

MEMORANDUM



TO: Erin Blaney, Regional District of Kitimat Stikine

FROM: Veronica Bartlett
and Eva
Robertsson,
Morrison Hershfield

PROJECT No.: 190497600

RE: Options for Residual Waste Management at Existing
Facilities to Consider for Inclusion in the Solid Waste
Management Plan

DATE: March 3, 2020

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Under the Environmental Management Act, regional districts are required to have a solid waste management plan (SWMP), which must be developed following the solid waste management planning guidelines provided by the Ministry of Environment and Climate Change Strategy (the Ministry) for content and process.

The Regional District of Kitimat Stikine (RDKS) is in the process of developing a new SWMP. The planning process was initiated in 2017 and steps 1 and 2 of the planning process were completed in 2018, resulting in the formation of the Public and Technical Advisory Committee (PTAC), assessment of the current system, development of the consultation plan and development of six technical memos covering specific topics. In November 2019, Morrison Hershfield (MH) was commissioned to provide consulting support to continue developing the SWMP for the RDKS.

This is Morrison Hershfield's third technical memo in a series of five, each presenting potential management options on key solid waste related topics:

- Summary of reduce and reuse
- Recycling and composting
- **Residual Waste Management at Existing Facilities**
- New Service Areas for RDKS
- Cost Recovery

The content of each memo will be presented to the PTAC. The feedback on these memos will be considered as MH develops a final memo outlining Preferred Options to be included in the new draft SWMP, which will be brought to the public for consultation.

This memo provides context with respect to residual waste management and existing facilities operated by the RDKS and highlights current key challenges and opportunities that should be considered. The memo outlines a number of potential strategies and options the RDKS may want to pursue to improve residual waste management.

CONTEXT

The RDKS' solid waste management system has undergone some major changes over the past few years, including: the construction of a new landfill, the expansion of another with significant upgrades, and the construction of three new transfer stations, two with integrated recycling depots. Additional changes include the closure of four landfills; two RDKS-owned and two owned by member municipalities.

The siting, design, and construction of the different facilities, especially Forceman Ridge Waste Management Facility (WMF), required major capital investment. The RDKS has also implemented a number of new programs, including three-stream curbside collection of garbage, recyclables and organics in the Terrace Service Area, the implementation of new disposal restrictions, and cost recovery models tailored for each service area.

The population growth in the Terrace Service Area and the District of Kitimat is closely tied to the development of the LNG industry and the global market. The waste generation from all sectors; residential, industrial, commercial, and institutional, is therefore difficult to predict. As such, the future rate of landfill airspace consumption is also difficult to predict.

As a result of the system overhaul, solid waste facility users, residents, RDKS staff, and contractors providing services have faced a challenging learning curve to get accustomed to the new system and expected standards of service. The RDKS has identified areas where operating procedures at solid waste facilities can be improved to get maximum benefit from the infrastructure and solid waste management services.

Current system performance and efficiency challenges were presented in Technical Memo 1: Efficiency within RDKS solid waste management functions. Key consideration highlighted in the memo included:

- Contractor performance
- RDKS staffing and roles
- Operating roles, responsibilities and expected timelines
- Information availability
- Policies and guidelines
- Service standards and plans
- Internal and external communication and education

One of the nine guiding principles adopted by PTAC for the planning process is the need to “Improve operational efficiency of the current solid waste system”. This guiding principle will underpin the strategies and options presented in this memo.

CURRENT RESIDUAL WASTE MANAGEMENT SYSTEM

Residual waste is managed through a system that is described below using three categories: Garbage collection, transfer stations, and landfills.

1.1 Waste Collection

The current system for collecting garbage within the region is summarized in Table 1 below. Apart from the City of Terrace which operates its own collection vehicles for residential garbage, the collection service provided to residents in the RDKS service areas and in other municipalities are contracted out.

Table 1 Summary of Residential Garbage Collection Programs in RDKS.

Municipality	Service Provider	Collection Frequency	Collection Type
City of Terrace	Municipal	Biweekly	Automated
District of Stewart	Municipal	Weekly	Manual
Village of Hazelton	Municipal	Twice Weekly	Manual
District of New Hazelton	Municipal	Biweekly	Manual



Municipality	Service Provider	Collection Frequency	Collection Type
Electoral Areas C and E	RDKS	Biweekly	Manual
District of Kitimat	Municipal	Weekly	Manual
Kitselas	Band Operations & Maintenance Department	Biweekly	Manual
Kitsumkalum	Private Contractor	Biweekly	Manual
Iskut	Band Operations & Maintenance Department	Weekly	Manual
Gitanyow	Band Operations & Maintenance Department	Weekly	Manual
Gitwangak	Band Operations & Maintenance Department	Weekly	Manual
Gitsegukla	Band Operations & Maintenance Department	Weekly	Manual
Witset	Band Operations & Maintenance Department	Weekly	Manual
Gitanmaax	Band Operations & Maintenance Department	Weekly	Manual
Glen Vowell	Band Operations & Maintenance Department	Weekly	Manual
Hagwilget	Private Contractor	Weekly	Manual
Kispiox	Band Operations & Maintenance Department	Weekly	Manual

1.2 Transfer Stations

The RDKS currently has three transfer stations within its boundaries as summarized in Table 2 below.

Table 2 Summary of RDKS Transfer Stations.

Facility Name	Service Area	Scales	Residual Waste transferred to:
Thornhill Transfer Station	Terrace	Yes	The Landfill at Forceman Ridge WMF
Stewart Transfer Station	Hazelton and Highway 37 North	No	Meziadin Landfill
Kitwanga Transfer Station	Hazelton and Highway 37 North	No	The Landfill at Hazelton WMF

The Thornhill Transfer Station (TTS) is equipped with scales and accepts garbage from curbside collection vehicles operated by the City of Terrace, Kitselas First Nation, and the contracted collector for Kitsumkalum and the RDKS. Self-hauled residential waste and construction and demolition (C&D) debris are also accepted at the TTS in loads under 5 cubic meters in size. Tipping fees are applied based on weight, as laid out in Bylaw 671.

The Stewart and Kitwanga Transfer Stations, guided under Bylaw 688, do not have scales and do not charge tipping fees to residents or businesses from within the Service Area. Volume-based tipping fees



are applied to asbestos, contaminated soil, and any material from industrial sources. The RDKS operates all three transfer stations under contracted operation agreements.

1.3 Landfills

There are five operational landfills in the region that are owned by the RDKS, and three landfills owned by other entities. These facilities are summarized in Table 3 below.

Table 3 Summary of Operational Landfills in Region

Facility Name	Ownership	Tonnage (2017)	Scale	Remaining Lifespan	Accepting waste from:
Forceman Ridge WMF	RDKS	6903	Yes	> 100 years	Terrace Service Area and Thornhill Transfer Station
Rosswood Landfill	RDKS	50	No	~20 years	Rosswood area residents only
Hazelton WMF	RDKS	3100	No	~50 years	The Hazeltons, east to Wisset and north to Kispiox, and the Kitwanga Transfer Station
Iskut Landfill	RDKS	150	No		Iskut Band and Electoral Area D residents
Meziadin Landfill	RDKS	2800	No	~50 years	Stewart Transfer Station, residents of the Meziadin area, and industrial camps
District of Kitimat Landfill	District of Kitimat	6250	No	<3 years Phase 2 ~27 years Phase 2 and 3 ³	District of Kitimat
Dease Lake Landfill	MOTI ¹	100	No		Dease Lake, Telegraph Creek, and surrounding Electoral Area F residents
New Aiyansh Landfill²	Village of Gitlaxt'aamiks	1200	No		Nisga'a Nation and Electoral Area A residents
Telegraph Creek Landfill²	Telegraph Creek Band		No	Closure imminent	Telegraph Creek Band and Electoral Area D & F Residents

¹ Ministry of Transportation and Infrastructure

² RDKS contributes cost sharing funding to the Nisga'a Lisims government and Telegraph Creek Band for Electoral Area users.

³ District of Kitimat does not have the authority, under the 2016 BC Ministry of Environment Landfill Criteria for Municipal Solid Waste, to expand laterally into Phase 3 without significant capital investment in design and operational improvement. The future of the Kitimat Landfill is currently undecided as the District of Kitimat is evaluating their long-term disposal options and relating costs.

In addition to the active landfills, there are four recently closed landfills within the RDKS; the Thornhill Landfill, Stewart Landfill, Kitwanga Landfill and Terrace Landfill. RDKS staff manage ongoing environmental monitoring at all operational RDKS-owned landfills and the closed Thornhill and Kitwanga landfills. Closure monitoring at the Terrace and Stewart landfills remains the responsibility of their respective municipalities.

All RDKS-owned landfills are operated under contracted operation agreements. The Forceman Ridge Waste Management Facility is the only landfill equipped with a weigh scale.

In 2017, an estimated 21,003 tonnes¹ of waste was landfilled in the RDKS when including quantities disposed at the four landfills not owned by the RDKS. In the Terrace Service Area, scale data indicates 51% of the waste disposed is from the ICI sector, 26% is from the residential sector, 17% is C&D waste, and the remaining 6% drop-off waste received in loads under 5 m³ in size. Due to lower ICI activity in the Hazelton and Highway 37 North Service Area, it is assumed that a higher proportion of the waste is generated, and therefore landfilled, by the residential sector.

The majority of waste in the Terrace Service Area flows through the Thornhill Transfer Station for final landfilling at the Forceman Ridge WMF. Both facilities are equipped with scales. Residential waste from the community of Rosswood is landfilled at the RDKS owned Rosswood Landfill. None of the waste management facilities in the Hazelton and Highway 37 North Service Area are equipped with weigh scales.

Based on the estimated 2017 disposal tonnages¹, the landfilled waste is distributed fairly evenly between the Terrace Service Area, the Hazelton and Highway 37 North Service Area, and the District of Kitimat (approximately one third each of the total estimated 21,000 tonnes landfilled within the RDKS).

This section provides a summary of the six potential new strategies and initiatives that aim to further improve residual waste management at existing solid waste facilities and reduce the associated costs in the region.

STRATEGY 1. SET LIMITS FOR SOLID WASTE ACCEPTED FROM OUTSIDE THE SERVICE AREA

The siting, design, construction, and operation of all RDKS solid waste management facilities are partially funded through tax requisition collected from the two service areas. The Terrace Service Area is funded by a 50% taxation 50% tipping fee requisition model, and the Hazelton Highway 37 Service Area is funded mainly through taxation with the only tipping fees being those charged to industrial users such as mine camps, or for special handling materials such as asbestos.

These funding mechanisms are important to consider when accepting solid waste from sources outside of each service area, including from industrial work camps. Out-of-service-area waste generators are currently charged a 25% surcharge for disposal at RDKS facilities which are set with the intention of offsetting the tax funded portion of the landfill airspace used.

It is MH's understanding that when Forceman Ridge WMF was designed and constructed the expected volumes of potential incoming industrial waste were much lower as the current LNG Canada project was not underway at the time. It is also understood that establishment of the two solid waste service areas and the associated cost recovery models did not consider the significant quantity of industrial waste received at the Forceman Ridge WMF. The tax/tipping ratio shifts away from the 50/50 ratio, under the current cost recovery model, as more waste is accepted from industrial sources in the Terrace Service Area. This results in a lower financial burden on tax payers in this Service Area. The Hazelton and Highway 37 North Service Area residents and commercial businesses are not experiencing the same financial benefit as less industrial waste is accepted at the facilities in the Service Area. In addition, it is MH's understanding that the landfill airspace at the landfill at Forceman Ridge WMF is being consumed at a faster rate than initially projected.

¹ As presented in the RDKS report *Background Information and Assessment of the Current Solid Waste System – 2018 Update*

In 2018 approximately 2% of the waste disposed at Forceman Ridge WMF originated from industry. In addition, almost 1,800 tonnes of contaminated soil were accepted and used for landfill operations. The RDKS currently accepts contaminated soil from industry at a rate of \$97.50/ tonne (\$78.00/tonne plus a 25% Out-of-Service-Area surcharge). A conservative approach is used when accepting contaminated soils from industry outside the Service Area to ensure accepted materials remain over a lined portion of the landfill and that materials are suitable for use on-site as cover material.

With large industrial work camps in the region and the LNG construction project in Kitimat there is a potential opportunity to accept more waste, including contaminated soil, from industry over the next few years. This presents an opportunity for additional revenue through collection of tipping fees subject to the out-of-service-area 25% surcharge. Careful consideration should be given to available landfill airspace and the value thereof when reviewing potential incoming industrial waste. Currently, preference has been given to industrial materials that do not take up landfill airspace, such as organics, clean wood, and contaminated soil that can be used on-site as cover material.

The RDKS has received industrial waste soil from within the North Coast Regional District and there may be interest in accepting waste soil from other neighboring regional districts, such as the Bulkley Nechako Regional District. Due to the geographic location of the Forceman Ridge WMF, it is unknown if hauling of waste from these areas would be financially viable. The RDKS may want to investigate if disposal gaps exist in other regional districts and if so, assess the potential benefits and challenges associated with accepting additional out-of-service-area waste.

If the RDKS decides to accept additional waste from outside the service areas for disposal at their facilities, they may want to control the flow of said waste within the regional district. For example, the RDKS would have the ability to direct such waste to the Meziadin Landfill instead of the landfill at Forceman Ridge WMF, where most industrial waste is currently accepted and disposed. By routing the waste to Meziadin Landfill or the landfill at Hazelton WMF the RDKS would generate revenue for the Hazelton and Highway 37 North Service Area, which currently is facing financial challenges, primarily due to higher than anticipated operating costs. This option will be further explored in the fifth and final technical memo on cost recovery.

There is currently no defined limit set on annual disposal volumes at the RDKS landfills. The RDKS needs to decide on how much airspace, if any, should be afforded to accommodate out-of-service-area and/or industrial waste. Consideration to the additional tipping fees to fund operations should be given when making this decision. The RDKS may want to establish a framework with evaluation procedures, limits to acceptable quantities, and applied tipping fees; either for each individual disposal facility or each solid waste service area.

The RDKS would also need to ensure the tipping fees are set to fully cover the cost of landfilling, including siting, capital, and closure/post-closure liability costs. The RDKS may also want to consider which alternative disposal options are available for industry and assess the cost per tonne breaking point for when industry would choose alternative disposal options.

The RDKS is currently charging a 25% surcharge for out-of-service-area waste, including waste from industrial work camps within the regional district. It is not uncommon for other jurisdictions to charge a 100% surcharge for waste generated outside the service area. This is done in Comox Valley Regional District for example. The surcharge is generally set based on the remaining airspace available and the landfill owner's need for increased revenue. However, for long-term financial sustainability the true value of airspace should be considered when establishing tipping fees and surcharges. Consideration should be given to costs associated with landfill siting, design, construction and closure, landfill liability, operations, and post-closure activities.



Possible options to incorporate in the SWMP include:

- 1A. Develop a policy that specifies the type and maximum amount of out-of-service-area waste accepted.
- 1B. Assess the value of landfill airspace and significantly increase surcharge for out-of-service-area waste.
- 1C. Develop policy to allow disposal from neighbouring Regional Districts.

STRATEGY 2. SET LIMITS AND REPORTING REQUIREMENT FOR LIQUID WASTE

Septage is accepted for treatment at Forceman Ridge and Hazelton Waste Management Facilities as well as Meziadin and Iskut Landfills. The types of liquid waste accepted are outlined in Bylaw 671 and 688. Septage is classified as controlled waste under both bylaws and disposal thereof requires an RDKS issued permit. Septage includes septic tank pumpage and treated sewage sludge in both Service Areas. Additional specification is provided in Bylaw 688 for septage accepted in the Hazelton and Highway 37 North Service Area and include:

- the contents of grease traps from restaurants within the Service Area when they are mixed with septic tank pumpage.
- wash water that is free of hydrocarbon contamination.

Other sewage wastes, such as wastewater, sewage and slurry, are classified as prohibited and are not accepted at the treatment facilities at Forceman Ridge and Hazelton WMF.

In 2018, approximately 1,095 tonnes of septage was accepted at the treatment facility at Forceman Ridge WMF, which is designed with the annual capacity of almost 2,200m³. The amount of septage accepted at the treatment facility at the Hazelton WMF, Iskut and Meziadin Landfills is unknown. The facility at Hazelton WMF is designed with an annual capacity of almost 1,100m³.

The accepted liquid waste generally contains 95% liquid and is pumped into filtration beds where the solids are separated from the liquids. The sludge in the filtration beds reaches about 85% moisture content before it is removed from the filtration beds, bulked, and composted. The liquid portion is pumped into an equalization pond where it is treated together with the landfill leachate collected on site.

There are currently two liquid waste haulers in the Terrace Service Area which both have active disposal permits for the treatment facility at Forceman Ridge WMF. There is one hauler with a disposal permit for the Hazelton and Highway 37 North Service Area. There are no records of active permits at the other two facilities accepting septage. The reporting requirement for the haulers is currently limited to specifying quantity, if the waste originates from residential or commercial sources, and if the waste is bulked or un-bulked septage. These reporting requirements provide the RDKS with limited control of the liquid waste accepted, its source and quality, which reduces their ability to enforce applicable bylaws.

The RDKS has concerns regarding two main liquid wastes:

- grease trap waste because of the presence of fats, oils and grease (FOG).
- catch basin waste from parking lots because of the high likelihood of the presence of hydrocarbons

The liquid waste treatment facilities are not designed to separate or treat FOG, which can cause clogging of the filtration system resulting in reduced environmental control and increased operating and maintenance costs. Nor are the systems designed to treat hydrocarbons, the presence of which would contaminate both the separated and composted sludge and the sewage.

The RDKS seeks to develop a policy that clearly defines the quantity, types, and sources of liquid waste accepted at its waste management facilities. The policy may include reporting requirements for: quantity of waste disposed; source of waste, i.e. residential or commercial; and type of waste, i.e. septage, grease trap, oil-water separator, or catch basin waste. The policy may also set out requirements for regular lab analysis for specific waste sources and acceptable limits for concentration of contaminants. It may also be warranted to include scheduled annual system maintenance periods and volume restrictions (m³ per month or similar) to prevent the treatment system from becoming overwhelmed. These requirements and restrictions need to align with any RDKS plans and policies relating to liquid waste management. The RDKS may want to discuss options with the haulers regarding how fines and potential disposal suspensions can be passed onto the waste generator.

The RDKS may want to develop a registry of establishments using grease traps, oil-water separators and catch basins coupled with an outreach program. A targeted outreach program could focus on educating the waste generators of proper and acceptable disposal of liquid and solid wastes. The registry could potentially be developed in collaboration with the haulers who know their customer base and the waste collected.

Possible options to incorporate in the SWMP include:

- 2A. Develop policy that requires haulers to report additional details on the quantity, source and type of waste disposed at facility (as part of annual permit).
- 2B. Improve record keeping as it pertains to active permits and liquid waste accepted at the landfill at Hazelton WMF and Iskut and Meziadin Landfills.
- 2C. Develop education program aimed at generators of waste.

STRATEGY 3. REDUCE GREENHOUSE GAS EMISSIONS

The RDKS prepares and submits annual reports on the greenhouse gas (GHG) emissions relating to the organization's activities as part of CARIP Climate Action²/Carbon Neutral Progress Survey in an effort to reduce organizational GHG emissions. The RDKS reports on GHG emissions relating to solid waste management, including landfill gas (LFG) management and organic waste composting.

Major efforts have been made to reduce GHG emissions from the landfill at Forceman Ridge WMF through LFG management. LFG, which is mainly composed of methane, is generated when organic waste is decomposed under anaerobic conditions. Methane has a 100-year global warming potential which is 21 times higher than that of carbon dioxide.

The RDKS is reducing the generation of GHGs at the landfill at Forceman Ridge WMF by restricting the disposal of organic material and by minimizing precipitation infiltrating the disposed waste. An LFG collection system is designed to capture the produced LFG via a network of horizontal and vertical pipes that are installed as the waste is disposed. The captured gas will be flared, which reduces the

² Local governments that have signed the Climate Action Charter and committed to becoming carbon neutral can access the Climate Action Revenue Incentive Program (CARIP), a grant that reimburses 100% of the carbon tax that local governments pay directly.



global warming potential 21 times as methane is converted to carbon dioxide. The installation of LFG capture piping is anticipated to commence in 2020.

These combined strategies result in GHG emission reductions without increasing efforts above regular landfill operations. According to the assessment presented in the *Forceman Ridge Regional Landfill Design, Operations & Closure Plan*³, collection of LFG will not be required under the BC Landfill Gas Management Regulation until 2069. Early installation of an active LFG management system can be considered a voluntary GHG emission reduction initiative which can generate some tradable carbon credits for the RDKS. In 2017 Sperling Hansen Associates estimated that the landfill at Forceman Ridge WMF could generate about 377,000 tonnes of CO₂e GHG emission reduction credits amounting to total revenue of about \$10 million until 2069 (at a price of \$25/tonne of CO₂e)³.

The RDKS has also collected and flared LFG at the Thornhill Landfill, on the same voluntary basis since 2019 (Figure 1). Therefore, the RDKS has the opportunity to generate carbon credits for emissions reductions achieved at the two RDKS landfills. If eligible, it would be suitable for the RDKS to commit to allocating the revenue obtained from the credits to the Service Area where the GHG reduction efforts were realized and the credits are generated.

The Climate Investment Branch of the Ministry of Environment and Climate Change Strategy procures GHG emission offsets, which includes those for waste and residual management.

Offsets for landfill gas collection were, for example, purchased from Columbia Shuswap Regional District for \$13/tonne in 2018. The current application period for the Request for Offset Units, Greenhouse Gas Offset Units close on July 19, 2021.



Figure 1 Landfill gas flare at the closed Thornhill Landfill.

Possible options to incorporate in the SWMP include:

- 3A. Assess eligibility for carbon credits for GHG reduction efforts in solid waste operations and allocate revenue to the service area where carbon credits were generated.

STRATEGY 4. ASSIST IN THE PREVENTION OF ILLEGAL DUMPING

Illegal dumping⁴ is an ongoing issue for the RDKS. Materials found at illegal dump sites are often those that would have been collected in a residential curbside program or could have been dropped-off

³ Forceman Ridge Regional Landfill Design Operations & Closure Plan, prepared by Sperling Hansen, 2017.

⁴ "Illegal dumping" refers to the intentional disposal of waste materials in unauthorized locations.

free of charge at the appropriate depots. Some of the main factors influencing illegal dumping include the perceived inconvenience to access disposal facilities, and a lack of education around available disposal options, and avoidance of anticipated disposal costs. Residents may be unaware of convenient disposal options in their area.

The RDKS is currently addressing illegal dumping with a range of initiatives including:

- Providing education and promotion of current options to recycle and dispose of waste safely at a waste management facility.
- Investigating optimizing operating hours at all solid waste facilities to increase user convenience and discourage illegal dumping.
- Encouraging people to report illegal dumping incidents on Crown Land and supporting community clean-up efforts. Residents can report illegal dumping by calling the toll-free line RAPP (Report all Poachers and Polluters).
- Supporting residents voluntarily picking up illegally dumped garbage by providing bag tags to receive free curbside garbage pickup. Residents are required to provide a photo of the site(s) before and after the cleanup. The tags are available at the RDKS office.
- Reimbursing tipping fees for disposal of illegally dumped waste material collected by non-profit organizations. Groups must make a request to the RDKS Board at one of two available annual application intakes.

The management and response to illegal dumping in rural areas on Crown Land is the responsibility of the BC Conservation Officer Service (BCCOS). Municipal governments are responsible for managing illegal dumped materials in their jurisdictions.

Historically, about 15 reports of illegal dumping were made to the BCCOS annually. In 2017, 55 reports were made, with that number increasing through 2018. It is unclear how many reports were recorded in 2019. Each report relates to a unique site and increased reports are not related to multiple complaints about one site.

The BCCOS reported that during 2019, a total of 37 investigations were conducted regarding illegal dumping. Thanks to the use of cameras, some of which were supplied by the RDKS, a number of offenders were identified and have been issued \$575 fines⁵.

Data shows that illegal dumping has increased in the RDKS. The issue has been highlighted by local media, such as by the Terrace Standard on October 25, 2018 (Figure 2).

The RDKS is currently participating in a Terrace area inter-agency working group to identify solutions and mitigation strategies. The working group includes representatives from the RDKS, Conservation Service, Ministry of Transportation and



Figure 2 Illegal dumping in the RDKS
(Terrace Standard October 25, 2018)

⁵ Information provided by Sergeant Tracy Walbauer, BC Conservation Officer Service for the North Coast Zone/ Skeena Region, Ministry of Environment, January 31, 2020.

Infrastructure, Nechako Northcoast, Natural Resource Officers, the Kitsumkalum Resource Officer, and the RCMP. The group has discussed identifying areas of known dumping activity and various options to mitigate known sites including signage, cameras, restricting access and cleaning the sites to discourage future dumping. The working group has not met since early 2019.

The RDKS can potentially use the already established working group to develop a region-wide illegal dumping prevention strategy. The strategy could set out the responsibilities of all parties, actions to take, and data reporting requirements to improve tracking, outreach, and staffing.

The first step in forming a strategy can be to conduct a survey to determine the most common materials illegally discarded and the most frequent locations. This will provide a basis for types of materials and “hot spots” on which to build an education campaign and clean-up and enforcement programs.

The strategy can include, but is not limited to, the following:

- Conduct targeted outreach campaigns if/when specific “problem” groups are identified.
- Establish a reporting mechanism where residents (e.g. neighborhood watch programs) and outdoor groups can report dumping location, to be targeted for contracted / volunteer cleanup.
- Restricting access and installing cameras at popular dumping sites.
- Post signs at frequent illegal dumping sites to educate about reporting and potential fines for illegal dumping.

The strategy should have input from stakeholder groups such as First Nations, forestry companies, BC Hydro, and back-country user groups (mountain bikers, river anglers, etc.).

Possible options to incorporate in the SWMP include:

- 4A. Utilize the existing illegal dumping working group to develop an illegal dumping strategy aimed to improve tracking and reduce the number of illegal dumping incidents.
- 4B. Implement strategy including survey of illegally dumped materials, public outreach and enforcement.

STRATEGY 5. CLOSE SELECTED SMALL LANDFILLS AND REPLACE WITH TRANSFER STATIONS

The RDKS operates some smaller landfills, which typically require significant costs to operate and maintain. Due to the limited amount of waste disposed and fixed costs associated with landfilling, the cost per tonne of waste landfilled is considerably higher than that at a larger landfill. There are opportunities to reduce operating costs to the RDKS by closing some of the smaller landfills and establishing transfer stations at these sites. This approach was already taken by the RDKS at Kitwanga, where a transfer station was established in 2017 in conjunction with the closure of the existing landfill.

There are currently two smaller landfills that could benefit from being replaced by transfer stations: Rosswood Landfill and Iskut Landfill.

The Rosswood Landfill, which is approximately a 30-minute drive north of Terrace, is intended for residential MSW generated from the Rosswood community of 150 - 200 residents. There are no tipping fees at this landfill. The RDKS has observed that some Terrace Service Area residents drive out to this landfill to avoid paying tipping fees at the Thornhill Transfer Station. The Rosswood Landfill has



approximately 20 years of capacity remaining. If the landfill were to close, and a transfer station built, waste from Rosswood would be sent to the Forceman Ridge WMF.

There is potential cost savings in closing this landfill. The operating cost in 2019 was \$37,000 for Rosswood compared to \$81,000 for the Thornhill transfer station and \$309,500 for Forceman Ridge WMF. Without taking into consideration the cost for diversion efforts at the facilities, the cost per tonne of disposed waste is about 15 times higher at the Rosswood landfill than that for Thornhill Transfer station and Forceman Ridge WMF combined⁶.

The Iskut Landfill is also relatively small, and services both the Iskut Band and residents of Electoral Area D. The RDKS has experienced on-going issues with maintaining compliance with the site's operational certificate. In collaboration with Iskut Band, the RDKS is interested in investigating the cost/benefits of closing the current landfill and establishing a transfer station that can offer improved waste diversion opportunities for the area. The RDKS will need to assess the feasibility of accepting waste at the Meziadin Landfill from a transfer station in Iskut.

For both Rosswood and Iskut, the RDKS would need to assess the cost/benefits of establishing transfer stations, including costs associated with waste hauling. The RDKS can investigate if there is potential grant funding available for a feasibility study and/or capital costs. If transfer stations are deemed cost effective and feasible, the RDKS can proceed to plan and construct transfer stations and implement landfill closures within the next 10 years.

An additional option for consideration for Iskut Landfill is to continue to landfill only inert material, such as demolition and land clearing waste and use a transfer station for the putrescible MSW. This is an operational practice some regional districts employ to reduce haul costs and continue to operate the landfill as an inert waste landfill.

Possible options to incorporate in the SWMP include:

- 5A. Assess cost/benefit of closing Rosswood and Iskut landfills by determining community need for transfer stations and implement if deemed feasible.
- 5B. Consider options to continue to operate the Iskut Landfill for demolition and land clearing waste.

SYSTEM EFFICIENCY IN THE CONTEXT OF RESIDUAL WASTE MANAGEMENT

Throughout the solid waste management planning process the RDKS is committed to placing a high importance on improving the operational efficiency of the current solid waste system. This was highlighted in Technical memo 1: Efficiency within RDKS Solid Waste Management Functions (February, 2019).

This section provides three strategies and associated initiatives for the RDKS to undertake to improve system performance and efficiency at existing facilities. Although the main focus of this memo is on residual waste management, efforts to increase efficiencies spans across the entire waste hierarchy (including reduce, reuse, recycle).

⁶ Assuming 50 tonnes of waste disposed at Rosswood landfill and 8,500 tonnes of waste disposed at the landfill at Forceman Ridge WMF in 2019.



STRATEGY 6. EFFECTIVELY USE LANDFILL AIRSPACE

When considering strategies applied to effectively using the remaining airspace at existing landfills in the RDKS, consideration should be given to the type of waste landfilled and how the landfill is operated. The type and quantity of waste placed in the landfill should be considered as landfill air space is valuable and should not be consumed by recyclable materials. Operating procedures, waste placement, and compaction also affect the use of the available airspace.

As discussed under Strategy 1, contaminated soils are accepted at the Forceman Ridge WMF and used onsite for operational cover material, and there is capacity to accept and utilize more. The facility Design, Operations, and Closure Plan (DOCP) includes a material management plan which incorporates calculations of how onsite materials are to be used for operations. The material balance shows that the onsite material is insufficient for operations and some reliance on imported soils for cover material is required. Approximately half of the required material is available within the footprint of the final landfill design. Additional material is planned to be sourced from a borrow area adjacent to the filling area and through imported soil. Recent airspace and waste compaction analysis show that the waste to cover ratio is significantly lower than 4:1 stipulated in the DOCP. A low waste to cover ratio means airspace is consumed by soil rather than waste reducing the life of the landfill and increasing the need for soil for landfill operations and, in the case for the landfill at Forceman Ridge WMF, the need to import this material.

Forceman Ridge WMF was opened in 2016 and was designed with 100 years of capacity. The site was selected after exhaustive investigations to ensure the facility could co-exist with the surrounding environment. Figure 3 shows the Forceman Ridge WMF under construction. The landfill is lined with a Geosynthetic Clay Liner and a High Density Polyethylene Composite Liner and constructed with leachate collection system and treatment. Installation of a landfill gas collection system is planned to commence in the summer of 2020.



Figure 3 Forceman Ridge WMF under construction.

The operation at Forceman Ridge WMF is guided under Operational Certificate (OC) 17227. The OC does not require the application of daily cover; however, the use thereof is considered a best practice to limit vector attraction, windblown litter, and odours. The use of daily cover also limits the infiltration of

precipitation and consequently the generation of leachate. The use of daily cover or an alternative daily cover is required under the BC Landfill Criteria for Municipal Solid Waste. Steel plates (also referred to as Revelstoke Iron Grizzly (RIG) plates) are currently available for use as an alternative daily cover at the site (Figure 4). It is MH's understanding that there is room for improved efficiency in the use of the RIG plates. The steel plates do not consume any airspace as they are removed at the beginning of every operating day and reused.



Figure 4 Placement of RIG plates as alternative daily cover at the landfill at Forceman Ridge WMF.

With the exception of Rosswood Landfill, the landfill at Forceman Ridge WMF is the only disposal facility in the Terrace Service Area. Though the landfill has many years of remaining capacity, the available airspace should be considered invaluable as siting of a new facility or expansion of the current one may be challenging. Recent airspace and waste compaction analysis show that the compaction rate achieved at the landfill meets the target of 0.75 tonnes/m³. However, as mentioned above, the use of operational soil is higher than ideal and the waste to cover ratio is well below the set target of 4:1. The high use of operational soil reduces the airspace utilization factor (tonnes of waste per cubic meter airspace used by waste and cover). Based on the results of the recent survey, additional operator training may be warranted with subsequent operational changes to conserve airspace and available cover material.

The Meziadin Landfill is nearing the end of the first phase of its lifespan, with Phase II currently undergoing design; construction is anticipated for 2020. There are five total phases planned for the Meziadin Landfill providing plenty of airspace available for future use. The landfill at the Hazelton WMF has three remaining phases which are expected to reach capacity in 2069. The RDKS may consider closing smaller landfills, as discussed in Strategy 5, and transferring waste from these communities to area landfills, such as Meziadin. Accepting additional industrial waste for disposal at either Meziadin landfill or the landfill at the Hazelton WMF is also being considered. These potential changes in waste accepted will affect the remaining life of the landfills which highlights the importance of efficient use of available airspace.

It is estimated that Rosswood Landfill has about 20 years of remaining capacity. Waste is only accepted from Rosswood's 150-200 residents. The remaining life of Iskut Landfill is unknown and received an estimated 150 tonnes of waste in 2017. Both landfills are small and the operational costs

per tonne are high considering the small service population. Existing airspace should be used effectively until alternative disposal options have been identified. It is MH's understanding that both landfills are natural attenuation sites and lateral expansion will likely require engineered liners and potentially other costly design features.

Conserving landfill airspace can be done by controlling the waste disposed. The RDKS may want to increase enforcement of the current disposal restrictions to ensure landfill airspace is not consumed by material required to be segregated under Bylaw 671 and 688. Additionally, enforcement of disposal restrictions ensures a fair system for all users and improved operations. The RDKS may also want to consider assessing the feasibility of using asphalt shingles for operations as alternative daily cover or road construction. Asphalt shingles are currently landfilled and the alternative beneficial use would offset some of the need to import operational soils and save the landfill airspace otherwise consumed. Consideration should be given to reducing the tipping fee for materials that can be used in landfill operations that otherwise would consume airspace.

Proper operation of the active face, waste placement, and compaction play an important role in effective use of landfill airspace. SWANA offers landfill training, including training for operations of composting facilities and landfill gas operations and management. The SWANA Manager of Landfill Operations (MOLO) course provides a comprehensive study of efficient landfill operations, including site design, regulations, health and safety, cost controls and other issues to consider when planning, operating, and closing landfills. The current landfill contractor supervisor is required to be MOLO certified and all contracted staff have some level of landfilling training. Some RDKS Works & Services department staff will receive MOLO training this spring.

It is also important to keep records of the waste placed and soil used each year to be able to assess the performance of landfill airspace. MH recommends that the RDKS continue to regularly perform aerial surveys of the landfill at Forceman Ridge WMF. The RDKS may also want to consider performing aerial surveys for the landfill at Hazelton WMF and the Meziadin Landfill with the objective to assess the use of airspace, remaining landfill life and operator contract adherence. Surveys could be performed every 3-5 years.

The RDKS has developed standard operating procedures (SOPs) for their facilities. The RDKS may want to review these internally on an annual basis and periodically provide the landfill operators a refresher on SOPs, performance targets and expected level of service.

Possible options to incorporate in the SWMP include:

- 6A. Enforce existing bylaws to control the waste disposed and minimize unnecessary airspace consumption.
- 6B. Review the landfill operations including the use of operational soil and alternative daily covers and waste placement and compaction. Based on findings consider providing contractor training to improve operations.
- 6C. Consider segregating materials, such as asphalt shingles, to be used for landfill operations thereby offsetting some need for operational soils while saving landfill airspace.

STRATEGY 7. IMPROVE PUBLIC ACCESSIBILITY TO EXISTING SOLID WASTE MANAGEMENT FACILITIES

One of the main comments received through the April 2019 Public Solid Waste Survey pertains to facility accessibility. There is a strong interest in having waste management facilities with recycling facilities and/or access to 24 hours unsupervised recycling locations. Changed or extended opening hours of transfer stations and landfills were also requested by survey responders.

With the major overhaul of the RDKS solid waste management system over the past few years there are no plans to open any new facilities outside of those discussed in the next memo for new service areas and new facilities at the PTAC meeting in April. In addition, all facilities need to be supervised in order to qualify for funding from EPR stewards such as Recycle BC. The RDKS is not intending to offer any 24-hour unsupervised facility for garbage or recycling.

The RDKS waste management facilities are currently open to the public between 2 and 5 days per week. The operating hours of each facility is shown in Table 4 below. Forceman Ridge WMF is not open to the public.

Table 4 Public opening hours at RDKS waste management facilities.

Facility	Public Hours
Thornhill Transfer Station	Winter: 12:00pm to 5:00pm – Saturday - Monday Summer: 12:00pm to 7:00pm – Saturday - Monday
Rosswood Landfill	12:00pm to 5:00 pm – Saturday - Sunday
Hazelton WMF	12:00pm to 7:00pm – Thursday - Monday
Kitwanga Transfer Station	1:00pm to 7:00pm – Wednesday - Sunday
Meziadin Landfill	10:00am to 5:00pm – Sunday - Monday, Thursday - Friday
Iskut Landfill	12:00pm to 6:00pm - Friday - Saturday
Stewart Transfer Station	12:00pm to 6:00pm - Tuesdays and Thursday 12:00pm to 4:00pm - Saturday

The RDKS has received requests for the Hazelton WMF to be open in the morning, as well as requests to extend the hours at the Thornhill Transfer Station. The RDKS may want to assess accessibility to current facilities and adjust the current operating hours to address client needs. This assessment could include offering an online survey requesting feedback on specific public and client needs pertaining to opening hours and facility accessibility.

Improved accessibility can likely be reached without increasing operating hours or the cost to taxpayers, but by shifting hours to align with the need of the public. The operating hours of other private facilities that offer solid waste services, such as privately operated recycling depots, should be considered so that residents can drop-off divertible materials, such as recyclables/ EPR products, during the same trip as garbage. The perception that operational hours are causing increased illegal dumping would be reduced by ensuring facility accessibility meets the needs of the residents.

There may be an opportunity to increase operating hours at one facility while decreasing the hours at another, given they are within the same service area. Such changes have to consider contractor agreements, peak visitor hours, and risk for increased illegal dumping. There may also be an opportunity to improve the facility operations and accessibility by applying seasonal opening hours, based on tracked visitor frequency.

Possible options to incorporate in the SWMP include:

- 7A. Adjust opening hours at transfer stations based on public feedback without raising operational costs significantly by maintaining the total hours of operation.
- 7B. Develop seasonal opening hours at targeted RDKS facilities.

STRATEGY 8. ENGAGE AND COMMUNICATE TO CITIZENS ON WASTE MANAGEMENT

The RDKS has identified the need to increase public education about the region's landfills, landfill closures and gas capture programs, and the need for responsible residual waste management. The RDKS Board has set a strategic mandate for the organization as a whole to increase efforts to engage and communicate with residents.

There is potential to open a site for public education at the Thornhill Transfer Station. It can be used for delivering education to schools, and other interested parties on the need to manage waste materials responsibly. The promotion of reduce, reuse, and recycling would also be an important part of the site.

The RDKS can also increase public education by offering tours for the public and schools/ universities at facilities such as the Forceman Ridge and the Hazelton WMFs.

Possible options to incorporate in the SWMP include:

- 8A. Establish an education site at the Thornhill Closed Landfill to educate the public and schools in responsible management of residual waste.
- 8B. Offering tours at suitable waste management facilities.

STRATEGY 9. DELIVER OPERATIONAL SERVICES IN-HOUSE

The RDKS has made significant capital investments in its solid waste management infrastructure. As a result of the system overhaul, users of the solid waste facilities and services, RDKS staff, and contractors providing services, have faced a significant learning curve and are continuing to become accustomed to the new system and expected standards of service. The RDKS has identified that optimizing operations to get maximum benefit from the infrastructure and services is a priority.

The RDKS has found that ensuring proper operation of RDKS-owned site equipment and efficient landfilling operations has required extensive RDKS staff hours in oversight and operator support at some sites. The RDKS is also concerned that the operational contracts in place may not be sufficiently incentivizing waste diversion. Current bylaws allow the RDKS to issue fines for disposal of compostable organics (currently only in the Terrace Service Area) and recyclable materials, however enforcement has not been applied to date.



Operations contracts are particularly challenging to secure for remote facilities. There are very few proponents willing to bid on operational contracts for remote facilities, and as a result of limited competition the operational costs of these facilities become inflated.

The RDKS may want to review the cost-benefit of operating targeted facilities using in-house staff instead of contractors. The review would include the need to purchase heavy equipment, where these are currently provided by the contractor.

The following is a list of potential benefits associated with moving to an in-house delivery model:

- Opportunities to share staffing and equipment resources between waste management facilities
- Greater flexibility to modify facility services to accept additional waste materials as needed (e.g. organic waste, EPR products)
- Greater control over organics processing and the quality of compost material
- Greater control over operational efficiencies and staff messaging to site users
- Potential reduced operating/annual costs by eliminating 'double payment' to contractor and RDKS staff hours to provide operator support and oversight

There are also potential risks associated with transitioning to an in-house delivery model. Potential risks include:

- Risk of higher administrative, management, coordination costs compared to current contracted delivery model due to additional staff and resources to manage
- High initial capital investment to purchase equipment
- Additional staff required – greater risk due to labour market conditions and availability
- Exposure to greater liability through additional high-risk operations

For the sites where the RDKS decides to continue to use a contractor for facility operations the RDKS can reconsider the incentives set out in its contract to enhance waste diversion and other operational efficiencies. As part of the previous memo for Recycling and Composting options, option 2C touched on contract requirements and performance incentives to provide continuous waste diversion education and enforcement.

The RDKS may want to reconsider the incentives set out in their operations contracts. There are a variety of options that can be considered; incentives for contractors can be based on achievements that have been made against agreed key performance indicators (KPIs). For example, in Suffolk County Council, UK, staff at depots receive incentive payments if they meet KPIs for customer satisfaction, waste diversion rates, and site cleanliness. The KPIs (and method of calculation) were agreed upon between the Council and Contractor as part of the contract negotiation process. In general, the contractor collects the data and calculates the payments as part of their contractual commitment. The payment is made as a result of the saving in disposal charges. The RDKS may also want to consider negotiating contracts more favorable for both the RDKS and the selected contractor.

Possible options to incorporate in the SWMP include:

- 9A. Assess the cost-benefit of using contractor vs. in-house staff to operate RDKS facilities, and transition to in-house service if determined to be beneficial.
- 9B. For facilities operated by contractors, review contract incentives to better incentivize waste diversion and site cleanliness.



IMPACTS OF POTENTIAL STRATEGIES TO INCREASE RECYCLING AND COMPOSTING

Table 5 provides an overview of the anticipated financial impacts of the strategies if implemented in the region. The table is followed by Table 6 which shows which stakeholder groups are affected by the strategies outlined in this memo.

Table 5. Anticipated financial impact related to the identified strategies for residual waste management at existing facilities.

#	Strategy	Operational costs	Capital Costs	Comments
1	Set limits for solid waste accepted from outside the service area Set limits for solid waste accepted from outside the service area	Low-High	Low-High	The additional cost depends on the amount of waste accepted and the surcharges applied to the waste.
2	Set limits and reporting requirement for liquid waste	Low-Medium	Low	Capital cost low assuming no additional infrastructure is required.
3	Reduce greenhouse gas emissions	Low-Medium	Low	Capital cost already allocated for LFG management system at Forceman Ridge WMF. Operational costs might be offset by carbon credit sales.
4	Assist in the prevention of illegal dumping	Low-Medium	Low	
5	Close selected small landfills and replace with transfer stations	Low-medium	Medium-High	Reduced operating costs likely to offset the capital cost for landfill closure and post-closure work.
6	Effectively use landfill airspace	Low	Low	Assumed small investment in education and operational improvements compared to savings of airspace its value.
7	Improve public accessibility to existing solid waste management facilities	Low	Low	Assuming no or small changes in total hours of operation.
8	Engage and communicate to citizens on waste management	Low	Low	
9	Deliver operational services in-house	Low-High	Low-High	The operational and capital cost depend on the model selected.



Table 6. Organizations and categories of individuals impacted by the identified strategies for residual waste management at existing facilities.

#	Strategy	RDKS	Member municipalities	Residents	Waste haulers and recycling facilities	ICI sector	Non-profit organizations	Comments
1	Set limits for solid waste accepted from outside the service area Set limits for solid waste accepted from outside the service area							
2	Set limits and reporting requirement for liquid waste							Additional reporting paper work will be required by all stakeholder.
3	Reduce greenhouse gas emissions							RDKS responsible for collection of landfill gas. Diversion of organics responsibility of all stakeholders.
4	Assist in the prevention of illegal dumping							
5	Close selected small landfills and replace with transfer stations							Closure will affect the users of the specific sites.
6	Effectively use landfill airspace							Stakeholders affected through either operational changes or enforcement of disposal restrictions.
7	Improve public accessibility to existing solid waste management facilities							Strategy will affect those using the sites.
8	Engage and communicate to citizens on waste management							
9	Deliver operational services in-house							