

**ALBERNI VALLEY LANDFILL  
2016 OPERATIONS AND MONITORING  
ANNUAL REPORT**

Submitted To: British Columbia Ministry of Environment  
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On behalf of the Alberni-Clayoquot Regional District  
Date: March 2017

## EXECUTIVE SUMMARY

The Alberni-Clayoquot Regional District (ACRD) operates the Alberni Valley Landfill (AVL) under Operational Certificate MR-00524. The AVL has operated as a landfill since the 1970's and accepts solid waste generated from the City of Port Alberni, ACRD Electoral Areas within the Alberni Valley and Bamfield and First Nations Communities Tseshah, Hupacasath, Huu-ay-aht and Uchucklesaht. This report is intended to meet the annual reporting requirements for the 2014 operating year, as required by the operational certificate and the *Landfill Criteria for Municipal Solid Waste* published by the BC Ministry of Environment (MoE) in 1993.

An estimated 20,216 tonnes of solid waste was landfilled at the AVL in 2016. Filling activities continued within the northeast expansion areas. Scale records and topographic surveys of the landfill face indicate a filling density of about 0.57 tonnes/m<sup>3</sup> is being achieved. There is an estimated landfill volume of 2,563,000 m<sup>3</sup> remaining at the AVL. Using an annual filling rate of 19,095 tonnes and a filling density of 0.54 tonnes/m<sup>3</sup> (five year average), it is estimated that the earliest the AVL will reach capacity is approximately 2089.

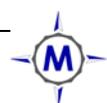
Expenditures for the 2016 operating year totaled about \$1,960,300 and include a capital cost contribution and funds allocated for closure and post-closure requirements.

In 2016, the quarterly water quality monitoring program continued at the AVL. The results were considered satisfactory and no immediate measures were recommended. Recommendations included in the attached Piteau report, include continuing water quality monitoring, process data for leachate interception wells quarterly, report climate data, continuing to monitor water levels in the south expansion area, and the two additional sampling locations installed on Stevens Creek can be removed from the quarterly sampling.

Leachate is transported via underground pipeline to the City of Port Alberni municipal sewage lagoon for treatment. In 2016, approximately 593,092 m<sup>3</sup> of leachate was treated at the municipal sewage lagoon.

A landfill gas generation assessment was completed in March 2011. The assessment estimated that less than 1,000 tonnes of methane was generated annually at the AVL, with future projections indicating that it may produce greater than 1,000 tonnes in the 2012 operating year. The landfill gas generation model was updated with current characterization data for the 2016 operating year and indicated that the AVL may generate greater than 1,000 tonnes of methane in the 2017 calendar year. Should actual generation rates be similar to those predicted, a landfill gas management design plan must be submitted to MoE by May 1, 2019.

There were no deviations from the operating plan during 2016. Projects included continuing expansion into the northeast expansion area, maintenance work (extending and shortening) on water quality monitoring wells, evaluating operation of existing interception wells and designing and implementing a backup interception system, investigating future sources of



cover material, working towards acquiring ownership or long term tenure of the landfill property, and improvements to the existing SCADA System.

Work proposed for 2017 includes continuing to fill in the northeast expansion area, continuing to work towards acquiring ownership or long term tenure of the landfill property, updating the regional solid waste management plan, continuing to plan an expansion to the transfer station area to accommodate gypsum and woodwaste separation, improving the SCADA system and doing some upgrades to the McCoy Lake pumphouse building.

Contingency measures for power outages, accidents and leachate excursion have been discussed. The AVL is operating as designed and there are no immediate concerns with the AVL.

The Design, Operations and Closure Report estimates the financial security needed for closure and post-closure activities to be approximately \$11,500,000. With over \$1,857,000 in the current fund, an annual contribution of \$120,000 to the closure and post-closure fund is considered appropriate at this time. As it is extremely difficult to predict costs and design practices 70 to 90 years into the future, the preliminary design and associated costs should be reviewed regularly.

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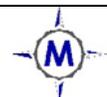
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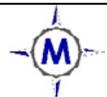
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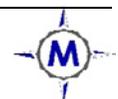
## 1. INTRODUCTION

The Alberni-Clayoquot Regional District (ACRD) operates the Alberni Valley Landfill (AVL) under the British Columbia Waste Management Act Operational Certificate Number MR-00524, issued June 29, 2004. A copy of the operational certificate is attached in Appendix A. The operational certificate provides the conditions for which the AVL is authorized to manage recyclable material and waste from the ACRD. The known areas disposing of waste at the AVL include the City of Port Alberni, ACRD Electoral Areas within the Alberni Valley and Bamfield and First Nations communities Tseshah, Hupacasath, Huu-ay-aht and Uchucklesaht.

The AVL has operated as a landfill since the early 1970's. It is located approximately 5 km west of Port Alberni. The landfill is accessed via McCoy Lake Road, through the Tseshah First Nation reserve land. A site location plan is attached as Figure 1. The landfill accepts various forms of solid waste including municipal solid waste, residential and commercial demolition materials (including roofing and gyproc), compost and stumps, and limited quantities of asbestos and contaminated soils. The landfill also accepts recyclables that are subsequently transferred from the landfill by Suncoast Waster Services Ltd. for recycling.

This report is intended to meet the 2016 annual reporting requirements for operations and monitoring at the AVL, as required by the operational certificate section 3.2 and the *Landfill Criteria for Municipal Solid Waste* published by BC Ministry of Environment (MoE) in 1993. Therefore, this report includes discussion of:

- Total volume and/or tonnage of waste discharged into the landfill for the year;
- Approved design volume;
- Remaining site life and capacity;
- Operational plans for the next 12 months;
- Operation and maintenance expenditures;
- Leachate, water quality and landfill gas monitoring data and interpretation;
- Amounts of leachate collected, treated and disposed;
- Any changes from approved reports, plans and specifications;
- An up to date contingency plan, noting any amendments made to the plan during the year;
- Amount of landfill gas collected and its disposition; and,
- Review of the closure plan and associated estimated costs.



## 2. SOLID WASTE QUANTIFICATION AND LANDFILL CAPACITY

A Solid Waste Management Plan (SWMP) was prepared for the ACRD by Gartner Lee Limited in 2007. The objective of the report was to update the 1996 Regional Solid Waste Management Plan to reflect the current status of solid waste operations and the current public and political direction. The SWMP outlines how the ACRD will comply with relevant regulations and operational certificates.

In the time since the SWMP was completed, several programs have been implemented to reduce the amount of solid waste entering the landfill. Along with the success of the curbside recycling program, preparation is ongoing for an updated Bylaw diverting gypsum and organics/woodwaste.

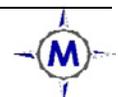
Throughout 2016, the AVL accepted waste and charged tipping fees according to ACRD Bylaw No. R1027 and R1006-4 (attached in Appendix B). The weight of solid waste entering the landfill in 2016 is summarized in Table 1 below.

Table 1: Measured Weight of Solid Waste Entering the AVL in 2016

Item	Weight (tonnes)
Residential Mixed Solid Waste	8,989
Commercial Mixed Solid Waste	6,081
Tires (# of tires)	213
Compost	32
Outgoing Steel	367.6
Incoming Cover Material	725.84
Asbestos	271
Special Waste	937.7
Roofing	1017
Gyproc	250
Mixed Construction Demolition	2,608
Service Road Cleanup	7.48

The above listed weights are all of the material that becomes landfilled. Any asbestos received is buried in a designated section near the east expansion areas. The majority of compost material is stockpiled onsite and removed by a private composting company. However, the compost bin in the transfer station, that is accessible to the public, sometimes has garbage mixed in. If the operator observes garbage mixed in with the compost material, the bin is disposed of in the landfill.

Any incoming cover material is used as intermediate cover and is not considered solid waste. Tires are stockpiled near the transfer station, before being removed by a recycling company. All separated recycled material (cans, glass, newspaper, cardboard, plastic and steel) is stockpiled



at the transfer area near the entrance is subsequently removed by a commercial recycling company.

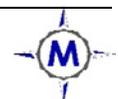
The data for the 2016 operating year was provided by the ACRD and is based on categorized scale records. When available, the direct weight of the categorized material was used. The amount of solid waste dropped off by individuals to the landfill site was provided based on the number of bags of garbage, as this is how payment is calculated. This is different from data provided in the past, where the weight of solid waste in the transfer bins was used. In order to convert the number of bags of garbage to a representative weight, an average weight of 7.5 kg per bag was used (based on information provided in an Ergonomic Assessment study completed by the University of Ontario and the Transportation Health and Safety Association of Ontario). Where the number of bags is between four and eight, we have used the average of six bags.

The amount of material landfilled during 2016 was approximately 20,216 tonnes. Therefore, the estimated cumulative quantity of solid waste at the AVL is approximately 761,450 tonnes. A table of the estimated historic weights from 1975 to 2016 is included in Appendix C.

Throughout 2016, landfilling continued within the northeast expansion area. The filling area and other site features are shown on Figure 2. The latest topographic surveys of the landfill face were conducted on January 21, 2016 and January 19, 2017. The volume difference between these dates is approximately 35,734 m<sup>3</sup>. Based on the monthly landfill reports from this period, approximately 20,216 tonnes of waste was landfilled, resulting in compacted density of 0.57 tonnes/m<sup>3</sup>. Filling densities have typically ranged from 0.41 to 0.66 tonnes/m<sup>3</sup>.

Property setbacks vary throughout the site. The western limit of the site adopts the 50 m setback. On the north boundary, the setback requirement of 50 m has been relaxed to 30 m, to accommodate the existing landfill toe. The current design criteria includes 15 m setbacks on the east and south edges, finished slopes of 3H to 1V and a finished elevation of 106 m. As of January 2017 there is an estimated 2,563,000 m<sup>3</sup> available before the landfill reaches full capacity. Further detail on the proposed filling plan can be found in the *Design, Operations and Closure Report* for the Alberni Valley Landfill.

It is projected that the population will likely increase in future years, and thus increase solid waste volumes, however, it is anticipated that programs to reduce solid waste material will balance this increase, if not decrease it. Therefore, an annual filling rate of 19,095 (the average filling rate from the last five years) has been used to estimate projected annual tonnages. The filling density has varied over the past years, ranging between 0.41 and 0.66. In order to evaluate the remaining capacity, a five year average density of 0.54 tonnes/m<sup>3</sup> was used. Therefore, it is estimated that the earliest the landfill will reach capacity is in year 2089. It should be noted that based on annual filling rates and densities, this value can vary significantly.



### 3. OPERATION AND MAINTENANCE EXPENDITURES FOR 2016

The AVL operated as usual throughout 2016. Funds were used to continue to investigate potential cover material sources, further development of the northeast expansion area, improvements to perimeter fencing, and design and construct the access road upgrades.

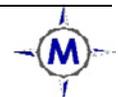
A summary of the 2016 expenditures are provided in Table 2 below.

Table 2: 2016 Operation and Maintenance Expenditures

<b>2016 Operations Expenditures</b>	
Daily Operations (Staff, utilities, equipment)	\$861,000
Miscellaneous Operations Costs (promotional/educational materials, recycling)	\$39,200
Administration	\$122,700
Capital Cost Contribution	\$738,900
Engineering, Monitoring & Consulting Fees	\$61,700
Landfill Closure & Post-Closure Fund Allocation	\$136,800
<b>Total</b>	<b>\$1,960,300</b>

The above table does not include costs associated with the Bamfield Transfer Station, recycling depot operations, and residential recycling pick up.

The 2016 expenditures for the AVL are within the original budgeted amount submitted by the ACRD.



#### 4. ENVIRONMENTAL PROTECTION PROGRAMS

The design and operation of the landfill must ensure adequate protection of human health and the environment. Environmental concerns include groundwater and surface water quality, and emission of Landfill Gases. The *Alberni Valley Landfill Design, Operations and Closure Report* (dated February 2012) describes the infrastructure and programs implemented to comply with the Landfill Criteria.

Water quality monitoring, leachate collection, and landfill gas are discussed in the sections below.

##### 4.1. Leachate & Water Quality

The quarterly water quality monitoring program continued throughout 2016. Piteau Associates Engineering Ltd. prepared and submitted a report entitled “*Water Quality Monitoring Program to December 2016, Alberni Valley Landfill*”, dated March, 2017. The report provides the monitoring data and interpretation of results from the surface water, groundwater, and leachate samples. A summary of the results are as follows:

##### Groundwater

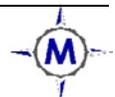
- Groundwater flow beneath the existing landfill is to the north, southeast, and east. The flow in the bedrock beneath the Northeast Expansion Area is to the southeast and south. Groundwater flow in the South and East expansion area is to the east and southeast. Flow rates and quantities are low due to limited thickness of permeable sediments and low permeability of bedrock. Construction of the berm and drain in the south expansion area appear to have controlled migration of seepage west towards Heath Creek.

##### Leachate Generation

- Leachate discharging from the base of the existing landfill suggests that the drain water is diluted by about 2:1 or less. Ammonia and COD concentrations have shown a slight rising trend over the past five years. Current leachate indicator concentrations are considered to be typical for a landfill of this size and age. Samples from the proposed south expansion area indicate no significant landfill effects have occurred to date, with the exception of slightly increased ammonia concentrations.

##### North Boundary

- Since the construction of the north leachate interception trench, only very slight leachate impacts have been observed north of the leachate interception trench, despite high water levels recorded in 2015 and early 2016.
- Monitoring at the Northeast corner reveals a highly mineralized chemistry, but shows no indication of leachate impact. It appears the water levels do not have time to



recover to static levels in between sampling sessions due to the low hydraulic conductivity of the bedrock.

### **West Boundary**

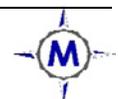
- Any potential historic leachate impacts in the southwest corner of the landfill appear to have been mitigated with the construction of the drain in the south expansion area.
- Chloride concentrations in surficial sediments on the west side of the landfill rose until it peaked in 1997 before leveling off and then decreasing. Ammonia concentrations have increased in the past years. This is likely the result of retardation, and are therefore expected to follow the chloride concentration and begin to decrease. This would mean the peak leachate generation rates have already occurred.

### **South Boundary**

- Bedrock well monitoring data indicates that no leachate impacts have occurred to the south and only very slight leachate impacts have occurred to the west, north and northeast of the present landfill footprint. Monitoring data for bedrock wells around the landfill site perimeter are well within drinking water criteria, except for iron, manganese and arsenic, which are attributed to the naturally occurring mineralogy of the bedrock in the area.
- The 2016 test results indicate there is no significant nitrogen loading leaching from the landfill along bedrock flow paths, although chloride concentrations indicate some leachate is reaching the monitoring well MW05-1D.

### **Surficial Waters**

- Leachate impacts have not been detected in Heath, McCoy, or Norris Creeks in 2016.
- Slight leachate impacts have previously been detected in Stevens Creek, north of the landfill boundary. Recent water quality in Stevens Creek indicates that the loading from the landfill is low and temporal in nature.
- Christie Creek received discharge from the leachate lagoon until 1998 when the pipeline to divert the flows was commissioned and leachate impacts have since been drastically reduced. The water quality met water quality criteria with the exception of total iron, manganese and zinc. The iron and manganese criteria are based on aesthetic objectives and the zinc exceedance is likely from a background source.
- Chemistry for two leachate interception wells indicated that they were intercepting leachate and controlling the migration of leachate towards Christie Creek when operating. However, it appears that PW-1 has been periodically in-operational and was not maintaining a low enough level to control migration.



Further detail and interpretation can be found in the water quality monitoring report, attached in Appendix D.

#### **4.2. Leachate Collection System**

A leachate collection system has been constructed to capture leachate generated by the landfill. The leachate collection system directs flow to the eastern edge of the landfill property where it enters a flow equalization pond. The current leachate control infrastructure includes:

- A berm at the north west extents of the landfill prevents surface flow from entering Stevens Creek;
- A pump lifts leachate accumulating below the landfill from the drain pipe at the base of the landfill to the concrete channel on the north boundary.
- A concrete lined leachate interception and conveyance channel along the north and eastern perimeters of the landfill directs flows to the flow equalization lagoon;
- A clay and HDPE lined berm along the western landfill boundary to prevents migration of groundwater through a bedrock trough towards Heath Creek;
- A 300 mm diameter perforated drain near the south side of the south expansion area directs flow to the east and subsequently the flow equalization lagoon.
- A 58,600 m<sup>3</sup> flow equalization pond stores leachate flows that exceed the flows which are above a predetermined rate to the City Lagoon. An overflow is provided for excessive storm events;

Leachate is collected from the Alberni Valley Landfill and transported via underground pipeline to the City of Port Alberni municipal sewage lagoon. The volume of leachate received at the sewage lagoon is measured by the City of Port Alberni. The table below summarizes the monthly leachate flows throughout 2016.

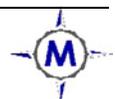


Table 3: Monthly Leachate Flows for 2016

<b>Month</b>	<b>Total Volume (m3)</b>	<b>Average Daily Volume (m3)</b>	<b>Max Daily Volume (m3)</b>	<b>Min Daily Volume (m3)</b>
January	85,069	2,744	5,038	673
February	90,834	3,132	4,956	-
March	97,988	3,161	4,745	1,609
April	19,964	665	1,517	345
May	8,327	269	351	207
June	4,520	151	266	113
July	2,615	84	121	47
August	1,095	35	171	-
September	4,191	140	487	51
October	67,958	2,192	6,184	87
November	149,473	4,982	6,247	1,490
December	61,058	1,970	4,433	723
<b>TOTAL</b>	<b>593,092</b>			

Based on the measured flow data, approximately 593,092 m<sup>3</sup> of leachate was transported to the City of Port Alberni sewage lagoon for treatment in 2016.

The monthly leachate flows for the past 10 years are plotted in the following chart.

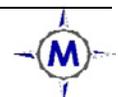
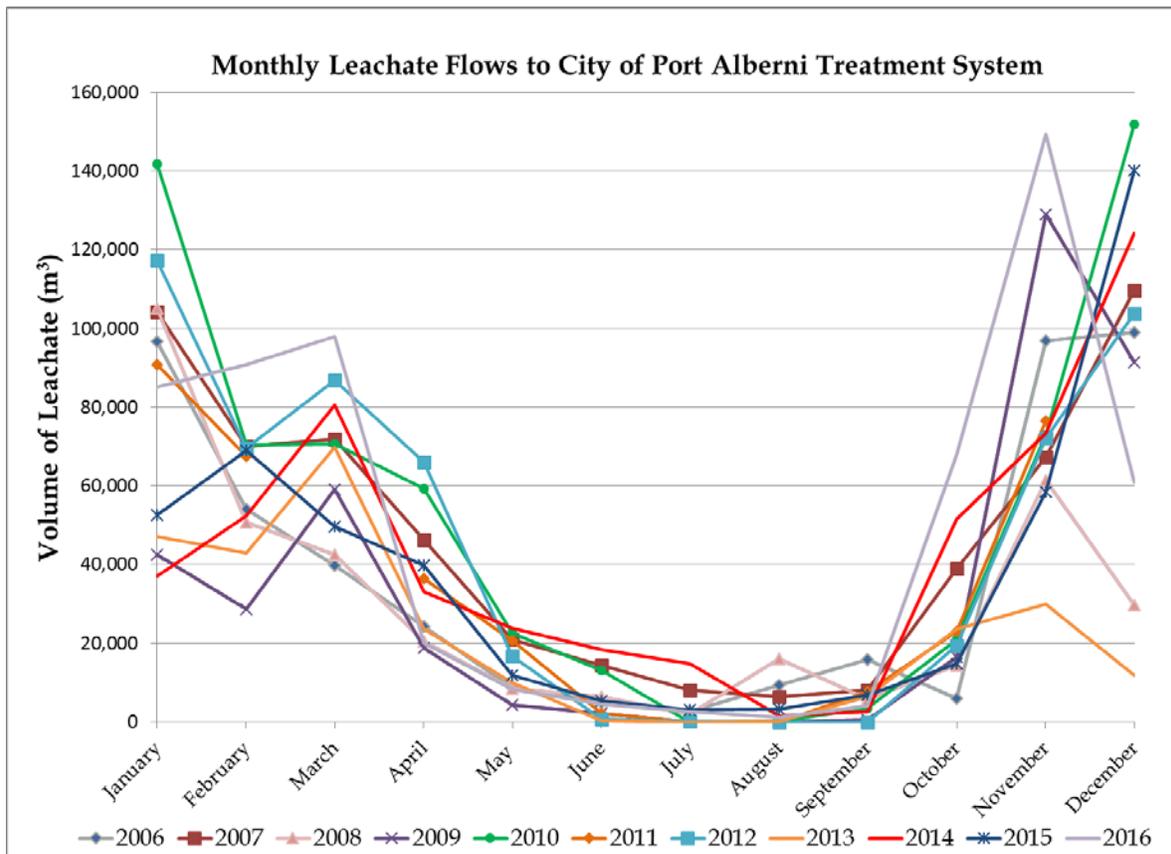


Chart 1: Monthly Leachate Volumes from 2006 to 2016



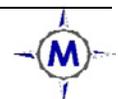
Flows follow the local precipitation patterns with increased flows during the wet winter months and lower flows during the dry summer months.

### 4.3. Landfill Gas

Landfill gas assessments are conducted every five years as the AVL was shown to produce less than 1,000 tonnes of methane annually. The following sections summarize the annual reporting requirements of the *Landfill Gas Management Regulation*.

#### 4.3.1. Introduction

The following section has been prepared in accordance with the requirements of the British Columbia Ministry of Environment’s Landfill Gas Management Regulation (Regulation), approved and ordered on December 8, 2008, and in accordance with the Landfill Gas Generation Assessment Procedure Guidance Report, as prepared for the British Columbia Ministry of Environment (MOE) by Conestoga-Rovers & Associates (CRA), dated March 2009. This section has been prepared by a qualified professional and meets the requirements of Section 4(3)(e) of the Regulation.



#### 4.3.2. Records

The following section presents the information required under Section 12(3), 13, and 14(1)(a) of the Regulation.

The Alberni-Clayoquot Regional District certifies that all records required under Section 12(3) of the British Columbia Ministry of Environment Landfill Gas Management Regulation are retained for a period of at least 10 years after they are made. Furthermore, the records will be produced for inspection or copying, upon written request from the director, in the time period specified by the director as required in Section 13 of the Regulation.

#### 4.3.3. Quantity, Source and Composition of Municipal Waste Received

The following section presents the information required under Sections 12(1)(a), 12(1)(b), 12(1)(c), 14(1)(a) and 14(2)(g) of the Regulation and as described in Section 5.1 of the Guidelines.

A breakdown of the quantity and type of solid waste entering the AVL in 2016 has been provided in Section 2. The waste composition has been categorized and a summary is provided in Appendix E. This table includes the measured waste categorization from 1995 to 2016.

As no solid waste categorization studies have been completed, the solid waste composition was based on a combination of scale records and the *British Columbia's Solid Waste Flow Report, 2006 Summary Report* prepared for MoE by BC Stats in February 2010. Further discussion on the methodology used can be found in the *Alberni Valley Landfill, Landfill Gas Generation Assessment*, prepared by McGill & Associates Engineering Ltd. in March 2011.

Using the same analysis and assumptions as the *Alberni Valley Landfill, Landfill Gas Generation Assessment*, in 2016 the AVL received:

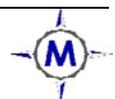
- 8,434 tonnes (41.7%) of relatively inert material
- 5,482 tonnes (27.1%) of moderately decomposable material
- 6,332 tonnes (31.3%) of decomposable material.

A table showing the breakdown of the waste composition for 2016 has been included in Appendix E.

#### 4.3.4. Waste Diversion

The following section presents the information required under Section 14(1)(b) of the Regulation.

The SWMP prepared in 2007 estimated that the ACRD had a recycling rate of 15%. This rate was based on scale records from 2005, prior to implementation of a curbside recycling program. The Multi-Material British Columbia (MMBC) recycling program was commenced in 2014. Under this province wide program, recyclable materials are collected and separated (cans, glass,



newspaper, cardboard, plastic and steel) and stockpiled at the AVL transfer station. The recyclable materials are subsequently removed by a commercial recycling company funded by the MMBC program.

The AVL accepts yard waste compost free of charge. The compost is stored onsite and subsequently removed by an outside contractor. The 2007 SWMP recommends several organic waste diversion programs such as establishing a yard waste depot within the City of Port Alberni, setting up a yard waste composting facility at the AVL or an alternate location, and completing a composting feasibility study. Though there is currently no formal organics waste diversion program in place, the ACRD is preparing a bylaw to ban kitchen and wood waste from the landfill.

#### 4.3.5. Landfill Gas Generation Model Results

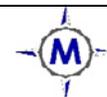
As found in the *Alberni Valley Landfill Gas Generation Assessment* finalized in 2011, the AVL is nearing 1,000 tonnes of methane production annually. Therefore, the *Landfill Gas Generation Estimation Tool* was used to update previous estimates of methane production. In updating the spreadsheet, the same assumptions were made as stated in the *Landfill Gas Generation Assessment Report for the Alberni Valley Landfill*, March 2011. The estimation tool spreadsheet results are attached in Appendix F and a summary of the landfill gas generation model results are presented in the table below.

Table 4: Landfill Gas Generation Model Results

	Year	Mass of Methane Generated (tonnes)
Estimated Quantity of Methane Produced in year Preceding the Assessment	2016	991
Estimated Quantity of Methane Produced in Year of the Assessment	2017	1,003
Estimated Quantity of Methane Produced One year after the Assessment	2018	1,014
Estimated Quantity of Methane Produced Two Years after the Assessment	2019	1,025
Estimated Quantity of Methane Produced Three Years after the Assessment	2020	1,035
Estimated Quantity of Methane Produced Four Years after the Assessment	2021	1,045

The model results indicate that the first year the AVL may produce greater than 1,000 tonnes of methane is in the year 2017.

Should future generation rates be similar to those projected, the annual landfill gas report for the 2017 year (submitted to MoE by May 1, 2018) may indicate that a Landfill Gas Management Design Plan be prepared and submitted to MoE by May 1, 2019.



It should be noted, however, that the landfill gas estimate process is based on the preceding 30 years from the year of evaluation. Therefore, each year, the annual tonnage disposed at the landfill is added to the overall model, and the annual tonnage from 30 years ago is removed. As the annual tonnage has remained similar from year to year, the projected date of exceedance has tended to also roll forward without being realized.

## 5. REVIEW OF OPERATING PLAN

In 2016, the landfill followed the same operating procedures as past years. Landfilling continued within east and northeast expansion areas and there were no major changes to the quarterly water quality monitoring program. Notable work related to AVL operations in 2016 included:

- Continuing to work towards acquiring ownership or long term tenure of the landfill property;
- Continuing expansion into the northeast corner of the landfill, including rerouting the terminus of the leachate perimeter trench;
- Evaluating the operation of the existing leachate interception wells adjacent to the lagoon and to design and implement a backup interception system;
- Investigating future sources of cover material;
- Doing maintenance work (extending and shortening) of water quality monitoring wells;
- Improving the current SCADA system.

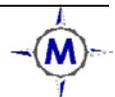
In 2016 there were no major deviations from the operating plan.

## 6. 2017 OPERATIONAL PLAN

In 2017, work will continue in the northeast expansion area (Cell B). Filling operations will continue as described in the *Alberni Valley Landfill Design, Operations and Closure Report* (dated February 2012).

Plans for 2017 include:

- Continuing to develop portions of the northeast expansion area;
- Continuing to work towards acquiring ownership or long term tenure of the landfill property;
- Continuing to plan an expansion to the transfer station area to accommodate proposed gypsum and woodwaste separation initiatives;



- Improving the current SCADA system; and,
- Planning for some upgrades to the McCoy Lake Road pumphouse building (that pumps water to the landfill reservoir).

The quarterly Water Quality Monitoring program will continue in the upcoming year, with the recommendations noted in the Monitoring report. Of note are the following items to be implemented:

- Piezometers at BH00-1C and BH00-2C should be replaced with multilevel completion piezometers, with 2" standpipes and data loggers. BH00-1C should be removed from the sampling program;
- The damaged MW02-1S should be repaired;
- MW13-2D should be removed from the sampling suite and the sampling frequency for MW13-1D, MW13-1S, and MW13-2S should be reduced to annual in the summer sampling session; and

In addition, the report recommended several design modifications and mitigative measures that include:

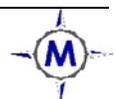
- Commission the two backup interception wells for PW-1 and PW-2;
- The controls for PW-1 and PW-2 should be adjusted to increase the interception of leachate; and
- Flow monitoring should be implemented to provide weekly cumulative data.

## 7. CONTINGENCY PLAN

A contingency plan has been developed to make provision for any unplanned events that may disrupt landfill operations. Various contingency measures have been discussed below.

In the event of a power outage, a backup generator is located onsite and is capable of restoring power to the scale, scale shed, maintenance building, caretaker's residence and leachate pumps at the transfer bin area.

Vehicles onsite are equipped with radios that communicate with the maintenance building and the scale shed. Should there be an accident or emergency, emergency vehicles can be called from the telephone at either the maintenance building or scale shed. In addition, the AVL has



been added to the Sproat Lake Fire Department service area which offers first responder services and firefighting services to onsite buildings and structures.

While monitoring wells are located to allow early identification of potential leachate problems, several contingency measures have been developed in the event that leachate excursion is found and these include:

- Drilling interception wells and installing pumps to intercept leachate flows and direct them into the leachate collection system;
- Excavating a deep sump to intercept flows destined for surface water bodies; and,
- Constructing a clay and/or bentonite berm to block groundwater flow.

A clay source is available locally and the landfill operators have the machinery available onsite for any construction needed.

## 8. CLOSURE PLAN

An *Alberni Valley Landfill Design, Operations and Closure Report* has been prepared for the AVL. The report outlines the proposed closure design for the AVL and the estimated post-closure requirements. No changes have been made to the closure design. As indicated previously the landfill is estimated to have around 70 years of remaining life before closure is required.

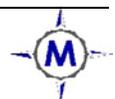
As per the report, the closure and post-closure costs have been estimated at approximately \$11,500,000.

In 2016, an additional \$120,000 was put into the closure fund. In addition, interest was added to the fund making the total amount added to the closure fund in 2016 to be \$136,811.55. There is currently just over \$1,857,000 in the current closure and post-closure fund.

The 2017 budget indicates that an additional \$120,000 will be added to the closure fund in 2017, in order to continue to build up the financial security and establish the funds needed for closure and post-closure activities. While several assumptions have been made in the preparation of the estimate (see *AVL Design, Operations and Closure Report, 2012*), it should be noted that the estimate is based on 70 to 90 years of life remaining at the AVL and current design practices. It is extremely difficult to predict costs and design practices that far into the future, therefore the closure design and associated costs should be reviewed regularly.

## 9. COMPLIANCE REVIEW

The last compliance review was completed with a Ministry of Environment representative on November 15, 2012. A compliance review was not completed during 2016.



## 10. LIMITATIONS

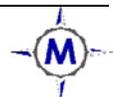
This document was prepared by McGill & Associates Engineering Ltd. for the Ministry of Environment, on behalf of the Alberni-Clayoquot Regional District. Its material, recommendations and conclusions represent the best material available to McGill & Associates Engineering Ltd. at the time of the report preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. McGill & Associates Engineering Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Yours truly,

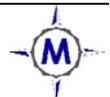
for McGill & Associates Engineering Ltd.

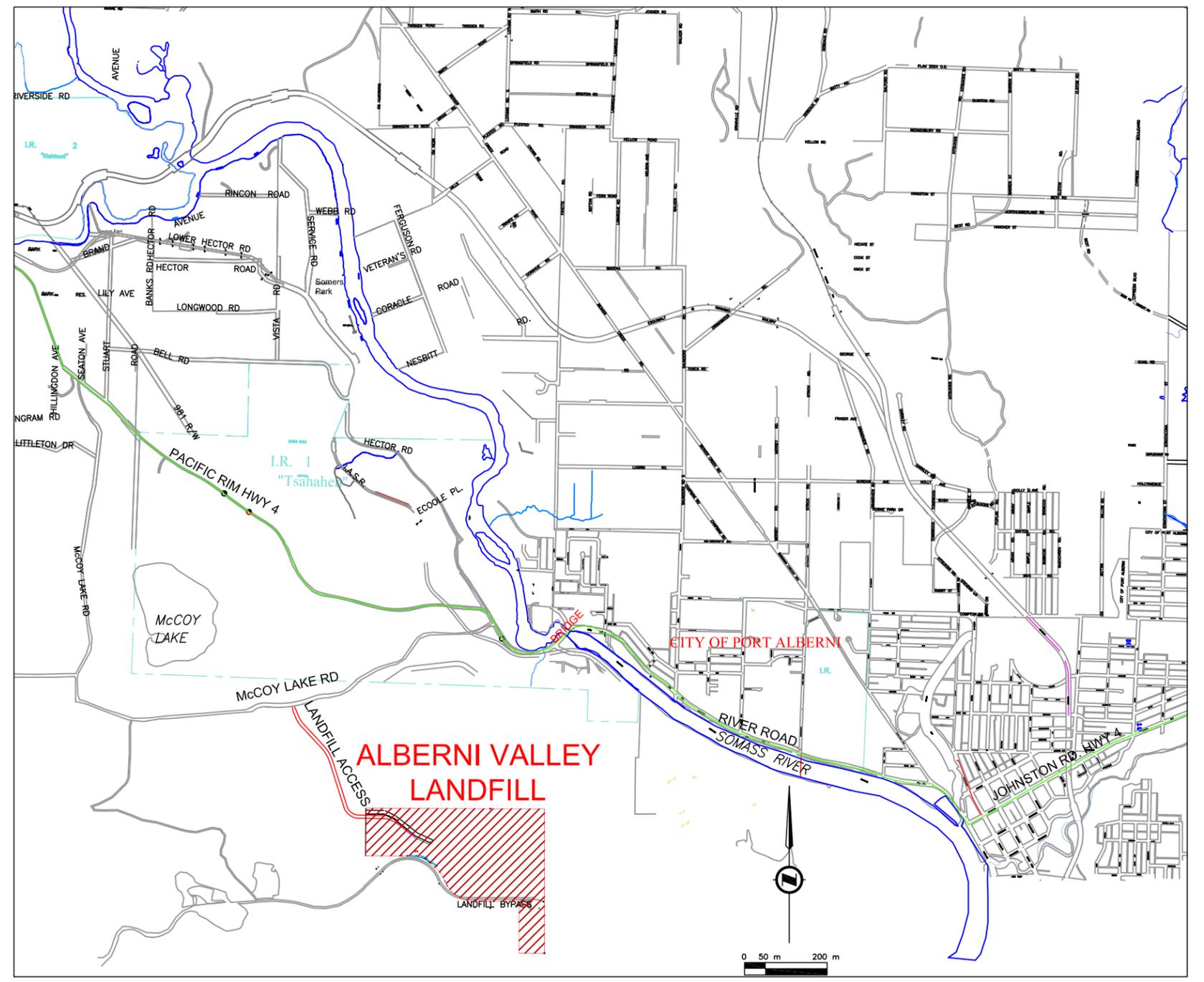
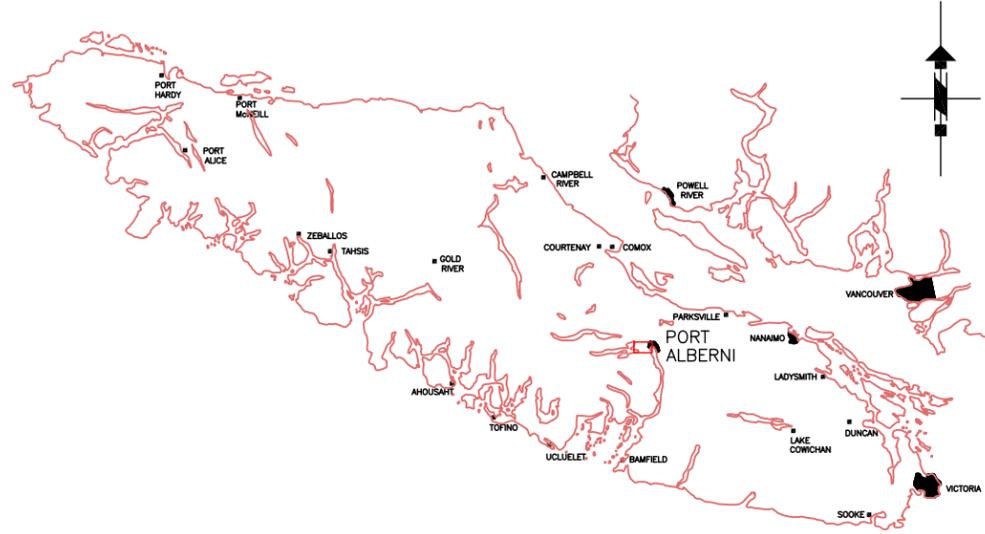


Bradley West, P. Eng.



## FIGURES





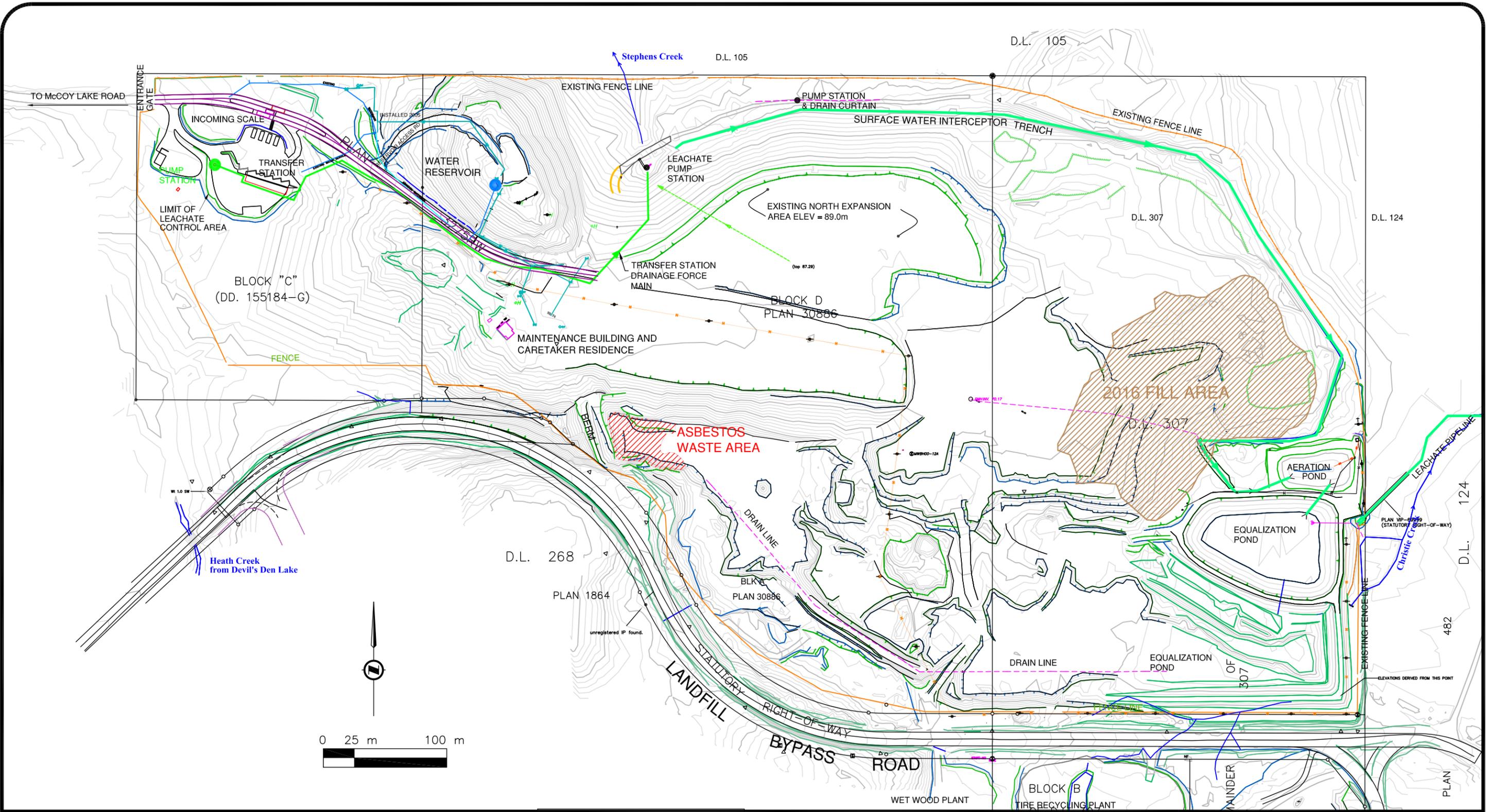
JAN. 2017

ALBERNI CLAYOQUOT REGIONAL DISTRICT  
 ALBERNI VALLEY LANDFILL - 2016 OPERATIONS & MONITORING REPORT  
 SITE LOCATION PLAN

FIGURE 1



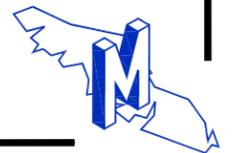
S:\2771 ACRD AVL Annual Reporting\2016\Figures\FIGURE 2 - General Site Plan.dwg Jan 30, 2017 10:54:03am



JAN. 2017

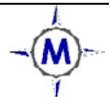
ALBERNI CLAYOQUOT REGIONAL DISTRICT  
 ALBERNI VALLEY LANDFILL - 2016 OPERATIONS AND MONITORING REPORT  
 GENERAL SITE PLAN

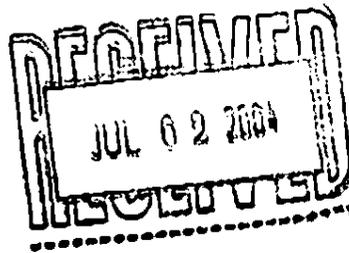
FIGURE 2



## **APPENDIX A**

Alberni Valley Landfill Operational Certificate MR-00524





File: MR-00524

Date: JUN 29 2004

**REGISTERED MAIL**

Alberni-Clayoquot Regional District  
3008 Fifth Ave  
Port Alberni BC V9Y 2E3

Dear Operational Certificate Holder:

Enclosed is Operational Certificate MR-00524 issued under the provisions of the *Waste Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the Operational Certificate.

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 Operational Certificate Holder. It is also the responsibility of the Operational Certificate Holder 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 7 of the *Waste Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given, in accordance with the practices, procedures and forms prescribed by regulation under the *Environment Management Act*. For further information, please contact the Environmental Appeal Board at 250 387 3464.

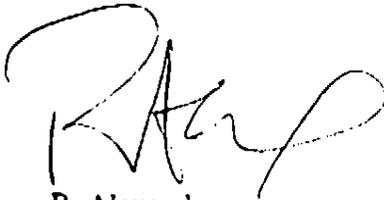
.../2

orig - agreements file  
cc - Sean

- 2 -

Administration of this Operational Certificate will be carried out by staff from the Vancouver Island Region office. Plans, data and reports pertinent to the Operational Certificate are to be submitted to the Regional Waste Manager at Ministry of Water, Land and Air Protection, Regional Operations, Vancouver Island Region, 2080 Labieux Road, Nanaimo, British Columbia, V9T 6J9.

Yours truly,

A handwritten signature in black ink, appearing to read 'R. Alexander', written in a cursive style.

R. Alexander  
Regional Waste Manager  
Vancouver Island Region

Enclosure (Copy of signed legal Operational Certificate)

cc: Environment Canada



MINISTRY OF WATER, LAND  
AND AIR PROTECTION

Vancouver Island Region  
Environmental Protection  
2000-A Lableux Road  
Nanaimo, British Columbia  
V9T 6J9  
Telephone: (250) 751-3100  
Fax: (250) 751-3103

**OPERATIONAL CERTIFICATE**

MR-00524

*Under the Provisions of the Waste Management Act*

**Regional District of Alberni-Clayoquot**

**3008 Fifth Avenue**

**Port Alberni, British Columbia**

**V9Y 2E3**

is authorised to manage recyclable material and waste from the Regional District of Alberni-Clayoquot and environs at the Alberni Valley landfill located near Port Alberni, 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**

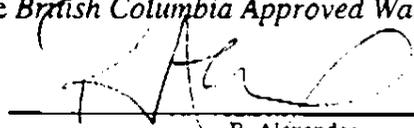
**1.1. Sanitary Landfill**

- 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 the management of leachate from the landfill.
- 1.2.2. The characteristics of the surface water and groundwater at the property boundary must not exceed concentrations set in the *British Columbia Approved Water*

Date Issued: JUN 29 2004  
Date Amended:  
(most recent)  
Page: 1 of 4

  
R. Alexander  
Regional Waste Manager

OPERATIONAL CERTIFICATE: MR-00524

*Quality Guidelines (Criteria) and A Compendium of Working Water Quality Guidelines for British Columbia.* Where natural background water quality concentrations exceed the aforementioned guidelines, characteristics of the surface water and groundwater must not exceed background concentrations.

- 1.2.3. The authorized works are a leachate collection and conveyance system, leachate treatment works, lift station and related appurtenances approximately located as shown on Site Plan A.
- 1.2.4. Leachate must be collected, treated and conveyed to the City of Port Alberni sewage treatment system.
- 1.2.5. The authorized works must be complete and in operation on and from the date of this operational certificate.

### **1.3. Location of authorised facilities**

The location of the facilities for the management of recyclable material and waste to which this operational certificate is applicable is Block D of Lot 268, Alberni Land District, approximately located as shown on attached Site Plan A. The location of the leachate treatment facility is Lot 307, Alberni Land District approximately located as shown on attached Site Plan A.

## **2. GENERAL REQUIREMENTS**

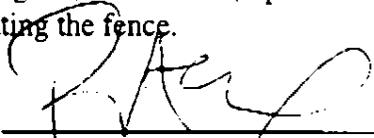
### **2.1. Entrance facilities**

- 2.1.1. The authorised facilities are signs, weigh scales, recyclable material and waste drop-off and storage facilities and related appurtenances approximately located as shown on attached Site Plan A.
- 2.1.2. The authorised facilities must be complete and in operation on and from the date of this operational certificate.

### **2.2. Bear-Proof Facilities**

- 2.2.1. 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.
- 2.2.2. A bear-proof electric fence must be installed around the landfill.
- 2.2.3. The bear-proof electric fence must be designed, constructed, operated and maintained to prevent bears from penetrating the fence.

JUN 29 2004



R. Alexander.  
Regional Waste Manager

2.2.4. The bear-proof electric fence must be complete and in operation on and from the date of this operational certificate.

**2.3. Qualified Professionals**

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

**2.4. Plans**

- 2.4.1. Site development, operating, leachate management, closure and post closure plans must be submitted to the Regional Waste Manager by October 31, 2004.
- 2.4.2. The plans 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.
- 2.4.3. The facilities must be developed, operated and closed in accordance with the plans.

**2.5. Landfill Gas**

- 2.5.1. 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.
- 2.5.2. 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*.
- 2.5.3. The potential for landfill gas generation is to be re-assessed at least once every 5 years after the initial assessment.

**2.6. Seismic and Fault Activity**

A report that assesses the risk from seismic and fault activity must be submitted to the Regional Waste Manager by October 31, 2004.

**2.7. 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.

JUN 29 2004



R. Alexander  
Regional Waste Manager

**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.

**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 May 1 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.

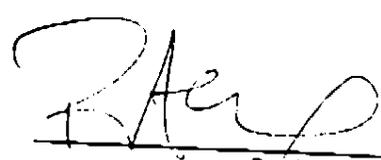
**4. SITE CLOSURE**

**4.1. Closure and Post-Closure Fund**

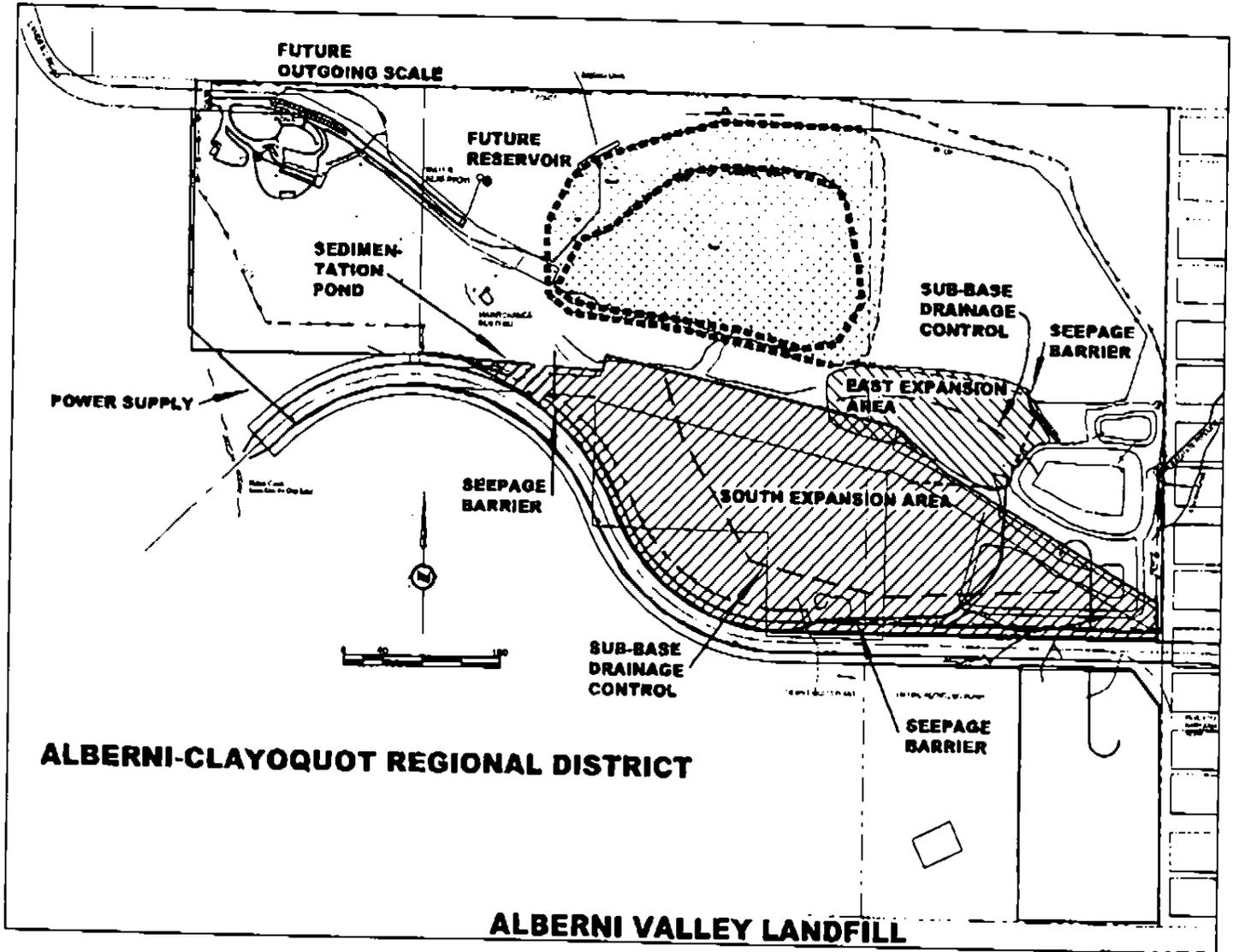
A closure and post-closure financial security trust fund must be built up over time. The closure and post-closure fund must ultimately meet or exceed the estimated closure and post-closure costs plus a reasonable contingency for any remediation that may be required.

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Page: 4 of 4

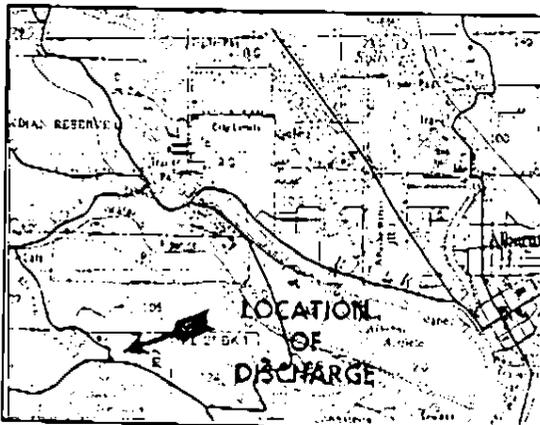
JUN 29 2004

  
\_\_\_\_\_  
R. Alexander,  
Regional Waste Manager

### SITE PLAN A



Location Map



Scale: 1:2400

OPERATIONAL CERTIFICATE: MR-00524

Date: JUN 29 2004

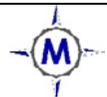
R. Alexander  
Regional Waste Manager  
Vancouver Island Region

## **APPENDIX B**

Alberni-Clayoquot Regional District Bylaw

No. R1027

No. R-1006-4





**REGIONAL DISTRICT OF ALBERNI-CLAYOQUOT**

**SCHEDULE "A" to BYLAW NO. R1006-4**

**CHARGES**

1. The charge for depositing covered solid waste at the disposal ground is:
  - a. Loads 84 kg or greater \$95.00/tonne (\$8.00 minimum)
  - b. Loads under 84 kg - \$2.00 each garbage bag or can (\$8.00 maximum)
  - c. \$2.00 for each tire or \$170 per tonne, whichever is greater
  - d. \$100.00 for each wrecked auto
  - e. \$200.00 for each wrecked truck, bus or recreational vehicle
2. In the event that the scales provided are not operational, weight shall be estimated by the scale clerk at the landfill.
3. The fee to be charged for all loads of solid waste which arrives at the landfill site uncovered shall be double the normal fee for loads of covered solid waste.
4. There shall be no charge for recyclable materials, including but not limited to paper, metal, boxboard, Corrugated Cardboard, compostable materials and other materials as determined by the Regional District but excludes any material contaminated by food or oil and any material that is a Controlled Waste.
5. All charges payable under this Bylaw shall be paid prior to the deposit of the solid waste for which the charge is made unless it is necessary to weigh the vehicle depositing solid waste loaded and empty to determine the weight of solid waste, in which case the charge shall be paid immediately after weighing the vehicle empty.
6. The person paying a charge shall obtain a receipt for such payment and shall produce such receipt for inspection on request of a person employed for that purpose at a disposal site as a condition of depositing solid waste at a disposal site.
7. Notwithstanding anything to the contrary in this Bylaw, persons depositing solid waste at a disposal site on a regular basis may apply to the Regional District for credit and if credit is granted to that person, then payment of the charge imposed under Section 1 shall be made and the credit extended on condition that:
  - a. Payment in full shall be received by the Regional District within thirty days of the last day of the month for which an invoice has been submitted. The Regional District will invoice monthly for material delivered during the proceeding month. The invoice amount will be based on the total quantity of the refuse delivered during the month, and the posted disposal rates in effect at the time of delivery.
  - b. Late payments will be subject to an interest charge of 2% per month (effective annual interest of 24%)

- c. The Regional District reserves the right to cancel, upon five days' notice, the credit offered herein for late payment, non-payment or other justified cause.

8. Controlled Waste

The charges, as measured by weight on the scales, for the depositing of Controlled Waste at the disposal site are:

- a. Construction/Demolition Waste - \$120.00 per tonne; if the Demolition Waste is crushed to pieces 7 cubic centimetres or smaller the charge is \$95.00 per tonne;
- b. Stumps, land clearing debris - \$120.00 per tonne;
- c. Waste oil (commercial) - \$0.50 per litre;
- d. Material containing traces of contaminated soils:
  - i. \$10.00 per tonne provided that the Ministry of Environment has approved of disposal of the contaminated soil, without treatment, at the Alberni Valley Landfill or;
  - ii. \$70.00 per tonne plus the Regional District's estimated out-of-pocket treatment costs, provided that the Ministry of Environment has approved of the treatment and disposal of the contaminated soil at the Alberni Valley Landfill.
- e. Material containing pumpings from domestic septic tanks - \$120.00 per tonne;
- f. Material containing catch basin and manhole material - \$120.00 per tonne;
- g. Waste asbestos - \$250.00 per tonne (\$120.00 minimum);
- h. Fish, shrimp shells, animal carcasses - \$170.00 per tonne (\$95.00 minimum), provided that there will be no charge for animal carcasses removed from public roadways by a public body or their contractor;
- i. Fridges and freezers - \$20.00 each;
- j. Batteries - no charge if separated and placed in hazardous waste container;
- k. Steel Cable - \$500.00 per tonne;
- l. Biomedical waste - \$132.00 per tonne;
- m. Loads containing Gypsum - \$120.00 per tonne;
- n. Loads containing Corrugated Cardboard - \$130.00 per tonne;
- o. Loads containing fish feed totes - \$400.00 per tonne (\$120.00 minimum).

REGIONAL DISTRICT OF ALBERNI-CLAYOQUOT

**BYLAW NO. R1027**

A Bylaw to Provide for  
the Regulation of Solid Waste Disposal and Tipping Fees  
at the Alberni Valley Landfill

**WHEREAS** by Supplementary Letters Patent, dated August 10, 1973 as amended, the Regional District of Alberni-Clayoquot was granted the function of Garbage Disposal under Division XIV of its Letters Patent;

**AND WHEREAS** the Regional District of Alberni-Clayoquot is empowered to establish a scale of charges payable for depositing Municipal Solid Waste at the Alberni Valley Landfill;

**AND WHEREAS** the Board of Directors of the Regional District of Alberni-Clayoquot deems it advisable to enact regulations pertaining to solid waste disposal and to establish a charge for depositing Municipal Solid Waste;

**NOW THEREFORE**, the Board of Directors of the Regional District of Alberni-Clayoquot in open meeting assembled enacts as follows:

**1. DEFINITIONS**

In this bylaw, unless the context otherwise requires:

- 1.1 **"Biomedical Waste"** means solid waste such as soiled sheets, garments and other similar solid waste. Excluded is waste material from pathology, operating rooms, laboratories and other hospital operations, which produce potentially infectious waste considered to be special waste;
- 1.2 **"Controlled Waste"** means certain hazardous waste, liquid waste and Municipal Solid Waste which is approved for disposal at the Alberni Valley Landfill site but which, because of its inherent nature and quantity, may require special handling and disposal techniques to avoid creating health hazards, nuisances, or environmental pollution. Controlled Waste includes, but is not limited to:
- a. Demolition wastes including:
    - i. roofing materials
    - ii. stumps, land clearing debris;
  - b. Waste oils (commercial)
  - c. Material containing the following:
    - i. traces of petroleum products;
    - ii. pumping from domestic septic tanks;
    - iii. catch basin and manhole material;
  - d. Waste asbestos;
  - e. Fish shrimp shells, animal carcasses;
  - f. Steel cable;
  - g. Biomedical waste
- 1.3 **"Corrugated Cardboard"** means recyclable waste from residential, industrial, commercial, institutional sources which includes, but is not limited to containers or materials used in containers consisting of 3 or more layers of Kraft paper material and having smooth exterior

liners and a corrugated or rippled core, but excluding containers which are impregnated with blood, grease, oil, chemicals, food residue, wax; or have polyethylene, foil or other non-paper liners; or are contaminated with a material which will render the corrugated cardboard not marketable;

- 1.4 **“Construction/Demolition Waste”** means waste produced from the construction, renovation, and demolition of buildings, bridges, wharfs, rail lines and other structures, but does not include waste containing or contaminated with asbestos, creosote, PCB treatments, paints or chemicals of any kind;
- 1.5 **“Environmental Management Act”** means the Environmental Management Act (British Columbia), as amended or replaced and any successor legislation and any regulations thereunder;
- 1.6 **“Disposal Site”** means the Alberni Valley Landfill;
- 1.7 **“Gypsum”** includes, but is not necessarily limited to new construction off-cuts or scraps and old wallboard that has been painted, covered in wallpaper, vinyl or ceramic tiles and is removed during renovation, but excluding wallboard from demolition sites or wallboard associated with asbestos;
- 1.8 **“Hazardous Waste”** means gaseous, liquid and solid waste which, because of its inherent nature and quantity, requires special disposal techniques to avoid creating health hazards, nuisances, or environmental pollution. Hazardous Wastes are toxins or poisons, corrosives, irritants, strong sensitizers, flammables, explosives, infectious waste, condemned food, etc. Flammable wastes excluding plastics, paper products and the like;
- 1.9 **“Ignitable”** means having the properties of:
  - a. flammable gas,
  - b. flammable liquid, or
  - c. flammable solids, or substances susceptible to spontaneous combustion or substances that on contact with water emit flammable gases as defined in the Special Waste Regulations of the Environmental Management Act;
- 1.10 **“Metal”** means recyclable ferrous and non-ferrous metallic materials which include, but are not limited to: sheet metal, siding, roofing, rebar, flashings, pipes, window frames, doors, furnaces, duct work, wire, cable, bathtubs, fencing, bicycle frames, automotive parts, machinery, appliances, garbage cans, metal furniture, tire rims and metal cans. It does not include metal that is incorporated into a product or packaging, such as a couch, that does not compose more than 50% of produce weight and that cannot be readily separated from the non-metallic components.
- 1.11 **“Municipal Solid Waste” (MSW)** means refuse that originates from residential, commercial or institutional, demolition, land clearing or construction sources within the Regional District of Alberni-Clayoquot;
- 1.12 **“Person”** means an individual, a body corporate, a firm, a partnership, association or any other legal entity or an employee or agent thereof.
- 1.13 **“Prohibited Waste”** means a waste prohibited from disposal under Schedule ‘C’ attached to and forming part of this bylaw;

- 1.14 **"Radioactive Waste"** means waste containing a prescribed substance as defined in the Atomic Energy Control Act in sufficient quantity or concentration to require a licence for possession or use under the Act and regulations made under that Act;
- 1.15 **"Reactive Waste"** means waste which is;
- a. explosive, oxidizing, or so unstable that it readily undergoes violent change in the presence of air or water;
  - b. generates toxic gases, vapours, or fumes by itself or when mixed with water; and
  - c. polymerizes in whole or in part by chemical action and causes damage by generating heat or increasing volume; as defined in the Special Waste Regulations of the Environmental Management Act;
- 1.16 **"Refuse"** means discarded or abandoned materials, substances or objects; but does not include Controlled Waste and Prohibited Waste;
- 1.17 **"Regional Board"** means the Board of Directors of the Regional District of Alberni-Clayoquot;
- 1.18 **"Regional District"** means the Regional District of Alberni-Clayoquot;
- 1.19 **"Special Waste"** means any chemical, compound, mixture, substance or article which is defined as such in the Special Waste Regulation of the BC Environmental Management Act.
- 1.20 **"Stewardship Materials"** means any waste or recyclable materials in an approved stewardship plan as defined in the Recycling Regulation of the BC Environmental Management Act;
- 1.21 **"Tires"** means the outer pneumatic rubber covering of wheels of passenger's vehicles, light service trucks and motorcycles with an inner diameter of less than 43 centimetres.
- 1.22 **"Waste Asbestos"** means a waste containing friable asbestos fibres or asbestos dust in a concentration greater than 1% by weight either at the time of manufacture, or as determined using a method specified in section 40 (1); of the BC Hazardous Waste Regulation;
- 1.23 **"Waste Oil"** means automotive lubricating oil, cutting oil, fuel oil, gear oil, hydraulic oil or any other refined petroleum based oil or synthetic oil where the oils are in the waste in a total concentration greater than 3% by weight and the oils through use, storage or handling have become unsuitable for their original purpose due to the presence of impurities or loss of original properties;
- 1.24 **"Yard and Garden Material"** means uncontaminated organic materials, substances or objects including, but not necessarily limited to, grass, lawn and hedge clippings, grass sod, flowers, leaves, vegetable stalks, shrubs and shrub tree branches less than 2" in diameter, but excluding Scotch Broom.

## 2. **CONDITIONS**

- 2.1 No person shall, in depositing Municipal Solid Waste (MSW) at the Disposal Site;
- a. deposit a Prohibited Waste;
  - b. deposit MSW except as directed by regulations for the use of the Disposal Site;
  - c. unless permitted by the Regional District, deposit MSW without first having it weighted on the scales at the Disposal Site;

- d. drive a vehicle anywhere on the Disposal Site except on roads provided by the Regional District for that purpose unless otherwise instructed;
- e. act in a manner contrary to the posted site regulations.

2.2 Controlled Waste will not be accepted for disposal at the Disposal Site without written approval of the Regional District. This requirement may be waived, if the Regional District or its agent determines that special handling and disposal techniques are not required to dispose of the Controlled Waste. Controlled Waste for which special handling and disposal techniques are required are subject to fees as outlined in Schedule "A" attached to and forming part of this bylaw.

2.3 No person shall salvage or remove material deposited at the Disposal Site without prior written approval of the Regional District.

2.4 No person shall loiter or leave their vehicle unattended at the Disposal Site.

2.5 Persons entering the Disposal Site do so at their own risk. The Regional District accepts no liability whatsoever for damage and/or injury to persons or property at the Disposal Site.

2.6 Children under 13, and pets shall not be permitted at the Disposal Site except inside a vehicle.

2.7 No person shall deposit Municipal Solid Waste at the Disposal Site, that does not originate from within the Regional District. Any person doing so will be in contravention of this bylaw.

### **3.0 CHARGES**

3.1 Every person depositing Municipal Solid Waste at the Disposal Site shall pay to the Regional District the applicable charges set out in Schedule "A" hereto.

3.2 Where a charge is not paid within the time specified in Schedule "B" , attached to and forming part of this bylaw, for its payment the person liable to pay such a charge shall:

- a. In addition to such a charge pay interest thereon at a rate set out in Schedule "A" from the date the charge was due to the date of payment;
- b. Not deposit any Municipal Solid Waste on or at the Disposal Site until such a charge and interest owing thereon has been paid in full.

### **4. VIOLATIONS AND PENALTIES**

4.1 No persons shall do any act or suffer or permit any act or thing to be done in contravention of this Bylaw.

4.2 Every person who contravenes this bylaw, by doing any act which the bylaw forbids, or omits to do any act which the bylaw requires:

- a. is guilty of an offence and is liable, on summary conviction, to a fine of not less than TWO HUNDRED (\$200.00) DOLLARS and not more than TEN THOUSAND (\$10,000.00) dollars for a first offence and for each subsequent offence to a fine of not less than FIVE HUNDRED (\$500.00) and not more than TEN THOUSAND (\$10,000.00) DOLLARS. A separate offence shall be deemed to be committed upon each day during and in which the contravention occurs or continues;
- b. may be prohibited from depositing Municipal Solid Waste at the Disposal Site.

5. **TITLE**

This bylaw may be cited as the "Alberni Valley Landfill Tipping Fee and Regulation Bylaw No. R1027, 2015"

6. **EFFECTIVE DATE**

Bylaw No. R1027 "Alberni Valley Landfill Tipping Fee and Regulation" comes into effect on July 1, 2015.

7. **REPEAL**

Bylaw No. R1006, cited as the "Alberni Valley Landfill Tipping Fee and Regulation Bylaw No. R1006, 1999" is hereby rescinded as of July 1, 2015.

Read a first time this 10<sup>th</sup> day of June, 2015

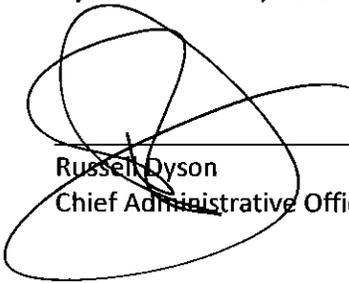
Read a second time this 10th day of June, 2015

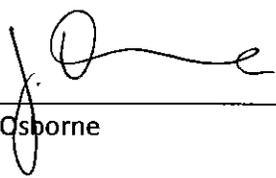
Read a third time this 10th day of June, 2015

ADOPTED this 10th day of June, 2015

Certified true and correct copy of "Alberni Valley Landfill Tipping Fee and Regulation Bylaw No. R1027, 2015"

The Corporate seal of the Regional District of Alberni-Clayoquot was hereto affixed in the presence of:

  
\_\_\_\_\_  
Russel Dyson  
Chief Administrative Officer

  
\_\_\_\_\_  
Josie Osborne  
Chair

**Schedule A  
Charges**

	<b>Solid Waste, excluding Controlled Waste</b>	<b>Tipping Fee</b>	<b>Other Charges</b>
	Loads of 84 kg or greater	\$95.00 per tonne	\$8.00 minimum
	Loads under 84 kg (each garbage bag or can)	\$2.00 each	\$8.00 maximum
	Wrecked auto (each)	\$100.00 each	
	Wrecked trucks, bus or recreational vehicle	\$200.00 each	
	Surcharge for Solid waste containing Prohibited Recyclable Materials	\$190 per tonne	
	Surcharge for improperly covered or secured loads	\$190 per tonne	

	<b>Recyclable Materials</b>	<b>Tipping Fee</b>	<b>Other Charges</b>
	Batteries	No Charge	
	Corrugated Cardboard	No Charge	
	Fridges and Freezers	\$20 each	
	Metal	No Charge	
	Stewardship Materials	No Charge	
	Tires	\$2.00 each or \$170 per tonne whichever is greater	
	Yard and Garden Waste (branches 2" & under)	No charge	

	<b>Controlled Waste</b>	<b>Tipping Fee</b>	<b>Other Charges</b>
	Construction/Demolition Waste	\$120 per tonne	
	Demolition waste crushed to pieces 7 cubic centimeters or smaller	\$95.00 per tonne	
	Stumps, land clearing debris	\$120.00 per tonne	
	Waste oil (commercial)	\$0.50 per litre	
	Contaminated Soils:		
	Provided that the Ministry of Environment has approved of disposal of the contaminated soil, without treatment, at the Alberni Landfill	\$10.00 per tonne	
	Provided that the Ministry of Environment has approved of the treatment and disposal of the contaminated soil at the Alberni landfill	\$70.00 per tonne	Plus estimated out-of-pocket treatment costs
	Pumpings from domestic septic tanks	\$120.00 per tonne	
	Catch basin and manhole material	\$120.00 per tonne	
	Waste asbestos	\$250.00 per tonne	\$120.00 minimum
	Fish, shrimp shells, animal carcasses provided that there will be no charge for animal carcasses removed from public roadways by a public body or their contractor	\$170.00 per tonne	\$95.00 minimum
	Steel Cable	\$500.00 per tonne	
	Biomedical waste	\$132.00 per tonne	
	Loads containing Gypsum	\$120.00 per tonne	
	Loads containing fish feed totes	\$400.00 per tonne	\$120.00 minimum

**Schedule B**  
**Policies and Procedures**

1. In the event that the scales provided are not operational, weight shall be estimated by the Scale Clerk employed by the Regional District of Alberni- Clayoquot.
2. All charges payable under this Bylaw shall be paid prior to the deposit of the solid waste for which the charge is made unless it is necessary to weigh the vehicle depositing solid waste loaded and empty to determine the weight of solid waste, in which case the charge shall be paid immediately after weighing the vehicle empty.
3. The person paying a charge shall obtain a receipt for such payment and shall produce such receipt for inspection on request of a person employed for that purpose at a disposal site as a condition of depositing solid waste at a disposal site.
4. Notwithstanding anything to the contrary in this Bylaw, persons depositing solid waste at a disposal site on a regular basis may apply to the Regional District for credit and if credit is granted to that person, then payment of the charge imposed under Schedule A shall be made and the credit extended on condition that:
  - a. Payment in full shall be received by the Regional District within thirty (30) days of the last day of the month for which an invoice has been submitted. The Regional District will invoice monthly for material delivered during the preceding month. The invoice amount will be based on the total quantity of the Municipal Solid Waste delivered during the month, and the posted disposal rates in effect at the time of delivery.
  - b. In order to reflect the additional administration costs associated with accounts in arrears, an overdue charge will be calculated monthly as the greater of:
    - i. \$2.00; or
    - ii. Interest of 2% per month (effective interest rate of 26.824%) on the unpaid balance.
  - c. The Regional District reserves the right to cancel the credit offered herein for late payment, non-payment or other justified cause.

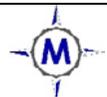
## Schedule C Prohibited Waste

The following gaseous liquids and municipal solid wastes are not acceptable for disposal at the Disposal Site and include, but are not limited to:

- i. Liquids, except as permitted herein;
- ii. Ignitable wastes;
- iii. Reactive wastes;
- iv. Radioactive wastes;
- v. Hazardous waste;
- vi. Special Waste, as defined in the *Special Waste Regulation* (British Columbia) except asbestos;
- vii. Medical waste
- viii. Solid Waste that is on fire or smouldering
- ix. Corrugated Cardboard
- x. Metal
- xi. Municipal Solid Waste that does not originate from within the Regional District;
- xii. Stewardship Materials
- xiii. Tires
- xiv. Yard and Garden Waste

## **APPENDIX C**

### Historic Weights at AVL



**APPENDIX C**  
**Estimated Historic Quantities at Alberni Valley Landfill**

<b>Year<sup>1</sup></b>	<b>Annual Weight (tonnes)</b>	<b>Cumulative Weight (tonnes)</b>
1975	18,903	18,903
1976	19,228	38,131
1977	19,460	57,591
1978	19,912	77,503
1979	19,677	97,180
1980	21,199	118,379
1981	18,713	137,092
1982	18,573	155,665
1983	18,433	174,098
1984	18,292	192,390
1985	17,869	210,259
1986	17,730	227,989
1987	17,593	245,582
1988	17,455	263,037
1989	17,317	280,354
1990	17,179	297,533
1991	17,042	314,575
1992	16,917	331,492
1993	17,062	348,554
1994	17,115	365,669
1995	19,653	385,322
1996	15,335	400,657
1997	16,694	417,351
1998	16,201	433,552
1999	15,959	449,511
2000	14,966	464,477
2001	13,462	477,939
2002	13,500	491,439
2003	14,672	506,111
2004	16,479	522,590
2005	19,198	541,788
2006	19,422	561,210
2007	22,019	583,229
2008	19,026	602,255
2009	22,878	625,133
2010	21,931	647,064
2011	18,942	666,006
2012	19,488	685,494
2013	18,155	703,649
2014	18,749	722,398
2015	18,837	741,234
2016	20,216	761,450

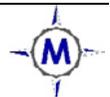
1. Annual weights from 1995 to 2016 are based on scale records. Annual weights prior to 1995 are based on estimates from the *Alberni Valley Landfill Report on Landfill Gas*, prepared by Cameron Advisory Services, May 2003.

## **APPENDIX D**

*Water Quality Monitoring Program to December 2016*

Alberni Valley Landfill

Piteau Associates Engineering Ltd.

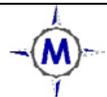


## **APPENDIX E**

Waste Categorization from 1995 to 2016

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Estimated Alberni Valley Landfill Waste Composition - 2016



Summary of AVL Weigh Scale Records - 1995 to 2016 (tonnes)

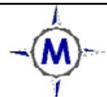
Waste Composition	Year																						
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Mixed Waste (Residential & Commercial)	14,049	12,714	14,405	12,824	11,558	12,037	11,235	11,554	12,423	13,670	14,832	15,395	17,134	13,332	-	-	-						
Residential Mixed Waste	n/a	590	10,519	12,072	9,041	8,977	8,510	8,000	8,582	8,989													
Industrial, Commercial & Institutional Mixed Waste	n/a	376	5,638	6,268	6,642	6,531	6,362	6,268	5,869	6,081													
Construction																							
Roofing	1,718	1,218	837	927	1,486	1,385	669	880	731	832	1,278	1,518	1,861	1,624	1,154	776	737	1,230	1,092	793	1,198	1,017	
Gyproc	48	136	56	28	38	59	60	55	53	60	120	152	192	209	175	188	128	108	99	106	138	250	
Mixed Demo	2,483	641	854	1,449	1,097	1,130	1,200	881	1,254	1,827	2,789	2,209	2,412	2,785	2,376	2,573	2,228	2,020	1,876	2,319	2,033	2,608	
Contaminated Soil	587	587	516	811	1,735	313	258	70	173	64	163	117	369	74	2,982	0	136	30	0	9	199	938	
Asbestos	5	39	11	78	13	15	13	39	34	20	16	31	51	26	23	53	29	592	214	619	688	271	
Land Clearing/Branches	n/a	291	33	22																			
Compost	n/a	341	68	32																			
Service Road Cleanup	763	0	15	84	32	27	27	21	4	6	0	0	0	10	11	1	1	0	2	3	0	7	
Animal Carcasses	n/a	28	1																				
<b>Total =</b>	<b>19,653</b>	<b>15,335</b>	<b>16,694</b>	<b>16,201</b>	<b>15,959</b>	<b>14,966</b>	<b>13,462</b>	<b>13,500</b>	<b>14,672</b>	<b>16,479</b>	<b>19,198</b>	<b>19,422</b>	<b>22,019</b>	<b>19,026</b>	<b>22,878</b>	<b>21,931</b>	<b>18,942</b>	<b>19,488</b>	<b>18,155</b>	<b>18,749</b>	<b>18,837</b>	<b>20,216</b>	

**Estimated Alberni Valley Landfill Waste Composition - 2016**

Waste Type	Mass (tonnes)	Mass (%)	Waste Category (tonnes)		
			Relatively Inert	Moderately Decomposable	Decomposable
<b>1. Residential Mixed Waste</b>	<b>8,989</b>	<b>-</b>			
Organics	4,306	47.9	-	-	4,306
Paper	1,690	18.8	-	1,690	-
Plastics	989	11.0	989	-	-
Multi-material	854	9.5	854	-	-
Textiles & Rubber	422	4.7	422	-	-
Other	180	2.0	-	180	-
Wood	36	0.4	-	36	-
Ferrous	202	2.3	202	-	-
Glass	171	1.9	171	-	-
Renovation	54	0.6	54	-	-
Non-ferrous	76	0.8	76	-	-
Haz-waste	9	0.1	9	-	-
		Subtotal =	2,778	1,906	4,306
<b>2. Industrial, Commercial and Institutional Mixed Waste</b>	<b>6,081</b>	<b>-</b>			
Organics	1,933	31.8	-	-	1,933
Paper	2,387	39.3	-	2,387	-
Plastics	560	9.2	560	-	-
Wood	358	5.9	-	358	-
Multi-material	22	0.4	22	-	-
Renovation	0	0.0	0	-	-
Textiles & Rubber	69	1.1	69	-	-
Ferrous	300	4.9	300	-	-
Glass	421	6.9	421	-	-
Other	1	0.0	-	1	-
Haz-waste	9	0.1	-	9	-
Non-ferrous	22	0.4	22	-	-
		Subtotal =	1,394	2,754	1,933
<b>3. Construction, Renovation &amp; Demolition</b>	<b>3,875</b>	<b>-</b>			
Roofing	1,017		1,017	-	-
Gyproc	250		250	-	-
Mixed Demolition	2,608		-	-	-
Wood	790	30.3	-	790	-
Other	765	29.3	765	-	-
Concrete	443	17.0	443	-	-
Drywall	281	10.8	281	-	-
Asphalt	208	8.0	208	-	-
Non-ferrous	68	2.6	68	-	-
Paper product	32	1.2	-	32	-
Ferrous	20	0.8	20	-	-
		Subtotal =	3,053	822	0
<b>4. Contaminated Soil</b>	<b>938</b>	<b>-</b>	938	-	-
<b>5. Asbestos</b>	<b>271</b>	<b>-</b>	271	-	-
<b>6. Land Clearing / Branches</b>	<b>22</b>	<b>-</b>	-	-	22
<b>7. Compost</b>	<b>32</b>	<b>-</b>	-	-	32
<b>8. Service Road Cleanup</b>	<b>7</b>	<b>-</b>	-	-	7
<b>9. Animal Carcasses</b>	<b>1</b>	<b>-</b>	-	-	1
<b>Total Waste (tonnes)=</b>	<b>20,216</b>		<b>8,434</b>	<b>5,482</b>	<b>6,300</b>
<b>Percentage (%) =</b>	<b>100%</b>		<b>41.7%</b>	<b>27.1%</b>	<b>31.2%</b>

## **APPENDIX F**

### Landfill Gas Generation Model Results



Year of Assessment	2017	LFG Management Regulation Reference
Annual Tonnage in Preceding Year	20,216 (tonnes/year)	4-2-a
Total waste in Place in the Preceding Y	533,462 (tonnes/year)	4-2-c
Methane generation in the Preceding Y	991 (tonnes CH4/year)	4-2-d

Next Five Years	Waste TonnageMethane Generation		
	(tonnes)	(tonnes CH4/year)	
2017	20,277	1,003	4-2-b & 4-2-e
2018	20,337	1,014	4-2-b & 4-2-e
2019	20,398	1,025	4-2-b & 4-2-e
2020	20,460	1,035	4-2-b & 4-2-e
2021	20,521	1,045	4-2-b & 4-2-e

	Relatively Inert	Moderately Decomposable	Decomposable	m <sup>3</sup> CH <sub>4</sub> /tonne
Gas Production potential, Lo =	20	120	160	
lag time before start of gas production, lag =	1 years			
Historical Data Used (years)	30			
1st Year of Historical Data Used	1987			
4 Years after Reporting Year	2021			
methane (by volume)	50%			
carbon dioxide (by volume)	50%			
methane (density) - 1atm, 25C	0.6557	kg/m <sup>3</sup>	(25C,SP)	
carbon dioxide (density)	1.7988	kg/m <sup>3</sup>	(25C,SP)	

Year	Year Number	Annual Tonnage (tonnes)	Cumulative Waste-in-place (tonnes)	Waste Tonnage			Methane Generation Rate, k			Annual Methane Production (tonnes/yr)
				Relatively Inert (tonnes)	Decomposable (tonnes)	Decomposable (tonnes)	Relatively Inert (year <sup>-1</sup> )	Decomposable (year <sup>-1</sup> )	Decomposable (year <sup>-1</sup> )	
1987	1	17,593	17,593	7,218	4,277	6,098	0.02	0.06	0.11	0.00
1988	2	17,455	35,048	7,161	4,244	6,050	0.02	0.06	0.11	88.54
1989	3	17,317	52,365	7,105	4,210	6,002	0.02	0.06	0.11	168.22
1990	4	17,179	69,544	7,048	4,176	5,954	0.02	0.06	0.11	239.91
1991	5	17,042	86,586	6,992	4,143	5,907	0.02	0.06	0.11	304.37
1992	6	16,917	103,503	6,941	4,113	5,864	0.02	0.06	0.11	362.30
1993	7	17,062	120,565	7,000	4,148	5,914	0.02	0.06	0.11	414.40
1994	8	17,115	137,680	7,022	4,161	5,932	0.02	0.06	0.11	462.58
1995	9	19,653	157,333	8,063	4,778	6,812	0.02	0.06	0.11	506.75
1996	10	15,335	172,668	5,945	4,113	5,277	0.02	0.06	0.11	559.80
1997	11	16,694	189,362	5,973	4,782	5,938	0.02	0.06	0.11	587.67
1998	12	16,201	205,563	6,423	4,313	5,465	0.02	0.06	0.11	623.59
1999	13	15,959	221,522	7,310	3,658	4,991	0.02	0.06	0.11	649.25
2000	14	14,966	236,488	5,902	4,005	5,059	0.02	0.06	0.11	664.82
2001	15	13,462	249,950	4,935	3,845	4,683	0.02	0.06	0.11	681.17
2002	16	13,500	263,450	4,835	3,884	4,781	0.02	0.06	0.11	691.16
2003	17	14,672	278,122	5,283	4,254	5,135	0.02	0.06	0.11	701.72
2004	18	16,479	294,601	6,019	4,782	5,679	0.02	0.06	0.11	717.24
2005	19	19,198	313,799	7,653	5,284	6,261	0.02	0.06	0.11	740.18
2006	20	19,422	333,221	7,635	5,329	6,458	0.02	0.06	0.11	770.40
2007	21	22,019	355,240	8,931	5,868	7,220	0.02	0.06	0.11	800.49
2008	22	19,026	374,266	7,877	5,061	6,087	0.02	0.06	0.11	839.26
2009	23	22,878	397,144	10,504	5,532	6,841	0.02	0.06	0.11	858.31
2010	24	21,931	419,075	7,947	6,209	7,775	0.02	0.06	0.11	887.01
2011	25	18,942	438,017	6,873	5,627	6,442	0.02	0.06	0.11	926.07
2012	26	19,488	457,505	7,615	5,497	6,376	0.02	0.06	0.11	944.16
2013	27	18,155	475,660	6,778	5,277	6,100	0.02	0.06	0.11	959.74
2014	28	18,749	494,409	7,025	5,265	6,459	0.02	0.06	0.11	969.92
2015	29	18,837	513,246	7,613	5,118	6,105	0.02	0.06	0.11	983.38
2016	30	20,216	533,462	8,434	5,482	6,300	0.02	0.06	0.11	991.40
2017	31	20,277	553,738	8,460	5,498	6,319	0.02	0.06	0.11	1002.94
2018	32	20,337	574,076	8,485	5,514	6,338	0.02	0.06	0.11	1013.99
2019	33	20,398	594,474	8,510	5,531	6,357	0.02	0.06	0.11	1024.58
2020	34	20,460	614,934	8,536	5,548	6,376	0.02	0.06	0.11	1034.74
2021	35	20,521	635,455	8,561	5,564	6,395	0.02	0.06	0.11	1044.50