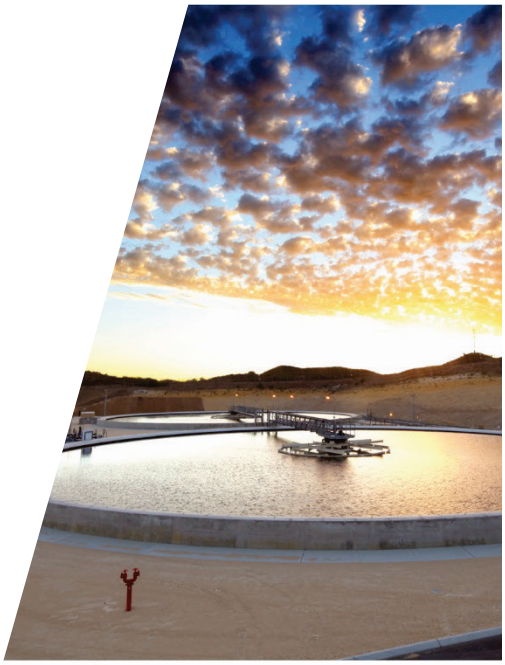


Closure and Upgrading Plan

Campbell River Waste Management Centre
Campbell River, BC

Comox Valley Regional District

Draft for Review

This document is in draft form. A final version of this document may differ from this draft. As such, the contents of this draft document shall not be relied upon. GHD disclaims any responsibility or liability arising from decisions made based on this draft document.

Table of Contents

Figure Index

Table Index

Table Index (following text)

Drawing Index

Appendix Index

1. Introduction

GHD was retained by Comox-Strathcona Waste Management (CSWM), a function of the Comox Valley Regional District (CVRD) and the Strathcona Regional District (SRD), to prepare the following Closure and Upgrading Plan for the Campbell River Waste Management Centre (CRWMC or Site).

The Site currently operates under Operational Certificate MR-02401, dated December 2, 2003 (OC) issued by the British Columbia Ministry of Environment and Climate Change (ENV), and last amended on May 19, 2020. The OC replaced the original permit issued in November 1973. A copy of the OC with the OC amendment letter are provided in Appendix A.

As indicated in the Landfill Criteria for Municipal Solid Waste (ENV, 2016) [Landfill Criteria], the ENV requires the submission of a Closure Plan two years prior to commencing closure or partial closure of a landfill cell. The landfill at the Site is forecasted to reach its airspace capacity in 2022. This report is being prepared as a combined Closure and Upgrading Plan. One of the amendments to the OC is the requirement for an Upgrading Plan for any non-conformances with the Landfill Criteria identified as part of the Landfill Criteria Conformance Review. This Closure and Upgrading Plan (Closure Plan) has been prepared in general accordance with the requirements of the Landfill Criteria.

1.1 Site Location

The CRWMC is located on Crown Lands within the city limits of Campbell River, British Columbia (BC) at 6700 Argonaut Road approximately 7.5 kilometres (km) west of the city centre. The Gold River Highway (Highway 28) is located to the north and west of the Site. McIvor Lake is located on the opposite side of Gold River Highway. The Site is bounded to the south and south east by Argonaut Road.

The southern portion of the Site was previously located on 3 property blocks including Block C, together with that part of Block A, and that part of Block K all part of District Lot 85, Sayward District. On January8, 2019, the three property blocks were combined into one property block. The current legal description for the southern half of the Site is Block M all, part of District Lot 85, Sayward District. The Licence of Occupation No. V934579 for Block M is provided in Appendix B.

The legal description of the northern portion of the Site is Block J, all part of District Lot 85, Sayward District. Lease No. 103555 for Block J is provided in Appendix B.

1.2 Regulatory Setting

The following provincial regulations are applicable to the design, operations, and monitoring of municipal solid waste landfills in BC and have been considered in the preparation of the Closure Plan:

- Environmental Management Act
- Comox Strathcona Waste Management - 2012 Solid Waste Management Plan, December 2012

- Second Edition Landfill Criteria For Municipal Solid Waste, June 2016 (hereinafter referred to as "Landfill Criteria")
- Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills, January 1996 (hereinafter called the "Environmental Monitoring Guidelines")
- Landfill Gas Management Regulation
- A Compendium of Working Water Quality Guidelines for British Columbia
- Contaminated Sites Regulation
- Hazardous Waste Regulation
- Groundwater Protection Regulation

2. Background

2.1 Site History

Prior to waste disposal operations at the Site, the Site operated as an aggregate extraction facility. According to CH2MHILL's 2009 closure plan, the Site was subsequently used as an unregulated dump site prior to the 1970s. Waste burning took place at the Site as well as disposal of liquid wastes (EBA, 2014). The City of Campbell River took over Site operations in the mid 1970s until ownership was transferred to the CVRD in 1999 (EBA, 2014). A private contractor, Berry and Vale, has operated the Site since 1996, and under contract with the CVRD since 1999.

The Site's entrance facility, material recovery area and the landfill are located on Block M. Block J is primarily used for extraction of sand and gravel for use as cover material for the landfill. The updated surface water management plan includes the establishment of a surface water management pond (SWM Pond) within Block J, which was constructed in 2018.

According to the CVRD and SRD's Solid Waste Management Plan (SWMP), the Site was projected to reach its capacity in early 2012. A transfer station was constructed in 2011 to divert certain incoming waste streams to the Comox Valley Waste Management Centre (CVWMC). In 2014, a mechanically stabilized earth wall (MSE wall) was constructed along the southeastern boundary of the limit of waste with the aim of addressing slope re-grading concerns and adding approximately five years of waste capacity. During the installation of the MSE wall, a portion of the lower slope along Argonaut Road was closed with final cover consisting of a low-permeability membrane and soil cover.

2.2 Site Physical Setting

The following subsections provide an overview of the physical setting of the Site. Figure 1 illustrates the topography and features within a 1 kilometre radius of the Site. Figure 2 illustrates the topography and drainage in the vicinity of the Site.

2.2.1 Topography and Drainage

Topography in the vicinity of the Site generally slopes downward to the east from McIvor Lake, (approximately 400 m to the west of the landfill footprint), flattening out approximately 500 m to the east of the Site. The Site is located on the north side of a local valley. The narrow valley floor slopes to the east/northeast following the course of Argonaut Road.

There are no natural watercourses on the Site. Site stormwater is conveyed in a network of Site ditches to the stormwater management pond (SWM Pond) located on Block J.

The closest natural surface water channel is located 400 m northeast of the Site and is one of several ephemeral tributaries of Cold Creek. Cold Creek discharges into the Quinsam River approximately 3 km northeast of the Site.

McIvor Lake, which is contiguous with Campbell Lake, is located approximately 400 m to the west of the Site with a lake elevation of approximately 175 metres above mean sea level (m AMSL) well above the inferred original ground surface elevation of the Site (140 m AMSL).

2.2.2 Geology

Overburden geology at the Site is relatively homogeneous and is primarily composed of deposits of fine to medium grained sand interbedded with deposits of medium subrounded gravel. Lenses of silt and fine grained sand up to four metres in thickness are present in an irregular distribution across the Site.

Decommissioned monitoring well EBA04-5 was the deepest boring within the Site boundaries with a depth of 67 metres below ground surface (m BGS). Bedrock was not encountered at monitoring well EBA04-5. Bedrock is also not encountered at private water supply wells, which are approximately 60 m deep and located approximately 3 km to the northeast to the Site. Bedrock is encountered at a depth of approximately 1.8 m BGS approximately 1.5 km to the southwest of the Site based on well stratigraphy log for private water supply well (well tag 98020) adjacent to McIvor Lake. The bedrock lithology was not indicated on the well log.

From review of bedrock geology maps of the area, it appears the Karmutsen formation is the bedrock unit in the vicinity of the Site. The Karmutsen formation is comprised of volcanic basalts and breccias.

2.2.3 Hydrogeology

The BC aquifer classification system lists Aquifer 975 to be evident over the extent of the Site. Aquifer 975 is classified as a sand and gravel aquifer of moderate productivity, high vulnerability, and low demand.

The Site is located on an unconfined aquifer primarily composed of sands and gravels. Groundwater within this aquifer flows to the east northeast across the Site and is generally encountered at depths ranging from 24 to 27 metres below ground surface (m bgs). From the mid-1990s to the early 2000s, an overall decrease in groundwater elevations within the sand and gravel aquifer by 2 to 4 m is apparent based on historical Site groundwater elevation measurements. The cause of this decrease in groundwater elevations is unknown, however, this change is not suspected to be related to the Site.

2.3 Zoning and Adjacent Land Use

Block M and J, as described in Section 2, are zoned as Industrial Four (I-4) under the City of Campbell River Bylaw No. 3250, 2006 (last amended November 4, 2019). Zoning of lands adjacent to the Site include Industrial Zone I-3, Rural One (RU-1), and Rural Two (RU-2). A Site Area Zoning map is provided as Figure 3.

The industrial land uses adjacent to the Site include concrete manufacturing and gravel extraction to the west and gravel extraction pit to the south. The industrial properties to the west include an auto scrap yard, two construction waste landfills, a small lumber mill, an asphalt plant and a salt storage shed and a scrap metal yard.

Forested Crown lands are present to the north, east, and southeast of the Site.

A residential dwelling is located on the RU-2 zoned property located immediately northeast of the Site, and approximately 430 m from the Landfill Footprint. A single residence is present west of the Site the east side of Gold River Highway. Several residential dwellings are located on Lakeshore Residential (LS-R) located to the west along McIvor Lake. The nearest residential dwelling in the LS-R properties is approximately 480 m from the Site and the Landfill Footprint.

2.4 Site Layout

Site layout is presented on Drawing C-01. The Site occupies approximately 29.7 hectares (ha) and includes two land blocks:

- Block M (10.72 ha on southern portion of the Site) –Site infrastructure located on Block M includes the landfill, perimeter containment berms and wall, access roads, surface water management piping and ditching, and the Site entrance facility. The Site entrance facility includes Site gate, weigh scales, Site offices, Berry and Vale's shop, waste drop-off building, material recovering area for recyclable materials, and a parking lot.
- Block J (18.97 ha on northern portion of the Site) – predominantly undeveloped forested land and the soil borrow pit, which is used to source granular fill for on-site uses. Block J is also the location of the SWM Pond. The surface water discharge from the Site is located at the eastern side of Block J approximately 300 metres (m) northeast of the corner of Block M. Block J provides the northern buffer zone for the landfill.

2.5 Estimated Site Life

The remaining airspace of the landfill is estimated by comparing the existing conditions with the proposed final contours for the landfill. Based on a November 5, 2019 topographic survey, the remaining airspace between the survey and final design top of waste contours is approximately 122,950 m^3. The corresponding intermediate cover over the landfill area will consume approximately 25,000 m^3, leaving approximately 97,900 m^3 of airspace available for landfilling. From November 5, 2019 to a June 8, 2020 survey, 26,750 m^3 of the airspace was consumed, leaving 71,150 m^3.

The average annual airspace consumption rate between 2016 and 2019 was 40,695 m^3/year, however the prorated annual consumption rate based on the June 2020 data suggests 45,860 m^3/year. To prolong the Site life, the CVRD has opted to transport walking floor trailers to the

CVWMC, located in Cumberland, BC, for the last 6 months of the landfill's life, which will result in a 30 percent waste diversion during this time frame.

Considering the remaining airspace, the airspace consumption rate, and planned partial waste diversion, approximately 1.7 to 1.85 years of Site life remains as of June 2020. As a result, the landfill is forecasted to reach its capacity during late winter or early spring of 2022. As required by the Landfill Criteria, this Closure Plan is being submitted to ENV as the Site is within two years to closure.

2.6 Planned Land Use

The Contaminated Sites Regulation (CSR) contains provisions that may apply during landfill closure. Municipal waste landfilling is a specific purpose/activity in Schedule 2 of the CSR that requires a site profile in accordance with Section 40 of the Environmental Management Act. The site profile will be completed at the time of closure, 10 days prior to the final deposit of waste.

At the time of final closure, the Site will be transitioned to a solid waste transfer station. The transfer station will be used for the collection of waste from Campbell River and surrounding communities, and transfer to the CVWMC. The remainder of the Site will be occupied by the closed landfill, access and maintenance roads, surface water management ditches and pond, environmental monitoring infrastructure, LFG collection and flaring infrastructure, and future compost facility. The Site, excluding the waste transfer station, will remain closed to the public for the post-closure period to protect public safety and prevent damage to Site infrastructure.

3. Closure and Upgrading Plan Overview

This Closure and Upgrading Plan includes the following components:

- Conceptual design of the final cover system and the schedule for the detailed design and construction of the final cover system
- Conceptual design of the LFG collection system and the schedule for the detailed design and construction of the LFG collection system
- Description of the post-closure and operations and maintenance activities

3.1 Conformance Review

In accordance with the OC, GHD on behalf of the CVRD, completed a Landfill Criteria Conformance Review, the results of which are provided as Appendix C.

The non-conformances identified are:

- The requirement for a hydrogeologic impact assessment in support of the Site closure plan
- The timing for the construction and commissioning of a LFG collection system
- The timing for the construction of a final cover system

A Landfill Criteria Upgrading Plan is required to address any non-conformances with the Landfill Criteria. This report is being prepared as a combined Closure and Upgrading Plan for

non-conforming Site works, which will be addressed through landfill closure. This includes the construction of the final cover system and LFG management system.

The Hydrogeologic Impact Assessment prepared in support of the landfill's closure is provided in Appendix D and forms part of this Closure and Upgrading Plan.

The schedule for implementing the Closure and Upgrading Plan is provided in Section 8.

4. Closure Design

The following sections provide an overview of the existing and design closure features of the landfill. The designs and plans presented in this Closure Plan represent a conceptual level design and will be developed to a final design level prior to construction.

4.1 Contours and Grading Plan

The final contours were developed to maximize available airspace and meet the requirements of the Landfill Criteria. The final contour plan for the Site is comprised of an approximate pyramidal shape with 3H:1V side slopes that will extend upwards from the existing lower slopes. The pyramidal shape will converge to a small top plateau graded to 1:20 slopes at an elevation of approximately 194 m AMSL. The area of the landfill that will receive final cover is 9.6 hectares. The final contours are presented on Drawing C-02.

The final contours include a haul road terraced on the slope running from the Site entrance area along the west and north side of the landfill to the top plateau to provide access to the top of the landfill for maintenance. A maintenance road and side slope swale will be cut into the north and east side slope of the landfill at elevations of approximately 168 to 172 m AMSL to provide access for maintenance.

All permanent roads will have a maximum grade of 15 percent and will be constructed with an adjacent surface water ditch to collect surface water runoff from the road.

4.2 Final Cover

The final cover system will be applied over 0.3 m of intermediate cover (native granular soil); a 0.15 m sand grading layer will be used in areas that have uneven grades or unsuitable soils. The final cover will consist of the following layers from top to bottom:

- 0.15 m of topsoil with suitable vegetation – to provide protection against erosion, prevent damage to the underlying layers, and promote evapotranspiration of precipitation.
- 0.45 m of protective cover soil – to provide a ballast layer, separation from the waste and protection against damage to the geomembrane barrier layer.
- Geocomposite drainage layer – to provide protection against damage to the LLDPE geomembrane and to promote surface water runoff. The drainage layer will prevent the build-up of pore pressure on the geomembrane to reduce the likelihood of leakage through the geomembrane barrier layer. The need for this layer will be evaluated during detailed design based on the final cover soil properties and slope stability analysis.

- 60 mil linear low-density polyethylene (LLDPE) geomembrane – to prevent infiltration of precipitation and control the release of landfill gas.
- 0.3 m intermediate cover – to provide a smooth, consistent, cushion layer above the waste for the installation of the geomembrane barrier layer.

The final cover system layers are presented on Drawing C-07. Topsoil will be 0.15 m thick and capable of supporting healthy vegetative growth. The protective cover soil will be on-Site and/or imported sand. All final cover layers will be selected during detailed design.

The final cover system was designed to minimize infiltration and corresponding leachate generation. A water balance model was used to predict the infiltration through the final cover system. The results forecast this final cover system to exceed the performance of the minimum final cover specified in the Landfill Criteria (i.e., 0.6 m of low-permeable soil).

The Hydrologic Evaluation of Landfill Performance (HELP) modelling completed to estimate the Site leachate generation and the performance of the proposed final cover, predicts that the installation of the final cover system will significantly reduce leachate generation to approximately 6.7 m^3 per year (as compared to the current 87,950 m^3 per year).

4.3 Existing Final Cover Tie-In

On the eastern side of the landfill, an MSE wall was constructed to buttress an existing steep landfill slope and provide additional airspace. The MSE wall consists of alternating layers of granular fill and geogrid or wire mat reinforcement. The external slope of the MSE wall consists of a vegetated wire facing units installed into the granular fill. The internal slope of the MSE wall is lined with a 60 mil LLDPE geomembrane with a 12 ounce non-woven geotextile installed for protection on both sides of the geomembrane. The geomembrane system acts as final cover for the lower portion of the slope adjacent to the MSE wall. The internal face of the MSE wall was backfilled against with a chimney drain consisting of crushed rock and granular fill.

A portion of the eastern side slope of the landfill surrounding the MSE wall received final cover during the installation of the MSE wall. The limit of existing final cover is shown on Drawing C-02 and the final cover tie-in is shown on Drawing C-07.

4.4 Surface Water Management

The surface water management strategy, consisting of mid-slope swales, ditches, and the stormwater management pond (SWM Pond), will be maintained at the Site during the post-closure period to manage and control surface water flows. In general, the surface water generated on the west, north, and upper portion of the landfill will be conveyed to the west and north toward the SWM Pond. The surface water generated on the lower portion of the east landfill slopes will be collected in the eastern perimeter ditch and conveyed to the north along Argonaut Road. The east and west perimeter ditches join together and discharge to the SWM Pond in Block J. Vegetation will be maintained on the landfill surface to control erosion and promote evapotranspiration, and in the channels to ensure channels maintain their design capacity. The hydrologic assessment was completed by developing a hydrologic model of the Site to estimate the runoff volume and discharge rate generated for the post-development condition. The location of the surface water ditches is shown on Drawing C-03.

The SWM Pond, including a lined forebay with a permanent pool for energy dissipation during storm events followed by an unlined main pond area, was constructed in 2018. The SWM Pond allows for infiltration during smaller storm events, and controlled discharge through the pond outlet under the 1:100 year, 24-hour storm event.

The surface water management on-Site at the time of closure will include the following infrastructure components:

- Haul road swale
- Mid-slope swale
- Northern Perimeter ditch
- Southern Perimeter ditch
- Surface conveyance water pipe
- SWM Pond
- Outlet Pipe and Channel

The proposed surface water management works are shown on the Drawings.

4.5 Landfill Gas Collection System

A landfill gas generation assessment was completed as part of the LFG design plan, submitted to the ENV as an attachment to the 2017 DOCP in March 2018. The LFG generation assessment was updated in spring 2019 as requested by ENV, and has been updated further for this Closure Plan (Table 1). The LFG Design Plan is provided in Appendix E. The LFG Design Plan will be updated as part of detailed design and implemented upon the closure of the landfill. The following list presents the planned LFG infrastructure:

- Vertical LFG collection wells and buried pipe network
- Enclosed flare
- LFG instrumentation (methane and oxygen sensors, flow meter)
- Condensate management
- Programmable logic controller (PLC) and data logger

Collection of operational data of the LFG collection system will also be conducted throughout the operation of the system. The LFG system infrastructure will be constructed as part of the final cover works for the landfill.

5. Geotechnical Assessment

5.1 Slope Stability

Slope stability of the landfill was previously assessed in the Site Design, Operations, and Closure Plan (DOCP) (GHD, 2017) for a worst-case scenario cross section. The slope stability analysis

resulted in a factor of safety (FS) of 2.49 for static conditions (compared to a target FS of 1.5) and a FS of 1.65 for the pseudo-static conditions (compared to a target FS of 1.1). The calculated FSs indicate the slopes are acceptable for design.

5.2 Veneer Cover Stability

Veneer cover stability analysis was also completed in the DOCP (GHD, 2017), which demonstrated that the targeted factors of safety for static conditions were achieved (FS of 1.51). This analysis will be reevaluated during the final cover detailed design with properties from actual materials that will be used in the final design. Interface shear tests will be performed with the actual materials of construction to confirm the preliminary veneer slope stability evaluation summarized above.

5.3 Differential Settlement

The native material below the landfill consists primarily of granular materials and, therefore, settlements within this layer can be assumed to have occurred practically as soon as loading was complete (elastic settlement). It may, therefore, be assumed that the compression (settlement) of the natural granular deposits is complete.

The waste part of a landfill consolidates/settles under self-weight due to the following reasons[1]:

- Mechanical - distortion, bending, crushing, and reorientation
- Smaller sized particles/pieces moving into larger voids
- Physical-Chemical Change – corrosion, oxidation and combustion
- Bio-chemical decomposition through aerobic and anaerobic processes

Due to varying thicknesses of the waste mass and variability in the waste composition, the magnitude of settlement can be non-uniform, and can result in differential settlement. The synthetic liner systems can stretch to relatively high strain values, typically up to 13 percent before tensile yielding occurs.

The primary settlement of a landfill is mainly due to mechanical reasons and fines moving into larger voids, and is typically completed within a few months or years of a closure of a landfill. Secondary settlement is due to physical-chemical changes and decomposition of the organic matter and continues over many years after the landfill closure. Organics such as vegetables, fruits, paper and clothing products take a few months to a few years, generally less than 5 years to decompose. Materials such as leather, tin cans, styrofoam and plastics may take 50 to more than 500 years to biodegrade. The major component of the secondary settlement occurs within the first few years and ranges from 5 to 30 percent of the original waste thickness.

External loads imposed by a development accelerate and increase the magnitude of settlement. Therefore, before a structure is built on a landfill, magnitude and time-rate of settlement must be

[1] Edil, T. B., Ranguette, V. J.; and Wuellner, W. W. (1990). “Settlement of Municipal Refuse” Geotechniques of Waste Fills – Theory and Practice STP1070, Landva and Knowels, eds., ASTM, West Conshohocken, PA., 225 – 239.

estimated. The settlement estimates can be made based on experience, settlement observations, and numerical modeling.

Landfilling began in 1973 and was built to elevation ±174 m in October 2018, and at present is at an elevation of ±185 m, an increase in height of 9 m in 3 years. The final landfill closure elevation will be approximately 194 m, an increase of 20 m in height from the 2018 elevation at the crest of the landfill. Assuming that the waste consolidation before 2018 is complete, the maximum landfill settlement at its crest can be estimated as 4 m (0.2 x 20 m), assuming a median settlement of 20%. The settlement at the landfill edges can be estimated as 2.8 m (0.2 x 14 m), which means that a differential settlement of 1.2 m could occur between the crest and edges of landfill. The strain on the final cover system geomembrane as a result of this differential settlement is less than the material's 13 percent tensile yield value.

6. Contaminating Lifespan

The post-closure period, during which the post-closure operations, maintenance, and monitoring will be required, is based on the contaminating lifespan (CLS) of the landfill. The CLS is the period of time after final closure of the landfill that is required for leachate parameters from the landfill to sufficiently decay such that the quality of the leachate meets the applicable BC CSR water quality standards. At the end of the CLS, the leachate no longer poses an environmental risk to the receiving environment.

The CLS estimate for the Site was updated by updating the leachate quality inputs into the calculations. The previous CLS estimate was provided in the 2017 DOCP used leachate quality data from landfill sites of a similar size and climatic setting. The updated CLS estimate completed as part of the Hydrogeologic Impact Assessment, uses modelled Site specific leachate quality estimates based on the background groundwater conditions and groundwater quality at the limit of waste at the Site.

Using the new input values, the updated CLS estimates for the Site are as follows:

- Mean estimate of 18 to 56 years
- Maximum estimate of 33 to 66 years

Section 7.4 of the Landfill Criteria indicates the estimated CLS of a landfill site must be at least 30 years, therefore, the 18 year estimate should not be used for future planning for the Site. From the updated CLS estimate for the Site, the maximum estimated CLS for the Site is 66 years. This is equal to the previous CLS estimate for the Site provided in the 2017 DOCP.

A detailed description of the updated CLS estimate is included in the Hydrogeologic Impact Assessment provided in Appendix D.

7. Post-Closure Operations and Maintenance

7.1 Reporting and Record Keeping Requirements

The OC requires that an updated DOCP be submitted to the ENV before January 1, 2022. As the Site is expected to reach capacity shortly after this date in spring 2022, the current DOCP (GHD, 2017) will be in place for the remainder of the Site life.

The post-closure period is defined by the Landfill Criteria as the period of time from installation of final cover over the entire landfill to the end of the contaminating lifespan. The CLS for the Site was estimated in Section 6 to be 66 years. This Closure Plan documents the post-closure operation and maintenance, as well as the post-closure environmental monitoring program, to be carried out throughout the contaminating lifespan of the landfill.

Annual Operations and Monitoring Reports will continue to be submitted throughout the post-closure period to document post-closure operations, monitoring events and results, and maintenance activities.

All relevant records as required by the Landfill Criteria, including for at least the last 7 years, will be maintained by the Site owner for the duration of the post-closure operations and monitoring period. The records will be available either on Site if practical, or at the Site owner's office for inspection and must be submitted to the Director within 14 days of a request from the ENV.

7.2 Site Infrastructure

Site access roads will be maintained post-closure to provide safe access to on-Site facilities and for conducting inspection and maintenance of landfill infrastructure. Site access roads will be inspected annually and repaired as required to ensure safe access for operational vehicles and emergency egress.

Site fencing will be maintained and/or replaced to prevent unauthorized entry to the Site and potential damage to Site infrastructure. Upon closure, the bear fence that extends around the perimeter of the landfill will be decommissioned and replaced with a suitable fence to prevent public entry. Fenced areas will include, at a minimum, the landfill, the LFG flare and associated above ground infrastructure, and the SWM Pond.

Argonaut Road is considered to be a fire break for the Site to the south and east. The other adjacent areas around the landfill are not of concern, considering the lack of vegetation in proximity to the landfill footprint.

7.3 Final Cover Inspections and Maintenance

The final cover will be inspected and vegetation will be managed (cut, removed or restored) as required to prevent damage via the growth of deep rooting plants and to facilitate annual inspections. Inspection should include identification of any exposed areas of geocomposite drain or LLDPE, to ensure that no significant damage has occurred due to plant growth, sloughing of the cover, or significant settlement. Damage observed will be noted and repaired as soon as practical.

7.4 Surface Water Management Works

Surface water management infrastructure will be inspected annually and damage will be noted and repaired as required. The surface water management works include ditches, swales, culverts, pipes, and the SWM Pond.

The SWM Pond will require post-closure maintenance to ensure adequate level of sediment removal and design infiltration rates are achieved. Outfalls and inlet structures should be inspected and repaired as necessary. Vegetation on banks should be cut as required to maintain design capacity and safe access. The forebays and ponds should be inspected annually to estimate the level of sediment accumulation, and sediment should be excavated from the base every five years or more frequently as needed to maintain design capacity.

Landfill ditches will require maintenance of vegetation to ensure that their design capacities are maintained and erosion, if any, is corrected. Vegetation in ditching should be cut at the minimum frequency noted above, or more frequently, if needed.

Drainage channels will also be inspected for damage caused by settlement, sloughing, or erosion. Ditch channels, liners, culvert inlets and outlets and culverts will be inspected to ensure that design flows and capacities are maintained. Damage will be noted and repaired as soon as practical.

7.5 Leachate Management

The primary objectives of the leachate management plan is to firstly minimize leachate generation, carry out comprehensive environmental monitoring of the attenuation processes occurring at and in the vicinity of the Site, and to reduce the potential for leachate related impacts to occur at the receiving environment.

The final cover installation will substantially minimize leachate generation, and will be inspected and maintained throughout the post-closure period. Further assessment of the post-closure attenuation of the leachate at the Site is examined in the Hydrogeologic Impact Assessment Report provided in Appendix D.

Ongoing monitoring of the surface water run-off and the groundwater quality within overburden aquifer beneath and downgradient of the Site will be used to ensure that groundwater quality at the Site is improving and the Site is meeting the leachate management plan objectives throughout the post-closure period. If changes in the groundwater quality do not meet the objectives, a corrective action plan will be implemented.

Currently, a small portion of leachate is collected at the Site in the vicinity of the MSE wall. A toe drain at the MSE wall collects leachate from the waste placed behind the MSE wall and also surface water, which percolates through the chimney drain inside the MSE wall during storm events. Leachate/surface water collected in MSE wall toe drain is directed to a sump located to the north of the MSE wall. The sump is a 1.2 m diameter HDPE pipe equipped with a liquid level sight gauge, and a hinged lid for removal of collected leachate.

Post-closure the MSE wall toe drain and sump will continue to collect leachate. A water level logger will be installed in the sump to signal the post-closure operator to empty the sump. When the post-closure operator is signaled to empty the sump, the leachate/surface water will be removed by pump

truck as required. Leachate/surface water removed from the sump will be transferred to the CVWMC leachate treatment facility, or another licensed facility, for treatment.

7.6 Landfill Gas Collection System Maintenance

The operation of a LFG collection system generally will meet the following performance standards from the Landfill Gas Management Facilities Design Guidance:

- Oxygen content should not exceed 2 percent by volume and nitrogen should not exceed 15 percent by volume at a LFG extraction well. Generally oxygen and nitrogen are below both concentrations for active LFG extraction wells at landfill sites.
- Methane content, oxygen content, carbon dioxide content, nitrogen content, and vacuum and valve position must be measured and recorded at all monitoring ports at all wells at least on a monthly basis. Monitoring of carbon monoxide and temperature will also be considered when developing the operation and maintenance plan.
- If the LFG analyzer detects high oxygen concentrations (greater than 2 percent by volume), a round of field monitoring and balancing must be initiated as soon as practically possible.

An operation and maintenance plan should be developed as part of the installation of the LFG management facility.

General maintenance will include the following:

- Weekly operations checks
- Monthly well balancing
- Monthly blower/flare station inspection
- Quarterly flow meter and LFG analyzer check
- Annual well head assembly inspection
- Annual blower/flare station inspection
- Annual blower/motor alignment check
- Annual flow meter and LFG analyzer maintenance and calibration

The LFG management system including collection infrastructure and flare will operate after closure. The operational life of the LFG management infrastructure will be determined based on reduction in methane generation rates, once operational data indicates that methane concentrations are reduced to a level which warrants the cessation of the flare operation (less than 500 tonnes of methane generated per year, according to the BC Landfill Gas Management Regulation). The LFG generation assessment has been updated (Table 1) to extend until less than 500 tonnes of methane is expected, which has been estimated at 2035. Operation of the LFG management system past this time would be considered voluntary. Post-closure period operation of LFG infrastructure will include operation, maintenance and repair (as needed).

Visual observation of the sub-surface migration of LFG is possible through identification of areas impacted by vegetative stress. Vegetative stress occurs due to the displacement of oxygen in the soil and the resultant oxygen deprivation of the plant roots. Deterioration of vegetation on or near

landfills may be both an aesthetic and a practical issue. In areas where vegetative cover is diminished, erosion of the cover may occur. This may result in a "cascade" effect resulting in increased LFG emissions.

7.7 Emergency Response Plan

An Emergency Response Plan has been developed for the Site in accordance with the BC Occupational Health and Safety Regulation 296/97 Part 4, s.4.13 (Emergency Preparedness and Response) and Part 5, s.5.97 (Emergency Procedures), as well as the BC Fire Code.

A copy of the Emergency Response Plan is provided in Appendix G. This plan must be reviewed and updated annually to ensure that it reflects current Site conditions and that all foreseeable emergency conditions are addressed. The results of the annual review will be included in the annual Operations and Monitoring report.

7.8 Environmental Monitoring

The purpose of the EMP is to monitor the quality of leachate, groundwater and surface water, and to monitor for the presence of LFG at, and in the vicinity of the Site. The EMP will detect actual and/or potential landfill-derived impacts to the receiving environment, if occurring. The post-closure environmental monitoring program for the Site will include the following:

- Hydraulic monitoring of groundwater levels
- Sampling and chemical analysis of surface water, groundwater, leachate and LFG
- General site inspections for settlement, erosion, and vegetative stress

The post-closure monitoring program will continue for the duration of the post-closure period. As the Site conditions relative to the quantity and quality of surface water and groundwater stabilize and become predictable under post-closure conditions, amendments to the environmental monitoring program may be warranted. Any proposed amendments to the long-term environmental monitoring program will be submitted to the Director for review and approval prior to implementation.

7.8.1 Water Quality and Landfill Gas Monitoring Criteria

Groundwater

Groundwater quality at the Site, as requested by the Director, is compared to the BC CSR generic numerical water quality standards (including amendments up to B.C. Reg. 253/2016, November 1, 2017). The following BC CSR water quality standards are applied to the Site as per Protocol 21 for Contaminated Sites – Water Use Determination (MOE, 2017):

- Schedule 3.2 Column 3 Aquatic Life, Freshwater
- Schedule 3.2 Column 6 Drinking Water

Surface Water

Surface water run-off that is infiltrated (i.e., water in the SWM Pond), is compared to the BC CSR generic numerical water quality standards. The following BC CSR water quality standards are

applied to the Site as per the OC and Protocol 21 for Contaminated Sites – Water Use Determination (MOE, 2017):

- Schedule 3.2 Column 3 Aquatic Life, Freshwater
- Schedule 3.2 Column 6 Drinking Water

Surface water samples collected from SW-1 and SW03-17, which are both located on natural watercourses is compared to the BC Approved Water Quality Guidelines (ENV, 2019) and the BC Working Water Quality Guidelines (MOE, 2017) . The Drinking Water guidelines and Freshwater Aquatic Life guidelines are applied to surface water quality at these locations.

Surface water locations that are added to the Site's EMP will be evaluated on a case-by-case basis if the BC CSR standards or BC WQGs should be applied. Consideration of the location (e.g. on site or off site) and nature (e.g. natural watercourse or infiltration dich) of the surface water sampling location will determine which water quality criteria is most appropriate.

Landfill Gas

LFG monitoring results will be compared to the criteria summarized in the table below. The applicable criteria is dependent on the type and location of the LFG monitoring location.

Table 7.1 LFG Monitoring Criteria

LFG Monitoring Location Type	Criteria(1)
LFG Probe	Methane – 5 percent by volume
LFG Extraction Well	Oxygen – 2.5 percent by volume Nitrogen – 15 percent by volume
LFG monitor inside a building	Methane – 10 percent of the lower explosive limit (LEL) (0.5% by volume).
(1) Source: Landfill Gas Management Facilities Design Guidelines (BC MOE, 2010)	

7.8.2 Groundwater Monitoring Program

The post-closure groundwater monitoring program consists of both hydraulic monitoring (water levels) and groundwater sampling for field and laboratory analysis. The groundwater monitoring program includes 14 monitoring wells on-Site and 11 monitoring wells off-Site. The wells are classified as background (upgradient), Landfill wells, and downgradient, as well as deep overburden or shallow overburden. The groundwater monitoring wells locations are shown in Figure 4, and include the following wells:

- Background wells: AM02-01, MW01-16
- Landfill wells, located within the Landfill Footprint or very close to the Site property line.
  - Shallow overburden: EBA04-7, HBT94-1, HBT94-3
  - Deep overburden: EBA04-1, EBA04-6, HBT94-2

- Downgradient wells located east of the Landfill Footprint:
  - Northeast downgradient shallow overburden: AG99-06, EBA11-1, EBA11-2, EBA11-3, EBA11-4, GLL93-4
  - Northeast downgradient deep overburden: MW04-19, MW08
  - Southeast downgradient shallow overburden: MW02-18, MW03-18, HBT94-5
  - Southeast downgradient deep overburden: AG99-01, AG99-02, AG99-04, AG99-05, MW06, MW07

The post-closure groundwater monitoring program for the Site will be reduced compared to the groundwater monitoring program completed during active landfilling. Initially, groundwater sampling will continue on a quarterly basis, but a reduced parameter list consisting of leachate indicator parameters will be analyzed for the second, third, and fourth quarters. Groundwater samples will be collected analyzed for a full suite of parameters during the first quarter including general chemistry parameters, nutrients, and dissolved metals.

Appendix F provides the proposed initial post-closure water quality monitoring program summary for groundwater at the Site.

Monitoring wells MW06, MW07, and MW08 will be installed prior to closure of the landfill. The locations of the additional monitoring wells are indicated on Figure 4. The rationale for the location for each well is summarized in Table 7.2, below.

Table 7.2 Proposed Groundwater Monitoring Locations Summary

Groundwater Monitoring Location	Estimated Screen Depth (mBGS)	Rationale
MW06	22 – 27	To provide shallow groundwater quality data downgradient of the southeastern boundary of the limit of waste. This location will be screened in the shallow portion of the overburden aquifer nested with AG99-02. AG99-02 is screened approximately 25 metres below the top of the water table. MW06 is scheduled for installation in 2020/2021.
MW07	20 – 25	To provide shallow groundwater quality data downgradient of the southeastern boundary of the limit of waste. This location will be screened in the shallow portion of the overburden aquifer nested with AG99-04. AG99-04 is screened approximately 25 metres below the top of the water table. MW07 is scheduled for installation in 2020/2021. MW03/AG99-05, MW06/AG99-02, and MW07/AG99-04 will provide well nests that are oriented in a line that runs parallel to and downgradient of the Site's southeastern property boundary.

Groundwater Monitoring Location	Estimated Screen Depth (mBGS)	Rationale
MW08	35 – 40	Provide deep groundwater quality data downgradient of nested wells EBA04-6/EBA04-7, The current groundwater monitoring program may not adequately monitor the deeper portion of the overburden aquifer northeast of the Site. MW08 is scheduled for installation in 2020/2021.

The results of the groundwater monitoring program will be reviewed and documented each year in the annual monitoring reports. As the post-closure period progresses, the groundwater monitoring program will be further reduced, primarily based on groundwater quality observations at the HBT94-1/2/3 well series and a trigger level assessment monitoring program may be proposed.

7.8.3 Surface Water Monitoring Program

Surface water monitoring locations are located on Site or downstream from the Site as shown in Figure 4. The proposed post-closure surface water monitoring program includes sampling of three surface water monitoring locations as follows:

- SW-1 is located on an ephemeral tributary of Cold Creek.
- SW03-17 is located on an unnamed pond located upstream of SW-1. SW03-17 was added to the Site's surface water monitoring program in 2017, as recommended in the 2016 Annual Operations and Monitoring Report to provide additional surface water quality data as SW-1 and SW-2 are often dry in the summer months.
- SWM Pond located on Block J in the Site.

The post-closure surface water monitoring program for the Site will be reduced compared to the surface water monitoring program completed during active landfilling. Initially, surface water sampling will continue on a quarterly basis, but a reduced parameter list consisting of leachate indicator parameters will be analyzed for the second, third, and fourth quarter. In the first quarter, surface water samples collected will be analyzed for various general chemistry parameters, nutrients, and total and dissolved metals. Appendix F provides a water quality monitoring program summary for surface water at the Site.

The results of the surface water monitoring program will be reviewed and documented each year in the annual monitoring reports. As the post-closure period progresses, the surface water monitoring program will be further reduced and a trigger level assessment monitoring program will be proposed.

7.8.4 Leachate Monitoring Program

The Landfill was developed as a natural attenuation landfill; therefore, leachate sample collection is not possible at this time, as no leachate collection system is in place at the Site. In addition, no leachate wells currently exist at the Site.

Thirty-one LFG extraction wells will be installed within landfill footprint upon Site closure. It is likely some of the LFG extraction wells will intersect leachate within the landfill. It is proposed to include one of the LFG extraction wells for leachate sampling in order to characterize the leachate within the

landfill. The specific LFG extraction well to include in the Site's EMP will be determined upon installation of the LFG extraction wells. The monitoring parameters for the leachate samples will be a reduced parameter list of leachate indicators during three out of four quarters and a comprehensive list of parameters during the remaining quarter as detailed in Appendix F.

7.8.5 Landfill Gas Monitoring Program

The LFG monitoring locations for the Site include LFG extraction wells, subsurface LFG probes, and onsite buildings. The location of the LFG probes and onsite buildings are indicated on Figure 4. The LFG monitoring locations are as follows:

- Sixteen LFG probes
- Thirty one LFG extraction wells
- Three on site buildings: scale house, office trailer, lunchroom trailer

The LFG probes will be monitored on a quarterly basis using a GEM 5000 for percent volume measurements of methane, oxygen, carbon monoxide, and balance gases. Water level measurements will be collected using a water level meter and pressure measurements will be collected using a digital manometer.

The LFG extraction wells will be monitored on a monthly basis using a GEM 5000 for percent volume measurements of methane, oxygen, carbon dioxide, and balance gases.

Each on site building will be equipped with a gas monitor capable of continuous gas monitoring for methane.

7.9 Contingency Measures

As defined by the Landfill Criteria, contingency measures are practical and implementable measures that may be implemented in the event of a failure or non-compliance with the Site's performance criteria.

The following describes the contingency plan process which could be implemented to deal with any future conditions such as unacceptable water quality impacts leaving the Site via surface water or groundwater flow, or high levels of LFG in the soil surrounding the landfill. Detailed assessment would be required to determine if and when such measures may be required. Detailed design of any systems would be required prior to implementation.

In general, the contingency response and implementation would follow the four steps below:

- Step 1 – Verification | Verify that trigger criteria have been exceeded through appropriate resampling and/or further evaluation.
- Step 2 – Assessment | Evaluate the likely source of the problem, including completion of additional monitoring or investigating required to complete the evaluation. Examine the potential impacts and evaluate trends. If further actions are required, proceed to Step 3.
- Step 3 – Evaluation | Review any pre-determined contingency measures and any other potential solutions. Carry out any further investigative/desk tasks necessary to evaluate alternative solutions and to develop the selected contingency measure. Proceed to Step 4.

- Step 4 – Implementation | Notify the ENV of the need to implement the contingency plan. Prepare detailed plans, specifications, and descriptions for the implementation, operation, and maintenance of the plan. Review with the ENV and obtain any prerequisite approval. Implement the contingency plan.

While going through the above process, if it is determined that no further action is warranted, the routine monitoring program will be re-implemented and re-evaluation of the triggering parameters and levels will be undertaken.

The exact implementation program that is developed and put into place is dependent upon the specific situation that is to be addressed. The general contingency action approach presented above provides a framework for determining the need for further actions and provides a method to investigate and develop actions that are appropriate to the situation.

The following list presents potential conditions and associated potential contingency measures that could be implemented at the Site.

- Increasing groundwater impacts surrounding the landfill
  - Increase extent and frequency of groundwater monitoring
  - Acquire access to the downgradient land(s) to increase the attenuation and landfill buffer zones within the Site
  - Extraction of impacted groundwater
- Leachate derived impacts are identified in off-site surface water:
  - Increase extent and frequency of surface water monitoring
  - Review surface water management at the landfill to prevent the release of leachate impacted water to the surface water management system and increase surface water controls
- LFG impacts are detected at levels higher than 10 percent of the lower explosive limit in on-site buildings, or higher than 50 percent of the lower explosive limit at the Site boundary:
  - Increase extent and frequency of LFG monitoring
  - Install LFG migration vents and/or barriers for on-Site structures
  - Install additional LFG collection infrastructure

The applicability of each contingency measure listed above to the potential Site-specific condition would be assessed at the time that the potential condition is identified.

8. Closure Schedule

The following table presents the schedule of closure-related activities planned prior to and following closure.

Table 8.1 Closure Schedule

Description	Type of Activity	Timeline
Detailed Design of Final Cover and LFG Collection and Management System	Design	2020–2021
CSR Site Profile	Report	10 days prior to reaching capacity
Final Waste Placement	Operations	Spring 2022
Final Cover Placement and LFG Collection System Installation	Construction	Summer/Fall 2022
LFG Management System (i.e., flare) Installation	Construction	Summer/Fall 2022
LFG Collection and Management System Commissioning	Commissioning	Fall/Winter 2022
Post-Closure Period Operations, Monitoring, and Maintenance	Operations	Fall/Winter 2022 until 2088

9. Summary

This Closure Plan has been prepared in anticipated of the Site reaching capacity in the spring of 2022, at which time the CVRD will initiate landfill closure works. This report also includes the Site's Upgrading Plan, resulting from the Landfill Criteria Conformance Review. All non-conformities have been addressed, with the exception of the construction works (i.e., final cover and LFG management facility) that will be constructed in 2022.

The Closure Plan includes the operations, maintenance, and monitoring that will take place throughout the Site's contaminating lifespan (estimated at 66 years), as well as the post-closure environmental monitoring program.

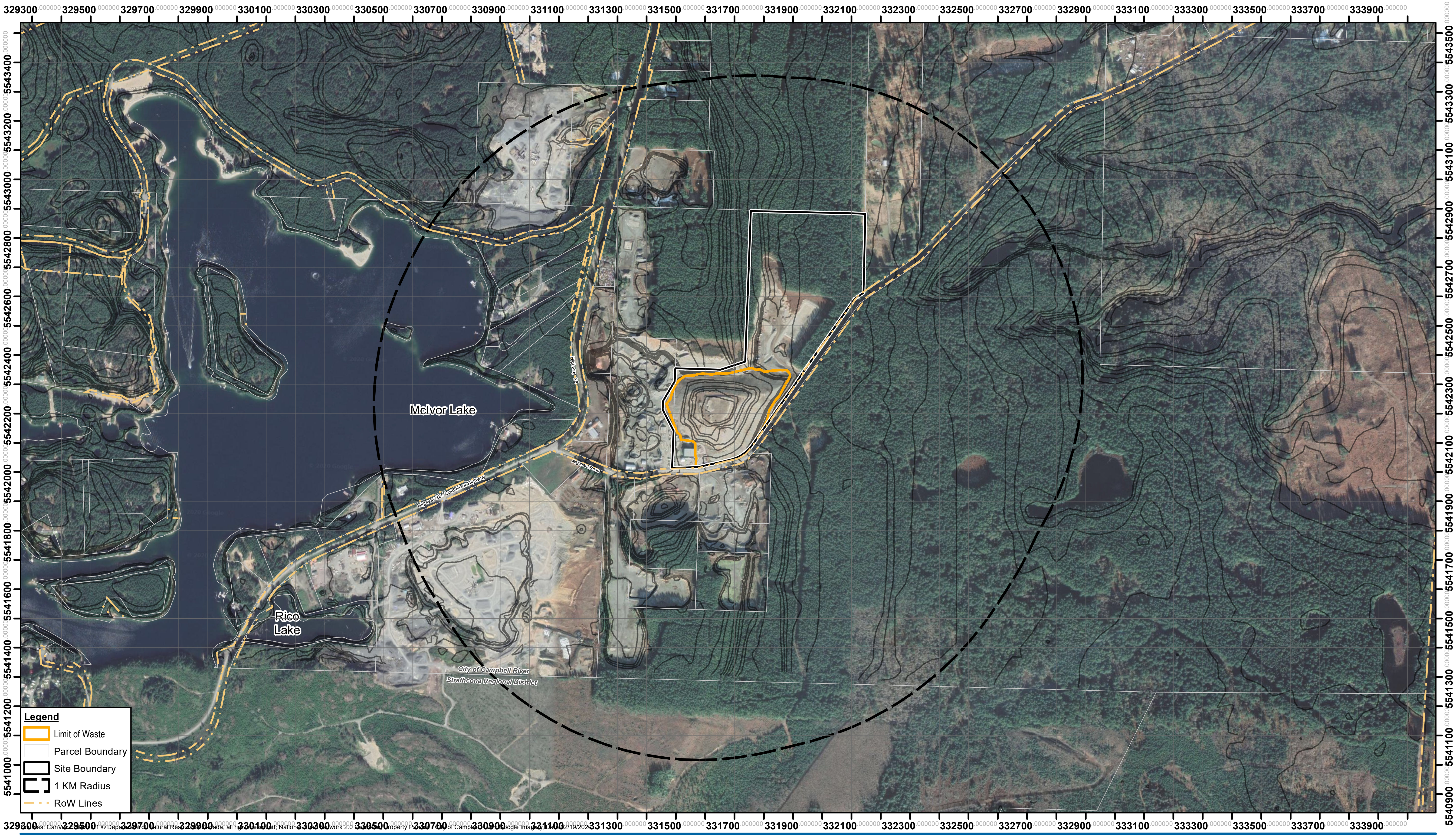
All of Which is Respectfully Submitted,

GHD

Shannon Kemp, P.Eng.

Michaela Dyck, P.Geo.

Deacon Liddy, P.Eng., MBA



CLOSURE/UPGRADING PLAN
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
COMOX VALLEY REGIONAL DISTRICT

SITE PLAN

11211013
Jun 26, 2020

FIGURE 1

GIS File: Q:\GIS\PROJECTS\11211000s\11211013\Layouts\202006_RPT-1\11211013_202006_RPT-1_GIS001.mxd

Sources: CanVec Edition 1.1 © Department of Natural Resources Canada, all rights reserved; National Road Network 2.0 GeoBase; Property Parcels - City of Campbel River; Google Imagery, Date 02/19/2020

0 125 250 375
Meters

Coordinate System:
NAD 1983 UTM Zone 10N

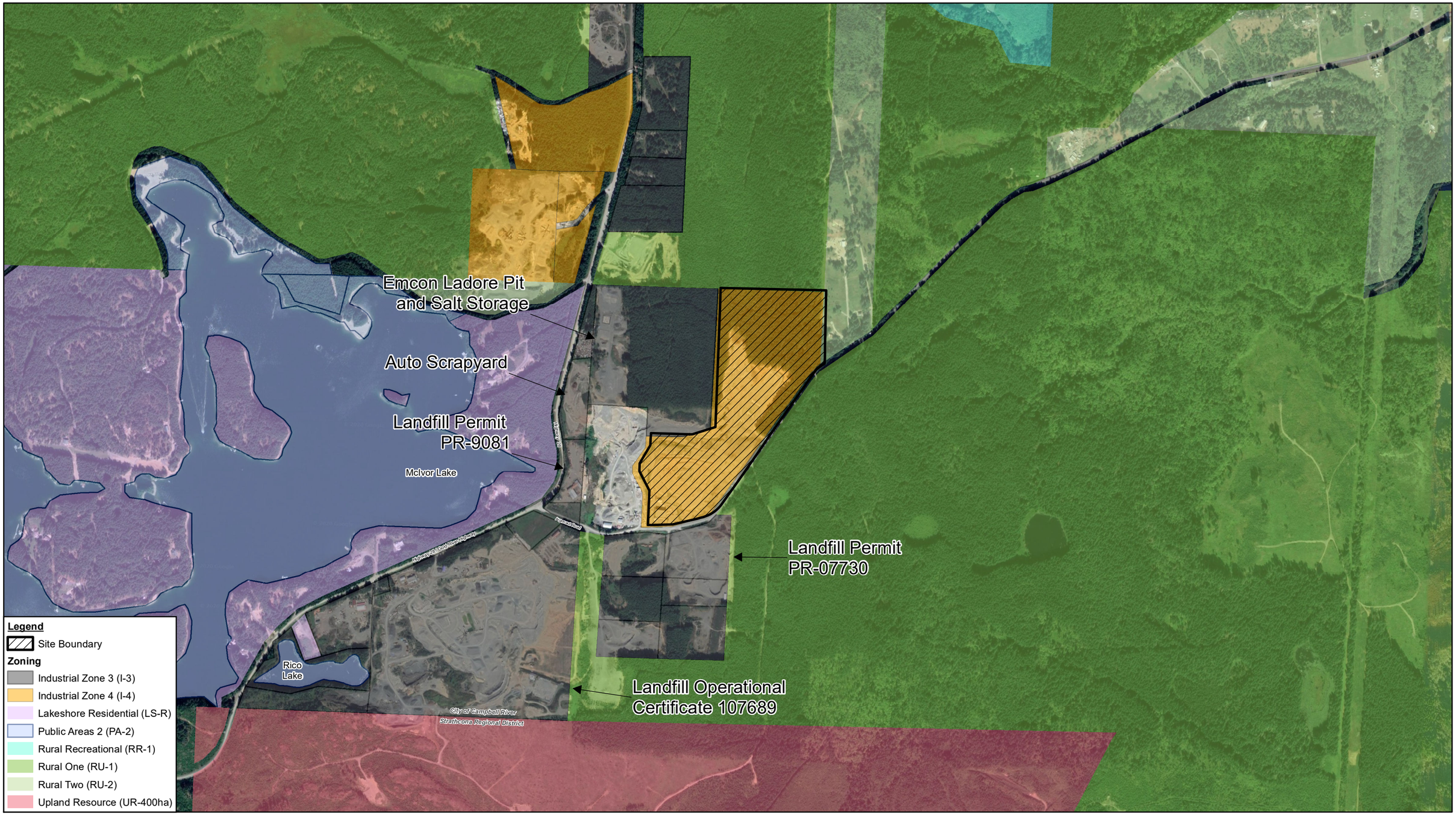
CLOSURE/UPGRADING PLAN
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
COMOX VALLEY REGIONAL DISTRICT

11211013
Jun 17, 2020

TOPOGRAPHY AND DRAINAGE

FIGURE 2

GIS File: Q:\GIS\PROJECTS\11211000s\11211013\Layouts\202006_RPT-1\11211013_202006_RPT-1_GIS002.mxd



Sources: CanVec Edition 1.1 © Department of Natural Resources Canada, all rights reserved; National Road Network 2.0 GeoBase; Property Parcels - City of Campbel River; Google Imagery, Date 11/24/2019

0 125 250 375
Meters

Coordinate System:
NAD 1983 UTM Zone 10N

N

GHD

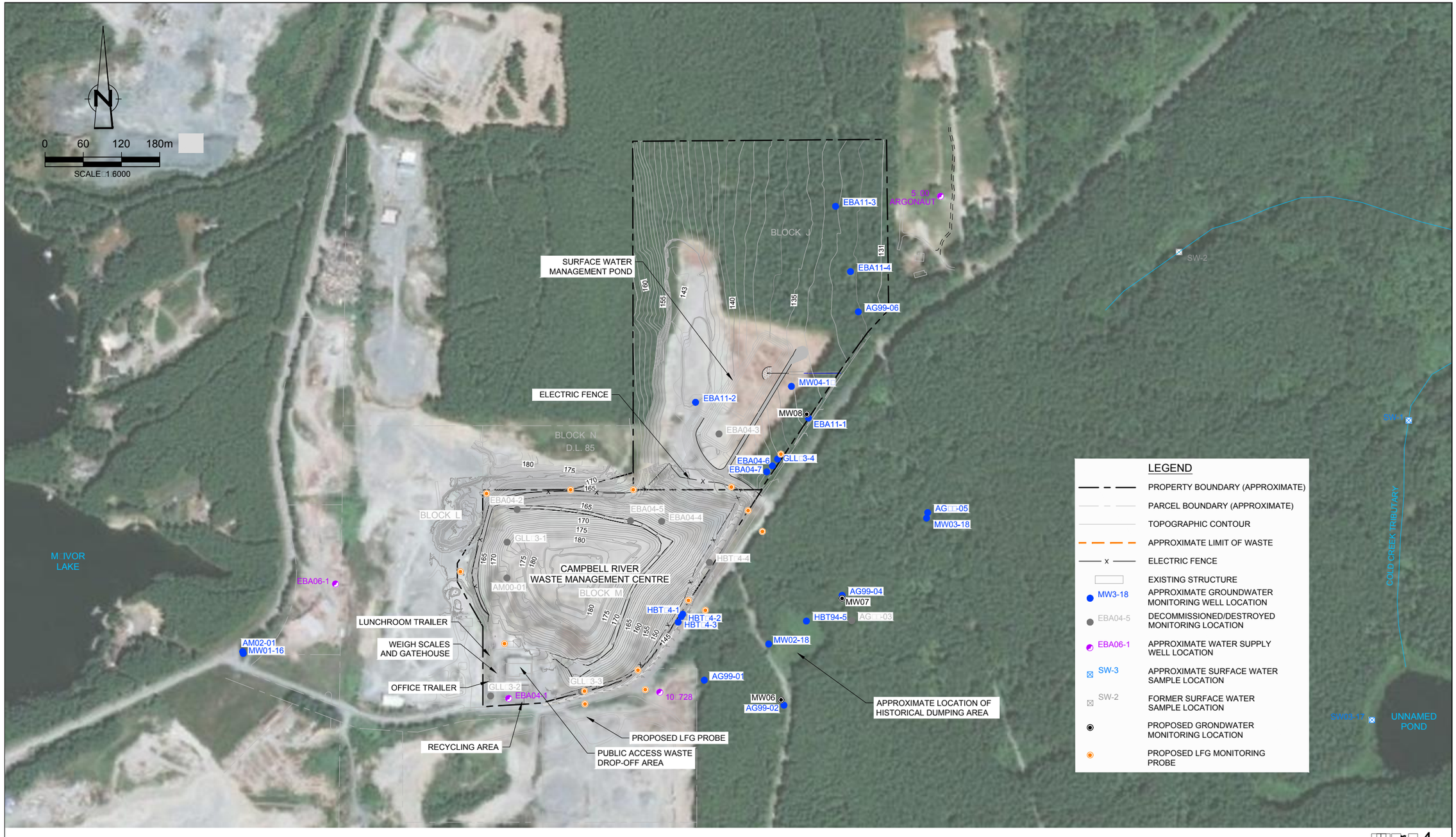
CLOSURE/UPGRADING PLAN
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
COMOX VALLEY REGIONAL DISTRICT

11211013
Jun 17, 2020

ZONING AND SURROUNDING LAND USE

FIGURE 3

GIS File: Q:\GIS\PROJECTS\11211000s\11211013\Layouts\202006_RPT-1\11211013_202006_RPT-1_GIS003.mxd



r 4

NOTE: M IVOR LAKE AND COLD CREEK TRIBUTARY LOCATIONS ARE APPROXIMATE.

SOURCE: TOPOGRAPHICAL INFORMATION BASED SURVEY BY M ELHANNEY ASSOCIATES DATED NOVEMBER 5, 201.
WELL LOCATIONS BASED ON SURVEY DATA PROVIDED BY TETRA TECH EBA.
LIMIT OF WASTE FROM SCS ENGINEERS, PHASE I CLOSURE PLAN, JUNE 6, 2013.

MONITORING LOCATIONS
CLOSURE/UPGRADING PLAN
CAMPBELL RIVER WASTE MANAGEMENT CENTRE
Comox Strathcona Waste Management

N CA V o r Pro 663 11212013 D D ACAD 2017 F r 11211013-01(RPT 1)GN-VA001.d

Table 1

Updated LFG Generation Assessment
Closure and Upgrading Plan
Campbell River Waste Management Centre
Comox Valley Regional District

	Relatively Inert	Moderately Decomposable	Decomposable	
Gas Production potential, Lo =	20	120	160	m^3 CH_4/tonne
Waste Composition (2006 SWMP)	36.1%	21.8%	42.2%	
lag time before start of gas production, lag =	1 years			
Historical Data Used (years)	30			
1st Year of Historical Data Used	1979			
4 Years after reporting year	2014			
methane (by volume)	50%			
carbon dioxide (by volume)	50%			
methane (density)	0.6557 kg/m^3		(25°C,1ATM)	
carbon dioxide (density)	1.7988 kg/m^3		(25°C,1ATM)	

Year	Annual Tonnage (tonnes)	Cumulative Waste-in-place (tonnes)	Waste Tonnage Relatively Inert (tonnes)	Waste Tonnage Moderately Decomposable (tonnes)	Waste Tonnage Decomposable (tonnes)	Methane Generation Rate, k Relatively Inert ($year^{-1}$)	Methane Generation Rate, k Moderately Decomposable ($year^{-1}$)	Methane Generation Rate, k Decomposable ($year^{-1}$)	Annual Methane Production (tonnes/yr)	Landfill Gas Production (m^3/hr)	Greenhouse Gas Emissions (as CO_2e/year)
1980	10,334	10,334	3,725	2,250	4,356	0.02	0.06	0.11	59.2	20.6	1,243
1981	10,545	20,879	3,802	2,296	4,445	0.02	0.06	0.11	114.0	39.7	2,393
1982	10,760	31,639	3,879	2,343	4,535	0.02	0.06	0.11	164.8	57.4	3,461
1983	10,980	42,619	3,958	2,391	4,628	0.02	0.06	0.11	212.1	73.9	4,454
1984	11,204	53,823	4,039	2,440	4,723	0.02	0.06	0.11	256.3	89.2	5,382
1985	11,432	65,255	4,121	2,489	4,819	0.02	0.06	0.11	297.7	103.6	6,251
1986	11,666	76,921	4,206	2,540	4,917	0.02	0.06	0.11	336.6	117.2	7,068
1987	11,904	88,825	4,291	2,592	5,018	0.02	0.06	0.11	373.2	130.0	7,838
1988	12,147	100,972	4,379	2,645	5,120	0.02	0.06	0.11	407.9	142.0	8,567
1989	12,395	113,367	4,468	2,699	5,225	0.02	0.06	0.11	440.9	153.5	9,259
1990	12,648	126,015	4,560	2,754	5,331	0.02	0.06	0.11	472.3	164.4	9,918
1991	12,906	138,921	4,653	2,810	5,440	0.02	0.06	0.11	502.3	174.9	10,549
1992	13,169	152,090	4,747	2,868	5,551	0.02	0.06	0.11	531.2	184.9	11,154
1993	13,438	165,528	4,844	2,926	5,664	0.02	0.06	0.11	558.9	194.6	11,738
1994	13,712	179,240	4,943	2,986	5,780	0.02	0.06	0.11	585.8	204.0	12,302
1995	13,992	193,232	5,044	3,047	5,898	0.02	0.06	0.11	611.9	213.0	12,849
1996	14,278	207,510	5,147	3,109	6,018	0.02	0.06	0.11	637.3	221.9	13,382
1997	14,569	222,079	5,252	3,172	6,141	0.02	0.06	0.11	662.1	230.5	13,903
1998	14,867	236,946	5,360	3,237	6,267	0.02	0.06	0.11	686.4	239.0	14,414
1999	15,170	252,116	5,469	3,303	6,394	0.02	0.06	0.11	710.3	247.3	14,916
2000	22,042	274,158	7,946	4,800	9,291	0.02	0.06	0.11	771.4	268.6	16,199
2001	21,642	295,799	7,802	4,713	9,122	0.02	0.06	0.11	824.6	287.1	17,317
2002	22,009	317,808	7,934	4,792	9,277	0.02	0.06	0.11	875.1	304.7	18,376
2003	23,638	341,446	8,522	5,147	9,964	0.02	0.06	0.11	930.2	323.9	19,535
2004	26,242	367,689	9,460	5,714	11,061	0.02	0.06	0.11	995.3	346.6	20,901
2005	26,700	394,389	9,626	5,814	11,254	0.02	0.06	0.11	1057.0	368.0	22,198
2006	28,295	422,684	10,200	6,161	11,926	0.02	0.06	0.11	1122.3	390.8	23,567
2007	31,207	453,891	11,250	6,795	13,154	0.02	0.06	0.11	1198.2	417.2	25,163
2008	30,096	483,987	10,850	6,554	12,686	0.02	0.06	0.11	1260.9	439.0	26,478
2009	26,405	510,392	9,519	5,750	11,130	0.02	0.06	0.11	1296.7	451.5	27,231
2010	27,358	537,750	9,863	5,957	11,532	0.02	0.06	0.11	1334.9	464.8	28,032
2011	26,130	563,880	9,420	5,690	11,014	0.02	0.06	0.11	1362.7	474.5	28,616
2012	25,698	589,578	9,264	5,596	10,832	0.02	0.06	0.11	1385.6	482.5	29,098
2013	26,992	616,570	9,731	5,878	11,377	0.02	0.06	0.11	1414.1	492.4	29,696
2014	28,373	644,943	10,229	6,178	11,959	0.02	0.06	0.11	1448.0	504.2	30,409
2015	25,303	670,246	9,122	5,510	10,665	0.02	0.06	0.11	1461.5	508.9	30,691
2016	25,490	695,736	9,189	5,551	10,744	0.02	0.06	0.11	1474.9	513.6	30,974
2017	26,371	722,107	9,507	5,742	11,116	0.02	0.06	0.11	1492.4	519.6	31,341
2018	26,506	748,613	9,555	5,772	11,172	0.02	0.06	0.11	1509.3	525.5	31,695
2019	26,409	775,022	9,520	5,751	11,131	0.02	0.06	0.11	1524.2	530.7	32,009
2020	24,824	799,846	8,949	5,405	10,463	0.02	0.06	0.11	1528.9	532.4	32,107
2021	24,824	824,670	8,949	5,405	10,463	0.02	0.06	0.11	1533.4	533.9	32,201
2022	14,244	838,914	5,135	3,102	6,004	0.02	0.06	0.11	1477.1	514.3	31,018
2023	0	838,914	0	0	0	0.02	0.06	0.11	1344.7	468.2	28,239
2024	0	838,914	0	0	0	0.02	0.06	0.11	1225.1	426.6	25,727
2025	0	838,914	0	0	0	0.02	0.06	0.11	1116.9	388.9	23,456
2026	0	838,914	0	0	0	0.02	0.06	0.11	1019.1	354.8	21,401
2027	0	838,914	0	0	0	0.02	0.06	0.11	930.5	324.0	19,541
2028	0	838,914	0	0	0	0.02	0.06	0.11	850.3	296.1	17,857
2029	0	838,914	0	0	0	0.02	0.06	0.11	777.7	270.8	16,331
2030	0	838,914	0	0	0	0.02	0.06	0.11	711.8	247.9	14,948
2031	0	838,914	0	0	0	0.02	0.06	0.11	652.1	227.1	13,694
2032	0	838,914	0	0	0	0.02	0.06	0.11	597.9	208.2	12,557
2033	0	838,914	0	0	0	0.02	0.06	0.11	548.8	191.1	11,524
2034	0	838,914	0	0	0	0.02	0.06	0.11	504.1	175.5	10,586
2035	0	838,914	0	0	0	0.02	0.06	0.11	463.5	161.4	9,734

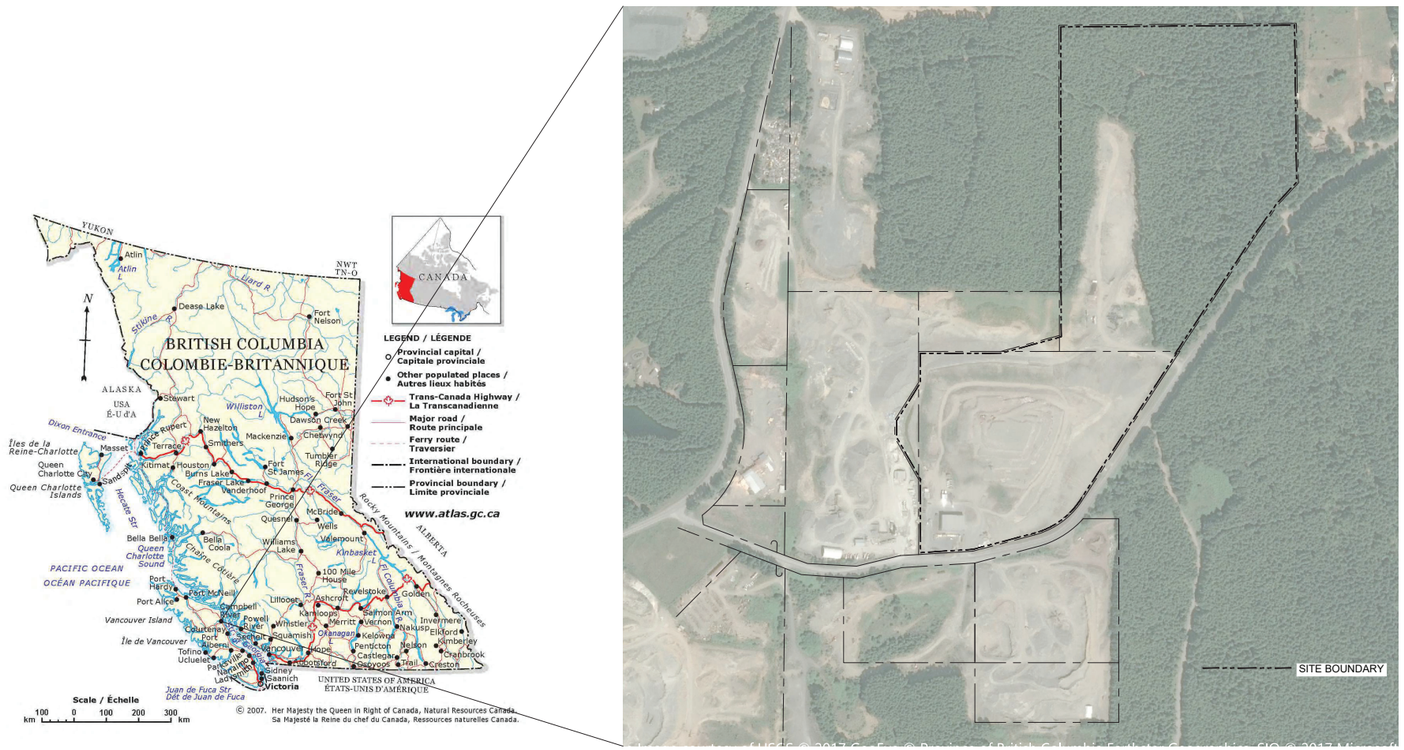
Sources:

- Landfill Gas Generation Assessment Procedure Guidance Report, Conestoga-Rovers & Associates, March 2009
- Landfill tonnages:
  -1965-1999 CH2MHill LFG Management Plan (Based on assumption that the population increased at a 2% annual rate between 1965 and 1998, and that the waste volume increase was directly proportional to the population rate).
  -2000-2016 Supplied by CVRD

CAMPBELL RIVER WASTE MANAGEMENT CENTRE
CAMPBELL RIVER, BRITISH COLUMBIA
CLOSURE AND UPGRADING PLAN

11212013-01

SOURCE:
BING IMAGERY: MICROSOFT PRODUCT SCREEN SHOT(S) REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION



SITE MAP

DRAWING INDEX

DWG NO.	REV NO.	DATE	TITLE
C-01	1	JUNE 2020	EXISTING CONDITIONS
C-02	1	JUNE 2020	FINAL CONTOURS
C-03	1	JUNE 2020	SURFACE WATER WORKS #1
C-04	1	JUNE 2020	SURFACE WATER WORKS #2
C-05	1	JUNE 2020	SURFACE WATER WORKS #3
C-06	1	JUNE 2020	CROSS SECTIONS
C-07	1	JUNE 2020	DETAIL SHEET 1
C-08	1	JUNE 2020	DETAIL SHEET 2
C-09	1	JUNE 2020	DETAIL SHEET 3

Plot Date: 17 August 2020 - 4:12 PM
Plotted By: David Botero
CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)GN\11212013-01(001)GN-VA001.dwg

0 20 40 60m

LEGEND:

- MAJOR CONTOUR (5m INTERVAL) (180.0)
- MINOR CONTOUR (1m INTERVAL)
- LEGAL BOUNDARY
- SITE BOUNDARY
- APPROXIMATE LIMIT OF WASTE
- DRAINAGE DITCH
- CHAIN LINK FENCE
- ELECTRIC FENCE
- LIMIT OF EXISTING FINAL COVER
- GRAVEL ROADWAY
- ASPHALT ROADWAY
- RIP RAP DITCH
- CULVERT
- M.H. MANHOLE
- EBA11-1 GROUNDWATER WELL LOCATION
- EBA04-5 DECOMMISSIONED WELL LOCATION
- EBA06-1 APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION
- SW-3 APPROXIMATE SURFACE WATER SAMPLE LOCATION

SOURCE:

EXISTING TOPOGRAPHICAL SURVEY COMPLETED MAY 2019 BY MCELHANNEY LAND SURVEYED LTD.

EXISTING TOPOGRAPHICAL SURVEY COMPLETED NOVEMBER 2019 BY MCELHANNEY LAND SURVEYED LTD.

SURFACE MATER MANAGEMENT POND AS-BUILT FROM 2019 BY MCELHANNEY LAND SURVEYED LTD.

GROUNDWATER WELL LOCATION, DECOMMISSIONED WELL LOCATION, APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION, APPROXIMATE SURFACE WATER SAMPLE LOCATION FROM 2015 OPERATIONS AND MONITORING REPORT BY GHD.

APPROXIMATE LIMIT OF WASTE PER MCELHANNEY CONSULTING SERVICES LTD., DRAWING LIMIT OF EXISTING WASTE, DATED MAY 30, 2013.

BING IMAGERY: MICROSOFT PRODUCT SCREEN SHOT(S) REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date
-	-	-	-	-

Drawn **T. WAGSTAFF**	Designer **S. KEMP**
Drafting Check **D. BOTERO**	Design Check **D. LIDDY**
Project Manager **D. LIDDY**	Date **Jun 26, 2020**
This document shall not be used for construction unless signed and sealed for construction.	Scale **1:2000**
Original Size **ANSI D**	Bar is 20mm on original size drawing 0 20mm

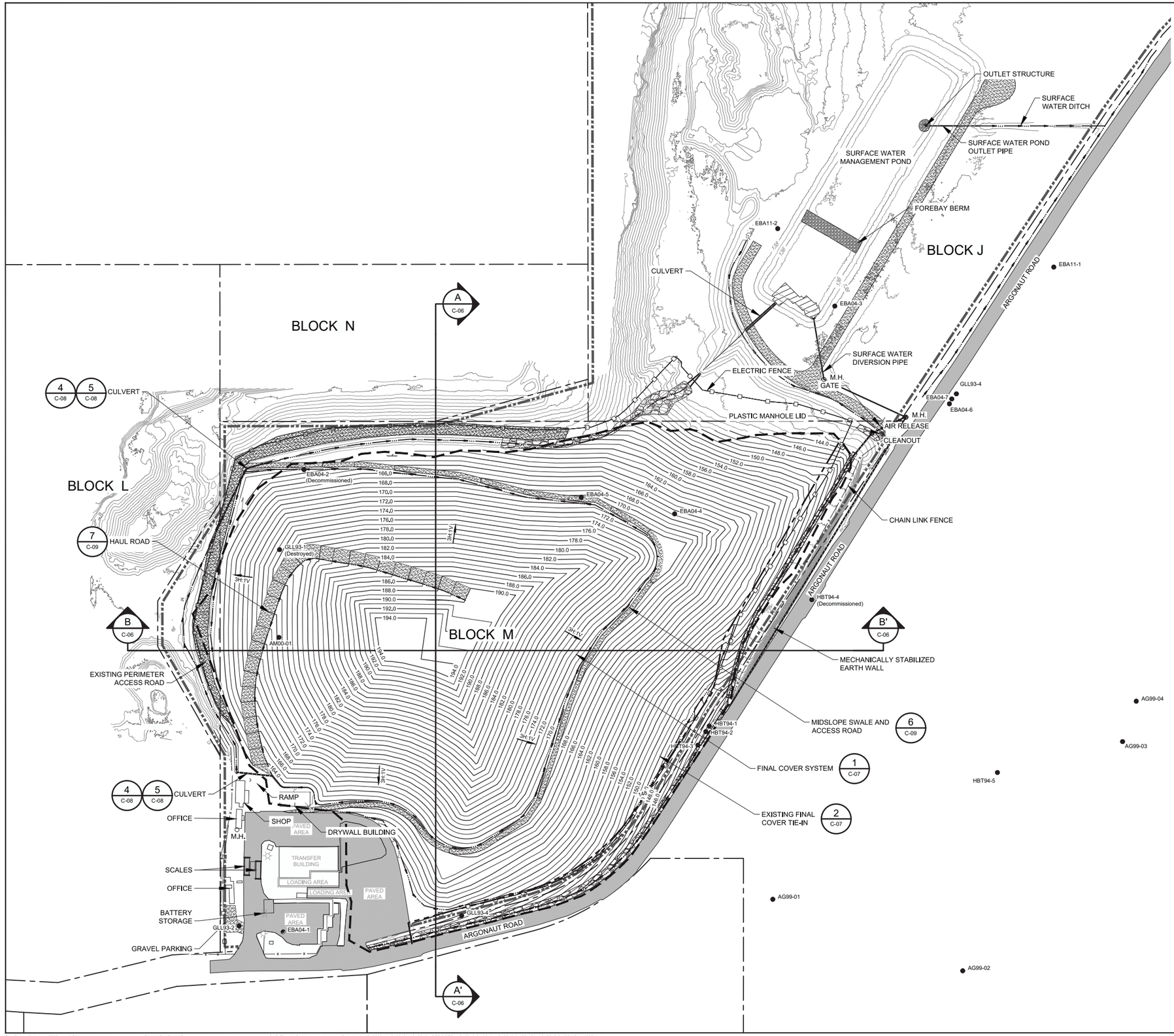
Project No. **11212013-01**

Title
EXISTING CONDITIONS NOVEMBER 5, 2019

Sheet No.
C-01

Sheet **2** of **17**

Plot Date: 17 August 2020 - 4:12 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CI\11212013-01(001)CI-VA001.dwg



0 10 20 30 40m

LEGEND:

- 180.0 — FINAL CONTOUR (2m INTERVAL)
- FINAL CONTOUR (1m INTERVAL)
- LEGAL BOUNDARY
- SITE BOUNDARY
- APPROXIMATE LIMIT OF WASTE
- DRAINAGE DITCH
- CHAIN LINK FENCE
- ELECTRIC FENCE
- LIMIT OF EXISTING FINAL COVER
- GRAVEL ROADWAY
- ASPHALT ROADWAY
- RIP RAP DITCH
- TURF REINFORCEMENT MAT
- CULVERT / SURFACE WATER PIPE
- M.H. MANHOLE
- EBA11-1 GROUNDWATER WELL LOCATION
- EBA04-5 DECOMMISSIONED WELL LOCATION
- EBA06-1 APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION
- SW-3 APPROXIMATE SURFACE WATER SAMPLE LOCATION

SOURCE:

EXISTING TOPOGRAPHICAL SURVEY COMPLETED MAY 2019 BY MCELHANNEY LAND SURVEYED LTD.

EXISTING TOPOGRAPHICAL SURVEY COMPLETED NOVEMBER 2019 BY MCELHANNEY LAND SURVEYED LTD.

SURFACE MATER MANAGEMENT POND AS-BUILT FROM 2019 BY MCELHANNEY LAND SURVEYED LTD.

GROUNDWATER WELL LOCATION, DECOMMISSIONED WELL LOCATION, APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION, APPROXIMATE SURFACE WATER SAMPLE LOCATION FROM 2015 OPERATIONS AND MONITORING REPORT BY GHD.

APPROXIMATE LIMIT OF WASTE PER MCELHANNEY CONSULTING SERVICES LTD., DRAWING LIMIT OF EXISTING WASTE, DATED MAY 30, 2013.

BING IMAGERY: MICROSOFT PRODUCT SCREEN SHOT(S) REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date

Drawn	K. RENNER	Designer	K. RENNER
Drafting Check	K. DHALIWAL	Design Check	D. LIDDY
Project Manager	G. FERRARO	Date	Jun 26, 2020
This document shall not be used for construction unless signed and sealed for construction.		Scale	1:1250
Original Size **ANSI D**		Bar is 20mm on original size drawing 0 20mm	

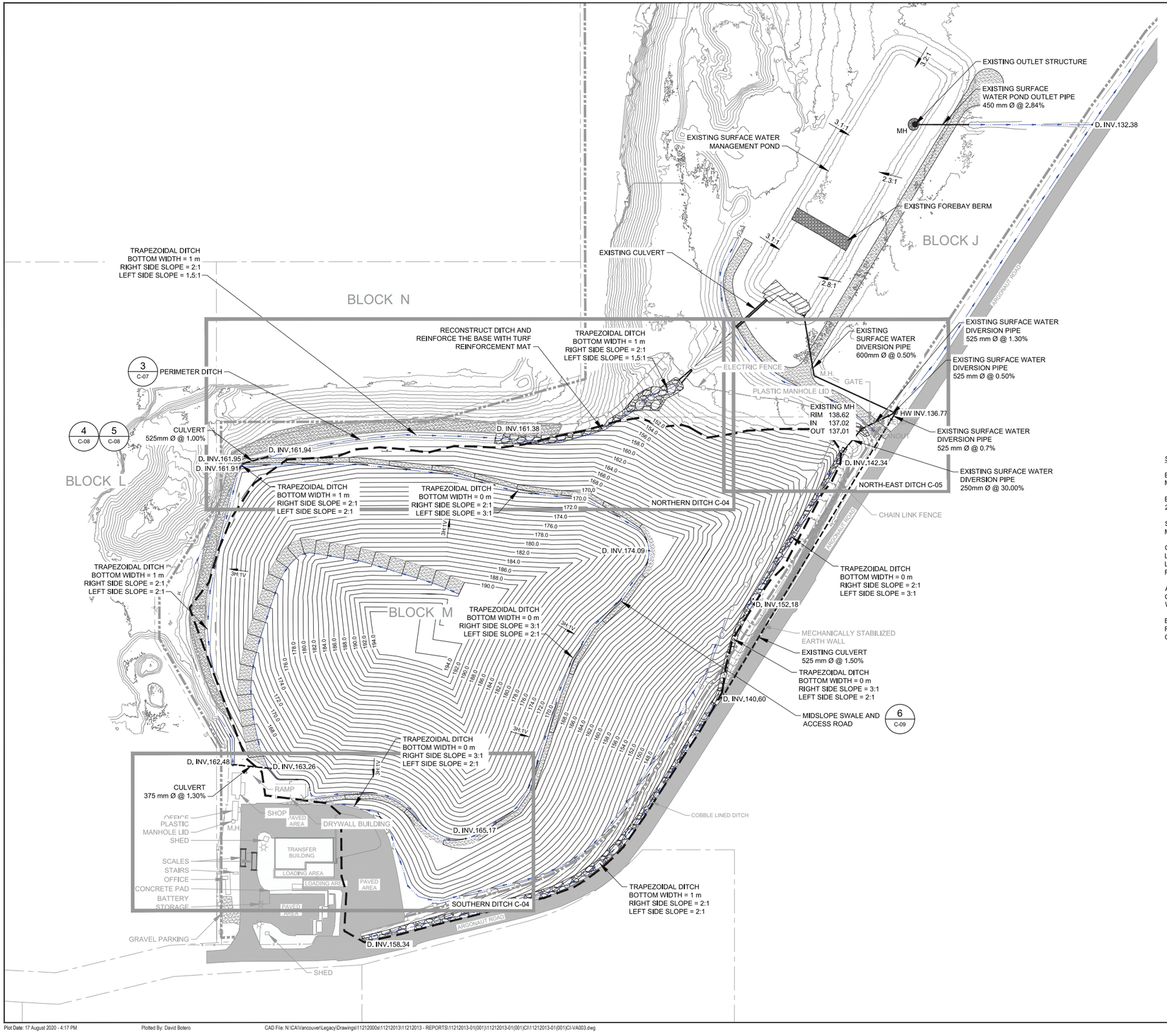
Project No. **11212013-01**

Title
FINAL CONTOURS

Sheet No.
C-02

Sheet 3 of 17

Plot Date: 17 August 2020 - 4:13 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CI\11212013-01(001)CI-VA002.dwg



0 10 20 30 40m

LEGEND:

- STORMWATER MANAGEMENT POND (2m INTERVAL)
- STORMWATER MANAGEMENT POND (1m INTERVAL)
- EXISTING MAJOR CONTOUR (2m INTERVAL)
- EXISTING MINOR CONTOUR (1m INTERVAL)
- LEGAL BOUNDARY
- SITE BOUNDARY
- APPROXIMATE LIMIT OF WASTE
- DRAINAGE DITCH
- CHAIN LINK FENCE
- ELECTRIC FENCE
- GRAVEL ROADWAY
- ASPHALT ROADWAY
- RIP RAP DITCH
- TURF REINFORCEMENT MAT
- CULVERT
- MANHOLE

SOURCE:

EXISTING TOPOGRAPHICAL SURVEY COMPLETED MAY 2019 BY MCELHANNEY LAND SURVEYED LTD.

EXISTING TOPOGRAPHICAL SURVEY COMPLETED NOVEMBER 2019 BY MCELHANNEY LAND SURVEYED LTD.

SURFACE MATER MANAGEMENT POND AS-BUILT FROM 2019 BY MCELHANNEY LAND SURVEYED LTD.

GROUNDWATER WELL LOCATION, DECOMMISSIONED WELL LOCATION, APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION, APPROXIMATE SURFACE WATER SAMPLE LOCATION FROM 2015 OPERATIONS AND MONITORING REPORT BY GHD.

APPROXIMATE LIMIT OF WASTE PER MCELHANNEY CONSULTING SERVICES LTD., DRAWING LIMIT OF EXISTING WASTE, DATED MAY 30, 2013.

BING IMAGERY: MICROSOFT PRODUCT SCREEN SHOT(S) REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 F 604 214 0525 W www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date

Drawn	K. RENNER	Designer	K. RENNER
Drafting Check	K. DHALIWAL	Design Check	D. LIDDY
Project Manager	G. FERRARO	Date	Jun 26, 2020
This document shall not be used for construction unless signed and sealed for construction.		Scale	1:1250
Original Size	ANSI D	Bar is 20mm on original size drawing	0 20mm

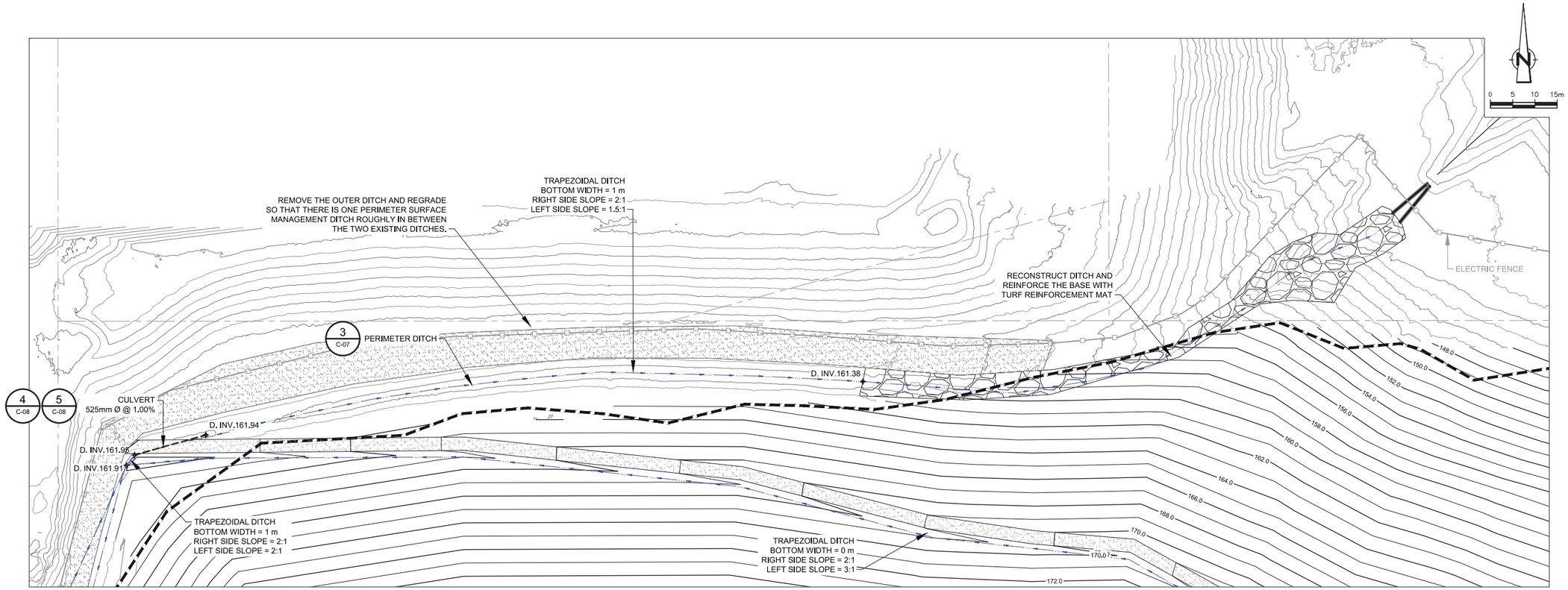
Project No. **11212013-01**

Title
SURFACE WATER WORKS #1

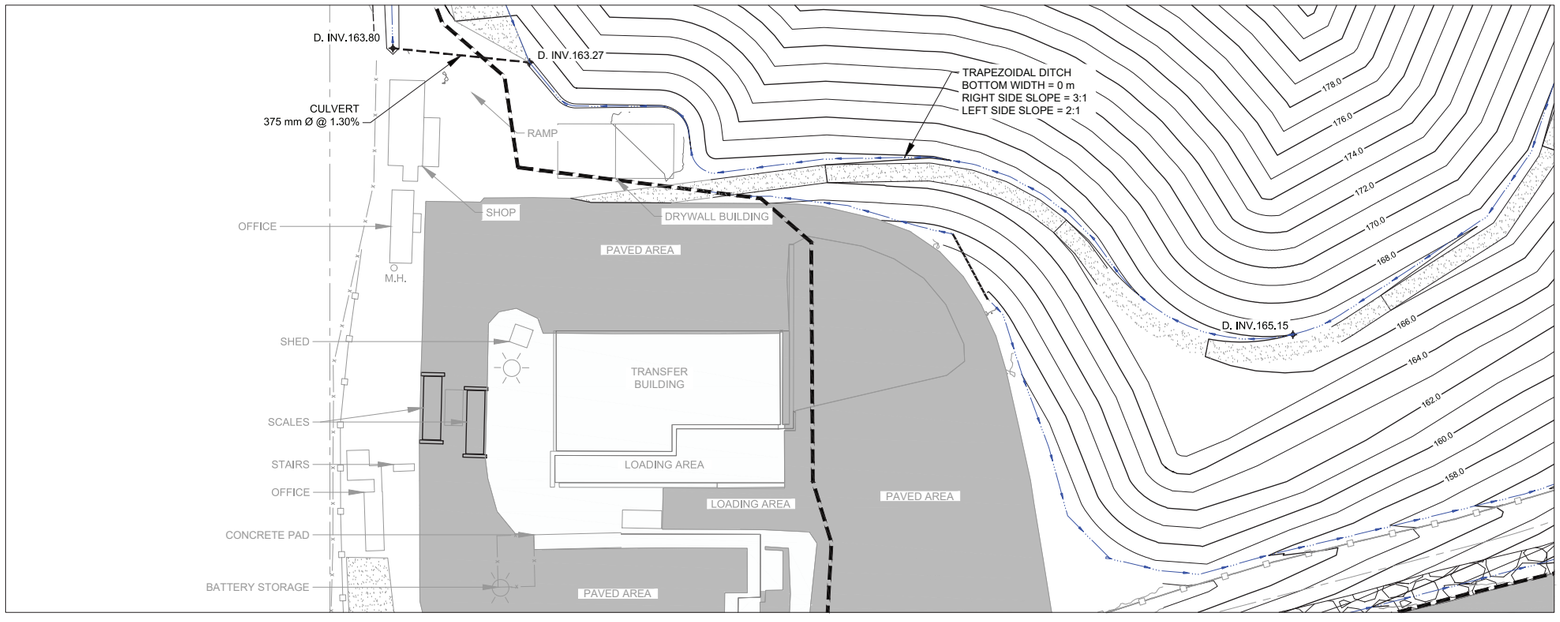
Sheet No.
C-03

Sheet 4 of 17

Plot Date: 17 August 2020 - 4:17 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)\CI\11212013-01(001)CI-VA003.dwg



NORTHERN DITCH
SCALE: 1:500



SOUTHERN DITCH
SCALE: 1:500

LEGEND:

- 180.0 — STORMWATER MANAGEMENT POND (2m INTERVAL)
- STORMWATER MANAGEMENT POND (1m INTERVAL)
- 180.0 — EXISTING MAJOR CONTOUR (2m INTERVAL)
- EXISTING MINOR CONTOUR (1m INTERVAL)
- LEGAL BOUNDARY
- APPROXIMATE LIMIT OF WASTE
- DRAINAGE DITCH
- CHAIN LINK FENCE
- ELECTRIC FENCE
- GRAVEL ROADWAY
- ASPHALT ROADWAY
- RIP RAP DITCH
- TURF REINFORCEMENT MAT
- CULVERT
- M.H. MANHOLE

SOURCE:

EXISTING TOPOGRAPHICAL SURVEY COMPLETED MAY 2019 BY MCELHANNEY LAND SURVEYED LTD.

EXISTING TOPOGRAPHICAL SURVEY COMPLETED NOVEMBER 2019 BY MCELHANNEY LAND SURVEYED LTD.

SURFACE MATER MANAGEMENT POND AS-BUILT FROM 2019 BY MCELHANNEY LAND SURVEYED LTD.

GROUNDWATER WELL LOCATION, DECOMMISSIONED WELL LOCATION, APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION, APPROXIMATE SURFACE WATER SAMPLE LOCATION FROM 2015 OPERATIONS AND MONITORING REPORT BY GHD.

APPROXIMATE LIMIT OF WASTE PER MCELHANNEY CONSULTING SERVICES LTD., DRAWING LIMIT OF EXISTING WASTE, DATED MAY 30, 2013.

BING IMAGERY: MICROSOFT PRODUCT SCREEN SHOT(S) REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date

Drawn	K. RENNER	Designer	K. RENNER
Drafting Check	K. DHALIWAL	Design Check	D. LIDDY
Project Manager	G. FERRARO	Date	Jun 25, 2020
This document shall not be used for construction unless signed and sealed for construction.		Scale	1:500
Original Size	ANSI D	Bar is 20mm on original size drawing	0 20mm

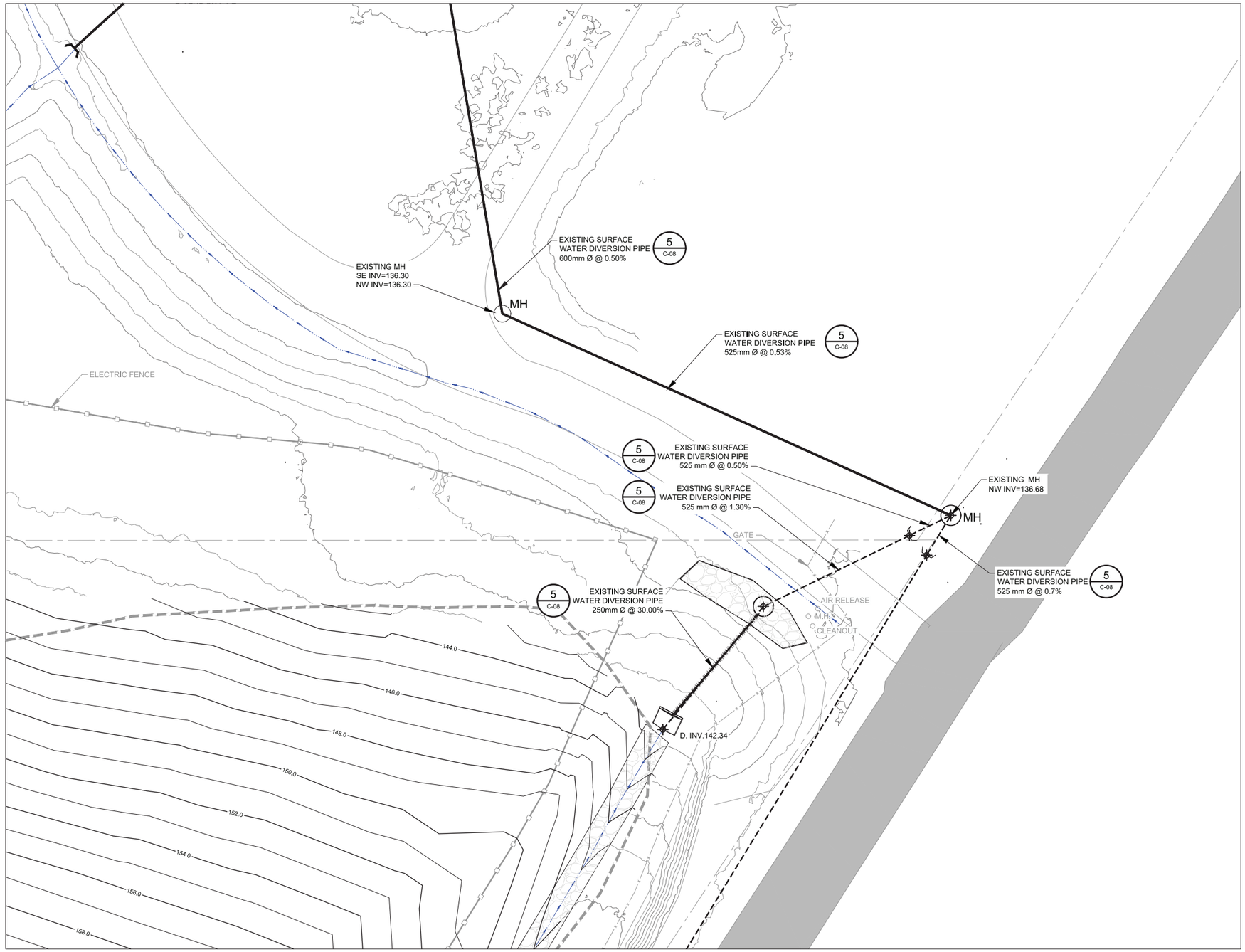
Project No. **11212013-01**

Title
SURFACE WATER WORKS #2

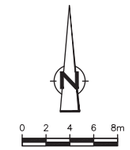
Sheet No.
C-04

Sheet 5 of 17

Plot Date: 17 August 2020 - 4:18 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CI\11212013-01(001)CI-VA004.dwg



NORTH-EAST DITCH
SCALE: 1:500



LEGEND:

- STORMWATER MANAGEMENT POND (2m INTERVAL)
- STORMWATER MANAGEMENT POND (1m INTERVAL)
- EXISTING MAJOR CONTOUR (2m INTERVAL)
- EXISTING MINOR CONTOUR (1m INTERVAL)
- LEGAL BOUNDARY
- APPROXIMATE LIMIT OF WASTE
- DRAINAGE DITCH
- CHAIN LINK FENCE
- ELECTRIC FENCE
- GRAVEL ROADWAY
- ASPHALT ROADWAY
- RIP RAP DITCH
- TURF REINFORCEMENT MAT
- CULVERT
- M.H. MANHOLE

SOURCE:

EXISTING TOPOGRAPHICAL SURVEY COMPLETED MAY 2019 BY MCELHANNEY LAND SURVEYED LTD.

EXISTING TOPOGRAPHICAL SURVEY COMPLETED NOVEMBER 2019 BY MCELHANNEY LAND SURVEYED LTD.

SURFACE MATER MANAGEMENT POND AS-BUILT FROM 2019 BY MCELHANNEY LAND SURVEYED LTD.

GROUNDWATER WELL LOCATION, DECOMMISSIONED WELL LOCATION, APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION, APPROXIMATE SURFACE WATER SAMPLE LOCATION FROM 2015 OPERATIONS AND MONITORING REPORT BY GHD.

APPROXIMATE LIMIT OF WASTE PER MCELHANNEY CONSULTING SERVICES LTD., DRAWING LIMIT OF EXISTING WASTE, DATED MAY 30, 2013.

BING IMAGERY: MICROSOFT PRODUCT SCREEN SHOT(S) REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date

Drawn	K. RENNER	Designer	K. RENNER
Drafting Check	K. DHALIWAL	Design Check	D. LIDDY
Project Manager	G. FERRARO	Date	Jun 26, 2020
This document shall not be used for construction unless signed and sealed for construction.		Scale	1:250
Original Size	ANSI D	Bar is 20mm on original size drawing	0 20mm

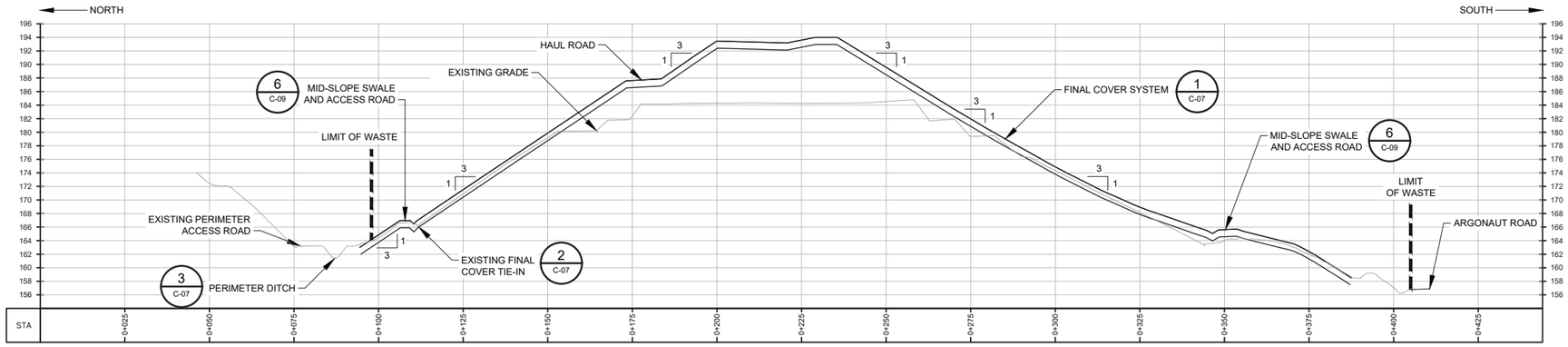
Project No. **11212013-01**

Title
SURFACE WATER WORKS #3

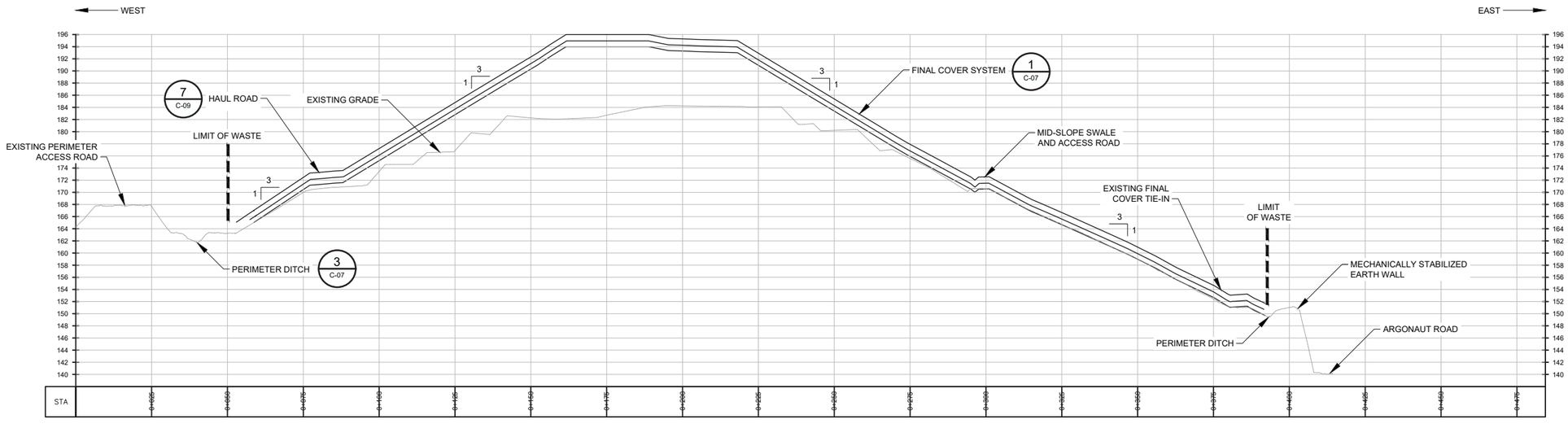
Sheet No.
C-05

Sheet **6** of **17**

Plot Date: 17 August 2020 - 4:18 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CR\11212013-01(001)CI-VA005.dwg



SECTION A-A' (C-02)
HORZ. 1:800
VERT. 1:400



SECTION B-B' (C-02)
HORZ. 1:800
VERT. 1:400

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date

Drawn **K. RENNER**	Designer **K. RENNER**
Drafting Check **K. DHALIWAL**	Design Check **D. LIDDY**
Project Manager **G. FERRARO**	Date **Jun 25, 2020**
This document shall not be used for construction unless signed and sealed for construction.	Scale **AS SHOWN**
Original Size **ANSI D**	Bar is 20mm on original size drawing 0 20mm

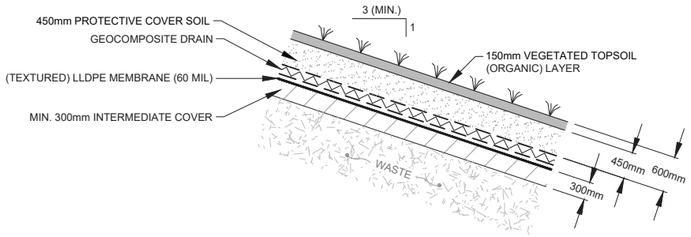
Project No. **11212013-01**

Title
CROSS-SECTIONS

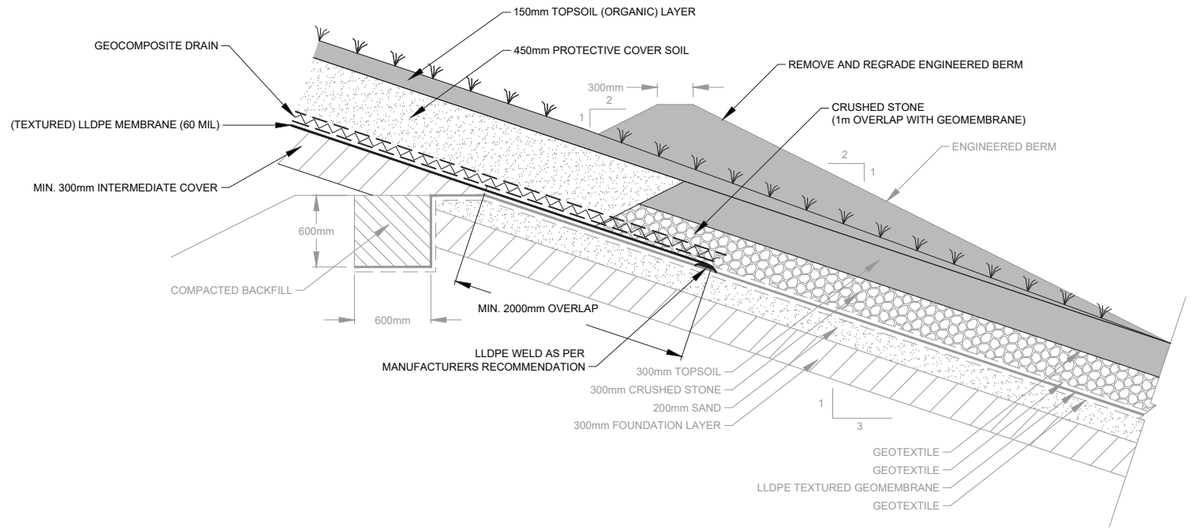
Sheet No.
C-06

Sheet **7** of **17**

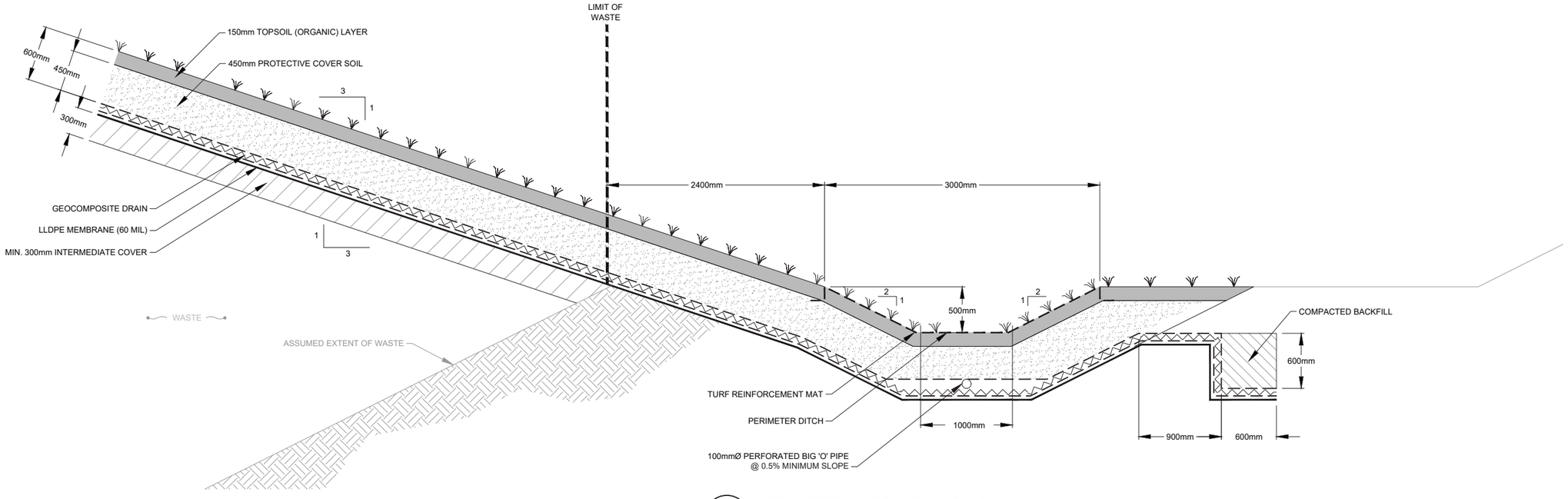
Plot Date: 17 August 2020 - 4:18 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CI\11212013-01(001)CI-VA006.dwg



DETAIL 1 C-02 FINAL COVER SYSTEM
1:50



DETAIL 2 C-02 EXISTING FINAL COVER TIE-IN
1:25



DETAIL 3 C-03 PERIMETER DITCH (TYPICAL)
1:25

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 F 604 214 0525 W www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date
1	ISSUED FOR MOE REVIEW	TW	GF	02/07/2018

Drawn	K. RENNER	Designer	T.ELLIOT
Drafting Check	K. DHALIWAL	Design Check	D. LIDDY
Project Manager	G. FERRARO	Date	Aug 17, 2020
This document shall not be used for construction unless signed and sealed for construction.		Scale	AS SHOWN
Original Size	ANSI D	Bar is 20mm on original size drawing	0 — 20mm

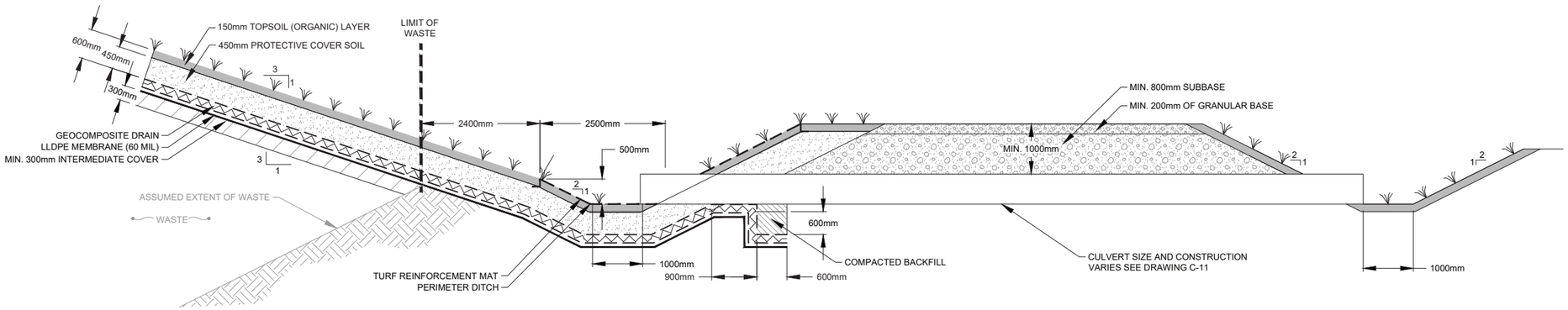
Project No. **11212013-01**

Title
DETAILS SHEET 1

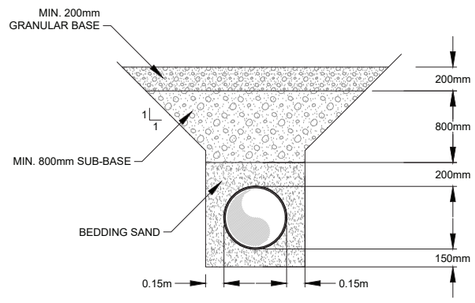
Sheet No.
C-07

Sheet 15 of 17

Plot Date: 17 August 2020 - 4:19 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CI\11212013-01(001)CI-VA007.dwg



DETAIL 4 CULVERT
1:50
C-02



DETAIL 5 CULVERT (TYPICAL)
N.T.S.
C-02

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date
1	ISSUED FOR MOE REVIEW	TW	GF	02/07/2018

Drawn	K. RENNER	Designer	T.ELLIOT
Drafting Check	K. DHALIWAL	Design Check	D. LIDDY
Project Manager	G. FERRARO	Date	Aug 17, 2020
This document shall not be used for construction unless signed and sealed for construction.		Scale	AS SHOWN

Original Size **ANSI D**

Bar is 20mm on original size drawing
0 20mm

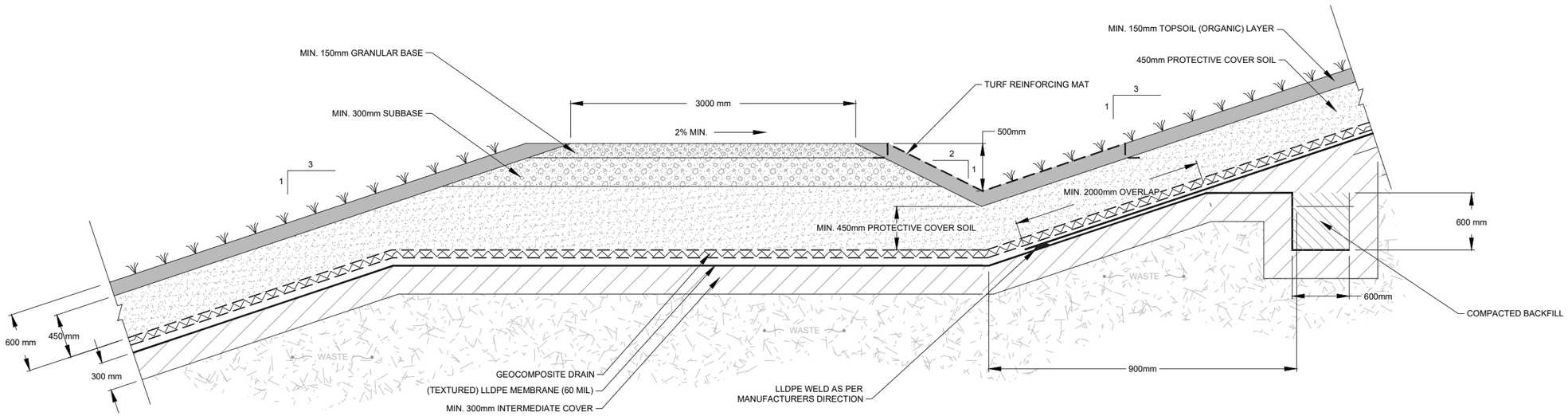
Project No. **11212013-01**

Title
DETAILS SHEET 2

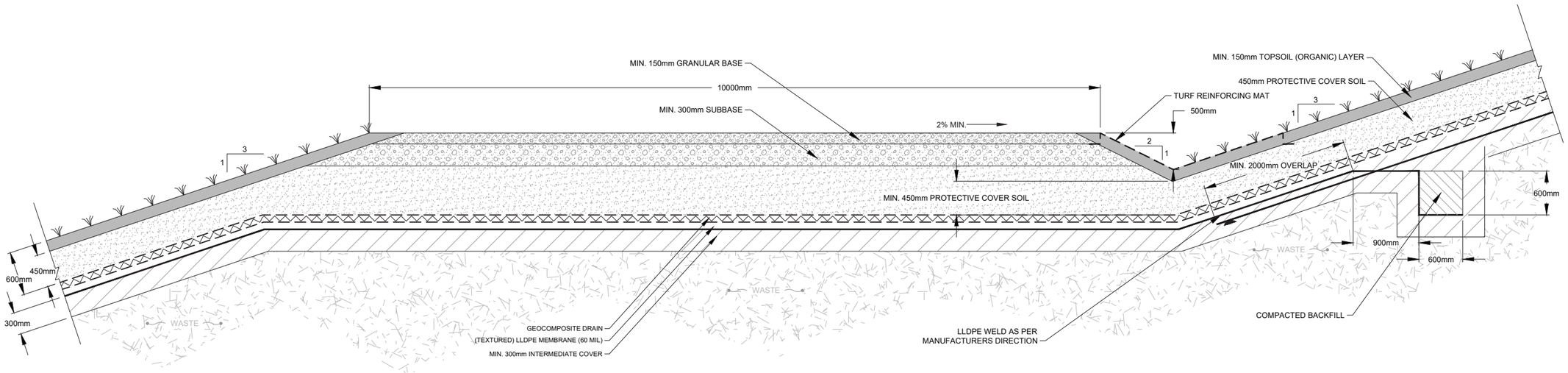
Sheet No.
C-08

Sheet **16** of **17**

Plot Date: 17 August 2020 - 4:20 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CI\11212013-01(001)CI-VA007.dwg



DETAIL 6 MID-SLOPE SWALE AND ACCESS ROAD
1:25 C-02



DETAIL 7 HAUL ROAD
1:30 C-02

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
CLOSURE AND UPGRADING PLAN

No.	Issue	Drawn	Approved	Date

Drawn	K. RENNER	Designer	T.ELLIOT
Drafting Check	K. DHALIWAL	Design Check	D. LIDDY
Project Manager	G. FERRARO	Date	Aug 17, 2020
This document shall not be used for construction unless signed and sealed for construction.		Scale	AS SHOWN
Original Size **ANSI D**		Bar is 20mm on original size drawing 0 20mm	

Project No. **11212013-01**

Title
DETAILS SHEET 3

Sheet No.
C-09

Sheet **17** of **17**

Plot Date: 17 August 2020 - 4:20 PM Plotted By: David Botero CAD File: N:\CA\Vancouver\Legacy\Drawings\11212000s\11212013\11212013 - REPORTS\11212013-01(001)\11212013-01(001)CI\11212013-01(001)CI-VA007.dwg

Appendices

Appendix A
Operational Certificate MR-02401

BRITISH COLUMBIA

MINISTRY OF WATER, LAND AND AIR PROTECTION

Vancouver Island Region
Environmental Protection
2080-A Labieux Road
Nanaimo, British Columbia
V9T 6J9
Telephone: (250) 751-3100
Fax: (250) 751-3103

OPERATIONAL CERTIFICATE

MR-02401

Under the Provisions of the Waste Management Act

Regional District of Comox-Strathcona

600 Comox Road

Courtenay, British Columbia

V9N 3P6

is authorised to manage waste and recyclable material from the Regional District of Comox-Strathcona and environs at the Campbell River landfill located on Argonaut Road, Campbell River, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Waste Management Act* and may result in prosecution.

1. MANAGEMENT OF WASTE AND RECYCLABLE MATERIAL

1.1. Sanitary Landfill

1.1.1. This subsection applies to the discharge of waste to a sanitary landfill.

1.1.2. Waste may be discharged to the sanitary landfill shown on attached Site Plan A.

1.1.3. The characteristics of the discharge must be municipal solid waste as defined under the *Waste Management Act* and other wastes as approved in writing by the Regional Waste Manager.

1.1.4. The authorised works are a sanitary landfill, and related appurtenances approximately located as shown on attached Site Plan A.

1.1.5. The authorised works must be complete and in operation on and from the date of this operational certificate.

1.2. Leachate

1.2.1. This subsection applies to leachate from the landfill.

1.2.2. The characteristics of the leachate must not exceed concentrations set in the *British Columbia Approved Water Quality Guidelines (Criteria)* and *A Compendium of Working Water Quality Guidelines for British Columbia* at the property boundary. Where natural background water quality concentrations

Date Issued: DEC 0 2 2003
Date Amended:
(most recent)

B. W. Medlar
Assistant Regional Waste Manager

exceed the aforementioned guidelines, characteristics of the leachate must not exceed background concentrations.

1.3. Entrance facilities

1.3.1. The authorised facilities are signs, weigh scales, recyclable material and waste drop-off and storage facilities and related appurtenances.

1.3.2. The authorised facilities must be complete and in operation on and from the date of this operational certificate.

1.4. Location of Authorised Facilities

The location of the facilities for the management of waste and recyclable material to which this operational certificate is applicable is Block C of District Lot 85, Sayward Land District, approximately located as shown on attached Site Plan A.

2. GENERAL REQUIREMENTS

2.1. Qualified Professionals

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

2.2. Plans

2.2.1. Site development, operating, leachate management, closure and post closure plans must be submitted to the Regional Waste Manager by December 31, 2003.

2.2.2. The plans referenced in subsection 2.2.1 must address, but not be limited to, each of the subsections in the *Landfill Criteria for Municipal Solid Waste* including performance, siting, design, operational and closure and post-closure criteria.

2.2.3. The facilities must be developed, operated and closed in accordance with the plans referenced in subsection 2.2.1.

2.3. Bear-Proof Facilities

2.3.1. Bears must not access putrescible waste at the landfill facility. All putrescible waste that arrives at the landfill facility must be immediately contained within a bear-proof bin or an area enclosed by a bear-proof electric fence. Grass, leaves, weeds, branches and woodwaste are exempt from bear-proofing requirements.

2.3.2. A bear-proof electric fence must be installed around the landfill facilities.

Date Issued: DEC 0 2 2003
Date Amended:
(most recent)

B. W. Medlar
Assistant Regional Waste Manager

2.3.3. The bear-proof fence must be designed, constructed, operated and maintained to prevent bears from penetrating the fence.

2.3.4. The bear-proof electric fence and bear-proof bins must be installed and in operation by March 30, 2004.

2.4. Landfill Gas

2.4.1. When 100,000 tonnes of waste have been discharged at the landfill, an assessment of the potential for landfill gas generation must be submitted to the Regional Waste Manager.

2.4.2. The landfill gas assessment must address, but is not limited to, subsections 4.2 and 6.4 of the *Landfill Criteria for Municipal Solid Waste* and section 6 of the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills.*

2.4.3. The potential for landfill gas generation is to be re-assessed at least once every 5 years after the initial assessment.

2.5. Seismic and Fault Activity

A report that assesses the risk from seismic and fault activity must be submitted to the Regional Waste Manager by December 31, 2003.

2.6. Additional Facilities or Works

The Regional Waste Manager may require investigations, surveys, and the construction of additional facilities or works including, but not limited to, additional leachate and landfill gas management facilities. The Regional Waste Manager may also amend the requirements of any of the information required by this operational certificate including plans, programs, assessments and reports.

3. MONITORING AND REPORTING

3.1. Monitoring Program

3.1.1. A monitoring program must be developed to identify any impacts to the environment and public health from the landfill.

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

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

Date Issued: DEC 0 2 2003
Date Amended:
(most recent)

B. W. Medlar
Assistant Regional Waste Manager

3.2. Annual Operating and Monitoring Report

3.2.1. An annual operating and monitoring report for the preceding 12 month period from January 1 to December 31 must be submitted to the Regional Waste Manager by April 30 of each year.

3.2.2. The report must include:

- An executive summary;
- Tonnage of each type of waste discharged to the landfill for the year;
- Remaining site life and capacity;
- Review of the preceding year of operation, plans for the next year and any new information or proposed changes relating to the facilities and plans;
- Comparison of the monitoring data with the performance criteria in section 4 of the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills*, interpretation of the monitoring data, identification and interpretation of irregularities and trends, recommendations, and any proposed changes to the monitoring program.

4. SITE CLOSURE

4.1. Closure and Post-Closure Fund

A closure and post-closure financial security trust fund must be built up over time. The closure and post-closure fund must ultimately meet or exceed the estimated closure and post-closure costs plus a reasonable contingency for any remediation that may be required.

Date Issued: DEC 0 2 2003
Date Amended:
(most recent)

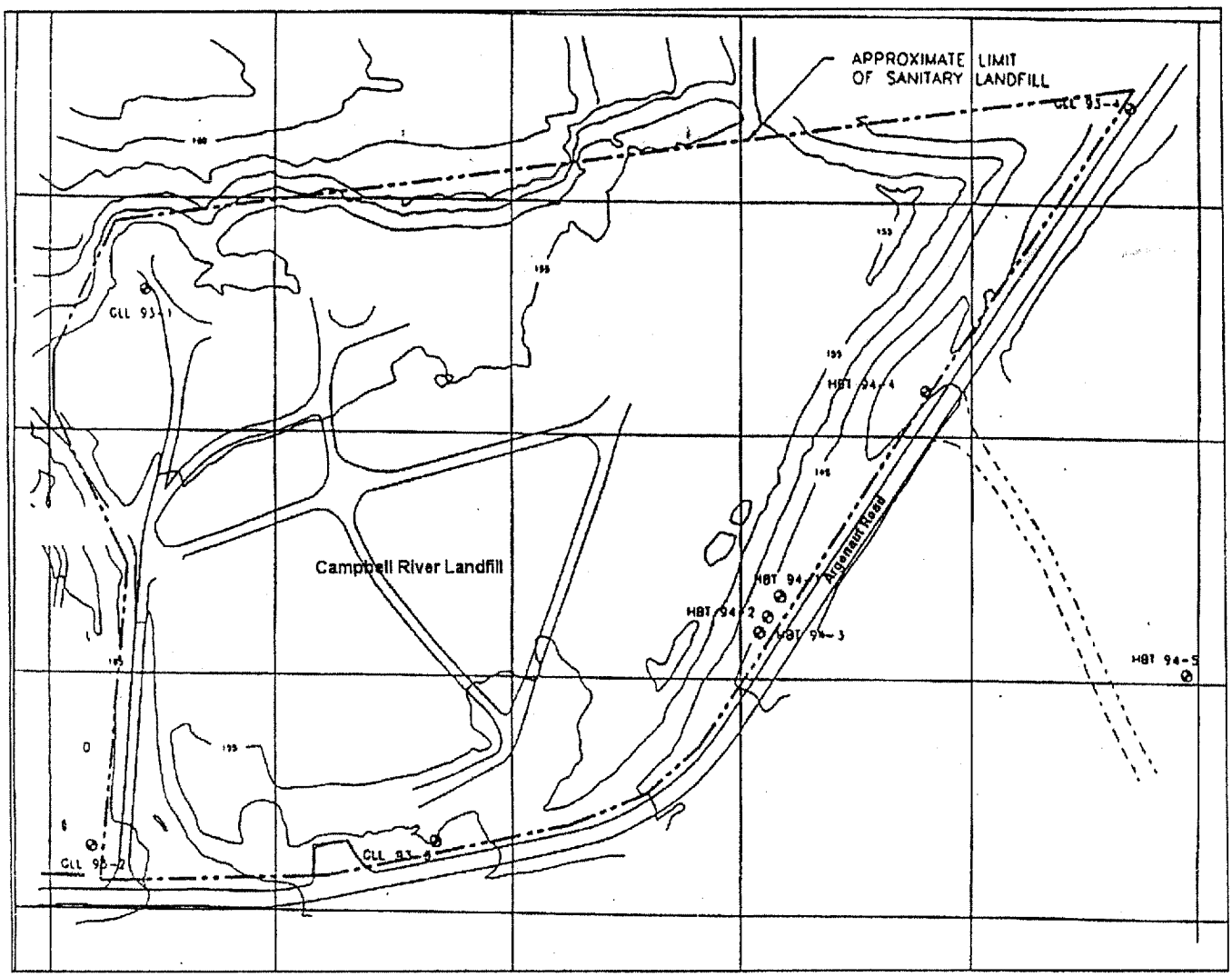
B. W. Medlar
Assistant Regional Waste Manager

PROVINCE OF
BRITISH COLUMBIA

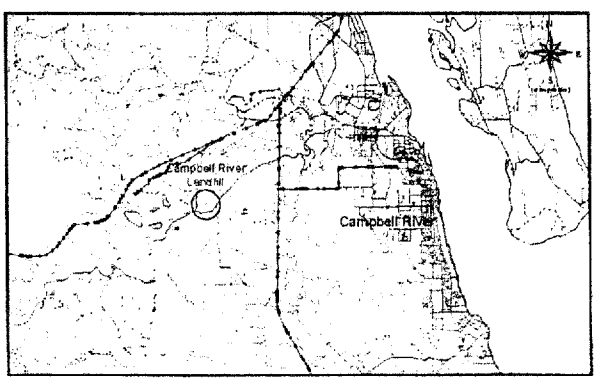
Environmental Protection

SITE PLAN A

N



Location Map



Scale: Not to Scale

Operational Certificate: MR-02401

Date: DEC 0 2 2003

B. W. Medlar
Assistant Regional Waste Manager
Vancouver Island Region

May 19, 2020

Tracking Number: 371230
Authorization Number: 2401

Comox Valley Regional District
600 Comox Rd
Courtenay BC V9N 3P6

Dear Operational Certificate Holder,

Application for Operational Certificate amendments dated March 23, 2018, under the *Environmental Management Act*

In response to the subject application, and pursuant to Section 16 of the Environmental Management Act, Operational Certificate 2401 (Appendix A) is hereby amended as follows:

1. Subsection 1.4. is amended from:

> The location of the facilities for the management of waste and recyclable material to which this operational certificate is applicable is Block C of District Lot 85, Sayward Land District, approximately located as shown on attached Site Plan A.

to:

> The location of the facilities for the management of waste and recyclable material to which this operational certificate is applicable is Block M and Block J of District Lot 85, Sayward Land District, approximately located as shown on attached Site Plan A

2. Section 1.5 is added:

1.5 Stormwater

1.5.1 The operational certificate holder must manage stormwater such that the stormwater is infiltrated into the ground with the authorized works.

1.5.2 The infiltrating stormwater must not include the concentration of any leachate substance in the stormwater greater than the Contaminated

Date issued: November 29, 1973
Date amended: May 19, 2020
(most recent)

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

Sites Regulation Generic Numerical Water Standards for Drinking Water (DW) and Aquatic Life (AW) for freshwater for that substance.

1.5.3 (a) The operational certificate holder must ensure that the Facility does not cause the concentration of Total Suspended Solids in the stormwater flowing from the Facility Site Boundary to be of worse quality than allowable concentrations specified in the British Columbia Approved and Working Water Quality Guidelines for a 24-hour duration during high flow conditions.

(b) The operational certificate holder must cause a Qualified Professional to determine the applicable water use(s) for stormwater discharging from the Landfill Site and the applicable, maximum allowable concentration specified in the British Columbia Approved and Working Water Quality Guidelines and include such determinations in the Annual Operations and Monitoring Report.

(c) The director may specify more stringent stormwater quality standards than those set out in this section.

1.5.4 The authorized works are mid slope swales, ditches, surface water management pond with energy dissipation and sediment traps, stormwater infiltration area, and related appurtenances approximately located as shown on Site Plan A.

1.5.5 The operational certificate holder must ensure that adequate authorized works to manage stormwater are complete and fully operational at all times.

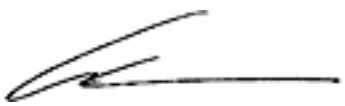
1.5.6 The location of stormwater discharge to which this operational certificate is applicable is Block J of District Lot 85, Sayward Land District, approximately located as shown on attached Site Plan A.

3. Subsection 2.0 is added:

2.0 Glossary

The following terms when capitalized in this authorization have the meanings ascribed below. Other terms used in this authorization have the same meaning as those defined in the *Environmental Management Act*, applicable regulations, and the Landfill Criteria, unless the context indicates a contrary intent.

Date issued: November 29, 1973
Date amended: May 19, 2020
(most recent)



Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

"**Facility**" Means the landfill including all works related to stormwater management in Section 1.5.4.

"**Landfill Criteria**" means the *Landfill Criteria for Municipal Solid Waste*, Second Edition, June 2016, as it is amended or replaced from time to time, or other appropriate guidance or regulation in place at the time, as determined by the Director;

"**Qualified Professional**" in relation to a duty or function referred to in this Operational Certificate, means an individual who:

(a) is registered in British Columbia with a professional organization, is acting under that organization's code of ethics and is subject to disciplinary action by that organization, and

(b) through suitable education, experience, accreditation and knowledge, may reasonably be relied on to provide advice within his or her area of expertise, which area of expertise is applicable to the duty or function;

4. Subsection 2.1. is amended from:

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

to:

The operational certificate holder must cause a Qualified Professional to:

(a) Design and inspect the construction of the Facility, and,

(b) Certify documents related to the Facility including plans, specifications, drawings, construction reports, assessments, reviews, investigations, studies, surveys, programs, reports and as-built record drawings.

(c) Submit a completed Declaration of Competency and a Conflict of Interest Disclosure Statement with each document.

Date issued: November 29, 1973
Date amended: May 19, 2020
(most recent)

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

5. Subsection 2.2.1 is amended from:

> 2.2.1 Plans
>
> Site development, operating, leachate management, closure and post closure plans must be submitted to the Regional Waste Manager by December 31, 2003.

to:

> (a) The operational certificate holder must cause a Qualified Professional to certify and submit an up to date DOCP, for the Facility, to the director before January 1, 2022. The landfill closure component of the DOCP must be submitted to the director by October 1, 2020 for approval.
>
> (b) The DOCP must comply with the requirements of this operational certificate, include the information specified in all the items listed in the Landfill Criteria Section 10.3 Design, Operations and Closure Plan, and, if a Landfill Criteria Upgrading Plan is required pursuant to section 2.7 of this operational certificate, conform with the Landfill Criteria Upgrading Plan.
>
> (c) The operational certificate holder must cause a Qualified Professional to certify and submit an updated DOCP to the director, as necessary to keep the DOCP up to date, at least once every five years after the date specified in the preceding (a).
>
> (d) The operational certificate holder must carry out the most recent DOCP and design, construct, operate, inspect, maintain, monitor, and close the Facility, in compliance with most recent DOCP and this operational certificate.

6. Subsection 2.4 is amended from:

> When 100,000 tonnes of waste have been discharged at the landfill, an assessment of the potential for landfill gas generation must be submitted to the Regional Waste Manager.
>
> The landfill gas assessment must address, but is not limited to, subsections 4.2 and 6.4 of the Landfill Criteria for Municipal Solid Waste and section 6 of the Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills.

Date issued: November 29, 1973
Date amended: May 19, 2020
(most recent)

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

2.4.1 The potential for landfill gas generation is to be re-assessed at least once every 5 years after the initial assessment.

to:

2.4.1 The operational certificate holder must ensure that:

(a) The Facility does not cause:

(i) combustible gas concentrations to exceed the lower explosive limit of methane (5 percent by volume), or a lower concentration specified by the director, in soil at the Landfill Site Boundary;

(ii) combustible gas concentrations to exceed 20 percent of the lower explosive limit of methane (1 percent by volume) in any building;

(iii) federal, provincial, or local ambient air quality objectives and standards to be exceeded in air at the Landfill Site Boundary.

7. Subsection 2.7. is added:

(a) The operational certificate holder must cause a Qualified Professional to certify and submit a Landfill Criteria Conformance Review to the director, on or before January 1, 2022.

(b) The Landfill Criteria Conformance Review must be in accordance with the Landfill Criteria Section 2.2 Conformance of Existing Landfills, and include:

(i) A comparison and evaluation of the conformance status of the Facility with all applicable sections of the Landfill Criteria, and,

(ii) if non-conformance(s) with the Landfill Criteria are identified, a Landfill Criteria Upgrading Plan, including an action plan and schedule for all proposed upgrades to conform to the Landfill Criteria, and technical and environmental justification for any proposed exceptions from the Landfill Criteria.

Date issued: November 29, 1973
Date amended: May 19, 2020
(most recent)

Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

8. Site Plan A is replaced by the following updated Site Plan A (Appendix B).

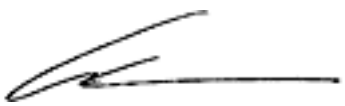
All other terms and conditions of the operational certificate remain in full force and effect.

Please note that although a revised operational certificate document has not been produced at this time a copy of this letter is being placed on the permit file, as an addendum to the operational certificate, to formally reflect the amendments.

This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the permittee. This permit is issued pursuant to the provisions of the Environmental Management Act to ensure compliance with Section 120(3) of that statute, which makes it an offence to discharge waste, from a prescribed industry or activity, without proper authorization. It is also the responsibility of the permittee to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the Environmental Management Act. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

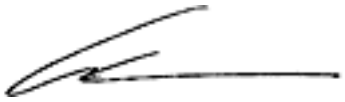
Date issued: November 29, 1973
Date amended: May 19, 2020
(most recent)



Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

Administration of this permit will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Documents pertinent to the operational certificate are to be submitted by email or electronic transfer to the Director, in accordance with the ministry Data & Report Submissions website at: http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions, or as further instructed. If you have any questions or concerns, please contact Authorizations - South at Authorizations.South@gov.bc.ca.

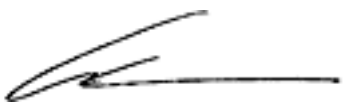
Yours truly,



Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

ENCL:
Appendix A - Operational Certificate 2401 (December 2, 2003)
Appendix B – Site Plan A (April 22, 2020)

Date issued: November 29, 1973
Date amended: May 19, 2020
(most recent)



Luc Lachance, P.Eng
for Director, *Environmental Management Act*
Authorizations - South Region

Appendix A

Operational Certificate 2401 (December 2, 2003)

BRITISH COLUMBIA

Date: DEC 0 2 2003

File: MR-2401

REGISTERED MAIL

Regional District of
Comox-Strathcona
600 Comox Rd
Courtenay BC V9N 3P6

Dear Regional District of Comox-Strathcona:

Enclosed is Operational Certificate MR-2401 issued under the provisions of the *Waste Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual operational certificate fee will be determined according to the Waste Management Operational certificate Fees Regulation.

This operational certificate does not authorise entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorised by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the operational certificate holder. This operational certificate is issued pursuant to the provisions of the *Waste Management Act* to ensure compliance with Section 54(3) of that statute, which makes it an offence to discharge waste without proper authorisation. It is also the responsibility of the operational certificate holder to ensure that all activities conducted under this authorisation are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board. Notice of the appeal must (1) be in writing, (2) include the grounds for appeal, (3) be directed by registered mail or personally delivered to the Chair, Environmental Appeal Board, 4th Floor 836 Yates Street, Victoria, British Columbia, V8V 1X4, (4) be delivered within 30 days from the date notice of the decision is given, and (5) be accompanied by a fee of $25, payable to the Minister of Finance. For further information, please contact the Environmental Appeal Board at 250 387-3464.

.../2

Ministry of Water, Land and Air Protection
Vancouver Island Region
Mailing Address:
2080A Labieux Road
Nanaimo BC V9T 6J9
Telephone: 250 751-3100
Facsimile: 250 751-3103

DEC 0 2 2003

Administration of this operational certificate will be carried out by staff from our regional office located at 2080-A Labieux Road, Nanaimo, British Columbia, V9T 6J9, telephone 250 751-3100. Plans, data and reports pertinent to the operational certificate are to be submitted to the Regional Waste Manager, at this address.

Yours truly,

B. W. Medlar
Assistant Regional Waste Manager
Vancouver Island Region

Enclosure

BRITISH COLUMBIA

MINISTRY OF WATER, LAND AND AIR PROTECTION

Vancouver Island Region
Environmental Protection
2080-A Labieux Road
Nanaimo, British Columbia
V9T 6J9
Telephone: (250) 751-3100
Fax: (250) 751-3103

OPERATIONAL CERTIFICATE

MR-02401

Under the Provisions of the Waste Management Act

Regional District of Comox-Strathcona

600 Comox Road

Courtenay, British Columbia

V9N 3P6

is authorised to manage waste and recyclable material from the Regional District of Comox-Strathcona and environs at the Campbell River landfill located on Argonaut Road, Campbell River, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Waste Management Act* and may result in prosecution.

1. MANAGEMENT OF WASTE AND RECYCLABLE MATERIAL

1.1. Sanitary Landfill

1.1.1. This subsection applies to the discharge of waste to a sanitary landfill.

1.1.2. Waste may be discharged to the sanitary landfill shown on attached Site Plan A.

1.1.3. The characteristics of the discharge must be municipal solid waste as defined under the *Waste Management Act* and other wastes as approved in writing by the Regional Waste Manager.

1.1.4. The authorised works are a sanitary landfill, and related appurtenances approximately located as shown on attached Site Plan A.

1.1.5. The authorised works must be complete and in operation on and from the date of this operational certificate.

1.2. Leachate

1.2.1. This subsection applies to leachate from the landfill.

1.2.2. The characteristics of the leachate must not exceed concentrations set in the *British Columbia Approved Water Quality Guidelines (Criteria)* and *A Compendium of Working Water Quality Guidelines for British Columbia* at the property boundary. Where natural background water quality concentrations

Date Issued: DEC 0 2 2003
Date Amended:
(most recent)

B. W. Medlar
Assistant Regional Waste Manager

exceed the aforementioned guidelines, characteristics of the leachate must not exceed background concentrations.

1.3. Entrance facilities

1.3.1. The authorised facilities are signs, weigh scales, recyclable material and waste drop-off and storage facilities and related appurtenances.

1.3.2. The authorised facilities must be complete and in operation on and from the date of this operational certificate.

1.4. Location of Authorised Facilities

The location of the facilities for the management of waste and recyclable material to which this operational certificate is applicable is Block C of District Lot 85, Sayward Land District, approximately located as shown on attached Site Plan A.

2. GENERAL REQUIREMENTS

2.1. Qualified Professionals

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

2.2. Plans

2.2.1. Site development, operating, leachate management, closure and post closure plans must be submitted to the Regional Waste Manager by December 31, 2003.

2.2.2. The plans referenced in subsection 2.2.1 must address, but not be limited to, each of the subsections in the *Landfill Criteria for Municipal Solid Waste* including performance, siting, design, operational and closure and post-closure criteria.

2.2.3. The facilities must be developed, operated and closed in accordance with the plans referenced in subsection 2.2.1.

2.3. Bear-Proof Facilities

2.3.1. Bears must not access putrescible waste at the landfill facility. All putrescible waste that arrives at the landfill facility must be immediately contained within a bear-proof bin or an area enclosed by a bear-proof electric fence. Grass, leaves, weeds, branches and woodwaste are exempt from bear-proofing requirements.

2.3.2. A bear-proof electric fence must be installed around the landfill facilities.

B. W. Medlar
Assistant Regional Waste Manager

2.3.3. The bear-proof fence must be designed, constructed, operated and maintained to prevent bears from penetrating the fence.

2.3.4. The bear-proof electric fence and bear-proof bins must be installed and in operation by March 30, 2004.

2.4. Landfill Gas

2.4.1. When 100,000 tonnes of waste have been discharged at the landfill, an assessment of the potential for landfill gas generation must be submitted to the Regional Waste Manager.

2.4.2. The landfill gas assessment must address, but is not limited to, subsections 4.2 and 6.4 of the *Landfill Criteria for Municipal Solid Waste* and section 6 of the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills.*

2.4.3. The potential for landfill gas generation is to be re-assessed at least once every 5 years after the initial assessment.

2.5. Seismic and Fault Activity

A report that assesses the risk from seismic and fault activity must be submitted to the Regional Waste Manager by December 31, 2003.

2.6. Additional Facilities or Works

The Regional Waste Manager may require investigations, surveys, and the construction of additional facilities or works including, but not limited to, additional leachate and landfill gas management facilities. The Regional Waste Manager may also amend the requirements of any of the information required by this operational certificate including plans, programs, assessments and reports.

3. MONITORING AND REPORTING

3.1. Monitoring Program

3.1.1. A monitoring program must be developed to identify any impacts to the environment and public health from the landfill.

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

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

Date Issued: DEC 0 2 2003
Date Amended:
(most recent)

B. W. Medlar
Assistant Regional Waste Manager

3.2. Annual Operating and Monitoring Report

3.2.1. An annual operating and monitoring report for the preceding 12 month period from January 1 to December 31 must be submitted to the Regional Waste Manager by April 30 of each year.

3.2.2. The report must include:

- An executive summary;
- Tonnage of each type of waste discharged to the landfill for the year;
- Remaining site life and capacity;
- Review of the preceding year of operation, plans for the next year and any new information or proposed changes relating to the facilities and plans;
- Comparison of the monitoring data with the performance criteria in section 4 of the *Landfill Criteria for Municipal Solid Waste* and the *Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills*, interpretation of the monitoring data, identification and interpretation of irregularities and trends, recommendations, and any proposed changes to the monitoring program.

4. SITE CLOSURE

4.1. Closure and Post-Closure Fund

A closure and post-closure financial security trust fund must be built up over time. The closure and post-closure fund must ultimately meet or exceed the estimated closure and post-closure costs plus a reasonable contingency for any remediation that may be required.

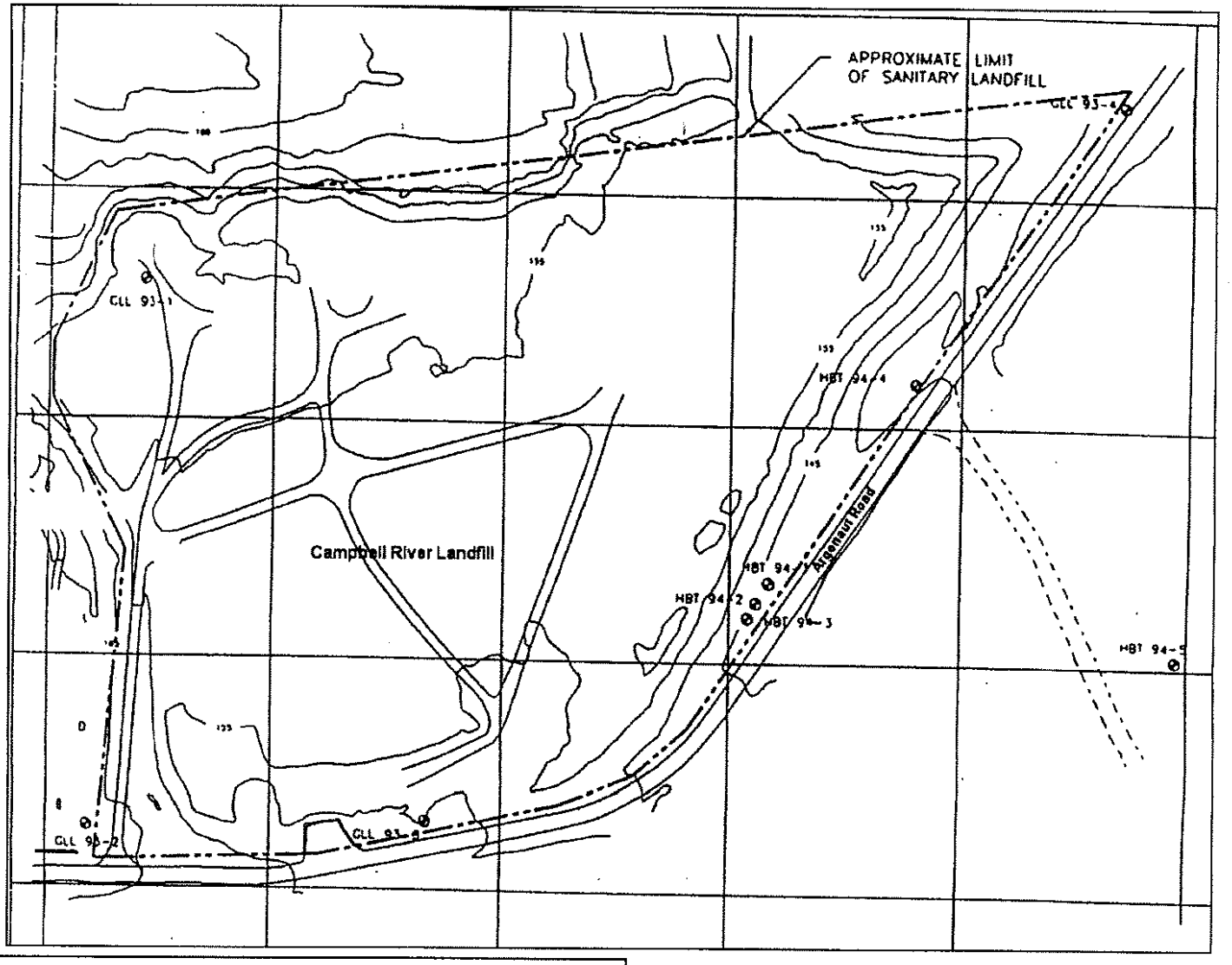
Date Issued: DEC 0 2 2003
Date Amended:
(most recent)

B. W. Medlar
Assistant Regional Waste Manager

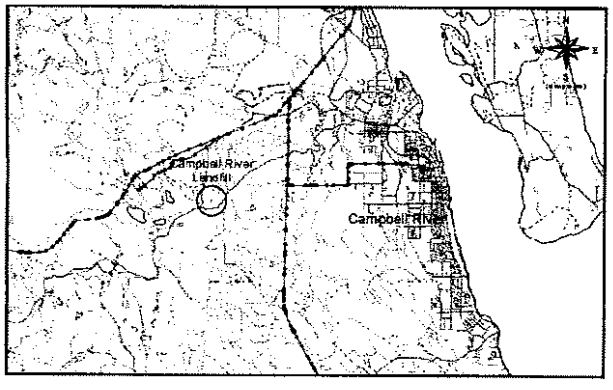
PROVINCE OF
BRITISH COLUMBIA

Environmental Protection

SITE PLAN A



Location Map



Scale: Not to Scale

Operational Certificate: MR-02401

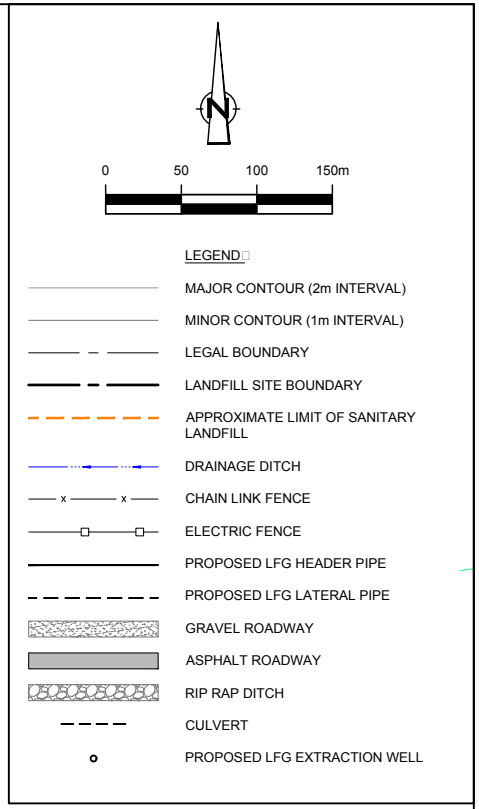
Date: DEC 0 2 2003

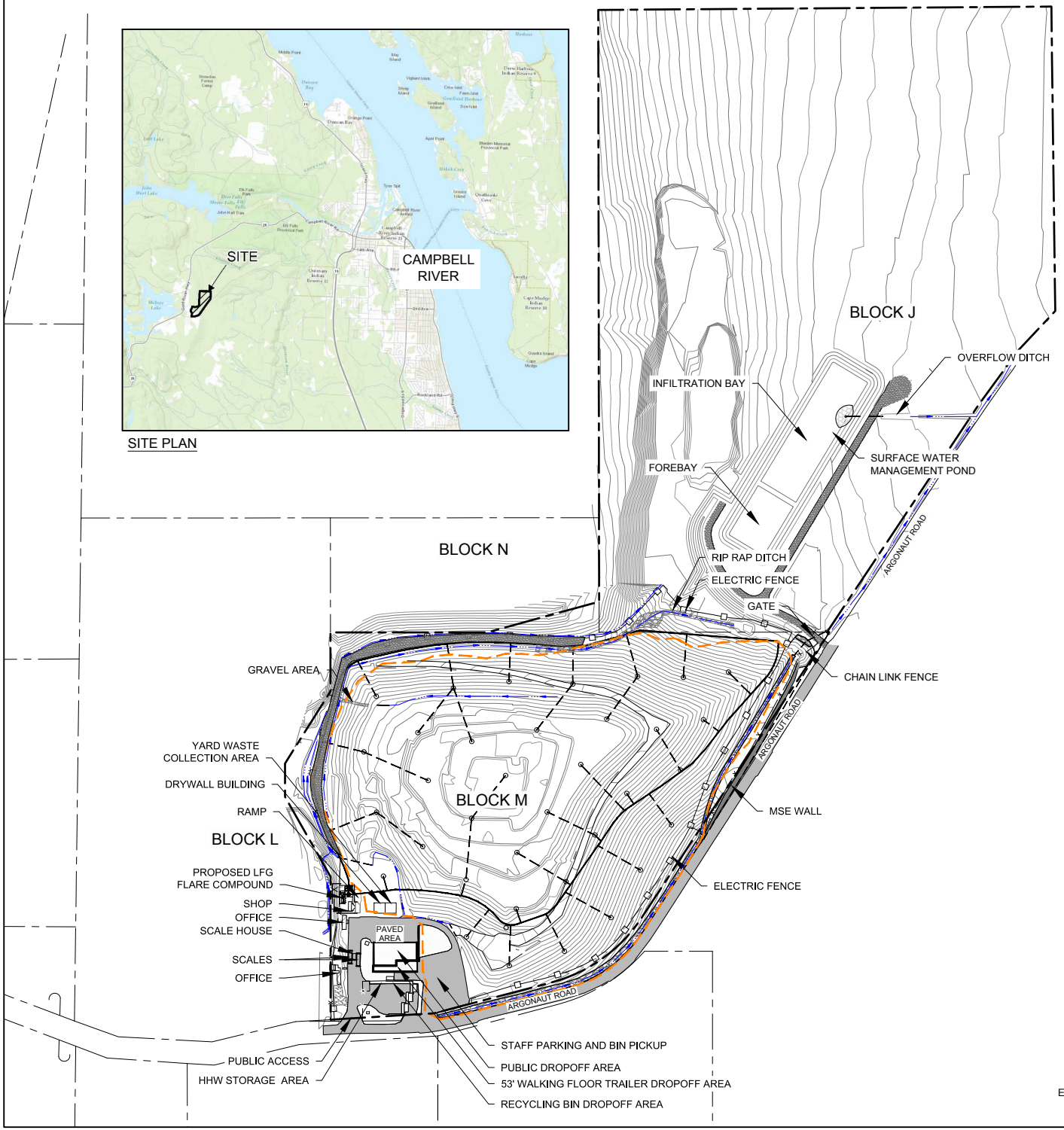
B. W. Medlar
Assistant Regional Waste Manager
Vancouver Island Region

Appendix B

Site Plan (April 22,2020)

SITE PLAN





EXISTING TOPOGRAPHICAL SURVEY COMPLETED OCTOBER 24, 2018.

Appendix B
License No. V934579 and Lease No. 103555

BRITISH COLUMBIA

LEASE

Lease No.: V934579

File No.: 0307020
Disposition No.: 934579

THIS AGREEMENT is dated for reference January 8, 2019 and is made under the *Land Act.* BETWEEN:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, represented by the minister responsible for the *Land Act*, Parliament Buildings, Victoria, British Columbia

(the "Province")

AND:

COMOX VALLEY REGIONAL DISTRICT
600 Comox Rd
Courtenay, BC V9N 3P6

(the "Lessee")

The parties agree as follows:

ARTICLE 1 - INTERPRETATION

1.1 In this Agreement,

"Agreement" means this lease;

"Commencement Date" means January 8, 2019;

"disposition" has the meaning given to it in the *Land Act* and includes a licence of occupation;

"Hazardous Substances" means any substance which is hazardous to persons, property or the environment, including without limitation

(a) waste, as that term is defined in the *Environmental Management Act*; and

(b) any other hazardous, toxic or other dangerous substance, the use, transportation or release into the environment of which, is now or from time to time prohibited, controlled or regulated under any laws or by any governmental authority, applicable to, or having jurisdiction in relation to, the Land;

"Improvements" includes anything made, constructed, erected, built, altered, repaired or added to, in, on or under the Land, and attached to it or intended to become a part of it, and also includes any clearing, excavating, digging, drilling, tunnelling, filling, grading or ditching of, in, on or under the Land;

"Land" means that part or those parts of the Crown land either described in, or shown outlined by bold line on, the schedule attached to this Agreement entitled "Legal Description Schedule" except for those parts of the land that, on the Commencement Date, consist of highways (as defined in the *Transportation Act*) and land covered by water;

"Realty Taxes" means all taxes, rates, levies, duties, charges and assessments levied or charged, at any time, by any government authority having jurisdiction which relate to the Land, the Improvements or both of them and which you are liable to pay under applicable laws;

"Rent" means the rent set out in Article 3;

"Security" means the security referred to in section 6.1 or 6.2, as replaced or supplemented in accordance with section 6.5;

"Term" means the period of time set out in section 2.2;

"we", **"us"** or **"our"** refers to the Province alone and never refers to the combination of the Province and the Lessee: that combination is referred to as **"the parties"**; and

"you" or **"your"** refers to the Lessee.

1.2 In this Agreement, "person" includes a corporation, partnership or party, and the personal or other legal representatives of a person to whom the context can apply according to law and wherever the singular or masculine form is used in this Agreement it will be construed as the plural or feminine or neuter form, as the case may be, and vice versa where the context or parties require.

1.3 The captions and headings contained in this Agreement are for convenience only and do not define or in any way limit the scope or intent of this Agreement.

1.4 This Agreement will be interpreted according to the laws of the Province of British Columbia.

1.5 Where there is a reference to an enactment of the Province of British Columbia or of Canada in this Agreement, that reference will include a reference to every amendment to it, every regulation made under it and any subsequent enactment of like effect and, unless otherwise indicated, all enactments referred to in this Agreement are enactments of the Province of British Columbia.

1.6 If any section of this Agreement, or any part of a section, is found to be illegal or unenforceable, that section or part of a section, as the case may be, will be considered separate and severable and the remainder of this Agreement will not be affected and this Agreement will be enforceable to the fullest extent permitted by law.

1.7 Each schedule to this Agreement is an integral part of this Agreement as if set out at length in the body of this Agreement.

1.8 This Agreement constitutes the entire agreement between the parties and no understanding or agreement, oral or otherwise, exists between the parties with respect to the subject matter of this Agreement except as expressly set out in this Agreement and this Agreement may not be modified except by subsequent agreement in writing between the parties.

1.9 Each party will, upon the request of the other, do or cause to be done all lawful acts necessary for the performance of the provisions of this Agreement.

1.10 Any liabilities or obligations of either party arising, or to be performed, before or as a result of the termination of this Agreement, and which have not been satisfied or remain unperformed at the termination of this Agreement, any indemnity and any release in our favour and any other provision which specifically states that it will survive the termination of this Agreement, shall survive and not be affected by the expiration of the Term or the termination of this Agreement.

1.11 Time is of the essence of this Agreement.

1.12 Wherever this Agreement provides that an action may be taken, a consent or approval must be obtained or a determination must be made, then you or we, as the case may be, will act reasonably in taking such action, deciding whether to provide such consent or approval or making such determination; but where this Agreement states that you or we have sole discretion to take an action, provide a consent or approval or make a determination, there will be no requirement to show reasonableness or to act reasonably in taking that action, providing that consent or approval or making that determination.

1.13 Any requirement under this Agreement for us to act reasonably shall not require us to act in a manner that is contrary to or inconsistent with any legislation, regulations, Treasury Board directives or other enactments or any policy, directive, executive direction or other such guideline of general application.

1.14 Where this Agreement contains the forms of words contained in Column I of Schedule 4 of the *Land Transfer Form Act,* those words will have the same effect and be construed as if the appropriate forms of words contained in Column II of that Schedule were contained in this Agreement, unless the context requires another construction of those words.

ARTICLE 2 - GRANT AND TERM

2.1 On the terms and conditions set out in this Agreement, we grant you a lease of the Land for waste disposal site and drainage works purposes.

2.2 The term of this Agreement commences on the Commencement Date and terminates on the 30th anniversary of that date, or such earlier date provided for in this Agreement. We reserve the right to terminate this Agreement in certain circumstances as expressly provided in this Agreement.

ARTICLE 3 - RENT

3.1 The Rent for the Term is $1.00, the receipt of which we acknowledge.

ARTICLE 4 - COVENANTS

4.1 You must

(a) pay, when due,

(i) the Rent to us at the address set out in Article 10,

(ii) the Realty Taxes, and

(iii) all charges for electricity, gas, water and other utilities supplied to the Land;

(b) deliver to us, immediately upon demand, receipts or other evidence of the payment of Realty Taxes and all other money required to be paid by you under this Agreement;

(c) observe, abide by and comply with

(i) all applicable laws, bylaws, orders, directions, ordinances and regulations of any government authority having jurisdiction in any way affecting your use or occupation of the Land or the Improvements including without limitation all laws, bylaws, orders, directions, ordinances and regulations relating in any way

to Hazardous Substances, the environment and human health and safety, and

(ii) the provisions of this Agreement;

(d) in respect of the use of the Land by you or by any person who enters upon or uses the Land as a result of your use of the Land under this Agreement, keep the Land and the Improvements in a safe, clean and sanitary condition satisfactory to us, and at our written request, rectify any failure to comply with such a covenant by making the Land and the Improvements safe, clean and sanitary;

(e) not commit any wilful or voluntary waste, spoil or destruction on the Land or do anything on the Land that may be or become a nuisance to an owner or occupier of land in the vicinity of the Land;

(f) use and occupy the Land only in accordance with and for the purposes set out in section 2.1;

(g) not construct, place or affix any Improvement on or to the Land except as permitted in the Management Plan;

(h) pay all accounts and expenses as they become due for labour or services performed on, or materials supplied to, the Land except for money that you are required to hold back under the *Builders Lien Act*;

(i) if any claim of lien over the Land is made under the *Builders Lien Act*, immediately take all steps necessary to have the lien discharged, unless the claim of lien is being contested in good faith by you and you have taken the steps necessary to ensure that the claim of lien will not subject the Land or any interest of yours under this Agreement to sale or forfeiture;

(j) if any soil is disturbed by you as a result of your construction or maintenance of the Improvements, at your expense, restore the surface of the Land to a condition satisfactory to us;

(k) take all reasonable precautions to avoid disturbing or damaging any archaeological material found on or under the Land and, upon discovering any archaeological material on or under the Land, you must immediately notify the ministry responsible for administering the *Heritage Conservation Act*;

(l) permit us, or our authorized representatives, to enter on the Land at any time to inspect the Land and the Improvements, including without limitation to test and remove soil, groundwater and other materials and substances, where the inspection may be necessary or advisable for us to determine whether or not you have complied with your

obligations under this Agreement with respect to Hazardous Substances, provided that we take reasonable steps to minimize any disruption of your operations;

(m) indemnify and save us and our servants, employees and agents harmless against all claims, actions, causes of action, losses, damages, costs and liabilities, including fees of solicitors and other professional advisors, arising out of one or more of the following:

(i) any breach, violation or non-performance of a provision of this Agreement,

(ii) any conflict between your use of the Land under this Agreement and the lawful use of the Land by any other person, and

(iii) any personal injury, bodily injury (including death) or property damage occurring or happening on or off the Land by virtue of your entry upon, use or occupation of the Land,

and the amount of all such losses, damages, costs and liabilities will be payable to us immediately upon demand; and

(n) on the termination of this Agreement,

(i) peaceably quit and deliver to us possession of the Land and, subject to paragraphs (ii) and (iii), the Improvements in a safe, clean and sanitary condition,

(ii) within 60 days, remove from the Land any Improvement you want to remove, if the Improvement was placed on or made to the Land by you, is in the nature of a tenant's fixture normally removable by tenants and is not part of a building (other than as a tenant's fixture) or part of the Land and you are not in default of this Agreement,

(iii) remove from the Land any Improvement that we, in writing, direct or permit you to remove, other than any Improvement permitted to be placed on or made to the Land under another disposition, and

(iv) restore the surface of the Land as nearly as may reasonably be possible, to the condition that the Land was in at the time it originally began to be used for the purposes described in this Agreement, but if you are not directed or permitted to remove an Improvement under paragraph (iii), this paragraph will not apply to that part of the surface of the Land on which that Improvement is located,

and all of your right, interest and estate in the Land will be absolutely forfeited to us, and to the extent necessary, this covenant will survive the termination of this

Agreement.

4.2 You will not permit any person who enters upon or uses the Land as a result of your use of the Land under this Agreement to do anything you are restricted from doing under this Article.

4.3 You must not use all or any part of the Land

(a) for the storage or disposal of any Hazardous Substances; or

(b) in any other manner whatsoever which causes or contributes to any Hazardous Substances being added or released on, to or under the Land or into the environment from the Land;

unless

(c) such storage, disposal, release or other use does not result in your breach of any other provision of this Agreement, including without limitation, your obligation to comply with all laws relating in any way to Hazardous Substances, the environment and human health and safety; and

(d) we have given our prior written approval to such storage, disposal, release or other use and for certainty any such consent operates only as a consent for the purposes of this section and does not bind, limit, or otherwise affect any other governmental authority from whom any consent, permit or approval may be required.

4.4 Despite any other provision of this Agreement you must:

(a) on the expiry or earlier termination of this Agreement; and

(b) at any time if we request and if you are in breach of your obligations under this Agreement relating to Hazardous Substances;

promptly remove from the Land all Hazardous Substances stored, or disposed of, on the Land, or which have otherwise been added or released on, to or under the Land:

(c) by you; or

(d) as a result of the use of the Land under this Agreement; or

(e) as a result of the use of the Land under the following prior agreements: Licence V922305, dated for reference December 6, 2016;

save and except only to the extent that we have given a prior written approval expressly

allowing specified Hazardous Substances to remain on the Land following the expiry of the Term.

4.5 We may from time to time

(a) in the event of the expiry or earlier termination of this Agreement;

(b) as a condition of our consideration of any request for consent to an assignment of this Agreement; or

(c) if we have a reasonable basis for believing that you are in breach of your obligations under this Agreement relating to Hazardous Substances;

provide you with a written request to investigate the environmental condition of the Land and upon any such request you must promptly obtain, at your cost, and provide us with, a report from a qualified and independent professional who has been approved by us, as to the environmental condition of the Land, the scope of which must be satisfactory to us and which may include all such tests and investigations that such professional may consider to be necessary or advisable to determine whether or not you have complied with your obligations under this Agreement with respect to Hazardous Substances.

4.6 You must at our request from time to time, but not more frequently than annually, provide us with your certificate (and if you are a corporation such certificate must be given by a senior officer) certifying that you are in compliance with all of your obligations under this Agreement pertaining to Hazardous Substances, and that no adverse environmental occurrences have taken place on the Land, other than as disclosed in writing to us.

4.7 We will provide you with quiet enjoyment of the Land.

ARTICLE 5 - LIMITATIONS

5.1 You agree with us that

(a) in addition to the other reservations and exceptions expressly provided in this Agreement this Agreement is subject to the exceptions and reservations of interests, rights, privileges and titles referred to in section 50 of the *Land Act*;

(b) other persons may hold or acquire rights to use the Land in accordance with enactments other than the *Land Act* or the *Ministry of Lands, Parks and Housing Act*, including rights held or acquired under the *Coal Act, Forest Act, Geothermal Resources Act, Mineral Tenure Act, Petroleum and Natural Gas Act, Range Act, Water Sustainability Act* or *Wildlife Act* (or any prior or subsequent enactment of the Province of British

Columbia of like effect); such rights may exist as of the Commencement Date and may be granted or acquired subsequent to the Commencement Date and may affect your use of the Land;

(c) with your prior consent, which consent you will not unreasonably withhold, we may make other dispositions of or over the Land, or any part of it, by way of easement, right of way or statutory right of way, to any person, including a Crown agency or ministry, and, upon such consent being given you will, if required by us, execute and deliver to us such instrument as may be necessary to subordinate your rights under this Agreement to such easement, right of way or statutory right of way;

(d) for the purpose of subsection (c), you will be deemed to have reasonably withheld your consent if a disposition made under that subsection would have a material adverse impact on your use of the Land under this Agreement;

(e) you have no right to compensation from us and you release us from all claims, actions, causes of action, suits, debts and demands that you now have or may at any time in the future have against us arising out of any conflict between your use of the Land under this Agreement and any use of, or impact on the Land arising from the exercise, or operation of the interests, rights, privileges and titles described in subsections (a), (b), and (c);

(f) if a proposed disposition under subsection (c) will not have a material adverse impact on your use of the Land under this Agreement you must not require any payment, whether as compensation or any other charge, as a condition of your consent to that disposition;

(g) you will not commence or maintain proceedings under section 65 of the *Land Act* in respect of any interference with your use of the Land under this Agreement that arises as a result of the exercise or operation of the interests, rights, privileges and titles described in subsections (a), (b) and (c);

(h) any interference with your use of the Land under this Agreement as a result of the exercise or operation of the interests, rights, privileges and titles described in subsection (a), (b) and (c) will not constitute a breach of our covenant of quiet enjoyment and you release and discharge us from all claims for loss or damage arising directly or indirectly out of any such interference;

(i) this Agreement does not limit any right to notice, compensation or any other benefit that you may be entitled to from time to time under the enactments described in subsection (b), or any other applicable enactment;

(j) you will not remove or permit the removal of any Improvement from the Land except as

expressly permitted or required under this Agreement;

(k) any interest you may have in the Improvements ceases to exist and becomes our property upon termination of this Agreement, except where an Improvement may be removed under paragraph 4.1(n)(ii) or (iii) in which case any interest you may have in that Improvement ceases to exist and becomes our property if the Improvement is not removed from the Land within the time period set out in paragraph 4.1(n)(ii) or the time period provided for in the direction or permission given under paragraph 4.1(n)(iii); and

(l) if, after the termination of this Agreement, we permit you to remain in possession of the Land and we accept money from you in respect of such possession, a tenancy from year to year will not be created by implication of law and you will be deemed to be a monthly tenant only subject to all of the provisions of this Agreement, except as to duration, in the absence of a written agreement to the contrary.

ARTICLE 6 - SECURITY AND INSURANCE

6.1 On the Commencement Date, you will deliver to us Security in the amount of $0.00 which will

(a) guarantee the performance of your obligations under this Agreement;

(b) be in the form required by us; and

(c) remain in effect until we certify, in writing, that you have fully performed your obligations under this Agreement.

6.2 Despite section 6.1, your obligations under that section are suspended for so long as you maintain in good standing other security acceptable to us to guarantee the performance of your obligations under this Agreement and all other dispositions held by you.

6.3 We may use the Security for the payment of any costs and expenses associated with any of your obligations under this Agreement that are not performed by you or to pay any overdue Rent and, if such event occurs, you will, within 30 days of that event, deliver further Security to us in an amount equal to the amount drawn down by us.

6.4 After we certify, in writing, that you have fully performed your obligations under this Agreement, we will return to you the Security maintained under section 6.1, less all amounts drawn down by us under section 6.3.

6.5 You acknowledge that we may, from time to time, notify you to

(a) change the form or amount of the Security; and

(b) provide and maintain another form of Security in replacement of or in addition to the Security posted by you under this Agreement;

and you will, within 60 days of receiving such notice, deliver to us written confirmation that the change has been made or the replacement or additional form of Security has been provided by you.

6.6 You must

(a) without limiting your obligations or liabilities under this Agreement, at your expense, purchase and maintain during the Term the following insurance with insurers licensed to do business in Canada:

(i) Commercial General Liability insurance in an amount of not less than $2,000,000.00 inclusive per occurrence insuring against liability for personal injury, bodily injury (including death) and property damage, including coverage for all accidents or occurrences on the Land or the Improvements. Such policy will include cross liability, liability assumed under contract, provision to provide 30 days advance notice to us of material change or cancellation, and include us as additional insured;

(ii) Environmental Impairment Liability (Pollution Legal Liability) insurance insuring against bodily injury, property damage, and cleanup expenses (including removal and/or transit and disposal of contaminants) arising from gradual or sudden pollution events arising from the performance of this Agreement by you in an amount not less than two million dollars ($2,000,000) per occurrence, including provision to provide 30 days advance notice to us of material change or cancellation, and include us as additional insured. If this insurance is written on a claims-made basis it must include the option to purchase an extended reporting period of 24 months beyond the date of cancellation or expiry of this Agreement;

(b) ensure that all insurance required to be maintained by you under this Agreement is primary and does not require the sharing of any loss by any of our insurers;

(c) within 10 working days of Commencement Date of this Agreement, provide to us evidence of all required insurance in the form of a completed "Province of British Columbia Certificate of Insurance";

(d) if the required insurance policy or policies expire or are cancelled before the end of the Term of this Agreement, provide within 10 working days of the cancellation or expiration, evidence of new or renewal policy or policies of all required insurance in the

form of a completed "Province of British Columbia Certificate of Insurance";

(e) notwithstanding subsection (c) or (d) above, if requested by us, provide to us certified copies of the required insurance policies.

6.7 We may, acting reasonably, from time to time, require you to

(a) change the amount of insurance set out in subsection 6.6(a); and

(b) provide and maintain another type or types of insurance in replacement of or in addition to the insurance previously required to be maintained by you under this Agreement;

and you will, within 60 days of receiving such notice, cause the amounts and types to be changed and deliver to us a completed "Province of British Columbia Certificate of Insurance" for all insurance then required to be maintained by you under this Agreement.

6.8 You shall provide, maintain, and pay for any additional insurance which you are required by law to carry, or which you consider necessary to insure risks not otherwise covered by the insurance specified in this Agreement in your sole discretion.

6.9 You waive all rights of recourse against us with regard to damage to your own property.

ARTICLE 7 - ASSIGNMENT

7.1 You must not sublease, assign, mortgage or transfer this Agreement, or permit any person to use or occupy the Land, without our prior written consent, which consent we may withhold.

7.2 Prior to considering a request for our consent under section 7.1, we may require you to meet certain conditions, including without limitation, that you provide us with a report as to the environmental condition of the Land as provided in section 4.5.

ARTICLE 8 - TERMINATION

8.1 You agree with us that

(a) if you

(i) default in the payment of any money payable by you under this Agreement, or

(ii) fail to observe, abide by and comply with the provisions of this Agreement (other than the payment of any money payable by you under this Agreement),

and your default or failure continues for 60 days after we give written notice of the default or failure to you,

(b) if, in our opinion, you fail to make diligent use of the Land for the purposes set out in this Agreement, and your failure continues for 60 days after we give written notice of the failure to you;

(c) if you

(i) become insolvent or make an assignment for the general benefit of your creditors,

(ii) commit an act which entitles a person to take action under the *Bankruptcy and Insolvency Act* (Canada) or a bankruptcy petition is filed or presented against you or you consent to the filing of the petition or a decree is entered by a court of competent jurisdiction adjudging you bankrupt under any law relating to bankruptcy or insolvency, or

(iii) voluntarily enter into an arrangement with your creditors;

(d) if you are a corporation,

(i) a receiver or receiver-manager is appointed to administer or carry on your business, or

(ii) an order is made, a resolution passed or a petition filed for your liquidation or winding up;

(e) if you are a society, you convert into a company in accordance with the *Society Act* without our prior written consent; or

(f) if this Agreement is taken in execution or attachment by any person;

this Agreement will, at our option and with or without entry, terminate, and all of your right, interest and estate in the Land will be absolutely forfeited to us.

8.2 If the condition complained of (other than the payment of any money payable by you under this Agreement) reasonably requires more time to cure than 60 days, you will be deemed to have complied with the remedying of it if you commence remedying or curing the condition within 60 days and diligently complete the same.

8.3 You agree with us that

(a) you will make no claim against us for compensation, in damages or otherwise, upon the lawful termination of this Agreement under section 8.1; and

(b) our remedies under this Article are in addition to those available to us under the *Land Act*.

ARTICLE 9 - DISPUTE RESOLUTION

9.1 If any dispute arises under this Agreement, the parties will make all reasonable efforts to resolve the dispute within 60 days of the dispute arising (or within such other time period agreed to by the parties) and, subject to applicable laws, provide candid and timely disclosure to each other of all relevant facts, information and documents to facilitate those efforts.

9.2 Subject to section 9.5, if a dispute under this Agreement cannot be resolved under section 9.1, we or you may refer the dispute to arbitration conducted by a sole arbitrator appointed pursuant to the *Commercial Arbitration Act*.

9.3 The cost of the arbitration referred to in section 9.2 will be shared equally by the parties and the arbitration will be governed by the laws of the Province of British Columbia.

9.4 The arbitration will be conducted at our offices (or the offices of our authorized representative) in Campbell River, British Columbia, and if we or our authorized representative have no office in Campbell River, British Columbia, then our offices (or the offices of our authorized representative) that are closest to Campbell River, British Columbia.

9.5 A dispute under this Agreement in respect of a matter within our sole discretion cannot, unless we agree, be referred to arbitration as set out in section 9.2.

ARTICLE 10 - NOTICE

10.1 Any notice required to be given by either party to the other will be deemed to be given if mailed by prepaid registered mail in Canada or delivered to the address of the other as follows:

to us

MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT
370 South Dogwood Street
Campbell River, BC V9W 6Y7;

to you

COMOX VALLEY REGIONAL DISTRICT
600 Comox Rd
Courtenay, BC V9N 3P6;

or at such other address as a party may, from time to time, direct in writing, and any such notice will be deemed to have been received if delivered, on the day of delivery, and if mailed, 7 days after the time of mailing, except in the case of mail interruption in which case actual receipt is required.

10.2 In order to expedite the delivery of any notice required to be given by either party to the other, a concurrent facsimile copy of any notice will, where possible, be provided to the other party but nothing in this section, and specifically the lack of delivery of a facsimile copy of any notice, will affect the deemed delivery provided in section 10.1.

10.3 The delivery of all money payable to us under this Agreement will be effected by hand, courier or prepaid regular mail to the address specified above, or by any other payment procedure agreed to by the parties, such deliveries to be effective on actual receipt.

ARTICLE 11 - MISCELLANEOUS

11.1 No provision of this Agreement will be considered to have been waived unless the waiver is in writing, and a waiver of a breach of a provision of this Agreement will not be construed as or constitute a waiver of any further or other breach of the same or any other provision of this Agreement, and a consent or approval to any act requiring consent or approval will not waive or render unnecessary the requirement to obtain consent or approval to any subsequent same or similar act.

11.2 No remedy conferred upon or reserved to us under this Agreement is exclusive of any other remedy in this Agreement or provided by law, but that remedy will be in addition to all other remedies in this Agreement or then existing at law, in equity or by statute.

11.3 The grant of a sublease, assignment or transfer of this Agreement does not release you from your obligation to observe and perform all the provisions of this Agreement on your part to be observed and performed unless we specifically release you from such obligation in our consent to the sublease, assignment or transfer of this Agreement.

11.4 This Agreement extends to, is binding upon and enures to the benefit of the parties, their heirs, executors, administrators, successors and permitted assigns.

11.5 If, due to a strike, lockout, labour dispute, act of God, inability to obtain labour or materials, law, ordinance, rule, regulation or order of a competent governmental authority, enemy or hostile action, civil commotion, fire or other casualty or any condition or cause beyond your reasonable control, other than normal weather conditions, you are delayed in performing any of your obligations under this Agreement, the time for the performance of that obligation will be extended by a period of time equal to the period of time of the delay so long as

(a) you give notice to us within 30 days of the commencement of the delay setting forth the nature of the delay and an estimated time frame for the performance of your obligation; and

(b) you diligently attempt to remove the delay.

11.6 You acknowledge and agree with us that

(a) this Agreement has been granted to you on the basis that you accept the Land on an "as is" basis;

(b) without limitation we have not made, and you have not relied upon, any representation or warranty from us as to

(i) the suitability of the Land for any particular use, including the use permitted by this Agreement;

(ii) the condition of the Land (including surface and groundwater), environmental or otherwise, including the presence of or absence of any toxic, hazardous, dangerous or potentially dangerous substances on or under the Land and the current and past uses of the Land and any surrounding land and whether or not the Land is susceptible to erosion or flooding;

(iii) the general condition and state of all utilities or other systems on or under the Land or which serve the Land;

(iv) the zoning of the Land and the bylaws of any government authority which relate to the development, use and occupation of the Land; and

(v) the application of any federal or provincial enactment or law to the Land;

(c) you have been afforded a reasonable opportunity to inspect the Land or to carry out such other audits, investigations, tests and surveys as you consider necessary to investigate those matters set out in subsection (b) to your satisfaction before entering into this Agreement;

(d) you waive, to the extent permitted by law, the requirement if any, for us to provide you with a "site profile" under the *Environmental Management Act* or any regulations made under that act;

(e) we are under no obligation, express or implied, to provide financial assistance or to contribute toward the cost of servicing, creating or developing the Land or the Improvements and you are solely responsible for all costs and expenses associated with your use of the Land and the Improvements for the purposes set out in this Agreement; and

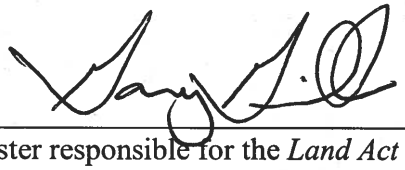
(f) we are under no obligation to provide access or services to the Land or to maintain or improve existing access roads.

11.7 You agree with us that nothing in this Agreement constitutes you as our agent, joint venturer or partner or gives you any authority or power to bind us in any way.

11.8 This Agreement does not override or affect any powers, privileges or immunities to which you are entitled under any enactment of the Province of British Columbia.

The parties have executed this Agreement as of the date of reference of this Agreement.

SIGNED on behalf of **HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA**
by the minister responsible for the *Land Act*
or the minister's authorized representative



Minister responsible for the *Land Act*
or the minister's authorized representative

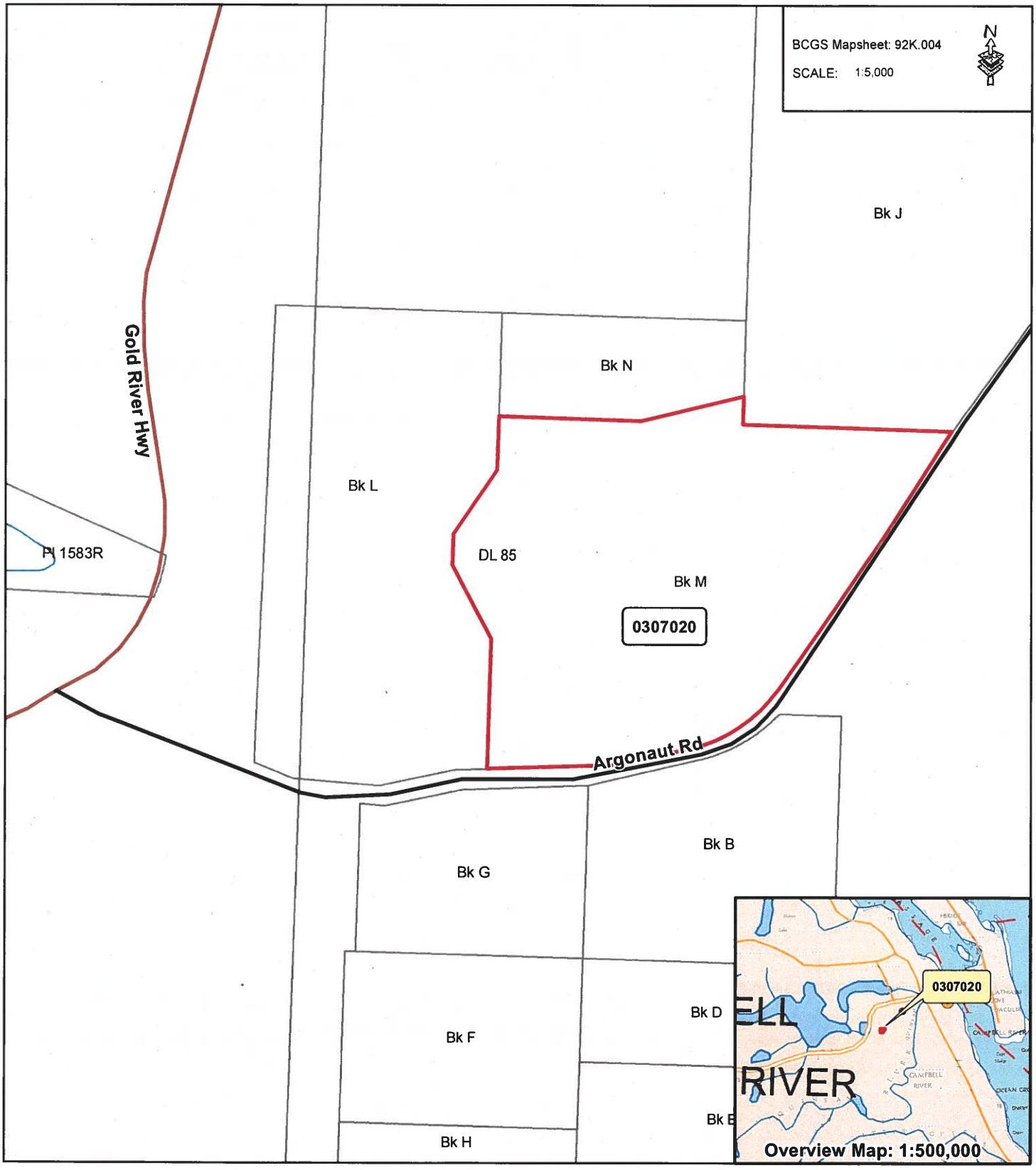
SIGNED on behalf of **COMOX VALLEY REGIONAL DISTRICT**
By its authorized signatories

Authorized Signatory

Authorized Signatory

LEGAL DESCRIPTION SCHEDULE

LEGAL DESCRIPTION: Block M, District Lot 85, Sayward District



BRITISH COLUMBIA

Ministry of Forests,
Lands and Natural
Resource Operations

Consent to Sub-Tenure

Lease No.: V934579 File No.: 0307020

CONSENT TO SUB-TENURE

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, as represented by the Minister responsible for the *Land Act* (the "Province") tenured the use of the following described land to the Comox Valley Regional District by way of a Lease No. V934579 dated the 8th day of January 2019:

Block M, District Lot 85, Sayward District.

In accordance with Article 7 of the Lease, the tenure-holder has asked the Province to consent to a sub-tenure to the City of Campbell River (the "sub-tenure-holder").

The Province hereby consents to the sub-tenure by the tenure-holder in favour of the sub-tenure-holder on the following terms and conditions:

1. the Province's consent to the sub-tenure will not be deemed to waive or modify the rights of the Province under the Lease; and

2. the provisions of Article 7 of the Lease restricting the tenure-holder from assigning, mortgaging, subletting or transferring the lease without the prior written consent of the Province remains in full force and effect.

The Province's consent to the sub-tenure given this 16 day of January 2019.

Duly Authorized Signatory of
HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, as represented by the Minister responsible for the *Land Act*

BRITISH COLUMBIA

Ministry of Forests, Lands and Natural Resource Operations and Rural Development

ENDORSEMENTS

Lease: V934579 File No.: 0307020
Endorsement No.: 1 Date: January 16, 2019

Portions sub-let unto the City of Campbell River for a term expiring January 8, 2049.

Authorized Representative

BRITISH COLUMBIA

5360.20 | CR.

July 17, 2013

File: 1405218

Comox Valley Regional District
600 Comox Road
Courtenay BC V9N 3P6

Attention: Vince Van Tongeren, Engineering Analyst

Dear Sir:

Enclosed is a certified true copy of Lease No.103555, covering Block J of District Lot 85, Sayward District, endorsed with the assignment dated January 18, 2012.

From: City of Campbell River

To: Comox Valley Regional District
600 Comox Road
Courtenay BC V9N 3P6

A copy of the Assignment/Assumption agreement has been inserted in the Lease document.

Please do not hesitate to call me at (250) 751-3175, if you have any questions.

Yours truly,

Barb Creber
A/Portfolio Administrator

Enclosure

pc: BC Assessment Authority, Courtenay
Ministry of Environment, EPD Nanaimo

Ministry of Forests, Lands
And Natural Resource Operations

West Coast Region

Suite 142 – 2080 Labieux Rd
Nanaimo BC V9T 6J9
Phone: (250) 751-7220
Fax: (250) 751-7224

BRITISH COLUMBIA

ASSIGNMENT/ASSUMPTION

Lease. No.: 103555

File No.: 1405218
Disposition No.: 157316

THIS AGREEMENT is dated for reference January 18, 2012.

BETWEEN:

CITY OF CAMPBELL RIVER
301 St Ann's Rd
Campbell River, BC V9W 4C7

OF THE FIRST PART

(herein the "Assignor")

AND:

COMOX VALLEY REGIONAL DISTRICT
600 Comox Road
Courtenay, BC V9N 3P6

OF THE SECOND PART

(herein the "Assignee")

AND:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, represented by the minister responsible for the *Land Act*, Parliament Buildings, Victoria, British Columbia

OF THE THIRD PART

(herein the "Province")

WITNESS THAT WHEREAS:

The Assignor and the Province entered into a agreement dated May 17, 1991 (herein called the "Document") over those lands more particularly known and described as:

BLOCK J OF DISTRICT LOT 85, SAYWARD DISTRICT

NOW THEREFORE THIS AGREEMENT WITNESSETH that for good and valuable consideration paid by the Assignee to the Assignor and by the Assignee and the Assignor to the Province, the receipt and sufficiency of which is hereby acknowledged by both the Assignor and the Province, the parties agree as follows:

ARTICLE I - ASSIGNMENT

1.1 The Assignor assigns all of his right, title, interest and estate in and to the Document to the Assignee.

ARTICLE II - ASSUMPTION

2.1 The Assignee covenants with the Province to assume and be bound by all the terms, conditions, covenants, obligations and agreements contained in the Document.

ARTICLE III - CONSENT

3.1 The Province consents to the execution and delivery of this agreement and the Assignment.

3.2 The Province releases and discharges the Assignor from all the terms, conditions, covenants, obligations and agreements contained in the Document.

ARTICLE IV - WARRANTIES AND REPRESENTATIONS

4.1 The Assignee warrants and represents to the Province, with the intent that the Province will rely thereon, that the Assignee:

(a) is a district or municipality incorporated under the *Local Government Act* and has the legal capacity to acquire land.

4.2 The Assignee acknowledges to the Province and to the Assignor that:

(a) the Assignee has inspected the land, and the improvements (if any) situate thereon, which are the subject of the Document and is fully aware of the condition of that land, and the improvements (if any) situate thereon, and accepts same in its current state;

(b) the Assignee has reviewed and inspected all municipal and regional by-laws, regulations and policies concerning the use and development of the land which is the subject of the Document; and

(c) there are no representations, warranties, collateral agreements or conditions affecting this agreement or the land, and the improvements (if any) situate thereon, which are the subject of the Document except as expressed herein and that this agreement constitutes the entire agreement.

ARTICLE V - NOTICE

5.1 The address of the Assignee for the service of notices or documents under the Document shall be the address specified for the Assignee on the first page of this agreement.

ARTICLE VI - MISCELLANEOUS

6.1 This agreement shall enure to the benefit of the parties hereto and their respective successors and permitted assigns.

6.2 The parties to this agreement confirm that the terms of the Document remain and continue in full force and effect.

6.3 This agreement may not be assigned by the Assignee except in accordance with the provisions of the Document.

6.4 This agreement shall be governed by and construed in accordance with the laws of the Province of British Columbia.

6.5 In this agreement, unless the context otherwise requires, the singular includes the plural and the masculine includes the feminine gender and corporation as the case may be.

6.6 The captions and headings contained in this agreement are for convenience only and are not to be construed as defining or in anyway limiting the scope or intent of the provisions hereof.

6.7 Where there is a reference to an enactment of the Province of British Columbia in this agreement, that reference shall include a reference to any subsequent enactment of the Province of British Columbia of like effect, and, unless the context otherwise requires, all statutes referred to herein are enactments of the Province of British Columbia.

6.8 If any section of this agreement or any part of a section is found to be illegal or unenforceable, that part or section as the case may be, shall be considered separate and severable and the remaining parts shall be enforceable to the fullest extent permitted by law.

6.9 All schedules attached to this agreement form an integral part of this agreement.

IN WITNESS WHEREOF the Assignor and Assignee have executed this agreement, and the Province has consented thereto, the day and year first above written.

SIGNED on behalf of **HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA** by the minister responsible for the *Land Act* or the minister's authorized representative

Minister responsible for the *Land Act*
or the minister's authorized representative

SIGNED on behalf of **CITY OF CAMPBELL RIVER** by its authorized signatories

Authorized Signatory DAVID G. MORRIS GENERAL MANAGER, FACILITIES & SUPPLY MANAGEMENT

Authorized Signatory Tracy Bate Deputy City Clerk

SIGNED on behalf of **COMOX VALLEY REGIONAL DISTRICT** by its authorized signatories

Authorized Signatory

Authorized Signatory

IN WITNESS WHEREOF the Assignor and Assignee have executed this agreement, and the Province has consented thereto, the day and year first above written.

SIGNED on behalf of **HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA**
by the minister responsible for the *Land Act*
or the minister's authorized representative

Minister responsible for the *Land Act*
or the minister's authorized representative

SIGNED on behalf of
CITY OF CAMPBELL RIVER
by its authorized signatories

Authorized Signatory DAVID MORRIS

Authorized Signatory

SIGNED on behalf of **COMOX VALLEY REGIONAL DISTRICT**
by its authorized signatories

Authorized Signatory

Authorized Signatory

For Land Title Office use: Page ___ of ___.

Province of British Columbia
Ministry of Crown Lands

Lease

Lease No. 103555 File No. 1405218

THIS LEASE dated for reference the 17th day of May, 1991.

IN PURSUANCE OF THE *LAND ACT* (Section 35) and the *LAND TRANSFER FORM ACT*

BETWEEN:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF BRITISH COLUMBIA, represented by the Minister of Crown Lands, Parliament Buildings, Victoria, British Columbia

(hereinafter called the " Lessor")

OF THE FIRST PART

AND:

District Of Campbell River
301 St. Ann's Road
Campbell River, British Columbia
V9W 4C7

(hereinafter called the " Lessee")

OF THE SECOND PART

WITNESS THAT WHEREAS the Lessor has agreed to grant to the Lessee a lease over that parcel of land described in the schedule attached entitled Legal Description (hereinafter called the "Land");

NOW THEREFORE in consideration of the fee to be paid by, and the covenants of the Lessee, the parties agree as follows:

Article I - Grant of Lease

(1.01) The Lessor, on the terms set forth herein, hereby demises and leases to the Lessee the Land, save and except those portions of the Land that consist of trails, roads, highways, water courses, or that are covered by water at the date hereof, for ***sanitary landfill purposes***

Article II - Term

(2.01) TO HAVE AND TO HOLD the Land unto the Lessee for a ***term of 30 years commencing on the 17th day of May, 1991*** (hereinafter called the "Commencement Date").

Lease 103555

File No. 1405218

Article III - Fees

(3.01) YIELDING AND PAYING THEREFORE for the term the fee prescribed in the attached Fee Schedule.

Article IV - Covenants of the Lessee

(4.01) The Lessee covenants with the Lessor

(a) to pay fees when due at the address of the Lessor first above written or at such other place as the Lessor may specify by notice in writing;

(b) to pay and discharge when due all applicable taxes, levies, charges and assessments now or hereafter assessed, levied or charged which relate to the Land or any improvements thereon (herein called "Realty Taxes");

(c) to observe, abide by and comply with all applicable laws, bylaws, orders, directions, ordinances and regulations of any competent governmental authority in any way affecting the Land and improvements situate thereon, or their use and occupation;

(d) to keep the Land in a safe, clean and sanitary condition satisfactory to the Lessor, and on written notice from the Lessor to make safe, clean and sanitary any portion of the Land or any improvements that, in the opinion of the Lessor, contravenes the provisions of this covenant;

(e) not to commit or suffer any willful or voluntary waste, spoil or destruction on the Land or to do or suffer to be done thereon anything that may be or become a nuisance or annoyance to the owners or occupiers of adjoining land;

(f) to use and occupy the Land in accordance with the provisions of this lease and any Special Proviso Schedule;

(g) to effect and keep in force during the term, insurance protecting the Lessor and the Lessee (without any rights of cross-claim or subrogation against the Lessor) against claims for personal injury, death, property damage, third party or public liability claims arising from any accident or occurrence on the Land or improvements up to an amount not less than $1,000,000.00, PROVIDED, however that the Lessor may, in his sole discretion, waive the requirements of this subsection on the delivery to the Lessor of evidence that the Lessee is self insured;

(h) to deliver to the Lessor from time to time, upon demand, proof of insurance required to be maintained by the Lessee, receipts or other evidence of payment of Realty Taxes, insurance premiums, leasehold mortgage installments or other monetary obligations of the Lessee required to be observed by the Lessee pursuant to this lease;

(i) notwithstanding subsection (g) of section 4.01, the Lessor may from time to time notify the Lessee that the amount of insurance posted by the Lessee pursuant to that subsection be changed and the Lessee shall, within 60 days of receiving such notice, cause the amount of insurance posted pursuant to subsection (g) of section 4.01 to be changed to the amount specified in the notice and deliver to the Lessor written confirmation of the change, except that when the Lessee is self-insuring this section shall not apply;

(j) to indemnify and save the Lessor harmless against all loss, damages, costs and liabilities, including fees of solicitors and other professional advisors arising out of

(i) any breach, violation or non-performance of any covenant, condition or agreement in this lease by the Lessee,

Lease 103555 File No. 1405218

(ii) any personal injury, death or property damage occurring on the Land or happening by virtue of the Lessee's use or occupation of the Land,

and the Lessor may add the amount of such loss, damages, costs and liabilities to the fees and the amount so added shall be payable to the Lessor immediately;

(k) to pay all accounts and expenses for labour performed on, or material supplied to, the Land, in accordance with the ***Builders Lien Act*** , and on behalf of the Lessor, to place written notices immediately after the commencement of any construction on the Land, on at least two conspicuous places, giving notice that the Lessor shall not be responsible for the cost of labour, services or materials performed on or supplied to the Land;

(l) on the expiration or earlier cancellation of this lease

(i) to peaceably quit and deliver possession of the Land and any improvements thereon to the Lessor, in a safe and sanitary condition,

(ii) to restore the surface of the Land to the satisfaction of the Lessor, AND

(iii) notwithstanding section 4.01 (l) (i) to remove any improvements that the Lessor may, in writing, direct or permit to be removed,

and all right, interest and estate of the Lessee shall cease and vest in the Lessor, and to the extent necessary this covenant shall survive the expiration or earlier cancellation of this lease;

(m) to permit the Lessor, or his authorized representative, to enter upon the Land at anytime to inspect the Land and any improvements thereon.

Article V - Assignment

(5.01) The Lessee shall not assign, mortgage, sublet or transfer this lease without the prior consent of the Lessor.

Article VI - Covenants of the Lessor

(6.01) The Lessor covenants with the Lessee for quiet enjoyment.

Article VII - Provisos

(7.01) PROVIDED always and it is hereby agreed as follows:

(a) if, after the termination by the passage of time of this lease or any extension thereof, the Lessor permits the Lessee to remain in possession of the Land and accepts rent in respect thereof, a tenancy from year to year shall not be created by implication of law and the Lessee shall be deemed to be a monthly tenant only subject to all of the terms and conditions of this lease, except as to duration in the absence of a written agreement to the contrary;

(b) title to and ownership of all buildings, structures and other improvements now or hereafter constructed on the Land shall be vested in the Lessor and the Lessee shall neither remove nor permit the removal of them from the Land except as expressly permitted or required by this lease;

(c) the Lessor is under no obligation to provide access or services to the Land or to maintain or improve existing access roads;

(d) the Lessor hereby reserves the right to grant other dispositions of the Land, or any part of it, with the prior consent of the Lessee, which consent shall not be unreasonably withheld, by way of easement, right of way or statutory right of way to a Crown corporation or agency, a municipality, or regional district,

or a person or corporation and, upon such consent being given, the Lessee shall forthwith execute and deliver to the Lessor such instrument as may be necessary to subordinate the Lessee's right and interest in the Land under this lease;

(e) for the purpose of subsection (d) of section 7.01, the Lessee shall be deemed to have withheld his consent reasonably if a grant of rights under that subsection would materially affect the exercise of the Lessee's rights hereunder;

(f) if a dispute should arise as to whether or not the exercise of the Lessee's rights hereunder would, in fact, be materially affected by a grant of rights under subsection (d) of section 7.01, then, the dispute shall be referred to a sole arbitrator appointed pursuant to the ***Commercial Arbitration Act***;

(g) the Lessee hereby acknowledges and agrees that no claim for compensation shall be made, in any form, in respect of a grant of rights under subsection (d) of section 7.01, where such rights do not materially affect the exercise of the Lessee's rights hereunder;

(h) this lease and the term herein granted is subject to:

(i) all subsisting grants to or rights of any person made or acquired under the ***Coal Act, Forest Act, Mineral Tenure Act, Petroleum and Natural Gas Act, Range Act, Wildlife Act*** , or ***Water Act*** , or any extension or renewal of the same, whether or not the Lessee has actual notice of them, AND

(ii) the exceptions and reservations of rights, interests, privileges and titles referred to in section 47 of the ***Land Act:***

(i) the Lessee acknowledges and agrees with the Lessor that

(i) any interference with the rights of the Lessee under this lease by virtue of the exercise or operation of the rights, privileges or interests described in subsections (d) and (h) of section 7.01 shall not constitute a breach of the Lessor's covenant of quiet enjoyment and the Lessee releases and discharges the Lessor from and against any claims for loss or damage arising directly or indirectly out of any such interference,

(ii) all costs and expenses, direct or indirect, that arise out of any interference by the Lessee with the rights, privileges and interests described in subsections (d) and (h) of section 7.01 shall be borne solely by the Lessee,

(iii) he shall not commence or maintain proceedings under section 60 of the ***Land Act*** in respect of any interference with his rights hereunder arising directly or indirectly out of the exercise or operation of the right, privileges or interests described in subsections (d) and (h) of section 7.01, AND

(iv) all schedules attached to this lease form an integral part of this lease.

Article VIII - Events of Default

(8.01) PROVIDED ALSO that this lease and the term and estate hereby granted are subject to the limitation that

(a) if the Lessee shall default in the payment of any installment of fees, or the payment of any other sum payable hereunder, and such default shall continue for 60 days after the giving of written notice by the Lessor to the Lessee;

(b) if the Lessee shall fail to perform or observe any of the covenants, agreements, conditions or provisos contained in this lease on the part of the Lessee to be performed or observed (other than the payment of fees or other sums of money) and such failure shall continue for, or shall not be remedied within, the period of 60 days next after the giving of written notice by the Lessor to the Lessee of the nature of such failure;

Lease 103555 | File No. 1405218

(c) if the term hereby granted shall be taken in execution or attachment by any person or the Lessee commits an act of bankruptcy, becomes insolvent or is petitioned into bankruptcy or voluntarily enters into an arrangement with his creditors;

(d) if the Lessor discovers that the Lessee either in his application for this lease or otherwise has, in the opinion of the Lessor, misrepresented or withheld any fact material to the application; OR

(e) if, in the opinion of the Lessor, the Lessee fails to make reasonable and diligent use of the Land for the purposes permitted herein, and such failure shall continue for a period of 60 days next after the Lessor gives written notice of the failure to the Lessee;

it shall then be lawful for the Lessor to enter upon the Land or any part thereof in the name of the whole, and this lease shall at the option of the Lessor, and with or without entry, terminate, and all the rights of the Lessee with respect to the Land shall be absolutely forfeited and shall lapse. If the condition complained of (other than the payment of fees or other sums of money) reasonably requires more time to cure than 60 days, the Lessee shall be deemed to have complied with the remedying thereof if the Lessee shall have commenced remedying or curing the condition within the 60 day period and diligently thereafter completes the same.

Article IX - Security

(9.01) The security in the sum of $0.00 and all rights, privileges, benefits and interests accruing thereto delivered by the Lessee to the Lessor (herein called the "Security") to guarantee the performance of the Lessee's obligations under this lease shall be maintained in effect until such time as the Lessor certifies in writing that such obligations have been fully performed; PROVIDED, however, that the Lessor may, in his sole discretion, waive the requirements of this subsection.

(9.02) In the event the Lessee should default in the performance of any of his obligations hereunder, it shall be lawful for the Lessor, in his sole discretion, to sell, call in and convert the Security, or any part of it, and such Security shall be deemed to have been absolutely forfeited to the Lessor.

(9.03) The rights of the Lessor under this Article shall be deemed to continue in full force and effect notwithstanding the expiration or earlier cancellation of this lease.

(9.04) Notwithstanding section 9.01, the Lessor may from time to time notify the Lessee that the amount of Security delivered by the Lessee to the Lessor be changed and specify the amount of Security required by the Lessor.

(9.05) The Lessee shall, within 60 days of receiving the notice referred to in section 9.04, cause the amount of security delivered to the Lessor to be changed to the amount specified in the notice and provide the Lessor with written confirmation of the change.

Article X - Notice

(10.01) Where service of a notice or a document is required under this lease the notice or document shall be in writing and shall be deemed to have been delivered to, or if sent by prepaid registered mail addressed to, the Lessor and the Lessee at the addresses specified for each in this lease, and where service is by registered mail the notice or document shall be conclusively deemed to have been served on the eighth day after its deposit in a Canada Post office at any place in Canada.

Lease 103555 File No. 1405218

(10.02) Either party may, by notice in writing to the other, specify another address for service of notices under this lease, and where another address is specified under this section, notices shall be mailed to that address in accordance with this Article.

(10.03) Notwithstanding section 10.01, any written notice to be served or given by the Lessor to the Lessee under this lease shall be effectively given or served by posting the same in a conspicuous place on the Land.

Article XI - Miscellaneous

(11.01) No term, condition, covenant or other provision herein shall be considered to have been waived by the Lessor unless such waiver is expressed in writing by the Lessor. Any such waiver of any term, condition, covenant or other provision herein shall not be construed as or constitute a waiver of any further or other breach of the same or any other term, condition, covenant, or other provision and the consent or approval of the Lessor to any act by the Lessee requiring the consent or approval of the Lessor shall not be considered to waive or render unnecessary such consents or approvals to any subsequent same or similar act by the Lessee.

(11.02) No remedy conferred upon or reserved to the Lessor is exclusive of any other remedy herein or provided by law, but such remedy shall be cumulative and shall be in addition to any other remedy herein or hereafter existing at law, in equity, or by statute.

(11.03) The terms and provisions of this lease shall extend to, be binding upon and enure to the benefit of the parties hereto and their successors and permitted assigns.

(11.04) Time is of the essence in this agreement.

Article XII - Interpretation

(12.01) In this lease, unless the context otherwise requires, the singular includes the plural and the masculine includes the feminine gender and a corporation.

(12.02) The captions and headings contained in this lease are for convenience only and are not to be construed as defining or in any way limiting the scope or the intent of the provisions hereof.

(12.03) Where this lease contains the forms of words contained in Column I of Schedule 4 of the ***Land Transfer Form Act,*** those words shall have the same effect and be construed as if the appropriate forms of words contained in Column II of that Schedule were contained herein in their place, unless the context requires another construction of those words.

(12.04) Where in this lease there is a reference to an enactment of the Province of British Columbia or of Canada, that reference shall include a reference to any subsequent enactment of like effect, and unless the context otherwise requires, all statutes referred to herein are enactments of the Province of British Columbia.

(12.05) If any section of this lease or any part of a section is found to be illegal or unenforceable, that part or section, as the case may be, shall be

CERTIFIED TRUE COPY

Date July 17/13 Signature

For Land Til Office use: Page ___ of ___.

Lease 103555	File No. 1405218

considered separate and severable and the remaining parts or sections, as the case may be, shall not be affected thereby and shall be enforceable to the fullest extent permitted by law.

IN WITNESS WHEREOF the parties have executed this lease as of the day and year first above written.

SIGNED on behalf of Her Majesty the Queen in Right of the Province of British Columbia by a duly authorized representative in the presence of:

E A Fullerton
851 Yates St.
Victoria

Authorized Representative

THE COMMON SEAL of Corporation Of The District Of Campbell River was hereunto affixed in the presence of

Robert V Patten MAYOR
Authorized Signatory

CLERK
Authorized Signatory

c/s

CERTIFIED TRUE COPY

Date July 8/13 Signature [signature]

For Land Title Office use: Page ___ of ___.

Province of British Columbia
Ministry of Crown Lands

Legal Description Schedule

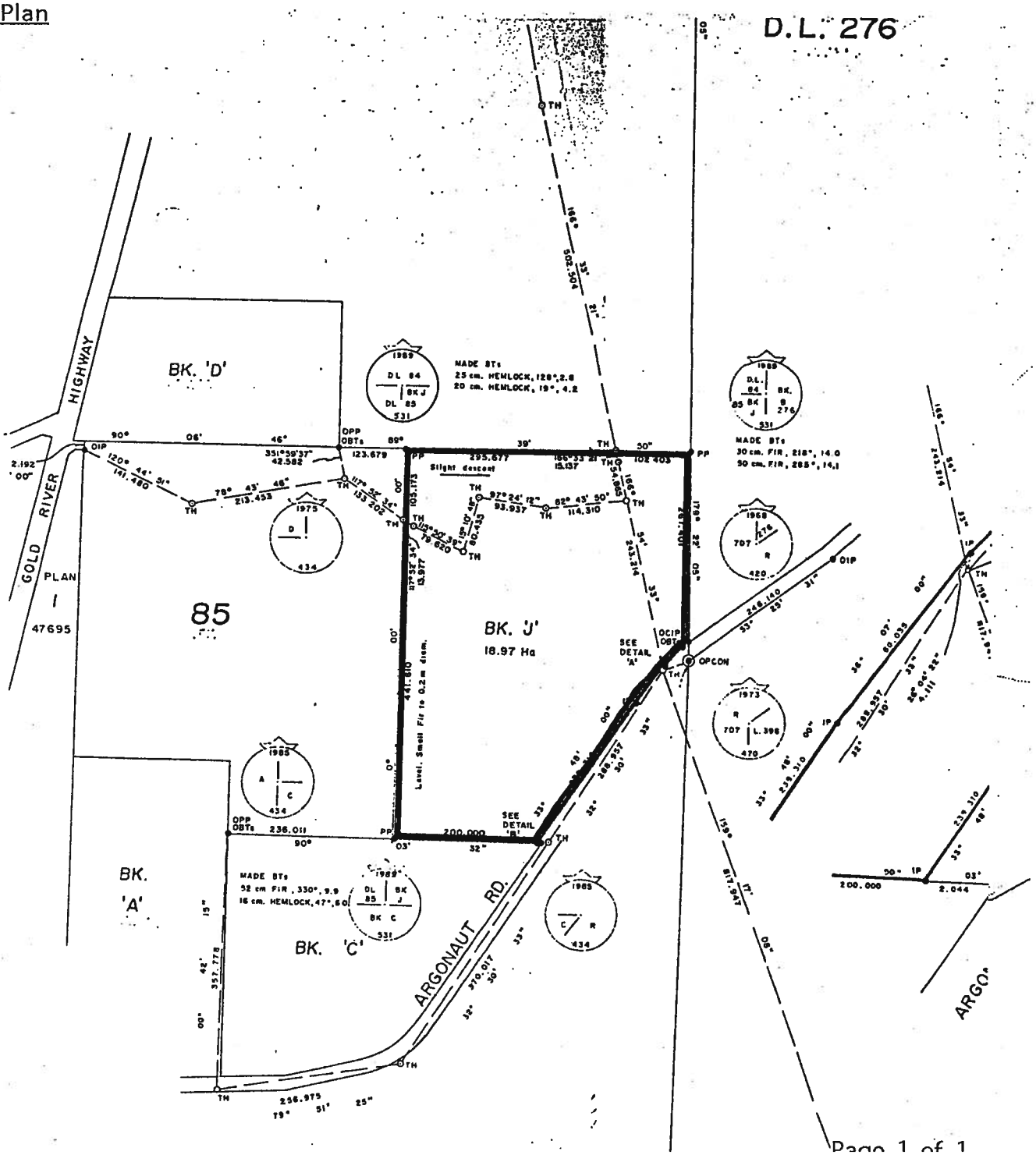
Lease No. 103555

File No. 1405218

1. Legal Description

Block J of District Lot 85, Sayward District as shown outlined in red on the sketch attached and containing 18.97 hectares.

2. Sketch Plan



CERTIFIED TRUE COPY

Date July 17/13 Signature

For Land Title Office use: Page ___ of ___.

Province of British Columbia
Ministry of Crown Lands

SPECIAL PROVISO SCHEDULE

Lease No. 103555 File No. 1405218

1. The Lessee shall:

   (a) Not undertake any improvement on the Land, except as provided for in this Lease, without the prior written consent of the Lessor.

   (b) Adhere to the provisions of his Waste Management permit issued by the Ministry of Environment.

2. ADDITIONAL PROVISOS

   (a) The Lessee shall obtain a License to Cut from the Ministry of Forests before proceeding with clearing the Land.

CERTIFIED TRUE COPY

Date July 17/13 Signature

For Land Title Office use: Page ___ of ___.

Province of British Columbia
Ministry of Crown Lands

FEE SCHEDULE

Lease No. 103555 File No. 1405218

THE FEE FOR THE TERM SHALL BE the sum of $1.00, payable in advance, on the Commencement Date.

CERTIFIED TRUE COPY

Date July 17/13 Signature

BRITISH COLUMBIA

Ministry of
Agriculture and Lands

ENDORSEMENTS

Lease No: 103555 | File No.: 1405218
Endorsement No.: 1 | Date: December 9, 2005

Lease recorded in the name of the City of Campbell River as of April 4, 2005 pursuant to Letters of Patent issued under Authority of the Local Government Act.

Authorized Representative

BRITISH COLUMBIA

Ministry of Forests, Lands and Natural Resource Operations

ENDORSEMENTS

Lease No: 103555 File No.: 1405218
Endorsement No.: 2 Date: July 17, 2013

Lease assigned unto Comox Valley Regional District by agreement dated January 18, 2012.

Authorized Representative

Appendix C
Landfill Criteria Conformance Review

Memorandum

Draft for Review

August 18, 2020

To:	Adem Idris (Comox Valley Regional District)	Ref. No.:	11212013
From:	Michaela Dyck/Deacon Liddy (GHD)/vk/01	Tel:	604-214-0510
cc:	Sarah Willie, Jesse Lee		

Subject: **Landfill Criteria Conformance Review**
Campbell River Waste Management Centre
Comox Valley Regional District

1. Introduction

The Comox Valley Regional District (CVRD) retained GHD Limited (GHD) to complete a conformance review for the Campbell River Waste Management Centre (CRWMC or Site) in accordance with the Landfill Criteria for Municipal Solid Waste (BC Ministry of Environment, 2016) [Landfill Criteria]. The Site is located within the city limits of Campbell River, British Columbia. This memorandum has been prepared as a precursor to the Closure Plan/Upgrading Plan Report and the Impact Assessment Report, both to be prepared by GHD.

2. Background

In March 2018, the CVRD submitted an application to amend the Site's Operational Certificate MR-2401 (OC), to the BC Ministry of Environment and Climate Change Strategy (ENV). The OC for the Site was last amended in December 2003. From ENV's review of the OC amendment application and December 2003 OC, ENV has added the following requirements to the draft amended OC:

(a) *The operational certificate holder must cause a Qualified Professional to certify and submit a Landfill Criteria Conformance Review to the director, on or before January 1, 2022.*

(ii) if non-conformance(s) with the Landfill Criteria are identified, a Landfill Criteria Upgrading Plan, including an action plan and schedule for all proposed upgrades to conform to the Landfill Criteria, and technical and environmental justification for any proposed exceptions from the Landfill Criteria.

The purpose of this memorandum is to summarize the results of the Landfill Criteria conformance review, by identifying any items that were not in conformance and that will be addressed in the Closure Plan/Upgrading Plan, Impact Assessment, and/or additional documentation.

3. Conformance Review

GHD completed the Landfill Criteria conformance review by reviewing each of the requirements of the Landfill Criteria and assigning the Site's status of conformance with each of the requirements. The conformance status categories used in the conformance review are as follows:

- Compliant – Conforms with Landfill Criteria requirement
- Not addressed – Requirement not addressed in applicable report/document
- Non-compliant – Site does not conform with Landfill Criteria requirement
- Exempt – Site is exempt from this requirement as per Section 2.1 of the Landfill Criteria
- Not applicable – Requirement does not apply to the Site operation

The checklist used to review the Landfill Criteria requirements and status of conformance is presented in Table 1 following the text.

4. Results of Conformance Review

Table 1 presents the results of the Landfill Criteria conformance review. Table 1 also includes notes regarding the report, section or figure that addresses each Landfill Criteria requirement or if the requirement will be addressed in a future report.

The following subsections discuss the "not addressed" and "non-compliant" Landfill Criteria requirements. The subsections are organized based on which document will be addressing the unfulfilled requirements.

4.1 Closure/Upgrading Plan

The Closure/Upgrading Plan will address a number of requirements that were identified as "not addressed" or "non-compliant" in the conformance review. The outstanding requirements and timeline to reach compliance are summarized in Table 4.1 below.

Table 4.1 Requirements Summary – Closure/Upgrading Plan

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
4.2	• Soil gas concentrations at the landfill site boundary shall not exceed the CH_4 LEL. • Combustible gas concentrations in Site buildings is <20% of CH_4 LEL (1% v/v)	Not addressed	2022/2023	Monitoring following LFG system installation
4.2	Landfills generating greater than 1,000 tonnes CH_4/yr shall: • Have a landfill gas (LFG) management system in place four years after the LFG Facilities Design Plan submission	Non-compliant	2022/2023	Installation of LFG system

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
5.7	• LFG management works shall be constructed as per the requirements of the LFG Management Regulation. • LFG works shall be constructed and operated in accordance with the BC LFG Management Facilities Design Guideline. • LFG management works shall follow the document entitled "Technologies and Best Management Practices for Reducing GHG Emissions from Landfills Guidelines".	Non-compliant	2022/2023	Installation of LFG system
5.8	Topsoil layer shall: • Have a depth related to the type of vegetation planned. • Provide moisture retention and nutrients required to support long term healthy vegetative growth. • Consist of an appropriate mix of soil, a carbon source and a nutrient source (soil or fabricated growing medium). • Be developed by a QP in compliance with British Columbia's organic matter recycling regulation if biosolids are used.	Not addressed	2020	Documented in Closure Plan (Section 4.2), specific requirements will be defined as part of detailed design
6.3	Final Cover soil shall: • Be placed within 365 days on any part of the landfill footprint at final contours.	Non-compliant	2022/2023	Placement of final cover at landfill closure
7.2	• Each area of the landfill that has achieved final contours shall be closed within 365 days. • Progressive closure activities shall be completed based on the filling plan.	Non-compliant	2022/2023	Placement of final cover at landfill closure
7.4	The contaminating lifespan shall: • Address permanent shutdown of LFG facilities.	Not addressed	2020	Addressed in Closure Plan (Section 7.6)
7.5	Contaminated Sites Regulation (CSR) and Landfill Closure: • Closures shall be completed in compliance with any applicable regulations of the BC CSR. • A site profile shall be completed and submitted to the director 10 days prior to final deposit of waste. • Additional closure requirements may be required if use will change after closure	Not addressed	2021/2022	Documented in Closure Plan (Section 2.6), submission at time of final closure

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
10.3	DOCP shall include a Geotechnical and Seismic Assessment including: • Differential settlement	Not addressed	2020	Addressed in Closure Plan (Section 5.3)

4.2 Hydrogeologic Impact Assessment

The Hydrogeologic Impact Assessment will address a number of requirements that were identified as "not addressed" or "non-compliant" in the conformance review. The outstanding requirements and timeline to reach compliance are summarized in Table 4.2, below.

Table 4.2 Requirements Summary – Hydrogeologic Impact Assessment

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
4.1	Ground or surface water quality must not decrease beyond that recommended by a QP for the Landfill at the landfill boundary or 150 m from the landfill.	Non-compliant	To be determined in Hydrogeologic Impact Assessment	Addressed in Hydrogeologic Impact Assessment (Section 3.5)
5.8	Final cover design shall meet the following characteristics or be of an alternative final cover (e.g., evapotranspirative cover) which provides equivalent or better performance with respect to reduction of infiltration: • Ensure the maximum allowable leachate generation rate is not exceeded.	Not addressed	2020	Addressed in Hydrogeologic Impact Assessment (Section 3.5)
9.1	Monitoring of leachate levels within the landfill shall be conducted to ensure: • Waste is not becoming saturated. • Pore pressures are maintained at acceptable levels to prevent slope instability. • Leachate is monitored to assist in determination of contaminating lifespan.	Not addressed	2022/2023	Leachate level monitoring to commence when the LFG collection wells are installed.
9.2	The EMP for groundwater shall be developed based on the: • Hydrogeology and Hydrology Characterization Report • Groundwater and Surface Water Impact Assessment • Expected landfill performance.	Non-compliant	2020	Addressed in Hydrogeologic Impact Assessment (Section 2.6 and Section 3.7)

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
10	The following reports shall be prepared for each landfill: • Hydrogeology and Hydrology Characterization (HHC) Report	Non-compliant	2020	Addressed in Hydrogeologic Impact Assessment (entire report)
10.1	The HHC report shall characterize: • Site geology • Site hydrogeology • Surface hydrology at and near the landfill site The HHC report shall include: • Map and cross-sections • Geologic structure • Hydraulic conductivity • Groundwater flow direction • Groundwater flux • Springs and groundwater discharge locations • Surface hydrology • Water quality • Background groundwater quality • Land and water use: well map and well information • Adjacent land use • Groundwater and surface water uses	Not addressed	2020	Addressed in Hydrogeologic Impact Assessment (Section 2.0)
10.2	Construction reports shall: • Demonstrate that geologic conditions encountered are as expected and used in groundwater and surface water impact assessment	Not addressed	2020	Addressed in Campbell River Surface Water Upgrades Construction Report (GHD, 2020)
10.3	The DOCP shall include a groundwater and surface water impact assessment for the nearer of the site boundary or within 150 m of landfill for: • Groundwater • Surface water • Planned and current uses of groundwater and surface water within 1 km of the	Not addressed	2020	Addressed in Hydrogeologic Impact Assessment (Section 2.5, 2.6, 2.7, 3.1, 3.5, 3.6)

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
	• Applicable water quality criteria and compliance monitoring locations • Application of the water quality monitoring results to date • Up-gradient and down-gradient surface water and groundwater quality • Identification of landfill parameters of concern • Leachate quality • Contaminant concentrations • Mass loadings • Trends • Assimilative capacity • Cumulative impacts			
10.3.2	A Surface Water Management Plan shall be prepared and include: • Description of potential for surface water impairment and resulting impacts	Not addressed	2020	Addressed in Hydrogeologic Impact Assessment (Section 2.7)
10.3.3	A Leachate Management Plan shall address the following: • Demonstrate the performance criteria (Section 4) will be satisfied	Not addressed	2020	Addressed in Hydrogeologic Impact Assessment (Section 3.5)

4.3 Design, Operations, and Closure Plan Requirements to be Addressed in the Closure/Upgrading Plan

From the review of Table 1, GHD identified the following requirements under the Landfill Criteria that were not documented in the 2017 Design, Operations, and Closure Plan (GHD, 2018) (2017 DOCP). Despite not being included in the 2017 DOCP, the Site is in compliance with these operational requirements. As the Landfill is within two years of ceasing operations, it would be ineffective to address some of the outstanding DOCP requirements. These items are being completed from a Site operational perspective, and as such, addressing them would simply be from an administrative perspective. As the Landfill will be closed in less than two years there will not be an updated DOCP to record these requirements that are already being carried out at the Site. The remaining outstanding DOCP requirements will be addressed in the Closure/Upgrading Plan. Table 4.3 summarizes the outstanding requirements and the timeline for addressing the requirement (if applicable).

Table 4.3 Outstanding Requirements Summary – DOCP

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
4.11	Access roads shall: • Meet the traffic load and vehicle type	Not addressed	n/a(1)	n/a(1)
6.1	Controlled waste shall be: • Disposed in a 2-4 m deep trench excavated into MSW at the active face • Disposed into native soil within the landfill footprint where no further excavation will occur • Recovery of recyclable and reusable materials should be encouraged	Not addressed	n/a(1)	n/a(1)
6.2	All waste shall be: • Spread in thin layers (0.6 m or less) on the active face	Not addressed	n/a(1)	n/a(1)
6.4	Noise from Site operations shall be minimized by: • <8% slope on main haul roads	Not addressed	n/a(1)	n/a(1)
6.7	The risk of landfill fires shall be reduced by: Constructing fire breaks >15 m wide free of combustible materials within the buffer zone, within the 20 m closest to the landfill footprint	Not addressed	n/a(1)	Addressed in Closure Plan
10.3	The DOCP shall include the following: • Topographical map showing: - elevation contours - natural ground slopes - other topographical features • Site Plan showing: - area at least 1 km from the landfill footprint - buffer zone - legal property boundaries, right-of-way and other easements - topographic contours (1.0 or 0.5 m) - UTM Grid (100 m spacing), north arrow and scale - all existing structures and infrastructure - tree line areas	Not addressed	2020	Addressed in Closure Plan
10.3	An Emergency Response Plan shall document strategies for dealing with emergencies at the site including: • HAZ-MAT incidents	Not addressed	2020	Addressed in Closure Plan

Landfill Criteria Section	Description	Status	Compliance Timeline	Action to Address
	• Power outages • Demonstrates the landfill meets the requirements of Work Safe BC			
10.3.1	A filling plan shall be developed and include: • Waste to cover ratio	Not addressed	n/a(1)	n/a(1)
(1)Requirement is an operational procedure that is carried out at the Site, but not documented in the 2017 DOCP. As the Landfill will be closed in less than two years there will not be an updated DOCP to address these requirements.				

5. Summary

Based on the findings of the conformance review, GHD summarizes the following:

- The majority of the outstanding requirements of the Landfill Criteria were already slated to be addressed in the Closure Plan or the Impact Assessment.

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
3	**Siting Criteria**						
3.1	>500 m from an existing or planned sensitive land use (schools, residences, hotels, restaurants, cemeteries, food processing facilities, churches and				X		Block J is adjacent to a residential lot. Landfill limit of waste is 350 m away from residential lot Exempt as per Sec 2.1.2 of Landfill Criteria
3.2	>100 m from a heritage or archaeological site (see also BC Heritage Conservation Act)				X		Two sites listed within site limits, but may be outdated. Exempt as per Sec 2.1.2 of Landfill Criteria
3.3	>8.0 kilometers from an airport (may be reduced to 3.2 km with bird control and approval)				X		6 km away from airport. Exempt as per Sec 2.1.2 of Landfill Criteria
3.4	>50 m from limit of waste (discharged MSW) to the property boundary				X		Limit of waste crosses onto City of Campbell River right-of-way. Landfill was established prior to development of modern landfill design requirements Exempt as per Sec 2.1.2 of Landfill Criteria
	30 m closest to the landfill site boundary shall be reserved for natural or landscaped screening				X		Limit of waste crosses onto City of Campbell River right-of-way. Landfill was established prior to development of modern landfill design requirements Exempt as per Sec 2.1.2 of Landfill Criteria
3.5	>300 m of a regular capacity water intake	X					Surface water point of diversion ~500 m away on 5800 Argonaut Rd property.
	>500 m of a high capacity water intake	X					Ladore Dam is 3.4 km away
3.6	A landfill shall not be located in a depression which acts as a point of water collection during rainfall events (unless acceptable diversion works are provided)	X					
3.7	>100 m from a geologically unstable area	X					
3.8	>100 m of an environmentally sensitive area (park, wildlife management area, critical wildlife area or wildlife sanctuary, BC Wildlife Act Section 3 land, an ecological reserve, bird sanctuary, Federal Wildlife Act wildlife area, a marine sanctuary, a wetland, habitat of rare, threatened or endangered species, etc.)	X					Quinsam Hatchery 1.5 km away
3.9/11	>100 m from a surface water body, including sea level maximum high tide or seasonal high watermark of an inland lake shoreline.	X					McIvor Lake 420 m away, which is upstream of the site
3.1	Not located in a flood plain	X					
3.12	>1.5 m above groundwater at all times	X					Base of landfill footprint not known, but unlikely to be 25 m deep (water table is ~25 m bgs)
4	**Performance Criteria**						
4.1	**Groundwater and Surface Water Quality**						
	Identify current and planned future uses of groundwater and surface water within 1 km of the landfill footprint	X					Identified in 2017 DOCP (Sec 2.5, 2.6) and reviewed in annual reports
	QP must recommend appropriate water quality criteria and compliance locations which must be approved in writing by the director	X					In 2017 DOCP Sec 13
	Ground or surface water quality must not decrease beyond that recommended by a QP for the Landfill at the landfill boundary or 150 m from the landfill			X			Groundwater quality site boundary exceeds applicable CSR standards to be addressed in impact assessment/hydrogeo report - potentially propose a buffer/attenuation zone
	Discharges to surface water considered as fish habitat must comply with the requirements of the federal Fisheries Act					X	No direct discharges to natural surface water bodies
4.2	**Landfill Gas Management**						
	Soil gas concentrations at the landfill site boundary shall not exceed the CH4 LEL		X				Not monitored at this time
	Combustible gas concentrations in Site buildings <20% of CH4 LEL (1% v/v).		X				Not monitored at this time
	LFG shall be managed in accordance with the following objectives and standards:						
	migration	X					
	H&S	X					
	LFG emissions shall be meet the following standards:						
	federal	X					LFG collection system designed to meet applicable standards
	provincial	X					
	local ambient air quality	X					
	Landfills with >100,000 tonnes of waste in place, or receiving > 10,000 tonnes/yr shall submit a LFG Generation Assessment Report	X					Updated Landfill Gas Generation Assessment report submitted early 2019

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
	Landfills generating greater than 1,000 tonnes CH4/yr shall:						
	prepare a LFG Management Facilities Design Plan	X					
	have LFG Management system in place four years after The LFG Facilities Design Plan submission			X			Original plan submitted in 2013, therefore deadline was 2017. Updated plan submitted in 2017 DOCP and will be constructed in 2022/2023
	LFG management systems are to be designed to maintain 75% collection efficiency as determined by the MOE Gas Generation Model	X					Current design targets 75% collection efficiency
4.3	**Nuisance**						
	A landfill shall be operated to prevent public nuisances e.g. noise, dust, litter, vectors or wildlife attraction	X					2017 DOCP (Sec 6.9, 6.20)
5	**Design Criteria**						
5.1	**Service Life and Contaminating Lifespan**						
	Landfill facilities design service life shall exceed the contaminating lifespan	X					To be stated in Closure Plan
5.2	**Site Layout**						
	Site layout shall:						
	take into consideration groundwater flow direction and surface water infiltration and discharge points	X					
	minimize potential for leachate and LFG impacts off-site	X					
	provide for site entrance, gatehouse, material recovery/recycling area, structures, access roads, landfill footprint, surface water ditching and management ponds, LFG management infrastructures (if applicable)	X					
5.3	**Landfill Base Design**						
	A QP geologic inspection shall be completed prior to placement and construction of landfill base liner system					X	Historic landfill cell developed without a base liner prior to requirement for liner in regulations
	The landfill base shall:						
	serve as an adequate foundation for construction of a landfill base liner and leachate collection system					X	
	be placed on stable soil or rock					X	
	be > 1.5 m above groundwater at all times					X	
	not be subject to consolidation that could result in differential settlement					X	
	provide for >2% primary drainage path slope (leachate collection piping)					X	
	provide for >0.5% secondary drainage path slope (drainage blanket)					X	
	provide for max 50 m drainage blanket drainage path length (to leachate collection pipe)					X	
5.4	**Landfill Base Liner**						
	Landfill base liner shall consist of:						
	a primary liner HDPE geomembrane liner					X	
	a secondary compacted clay or Geosynthetic Clay liner					X	
	QA/QC on liner install shall be conducted consisting of:						
	continuous inspection by QP					X	
	non-destructive leak testing of each seam					X	
	post backfill leak detection survey of HDPE geomembrane					X	
	The HDPE geomembrane shall meet the following minimum requirements						
	>1.5mm thickness					X	
	>100 yr liner service life					X	
	meet or exceed industry standard QA/QC					X	
	texture & asperity shall be designed to provide stability in all circumstances including earthquake					X	
	The secondary clay liner shall:						
	consist of a compacted clay liner or GCL with equivalent performance					X	
	be composed of >25% clay and >60% silt and clay by weight					X	
	> 750 mm compacted thickness perpendicular to slope (If secondary					X	
	<1x10-7cm/sec compacted hydraulic conductivity					X	
	>0.1% organic carbon content					X	
	remain stable when exposed to leachate (clay structure and permeability)					X	

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
5.5	**Leachate Collection System (LCS)**						
	Landfills shall have a LCS above the geomembrane liner					X	
	the LCS shall be:						
	constructed in accordance with approved Leachate Management Plan					X	
	installed with QP oversight and continuous QA/QC inspection by QP					X	
	managed in accordance with the approved Leachate Management Plan					X	
	designed to maintain a leachate head of <0.3 m at any point on the landfill base liner					X	
	Shall be constructed of the following (or alternative with equivalent hydraulic conductivity and mechanical protection):						
	a non-woven geotextile installed on top of geomembrane liner (placed prior to placement of stone to protect against puncture)					X	
	a drainage blanket consisting of continuous 0.3 m thick, 50 mm diameter chemically inert clear stone with minimal fines or equivalent					X	
	an engineered filter layer above stone drainage blanket					X	
	leachate collector pipes consisting of:						
	perforated or slotted HDPE collector pipes placed within drainage blanket at < 15 m lateral spacing between pipes and with < 50 m drain path					X	
	pipes sized to handle leachate flows based on site-specific leachate generation calculations but always >150 mm diameter					X	
	pipes with wall thickness designed based on site specific loading from waste and final cover loads					X	
	> 2% collector pipe slope along primary leachate flow paths					X	
	cleanouts at each end of leachate collector pipes					X	
	collection header and sump to collect leachate from collector pipes					X	
	Steps shall be taken to prevent entry of air into collector pipes during operation					X	
5.6	**Surface Water (SW) Management Works**						
	Surface water management works shall:						
	be designed and constructed in accordance with SWMP	X					
	be completed prior to commencement of landfill site operations				X		Landfill was in existance prior to the completion of the updated surface water manangement works
	direct/convey SW runoff away from the active operation to minimize surface water contact with waste	X					
	prevent surface water run-on onto the landfill footprint	X					
	minimize potential for on-site erosion	X					
	minimize potential for downstream sediment loading	X					
	control peak flow to prevent downstream flooding	X					
	be designed based on hydrogeologic modeling of 5-, 10- and 100- year design storm events	X					
	include implementation of appropriate erosion control measures to prevent erosion of banks and landfill side slopes (e.g. hydroseeding, erosion control blankets and straw wattle)	X					
	promote settling of sediment	X					
	promote infiltration of retained storm water for groundwater recharge	X					
	have low flow control structures and high flow overflow spillways for all SW ponds	X					
	have ditches and retention ponds designed for the control and retention of a 1:100-year, 24-hour storm events	X					
	be designed to account for additional water from snow melt and prolonged multi-day precipitation events	X					
	treat SW runoff generated from active areas of the landfill as leachate	X					
	include ditches armored with appropriate erosion protection for expected flows	X					
	not have ditches sloped <1%	X					
	be designed such that no flow reversals develop in ditches due to localized settlement	X					
	have erosion control measures to prevent active erosion of channel slopes and surfaces that contribute to runoff	X					
	Mid-slope drainage ditches/swales shall be constructed on final cover surfaces as required to prevent erosion of cover soil. Recommended spacing of ditches 15 m vertical	X					

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
5.7	**Landfill Gas Management (LFG) Works**						
	Works shall be constructed as per the requirements of the LFG Management Regulation			X			To be constructed in 2022-2023
	LFG works shall be constructed and operated in accordance with the BC LFG Management Facilities Design Guideline			X			
	LFG management works shall follow document entitled "Technologies and Best Management Practices for Reducing GHG Emissions from Landfills Guidelines"			X			
5.8	**Final Cover Design**						
	The final cover design shall:						
	prevent exposure of humans and/or wildlife to MSW	X					
	control infiltration of precipitation	X					
	minimize the uncontrolled release of methane to the atmosphere	X					
	limit erosion and release of sediment to surrounding surface waters	X					
	control the release of odours	X					
	minimize oxygen infiltration and fire risk	X					
	be compatible with the end use planned for the landfill site	X					No planned future use for landfill footprint at this time
	Barrier Layer						
	Final cover design shall meet the following characteristics or be of an alternative final cover (e.g. evapotranspirative cover) which provides equivalent or better performance with respect to reduction of infiltration:						
	consist of a barrier layer with a hydraulic conductivity <1 x 10-5 cm/sec (arid regions) or 1 x 10-7 cm/sec (non-arid regions)	X					
	have minimum compacted thickness of 0.6 m measured perpendicular to the slope	X					
	have a topsoil layer thickness determined by annual precipitation but not less than >0.15 m	X					
	have a topsoil layer capable supporting sustained vegetative cover over barrier layer	X					
	ensure the maximum allowable leachate generation rate is not exceeded		X				To be estimated in impact assessment
	be designed based on hydrologic modeling demonstrating final cover stability under design storm conditions and consistency with the LMP	X					
	allow for waste stabilization during the post-closure period	X					LLDPE geomembrane
	designed in coordination with LFG management facilities including LFG collection/venting facilities	X					
	Topsoil layer shall:						
	have a depth related to the type of vegetation planned		X				To be addressed in Closure Plan
	provide moisture retention and nutrients required to support long term healthy vegetative growth		X				To be addressed in Closure Plan
	consist of an appropriate mix of soil, a carbon source and a nutrient source (soil or fabricated growing medium)		X				To be addressed in Closure Plan
	be developed by a QP in compliance with BCs organic matter recycling regulation If biosolids are used		X				To be addressed in Closure Plan
	Vegetation shall:						
	have seed or hydroseed applied at the earliest opportunity (which will allow for germination)	X					Areas with final cover have been hydroseeded and vegetation is established
	achieve erosion control, low maintenance and end use objectives	X					
	be periodically reseeded and fertilized until cover is fully established	X					
	sustain vegetal species selected whose root systems will not impact performance of the low permeability layer	X					
5.9	**Final Contours**						
	Landfill side slopes shall be no steeper than 33%	X					With exception of MSE wall, yes all slopes designed to 33%
	Landfill top plateau must have minimum slope of 10 % for soil cover	X					
	Top plateau with durable geomembrane or composite barrier layer with an overlying drainage layer above the final landfill side slopes may have a minimum slope of 4 %	X					
	Grades may be altered post-closure to accommodate a planned beneficial land use if no differential settlement can be demonstrated for a period of at least 1 year post-closure					X	
	Surface water control benches shall be installed at a minimum every 15 m vertical	X					
5.10	**Site Security and Fencing**						
	Landfill security shall discourage unauthorized access	X					Gates locked after hours
	Minimum 1.2m high fence, post and wire or better, around the entire perimeter of Landfill Site	X					1.2 m electrified fence around landfill
	Minimum 2.0 m high fence is recommended where vehicle access can be achieved from outside	X					
	Site Security shall include vandal proof locking mechanisms at publicly accessible entry points and shall be maintained in a locked position outside of operating hours	X					

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
5.11	**Access Roads**						
	Entrance facilities should be placed to minimize queuing along public roads	X					DOCP Sec 6.14
	Access roads shall:						
	be all-weather safe	X					
	provide access to on-site facilities for inspection and maintenance during the operating and post-closure periods	X					
	provide safe public access to all material drop-off and waste disposal areas	X					
	prevent the tracking of mud or waste from the site onto public roadways	X					Public areas all paved. Active face access is sand covered
	meet the traffic load and vehicle type		X				
	>4 m for single lane	X					
	>7 m for two lanes					X	
	<8 % grade on public access roads	X					
	<15% grades on construction/internal roads	X					
	have armored ditches for roads >2% grades	X					Ditches designed in updated SW management works
5.12	**Vector and Wildlife Management and Nuisance Controls**						
	Landfill site shall be designed to satisfy the operation criteria with respect to vector and wildlife management and nuisance controls	X					DOCP Sec 6.21
6	**Operations Criteria**						
6.1	**Authorized Wastes**						
	The DOCP shall identify:						
	waste to be received including controlled waste	X					accepts asbestos DOCP Sec 6.11.4
	controls to be implemented for their receipt and disposal of all wastes	X					DOCP Sec 6.11
	Hazardous Wastes						
	Approval from the Director shall:						
	be received for disposal of Hazardous Wastes					X	Site not authorized to receive Haz Waste
	only be issued for asbestos and/or hydrocarbon contaminated soil	X					accepts asbestos DOCP Sec 6.11.4. Soil acceptance proceedure outlined in DOCP Sec 6.11.1
	Controlled wastes						
	Controlled wastes shall only be deposited:						
	with approval from the Director	X					DOCP Sec 6.11
	where it has been demonstrated that there is no other viable alternative for the waste stream					X	
	Waste asbestos shall be:						
	transported in compliance with the TDG Act and regulations	X					accepts asbestos DOCP Sec 6.11.4
	deposited only in compliance with section 40(2) of the HWR	X					
	Controlled waste shall be:						
	disposed in a 2-4 m deep trench excavated into MSW at the active face		X				DOCP Sec 6.11.3 - doesn't specify depth
	disposed into native soil within the landfill footprint where no further excavation will occur		X				
	immediately covered with a minimum of 0.5 m of cover or MSW	X					
	Recovery of recyclable and reusable materials should be encouraged		X				
6.2	**Landfilling of Wastes**						
	All waste shall be:						
	placed within the landfill footprint in accordance with the Filling Plan	X					DOCP Sec 5.1 - Fill Plan
	spread in thin layers (0.6 m or less) on the active face		X				layer thickness not specified
	The area of active face shall be kept at a minimum	X					active face size/requirements not provided
	Recommendation in Appendix A shall be followed for landfilling of waste				X		Not a new landfill cell design, bringing historic cell to closure
6.3	**Cover Placement**						
	Daily cover soil shall:						
	be >150 mm thick	X					DOCP Sec 6.16.1
	be placed over the entire surface of the active face at the end of each operating day	X					DOCP Sec 6.16.1
	or of equivalent alternate material approved by Director	X					DOCP Sec 6.16.1 - also provides suggestion for tarps or steel plates
	Intermediate cover shall:						
	be >300 mm thick soil	X					DOCP Sec 6.16.2
	be placed on areas that will not receive waste for >30 days	X					
	or of equivalent alternate material approved by Director					X	
	Water contacting daily cover shall be managed as leachate in accordance with the LMP (if considered leachate)	X					

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
	Optional stripping of cover shall:						
	be undertaken only immediately before beginning an active face on top					X	No stripping of cover required
	not result in unacceptable nuisance odours and/or odour complaints					X	
	Final Cover soil shall						
	>600 mm thick or equivalent material (as outlined in 5.8 above).	X					DOCP Sec 6.16.3
	be placed within 365 days on any part of the landfill footprint at final contours			X			Final cover to be placed all at once in 2022-2023
	Contaminated soil may be used as waste cover under the conditions provided in App B					X	Not a current or planned operation
6.4	**Nuisance Controls**						
	The landfill shall be designed and operated to:						
	prevent impacts from nuisance factors	X					DOCP Sec 6.20
	comply with any local government nuisance bylaws	X					
	have a complaint response procedure posted on-site						Need to double check signage on site
	Dust						
	Dust releases should be controlled on site	X					DOCP Sec 6.20.1
	dust emissions from roads shall:						
	be controlled via watering (or equivalent)	X					
	not be controlled by chloride (if possible)	X					
	not be controlled by waste oil	X					
	Landfill supervisory staff shall:						
	routinely watch out for dust clouds	X					
	initiate remedial measures whenever excessive dust is observed	X					
	Noise						
	Site operations shall be minimized by:						
	making use of natural and/or constructed features such as vegetation or berms		X				DOCP Sec 6.20.2
	<8% slope on main haul roads		X				
	scheduling operations appropriately	X					bird control sounds limited to 8am-5pm
	Litter						
	Litter on the landfill shall:						
	not be left exposed	X					DOCP Sec 6.20.3
	be prevented from migrating beyond the landfill site boundary	X					
	be removed at least once per year	X					
	Odour						
	Operations shall be conducted in a manner to prevent nuisance from odour	X					DOCP Sec 6.20.4
	An aeration system shall be installed in leachate storage ponds and other liquid facilities that generate unpleasant odours					X	No leachate ponds
	Biosolids and other odorous materials shall be stored, blended, and processed with required odour control measures in place					X	No biosolids on site
6.5	**Vector and Wildlife Management**						
	Landfills shall						
	apply cover to discourage wildlife from feeding at landfills	X					DOCP Sec 6.21
	have a bird deterrent program if <8km from an airport or are located where birds converge	X					DOCP Sec 6.21 - birds of prey mentioned as bird management method
	implement a rodent control program	X					DOCP Sec 6.21 - rodents to be managed by third party contractor
	have bear proof electric fences if they are located in bear habitat within 120 days of a bear siting or other dangerous wildlife (cougar, coyote, wolf).	X					electric fence
6.6	**Burning**						
	Landfills shall burn clean wood and/or yard wastes only if:						
	approved in the SWMP, OC or permit					X	Not a current or proposed operation. Not authorized for burning
	if it can be demonstrated to the director that there is no viable alternative					X	
	Open burning shall undertaken only if:						
	a technical assessment report satisfactory to the directors is be submitted					X	
	is approved in the SWMP, OC or permit					X	
	is approved by any other applicable fire protection authorities (see Appendix C for further details)					X	

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
6.7	**Landfill Fire Management**						
	The risk of landfill fires shall be reduced by:						
	application of daily, intermediate and final cover requirements	X					
	isolating wastes by specified thicknesses of inert daily and intermediate cover	X					
	constructing fire breaks >15 m wide free of combustible materials within the buffer zone, within the 20 m closest to the landfill footprint		X				Buffer areas free of combustible materials not described
	providing year-round, immediate access to >4,000 lpm water or suitable alternative fire suppression equipment specified in the Fire Safety Plan	X					DOCP Sec 14
	providing fire suppression equipment to all landfill equipment working at the operating face	X					
	taking all reasonable efforts to immediately extinguish unauthorized fires					X	no fires recorded
	reporting large fires which pose a threat to public health or to neighbouring property to the Provincial Emergency Program					X	no fires recorded
6.8	**Scavenging**						
	Scavenging shall be prevented	X					DOCP Sec 6.22
6.9	**Site Health And Safety Plan**						
	The landfill site operations shall meet the requirements of Work Safe BC	X					DOCP Sec 6.6 - review Barry and Vale's H&S Plan
6.1	**Signage**						
	External signage shall include name of owner/external landfill operator, contact information, hours of operations, emergency contact information, waste and recyclable accepted or prohibited, tipping fees	X					DOCP Sec 6.2
	Internal signage shall include directions for: for public and commercial waste haulers to drop-off, material recovery, disposal areas	X					
6.11	**Weigh Scales**						
	Weigh scales shall						
	be installed if site receives >5,000 tonnes of waste per year	X					DOCP Sec 6.3
	meet requirements of federal Weights and Measures Act	X					
6.12	**Records**						
	Records shall:						
	be kept on-site for inspection and maintained for at least 7 years	X					
	be ready to be submitted to MOE within 14 days if requested	X					
	Records shall include:						
	Permit or the Operational Certificate	X					Confirm with CVRD if these are all available on site
	plans and reports	X					
	inspection records conducted by regulatory agencies	X					
	a complaint ledger	X					
	waste tonnages and volumes disposed of in a landfill	X					
	recyclable material data and disposition for each category of waste and recyclable material received and exported from the landfill site (if available)	X					
6.13	**Operator Training**						
	Landfills shall:						
	be supervised and operated by trained qualified personnel	X					DOCP Sec 6.5
	have staff trained in appropriate specialized professional training	X					Confirm all with CVRD
	have staff which should engage in continuing education	X					
7	**Closure and Post-Closure Criteria**						
7.1	**Closure Plan**						
	A Closure Plan shall:						
	be included in the DOCP	X					DOCP Sec 12
	be updated within two years of landfill closure or when significant changes that may impact its operational lifespan to the landfill site are planned	X					In progress
	include proposed post-closure land use for the Site	X					DOCP Sec 12.1
7.2	**Progressive Closure**						
	Each area of the landfill that has achieved final contours shall be closed within 365 days			X			To all be closed in 2022/2023.
	Progressive closure activities shall be completed based on the filling plan			X			
7.3	**Post-Closure Operations and Maintenance**						
	Post-closure operations shall be conducted in accordance with the Closure Plan	X					DOCP Sec 12

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
7.4	**Contaminating Lifespan**						
	The contaminating lifespan shall:						
	be determined using the latest updated environmental monitoring information	X					DOCP Sec 11
	be assumed to be >30 years for post-closure operation and maintenance, and financial security requirements	X					
	address permanent shutdown of LFG facilities		X				To be addressed in Closure Plan
7.5	**Contaminated Sites Regulation and Landfill Closure**						
	Closures shall be completed in compliance with any applicable regulations of the BC CSR.		X				To be addressed in Closure Plan
	A site profile shall be completed and submitted to the director 10 days prior to final deposit of waste		X				To be submited after last truck of waste is deposited at the landfill
	Closure process and the post-closure monitoring and reporting requirements will be regulated under the closure plan	X					DOCP Sec 12.3
	Additional closure requirements may be required if use will change after closure		X				To be addressed in Closure Plan
8	**Financial Security**						
	Private Landfills shall provide financial security					X	Intended for private landfills
	Publicly held landfills shall:						
	Follow the Public Sector Accounting Board's financial reporting model for annual financial reporting purposes	X					Updated each year and presented in tech memo attached to annual report
	Establish a dedicated closure fund to ensure that taxpayers are appropriately funding the future liability associated with the landfills including progressive closure and post closure care and monitoring	X					
8.1	**Amount of Financial Security**						
	Financial security required must be estimated and be sufficient to match liabilities for each phase of development, close the site at any point of operation, and to continue with post-closure maintenance and monitoring					X	Intended for private landfills
	An initial security deposit shall be kept equal to, at a minimum, the liability associated with the site when maximum land disturbance as a result of site development prior to placement of any waste has been conducted					X	
	Increasing financial security shall be kept which matches the costs projected and the timeline for each phase of development					X	
	At the time of site closure the financial security shall be adequate to offset final closure and post closure care					X	
8.2	**Calculating Financial Security**						
	The amount of financial security shall be calculated as the sum of the Cost of emergency closure or planned closure, whichever is greater	X				X	Intended for private landfills
	All costs shall:						
	be identified individually and tabulated for each phase of the landfill development					X	Intended for private landfills
	shall include costs associated with administration, engineering assessment and construction oversight					X	
	The costs shall not be reduced by the value of any assets					X	
	A contingency of 20% shall be added to the total estimated costs					X	
	Closure Costs						
	The following activities shall be included in the forecasting of closure costs:						
	compaction grading of the landfill surface area	X					
	final cover placement and establishment of vegetation	X					
	installation of fences, gates, surface water control works, landfill gas	X					
	Post-Closure Costs						
	The following activities shall be included in the forecasting of post-closure costs:						
	management and maintenance of the landfill final cover including fertilizing					X	Intended for private landfills
	operation and maintenance of any on-site or off-site leachate management					X	
	operation and maintenance of LFG management facilities					X	
	operation and maintenance of site infrastructure including surface water					X	
	construction or replacement of any monitoring or control works as required					X	
	annual environmental monitoring and reporting					X	
	contingency measures cost					X	
	activities to be included are the costs of implementing and maintaining the landfill					X	

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
8.3	**Post-Closure Period**						
	The post-closure period for which post-closure care will be required shall be determined based on the contaminating lifespan of the landfill	X					
	Contaminating lifespan of the landfill shall be no less than 30 years and may either be determined by a QP or no less than: <100,000 tonnes MSW in place : 50 years 100,000-1,000,000 tonnes MSW in place : 100 years >1,000,000 tonnes MSW in place: 200 years	X					CLS estimated at 66 years Waste in place at closure estimated to be approximately 850,0000 tonnes
8.4	**Cost to be Presented in Current Dollars**						
	All cost estimates shall be presented in net present values	X					
	Cost estimates shall be adjusted for inflation and discount rates calculated	X					
	Discount rates shall be based on the current Government of Canada Long Term	X					
	The rate of return shall be 2% unless otherwise determined by a member of the *Canadian Institute of Actuaries* or other QP	X					Intended for private landfills, municipal bond rate is used in CVRD estimates
8.5	**Review Period**						
	Cost estimates shall be reviewed at least every 5 years or at the commencement of a new landfill phase or where there has been a significant design revision					X	Intended for private landfills
8.6	**Types of Financial Security**						
	The financial security shall consist of an irrevocable letter of credit or a Surety Bond (recommended for short term issuance only)					X	
	The financial institution issuing the irrevocable letter of credit shall meet the following criteria: Is a Canadian Chartered Schedule 1, 2 or 3 Banks or Canadian Credit Union Has a senior unsecured long term credit rating of Standard and Poor's A+, Moody's A1, or Dominion Bond Rating Service A (high) Has an office in Canada					X	
9	**Monitoring Criteria**						
	A detailed Environmental Monitoring Plan (EMP) shall:						
	be prepared for leachate, groundwater, surface water, and LFG	X					DOCP Sec 13
	demonstrate compliance with performance criteria consistent with plans/reports	X					
	address the need for monitoring within 1 km of the landfill footprint	X					
	be developed in accordance with the "Guidelines for the Environmental Monitoring at Municipal Solid Waste Landfills" for groundwater, surface water, leachate and soils and vegetation or its approved replacement	X					
	be included in the DOCP	X					
9.1	**Leachate Monitoring**						
	Monitoring of leachate levels within the landfill shall be conducted to ensure:						
	LFG extraction wells are not flooding					X	No LFG wells installed
	waste is not becoming saturated		X				No leachate wells installed
	pore pressures are maintained at acceptable levels to prevent slope instability		X				
	Leachate is monitored to assist in determination of contaminating lifespan		X				
9.2	**Groundwater and Surface Water Monitoring**						
	Groundwater and surface water monitoring results are to be assessed for compliance with applicable criteria	X					completed in each annual report
	The EMP for groundwater shall be developed based on the:						
	Hydrogeology and Hydrology Characterization Report			X			Hasn't been updated since 2004. Will be updating in the hydrogeo impact assessment
	Groundwater and Surface Water Impact Assessment			X			Will be completed in hydrogeo report
	expected landfill performance			X			Will model in hydrogeo report
	The EMP for surface water shall be developed:						
	to monitor the performance of the surface water control works	X					DOCP Sec 13.3. To be updated in hydrogeo/impact assessment report
9.3	**Landfill Gas Monitoring**						
	The EMP for landfill gas shall follow the requirements in the BC Landfill Gas Management Facilities Design Guidelines	X					DOCP Sec 13.4. To be updated in Closure Plan

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
10	**Plans and Reports**						
	All reports shall be:						
	be certified by a qualified professional	X					
	kept up to date	X					
	maintained on-Site for inspection/submission as required	X					
	The following shall be conducted in accordance with the plans and reports:						
	landfill planning	X					
	landfill design	X					
	landfill construction	X					
	landfill operation	X					
	landfill monitoring	X					
	landfill closure	X					
	The following reports shall be prepared for each landfill:						
	Landfill Criteria Conformance Review and Upgrading plan (if applicable)	X					In progress
	Hydrogeology and Hydrology Characterization Report		X				To be addressed in hydrogeo/impact assessment report.
	Construction Reports(s)	X					Surface water construction report to be finished
	Design, Operation and Closure Plan (DOCP)	X					
	Landfill Gas Generation Assessment (if required),	X					
	Landfill Gas Management Facilities Design Plan (if required)	X					
	Annual Operations and Monitoring Report(s)	X					
10.1	**Hydrogeology and Hydrology Characterization Report (HHC report)**						
	The HHC report shall characterize:						
	site geology		X				To be addressed in hydrogeo/impact assessment report
	site hydrogeology		X				To be addressed in hydrogeo/impact assessment report
	surface hydrology at and near the landfill site		X				To be addressed in hydrogeo/impact assessment report
	The HHC report shall include:						
	map and cross-sections		X				To be addressed in hydrogeo/impact assessment report
	geologic structure		X				To be addressed in hydrogeo/impact assessment report
	hydraulic conductivity		X				To be addressed in hydrogeo/impact assessment report
	groundwater flow direction		X				To be addressed in hydrogeo/impact assessment report
	groundwater flux		X				To be addressed in hydrogeo/impact assessment report
	springs and groundwater discharge locations		X				To be addressed in hydrogeo/impact assessment report
	surface hydrology		X				To be addressed in hydrogeo/impact assessment report
	water quality		X				To be addressed in hydrogeo/impact assessment report
	background groundwater quality		X				To be addressed in hydrogeo/impact assessment report
	land and water use: well map and well information		X				To be addressed in hydrogeo/impact assessment report
	adjacent land use		X				To be addressed in hydrogeo/impact assessment report
	groundwater and surface water uses		X				To be addressed in hydrogeo/impact assessment report
10.2	**Construction Report(s)**						
	Landfills shall prepare construction reports after:						
	construction	X					Surface water construction report in progress
	significant modification of landfill facilities					X	No other significant modifications have occurred since the DOCP
	Construction reports shall:						
	demonstrate that the landfill has been constructed in accordance with the plans,					X	Intended for new landfill cell construction
	demonstrate that geologic conditions encountered are as expected and used in groundwater and surface water impact assessment		X				To be addressed in impact assessment
	include inspection quality assurance/quality control testing results					X	Intended for new landfill cell construction
	include as-built record drawings including the lines, grades and as- built elevations of the landfill					X	Intended for new landfill cell construction
	include results of all soil test data					X	Intended for new landfill cell construction
	include geologic inspection report(s)					X	Intended for new landfill cell construction
	be kept up to date as landfill development occurs					X	Intended for new landfill cell construction
	be retained for inspection and upon request submitted to the MOE					X	Intended for new landfill cell construction
	demonstrate QA/QC testing has been conducted during the construction or significant alteration to the landfill					X	Intended for new landfill cell construction
	address concerns identified during QA/QC testing					X	Intended for new landfill cell construction

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
10.3	**Design, Operations and Closure Plan**						
	Landfill owners shall prepare and maintain a DOCP that:						
	is reviewed and updated as needed or at least every five years	X					
	demonstrates that the facility will be planned, designed, constructed, operated, monitored and closed in accordance with the criteria	X					
	The DOCP shall include the following:						
	Topographical map showing:						
	area at least 1 km from the landfill footprint	X					DOCP Fig 1.1
	elevation contours		X				
	natural ground slopes		X				
	drainage patterns	X					DOCP Fig 2.1
	other topographical features		X				
	Site Plan showing:						
	area at least 1 km from the landfill footprint		X				
	landfill property	X					DOCP Fig 1.2
	landfill site boundary	X					DOCP Fig 1.2
	landfill footprint	X					DOCP Fig 1.2
	buffer zone		X				Site developed without buffer zone prior to modern legislative requirements
	all applicable features in the siting criteria and corresponding distances		X				Siting critiera map not included (some cirteria not applicable/excempt)
	legal property boundaries, right-of-way and other easements		X				To be updated with current property lots
	topographic contours (1.0 or 0.5 m)		X				
	UTM Grid (100 -m spacing), north arrow and scale		X				
	all existing structures and infrastructure		X				
	tree line areas		X				
	Site Layout Plan including:						
	landfill site boundary	X					DOCP Fig 1.2, Dwg C-01
	landfill footprint	X					DOCP Fig 1.2, Dwg C-01
	buffer zone					X	Site developed without buffer zone prior to modern legislative requirements
	current landfill contours	X					DCOP Fig 1.2, Dwg C-01
	final landfill contours	X					Dwg C-02
	waste thickness	X					DOCP Dwg C-06 to C-13. Waste thickness for remaining airspace covered under DOCP Sec 5.1
	design volume	X					DOCP Dwg C-06 to C-13. Design volume covered under DOCP Sec 5.1
	Landfill facilities including:						
	site entrance	X					DOCP Fig 1.2, Dwg C-01
	fencing	X					DOCP Fig 1.2, Dwg C-01
	roads	X					DOCP Fig 1.2, Dwg C-01
	gatehouse	X					DOCP Fig 1.2, Dwg C-01
	weigh scale	X					DOCP Fig 1.2, Dwg C-01
	waste and recyclable drop-off and recycling facilities	X					DOCP Fig 1.2, Dwg C-01
	leachate management works					X	No LCS
	surface water management works	X					DOCP Dwg C-03, C-04
	landfill gas management works	X					DOCP Appendix G, Dwg C-01
	Physical Summary including:						
	physical setting	X					DOCP Sec 1.1, 1.4, 2
	geology	X					DOCP Sec 2.3
	hydrogeology	X					DOCP Sec 2.4
	hydrology	X					DOCP Sec 2.2, 2.6
	climatic conditions	X					DOCP Sec 2.7

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
	Geotechnical and Seismic Assessment including:						
	bearing capacity				X		No design for new a landfill base in this DOCP
	differential settlement		X				DOCP Sec 7.5 - indicates further analysis required
	slope stability during construction, operations and post-closure	X					DOCP Sec 7.3
	seismic and fault activity risk assessment	X					DOCP Sec 7.2
	effects on the landfill base liner and leachate collection system					X	No base liner, no LCS
	conclusions and recommendations regarding the suitability of the landfill site				X		Landfill has been in existance since 1970s
	Groundwater and Surface Water Impact Assessment including:						
	Impact assessment at the nearer of the site boundary or within 150 m of landfill for:						
	Groundwater		X				Not included in DOCP. To be done in hydrogeo/impact assessment
	Surface water		X				
	planned and current uses of groundwater and surface water within 1 km of the		X				
	applicable water quality criteria and compliance monitoring locations		X				
	application of the water quality monitoring results to date		X				
	up-gradient and down-gradient surface water and groundwater quality		X				
	identification of landfill parameters of concern		X				
	leachate quality		X				
	contaminant concentrations		X				
	mass loadings		X				
	trends		X				
	assimilative capacity		X				
	cumulative impacts		X				
	Landfill Design						
	Design that demonstrates the landfill will satisfy all sections of the Criteria along with necessary plans specs, drawings, elevations sections etc.	X					
	Filling Plan						
	Planned development of individual phases and cover borrow areas	X					
	Progressive Closure Plan						
	Documents that show how progressive closure will be implemented including:						
	Phasing Plan showing areas to be progressively closed	X					Phased filling plan indicates areas that will be closed with intermediate cover once they reach final waste contours
	plan area of each progressive closure	X					
	schedule for each progressive closure	X					
	proposed cover system profile	X					
	stability analysis including under design storm conditions	X					
	analysis of landfill gas production and any required venting	X					
	materials management plan indicating the closure material source and storage	X					
	Lifespan Analysis Table						
	Projection of annual waste tonnage to be:						
	received					X	Intended for landfills with more site life remaining
	reused					X	
	recycled					X	
	burned					X	No waste burning authorized or planned
	landfilled	X					
	airspace consumed	X					
	Contaminating Lifespan Assessment						
	Lifespan assessment of key contaminants demonstrating validity of design service life and contaminating lifespan	X					DOCP Sec 11 for CLS.
	Surface Water Management Plan (see section 10.3.2)						
	Leachate Management Plan (see section 10.3.3)						
	LFG Management Plan (if required)						
	Demonstrates the LFG management facilities will satisfy the “Criteria”	X					
	May consist of an LFG Facilities Design Plan	X					

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
	Environmental Monitoring Plan (see section 9)						
	Facility Operations Plan						
	Demonstrates how the facilities will be operated in compliance with the operation criteria	X					DOCP Sec 6
	The design of the nuisance control measures is to be included in the plan	X					DOCP Sec 6.20
	Closure Plan (see section 10.3.4)						
	Fire Safety Plan						
	Submitted to the Fire authority that would respond to the fire	X					
	Describes how fire risks will be minimized	X					DOCP Sec 14, App J
	Includes an emergency response plan to quickly extinguish a fire if one develops	X					DOCP Sec 14, App J
	Identifies a suitable water supply, firefighting and heavy equipment resources	X					DOCP Sec 14, App J
	Emergency Response Plan						
	Shall document strategies for dealing with emergencies at the site including:						
	HAZ-MAT incidents		X				Verify with site operator
	spills	X					DOCP Sec 14, App J
	power outages		X				Verify with site operator
	extreme climate events	X					DOCP Sec 14, App J
	Demonstrates the landfill meets the requirements of Work Safe BC		X				DOCP Sec 6.6 - verify with Jesse/Site operator
	Financial Security Plan (see section 8)						
	Contingency Plan						
	Shall include:						
	possible failure and non-compliance scenarios of the leachate, surface water, and landfill gas management facilities.	X					DOCP Sec 15 - to be reviewed in impact assessment
	Practical and implementable contingency measures to address any failure or non-compliance with the performance criteria.	X					DOCP Sec 15
	Land Survey						
	Identifies landfill site boundary and the landfill footprint.	X					DOCP Fig 1.2
	The limits of the landfill footprint and landfill site boundary are to be established and maintained in the field.	X					DOCP Fig 1.2
10.3.1	**Filling Plan**						
	A filling plan shall be developed and include:						
	generation and collection of leachate					X	No leachate collection system
	methods to control of storm water	X					DOCP Sec 8
	methods to control of litter during the various seasonal conditions	X					DOCP Sec 6.20.3
	calculation of interim slope stability and safety	X					DOCP Sec 7.3 - final conditions slope stability
	method of vehicle access to the active waste disposal area	X					DOCP Sec 6.14
	progressive closure of the landfill footprint					X	Closure all at once in 2022-2023
	methods to minimize nuisance impacts such as dust, nuisance weeds, etc.	X					DOCPSec 6.20
	description of fill method cell by cell	X					DOCP Sec 5
	identification of the development of cells, strips and lifts	X					DOCP Sec 5
	full details on the cell geometry and cell size	X					DOCP Sec 5 and Dwg C-07 to C-13
	requirements and plans for daily, intermediate and final cover	X					DOCP Sec 5.2, 6.16
	plans for any proposed stripping and reuse of cover layers and road materials					X	No plans to reuse materials in DOCP
	target compaction density	X					DOCP Sec 6.15
	waste to cover ratio		X				
	air space utilization factor	X					DOCP Sec 6.15
	engineering drawings presenting the progressive closure of the landfill footprint					X	Closure all at once

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
10.3.2	**Surface Water Management Plan**						
	A Surface Water Management Plan shall be prepared and include:						
	explanation of how the landfill will satisfy performance criteria	X					DOCP Sec 8.1
	description of potential for surface water impairment and resulting impacts		X				
	a demonstration of understanding of the local and regional watershed	X					Physical setting section
	demonstration that the natural hydrologic cycle is preserved	X					
	a description of surface water management on Site	X					DOCP Sec 8.4
	measures to promote diversion of clean water to minimize leachate production and promote groundwater recharge	X					DOCP Sec 8.4, Dwg C-03 to C-05
	measures to protect the surface water quality in the off-site surface water bodies receiving drainage from the landfill site	X					DOCP Sec 8.4, Dwg C-03 to C-05
	a design for surface water control works	X					DOCP Sec 8.4, Dwg C-03 to C-05
	a design that will maintain run-off from the site sediment free and at rates that are consistent with pre-development flows	X					DOCP Sec 8.4, Dwg C-03 to C-05
	identification the surface water management works required for the control of erosion, sediment transport, flood risk, water quantity and water quality	X					DOCP App E
	meteorological data applicable to the site	X					DOCP App E
	results of the hydrologic modeling	X					DOCP App E
	detailed design of ditches, down-chutes, culverts, retention ponds and other surface water control infrastructure	X					DOCP Sec 8.4
	discussion addressing management of surface water during operation and post-closure	X					DOCP Section 8.4.2, 8.4.3
	The Surface Water Management Plan shall prepared in a manner consistent with the water management requirement strategies utilized in developing the leachate management plan and the groundwater and surface water impact assessment	X					SW Management overall goal is to reduce leachate generation and to separate leachate from surface water run-off
10.3.3	**Leachate Management Plan**						
	All new and expanding landfills and new landfill phases at existing landfills shall:						
	be designed with engineered liner system					X	Not expanding the landfill
	be designed with engineered leachate collection system					X	Not expanding the landfill
	A Leachate Management Plan shall address the following:						
	leachate generation quantities under average and extreme conditions for the following flows	X					DOCP Sec 9.2
	demonstrate the performance criteria (Section 4) will be satisfied		X				To be addressed in impact assessment
	present an assessment of alternatives for off-site or on-site leachate treatment					X	No leachate collection
	identify the preferred treatment method					X	No leachate collection
	demonstrate that the preferred alternative is practical and implementable					X	No leachate collection
	provide an implementation schedule of the preferred alternative					X	No leachate collection
	identify required approvals for implementation of the Leachate Management Plan if off-site disposal/treatment is proposed.					X	No leachate collection
	A Leachate Management Plan shall include (at a minimum):						
	Leachate generation quantities under average and extreme conditions for the following flows						
	annual					X	Calcs are intended to design LCS. No LCS at site
	monthly					X	Calcs are intended to design LCS. No LCS at site
	peak					X	Calcs are intended to design LCS. No LCS at site
	leachate chemistry profiles (actual and expected) including concentrations of:						
	ammonia	X					DOCP Sec 9.5
	BOD	X					DOCP Sec 9.5
	chloride	X					DOCP Sec 9.5
	iron	X					DOCP Sec 9.5
	manganese	X					DOCP Sec 9.5
	TSS	X					DOCP Sec 9.5
	landfill liner strategy (including leachate compatibility and lifespan).					X	No leachate collection
	leachate collection strategy (including protection from clogging).					X	No leachate collection
	leachate collection system efficiencies.					X	No leachate collection

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
	Treatment System Selection and Design Plans including:						
	identification of Management Alternatives including opportunities for moisture reduction, on-site treatment, off-site treatment, and recirculation.					X	No leachate collection
	evaluation of management alternatives including required level of treatment, availability of infrastructure, economics, sustainability and environmental risks.					X	No leachate collection
	sludge management					X	No leachate collection
	treatment system performance monitoring and maintenance					X	No leachate collection
	leachate discharge strategy					X	No leachate collection
	leachate management contingency plan	X					DOCP Sec 15
	If discharging to a groundwater infiltrations system:						
	demonstration leachate meets applicable groundwater standards as specified by the director					X	No leachate collection
	If discharging to a stream or river:						
	demonstration that the discharge meets applicable surface water quality standards as specified by director					X	No leachate collection and no direct discharge to a surface water body
	demonstration that any leachate discharge to surface water comply with requirements of the federal Fisheries Act					X	No leachate collection and no direct discharge to a surface water body
10.3.4	**Closure Plan**						
	Landfills shall prepare Closure Plan describing post-closure operations and maintenance of:						
	general site facilities (e.g. roads, fencing &c.)	X					DOCP Sec 12.1 All to be updated/expanded upon on Closure Plan
	overall facility	X					DOCP Sec 12.1
	final cover	X					DOCP Sec 12.5
	surface water management works	X					DOCP Sec 12.4
	leachate collection and on-site leachate treatment facility/leachate haulage program					X	No leachate collection
	LFG management facilities	X					DOCP Sec 12.6
	environmental monitoring program throughout entire Contaminating Life Span	X					DOCP Sec 12.3
	contingency measures for any reasonably foreseeable failure of works	X					DOCP Sec 15
10.4	**Landfill Gas Generation Assessment**						
	Landfills with >100,000 tn waste in place or that receive >10,000 tn/yr shall undertake an assessment of landfill gas generation and to submit the results to the MOE	X					DOCP App G and updated LFG Generation Assessment report completed in spring 2019
10.5	**Landfill Gas Management Facilities Design Plan**						
	Sites generating >1,000 tonnes CH4 shall complete a LFG Management Facilities Design Plan and installation of design	X					DOCP App G
10.6	**Annual Operations and Monitoring Report**						
	Landfills shall prepare a Annual O&M Report which includes:	X					
	Annual Environmental Monitoring Report						
	Data tabulation, comparison to performance criteria, interpretation, trends	X					
	Identification of any non-compliant criteria (present or predicted future)	X					
	Conclusions, recommendations and proposed changes to the environmental monitoring plan	X					
	Annual Operations Report						
	Total volume, tonnage, and types of waste discharged into the landfill for the year	X					
	Types and tonnages of waste that were not directly disposed of into the landfill such as open burned, recycled, composted, etc.	X					
	Leachate quantities collected, treated and discharged.					X	no leachate collection
	LFG quantities collected flared and utilized (as required by LFG Management Plan)					X	no LFG collection at this time
	Operational plan for the following 12 months	X					
	Remaining site life and capacity	X					
	Closure works completed to date	X					

Compliance Checklist
Landfill Criteria for Municipal Solid Waste - Second Edition (June 2016)
Campbell River Waste Management Centre
Comox Valley Regional District

	Second Edition Landfill Criteria for Municipal Solid Waste (June 2016)	Compliant	Not Addressed	Non Compliant	Exempt	Not Applicable	Comments
	Results of regular inspection for:						
	cover integrity	X					
	health of vegetation	X					
	undesirable plant species	X					
	burrowing animals	X					
	erosion	X					
	settlement	X					
	any changes from approved reports, plans and specifications	X					
	any complaints received and the action taken as a result of a complaint	X					
	Financial Security Plan update	X					
	identification of any non-compliance with the Solid Waste Management Plan	X					
	progress report on efforts to resolve previously determined non-compliance	X					
	Landfill owners are encourage to track and report the following:						
	compaction, waste to cover ratio, waste to road ratio and airspace utilization	X					
	operation and maintenance expenditures	X					

Appendix D
Hydrogeologic Impact Assessment

Appendix E
Landfill Gas Management Facilities Design Plan

Draft for Review

This document is in draft form. A final version of this document may differ from this draft. As such, the contents of this draft document shall not be relied upon. GHD disclaims any responsibility or liability arising from decisions made based on this draft document.

Updated Landfill Gas Management Facilities Design Plan

Campbell River Waste Management Centre

Comox Valley Regional District

GHD | 10271 Shellbridge Way Suite 165 Richmond British Columbia V6X 2W8 Canada

056484 | 200 | 02 | Report No 31 | June 13 2017

Table of Contents

Drawing Index

Table Index

Table Index (Following Text)

Appendix Index

1. Introduction

GHD Limited (GHD) has prepared the following report entitled, “Updated Landfill Gas Management Facilities Design Plan” for the Campbell River Waste Management Centre (CRWMC or Site) on behalf of the Comox Valley Regional District (CVRD).

This Updated Landfill Gas Management Facilities Design Plan (Plan) has been prepared to meet Section 7(2) of the "*Landfill Gas Management Regulation*" (Regulation), with consideration to the "*Landfill Gas Management Facilities Design Guidelines*" (Guidelines) (CRA, 2010). For the purpose of this plan and conformance with Section 7(2)(f) of the Regulation, Deacon Liddy, P. Eng., is the qualified professional.

This Plan has been organized to meet the requirements of the Landfill Gas (LFG) Management Facility Design Guidelines as follows:

- Section 2.0 - Site Conditions and Design Objectives
- Section 3.0 - Existing Landfill Gas Management Facilities
- Section 4.0 - Planned Landfill Gas Management System Upgrades
- Section 5.0 - System Optimization
- Section 6.0 - Additional Information

The construction of the LFG Management Facilities will follow the placement of the final cover for the CRWMC. The construction of the LFG management Facilities following the placement of the final cover is favorable due to the following:

- Prior to the landfill closure, the LFG collection field will be able to capture LFG from a footprint of approximately 29,500 square metres, which would result in high operational costs and down time.
- The potential LFG collection footprint prior to landfill closure, in the outer areas of the limit of waste, would be in the older waste relative to the centre of the limit of waste.
- Following the landfill closure, the LFG collection field will be able to capture LFG from a footprint of approximately 60,900 square metres.
- Until the final cover is placed, air intrusion would be expected if the LFG Extraction Plant places a strong vacuum on the collection field.
- The Comox Valley Waste Management Centre LFG management facilities are currently in the commissioning phase until installation of the final cover to reach the expected recovery rates.
- Reaching the target of 75 percent design recovery collection efficiency will not be able to be reached until the final cover is placed.

2. Site Conditions and Design Objectives

The CRWMC is located approximately 6.5 kilometres (km) east of the city of Campbell River, British Columbia (BC), on Argonaut Road. The Site is owned by the CVRD and operated by Berry and Vale under contract with the CVRD. The authorized works include the municipal solid waste landfill and related appurtenances.

The landfill currently operates under OC MR-02401, issued on December 2, 2003. OC MR-0240 replaced the original permit, which was issued in November 1973 and last amended in July 1992. Refuse authorized for disposal at the Site is characterized as “municipal solid waste as defined under the Waste Management Act”.

The Site is located within the city limits of Campbell River, BC on Argonaut Road approximately 7.5 kilometres (km) east of the city centre. The Site is composed of two land parcels, Blocks C and J within District Lot 85 of the Sayward Land District. The total Site area is 29.7 hectares. The Site is currently zoned as Industrial Four (I-4) under the City of Campbell River Bylaw No. 3250. The property directly west of Block C is owned by Island Ready Mix and houses operations and equipment for concrete manufacturing and a gravel pit. Directly south of the Site is a gravel pit. Mature forests situated on Crown Land are located to the north and east of the Site. There are three residential dwellings located approximately 500 meters (m) to the northeast of the landfill footprint.

The property immediately to the east of Block J is occupied by a single dwelling residential lot. There are also several active and historical industrial operations in the vicinity of the landfill. Active industrial operations include an auto scrap yard, two construction landfills, and an asphalt paving plant and an Emcom facility which includes a salt storage shed. Historical operations in the vicinity include a crane operation which housed facilities for cleaning copper coated fish farm nets and a metal scrap yard.

According to CH2MHILL’s 2009 closure plan, the Site operated as an informal dump site prior to the 1970s. Waste burning took place at the Site as well as disposal of liquid wastes (EBA, 2014). Prior to landfilling at the Site, the Site operated as an aggregate extraction facility. The City of Campbell River took over Site operations in the mid 1970s until ownership was transferred to the CVRD in 1999 (EBA, 2014). A private contractor, Berry and Vale, has operated the Site under contract with the CVRD since 1996.

A report titled Landfill Gas Generation Assessment for the CRWMC (CRA, 2010) was submitted to the MOE. The LFG generation rate was updated by GHD for this report to reflect more recent projections of future waste disposal rates, and corresponding changes in future LFG generation. The updated projections of future LFG generation are provided in Appendix A and are summarized in Table 2.1.

Table 2.1 Results of Landfill Gas Generation Modelling

Year	Annual Waste Disposal Rate	Projected Landfill Gas Generation (m^3/hr)
2012	25,698	482.5
2013	26,992	492.4
2014	28,373	504.2

Table 2.1 Results of Landfill Gas Generation Modelling

Year	Annual Waste Disposal Rate	Projected Landfill Gas Generation (m^3/hr)
2015	25,303	508.9
2016	25,490	513.6
2017	26,371	519.6
2018	26,506	525.5
2019	26,409	530.7
2020	26,016	534.7

The annual LFG generation in cubic metres per hour can be approximately converted to an annual average tonnage of methane (tonnes of methane per year) by multiplying the modelled LFG generation in cubic metres per hour by a factor of 2.89 (e.g., 519.6 m^3/hr of LFG at 50% methane is approximately equal to an annual average of 1,502 tonnes of methane per year at a standard temperature of 20°C).

Health and safety safeguards for LFG migration and for LFG control will include on-Site and off-Site gas monitoring wells, monitoring locations beneath nearby off-Site structures, and periodic monitoring of these locations for methane content. The typical LFG probe designs are presented on Drawing C-03.

3. Landfill Gas Management Facilities Design

The following section presents a description of the planned methods, management practices, and processes for landfill gas management at the landfill site as required under Sections 7(2)(a) of the Regulation.

3.1 Design Considerations

The following provides a summary of the information reviewed and pertinence to the conceptual design of the LFG collection system:

Information/Data Input	Design Considerations
Fill Plan – The closure of the landfill is scheduled to take place in 2023.	By constructing the LFG collection system during the landfill closure, the collection system will be installed as one construction project. The LLDPE final cover will be installed over the surface of the landfill during the same closure construction contract.
MSE Wall- Presence of lock Block MSE (mechanically stabilized earth) Wall on eastern edge of landfill.	Presents a potential path for air intrusion if wells are placed in close proximity. Wells will be placed at a horizontal distance of 25 metres or greater from the MSE Wall.

A design standards compliance checklist is included in Table 1.1 following the text.

3.2 Conceptual Design Assumptions

LFG collection system conceptual designs were generated for implementation during the final closure of the landfill. For the purpose of this report, the following general design elements were included:

- Pipe network to be composed of buried High Density Polyethylene (HDPE) pipe
- Vertical collection wells to have a collection radius of 25 metres (greater than 25 metres away from the MSE wall)
- Valve chambers comprising flow control and sample port assemblies
- Single centrifugal blower with variable frequency drive
- Condensate knockout/moisture separator at the flare station
- Two condensate traps each with an adjacent condensate storage tank
- Gas probes installed in more permeable strata between the landfill footprint and the property boundary
- LFG plant will be skid mounted with blower/motor units and all instrumentation
- LFG instrumentation to include flow meter, pressure and temperature gages, and LFG gas sensors (methane and oxygen)
- Programmable logic controller
- Flare Stack Thermocouple
- Datalogger/ autodialer

3.3 Collection Field Development

The LFG Generation Assessment (CRA, 2010) identified that the Site is required to install a LFG management system as per the LFG Regulation.

GHD's proposed conceptual design is based on a vertical well network in the landfill area of the Site (Drawing C-01). It is envisioned that construction of this network will include construction of the LFG control plant, enclosed flare, and approximately 31 vertical collection wells with approximately 2,300 m of collection pipe. The collection system will be designed to capture all of the landfill gas generated, which is equivalent to approximately 1,500 tonnes of methane per year. Details of the installation of the collection field wells, underground piping, and chambers are included in Drawing C-02 and Drawing C-03.

The use of vertical collection wells is favourable over the use of horizontal collection trenches as the wells will be able to collect gas generated at the deeper levels of the landfill and the wells can all be installed at closure. The collection wells will also be easier to construct as it will not involve the excavation of trenches into the waste mass. Due to the pyramid type shape of the landfill and limited working area, installing horizontal trenches would be difficult to integrate with operations.

The LFG collection system will be installed as part of the final closure of the landfill, so no further expansion of the wellfield will occur.

3.4 Header Piping

A 200 mm diameter HDPE header pipe will be installed on the north and west perimeter of the landfill, and along the south and east side slope of the landfill. The subheader piping will be 150 mm diameter HDPE pipe and will connect to the vertical LFG collection wells.

3.5 Condensate Management

Condensate traps will be placed at the low points in the LFG collection system header piping. One condensate trap will be placed at the entrance to the blower/flare station and another will be placed at the northeast termination of the two header pipes.

The two condensate traps will allow for collected condensate to gravity drain into an underground concrete tank. The tanks will have a level logger which will allow for a signal to the landfill post-closure operator to empty the storage tank. After the condensate trap is drained, the condensate will be disposed of at either the City of Campbell River Waste Water Treatment Plant or the future Comox Leachate Treatment Facility. Details of the condensate trap installation are included in Drawing M-01.

3.6 Landfill Gas Extraction Plant

A layout of the LFG Extraction Plant skid is presented in Drawing C-04. The LFG Extraction Plant will include the following features:

- Condensate trap ('p' trap) connected to a storage tank
- Condensate knockout pot
- LFG Analyzer (O_2 and CH_4)
- Blower with a capacity of 100 m^3/hr to 500 m^3/hr
- Pressure gauges
- Flow meter
- Flame Arrestor
- Flare stack thermocouple
- Enclosed Flare with a maximum capacity of 500 m^3/hr

3.7 Flaring

Two types of flares are typically used at LFG extraction plants 1) candlestick type flares or 2) enclosed flares. Candlestick type flares typically range in cost from $30,000 to $60,000, whereas small enclosed flares typically range in cost from $175,000 to $200,000. Candlestick type flares are commonly used in conjunction with utilization facilities as backup during maintenance and breakdowns or when LFG collection exceeds the capacity of the utilization system. Candlestick type

flares offer a low-cost method of disposing LFG; however, the destruction efficiency of candlestick flares is lower than enclosed flares. Enclosed flares are often used at sites where utilization is not viable. They are designed to achieve a specified combustion temperature and retain exhaust gases at that temperature for a specified time to ensure a maximum degree of destruction of contaminants is achieved.

Until a feasibility study is completed, it is unknown whether utilization will be a viable option for the Site.

Should an enclosed flare be installed, it shall meet the requirements of Design Standard 8. As such, it must be designed to have a minimum retention time of 0.5 seconds and a minimum flare temperature of 875 degrees Celsius. To ensure safe operations, it must be equipped with the following features:

- Flame arrestor
- Electronic ignition system
- Flame sensors/scanners
- Automated modulation and shut-off valves
- Temperature sensors/thermocouples
- Electronic interlocks to shut the system down under fault conditions

All of the above are typical features of an enclosed flare.

3.8 LFG Utilization Equipment

Selecting an option for utilization is dependent on a number of factors, including energy or product sales prices, capital and operating costs, and proximity to infrastructure such as electricity or natural gas transmission. Electricity generation is often favoured because the basic equipment is readily available and the economics are favourable. Electricity generation can be achieved with low- and medium-grade LFG using a variety of technologies and with minimal pre-treatment.

For high-grade applications, such as the generation of natural gas or direct use, pre-treatment requirements increase considerably, as do the costs for this level of processing.

Primary constituents in LFG requiring pre-treatment include the following:

- Free moisture/water vapour
- Particulates
- Hydrogen sulphide
- Siloxanes
- Halogenated organic compounds
- Carbon dioxide

Relative amounts of these compounds must be ascertained on a site-specific basis through testing, and it is recommended that such testing be undertaken prior to selecting a utilization option.

Should utilization prove to be a viable option, the utilization plant would be located adjacent to the proposed location for the flare compound, south west of the landfill.

4. System Installation, Operation, and Maintenance

The following section presents a plan for installation, operation, and maintenance of landfill gas management facilities at the landfill site.

4.1 Installation and Commissioning

Newly installed LFG extraction points will be commissioned through the following procedure:

- Measure pressure on wellhead side of extraction point valve.
- If pressure is positive then open valve to target an initial vacuum of 10 inches of water column on the landfill side of the valve. Measure and record oxygen content, methane content, carbon dioxide, and balance concentrations and the vacuum pressure on the blower-flare station side of the valve. If oxygen above 0.5 percent is detected immediately adjust the valve to reduce the vacuum pressure until oxygen concentrations fall below 0.5 percent. If the methane content is 35 percent or higher and flow is present within the well, adjust the valve to increase until the oxygen content begins to reach 0.5 percent.
- Return to the extraction point within 4-8 hours and measure the oxygen content of the LFG. If the oxygen content is above 0.5 percent reduce the pressure on the landfill side of the valve to achieve an oxygen content below 0.5 percent.
- Continue to balance the new wells points daily for a week.
- At the end of the first week a full balancing of the active portions of the LFG collection system will be required. The valves on existing wells may need to be opened slightly to maintain a similar vacuum to before the addition of the new extraction points.
- At the end of the first week balance the entire system once per week for the first month.
- At the end of the first month, return to monthly balancing of the LFG collection system.

4.2 Operation

The operation of a LFG collection system generally needs to meet the following performance standards:

- Oxygen content should not exceed 2 percent by volume and nitrogen should not exceed 15 percent by volume at a LFG extraction well. Generally oxygen and nitrogen are below both concentrations for active LFG extraction wells at the Site.
- Methane content, oxygen content, carbon dioxide content, nitrogen content, and vacuum and valve position must be measured at all monitoring ports at all wells at least on a monthly basis.
- If the LFG analyzer detects high oxygen concentrations (greater than 2 percent by volume), a round of field monitoring and balancing must be initiated as soon as practically possible.

4.3 Maintenance

An operation and maintenance plan should be developed as part of the installation of the LFG management facility.

General maintenance will include the following:

- Weekly operations checks
- Monthly well balancing
- Monthly blower/flare station inspection
- Quarterly flow meter and LFG analyzer check
- Annual well head assembly inspection
- Annual blower/flare station inspection
- Annual blower/motor alignment check
- Annual flow meter and LFG analyzer maintenance and calibration

5. System Optimization

Routine and scheduled monitoring and adjustment of the LFG collection field is required to optimize the effectiveness of the collection system in response to varying LFG generation rates; this activity is generally called well field balancing. A well designed, constructed, and operated LFG recovery system can collect 75 percent or more of the LFG at a landfill site. It is important for a collection system to be operated to match the site's changing LFG generation potential without over or under-drawing on the collection field. In addition to the changing LFG generation rate over the life of the landfill, the effective LFG generation rate also varies somewhat over the short term as a function of factors such as meteorological conditions, differential settlement, equipment efficiencies, and cover system conditions.

The LFG collection field must be routinely monitored and adjusted to optimize the effectiveness of the collection system. The adjustment of valve settings to reduce or increase LFG flows from low or high generation areas of the landfill is required to maximize LFG collection without overdrawing from those areas of the site that may be susceptible to air intrusion. It should be noted that collection field adjustments must be made based upon a review of historic well or trench performance considered within the context of the overall field operation. Even relatively minor changes to a particular collection point will influence flow, vacuum, and gas quality at other locations within the collection system.

A certain amount of judgment gained from site-specific experience is required when making adjustments to the collection field. If LFG readings at a specific well are found to be substantially below the LFG concentration at the LFG Collection Plant, then the flow from that well should be reduced. Wholescale changes in the valve position (i.e., going from fully open to fully closed) are often counter-productive, as a given well may demonstrate high oxygen/low methane at full vacuum exertion, but reasonable gas quality at some reduced level; this reflects the purpose of well control

valves. Smaller changes in valve position are more conducive to effective operations, and are most useful when the history of a well relative to LFG quality and valve position are recorded and utilized to guide future balancing activities.

6. Additional Information

As required under Sections 7(2)(e) of the Regulation the LFG Management Facilities Design Plan is required to contain any other information requested in writing by the director. No additional information has been requested by the director in writing.

Table 1.1

Design Standards Compliance
Updated Landfill Gas Management Facilities Design Plan
Campbell River Waste Management Centre
Comox Valley Regional District

Standard #	Landfill Gas Management Facilities Design Guidelines	CRWMC Landfill Gas Management Facility Design Plan
Design Standard 1	The results of the LFG generation assessment conducted in accordance with the Regulation will provide the basic inputs to design the LFG management system.	The LFG generation assessment results were used to size the LFG collection system piping.
Design Standard 2	It is expected that LFG management systems must be designed to maintain 75 percent collection efficiency.	The LFG collection system has been designed to target a LFG collection efficiency of 75 percent.
Design Standard 3	All regulated landfills are required to design and install active LFG collection systems to collect LFG as per the BC MOE Regulation requirements.	The design plan presents a design that complies with the BC MOE Regulation requirements.
Design Standard 4	LFG management systems will be designed to accommodate the maximum LFG generation expected, rather than the expected LFG collection.	The LFG collection system has been designed to accommodate all the of LFG generated from the landfill based on the LFG generation assessment results.
Design Standard 5	All LFG captured must undergo a reduction in global warming potential as it relates to the methane component of the gas (i.e. flaring, LFG utilization for electricity generation, fuel for vehicles).	The primary destruction device at the CRWMC will be an enclosed drum flare (or utlization in the future).
Design Standard 6	An active LFG collection system is required to include a complete LFG extraction control plant on-site with a LFG flare. If flaring will be the primary methane destruction device, an enclosed high-efficiency flare will be utilized. A candlestick flare may be utilized as the backup system to a LFG utilization system, or may be used when there is a surplus of LFG collected (above the capacity of the utilization system). However, where a utilization system is in place and a candlestick flare is used as backup, the candlestick flare will not be the primary combustion device.	The primary destruction device at the CRWMC will be an enclosed drum flare (or utlization in the future).
Design Standard 7	LFG flow rate (in m^3/hr or equivalent), methane composition (in percent by volume), oxygen content (in percent by volume) and flare stack temperature (in degrees Celsius) must be measured on a continuous basis with ongoing logging of all data on an aggregated period of not less than every five minutes.	A datalogger will be installed to monitor each of these parameters.
Design Standard 8	An enclosed flare must be designed to have a minimum retention time of 0.5 seconds and a minimum flare temperature of 875 degrees Celsius.	The primary destruction device at the CRWMC will be an enclosed drum flare.
Design Standard 9	Landfill owners and operators must develop an Operations and Maintenance Manual for the LFG management systems.	An LFG operations and maintenance manual will be developed.
Design Standard 10	All buildings on the landfill site must have continuous combustible gas measurement equipment.	The LFG management system buildings will have continuous gas measurement equipment.

Drawings

CAMPBELL RIVER WASTE MANAGEMENT CENTRE
CAMPBELL RIVER, BRITISH COLUMBIA
LANDFILL GAS DESIGN PLAN

56484-200

SOURCE
JANUARY 01, 2007. GOVERNMENT OF CANADA, NATURAL RESOURCES CANADA.

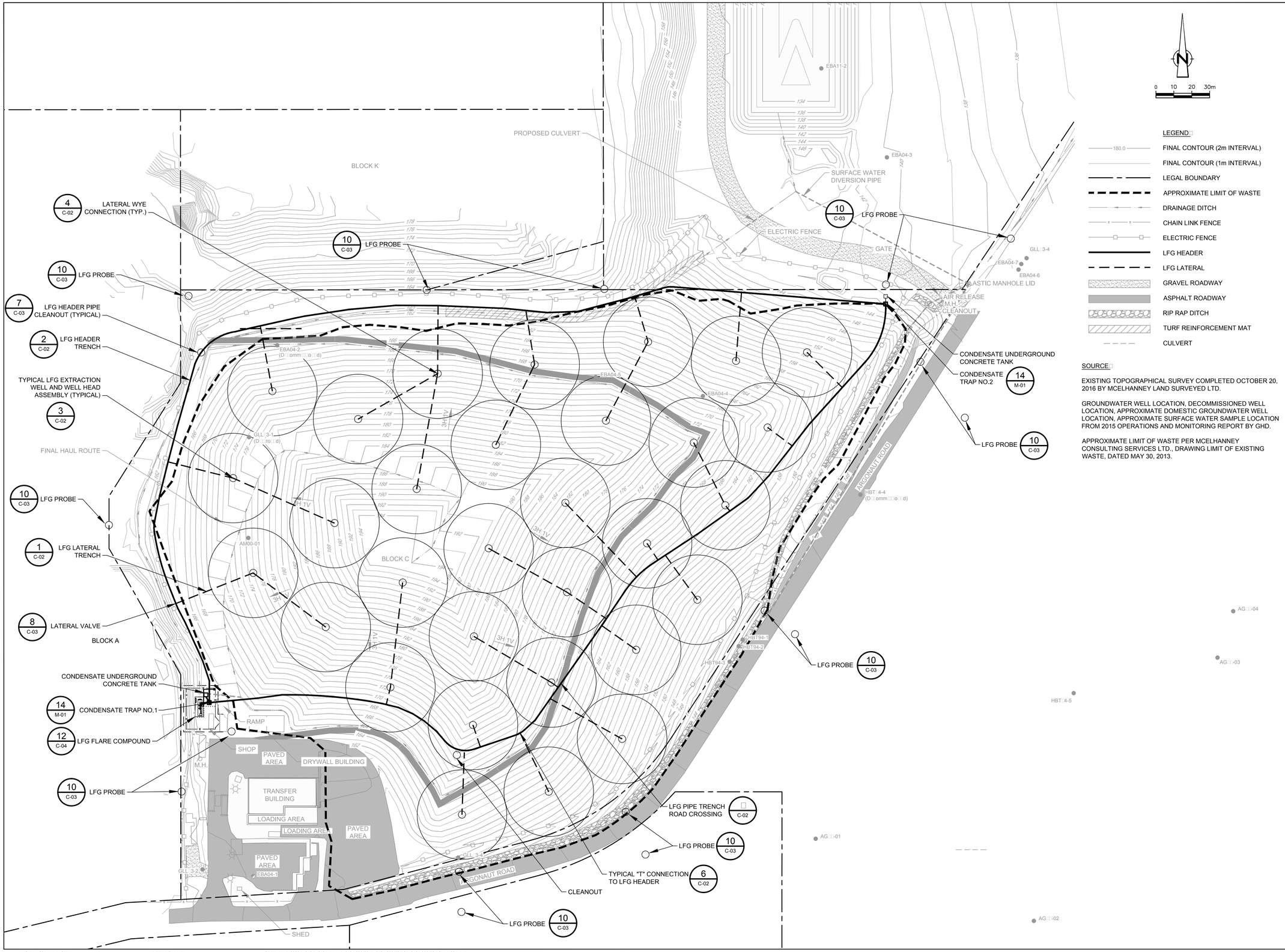
AREA MAP

SOURCE
BING IMAGERY: MICROSOFT PRODUCT SCREEN SHOT(S) REPRINTED WITH PERMISSION FROM MICROSOFT CORPORATION

SITE MAP

DRAWING INDEX

DWG NO.	REV NO.	DATE	TITLE
C-01	0	JUNE 2017	COLLECTION SYSTEM LAYOUT
C-02	0	JUNE 2017	LFG COLLECTION SYSTEM DETAILS (1 OF 2)
C-03	0	JUNE 2017	LFG COLLECTION SYSTEM DETAILS (2 OF 2)
C-04	0	JUNE 2017	LANDFILL GAS FLARE COMPOUND LAYOUT
M-01	0	JUNE 2017	LANDFILL GAS COLLECTION SYSTEM CONDENSATE TRAP DETAILS



LEGEND

- 180.0 — FINAL CONTOUR (2m INTERVAL)
- FINAL CONTOUR (1m INTERVAL)
- LEGAL BOUNDARY
- APPROXIMATE LIMIT OF WASTE
- DRAINAGE DITCH
- CHAIN LINK FENCE
- ELECTRIC FENCE
- LFG HEADER
- LFG LATERAL
- GRAVEL ROADWAY
- ASPHALT ROADWAY
- RIP RAP DITCH
- TURF REINFORCEMENT MAT
- CULVERT

SOURCE

EXISTING TOPOGRAPHICAL SURVEY COMPLETED OCTOBER 20, 2016 BY MCELHANNEY LAND SURVEYED LTD.

GROUNDWATER WELL LOCATION, DECOMMISSIONED WELL LOCATION, APPROXIMATE DOMESTIC GROUNDWATER WELL LOCATION, APPROXIMATE SURFACE WATER SAMPLE LOCATION FROM 2015 OPERATIONS AND MONITORING REPORT BY GHD.

APPROXIMATE LIMIT OF WASTE PER MCELHANNEY CONSULTING SERVICES LTD., DRAWING LIMIT OF EXISTING WASTE, DATED MAY 30, 2013.

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

DRAFT CONCEPTUAL DESIGN

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
LANDFILL GAS MANAGEMENT FACILITIES DESIGN PLAN

No.	Issue	Drawn	Approved	Date
1	DRAFT CONCEPTUAL DESIGN	KR	DL	05/01/2017

Drawn	K. RENNER	Designer	D. LIDDY
Drafting Check	K. DHALIWAL	Design Check	D. BARTON
Project Manager	G. FERRARO	Date	Jun 13, 2017
This document shall not be used for construction unless signed and sealed for construction.		Scale	1:1000
Original Size ANSI D		Bar is 20mm on original size drawing 0 20mm	

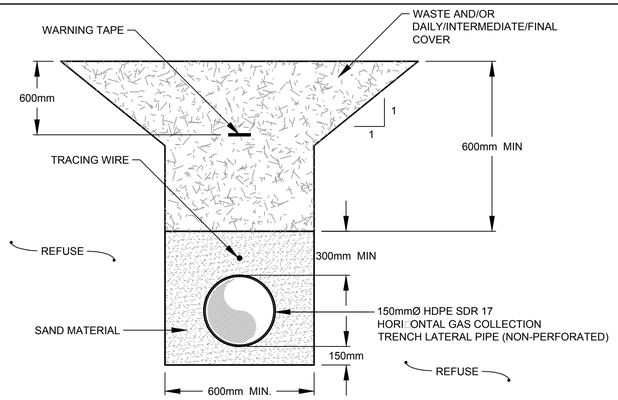
Project No. **56484-200**

Title
COLLECTION SYSTEM LAYOUT

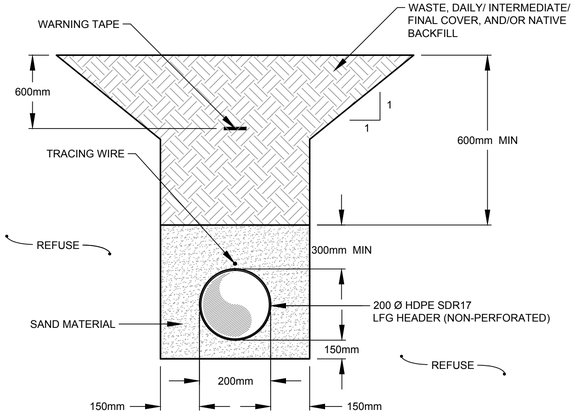
Sheet No.
C-01

Sheet 1 of 5

Plot Date: 13 June 2017 - 4:17 PM Plotted By: Michael Donovan CAD File: P:\drawings\56000s\56484\56484-reports\56484-200(031)\56484-200(031)C\56484-200(031)CI-WA001.dwg



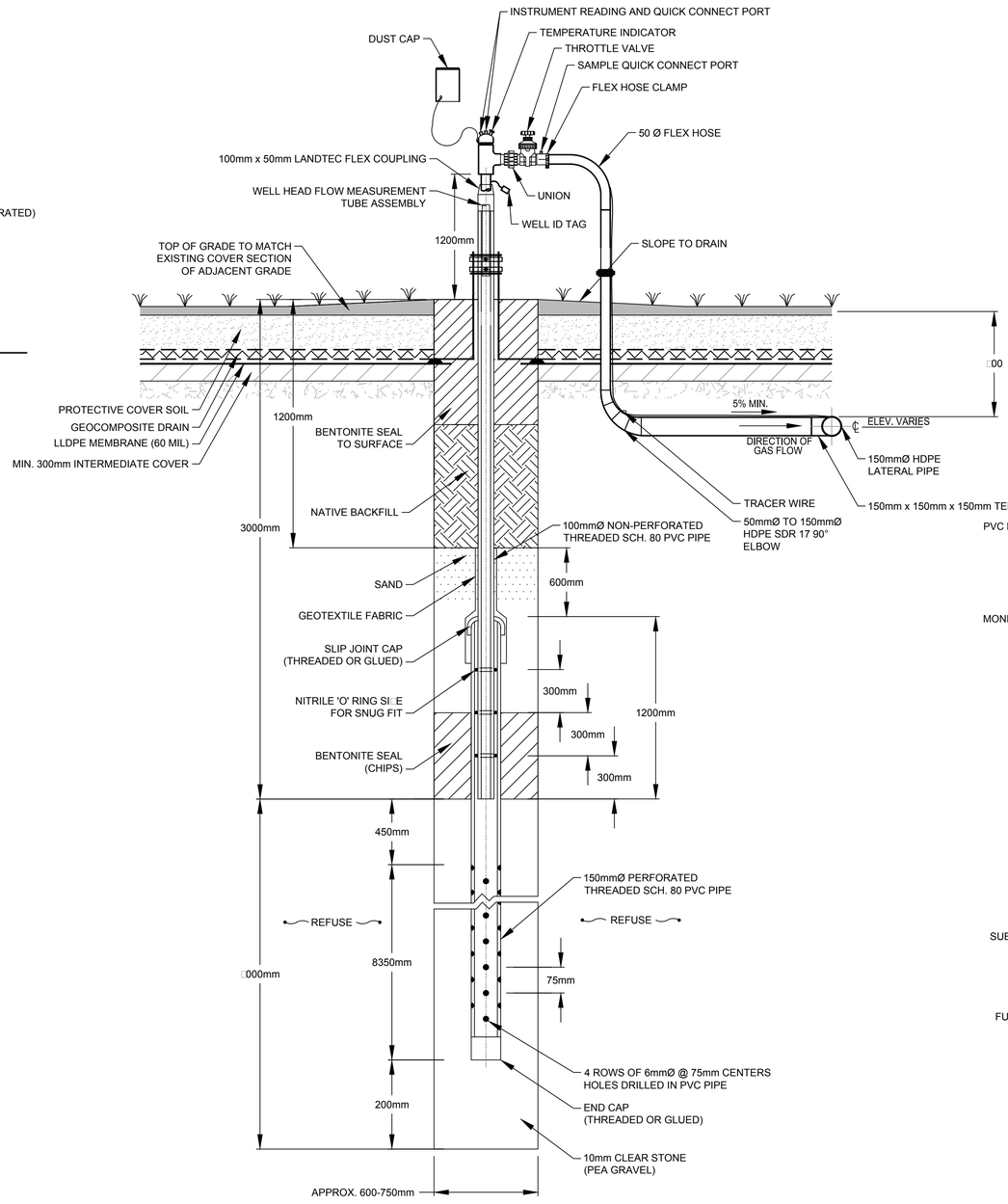
DETAIL 1 C-01 LFG LATERAL TRENCH
NTS



DETAIL 2 C-01 LFG HEADER TRENCH
NTS

NOTE:

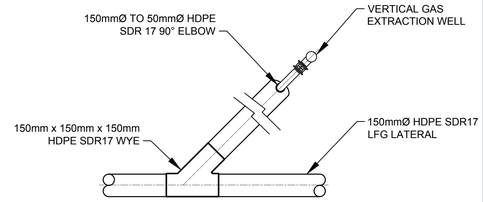
WITHIN THE LIMITS OF THE LANDFILL, NATIVE MATERIAL IS EXPECTED TO BE THE LANDFILL CLAY COVER, ALTHOUGH WASTE MAY BE ENCOUNTERED NEAR THE BOTTOM DEPTH OF THE TRENCH. THE BACKFILL MATERIAL FOR THE TRENCH WITHIN THE LANDFILL LIMITS IS EXPECTED TO BE THE EXISTING CLAY COVER. BEYOND THE LIMITS OF THE LANDFILL, THE NATIVE MATERIAL IS EXPECTED TO BE SAND, GRAVEL, AND/OR PEAT.



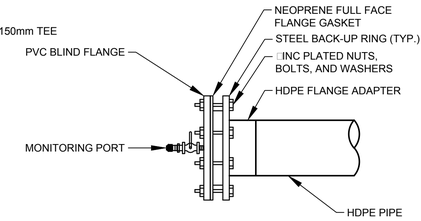
NOTE:

1. TYPICAL BORING DEPTH IS 15m OF REFUSE DEPTH.
2. EXTRACTION WELL LOCATIONS AND ELEVATIONS TO BE VERIFIED IN THE FIELD. THE OWNER AND ENGINEER MUST APPROVAL ALL CHANGES TO THE WELL SCHEDULE.
3. LIMESTONE, CRUSHED CONCRETE AND LIKE MATERIALS ARE NOT APPROVED AS BACKFILL MATERIAL.
4. BENTONITE TO BE HYDRATED DURING INSTALLATION OF WELL.

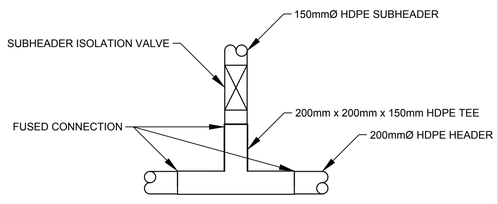
DETAIL 3 C-01 TYPICAL LFG EXTRACTION WELL AND WELL HEAD ASSEMBLY (TYP.)
NTS



DETAIL 4 C-01 LATERAL WYE CONNECTION(TYP.)
NTS



DETAIL 5 C-03 BLIND FLANGE
NTS



DETAIL 6 C-01 TYPICAL "T" CONNECTION TO LFG HEADER
NTS

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 F 604 214 0525 W www.ghd.com

DRAFT CONCEPTUAL DESIGN

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
LANDFILL GAS MANAGEMENT FACILITIES DESIGN PLAN

No.	Issue	Drawn	Approved	Date
1	DRAFT CONCEPTUAL DESIGN	KR	DL	05/01/2017

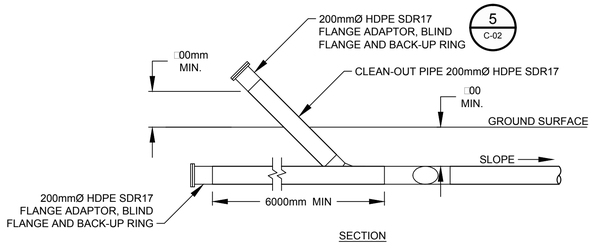
Drawn	K. RENNER	Designer	D. LIDDY
Drafting Check	K. DHALIWAL	Design Check	D. BARTON
Project Manager	G. FERRARO	Date	Jun 13, 2017
This document shall not be used for construction unless signed and sealed for construction.		Scale	AS SHOWN
Original Size	ANSI D	Bar is 20mm on original size drawing	0 — 20mm

Project No. **56484-200**

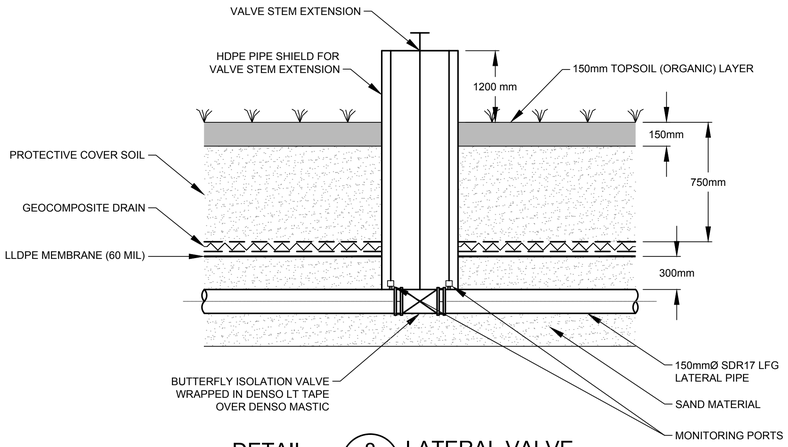
Title
LFG COLLECTION SYSTEM DETAILS (1 OF 2)

Sheet No.
C-02

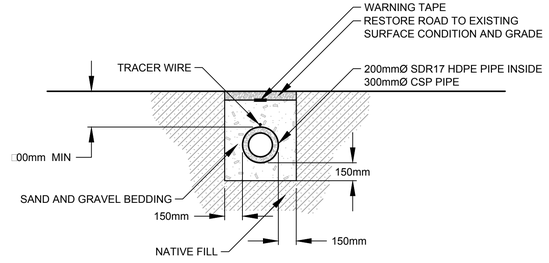
Sheet 2 of 5



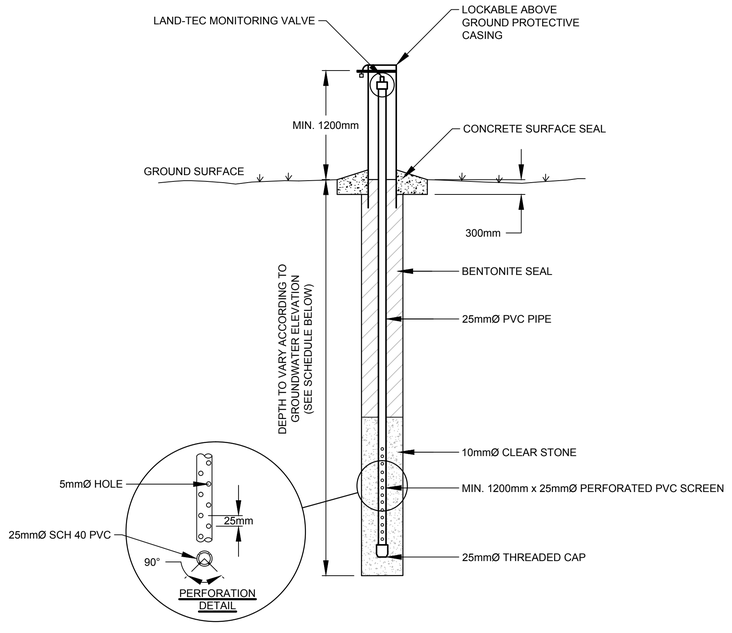
DETAIL 7 C-01 — LFG HEADER PIPE CLEANOUT (TYPICAL)
NTS



DETAIL 8 C-01 — LATERAL VALVE
NTS



DETAIL □ C-01 — LFG PIPE TRENCH ROAD CROSSING
NTS



DETAIL 10 — LFG PROBE
NTS

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

DRAFT
CONCEPTUAL DESIGN

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
LANDFILL GAS MANAGEMENT FACILITIES DESIGN PLAN

No.	Issue	Drawn	Approved	Date
1	DRAFT CONCEPTUAL DESIGN	KR	DL	05/01/2017

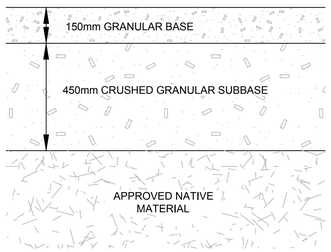
Drawn	K. RENNER	Designer	D. LIDDY
Drafting Check	K. DHALIWAL	Design Check	D. BARTON
Project Manager	G. FERRARO	Date	Jun 13, 2017
This document shall not be used for construction unless signed and sealed for construction.		Scale	AS SHOWN
Original Size	ANSI D	Bar is 20mm on original size drawing	0 — 20mm

Project No. **56484-200**

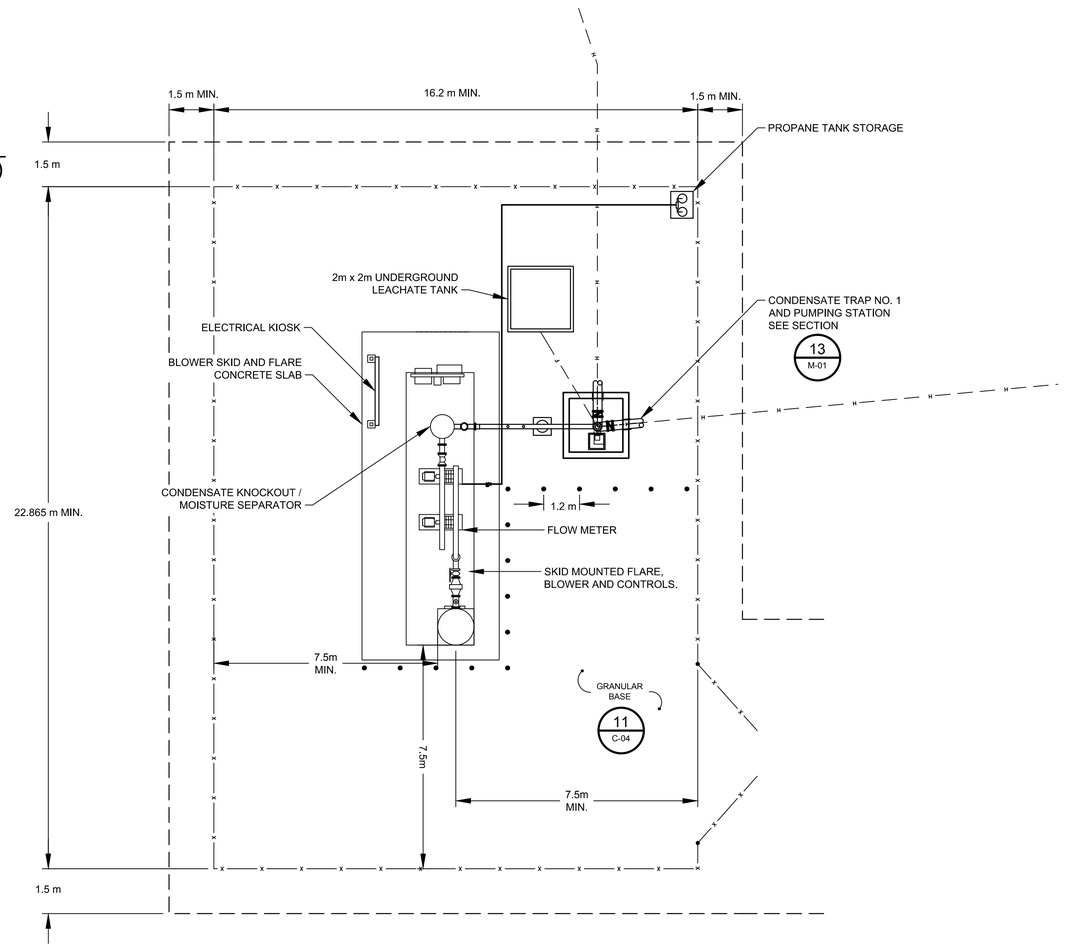
Title
LFG COLLECTION SYSTEM DETAILS (2 OF 2)

Sheet No.
C-03

Sheet 3 of 5



DETAIL 11 C-04 COMPOUND GRANULAR BASE SECTION (TYPICAL)
NTS



DETAIL 12 C-01 FLARE SYSTEM COUMPOUND
1:100

LEGEND

- CONDENSATE DRAIN
- LFG HEADER
- FENCE
- COMPOUND LIMIT

N

0 1 2 3m

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 F 604 214 0525 W www.ghd.com

DRAFT
CONCEPTUAL DESIGN

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
LANDFILL GAS MANAGEMENT FACILITIES DESIGN PLAN

No.	Issue	Drawn	Approved	Date
1	DRAFT CONCEPTUAL DESIGN	KR	DL	05/01/2017

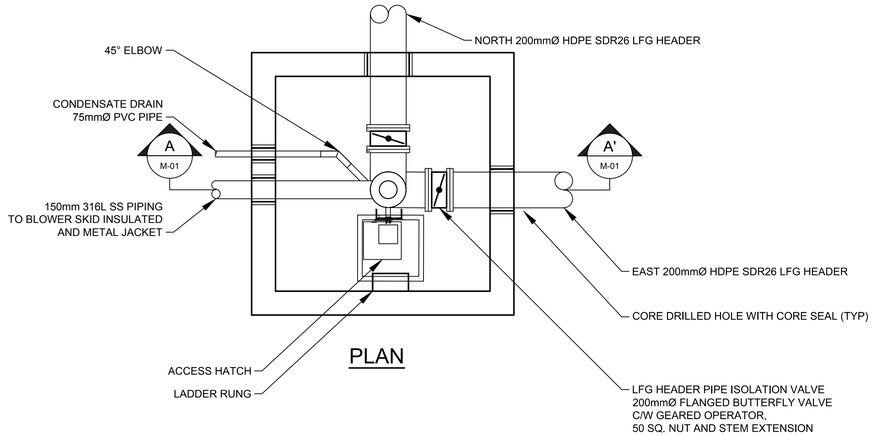
Drawn	K. RENNER	Designer	D. LIDDY
Drafting Check	K. DHALIWAL	Design Check	D. BARTON
Project Manager	G. FERRARO	Date	Jun 13, 2017
This document shall not be used for construction unless signed and sealed for construction.		Scale	AS SHOWN
Original Size	ANSI D	Bar is 20mm on original size drawing	0 20mm

Project No. **56484-200**

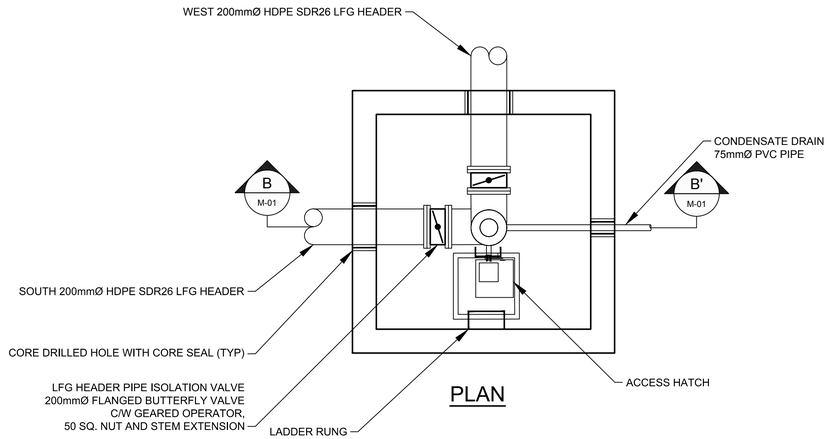
Title
LANDFILL GAS FLARE SYSTEM COMPOUND LAYOUT

Sheet No.
C-04

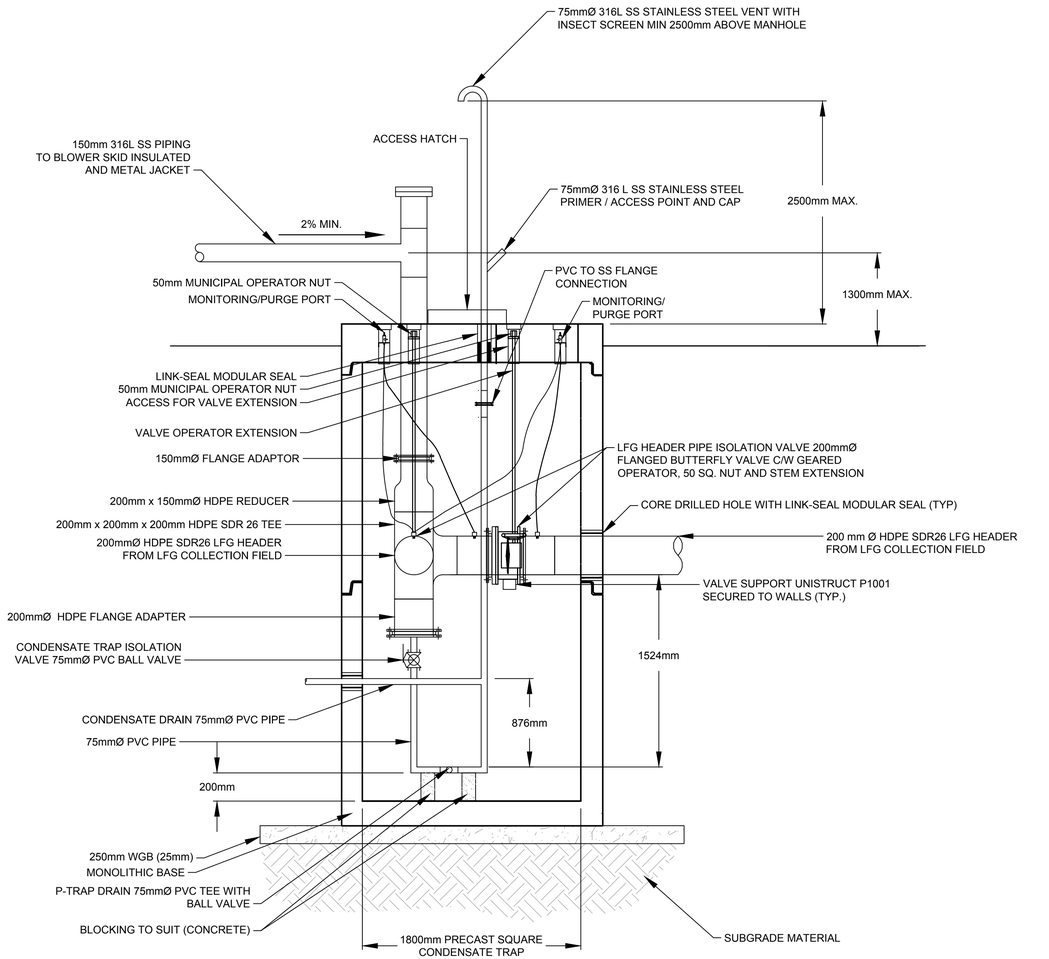
Sheet 4 of 5



PLAN



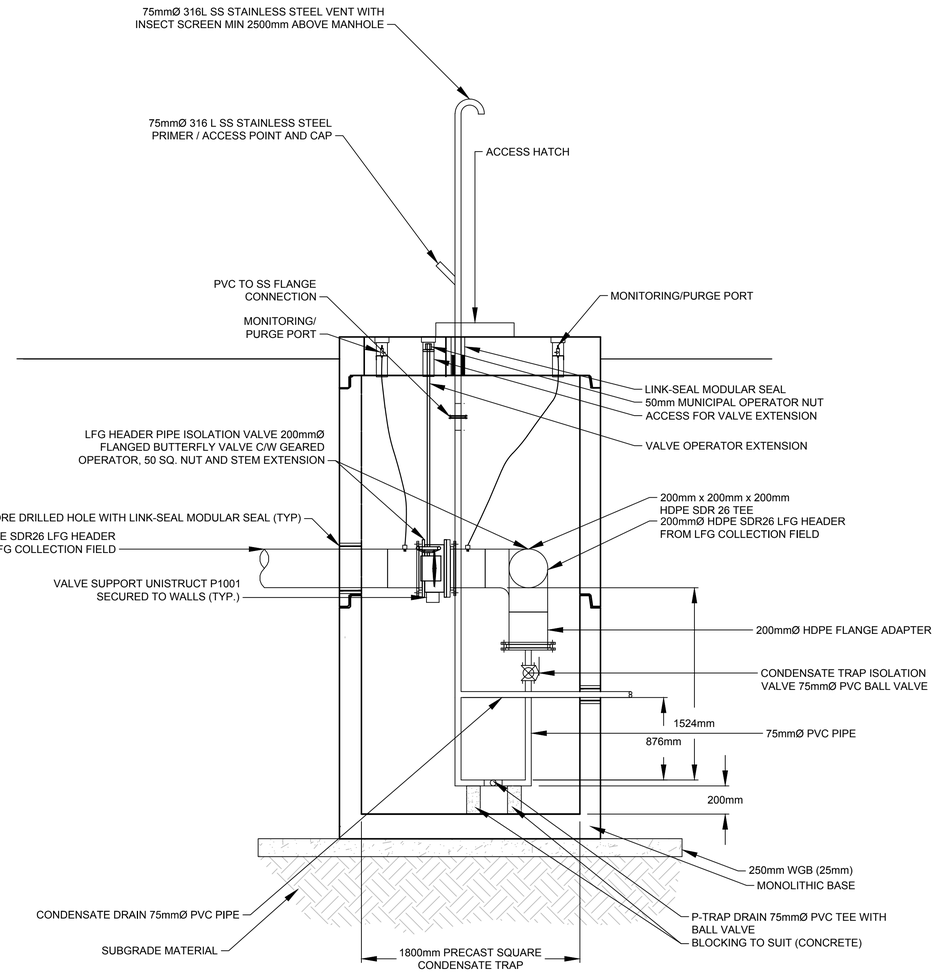
PLAN



SECTION A-A'

DETAIL 13 C-01 CONDENSATE TRAP No.1

NTS



SECTION B-B'

DETAIL 14 C-01 CONDENSATE TRAP No.2

NTS

GHD
10271 Shellbridge Way Suite 165
Richmond British Columbia V6X 2W8 Canada
T 604 214 0510 **F** 604 214 0525 **W** www.ghd.com

DRAFT
CONCEPTUAL DESIGN

Client
CAMPBELL RIVER WASTE MANAGEMENT CENTRE

Project
LANDFILL GAS MANAGEMENT FACILITIES DESIGN PLAN

No.	Issue	Drawn	Approved	Date
1	DRAFT CONCEPTUAL DESIGN	KR	DL	05/01/2017

Drawn	K. RENNER	Designer	D. LIDDY
Drafting Check	K. DHALIWAL	Design Check	D. BARTON
Project Manager	G. FERRARO	Date	May 1, 2017
This document shall not be used for construction unless signed and sealed for construction.		Scale	AS SHOWN
Original Size	ANSI D	Bar is 20mm on original size drawing	0 20mm

Project No. **56484-200**

Title
LANDFILL GAS COLLECTION SYSTEM CONDENSATE TRAP DETAILS

Sheet No.
M-01

Sheet **5** of **5**

Plot Date: 13 June 2017 - 4:24 PM Plotted By: Michael Donovan CAD File: P:\drawings\56000s\56484\56484-reports\56484-200(031)\56484-200(031)ME\56484-200(031)ME-WA001.dwg

Appendices

Appendix A
Updated LFG Generation Assessment

Appendix A

Updated LFG Generation Assessment
Updated Landfill Gas Management Facilities Design Plan
Campbell River Waste Management Centre
Comox Valley Regional District

	Relatively Inert	Moderately Decomposable	Decomposable	
Gas Production potential, Lo =	20	120	160	m^3 CH_4/tonne
Waste Composition (2006 SWMP)	36.1%	21.8%	42.2%	
lag time before start of gas production, lag =	1	years		
Historical Data Used (years)	30			
1st Year of Historical Data Used	1979			
4 Years after reporting year	2014			
methane (by volume)	50%			
carbon dioxide (by volume)	50%			
methane (density)	0.6557	kg/m^3	(25°C,1ATM)	
carbon dioxide (density)	1.7988	kg/m^3	(25°C,1ATM)	

Year	Annual Tonnage (tonnes)	Cumulative Waste-in-place (tonnes)	Waste Tonnage Relatively Inert (tonnes)	Waste Tonnage Moderately Decomposable (tonnes)	Waste Tonnage Decomposable (tonnes)	Methane Generation Rate, k Relatively Inert ($year^{-1}$)	Methane Generation Rate, k Moderately Decomposable ($year^{-1}$)	Methane Generation Rate, k Decomposable ($year^{-1}$)	Annual Methane Production (tonnes/yr)	Landfill Gas Production (m^3/hr)	Greenhouse Gas Emissions (as CO_2e/year)
1980	10,334	10,334	3,725	2,250	4,356	0.02	0.06	0.11	59.2	20.6	1,243
1981	10,545	20,879	3,802	2,296	4,445	0.02	0.06	0.11	114.0	39.7	2,393
1982	10,760	31,639	3,879	2,343	4,535	0.02	0.06	0.11	164.8	57.4	3,461
1983	10,980	42,619	3,958	2,391	4,628	0.02	0.06	0.11	212.1	73.9	4,454
1984	11,204	53,823	4,039	2,440	4,723	0.02	0.06	0.11	256.3	89.2	5,382
1985	11,432	65,255	4,121	2,489	4,819	0.02	0.06	0.11	297.7	103.6	6,251
1986	11,666	76,921	4,206	2,540	4,917	0.02	0.06	0.11	336.6	117.2	7,068
1987	11,904	88,825	4,291	2,592	5,018	0.02	0.06	0.11	373.2	130.0	7,838
1988	12,147	100,972	4,379	2,645	5,120	0.02	0.06	0.11	407.9	142.0	8,567
1989	12,395	113,367	4,468	2,699	5,225	0.02	0.06	0.11	440.9	153.5	9,259
1990	12,648	126,015	4,560	2,754	5,331	0.02	0.06	0.11	472.3	164.4	9,918
1991	12,906	138,921	4,653	2,810	5,440	0.02	0.06	0.11	502.3	174.9	10,549
1992	13,169	152,090	4,747	2,868	5,551	0.02	0.06	0.11	531.2	184.9	11,154
1993	13,438	165,528	4,844	2,926	5,664	0.02	0.06	0.11	558.9	194.6	11,738
1994	13,712	179,240	4,943	2,986	5,780	0.02	0.06	0.11	585.8	204.0	12,302
1995	13,992	193,232	5,044	3,047	5,898	0.02	0.06	0.11	611.9	213.0	12,849
1996	14,278	207,510	5,147	3,109	6,018	0.02	0.06	0.11	637.3	221.9	13,382
1997	14,569	222,079	5,252	3,172	6,141	0.02	0.06	0.11	662.1	230.5	13,903
1998	14,867	236,946	5,360	3,237	6,267	0.02	0.06	0.11	686.4	239.0	14,414
1999	15,170	252,116	5,469	3,303	6,394	0.02	0.06	0.11	710.3	247.3	14,916
2000	22,042	274,158	7,946	4,800	9,291	0.02	0.06	0.11	771.4	268.6	16,199
2001	21,642	295,799	7,802	4,713	9,122	0.02	0.06	0.11	824.6	287.1	17,317
2002	22,009	317,808	7,934	4,792	9,277	0.02	0.06	0.11	875.1	304.7	18,376
2003	23,638	341,446	8,522	5,147	9,964	0.02	0.06	0.11	930.2	323.9	19,535
2004	26,242	367,689	9,460	5,714	11,061	0.02	0.06	0.11	995.3	346.6	20,901
2005	26,700	394,389	9,626	5,814	11,254	0.02	0.06	0.11	1057.0	368.0	22,198
2006	28,295	422,684	10,200	6,161	11,926	0.02	0.06	0.11	1122.3	390.8	23,567
2007	31,207	453,891	11,250	6,795	13,154	0.02	0.06	0.11	1198.2	417.2	25,163
2008	30,096	483,987	10,850	6,554	12,686	0.02	0.06	0.11	1260.9	439.0	26,478
2009	26,405	510,392	9,519	5,750	11,130	0.02	0.06	0.11	1296.7	451.5	27,231
2010	27,358	537,750	9,863	5,957	11,532	0.02	0.06	0.11	1334.9	464.8	28,032
2011	26,130	563,880	9,420	5,690	11,014	0.02	0.06	0.11	1362.7	474.5	28,616
2012	25,698	589,578	9,264	5,596	10,832	0.02	0.06	0.11	1385.6	482.5	29,098
2013	26,992	616,570	9,731	5,878	11,377	0.02	0.06	0.11	1414.1	492.4	29,696
2014	28,373	644,943	10,229	6,178	11,959	0.02	0.06	0.11	1448.0	504.2	30,409
2015	25,303	670,246	9,122	5,510	10,665	0.02	0.06	0.11	1461.5	508.9	30,691
2016	25,490	695,736	9,189	5,551	10,744	0.02	0.06	0.11	1474.9	513.6	30,974
2017	26,371	722,107	9,507	5,742	11,116	0.02	0.06	0.11	1492.4	519.6	31,341
2018	26,506	748,613	9,555	5,772	11,172	0.02	0.06	0.11	1509.3	525.5	31,695
2019	26,409	775,022	9,520	5,751	11,131	0.02	0.06	0.11	1524.2	530.7	32,009
2020	26,016	801,038	9,379	5,665	10,966	0.02	0.06	0.11	1535.7	534.7	32,250
2021	26,158	827,196	9,430	5,696	11,026	0.02	0.06	0.11	1547.2	538.7	32,491

Sources:

- Landfill Gas Generation Assessment Procedure Guidance Report, Conestoga-Rovers & Associates, March 2009
- Landfill tonnages:
  - -1965-1999 CH2MHill LFG Management Plan (Based on assumption that the population increased at a 2% annual rate between 1965 and 1998, and that the waste volume increase was directly proportional to the population rate)
  - -2000-2016 Supplied by CVRD

www.ghd.com

Appendix F
Proposed Monitoring Specifications

Environmental Monitoring Program Specifications – Proposed

PROJECT: Comox Strathcona Waste Management
Campbell River Waste Management Centre

PROJECT NO.: 12345678

PROJECT MANAGER: Firstname Lastname

PROJECT COORDINATOR: Firstname Lastname

MONITORING STAFF:	**RESPONSIBILITY**
Firstname Lastname	Field Technician(s)
Firstname Lastname	Project Chemist
Firstname Lastname	Database Analyst

LABORATORIES USED: Labname

AUTHORIZATION: **MONITORING EVENT(S)** February, May, August, November **PC/PM SIGNATURE** _____

Revision #	Date	Revision	GHD
TBD	TBD	TBD	TBD

WATER QUALITY MONITORING

Monitoring Locations: Table 1
Monitoring Frequency: Table 1
Monitoring Parameters: Table 2

Table 1

Sampling Schedule
Environmental Monitoring Program Specification - Proposed

Monitoring Location	Monitoring Location Purpose	Sample Matrix	Hydraulic Monitoring	Feb	Feb	May, Aug, Nov	Aug
Groundwater Monitoring Program (25 locations)							
AG99-01	Monitor downgradient groundwater quality to the east of the Site, off-Site.	WG	√	Schedule A	-	-	Schedule C
AG99-02	Monitor downgradient groundwater quality to the east of the landfill.	WG	√	Schedule A	-	-	Schedule C
AG99-04	Monitor downgradient groundwater quality to the east of the landfill.	WG	√	Schedule A	-	Schedule C	-
AG99-05	Monitor downgradient groundwater quality to the east of the Site, off-Site, deep nested well.	WG	√	Schedule A	-	-	Schedule C
AG99-06	Downgradient of the landfill, northeast.	WG	√	Schedule A	-	Schedule C	-
MW01-16	Background.	WG	√	Schedule A	-	Schedule C	-
AM02-01	Background.	WG	√	Schedule A	-	Schedule C	-
EBA04-1	Tap from the building near the scalehouse.	WG	-	Schedule A	-	-	Schedule C
EBA04-6	Northeast toe of landfill, off-Site.	WG	√	Schedule A	-	Schedule C	-
EBA04-7	Northeast toe of landfill, off-Site.	WG	√	Schedule A	-	Schedule C	-
EBA11-1	Downgradient of the Site to the northeast, off-Site.	WG	√	Schedule A	-	Schedule C	-
EBA11-2	Downgradient of the landfill to the northeast.	WG	√	Schedule A	-	Schedule C	-
EBA11-3	Downgradient of the landfill to the northeast.	WG	√	Schedule A	-	Schedule C	-
EBA11-4	Downgradient of the landfill to the northeast.	WG	√	Schedule A	-	Schedule C	-
GLL93-4	Northeast toe of landfill, off-Site. Historically dry	WG	√	-	-	-	-
HBT94-1	Downgradient, southeast property line.	WG	√	Schedule A	-	Schedule C	-
HBT94-2	Downgradient, southeast property line.	WG	√	Schedule A	-	Schedule C	-
HBT94-3	Downgradient, southeast property line.	WG	√	Schedule A	-	Schedule C	-
HBT94-5	Downgradient of the Site, east, off-Site. Historically dry	WG	√	-	-	-	-
MW02-18	Downgradient of the Site, east, off-Site.	WG	√	Schedule A	-	Schedule C	-
MW03-18	Monitor downgradient groundwater quality to the east of the Site, off-Site, shallow nested well.	WG	√	Schedule A	-	Schedule C	-
MW04-19	Downgradient of the landfill, northeast.	WG	√	Schedule A	-	Schedule C	-
MW06-XX	Downgradient of the landfill, southeast	WG	√	Schedule A	-	Schedule C	-
MW07-XX	Downgradient of the landfill, southeast	WG	√	Schedule A	-	Schedule C	-
MW08-XX	Downgradient of the landfill, northeast.	WG	√	Schedule A	-	Schedule C	-
Surface Water Monitoring Program (4 locations)							
SW-1	Cold Creek Tributary.	WS	√	Schedule A	-	Schedule C	-
SW03-17	Unnamed Pond upstream of SW-1.	WS	√	Schedule A	-	Schedule C	-
SWM Pond	Surface Water Management Pond.	WS	√	Schedule A	-	Schedule C	-
Ladore Dam	Ladore Dam Reservoir (https://www.bchydro.com/energy-in-bc/operations/transmission-reservoir-data/previous-reservoir-elevations/vancouver_island/ladore_ldr.html)	WS	√	-	-	-	-
Leachate Monitoring Program (1 location)							
LFG Extraction Well XX		WL	√	Schedule A	Schedule B	Schedule C	-
Field Quality Assurance/Quality Control							
Field Blank		WG	-	Schedule A	-	Schedule C	-
Groundwater Duplicate		WG	-	Schedule A 2x	-	Schedule C 2x	-
Surface Water Duplicate		WS	-	Schedule A	-	-	Schedule C
Trip Blank (VOCs)		WG	-	-	Schedule B	-	-

Notes:

WG - Groundwater
WS - Surface Water
√ - Every monitoring event

Table 2

Analytical Parameters
Environmental Monitoring Program Specification - Proposed

	Groundwater	Surface Water	Leachate
Schedule A			
Hydraulic Monitoring			
Water level	√	-	√
Depth to bottom of well	√	-	√
Flow	-	√	-
Field Parameters			
Dissolved Oxygen (mg/L)	√	√	√
ORP (mV)	√	√	√
pH (s.u.)	√	√	√
Conductivity (uS/cm)	√	√	√
Temperature (deg C)	√	√	√
Total Dissolved Solids (mg/L)	√	√	√
Turbidity (ntu)	√	√	√
General Chemistry			
Alkalinity (Speciated)	√	√	√
Chloride (Dissolved)	√	√	√
Fluoride	√	√	√
pH	√	√	√
Conductivity	√	√	√
Sulphate (Dissolved)	√	√	√
Dissolved Hardness (as $CaCO_3$)	√	√	√
Total Dissolved Solids (TDS)	√	√	√
Nutrients			
Ammonia-N	√	√	√
Nitrate (as N)	√	√	√
Nitrite (as N)	√	√	√
Nitrate/Nitrite (N+N)	√	√	√
Metals (incl. Hg)			
CSR Dissolved Metals	√	√	√
CSR Total Metals	-	√	√
Schedule B			
Volatile Organic Compounds (VOCs)			
VOCs	-	-	√
Petroleum Hydrocarbons			
Total VH (C6-C10)	-	-	√
Total VPH (C6-C10) Less BTEX	-	-	√
Schedule C			
Hydraulic Monitoring			
Water level	√	-	√
Depth to bottom of well	√	-	√
Flow	-	√	-
Field Parameters			
Dissolved Oxygen (mg/L)	√	√	√
ORP (mV)	√	√	√
pH (s.u.)	√	√	√
Conductivity (uS/cm)	√	√	√
Temperature (deg C)	√	√	√
Total Dissolved Solids (mg/L)	√	√	√
Turbidity (ntu)	√	√	√
General Chemistry			
Alkalinity (Speciated)	√	√	√
Chloride (Dissolved)	√	√	√
pH	√	√	√
Conductivity	√	√	√
Sulphate (Dissolved)	√	√	√
Dissolved Hardness (as $CaCO_3$)	√	√	√
Total Dissolved Solids (TDS)	√	√	√
Nutrients			
Ammonia-N	√	√	√
Metals			
Dissolved Iron	√	√	√
Dissolved Manganese	√	√	√
Total Iron	-	√	√
Total Manganese	-	√	√

Appendix G
Emergency Response Plan

Table of Contents

Figure Index

Table Index

Table Index (following text)

Attachments

1. Introduction

The operations staff of the Campbell River Waste Management Centre (CRWMC or Site) have developed the following Emergency Response Plan (ERP) based on an assessment of the risks identified on-Site. This ERP has been prepared in compliance with the British Columbia Occupational Health and Safety (B.C. OH&S) Regulation 296/97 Part 4, s.4.13 (Emergency Preparedness and Response) and Part 5, s.5.97 (Emergency Procedures), as well as the British Columbia Fire Code. This plan documents the potential hazards and sets out the safety measures, roles, responsibilities, procedures, and parties to be contacted in the event of a medical or environmental emergency, or the occurrence of any of the identified hazardous situations.

The CRWMC is located within the city limits of Campbell River, British Columbia (BC), at 6700 Argonaut Road approximately 7.5 kilometres (km) east of the city centre. The Site is composed of two land parcels, Blocks M and J within District Lot 85 of the Sayward Land District. The total Site area is 29.7 hectares (ha). The CRWMC is owned by the Comox Valley Regional District (CVRD) and operated by Barry and Vale Contracting Ltd.

The CRWMC currently operates under operational certificate (OC) MR-02401. The Landfill receives industrial, commercial and institutional (ICI) waste, municipal solid waste (MSW), construction and demolition (C&D) wastes, yard waste, carcasses, clean fill, clean wood waste, drywall/gypsum waste, cut grass & raked leaves. The Site also receives the following wastes which are stockpiled and periodically removed for off-Site disposal: Cardboard and mixed paper, recycling plastic containers (1-7), tires, propane tanks, household and automotive batteries, appliances, scrap metal, mattresses, used oil and electrical items and household hazardous wastes (HHW).

The following sections detail the Emergency Response Plan for waste disposal operations at CRWMC. It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms. The potential health and safety concerns identified in this plan include illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in weather. The following sections outline the general procedures for dealing with emergency situations that may potentially be experienced at the Site.

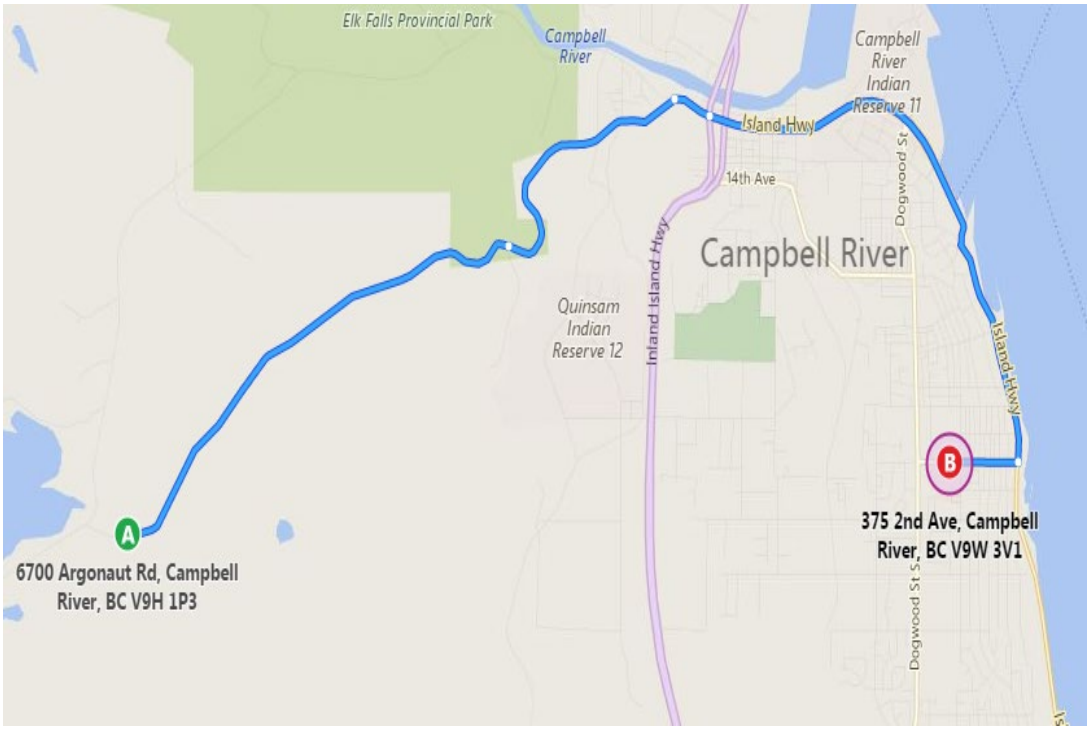
This Plan will be reviewed by all on-Site personnel and kept at CRWMC. Emergency information presented herein, will be posted at the Site in locations where it can readily be seen. This Plan will be reviewed at least once annually by the owner/operator of the landfill, in consultation with the employee health and safety representative, to ensure that it remains effective and accurate as an Emergency Response Plan.

2. Emergency Contacts

This page is to be posted with the hospital road map in conspicuous workplace locations.

Table 2.1 Emergency Contacts

Contact	Phone Number
Fire	911
Police	911
Ambulance	911
Poison Control Centre	1-800-567-8911
Hospital	250-850-2141
Provincial Emergency Program (PEP), 24 hour Spill Reporting	1-800-663-3456
WorkSafe BC	1-888-621-7233
BC Ministry of Environment and Climate Change Strategy Regional Waste Manager (Luc Lachance)	250-751-3199
Ministry of Forest, Lands and Natural Resource Operations and Rural Development	250-286-9300
Fire Department	250-286-6266
Forest Fire Reporting	1-800-663-5555 *5555 Cellular
Barry and Vale Contracting Ltd. (CRWMC Operator)	
Moe Vale	250-287-6387 (Cell)
Mathew Peterson	250-203-2134 (Cell)
Comox Valley Regional District (CRWMC Owner)	
Jesse Lee	250-344-6475 (Cell)
Marc Rutten	250-334-6080 (Office)



Map Data/Image Source: Bing Maps, 2017

Figure 2.1 Emergency Hospital Route

To be posted in conspicuous areas of the workplace.

Hospital:	250-850-2141 Campbell River Hospital 375 2nd Ave. Campbell River, BC V9W 3V1

Directions to Campbell River Hospital (see Figure 2.1):

- Head west on Argonaut Road
- Turn right onto Gold River Hwy/BC-28 E toward Campbell river
- Turn right onto Inland Island Hwy/BC-19 S (signs for Nanaimo)
- Turn left onto 14 Avenue
- Continue onto Homewood Road
- Continue onto 9 Avenue
- Slight right onto Alder St.
- Turn right onto 2 Ave, Destination will be on the left

3. Emergency Equipment Available On Site

The following emergency equipment is available at the scale building and maintenance shop:

- First aid kit (Level 1 Kit) – Scale building
- 20 pound Class A, B, and C dry chemical fire extinguisher – in each building
- Petroleum spill containment kit
- Telephone – Scale building

All Site vehicles and equipment, including excavators, loaders, rock-trucks, and pick-up trucks, are all equipped with Class A, B, and C dry chemical fire extinguishers and spill kits. A copy of the February 2020 inventory and inspections of each fire extinguisher on Site is provided in Attachment 1.

A suitable pump with appropriate length of hose will be kept available on-site at all time to pump water for emergency use. A 22,000 litre water tanker with a fire boss nozzle capable of a stream 90 metres (300 ft) long is available on Site.

The facility is equipped with a well for emergency use which may be accessed by three stand pipes at the site. Two 2,000 gallon water tanks are kept on site at all times. The tanks are equipped with fire pumps and may be transported via roll-off truck.

4. Emergency Routes and Assembly Points

The CRWMC Operator will ensure that emergency exit routes and assembly points are marked on Site by clear signage and in accordance with municipal and provincial requirements. A copy of the Site's Emergency Exit Plan is provided in Attachment 2.

5. Medical Emergencies

The CRWMC Operator will employ, and assign to the Site, a competent and authorized representative, herein referred to as the HSO (Health and Safety Officer). A Site Health and Safety Representative will also be selected. The Site Supervisor will be present at the CRWMC during normal operating hours.

The CRWMC Operator will ensure that the Site and all on-Site personnel, as a minimum, are equipped with the appropriate first aid materials and supplies and personnel protective equipment (PPE), and clothing required by municipal and provincial regulations. Safety and emergency equipment and PPE and clothing will be stored in a readily accessible location when not in use and kept clean and well maintained. The location of the equipment will be marked by clear signage.

Emergency and first-aid equipment will be placed at or near the active work area of the CRWMC during normal operating hours. A list of the emergency and first aid equipment available at the Site and where this equipment is located is provided in Section 3.0 of this Plan.

As a minimum, the CRWMC Operator will designate at least one person who is trained in basic first aid and CPR as the First Aid Attendant, to be on-Site at all times. This person may perform other duties, but will be immediately available to render first aid when required.

In the event of injury requiring immediate first-aid/medical attention to on-Site personnel, the following procedures will be implemented:

- Notify the First Aid Attendant and administer initial first aid services.
- Notify the HSO/Site Supervisor.
- Phone Emergency Medical Services (EMS) at 911 and describe the nature of the injury or event.
- As directed by EMS, administer additional on-going first aid or CPR.
- As directed by EMS, either wait for an ambulance to arrive or transport personnel to the specified hospital along the most direct route.
- If the injured person will be transported by ambulance and it is safe to leave them (when only two workers are on Site) meet the ambulance at the gate and direct them to the injured person, otherwise, give the ambulance/hospital complete and accurate directions to your exact location at the Site.
- Notify WorkSafe BC in the case of serious injury.

Note: Any person transporting an injured/exposed person to the designated hospital for treatment, should take directions to the hospital with them (Figure 2.1). Details of the injury and a list of the compounds of concern, animal or insect bites, or other injurious circumstances to which the worker may have been exposed should also accompany the injured person.

6. Fire or Explosion

All fire-fighting equipment present at the Site shall be regularly inspected (monthly minimum) and maintained in accordance with manufacturer's recommendation and a record of these inspections will be kept on Site.

The landfill Site should have year-round and immediate access to a water supply capable of a sustained flow of water for firefighting purposes that exceeds 4,000 liters per minute or suitable alternative fire equipment.

6.1 Landfill Fires

The risk of landfill fires can be reduced through the implementation of appropriate landfill operational practices including the following:

- Placement of daily/intermediate cover material.
- Adequate stockpiling of soil material for daily/intermediate cover and fire control.
- Availability and maintenance of appropriate equipment for fire control.

- Prohibition of smoking and unpermitted hot work on and around the Landfill.

Should a landfill fire occur, the nature of the fire should determine the response. A surface fire should be extinguished by isolating the load on fire and smothering the fire with cover soil. A fire within the landfill should be extinguished through a combination of cover soil and potentially water suppression. Excavating waste in the vicinity of a landfill fire may allow oxygen intrusion into the waste further feeding the fire and should not occur outside of a fire response plan approved by B.C. Ministry of Environment or the local fire department.

In the event of an uncontrolled fire, explosion, release of hazardous material, or the need for emergency evacuation, the following procedures will be followed:

- Notify all workers on Site by sounding the air horn alarm and communicating via portable radios.
- Site personnel will report immediately to the upwind safe assembly area and the Site Supervisor will confirm the safe evacuation of all workers from the hazardous area.
- Notify the Fire Department / emergency services immediately.
- Notify the HSO.
- Notify any adjacent workplaces or residences which may be affected by exposure (Note: notification of the public must be in conformity with the requirements of municipal and provincial agencies (BC Reg. 296/97, s.5.100)).
- Site personnel will position themselves at the entrance gate and such other safe locations as to effectively direct the Fire Department to the location of the uncontrolled fire or hazardous circumstances.
- Shut down all Site operations.
- Site personnel will advise the Fire Commander of the location, nature, and identification of any hazardous materials at the Site as per the Inventory of Hazardous Substances maintained at the Site (see Section 10.0).
- If the Site Supervisor determines that it is safe to do so, before the Fire Department arrives, site personnel may:
  - Use fire equipment available on Site
  - Remove or isolate flammable or other hazardous materials that may contribute to the fire
- If the Fire Commander determines that it is safe to do so, Site personnel may assist the Fire Department.

7. Spills or Leaks

The CRWMC operator will ensure that all on-Site personnel have received the appropriate Work Place Hazardous Materials Information System (WHMIS) training as required by provincial regulations. The CRWMC operator will ensure that personnel assigned to spill clean-up and re-entry duties have been trained in the safe procedures and use of personal

protective equipment appropriate to the spill conditions. Written procedures for clean-up and record of training will be maintained on Site. The CRWMC operator will ensure that PPE and related clean-up equipment is readily available on Site and maintained in good condition.

In the event of a spill or leak, site personnel will follow the following procedures.

- Notify the Site Supervisor and/or HSO of the accidental release.
- Report off-Site spills and releases of hydrocarbon contaminated soils or contaminated water to Provincial Emergency Program (PEP) and the B.C. Ministry of Environment in accordance with the B.C. Spill Reporting Regulation.
  - B.C. Emergency Management: 800-663-3456
- Locate the source of the spillage, determine the degree of hazard associated with the clean-up activities, and if it can be done safely, stop the flow or release of the contaminant.
- Contain and recover the spilled materials, in a safe manner as appropriate.
- Notify WorkSafe BC.

Where volumes of spilled or leaked material exceed those specified in the BC Spill Reporting Regulation (B.C. Reg. 263/90) (Attached as Table 1) a report shall be made to PEP including the following information. Reportable limits should be confirmed at least annually during the revision of the report.

- The reporting person's name and telephone number
- The name and telephone number of the person who caused the spill
- The location and time of the spill
- The type and quantity of the substance spilled
- The cause and effect of the spill
- Details of action taken or proposed to comply with Section 3
- A description of the spill location and of the area surrounding the spill
- The details of further action contemplated or required
- The names of agencies on the scene, and
- The names of other persons or agencies advised concerning the spill

If the spill is not reportable under the B.C. Spill Reporting Regulation, a Notification of Independent Remediation Initiation form, Site Risk Classification Report Form, and Exposure Pathway Questionnaire is required and the independent remediation may be initiated.

If the spill is reportable under the B.C. Spill Reporting Regulation, a B.C. Ministry of Environment case manager will be appointed to guide remediation requirements.

8. Inclement Weather

The following special procedures will be implemented during periods of severe weather, such as high winds, rain, electrical storms, thermal inversions, and winter conditions.

8.1 High Winds

If winds become excessive, the following control measures will be implemented at the CRWMC to ensure that dust and litter does not become problematic or hazardous:

- Low speed limits will be enforced
- All vehicle traffic transporting waste to and around the CRWMC will be appropriately loaded to prevent debris from blowing out of the vehicle
- Landfilling activities will be reduced
- Soil handling operations will be suspended
- If dry conditions warrant, water (dust suppressant) will be applied to roadways and borrow areas, and if required, to the active disposal area
- Personnel will wear appropriate respiratory protection if total dust particulates exceed provincial exposure limits

8.2 Rain and Electrical Storms

Rain: is not expected to adversely affect operations; therefore, the CRWMC will be operated during all but extremely excessive rain periods. If access roads become impassable due to heavy rain, they will be graded and granular material will be added as necessary to maintain and improve operating conditions.

Electrical Storms: In the event of an electrical storm, all operations will be suspended until the storm subsides and personnel will take safe shelter in the Site Office. All electrical powered equipment will be immediately shut down in a manner that will not endanger personnel.

8.3 Winter Conditions

During winter operations, the CRWMC Operator will undertake advanced planning for site preparation/access, snow removal, and the stockpiling and storage of waste cover material.

The following procedures will be taken during winter weather conditions:

- The CRWMC operator will ensure that all on-Site personnel are suitably clothed for working in winter conditions and monitor ongoing conditions to minimize the potential for cold related stress/hypothermia.
- During severe winter conditions, the HSO will provide appropriate direction to on-site personnel, regarding the continuance or curtailing of CRWMC operations.
- Site equipment will be cleaned and maintained on a daily basis to ensure safe operation during periods of cold or extreme weather.

- Snow accumulation will be removed from the access roads and working areas prior to and during each day's landfilling activities, as required to maintain safe working conditions.
- Frozen fill materials will not be placed in the landfill.
- All runoff from snow, which has contacted waste or soil in the Landfill will be managed as leachate and controlled accordingly.

8.4 Power Outages

In the event of a power outage, a backup generator is available on Site. The backup generator is able to provide power to the scale, scalehouse, office trailers, lighting for the transfer station, and the electric fence.

9. Emergency Procedures Training and Drills

The following training requirements will be followed as written in the B.C. OH&S Reg. 296/97 Part 4, s.4.16:

- All workers must be given adequate instruction in fire prevention and emergency evacuation procedures applicable to their workplace.
- Workers assigned firefighting duties must be given adequate training by a qualified instructor in suppression methods, fire prevention, emergency procedures, company organization and chain of command, and firefighting crew safety and communications applicable to their workplace.
- Retraining must occur once per year.
- A worker not covered by B.C. OH&S Reg. 296/97 Part 31 (Firefighting), who is assigned firefighting duties, must be physically capable of performing the duties assigned safely and effectively, before being permitted to do them.
- At least once per year, emergency drills must be conducted to ensure worker awareness and effectiveness of the exit routes and procedures.
- A record of the drills is to be kept at the Site Office.

10. Hazardous Substance Inventory and Notification of Fire Department

The CRWMC Operator will maintain a Hazardous Substance Inventory (Inventory) at the Site. The Inventory will include safe handling methods for all hazardous substances that are stored at the Site in quantities that may endanger workers in an emergency. The Inventory will include such materials as WHMIS controlled products, explosives, pesticides, radioactive materials, hazardous wastes, and will provide the nature, location, quantity and Material Safety Data Sheets (MSDS) for the material.

As part of Site operations, the CRWMC Operator performs visual inspections of all waste loads received at the Site and any material not authorized for discharge or temporary storage at Site pending off-Site disposal at the Site is rejected by the operator and sent off Site for disposal. As such, the Inventory is limited to materials that are stored on Site for use by the CRWMC and materials stored on-Site pending removal for off-Site disposal (e.g. HHW) only and not for landfilled materials.

The Inventory is to be kept up to date and located in an area readily accessible by personnel during an emergency. The Fire Department shall be notified of the Inventory and location of the hazardous substances, as well as any significant changes to the Inventory.

Reportable Limits for Spills and Releases
Campbell River Emergency Response Plan
Campbell River Waste Management Centre
Comox Strathcona Waste Management

Substance spilled[1]	**Specified amount**[1]
Explosives Class 1 as defined in section 2.9 of the Federal Regulations	Any quantity that could pose a danger to public safety or 50 kg
Flammable Gases Class 2.1 other than natural gas, as defined in section 2.14 (a) of the Federal Regulations	10 kg
Non-Flammable and Non-Toxic Gases Class 2.2 as defined in section 2.14 (b) of the Federal Regulations	10 kg
Toxic Gases Class 2.3 as defined in section 2.14 (c) of the Federal Regulations	5 kg
Flammable Liquids Class 3 as defined in section 2.18 of the Federal Regulations	100 L
Flammable Solids Class 4 as defined in section 2.20 of the Federal Regulations	25 kg
Oxidizing Substances Class 5.1 as defined in section 2.24 (a) of the Federal Regulations	50 kg or 50 L
Organic Peroxides Class 5.2 as defined in section 2.24 (b) of the Federal Regulations	1 kg or 1 L
Toxic Substances Class 6.1 as defined in section 2.27 (a) of the Federal Regulations	5 kg or 5 L
Infectious Substances Class 6.2 as defined in section 2.27 (b) of the Federal Regulations	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
Radioactive Materials Class 7 as defined in section 2.37 of the Federal Regulations	Any quantity that could pose a danger to public safety and an emission level greater than the emission level established in section 20 of the "Packaging and Transport of Nuclear Substances Regulations"
Corrosives Class 8 as defined in section 2.40 of the Federal Regulations	5 kg or 5 L
Miscellaneous Products, Class 9 Substances or Organisms as defined in section 2.43 of the Federal Regulations	25 kg or 25 L
Waste containing dioxin as defined in section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
Leachable toxic waste as defined in section 1 of the Hazardous Waste Regulation	25 kg or 25 L
Waste containing polycyclic aromatic hydrocarbons as defined in section 1 of the hazardous Waste Regulation	5 kg or 5 L
Waste asbestos as defined in section 1 of the Hazardous Waste Regulation	50 kg
Waste oil as defined in section 1 of the Hazardous Waste Regulation	100 L
Waste containing a pest control product as defined in section 1 of the Hazardous Waste Regulation	5 kg or 5 L
PCB Wastes as defined in section 1 of the Hazardous Waste Regulation	25 kg or 25 L
Waste containing tetrachloroethylene as defined in section 1 of the Hazardous Waste Regulation	50 kg or 50 L
Biomedical waste as defined in section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
A hazardous waste as defined in section 1 of the Hazardous Waste Regulation and not covered under items preceding items	25 kg or 25 L
A substance, not covered by preceding items, that can cause pollution	200 kg or 200 L
Natural gas	10 kg, if there is a breakage in a pipeline or fitting operated above 100 psi that results in a sudden and uncontrolled release of natural gas

NOTES:
(1) Substance definitions and reportable spill amounts from BC Spill Reporting Regulation (B.C. Reg. 263/90 including amendments upto B.C. Reg 376/2008, December 9,2008), current to May 2, 2017.

Federal Regulations: The Transportation of Dangerous Goods Regulations made under the *Transportation of Dangerous Goods Act* (Canada)
Hazardous Waste Regulation: B.C. Reg. 63/88.

Attachment 1
Annual Fire Extinguisher Inspection Report

RALEIGH
Fire Safety Ltd
Unit L, 1690 Maple Street
Campbell River, BC V9W 3G2
Phone (250) 850-2030 Fax (250) 850-2070

Inspection Date: 12-Feb-20

ANNUAL FIRE EXTINGUISHER INSPECTION REPORT

Berry & Vale Contracting
CR Landfill
3815 Discovery Drive
Campbell River

Location	Type	Serial #	Comments
Left of Dump Station	20lb ABC	54025	Inspection
Right of Dump Station	20lb ABC	449248	Inspection
Right of Shop	5lb ABC	839015	Inspection
Left of Shop	10lb ABC	766973	Inspection
Seacan Left of Shop	5lb ABC	707949	Inspection
Weigh Shack	10lb ABC	284594	6yr Maintenance
Weigh Shack - Spare	10lb ABC	807405	Inspection
Office	5lb ABC	858976	Inspection
Lunch Room	5lb ABC	1982765	Inspection
Storage	5lb ABC	839011	Inspection
Hazardous Waste Disposal	5lb ABC	814131	Inspection
Recycling Station	5lb ABC	21889	Inspection
** MACHINES **			
L- 01	5lb ABC	159	Inspection
Mack #44	5lb ABC	16124	Not Available
Mack #44	5lb ABC	161724	Not Available
2004 Dodge	5lb ABC	1982763	Not Available
EX-06	5lb ABC	2036340	Inspection
Backhoe - EX03	5lb ABC	257942	Inspection
L8000	5lb ABC	262235	Inspection
3-70C Trash Master	10lb ABC	273165	Inspection
Mack #51	5lb ABC	28724807	6yr Maintenance
JD 75 Excavator	5lb ABC	55352408	Not Available
Mack #55	2.5lb ABC	56077051	Inspection
LB 210X3	2.5lb ABC	6662576	Not Available
Mack #33	5lb ABC	674403	6yr Maintenance
Case Excavator #08	5lb ABC	695518	Inspection
Volvo Front Loader	5lb ABC	736666	Not Available

DB#: 1745

RALEIGH
Fire Safety Ltd
Unit L, 1690 Maple Street
Campbell River, BC V9W 3G2
Phone (250) 850-2030 Fax (250) 850-2070

Inspection Date: 12-Feb-20

ANNUAL FIRE EXTINGUISHER INSPECTION REPORT

Berry & Vale Contracting
CR Landfill
3815 Discovery Drive
Campbell River

Location	Type	Serial #	Comments
Volvo	5lb ABC	76814434	Inspection
Sterling #14	5lb ABC	858984	Inspection
Truck #43	2.5lb ABC	898752	Hydro\Refill
LB145	2.5lb ABC	98606773	Inspection
Dozer 7500 - EQ-01	2.5lb ABC	98906774	Not Available

Attachment 2
Emergency Exit Plan


Argonaut Rd
Emergency Exit
Muster Point
Argonaut Rd

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Deacon Liddy
Deacon.Liddy@ghd.com
604.248.3671

Michaela Dyck
Michaela.Dyck@ghd.com
604.248.3928

www.ghd.com