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2015 Regional Solid Waste Management Plan

Prepared for

Regional District of Fraser-Fort George

By
MWA Environmental Consultants Ltd.
in association with XCG Consultants Ltd.

Glossary

C&D	Construction and demolition
Disposal	Landfilling
Diversion	Activities that divert waste materials away from disposal as garbage to alternatives such as recycling or composting. Does not include combustion of garbage to produce energy.
DLC	Demolition, landclearing and construction
EPR	Extended producer responsibility
FBRL	Foothills Boulevard Regional Landfill
Waste Generation	The sum of all materials discarded that require management as solid waste, including garbage, recycling and composting. Does not include organic waste composted at home.
HHW	Household hazardous waste
ICI	Industrial, commercial and institutional (does not include heavy industry)
LFG	Landfill gas
MMBC	Multi-Material BC (residential recycling product stewardship organization)
MOE	BC Ministry of Environment
ODS	Ozone depleting substance (e.g. CFCs)
Organic waste / organics	Kitchen scraps, food waste, yard and garden waste
Plan	Regional Solid Waste Management Plan
RDFFG	Regional District of Fraser-Fort George
REAPS	Recycling and Environmental Action Planning Society (local non-profit organization involved in environmental awareness and education)
RSWMP	Regional Solid Waste Management Plan
TAC	Technical Advisory Committee

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1 Introduction

In British Columbia, Regional Districts are mandated by the Provincial Environmental Management Act to develop Solid Waste Management Plans that are long term visions of how each regional district would like to manage their solid wastes, including waste diversion and disposal activities. These plans are updated on a regular basis to ensure that the plan reflects the current needs of the regional district, as well as current market conditions, technologies and regulations.

During 2015, the Regional District of Fraser-Fort George (RDFFG) conducted a review of the 2008 Regional Solid Waste Management Plan (RSWMP or Plan) with the objective of developing an updated RSWMP addressing the period from 2015 to 2025. The review considered the implementation status of the 2008 RSWMP as well as the Plan's effectiveness in meeting targets and commitments. This Plan update builds on the 2008 RSWMP, maintaining the guiding principles, vision and goals of the 2008 Plan.

2 The Planning Process

The RSWMP review process was conducted in three phases. The first phase was an assessment of the current system and the implementation status of the 2008 Plan. The second phase looked at options to enhance the current system for managing solid waste and the identification of a proposed set of actions for inclusion in an updated RSWMP. The third phase consisted of public and stakeholder consultation on the proposed actions and incorporating the feedback into the final version of the updated Plan.

Through the 3 stages, the process has been guided by the RDFFG, with input from a Technical Advisory Committee made up of local government and First Nation representatives, and consulting support from Maura Walker and Associates and XCG Consultants Ltd.

The membership of the Technical Advisory Committee (TAC) included:

- District of Mackenzie
- Village of McBride
- City of Prince George
- Village of Valemount
- Lheidli T'enneh Band
- McLeod Lake Indian Band
- Regional District of Fraser-Fort George

Other waste management stakeholders, such as private sector service providers and the local environmental non-governmental organizations were consulted through interviews at the launch of the plan review process and again at the end of Stage 2 at a workshop to provide initial feedback on the proposed options under consideration. The workshop was attended by 20 people plus the facilitators. The following organizations were represented at the workshop:

- College of New Caledonia
- University of Northern BC
- Waste Management
- Westbin
- Northern Bear Awareness Society
- PGAIR
- Prince George Chamber of Commerce
- REAPS
- BC Ministry of the Environment
- RDFFG
- District of Mackenzie
- City of Prince George
- Village of McBride

The general public was also engaged in the planning process. At the start of the process, the public was given the opportunity to respond to a survey about their utilization of solid waste management services and their opinions about issues related to solid waste management. This survey was broadly promoted and over 500 surveys were completed. The results of the survey were shared with the TAC and helped to inform the discussions regarding future options.

Additional public consultation was conducted once the draft Plan was prepared. The month-long consultation program included an information sheet on the draft Plan combined with a survey that was distributed through RDFFG solid waste facilities, presentations to stakeholder groups, a website, press coverage and a second on-line survey. The survey (hard copy and on-line) was completed by 363 people. Presentations on the draft Plan were given by RDFFG staff to the following organizations:

- City of Prince George
- District of Mackenzie
- Village of McBride
- Village of Valemount
- Prince George Chamber of Commerce
- REAPS
- PG Air
- Lheidli T'enneh First Nation

These presentations provided an opportunity to ask questions and provide feedback. Feedback from these stakeholder presentations, combined with the results of the survey, assisted in finalizing the content of this Plan.

2.1 Guiding Principles

Guiding principles set the course for the planning process and assist in the selection of options for future consideration. The guiding principles for regional solid waste management plans are provided by the Ministry of Environment in their *Guide for the Preparation of Solid Waste Management Plans by Regional Districts 1994* (the Guidelines) and are as follows:

- The consumption of material and energy resources is set at a level which is ecologically sustainable;
- The regional solid waste stream is reduced to the greatest extent possible, in accordance with the hierarchy of **r**educe, **r**euse, and **r**ecycle, and consistent with local resources and the nature of the regional solid waste stream;
- The goal of environmental policy is zero pollution and the strategies for achieving that goal are in accordance with the precautionary principle;
- Citizens and businesses are enabled to make environmentally sound choices about consumption of resources and generation of waste through provision of appropriate information, including user-pay and market-based incentives wherever possible; and
- Waste reduction and diversion policies and strategies are developed through consultation and are socially acceptable and cost-effective, based on an understanding of costs and benefits, both monetary and non-monetary.

The Ministry of Environment is presently updating the 20-year old Guidelines to reflect the current solid waste management landscape and the experience of regional districts and partners in the municipal solid waste sector. Although the proposed new guidelines will apply only to regional districts amending their plan following implementation of the guideline in May 2016, this Plan update is consistent with the proposed new guidelines.

3 Plan Area

The Solid Waste Management Plan applies to the entire RDFFG, which covers nearly 52,000 km^2. The electoral boundaries are shown on Figure 3-1 and include the City of Prince George, the District of Mackenzie, the Village of McBride, the Village of Valemount, and Electoral Areas 'A' Salmon River and Lakes, 'C' Chilako River-Nechako, 'D' Tabor Lake-Stone Creek, 'E' Woodpecker-Hixon, 'F' Willow River-Upper Fraser, 'G' Crooked River-Parsnip, and 'H' Robson Valley-Canoe. In addition there are two First Nation Reserves[1].

Population density in RDFFG is 1.8 persons per square kilometer.[2]

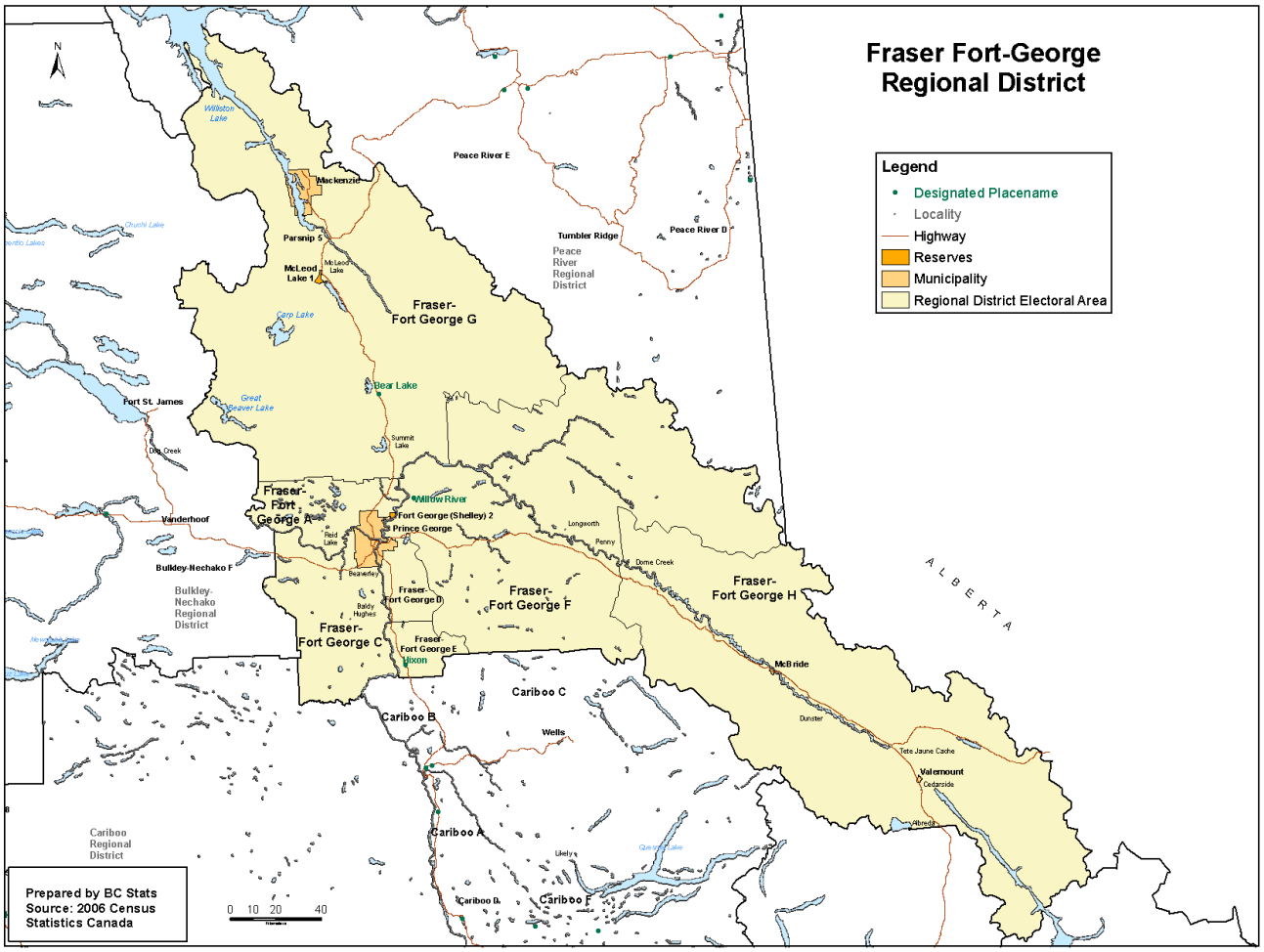


Figure 3-1 Map of Regional District of Fraser-Fort George

[1] Source: BC Stats

[2] Source: Statistics Canada

The RDFFG is located in central-eastern BC. It is bounded by Alberta to the east, the Thompson-Nicola Regional District to the south, the Cariboo Regional District to the southwest, the Bulkley-Nechako Regional District to the west, and the Peace River Regional District to the north / northeast.

3.1 Population

As shown in Table 3-1, based on the 2011 Census, the population of RDFFG in 2011 was 91,879, including Municipalities, Electoral Areas and First Nation Reserves. The population count remained relatively unchanged since the 2006 census. BC Stats estimates that the 2014 population was 95,216[3].

Table 3-1 Population, By Area[4]

Area	2011 Population	% of RDFFG total
District of Mackenzie	3,507	4%
Village of McBride	586	1%
City of Prince George	71,974	78%
Village of Valemount	1,020	1%
Fraser-Fort George A	3,362	4%
Fraser-Fort George C	3,434	4%
Fraser-Fort George D	4,175	5%
Fraser-Fort George E	479	1%
Fraser-Fort George F	1,207	1%
Fraser-Fort George G	317	0%
Fraser-Fort George H	3,507	2%
First Nation Reserves	153	less than 1%
Regional District of Fraser-Fort George	**91,879**	**100%**

[3]Source: http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/PopulationProjections.aspx

[4]Source:http://www.bcstats.gov.bc.ca/StatisticsBySubject/Census/2011Census/PopulationHousing/MunicipalitiesByRegionDDistrict.aspx

3.2 Housing and Economic Data

In 2011, there were 37,330 households in the RDFFG. Table 3-2 provides a breakdown of the types of housing.[5]

Table 3-2 Housing Types

Housing Type	Occupied Units (2011)
Single-detached house	24,810
Apartment; building that has five or more storeys	390
Movable dwelling	2,975
Other dwelling	9,150
Semi-detached house	*1,280*
Row house	*1,715*
Apartment; duplex	*1,820*
Apartment; building that has fewer than five storeys	*4,295*
Other single-attached house	*40*
Total number of occupied private dwellings	**37,330**

According to BC Statistics 2006 census data, the main industries (by labour force) for the region were logging and forest products, manufacturing, retail trade, health care and social assistance, and wood product manufacturing.[6] 2011 Census data related to labour force were not available at the time that this report was prepared.

4 The Current Solid Waste Management System

This section provides a summary of the implementation status of the 2008 RSWMP as well as an overview of the current solid waste management system, including data on the quantity and composition of solid waste disposed. This information was used to determine the opportunities available to RDFFG to improve on the existing system and is the baseline from which the 2015 RSWMP was developed.

4.1 Implementation Status of the 2008 Regional Solid Waste Management Plan

The RDFFG has partially implemented the key actions from the 2008 RSWMP, as outlined in Table 4-1. Although most diversion activities were scheduled for implementation by 2012, the addition of packaging and printed paper (PPP) to the Provincial Recycling Regulation in 2011 and the subsequent approval of the Multi-Material BC's stewardship plan in April 2013, delayed the introduction of curbside recycling in Prince George by two years. The uncertainties and complexities surrounding the new

[5] Source: Statistics Canada (http://www12.statcan.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CD&Code1=5953&Geo2=PR&Code2=59&Data=Count&SearchText=fraser-fort%20george&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1)

[6] Source: 2006 Community Facts for Fraser-Fort George, BC Stats

collection system for PPP also required considerable staff resources that would have otherwise been focused on implementing Plan components aimed at increasing diversion in the industrial, commercial, institutional (ICI) sector. Nevertheless, from 2009 to 2014 a diversion and residual management infrastructure was established within the RDFFG that will support increased diversion and ensure compliance with regulatory requirements going forward.

Table 4-1 Implementation of 2008 RSWMP

Key Action	Status
Curbside recycling in Prince George	Complete
Increase recycling services at disposal facilities	Complete
Disposal bans on recyclable waste	Incomplete
Increase the capacity of the composting facility	Underway
Transfer Station Operations & Amalgamation Study	Complete
Amalgamate some transfer stations	Incomplete

The RDFFG has had a significant focus on the residual management since completion of the 2008 RSWMP, with the following actions being completed:

- Integrated Landfill Management Plan for Foothills Boulevard Regional Landfill addressing design and operations, a post-closure concept, and landfill gas;
- Transfer Station Efficiency and Amalgamation Study confirming the intention to convert the Mackenzie Regional Landfill site to a full service transfer station and close the Mackenzie Regional Landfill to all but inert waste;
- Mackenzie Transfer Station Feasibility Study – prepared with a $2.1M capital cost estimate to construct the new facility; and
- Two rural landfills, Dome Creek and Sinclair Mills, were closed however final closure is still outstanding.

In addition, in 2013 the RDFFG developed and approved a Regional Solid Waste Management Financial Plan (the Financial Plan) to address the long-term financing of the solid waste management system and to:

- Support the implementation of the RSWMP;
- Ensure compliance with regulatory requirements; and,
- Provide a strategy to deal with landfill closure liabilities.

The Financial Plan aimed to ensure that there would be no deficit in funding for the solid waste system, and therefore the solid waste system financial model includes:

- Incremental increases to tipping fees, of $5 per year from 2013 to 2019 (60% of system funding);
- Incremental increases to property taxes (40% of system funding); and
- Introduction of small load tipping fees at Foothills Boulevard Regional Landfill (implemented in 2013).

4.2 The Current Solid Waste Management System

The existing solid waste management system in the RDFFG is diverse and is a combination of local government and private sector services. The key components of the existing system are:

- Municipal garbage collection provided by all municipalities (Prince George provides collection to homes only, and the other municipalities provide collection to homes, businesses and institutions);
- Depot based recycling for homes in all other areas;
- Residential curbside recycling in the City of Prince George provided by Multi-Material BC;
- Private garbage and recycling collection companies in Prince George;
- A yard waste composting facility operated at the Foothills Boulevard Regional Landfill site;
- A private recycling processor located in Prince George;
- A broad range of take-back locations for EPR products (primarily located in Prince George);
- Foothills Boulevard Regional Landfill, located in Prince George, that receives 96% of the region's garbage;
- Legrand Regional Landfill, a landfill that receives only construction and demolition waste from the McBride and Valemount areas;
- The Mackenzie Regional Landfill which receives garbage from the Mackenzie area only;
- 17 transfer stations that receive waste from rural communities throughout the RDFFG;
- Two transfer stations in Prince George that provide convenient disposal and recycling options for residents; and
- Communications and education in support of waste management services provided by the RDFFG, the City of Prince George and REAPS (a non-profit organization based in Prince George).

4.3 System Performance

In 2014, the RDFFG disposed of an estimated 80,000 tonnes of municipal solid waste. Roughly 28,800 tonnes of material were recycled, composted or managed through extended producer responsibility (EPR) programs.

The general trend since the 1990s has been a decrease in the per capita amount of waste disposed and an increase in amount diverted to recycling and composting, as shown in Table 4-2. The 2008 RSWMP had a target of 50% waste diversion once the Plan was completed. Because the Plan has not yet been fully implemented for the reasons discussed above, the estimated diversion rate in 2014 was 26% (up from 21% in 2007). However, the overall amount of waste generated on a per person basis has remained fairly constant.

Table 4-2 Disposal and Diversion (1997-2014)[7]

	1997 kg per capita	2002 kg per capita	2007 kg per capita	2014 kg per capita
Disposal	1,037	778	1,008	840
Diversion	93	144	272	302
Generation	1,130	923	1,280	1,142
Diversion Rate	8%	16%	21%	26%

In 2013 the RDFFG conducted a waste characterization study [8]at the Foothills Boulevard Regional Landfill (FBRL) to provide an indication of what types of waste continue to be landfilled and by whom. This information indicates which waste materials offer the greatest potential opportunity for future waste diversion.

The pie chart (Figure 4-1) shows the proportion of the various waste materials being landfilled, based on weight. The data from this study indicates roughly half of what is currently landfilled is comprised of materials that are recyclable, compostable, or could be managed through an EPR program.

[7] Source: RDFFG data

[8] TRI Environmental, 2013 Solid Waste Characterization Study, 2013

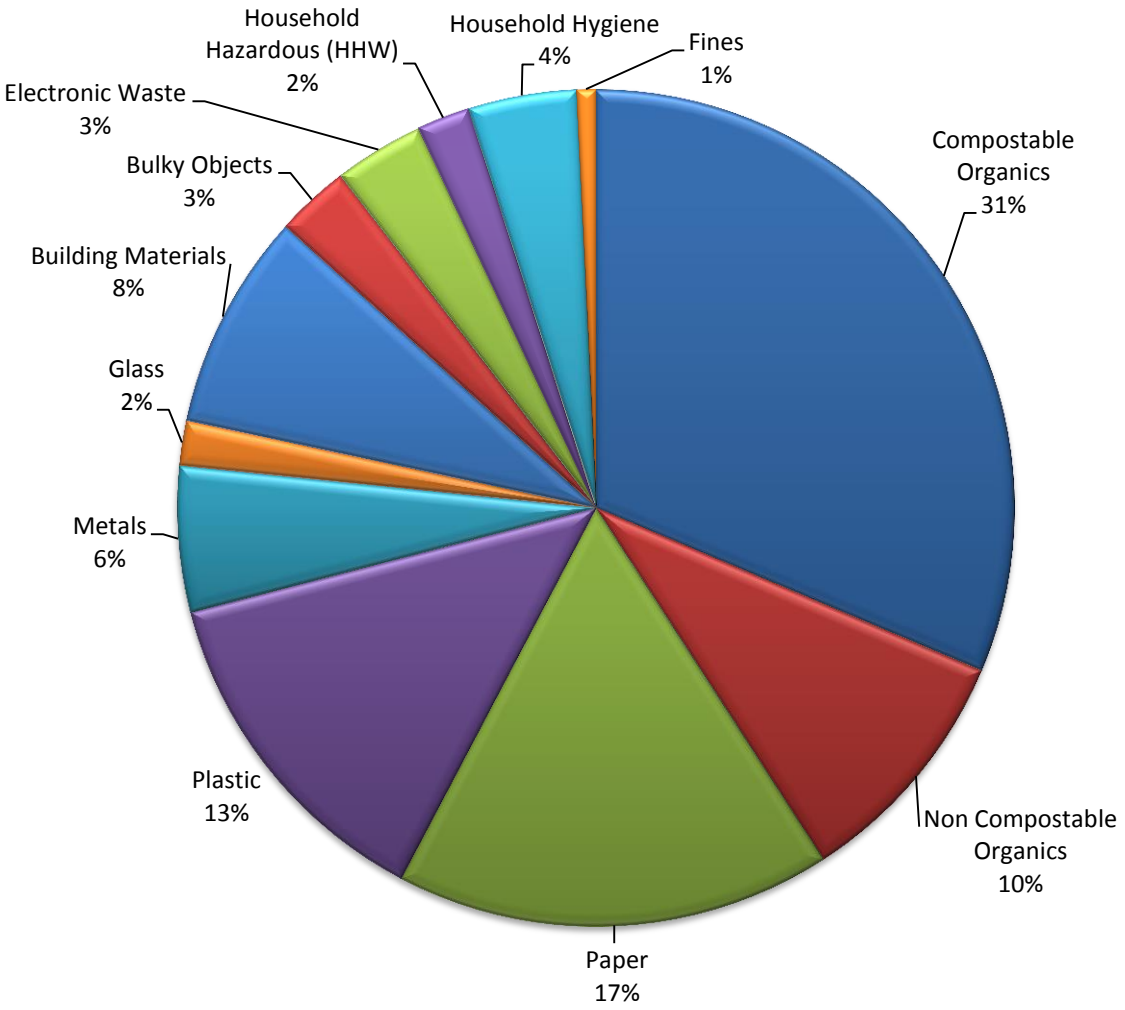
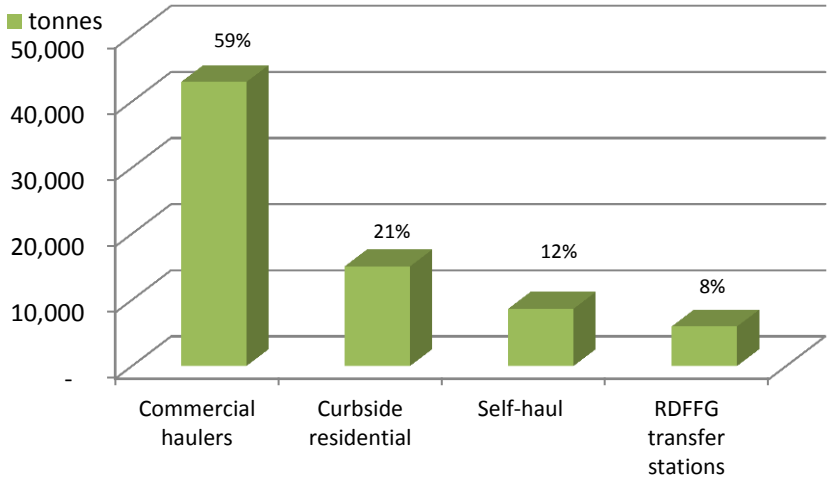


Figure 4-1 Current Waste Composition

A review of scale house records indicates the sources of the waste received at the landfill, which are summarized in Figure 4-2. This graph shows that the vast majority (59%) of landfilled solid waste was delivered by commercial haulers who collect from local businesses and institutions, and that curbside residential homes in Prince George are the next largest contributor to FBRL (21% of garbage delivered to the landfill).

Figure 4-2 Sources of Landfilled Waste



5 Looking to the Future: The 2015 RSWMP

The development of the 2015 RSWMP identified the following key objectives for this plan to address:

- On-going improvement of waste diversion
- Creating and maintaining solid waste infrastructure that meets or exceeds provincial guidelines and requirements; and
- Sustainable funding of services and infrastructure, including long-term liabilities.

The programs, policies and infrastructure identified in this plan, and an update of the 2013 Financial Plan are intended to meet these objectives.

5.1 Targets

The 2008 RSWMP identified a target of 50% diversion of waste away from landfilling. For the 2015 RSWMP, this target remains relevant; however, the per capita amount of waste disposed will be used as an indicator of achieving the 50% target since this number is a more accurate measure than estimating diversion. The MOE has also established waste disposal as an annual reporting requirement. As shown in Table 5-1, this means that the target for the RSWMP is to achieve an annual per capita disposal rate of 570 kg per capita. Consequently, the target for this Plan is to achieve a per capita disposal rate of 570 kg by 2020.

Table 5-1 Achieving the 50% Target

	2014 (kg per capita)	50% Diversion (kg per capita)
Disposal	840	570
Diversion	300	570
Generation (disposal + diversion)	1,140	1,140
Diversion Rate	26%	50%

6 Waste Diversion Components

The waste diversion components of a solid waste management system aim to minimize the amount of waste to landfill through reducing, reusing, recycling and composting. The new initiatives described in this section are regarded as the most significant opportunities to achieve waste diversion in the RDFFG based on the waste characterization data described in Section 4.2. Together, these components are intended to achieve the targeted disposal rate of 570 kg per capita.

6.1 What's being done now?

The RDFFG currently provides a number of waste diversion services:

- Encouraging backyard composting through the provision of composters and how-to information (on-line and hard copy)
- Encouraging reuse through Swap Sheds at select waste management facilities and the "Junk in the Trunk" event in Prince George
- The provision of multi-material recycling bins for residential packaging and paper at 13 transfer stations and 2 landfills
- Recycling of metal, motor oil, antifreeze, lead-acid batteries and tires at select waste management facilities
- Yard waste composting facility at Foothills Boulevard Regional Landfill
- Yard waste diversion at Mackenzie and Valemount waste management facilities

In addition to RDFFG services:

- Multi-Material BC (MMBC) provides residential curbside recycling collection in Prince George, as well as two drop-off depots
- There are a range of private sector recycling companies in the Prince George area
- REAPS provides 3Rs information to residents and business throughout the area
- Extended producer responsibility (EPR) programs have established take-back locations in Prince George and to a limited extent in the other municipalities, as shown in Table 6-1

Table 6-1 Number of EPR Take-Back Locations within the RDFFG[9]

Program	Prince George	Mackenzie	Valemount	McBride
BCUOMA – used oil, oil containers, oil filters	5	2	2	2
BCUOMA – antifreeze	2	1	2	1
Encorp – beverage Containers	3	1	1	1
Cdn Battery Association – lead acid batteries	5	1	0	0
Call2Recycle/CWTA – rechargeable batteries and cell phones	15	1	1	0
EPRA – electronics: Computers, televisions, audio-visual, medical equipment, office equipment	6	0	1	0
LightRecycle – lamps and lighting equipment	5	0	1	0
OPEI – outdoor power equipment	6	0	0	0
CESA – small appliances and electrical equipment	3	0	0	0
AlarmRecycle – smoke and carbon monoxide alarms)	2	0	1	0
Switch the 'Stat – thermostats	7	0	0	0
Product Care – paint	3	1	1	0
Product Care – solvents and flammable liquids, gasoline and pesticides	1	0	0	0
Health Product Stewardship Association – pharmaceuticals	6	2	0	0
BC Tire Stewardship – tires	23	1	1	1

6.2 What issues and opportunities need to be addressed?

- Although the amount of waste recycled and composted is increasing, the overall amount of waste generated (recycled + composted + landfilled) continues to increase on a per capita basis.
- The ICI sector is the largest contributor to the amount of waste landfilled and represents the sector with the greatest potential for diversion.
- There is private sector collection and processing capacity in the Prince George area to handle more recyclable materials.
- The diversion of residential recyclables could be enhanced through regulatory and financial mechanisms, thereby reducing the amount of garbage requiring collection.
- The residential recycling services currently provided by RDFFG at 13 rural transfer stations and 2 landfills do not receive funding through designated EPR organizations like Multi-Material BC and

[9] Information regarding the number and location of take-back sites for each EPR program was obtained from each program's websites in May 2015.

consequently consumers pay for recycling twice through the purchase of products (through fees embedded in the cost of a product that are used by MMBC to fund their program) and again through their taxes (used by RDFFG to fund their multi-material recycling program).

- There have been substantive changes in solid waste management in recent years with the advent of EPR programs. There is uncertainty regarding the level of public awareness of available waste diversion opportunities, and how effective current communication tools are in enhancing awareness.
- The RDFFG does not have a policy framework for determining their role in providing collection services for EPR programs. They currently collect some EPR products (e.g. tires, motor oil) at some facilities and the list of products covered by an EPR program is anticipated to expand.
- The single largest type of waste in the landfill, by weight, is compostable organic waste. However, there is a lack of capacity to process this material and there is uncertainty regarding the ability of the market to absorb additional processed organic waste (e.g. compost).
- There are limited local opportunities to recycle construction and demolition waste.

6.3 What's next?

In general, the services that RDFFG currently provides will be maintained. In addition, the following actions will be implemented as a means of addressing the issues and opportunities listed above.

6.3.1 Reduction and Reuse

- Expand reuse events to other municipalities
- Develop campaigns to encourage reduction and reuse behavior. These campaigns would tackle one subject area at a time, like the use of plastic bags, and are intended to complement and build on each other. One of the most significant reduction opportunities is believed to be food waste and therefore it is also proposed that there be a campaign specifically targeting food

6.3.2 Residential

- Collaborate with municipalities to review current garbage collection can limits and cart fees to ensure that they encourage diversion
- Consider implementation of curbside recycling collection in Mackenzie, Valemount and McBride if/when funding becomes available from Multi-Material BC or another stewardship organization
- Promote recycling in the multi-family residential sector (20% of housing stock) through ICI disposal restrictions and/or bans as discussed below
- Support municipalities to promote existing diversion opportunities in their communities

6.3.3 Organic Waste

- Undertake a step-wise approach to increasing the diversion of organic waste:
    - Conduct a composting marketing study

- If market study indicates additional organics diversion is viable, then update the organics composting feasibility study, including an assessment of co-composting with biosolids and the potential for small-scale composting at Mackenzie and Valemount
- Implement seasonal yard waste collection in Prince George once capacity at Foothills is available (municipal service)
- If and when food waste processing capacity is developed, the following actions will be considered:
  - Implement curbside residential food scraps collection
  - Ban the disposal of ICI food waste in garbage

6.3.4 Industrial, Commercial and Institutional (ICI)

- Apply differential tipping fees and/or a disposal ban on readily divertible materials to encourage source separation. This would be done initially at Foothills Boulevard Regional Landfill, with future expansion to other facilities.
- Assist private collectors to encourage more/better ICI recycling particularly in the multi-family residential sector
- Increase the ICI sector's awareness of available waste diversion opportunities

6.3.5 Construction and Demolition (C&D)

- Conduct a C&D waste diversion study to determine local market capacity for wood waste and other C&D waste materials, as well as identifying the barriers to more diversion by the construction and demolition industry. Based on the outcome of the study the RDFFG may:
  i. Provide drop-off bins/areas for small-volume source-separated C&D waste materials at Foothills landfill
  ii. Implement disposal facility policies (e.g. disposal bans) that would support the development of private sector C&D waste capacity
  iii. Develop targeted communication materials that will support C&D waste diversion

6.3.6 Communications

- Conduct a survey to determine current levels of awareness and efficacy of current communications
- Apply community based social marketing (CBSM) techniques as a method to develop new waste reduction and diversion campaigns. CBSM is an approach to program development and operation that encourages high rates of effective participation and long-term behavior change
- Promote RCBC's hotline and Recyclepedia

6.3.7 Illegal Dumping

- Collaborate with government, First Nations and private sector stakeholders on the development of a regional illegal dumping strategy that may include the following actions:
  - Assess the nature and extent of illegal dumping in RDFFG

- Map known problem sites
- Conduct clean ups
- Continuing to provide funding to waive tipping fees for clean-up events
- Establish and enforce a bylaw that puts the onus for proper disposal on the waste generator
- Develop a “observe, record and report” program

6.3.8 Bear-Human Conflict Management

- The RDFFG will work with local Bear Aware groups and the Province to ensure that local citizens are informed about how to manage their waste in a manner that does not attract wildlife.
- Municipalities and the RDFFG will ensure that their waste collection bylaws require containerization of garbage and enforced set out times for curbside collection to minimize wildlife access opportunities.
- Backyard composting education materials will address how to compost in a manner that does not attract wildlife into residential areas.

6.4 Diversion Potential

Table 6-2 provides a low-range and high-range estimate of the additional diversion that can be achieved by implementing the diversion strategy components. The level of diversion achieved by a given program can be affected by program maturity (new programs often take a few years before maximum participation 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 535 to 620 kg per capita per year. The target for this plan is a disposal rate of 570 kg per capita; to achieve this target, a 32% reduction in the per capita amount of waste currently landfilled is required.

Table 6-2 Estimated Diversion Potential

Sector/Target Material	Sector contribution to the landfill	Material contribution to the landfill	Diversion potential if 50% of targeted material was diverted	Diversion potential if 60% of targeted material was diverted	Diversion potential if 70% of targeted material was diverted
Residential Diversion	35%				
recyclable paper and packaging		11%	1.8%	2.2%	2.6%
yard waste		13%	2.3%	2.8%	3.2%
food waste and compostable paper		30%	5.2%	6.2%	7.3%
EPR materials (non PPP)		2%	0.3%	0.4%	0.5%
Residential Diversion Potential			**9.7%**	**11.6%**	**13.5%**
ICI Diversion	40%				
recyclable paper and cardboard		13%	2.6%	3.1%	3.7%
recyclable film		6%	1.2%	1.5%	1.7%
yard waste		2%	0.4%	0.5%	0.5%
food waste and compostable paper		21%	4.2%	5.0%	5.8%
EPR materials (non PPP)		3%	0.5%	0.6%	0.8%
metal		7%	1.3%	1.6%	1.9%
ICI Diversion Potential			**10%**	**12%**	**14%**
Construction & Demolition Diversion	25%				
wood		4%	0.5%	0.6%	0.7%
drywall		5%	0.6%	0.8%	0.9%
masonry		4%	0.5%	0.6%	0.7%
asphalt products		36%	4.5%	5.4%	6.3%
Construction and Demolition Diversion Potential			**6.2%**	**7.4%**	**8.6%**
POTENTIAL ADDITIONAL DIVERSION FROM LANDFILL			26.1%	31.3%	36.5%
			220 kg	263 kg	305 kg
ESTIMATED ANNUAL DISPOSAL			**620 kg/cap**	**575 kg/cap**	**535 kg/cap**

6.5 What will it cost?

Table 6-3 lists the costs associated with the current and future components of the waste diversion strategy, as well as provides a proposed schedule for implementation. The new diversion programs will add an estimated $235,000-$305,000 per year to the current budget of $1,368,000.

Table 6-3 Diversion Strategy Costs

Reduction and Reuse	2016	2017	2018	2019	2020
Current Program					
Backyard Composting Program					
Capital Costs	$0	$25,000	$0	$0	$0
Operating Costs	$82,800	$82,800	$82,800	$82,800	$82,800
Sub-Total	***$82,800***	***$107,800***	***$82,800***	***$82,800***	***$82,800***
Proposed Program					
Promotion of Reduction and Reuse	$15,000	$15,000	$15,000	$15,000	$15,000
Expand reuse events to Mackenzie, Valemount and McBride	$5,000	$5,000	$5,000	$5,000	$5,000
New FTE @ 0.5	$37,500	$37,500	$37,500	$37,500	$37,500
Sub-Total	***$57,500***	***$57,500***	***$57,500***	***$57,500***	***$57,500***
Residential Diversion Program	**2016**	**2017**	**2018**	**2019**	**2020**
Current Program					
Recycling at Transfer Stations & Landfills					
Operating Costs	$200,000	$200,000	$200,000	$200,000	$200,000
Multi-Material Recycling					
Operating Costs	$600,000	$600,000	$600,000	$600,000	$600,000
Sub-Total	***$800,000***	***$800,000***	***$800,000***	***$800,000***	***$800,000***
Proposed Program					
Collaborate with municipalities to review can limits and cart fees	$0	$0	$0	$0	$0
Implement curbside recycling in Mackenzie, McBride and Valemount	$0	$0	$0	$0	$0
Sub-Total	***$0***	***$0***	***$0***	***$0***	***$0***
Organics Diversion Planning & Program Development	**2016**	**2017**	**2018**	**2019**	**2020**
Current Program					
Yard Waste Composting Facility at FBRL					
Operating Costs	$400,000	$400,000	$400,000	$400,000	$400,000
Yard Waste Composting Facility at Mackenzie Landfill					
Operating Costs (included in landfill operating costs)	$0	$0	$0	$0	$0
Sub-Total	***$400,000***	***$400,000***	***$400,000***	***$400,000***	***$400,000***

Organics Diversion Planning & Program Development	**2016**	**2017**	**2018**	**2019**	**2020**
Proposed Program					
Organic Waste Market Study	$25,000	$0	$0	$0	$0
Compost Processing Feasibility Study	$0	$50,000	$0	$0	$0
Seasonal Waste Collection (municipality provided service)	$0	$0	$0	$0	$0
Sub-Total	***$25,000***	***$50,000***	***$0***	***$0***	***$0***
ICI Diversion Program	**2016**	**2017**	**2018**	**2019**	**2020**
Proposed Program					
Implement disposal bans and/or differential tipping fees	$0	$0	$0	$0	$0
Assist private collectors to encourage more/better ICI recycling	$0	$0	$0	$0	$0
Increase awareness of diversion opportunities including targeted communication	$25,000	$10,000	$10,000	$10,000	$10,000
ICI Disposal Bans including targeted communication materials	$25,000	$10,000	$10,000	$10,000	$10,000
New FTE @ 0.5	$37,500	$37,500	$37,500	$37,500	$37,500
Sub-Total	***$87,500***	***$57,500***	***$57,500***	***$57,500***	***$57,500***
CD Diversion Program	**2016**	**2017**	**2018**	**2019**	**2020**
Proposed Program					
Conduct a CD waste diversion study	$0	$20,000	$0	$0	$0
Provide drop-off bins for self-haul at Foothills	$0	$0	$0	$0	$0
Apply disposal bans and/or differential tipping fees	$0	$0	$0	$0	$0
Develop targeted communication materials	$0	$0	$10,000	$10,000	$10,000
New FTE (included in ICI Diversion Program above)	$0	$0	$0	$0	$0
Sub-Total	***$0***	***$20,000***	***$10,000***	***$10,000***	***$10,000***
EPR Policy	**2016**	**2017**	**2018**	**2019**	**2020**
Proposed Program					
Establish policy framework for decision-making	$0	$0	$0	$0	$0
Sub-Total	***$0***	***$0***	***$0***	***$0***	***$0***

Promotion and Education	**2016**	**2017**	**2018**	**2019**	**2020**
Current Program					
Advertising	$75,000	$75,000	$75,000	$75,000	$75,000
Sub-Total	***$75,000***	***$75,000***	***$75,000***	***$75,000***	***$75,000***
Proposed Program					
Survey to determine current program effectiveness	$10,000	$0	$0	$0	$0
Support municipalities to promote curbside & drop-off opportunities	$0	$0	$0	$0	$0
Rebrand the RDFFG solid waste program	$25,000	$0	$0	$0	$0
Promote RCBC Hotline and Recyclepedia	$5,000	$5,000	$5,000	$5,000	$5,000
Apply community based marketing to develop new programs	$0	$0	$0	$0	$0
New FTE @ 0.5	$37,500	$37,500	$37,500	$37,500	$37,500
Sub-Total	***$77,500***	***$42,500***	***$42,500***	***$42,500***	***$42,500***
Illegal Dumping Prevention Program	**2016**	**2017**	**2018**	**2019**	**2020**
Current Program					
Waive tipping fees for volunteer, non-profit or local government site clean-up	$10,000	$10,000	$10,000	$10,000	$10,000
Sub-Total	***$10,000***	***$10,000***	***$10,000***	***$10,000***	***$10,000***
Proposed Program					
Assess nature and extent of problem including mapping sites	$20,000	$0	$0	$0	$0
Develop strategy	$0	$0	$0	$0	$0
Implement illegal dumping strategy (clean-ups, observe/record/report, etc.)	$0	$30,000	$30,000	$30,000	$30,000
New FTE @ 0.5	$37,500	$37,500	$37,500	$37,500	$37,500
Sub-Total	***$57,500***	***$67,500***	***$67,500***	***$67,500***	***$67,500***
Bear-Human Conflict Management	**2016**	**2017**	**2018**	**2019**	**2020**
Initiatives to be incorporated into Promotion & Education	$0	$0	$0	$0	$0
TOTAL	**2016**	**2017**	**2018**	**2019**	**2020**
Total Current Diversion Programs - Capital	*$0*	*$25,000*	*$0*	*$0*	*$0*
Total Current Diversion Programs - Operating	*$1,367,800*	*$1,392,800*	*$1,367,800*	*$1,367,800*	*$1,367,800*
Total Proposed Diversion Programs - Operating	*$305,000*	*$295,000*	*$235,000*	*$235,000*	*$235,000*
Total Annual Diversion Costs	***$1,672,800***	***$1,712,800***	***$1,602,800***	***$1,602,800***	***$1,602,800***

7 Residual Waste Management System and Projects

7.1 What's being done now?

Residual waste refers to discarded materials that are not diverted to reuse, recycling or composting and therefore require landfilling. In the RDFFG, all residual waste is delivered to RDFFG Transfer Stations or Regional Landfills.

Figure 7-1 RDFFG Transfer Stations

There are 17 transfer stations throughout the regional district, as shown in Figure 7-1. The majority of residual waste received at the transfer stations is transferred to the Foothills Boulevard Regional Landfill in Prince George, with the exception of:

- loads from northern transfer stations which are sometimes transferred to the Mackenzie Regional Landfill based on hauling efficiencies; and
- select inert waste received at transfer stations in the southeastern portion of the regional district which is transferred to the Legrand Landfill for disposal.

A transfer station efficiency study was completed in 2010 that provided options for transfer station amalgamation. Since that time one transfer station, Red Rock, has been closed. In addition, upgrades to 3 transfer sites (Willow River, Buckhorn, Berman Lake) have been undertaken.

There are 3 operating landfills in the region: Foothills Boulevard, Mackenzie and Legrand. The Foothills Boulevard Regional Landfill receives 91% of the region's waste, the Mackenzie Landfill receives 7% and Legrand receives 2%. An Integrated Landfill Management Plan for Foothills Boulevard Regional Landfill that addressed design and operations, a post-closure concept, and landfill gas was completed in 2010.

There are 13 landfills that have ceased operation. Only one of these closed landfills, West Lake Regional Landfill, has undergone final closure and capping, meeting provincial regulatory requirements.

7.2 What Issues Need to be Addressed?

- The transfer station system is expensive to operate and there may be opportunities to increase system efficiencies
- There are high levels of servicing that contribute to the cost of the system:
    - There are 6 transfer stations within 30 km of Prince George
    - There are 2 transfer stations in Prince George and a fully serviced landfill
    - There are multi-material recycling bins at the transfer stations and landfill in Prince George, in addition to residential curbside recycling
    - Extensive hours of operation at many transfer stations and landfills
- For the Foothills Landfill:
    - There has been settlement on the filled portion of the site, which has potentially created more capacity, but there are costs associated with making this space usable for additional waste disposal
    - There are major capital projects required at this site to continue to use it as a regional landfill that meets all regulatory requirements
    - There is an opportunity to beneficially reuse the landfill gas generated at the site
- For the Legrand Landfill
    - There is no Design and Operations Plan for this facility
    - The lifespan of this site is unknown
    - Progressive closure of the site is required
- For the closed landfills

- 2008 RSWMP indicates that all landfills are slated for final closure, which could be a significant capital expense. RDFFG is awaiting direction from the Ministry of Environment with respect to final closure requirements for these sites, which will assist in defining the potential cost.

7.3 What's Next?

For the Foothills Boulevard Regional Landfill (as per Integrated Landfill Management Plan):

- Relocation of Site entrance at the Foothills Boulevard Regional Landfill to facilitate the ongoing development and lateral expansion of the existing landfill site. Included in the Site entrance relocation project is: a new entrance; weigh scales and scale house; public tipping area; recycling area; new operations building; new and expanded compost facility; and relocation of water, sanitary, and electrical infrastructure ($7,476,716).
- Beneficial Use of Landfill Gas project at the Foothills Boulevard Regional Landfill ($3,600,000).
- Cell 1 Closure Decommissioning. This project includes removal of the existing final cover system in the eastern portion of the Cell 1. Removal of the existing cover system will allow for additional filling and extend the site life of the landfill cell by 5 years ($689,310).

For the Mackenzie Regional Landfill:

- As per the 2008 RSWMP, this site will be considered for closure as an MSW landfill and replaced with a full service transfer station with residual waste hauled to the Foothills Boulevard Regional Landfill ($2,105,000). The remaining landfill site capacity could be used to bury select waste (e.g. construction and demolition waste).

For the Legrand Regional Landfill:

- Undertake an assessment of demolition, landclearing and construction (DLC) waste disposal requirements and diversion potential.
- Progressive Closure.
- Develop a Design and Operations Plan for the site to both quantify remaining airspace and identify long term capital projects at the site.

For the closed landfills

- Undertake final closure of the Valemount Regional Landfill.
- Develop a plan to close the remaining landfills once the specific closure requirements are deemed acceptable by the Province.

7.4 What will it cost?

Table 7-1 lists the costs associated with the current and future components of the residual waste management system, as well as provides the anticipated schedule for implementation of capital projects.

Table 7-1 Residual Waste Management System Costs

Residual Waste Management	2016	2017	2018	2019	2020
Capital Costs					
Foothills Boulevard - Scalehouse Relocation and Water/Sanitary Infrastructure	$7,476,716	$0	$0	$0	$0
Foothills Boulevard - LFG Utilization Project	$0	$3,600,000	$0	$0	$0
Foothills Boulevard - Decommission Leachate Recirculation System and Existing Cover	$0	$0	$0	$689,310	$0
Mackenzie & Legrand Landfill	$0	$0	$0	$0	$0
Landfill Closures	$750,000	$0	$400,000	$400,000	$400,000
Sub-Total	***$8,226,716***	***$3,600,000***	***$400,000***	***$1,089,310***	***$400,000***
Operating Costs					
Foothills Boulevard Regional Landfill	$5,612,448	$5,869,940	$5,654,412	$5,734,680	$5,775,755
Foothills Boulevard Regional Landfill – Landfill Gas Utilization Project	$0	$160,000	$320,000	$320,000	$320,000
Mackenzie Landfill	$460,000	$374,500	$138,422	$147,139	$137,715
Legrand Landfill DLC	$100,000	$55,000	$55,000	$65,000	$55,000
Closed Landfills Monitoring	$25,000	$25,000	$50,000	$50,000	$50,000
Sub-Total	***$6,197,448***	***$6,484,440***	***$6,217,834***	***$6,316,819***	***$6,338,470***
Transfer Stations	**2016**	**2017**	**2018**	**2019**	**2020**
Capital Costs					
Existing Transfer Stations	$0	$0	$425,000	$350,000	$525,000
Mackenzie Transfer Station	$0	$2,105,000	$0	$0	$0
Sub-Total	***$0***	***$2,105,000***	***$425,000***	***$350,000***	***$525,000***
Operating Costs					
Existing Transfer Stations	$1,659,000	$1,620,000	$1,581,000	$1,581,000	$1,581,000
Mackenzie Transfer Station	$0	$165,672	$308,317	$301,805	$304,700
Sub-Total	***$1,659,000***	***$1,785,672***	***$1,889,317***	***$1,882,805***	***$1,885,700***
Other Components	**2016**	**2017**	**2018**	**2019**	**2020**
Operating Costs					
Waste Composition Study	$0	$0	$0	$40,000	$0
Solid Waste Management Plan Updates	$0	$0	$0	$0	$100,000
Sub-Total	***$0***	***$0***	***$0***	***$40,000***	***$100,000***
Total	**2016**	**2017**	**2018**	**2019**	**2020**
Total Residual Management - Capital	*$8,226,716*	*$5,705,000*	*$825,000*	*$1,439,310*	*$925,000*
Total Residual Management - Operating	*$7,856,448*	*$8,270,112*	*$8,107,151*	*$8,239,624*	*$8,324,170*
Total Annual Residual Management Costs	***$16,083,164***	***$13,975,112***	***$8,932,151***	***$9,678,934***	***$9,249,170***

8 The Financial Picture

8.1 Staffing

To meet the diversion and disposal targets identified in this Plan, the RDFFG will need to hire an additional 2.0 full time equivalent (FTE) positions dedicated to new waste diversion initiatives. As indicated in Table 6.1, these new positions are required for new programs associated with: reduction and reuse (0.5 FTE); ICI and C&D diversion (0.5 FTE); promotion and education (0.5 FTE); and illegal dumping (0.5 FTE). The Beneficial Use of Landfill Gas project at the Foothills Boulevard Regional Landfill will also require an additional 1.0 FTE position to supervise construction, operation and maintenance of the facility.

8.2 Estimated Expenditures

Solid waste management is a major region-wide service provided by the RDFFG. The RDFFG's 2015 solid waste management budget is just under $15 million. Approximately $8 million of this budget covers operating costs, $5 million is for capital projects and $1 million is allocated to reserve funds. Reserve funds are established to finance future capital projects as well as post-closure monitoring and maintenance. Revenues associated with this budget come from tipping fees, taxation, recycling revenues and other sources, including reserve funds.

As indicated in Table 8-1, over the next five year period (2016-2020) this Plan Review and Update estimates that total operating expenditures for this service will increase from $9.5 million in 2016 to $9.9 million in 2020.

Table 8-1 Summary of the Solid Waste Management System Costs (2016 - 2020)

	2016	2017	2018	2019	2020
Capital Expenditures					
Diversion Programs - Current	*$0*	*$25,000*	*$0*	*$0*	*$0*
Residual Management	*$8,226,716*	*$5,705,000*	*$825,000*	*$1,439,310*	*$925,000*
Total Annual Capital Expenditures	***$8,226,716***	***$5,730,000***	***$825,000***	***$1,439,310***	***$925,000***
Operating Expenditures					
Diversion Programs - Current	*$1,367,800*	*$1,392,800*	*$1,367,800*	*$1,367,800*	*$1,367,800*
Diversion Programs - Future	*$305,000*	*$295,000*	*$235,000*	*$235,000*	*$235,000*
Residual Management	*$7,856,448*	*$8,270,112*	*$8,107,151*	*$8,239,624*	*$8,324,170*
Total Annual Operating Expenditures	***$9,529,248***	***$9,957,912***	***$9,709,951***	***$9,842,424***	***$9,926,970***
Total					
Annual Costs	***$17,755,964***	***$15,687,912***	***$10,534,951***	***$11,281,734***	***$10,851,970***

With respect to 2016 operating expenditures, current diversion programs represent 14% ($1.4 million), new diversion programs represent 3% ($0.3 million) and residual management programs represent 83% ($9.5 million) of total system expenditures.

Table 8-1 also provides estimates of capital expenditures over the next five year period. Major capital projects required to meet regulatory requirements at the Foothills Boulevard Regional Landfill, the completion of the Beneficial Use of LFG Project, as well as the construction of the new Mackenzie Transfer Station, entail significant capital costs in 2016 and 2017 respectively.

8.3 Cost Recovery Mechanisms

The 2013 Solid Waste Management Financial Plan (the Financial Plan) identifies the cost recovery mechanisms that are currently utilized to fund the implementation of the RSWMP, ensure compliance with regulatory requirements and provide a strategy to deal with landfill closure liabilities. Under the current Financial Plan, 60% of solid waste system costs are recovered through tipping fees while 40% of costs are recovered through taxation. Although the current Financial Plan already entails an increase in tipping fees from $62 per tonne in 2013 to $90 per tonne in 2019, in 2016 the Financial Plan will be reviewed to ensure that the costs and revenue impacts of new waste diversion and residual management projects arising from this review process can be accommodated within the current financing strategy.

8.4 Plan Flexibility

Costs provided in this plan are estimates and may not reflect actual costs at the time of implementation. As a result, programs and infrastructure may undergo further assessment, including an assessment of costs and continued community support, by the Plan Monitoring Committee prior to implementation.

The Plan implementation schedule will be flexible enough to reflect the variability in priorities and available funding of the RDFFG and its member municipalities. The Plan is intended to be flexible when warranted to implement plan components, directly or through private firms and/or non-profit organizations.

Notwithstanding the above, the contents of this Plan are subject to legal requirements, and as a result, guidance and the direction from the Ministry of the Environment will be sought in regards to the appropriate level of flexibility in a specific circumstance.

9 Monitoring and Measurement

The implementation of this plan will be monitored on a regular basis to ensure that its objectives are being met, and to identify if there is a need to adjust the intended course of action. This will be achieved through:

- A Plan Monitoring Committee;
- Annual reporting;
- A waste composition study and

- Conducting a plan review in 5 years.

9.1 Plan Monitoring Committee

A Plan Monitoring Committee will be formed to monitor the implementation on the Plan and report directly to the Environment and Parks Standing Committee of the Regional Board. The Plan Monitoring Committee members will:

- review and become familiar with the Solid Waste Management Plan;
- review and become familiar with the existing solid waste management system in the RDFFG;
- identify methodologies to be employed in the monitoring and evaluation of the Plan's implementation;
- monitor the implementation of the Plan and the effectiveness of the SWMP at achieving its objectives; and
- make recommendations to increase the effectiveness of the Plan or the solid waste management system.

The committee membership will strive to have a broad representation of interests including local government, First Nations, the waste management industry, environmental organizations, the business sector, and residents. Additionally, selection of members will attempt to create a committee with a balance of representation geographically, demographically, and with a variety of interests and perspectives. In general there will be 1-2 meetings per year of the committee with the provision for additional meetings, workshops or other presentations at the committee's discretion.

9.2 Plan Evaluation

A report will be developed on an annual basis that provides the status of the Plan's implementation and progress towards its targets. This data will be provided to the Plan Monitoring Committee and the Board. Additionally, disposal data will be entered into the Province's waste disposal calculator.

A waste composition study on the residual waste management stream will be conducted in advance of the next RSWMP update to assess the success of current waste diversion programs and policies and identify opportunities for additional diversion. For the purposes of comparability, the next waste composition study should be conducted at approximately the same time of year as the 2013 study.

9.3 Plan Updates

A review and update of the Regional Solid Waste Management Plan will be undertaken every five years to ensure that it reflects the current needs of the RDFFG.

10 Approval by the Board

This Plan was approved by the Board of Directors by the following resolution on (date):

INSERT RESOLUTION FROM BOARD MINUTES