ALBERNI-CLAYOQUOT
REGIONAL DISTRICT

West Coast Waste Management

Asset Management Plan

Version 1

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1 EXECUTIVE SUMMARY

1.1 Purpose of the Plan

The West Coast Waste Management 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.

1.2 Asset Description

The West Coast Landfill (WCL) assets include:

- Scale house & vehicle scale
- Water system and leachate equipment
- Tipping wall & recycling sheds
- WCL property
- Pump station
- Bear fencing & electric gate

1.3 Levels of Service

The present funding levels are insufficient to continue to provide the existing services at current levels in the medium-term. Current reserve balances and revenue trends would not present a threat to providing the current level of service but the Board has mandated further diversion than what is currently provided and that will require an updated analysis.

1.4 Future Demand

The main demands for new services are created by:

- Growth rate
- Diversion rates and programs
- Board of Directors and resident level of service expectations
- Legislative regulations

These will be managed through a combination of managing existing assets, upgrading of existing assets and providing new assets to meet demand and demand management. Demand management practices include non-asset solutions, ensuring against risks and mitigating failures.

1.5 Lifecycle Management Plan

Asset Management assists in conscious and calculated decisions for all assets covered in AMPs from acquisition, operation, maintenance, disposal and renewal or upgrade. During the course of an assets life, the replacement or retirement value is known along with an estimated date of replacement based on age and condition. Annual contributions required are calculated for each component in each service so we can measure the funding gap between current and future levels of service in order to align funding and service expectations. The AM Program achieves responsible and reliable lifecycle management practices.

The Asset Management Coordinator will create the West Coast Waste Management AMP with the assistance of consultant reports and operations staff. Asset Management systems will continue to be maintained once this position expires by ACRD staff. Estimated service life and replacement cost of the landfill infrastructure were determined using Annual Reports for the WCL. Management and staff provide risk assessments and goals.

Tipping Wall

1.6 Financial Summary

The WCL assets, excluding assets owned by the Operations Contractor, have a total current replacement value of $711,000 in 2020 dollars and a current closure cost of $5.6 million with future closure and post-closure costs expected to reach $10.4 million with inflation. With an estimated inflation rate of 1.5% (10-year CPI average), estimated future replacement costs are $1.06 million for current infrastructure at the end of the components estimated service life, with no consideration for a future landfill site. Not included in the estimates are projections for future demand and projected capital upgrades. The West Coast population experiences roughly 1.3% growth annually; however, when factoring in the large number of visitors to the West Coast, the equivalent population nearly doubles that of permanent residents. The WCL and ACRD are constantly researching and implementing new diversion programs that should offset any demand growth. Population and equivalent population changes will be considered in future AMPs.

The Ministry of Environment and the Public Sector Accounting Board requires that financial liability for closure and post-closure monitoring costs of municipal solid waste landfills is properly recognized and

adequately funded. The WCL has a dedicated capital reserve account that is currently insufficient to cover future capital expenditures and a closure account that is projected to cover the required costs when the landfill reaches capacity in approximately 2062. A Design, Operations and Closure Plan (DOCP) is planned to be updated to include the recent Economic Analysis for WCL and any updates to the recommended annual closure contribution amount.

The solid waste activity is debt free and activities are funded to 71% by tipping fees and only 9% by requisition. Increases in tax requisitions are not planned for this service; additional required revenues will be generated through user fees, if necessary. Figure 1.6 shows the distribution of income for the WCL while Figure 1.7 shows the tipping fee revenue in relation to the total waste tonnage landfilled.

Figure 1.6 – Income Sources for WCL

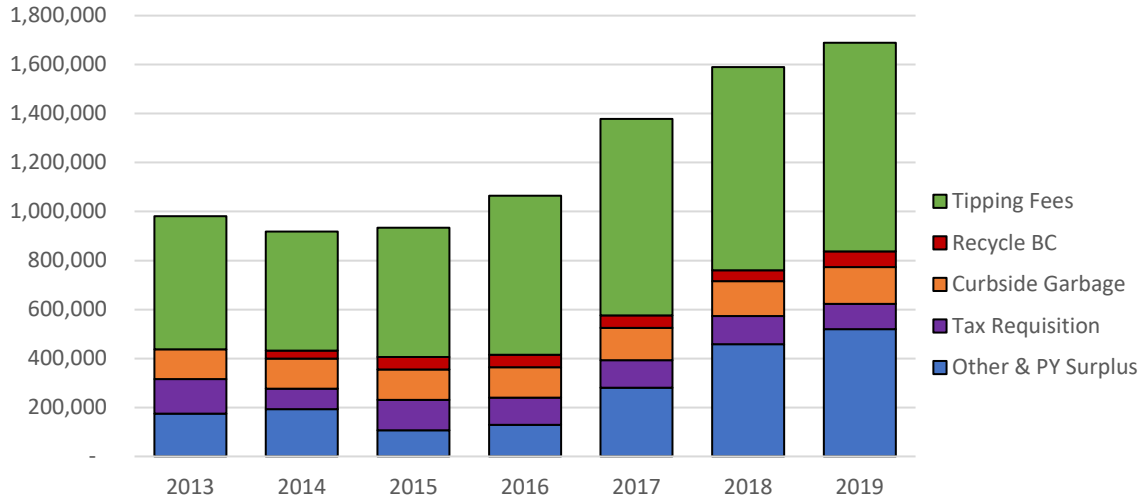
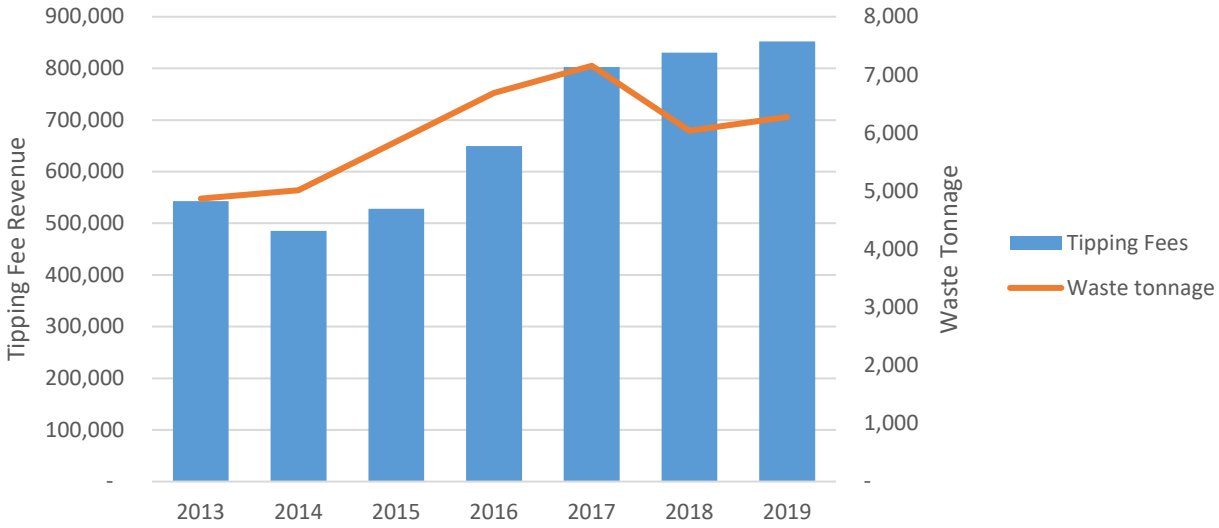


Figure 1.7 – Total Tipping Fees



It should be noted that different materials have different tipping rates and bagged garbage isn't weighed but rather charged a rate per bag. Total weights are calculated using scale records only; additionally, self-haul bagged garbage is very minimal at WCL.

1.7 Asset Management Practices

Assets are managed using a combination of Microsoft Office, CompuWeigh 6, Vadim and consulting firms. Registries and AMPs will be reviewed and updated on an annual basis prior to the release of the following version.

1.8 Monitoring and Improvement Program

At the end of this AMP, there will be an Improvement Plan intended to improve Asset Management practices within WCL and the Asset Management Program as a whole. Generally included in Improvement Plans are suggested changes or additions to documented inspections and condition assessments, monitoring of asset-specific operational and maintenance procedures and assigning present risks a numerical rating in order to measure mitigation success.

2 INTRODUCTION

2.1 Background

This AMP encompasses all WCL assets excluding assets owned by contractors. The purpose of the plan is to facilitate the strategic management of the West Coast Waste Management service and the WCL, giving guidance on new and existing infrastructure to maximize use of financial resources long-term,

reduce risk and provide a prioritized view for service continuity and improvements over a 20-year planning period and beyond.

The ACRD AM Program follows the advice of the Asset Management BC Framework; Plans are designed to be living documents that change with the organization to reflect progress made while continuously striving for sustainable service delivery. Consideration of community priorities and an understanding of trade-offs between resources and desired services is the foundation of sound AM practices.

Ortho image of the West Coast Landfill

The AMBC Roadmap guides organizations through basic, intermediate and advanced Asset Management Practices. It is the goal of the ACRD to achieve a basic to intermediate level of understanding.

This AMP should be read in the context of the ACRD's Asset Management Policy and Strategy. The West Coast Waste Management AMP is a living document and will develop with AM practices and with the influence of the following corporate documents:

- Annual strategic priorities
- Short-term and long-term financial plans
- Maintenance policies
- Annual Reports
- User rates and fees bylaw
- Grant applications and funding

AMPs are designed for several reasons. First, to guide Management and the Board in planning and decision-making. Second, to aid in the creation of short term and long term financial plans as well as operational plans. Last, to spark community engagement for the service.

As the ACRD moves through the AM implementation process, knowledge and understanding of the AM Program increases and it is expected that this plan evolve further, solidifying assumptions made and filling in any present information gaps where further research or information is required.

The WCL began operations in 1980 and per the 2019 Annual Report prepared by the ACRD, an estimated 723,284 cubic meters remains for future filling. At the current rate, the WCL will reach capacity in approximately 2062.

The ACRD owns the WCL property. The current 70-acre parcel was originally much smaller and owned by MacMillan Bloedel prior to being acquired by the ACRD in fee simple in the early 2000's. No expansion is planned for the WCL and revival of the land will take place during the closure process.

Due to the nature of a landfill, leachate infrastructure that is buried beneath filled cells will not be replaced but rather added when and where needed, such as monitoring wells. The landfill is situated on a clay base that creates a waterproof barrier so less leachate infrastructure is required than other landfills created on more permeable surfaces. While the clay base has proven to be an adequate substitute to manmade infrastructure, there have been instances of increased leachate levels diverting to nearby Sandhill Creek. The plan to mitigate this issue is further outlined in the ACRD 2019 WCL Annual Report.

2.2 Asset Inventory

The WCL consists of many components including:

- 70-acre WCL property
- Scale house & vehicle scale
- Electric bear fencing
- Tipping wall & recycling sheds
- Hydro poles
- Leachate collection system
- Water system & mains
- Pump station

Current replacement costs were estimated by staff and consultants using historical and industry estimates. Unit costs include all installation and remediation activities. Remaining useful life estimates were based on installation dates and expected service life provided by staff based on knowledge and experience.

WCL closure costs were determined based on engineering assessments and the estimated remaining useful life of the landfill. Closure costs include initial closure expenses as well as ongoing maintenance and monitoring of the land.

2.3 Levels of Service

Levels of service are the defined quality for a particular activity or service against which performance may be measured, relating to quality, quantity, reliability, responsiveness, environmental impacts and cost.

The levels of service determine the amount of resources that are required to manage the solid waste activity in order to provide the community with the levels of service specified. Customer expectations, affordability, community outcomes and Ministry of Environment (MoE) requirements. Levels of service are defined using two terms, customer levels of service and technical levels of service.

Customer LOS: measure how the customer receives the service and measure of value we provide.
Technical LOS: technical measures of performance relating to the allocation of resources to service activities to best achieve the desired outcomes and demonstrate effective performance.

- Operations – ongoing activities, day-to-day operations
- Maintenance – activities enabling an asset to provide service for its planned life
- Renewal – activities that return the service capability to near original capacity
- Upgrade – activities that provide a higher level of service

For the purposes of this report, customer's level of service expectations are set upon the annual adoption of the financial plan and strategic priorities as it is a reflection of the values, policies, and priorities of the Board of Directors with input from committees and public engagement sessions, if desired. This will assist the ACRD's Board of Directors and stakeholders in matching the level of service required, service risks and consequences with the community's ability and willingness to pay for the service.

The current and expected Levels of Service detailed in Tables 2.1 and 2.2 shows the expected levels of service based on resource levels in the current financial plan. Organizational measures are measures of fact related to the service delivery outcome.

Table 2.1 - Customer Level of Service Objectives

Values	Expectation	Performance/ Organizational Measure Used	Current Performance	Forecast with Current Budget
Quality	Landfill and access road are safe and accessible year-round	Number of safety incidents involving the public or landfill staff	Tipping wall and internal roads are built on the old landfill site and the ground tends to settle and cause water to pool and freeze Tipping wall and railing at tipping wall are in poor condition and due for replacement	No instances of falls, trips or other incidents Internal roads regraded Tipping wall and railing replaced prior to issuance of next AMP version
Function	Landfill accepts all commonly accepted waste streams Minimal wait times to access facilities	Banned materials versus other accepted materials at landfills in areas of similar population Line-up length, wait times, complaints	WCL accepting most commonly accepted materials compared to surrounding landfills except asbestos which is directed to AVL Wait times are minimal due to minimal traffic	WCL accepts all materials accepted at other surrounding landfills No change
Capacity and Use	Landfill will continue to remain active until capacity is reached in which time a new landfill site will open or become available	Diversion or reducing use of cover material. Closure plans in place to address closure and relocation prior to capacity	DOCP plans slated for updating. Reduction of cover material usage. Additional diversion programs are being developed for more frequently landfilled waste streams. Ocean rope and netting as well as mattress diversion recently in place	Organics diversion program. Further diversion programs in place for higher volume waste streams with a notable decrease in landfilled waste

Table 2.2 - Technical Levels of Service

Service	Service Objective	Objective Measure	Current Performance	Desired Outcome
Operations 2020 Budget: $517,500 excluding operations contract	Facility must be bear proofed	Number of bear entrances to protected areas	Bear fencing surrounding perimeter of landfill	No instances of bear entry to landfill
	Landfill gas is managed within the Ministry's guidelines	Landfill gas must not exceed 1,000 tonnes annually without mitigation	Landfill methane gasses estimated at 250 tonnes annually in 2019. No medium-term requirement for Landfill Gas Management	Passive gas collection sytems will be installed at closure. Active landfill gasses unlikely to exceed allowable limits
	Necessary reporting to the Ministry is kept up to date	Comprehensive Annual Report is completed and submitted annually	All required reporting is done on an annual basis. DOCP coming in 2022	Required reporting is consistent and in compliance with landfill/MoE regulations
Maintenance 2020 Budget**:** No set maintenance budget; included in Operations	Landfill shall not create a nuisance (dust, noise, litter, odor, vectors and/or wildlife attraction)	Number of nuisance complaints.	WCL has not received any nuisance complaints	No change
	Surface water diversion and storm water management system in place	Direct surface water away from active operation area to minimize contact with waste	Currently no storm water diversion system	Install storm water diversion system to keep runoff out of leachate system
Renewal 2020 Budget: $63,500	Closure fund and post-closure fund must be built up over time	Funds must ultimately meet or exceed the estimated closure and post-closure costs plus contingency	Closure fund reserves are at an adequate level and projected to cover required costs upon closure	No change unless directed by DOCP report
Upgrade/ New 2020 Budget: $1,066,600	Future site for landfill is located within 25 years prior to landfill closure	Funds are secured and tenure discussions have begun on a new site	No funds secured. It is expected that there will be no permission granted to construct another landfill	No change. Based on surrounding community landfills, it appears likely that waste will be barged off Vancouver Island after landfill reaches capacity

It is important to monitor the service levels provided regularly as these will change as regulations and expectations change. The current performance is influenced by work efficiencies, technology and Ministry of Water, Land and Air Protection ("the Ministry") regulations that will change over time. Review and establishment of the agreed performance that achieves the best balance between service, risk and cost is essential.

2.4 Emergency Preparedness

The WCLF does not currently have an Emergency Response Plan but there will be a plan created in the future. Recommendations to pursue an Emergency Response Plan, Contingency Plan and Fire Safety Plan are included in the Improvement Plan section of this AMP.

3 CURRENT STATE OF WCL INFRASTRUCTURE

3.1 Inventory

Table 3.1 - Assets Covered by this Plan

Asset Category	Quantity	2020 Replacement Value
Scale house and vehicle scale	1	117,000
Recycling sheds	2	20,000
Tipping wall	1	15,000
Bear fencing	2,050m	57,400
Electric gate	1	12,000
Hydro poles	4	21,200
Leachate transmission main	1,000m	270,000
Water main	30m	8,700
Leachate pond pump station	1	160,000
Septic field and tanks	1	25,000
Shallow water well, filtration, pump	1	5,000
TOTAL		**$711,300**

Amounts derived using a combination of estimates and known data

Piping and fencing lengths are estimated. Determining actual lengths and quantities of assets, where value is provided, is part of the improvement plan.

3.2 Waste Trends

The 2020 equivalent population within Tofino, Ucluelet and Area C (Long Beach) is approximately 10,200. Waste makes its way to the WCL through various streams: curbside pickup, residential and commercial third party delivery and residential delivery by homeowners. Curbside garbage and recycling pickup is performed by private contractors for residents within Tofino, Ucluelet and part of Area C (Long Beach); specifically Port Albion and Millstream. Garbage and some stewardship products can also be delivered to and sorted at the WCL.

Historically, the ACRD as a whole has been significantly higher than the provincial average for landfilled waste per capita. The West Coast waste trends, however, tend to favour closer to the provincial average. With the possible implementation of further diversion and stewardship programs, the waste trends on the West Coast are expected to drop below the provincial average. Figure 3.2 shows the trend of waste per capita for the West Coast versus the Province and Figure 3.3 shows the trend of

recycling diversion. Data is not yet available for 2019 provincial averages so estimates have been used. Based on available data, the West Coast communities have a satisfactory landfill rate per capita; however, recycling per capita is significantly lower than the provincial average. This may be reflective of varying consumer habits versus other communities, the volumes of tourists that frequent the area that may not have access to or knowledge of available recycling options or residents opting to drop recycling off at an independently owned Recycle Depot.

Waste trends have a direct impact on the life expectancy and lifecycle costs of the landfill. Material composition can increase the likeliness of requiring a Landfill Gas Management system and higher than expected waste tonnages landfilled will diminish the landfill capacity at a faster rate. For further details of material composition, refer to the ACRD 2019 WCL Annual Report.

Figure 3.2 – Waste Per Capita Trends in Tonnes

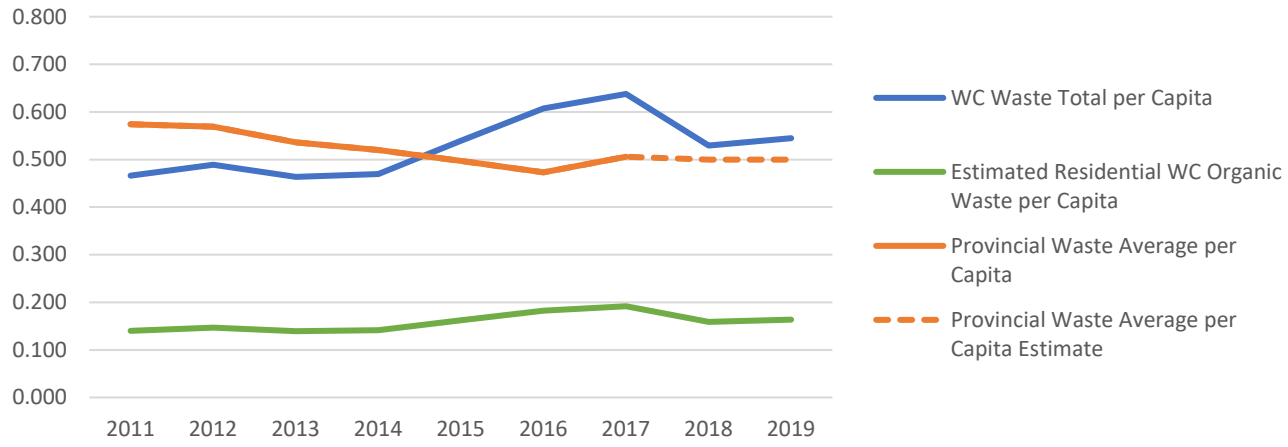
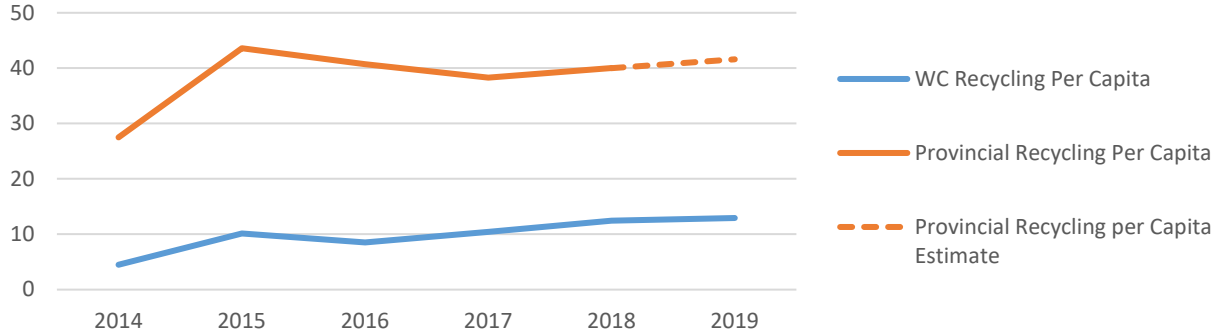


Figure 3.3 – Recycling Per Capita Trends in Kilograms



3.3 Landfill Gas Management

Based on waste composition and estimated annual methane production, the WCL is not expected to require additional Landfill Gas Management infrastructure in the future. With the addition of an Organics Diversion Program, the likelihood of approaching the annual limit of 1,000 tonnes of methane gas is further lessened. Landfill gas projections will be reviewed with each subsequent version of this AMP.

Funding was secured through the Consolidated Strategic Landfill Diversion Program for $1.54 million for an Organics Program and recently the ACRD hired an Organics Diversion Coordinator to oversee the project. Additional tipping walls may need to be constructed to facilitate organics diversion at the WCL site. This will also likely increase traffic to the landfill and will increase general maintenance requirements on the facilities and infrastructure. Ideally, revenues earned from the program will offset the increase in expenditures.

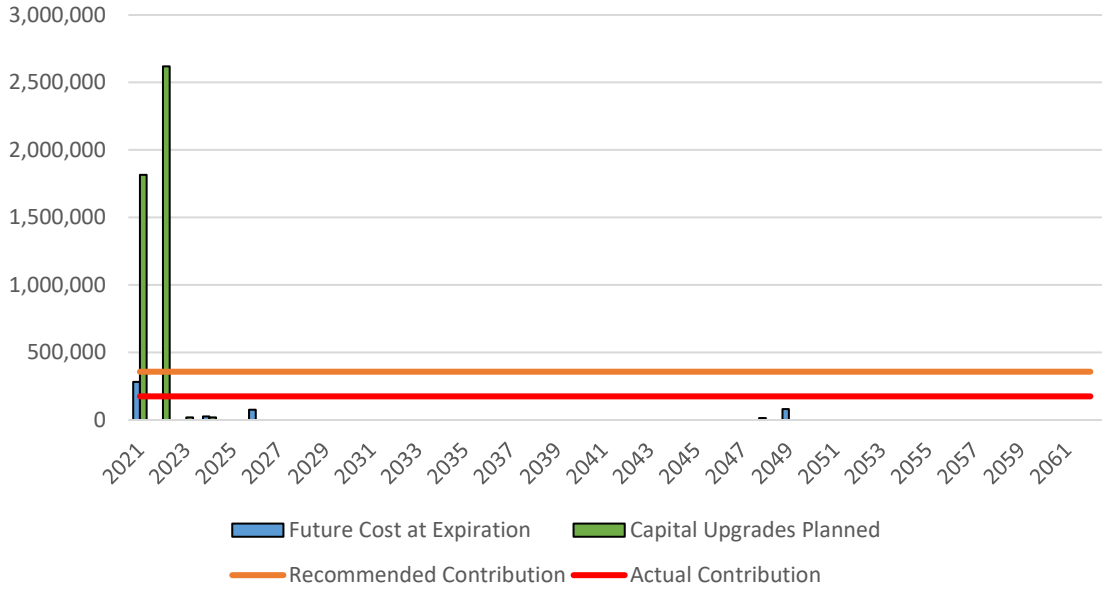
3.4 Replacement Costs and Dates

Asset management changes the financial focus from historical cost and annual amortization included in the ACRD's financial statements to estimated replacement value, estimated service life, and annual capital investment required.

Approximately 52% of the WCL assets are due for replacement within 10 years. While a tax increase isn't currently planned for the service, there is a funding gap that needs to be addressed either through requisition or tipping fee revenues. Contributing $345,000 annually towards the capital reserve will eliminate the current funding gap, however, this does not include any possible future debt financing obligations. Annual contributions of $88,000 are required to ensure adequate closure funds when the landfill reaches capacity. Per the 2020-2024 Financial Plan, $175,000 was contributed to the capital reserve account and $120,000 to the closure fund in 2020.

The septic system is nearing the end of its useful life with an estimated future replacement cost of $26,500 and the tipping wall and railing are in poor condition with an estimated replacement cost of $25,000. In addition, a 2020 report from Sperling Hansen Associates identified the need for approximately $2.6 million in upgrades to the current leachate system. The ACRD has inquired about borrowing through the Province for this project. Debt servicing costs and future replacement costs for this project are not included in the financial recommendations in this AMP as they are not currently known. Figure 3.2 summarizes suggested infrastructure replacement dates and estimated costs by year until 2060.

Figure 3.2 - Projected Timing for Capital Renewal



Currently, all efforts are dedicated towards extending the current landfills estimated service life beyond the current 42 years to upwards of 100 years with diversion and education programs. It is certain that when the landfill reaches capacity that waste handling will be vastly different from the current methods. Material for reuse handling will likely take prescidence over waste handling and landfill fill rates will in turn be drastically lower; because of these reasons, cost projections for a future landfill site have not been included in the financial projections within this AMP.

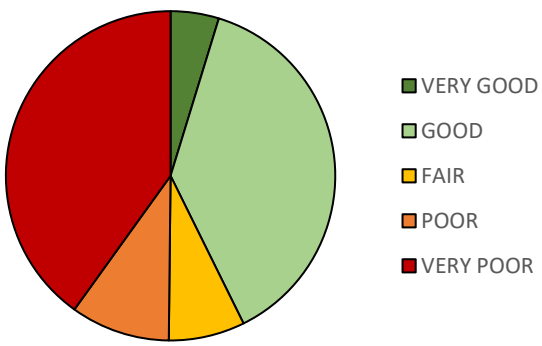
Every year when the AMP is reviewed and a new version is created, the financial position of the landfill will be analyzed along with revenue levels and further changes to the recommended contribution levels will likely occur at that time given new information, performance and changes to the service.

3.5 Condition Assessments

Condition assessments were performed by staff on some assets while estimated remaining service life was the determining factor on other assets. Based on conditions and estimated service life remaining, 40% of the WCL assets assessed have a very poor physical condition.

Figure 3.3 shows the current cost to replace assets based on the percentage of estimated useful service life remaining. The assets that fall under the "Very Poor" category have been further detailed in section 4.1 along with other Improvement Works Required that have not yet been installed.

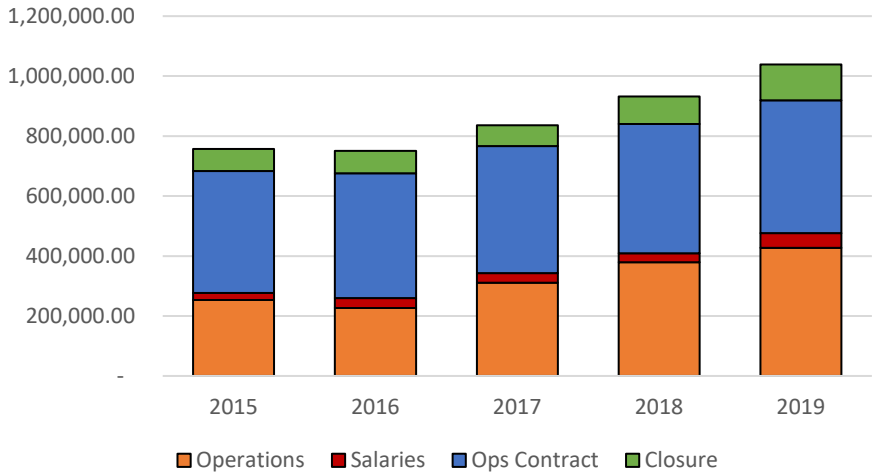
Figure 3.3 – Current Replacement Cost by Condition



3.6 Current Operations and Maintenance Costs

A key function of Asset Management is to track maintenance costs separate from operations costs to identify areas that are requiring more repairs as an indication of failing infrastructure. Currently, operations and maintenance costs are grouped together for budgetary purposes. This does not allow for differentiation between day-to-day costs and repairs. It is recommended that there be a clearer definition of maintenance and repair costs as an additional measure to ensure all assets at risk for failure are identified. Figure 3.4 shows the trend in operations expenses and closure contributions since 2015.

Figure 3.4 – Operations and Maintenance Cost Trends



Average operation costs total $319,400 per year, excluding salaries, closure and operation contract costs.

3.7 Risk Management Plan

Risk management is a key objective set out in our Asset Management Policy. With acceptable levels of service in mind, we have adopted a risk management framework to assess and rank criticality of the ACRD's infrastructure. One of the outcomes of implementing risk management is the ability to prioritize and meet required capital expenditures based on criticality for the WCL.

Risk management is the systematic application of management policies, procedures and practices to the tasks of identifying, analysing, evaluating, treating and monitoring activities to ensure:

- Risk is understood and identified
- Hazards and practices that could cause financial loss, disruption to organizational goals, injury to people or damage to the environment are controlled
- Insurance policies are made to protect the business and community interest should loss occur

The goal in adopting a framework is to have a consistent accurate understanding of the state of the WCL's infrastructure. The framework includes a standardized grading system that is easily repeatable,

enables comparison of the status of infrastructure condition over time and across municipalities for comparison.

A risk matrix has been prepared and will be used for risk ratings throughout the ACRD. This matrix will also be used in conjunction with regular condition assessments to properly evaluate new and existing risks.

The risk assessment process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, develops a risk rating, evaluates the risk and develops a risk treatment plan for non-acceptable risks. Critical risks are those assessed with 'Very High' (requiring immediate corrective action) and 'High' (requiring corrective action) risk ratings identified in the assessment process.

According to the General Manager of Community Services, the following are credible risks that could create a "High" risk rating at this time:

1. Earthquake causing rupture in natural clay foundation of the landfill and causing leachate to drain into nearby watercourses.
2. Damage to the leachate transmission main causing a leachate spill.
3. Fire at landfill site. Landfill fires can be explosive, dangerous and very hard to extinguish given the composition of a landfill. Would pose a threat to the area and air quality.
4. Large influx of waste due to emergency recovery. If there is an event that results in large structures being destroyed, they will be landfilled and end up consuming valuable space and push WCL much closer to capacity.

Sandhill Creek

4 ASSET MANAGEMENT IMPROVEMENT PLAN

4.1 Infrastructure Replacement Priority Ranking

Table 4.1 lists the components within the WCL in order of their required estimated replacement. This information will be used to build the 5-year Financial Plans as well as aid in creating a Long-Term Financial Plan (LTFP) for this class of assets.

When budgeting for future projects, it is recommended that a 30% general contingency and a 30% allowance for construction, engineering, financial, legal and admin costs be added to total project costs.

It is important to note the volatile prices of construction materials. Many factors can change the costs of materials required for projects and while the actual costs may differ, only the most current and available costs are used.

Table 4.1 – Improvement Works Required

Component	Length or Quantity	Current Replacement Costs (pre-tax, pre-contingency)	Risk	Estimated Service Life Remaining in Years
Leachate collection system	1	2,600,000	High	Not installed
Tipping wall and railing	1	25,000	High	1
Storm water diversion infrastructure	1	100,000	High	Not installed
Total Cost – High Risk		**$ 2,725,000**		
Vehicle scale replacement	1	85,000	Moderate	1
Septic field and tank replacement	1	25,000	Moderate	4
Total Cost – Moderate Risk		**$ 110,000**		
Additional organics tipping wall	1	3,500	Low	Not installed
Water pump station replacement	1	5,000	Low	1
Battery/recycling shed	1	10,000	Low	1
Total Cost – Low Risk		**$ 18,500**		
Total Current Replacement		**$2,853,500**		

Table 4.1 is intended as a guide for replacements based on ages and known conditions. Circumstances, grant funding availability, user funding availability, Ministry priorities, levels of service and changes and Management or Board expectations will all have influences on priority replacements. This listing will be updated during each revision of the AMP and DOCP.

4.2 Demand Management Plan

The demand for more or improved services will be managed through the existing infrastructure, upgrading existing assets or providing new assets. The Solid Waste Management Plan will be updated after a public engagement process that often results in changes to the service based on the resulting

community input. The population within the West Coast has been relatively stable so undeliverable demands are not expected to occur that cannot be mitigated with new diversion programs. Demand management includes using contractors to provide non-asset solutions without the need for the ACRD to acquire more assets.

The Board does not intent to have a demand management plan, however, further opportunities will be developed in future revision of this AMP.

Future demand will be driven by a number of primary drivers including:

- Demographic change
- Change in commercial and industrial activity
- Economic conditions
- Impact of waste flows from other areas
- Consumption patterns
- Policy, legislation, regulation
- Waste programs, education and initiatives
- Community expectations

4.3 Improvement Plan

The tasks identified in the Table 4.2 are required to achieve the WCL asset management objectives, manage risks, and close the gap between current and targeted levels to achieve within the AMBC Road Map. The Figure also identifies the integration of these tasks into the organization as recommended by the AMBC Framework.

Table 4.2 – Improvement Plan

Task#	Task	Timeline
1	Begin documenting condition assessments on tangible capital assets with a numerical condition rating to improve accuracy of replacement timelines	2021
2	Differentiate between Operations and Maintenance costs to better identify failing assets	2021
3	Aging infrastructure is identified and slated for replacement or renewal	Ongoing
4	Where possible, identify and implement diversion and education programs to extend the life of the landfill	Ongoing
5	Identification of funding possibilities for capital projects	Ongoing
6	Monitor methane gas emission trends to forecast required date for possible landfill gas management infrastructure installation and budget for accordingly	Ongoing
7	Financial budgets for asset replacement and capital reserve contributions align with DOCP, Ministry of Environment and Ministry of Water, Land and Air Protection recommendations	Spring 2021/ Annually
8	Regional asset identification system for specific assets to record expenses at the asset level, where appropriate	Early 2021
9	Create and implement Emergency Response Plan	2022
10	Create and implement Fire Safety Plan	2022
11	Create and implement Contingency Plan	2022
12	Solid Waste Management Plan update	2022/2023
13	Review changes to the asset registry annually to account for additions, disposals and changes in useful life	Annually
14	Review Risk Framework for changes	Annually
15	Determining actual lengths of transmission mains and water mains where value is added	As time allows
16	Research future landfill options before capacity is reached	2059

5 REFERENCES

Alberni-Clayoquot Regional District

- 2020, “West Coast Landfill: 2019 Annual Report”, British Columbia, https://www.acrd.bc.ca/dms/documents/environmental-services/solid-waste-management/wc-landfill-annual-reports/2019_wc_landfill_annual_report.pdf

Asset Management BC

- 2011, “Asset Management for Sustainable Service Delivery: A BC Framework”
- 2011, “Roadmap Project: A guide for using the Asset Management BC Road Map”, Opus International Consultants Ltd, https://www.assetmanagementbc.ca/wp-content/uploads/Guide_for_using_the_Roadmap-AMBC-Sept_23_2011.pdf
- 2014, Canadian Infrastructure Report Card “Asset Management Primer”, https://www.assetmanagementbc.ca/wp-content/uploads/Asset_Management_Primer-CIRC-October_2014.pdf

BC Ministry of Environment

- 2016, Second Edition, “Landfill Criteria for Municipal Solid Waste”, British Columbia, https://www2.gov.bc.ca/assets/gov/environment/waste-management/garbage/landfill_criteria.pdf

McGill & Associates Engineering Ltd.

- 2019, “West Coast Landfill Leachate Collection and Treatment Assessment”, British Columbia

NAMS Canada Certificate Program

- 2006, “International Infrastructure Management Manual”, Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM.
- 2008, “NAMS.PLUS Asset Management”, Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/namsplus.
- 2015, 2nd edition, “Australian Infrastructure Financial Management Manual”, Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/AIFMM.
- 2015, 3rd edition, “International Infrastructure Management Manual”, Institute of Public Works Engineering Australasia, Sydney, www.ipwea.org/IIMM.

Sperling Hansen Associates

- 2020, “West Coast Landfill Economic Analysis”, British Columbia