



REGULAR MEETING OF COUNCIL

AGENDA

DATE: Tuesday, April 3, 2018
TIME: 4:30 p.m.
LOCATION: Council Chambers, Enderby City Hall

1. APPROVAL OF AGENDA

2. ADOPTION OF MINUTES

[Regular Meeting Minutes of March 19, 2018](#)

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3. PUBLIC AND STATUTORY HEARINGS

4. PETITIONS AND DELEGATIONS

5. DEVELOPMENT MATTERS

6. BUSINESS ARISING FROM THE MINUTES AND/OR UNFINISHED BUSINESS

7. BYLAWS

8. REPORTS

Mayor and Council

9. NEW BUSINESS

[Village of Canal Flats](#) – Correspondence dated February 28, 2018
Re: Support for Flexible Ride-Sharing Regulation

pg 5

[UBCM](#) – Correspondence dated March 28, 2018
Re: UBCM Principles for Cannabis Taxation

pg 6

[Enderby Arts Festival 2018 – Temporary Road Closure](#) – Memo from Planner and
Deputy Corporate Officer dated March 28, 2018

pg 7-10

[Draft Solid Waste Management Plan \(2017 Update\)](#) – Memo from Planner and Deputy
Corporate Officer dated March 28, 2018

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- [Draft Solid Waste Management Plan](#)
- [Slides](#)

10. PUBLIC QUESTION PERIOD

11. CLOSED MEETING RESOLUTION

Closed to the public, pursuant to Section _____ of the *Community Charter*

12. ADJOURNMENT

THE CORPORATION OF THE CITY OF ENDERBY

Minutes of a **Regular Meeting** of Council held on Monday, March 19, 2018 at 4:30 p.m. in the Council Chambers of City Hall

Present: Councillor Brian Schreiner, Acting Mayor
Councillor Tundra Baird
Councillor Brad Case
Councillor Roxanne Davyduke
Councillor Raquel Knust
Councillor Shawn Shishido

Chief Administrative Officer – Tate Bengtson
Planner and Deputy Corporate Officer – Kurt Inglis
Recording Secretary – Bettyann Kennedy
The Press

APPROVAL OF AGENDA

Moved by Councillor Knust, seconded by Councillor Baird that the agenda be approved as circulated.

Carried

ADOPTION OF MINUTES

Regular Meeting Minutes of March 5, 2018

Moved by Councillor Shishido, seconded by Councillor Case that the minutes of the regular meeting of March 5, 2018 be adopted as circulated.

Carried

PETITIONS AND DELEGATIONS

Forsite Consultants Ltd – Randy Spyksma and Julie Maxwell
Re: Community Wildfire Prevention Plan Update

The Community Wildfire Prevention Plan will identify potential risks within the community and a predetermined radius around the city limits. It is designed to identify risk, assess the consequences and create an action plan for managing those risks.

Hazards will be identified which will be used for emergency preparedness. There is very little Crown land in the 2 km radius around Enderby; it is mostly privately owned.

Fire Smart Principles will be discussed with private property owners. The focus is on educating the public to limit the risk of property loss should a wild fire occur. The plan is intended to be an educational tool.

Timeline: Fieldwork will begin shortly, followed by public open house in late May, with completion expected by June 25th.

BYLAWS – Adoption

Parks, Recreation and Culture Fees Imposition Bylaw No. 1578, 2015 Amendment Bylaw No. 1649, 2018

A bylaw to amend Parks Recreation and Culture Fees Imposition Bylaw No. 1578, 2015

Moved by Councillor Baird, seconded by Councillor Case that Parks, Recreation and Culture Fees Imposition Bylaw No. 1578, 2015 Amendment Bylaw No. 1649, 2018 be adopted.

Carried

NEW BUSINESS

Mill Avenue Bus Stop – Discussion Item

There are 4 options to explore:

- 1) Remove 10 parking spots on north side of Mill Ave between George St & Belvedere St.
- 2) Close the stop on Mill Ave and relocate to Maud St, removing 5 parking spots.
- 3) Close the stop on Mill Ave and reverse the loops travelled by both routes – buses would travel northbound on Maud St and westbound on Mill Ave.
- 4) Explore re-routing one or both bus services through Enderby.

Discussion:

- Option 3 could be viable. Trade-off would be loss of landscaping. This option could be done by mid-May.
- Option 4 would take longer, but may identify the best long-term bus stop location. It could involve using Maud St on the west side of the highway (in front of Evangelical Chapel or Credit Union), but this would not be known until BC Transit completes its analysis.

Moved by Councillor Baird, seconded by Councillor Case that Council supports Option #4;

AND THAT Staff engage with BC Transit to suggest they consider exploring a new bus stop location on Mill Avenue west of Highway 97A.

Carried

BC Municipal Climate Leadership Council Workshop – Correspondence dated March 5, 2018

Moved by Councillor Baird, seconded by Councillor Shishido that the correspondence be received and filed.

Carried

6th Annual “Our Enderby” Clean-up Challenge – Memo from Planner and Deputy Corporate Officer dated March 12, 2018

Moved by Councillor Shishido, seconded by Councillor Davyduke that Council endorse April 21, 2018 as the date for the 6th Annual Our Enderby Clean-up Challenge.

Carried

City of Maple Ridge – Correspondence dated March 14, 2018
Re: Employer Health Tax

Moved by Councillor Baird, seconded by Councillor Knust that the correspondence be received and filed.

Carried

PUBLIC QUESTION PERIOD

None

CLOSED MEETING RESOLUTION

Moved by Councillor Shishido, seconded by Councillor Knust that, pursuant to Section 92 of the *Community Charter*, the regular meeting convene In-Camera to deal with matters deemed closed to the public in accordance with Section 90 (1) (e) and (k) of the *Community Charter*.

Carried

ADJOURNMENT

The regular meeting reconvened at 5:25 p.m.

Moved by Councillor Knust, seconded by Councillor Shishido that the regular meeting adjourn at 5:25 p.m.

Carried

MAYOR

CHIEF ADMINISTRATIVE OFFICER



Box 159, 8866 Grainger Rd., Canal Flats, B.C. V0B 1B0
Phone: 250-349-5462 Fax: 250-349-5460
village@canalflats.ca

Agenda

February 28, 2018

Mayor Greg McCune
City of Enderby
PO Box 400
Enderby, BC
V0E 1V0

Dear Mayor McCune

Re: Adoption of a Flexible Ride-Sharing Regulation in the Province of BC

At the Monday, February 13, 2018 Regular Council Meeting, Council for the Village of Canal Flats passed the following resolution:

2018-8469 Moved by Councillor Sterzer seconded by Councillor Gornik

THAT the Village of Canal Flats Council direct staff to provide a letter of support to the City of Enderby regarding their initiatives introduced at the 2017 UBCM for the province to implement legislation for a regulatory framework that provides flexibility for programs such as ride-sharing programs to support small, rural and remote communities where public transportation is limited.

CARRIED.

The Village of Canal Flats Council agrees that rural communities would benefit from ridesharing where public transit cannot accommodate the needs of residents.

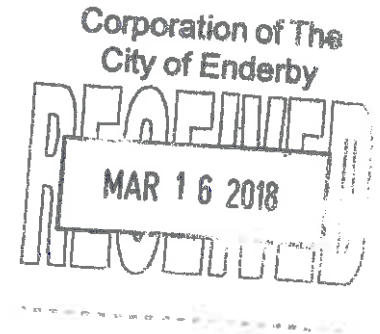
Ridesharing reduces impaired driving, complements public transit and provides flexible earning opportunities to driver/partners.

Please accept this letter of support for this initiative and if you have any questions, please contact us at the above address.

Yours truly,

Mayor Ute Juras

Cc: UBCM Member Municipalities





Agenda

UBCM Principles for Cannabis Taxation

Mar. 28, 2018

The UBCM Executive, at its February 23, 2018 meeting, endorsed a principled approach to cannabis excise tax revenue sharing. In the absence of fulsome data, UBCM's four principles seek to ensure that BC's share of cannabis excise tax revenue addresses all local government costs associated with legalization, with remaining funds shared between the Province and BC local governments.

Derived primarily from the work of the Joint Provincial-Local Government Committee on Cannabis Regulation and established UBCM policy (i.e. endorsed resolutions), UBCM has established the following four principles:

1. Cannabis legalization should not result in additional local government funding by property taxpayers
2. Local governments should be reimbursed for costs associated with the implementation of legalized cannabis.
3. Local governments should be reimbursed for any additional policing costs resulting from cannabis legalization.
4. Remaining excise tax revenue (after taking out expenses incurred as part of principles 1-3 and the federal share) should be shared between the Province of BC and local governments.

It is generally accepted that local government services will be greatly impacted by the legalization of non-medical cannabis. Areas such as policing, bylaw enforcement, land use, public health, business licensing, education, and public consultation have the potential to increase local budgets. Of these costs, law enforcement is arguably the most costly line item on a local government's budget. UBCM's principles look to address these costs, while also trying to ensure that any remaining taxation revenue will be shared between the Province and BC local governments.

Through endorsed resolutions 2017-SR1, 2016-A3, and 2016-A2, UBCM's membership has placed a high priority on cost recovery and equitable sharing of taxation revenue. However, at this point there is a lack of reliable data, and with a provincial framework that continues to evolve, UBCM has taken a principled approach to cannabis taxation revenue sharing.

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THE CORPORATION OF THE CITY OF ENDERBY

MEMO

To: Tate Bengtson, Chief Administrative Officer
From: Kurt Inglis, Planner and Deputy Corporate Officer
Date: March 28, 2018
Subject: Enderby Arts Festival 2018 - Temporary Road Closure

RECOMMENDATION

THAT Council receives the Enderby & District Arts Council's Temporary Road Closure application for information.

BACKGROUND

The Enderby & District Arts Council has submitted a Temporary Road Closure application (attached) for the Enderby Arts Festival scheduled for Saturday July 28, 2018; the applicant is proposing to close portions of Cliff Avenue and Belvedere Street between the hours of 6:00 am and 5:00 pm.

As this is not a first-time event and all requirements for a road closure have been met consistent with the *Temporary Road Closures for Community Events* policy, Staff have approved the application. As the Enderby & District Arts Council's insurance is not due for renewal until June 2018, a certificate of insurance will be provided at that time; the City is a named insured on the Arts Council's current insurance policy.

Respectfully Submitted,



Kurt Inglis
Planner and Deputy Corporate Officer

Policy Title	Temporary Road Closures for Community Events
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Adopted: August 13, 2012	Authorized By: Mayor and Council Regular Meeting of August 13, 2012	Replaces: Not applicable
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PURPOSE:

The City will consider approving the temporary closure of municipal roads for a community event.

POLICY:

Temporary road closures will only be considered for community events which are sponsored by a recognized organization.

The Chief Administrative Officer or designate is granted the authority to approve a Temporary Road Closure Permit on behalf of Council, subject to the applicant meeting all the requirements of this policy. First time events must be approved by City Council.

A completed Schedule A, "Application for Temporary Road Closure," shall be submitted to City Hall at least 21 days prior to the closure. The application must include a map of the proposed road closure and emergency access through the closure. Applications for first-time or relocated events requiring Council approval must be submitted two months prior to the closure.

The organizer shall notify and consult with business owners within a one-block radius of the proposed road closure and residents adjacent to the proposed road closure. The organizer agrees to take reasonable steps to mitigate disruption for affected business owners and residents. Failure to adequately notify and consult affected businesses and residents may result in revocation of permit or refusal of future applications. Unless exempted by Council, all first-time or relocated event applications must include a petition signed by a majority of affected business owners agreeing to the proposed event.

The applicant for a Temporary Road Closure must submit proof of public liability and property damage insurance in a form acceptable to the City. The applicant may request that insurance requirements be waived based on the risk profile of the event. Such waiver does not affect any other responsibility of the applicant to obtain insurance.

The applicant shall be responsible for all traffic management, including the provision, set up, and removal of signs and barricades on the same day as the road closure.

The applicant shall be responsible for ensuring that all food service establishments, including but not limited to mobile vending units, food services at temporary events, and sellers of home-prepared foods, shall have the appropriate authorization or permit from Interior Health.

The applicant shall be responsible for emptying municipal garbage receptacles and cleaning up litter from the road closure area on the same day as the closure.

As a condition of permit, the City of Enderby will not be liable or otherwise responsible for any scheduling conflict, revocation, refusal, maintenance closure or other damage or harm related to the issuance of this permit.

**Schedule A
Application for a Temporary Road Closure for a Community Event**

Is this a first-time or relocated event? Yes No

Name of Sponsoring Organization ENDERBY + DISTRICT ARTS COUNCIL

Name of Contact Person NEIL FIDLER

Telephone or Email nfidler@shaw.ca 250 838 0577

Name of Event ENDERBY ARTS FESTIVAL

Date(s) of Closure July 28 2018

Start time for Closure 6:00 AM End time for Closure 5:00 PM

Location of Closure CLIFF AVE GEORGE ST - OLIVERMAN RD
BELVIDERE CLIFF - MILL

Required Attachments

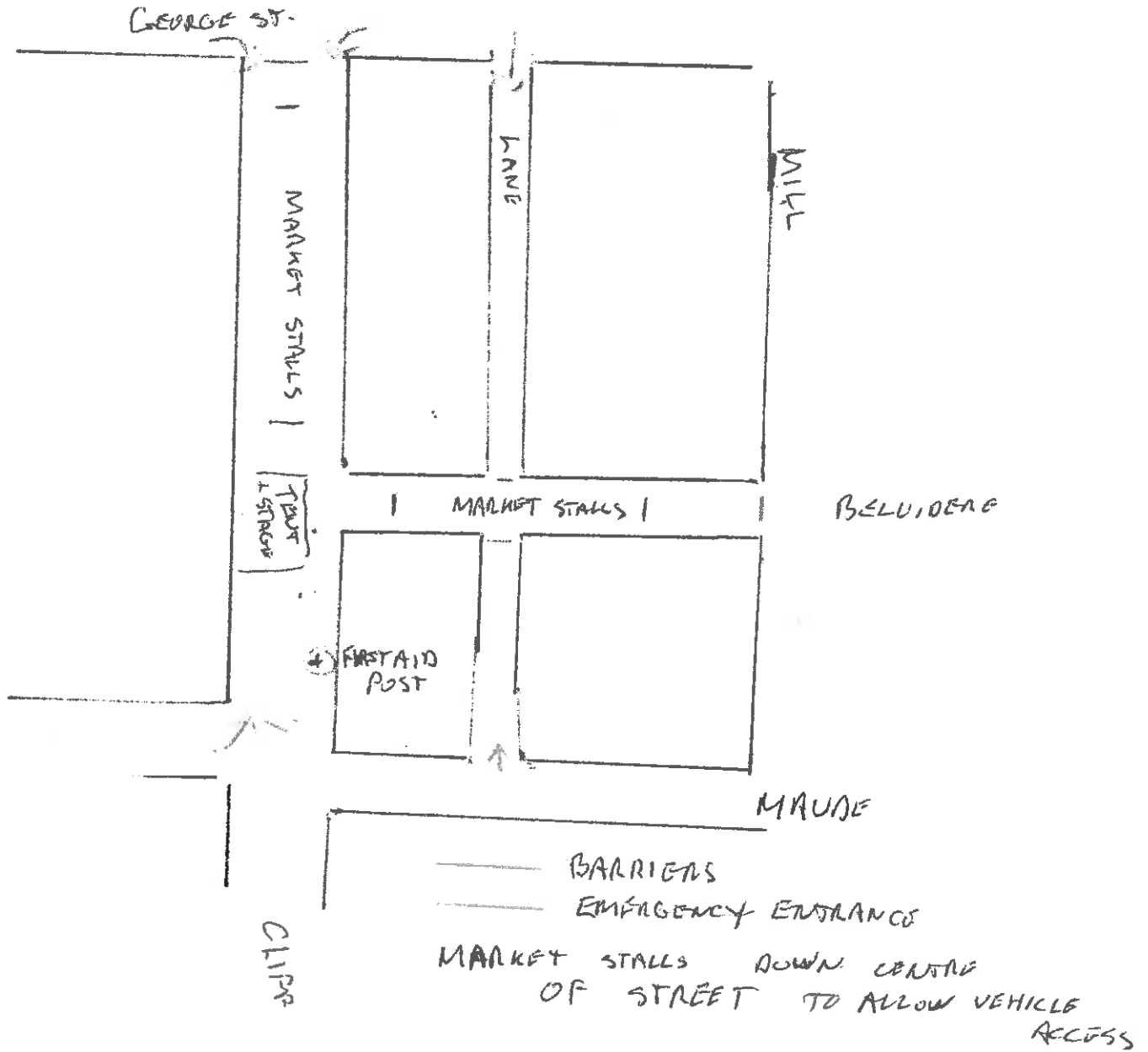
- Map showing closure and emergency access route
- Petition of affected business owners (if applicable)
- Certificate of insurance (if applicable)

Indemnity: The applicant agrees to indemnify and save harmless the City of Enderby from and against any and all claims, including but not limited to harm, damage, injury, or loss to body or property caused by, arising from, or connected with any act or omission of the applicant or any agent, employee, customer licensee or invitee of the applicant, and against and from all liabilities, expense costs and legal or other fees incurred in respect of any such claims or any actions or proceedings brought thereon arising directly or indirectly from or in connection with the property, facilities, or services of the City. The applicant will be required to obtain and keep in force throughout the period of use insurance in a form specified by the City of Enderby unless waived in writing.

Authorized Signatory _____ Date _____

Do Not Complete - For Administrative Purposes			
Approved by	<u>Y. Kurt Ins</u>	Date	<u>March 28, 2018</u>
Certificate of Insurance	<u>Yes</u>	No	N/A
Map	<u>Yes</u>	No	N/A
Petition of Affected Business Owners	<u>Yes</u>	No	N/A

2018 ARTS FESTIVAL



THE CORPORATION OF THE CITY OF ENDERBY

MEMO

To: Tate Bengtson, Chief Administrative Officer
From: Kurt Inglis, Planner and Deputy Corporate Officer
Date: March 28, 2018
Subject: Draft Solid Waste Management Plan (2017 Update)

RECOMMENDATION

THAT Council advises the Regional District of North Okanagan that the City of Enderby is:

- i. Open to having discussions at the regional level regarding solid waste management;
- ii. Looking forward to reviewing the results of the Solid Waste Management Survey, as it will help inform Enderby's long term approach to solid waste management;
- iii. Supportive of using education and awareness to promote solid waste reduction; and
- iv. Desirous of further consultation regarding the strategic objectives and implementation of the Solid Waste Management Plan, prior to the Plan being submitted for Ministry approval.

BACKGROUND

The Regional District of North Okanagan (RDNO) is responsible for managing solid waste within the region. It owns or co-leases six different Recycling and Disposal Facilities (RDF), and two Municipal transfer stations in the North Okanagan. Each local jurisdiction is responsible for curbside garbage collection while Recycle BC is responsible for residential recycling collection. Currently, curbside garbage collection is provided by the municipalities of Vernon, Armstrong, Enderby and Lumby; single family households in Coldstream, Spallumcheen, and the Electoral Areas either subscribe to a private collection service or self-haul their household garbage to a RDF.

In British Columbia, regional districts develop Solid Waste Management Plans (SWMPs) under the provincial *Environmental Management Act*. In 2017, the RDNO initiated an update to its SWMP; the intent of the update was to provide a long-term vision of how the RDNO plans to manage its solid wastes, and also serve to guide solid waste management related activities and policy development, for the next 10 years.

The SWMP update process involves 4 key steps:

- 1. Assessment of current system and develop list of options;
- 2. Detailed analysis and evaluation of priority options;
- 3. Community and stakeholder consultation, including public, key stakeholders, and First Nations; and
- 4. Update Solid Waste Management Plan for Ministry approval.

The RDNO has completed Steps 1 and 2 which has resulted in the attached Draft Solid Waste Management Plan. The Draft SWMP addresses issues related to solid waste management and then outlines strategies, actions and a budget to address them. RDNO is now undertaking public consultation prior to updating the Plan for Ministry approval.

The Draft SWMP identifies a number of high-level strategies that form the foundation of the Plan; these strategies include:

- i. Increase organics diversion;
- ii. Reduce disposal from single family residential households;
- iii. Reduce disposal for sectors served by commercial haulers (industrial/commercial/institutional, multi-family residential, and construction & demolition waste);
- iv. Develop programs to actively promote waste reduction and reuse initiatives;
- v. Establish staff positions to develop, implement and provide ongoing efficiency to ensure program effectiveness;
- vi. Develop a centralized disposal plan with additional landfill capacity; and
- vii. Prepare a disaster response plan.

There are a number of actions associated with each strategy that are discussed in the Draft SWMP.

At a meeting between RDNO and City Staff to discuss the Draft SWMP, RDNO Staff advised that they would like to receive formal comments from the City of Enderby regarding the strategic direction.

Staff feel that it is clear that the strategic direction of the SWMP will have significant environmental, social and economic impacts to the City of Enderby and its residents; RDNO Staff were forthcoming in advising that, until an Implementation Plan is developed for the SWMP, they are unable to forecast or measure these impacts at the local level. Given this, Staff feel that the City is not in a position to provide detailed comments on the Draft SWMP as there is insufficient information available to understand the impact. In lieu of providing detailed comments to the RDNO regarding the Draft SWMP, Staff are recommending that Council supports providing the following comments:

1. The City is open to having discussions at the regional level regarding solid waste management

RDNO Staff advised that one of the ways in which solid waste reduction targets could be achieved would be to explore different regional solid waste management initiatives. Staff recognize that there may be strategic benefits and cost efficiencies associated with a regional approach to some aspects of solid waste management, and furthermore, this may present opportunities for inter-jurisdictional coordination that may help to advance priorities. Given this, Staff are supportive of on-going conversations at the regional level to explore these opportunities.

2. The City is looking forward to reviewing the results of the Solid Waste Management Survey, as it will help to inform Enderby's long term approach to solid waste management

In April, the RDNO will be implementing a public survey seeking feedback on the Draft SWMP. Staff anticipate that the results of this survey will be helpful for the City in assessing community support for initiatives that may require behaviour changes or new costs.

3. The City is supportive of using education and awareness as a tool to help promote solid waste reduction

Staff feel that it is appropriate to support the broad use of education and awareness to promote solid waste reduction. This is a cost-effective first step that is consistent with regulatory best practices.

- v. The City is desirous of further consultation regarding the strategic objectives and implementation of the Solid Waste Management Plan, prior to the Plan being submitted for Ministry approval.

Given that the City is not in a position to provide detailed comments on the Draft SWMP at this time, Staff feel that it is important to communicate to the RDNO that the City wishes to have further consultation regarding the strategic objectives and implementation of the SWMP, prior to the Plan being submitted for Ministry approval. As the strategic objectives and implementation of the SWMP evolve, it will allow the City to gain a better understanding of the associated environmental, social, and economic impacts. Further consultation will ensure that the City is in a position to communicate its objectives relative to solid waste management when sufficient information is available.

Respectfully Submitted,



Kurt Inglis

Planner and Deputy Corporate Officer

SOLID WASTE MANAGEMENT PLAN DRAFT 2017 UPDATE



ISSUED FOR REVIEW
FEBRUARY 2018

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EXECUTIVE SUMMARY

In British Columbia, regional districts develop solid waste management plans (SWMPs) under the provincial Environmental Management Act. This plan, an update of the one prepared in 2011, provides a long-term vision of how the Regional District of North Okanagan (RDNO) would like to manage its solid wastes and will serve to guide the solid waste management related activities and policy development in the RDNO for the next 10 years.

For this plan, the issues addressed were:

1. Almost 30% of the current waste stream is comprised of compostable organics
2. Not all households receive curbside garbage collection resulting in less diversion potential compared to a three-stream system (recycling, organics, and garbage)
3. Over 60% of the current waste stream is collected through commercial haulers.
4. There are currently insufficient programming and behaviour change resources to support the first levels of the pollution prevention hierarchy including rethink, reduce and reuse initiatives.
5. No staff resources are currently focused on supporting and implementing residential and ICI waste reduction programs, including collection and diversion efforts.
6. ASRDF is reaching capacity, there are emerging and ongoing environmental issues at the ASRDF and LRDF, and additional land has been purchased beside the GVRDF to allow for mitigation of environmental issues and lateral expansion of the site, reconfiguration of the disposal system may be necessary to mitigate issues and increase efficiency in the system.
7. The RDNO has no disaster debris management plan.

This plan provides strategies, actions and a budget to address these issues.

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ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
ASRDF	Armstrong Spallumcheen Recycling and Disposal Facility
CBSM	Community-based Social Marketing
C&D	Construction and Demolition
EPR	Extended Producer Responsibility
GHG	Greenhouse Gas
ICI	Industrial Commercial Institutional
GVRDF	Greater Vernon Recycling and Disposal Facility
HHW	Household Hazardous Waste
LRDF	Lumby Recycling and Disposal Facility
MF RES	Multi-family Residential
MSW	Municipal Solid Waste
RDNO	Regional District of North Okanagan
RD	Regional District
RDF	Recycling and Disposal Facility
RSWAWG	Region Solid Waste Advisory Working Group
RYWCF	Regional Yard Waste Composting Facility
SF RES	Single Family Residential
SWMP	Solid Waste Management Plan

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Regional District of North Okanagan and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Regional District of North Okanagan, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

In British Columbia, regional districts develop solid waste management plans under the provincial *Environmental Management Act*. Regional districts are modeled as a federation composed of municipalities and electoral areas, each of which has representation on the regional board. Solid waste management plans are long term visions of how each regional district would like to manage its solid waste in accordance with the pollution prevention hierarchy. This plan will be renewed on a 10-year cycle to ensure that it reflects the current needs of Regional District of North Okanagan (RDNO) as well as current market conditions, technologies and regulations.

This draft document represents an update of the RDNO's 2011 solid waste management plan (SWMP) and once approved by the Province (along with any approval conditions), becomes a regulatory document for solid waste management and serves to guide the solid waste management related activities and policy development in the RDNO. In conjunction with regulations and operational certificates that may apply, this plan regulates the operation of sites and facilities that make up the region's waste management system.

1.1 Guiding Principles

A solid waste management plan provides regional districts (RD) – and their residents and businesses – clear direction on how they will achieve their solid waste goals. The province has provided the following guiding principles to follow in the development of their solid waste management plans:



During this planning process, the Regional Solid Waste Advisory Working Group's (RSWAWG) reviewed these guiding principles, as well as the principles used in all prior RDNO solid waste management plans, and integrated these principles along with locally relevant components to guide the development of this plan update.

The RDNO should reduce the disposal of residual solid waste because it can:

1. Negatively impact the environment
2. Requires resources to manage such as financial and landfill capacity, and
3. Because a reduction is being recommended by the Province of British Columbia.

The RDNO will:

Encourage residents and workers in all business sectors in the region to act in accordance with:

1. The hierarchy of “reduce, reuse and recycle”
2. The ideal of zero waste within closed loops
3. Ecological and social sustainability of waste disposal practices
4. The prevention of littering, air and water pollution and greenhouse gas emission

through approved programs, bylaws and polices that include:

1. Education and promotion
2. Best practices
3. Consistent criteria
4. Effective services
5. Incentives, and
6. Restrictions;

and, will prioritize and favour, in its practices

1. Prevention of air and water pollution
2. Prevention of greenhouse gas emissions
3. Use of renewable energy
4. Public health and safety
5. Development of collaborative partnerships to support initiatives, and
6. Resources shared with other jurisdictions, such as facilities and services.

1.2 Pollution Prevention Hierarchy and Targets

This plan adopts the 5 R pollution prevention hierarchy as illustrated in Figure 1-1.



Figure 1-1: The Pollution Prevention Hierarchy

Source: (BC Ministry of Environment and Climate Change Strategy, n.d. ¹)

The Plan’s proposed strategies and actions are laid out in Sections 3.0, 4.0, and 5.0 and are presented in the order of the hierarchy: reduce, reuse, recycle, residual waste management.

The implementation of the proposed strategies and actions over a 10-year timeframe is expected to reduce the annual per person disposal rate from 550 kg per capita to 350 kg per capita over the next 10 years, by 2028, through a phased approach. Phasing implementation will optimize existing and implement new waste reduction and diversion programs with the capacity to reduce disposal per capita. The quantity of refuse to divert by 2028 through various programs is estimated to be 10,500 tonnes based on today’s disposal rate. The disposal rate target aligns with the British Columbia Ministry of Environment and Climate Change Strategy’s (Ministry) provincial target disposal rate of 350 kg per capita per year.

Additionally, the Ministry set a target to have 75% of the population in British Columbia covered by an organic waste disposal restriction by 2020 and through a separate Recycling Regulation, the Ministry oversees an Extended Producer Responsibility (EPR) program that sets 75% recovery targets for products covered through the program (e.g., beverage containers, packaging and printed paper, electronics, and other items).

As a signatory to the Climate Action Charter, RDNO is working towards reducing greenhouse gas (GHG) emissions derived from corporate operations which includes the transportation and diversion of solid waste. In working towards fulfilling the commitments of the Climate Action Charter, RDNO will conduct annual inventories of GHG emissions and seek opportunities for reducing emissions. With respect to solid waste management, RDNO will amend collection and or hauling contracts to include fuel management reporting requirements to populate the corporate GHG emissions inventory and encourage the use of fuel efficient vehicles. Energy efficiency opportunities will also be investigated in facilities used in the diversion of solid waste. The RDNO Regional Growth Strategy proposes to establish regional GHG reduction targets of 15% by 2020 and 25% by 2030 from the 2007 baseline. Solid waste management makes up 4.6% of regional community GHG emissions, therefore, initiatives that result in waste reduction, waste diversion or transportation reductions within the SWMP will contribute to achieving these GHG reduction targets.

¹ <http://www2.gov.bc.ca/gov/content/environment/waste-management/zero-waste>

1.3 The Plan Update Process

The process to review and update the SWMP was conducted in four steps. The first step included two components: the establishment of RSWAWG to assist in the plan review and update, an assessment of the current system and a report on the implementation status of the 2011 SWMP to develop a long and short list of options for consideration in the 2017 SWMP Update. The second step was a detailed analysis and evaluation of priority options, and developing and writing the 2017 SWMP Update. The third step was completion of a community and stakeholder consultation process to engage the public, key stakeholders, and First Nations to provide input on the selected options. The fourth step was to finalize the 2017 SWMP Update for submission to the Ministry for approval.



Several reports, as listed below, were prepared by the consultants to assist the RWSAWG with their deliberations. These documents are available on the solid waste management page of the RDNO's website (<http://www.rdno.ca/index.php/services/community/solid-waste>). These reports, as seen in Appendix B, include:

- Current Solid Waste System Report
- Technical Memorandum 1: Disposal Options
- Technical Memorandum 2: Reduce, Reuse and Recycle
- Technical Memorandum 3: System Recap, Bylaws, Policies, Plan Options

2.0 BACKGROUND

2.1 Plan History

The objectives of the 2011 SWMP review were to evaluate the status of current waste reduction initiatives and the quantity of waste currently being disposed. Seventy-one potential waste reduction initiatives were identified; ten strategies were selected and another six were derived through additional consultation, shown in Table 2-1. The primary objective of the SWMP Update was to create a feasible plan and identify initiatives which would allow RDNO to reduce the per capita disposal rate from 0.63 tonnes to 0.55 tonnes. The RDNO's first SWMP was completed in 1995, and updated SWMPs have been completed in 2002 and 2011. The updated plan in 2011 did not receive final approval by the Ministry due to a shortage of staffing resources at the provincial level.

Table 2-1: 2011 Solid Waste Management Plan Update Strategies

No.	Strategy	Description	Status
1.	Organic Waste Management Strategy	Determine the best management strategy for organic waste including wood and yard waste from the DLC, residential, commercial, industrial, and agricultural sectors; and kitchen scraps from the residential, commercial, industrial and agricultural sectors.	Ongoing
2.	Expanded Curbside Collection	Determine the economic viability of an Expanded Curbside Collection Program for all residential generated materials, including garbage, compostables, and recyclables.	Ongoing
3.	Implement One Bag/Can Limit	Consider a weekly one bag/can limit for households with a municipal curbside collection service. Since 1996 the limit has been set at two cans per week; given new diversion opportunities, there is increased viability for shifting to a new norm of one can per week	Ongoing
4.	Blue Box Recycling Program for Businesses	Determine the best method for including businesses in the Blue Box Recycling Program.	Ongoing
5.	Upgrade Communications Tools	Upgrade the RDNO website and other communication tools to help residents, businesses and others determine what materials can be recycled	Ongoing
6.	Enhance Service at GVRDF for Commercial Haulers	Evaluate the economic and operational implications of providing enhanced service for commercial haulers at the GVRDF. Enhancements could include early openings and a dedicated commercial scale. Being addressed through ongoing operations and major capital works, including the addition of a third lane in 2018 to assist commercial haulers	Ongoing
7.	Audits of Large Waste Generators	Consider offering a comprehensive waste audit to the 15 largest waste generators in the Region. Currently to be addressed through behavior change programs that provide audit support	Not currently being pursued
8.	DLC Waste Management Strategy	Examine mechanisms for further diversion of DLC waste, including but not limited to, private and public resource recovery parks and partnerships with industry.	Partially pursued via permitting mechanisms for City of Vernon, working to implement with other municipalities
9.	Non-Typical Municipal Solid Waste Management	Examine efficiencies and environmental protection needs with respect to including management of non-typical municipal solid wastes such as agricultural (e.g., plastics and slaughter waste) and industrial wastes (e.g., ash and wood), and water and wastewater treatment plant wastes in the SWMP.	Partially pursued by using Tolko Mill outputs to supplement daily cover, accepting Duteau Creek Water Treatment Plant sludge for composting, and accepting animal fatalities from agricultural operations
10.	Blue Bag Recycling Program Improvements	Evaluate the curbside Blue Bag Program and the Drop Centre Program to determine if the program should be expanded to include materials such as textiles, fluorescents, agriculture plastics, and other plastic products.	Partially pursued via Drop Centres (Recycle BC oversees Blue Bag Program)

No.	Strategy	Description	Status
11.	Development Cost Charges	Determine how local governments can include solid waste management infrastructure in their Development Cost Charge (DCC) bylaws by 2016.	Pursued but not currently viable
12.	Inter-Regional Solid Waste Management Committee	If interest exists, facilitate cooperation of southern interior solid waste management staff, municipal councils, and regional district Boards of Directors through an interregional Solid Waste Management Committee.	Pursued but not currently viable
13.	Monitor Waste to Energy Technology	Monitor waste to energy technology as it becomes accessible to small communities in Canada	Pursued but not currently viable
14.	Eco-Depots	Evaluate eco-depot concepts and locations especially with respect to customer convenience and land use in the region.	Completed
15.	Blue Bag Processing Facility	Continue to operate the current Blue Bag processing system and facility with minor capital improvement until more details about the provincial EPR program for packaging and printed paper are known.	No longer required
16.	More Frequent Free Styrofoam Collection Events	Consider increasing the number of free Styrofoam collection events until Styrofoam packaging becomes part of an industry stewardship program	No longer required

The draft 2017 SWMP is an update of the RDNO's 2011 SWMP and once approved by the Province (along with any approval conditions), becomes a regulatory document for solid waste management and guides solid waste management related activities in the RDNO for the next ten years.

2.2 Plan Area

The SWMP applies to the entire RDNO region. The land area of the RDNO is 7,503 square kilometres and the population density is 11.2 people per square kilometre. Regional districts are modeled after federations composed of municipalities and electoral areas, each of which have representation on the regional board. RDNO municipalities and electoral areas include Armstrong, Coldstream, Enderby, Lumby, Spallumcheen, Vernon, B – BX/Swan Lake, C – BX/Silver Star, D – Rural Lumby, E-Cherryville, and F- Rural Enderby. A map of the RDNO is included as Figure 2-1.

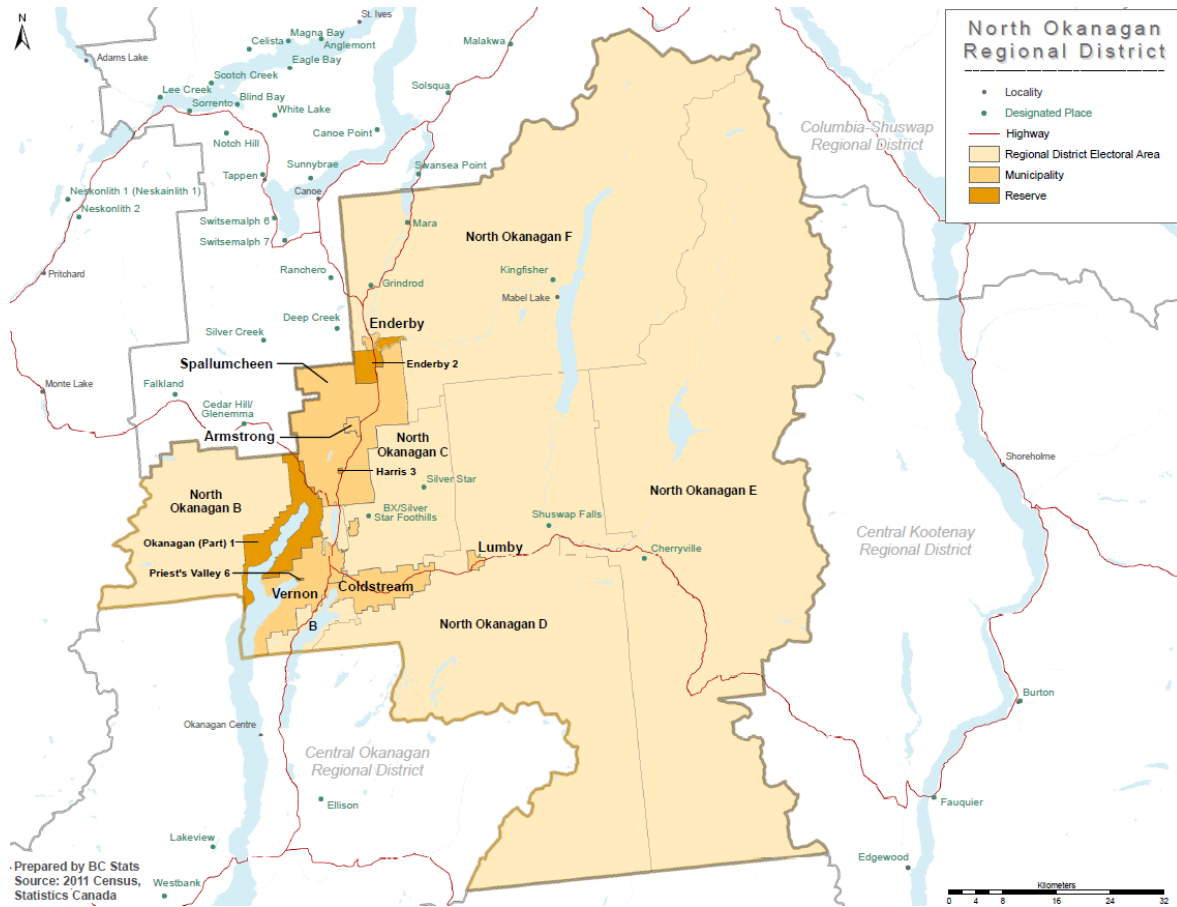


Figure 2-1. Map of Regional District of North Okanagan

Source: (BC Ministry of Environment and Climate Change Strategy, n.d. ²)

The plan also included consultation with the First Nations. The following Indian Reserves are located fully and in part in the RDNO under control of the Okanagan and Spltasin First Nations:

- Enderby Indian Reserve No. 2;
- Harris Indian Reserve No. 3;
- Okanagan Indian Reserve No. 1 (only partly within the RD); and

² <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/land-use/administrative-boundaries/census-boundaries>

- Priest's Valley Indian Reserve No. 6.

2.2.1 Population and Employment

In 2016, the population of the RDNO was 84,354, which represents a change of 3.8% from 2011 as outlined in Table 2-2. This compares to the provincial average increase of 5.6% and the national average of 5.0% as reported by Statistics Canada. Approximately 60% of the population collectively reside in the communities of Vernon and Coldstream. Population growth in the five-year period 2006 to 2011 was a modest 1% per annum and has slowed to 0.8% per annum with more rapid growth occurring in Vernon and Coldstream.

Table 2-2: Population Change

Years	Population counts	Population change
2006 (census)	77,301	-
2011 (census)	81,237	+5.1% (from 2006-2011)
2016 (census)	84,354	+3.8% (from 2011-2016)
2026 (projected)	94,250	(+1.12% Growth/annum) ¹

¹ RDNO Regional Growth Strategy Estimated Growth Rate (http://www.rdno.ca/bylaws/Bylaw_2500.pdf)

2.2.2 Housing and Economic Data

The 2016 census data reported by Stats Canada reports that in 2016, there were 35,875 private dwellings occupied in the RDNO which represent a change of 6.3% from 2011. The total number of dwelling in the RDNO is 39,970. Single-detached houses represented 64.2% of all occupied private dwellings in this region in 2016. A summary of the distribution of dwelling types is summarized in Table 2-3.

Table 2-3: Proportion of Occupied Dwelling Types (Statistics Canada 2016)

Occupied Dwelling Type	Proportion	Number
Single Detached Homes	64.2%	23,032
Row Houses, Duplex, and Semi-Detached Homes	17.4%	6,242
Apartment Buildings	13.9%	4,987
Other (mobile homes and other single attached houses)	4.5%	1,614
Total	100%	35,875

The region's employment is distributed across several sectors; the largest employment generators in the RDNO include retail trade, health care, construction and manufacturing.

2.2.3 Collection

There is curbside recycling collection for over 50% of RDNO single family residences (SF RES). Garbage is collected weekly in most municipalities, which equates to approximately 62% of RDNO households, all with a two bag/can limit. Some residents need to contact private haulers to arrange for a subscription based service as there is no collection services provided or administered by their municipalities or the RDNO. Weekly curbside organics collection is not provided in any areas; however, most municipalities have a twice yearly curbside and drop off yard waste collection in spring and fall (e.g., Coldstream). For the purposes of this report, organics is defined to include

yard waste and food scraps (including wasted food).

Multi-family residential (MF RES) properties with more than four units were required to contact and register for recycling collection services through Recycle BC-registered haulers.

A summary of the existing residential curbside collection programs is provided in Table 2-4.

Table 2-4: Residential Curbside Collection

Municipality or Electoral Area	Households ¹	Regular Curbside Collection Service		
		Garbage	Recycling	Yard Waste
Vernon	17,798	Yes	Yes	No ²
Armstrong	2,132	Yes	Yes	No ²
Enderby	1,391	Yes	Yes	No ²
Lumby	563	Yes	Yes	No ²
Coldstream	3,915	No ³	Yes	No ²
Spallumcheen	2,001	No ³	Yes	No ²
Electoral Area B	1,284	No ³	Yes	No
Electoral Area C	1,497	No ³	Yes (part)	No
Electoral Area D	1,106	No ³	Yes (part)	No
Electoral Area E	431	No ³	No	No
Electoral Area F	1,737	No ³	Yes (part)	No
Total Households with Publicly-Contracted Collection	-	21,884	33,855	0
Total Households without Publicly-Contracted Collection	-	11,971	0	33,855
Total Households in RDNO Municipalities and Electoral Areas	-	33,855	33,855	33,855

¹ 2016 Stats Canada Census Households with Usual Residents

² The City of Vernon provides a yard waste collection service in the spring and fall over a one week period as well as a spring chipping program conducted over a two-week collection period. Enderby, Lumby, Armstrong and Spallumcheen (3 subdivisions only) also provide a one-day only spring and/or fall yard waste collection service. Coldstream provides a seasonal drop off service.

³ Collection services can be arranged by the resident through the private sector on a subscription basis

2.2.4 Facilities

Municipal solid waste (MSW) in the region can be directed for management to any authorized site or facility identified in the plan. Authorized sites or facilities are listed below:

2.2.4.1 Existing Facilities

There are three transfer stations that accept MSW including:

- Cherryville Transfer Station, located at 205 Aumond Road in Cherryville (Electoral Area E) at a closed landfill site [Crown Lease] – waste is transferred to the LRDF
- Kingfisher Transfer Station, located at 150 Beattie Road near Mabel Lake (Electoral Area F) at a closed landfill site – waste is transferred to the ASRDF

- Silver Star Transfer Station, located at 9695 Silver Star Road at Silver Star Mountain Ski Resort (Electoral Area C) [Crown Lease] – waste is transferred to the GVRDF

There are three active disposal facilities, or landfills, that exist in RDNO.

- Lumby Recycling and Disposal Facility (LRDF) (OC #15282) is the smallest of the three landfills, receiving 1,841 tonnes in 2016, and is located at 221 Trinity Valley Road near Lumby (Electoral Area D). The plan for this site is to continue filling the east half of the footprint and to evaluate converting the facility into a construction and demolition waste site only to mitigate environmental issues. The estimated closure year is 2071.
- Armstrong Spallumcheen Recycling and Disposal Facility (ASRD) (OC #15284) received 11,419 tonnes in 2016, a small increase (1.3%) from 2015, and is located at 3367 Powerhouse Road in Spallumcheen. The plan for this site is to focus on filling the unlined north half of the existing footprint so that a partial closure (Phase 1) can be constructed in 2019 to mitigate environmental issues. A landfill gas collection system is also being evaluated for implementation in 2019. The estimated closure year is 2027
- Greater Vernon Recycling and Disposal Facility (GVRDF) (OC #15286) received 28,926 tonnes in 2016, an increase of 1.7% from 2015, and is located at 120 Birnie Road near Vernon (Electoral Area B). The plan for this site is to focus filling on the upper northeast bench of the footprint to maximize landfill gas extraction. A conceptual design for a lateral expansion area on the 99 acre parcel adjacent to and west of the current footprint was completed in 2015. The estimated closure year for the existing footprint is 2059 and for the expanded footprint is 2081.
- Eco Depot
 - Located at Interior Freight and Bottle Depot (in Vernon), the Eco Depot accepts Household Hazardous Waste (HHW) from residents and is open seven days per week. This depot replaced annual roundups for HHW in the region. Interior Freight and Bottle Depot also accepts most EPR-managed products as well so is considered a one-stop-drop facility.
- Composting Facility
 - The Regional Yard Waste Composting Facility (RYWCF) is located at the GVRDF and was commissioned in 2011. This facility produces the RDNO branded compost called “rdno-gro”. The RYWCF accepts chipped yard and garden waste, as well as chipped logs and stumps and the RDNO’s Duteau Creek Water Treatment Plant sludge, which is composted in large windrows, turned, watered and monitored regularly and then screened to produce a Class A compost. The rdno-gro is distributed to the public and landscaping businesses on a self-load basis starting in the spring of each year. Residents and landscaping businesses can drop off yard waste free of charge all year round at the GVRDF yard waste tipping area. This material is chipped by the GVRDF operations contractor regularly and hauled and placed into windrows at the RYWCF.
- Backyard Composting Demonstration Garden (Xerindipity Garden)
 - The Xerindipity Garden was constructed in 2005 to provide a venue for demonstrating backyard composting and to hold education seminars on topics such as ‘how to compost in your backyard’, ‘grass-cycling’, ‘water wise gardening’, etc. The facility property is leased from the City of Vernon and is co-managed by the RDNO’s Greater Vernon Water Utility. It’s location beside the Okanagan Science Center and the Arts Council of the North Okanagan facilities inside the City’s Polson Park makes it ideal for promoting environmental and waste reduction initiatives.

2.2.4.2 Closed Facilities

- Ashton Creek Recycling & Disposal Facility (RDF) [final closure 1997] (OC #15287), located near Enderby off Mabel Lake Road (Electoral Area F)
- Cherryville RDF [final closure 2016] (OC #15285)
- Kingfisher RDF [final closure 2003] (OC #15281)
- Pottery Road RDF [final closure 2015] (PR 15289), located at 288 Pottery Road near Vernon (Electoral Area C)

2.3 Waste Disposal

When RDNO waste disposal data is organized according to “hauler type”, or by generator type (residential, Industrial, Commercial and Institutional [ICI], and Construction & Demolition [C&D]) that delivers it to disposal facilities, the distribution of garbage is reported in Table 2-5. When broken down by “hauler type”, commercial haulers deliver SF RES garbage to disposal facilities primarily using rear or side load packer trucks and on behalf of municipalities and subscription customers (private curbside collection contracts) (20%); commercial haulers deliver MF RES, ICI and C&D waste from the three sectors primarily using front load, roll off and other large trucks and trailers (62%); and self-haul customers deliver residential, ICI and C&D waste using an assortment of small personal vehicles and tip the materials into containers at each facility, including the transfer stations (18%).

Table 2-5: Current Garbage Disposal by Hauler

Hauler	Estimated Garbage by Hauler (2017 ¹)	
	Tonnes	Percent
Single Family (SF RES) Municipal and Subscription Curbside	9,059	20%
ICI (including Multi-Family Residential [MF RES] and C&D)	28,084	62%
Self-Haul (SF RES, ICI, and C&D)	8,153	18%
Total	45,296	-

¹ Annualized based on extrapolation of actual scale data from March to November 2017.

However, as discussed in the 2017 RDNO Current Solid Waste System Report, curbside garbage collection is only provided by the municipalities of Vernon, Armstrong, Enderby and Lumby. The remaining 35% of SF RES households in Coldstream Spallumcheen and the Electoral Areas either subscribe to a private collection service or self-haul their household garbage to the nearest RDNO RDF. If those households that currently receive curbside recycling collection service from Recycle BC were to also receive curbside garbage collection, the proportion of garbage collected from SF RES households through a municipal program increases significantly as shown in Table 2-6.

Table 2-6: Adjusted Garbage Disposal by Hauler

Hauler	Estimated Garbage by Hauler (2017 ¹)	
	Tonnes	Percent
SF RES Municipal and Subscription Curbside	14,059	30%
ICI (MF RES and C&D)	26,584	60%
Self-Haul (SF RES, ICI and C&D)	4,653	10%
Total	45,296	-

¹ Annualized based on extrapolation of actual scale data from March to November 2017.

2.4 Waste Composition

Figure 2-2 shows the adjusted 2012 waste composition results that represent aggregated results from across sectors. These results were adjusted to remove yard waste, given the 2016 program adjustment that permitted free year-round yard waste drop-off at all facilities and the corresponding reduction of yard waste in the garbage.

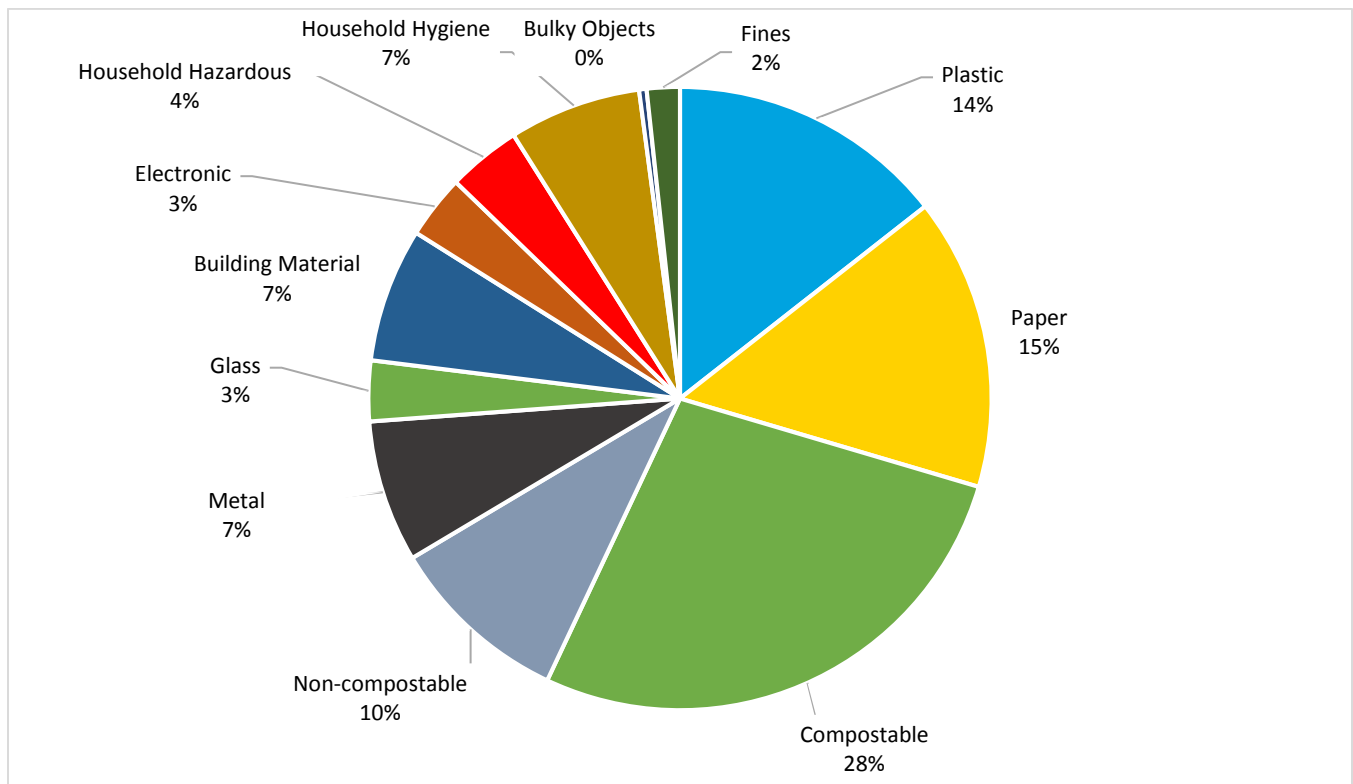


Figure 2-2: Waste Composition Results (2012 Adjusted) by Weight

As is done in other jurisdictions, about 15% of the paper portion of the above graph can be added to the Compostable portion of the graph, increasing the Compostable quantity in the waste stream to 30%.

2.5 Waste Management System Participants

Table 2-7 provides a list of the various organizations that contribute to MSW management in the RDNO.

Table 2-7: Municipal Solid Waste Management Participants

Who	Roles in Solid Waste Management
Federal Government	<ul style="list-style-type: none"> Regulates waste management facilities under federal jurisdiction
Provincial Government	<ul style="list-style-type: none"> Approves Solid Waste Management Plans as regulated through the Environment Management Act Regulates Product Stewardship programs through the Recycling Regulation Authorizes discharges to the environment through permits and operational certificates Responsible for enforcement of Provincial regulations and the conditions set out in discharge permits and operational certificates Various Ministries have several other regulatory authorities related to waste management
Regional District of North Okanagan	<ul style="list-style-type: none"> Develops plans to provide big picture oversight of waste management in the region Owns and operates waste management facilities Through regional plans and plan implementation (including bylaws), works to meet regional waste disposal goals and targets and ensures that the communities have access to RDNO facilities and services Collaborates and cooperates with local organizations, businesses and agencies to implement plans and new programs Ensures that legislative and policy requirements are followed, including monitoring and reporting Supports the provision of Product Stewardship programs in the RDNO Provides waste management related education and promotion of programs
Product Stewardship Producers and Agencies	<ul style="list-style-type: none"> Ensures reasonable and free consumer access to collection facilities Collects and processes stewarded products Coordinates local government delivery as a service provider where applicable Provides and/or funds education and marketing Provides deposit refunds to consumers (where applicable) Monitors and reports on key performance indicators such as recovery rates to the Province on a regional district basis (when possible)
First Nations Communities	<ul style="list-style-type: none"> Provides waste management services to residents and businesses
Non-Profit Sector	<ul style="list-style-type: none"> Applies for waste reduction funding through the available grant programs Engages in and promotes reuse and upcycling
Residents and Businesses	<ul style="list-style-type: none"> Responsible for carrying out proper waste reduction, recycling and disposal activities Collaborates and cooperates with local government initiatives
Neighbouring Jurisdictions	<ul style="list-style-type: none"> Identifies and engages in opportunities for collaboration and cooperation

2.6 Key Issues

The key issues for developing this plan emerged through ongoing discussions with the RSWAWG and are summarized below. The options outlined in Section 3.0 Goals and Strategies address the issues listed.

1. Almost 30% of the current waste stream is comprised of compostable organics

2. Not all households receive curbside garbage collection resulting in less diversion potential compared to a three-stream system (recycling, organics, and garbage)
3. Over 60% of the current waste stream is collected through commercial haulers.
4. There are currently insufficient programming and behaviour change resources to support the first levels of the pollution prevention hierarchy including rethink, reduce and reuse initiatives.
5. No staff resources are currently focused on supporting and implementing residential and ICI waste reduction programs, including collection and diversion efforts.
6. ASRDF is reaching capacity, there are emerging and ongoing environmental issues at the ASRDF and LRDF, and additional land has been purchased beside the GVRDF to allow for mitigation of environmental issues and lateral expansion of the site, reconfiguration of the disposal system may be necessary to mitigate issues and increase efficiency in the system.
7. The RDNO has no disaster debris management plan.

3.0 GOALS AND STRATEGIES

To meet the disposal rate target of 350 kg per person, below are the recommended program and policies to be implemented over the next ten years. The recommendations are split into two types: Reduce, Reuse and Recycle and Residual Management.

For each option, a table is included that describes the costs associated with the proposed program. While the RDNO is ultimately responsible for these costs, they may be recovered through increased current tipping fees, new tipping fees or increased taxation as further addressed in Section 5.0 Finance and Administration. Note that staffing needs are listed for each table and the related cost is consolidated in Section 3.1.5 Establish Staff Positions.

3.1 Reduce, Reuse and Recycle

3.1.1 Increase Organics Diversion

Issue: Almost 30% of the current waste stream is comprised of compostable organics.

- A. Review and adopt an Organics Diversion Strategy based on the four options considered in the Organics Management Options Study to provide clear direction with respect to policy (disposal restrictions), collection (kitchen scraps or food and yard waste combined, expanded curbside collection or current municipal collection programs only); processing (public or private, in-region or out-of-region); and transfer out of region.
- B. Develop an implementation plan for the organics strategy to address residential and ICI sectors.
- C. Provide additional staff resources to consult with applicable stakeholders including municipal partners and solid customers, processors, and commercial haulers.
- D. Implement the processing infrastructure component of the organics strategy.

Table 3-1: Organics Diversion: Estimated New Costs

Actions	Estimated Capital Cost	Estimated Operating Cost
Organics Diversion Strategy Implementation for Residential and ICI	-	Staff
Organics Diversion Processing Infrastructure (Transfer Station only)	\$1,000,000	- ¹

¹ Assumes existing staff will operate the new organics transfer component of the RDF

3.1.2 Reduce Disposal from SF Residential Households

Issue: Not all households receive curbside garbage collection resulting in less diversion potential compared to a three-stream system (recycling, organics, and garbage).

- A. Expand curbside garbage collection to all SF RES households that currently receive curbside recycling collection (Expanded Curbside Collection). Consider clear bag options.
- B. Implement a One Bag/Can Limit for SF RES households that currently receive municipal curbside garbage collection, expand to all SF RES households if Expanded Curbside Collection is implemented.
- C. Undertake a study to determine the demand for curbside collection of yard waste as well as the implications of switching to automated collection, for both SF RES and MF RES.
- D. Implement a kitchen scraps collection program for SF RES households that currently receive municipal curbside garbage collection; expand to all SF RES households if Expanded Curbside Collection is implemented. Implement a One Bag/Can Limit with every other week garbage collection service.
- E. Design and implement behaviour change (education and promotion) programming using a community-based social marketing (CBSM) approach.
- F. Consideration for pilots will be discussed when the community is engaged during consultation.
- G. Provide additional staff resources to consult with municipal partners and customers to recommend policy decisions regarding implementation of expanded curbside collection: number and location of households, trial areas, types of materials collected (kitchen scraps only or food and yard waste), type of cooperation with Recycle BC’s Blue Box Program, and type of collection system (manual or automated).

Table 3-2: SF Residential Household Disposal Reduction: Estimated New Costs

Actions	Estimated Capital Cost	Estimated Operating Cost
SF Residential Household Program Disposal Reduction Implementation	-	\$50,000 to be allocated in year 2 of the SWMP to determine most efficient and effective collection methods in cooperation with municipalities \$67,000 to be allocated across years 2-4 of the SWMP for promotion and behavior change with staff support

3.1.3 Reduce Disposal for Sectors Served by Commercial Haulers (ICI, Multi-family Res and C&D Waste)

Issue: Over 60% of the current waste stream is collected through commercial haulers.

- A. Review the effectiveness of the current level of application/enforcement of the Regulated Material (R03) recycling and disposal fee and consider implementing disposal bans on recyclable materials including kitchen

scraps and addressing other existing bylaw policies such as secure loads. Consider use of a “regulate, collaborate, communicate, educate and enforce” model.

- B. Review the impact of disposal bans on illegal dumping levels and implement an illegal dumping prevention and enforcement program if required.
- C. Explore waste stream management licensing options to ensure a level playing field to support private sector market development for recycling materials.
- D. Work with private sector to ensure markets for diverted materials, with a focus on wood and compost, by banning these items from disposal and encouraging the development of private sector infrastructure to process and market non-residential recyclable materials.
- E. Design and implement behavior change (education and promotion) programming using a CBSM approach.
- F. Provide the additional staff resources to implement disposal bans, including enforcement and education, for MF RES in particular.

Table 3-3: Reduce Disposal for Sectors Served by Commercial Haulers: Estimated New Costs

Actions	Estimated Capital Cost	Estimated Operating Cost
ICI, MF RES, and C&D Disposal Reduction Implementation	-	\$50,000 to be allocated across years 3-5 of the SWMP with staff support

3.1.4 Develop Programs to Actively Promote Waste Reduction and Reuse Initiatives

Issue: There are currently insufficient programming and behaviour change resources to support the first levels of the pollution prevention hierarchy including rethink, reduce and reuse initiatives.

- A. Continue to demonstrate backyard composting through the Xerindipity Garden at Polson Park and deliver the Composter Rebate Program.
- B. Continue to administer the Waste Reduction Initiatives Fund for not-for-profit organizations that need seed capital funding for new or amended programs.
- C. Provide behavior change and education programs including a kitchen scraps reduction campaign (e.g., Love Food Hate Waste)
- D. Advocate with senior governments to support expansion of EPR programs (e.g., mattresses, carpet, textiles).

Table 3-4: Waste Reduction and Reuse Initiatives: Estimated New Costs

Actions	Estimated Capital Cost	Estimated Operating Cost
Waste Reduction and Reuse Initiatives Implementation	-	\$50,000 to be used across year 2 and 4 of the SWMP with staff support

3.1.5 Establish Staff Positions to Develop, Implement and Provide Ongoing Efficiency to Ensure Program Effectiveness

Issue: No staff resources are currently focused on supporting and implementing residential and ICI waste reduction programs, including collection and diversion efforts.

- A. Re-establish a waste reduction program planner to oversee the expansion to expanded curbside collection.
- B. Establish a staff position that collaborates with key stakeholders, including haulers and businesses, and provides educational support and other services, including providing support for organics program development and implementation.

Table 3-5: Staff Positions: Estimated New Costs

Actions	Estimated Capital Cost	Estimated Operating Cost
Staff Positions to Drive Program Implementation	-	\$193,310 for two staff positions, including annual benefits

3.2 Residual Management

3.2.1 Develop Centralized Disposal Plan with Additional Landfill Capacity

Issue: ASRDF is reaching capacity, there are emerging and ongoing environmental issues at the ASRDF and LRDF, and additional land has been purchased beside the GVRDF to allow for mitigation of environmental issues and lateral expansion of the site, reconfiguration of the disposal system may be necessary to mitigate issues and increase efficiency in the system. Additionally, GVRDF access issues continue to be a challenge since highway upgrades in the 1970s.

- A. GVRDF – A conceptual design for a lateral expansion has been developed to extend the landfill footprint to the west of its current boundary resulting in a potential 30 years of additional disposal capacity. The current footprint is expected to last until 2059. The expansion will need to commence within the next ten years to secure a permit amendment from the Province. Major permit amendments can take five years or more and must be approved in the SWMP prior to the application stage.

Regarding GVRDF access, the Ministry of Transportation and Infrastructure has a current project underway to address infrastructure challenges along the full corridor, including the section near the GVRDF. Congestion and routing issues can also be addressed by reducing the amount of traffic going to the site.

- B. ASRDF – Unless waste reduction measures are enhanced significantly, it is expected that the current landfill capacity will be filled by 2027 (9 years). The planned phase one closure (north unlined section) will help mitigate environmental issues at this site starting in 2019. It is recommended that the landfill be closed as soon as the capacity is reached and a self-hauler transfer station be constructed, with all large loads (front load, rear and side load, and roll off trucks) going directly to the GVRDF. Options for waste transfer will be studied to determine the best overall option.

- C. LRDF – The most financially sustainable model for landfill operation, environmental protection and closure warrants preserving landfill space at this site only for inert C&D waste with a transfer station put into place to accommodate self-haul loads only. The timing for this change should be determined within the next five years, and may result in some reduction in operating costs related to landfill maintenance and service hours.
- D. Hesperia Landfill – The City of Vernon has hired a consultant to help with regulatory compliance for their Hesperia Landfill (Upper Bench Row Road), which is operated by the City of Vernon as a demolition, land clearing, and construction material disposal facility. The landfill is authorized under Operational Certificate (OC) 15288 to dispose of up to 15,200 m³ of demolition and construction wastes, comprised of inert material such as clean fill and concrete, each year. The OC, which was issued by the Ministry in 1998, states that is in accordance with the RDNO SWMP. This landfill was included in the original SWMP, but is has not been included in any of the updates because RDNO was unaware that operations were on-going at this landfill. The City of Vernon has recently approached the Ministry to discuss amending the OC to increase the annual maximum discharge rate and to revise some of the OC clauses that are not necessarily applicable to their operations. The Ministry has also recommended that the City of Vernon seek a formal amendment for these changes. However, for the Ministry to consider an amendment, the landfill needs to be included in the RDNO’s regional SWMP.

Table 3-6: Centralized Disposal Plan Design and Construction: Estimated New Costs

Actions	Estimated Capital Cost	Estimated Operating Cost
GVRDF Lateral Expansion – Investigation and Design	\$100,000 to be allocated in year three of the SWMP	-
ASRFD Transfer Station Development	\$2.5 million with \$250,000 to be allocated for design in year 8 and \$2.25 million for year 10 construction	-
LRDF Transition to C&D Landfill with Self-haul Drop-off Bay	\$300,000 to be allocated in years 5 and 6 for design and construction	-

3.2.2 Prepare a Disaster Response Plan

Issue: The RDNO has no debris management plan.

- A. Address disaster response waste (e.g., docks, Styrofoam, sandbags, burned buildings, fires) – Ensure solutions for disaster materials management are developed before a disaster occurs so systems can be put into place to manage the rapid increase in materials that are often generated after a disaster. This effort is likely to need inter-departmental collaboration and resource sharing.

There are no additional costs associated with disaster response plan preparation.

3.3 Resulting Diversion Potential

The recommended actions have the potential to reduce the amount of solid waste disposed in the RDNO by approximately 150 kg per capita per year, as shown in Table 3-1. This means the disposal rate would be 350 kg per capita per year, meeting the Provincial and RDNO’s disposal rate target.

Table 3-7: Diversion Potential with Programs Implemented

Material Grouping by Hauler Type	Hauler Contribution to Landfill	Diversion Potential out of Landfill (%)	Diversion Potential out of Landfill (kg/capita)
Residential	30%		
EPR-PPP		60%	12
EPR-non-PPP		40%	5
Other recyclable		30%	3
Compostable		90%	48
Building Material		20%	2
Residential Diversion Potential			69
ICI	60%		
EPR-PPP		60.0%	16
EPR-non-PPP		40.0%	10
Other recyclable		30.0%	6
Compostable		30.0%	31
Building Material		33.0%	10
ICI Diversion Potential			74
Self-Haul	10%		
EPR-PPP		50%	2
EPR-non-PPP		40%	2
Other recyclable		30%	0
Compostable		20%	0
Building Material		20%	3
Self-Haul Diversion Potential			7
Potential Additional Diversion from Landfill			150
Estimated Annual Disposal (assuming 500 kg/capita)			350

Table 3-8 provides a list of items that are included in the material groupings listed above.

Table 3-8: Category Items

Category	Included Items (e.g.)
EPR-PPP (SF RES)	Packaging and Printed Paper Materials (Residential Managed by Recyclable BC)
PPP (ICI)	Packaging and Printed Paper Materials
EPR-non PPP	Electronics, Batteries, Used Oil, and Containers, Etc.
Other Recyclable	Textiles and Plastic Film
Compostable	Compostable Food and Compostable Paper
Building Materials	Drywall, Masonry, Clean Wood, and Metals

4.0 PLAN MONITORING AND MEASUREMENT

4.1 Regional Solid Waste Advisory Working Group

The RSWAWG will monitor the implementation of the plan and make recommendations to increase its effectiveness. A description of the RSWAWG tasks and make up are included in the preliminary terms of reference which can be found in Appendix C.

4.2 Annual Reporting

RDNO will compile data from RDNO sites on all residual disposal activities in the regional district and provide annual information to the Ministry's online disposal calculator.

4.3 Five-Year Effectiveness Review

Five years into the implementation of this Plan, RDNO will carry out a review of the plan's implementation and effectiveness, as prescribed by the Ministry. This review should result in a report that is made publicly available but does not need to be submitted to the Ministry for approval. This review may include:

- Overview of all programs or actions undertaken in the first five years to support the plan goals and targets, including status and implementation costs for each
- Description and forecasted budget for programs or actions not yet started and status, including explanations for delays or cancellations of plan components
- Five-year trend information for waste disposal per person
- Five-year trend of greenhouse gases emitted and avoided, if available
- Any significant changes that might impact the solid waste management system over the next five years.

Table 4-1: Five-Year Effectiveness Review

Actions	Estimated Capital Cost	Estimated Operating Cost
Effectiveness Review Implementation	-	\$25,000 to be allocated for year 5 of the SWM Plan

4.4 Waste Composition Studies

In advance of the five-year review noted, a multi-season waste composition study on the residual waste management stream is proposed for year 1 and year 5, if appropriate, in advance of the next SWMP Update to assess the success of current waste diversion programs and policies and identify opportunities for additional diversion.

Table 4-2: Waste Composition Studies

Actions	Estimated Capital Cost	Estimated Operating Cost
Waste Composition Studies	-	\$100,000 to be allocated in years 2 and 6 of the SWM Plan

5.0 FINANCE AND ADMINISTRATION

The strategies, actions and costs associated with meeting the first two goals have been discussed in previous sections and represent significant changes and improvements to the MSW management system in the RDNO. This section of the plan presents a summation of the estimated costs (in 2017 dollars) to the RDNO for the proposed solid waste management system and addresses options for how the implementation of the Plan will be financed.

[More explanation to be added to this section following the March 14 Regional Board meeting.]

Table 5.1 provides a five-year financial plan reflecting the proposed programs.

Table 5-1: Five-Year Financial Plan

RDNO FINANCIAL PLAN	2018	2019	2020	2021	2022
REVENUE					
Tipping Fees	\$ 5,840,000	\$ 5,951,700	\$ 5,900,000	\$ 5,900,000	\$ 5,900,000
Tax Requisition	\$ 420,000	\$ 420,000	\$ 420,000	\$ 420,000	\$ 420,000
Grants	\$ 202,500	\$ 1,767,500	\$ 2,500	\$ 2,500	\$ 2,500
Interest Income	\$ 36,910	\$ 44,437	\$ 35,736	\$ 36,461	\$ 36,599
Sundry Income	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Transfer from Operating Reserve	\$ 1,308,500	\$ -	\$ -	\$ -	\$ -
Transfer from Statutory Reserve	\$ 55,000	\$ 391,800	\$ 37,000	\$ 334,600	\$ -
Recycled Commodities Revenue	\$ 86,000	\$ 95,600	\$ 97,232	\$ 98,897	\$ 100,595
Other income - Gravel Royalties	\$ 8,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000
Rental and Lease Income	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
TOTAL OPERATING REVENUE	\$ 7,962,910	\$ 8,680,037	\$ 6,501,468	\$ 6,801,458	\$ 6,468,694
EXPENDITURES					
Existing Operating Expenditures					
Waste Reduction/Recycling Polices and Program	\$ 35,000	\$ 35,700	\$ 36,414	\$ 37,142	\$ 37,885
Recycling Operations	\$ 342,000	\$ 348,840	\$ 355,817	\$ 362,933	\$ 370,191
Landfill and RDF Operations	\$ 3,198,130	\$ 3,197,656	\$ 3,261,609	\$ 3,326,841	\$ 3,393,378
Adminstration (Including Wages & Benefits)	\$ 750,910	\$ 763,887	\$ 749,164	\$ 794,748	\$ 810,643
Other (Monitoring, Studies, Eco Depot)	\$ 204,000	\$ 208,080	\$ 212,243	\$ 216,488	\$ 220,817
Transfer to Operating Reserve	\$ 319,370	\$ 643,074	\$ 657,053	\$ 598,706	\$ 497,780
Transfer to Statutory Reserve - Landfill Closure	\$ 1,550,000	\$ 1,100,000	\$ 1,100,000	\$ 1,100,000	\$ 1,100,000
Total Annual Existing Operating Expenditures	\$ 6,399,410	\$ 6,297,237	\$ 6,372,300	\$ 6,436,858	\$ 6,430,694
Existing Capital Expenditures					
Closure & Post-Closure	\$ 55,000	\$ 391,800	\$ 37,000	\$ 334,600	
Capital Expenditures	\$ 1,508,500	\$ 1,991,000	\$ 129,168	\$ 30,000	\$ 38,000
Total Annual Existing Capital Expenditures	\$ 1,563,500	\$ 2,382,800	\$ 129,168	\$ 364,600	\$ 38,000
Total Annual Existing Expenditures	\$ 7,962,910	\$ 8,680,037	\$ 6,501,468	\$ 6,801,458	\$ 6,468,694
Revenue - Expenditures	\$ -	\$ -	\$ -	\$ -	\$ -
PROPOSED Operating Expenditures					
Increase organics diversion					
Reduce Disposal from SF Residential Households		\$ 42,000	\$ 15,000	\$ 10,000	
Reduce Disposal from Commercial Haulers			\$ 25,000	\$ 15,000	\$ 10,000
Develop Programs to Actively Promote Waste Reduction and Reuse Initiatives		\$ 25,000		\$ 25,000	
Establish staff positions (2 FTE + benefits)		\$ 193,310	\$ 193,310	\$ 193,310	\$ 193,310
Prepare a Disaster Response Plan	\$ -				
Five Year Review					\$ 25,000
Waste Composition study		\$ 50,000			
Total Annual Proposed Operating Expenditures	\$ -	\$ 310,310	\$ 233,310	\$ 243,310	\$ 228,310
PROPOSED Capital Expenditures					
Increase organics diversion (assumes private compost facility)					
GVRDF Lateral Expansion (Investigation and Design)			\$ 100,000		
ASRDF Transfer Station Development					
LRDF Transition to C&D Landfill					\$ 150,000
Hesperia Landfill (City of Vernon)					
Total Annual Proposed Capital Expenditures	\$ -	\$ -	\$ 100,000	\$ -	\$ 150,000
Total Annual Proposed Expenditures	\$ -	\$ 310,310	\$ 333,310	\$ 243,310	\$ 378,310
TOTAL OPERATING EXPENDITURES	\$ 6,399,410	\$ 6,607,547	\$ 6,605,610	\$ 6,680,168	\$ 6,659,004
REVENUE SOURCE TBA	\$ -	\$ (310,310)	\$ (333,310)	\$ (243,310)	\$ (378,310)
TOTAL CAPITAL EXPENDITURES	\$ 1,563,500	\$ 2,382,800	\$ 229,168	\$ 364,600	\$ 188,000
TOTAL EXPENDITURES	\$ 7,962,910	\$ 8,680,037	\$ 6,501,468	\$ 6,801,458	\$ 6,468,694
Revenues - Expenses	\$ -	\$ -	\$ -	\$ -	\$ -

Note: This table assumes only costs to RDNO. Costs for individual jurisdictions will depend on how the SWMP is implemented.

6.0 PLAN SCHEDULE

6.1 Plan Implementation Schedule

Table 6-1 provides the planned implementation schedule for the Solid Waste Management Plan from 2018 to 2027.

Table 6-1: Implementation Schedule

Proposed Implementation Schedule	2018	2019	2020	2021	2022
<i>REDUCE, REUSE, RECYCLE</i>					
Increase organics diversion					
Adopt Organics Diversion Strategy and develop Implementation Plan					
Reduce Disposal from SF Residential Households					
Determine best options for collection service adjustments					
Design and implement behavior change and education program					
Reduce Disposal for Sectors Served by Commercial Haulers					
Develop disposal bans					
Plan and implement an illegal dumping prevention and enforcement program					
Support level playing field and market development					
Design and implement behavior change and education programs					
Develop Programs to Active Promote Waste Reduction and Reuse Initiatives					
Compost demonstration and backyard composting programs					
Continue to administer the Waste Reduction Initiatives Fund					
Design and implement behavior change and education programs					
Establish staff positions to develop, implement and provide ongoing efficiency for program effectiveness					
Re-establish a Waste Reduction Program Planner to oversee expansion to universal collection and organics diversion					
Establish a staff position that collaborates with key stakeholders including haulers and businesses, provides educational support and other services, including providing support for organics program development and implementation					
<i>RESIDUAL MANAGEMENT</i>					
Develop centralized disposal plan with additional landfill capacity					
GVRDF Lateral Expansion					
ASRDF Transfer Station Development					
LRDF Transition to C&D Landfill					
Hesperia Landfill (City of Vernon)					
Prepare a Disaster Response Plan					
<i>PLAN MONITORING AND EFFECTIVENESS</i>					
Five Year Review					
Waste Composition study					

7.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

ISSUED FOR REVIEW

Prepared by:
Monica Wallani, MBA, P.Eng.
Project Engineer
Solid Waste Management Practice
Direct Line: 778.945.5783
Monica.Wallani@tetrattech.com

/sy/tv

ISSUED FOR REVIEW

Reviewed by:
Tamara Shulman, BA, M.Sc.
Team Lead – Planning
Solid Waste Management Practice
Direct Line: 604.608.8636
Tamara.Shulman@tetrattech.com

APPENDIX A

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GEOENVIRONMENTAL

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APPENDIX B

SWMP TECHNICAL MEMORANDA

- Current Solid Waste System Report (July 25, 2017)
- Technical Memorandum 1: Disposal Options (September 12, 2017)
- Technical Memorandum 2: Reduce, Reuse and Recycle (October 18, 2017)
- Technical Memorandum 3: System Recap, Bylaws, Policies, Plan Options (January 24, 2018)

To:	Nicole Kohnert, P.Eng	Date:	September 12, 2017
c:		Memo No.:	1
From:	Avery Gottfried, ME, P.Eng Michel Lefebvre, P.Eng	File:	SWM.SWOP03478

Subject: Technical Memo No. 1 – Solid Waste Management Plan Disposal Option Information

This 'Issued for Review' document is provided solely for the purpose of client review and presents our interim findings and recommendations to date. Our usable findings and recommendations are provided only through an 'Issued for Use' document, which will be issued subsequent to this review. Final design should not be undertaken based on the interim recommendations made herein. Once our report is issued for use, the 'Issued for Review' document should be either returned to Tetra Tech Canada Inc. (Tetra Tech) or destroyed.

1.0 INTRODUCTION

The Regional District of North Okanagan (RDNO) retained Tetra Tech Canada Inc. (Tetra Tech) to manage a review and update of the RDNO's 2011 Solid Waste Management Plan (SWMP). The 2017 SWMP update will review existing solid waste management policies and programs, identify and evaluate options for reduction and diversion, residual management, and financing, and also set the RDNO's waste management principles, targets and strategies for the next ten years. A summary of the project phases and deliverables is included on Figure 1-1.

The assessment stage included the issued for review Current Solid Waste System Report that was presented at the meeting on August 1, 2017. The report documented the current condition of the RDNO's solid waste management system, and was used as a basis for discussion for the direction of the SWMP update entering the second stage, "Analysis and Evaluation".

Within Stage Two, the first technical memorandum (tech memo) focuses on recovery and residuals management, the interrelated fourth and fifth Rs of the 5-R waste prevention hierarchy (pictured on Figure 1-2). The purpose of this first tech memo is to determine which options require further research and analysis and include in the list of options for financial analysis, and which should be eliminated from consideration within the RDNO's SWMP update. The second tech memo will also address the first three Rs – reduce, reuse, and recycle. The third and final tech memos will assess the financial implications and synergies for selected options for integration with the 2017 SWMP.

This tech memo will be presented to the Regional Solid Waste Advisory Working Group (RSWAWG) at the third meeting on September 21, 2017, to gather feedback on the options and recommendations. The Working Group's input will be sought on each of the tech memos and this advice will guide the selection of options for inclusion in the updated plan. The selected options will be researched in more detail to gauge their specific application within the RDNO, including estimated costs and determining how they align with other plan components. A draft plan update with preferred options will be prepared for review by the Working Group prior to undertaking community and stakeholder consultation. Once these three tech memos have been issued for review, the consultation stage will engage RDNO constituents from public and private sectors through to First Nations to align on the direction of the 2017 SWMP update. Finally, the 2017 SWMP update will be crafted based on the outcomes of the previous deliverables, including a consultation summary.

The project consists of four stages, as shown on Figure 1-1: Project Phases and Associated Deliverables below.

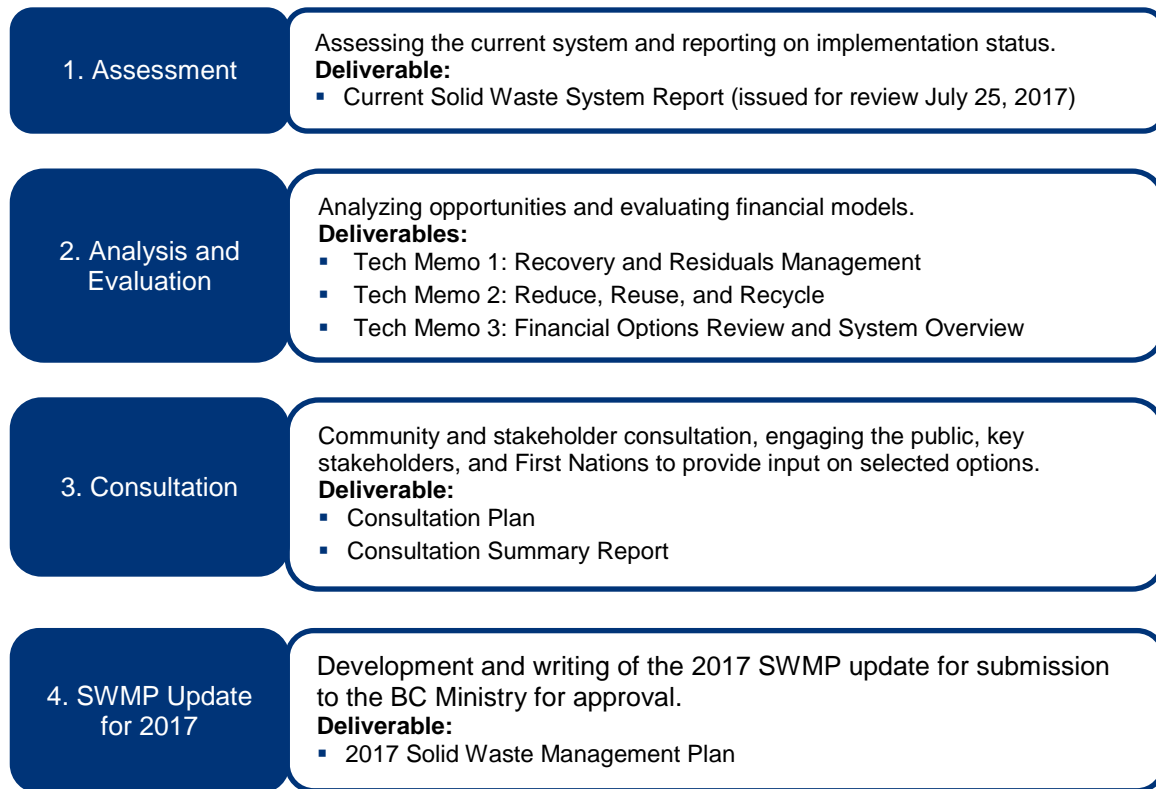


Figure 1-1: Project Phases and Associated Deliverables

1.1 Objective of Tech Memo 1

The waste prevention hierarchy (reduce, reuse, recycle, recovery, and residuals management) is a useful tool to evaluate opportunities to improve a solid waste management system (see Figure 1-2) and will be foundational for the RDNO's SWMP update. Where practical and feasible, the hierarchy order preference is for other waste management strategies to be undertaken after all opportunities for prevention and reduction at a higher level have been actively pursued. For example, after minimizing the amount of waste produced through reduction and reuse processes, the best practice is to divert as much useful and recycle material as possible from the waste stream that is still being disposed. Opportunities for recycling should be explored after all opportunities for reduction and reuse of materials have been exhausted. Likewise, recovery is an option once all recycling opportunities are in place and fully optimized. Once these options have been exhausted, recovery technologies can be implemented prior to final disposal (landfilling) of any residuals to maximize the value of wasted resources.

In 2016, the calculated per capita disposal rate in the RDNO was 500 kg per capita, and a total of just over 43,000 tonnes of municipal solid waste (MSW) waste disposed of in the region's three landfills including 28,300 tonnes at the Greater Vernon Recycling and Disposal Facility (GVRDF), 11,419 tonnes at the Armstrong/Spallumcheen Recycling and Disposal Facility (ASRDF) and 1,841 tonnes at the Lumby Recovery and Disposal Facility (LRDF).

Recovery (fourth R) is the application of technology to recover material and/or energy from the solid waste stream as possible in a safe and environmentally sound manner. Section 2.0 of this memo provides an overview of a number of common recovery technologies to inform the options available to the RDNO. Section 2.0 also includes

some technologies that can be utilized to further optimize the recycling infrastructure, including capture of materials for recycling and energy recovery.

Section 3.0 provides an overview of key issues currently being investigated or resolved at the three landfill sites, and presents a summary of options available for improvement. Through the process of maximizing the first 4 R's, the residual management (fifth R) component of the waste stream is expected to be minimized.

The benefits to this approach are as follows:

- **Actions taken at higher levels in the waste prevention hierarchy can eliminate or reduce the environmental management costs of actions at lower levels.** For example, waste prevention programs can reduce costs associated with handling waste in the first place.
- **The waste prevention hierarchy can potentially reduce the environmental impacts of product manufacturing and distribution.** For example, reuse (and, to a lesser degree, recycling) will reduce the demand for and thus environmental impact of extracting and processing virgin resources, while the use of recycled materials can reduce the energy cost and virgin inputs needed to manufacturing new products.

As part of this tech memo, a brief summary of the technologies utilized in solid waste management systems to aid in the recovery of additional materials or energy are included for the information of the committee. Technology recovery and residual options explored in this tech memo include:

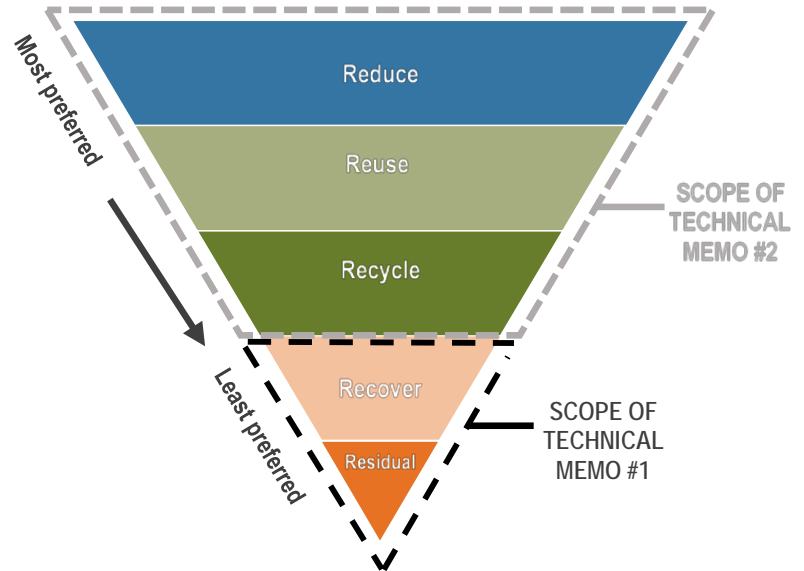


Figure 1-2: Waste Prevention Hierarchy

Technology Opportunities

- a. Mixed Waste Material Recovery Facilities (mixed waste MRF)
- b. Anaerobic Digestion

Recovery Opportunities

- c. Landfill Gas Capture
- d. Thermal Conversion
 - i. Refuse Derived Fuel
 - ii. Gasification
 - iii. Pyrolysis
 - iv. Waste to Energy (Incineration)

Residual Management

- a. Transfer Stations
- b. Active Landfills
- c. Closed Landfills

2.0 TECHNOLOGY OPPORTUNITIES

As part of the 2011 SWMP, it was determined the next plan review would include a review of recovery opportunities including waste to energy. The previous plan update stated the following:

- Monitor waste to energy technology as it becomes accessible to small communities in Canada. Report on the feasibility of establishing a MSW to energy facility in the North Okanagan.

Table 2-1 provides a brief description of the recovery technologies and applicable inputs that are used as a feedstock, and outputs that are recovered with the technology. Recovery is typically taken to mean the conversion of non-recyclable waste materials (or materials which otherwise escape the recycling stream) into useable energy which includes heat, electricity and fuel. The most common forms of energy recovery from waste in Canada include landfill gas (LFG) collection and advanced thermal conversion technologies.

Table 2-1 Recovery Technologies

Classification	Recovery Technology and Description	Inputs (“Feedstock”)	Valued Outputs
Technology Opportunities			
Mechanical	Mixed Waste Material Recovery Facilities (Mixed Waste MRF) Manual and/or automated sorting and segregation of waste on conveyer belts to capture and recover recyclables that would otherwise be sent to landfill.	Mixed MSW	Recyclables Organic Materials
Biological	Anaerobic Digestion Biological processes that enable microorganisms to break down biodegradable material in the absence of oxygen.	Organic Material	Methane – Energy Digestate, used for composting, direct land application, or dehydration
Recovery Opportunities			
Biological	Landfill Gas Capture Using wells to capture the natural by-product of the decomposition of organic material in landfills.	Municipal Solid Waste (MSW)	Methane - Energy
Mechanical and Thermal	Refuse Derived Fuel A solid fuel produced from pre-processing MSW into combustible components and selected waste with recoverable calorific value for use in Thermal processes.	Mixed MSW or Pre-screened MSW	Solid fuel that can be combusted to offset use of fossil fuel
Thermal	Gasification High temperature oxidation process (oxygen starved environment) to break down organic portions of waste into elemental compounds and produce a syngas.	Mixed MSW or Pre-processed high energy content MSW	Syngas
Thermal	Pyrolysis Form of gasification, using high heat while being starved of oxygen utilizing catalyst to enhance the process.	Typically woody biomass, paper products, plastics, etc.	Syngas Char
Thermal	“Waste to Energy” (Incineration / Combustion) Combustion process that generates high heat to create high temperature steam for energy generation	MSW	High pressure steam, electricity and/or district heating

2.1 Mixed Waste Material Recycling Facilities (mixed waste MRF)

There are three general categories of material recovery facilities (MRFs):

- Clean MRFs which takes in co-mingled or source separated recyclable materials which is then sorted and baled for their respective commodity markets;
- Mixed waste MRF (aka “Dirty” MRF) which takes in mixed MSW (i.e., garbage), or MSW with organics removed, that is then sorted and baled for their respective commodity markets and/or separated for further organics processing; and
- Hybrid MRFs which may take in several different materials streams, some of which may be source separated recyclables, and/or mixed MSW.

Many solid waste management jurisdictions in North America are considering the use of mixed waste MRFs as part of an overall integrated solid waste management system. Mixed waste MRFs typically consist of conveyor systems, bag splitters, screens and/or trommels to separate the waste into different size fractions. The waste stream then travels through a series of magnets, eddy current separators, air classifiers and hand sorters to divide the waste stream into the required constituent streams for removal of recyclables and organics depending on the facility design. The process does not produce the same quality of commodities as a clean recycling MRF because of contamination from putrescible materials such as food scraps, liquids and other contaminants. As a result, the market value for commodities from a mixed waste MRF is typically less than that of a typical MRF used to sort collected recyclables.

The effectiveness of mixed waste MRFs is dependent on the remaining composition of the waste stream and any upstream initiatives that could mitigate contamination from wet organic materials. A source separated organics program can benefit a solid waste system with a mixed waste MRF. Typically these facilities are considered as an added element in the waste management system to increase the diversion of recyclable and compostable material from within the MSW stream by sorting and removing recyclable materials contained within the garbage after curbside recycling and prior to disposal. This added operation can increase diversion; however, there is an added processing cost to the waste management system to build and operate the facility.

There are many design considerations that impact the effectiveness of mixed waste MRFs, and the labour or technology required to capture enough recyclable materials from the MSW to justify the additional cost of building and operating the facility. For example, an important consideration is the waste composition of the material entering the facility, and whether a community proposes to use this technology as its primary form of recycling and waste diversion or as a supplemental step to take out the remaining recyclable and divertible materials before the residuals (or garbage) stream is ultimately disposed. Typical diversion rates of approximately 10% to >50% have been estimated for mixed waste MRFs depending on the facility design, the composition of the incoming waste, and the effectiveness of the source-separated recycling program.

A mixed waste MRF could be used to enhance waste diversion and capture of recyclables for jurisdictions that choose not to divert waste. The target MSW stream is the garbage stream with an objective to reduce the amount of material requiring disposal and to extend the available disposal capacity within the region. The most likely scenario for a mixed waste MRF being economically feasible is in cooperation and participation with the member municipalities to achieve economies of scale. In the RDNO, with a primary goal of the SWMP to focus on the first three Rs in the waste prevention hierarchy, and currently having many waste diversion programs in place, it is unlikely that a mixed waste MRF would be used to replace existing diversion programs.

2.2 Anaerobic Digestion

Anaerobic digestion (AD) is a biological process where microorganisms break down biodegradable material in the absence of oxygen. The process is carried out by anaerobic micro-organisms that convert carbon-containing compounds (organics) to biogas in a contained process to optimize capture. The biogas is a mixture of methane (CH₄), carbon dioxide (CO₂), water, and other impurities. Total mass from the beginning to the end of the cycle is typically reduced by 30% to 40%.


Anaerobic systems are becoming increasingly popular for food scraps processing due to their ability to generate power and better contain odours for higher putrescible materials that can be used in limited amounts within open air composting systems. The technology has successfully operated at commercial scale for many years, particularly in the European Union. The art of building low-cost, reliable digesters is strictly dependent on the optimal adaptation of the design to the specific types of feedstock or substrate available. Their major drawback is that capital, operating and maintenance costs are high compared with aerobic composting systems.


The biogas is sequestered in storage tanks and can be sent through a combined heat and power unit (“CHP”) to generate electricity, or be upgraded using scrubbing technologies for direct injection into the natural gas pipeline network or used as fuel for compressed natural gas (“CNG”) vehicles. At the end of the digestion cycle, residual organic solids (digestate) can be used as a base material for composting to increase the biological value of the end product and optimize nutrient update to plants. The digestate material produced as a by-product is rich in soil nutrients and typically maintains high structural integrity which assists in erosion control. It can also be marketed as a fertilizer that has value for agricultural production.

AD is a common conversion technology for the organic fraction of MSW, agricultural waste, waste water treatment facilities, and other operations. It is carried out in an enclosed system, typically a stainless steel or concrete vessel that is connected to a computer system that monitors and controls air flow, temperature, moisture, and mixing. Retention times for all AD technologies depend on design specifics and feedstock characteristics, with a typical range of twelve to thirty days. There are a variety of systems available as described in Table 2-2 which are either referred to as “wet”, involving high moisture content and often associated with waste water treatment and sludge, or “dry”, which contain solid organics and yard debris from MSW.

The choice of which digester to use is driven by the existing or planned biomass handling system at the facility. Each type of digester has its own specialty and constraints. All technologies can capture methane and reduce pathogens, but they differ in cost, climate suitability, and the concentration of solids in feedstock. Typical technologies are detailed in Table 2-2 including information relevant to their potential application for the RDNO.

Table 2-2 Anaerobic Digestion (AD) Technologies

AD Technology	Details
<p data-bbox="224 1507 490 1537">Complete Mix Digestion</p> <p data-bbox="321 1562 393 1591">“Wet”</p> 	<ul style="list-style-type: none"> <li data-bbox="587 1512 1466 1566">▪ Most commonly in municipal sewage sludge digestion practices, this process uses substrates in a slurry [1% to 15% organic total solids (TS) by mass], <li data-bbox="587 1570 1466 1654">▪ Waste entering the digester is mixed in order to uniformly distribute it. Waste is processed in a heated tank above or below ground. A mechanical or gas mixer keeps the solids in suspension so that the bacteria can decompose the feedstock. <li data-bbox="587 1659 1466 1713">▪ Generally suitable for liquid based feedstock (e.g., manure and pulped food waste) that has 2% to 15% solids. Therefore, this is often referred to as “wet AD.” <li data-bbox="587 1717 1466 1772">▪ As this technology requires a considerable amount of preprocessing to process the organic fraction of MSW it is not considered a viable option for the RDNO.

AD Technology	Details
<p data-bbox="233 268 480 296">High Solids Digestion</p> <p data-bbox="326 323 388 350">"Dry"</p> 	<ul style="list-style-type: none"> <li data-bbox="586 268 1466 350">▪ Dry AD can process solid substrates with as much as 40% to 50% total solids (TS) by mass. This is well within the range of available high "solid" or "stackable" substrates such as MSW, food waste, yard waste, and other organic substrates. <li data-bbox="586 359 1466 411">▪ The higher solids content equates to higher transport efficiencies in comparison to wet systems where 90% or more of the feedstock transported is simply water. <li data-bbox="586 420 1466 554">▪ The lack of stirring during the process means that not all materials are exposed to the methanogenic microbes vital to AD reactions, and the gas production suffers as a result. Depending on the preprocessing included dry AD can achieve a portion of the efficiencies (as low as 50% to 60%) of the production rates achieved by wet AD technologies. <li data-bbox="586 562 1466 640">▪ Numerous proprietary technologies have been developed to commercially execute dry AD. Most notable amongst these technologies are "garage style" digesters and assisted plug flow digesters. <li data-bbox="586 648 1466 726">▪ New innovations in the "dry" technology have begun to address smaller scale waste streams which align with the needs of the RDNO, and this could be a viable technology option.

Anaerobic digestion is an organic management processing option that can be taken into consideration given the amount of organics remaining in the RDNO's waste stream (approximately 30% according to the 2012 waste composition study). Typically, composting is a simpler and less capital intensive organic processing option than anaerobic digestion. For either technology to be feasible, source separated organics needs to be collected from generators and markets for the end products needs to be available from each process.

2.3 Landfill Gas Capture

MSW disposed of in landfill facilities generate LFG due to the anaerobic decomposition of organic material in the waste material. LFG, comprised primarily of methane and carbon dioxide in combination with trace contaminants, is a significant source of greenhouse gas emissions. The capture of LFG from municipal landfills, and destruction via flaring or utilization of the captured gas offers the following environmental benefits:

- Reduced net greenhouse gas emissions associated with the destruction of methane, which has a global warming potential (GWP) 25 times greater than that for carbon dioxide;
- Reduced emissions of odours that may be associated with the LFG; and
- Development of LFG utilization opportunities typically associated with direct use (boiler fuel) options, the processing of renewable natural gas, and renewable electrical power generation projects.

The RDNO has a long-term goal to develop a LFG green energy project at the GVRDF. In preparation of this, a LFG management system has been implemented at the GVRDF and is currently flaring the collected gas. This existing project has set the groundwork for future energy recovery utilizing this gas.

Landfill gas must be monitored at all landfill sites in BC for health and safety reasons, and also to reduce impacts to air quality. The British Columbia guidelines required that a landfill site that is estimated to generate greater than 1,000 tonnes or more of methane per year must ensure that a LFG management plan is prepared for the landfill site and an active gas collection system installed to reduce fugitive LFG emissions to the atmosphere. In the RDNO, the GVRDF exceeds the 1,000 tonnes per year threshold and is therefore required to capture and reduce methane emissions. The ASRDF and LRDF produce less than 1,000 tonnes of methane per year each and are therefore not regulated to collect and destroy LFG. LFG is monitored at the ASRDF and is further described below.

A LFG capture system typically consists of a series of vertical gas extraction wells joined through a system of lateral pipes, which are connected to a main header pipe that conveys the gas to a treatment facility. At the GVRDF, the gas treatment facility is comprised of an extraction plant equipped with a utility flare. It is estimated by the US EPA that a new engineered landfill can capture roughly 60% of LFG during operation depending on system design and effectiveness, and up to 90% of the methane can be captured after a geomembrane cover is placed on the landfill during closure. The LFG system at GVRDF was commissioned in April of 2015. The total quantity of methane destroyed at the LFG flare station in 2016 was 411 tonnes, with a carbon dioxide equivalent of 10,270 tonnes.

Landfill gas monitoring probes are installed at the ASRDF in native soils around the perimeter of the landfill to monitor the subsurface migration horizontally and vertically through the soil. Monitoring started in 2011 when a number of probes were installed to assess a LFG migration issue on the south side of the landfill footprint. Probes are sampled on a quarterly basis, or more frequently as needed, to determine if LFG is migrating away from the landfill, indicating the possible need for LFG control. Generally, LFG migration probes are installed at or near the landfill property boundary as migration beyond the boundary may impact neighbouring structures.

Landfill gas capture technologies are well proven commercially, and provide the potential to capture energy and/or reduce greenhouse gas emissions from landfill. With regards to implementing LFG capture at other landfills within the RDNO (for example the ASRDF and LRDF), so far only the GVRDF meets the trigger levels under the BC Landfill Gas Regulation.

The candlestick flare at the GVRDF is being used as the primary instrument to destroy LFG at this site. Data is being collected with respect to LFG quantity and quality in order to facilitate the development of a suitable and sustainable beneficial use, green energy project at the GVRDF.

The highest potential next step for the RDNO with regards to the LFG collection system include:

- Continue with the evaluation of the current LFG management system at GVRDF and implement options for repurposing the collected gas beyond flaring on site as soon as possible: for example, processing and injection into the natural gas grid, or generating electricity;
- Further expand the landfill capacity at the GVRDF can allow for expansion of the existing LFG infrastructure allowing for optimal LFG recovery;
- Minimize the quantity of organics in the MSW disposed through implementation of a source-separated organics diversion program, thus significantly reducing the potential for LFG generation; and
- Complete the current investigation on the ASRDF LFG migration issue to determine the impacts and develop and implement mitigation strategies if required.

2.4 Thermal Technologies

2.4.1 Refuse Derived Fuel

Refuse-derived fuel (“RDFuel”) are fuels made from the combustible components of MSW, including commercial, industrial and consumer waste. RDFuel can replace virgin biomass being used for energy production. Therefore RDFuel can be used to replace finite resources like fossil fuels, and also decrease the volume of waste being landfilled.

From within the MSW stream, all materials that are inert, i.e., non-combustible, and those which have practical value as recyclables are removed prior to treatment. This may include ferrous and non-ferrous metals, glass, gypsum board, plaster, rock, and dirt. What remains is ideally an assortment of plastics and fibre. The Btu value of RDFuel is determined by the caloric content of the material it contains. Typically, a higher plastics content equates to higher heating values for the resulting fuel. The fibre component may also include cardboard, boxboard, and other cellulosic fractions such as wood scrap or any biomass in the waste stream being processed.



Photo 1: Typical Refuse Derived Fuel (RDFuel) Pellet

Sorting and processing can incorporate shredding, size screening, magnetic separation, coarse shredding and final refinement. Final refinement can include further shredding of the sorted material, or dehydrating the combustible waste portion using various pre-processing technologies. RDFuel is typically produced as fluff, but is usually baled or densified into pellets to make storage and transportation more economical. Most RDF processing facilities are located near a source of MSW, but once the RDFuel product is prepared, it may be transported long distances to an incinerator, gasifier or other such facility for use.

RDFuel can be utilized as clean burning fuel to be co-fired with or replace coal, petroleum coke and other fuels in cement kilns, industrial boilers and at utilities generation plants. The fuels generated by these technologies are typically classified as clean burning (when used to off-set coal) and can be used as a partial [normally up to 10%] coal substitute. RDFuel can also be used in conjunction with other technologies such as pyrolysis and gasification.

Feasibility of Creating Refuse Derived Fuel for the Regional District of North Okanagan

RDFuel is currently gaining momentum as both an alternative to landfill and a cleaner burning fuel due to innovations in related pre-processing technology. The long term hope in the industry is that this technology will be able to address dry material, including MRF residuals as part of an integrated system even for relatively low throughput facilities. This technology would likely be deployed as part of an integrated waste recovery system for MSW and would typically require complex mechanical sorting systems on the front-end. At this time, the RDNO's existing MSW stream does not have sufficient quantities necessary to make investments in processing technology worthwhile; however, there are specific source separated material streams such as clean and dirty wood that could be utilized by a private processor. These materials could be put to a higher and better use as a fuel source than currently used as alternative daily cover at the landfill.

2.4.2 Gasification

Gasification is a partial combustion process where the oxygen level is limited in order to convert organic or other fossil fuel based carbon-rich materials into a carbon-rich ash and a series of gases including carbon monoxide, hydrogen and carbon dioxide. This conversion of solid material into gas (fuels) and other desired end products is called synthesis and the gas therefore is known as or synthetic gas or (syngas).

While gasification is a more complex technology than incineration, it allows for the recovery of valuable products (i.e., syngas) which can be processed into usable chemicals (fuels, alcohols, etc.). The syngas is typically used to fuel a boiler and generate electricity via a steam turbine, although further processing can convert syngas into easy to use biofuels like synthetic gasoline and diesel. The energy derived from gasification and combustion of the syngas is considered to be a source of renewable energy if the gasified compounds were obtained from biomass or other natural sources. One perceived advantage of gasification is that its use can be considered potentially more efficient than direct combustion of the original fuel, since the resultant clean syngas product typically has the ability to be used directly in gas engines, to produce methanol and hydrogen or be converted into other synthetic fuels.



Photo 2: Gasification Plant

Gasification has been developed in various formats, and several versions of gasification equipment are available or in various stages of commercialization although commercially. Gasification has not achieved as high a level of acceptance as traditional combustion because of its relatively high complexity and high capital costs.

This technology is growing in popularity in large part because of the wide variety of potential feedstock that may be processed, as well as the perceived level of variability that may be acceptable. Thus the benefits of gasification are considered to be increased efficiency, greater variety of end products, and fewer back-end pollution control requirements than incineration or pyrolysis, although, similarly to traditional incineration and pyrolysis, it requires a consistent, high volume of feedstock to be economically sustainable.

Among the primary challenges facing waste gasification technologies is to reach an acceptable energy returned on energy invested ratio, as the efficiency of converting syngas to electric power may be offset by the often significant power consumption required in preprocessing, the use of oxygen and the gas cleaning process. In addition, the build-up of residue in the reactor necessitates frequent shutdown for cleaning. This makes what should be the benefit of a continuous feed system potentially irrelevant. True capital and operating costs of a system are still unknown until a full commercialization cycle can be completed, making it difficult to compare to alternatives.

Gasification's Feasibility for the Regional District of North Okanagan

Commercialization efforts remain elusive due, in large part, to the uncertainty of both capital costs and ongoing operating costs. Similar to incineration, this technology is expected to be capital intensive, necessitating deployment in large metropolitan areas where aggregation may help to leverage economies of scale. While there is potential value in small scale gasification designs deployed in an integrated waste handling technology suite, larger scale commercialization must be realized first. Since gasification technology is more complex, more expensive than other thermo-chemical technologies, and has limited commercial viability, at this time it is not recommended as a viable option for the RDNO in the next ten years.

2.4.3 Pyrolysis

Pyrolysis is a method of applying heat (thermal energy) to organic materials to decompose them. Pyrolysis occurs in the absence of oxygen, sometimes with the addition of a catalyst to spur the reaction. Pyrolysis in the waste industry typically refers to transforming solids like plastics, tires or biomass, into gases, liquids and a solid by-product rich in carbon content. The products of the pyrolysis process and their uses are described in Table 2-3.

Table 2-3: Products of Pyrolysis; their Contents and Uses

Products of Pyrolysis	Contains	Uses
Char (or 'biochar')	<ul style="list-style-type: none"> Solids with a high carbon content. Can also include inorganics or catalysts that were carried through the process. 	<ul style="list-style-type: none"> Typically burnt, or more recently incorporated as a soil amendment.
Non-condensable Gas	<ul style="list-style-type: none"> Made up of hydrogen, methane, carbon monoxide and other non-condensable gases. 	<ul style="list-style-type: none"> May be used as a heat source, flared, or burned similarly to conventional natural gas.
Liquid Fuel	<ul style="list-style-type: none"> Composed of dozens of organic chemicals. Pyrolysis 'oil' typically requires additional processing before replacing traditional fuels. 	<ul style="list-style-type: none"> Liquids undergo a process to separate water from other materials, after which they may be processed and refined into fuels, oils and chemicals.

In general, the technology is thought to have a great degree of flexibility as most organic compounds can be broken down to basic components using the pyrolysis process, and upgrades enable pyrolysis systems to generate a range of specific, valuable end products within the categories identified above.

Pyrolysis has been used for many years in the chemical industry to produce charcoal, activated carbon, methanol, and other chemicals from wood, which are then converted to compounds used to produce consumer products; e.g., turn coal into coke; convert biomass into syngas and biochar. It can also be used to neutralize waste into non-hazardous substances for safe disposal. Recently, experimental and pilot pyrolysis plants have been used to turn waste plastics back into usable oil and fuels; waste tires into carbon black (used to manufacture new tires) or fuel oil blends, and; biomass into fuels and chemicals for transportation.



Photo 3: Plastics Pyrolysis Facility

Pyrolysis' Feasibility for the Regional District of North Okanagan

The most crucial determinant of success for these technologies is the ability to aggregate and prepare the feedstock materials, since this ultimately determines the quality of the final product. End products must meet market standards for quality and quantity which impact the economics of the plant. Challenges exist for all forms of pyrolysis, with the relative variability or inconsistency of feedstock making it difficult to control the quality and uniformity of the final products. Pyrolysis is a technology with many potential applications for waste materials management, which helps explain the high degree of experimental activity currently taking place; however, there are no known facilities operating in Canada. Capital costs and operating costs tend to be higher due to the complexity of the process, varying feedstock quality, and additional processing requirements. Because this technology is generally considered to not be commercially viable for mixed waste due to its high variability, it is not being considered further for implementation in the RDNO. There could be opportunity to support a private facility that could be built in partnership with the forestry industry, and the RDNO could consider separating the clean wood received at the landfills, and currently being sued for cover, and provide it instead to a private facility for a higher and more beneficial use (e.g., Tolko's Co-Gen in Spallumcheen).

2.4.4 Waste to Energy (Incineration/Combustion)

Waste remaining after diversion efforts must be dealt with. With declines in landfill capacity and significant challenges siting new landfills, long-term disposal options are a high priority for regional governments. Waste to Energy (WTE) technologies are often considered a viable alternative to landfills as they convert waste materials to fuel products which can be used in place of virgin fossil fuel. Depending on the technology, employing WTE can result in an 80% mass reduction (by weight), and 90% reduction in volume. The remaining material is in the form of bottom and fly ash that must be landfilled or recycled depending on available markets.

Although all of the advanced recovery technologies covered in this section qualify as 'waste to energy', the most common and long-standing form of WTE processing is incineration, also known as combustion, defined as the burning of fuel to produce power and/or heat. This requires oxygen and high temperatures in an enclosed vessel. Incineration technology produces heat, ash residue, and gas, predominantly nitrogen (N_2), carbon dioxide (CO_2), and water vapour.



Photo 4: Burnaby WTE Facility.

Heat generated by incineration is captured and used to heat industrial boilers to generate pressurized steam, which can be used for direct heating, or passed through steam turbine generators to produce electric power, as in the Metro Vancouver WTE facility pictured in Photo 4. The gas must be treated to meet regulatory emission requirements for chemical pollutants and particulates. Ash residues are produced in both light ("fly ash") and heavy fractions ("bottom ash"). Both forms tend to contain residual compounds, and are typically landfilled. Fly ash requires pre-processing to dampen it prior to landfilling. Some options for beneficial reuse of bottom ash are being practiced, for example, as an additive in road building. Environmental concerns associated with these systems include air emissions that could impact air quality.

WTE technologies need to be operated at their designed processing capacity to be economical. If they are designed and sized appropriately to meet anticipated long term disposal capacities, then ideally, the costs can be as projected. Two examples are summarized below to demonstrate this requirement, and a feasibility assessment of value for the RDNO is presented.

Durham Region Waste to Energy Facility

Durham Region in Ontario is commissioning their mass burn WTE facility (WTEF). It employs a similar thermal processing technology to Metro Vancouver's WTE facility in Burnaby. This facility is estimated to cost \$260 million and process 140,000 tonnes per year. Although this facility cost \$260 million, much of the foundation and infrastructure was designed for a 400,000 t/yr facility. This facility has elevated capital costs which affects its unit processing cost. The calculated unit processing cost for the Durham WTEF is estimated to be \$250 per tonne. This includes a 20 year amortization at an interest rate of 6%. If the facility was built for its design capacity, the unit processing cost is estimated to be \$150 per tonne. This includes the cost for disposal of the residuals.

City of Edmonton Waste to Energy Facility

The City of Edmonton in Alberta is also commissioning a WTE facility that uses gasification technology from Enerkem. This facility is one of the first commercial scale gasification facilities in North America and cost over \$210 million. It is designed to process 100,000 tonnes of MSW annually.

The unit processing cost was calculated for the Enerkem facility. Additional pre-processing activities supports higher operating costs (estimated to be 20% higher than the Durham WTEF). The unit processing cost is estimated to be \$195 per tonne.

Tri-Regional Waste to Energy Feasibility Study

In 2010, the Cowichan Valley Regional District, the Comox Valley Regional District, and the Regional District of Nanaimo conducted a Tri-Regional District Solid Waste Study. The study assessed the feasibility of thermal treatment (or WTE) technologies for MSW for the three southern Vancouver Island regional districts. The study assessed different technologies, considering the combined solid waste available from the three regional districts. Figure 2-1 illustrates the expected unit processing cost for thermal treatment technologies based on their design processing capacity. For the three regional districts, the design capacity was 200,000 tonnes per year. This indicates a unit processing capacity that is just over \$100 per tonne in 2009 dollars.

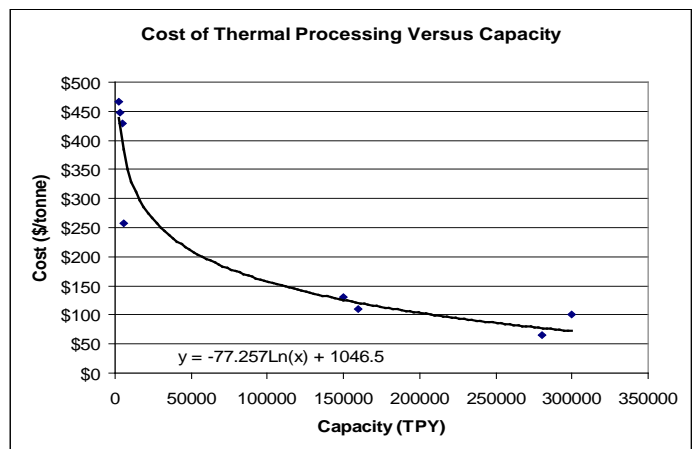


Figure 2-1: Cost of Thermal Processing Versus Capacity

Waste-to-Energy Feasibility for the RDNO

The combustion process is highly developed commercially and is available in numerous vendor specific designs. The technology is also highly complex and requires high upfront capital costs and long term contracts typically 20 to 30 years that guarantee a specific quantity of MSW. Currently in Canada there are four WTE facilities, and they are in located in highly populated areas with sufficient volume to sustain the economics of incineration. There have been a large number of proposals from companies that have come forward with smaller-scale WTE technologies; however, there is no full-scale operational facility in Canada that can be used as operating examples for the smaller scale WTE technologies. With the RDNO total garbage tonnage of 43,020 tonnes in 2016, and new diversion programs likely to decrease the total amount of MSW requiring disposal, it is recommended that a WTE plant not be considered for development or inclusion in the options for the 2017 SWMP update.

2.5 Technology Options Available and Priorities for Further Evaluation

The BC Ministry expects local governments to have a minimum target of 70% reduction of waste (or a 350 kg/capita/year) before utilizing WTE as a waste management option. The 70% target is calculated only from reduce, reuse, and recycle initiatives. When a region has sufficient reduction, reuse, and recycling, there is often not a viable business case for incineration/combustion technologies such as waste to energy, pyrolysis or gasification, which rely on a minimum threshold of feedstock to be financially viable. Likewise the production of refuse derived fuel technologies require certain minimum feedstock thresholds to develop a business case for the technology investment. Table 2-4 summarizes the recommendations for residuals management in the RDNO.

Table 2-4: Residual Management Options for Consideration in the SWMP Update

Recovery Technology and Description	Inputs (“Feedstock”)	Valued Outputs	Considerations for SWMP Update
Technology Opportunities			
Mixed Waste Material Recovery Facilities (Mixed Waste MRF)	Mixed/MSW	Recyclables	Not recommended for this SWMP update.
Anaerobic Digestion	Organic Material	Methane – Energy Digestate, used for composting, direct land application, or dehydration	Keep as an option for organics processing when developing an organics program.
Recovery Opportunities			
Landfill Gas Capture	Mixed/Municipal Solid Waste (MSW)	Methane – Energy	Options available including utilizing LFG at GVRDF, and expanding and further enhancing capture at GVRDF. Prevention and mitigation strategies include minimizing organics in landfills, and resolving migration issues at ASRDF.
Refuse Derived Fuel	Feedstock preparation including shredding and screening of MSW	Solid fuel for waste to energy technologies	Not recommended as a technology for the RDNO, however some source separated materials (wood, asphalt shingles) could potentially find better use in these markets through private facilities involved in wood waste management or with Energy BC.
Gasification	Pre-processed high energy content MSW	Syngas	
Pyrolysis	Typically woody biomass, paper products, etc.	Syngas Char	
“Waste to Energy” (Incineration / Combustion)	Feedstock preparation including shredding and screening of MSW	Electricity, high pressure steam, or district heat Metals	Not Recommended.

With respect to waste Recovery, current measures such as LFG capture are considered the most viable measures to capture energy from waste and mitigate environmental impacts from landfilling. With respect to residual waste, landfilling is the RDNO’s only current residual management process. A review and evaluation of the transfer stations, active landfills, closed landfills, and proposed next steps in landfill management are presented in [Section 3.0](#).

3.0 RESIDUAL MANAGEMENT

3.1 Active Landfills

3.1.1 Landfill Facilities Overview

Landfilling, as the primary residuals management strategy, has been part of the RDNO solid waste management system since the first SWMP was developed in 1995. Even with high diversion targets and diversion rates, landfills will continue to remain an essential component of the RDNO solid waste management system to deal with the residual waste which cannot be practically removed from the waste stream along with items not well designed for recycling that are disposed of as garbage. Since the first plan was developed for the RDNO in 1995, four small landfill sites have been closed. In both the 1995 and 2002 plans, the RDNO stated that existing regional landfills will remain in operation until they reach design capacity, while remaining environmentally and economically viable.

In British Columbia, landfills are designed and managed to minimize risk to public health and safety and to ensure environmental protection. The “Landfill Criteria for Municipal Solid Waste” guidance document provides standards for siting, design, construction, operation and closure of MSW landfills. This guidance document, originally developed in 1993, was updated by the BC Ministry in 2016 to reflect the current best management practices and standards that have been developed over the years to enhance environmental protection.

Modern landfills are engineered and managed facilities for the disposal of solid waste residuals. They are designed, operated and monitored to ensure compliance with environmental criteria. Landfills have value measured by the amount of MSW that can be placed into available engineered disposal capacity termed “airspace”. It is typically advantageous to preserve the airspace to extend the lifetime capacity of a landfill as regions that exhaust their landfill capacity may have difficulty siting a new landfill. This can cause a region to require waste exporting, which can escalate costs. The economics of transfer and disposal out-of-region can be prohibitive and leave the region unable to deal with their own waste. Landfill capacity in the RDNO is estimated to be 34 years at the GVRDF, 17 years as the ASRDF and 57 years as the LRDF.

3.1.2 Operational Risks and Opportunities

Tetra Tech’s Current Solid Waste Management System Report provided an overview of the three operating landfills within the RDNO. Each year annual reports are produced by April 30 for each operation and close landfill as required by the BC Ministry. The reports are published on the RDNO website and submitted to the BC Ministry. Based upon these report, it is understood that all currently available permitted landfill space is expected to be consumed by 2075. It is noted that the ASRDF has the most finite life (2034) while the GVRDF has lateral expansion potential. Long term planning with respect to all three landfill sites is necessary in order to ensure future residuals disposal capacity and where to direct investments in infrastructure. There are a number of studies underway including an update to the design, operations, and closure plans (DCOPs) for each landfill site, along with environmental investigations that can influence the ongoing economic viability of the LRDF and ASRDF sites. Table 3-1 provides a synopsis of the ongoing operations at each of the RDNO’s RDFs and provides a summary of the key risks and opportunities for consideration for a long term disposal plan for the RDNO.

Table 3-1 Recycling and Disposal Facility Information Matrix

Variable	Lumby RDF	Armstrong/Spallumcheen RDF	Greater Vernon RDF
Population served and capture area	4,505 residents	17,184 residents	61,655 residents
Distance from service area, and from the City of Vernon	6.5 km north of Lumby, and 33.5 km East from the City of Vernon.	2.0 km north of the City of Armstrong and 24.6 km north from the City of Vernon.	7 km southwest of the City of Vernon.
Filling rate (tonnes/year)	1,841 tonnes	11,419 tonnes	28,296 tonnes
Years until full/closure under current design plans	2074 (57 years)	2034 (17 years)	2051 (34 years)
Expansion capacity available	Yes - Potential expansion to the south	None	Yes – Current landfill is approximately 14 ha of the 79 ha site. Additional land to the west of the current landfill cells is available for expansion.
Tipping fee	Refuse/MSW \$100/tonne, \$5 minimum charge per load		
Approximate funds generated from tipping fees (2017 estimate)	\$220,000	\$1,375,000	\$3,600,000
2016 direct operation and maintenance expenditures	\$219,836 (\$119/tonne)	\$842,865 (\$74/tonne)	\$1,686,274 (\$60/tonne)
Estimated 2016 funds transferred to landfill closure reserve	\$29,456 (\$16/tonne)	\$182,704 (\$16/tonne)	\$452,736 (\$16/tonne)
Total direct operation and closure (Does not include capital projects and shared expenses)	\$249,292 (\$135/tonne)	\$1,025,569 (\$90/tonne)	\$2,139,010 (\$76/tonne)
Estimated shared expenses (Administration, Eco-Depot, Composting Facility, Recycling Programs, etc.)	\$753,000 + \$800,000 (Capital Expenditures)		
Total RDNO landfill closure statutory reserve funds (2017)	\$5,588,167 (Contribution are made to the reserve at a rate of \$16/tonne)		
Estimated closure cost	Under review in development of updated Design, Operation and Closure Plans for each RDF		
Landfill design type	Unlined natural attenuation landfill	Historically an unlined attenuation landfill, 7 new landfill cells are lined	Unlined natural attenuation landfill
Significant work completed or underway since 2011 plan	<ul style="list-style-type: none"> ▪ Land swap with property owner south of the landfill to create larger buffer area for natural attenuation to take place 	<ul style="list-style-type: none"> ▪ Phase one closure of area where leachate breakout occurred ▪ Installation of poplar tree plantations and evaporation ponds for leachate control ▪ Construction of lined landfill cell (Cell 7) for new waste placement ▪ New leachate pump station and pump ▪ LFG migration investigation and mitigation 	<ul style="list-style-type: none"> ▪ Land acquisition to the east for landfill expansion, and preliminary conceptual design developed ▪ Installation of LFG capture system ▪ The filling plan for the next five to ten years is focused on the upper northeast bench of the footprint in order to maximize LFG extraction potential over the next 10 years ▪ Construction of the Regional Yard Waste Composting Facility was completed in the fall of 2011 ▪ New leachate pump stat and reservoir ▪ Upgraded entrance and storm water management

Variable	Lumby RDF	Armstrong/Spallumcheen RDF	Greater Vernon RDF
Site challenges	<ul style="list-style-type: none"> ▪ Long term plan for groundwater quality and buffer zones for leachate impacts, possible leachate plume mitigating risks identified ▪ Stormwater planning ▪ Economics of operating a small landfill 	<ul style="list-style-type: none"> ▪ 2015 significant leachate breakout occurred ▪ Ongoing leachate plume and migration issues around the ASRDF and at the property boundary ▪ LFG migration identified at property boundaries and mitigation strategy under development ▪ Limited availability of good cover material for intermediate or side cover ▪ Residential properties are located in close proximity to the RDF leaving small buffer zones for contaminant management 	<ul style="list-style-type: none"> ▪ Site access from the highway - the left turn exiting the landfill onto the highway has bad sight lines and no space for acceleration before merging with traffic ▪ Seepage from the leachate pond identified, options for controlling seepage are being developed ▪ Ensure adequate stormwater control measures or storage capacity are in place ▪ Wood waste management (significant stockpiles)
Key risks	<ul style="list-style-type: none"> ▪ Potential leachate plume below the property, slowly migrating south in the direction of groundwater travel 	<ul style="list-style-type: none"> ▪ Stormwater control, leachate plume migration to the north west and LFG migration. ▪ Risk that cost of mitigating the environmental risks makes the site financially unsustainable 	<ul style="list-style-type: none"> ▪ Landfill expansion will include significant quarrying of rock, and the cost for the new expansion airspace would be more than the existing airspace or constructing a new landfill at an alternative site ▪ Inability to mitigate leachate migration off site toward both lakes
Identified long term mitigation strategies or opportunities to minimized key risks	<ul style="list-style-type: none"> ▪ Continue with hydrologic studies to identify leachate plume migration ▪ Determine if the economics of the current site operation is adding value, or if the option to close the site to MSW, and use available airspace for dry inert waste (construction and demolition material) to limit the ongoing environmental liabilities is a superior option 	<ul style="list-style-type: none"> ▪ Continue with hydrogeological studies to identify leachate plume migration, and resolve LFG migration issues ▪ Determine if the economics of the current site operation is adding value, or if the option to close the site to MSW, before 2034, and construction of a transfer facility is a superior option 	<ul style="list-style-type: none"> ▪ Continue with expansion area exploratory drilling to determine the geotechnical parameters for the area ▪ Consider utilization of LFG once more wells are turned on and the volume of LFG increases ▪ Consider locations for new recovery facility and location for regional compost facility

The RDNO will need to consider whether the budget for the ASRDF and LRDF site can be increased to address the additional requirements of the updated guidelines and ongoing environmental control measures, or if the closure of the landfill and installation of transfer stations would provide better economic and environmental performance. Additional studies currently underway may determine that additional control measures and infrastructure will be required, and this will dictate whether the continued operation of the sites are financially viable. If the sites cannot continue to operate over the long term for MSW, it may be necessary to construct transfer stations that would collect waste to be transferred to the GVRDF. The GVRDF would therefore become the centralized disposal facility for the region, and the property would undergo expansion and investment to address the new landfill criteria and optimize performance.

3.2 Closed Landfills

There are four closed landfills in the RDNO. Two of these sites (Cherryville and Kingfisher) are currently used as transfer stations. All sites have ongoing environmental monitoring programs to assess trends in groundwater quality. A summary for the four closed landfills are included in Table 3-2.

Table 3-2: Closed Landfills Information

	Ashton Creek RDF	Cherryville RDF	Kingfisher RDF	Pottery Road RDF
Closure date and activities	Stopped landfilling waste in 1996; final closure completed in 1997	Stopped landfilling waste in 2008; final closure completed in 2016	Stopped landfilling waste in 2002; final closure in 2003	Stopped landfilling waste in 1986; final closure completed in 2015, including purchase of a right of way to allow for natural attenuation of the leachate plume west of the landfill footprint
Current site use	None	Transfer Station (since 2008)	Transfer Station (since 2003)	None
Future site use	None planned	Transfer station	Transfer Station	Recreational, specifically a disc golf course, trails and a bike skills park.
Ongoing operations	<ul style="list-style-type: none"> Environmental monitoring 	<ul style="list-style-type: none"> Environmental monitoring Transfer station operation activities 	<ul style="list-style-type: none"> Environmental monitoring Transfer station operation activities 	<ul style="list-style-type: none"> Environmental monitoring
Identified site risks	<ul style="list-style-type: none"> Ongoing environmental monitoring is performed and evaluation of trends in exceedances for specific metals and leachate parameters 			
Identified mitigation strategies or opportunities to minimized risks	<ul style="list-style-type: none"> Long-term monitoring required for the length of this new plan to monitor the performance of environmental controls Repairs as necessary to fencing, ditching and cover area 			

No new options have been developed for the closed landfill sites. Ongoing environmental monitoring and periodic site maintenance will be required for the foreseeable future. The post closure use of the Pottery Road RDF may be turned over to the Parks Department in the near future.

3.3 Transfer Stations

As reviewed in the Current System Assessment Report, the RDNO manages three transfer stations – Cherryville Transfer Station, Kingfisher Transfer Station, and Silver Star Transfer Station as summarized in Table 3-3.

Currently the Cherryville and Kingfisher transfer station facilities accept the majority of the recyclable materials that are accepted at the operating RDF facilities to encourage waste diversion and recycling. This current strategy to capture all recyclable materials requires the service to be offered at a subsidized rate, as the facilities are not able to capture the required funds to cover the costs of operating the transfer stations through tipping fees alone. Current service hours have been minimized to balance the budget for operating the sites while still ensuring residents have adequate site access.

Table 3-3: Transfer Station Information

	Cherryville Transfer Station	Kingfisher Transfer Station	Silver Star Transfer Station
Hours	Tuesday and Saturday, 9 am – 4 pm	November 1 – March 31: Sundays, 9 am – 4 pm April 1 – October 31: Wednesdays and Sundays, 9 am – 4 pm	Open 7 days per week, 24 hours per day.
Site history	Landfill closed in 2008. Operating as transfer station since 2008.	Landfill closed in 2003. Operating as a transfer station since 2003.	Operated since 2000
2016 tonnage collected	227 tonnes	123 tonnes	369 tonnes
Service population	1,010	300 (population varies seasonally)	98 (population varies dramatically on a seasonal basis)
Approximate funds generated from tipping fees (2017 estimate)	\$29,000	\$14,000	\$116,814 (for transfer station operation)
2016 direct operation and maintenance expenditures	\$67,700	\$48,000	\$116,814

Although no new options have been developed for the existing transfer stations, it may be necessary to assess the economics of continuing to collect wood and bulky items at the Kingfisher and Cherryville Transfer Stations. The costs to process and remove the wood chips and to accept the large bulky items (e.g., furniture) are increasing. It may be best to require these materials be hauled directly to the nearest RDF. The provision of recycling services at all transfer stations and RDFs in the region has been part of the ongoing strategy to maximize waste diversion. Identification of a clean wood waste market or uses on site is required to ensure the stockpiles of wood and other materials at the Cherryville and Kingfisher transfer stations is well managed.

4.0 OPTIONS AVAILABLE AND PRIORITIES FOR FURTHER EVALUATION

Based on a review of technology opportunities and residual management, the following scenarios and opportunities are under consideration for further evaluation in the economic analysis phase of the project and for potential inclusion in the updated plan. A more detailed review of technology option considerations is provided in Section 2.5 within the Table 2.4 Residual Management Options for Consideration in the SWMP. The selected scenarios and opportunities factored in what would still help to optimize reduction, reuse, and recycling and consider minimum feedstock thresholds needed to develop a business case.

- Anaerobic Digestion
 - Keep for consideration as an organics processing option when developing an organics program.
- Landfill Gas Capture
 - Continue with the evaluation of the current LFG system at the GVRDF and implement options for repurposing the collected gas beyond on-site flaring. For example, use the LFG for processing and injection into the natural gas grid, or to generate electricity; and
 - Minimize the quantity of organics in MSW through implementation of a source-separated organics program diverting these materials away from the landfill thus significantly reducing the potential for LFG generation.

- Thermal Technologies
 - Not recommended to pursue any thermal technologies for MSW treatment (as summarized in Table 2-4);
 - Include opportunities for some high energy source separated materials (clean and dirty wood) and identify markets for them through private thermal facilities involved in wood waste management or with Energy BC; and
 - Minimize costs associated with collection wood and other materials at transfer stations by having these materials direct hauled to local RDFs.

The options for potential residual management scenarios under consideration are summarized in Table 4-1.

Table 4-1 Summary of Residual Management Scenarios

Variable	Lumby	Armstrong	Vernon	Outcome
Current operation	<ul style="list-style-type: none"> ▪ Monitor and evaluate site financial model and environmental performance, mitigate environmental issues as identified 	<ul style="list-style-type: none"> ▪ Monitor and evaluate site financial model and environmental performance, mitigate environmental issues as identified 	<ul style="list-style-type: none"> ▪ Monitor and evaluate site financial model and environmental performance, mitigate environmental issues as identified 	<ul style="list-style-type: none"> ▪ Minimize financial liability or operating three close proximity landfills
Modified operation scenario for consideration	<ul style="list-style-type: none"> ▪ Convert to MSW transfer station, and preserve landfill space for inert C+D material only to limit environmental risks 	<ul style="list-style-type: none"> ▪ Close landfill early to mitigate environmental risks and construct a transfer station ▪ Develop LFG control system 	<ul style="list-style-type: none"> ▪ Confirm expansion design, and invest in the landfill expansion to improve site performance and create long term centralized disposal site for the region 	<ul style="list-style-type: none"> ▪ Development of long term disposal capacity for the RDNO ▪ Invest financial capital in GVRDF landfill site for optimal outcomes
Performance criteria for decision making	<ul style="list-style-type: none"> ▪ Financially sustainable model for landfill operation and closure ▪ Environmental performance meets monitoring requirements 	<ul style="list-style-type: none"> ▪ Financially sustainable model for landfill operation and closure ▪ Environmental performance site upgrades meets monitoring requirements 	<ul style="list-style-type: none"> ▪ Financially sustainable model for landfill operation and closure ▪ Environmental performance site upgrades meets monitoring requirements 	<ul style="list-style-type: none"> ▪ Use financial performance for maintaining environmental standards and performance benchmarks to evaluate and determine potential early closure and site upgrades

Landfill capacity in the RDNO is estimated to be 34 years at the GVRDF, 17 years as the ASRDF and 57 years as the LRDF. The ASRDF has the most finite life (2034) and the GVRDF has lateral expansion potential which could extend site life beyond 2051. Long term plans for all three landfill sites is necessary in order to ensure future disposal capacity and where to direct investments in infrastructure. Pending confirmation from the RDNO Board and Regional Solid Waste Advisory Working Group, these options will undergo financial analysis for application scaled to the RDNO's current and future projected waste management status. The results of this analysis will be presented in Technical Memo No. 3, once all options further up the waste management hierarchy have been discussed and selections made through Technical Memo No. 2.

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6.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

ISSUED FOR REVIEW

Prepared by:
Avery Gottfried, P.Eng.
Solid Waste Planning Engineer
Solid Waste Management Practice
Direct Line: 604.830.6989
Avery.Gottfried@tetrattech.com

/bvb

Attachment (1): Tetra Tech's General Conditions

ISSUED FOR REVIEW

Reviewed by:
Michel Lefebvre, P.Eng.
Manager
Solid Waste Management Practice
Direct Line: 780.451.2130 ext. 255
Michel.LeFebvre@tetrattech.com

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GEOENVIRONMENTAL REPORT

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To:	Nicole Kohnert, P.Eng	Date:	October 18, 2017
c:		Memo No.:	2
From:	Avery Gottfried, ME, P.Eng Carey McIver, MA Tamara Shulman	File:	SWM.SWOP03478

Subject: Technical Memo No. 2 – Reduce, Reuse and Recycle

This 'Issued for Review' document is provided solely for the purpose of client review and presents our interim findings and recommendations to date. Our usable findings and recommendations are provided only through an 'Issued for Use' document, which will be issued subsequent to this review. Final design should not be undertaken based on the interim recommendations made herein. Once our report is issued for use, the 'Issued for Review' document should be either returned to Tetra Tech Canada Inc. (Tetra Tech) or destroyed.

1.0 INTRODUCTION

The Regional District of North Okanagan (RDNO) retained Tetra Tech Canada Inc. (Tetra Tech) to manage a review and update of the RDNO's 2011 Solid Waste Management Plan (SWMP). The SWMP update will review existing solid waste management policies and programs, identify and evaluate options for reduction and diversion, residual management, and financing, and also set the RDNO's waste management principles, targets and strategies for the next ten years. A summary of the project phases and deliverables is included on Figure 1-1.

The assessment stage included the issued for review Current Solid Waste System Report that was presented at the meeting on August 1, 2017. The report documented the current condition of the RDNO's solid waste management system, and was used as a basis for discussion for the direction of the SWMP update entering the second stage, "Analysis and Evaluation".

Within Stage Two, the first technical memorandum (tech memo) presented on September 21, 2017, focused on recovery and residuals management, the interrelated fourth and fifth Rs of the 5-R waste prevention hierarchy (pictured on Figure 1-2). The outcome from the meeting and first tech memo include a list of options for financial analysis, and elimination of some options from consideration within the RDNO's SWMP update. This second tech memo will address the first three Rs – reduce, reuse, and recycle. The third and final tech memos will assess the financial implications and synergies for selected options for integration with the 2017 SWMP.

This tech memo will be presented to the Regional Solid Waste Advisory Working Group (RSWAWG) at the fourth meeting on October 25, 2017, to gather feedback on the options and recommendations. Section 2.0 of this memo provides an overview the current reduction, reuse and recycling programs that are tracked by the RDNO. Section 3.0 provides analysis of the primary new options for consideration that have been identified throughout the meetings and analysis to date. Section 4 summarizes the potential diversion potential for the options under consideration to help determine what new waste reduction and diversion targets could be achieved.

The Working Group’s input will be sought on each of the tech memos and this advice will guide the selection of options for inclusion in the updated plan. The selected options will be researched in more detail to gauge their specific application within the RDNO, including estimated costs and determining how they align with other plan components. A draft plan update with preferred options will be prepared for review by the Working Group prior to undertaking community and stakeholder consultation. Once these three tech memos have been issued for review, the consultation stage will engage RDNO constituents from public and private sectors through to First Nations to align on the direction of the SWMP update. Finally, the SWMP update will be crafted based on the outcomes of the previous deliverables, including a consultation summary.

The project consists of four stages, as shown on Figure 1-1: Project Phases and Associated Deliverables below.

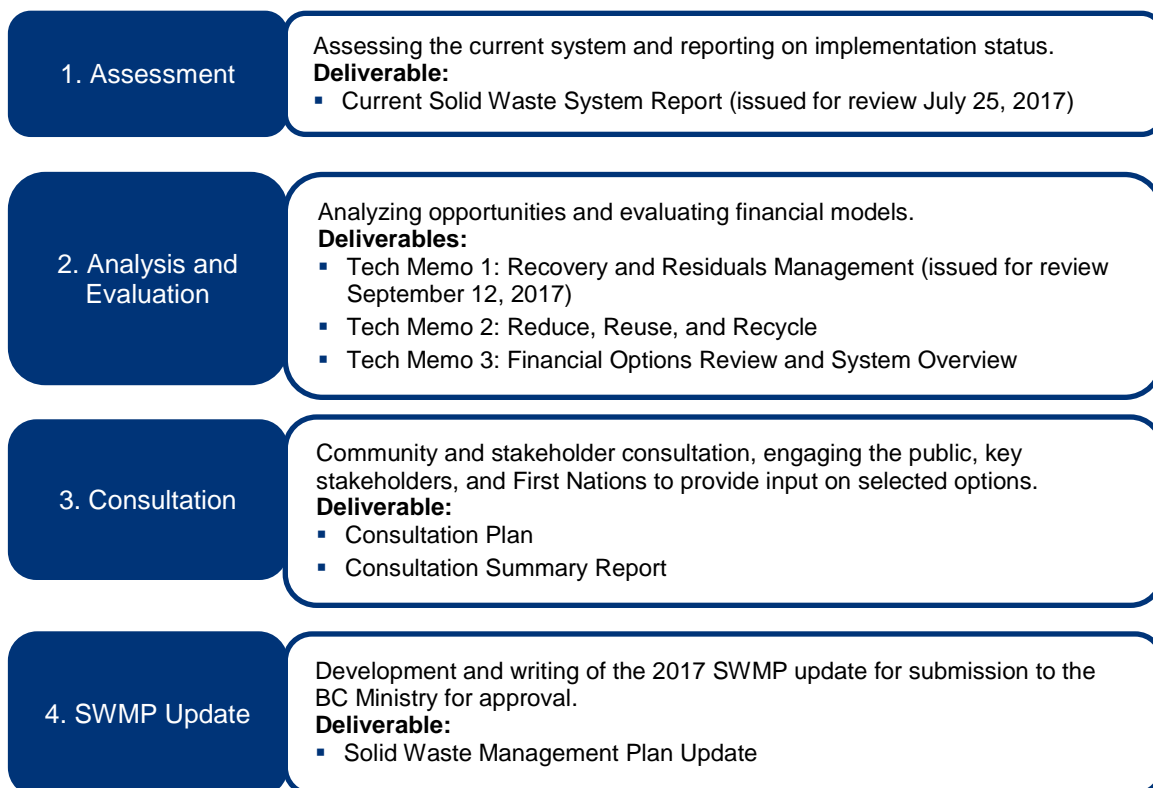


Figure 1-1: Project Phases and Associated Deliverables

1.1 Guiding Principles

The waste prevention hierarchy (reduce, reuse, recycle, recovery, and residuals management) is a useful tool to evaluate opportunities to improve a solid waste management system (see Figure 1-2) and will be foundational for the RDNO’s SWMP update. Where practical and feasible, the hierarchy order preference is for other waste management strategies to be undertaken after all opportunities for prevention and reduction at a higher level have been actively pursued. For example, after minimizing the amount of waste produced through reduction and reuse processes, the best practice is to divert as much useful and recyclable material as possible from the waste stream that is still being disposed. Opportunities for recycling should be explored after all opportunities for reduction and reuse of materials have been exhausted. Likewise, recovery is an option once all recycling opportunities are in place and fully optimized. Once these options have been exhausted, recovery technologies can be implemented prior to final disposal (landfilling) of any residuals to maximize the value of wasted resources.

The benefits to this approach are as follows:

- **Actions taken at higher levels in the waste prevention hierarchy can eliminate or reduce the environmental management costs of actions at lower levels.** For example, waste prevention programs can reduce costs associated with handling waste in the first place.
- **The waste prevention hierarchy can potentially reduce the environmental impacts of product manufacturing and distribution.** For example, reuse (and, to a lesser degree, recycling) will reduce the demand for and thus environmental impact of extracting and processing virgin resources, while the use of recycled materials can reduce the energy cost and virgin inputs needed to manufacturing new products.

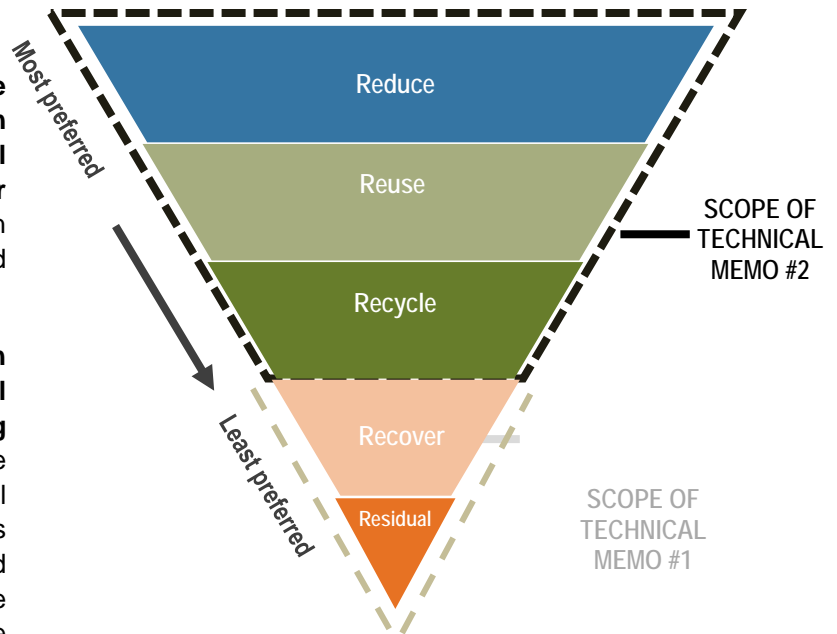


Figure 1-2: Waste Prevention Hierarchy

The province expects a solid waste management plan to provide regional districts—and their residents and businesses – with clear direction on how they will achieve shared solid waste goals. The province has provided eight guiding principles as summarized in Table 1-1 for regional districts to follow in developing their solid waste management plan. In addition to the guiding principles, the RDNO can include additional locally-relevant guiding principles in their solid waste management plans.

Table 1-1: Guiding Principles

Provincial Guiding Principles	
1	Promote zero waste approaches and support a circular economy.
2	Promote the first 3 Rs (reduce, reuse and recycle).
3	Maximize beneficial use of waste materials and manage residuals appropriately.
4	Support polluter and user-pay approaches and manage incentives to maximize behaviour outcomes.
5	Prevent organics and recyclables from going into the garbage wherever practical.
6	Collaborate with other regional districts wherever practical.
7	Develop collaborative partnerships with interested parties to achieve regional targets set in plans.
8	Level the playing field within regions for private and public solid waste management facilities.

1.2 Options Summary

There are a number of options to increase waste reduction, diversion and recycling in the RDNO. To aid in the analysis and development, the options have been summarized below into the following areas:

- Organics Diversion Programs
 - Provide organics diversion for residential, commercial including transfer station and composting facility requirements.
- Universal Collection
 - Improve access to collection services including organics collection.
- Markets for Materials
 - Ensure markets for diverted materials, with a focus on wood and compost.
- Waste Reduction and Education Programs
 - Use a zero waste approach.
 - Institute food waste reduction campaigns.
 - Provide behavior change and education programs.
- Reduction and Diversion Services and Support
 - Support on-site composting (e.g., Silver Star Mountain Resort).
 - Augment and expand extended producer responsibility (EPR) programs.
 - Consider special service needs for some rural areas, keeping in mind aging population and service requirements.
 - Continue Waste Reduction Initiatives Fund.
 - Address disaster response waste (e.g., docks, Styrofoam, sandbags).
 - Evaluate opportunities for new programs (e.g., textiles).

1.3 Targets

The Ministry has established waste disposal as an annual reporting requirement for regional districts and set a provincial target of 350 kg per capita per year to be achieved by 2020. A second performance measure set by the Ministry is to have 75% of the population in British Columbia covered by an organic waste disposal restriction by 2020. Through a separate Recycling Regulation, the Ministry oversees an EPR program that sets 75% recovery targets for products covered through the program (e.g., beverage containers, packaging and printed paper, electronics, and other items).

The 2002 SWMP identified a target of 0.55 tonnes per capita (550 kg per capita) based on an original target of 50% reduction in waste disposal based on 1990 levels (1,100 kg per capita). The RDNO has consistently met its 550 kg per capita target since 2011. The RDNO can choose to continue with the current target or adopt the Provincial target, or develop a new RDNO-specific target. This tech memo recommends interim targets to move towards the

Provincial disposal target of 350 kg per capita over the next 10 years (by 2028). The phasing can be informed by the timeline set for optimizing existing and implementing new waste reduction and diversion programs with the capacity to reduce disposal per capita. The quantity of refuse to divert by 2028 through various programs is estimated to be 10,500 tonnes based, on today's disposal rate.

Following the primary options summarized in Section 1.2, the following impacts on the waste disposal rate could be achieved:

- Organics Diversion Programs (up to 5,000 tonnes or 59 kg per capita).
- Universal Collection (2,000 tonnes to 3,500 tonnes or 24 kg to 41 kg per capita).
- Markets for Materials (no new diversion, required for effective delivery of current programs).
- Waste Reduction and Education Programs (depending on resources, up to 500 tonnes to 1,000 tonnes or 6 kg to 12 kg per capita).
- Reduction and Diversion Services and Support (depending on resources, up to 500 tonnes to 1,000 tonnes or 6 kg to 12 kg per capita).

If all programs were adopted and implemented, 10,500 tonnes of new diversion could be achievable. This is equivalent to an improvement in the waste disposal rate of up to 124 kg per capita. Looking at program options, if both organics diversion and universal collection were implemented, a 400 kg per capita target could be achievable; with a full scale organics diversion program, a 450 kg per capita target would be achievable.

2.0 CURRENT PROGRESS TRACKING

As shown on Figure 2-1, the total kilograms of waste disposed per capita has been static since 2011.

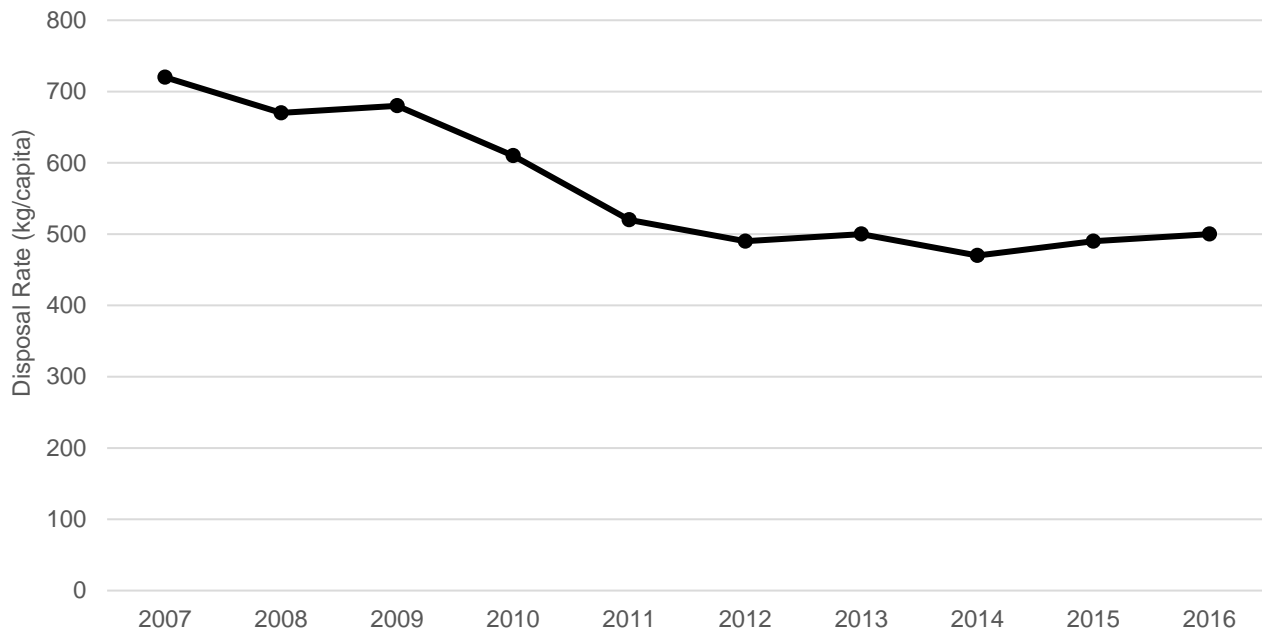


Figure 2-1: Disposal Rate (kg/capita)¹

¹ Figure adapted from 2016 Solid Waste Management Plan Annual Report

Looking at all materials managed by the RDNO as shown on Figure 2-2, there have been more changes in the quantities of materials recycled. There has been an increase in the quantity of yard waste, metal, clean and dirty wood and crushable materials (rubble and concrete) that account for the increasing quantities of recyclable materials managed by the RDNO. Materials such as wood and crushed concrete are used in landfill operations, and yard waste collected at the Greater Vernon Recycling and Disposal Facility (GVRDF) is composted at the Regional Yard Waste Composting Facility at the GVRDF.

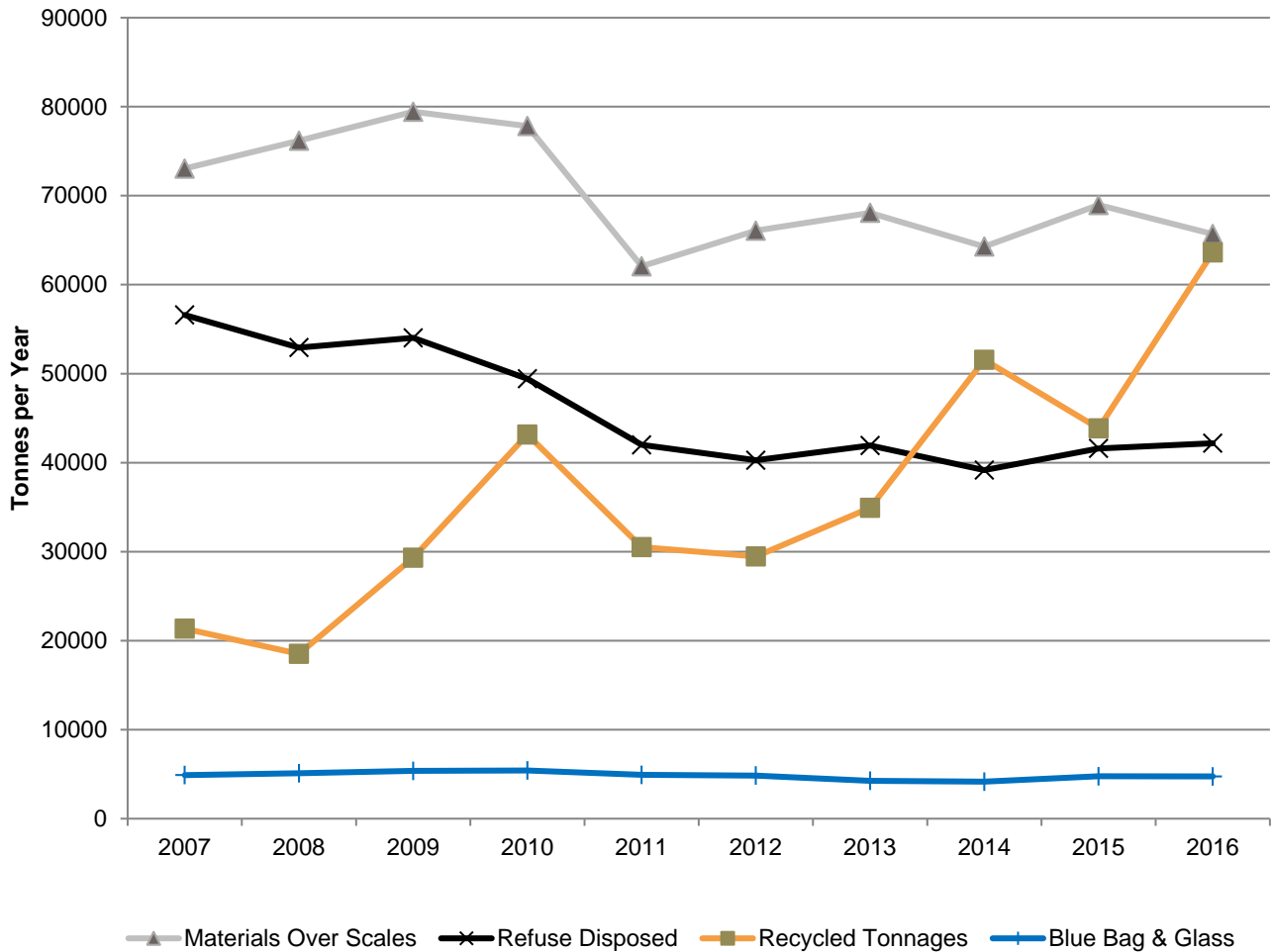


Figure 2-2: Disposal Rate (kg/capita)¹

Table 2-1 outlines the core strategies from the 2011 plan that focused on reduction, reuse or recycling and can help explain the changes observed in the amount of materials managed at RDNO facilities. In 2015, the Interior Freight and Bottle Depot (in Vernon) was awarded the contract by the RDNO to become a drop-off depot (Eco Depot) for residential quantities of household hazardous waste (HHW) for free, including all transport of dangerous goods classes of hazardous waste not accepted under BC EPR programs (except explosives). Discussion on universal curbside collection was postponed and will be included in this plan. Differential tipping fees have increased since 2011, and loads that contain regulated materials or construction and demolition waste are charged at more than double the cost of regular refuse or separated materials such as asphalt shingles, wood and drywall. These variable tipping fees provide incentive for customers to sort and separate prior to arriving and also at the facilities.

Table 2-2: 2011 Solid Waste Management Plan Update Strategies

No.	Strategy	Description	2011 Estimated Diversion Potential	Implementation Period	Current Status
3	Eco-Depots	Evaluate eco-depot concepts and locations especially with respect to customer convenience and land use in the region.	N/A	2 years to 5 years	Completed.
7	Universal Curbside Collection	Determine the economic viability of a Universal Curbside Collection Program for all residential generated materials, including garbage, compostables, and recyclables.	5,000 tonnes/yr	2 years to 5 years	Postponed.
8	DLC Waste Management Strategy	Examine mechanisms for further diversion of DLC waste, including but not limited to, private and public resource recovery parks and partnerships with industry.	13,400 tonnes/yr	1 year to 5 years	Ongoing.
9	Organic Waste Management Strategy	Determine the best management strategy for organic waste including wood and yard waste from the DLC, residential, commercial, industrial, and agricultural sectors; and food waste from the residential, commercial, industrial and agricultural sectors.	4,750 tonnes to 7,000 tonnes/yr	1 year to 10 years	Ongoing, with options and cost analysis completed in 2017.

3.0 OPTIONS FOR CONSIDERATION

This section provides additional information and reviews options (not currently in place) that have been developed.

3.1 Organics Division

Reducing and diverting organic waste from landfill disposal has been an integral component of the RDNO solid waste management planning process. This is because organic waste, comprised primarily of wood waste, yard waste, and food waste, not only represents the largest component of landfilled waste in the region (34%) but also generates methane, a potent greenhouse gas, and leachate during decomposition in a landfill.

The 2011 SWMP included an Organics Waste Management Strategy that identified a range of initiatives and programs to divert organic waste from disposal over a 10-year time-period. Although there has been significant progress in diverting wood and yard wastes from landfill disposal, the RDNO has yet to consider the viability of expanding their organics diversion programs to include food waste. This initiative was identified in the Organics Management Strategy as an action to be considered for implementation within the next 10 years.

To provide input into the 2017 SWMP update, the RDNO engaged XCG Consulting Ltd. (XCG), in collaboration with Carey McIver & Associates Ltd. (CMA) and Maura Walker & Associates (MWA), to undertake a Facilities Life Cycle Cost Assessment and Organics (Food Waste) Management Options Study for the RDNO solid waste management system. The purpose of the study was to develop a full list of options and then select at least four viable food waste diversion options and then determine the financial impact of each option on the RDNO solid waste management system relative to the status quo.

Two separate reports were prepared and presented to the Regional Solid Waste Advisory Working Group at their first meeting on June 13, 2017. The following section summarizes the outcomes of these two studies and defines core options for next steps.

3.1.1 Current Organic Waste Management System

Since the 2011 Plan Update, the RDNO has implemented many of the reduction, collection and processing initiatives identified in the Organic Waste Management Strategy. With respect to reduction, the RDNO provides information on their website regarding backyard composting and grass-cycling, operates a backyard composter rebate program and provides support to Xerindipity, an outdoor environmental education centre. Xerindipity showcases composting, natural lawn care, pesticide free gardening, water-wise gardening, worm composting and xeriscaping.

To support the source separation of yard and wood wastes, under the RDNO Municipal Solid Waste Management Bylaw 2659, wood waste and yard waste have been classified as regulated materials, meaning that any loads of refuse containing these organic materials are charged at more than double the refuse tipping fee. As of July 1, 2016, the surcharge for loads containing regulated materials was \$203 per tonne compared to the regular refuse rate of \$100 per tonne. However, if customers deliver source separated loads of these materials, yard waste is free of charge and the tipping fee for wood waste is currently \$20 per tonne.

The organics waste management collection system in the RDNO is based on residents and businesses delivering their yard and wood wastes to either the GVRDF, the Armstrong Spallumcheen Recycling and Disposal Facility (ASRDF), the Lumby Recycling and Disposal Facility (LRDF) or two small transfer stations: Cherryville Recycling and Disposal Facility and Kingfisher Recycling and Disposal Facility.

Due to the regulated waste policy and tipping fee structure described above, as indicated on Figure 3-1, the quantities of source separated wood and yard wastes delivered to RDNO facilities has been increasing over the last five years. Although yard waste quantities have been increasing steadily over the last five years, it is important to note that the quantity of wood waste received on an annual basis is more affected by local economic activity and the existence of private sector alternatives than for yard waste.

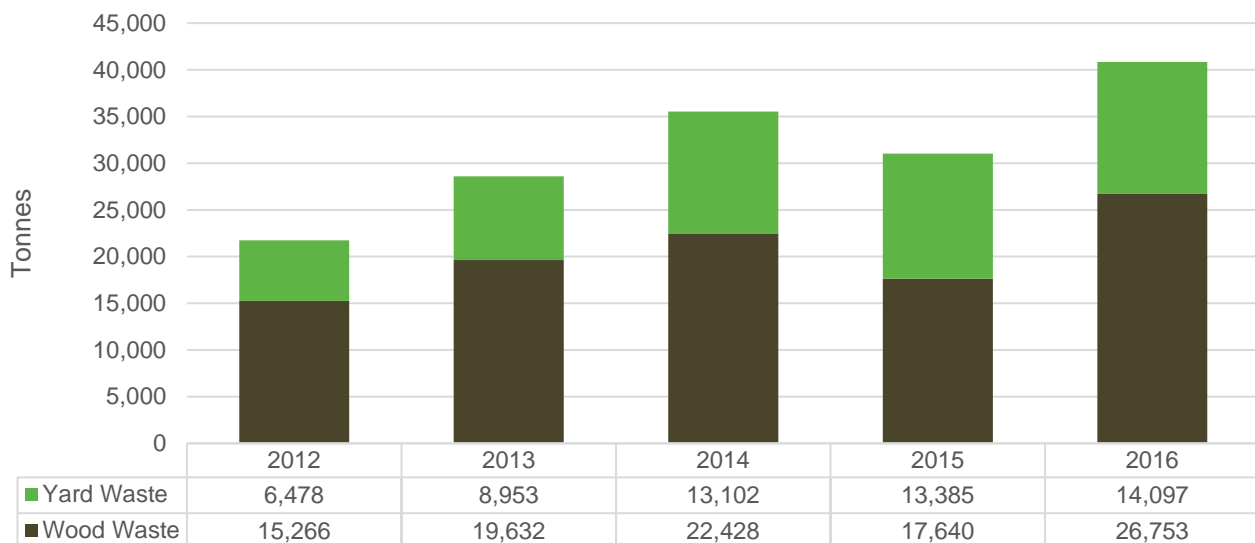


Figure 3-1: Wood and Yard Waste Diversion 2012-2016

With respect to yard waste, regional yard waste composting operations at the GVRDF began in the spring of 2012. The composted and screened yard waste, known as rdno•gro is used for various landscaping projects in the region as well as for landfill closures. Limited quantities of rdno•gro are also made available to residents for personal use, free of charge.



Wood waste delivered to the RDNO facilities is chipped and used primarily as landfill cover (50/50 wood/soil) but also as bio-cover on top of intermediate cover to improve aesthetics and odour.

With respect to yard waste collection programs, as discussed in the Current Solid Waste Management System Report, there are currently no regular weekly curbside collection services for organics, either yard or food wastes, in the RDNO. Most municipalities offer only spring and fall chipping and leaf collection services. Curbside garbage collection is also not universal in the region, where only the municipalities of Vernon, Armstrong, Enderby and Lumby provide curbside garbage collection services to their residents. However, curbside recycling services are available to most of the households in the region, except some very rural homes.

3.1.2 Best Management Practices and Innovation in British Columbia

The RDNO does not need to look beyond British Columbia to find examples of best practices in organic waste management. As indicated on Figure 3-2, the MSW management system in the RDNO also performs well when compared to regional districts with similar population and level of economic activity. However, there are still two regional districts with better performance: the Cowichan Valley Regional District (CVRD) and the Regional District of Nanaimo (RDN).

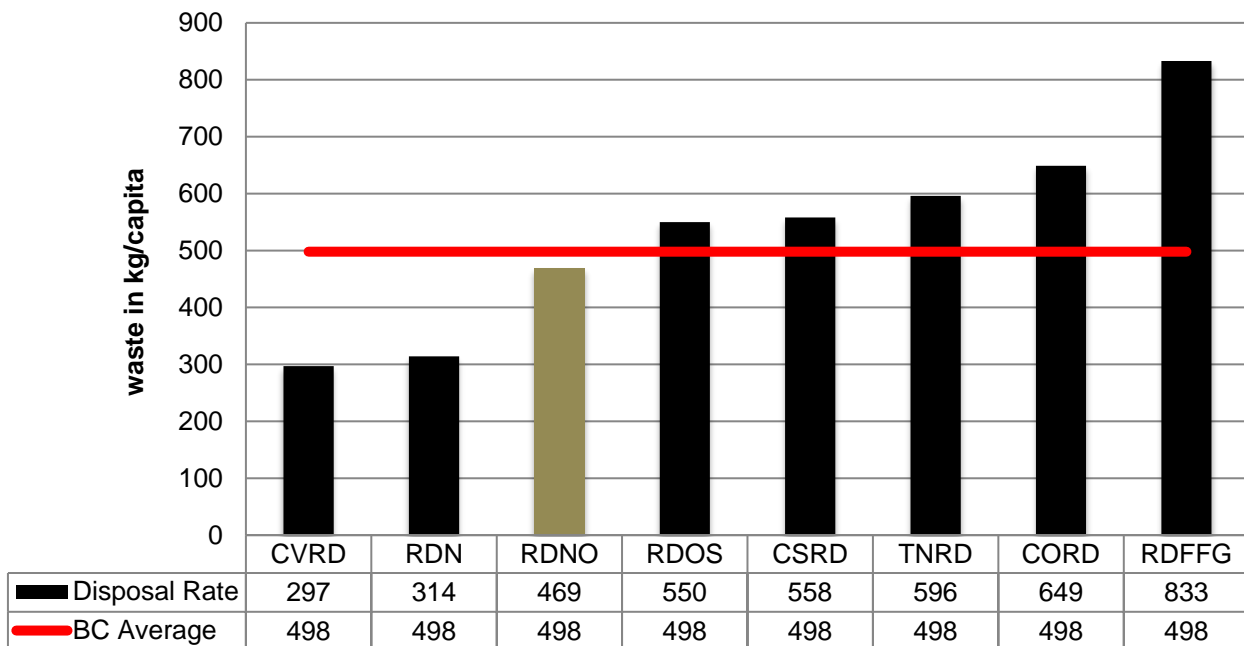


Figure 3-2: Disposal Rates in Regional District with Similar Populations 2015

The difference in disposal rates can be attributed, in large part, to the implementation of organics diversion strategies in these two Vancouver Island regional districts. In 2006, both the CVRD and RDN introduced bans on the disposal of commercial organic wastes to reduce GHG emissions, preserve landfill capacity and reduce waste export disposal costs. Residential collection programs followed roughly 5 to 7 years later in both those regional districts.

In 2015, the Capital Regional District and Metro Vancouver implemented organics disposal bans from both the commercial and residential sector. As a result, in 2015 roughly 66% of the population of British Columbia was covered by an organic waste disposal ban. There are also numerous municipal collection programs in regional districts that have not implemented disposal bans (e.g., Grand Forks, Abbotsford, and Comox). Consequently, with respect to best practices in organic waste management, these British Columbia local governments can provide practical and effective examples to other regional districts wishing to maximize their waste reduction efforts.

The CMA study provided examples of best management practices implemented by local governments in British Columbia that could be applicable to the RDNO. These included: regional district policies such as food waste disposal bans (RDN, CVRD, Capital Regional District and Metro Vancouver); food waste collection programs (RDN, Grand Forks, and Port Coquitlam) and reduction programs such as Love Food Hate Waste (Metro Vancouver) and Compost Coaching (North Shore Recycling Program).

3.1.3 Organics Management Opportunities in the Regional District of North Okanagan

Prior to developing viable food waste management options for the RDNO, the study team gathered information on: available feedstock quantities; local compost processing capacity and costs; as well as opportunities and costs for reduction, collection and transfer services.

3.1.3.1 Feedstock Quantities

To provide an estimate of additional organic feedstock quantities available in the RDNO, the study team compared results from two methods: estimates based on waste composition data (when actual data isn't available) and estimates based on actual data available from similar communities.

As indicated above, the CMA study identified that the RDN and the CVRD on Vancouver Island have the lowest disposal rates in British Columbia. Both regional districts implemented disposal bans on commercial sector food waste in 2006, and all households in the RDN and most of the households in the CVRD have curbside food waste collection service. Table 3-1 provides residential curbside collection data for four communities that are comparable to the RDNO.

Table 3-1: Curbside Food Waste Collection Data for RDN and CVRD

Curbside Program	Households	Person/HH	Est. Pop	Food Waste		
				Tonnes/yr	kg/hh/yr	kg/cap/yr
RDN						
City of Nanaimo	27,600	2.3	63,480	3,505	127	55
RDN Service Area	28,130	2.2	61,886	3,151	112	51
Total	55,730		125,366	6,656	119	53
CVRD						
Town of Ladysmith	3,410	2.3	7,843	436	128	56
District of North Cowichan	10,640	2.3	24,472	1,075	101	44
Total	14,050		32,315	1,511	108	47
Average					117	52

Based on an average of 117 kg per household, or 52 kg per capita per year for residential food waste, Table 3-2 provides an estimate of potential food waste diversion by recycling and disposal facility (RDF) service area in the RDNO.

Table 3-2: Residential Curbside Food Waste Estimate for the RDNO

Site	Service Area	Households	Person/HH	Pop. Est.	Food Waste Estimate	
					117 kg/hh/yr	52 kg/cap/yr
GVRDF	Vernon	17,381	2.2	38,238	2,034	1,988
	Coldstream	3,980	2.7	10,746	466	559
	Electoral Area B	1,376	2.5	3,440	161	179
	Electoral Area C	1,342	2.6	3,489	157	181
	<i>Sub-Total</i>	<i>24,079</i>		<i>55,913</i>	<i>2,817</i>	<i>2,907</i>
ASRDF	Armstrong	2,099	2.4	5,038	246	262
	Spallumcheen	1,820	2.6	4,732	213	246
	Enderby	1,063	2.1	2,232	124	116
	Electoral Area F	876	2.4	2,102	102	109
	<i>Sub-Total</i>	<i>5,858</i>		<i>14,104</i>	<i>685</i>	<i>733</i>
LRDF	Lumby	759	2.4	1,822	89	95
	Electoral Area D	492	2.5	1,230	58	64
	Electoral Area E	335	2.3	771	39	40
	<i>Sub-Total</i>	<i>1,586</i>		<i>3,823</i>	<i>186</i>	<i>199</i>
TOTAL		31,523		73,840	3,688	3,840

Table 3-2 indicates that if households in the RDNO were serviced by curbside food waste collection programs like those provided in the RDN and CVRD, roughly 3,800 tonnes of food waste could be diverted from landfill disposal. However, given that roughly 32% of RDNO households do not receive universal mandatory curbside garbage collection, it is unlikely that this much food waste would be recovered from the residential sector.

Table 3-3 provides an estimate of food waste based on curbside collection in the municipalities that currently provide a garbage collection service at 52 kg per capita annually and a drop-off service at the GVRDF, ASRDF and LRDF based on estimated recovery rate of 10 kg per capita per year. This drop-off estimate is based on data from a drop-off food waste pilot program operated by the Powell River Regional District. Using this methodology, the residential food waste estimate is reduced to 2,700 tonnes.

Table 3-3: Residential Food Waste Estimate – Curbside + Drop-Off

Site	Service Area	Households	Person/HH	Pop. Estimate	Food Waste Tonnes
GVRDF	Vernon	17,381	2.2	38,238	1,988
	Coldstream	3,980	2.7	10,746	107
	Electoral Area B	1,376	2.5	3,440	34
	Electoral Area C	1,342	2.6	3,489	35
	<i>Sub-Total</i>	<i>24,079</i>		<i>55,913</i>	<i>2,165</i>
ASRDF	Armstrong	2,099	2.4	5,038	262
	Spallumcheen	1,820	2.6	4,732	47
	Enderby	1,063	2.1	2,232	116
	Electoral Area F	876	2.4	2,102	21
	<i>Sub-Total</i>	<i>5,858</i>		<i>14,104</i>	<i>446</i>

Site	Service Area	Households	Person/HH	Pop. Estimate	Food Waste Tonnes
LRDF	Lumby	759	2.4	1,822	95
	Electoral Area D	492	2.5	1,230	12
	Electoral Area E	335	2.3	771	8
	<i>Sub-Total</i>	<i>1,586</i>		<i>3,823</i>	<i>115</i>
TOTAL		31,523		73,840	2,726

With respect to food waste from the industrial, commercial, and institutional (ICI) sector, based on the RDN average recovery rate of 23 kg per capita, the RDNO could expect to recover roughly 2,000 tonnes of food waste from this sector.

Consequently, as indicated in Table 3-4, the total amount of food waste that could potentially be diverted from landfill is roughly 5,000 tonnes per year. This includes 2,000 tonnes of food waste from households in the City of Vernon plus 1,000 tonnes of food waste from households in the rest of the RDNO, as well as 2,000 tonnes of waste from the ICI sector.



Table 3-4: RDNO Food Waste Feedstock Estimate

Sector	Tonnes Per Year
Vernon (Residential)	2,000
Rest of RDNO (Residential)	1,000
Commercial	2,000
Total	5,000

3.1.3.2 Processing Capacity and Costs

The availability of cost-effective and reliable organic waste processing capacity is essential to the development of organics management options. The regional yard waste composting facility at the GVRDF is a mechanically aerated (turned with an excavator) open windrow facility and is not designed to process food waste.

To divert food waste from RDNO landfills, the RDNO will need to have a processing (composting) facility available that can manage this stream effectively. To achieve this, the RDNO can take advantage of existing private sector processing capacity or construct its own capacity. The CMA report provides a detailed discussion of processing capacity and costs associated with the privately-owned and operated Spa Hills Farm Composting facility located in the Columbia Shuswap Regional District (CSR) as well as costs associated with constructing a new food waste processing facility at the GVRDF.

3.1.3.3 Collection Opportunities and Costs

With respect to residential garbage collection, as discussed in the Current System Report, although all households receive curbside collection of recyclables, curbside garbage collection is not universal throughout the RDNO. All municipally operated collection systems are contracted-out to two main private collection companies: Waste Connections and Tip-It Waste Solutions. CMA met with representatives from these two companies to discuss the opportunity to expand their services to include curbside collection of organic waste. CMA also met with representatives from the City of Vernon to gauge their interest in providing curbside collection of food waste only or

yard waste and food waste. In all cases, current service providers are supportive of providing organics collection programs.

The issue that current residential service providers will need to resolve is whether to expand collection to include food waste-only or to both food and yard waste. This is an important issue since the addition of yard waste collection entails an increase in collection costs without a corresponding increase in diversion. In other words, given the high level of yard waste diversion already achieved through drop-off sites, curbside collection would not necessarily result in increased yard waste diversion. An audit to determine the amount of yard and garden debris in the garbage could be considered during peak spring season to gauge the potential impact of adding yard waste into curbside programs.

This is because residents that were previously self-hauling their yard waste to drop-off sites, would now be putting this material out at the curb. This may be a costly convenience. The food waste-only collection programs in the RDN and CVRD cost in the range of \$100 to \$168 per household per year for weekly food waste and bi-weekly garbage collection. However, programs in British Columbia that collect food and yard waste can cost \$200 per household per year or more depending on whether the service is manual or automated cart based.

Although the City of Vernon has expressed an interest in implementing a curbside collection program for food and yard waste, a new yard waste drop-off facility in the north end of the City may be a more cost-effective option for the yard waste component of organic waste. In any case, each municipality in the RDNO will need to assess the costs and benefits of adding food only or food and yard waste to their current collection program. Since the scope of this study is limited to the financial impact of diverting additional organics from RDNO operated RDFs, cost estimates were not developed for municipal curbside collection programs.

With respect to organics diversion from the ICI sector, CMA met with the major private haulers in the region (Waste Connections of Canada, Waste Management Canada, and Tip-It Waste Solutions). All three companies were supportive of providing food waste collection services to their customers. Waste Connections and Waste Management, in particular, have experience with commercial food waste collection systems due to the existence of disposal bans in the Lower Mainland and parts of Vancouver Island.

Depending on the quantity of food waste, generators use plastic garbage cans to collect food waste from kitchens while private haulers utilize plastic carts and metal bins to collect food waste outside of commercial establishments.

The only concern expressed by these companies regarding the implementation of either residential or commercial food waste diversion programs, was the lack of a convenient and accessible processing facility in the RDNO. Although the Spa Hills Farm composting facility is within a reasonable haul distance from population centres in the RDNO, haulers report that the access to the facility is not ideal given the condition of the roads to and within the farm. Consequently, they indicated that for organic waste diversion to Spa Hills to be successful, a local transfer facility would need to be constructed by the RDNO.

3.1.4 Organic Management Options

Based on an assessment of the current organic waste management system, a review of best practices in British Columbia as well as organic waste management opportunities available in the RDNO, the CMA study selected the four options based on environmental, social and economic criteria. These four options are organized around the following assumptions with respect to policy, collection, processing and diversion.

3.1.4.1 Policy Assumptions

Under the RDNO Municipal Solid Waste Management Bylaw 2659, wood waste and yard waste have been classified as regulated materials, meaning that the any loads of refuse containing these organic materials are charged at more than double the refuse tipping fee. To support source separation of food waste, the study team assumes that the RDNO will designate food waste as a regulated material under the bylaw, either for food waste generated by the ICI sector or for both ICI and residential food waste. These two alternatives are recognized in the list of options.

3.1.4.2 Collection Assumptions

If the RDNO designates ICI food waste as a regulated material, the CMA study assumed that private haulers would provide collection services to their ICI customers. However, given that curbside garbage collection is not universal throughout the RDNO, the list of options recognizes two collection scenarios for residential waste. Based on discussions with staff from the City of Vernon, it is possible that the city may expand their curbside collection service to include food waste (and potentially yard waste) without residential food waste classified as a regulated material. Alternatively, if the RDNO chooses to classify ICI and residential food waste as a regulated material, this would force the implementation of curbside garbage and food waste collection programs across the region.

3.1.4.3 Processing Assumptions

As discussed in Section 4.2, if the RDNO chooses to regulate food waste, the only viable processing options are to either transfer the material 38 km out-of-district to the Spa Hills Farm Composting Facility near Silver Creek in the CSRD, or construct a public or private composting facility at the GVRDF. These alternatives are reflected in the list options developed by the study team.

3.1.4.4 Diversion Assumptions

As discussed previously, the RDNO already diverts significant quantities of yard waste and wood waste from landfill disposal. Consequently, the diversion impacts identified in the long-list are limited to food waste only. Although this is clear for options that transfer food waste to Spa Hills, options that involve the construction of a composting facility at the GVRDF identify new diversion of food waste and existing diversion of yard waste. This is because the capital costs associated with constructing a processing facility are based on a design capacity that includes equal parts food waste and yard waste as a bulking amendment. It is assumed that this yard waste is already being diverted at the GVRDF.

3.1.5 Short List Options

3.1.5.1 Option 1: ICI Plus City of Vernon, Permanent Transfer to Spa Hills Farm

Designate ICI food waste as a regulated material. City of Vernon implements curbside collection program for residential food waste. Construct a permanent transfer station at the GVRDF and contract with Spa Hills for transfer and processing.

Rationale

This option provides moderate diversion (4,000 tonnes per year), has a high potential for public support based on discussions with City of Vernon staff, moderate capital costs (\$1 Million), low technical risk and a moderate ease of implementation.

3.1.5.2 Option 2: ICI Plus RDNO Residential – Permanent Transfer to Spa Hills Farm

Designate ICI and residential food waste as a regulated material. Implement a region-wide universal curbside collection program. Construct a permanent transfer station at the GVRDF and contract with Spa Hills for transfer and processing. Construct small transfer facilities at ASRDF and LRDF for self-haul only.

Rationale

This option provides high diversion (5,000 tonnes per year), has a moderate potential for public support due to concerns regarding universal collection programs, and moderate capital costs (\$1 million), low technical risk and a moderate ease of implementation.

3.1.5.3 Option 3: ICI Only, Public Facility at GVRDF

Designate ICI food waste as a regulated material. Construct publicly owned and operated organics composting facility at GVRDF.

Rationale

This option provides low diversion (2,000 tonnes per year), may have low public support due to higher capital investment than Spa Hills Farm options, has moderate capital costs (\$1.6 Million) and moderate technical risk due to the potential for odour but will be easy to implement as there would be no change in residential collection service levels.

3.1.5.4 Option 4: ICI Plus RDNO Residential, Public Facility at GVRDF

Designate ICI and residential food waste as a regulated material. Implement region-wide curbside collection program. Construct publicly owned and operated organics composting facility at GVRDF. Construct small transfer facilities at ASRDF and LRDF for self-haul only.

Rationale

This option provides high diversion (5,000 tonnes per year), may have low public support due to higher capital costs, has moderate capital costs (\$4 Million) and moderate technical risk due to the potential for odour. However, there will be some implementation challenges due to issues associated with universal collection.

3.1.6 Financial Impact of Short-List Options

As discussed above in the introduction to this section, the purpose of the organics management options study was to develop four viable organic diversion options and then determine their financial impact on the RDNO solid waste management system. To do this, XCG prepared a financial model of the current solid waste system (status quo) that would provide answers to the following questions:

- Is the current status quo model balanced (i.e., does the current revenue stream meet the solid waste management system expenses, including long-term capital requirements)?
- What would be the estimated capital and operational costs of implementing each of the four organics diversion options?
- What would be the impact to the site life of the existing landfills?
- What would be the impact relative to the status quo model.

XCG’s cost analyses of the four waste diversion options presented above were completed using the net present value (NPV) methodology to facilitate comparison of alternatives. If the NPV of the analysis is positive, it indicates that the cash flow into the system, in this case revenue from tipping fees, recycling and taxation is sufficient to cover the cash flow out of the system. A negative NPV is the result of inadequate cash flow to cover all expenditures and is not financially sustainable in the long-term without reducing the expenditures or increasing revenues.

The full analysis included all cost assumptions that are presented in the XCG study presented to the Working Group at their first meeting. The following Table 3-5 provides a summary of the results with respect to organics diverted, average cost per tonne of organics, NPV and impact on the site life existing landfills.

Table 3-5: Summary of Financial Impact of Short-List Options

Option	Organics Diverted (tonnes)	Average Cost per tonne	NPV	Site Life Impact
Status Quo			22,969,799	
Option 1 (ICI Ban and Vernon, Spa Hills)	4,000	\$140	8,985,732	GVRDF 3 yrs
Option 2 (ICI and Residential Ban, Spa Hills)	5,000	\$157	2,994,959	GVRDF 3 yrs ASDRF 1 yr LRDF 6 yrs
Option 3 (ICI Ban, RDNO Owned)	2,000	\$189	13,627,867	GVRDF 1.5 yrs
Option 4 (ICI and Residential Ban, RDNO Owned)	5,000	\$206	-3,110,126	GVRDF 3 yrs ASDRF 1 yr LRDF 6 yrs

As indicated in Table 3-5, while each option provides significant diversion from disposal, each option is more costly than the status quo. While Option 1 to Option 3, each have a positive NPV, meaning that system is balanced and would not result in any reduction in expenditures or increase to revenues, Option 4, where the RDNO constructs a publicly owned and operated organic composting facility at GVRDF, is not balanced and would require a reduction in expenditures or an increase in revenues. Nevertheless, all four options increase the site life of existing facilities and reduce the generation of methane, a potent greenhouse gas.

Input from the Working Group and the public will be required to select a sustainable organic management option that reconciles environmental, social and economic imperatives. Organic management options also interrelate with landfill gas capture options presented in Tech Memo 1, as some of the methane produced by organics decomposing in a landfill can be captured and utilized. The financial implications will include analysis of the costs of implementing both programs.

3.2 Universal Collection

Universal collection refers to ensuring all residents and businesses have equal access to recycling, organics, and garbage services. If these programs are accessible, grouped, and convenient, participation in diversion programs increases and can be further incentivized through collection schedule changes (i.e., switch to every other week garbage collection with weekly organics collection). The overall strategy is to ensure recycling and organics diversion programs and services are available and convenient for everyone at home, at work and on the go.

3.2.1 Residential Curbside

As discussed in the previous section, the quantities of materials that can be expected to be diverted for recycling and organics programs increase if a convenient and easy to use service is offered. Curbside recycling programs have been developed for a vast majority of residents in the RDNO since they have shown much higher capture rates of recyclables when compared to drop-off depots programs. With the implementation of an organics program along with garbage collection, the provision of a universal residential curbside organics program would actively support diversion efforts. By adding every other week garbage along with organics, many jurisdictions have seen a garbage reduction of over 35%.

Additional environmental, social and economic advantages have been demonstrated through universal collection programs and most municipalities have moved to this collection model to recognize these benefits which can include:

- Consistent level of service for all residents;
- Ability to expand programs to improve waste reduction (organics and yard waste collection);
- Ability to implement user pay programs through cart based collection;
- Standard limits on number of bags or cart sizes to influence use of recycling and organics programs;
- Potential decreases in backyard burning and illegal dumping;
- Improved safety due to fewer vehicles on the roads;
- Accountability of the service provider (customers have a collective say on service issues);
- Certainty (one provider under detailed contract with local government to provide service);
- Fewer trips to the landfill; and
- Lower cost due to servicing efficiencies.

Through this process, the RDNO could assist with the implementation of a universal collection service through a regional or subregional tendering process, with the member municipalities having the option to manage contracts themselves. The RDNO has the option to investigate implementing automated curbside collection, using carts, for all areas currently being served by Recycle BC's packaging and printed paper recycling program.

If implemented, universal collection will increase the amount of material diverted if an organics collection program is developed, reduce the number of self-haulers driving to RDFs through many neighborhoods, in turn reducing the number of vehicles on the road and their associated GHG emissions. This will contribute to regional and local GHG reduction targets that are set within the Regional Growth Strategy and Official Community Plans. This type of universal program would also potentially assist with reducing the amount of solid waste burned in the rural areas and increase the amount of compostable and recyclable material diverted from landfill.

The key next step for potential implementation would include:

- Determine the logistics and costs for implementing universal and compulsory residential organics and refuse collection in areas currently receiving only subscription service and curbside recycling services.
 - Collection types (automated or manual).
 - User pay options (based on cart sizes).

- Conduct the appropriate negotiation process to establish the contract rates and service areas, and determine who will manage the contract (RDNO or Municipality).
- Arrange and hold public meetings to inform the residents of the new service. Provide cost, schedule, and service specifications information.
- Develop and approve a service establishment bylaw.
- Develop and approve a rate bylaw (consider a blended rate if one universal rate cannot be negotiated with the haulers).

3.2.2 Multi-family Residential and Industrial, Commercial and Institutional

Similar to residential single family properties, jurisdictions are using both disposal restrictions along with requirements for recycling and organics services so the infrastructure is put in place to support increased participation and overall diversion.

- Develop bylaw adjustments to actively promote and require recycling and organics diversion. The bylaws call for the establishment of additional diversion infrastructure and services for sectors not directly serviced by public jurisdictions. The bylaws are first promoted through outreach and technical assistance initiatives, with enforcement set in place over time as part of an integrated “carrot and stick” approach.
- Several British Columbia jurisdictions have recently instituted mandatory recycling and composting by-laws that require multi-family residential complexes and ICI sector businesses and institutions to provide separate collection for food scraps and other organics, recyclables and garbage, including the District of Squamish² and the Resort Municipality of Whistler³.
- In concert with these bylaws, jurisdictions also provide technical assistance to actively supporting system setup and facilitate behaviour change to optimize systems use. For example, the nongovernmental association AWARE was contracted to conduct site visits to multi-resident stratas and businesses in Squamish and Whistler prior to and following the bylaw adoption to require mandatory recycling and organics collection services. City of Whitehorse actively promotes commercial composting to reinforce regulatory changes by offering green cart service directly and engaging a local service provider, Zero Waste Yukon, to provide business assistance⁴.

Next steps include conducting a scan of similar legislation to draft the appropriate model bylaw amendments that can be used by municipalities. Municipalities would be required to submit the bylaw changes for review and approval with RDNO, publicize the requirement, and put a system in place to monitor and enforce compliance after an educational grace period.

3.3 Markets for Materials

It is important to ensure materials that are diverted from disposal are being utilized following the waste reduction hierarchy and that markets are available to utilize the material that is diverted. Materials currently being diverted that have had difficulties finding markets include yard and wood wastes. Both materials can end up being stockpiled as more material is diverted and generated than is needed or markets available. Stockpiling can impact operations

² District of Squamish, 2017. Section 5.0 Multiple-Unit Residential and Industrial, Commercial and Institutional Collection: <https://squamish.civicweb.net/FileStorage/76336035401545779F58F103938C6A2D-Solid%20Waste%20Bylaw%20No.%202547,%202017.docx>

³ Resort Municipality of Whistler, 2017. Solid Waste Storage, Signage and Transport, Section 9: https://www.whistler.ca/sites/default/files/2017/Sep/meeting-package/agenda/24152/2017-09-19_regular_council_package_final.pdf

⁴ City of Whitehorse, 2017. Commercial and Multi-family Organic Diversion. <http://www.whitehorse.ca/departments/environmental-sustainability/waste-diversion/additional-information/ici-organic-collection>

by increasing operation time required to manage the materials, and increase fire risks during summer months. Additional costs may be incurred to move the materials or reduce stockpiles regularly, and if no uses for the materials are found they would need to be disposed once there is no longer space available for storage.

- Evaluate rdno•gro markets for utilizing compost generated at GVRDF.
- Assess wood waste management markets and options.
- RDFs currently use diverted clean (pallets, cut-ends, etc.) and dirty (dimensional wood, furniture, etc.) wood as a cover material (mixed with soil 50/50). Higher and better uses for clean wood material potentially exist in partnership with the forestry industry or other industries and manufacturing.
- Closed RDFs no longer have a use for wood and yard waste that is currently dropped off at the KRDF and CRDF. Material could be accepted only at active RDFs to allow smaller transfer sites to control costs.

Next steps for market analysis usually includes conducting studies with industry experts to identify potential markets, or develop potential working groups and business plans. The Southern Interior Waste Managers Association recently agreed to conduct a wood waste inventory to determine the quantities and quality of wood waste available for reuse and recycling in the southern British Columbia regional districts generated through the local government RDFs.

3.4 Waste Reduction and Education Programs

Combining a zero waste approach with waste reduction and robust education programs creates the foundation for behaviour change over time to support a culture shift in how we use resources. The section below outlines some key components to inform how programs can be rolled out efficiently and effectively.

Zero Waste Approach

RDNO could consider adopting zero waste as a guiding principle for the SWMP. The term 'zero waste' has been adopted by a wide range of institutions, municipalities, businesses, non-profits, and even countries (e.g., Zero Waste New Zealand). These organizations and institutions use a broad range of policy definitions for zero waste; for some, it is an overarching policy framework for materials management, others consider it to be an aspirational or actual goal to pursue (generally considered to be 90% or 95% diversion and above). The Ministry recently conducted a Zero Waste Business case that found moving towards zero waste will reduce costs, generate business and, support the creation of new jobs⁵. The common thread across zero waste initiatives is the intent to optimize waste management systems by employing approaches such that:

- Waste prevention is the key message with a focus on approaches such as improved product design, food waste prevention, and green purchasing;
- A strong emphasis is placed on reuse, repair, and the sharing-economy to reduce consumption of raw materials; and
- Diversion of materials, in the form of recycling, composting and anaerobic digestion, is maximized before sending materials for disposal.

⁵ BC Ministry of the Environment and Climate Change Strategy, 2017. Zero Waste. <https://www2.gov.bc.ca/gov/content/environment/waste-management/zero-waste>

Food Waste Prevention

Food waste reduction and rescue has become paramount in recent years. The United Nations Food and Agriculture Organization (FAO) estimated that a third of food produced for human consumption is lost or wasted globally, amounting to 1.3 billion tons (imperial) per year. Far more food is wasted per capita in the industrialized world compared with developing countries. In British Columbia, the Ministry has taken the initiative to provide food waste reduction tools⁶ for residential and commercial sectors including a Food Waste Reduction Toolkit tailored to municipalities. For example, RDNO could consider adopting a well-established residential food waste prevention campaign called Love Food Hate Waste. This program was initially designed by WRAP, a UK organization and is now being utilized by Canadian municipalities. Metro Vancouver has adapted the Love Food Hate Waste program for Canadian municipalities and has resources available to share with participating jurisdictions⁷. It is designed to raise awareness to reduce the amount of “avoidable” food waste in the region by partnering with business and government to design and implement campaigns and tools to actively promote behaviour change. Based on recent studies, up to 60% of food waste found in residential waste streams is comprised of “avoidable” food waste. When this percentage is applied to RDNO, approximately 12% (estimated 3,000 tonnes) of the landfilled waste was food that could have been eaten.

Behaviour Change and Education Programs

In addition to continuing to promote waste reduction and diversion programs through vivid print and electronic communications tools, social media (e.g., Facebook, Twitter, YouTube), hands on technical assistance, and other behavior change tools can be integrated into education efforts. The behavior change tactics derived from community-based social marketing (CBSM) can provide a framework for how to most effectively target a specific behaviour such as increasing recycling participation or diverting food scraps for specific audiences to address barriers and reinforce benefits of an activity. Derived from social marketing by Doug McKenzie-Mohr, an environmental psychologist, CBSM offers a myriad of behavior change tools that can be incorporated into existing and future education initiatives. Examples of CBSM behavior based tools include:

- Commitment – By agreeing to a small request, people have subsequently been found to be far more likely to agree to a larger request. As a result, many CBSM-based programs ask people for a verbal or written pledge or agreement.
- Prompts – Prompts can also be used to encourage people to engage in positive behaviour. By providing visual or auditory aids, people are reminded to perform a particular action. Prompts often take the form of a sticker or tag posted in close proximity to the action. Distributing kitchen containers to serve as a prompt for diverting food scraps can be effective; they can be distributed at a recycling depot as done in Whistler, and are a common tool to distribute as part of residential organics collection programs.
- Norms – Norms guide how we behave and are largely influenced by the behaviour of those around us. If members of our community, especially our immediate networks, are living sustainably, we are more likely to do the same. When norms have a visible element, be it a blue recycling box or a sign that says “We Compost,” they can have a more significant impact on behaviour change.
- Social Diffusion – New behaviours are frequently adopted because friends, colleagues, or competitors have changed certain behaviours. To encourage social diffusion, make commitments to new behaviours public and visible (such as adding a sticker for another environmental behaviour to the side of a collection container) and/or recruit well known and respected opinion leaders in the community to promote a specific behaviour.

⁶ BC Ministry of Environment and Climate Change Strategy, 2017. Food Waste Reduction Tools & Resources. <http://www2.gov.bc.ca/gov/content/environment/waste-management/recycling/organics/tools-resources>

⁷ Metro Vancouver, 2017. Love Food Hate Waste Canada. <http://www.lovefoodhatewaste.ca>

- Communication – The more relevant messages are to a group, the more likely it is to captivate someone’s attention. It is also important to make messages easy to remember and provide personal or community goals and targets, then provide feedback on success to the community. By generating opportunities for person-to-person, word-of-mouth contact, personalized messages spread through diffusion in an influential way, which ultimately personalizes the message.
- Incentives/Disincentives – Closely pairing an incentive, or reward, to specific positive behaviour can have a substantial impact on encouraging sustainable activities. This strategy is particularly useful when motivation to engage in action is low or people are not doing the activity as effectively as they could. It is recommended to use non-monetary awards, such as award certificates and social approval. Programs with monetary incentives and budgetary implications, such as discount programs for compost bins, serve as valuable incentives as well, on a case-by-case basis. A disincentive, such as having to pay for parking that was once free, is related behaviour change mechanism.
- Convenience – Consider the external barriers related to a project, how they can be overcome, and what resources are needed to successfully address them. A behaviour must be relatively convenient in order to become a new habit. For example, many businesses have various sizes of colour-coded containers to make food scraps collection convenient from point of generation through to how it is consolidated at the loading dock.

3.5 Reduction and Diversion Services and Support

Several reduction and diversion services and support could be beneficial for RDNO to pursue as part of the SWMP update. Below is a list of programs and support services that have been identified during the plan update:

- Support on-site composting – There is an opportunity for larger business and institutions in the region, such as Silver Star Mountain Resort, to establish smaller scale on-site composting or anaerobic digestion systems. In addition to removing food scraps and other organic materials from the waste stream, there are additional benefits related to positive public relations and staff morale. Metro Vancouver commissioned a study that provides an overview of organics collection and processing options entitled Onsite Organics Management Options Review⁸ that may be of benefit for a resort community. A summary of the study was also published in Biocycle Magazine⁹ in 2015.
- Augment and expand EPR programs – The Canadian Council for Ministers of the Environment (CCME) continues to provide guideline updates for Canada-wide implementation of EPR programs¹⁰. For example, products not yet in the BC Recycling Regulation that are recommended for Canada-wide EPR include carpet, textiles, and furniture. RDNO can continue to stay abreast of industry trends through conferences and annual updates¹¹ as provided by the CCME and the BC Product Stewardship Council (BCPSC). There is also an opportunity to advocate for new programs through direct correspondence with the Ministry or through associations of which RDNO is a member (e.g., BCPSC). The management by the RDNO of materials such as mattresses, propane tanks and drywall through well managed programs presents an opportunity to justify the expansion of EPR to these materials.
- Continue Waste Reduction Initiatives Fund – The RDNO currently administer a fund where individuals, community groups and non-profit organizations, including school groups, are eligible to apply for WRIF funding. Funding is available for capital items needed to implement initiatives that contribute to waste reduction in the

⁸ Metro Vancouver, 2014. On-site Organics Management Options Review. http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/On-site_Organics_Management_Options_Review-Dec-14.pdf

⁹ Biocycle, 2015. Evaluating On-site Organics Management Options. <https://www.biocycle.net/2015/08/18/evaluating-on-site-organics-management-options/>

¹⁰ Canadian Council for Ministers of the Environment, 2009. Canada-wide Action Plan for Extended Producer Responsibility. http://www.ccme.ca/files/current_priorities/waste/pn_1499_epr_cap_e.pdf

¹¹ EPR Canada, 2017. 2016 Extended Producer Responsibility Summary Report. <http://www.eprcanada.ca/>

RDNO. Examples of projects that have received WRIF funding include: developing square metre garden plots, establishing composting systems at schools, and implementing event recycling¹². Next steps for program enhancement could include making additional funds available, changing the criteria to include other program aspects beside capital, and/or advertising the fund more widely. The fund could support programs such as development of a toy library, tool library, repair café, rebuild centres, zero waste events, food waste reduction, kitchen catcher give-away, etc. As part of grant program development, conduct further inquiry to determine the expected impact/return for the type and amount of grants.

- Address disaster response waste (e.g., docks, Styrofoam, sandbags, fires) – Ensure solutions for disaster materials management are developed before a disaster occurs so systems can be put into place to manage the rapid increase in materials that are often generated after a disaster.
- Evaluate opportunities for new programs on an ongoing basis (textiles, etc.) – An ongoing strategy is ensuring the resources are available to research and develop new diversion programs as opportunities exist. Currently around the province, there are pilot projects looking at programs for the diversion of textiles and couch and armchair deconstruction. Resources include staff time and involvement in networking.

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¹²RDNO, 2017. Waste Reduction Initiatives Fund. <http://www.rdno.ca/index.php/services/engineering/solid-waste/education-awareness/waste-reduction-initiatives-fund>

5.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

ISSUED FOR REVIEW

Prepared by:
Avery Gottfried, P.Eng.
Solid Waste Planning Engineer
Solid Waste Management Practice
Direct Line: 604.830.6989
Avery.Gottfried@tetrattech.com

ISSUED FOR REVIEW

Prepared by:
Carey McIver, MA
Principal
Carey McIver & Associates Ltd.
Direct Line: 250.821.9889
Carey@careymciver.com

ISSUED FOR REVIEW

Reviewed by:
Tamara Shulman
Team Lead - Planning
Solid Waste Management Practice
Direct Line: 604.608.8636
Tamara.Shulmand@tetrattech.com

/bvb

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GEOENVIRONMENTAL

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To: Nicole Kohnert, P.Eng. **Date:** January 24, 2018
c: **Memo No.:** 3
From: Carey McIver, MA **File:** SWM.SWOP03478-01
Tamara Shulman

Subject: Tech Memo 3 – System Recap, Bylaws, Policies, and Plan Options

This 'Issued for Review' document is provided solely for the purpose of client review and presents our interim findings and recommendations to date. Our usable findings and recommendations are provided only through an 'Issued for Use' document, which will be issued subsequent to this review. Final design should not be undertaken based on the interim recommendations made herein. Once our report is issued for use, the 'Issued for Review' document should be either returned to Tetra Tech Canada Inc. (Tetra Tech) or destroyed.

1.0 INTRODUCTION

The Regional District of North Okanagan (RDNO) retained Tetra Tech Canada Inc. (Tetra Tech) to manage a review and update of the RDNO's 2011 Solid Waste Management Plan Update (SWMP). The SWMP update in progress is to review current solid waste management policies and programs, identify and evaluate options for additional reduction and diversion, residual management, and financing, and also set the RDNO's waste management principles, targets, and strategies for the next ten years. A summary of the project phases and deliverables is included on Figure 1-1.

During the Stage One Assessment, the current system was reviewed and potential gaps and opportunities were identified in a Current Solid Waste System Report. For Stage Two Analysis and Evaluation, two Technical Memoranda (Tech Memo) have been issued to assess opportunities for and evaluate: recovery and residual management (Tech Memo 1); and reduce reuse and recycle options (Tech Memo 2).

This third Tech Memo is the final memorandum to be presented to the Regional Solid Waste Advisory Working Group at the sixth meeting on January 31, 2018, to gather feedback on the options and recommendations. The Sections are as follows:

- Section 2.0 – Recap and Reframe:
 - Provides updated information on garbage disposal by sector, waste composition, potential diversion, GHG implications (full GHG Tech Memo provided separately), current financials and staff, priorities from the 2011 SWMP as captured in the 2016 Annual Report and a recap of the issues that must be addressed in this plan review and update.
- Section 3.0 – Reviews and evaluates RDNO solid waste-related bylaws and policies.
- Section 4.0 – Summarizes plan options and identifies initial resource needs.

The Working Group's input is being sought on each Tech Memo to help guide the selection of options for inclusion in the updated plan. The selected options will be further refined for the draft plan with 10 year costs and diversion estimates. A draft plan update with preferred options will be prepared for review by the Working Group prior to undertaking community and stakeholder consultation. Once these three Tech Memos and the preliminary plan have been reviewed, the consultation stage will engage RDNO constituents from public and private sectors through to First Nations to align on the direction of the SWMP update. The SWMP update will be finalized based on consultation feedback, approved by the RSWAWG, adopted by the full Board, and submitted to the Province.



Figure 1-1: Solid Waste Management Planning Steps

The stages of this project fit within the Ministry-defined steps as follows:

Step 1: Initiate the Process – Establish the project.

Step 2: Set the Plan Direction – Identify principles, goals and targets and assess the current system:

- Deliverable: Current Solid Waste System Report (July 25, 2017).

Step 3: Evaluate Options – Analyze opportunities, evaluate financial implications, and conduct consultation:

- Deliverables:
 - Tech Memo 1: Recovery and Residuals Management (September 12, 2017).
 - Tech Memo 2: Reduce, Reuse, and Recycle (October 25, 2017).
 - Tech Memo 3: System Recap, Finance, Bylaws, and Policies, and Plan Options (January 31, 2018).
 - Consultation Plan.

Step 4: Prepare and Adopt the Plan – Develop and finalize draft plan for submission to the BC Ministry:

- Deliverables:
 - Consultation Summary Report.
 - Solid Waste Management Plan Update (Issued for Review and Issued for Use).

2.0 RECAP AND REFRAME

At the fifth meeting of the RSWAG on December 6, 2017, the Study Team delivered a Power Point presentation which recapped and reframed information that had been provided in the Current Solid Waste System Report (July 2017) and Tech Memo No.2 – Reduce, Reuse, Recycle (October 2017). The updated information and data along with additional items for consideration are provided below to serve as the foundation for plan option development.

2.1 Garbage Disposal by Hauler

The Ministry has established waste disposal as an annual reporting requirement for regional districts and set a provincial target of 350 kilograms (kg) per capita per year to be achieved by 2020. A second performance measure set by the Ministry is to have 75% of the population in B.C. covered by an organic waste disposal restriction by 2020. As discussed in the Current Solid Waste Management System Report, in 2016 the disposal rate in the RDNO was 500 kg per capita which is slightly higher than the 2015 average provincial disposal rate of 497 kg per capita. Although the RDNO has been very successfully at reducing disposal from 1990 levels, there is significant potential to increase waste diversion even further. For example, in 2016, the Cowichan Valley Regional District (CVRD) and the Regional District of Nanaimo (RDN), similar size and demographic regions, reported disposal rates of 358 and 349 kilograms per capita respectively.

Reviewing garbage disposal by type and sector allows planners to target “best practice” policies and programs to maximize diversion such as those implemented in the CVRD and RDN. The RDNO Annual Reports and Tetra Tech’s Current Solid Waste Management System both report on tonnage by type of waste and jurisdiction as classified by scale clerks when loads enter the facilities. This reporting indicates that residential waste represents 63% of waste disposed at RDNO landfills, industrial, commercial, and institutional (ICI) waste represents 35% and construction and demolition (C&D) waste 2%. These numbers are atypical with respect to other regional districts in BC.

When RDNO scale data is organized according to who (residential, ICI or C&D) delivers it to disposal facilities, the picture changes significantly as indicated in Table 2-1. When broken down by “hauler type”, commercial haulers deliver single family (SF) residential garbage to disposal facilities primarily using rear or side load packer trucks and on behalf of municipalities and subscription customers via curbside public or private collection programs (20%); commercial haulers deliver multi-family residential (MF), ICI and C&D waste from the three sectors primarily using front load, roll off and other large trucks and trailers (62%) and self-haul customers deliver residential, ICI and C&D waste into containers at each facility, including the transfer stations, primarily using an assortment of small personal vehicles (18%). When viewed this way the biggest potential for diversion is in the ICI sector.

Table 2-1: Current Garbage Disposal by Hauler

Hauler	Estimated Garbage by Hauler (2017 ¹)	
	Tonnes	Percent
Single Family (SF Res) Municipal and Subscription Curbside	9,059	20%
ICI (including Multi-Family Residential [MF Res] and C&D)	28,084	62%
Self-Haul (SF Res, ICI, and C&D)	8,153	18%
Total	45,296	-

¹ Annualized based on extrapolation of actual scale data from March to November 2017.

However, as discussed in the Current Solid Waste System Report, curbside garbage collection is only provided by the municipalities of Vernon, Armstrong, Enderby and Lumby. The remaining 35% of SF households in Coldstream Spallumcheen and the Electoral Areas either subscribe to a private collection service or self-haul their household garbage to the nearest RDNO recycling and disposal facility (RDF). If those households that currently receive curbside recycling collection service from Recycle BC were to also receive curbside garbage collection, the proportion of garbage collected from SF households through a municipal program increases significantly as shown in Table 2-2.

Table 2-2: Adjusted Garbage Disposal by Hauler

Hauler	Estimated Garbage by Hauler (2017 ¹)	
	Tonnes	Percent
SF Res Municipal and Subscription Curbside	14,059	30%
ICI (MF Res and C&D)	26,584	60%
Self-Haul (SF Res, ICI and C&D)	4,653	10%
Total	45,296	-

2.2 Waste Composition

Figure 2-1 shows the adjusted 2012 waste composition results that represent aggregated results from across sectors. These results were adjusted to remove yard waste, given the 2016 program adjustment that permitted free year-round yard waste drop-off at all facilities and the corresponding reduction of yard waste in the garbage.

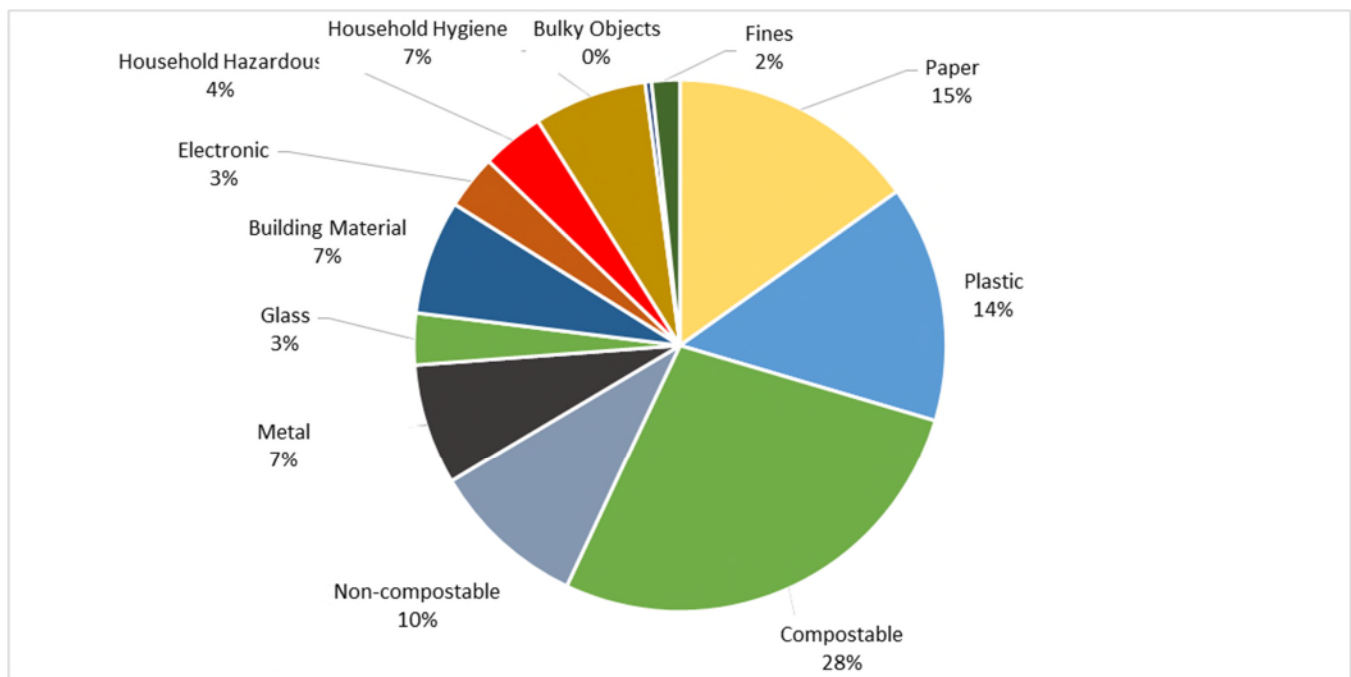


Figure 2-1: Waste Composition Results (2012 Adjusted)

2.3 Potential Diversion

Table 2-3 provides a mid-range and high-range estimate of the additional diversion that could be achieved by implementing the diversion strategy options across sectors (i.e., residential, ICI). As stated in Section 2.1, it is assumed that the residential universal collection will be considered as one of the programs in the plan. Therefore, the hauling distribution used here is 30%-60%-10% for residential, ICI and self-haul, respectively as identified above in Table 2-2. The level of diversion achieved by a given program can be affected by program maturity (new programs often take a few years before higher capture rates are achieved) and level of supporting activities employed (e.g., financial signals, communication, enforcement). As shown in the table, together, the diversion strategy components are expected to achieve an estimated disposal rate between 350 to 432 kg per capita per year. If the target for this plan were to be set at a disposal rate of 400 kg per capita; to achieve this target, a 30% reduction in the per-capita amount of garbage currently landfilled would be required. To meet the Provincial target or 350 kg per capita, a per capita garbage reduction of 44% would be required.

Table 2-3: Potential Waste Diversion

	Contribution to Landfill by Hauler Type	Material Contribution to Landfill	Diversion Potential if 20% of Targeted Material was Diverted	Diversion Potential if 30% of Targeted Material was Diverted	Diversion Potential if 44% of Targeted Material was Diverted
SF Res Municipal and Subscription Curbside	30%				
EPR-PPP		12.9%	0.8%	1.1%	1.7%
EPR-non-PPP		8.3%	0.5%	0.7%	1.1%
Other recyclables		5.6%	0.3%	0.5%	0.7%
Compostables		35.4%	2.1%	3.1%	4.7%
Building Material		8.0%	0.5%	0.7%	1.1%
Residential Diversion Potential			4.2%	6.2%	9.4%
ICI (MF Res and C&D)	60%				
EPR-PPP		9.1%	1.1%	1.6%	2.4%
PPP		8.5%	1.0%	1.5%	2.3%
Other recyclables		6.9%	0.8%	1.2%	1.8%
Compostables		34.5%	4.1%	6.1%	9.2%
Building Material		9.8%	1.2%	1.7%	2.6%
ICI Diversion Potential			8.3%	12.2%	18.4%
Self-Haul (SF Res, ICI and C&D)	10%				
EPR-PPP		7.0%	0.1%	0.2%	0.3%
EPR-non-PPP		9.6%	0.2%	0.3%	0.4%
Other recyclables		2.6%	0.1%	0.1%	0.1%
Compostables		4.5%	0.1%	0.1%	0.2%
Building Material		27.9%	0.6%	0.8%	1.2%
Drop-Off Diversion Potential			2.1%	2.8%	4.3%
Potential Additional Diversion from Landfill			13.52%	20.0%	30.0%
			68 kg/c	100 kg/c	150 kg/c
Estimated Annual Disposal¹			432 kg/c	400 kg/c	350 kg/c

¹ Calculated based on current disposal rate of 500 kg per capita.

Table 2-4 provides a list of items that are included in the categories listed above.

Table 2-4: Category Items

Category	Included Items (e.g.)
EPR-PPP (SF Res)	Packaging and Printed Paper Materials (Residential Managed by Recyclable BC)
PPP (ICI)	Packaging and Printed Paper Materials
EPR-non PPP	Electronics, Batteries, Used Oil, and Containers, Etc.
Other Recyclable	Textiles and Plastic Film
Compostable	Compostable Food and Compostable Paper
Building Materials	Drywall, Masonry, Clean Wood, and Metals

2.4 Financials and Staffing

The RDNO's current operating revenue totals \$6.4 million with 84% of it derived from tipping fees. The budget is currently balanced with the current solid waste management system aligning to \$6.4 million annually. Over 40% of the expenses are for facility operations and 1% is allocated for policies and programs. Table 2-5 summarizes the 2017 RDNO Financial Plan.

Table 2-5: Financial Plan

FINANCIAL PLAN	2017	%
OPERATING REVENUE		
Tipping Fees	\$5,342,000	83%
Tax Requisition	\$430,000	7%
Grants	\$2,500	0%
Interest Income	\$11,389	0%
Sundry Income	\$2,001	0%
Transfer from Operating Reserve	\$491,814	8%
Transfer from Statutory Reserve	\$50,000	1%
Recycled Commodities Revenue	\$77,500	1%
Other income - Gravel Royalties	\$3,000	0%
Rental and Lease Income	\$4,000	0%
TOTAL OPERATING REVENUE	\$6,414,204	100%
OPERATING EXPENDITURES		
Waste Reduction/Recycling – Policies and Programs	\$73,000	1.1%
Waste Reduction/Recycling	\$779,000	12.1%
Greater Vernon RDF	\$1,389,400	21.7%
Armstrong / Spallumcheen RDF	\$ 810,300	12.6%
Lumby RDF	\$ 206,800	3.2%
Cherryville RDF	\$ 67,700	1.1%
Kingfisher RDF	\$ 48,000	0.7%
Silver Star Solid Waste	\$ 116,814	1.8%
Administration and Overheads	\$ 781,189	12.2%
Other	\$ 411,000	6.4%
Capital Expenditures	\$ 800,000	12.5%
Closure & Post-Closure	\$ 50,000	0.8%
Transfer to Operating Reserve	\$ 225,000	3.5%
Transfer to Reserve/Landfill Closure	\$ 656,000	10.2%
TOTAL OPERATING EXPENDITURES	\$6,414,203	100%
NET REVENUE/(EXP)	1	-

Staffing costs (Administration) cover part of the General Manager position and a clerical position, and a full-time Regional Engineering Services Manager, Recycling and Disposal Facilities Operations Manager and Environmental Technician, along with management and operations staff for the three active RDFs. The staff structure is shown in Figure 3-1 below.

The Regional Engineering Services Manager is responsible for the development, implementation, management and coordination of capital projects, plans, policies, programs and activities associated with solid waste management planning, improvements and compliance such as landfill capital plans, environmental monitoring and closure planning as well as various other engineering services such as transit, air quality, drainage and street lights. The Engineering Technician – Solid Waste reports to the Engineering Services Manager to work with a technical team of engineers, technologists, operators and other RDNO staff to contribute to the efficient and effective delivery of sampling, monitoring, program delivery, and data compilation services for the solid waste management function.

The Recycling and Disposal Facilities Operations Manager provides leadership and overall management relative to the six RDNO RDFs (landfills, transfer stations and composting facility) including contract management. There are five Inspectors and eight scale attendants reporting to this Manager. Scale Attendants operated the scales and Inspectors inspect vehicles and direct customers to ensure that municipal solid waste and recyclable materials are deposited in the appropriate locations and enforce the facility bylaw and policies.

Prior to 2014, a Waste Reduction Coordinator position reported to the Recycling and Disposal Facilities Operations Manager. This position was omitted in 2014 when Recycle BC took over the RDNO’s Blue Bag Curbside Collection Program. This means that waste reduction and diversion planning, delivery, public outreach and communication initiatives are spread thinly between the two Managers and the Engineering Technician, with no one position having a direct responsibility for program design and implementation as well as education and promotion. Given that updated garbage disposal by sector shows that over 60% of the current garbage disposal is derived from ICI sources and close to 30% of the overall waste stream is comprised of compostable organics, it is clear that additional staff resources need to be allocated to develop and implement new waste reduction and diversion initiatives for both the ICI and residential sectors if the RDNO wants to achieve more waste diversion.

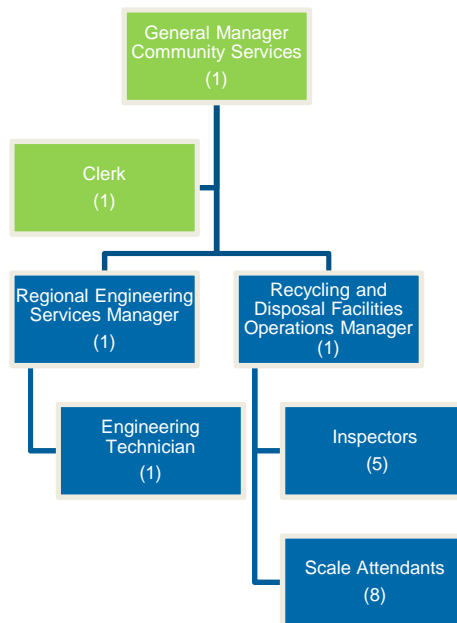


Figure 3-1: Current Staffing Structure

2.5 Priorities from 2011 Solid Waste Management Plan

The 2011 SWMP update identified a total of 16 strategies; 10 through the main strategy and another six derived through additional consultation. The strategies below are grouped by current status so current priorities can be factored into continued options development. Note that the 2011 Plan vetted and prioritized options based on previous plans.

For Plan Consideration.

- **Organics Management Strategy** – Determine the best management strategy for organic waste including wood and yard waste from the DLC, residential, commercial, industrial, and agricultural sectors; and food waste from the residential, commercial, industrial, and agricultural sectors.
- **Universal Residential Curbside Collection** – Determine the economic viability of a Universal Residential Curbside Collection Program for all residential generated materials, including garbage, compostables, and recyclables.
- **Implement One Bag/Can Limit** – Consider a weekly one bag/can limit for households with a municipal curbside collection service. Since 1996 the limit has been set at two cans per week; given new diversion opportunities there is increased viability for shifting to a new norm of one can per week.
- **Blue Bag Recycling Program for Businesses** – Determine the best method for including businesses in the Blue Bag Recycling Program. To date only the City of Vernon has implemented a program, however other member municipalities have expressed some interest.
- **Upgrade Communications Tools** – Upgrade the RDNO web site and other communication tools to help residents, businesses and others determine what materials can be recycled.
- **Enhance Service at GVRDF for Commercial Haulers** – Evaluate the economic and operational implications of providing enhance service for commercial haulers at the GVRDF. Enhancements could include early openings and a dedicated commercial scale. Being addressed through ongoing operations and major capital works, including the addition of a third lane in 2018 to assist commercial haulers.

Not currently being pursued.

- **Audits of Large Waste Generators** – Consider offering a comprehensive waste audit to the 15 largest waste generators in the Region. Currently to be addressed through behaviour change programs that provide audit support.
- **Demolition and Land Clearing (DLC) Waste Management Strategy** – Examine mechanisms for further diversion of DLC waste, including but not limited to, private and public resource recovery parks and partnerships with industry. Currently to be addressed through building and demolition permitting processes.
- **Non-Typical Municipal Solid Waste Management** – Examine efficiencies and environmental protection needs with respect to including management of non-typical municipal solid wastes such as agricultural (e.g., plastics and slaughter waste) and industrial wastes (e.g., ash and wood), and water and wastewater treatment plant wastes in the SWMP. Currently addressed on a case by case basis with support from provincial and federal government agencies.
- **Blue Bag Recycling Program Improvements** – Evaluate the curbside Blue Bag Program and the Drop Centre Program to determine if the program should be expanded to include materials such as textiles, fluorescents, agriculture plastics, and other plastic products (Recycle BC is responsible for residential recycling for packaging and printed paper.) Currently being considered only when senior levels of government develop new programs (e.g. additions to the BC Recycling Regulation for EPR).

Pursued but not currently viable.

- **Development Cost Charges** – Determine how local governments can include solid waste management infrastructure in their Development Cost Charge (DCC) bylaws by 2016.
- **Inter-Regional Solid Waste Management Committee** – If interest exists, facilitate cooperation of southern interior solid waste management staff, municipal councils, and regional district Boards of Directors through an interregional Solid Waste Management Committee.
- **Monitor Waste to Energy Technology** – Monitor waste to energy technology as it becomes accessible to small communities in Canada.

Completed.

- **Eco-Depots** – Evaluate eco-depot concepts and locations especially with respect to customer convenience and land use in the region.

No longer required.

- **Blue Bag Processing Facility** – Continue to operate the current Blue Bag processing system and facility with minor capital improvement until such time as more details about the provincial EPR program for packaging and printed paper are known.
- **More Frequent Free Styrofoam Collection Events** – Consider increasing the number of free Styrofoam collection events until Styrofoam packaging becomes part of an industry stewardship program.

3.0 BYLAWS AND POLICIES

Policies and bylaws define the “rules of the road” for how solid waste should be managed in the RDNO. They can also be applied to address many of the issues identified during the Plan update. The following sub-sections describe current RDNO solid waste bylaw components as well as provide an overview of policies and bylaw amendments or additions that could be considered in the RDNO.

3.1 Bylaw Review

RDNO Municipal Solid Waste Management Bylaw No. 2659

There are typically two types of bylaws that local governments adopt to manage solid waste: collection service bylaws and facility regulation bylaws. Collection service bylaws regulate the curbside collection of garbage, recyclables and organics from primarily single family residential customers, although in some cases, such as in the City of Vernon the curbside collection service for recyclables is also available to some ICI customers. Facility regulation bylaws apply to RDFs and establish regulations, conditions of use as well as user fees and penalties. The RDNO regulates and sets fees at its RDFs under Municipal Solid Waste Management Bylaw No. 2659, as amended. Table 3-1 provides an outline of the sections and schedules to this bylaw.

Table 3-1: RDNO Municipal Solid Waste Management Bylaw 2659

Sections	Schedules	
Interpretation, Schedules and Definitions	Schedule A	Recycling and Disposal Fees
Regulations, Conditions of Use and General	Schedule B	Regulated Material
Exemptions, Violations and Penalties	Schedule C	Recyclable Material
Inspections and Dispute Mechanism	-	

The bylaw defines certain materials as prohibited waste, controlled waste, regulated material and recyclable material. Prohibited Waste means solid waste designated to be inappropriate for disposal at an RDF for environmental, regulatory or legal reasons, or for reasons related to the safe and efficient operation of the RDF. Controlled Waste means solid waste that requires preapproval by the Manager for disposal at an RDF and because of its inherent nature and quantity, may require special handling and/or disposal techniques. Regulated and Recyclable Materials means those materials listed in Schedules B and C that are considered to have alternative drop off opportunities (can be diverted from disposal).

Table 3-2 lists the materials that are included as Prohibited Waste, Controlled Waste, Regulated Material and Recyclable Material in Bylaw 2659.

Table 3-2: Prohibited Waste, Controlled Waste, Regulated Material and Recyclable Material

Prohibited Waste	Controlled Waste	Regulated Material	Recyclable Materials
<ul style="list-style-type: none"> ▪ Liquid or semi-solid including septage ▪ Hazardous Waste ▪ Solid Waste on fire or smouldering ▪ Automobiles etc. ▪ Renderable Products ▪ Slaughterhouse, fish hatchery etc. ▪ Biomedical Waste 	<ul style="list-style-type: none"> ▪ Screenings from municipal treatment plants etc. ▪ Condemned foods ▪ Animal feces ▪ Bloody furniture ▪ Sawdust ▪ Bulky Waste ▪ Clinical/Laboratory Waste ▪ Carcasses ▪ Contaminated Soil ▪ Waste Asbestos ▪ Foundry Dust ▪ Food Processing Waste ▪ Septage Waste ▪ Noxious Weeds ▪ Logs and Stumps- large, dirty, ungrindable ▪ Infested Vegetation ▪ Tire – Oversize, and ▪ Preserved Wood. 	<ul style="list-style-type: none"> ▪ Stewardship Products ▪ Asphalt Roofing ▪ Batteries ▪ Box Springs ▪ Crushable Material for Aggregate ▪ Drywall, Recyclable ▪ Fluorescent Tubes and Bulbs ▪ Glass Jars and Bottles ▪ Logs and Stumps – Clean and Grindable ▪ Mattresses ▪ Propane Tanks ▪ Recyclable Material ▪ Refrigeration Appliances ▪ Scrap Metal ▪ Soil or other Fill Material ▪ Styrofoam ▪ Tires ▪ Wood Waste – Clean and Dirty ▪ Yard and Garden Waste 	<ul style="list-style-type: none"> ▪ Aluminum-cans, trays, foil ▪ Cardboard ▪ Mixed Paper ▪ Newspaper ▪ Plastics includes #1, #2, #3, #4, #5, #6, and #7 plastic labelled containers and plastic film ▪ Tin Cans

Under the Regulations Section, the bylaw states that no person shall:

- Bring Prohibited Waste to a RDF unless acceptance is specifically authorized in writing by both the Regional District and the B.C. Government

- Bring Controlled Waste to a RDF unless preapproved by the Manager
- Deposit Regulated Material in locations at a RDF that are not specifically designated for the material type by signage or verbal or written instructions
- Deposit Recyclable Material in locations at a RDF that are not specifically designated for the material type by signage or verbal instructions.

Tipping Fees

A tipping fee schedule has multiple purposes. Applying tipping fees to incoming waste is how the RDNO funds current operations, future capital expansion and final closure costs. In addition, through the application of variable rates to the different waste streams, the RDNO provides a financial incentive to their customers to separate and divert Regulated and Recyclable Materials from disposal.

Similarly, tipping fees can be set at a level that encourages waste generators to seek out lower-cost private sector alternatives, like a private recycling depot or scrap metal yard, which avoids the RDNO having to store and subsequently transport the material to recycling facility or market. Another purpose for the tipping fee schedule is to track the quantities of the different categories of waste that are handled at the facilities. Having detailed information on the volumes and revenues associated with each waste stream is invaluable for planning purposes.

Under the current fee schedule the tipping fee for regular refuse is \$100 per tonne while the fee for refuse containing Regulated Material (other than drywall) is roughly double that fee at \$203 per tonne while the fee for any refuse containing drywall is \$303 per tonne. Controlled Waste is charged at \$174 per tonne.

It is important to note that Regulated Material is not banned from disposal. If customers choose to dispose of a Regulated Material, they are subject to higher recycling and disposal fees. This “carrot” approach puts the onus on the RDNO to provide sufficient resources at RDF’s (the back-end) to enforce the bylaw. Regional district’s that have gone beyond variable tipping fees to full disposal bans have had greater success at diversion as discussed in the following section.

3.2 Policy Overview

3.2.1 Disposal Bans

To encourage even more source-separation and diversion without relying solely on variable tipping fees, many regional districts and municipalities implement disposal bans on recyclable and compostable materials. This is a low-cost policy tool used to signal to waste generators and waste collection companies that they are expected to separate and recycle/compost specific materials for which alternatives are readily available (e.g. cardboard, metal, yard waste).

Disposal bans are enforced at the point of disposal (i.e. at transfer stations and landfills) through the application of significant surcharges on garbage found to contain banned materials. To ensure sustained success, disposal bans require the local government to work closely with ICI waste generators and particularly commercial waste haulers in the design, start up and on-going maintenance of this policy. The RDN, whose disposal ban on cardboard was implemented in 1992, has a consistent approach whenever they introduce a new disposal ban:

1. **Regulate** (decide to ban a waste stream with a readily available alternative to landfilling)
2. **Collaborate** (work with affected stakeholders to determine the timing of implementation and the ramp up of enforcement measures)
3. **Educate** (make sure all haulers and waste generators are aware of the upcoming new disposal ban, and plan to communicate regularly)
4. **Enforce** (enforce the disposal ban at the point of disposal).

Approaches to Disposal Ban Enforcement

The approach to enforcing disposal bans has evolved over the last decade as regional districts have gained more experience with this policy tool. Enforcement is only one component of an integrated approach to implementing a disposal ban. As indicated in Figure 4-1, collaboration with waste haulers and generators is essential not only during the design of a disposal ban but also during implementation.

Many regional districts have discovered that the need to enforce a disposal ban is short-term and minimal if adequate up-front collaboration with waste haulers, supported by effective education of waste generators, results in diversion becoming “business-as-usual”. In effect, waste haulers become the enforcers since the implementation of a disposal ban provides them with an opportunity to increase their market share if they can provide more cost-effective collection options to their customers.



Figure 3-1: Integrated Disposal Ban Design and Implementation

Nevertheless, local governments do need to provide some level of enforcement. With respect to disposal bans on cardboard, mixed waste paper and scrap metal, some local governments such as the Capital Regional District, who contract out disposal operations, have dedicated bylaw enforcement officers at the landfill inspecting loads at the working face and issuing fines if required. In the RDN, bans are enforced at the landfill by RDN equipment operators who notify a supervisor to inspect the load, take pictures and then advise the scale clerk to apply a surcharge to the

load. This information is then passed on to a Zero Waste Compliance Officer who follows up with the hauler and generator to educate them on compliance options.

It is important to note that the goal of the surcharge is not to make money for the regional district but to provide an opportunity to educate. In most cases the first infraction results in a warning while the second infraction results in a surcharge. However, based on experience, most infractions occur within the first six to twelve months of ban implementation after which fines are minimal as waste diversion becomes business as usual.

Metro Vancouver (MV) refined this approach with the introduction of their food scraps disposal ban in January 2015. From 2012-2013, MV planned their organics diversion strategy in collaboration with stakeholders and then released their implementation strategy in 2014. The strategy was based on a phased implementation approach as illustrated in Figure 5-1 below. Although the ban was effective January 2015, the first six months was considered as an education period with no surcharge on tipping fees. However, from July to December 2015, if a hauler arrived with a load at a transfer station or disposal facility containing more than 25% food scraps, a 50% surcharge was applied to their tipping fee. This 20% threshold was reduced to 10% in 2016 and then down to 5% in 2017.

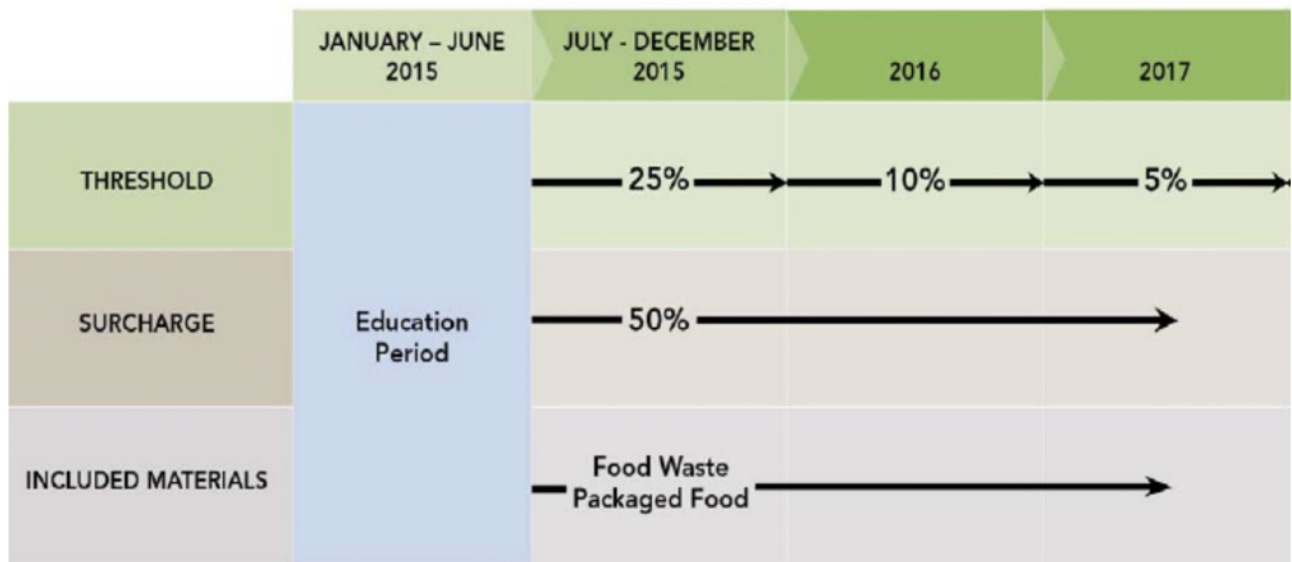


Figure 5-1: Metro Vancouver Organics Disposal Ban Phased Implementation

Although MV hired contracted enforcement staff at their facilities to inspect incoming loads for food waste, most regional districts have used their own staff to enforce disposal bans on a wide range of materials. This is because, as discussed above, enforcement activity is usually short-term while waste generators and haulers adjust to new waste management behaviours.

MV’s phased approach was extremely successful and has been adopted by other regional districts as they introduce their own disposal bans. Most recently, in April 2017 the Regional District of Fraser-Fort George approved a commercial cardboard diversion program that will apply phased surcharges and thresholds to loads containing cardboard. This program will be implemented by regional staff.

3.2.2 Waste Stream Management Licensing

The BC *Environmental Management Act* (the Act) grants the authority and responsibility to manage all municipal solid waste and recyclables to the province’s regional districts. As part of this authority, under Section 24 of the Act,

regional districts are responsible for developing and implementing SWMPs that provide long term visions for the management of municipal solid waste, including waste diversion and disposal activities.

For the purposes of implementing an approved SWMP, Section 25 of the Act contains provisions for the regulation of solid waste management facilities and haulers by regional districts. As per the Act, this tool can be used by regional districts, if they so choose, to regulate their local solid waste industry by achieving operational and administrative control over privately-owned and/or publicly-owned facilities and haulers managing recyclable material and municipal solid waste in their region.

The Act allows regional districts to create bylaws respecting the following:

- The types and quantities of waste materials managed at a site;
- The types and quantities of waste materials transported within the regional district (*haulers*);
- The operation, closure and post-closure of a waste management site;
- The fees and charges applied to waste management activities;
- The recording and submission of waste management information;
- The requirement to hold a license;
- The requirement to comply with a code of practice; and
- The requirement for operators of sites to obtain risk insurance or provide some form of security.

In particular, the Act allows for the licensing system to establish different prohibitions, conditions, requirements, and exemptions for different classes of sites, operations, activities, waste or recyclables. This means that each license can be case specific.

Therefore, waste stream management licensing is another potential tool for the RDNO to employ to assert control over the waste management system.

Licenses can be used to administer and enforce any bylaw developed by a regional district under the Act's authority. The Act provides for two types of licenses that a regional district can issue: a waste stream management license (WSML) issued to the owner or operator of a site that accepts and manages municipal solid waste; and, a hauler license issued to a hauler.

Regional Districts may choose to regulate their local solid waste industry for the following reasons:

- To ensure the diversion of recyclable material;
- To prevent abandonment of large quantities of solid waste or recyclable material;
- To track the movement of municipal solid waste and recyclable material;
- To assist in determining success in meeting waste reduction goals;
- To establish minimum administrative and operational requirements for facilities;
- To encourage private sector investment in waste management (through the establishment of a level playing field); and

- To protect the public interest by managing the flow of municipal solid waste to regional district facilities to ensure financial sustainability.

Examples of Regional Districts with Licensing Bylaws

MV introduced a regulatory program to ensure proper management of privately operated municipal solid waste and recycling facilities in their 1995 SWMP. These facilities are regulated by the Municipal Solid Waste and Recyclable Material Regulatory Bylaw which specifies operating requirements so as to protect the environment and public health, protect the region's land base in accordance with the host municipality's zoning and land use policies, ensure that regional, municipal and private facilities operate to equivalent standards, and to achieve the objectives of the MV Integrated Solid Waste and Resource Management Plan.

Under the Bylaw, licenses are required for the following types of privately owned facilities: disposal facilities; material recovery facilities, transfer stations, composting facilities, storage facilities and certain types of brokering facilities.

In another example, RDN and CVRD, working in partnership, adopted Waste Stream Management Licensing Bylaws No. 1386 (RDN) and 2570 (CVRD) in 2004. Under these bylaws, the RDN and the CVRD are authorized to license all private or non-government operated municipal solid waste diversion and recycling facilities within their respective regions.

The bylaws were established under the authority of both the RDN and CVRD SWMPs and were approved by the Ministry of Environment in 2005. The bylaws are a response to concerns by the recycling industry in both districts regarding competing businesses that operate with low standards. The photograph below shows one example of an undesirable operation competing with legitimate recycling operations prior to the establishment of a licensing system.



Pile of waste drywall being "stored" on private land in the CVRD

The bylaws create a level set of standards for the recycling and composting industry that protects private sector investment in local solid waste management infrastructure, and enhances diversion in the regions. They are also intended to shield taxpayers from the risk and expense related to clean-up of poorly operated and/or abandoned facilities. In both the RDN and the CVRD, the WSML bylaws help improve the quality of data received from private diversion and recycling facilities, as they are required to submit monthly material statements to the districts. Improved data reporting allows both the RDN and CVRD to effectively track progress towards their waste reduction goals and to plan future programs and program improvements.

In the three regional districts discussed above, the license application process includes a 45-day public consultation period for new applications. License applications are reviewed by staff; and if applications are acceptable, staff also issues the license. Any applicant or licensee affected by the staff decision may appeal the decision to the Board.

The three regional districts also operate their respective licensing systems on a self-financing basis, in that license application, amendment and annual administration fees have been designed to pay for the regulatory program. In MV, the application fees range from \$500 to \$5,000 depending on the type of facility, with an annual administration fee of \$1,000 for all licensed facilities. In the RDN and CVRD system, license application fees range from \$100 to \$1,000 depending on the type of facility, with an annual administration fee of \$100 - \$500 depending on the type of facility.

All three regulatory schemes require staff time to review applications, inspect facilities and enforce license requirements. For the RDN in particular, staff time dedicated to the WSML bylaw, at 1 Full-time Equivalent (FTE) annually, exceeds the revenue generated by the system. However, the RDN reports that the documented diversion attributed to the WSML system has been worth the expense.

Nevertheless, as part of their SWMP Review, the RDN will be reviewing the fee structure contained in their WSML, to determine whether the fees should be adjusted to more accurately reflect costs.

3.2.3 Codes of Practice Bylaws

Code of Practice bylaws are another approach to facility regulation, that is similar to waste stream management licensing, but instead of licensing all solid waste management facilities, code of practice bylaws seek to establish operating standard *for a specific type* of solid waste facility. This is the approach the Capital Regional District (CRD) has undertaken with the development of the Composting Facilities bylaw and the Salt Spring Island Transfer Station bylaw.

This approach to facility regulation limits the authority to only those types of facilities that the CRD deemed necessary to assert some level of operating standards. As an example, the CRD implemented the *Salt Spring Island Transfer Station Regulation Bylaw 2810* in 2002. The purpose of the bylaw is to regulate and license the operation of facilities that are used for the management of municipal solid waste or recyclable material on Salt Spring Island (SSI). Under this bylaw, transfer stations must not contaminate ground or surface water or generate unacceptable levels of odour, vectors, litter or dust. This bylaw also requires performance security.

The bylaw was put in place to address the development of private sector transfer stations on Salt Spring Island to ensure that they met minimum desired operating standards and created a level playing field.

In summary, adoption of a waste stream management licensing or code of practice bylaw could provide the RDNO with tools that can provide a level of local government control over the operation of private sector solid waste facilities, and could also be used to diminish the potential for facilities that operate at a low standard.

3.2.4 Support Expansion of EPR Programs

Extended Producer Responsibility (EPR) is a provincial policy tool that aims to shift the responsibility for end-of-life management of products (physically and economically) to their manufacturer and retailers (called “producers”) and away from local governments. This policy is intended to, among other things, create an incentive for producers to include environmental considerations in design of products.

Regional Districts can engage with the product stewards through facility agreements (collecting products for the stewards), program promotion, sharing knowledge and information and stewardship plan consultation. The RDNO

could take a hard stance or a more flexible and soft stance with respect to sharing the costs of managing the promotion, stockpiling, preparation for markets, and shipping of products that are the responsibility of EPR stewardship agencies (Stewards) in the region. The RDNO currently takes a fairly soft stance on supporting the stewards on and off the RDF sites. For example, the more recently implemented Major Appliances Program, the RDNO bares all the costs of Freon removal from the refrigerated appliances, moving the appliances from the drop off location to the stockpiles and managing the stockpiles. Fortunately this program is being amended so that costs are more shared with the steward. The SWMP should reflect how the RDNO wants to share in the responsibility of managing products with and for the Stewards, including continue to advocate for the continuation and expansion of product stewardship programs through Recycling Regulation enforcement and improvements; cover the full cost of program implementation; require an increased return for products in the program (i.e., from 75 to 100% especially for more established programs such as tires); and ensure that program access is readily available in more rural areas.

The Canadian Council for Ministers of the Environment (CCME) also continues to provide guideline updates for Canada-wide implementation of EPR programs. For example, products not yet in the BC Recycling Regulation that are recommended for Canada-wide EPR include carpet, textiles, and furniture. RDNO can continue to stay abreast of industry trends through conferences and annual updates as provided by the CCME and the BC Product Stewardship Council (BCPSC). There is also an opportunity to advocate for new programs through direct correspondence with the Ministry or through associations of which RDNO is a member (e.g., BCPSC). The management by the RDNO of materials such as mattresses, propane tanks and drywall through well managed programs presents an opportunity to justify the expansion of EPR to these materials.

4.0 ISSUES AND PLAN OPTIONS

4.1 Reduce, Reuse, and Recycling

This SWMP review process has identified issues and associated program and policy options available to reduce the current RDNO 500 kilogram per capital disposal rate. The issues and options are summarized below.

4.1.1 Option 1: Increase organics diversion

Issue: Almost 30% of the current waste stream is comprised of compostable organics.

- A. Review and adopt an Organics Diversion Strategy based on the four options considered in the Organics Management Options Study to provide clear direction with respect to policy (disposal restrictions), collection (food waste or food and yard waste combined, universal collection or current municipal collection programs only); processing (public or private, in-region or out-of-region); and transfer out of region.
- B. Develop an implementation plan for the organics strategy to address residential and ICI sectors.
- C. Provide additional staff resources to consult with applicable stakeholders including municipal partners and solid customers, processors, and commercial haulers.

4.1.2 Option 2: Reduce disposal from SF residential households

Issue: Not all households receive curbside garbage collection resulting in less diversion potential compared to a three stream system (recycling, organics, and garbage).

- A. Expand curbside garbage collection to all SF res households that currently receive curbside recycling collection (Universal Collection). Consider clear bag options.
- B. Implement a One Bag/Can Limit for SF res households that currently receive municipal curbside garbage collection, expand to all SF res households if Universal Collection is implemented.
- C. Undertake a study to determine the demand for curbside collection of yard waste as well as the implications of switching to automated collection.
- D. Implement a food waste collection program for SF res households that currently receive municipal curbside garbage collection; expand to all SF res households if Universal Collection is implemented. Implement a One Bag/Can Limit with every other week garbage collection service.
- E. Design and implement behaviour change (education and promotion) programming using a community-based social marketing (CBSM) approach.
- F. Provide additional staff resources to consult with municipal partners and customers to recommend policy decisions regarding implementation of universal curbside collection: number and location of households, trial areas, types of materials collected (food waste only or food and yard waste), type of cooperation with Recycle BC's Blue Box Program, and type of collection system (manual or automated).

4.1.3 Option 3: Reduce disposal from commercial haulers (ICI, Multi-family and C&D waste)

Issue: Over 60% of the current waste stream is collected through commercial haulers.

- A. Review the effectiveness of the current Regulated Waste policy and consider implementing disposal bans on recyclable materials including food waste and addressing other existing bylaw policies such as secure loads. Consider use of a “regulate, collaborate, educate and enforce” model.
- B. Review the impact of disposal bans on illegal dumping levels and implement an illegal dumping prevention and enforcement program if required.
- C. Explore waste stream management licensing options to ensure a level playing field to support private sector market development for recycling materials.
- D. Work with private sector to ensure markets for diverted materials, with a focus on wood and compost, by banning these items from disposal and encouraging the development of private sector infrastructure to process and market non-residential recyclable materials.
- E. Design and implement behavior change (education and promotion) programming using a CBSM approach.
- F. Provide the additional staff resources to implement disposal bans, including enforcement and education.

4.1.4 Option 4: Develop programs to actively promote waste reduction and reuse initiatives

Issue: There are currently insufficient programming and behaviour change resources to support the first levels of the pollution prevention hierarchy including rethink, reduce and reuse initiatives.

- A. Continue to demonstrate backyard composting through the Xerindipity Garden at Polson Park and deliver the Composter Rebate Program.

- B. Continue to administer the Waste Reduction Initiatives Fund for not-for-profit organizations that need seed capital funding for new or amended programs.
- C. Provide behavior change and education programs including a food waste reduction campaign (e.g., Love Food Hate Waste)
- D. Advocate with senior governments to support expansion of EPR programs (e.g., mattresses, carpet, textiles).

4.1.5 Option 5: Establish staff positions to develop, implement, and provide ongoing efficiency to ensure program effectiveness

Issue: No staff resources are currently committed to supporting and implementing residential and ICI waste reduction programs, including collection and diversion efforts.

- A. Re-establish a waste reduction program planner to oversee the expansion to universal collection.
- B. Establish a staff position that collaborates with key stakeholders, including haulers and businesses, and provides educational support and other services, including providing support for organics program development and implementation.

4.2 Residual Management

This SWMP review process has captured issues and potential solutions to address residual management over the next 10 year period, as outlined below.

4.2.1 Option 1: Develop centralized disposal plan with additional landfill capacity

Issue: The Armstrong/Spallumcheen RDF (ASRDF) is reaching capacity, there are emerging and ongoing environmental issues at the ASRDF and Lumby RDF (LRDF), and additional land has been purchased beside the Greater Vernon RDF (GVRDF) to allow for mitigation of environmental issues and lateral expansion of the site, reconfiguration of the disposal system may be necessary to mitigate issues and increase efficiency in the system.

- A. GVRDF – A conceptual design for a lateral expansion has been developed to extend the landfill footprint to the west of its current boundary resulting in a potential 30 years of additional disposal capacity. The current footprint is expected to last until 2059. The expansion will need to commence within the next ten years in order to secure a permit amendment from the Province. Major permit amendments can take five years or more and must be approved in the SWMP prior to the application stage.
- B. ASRDF – Unless waste reduction measures are enhanced significantly, it is expected that the current landfill capacity will be filled by 2027 (9 years). The planned phase one closure (north unlined section) will help mitigate environmental issues at this site starting in 2019. It is recommended that the landfill be closed as soon as the capacity is reached and a self-hauler transfer station be constructed, with all large loads (front load, rear and side load, and roll off trucks) go directly to the GVRDF.
- C. LRDF – The most financially sustainable model for landfill operation, environmental protection and closure warrants preserving landfill space at this site only for inert C&D waste with a transfer station put into place to accommodate self-haul loads only. The timing for this change should be determined within the next five years.
- D. Hesperia Landfill – The City of Vernon has hired a consultant to help with regulatory compliance for their Hesperia Landfill (Upper Bench Row Road), which is operated by the City of Vernon as a demolition, land clearing, and construction material disposal facility. The landfill is authorized under Operational Certificate (OC) 15288 to dispose of up to 15,200 m³ of demolition and construction wastes, comprised of inert material such

as clean fill and concrete, each year. The OC, which was issued by the Ministry in 1998, states that is in accordance with the RDNO SWMP. This landfill was included in the original SWMP, but is has not been included in any of the updates because RDNO was unaware that operations were on-going at this landfill. The City of Vernon has recently approached the Ministry to discuss amending the OC to increase the annual maximum discharge rate and to revise some of the OC clauses that are not necessarily applicable to their operations. The Ministry has also recommended that the City of Vernon seek a formal amendment for these changes. However, for the Ministry to consider an amendment, the landfill needs to be included in the RDNO’s regional SWMP.

4.2.2 Option 2: Prepare a disaster response plan

Issue: The RDNO has no debris management plan.

- A. Address disaster response waste (e.g., docks, Styrofoam, sandbags, burned buildings, fires) – Ensure solutions for disaster materials management are developed before a disaster occurs so systems can be put into place to manage the rapid increase in materials that are often generated after a disaster. This effort is likely to need inter-departmental collaboration and resource sharing.

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6.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

ISSUED FOR REVIEW

ISSUED FOR REVIEW

Prepared by:
Carey McIver, MA
Principal
Carey McIver & Associates Ltd.
Direct Line: 250.821.9889
Carey@careymciver.com

Reviewed by:
Tamara Shulman
Team Lead - Planning
Solid Waste Management Practice
Direct Line: 604.608.8636
Tamara.Shulmand@tetrattech.com

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APPENDIX C

REGIONAL SOLID WASTE PLAN MONITORING WORKING GROUP DRAFT TERMS OF REFERENCE

The Regional Solid Waste Plan Monitoring Working Group (RSWPMWG) will be established by the RDNO Board and the Terms of reference will be adopted through the RDNO Board. The following are preliminary Terms of Reference.

1. Purpose and Scope

The purpose of the RSWPMWG is to advise the RDNO Board and staff on the implementation of the Solid Waste Management Plan. Tasks include:

- Reviewing information related to implementation of the plan, including waste quantities, populations, and diversion rates for each plan component
- Advising on each major plan review which will occur every five years
- Providing recommendations regarding disputes arising during implementation of the plan that pertain to:
 - interpretation of a statement or provision in the plan, or
 - any other matter not related to a proposed change to the actual wording of the plan or an operational certificate
- Ensuring adequate public consultation in matters that could significantly affect the public such as the opening or closure of local landfills and transfer stations.
- Reviewing new facility applications and making recommendations to the Board

2. Authority

The group makes recommendations to the RDNO Board via the RSWPMWG. The Board is the final authority on decisions.

3. Membership

The group shall consist of no more than 15 members appointed by the RDNO Board. Membership shall include representation of the various stakeholder groups.

Memberships are for two-year periods, and may be renewed for up to two additional terms. (Membership should be staggered for two-year terms.)

4. Meeting arrangements

- The Chair and Vice-Chair are elected annually from amongst the voting membership.
- The group will meet at least once annually or at the call of the chair. Meetings will take place at the RDNO Boardroom unless otherwise specified. Members are expected to attend in person unless arrangements are made to participate by phone or online (e.g., via Skype).
- Quorum shall be a minimum of 50% plus 1 voting members
- The RDNO is responsible for taking minutes. Draft minutes are approved by the group at its next meeting.
- The RDNO will prepare agendas in consultation with the Chair and Vice-chair. Agendas will be sent to PMAC members by email one week before the meeting and posted on the RDNO website.

- All group members are equal and have equal opportunity to contribute at meetings, and must respect the opinions of others.
- Members are encouraged to work collaboratively and to be committed to reaching consensus where possible, considering the best interests of the community. Any members unable to agree with the decision may have their objections noted in the minutes.
- Members who miss three consecutive Group meetings may have their membership revoked at the Board's discretion.
- In any proceeding, members must declare any real or perceived conflict of interest. The member involved should excuse themselves from proceedings that relate to the conflict unless explicitly requested to speak, on a majority vote to do so. Any subsequent information provided by the member will clearly be identified in the minutes as coming from a source perceived to be in a conflict of interest.
- Regular communications between meetings is by email or other acceptable form of electronic communication.
- Members of the public may observe meetings but will not have voting rights or speaking rights unless invited to speak by the Chair.

5. Reporting

The group reports to the RSWPMWG. Meeting minutes are provided to the Regional Solid Waste Management Committee and the Solid Waste Management Committee representative that participates on the RSWPMWG is expected to provide regular updates to that Committee.

6. Resources and budget

RDNO provides the meeting space and any refreshments, and staff to take minutes. Funds for any projects are from the Solid Waste Management Plan budget and subject to normal budgetary review and approvals.

Participation in the committee is voluntary and there is no remuneration for members' time. Group members will be reimbursed for travel costs (mileage) in accordance with the kilometer rate set out in the current Director Remuneration and expense bylaw.

7. Deliverables

The group shall provide:

- An annual report to the RSWPMWG on the implementation of the plan
- Recommendations to the Board (via RSWPMWG) on changes required to the plan implementation

8. Review

The terms of reference will be reviewed every year and updated as required. Changes to the terms of reference must be approved by the Board.

APPENDIX D

PLAN DISPUTE RESOLUTION PROCEDURES

The parties will make all reasonable efforts to attempt to resolve the dispute in an amicable manner without outside intervention. The Ministry of Environment does not become involved in resolving or making a decision in a dispute.

This dispute resolution procedure may apply to the following types of conflicts:

- Administrative decisions made by RDNO staff
- Interpretation of a statement, bylaw, policy or provision in the plan
- The manner in which the plan or facility Operational Certificates implemented
- Any other matter not related to a proposed change to the wording of the plan or Operational Certificate.

Collaborative Decision Making and Dispute Resolution Procedure

Negotiation	<ul style="list-style-type: none"> ▪ Parties involved in the dispute make all efforts to resolve the dispute on their own. ▪ Parties may make use of a facilitator
Regional Solid Waste Advisory Working Group (if appropriate)	<ul style="list-style-type: none"> ▪ Parties involved in the dispute will have opportunity to speak to the group ▪ Group will review, consider and provide recommendations to the Board
Board	<ul style="list-style-type: none"> ▪ Parties involved in the dispute will have opportunity to speak to the Board ▪ Board will receive recommendations from the Committee and settle the dispute; or, recommend mediation
Mediation	<ul style="list-style-type: none"> ▪ Parties involved in the dispute agree on a mediator. If the parties cannot agree on a mediator, the matter shall be referred to the BC Mediation Roster Society of equivalent roster organization for selection of a mediator ▪ All efforts will be made to reach an agreement throughout mediation ▪ Costs for mediation are shared by the parties in dispute
Independent Arbitrator	<ul style="list-style-type: none"> ▪ If the dispute cannot be resolved by a mediator, the matter will be referred to arbitration and the dispute will be arbitrated in accordance with the <i>Local Government Act</i> or <i>BC Commercial Arbitration Act</i> ▪ The arbitrator shall make a final, binding decision ▪ Costs for arbitration shall be apportioned at the discretion of the arbitrator

Tetra Tech Canada Inc.
Suite 1000 – 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5 CANADA
Tel 604.685.0275 Fax 604.684.6241



Stakeholders Meetings Draft Solid Waste Management Plan (SWMP) Update



March & April, 2018

complex world | CLEAR SOLUTIONS™

Agenda

- Context
 - Regulatory Requirements
- Planning Process Overview
- Draft SWMP Update
 - Direction Setting
 - System Summary
 - Goals and Strategies
 - ASRDF Waste Shed Information
 - Diversion Potential and Financial Plan



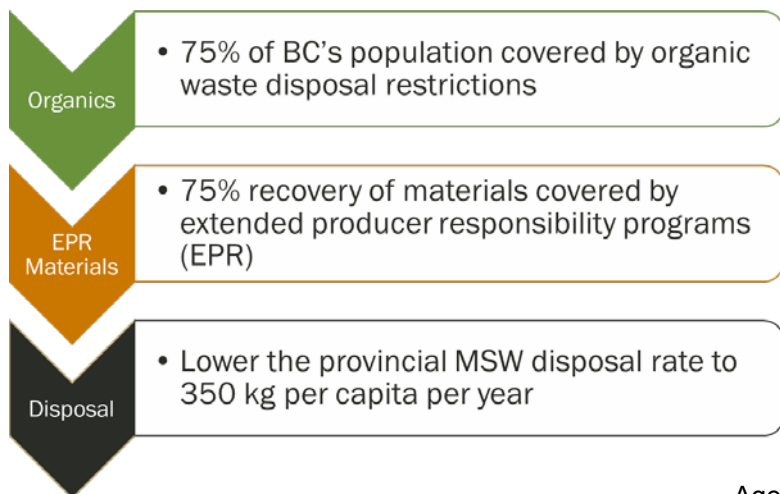


Meeting Objectives

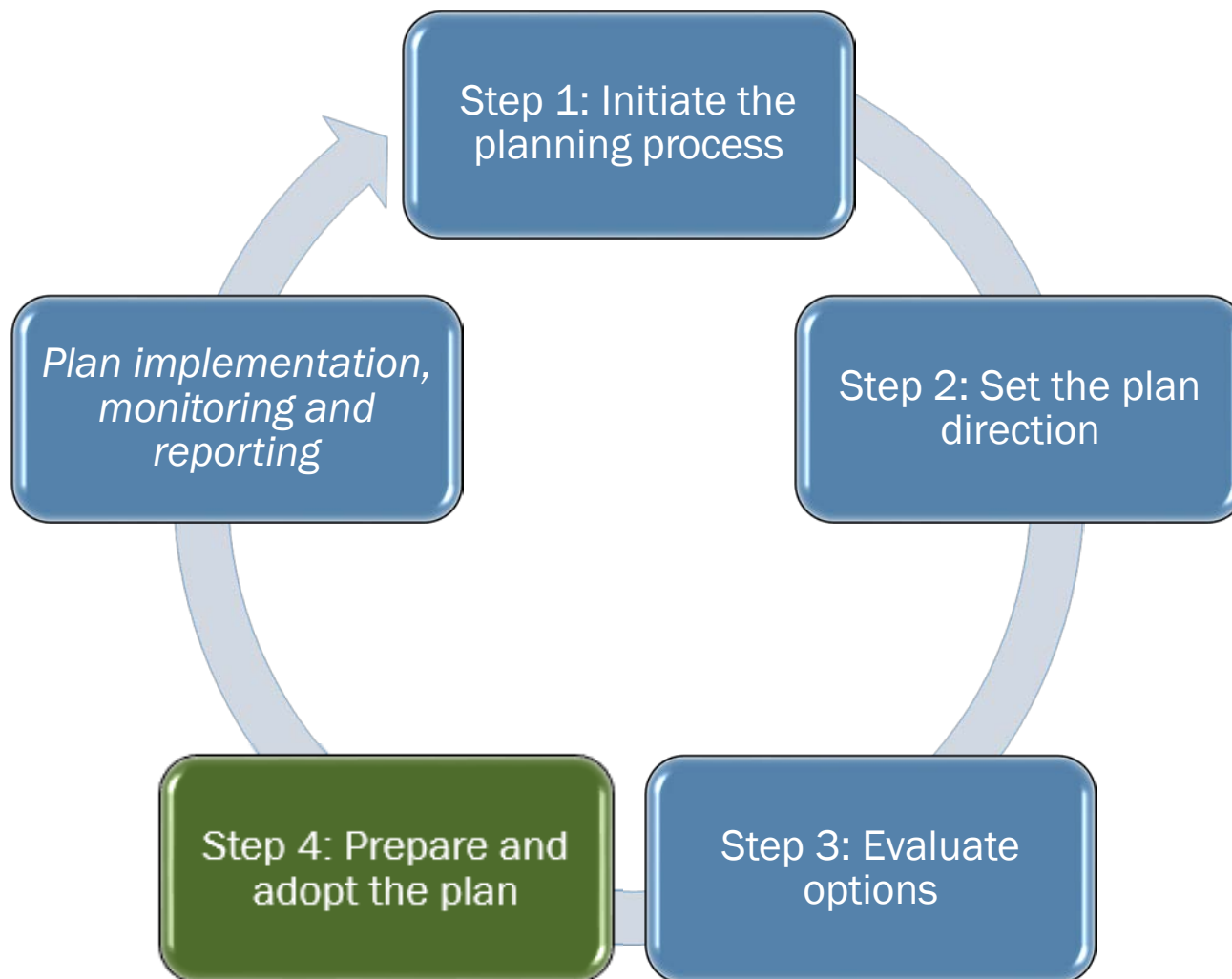
- **Introduce recommended Draft SWMP Update**
- **Obtain feedback**
- **Provide clarity on the following items:**
 - The SWMP Update is a strategy not an ‘implementation’ plan
 - Implementation plans will be community specific and discussed with each individual community
 - Costs for each initiative will be further refined and finalized based on the implementation plan developed by each community

Regulatory Requirements (Environmental Management Act and Guidelines)

- All regional districts in BC are required to have Solid Waste Management Plans
- The Plan is comprehensive for the next 10 years, with vision for next 20-30 years
- Includes all material streams and aspects of solid waste management



Solid Waste Management Planning Process





RSWAWG Membership – Board and Staff

Board Member	Representing the Following Communities
Director C. Lord (Chair)	City of Vernon
Director R. Fairbairn (Vice Chair)	Electoral Area “D”
Director D. Dirk	Coldstream
Director J. Brown	Township of Spallumcheen
Director J. McCune (alt)	Enderby
Director M. Macnabb (alt)	Electoral Area “C”

Staff
General Manager Community Services
Regional Engineering Services Manager
Recycling & Disposal Facility Operations Manager
Engineering Technician
Clerk

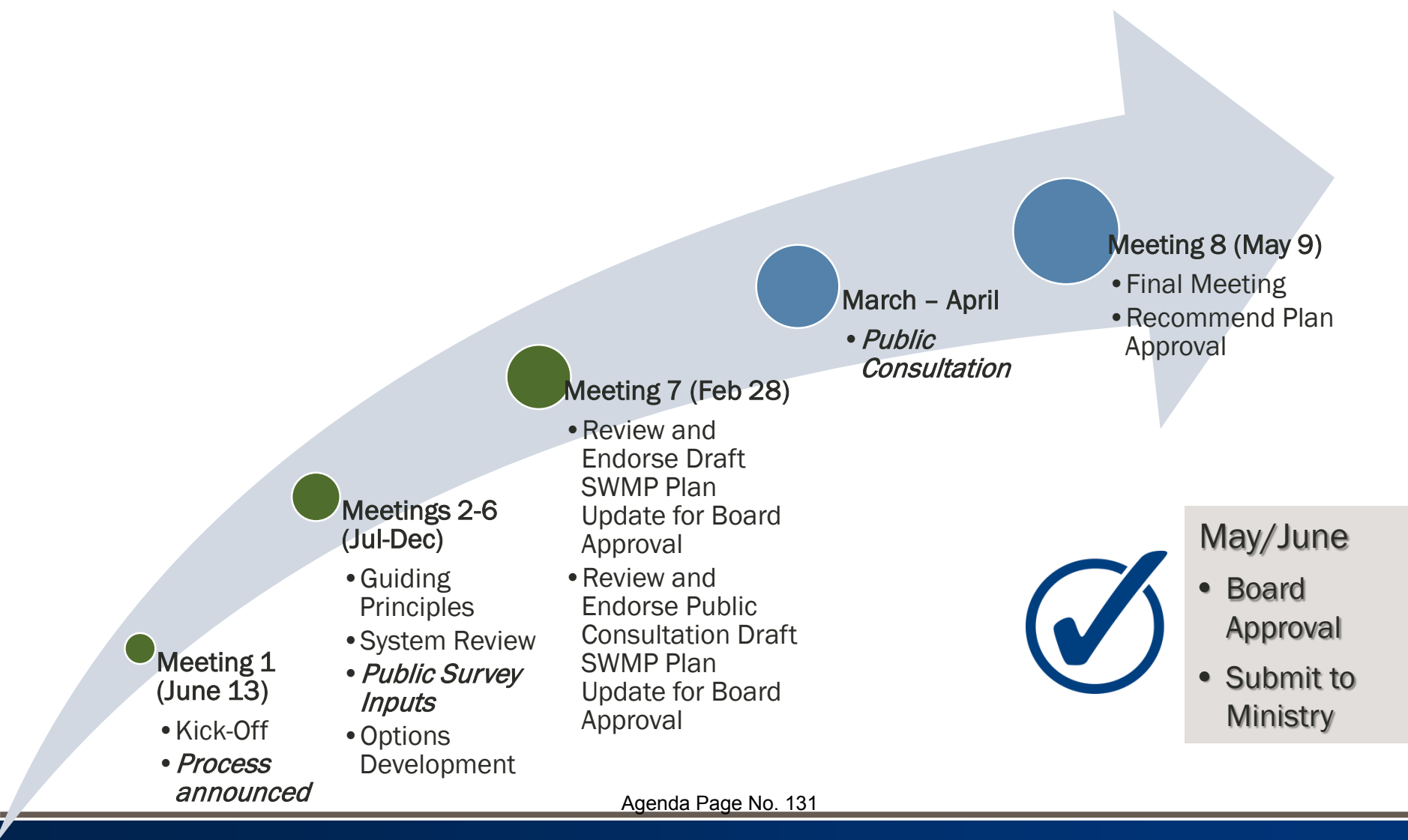


RSWAWG Membership – Representation From Various Sectors

Community Interest	Member	Affiliation	Community
Private Sector Waste Management Industry Service Provider	M. Loewen	Waste Connections (Hauler-BFI)	Okanagan
Private Sector Solid Waste Facility Representatives	S. Fast	Cascades (MRF)	Okanagan
	K. Curtis	Curtis Farms (composting bioslids)	Armstrong
	J. Aarsen	Interior Freight and Bottle Depot	Vernon
Non-Profit Group with an Interest in Solid Waste Management	D. Clay	SENS (retired)	Area C
	R. Collins	SENS (retired)	Area D
Large Solid Waste Generator	I. Eggen	Agricultural Producer	Cherryville
	P. Martin	Canadian Tire (large retailer)	Vernon
Business Representatives, Including One Focused on the 3 Rs	M. Piorecky/ R. Kupchanko	Environmental Consultants (AE)	Vernon
Members at Large for the Community	H. Trueman	Environmental Committee	Vernon
	G. Wright	Agricultural Business Background	Coldstream
	E. Wilson	Geotech Engineer/Solid Waste Experience	Vernon
	H. Merler	Scientist/Teacher	Vernon
	J. Sparling	Professional Geologist	Area C
	M. Kelly	Writer/Research	Vernon
	J. Freeman	High School Student	Vernon



SWMP Plan Update Timeline - 2017-2018





Set Plan Direction

1. *Establish* Guiding Principles based on Ministry's & past updates
2. *Reduce disposal rate from 500 kg per capita to 350 kg per capita*
3. *Develop* goals and strategies with estimated diversion potential
4. *Build* financial plan



Set Plan Direction: Guiding Principles

The Regional District of North Okanagan (RDNO) should reduce the disposal of residual solid waste because it can:

1. Negatively impact the environment
2. Requires resources to manage such as financial and landfill capacity, and
3. Because a reduction is being recommended by the Province of British Columbia

The RDNO will:

- A. Encourage residents and workers in all business sectors in the region to act in accordance with
 - a. The hierarchy of “reduce, reuse and recycle”
 - b. The ideal of zero waste within closed loops
 - c. Ecological and social sustainability of waste disposal practices, and
 - d. The prevention of littering, air and water pollution and greenhouse gas emissions

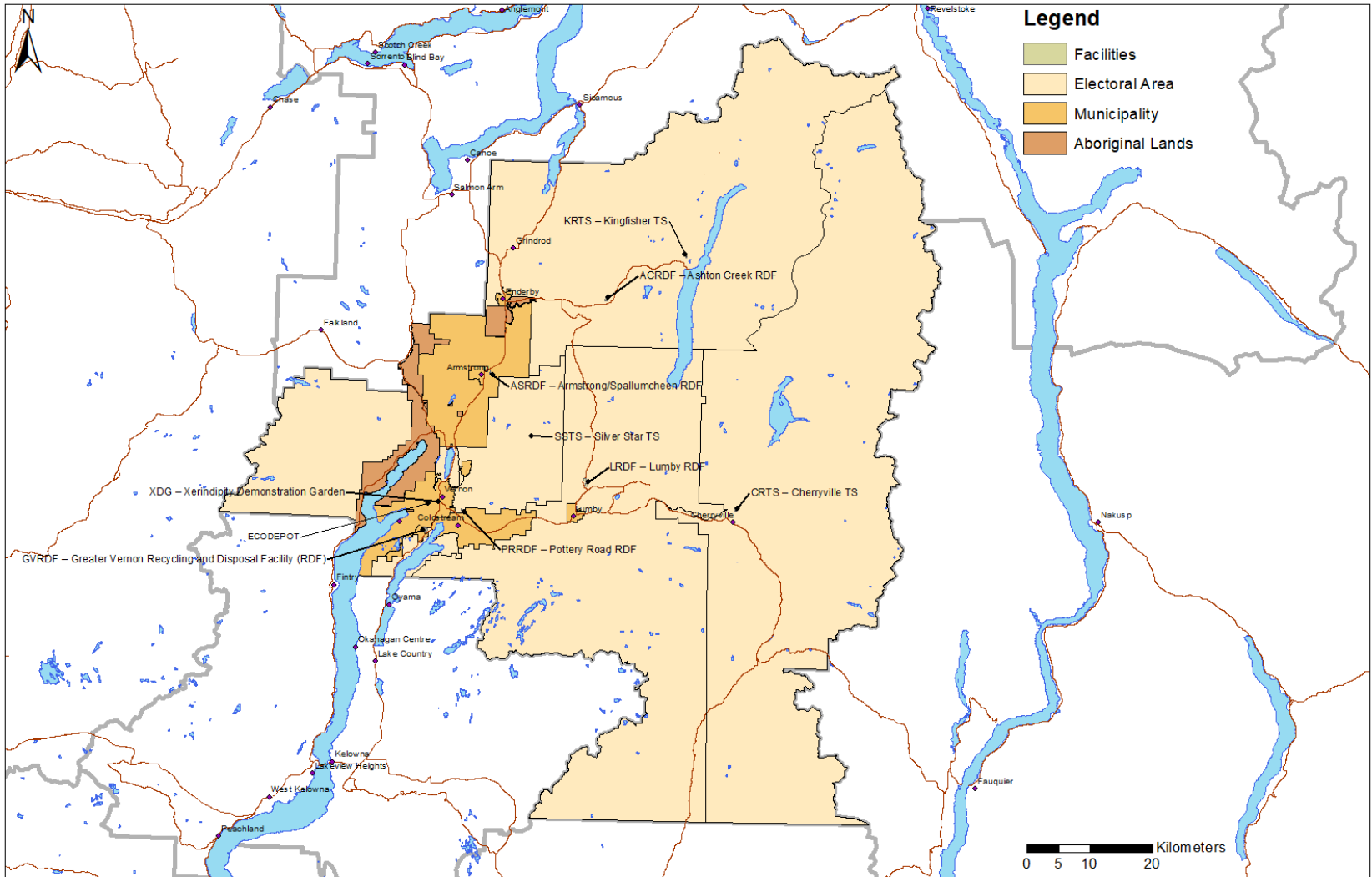
through approved programs, bylaws and policies that include

- e. Education and promotion
- f. Best practices
- g. Consistent criteria
- h. Effective services
- i. Incentives, and
- j. Restrictions;

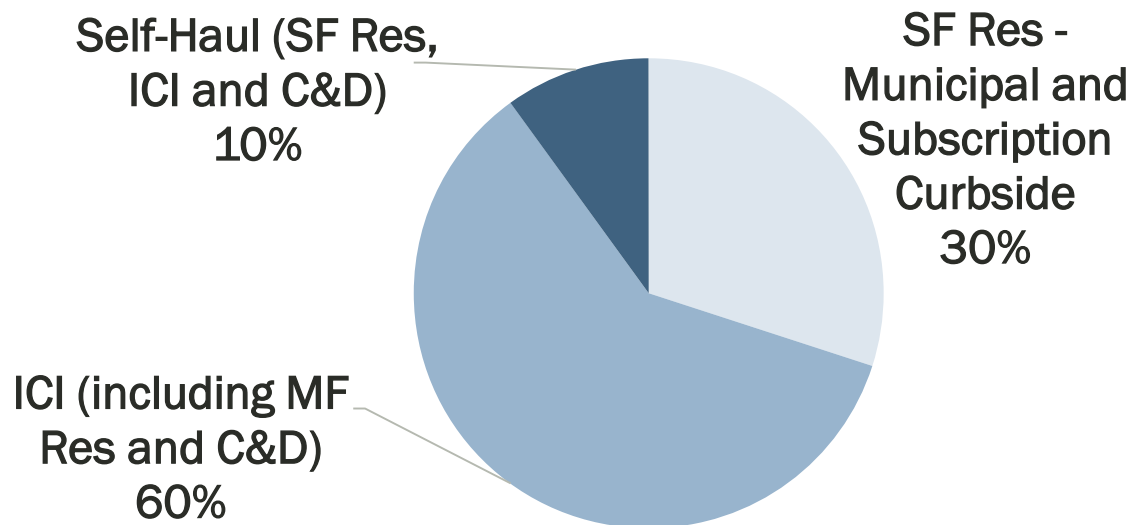
and,

- B. will prioritize and favour, in its practices
 - a. Prevention of air and water pollution
 - b. Prevention of greenhouse gas emissions
 - c. Use of renewable energy
 - d. Public health and safety
 - e. Development of collaborative partnerships to support initiatives, and
 - f. Resources shared with other jurisdictions, such as facilities and services

System Summary: Plan Area and Facility Locations

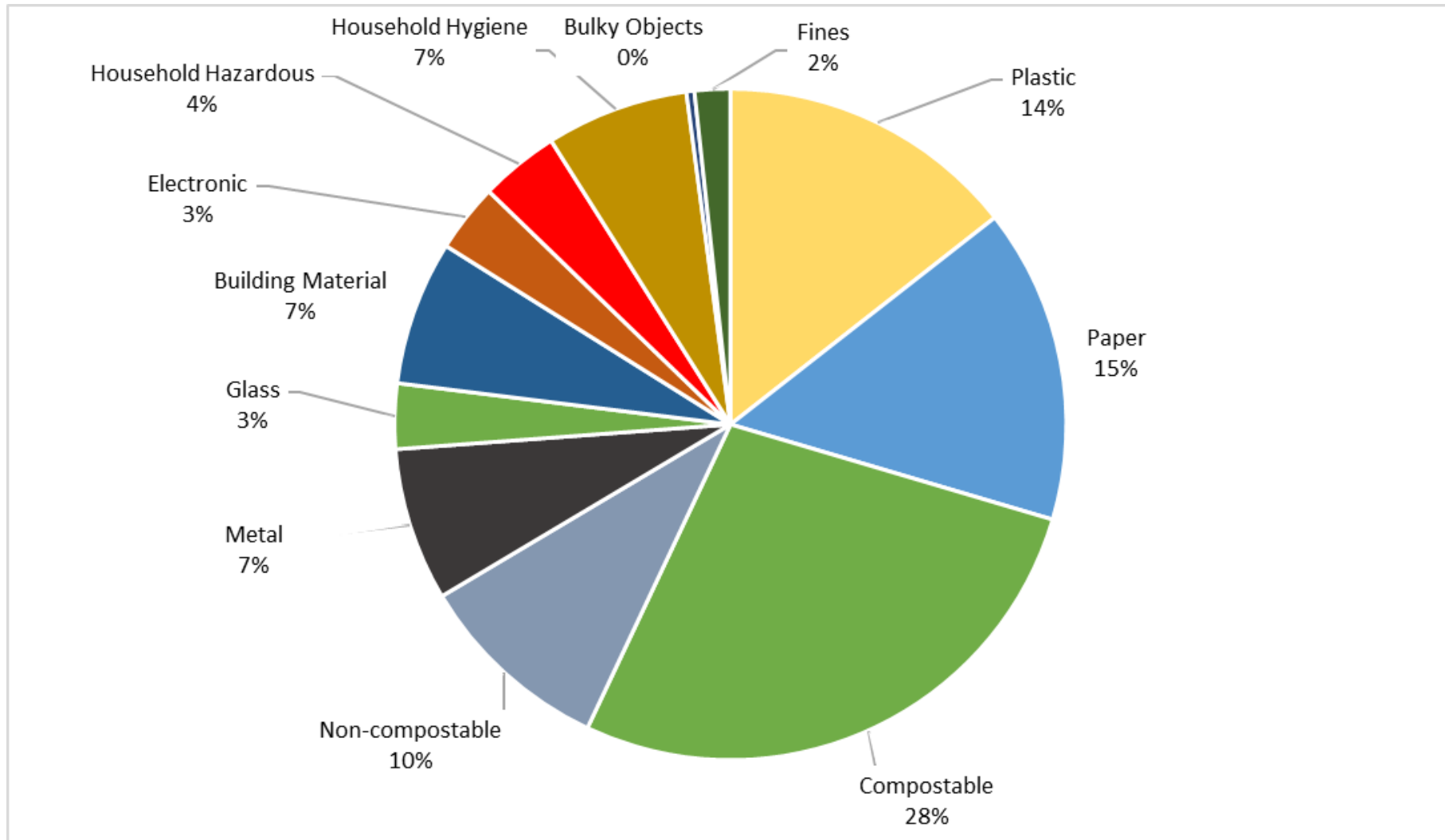


Background: Tonnes Disposed by Sector (2016 Adjusted)



Recycling & Disposal Facility (RDF)	Total (tonnes)	% Total Waste Disposed
Lumby RDF	1,870	4.2%
Armstrong Spallumcheen RDF	12,034	27.7%
Greater Vernon RDF	29,116	66.4%
Total	43,020	-

Waste Composition (2016 Adjusted)



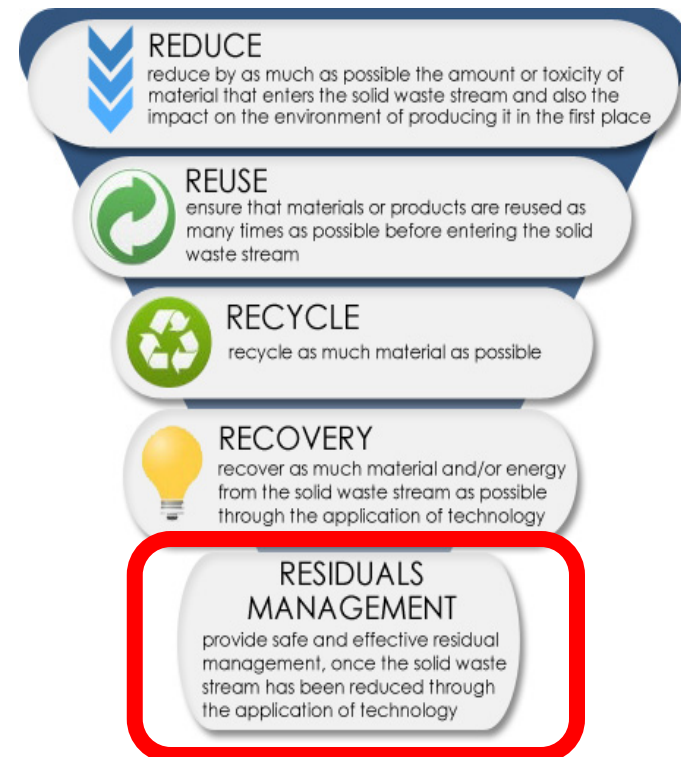
Key Issues: Reduce, Reuse, Recycle

1. Almost 30% of the waste stream is comprised of compostable organics
2. Not all households receive curbside garbage collection
3. Over 60% of the waste stream is collected through commercial haulers
4. Insufficient programming and behaviour change resources
5. No staff resources are currently focused on supporting and implementing residential and ICI waste reduction programs



Key Issues: Residuals Management

1. Armstrong/Spallumcheen RDF is reaching capacity and there are emerging and ongoing environmental issues at all three open landfills
2. No disaster debris management plan



Proposed Goals and Strategies

Reduce, Reuse, Recycling Options

1. Increase Organics Diversion
2. Reduce Disposal from SF Residential Households
3. Reduce Disposal for Sectors Served by Commercial Haulers
4. Develop Programs to Actively Promote Waste Reduction and Reuse Initiatives
5. Establish Staff to Ensure Reduction Program Effectiveness



Residuals Management Options

1. Develop Centralized Disposal Plan with Additional Landfill Capacity
2. Prepare Disaster Response Plan

Reduce, Reuse, and Recycling Options



Option 1. Increase Organics Diversion

Issue: *Almost 30% of the current waste stream is comprised of compostable organics.*

- A. Review and adopt Organics Diversion Strategy** to provide clear direction for policy, collection, and processing
- B. Develop implementation plan** for residential and ICI sectors
- C. Provide additional staff resources** to consult with applicable stakeholders
- D. Implement processing infrastructure**

Actions	Estimated Capital Cost	Estimated Operating Cost
Organics Diversion Strategy Implementation for Residential and ICI	-	Staff
Organics Diversion Processing Infrastructure	-	-



Benefits of Organics Diversion

Environmental

- Reduces GHG emissions
- Preserves landfill capacity
- Reduces landfill leachate
- Improves soils

Social

- Protects human health
- Mitigates against climate change
- Reduces landfill safety risks

Economic

- Extends landfill life
- Produces marketable product
- Provides employment
- Reduces costs to manage leachate and landfill gas

Option 2. Reduce Disposal from Single Family Households

Issue: Not all households receive curbside garbage collection resulting in less diversion potential

- A. **Expand curbside collection.** Consider clear bag
- B. **Implement One Bag/Can Limit**
- C. **Undertake a study** to identify demand for curbside collection of yard waste and other collection efficiencies
- D. **Implement food waste collection** and every other week garbage collection
- E. **Design and implement behavior change** through community-based social marketing (CBSM)
- F. **Provide additional staff resources** to recommend policy decisions for universal collection

Actions	Estimated Capital Cost	Estimated Operating Cost
SF Residential Household Program Disposal Reduction Implementation	-	\$50,000 to be allocated in year 2 of the SWMP to determine most efficient and effective collection methods in cooperation with municipalities \$67,000 to be allocated across years 2-4 of the SWMP with staff support

Option 3. Reduce Disposal for Sectors Served by Commercial Haulers

Issue: 60% of current waste stream is through commercial haulers

- A. **Review Regulated Waste policy** and consider implementing disposal bans
- B. **Review impact of disposal bans** on illegal dumping levels
- C. **Explore waste stream management licensing**
- D. **Work with private sector** to ensure markets for diverted materials
- E. **Design and implement behavior change** through CBSM
- F. **Provide additional staff resources** to implement disposal bans

Actions	Estimated Capital Cost	Estimated Operating Cost
ICI, MF res, and C&D Disposal Reduction Implementation	-	\$50,000 to be allocated across years 3-5 of the SWMP with staff support

Option 4. Programs to Actively Promote Waste Reduction and Reuse Initiatives

Issue: Insufficient programming and behavior change

- A. Continue demonstrating backyard composting
- B. Continue administering Waste Reduction Initiatives Funds
- C. Provide behaviour change and education programs
- D. Advocate with senior governments to support expansion of EPR programs

Actions	Estimated Capital Cost	Estimated Operating Cost
Waste Reduction and Reuse Initiatives Implementation	-	\$25,000 to be used in year 2 and 4 of the SWMP with staff support

Option 5. Establish Staff to Ensure Reduction Program Effectiveness

Issue: No staff resources to support waste reduction programs

- A. Re-establish a waste reduction planner** to oversee next steps to explore collection efficiencies intended to optimize diversion
- B. Establish staff position** that collaborates with ICI key stakeholders and provide educational support and other services

Actions	Estimated Capital Cost	Estimated Operating Cost
Staff Positions to Drive Program Implementation	-	\$193,310 for two staff positions, including benefits

Residuals Management Options



Option 1. (Disposal) Develop Centralized Disposal Plan with Additional Landfill Capacity

Issue: ASRDF reaching capacity, emerging and ongoing environmental issues at ASRDF and LRDF, and landfill expansion needed at GVRDF. GVRDF access issues.

- A. GVRDF – lateral expansion, for potential 30 years of additional capacity, to commence within 10 years to secure permit from the Province. Address access.
- B. ASRDF – close landfill when capacity is reached with large loads directed to GVRDF (2027)
- C. LRDF – preserve space for inert C&D waste with a transfer station put into place to accommodate self-haul loads only, within 5 years
- D. Hesperia Landfill – City of Vernon to manage but needs to be included in regional SWMP
- E. Kingfisher and Cherryville Transfer Station – reduce service to eliminate bulky item bin and wood/yard stockpiling.

Actions	Estimated Capital Cost	Estimated Operating Cost
GVRDF Lateral Expansion – Investigation and Design	\$100,000 to be allocated in year three of the SWMP (\$38 million phased)	-
ASRDF Transfer Station Development	\$2.5 million with \$250,000 to be allocated for design in year 8 and \$2.25 million for year 10 construction	-
LRDF Transition to C&D Landfill with Self-haul Drop-off Bay	\$300,000 to be allocated in years 5 and 6 for design and construction	-

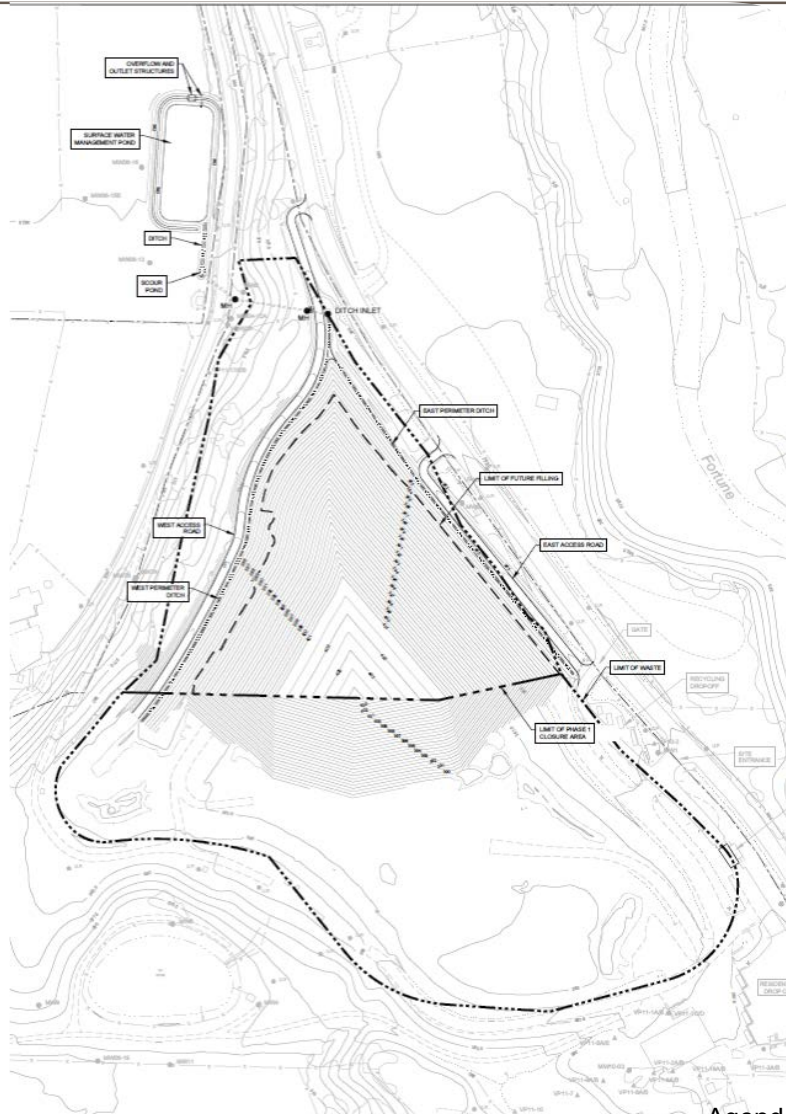
Waste Shed Management – North End

- Armstrong and Enderby have municipal collection (avg \$7.25/mo/home, 2 bag/can limit) and twice per year yard waste collection (by Public Works & free tipping)
- Okanagan Indian Band has curbside collection – garbage and recycling (L&L Disposal, weekly & biweekly)
- Spallumcheen and E.A. ‘F’ subscription services (\$16/month, 2 bag/can limit) [some Spallumcheen subdivisions have yard waste collection]
- Fibre glass waste accepted at ASRDF (industrial)
- Curbside Blue Box Program – by Recycle BC (Emterra contractor)
- Cardboard & garbage dumpsters (ICI sector) – subscription service
- Collection depots in Armstrong and Enderby – Recycle BC and other stewardship products
- Second hand and thrift stores
- IPE – food waste diversion

Self-Haul Information

November 2017 Survey	
Jurisdiction Using ASRDF	Self Haul Customers
Area B	11
Area C	2
Area D	1
Area F	66
Area F/CSRD	1
Armstrong	49
Coldstream	3
CSRD	2
Enderby	12
Falkland	1
Grindrod Area F	1
Kelowna	1
Lumby	1
Spallumcheen	218
Vernon	7
Grand Total	376
Annual Total	4,512

Armstrong/Spallumcheen RDF



- Phase 1 Closure – 2019
 - Tendering 2018
- Final Closure - 2027
- Storm water management
 - Retention pond
 - Evaporation pond
 - Extra ditching/culverts
 - Leachate pond conversion to storm water pond
- 3:1 slopes (ALC approval)
- Post-closure plan
 - Transfer station (type?)
 - Waste diversion (stockpiles?)
 - Environmental monitoring (\$1.7M liability)

Option 2. (Disposal) Disaster Response Plan

Issue: *No debris management plan*

- A. Ensure solutions for disaster materials management
 - Requires inter-departmental collaboration and resource sharing



Resulting Diversion Potential

	Amount Sent to Landfill <i>By Hauler</i>	Annual Diversion Potential out of Landfill (kg/capita)
Single Family Municipal and Subscription Curbside	30%	69
Industrial, Commercial and Institutional (including Multi-Family Residential and Construction & Demolition)	60%	74
Self-Haul (Single Family Residential, ICI and C&D)	10%	7
Potential Additional Diversion from Landfill		150 kg/c
Estimated Annual Disposal¹		350 kg/c

Five Year Financial Plan



RDNO FINANCIAL PLAN	2018	2019	2020	2021	2022
TOTAL OPERATING REVENUE	\$ 7,962,910	\$ 8,680,037	\$ 6,501,468	\$ 6,801,458	\$ 6,468,694
TOTAL OPERATING EXPENDITURES	\$ 6,399,410	\$ 6,607,547	\$ 6,605,610	\$ 6,680,168	\$ 6,659,004
TOTAL CAPITAL EXPENDITURES	\$ 1,563,500	\$ 2,382,800	\$ 229,168	\$ 364,600	\$ 188,000
REVENUE SOURCE ¹	\$ -	\$ (310,310)	\$ (333,310)	\$ (243,310)	\$ (378,310)
TOTAL EXPENDITURES	\$ 7,962,910	\$ 8,680,037	\$ 6,501,468	\$ 6,801,458	\$ 6,468,694
Revenues - Expenses	\$ -	\$ -	\$ -	\$ -	\$ -

¹Reserves, nominal tipping fee increase, taxation, and grants
 Agenda Page No. 154

Costs Per Household Across Regional District

- Current annual cost per household - garbage only
 - Subscription service (private) - \$192 to 230 per year
 - Self-haul - \$130 to 260 per year
 - Curbside (municipal program) - \$107 per year average
- Adding Organics - estimated annual cost per household
 - Garbage and Kitchen Scraps only
 - Assumes 'manual' collection - \$140 to \$190 per year
(Weekly organics and every other week garbage alternating weeks)

Public Engagement Phase 2



Mar 14, 2018

- Special Board Meeting
- Stakeholder Meeting



March-April

- Outreach material development
- Utility Bill inserts



April 11, 2018

- Open House
- Stakeholder Meetings



Apr 6-27, 2018

- Online survey implementation



May 1-4, 2018

- Survey Data Synthesis



May 4, 2018

- Consultation Summary



May 9, 2018

- Incorporate public and stakeholder input to finalize and approve SWMP