



ALBERNI-CLAYOQUOT  
REGIONAL DISTRICT

# Alberni Valley Landfill

## 2021 ANNUAL REPORT

Submitted to: BC Ministry of Environment & Climate Change Strategy

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PERMIT TO PRACTICE  
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APRIL 2022

## Report Summary

	Reporting Year 2021	Unit
Waste Tonnage Disposed at AVL	16,319	t
Landfill Airspace Consumed	28,750	m <sup>3</sup>
Landfill Airspace Remaining	2,432,310	m <sup>3</sup>
Anticipated Closure Date at Current Fill Rate/Density	2091 (Draft DOCP 2114)	
Waste in Place at Landfill	845,257	t
Leachate Generated & Treated	549,257	m <sup>3</sup>
Landfill Gas Management	Pilot monitoring conducted with VIU	
Closure Works Undertaken	None	
Inspection Works	DOCP revisions completed in draft	
Changes from MOECCS Approved Plans	None	
Non-Compliances	Exceedance of BCWQG at the property boundary in 2020; Minor excursions from operations according to the 2012 DOCP; Marginally late 2020 Annual Report (9 days)	
Progress on Non-Compliances	N/A	
AVL Wasteshed Projects Undertaken in 2021	Future Projects Proposed	
Asset Management Plan	VIU LFG Monitoring Partnership (2022)	
Recollect Recycling App/ Sort'nGo	Landfill Gas Flare Installation (2022)	
Bear Aware Program	Alberni Valley Collections Contract (2022)	
Environmental Monitoring Program Improvements	Construction and Demo Diversion Program (2023)	
SCADA for North Boundary and Stevens Creek Sites	SW Bylaw Update (2022)	
Design Operation and Closure Plan Update	Update of Solid Waste Management Plan (2023)	
McCoy Pump Station Upgrade	Develop SOP's (Leachate/LFG system - 2022)	
3 <sup>rd</sup> Ave Recycling Depot Contract – Social Focused RFP	McCoy Pump Station Upgrade (2022)	
VIU Landfill Gas Monitoring Partnership	Establish Baling Facility AVL (2022-2023)	
CPA 3-Stream Waste Collection	Landfill Tenure (2022)	
Organics Diversion	Additional Lighting/Cameras (2022)	
Upgrades to drop off area plus organics drop off	Landfill Working Group (2022)	
Landfill Gas Flare Installation		
Added Leachate Interception Wells/Well replacement		
Meteorological Station sited and installed		
Ministry of Environment Air Quality Station installed		
Solid Waste Management Goals	Target	Actual
1 - Waste Generation Rate	< 400 kg/capita	597 kg/capita
2- Diversion of Waste	>50%	24%
3 - Airspace Consumption Ratio	>660 kg/m3	568 kg/m3
4 – Capital Contributions	>\$115,000/year	\$120,000/year
5 – Water Quality	Meet FWAL	A few locations did not meet FWAL for trace metals
6 – Landfill Gas Generation	<1,000 tonnes CH4/year	Est. 891 tonnes CH4/year

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## Background

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. The AVL is located approximately 5 km west of Port Alberni and has been in operation since the early 1970s. The “waste shed” for municipal solid waste destined for the AVL includes the City of Port Alberni, ACRD Electoral Areas within the Alberni Valley and Bamfield and First Nations communities Tseshaht, Hupačasath, Huu-ay-aht and Uchucklesaht.

This report was prepared by staff at the ACRD to satisfy the annual reporting requirements for the AVL, as required by the Operational Certificate and the 2016 *Landfill Criteria for Municipal Solid Waste* published by BC Ministry of Environment and Climate Change Strategy (MOECCS). The report has been reviewed by solid waste engineers from Tetra Tech Canada Inc. that are familiar with the facility and operations. The content of the Annual Report and supporting materials were reviewed by Tetra Tech Canada Inc. in conjunction with the ACRD staff prior to the report being finalized.

## Mission Statement

“To protect human health and the environment and maximize value of service by effectively managing the region’s solid waste in an environmentally, socially and economically responsible manner.”

## Waste Quantification

### Landfilled

In 2021, the AVL accepted 16,319 tonnes of municipal solid waste (MSW) and other wastes including, construction and demolition (C&D), asbestos-containing materials (ACM) and ocean clean-up material. The breakdown of waste types disposed in 2021 is as shown in Table 1. The cumulative quantity of waste disposed of at the AVL as of the end of 2021 is now 845,257 tonnes.

**Table 1 – Landfilled Waste 2021 (tonnes)**

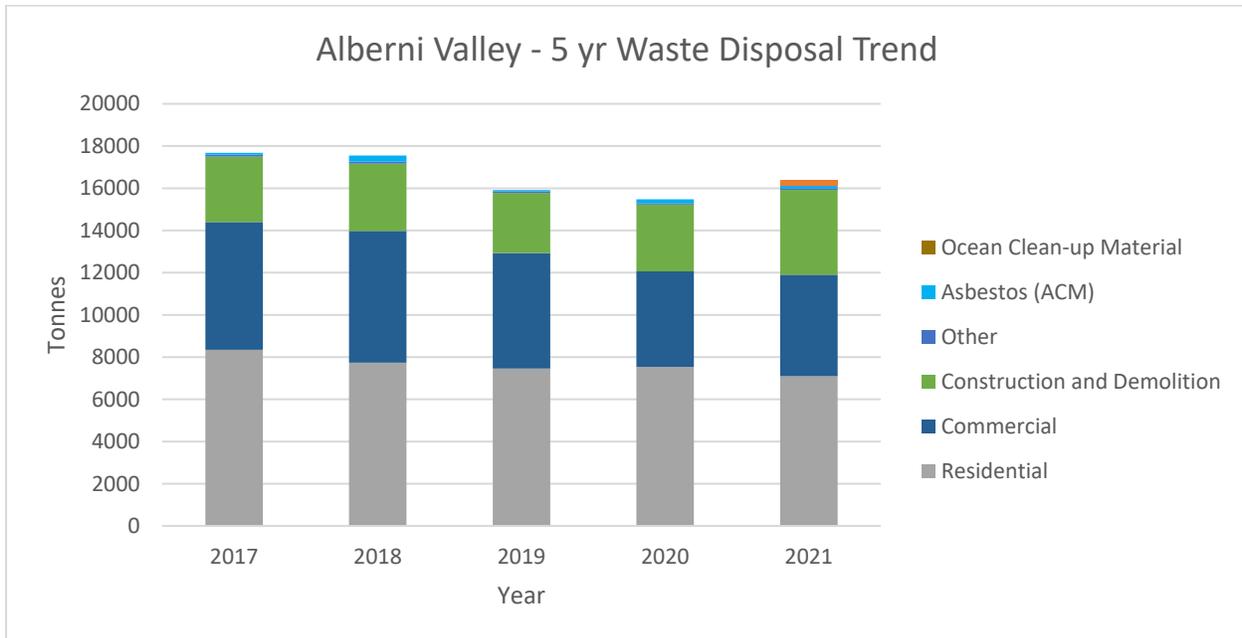
<b>Residential Garbage</b>	7,096
<b>Commercial Garbage</b>	4,809
<b>Construction and Demolition</b>	3,080
<b>Other Garbage</b>	80
<b>Asbestos (ACM)</b>	133
<b>Ocean Clean-up Material</b>	264
<b>TOTAL</b>	<b>16,319</b>

A year over year comparison of waste processed through the AVL was compiled over a 5-year period (Chart 1 below). The key trends are:

- Residential waste disposed has steadily reduced over the last 5 years.
- Commercial and Construction/Demo (C&D) waste (combined) saw a dip in 2020, likely due to the pandemic and slowdown in the economy but has since picked back up to pre-pandemic levels.

- Ocean Clean-up waste is now being tracked separately (2021 only at 264 tonnes). This will be closely tracked as these numbers are expected to climb in future years.

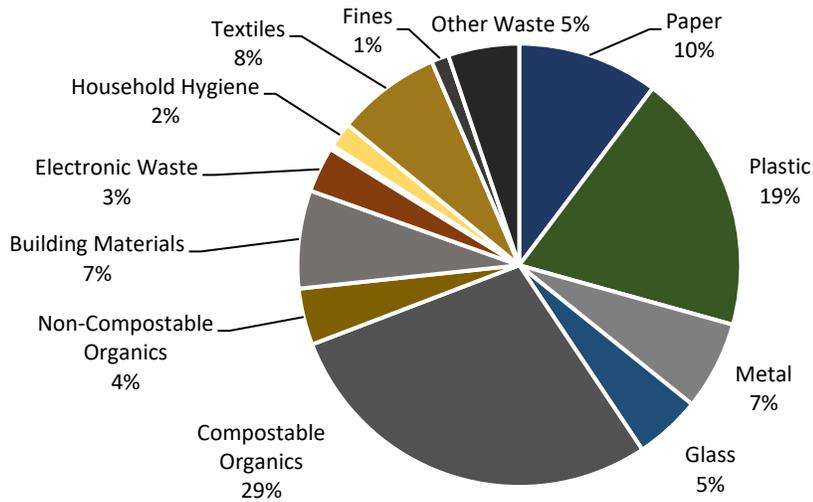
**Chart 1 – 5 Year Waste Disposal Trend in the Alberni Valley**



In 2019, the ACRD retained Dillon Consulting Limited to complete a Waste Composition Study. The focus of this study was to gain an understanding of the quantity of organics, recyclables, and Extended Producer Responsibility (EPR) materials in the garbage streams for curbside residential, self-haul and commercial waste. The residential waste was also categorized by its origins allowing the production of composition profiles for each stream of waste by geographic location.

The graph below (Chart 2) illustrates the weighted average material composition for residential curbside municipal solid waste. The largest material category was compostable organics (28.6%) followed by plastic (19%) and paper (10%). Most of the compostable organics stream was food waste (22.5%). The largest subcategory of the plastics category was durable plastic products (non-recyclable plastics) at 7.6%, followed by film packaging (5.7%) and rigid recyclable plastic (4.7%). The Paper category largely comprised cardboard (6.1%) and recyclable paper (2.8%).

**Chart 2 - AVL Average MSW Composition 2019**



From this original study, it was clear that organics was the largest single category contributor to landfill waste: as a result, the ACRD has prioritized organics diversion efforts. Phase 1 of this project occurred in September 2021 with the introduction of curbside organics collection from 6,700 single-family homes in the City of Port Alberni. The organic material collected was consolidated at the AVL then transported to a local composting contractor, Earth Land & Sea (ELS).

The estimated population served by the landfill is 26,687 in 2021 resulting in a waste disposal rate of 597 kg/capita per annum. This value represents a 5.6% increase in waste per capita from 2020. This is primarily due to three factors:

- 1) Revised census estimates received from the province in 2021, showing expected population increase to be 3.2% less than expected (27,574 estimated vs 26,687 actual); and
- 2) A pandemic-induced increase in at-home and at-business renovation work, which increased the tonnage of waste, disposed in the AV.
- 3) The organics diversion program initiated in the Fall and so was only able to divert organics from landfill disposal for a quarter of the year.

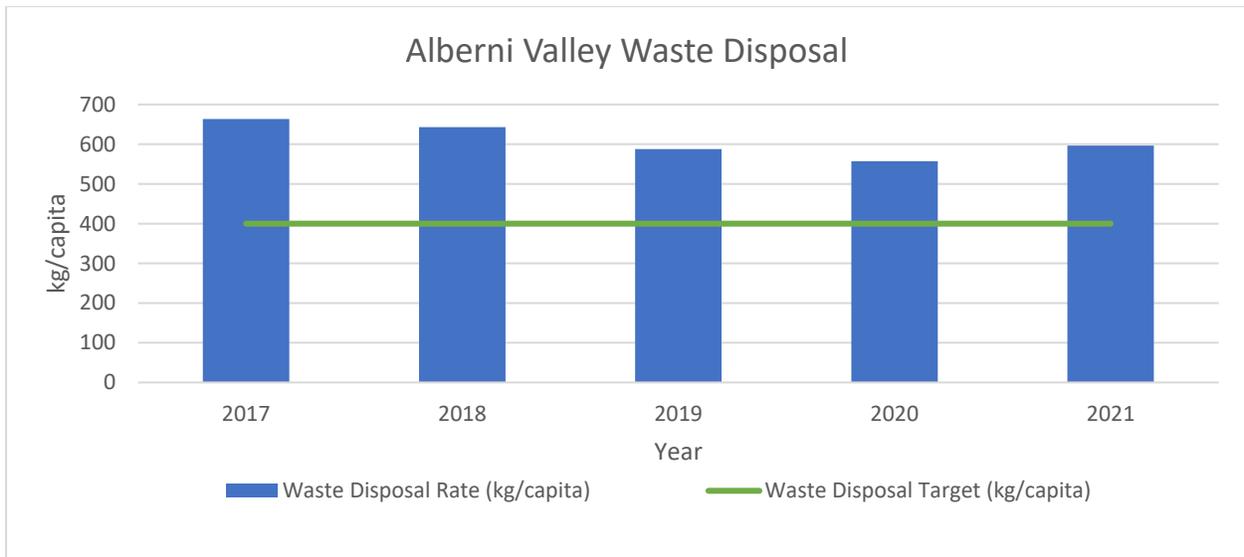
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***Target 1 - Reduce landfill disposal to less than 400 kg/capita***

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The Waste Disposal Rate, increased to 597 kg/capita is still well above the target rate of 400 kg/capita as shown in Chart 3.

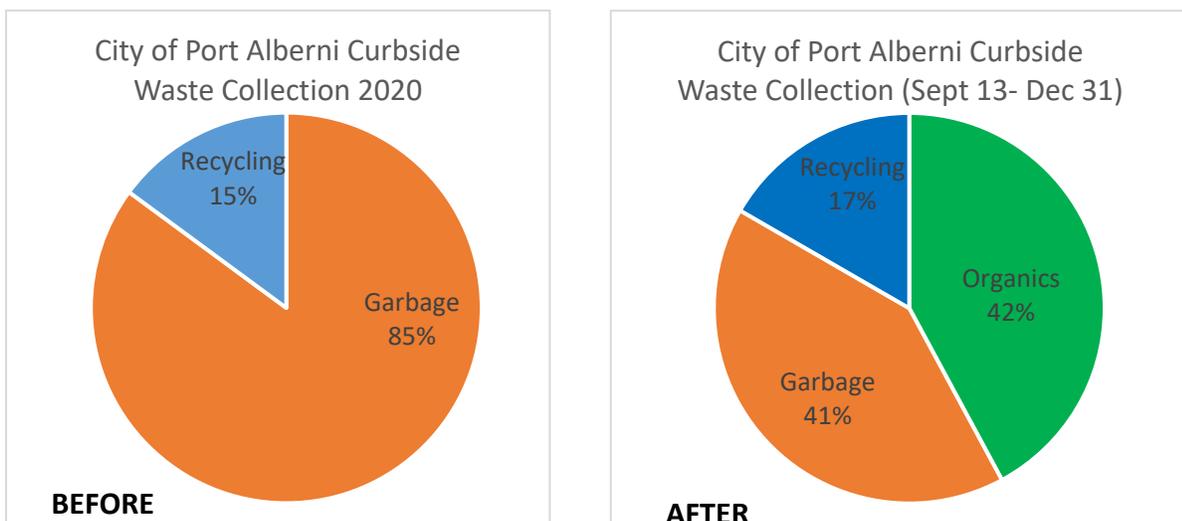
**Chart 3 - Annual Waste Disposal Rates**



**Diverted**

The estimated quantity of materials recorded as diverted from landfilling in 2021 was 5,088 tonnes, a significant increase over 2020. The largest change in diversion is attributed to the addition of curbside organics, which diverted 667 tonnes of material from the landfill between September 13, 2021 and December 31, 2021. Phase 1 of this new ACRD program was rolled out to 6,700 single-family homes in the City of Port Alberni (CPA). Preliminary data for the first 16 weeks of this program shows a dramatic reduction in the garbage stream in comparison to 2020 (Chart 4).

**Chart 4 – 3-Stream Collection (Before and After)**



The overall AV diversion rate for 2021 was 24.2% (up from 23%) however, this measure is an underestimation of the actual diversion taking place. It does not include much of the diversion from private sector sources. The ACRD does not have a waste licensing bylaw and so does not receive reports from many resource recovery and recycling companies: including such data would further improve the apparent diversion rate.

**Chart 5 - Reported Annual Waste Diversion Rates**

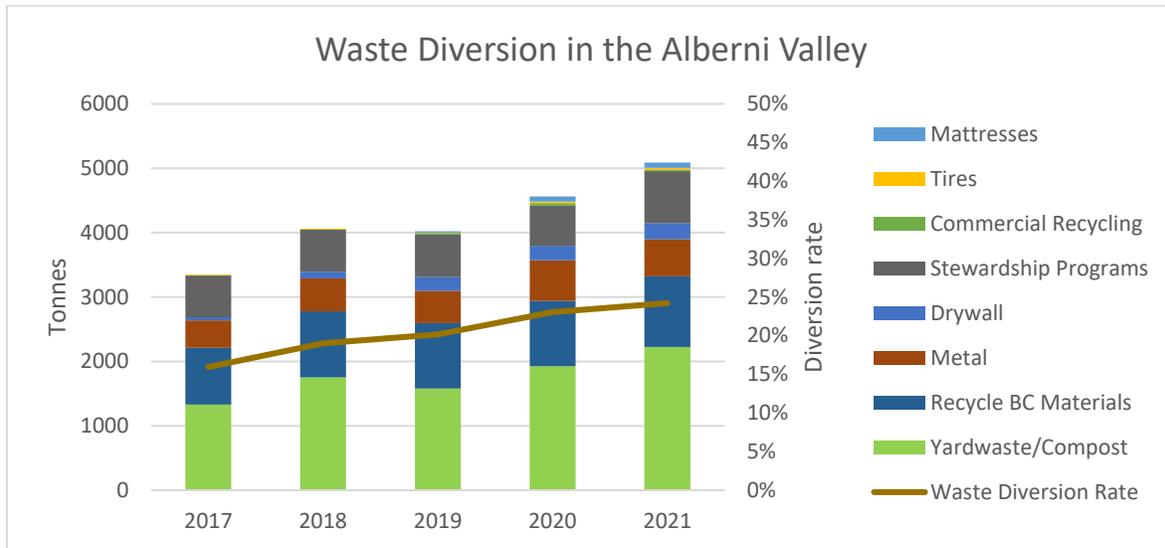


Chart 5 displays diversion rates over the last five years, collected through the following key programs:

- Organics/Yard Waste Collection (2,224 tonnes):
  - Self-hauled wood waste (376 tonnes)
  - Self-hauled yard/green waste (373 tonnes)
  - (NEW) Curbside collection in CPA (667 tonnes)
  - 3<sup>rd</sup> party organics processing from private sources (808 tonnes)
- The 4<sup>th</sup> Avenue Return-It Depot – privately operated; and
- Three ACRD operated Waste/Recycling Centers (2021 diversion tonnage):
  - 3<sup>rd</sup> Avenue Depot (182 tonnes)
  - McCoy Lake (AVLF) Depot (2,564 tonnes)
  - Bamfield Depot (49 tonnes)
- Curbside Recycling Collection in the City of Port Alberni (CPA) and Beaver Creek

The largest contributor in landfill diversion rates is organic material (44% of the waste diverted). The introduction of curbside organics collection in CPA (Chart 4, above), which saw 667 tonnes of material consolidated at the AVL, then delivered to a local company to be processed into compost. This same company, ELS, saw an additional uptick in privately collected organic feedstock from 552 tonnes (2020) to 808 tonnes (2021): this is material that was delivered directly to the ELS site.

The 3<sup>rd</sup> Avenue Recycling Depot saw an increase in tonnage, primarily due to the pandemic and an increase in online shopping resulting in a larger than normal amount of packaging. There was a slight increase in diverted tonnes at the Bamfield station as well. The landfill underwent upgrades in the transfer station area to accommodate curbside collection of recyclables and organics (NEW) in the City of Port Alberni. Depot drop-off quantities remained static, which was still a good achievement, given the pandemic. It continued to receive stewardship products that included; batteries, paint, household hazardous waste, electronics, small and large appliances, lights, and outdoor equipment in addition to paper and packaging materials. The AVL facility also diverts a growing range of non-stewardship products including tires; metals, clean wood waste, mattresses, gypsum, as well as yard and garden waste.

Finally, curbside recycling for the City of Port Alberni, Beaver Creek, Tseshaht First Nation and Hupačasath First Nation continues to increase for the fourth straight year, up 9.3% to 680 tonnes.

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### ***Target 2 - Increase Diversion of Waste to 50%***

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These additional diversion efforts and the reduction in waste generated has resulted in an increased diversion rate of 24.2%, up from the 2020 rate of 23%. While showing improvement in recorded diversion rate, it is still well below the target set in the ACRD solid waste management plan of a 50% diversion rate. While removal of landfilled organics will significantly improve this diversion rate, it is worth noting that this rate only represents materials diverted from the landfill in the waste shed, through known stewardship programs and the ACRD's solid waste systems. That said, more is being diverted by private entities within the waste shed, but outside of the ACRD MSW system. Work will continue with the goal of finding this important data and providing a more accurate picture of exactly how much waste is diverted from landfilling.

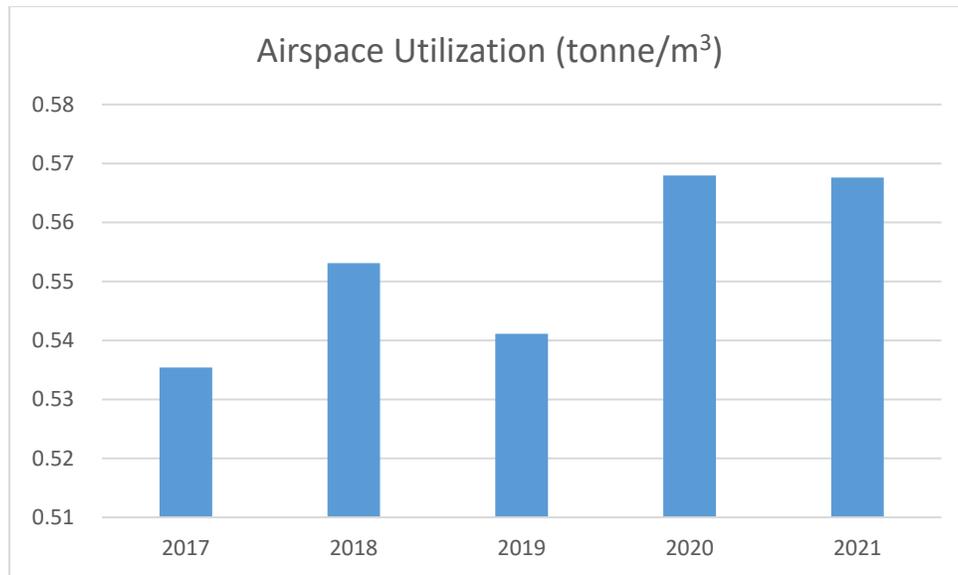
As previously described, the greatest remaining single opportunity to increase waste diversion is through the diversion of organics. With the initial success of the new 3-stream program in 2021, it is expected that diversion rate will increase. This will be primarily due to a full year of organics curbside collection and an associated expansion of self-haul organics drop-off. Diversion of this and other materials will also continue to increase with continued education and promotion of the existing recycling programs and systems in place.

## **Landfill Capacity**

### **Airspace Utilization**

In 2021, 28,750 m<sup>3</sup> of airspace was consumed by waste and cover materials used. This is based on comparing the annual topographical surveys completed at year-end. The total disposed tonnage was 16,319, resulting in an airspace consumption ratio of 568 kg/m<sup>3</sup>, (waste tonnage divided by airspace consumed by that waste). Though this rate is the same as that in 2020, it remains an improvement over the past five years and was a result of both beneficial changes in operational methods for landfilling at the site as well as refinement in data calculations on cover utilization.

**Chart 6 - Airspace Consumption Ratios**



568 kg/m<sup>3</sup> is an improvement from previous years but still below the targeted 660 Kg/m<sup>3</sup>.

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***Target 3 – Minimum Airspace Consumption Ratio of 660 kg/m<sup>3</sup>***

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The volume of cover material used in 2021 was 7,100 m<sup>3</sup>, which is a 12.6% reduction in airspace consumption from 2020 for cover material. The operations contractor has been investigating innovative approaches to further reduce this amount and employed monthly surveying of test waste cells. This method provided a more accurate measure of cover material usage by calculating unity factors based on 16 truckloads of cover, averaging 17.5 tonnes per load, to cover 1 surveyed cell that measures 10m X 30m X 2.8m. Calculated unity factors for one cell from these actual numbers produced:

- Cover material airspace (per cell) = 155.2 m<sup>3</sup>
- Cover material tonnage (per cell) = 280 tonnes
- Average cover usage = 1.8 tonnes/m<sup>3</sup>

The resulting cover material airspace used in 2021 was calculated using these factors in comparison with total tonnage of cover material used (12,810 tonnes). The reduction in airspace consumption is likely due to this new method of calculation but continued surveys in 2022 will further refine these factors. Operationally, the landfill contractor continues to work on restricting cover use which will not only reduce the costs of providing cover material but also preserve airspace and ultimately extend the life of the landfill.

### Remaining Life

In 2021, the DOCP was updated to reflect revised population estimates; introduction of organics diversion; staged adjustments in filling; and revised present day equivalent costs for closure and post closure of the site. Based on the airspace consumed in 2021, there is an estimated 2,432,310 m<sup>3</sup> remaining airspace at the AVL at the beginning of 2022. Population census was revised based on new

provincial numbers received at the end of 2021. Based on the current population growth rate of 0.9%, waste generation of 597 kg/capita, and airspace consumption ratio of 568 kg/m<sup>3</sup>, the landfill will reach capacity in approximately 2093. That said the revised DOCP estimates that the landfill reaching capacity in 2114 at minimum. The new DOCP estimate is 23 years longer than estimates from 2020, largely due to the introduction of organics diversion and its inclusion into the revised DOCP. However, if the ACRD meets the targets for reducing waste generation to 400 kg/person and minimum airspace consumption ratios, the landfill lifespan will extend to approximately 2121.

## Operations

### Variations from DOCP

The Design, Operations and Closure Plan (DOCP), previous version completed in 2012 by McGill and Associates Engineering, was updated in 2021 (draft being finalized in January 2022) by Sperling Hansen Associates. The updated DOCP includes, but is not limited to:

- Detailed filling for the current phase of the AVL (Phase 1) to assist operators.
- Updated Landfill Fire Safety Plan including updated emergency contact info.
- Updated landfill lifespan to include impact of organics diversion.
- Costs updated to present-day values for Landfill Closure/Post-Closure capital and monitoring.

Variations in the last year from the 2012 plan include:

- In 2021, the groundwater interceptor well system upgrades were completed to address the fouling issues in the leachate wells (previously referenced in the 2020 Annual Report). Capital system upgrades included the installation of wells and pumps to intercept leachate flows and direct them into the leachate collection system and onboarding of the real time communication system (SCADA) for continuous monitoring and maintenance.
- The 2012 DOCP also projected that 1,000 tonnes of methane would be produced by the landfill in 2012. Reaching that threshold would have required the design and installation of a landfill gas collection system. In 2020, Sperling Hansen and Associates (SHA) undertook landfill gas modelling. They used two approaches and noted good agreement between the results from the different methodologies. In 2021, SHA revisited their landfill gas assessments to reflect the inclusion of organics diversion in the modelling. Using the model required by the Province shows gas generation estimates for annual methane generation at the AVL in 2020 was approximately 897 tonnes/year and 891 tonnes/year in 2021. The revised model results show that the Alberni Valley Landfill is currently not mandated to install an active LFG management facility. However, ACRD is required to submit an LFG Generation Assessment Report to the MOECCS every 5 years – the next assessment is scheduled for 2026.
- The 2012 DOCP includes the acquisition of ownership or long-term tenure of the AVL property. The ACRD has been working with the Province over the intervening nine years to acquire security of the property. This process continues and will likely result in a Crown Grant, that will combine the various parcels on the landfill site into one lot. In 2021, the Province and ACRD continued work towards a resolution, engaging in several Ministry-held meetings with ACRD staff and members of the Tseshaht First Nation (TFN). In 2022, an operational landfill-working group will kick off a new phase of consultation with the TFN (see project section for details).

### Conformance to SWMP

The most recently adopted Solid Waste Management Plan (SWMP) from 2008 listed several initiatives to meet the first two targets in the report; reduce per capita waste generation to 400 kg/person; and increase diversion to 50%. Most of these initiatives had been implemented with one remaining major action item being the implementation of an organics diversion program. In 2021, the new organics coordinator spearheaded the introduction of organics diversion in the ACRD. Phase 1 of this program began in the ACRD with the introduction of 3-stream curbside collection for 6,700 single-family homes of garbage/recycling/organics, within the City of Port Alberni (CPA). This significant change saw a switch from the previous manual collection of garbage and recyclables to 3-stream collection, via automated carts for garbage, recyclables and organics. Working in collaboration with the CPA, the program went live in September 2021, highlights shown below:

- 667 tonnes of organics, representing 42% of this waste stream, were successfully diverted.
- Monthly curbside recycling numbers saw this stream increase from 12% to 15% of the total.
- Contamination rates are at approximately 4% of the organics stream, education outreach has been a large contributor to keeping this number small.
- CPA took over curbside collection of recyclable materials from the ACRD, though the ACRD continues to provide education assistance through the Sort'nGo waste app.

Supporting organics diversion for the commercial sector and surrounding electoral areas will follow in 2022 as part of Phase 3 of this multi-year program.

### Compliance Resolutions

The ACRD received an inspection on May 19, 2021. The AVL was shown to comply with the Landfill Gas Regulations but did receive an advisory notice for 3 items:

- Exceedance of BCWQG at the property boundary in 2020– As noted in the 2020 Environmental Monitoring report;
- Minor excursions from operations according to the 2012 DOCP – per the 2020 Annual report, this referred to additional work on site beyond the scope of the original DOCP. This work included the addition of infrastructure to intercept leachate flows with added wells and a new SCADA system; an updated landfill gas assessment conducted in 2020; and the ongoing discussions regarding long-term tenure of the AVL site which to date has not been resolved; and
- Marginally late 2020 Annual Report (9 days) – submission of the annual report was delayed due to staffing capacity issues. Early in 2021, an extension was requested to submit the 2020 report late, which was granted. The 2020 annual report was submitted in accordance with this extension.

### Public Feedback on Landfill Operations

Although the AVL is located away from residential communities, the ACRD and its operator still work hard at minimizing nuisances, such as odor, noise and litter. The feedback of landfill visitors is also important, whether positive or negative. While a formal complaint tracking system was created in 2020 to ensure that all complaints are documented and followed up on appropriately, it was equally important to track constructive feedback. To that end, an enhanced program was launched and promoted in 2021 to encourage more customer input, via [feedback@acrd.bc.ca](mailto:feedback@acrd.bc.ca). This information was

distributed at the ACRD's local waste disposal sites as well as the Tseshaht and Hupačasath First Nations offices.

In 2021, the ACRD received three complaints about landfill operations:

- One complaint related to an employee not wearing a mask – the contractor promptly resolved this.
- Two complaints were regarding lack of disposal options for commercial cardboard at the AVL – addressed with the increase in frequency of pick-ups of the commercial bins.

Also in 2021, the ACRD received numerous positive comments for the AVL, some of which are excerpted here:

- “find all the staff very friendly and will always take the time for a little chat providing It's not too busy. A very clean and well organized landfill. Always fun to go there”
- “Easily the most festive dump I've ever been to. They were all decked out for Halloween and so many decorations that anyone visiting couldn't help but smile...”
- “Friendly staff, great service....”

### Inspections

Regular site inspections and reporting requirements have been incorporated in the updated operations contract for 2021. The newly expanded solid waste team and the landfill operations staff are performing regular inspections, coupled with monthly update meetings, to ensure compliance with the contract, operations certificate and provincial requirements.

### Overview of work for upcoming year

There are several projects planned for 2021. These include the finalization of the DOCP document, an expansion of the landfill gas monitoring programs and other items as detailed in the Projects Upcoming section.

## Finances

### Operating Expenses

In 2021, the operating expenses for the AV and Bamfield Wasteshed were:

**Table 2 - Operating Expenses**

	<b>2021</b>
<b>LANDFILL OPERATING COSTS</b>	\$ 1,373,864
<b>ADMIN &amp; EDUCATION COSTS</b>	\$ 416,807
<b>RECYCLING</b>	\$ 612,133
<b>TOTAL COSTS</b>	\$ 2,402,803
<b>RECOVERIES</b>	\$ 530,425
<b>NET COST</b>	\$ 1,872,378
<b>RESERVE FUNDS ALLOCATION</b>	\$ 1,540,773

### Capital and Closure Funding

The 2012 DOCP identified the need for \$11,500,000 for closure and post-closure activities and recommended that the ACRD contribute approximately \$115,000 annually to this fund. In the past five years, contributions have been \$120,000 annually to the Closure Reserve and over \$450,000 to the Capital Reserve. The growth of these funds are shown on Chart 6.

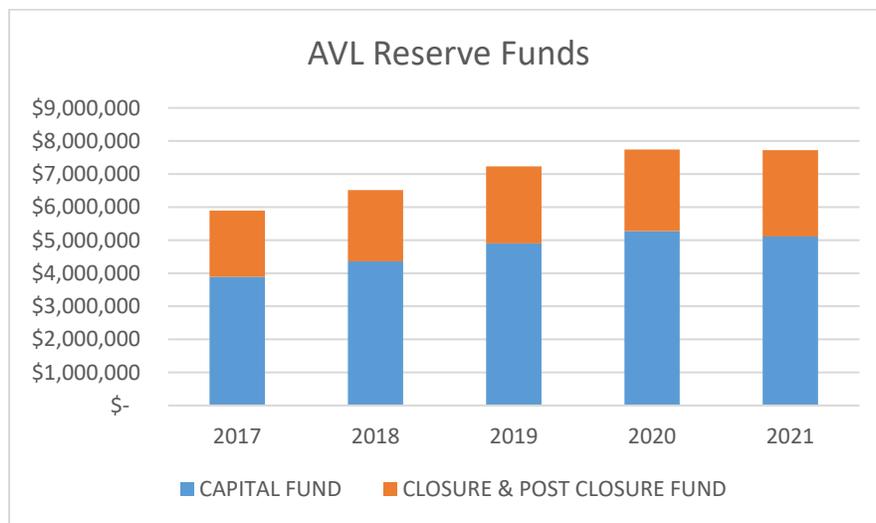
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#### **Target 4 – Annual Capital Contributions meet Funding Requirements**

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With an anticipated closure date of 2091, there are 70 years remaining before the end of the landfill life. At the end of 2021, the Closure and Post-Closure reserve has approximately \$2,470,524. The updated DOCP which will be completed in 2021, will review and update closure and post-closure contribution requirements.

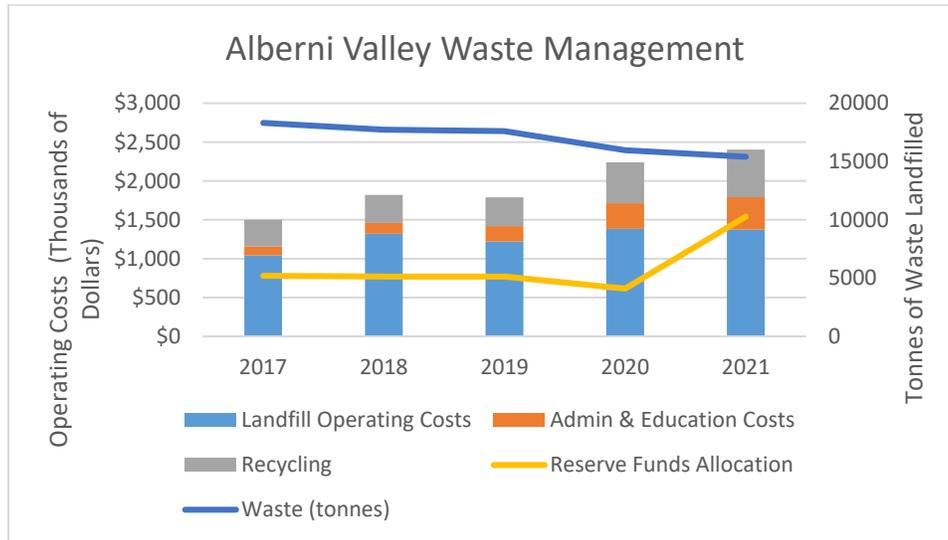
**Chart 7 - Capital Reserve Funds**



### Operational Efficiency

Chart 8 below shows the total operating costs including contracts, administration, and support to manage solid waste in the Alberni Valley. It covers the operation of the AVL, 3<sup>rd</sup> Avenue Recycling Depot and curbside recycling collection but excludes costs related to the Bamfield Transfer Station. The costs are influenced by inflation and the volume of material landfilled.

**Chart 8 - Annual Costs and Tonnages**



2021 saw a significant increase in operational costs with the changeover of contractors at the 3<sup>rd</sup> Avenue Depot. In 2022, these costs are expected to reduce due to:

- A successful procurement process in December 2021 will result in the onboarding of a new contractor in 2022 at a reduced rate;
- An increase in revenues is also expected with expansion in the current recycling program to help offset costs; and
- Ongoing management of materials and increased efficiencies in managing waste at the AVL.

## Environmental Monitoring

### Leachate Monitoring

The ACRD measures water quality parameters at fixed locations in and around the AVL on a fixed quarterly schedule. The locations include two leachate drains, eighteen monitoring well sites, two leachate interception wells and six surface water monitoring points. Samples are analyzed by an independent laboratory for metals, volatile organic compounds (VOCs), inorganic compounds, pH, conductivity and other water quality parameters. All monitoring data are provided directly to our environmental monitoring consultant, Piteau Associates Consulting, for their review. Piteau compiles and analyzes the data and prepares an annual environmental report to accompany this report to be supplied to the BC Ministry of Environment and Climate Change Strategy (MOECCS).

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#### ***Target 5 – Confirm all leachate is treated to meet the FWAL criteria***

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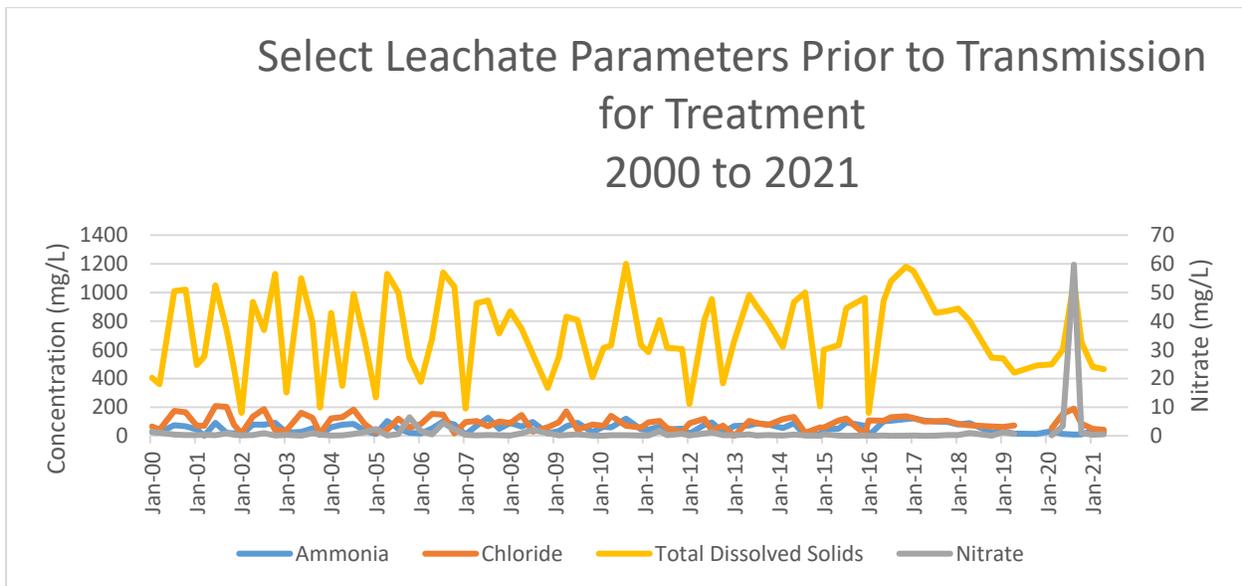
The landfill includes a leachate collection system comprised of internal drains, pumping systems, collection trenches, aeration lagoon and a flow equalization pond. Once collected, leachate is piped directly to the City of Port Alberni’s (CPA) wastewater facility for treatment.

The water quality parameters of the leachate leaving the landfill have been monitored since 1990. Chart 9 below illustrates the recorded levels of ammonia, chloride, nitrate and total dissolved solids for

the past 20 years. Note the seasonal variations in key parameters reflecting the lower flow conditions in the summer months. In this period of low flows in the summer of 2021, there was an unusual spike in ammonia and nitrate values. This had not occurred in previous years and Piteau recommends collecting a few more years of data to see if similar summer spikes occur or if this was a one-time event.

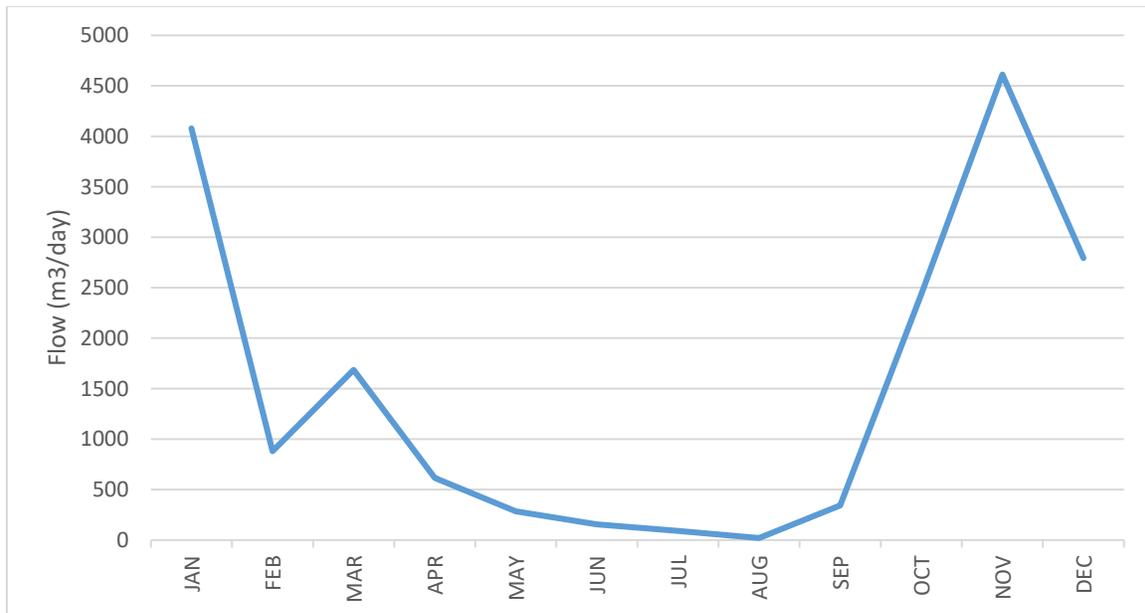
Additionally, 2021 saw a heat dome effect hit much of the Province, including the AV area, during the summer months. This resulted in no sample being collected for leachate as the lagoon was too low.

**Chart 9 - Leachate Parameters**



Leachate is transferred by a dedicated pipeline to the City of Port Alberni’s (CPA’s) wastewater system for treatment. The graph below shows the 2021 leachate flows into the CPA sewage lagoon with a total volume of 549,257 m<sup>3</sup> for 2021. Currently, there is no diversion of clean runoff water, so the graph below (Chart 10) is indicative of the amount of water generated from precipitation within the disposal area at the landfill. Future works, including final capping, will be able to divert clean runoff.

**Chart 10 - 2021 Leachate Discharge Flows**



### Water Quality of Surrounding Environment

Piteau (2021) reported on the results of environmental monitoring conducted throughout the year. The complete monitoring report is supplied as an additional volume to this and their conclusions were as follows:

1. Groundwater flow in the limited surficial sediments beneath the landfill property is interpreted to dominate the flow regime, due to the low hydraulic conductivity of the bedrock. Flow in surficial sediments to the north are managed with a clay berm and interception trench pumping system. The French Drain in the South Expansion Area and the seepage cut-off wall/berm at the west of the property control seepage that may have migrated west to Heath Creek. Seepage east of the property is managed by the leachate interception wells.
2. Current leachate indicator concentrations are typical for a landfill of this size and age. Samples from the French Drain in the South Expansion Area indicate no significant landfill effects except for slightly elevated ammonia concentrations.
3. Leachate effects in surficial sediments were only noted at MW94-6S on the north side of the landfill, and PW-2, MW02-3S and MW05-1S near the flow equalization pond. Flow past MW94-6S is captured by the north leachate interception trench and pumping system. Minor effects by the pond can be mitigated with the operation of PW-2 and PW15-2, as described below.
4. Monitoring data for bedrock monitoring wells sampled in 2021 indicate no leachate effects have occurred to the south and only slight leachate effects have occurred to the west, north, northeast and east of the present landfill footprint.
5. When operated as recommended, the interception wells control the migration of leachate towards Christie Creek. Shallow leachate interception well PW-2 was providing adequate containment for the first half of 2021, but was not operating as intended for the second half based on manual water level measurements. PW-1, the original bedrock pumping well, appears to have been inducing flow

from the direction of nearby observation wells MW05-1D and MW02-3S since it was recommissioned in May 2020. Although submersible pumps have been installed in the backup interception wells PW15-1 and PW15-2, they have not yet been commissioned.

6. As in previous years, no leachate effects were detected in Heath Creek in 2021. Water quality results from this site in 2021 complied with receiving surface water criteria except for aluminum, arsenic, and copper.
7. Slight leachate effects have been detected in Stevens Creek, which flows over the north landfill property boundary onto Lot 105. With the exception of aluminum and copper, water quality results from this site in 2021 complied with all receiving surface water criteria.
8. Water quality in Christie Creek has improved significantly since the discharge from the aeration lagoon was diverted to the leachate pipeline in 1998. In 2021, water quality complied with all receiving surface water quality criteria, except for aluminum, copper, and zinc, which are unlikely to be associated with leachate.
9. Dissolved organic carbon (DOC) and dissolved copper (at surface water monitoring sites where only total copper was typically measured) were included in the sampling program in 2020 and 2021 to assess compliance with the sample-specific calculated Fresh Water Aquatic Life guideline for dissolved copper developed in 2019. Exceedances were recorded at most sites, and the calculated guidelines were relatively insensitive to DOC concentration. Monitoring results for total and dissolved copper at surface water monitoring sites indicate that where total copper exceeded the sample-specific dissolved copper guideline, 67% of the dissolved copper results also exceeded the guideline.

As Piteau reported, a significant well rehabilitation project was conducted in 2020. The rehabilitation included cleaning the wells, installing new instrumentation and replacing the pumps. In addition to rehabilitating the existing pumps, the new wells (the “back up wells”) that were previously drilled in that area of interest were equipped with pumps and pressure transducers. The intent was to have the entire well field controlled automatically by a SCADA system. The capital work was completed in 2021, enhancing groundwater diversion capability on the AVL system.

## Landfill Gas Monitoring

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### ***Target 6 - Landfill Gas Generation Less than 1,000 tonnes/year of methane***

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MOECCS requires that assessment of landfill gas (LFG) is completed using the Provincial spreadsheet model. In 2020, Sperling Hansen and Associates (SHA) prepared an updated assessment of landfill gas emissions using two approaches, one of which was the Provincial Landfill Gas Assessment Tool. There was good agreement between the two methodologies. SHA projected emissions using a waste composition that was based on the waste composition study that was conducted across the ACRD in 2019. This projection has since been revised by SHA in 2021 as part of the DOCP update.

The SHA modelling showed approximately 891 t of methane was emitted in 2021. This is less than the 1,000 t of methane threshold set by MOECCS above which a landfill gas management system would be required.

Landfill gas emissions were monitored in 2021 as part of a research initiative in partnership with Vancouver Island University. This work was included as part of the environmental monitoring program in

2021, with a draft report submitted for review in late December. This first phase will be completed in the 1<sup>st</sup> quarter of 2022. Additionally, the ACRD is in the process of voluntarily installing a landfill gas flare adjacent to a key monitoring well in the central area of the landfill. The VIU team noted elevated localized emissions in this area, which presented an opportunity to utilize this preferential path to capture and eliminate LFG. While not required under the regulation, the ACRD is taking the opportunity to install a small LFG flare at this location to aid in reducing GHG emissions.

### Other Greenhouse Gas Emissions

Landfilling operations require the use of motorized equipment including small machinery such as power washers, small utility vehicles (ATVs), and pickup trucks, as well as heavy-duty machinery such as compactors, graders and excavators. The fuel used for this equipment is primarily diesel. In 2021, the contractor burned approximately 38,916 liters of diesel in the operation of the landfill, estimated to have produced 117.7 tonnes of CO<sub>2</sub>. The ACRD will continue to work with the contractor to reduce the greenhouse gas emissions from the use of equipment for the landfill operations. This can be improved with the use of newer equipment with more efficient engines. Other options to explore would be to switch the types of other power sources or fuels such as biodiesel.

### Illegal Dumping

Illegal dumping of wastes is of concern to both residents and to the ACRD. These wastes include yard and household wastes dumped in quiet locations. Typically, illegal dumping has taken place on private forestlands and local forest companies are now restricting access to forestry lands to reduce illegal dumping and for fire concerns. The ACRD is also aware that waste has been illegally dumped on First Nation Lands. The frequency of illegal dumping acts is not currently measured but it is addressed in a complaint driven process. In 2021, five waivers for illegally dumped waste were approved for the AVL, with a combined weight of 2.24 tonnes.

The ACRD completes cleanup where significant quantities of waste are illegally dumped. The ACRD also waives tipping fees for approved community groups to clean up areas within the waste shed.

## Projects Completed 2021

Asset Management Plan - Version 1 was adopted June 24, 2020. The Alberni Valley & Bamfield Waste Management Plan (AVLF) Asset Management Plan (AMP) is part of the ACRD Asset Management program to facilitate informed decision-making and effective allocation of resources for infrastructure. The purpose of an AMP is to deliver sustainable, cost-effective services to ACRD communities in a socially, economically, and environmentally responsible manner, while providing the level of service agreed upon by the Board of Directors. In 2021, the Altus Group was contracted by the ACRD to establish the Asset Management Plan – Altus completed inventory all ACRD-owned fixed assets tied to the Solid Waste Program in the Alberni Valley.

Recollect Recycling App – This mobile App communicates digitally with people to provide all recycling information; collection schedules; information on how to properly recycle and dispose of materials; as well as notify residents as to schedule changes. In 2021, the rollout of 3-stream curbside collection saw a significant increase in the download and use of the app. 4,300 users installed the app in 2021 (with 3,500 coming on since the roll-out of 3-stream collection in September). Users accessed the app in excess of 52,000 times to request collection schedules, how-to's for disposal/recycling, where do drop-

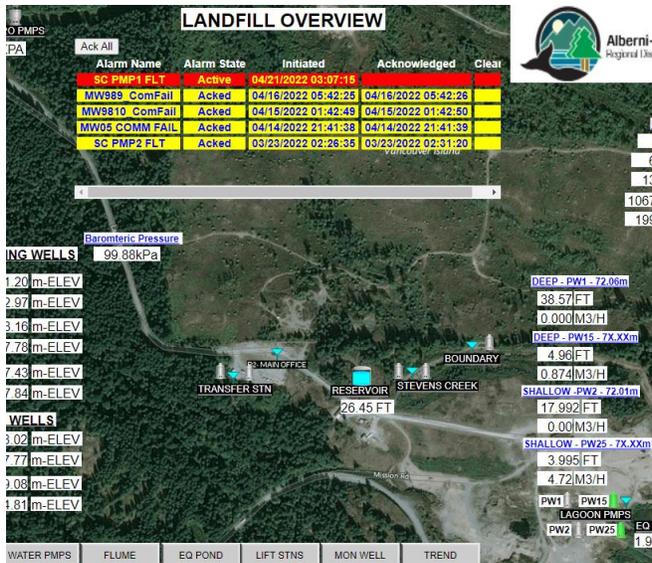
off materials, do's and don'ts, etc. The app was instrumental in educating residents to divert waste and reduce the amount of waste disposed in the AVL.

Bear Aware Program – This community program was designed by MOECCS in partnership with the British Columbia Conservation Foundation and the Union of British Columbia Municipalities. It is a voluntary, preventative conservation measure that encourages communities, businesses and individuals to work together to address the root causes of human-animal conflicts and reduce the resulting number of animals destroyed. In 2021, the ACRD worked with WildSafeBC to provide educational awareness to residents in the Alberni Valley and Bamfield; conduct improvements on waste collection in Bamfield as well as the AV; and promote best practices for residents, such as inclusion of electric fencing and bear-resistant collection containers. The AVL plays a role in this program via the ongoing maintenance of its electrified bear-proof fencing, which encloses the entire site and operates 365 days/year.

Environmental Monitoring Program Improvements – In 2021, Piteau conducted field cross training with ACRD staff to compile a field procedure document and default data collection sheets. ACRD staff successfully tested the new procedure during 3<sup>rd</sup> and 4<sup>th</sup> quarter of 2021. Additionally, 2021 saw the installation of leachate interception wells and linkage to SCADA system to allow for remote monitoring, described below.



SCADA for North Boundary and Stevens Creek Sites – To better monitor the north boundary pumping station, level sensors were installed at two monitoring wells and have been connected to the AVL SCADA system. This system provides continuous monitoring of the water level in the two wells and ensures the pumps are achieving the design drawdown to limit groundwater from leaving the site in those locations.



**Design Operation and Closure Plan Update** – The previous DOCP, created in 2012, was reviewed and updated over the course of 2021. This work was necessary to capture the detailed development phases of the site, ensure that future development is in line with the Province latest version of the Landfill Criteria (2016). The consultant on record, Sperling Hansen Associates, completed the DOCP review and updates with ACRD and landfill staff input. Key additions to the new DOCP include updated contact information in case of landfill fire; detailed filling of the current Phase 1, broken into stages for operational purposes; updated modelling of the lifespan of the site to reflect diversion of organics as well as present day costs for operations, closure and post-closure. The draft 2021 DOCP was reviewed in January 2022.

**McCoy Pump Station Upgrade** – The fresh water required for the operation of the AVL comes from the pump station located on McCoy Lake Road. This outdated station and its infrastructure was slated for replacement in 2021. A complete newer station, including the building, pumps and manifold, became available from the City of Port Alberni; however, the unit was not made available until the end of the year. In December 2021, the ACRD purchased the newer unit from the CPA and moved it to the AVL site to await installation in the 2022 construction season.

**3<sup>rd</sup> Ave Recycling Depot Contract – Social Focused RFP** - The ACRD developed a request for proposals to take over operations of the Recycling Depot located at 3620 3<sup>rd</sup> Ave in Port Alberni. This RFP targeted those businesses that create training and employment opportunities for people facing systemic barriers to entry into the mainstream labour market to take over operation of the Recycling Depot. As a result, a local contractor, INEO Employment Services, was successful in its bid to operate the site and has begun operations as of February 2022. The Depot continues to support waste diversion from the AVL through many stewardship programs.

**VIU Landfill Gas Monitoring Partnership** – The ACRD collaborated with Vancouver Island University (VIU) on a project that utilized both a mobile gas-monitoring lab that can detect gases at small concentrations as well as handheld monitoring devices on the AVL site. The data-gathering program ran for 2021 and will wrap in Q1 2022. Images below show site examples of particle sensors, solar powered GHG sensors (CO2 and methane), hand sampling and the mobile lab (courtesy of VIU).



CPA 3-Stream Waste Collection – In 2021 the new Sort'nGo waste service, which includes the introduction of a three-stream (organics, recycling and garbage) automatic cart collection system, began for single family households in the City of Port Alberni. As mentioned earlier in this report, the program diverted organics and recyclables away from the AVL.



Organics Diversion - The ACRD implemented organics diversion in 2021, including public engagement and education on the new system as well as the acquisition of green bins for collection within the City of Port Alberni. As part of a phased approach, the electoral areas of the Alberni Valley will be offered

collection and other alternatives for organics diversion. A public consultation program began in late 2021 to assess rural interest in a similar curbside collection service of organics (and recyclables). The results of this consultation process will provide valuable information on the best path forward to enhance organics diversion. This focus on organics diversion will eventually lead to banning of the disposal of organics in the AVL in the near future.

AVL Upgrades: Recycling and Transfer Station upgrades at the AVL, including new access roads, tipping bin walls, and associated earthworks and infrastructure. These upgrades were completed in 2021 and now accommodate the new 3-stream curbside collection program, which supports diversion of organics and recycling streams.



Flare Installation – In previous years, an existing groundwater monitoring well was found producing high levels of landfill gas. In 2021, a new gas well was drilled to facilitate the installation of a flare to burn this off and reduce GHG emissions. Due to inclement weather, the well was temporarily capped and completion is scheduled for 2022.

Leachate Interception Back-Up Wells Install and Well Replacement - To provide a more robust groundwater diversion capability, the leachate “backup wells” along side the existing wells were commissioned to operate in unison with the current wells. In 2021, these wells were equipped with submersible pumps and an upgraded control system to make these a single combined well field. The system is now running very effectively.



Meteorological Station sited and installed – A meteorological tower was built and installed near the elevated water reservoir on the AVL site. The site is intended to monitor representative weather and precipitation data in the Alberni Valley to support the landfill gas monitoring pilot project being conducted with VIU. This data will be utilized by the Province, VIU, ACRD and other parties and linked into the site SCADA system.



Ministry of Environment Air Quality Station installed – In an agreement with the ACRD, the BC Ministry of Environment and Climate Change Strategy installed an air quality monitoring webcam on the highest point of the AVL, the aforementioned water tower. The system will provide valuable data to aid in the understanding of the Alberni Valley air shed.

## **Projects Upcoming**

VIU Landfill Gas Monitoring Partnership (2022)

The ACRD will be working on the next phase of emissions monitoring with VIU in 2022 through installation of onsite permanent sensors for real time monitoring via the landfill SCADA system. Separately, VIU will be working out in the neighbouring communities to conduct additional emissions monitoring.

Flare Installation (2022) – This capital work is scheduled for completion in 2022 and includes a flare monitoring system. This monitoring system will be incorporated into the SCADA system to determine how much gas is being destroyed and to assist in determining any future needs.

Alberni Valley Collections Contract (2022) – The AV Curbside recycling collection contract will be up for renewal in 2021. With the addition of organics diversion, the scope of the collection program needs to be reviewed and adjusted prior to issuing for competitive bids.

Construction and Demolition Diversion Program (2023)– Investigate potential Construction and Demolition waste diversion working with the CWMA Construction & Demolition working group.

Solid Waste Bylaw Update (2022) – this is to enable the ACRD to receive reports from private resource recovery and recycling companies.

Update of Solid Waste Management Plan (2023) – the current Solid Waste Management Plan is 13 years old. In British Columbia, Regional Districts are mandated by the Provincial Environmental Management Act to develop Solid Waste Management Plans that are long term visions of how each regional district would like to manage their solid wastes, including waste diversion and disposal activities.

Develop Standard Operating Procedures (SOP's) for leachate and LFG systems (2022) - With the upgrades to the AVL's environmental monitoring systems, SOP's will be developed to include inspection frequency, maintenance reporting and roles/responsibilities.

McCoy Pump Station Upgrade (2022) – This station will be installed as part of the ACRD capital program and brought online during summer of 2022.

Establish Baling Facility AVL (2022-2023) - Staff will be exploring the opportunity to consolidate recyclables in the AV through establishment of baling infrastructure in order to reduce trucking costs. It is not yet determined if a facility will be provided at the AVL.

Landfill Tenure (2022) – Staff is working with the BC Ministry of Forests, to establish a long-term Crown-grant tenure of the AVL site to replace the existing tenure land parcels. Part of this ongoing work through 2022 includes consultation with the adjacent Tseshaht First Nations Government to ensure that environmental monitoring of the landfill site continues to improve and minimize impacts to the surroundings.

Additional Lighting/Cameras (2022) – Additional lighting and cameras for the landfill site will be installed to further enhance site safety and security.

Landfill Working Group (2022) – As part of the work with the Ministry of Forests, a working group including staff from the ACRD and Tseshaht First Nations, along with technical experts, will meet quarterly with the overall objective of knowledge sharing and achieving mutual understanding of environmental monitoring of the AVL.