

REGIONAL DISTRICT OF EAST KOOTENAY

Solid Waste Management Plan Review Characterization of the System Report



PREPARED FOR: REGIONAL DISTRICT OF EAST KOOTENAY

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PRJ17050

January 2018



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ASSOCIATES



- Landfill Engineering
- Solid Waste Planning
- Environmental Monitoring
- Landfill Fire Control

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January 26th 2018

**RE: Regional District of East Kootenay Solid Waste System Review
Stage 1 - Characterization of Existing System Report**

Dear Mr. Paterson,

This document presents a compilation of the Stage 1 Review of your Solid Waste Management system that has been completed by Sperling Hansen Associates (SHA). The purpose of Stage 1 of the plan was to fully understand and quantify the existing system.

This report is organized into nine sections as follows: 1) Introduction 2) Background Information, 3) Existing Programs and Facilities 4) Existing Facilities by Subregion 5) Quantifying the System, 6) Finances 7) Benchmarking Comparison 8) Bylaws and 9) Issues and Opportunities. The Stage 1 work was carried out based on a three-day site tour of the region (completed in July 2017); as well as data and reports provided by the RDEK.

We trust this report will provide the RDEK Board with a solid information base to move into the Solid Waste Management Plan Update process, and will provide SHA a strong base to begin further analysis of the system.

Please contact us if you have any questions about this report.

Yours truly,
SPERLING HANSEN ASSOCIATES

TABLE OF CONTENTS

Table of Contents.....	i
GLOSSARY	v
1. Introduction	1
2. Background Information.....	1
2.1 Plan Area	1
2.2 Geography.....	4
2.3 Economic Base	5
2.4 Implementation of 2003 SWMP	5
3. Existing Programs and Facilities	10
3.1 Solid Waste Collection Services.....	10
3.2 Recycling	10
3.3 Reduction and Reuse Programs	11
3.4 Recovery	12
3.5 Education and Outreach.....	12
3.6 Extended Producer Responsibility.....	12
3.7 Household Hazardous Waste	12
4. Existing Facilities by Subregion.....	20
4.1 Columbia Valley Subregion	20
4.1.1 Columbia Valley Landfill	20
4.1.2 Attended Transfer Stations	22
4.1.3 Unattended Transfer Stations – Brisco Spillamacheen / Radium / Fairmont.....	23
4.1.4 Canal Flats Marshalling Area	24
4.2 Central Subregion	27
4.2.1 Central Subregion Landfill	28
4.2.2 Attended Transfer Stations	31
4.2.3 Unattended Transfer Stations	33
4.2.4 Marshalling Areas.....	34
4.3 Elk Valley Subregion.....	35
4.3.1 Sparwood Landfill	35
4.3.2 Attended Transfer Stations	37
4.3.3 Unattended Transfer Stations	38
5. Quantifying the system.....	39
5.1 Waste Generation and Disposal.....	39
5.2 Waste Composition.....	43
6. Finances	43
6.1 Columbia Valley Subregion	45
6.2 Central Subregion	46
6.3 Elk Valley Subregion.....	47
7. Benchmarking Comparison	49
7.1 Overview of Regional Districts	50
7.2 Results of Benchmarking Analysis.....	53
8. Bylaws	51
8.1 Regional and Municipal Bylaws.....	51

8.2	Provincial Policies and Legislation	51
8.2.1	Environmental Management Act.....	52
8.2.2	Recycling Regulation	52
8.2.3	Open Burning Smoke Control Regulation.....	52
8.2.4	Organic Matter Recycling Regulation (OMRR)	52
8.2.5	Landfill Criteria for Municipal Solid Waste.....	52
8.2.6	Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills	52
8.2.7	Landfill Gas Management Regulation.....	52
9.	Issues and opportunities.....	53

List of Tables

Table 2-1 Population Statistics in the RDEK
 Table 2-2 - Implementation status of 2003 SWMP
 Table 3-1 - EPR Programs and Locations in the Regional District of East Kootenay
 Table 5-1- 2016 Disposal and Diversion Data in the RDEK
 Table 5-2 - Waste Generation and Disposal Rates based on Scale Data from RDEK
 Table 6-1 - 2016 Costs for Solid Waste Management in the RDEK
 Table 6-2 - Disposal, Diversion, and Recycling Costs for the RDEK Summarized
 Table 6-3 - Columbia Valley Financial Plan – Solid Waste
 Table 6-4 – Diversion, Recycling and Disposal Costs - Columbia Valley Subregion
 Table 6-5 - Central Subregion Financial Plan - Solid Waste
 Table 6-6 – Diversion, Recycling and Disposal Costs – Central Subregion
 Table 6-7 -Elk Valley Financial Plan - Solid Waste
 Table 6-8 - Diversion, Recycling and Disposal Costs - Elk Valley Subregion
 Table 7-1 - Results of Benchmarking Analysis
 Table 7-2 - Tipping Fee Schedule Comparison between Regional Districts

List of Figures

Figure 2-1 Regional District of East Kootenay Subregion and Community Map
 Figure 3-1 - Pollution Prevention (5 R) Hierarchy
 Figure 5-1 2015 Regional District Disposal Rates (Retrieved from Environmental Reporting BC)
 Figure 5-2 Historical Disposal Rates for the RDEK (Retrieved from Environmental Reporting BC)
 Figure 5-3 - Waste Disposal Rates between 2010 - 2016 for the RDEK
 (calculated from scale data).
 Figure 7-1 - 2015 Per Capita Disposal rates
 Figure 7-2 - 2016 Per Capita Disposal Rates
 Figure 7-3 - Comparison between 2016 Waste Generation, Disposal and Recycling Rates

List of Photos

Photo 4-1 - MSW Tipping Area at the Columbia Valley Landfill
 Photo 4-2- White goods stockpiled at the Columbia Valley Landfill
 Photo 4-3 – Green Waste and Wood Waste Stockpiles at the Columbia Valley Landfill
 Photo 4-4 - Fairmont Transfer Station - Roll-Off Bin for MSW
 Photo 4-5 - Yellow Bin Recycling Area at Fairmont Transfer Station
 Photo 4-6 - Canal Flats Transfer Station and Marshalling Area - Roll-Off Bin for MSW
 Photo 4-7 – Wood waste Stockpiles at Canal Flats Marshalling Area
 Photo 4-8 - Scrap Metal Stockpile at Canal Flats Marshalling Area
 Photo 4-9 - Southeast Disposal truck at Active Face of Central Subregion Landfill
 Photo 4-10 - Active Face at Central Subregion Landfill
 Photo 4-11 - Chipped wood waste and Clean Wood Waste Stockpiles at the Central Subregion Landfill.
 Photo 4-12 - Clean Wood waste at the Kimberley Transfer Station (Attended Site)
 Photo 4-13 - Wood Re-use Pilot Project at the Kimberley Transfer Station
 Photo 4-14- Mattress Reuse Pilot Project at Cranbrook Transfer Station
 Photo 4-15 - Transtor Bin at Fort Steele Transfer Station

Photo 4-16 - Wood Waste piles at the Wasa Transfer station
Photo 4-17 - Active Face at Sparwood Landfill
Photo 4-18 - Diversion Area at the Sparwood Transfer Station / Landfill
Photo 4-19 - Scale House at the Elkford Transfer Station
Photo 4-20 - MSW Tipping Area at the Fernie Transfer Station
Photo 4-21 - Yellow Bin Recycling area at the Fernie Transfer Station

GLOSSARY

Clean Wood Waste	Solid wood, lumber and pallets that are unpainted, untreated, and free of glue.
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, land clearing and construction waste is inert solid waste derived from construction, remodeling or demolition of structures, roads and sidewalks.
EPR	Extended producer responsibility
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.
GHG	Greenhouse gas
Green Waste	Woody debris such as tree branches and small stumps.
HHW	Household hazardous waste
ICI	Industrial, commercial and institutional (does not include heavy industry)
MSW	Municipal Solid Waste – waste derived from residential, commercial and institutional sources, including garbage and recycling such as: packaging, green waste, furniture, clothing appliances, paint, etc.
RecycleBC	Residential recycling product stewardship organization
MOE	BC Ministry of Environment
MRF	Material recycling facility (recycling processor)
ODS	Ozone depleting substance (e.g. CFCs)
Organic Waste	Kitchen scraps, food waste, yard and garden waste
Plan	Regional Solid Waste Management Plan
PPP	Printed Paper and Packaging
RDEK	Regional District of East Kootenay
RSWMP	Regional Solid Waste Management Plan
Yard and Garden	Lawn clippings, grass, and leaves

1. INTRODUCTION

The Regional District of East Kootenay is responsible for coordinating and administering the solid waste management function in the East Kootenay region. An overview of the Region is seen in Figure 2-1 below. The District was incorporated in 1966 and comprises of six electoral areas and eight municipalities.

The solid waste system in the East Kootenay is funded mostly through tax requisition, with some user fees in place for select items. The district is broken into three sub-regions, which all provide similar levels of service. Single stream recycling is offered through a widespread network of yellow bins in each community and at each transfer station. EPR programs are available in most communities at bottle depots or hardware stores. Although encouraged, there is no incentive to participate in recycling programs – due to the absence of user pay fees and abundance of unattended, unsupervised transfer stations.

Although a Solid Waste Management Plan Update has not been initiated by the RDEK at this time, this report has been prepared in accordance with the “Guide to the Preparation of Regional Solid Waste Management Plans”.

The intention for this review is to characterize the current waste system and build a strong basis for the upcoming Solid Waste Management Plan update, when the RDEK determines it is necessary.

2. BACKGROUND INFORMATION

2.1 Plan Area

The Regional District is divided into three subregions: Columbia Valley, Central, and Elk Valley, as shown in Figure 2-1. The sub regions were established in 1993, through adoption of a local service area bylaw. Each of the subregions area responsible for implementing solid waste programs.

The Columbia Valley subregion consists of Electoral Areas F & G and the municipalities of Radium Hot Springs, Invermere, and Canal Flats. The Central subregion consists of Electoral Areas B, C, and E and the municipalities of Kimberley and Cranbrook. The Elk Valley subregion consists of Electoral Area A and the City of Fernie, District of Elkford and District of Sparwood. The Region is also home to numerous unincorporated communities and First Nations communities.

As per 2016 Census data, the RDEK’s total population is 60,439. Approximately 73% of the population resides in urban environments (municipalities or incorporated communities), 26% resides in rural environments and 1% resides in First Nations communities. Population statistics from the past 15 years are shown in Table 2-1 below. Slow population growth is predicted over the next 25 years, due to a decline in resource industries like Forestry and Mining (RDEK Profile Issue No. 7).

An important factor to note in regards to solid waste generation in the East Kootenay’s is the seasonal or “shadow population.” The Region receives increased waste at their transfer stations and landfills during summer and winter months, when out of area tourists flock to the area to take part in recreational activities. It is estimated that 69% of private dwellings in the RDEK are occupied by the

usual resident. Windermere has the lowest level of occupancy by usual residents whereas Cranbrook has the highest.

To partially offset some of the impacts from the “shadow population”, the RDEK receives an additional fee from selected provincial parks and campgrounds to manage waste; however, this does not capture the population utilizing weekend condo rentals as well as camping and outdoor visitors during the summer months.

Table 2-1 Population Statistics in the RDEK

Area	Urban, Rural, Indian Reserve	Population				
		2001	2006	2011	2016	% total
Columbia Valley Subregion						
Canal Flats	U	754	700	715	668	1%
Invermere	U	2,858	3,002	2,955	3,391	6%
Radium	U	583	735	777	776	1%
Electoral Areas F & G	R	4,237	4,502	4,065	4,188	7%
Columbia Lake IR	IR	165	153	131	140	0%
Shuswap IR	IR	176	169	293	319	1%
Total		8,773	9,261	8,936	9,482	16%
Central Subregion						
Cranbrook	U	18,476	18,267	19,319	20,047	33%
Kimberley	U	6,484	6,139	6,652	7,425	12%
Electoral Areas C & E	R	7,618	7,597	7,335	7,789	13%
Cassiamayooks IR	IR	5	5	5	-	0%
St. Mary IR	IR	166	159	104	170	0%
Total		32,749	32,167	33,415	35,431	59%
Elk Valley						
Fernie	U	4,611	4,217	4,448	5,249	9%
Sparwood	U	3,812	3,618	3,667	3,784	6%
Elkford	U	2,589	2,463	2,523	2,499	4%
Electoral Areas A & B	R	3,675	3,692	3,644	3,919	6%
Tobacco Plains IR	IR	82	67	57	75	0%
Total		14,769	14,057	14,339	15,526	26%
RDEK Total		56,291	55,485	56,690	60,439	
Total Urban		43,839				73%
Total Rural		15,896				26%
Total First Nations		704				1%

2.2 Geography

The East Kootenay is divided into three physical units: the Purcell Mountains, the Rocky Mountain Trench, and the Rocky Mountains (RDEK Profile Issue No. 7). The region is bordered by Alberta to the East and the United States to the South.

The Columbia Valley subregion is part of the Rocky Mountain trench and includes the RDEK's two largest lakes: Columbia and Windermere.

The Rocky Mountain Trench is broader in the Central subregion, allowing for dispersed settlement and large natural grassland areas.

Settlement in the Elk Valley subregion is narrow and concentrated in the Elk Valley. The area is situated in high elevation with steep topography.

2.3 Economic Base

The economy in the East Kootenay Region has been driven by the resource industry – namely mining and forestry (RDEK Profile Issue No. 7). The mining industry is the largest component of the regional economy, and is based on coal, metallic minerals, and non-metallic minerals. Solid waste from the area's mines is typically managed at on-site landfills and therefore does not contribute to the RDEK system. The Forest sector is one of the largest employers in the region, and five major sawmills operate in the RDEK. The Skookumchuck pulp mill relies on surplus wood chips from the region, and a co-generation plant produces 32 megawatts of power using wood waste from sawmill and chipped clean wood from the RDEK's landfills. Agriculture is also an important part of the regional economy, with approximately \$14,500,000 annual gross farm receipts reported in 2011.

In the Columbia Valley subregion, the recreation and tourism industry is strong and is the primary economic base; forestry is the primary resource-based economic component.

In the Elk Valley, the economy is dominated by coal mining, followed by Forestry and tourism/recreation.

The economy in the Central subregion is diverse and includes transportation, accommodation, and government sectors as well as forestry and agriculture. The main center is Cranbrook. Tourism and Recreation are becoming main drivers in the City of Kimberley, shifting from mining.

2.4 Implementation of 2003 SWMP

The Regional District of East Kootenay began their first Solid Waste Management planning process in 1992; the plan was last updated in 2003.

In 1993, following submission of the Stage 2 Report, the RDEK established the three subregions that exist today, by adopting a local service area bylaw. This meant each of the subregions would be responsible for implementing the plan programs.

The goals stated in the plan are as follows:

- To minimize, as much as possible, the generation of wastes.
- To work towards reducing the quantity of waste being disposed of by 30% by 1995 and by 50% of volumes based on the Municipal Solid and Biomedical Waste Management Strategy of 1989.
- To manage waste based on the 5 R hierarchy.
- To manage waste economically and efficiently.
- To educate citizens and businesses on how to reduce wastes.
- To strive for annual decreases in per capita waste generation.
- To provide access to environmentally sound waste diversion and disposal facilities throughout the Regional District.
- To develop and implement a user-pay system that will encourage people to participate in waste reduction efforts and gradually shift all or a portion of the cost of residual management from the tax base to the user pay system.

- To develop a 20-year plan that established an economical, technically feasible, and practical program to manage solid waste that is both environmentally safe and accepted by the public.
- To develop a plan that conforms to the strategies of higher levels of government.
- To co-ordinate and co-operate with neighboring subregions and other Regional Districts on solid waste management.
- To develop and promote partnerships with senior levels of government by acknowledging a shared responsibility in the protection and enhancement of the environment.

A number of policies were outlined to support these goals, as well as actions for implementing the plan. The actions and their implementation status are seen below in Table 2-2.

Table 2-2 - Implementation status of 2003 SWMP

RDEK SWMP 2003 Action Items	Implementation Status
REDUCE	
Public education will address all age groups and public and private sectors and provide a consistent, visible and positive message regarding the benefits and specifics of each subregional program. This message can be delivered through newspaper, radio, television, liaison with school districts, public speaking engagements, etc.	Complete
RDEK has prepared a self-audit manual for business. Businesses will be encouraged to carry out waste audits and the RDEK staff will be made available to assist in carrying out the audit.	Incomplete.
The RDEK and its member municipalities will implement waste reduction techniques in their daily operations. Examples of such techniques may include requiring all printing to be two-sided; utilizing electronic rather than hard copy record keeping; utilizing e-mail where possible; eliminating the use of disposable products wherever possible.	Complete.
The RDEK will be responsible for program administration and cost recovery for all common regional programs as well as local programs for unincorporated electoral areas. Member municipalities will be responsible for cost recovery of their own diversion, collection and disposal programs. Means of recovery the cost may be through taxes, a utility fee, a service fee, user pay programs or other fees and fines.	Complete.
REUSE	
The chipping and composting of wood waste will be considered in conjunction with the evaluation of centralized composting. Wood chips may be made available to the public, used in reclamation or incorporated into the operations of landfills and transfer stations.	Complete - Woodchips are used in biocover applications at the Region's landfills.
The RDEK may develop central composting facilities at all its landfill or residual management operations. Community groups will be encouraged to organize workshops on backyard composting. The RDEK will develop trial composting programs at its waste management facilities.	Complete.
RDEK will designate storage areas at residual facilities and designated transfer stations to enable separation of reusable materials and direct the public to the appropriate storage area.	Complete.
The RDEK will promote and encourage the use of existing materials exchange programs through the Recycling Council of BC.	Complete.

RDEK SWMP 2003 Action Items		Implementation Status
RECYCLE		
<i>Columbia Valley & Central Subregion</i>		
RDEK will continue to offer recycling through drop boxes and consider the option of curbside recycling collection based on possible reduction in cost of service and maximization of effectiveness.		Complete.
RDEK will provide containers to businesses and institutions and arrange for regular pickup of recyclables and delivery to a processing facility.		Complete.
RDEK has further stimulated the effectiveness of recycling by promoting recycling through education, waste audits, and by implementing disposal bans on products for which recycling facilities are available.		Partially Complete.
RDEK will provide space at its residual management facilities or other suitable locations for the drop off of scrap metal and white goods.		Complete.
The RDEK will ensure that appliances containing Ozone Depleting Substances will be serviced by a qualified person prior to recycling. This will be accomplished by requiring certification by a qualified person prior to disposal and/or storage and removal of ODS at designated RDEK facilities		Complete.
<i>Elk Valley Sub Region</i>		
Recycling programs will continue to be operated by private contractors in the districts of Sparwood and Elkford, the City of Fernie, and electoral area A.		Complete.
Commercial recycling is presently in operation in Sparwood, Fernie and Elkford - is contracted out to private contractors. The subregion will continue to provide recycling opportunities as long as they are required.		Complete.
The RDEK will collate and distribute existing educational and promotional material available from the Provincial Government and Federal Government to encourage participation in the recycling program.		Complete.
A directory of business and organization providing recycling services will be prepared co-operatively between the subregions		Complete.
RECOVER		
RDEK staff will work with proponents to assist in the development of cogeneration proposals as necessary. The possibility of diverting wood waste to fuel a cogeneration plan may become a reality within the life of this plan.		Complete.

RDEK SWMP 2003 Action Items		Implementation Status
RESIDUALS MANAGEMENT		
<i>Central Subregion</i>		
Designated wood waste will be trench burned at the central subregion landfill as a means of disposal as a last resort if other disposal or reuse options are not viable.		No wood waste is burned at Central.
Central subregion has developed marshalling areas to serve Electoral areas B and E to enable separation and stockpiling of recyclable materials including clean fill, and DLC wastes.		Complete.
Clean wood waste will be open burned at approved times at Tie Lake and Wasa transfer station marshalling areas.		Complete.
<i>Columbia Valley Subregion</i>		
RDEK will undertake a landfill development process to maximize the life of the existing Columbia Valley Subregion Landfill. The Columbia Valley Landfill will remain in operation until a future disposal system is approved.		Complete.
The existing transfer stations located at Canal Flats, Fairmont Hot Spring, Brisco/Spillimacheen and Radium/Edgewater will continue in operation. The Columbia Valley subregion will construct additional transfer stations to improve refuse handling within the subregion if required.		Complete/On-going. RDEK will evaluate needs of additional transfer stations in Columbia Valley
Designated clean wood wastes will be open burned on a periodic basis at approved times at the Canal Flats transfer station.		Complete.
<i>Elk Valley Subregion</i>		
The Elk Valley subregion will develop and operate transfer station in the district of Elkford, District of Sparwood, and in or near the City of Fernie.		Complete. Transfer Stations are in operation in Fernie, Sparwood and Elkford.
The City of Fernie and District of Elkford Landfills are to be closed to the public.		Complete.
The Elk Valley subregion shall develop a marshalling area at the Sparwood Transfer station. Designated clean wood waste will be open burned on a periodic basis.		Complete.
In compliance with the Landfill Criteria for Municipal Solid Waste, the RDEK will prepare closure plans for all landfills that will cease to operate and submit for approval.		Complete.
The RDEK will encourage the use of existing industry stewardship programs.		Complete.

3. EXISTING PROGRAMS AND FACILITIES

The solid waste system in the RDEK is funded almost entirely through the tax base, via tax requisition that is based on assessed property value. Tipping fees are in place for some items, such as construction/demolition waste, biomedical waste, soil, asphalt, mobile homes, and tires – however, these fees can only be enforced at attended transfer stations and landfills.

The system consists of a mixture of attended landfills and transfer stations, as well as unattended transfer stations (garbage and recycling bin only) and marshalling areas (garbage, recycling and diversion areas).

In total, there are two landfills which manage municipal solid waste (MSW) (Central Subregion Landfill and Columbia Valley Subregion Landfill) and one demolition, land clearing and construction (DLC) only landfill (Sparwood Landfill).

Waste from the Columbia Valley subregion is managed at the Columbia Valley Subregion Landfill, whereas waste from the Elk Valley and Central subregions is managed at the Central Subregion Landfill. Tipping fees received from the Elk Valley are held in a “Diversion Fund” for the Central subregion. The purpose of this fund is to finance diversion initiatives in the Central subregion with the intention that, if successful, the programs will be introduced throughout the entire regional district.

There are 19 transfer stations throughout the region. Unattended transfer stations are located in the Columbia Valley and Central subregions only; these sites are open 24 hours a day, 7 days a week, allowing residents to dispose of any and all wastes at all times. The RDEK employs two full time staff members to visit each unattended site daily (during week days) to check the site and provide clean-up services as required.

Illegal Dumping is not a large issue in the RDEK, likely due to readily accessible transfer stations and minimal amount of tipping fees.

The solid waste management facilities for each subregion are discussed in detail in Section 4.1 to 4.3.

3.1 Solid Waste Collection Services

Curbside garbage collection is offered in most of the large communities including:

- Cranbrook
- Fernie
- Elkford
- Sparwood
- Kimberley
- Invermere

3.2 Recycling

Recycling is collected through the Regional District’s “Yellow Bin” system. The program consists of over 400 yellow recycling bins strategically placed throughout the region for single stream recyclables including paper, cardboard, tin/aluminum cans, grocery bags, and plastics number 1 through 6. Separate bins are provided for “glass only.” The yellow bins are also located at RDEK transfer stations and

landfills. The yellow bin program services both residential and ICI recycling and all bins are available for use by public or commercial users.

Recyclables from the bins are transported to the South Sky Recycling Center, a Materials Recovery Facility (MRF) in Cranbrook, operated by Southeast Disposal. Southeast Disposal is responsible for the supply and collection of the yellow bins, as well as sorting and processing of the recyclables. The per tonne cost of the program incurred by the RDEK is \$275 per tonne. The processed recyclables are sold to market and the revenue received reduces the per tonne cost to the RDEK.

The Yellow Bin program is generally well used and well received by residents in the RDEK, however, the nature of the unattended transfer station sites does not enforce or incentivize diversion of materials from the waste stream.

3.3 Reduction and Reuse Programs

Located at the top of the 5 R hierarchy (as seen in Figure 3-1), Reduction and Reuse programs help to reduce the amount of waste sent to landfills.



Figure 3-1 - Pollution Prevention (5 R) Hierarchy

Reuse Centers (share sheds) are extremely popular in the region and are located at all of the attended transfer stations and Landfills. The reuse centers provide a place for residents and tourists to “drop-and-shop.” Landfill operators remove items from the share shed area to waste bins if they have not been re-homed within a few days. Thrift stores are also located throughout the RDEK; these encourage reuse of clothing, house wares and sporting goods.

Waste reduction is also encouraged through backyard composting. The RDEK offers a composting course in the summer. For a nominal fee of \$20, attendees receive a black bin composter and learn the

basics of backyard composting. In addition to the course, the Regional District sells backyard composters at wholesale cost (\$55) all year round.

In 2016, a pilot centralized composting program was initiated by the RDEK in the Elk Valley and Columbia Valley. Composting was undertaken at the Sparwood Landfill and at the Columbia Valley landfill. Compost bins were set out at the Wapiti Music Festival, Annex Park, Independent Grocer in Fernie, the Fernie Transfer Station, and 9 locations in Invermere and at the Radium Mountainside Market. The public was encouraged to drop off their household compostable items such as food waste and paper towels. The composting initiative was carried out with success and had sufficient community buy-in; however, the amount of compost generated for potential end-use was very small likely making such future programs expensive.

3.4 Recovery

The RDEK diverts chipped clean wood waste and some green waste from the Central Subregion Landfill and Columbia Valley Subregion Landfill for energy recovery. The Material is chipped at the landfill and hauled to a cogeneration facility in Skookumchuck, at the Paper Excellence mill. In addition to energy production, diverting organic materials (wood waste) from the landfill reduces Greenhouse Gas emissions and saves landfill airspace.

3.5 Education and Outreach

The RDEK facilitates an education program in schools throughout the Region, focusing on waste reduction education. WildSafe BC is also active in the Columbia Valley, Elk Valley, Fernie, Kimberley and Cranbrook. The organization delivers education regarding wildlife and human interaction. Part of this includes door-to-door canvassing and garbage inspections/tagging to discourage bear attraction into communities.

Also prevalent are signs at every transfer station indicating what types of materials should be recycled, disposed or diverted. These signs provide information regarding drop-off locations for EPR materials such as used oil, small appliances and batteries.

3.6 Extended Producer Responsibility

Extended Producer Responsibility (EPR) is a provincial policy tool that aims to shift the responsibility for end of life management of products to the producer and away from local governments. These programs are mandated by Recycling Regulation 449/2004, which required producers of the products to develop end-of-life collection and recovery program.

Extended Producer Responsibility programs are present in the RDEK, with depots located in many of the communities, as shown in Table 3-1 below. Most of the depots/collection centres are located at the bottle depots or home-building stores in the region. The only Recycle BC depot in the region is located at the Cranbrook bottle depot.

3.7 Household Hazardous Waste

The RDEK hosts Household Hazardous Waste roundups every second year in each subregion for items such as sodium hydroxide, butane, propane, gas and diesel, antifreeze, paint and paint thinner etc. Representatives from Terrapure are typically present at the roundups to collect any materials that are not included in BC Product Stewardship Programs. Product Care and Canadian Electrical Stewardship

Association (CESA) representatives were also in attendance at the 2016 roundup. In addition to collection services, education is provided to the public on available disposal programs in the region for year-round services.

The total cost for the 2016 roundups (3 locations) was approximately \$65,000. The amount of wastes accepted included:

<u>Product</u>	<u>Amount Collected</u>
- Paint	3870 litres
- Aerosols	276 litres
- Pesticides	39 litres
- Solvents	152 litres
- Automobile batteries	10 batteries
- Household Batteries	115 kg
- CESA products	402 kg

Table 3-1 - EPR Programs and Locations in the Regional District of East Kootenay

EPR Program	Product Type	Depot Location
AlarmRecycle (ReGeneration)	Smoke Alarms and CO Alarms	Cranbrook – 2 Locations Kimberley – 1 Location Ferne – 1 Location Invermere – 1 Location
LightRecycle (ReGeneration)	Lighting Products	Cranbrook – Locations Kimberley – 2 Locations Ferne – 2 Locations Invermere – 1 Location
BC Pesticides & Flammable Liquids(ReGeneration)	Pesticides, Flammables & Fertilizers	Cranbrook Bottle Depot
Outdoor Power Equipment Institute of Canada (ReGeneration)	Outdoor Power Equipment	Kimberley – 1 Location Invermere – 1 Location
ElectroRecycle (ReGeneration)	Small Appliances and Power tools	Cranbrook – 1 Location Ferne – 1 Location
Major Appliance Recycling Roundtable	Large Appliances	RDEK Transfer Stations/ Landfills
ReGeneration Paint Program	Paint	Cranbrook – 1 Location Ferne – 1 Location Kimberley – 1 Location Invermere – 2 Locations
BC Used Oil Management Association	Used Oil	Cranbrook – 5 Locations Ferne – 2 Locations Invermere – 3 Locations Radium – 1 Location Elko – 1 Location Elkford 1 Location
Canadian Battery Association		Kimberley – 1 Location Cranbrook – 2 Locations Elko – 1 Location Ferne – 1 Location Sparwood – 1 Location Invermere – 1 Location
Call 2 Recycle	Batteries (except lead acid batteries)	Cranbrook – 8 Locations Ferne – 2 Locations Invermere – 4 Locations Elkford – 1 Locations Sparwood – 1 Locations
Health Product Stewardship Association	Medicine	Cranbrook – 6 Locations Kimberley – 3 Locations Ferne – 3 Locations Elkford – 1 Locations Sparwood – 2 Locations Invermere – 2 Locations
Recycle My Cell	Cell Phones	Cranbrook – 3 Locations Sparwood – 2 Locations Ferne – 1 Location Invermere – 1 Location
Tire Stewardship BC	Tires	Cranbrook – 8 Locations Ferne – 6 Locations Sparwood – 3 Locations Invermere – 4 Locations

4. EXISTING FACILITIES BY SUBREGION

4.1 Columbia Valley Subregion

Located in the northern portion of the RDEK, the Columbia Valley subregion consists of Electoral Areas F & G and the municipalities of Radium Hot Springs, Invermere, and Canal Flats.

The solid waste system in this subregion consists of the Columbia Valley Landfill (located in Windermere); three transfer stations (Brisco-Spillimacheen, Radium-Edgewater and Fairmont); and one marshalling area/transfer station (Canal Flats). All of the transfer stations in this region, with exception to the landfill are unattended. All recycling and waste hauling, as well as landfill operations in the Columbia Valley is currently under contract to Southeast Disposal.

A user fee structure is in place for the Columbia Valley Landfill; items which are subject to a user fee at the landfill include the following:

<u>WASTE</u>	<u>RECYCLABLES</u>
- Animal Carcasses	- Asphalt
- Asbestos	- Auto Hulks
- Biomedical Waste	- Concrete
- Construction/Demolition Waste	- Mobile Homes
- Food Processing Waste	- Tires
- Land Clearing Waste	
- Soil	
- Steel Cables	

Tires larger than 35" are not accepted in the Columbia Valley.

The above listed user-fees cannot be enforced at any of the unattended sites. Thus, many of the items are dropped off at the sites and the Regional District incurs all disposal fees.

As discussed previously, the “shadow population” from tourism contributes to waste generation in the region; Windermere has the lowest level of occupancy by usual residents.

Additionally, transfer stations at the north end of the subregion (Brisco and Edgewater) are regularly visited and utilized by residents outside of the Regional District who do not contribute to the tax-based fee structure. Rather than tip their waste at transfer stations within the Columbia Shuswap Regional District – which are user-pay sites – CSRD residents living close to the RDEK boundary simply tip for free.

4.1.1 Columbia Valley Landfill

The Columbia Valley landfill receives waste from the entire Columbia Valley subregion. The landfill is located in Windermere B.C., 10 km from Invermere. Based on the RDEK’s Environmental Services 2016 Annual Solid Waste Report, the Columbia Valley Landfill has approximately 35-40 years of operating lifespan remaining.

The landfill is open 7 days a week between the hours of 9:00 am to 6:00 pm, and includes a residential drop-off/transfer station area. The RDEK's Yellow Bin recycling is offered at the Columbia Valley Landfill, as is a Reuse Centre where users of the site can drop-and-shop for items such as furniture, books, toys, and house ware.

Diversion areas are set up for propane tanks, scrap metal, white goods, concrete and tires.



Photo 4-1 - MSW Tipping Area at the Columbia Valley Landfill

White goods are serviced by a certified contractor. Once the Freon is removed, the white goods are managed with the rest of the regular metal diversion program through Columbia Recycle.



Photo 4-2- White goods stockpiled at the Columbia Valley Landfill

As listed above, and in the user-fee schedule, tires are subject to a tipping fee at the landfill. The tipping fee is in place to cover the cost of transportation and processing of the tires. Residents are encouraged to return used tires to a local depot (such as Canadian Tire) instead of depositing at the landfill. Tires that are received at RDEK facilities are stockpiled until an adequate tonnage is in place to make it economically viable for hauling. Once the stockpile is large enough, the tires are collected by a Tire Stewardship BC Contractor.



Photo 4-3 – Green Waste and Wood Waste Stockpiles at the Columbia Valley Landfill

Yard and garden waste and green waste is accepted at the site at no cost, as is clean wood waste. As seen in Photo 4-3, large stockpiles of green waste and clean wood waste accumulate on site. When needed, a contractor is brought in to chip the wood waste (as a cost to the RDEK) and haul to the cogeneration facility in Skookumchuck (operated by Paper Excellence). The green waste is loaded separately and is eventually blended at the co-generation facility for more consistent feedstock. The hauling cost of the wood waste is covered by Paper Excellence.

Concrete waste (with and without re-bar) is stockpiled and managed / used onsite. Every few years, when stockpiles get large, the RDEK contracts a concrete crushing contractor to process the material to a manageable size and is used on-site for operational requirements such as road base, drainage and leachate works.

4.1.2 Attended Transfer Stations

There are no attended transfer stations in the Columbia Valley, except for the transfer station provided at the Columbia Valley Landfill (described above).

4.1.3 Unattended Transfer Stations – Brisco Spillamacheen / Radium / Fairmont

Residents in the Columbia Valley subregion are serviced by three unattended transfer stations located in Brisco, Edgewater, and Fairmont Hot Springs. The transfer stations consist of a roll-off bin housed in a covered tipping area, as seen in Photo 4-4 below. A rolling chain-link barrier seen on the front of the tipping area keeps bears out of the bins, and allows for easy access for public waste discharge.

All unattended transfer stations are attended to by an RDEK staff member daily, for minor site clean-up, inspection and maintenance (during week days only).



Photo 4-4 - Fairmont Transfer Station - Roll-Off Bin for MSW

Because the sites are unattended, there is no way for the hauler to determine if and when the bins are full prior to visiting the site. Due to this uncertainty, the bins are pulled daily to ensure there is always a bin available for the public. Waste from these transfer stations are hauled to the Columbia Valley Landfill in Windermere.

Also available to residents is the yellow bin recycling program, as outlined in the photo below. The yellow bins are provided by and serviced by Southeast Disposal. Additionally, a small bin/barrel is provided for ashes. The purpose of the ash barrel is to reduce the risk of fire in the roll-off bin. No additional diversion areas are available at the three unattended transfer stations.



Photo 4-5 - Yellow Bin Recycling Area at Fairmont Transfer Station

4.1.4 Canal Flats Marshalling Area

The Canal Flats Transfer station provides residents with roll-off bin's for MSW and yellow bins for recycling, as well as marshalling areas for divertible materials. Similar to the unattended transfer stations, the Canal Flats site is visited by an RDEK staff member daily to ensure the site is clean and in order (during weekdays only).



Photo 4-6 - Canal Flats Transfer Station and Marshalling Area - Roll-Off Bin for MSW

The yellow bin system is popular with users of the site; however, during site inspections it was noted that cardboard still ends up in the MSW roll-off bins – due to lack of enforcement/attention to participation.

In addition to single stream recycling, diversion opportunities provided at the transfer station include clean wood waste/green waste and scrap metal.

Scrap metal is sorted, loaded, hauled and processed by Columbia Recycle.

The wood waste piles, seen in Photo 4-7, are managed through a burn permit held by the RDEK. The Wood waste is separated into multiple small piles at the site. Because the site is open 24 hours a day, 7 days a week, there is a risk of the wood piles being lit and burned as large bonfires. Separating the wood debris into smaller piles minimizes the risk of an out of control, large fire occurring at the site.

Because the site is unattended, some contamination occurs in the diverted materials. This presents some current and future challenges to the RDEK. Currently the site requires maintenance from a contractor to clean up the diversion areas and transport items that are considered to be waste into the roll off bins. For example: Photo 4-8 shows a hot tub/jacuzzi dropped off at the scrap metal diversion area. Scrap vehicles are commonly discarded at the site. There is no enforcement or oversight regarding dumping of banned, prohibited or even hazardous materials.

Contamination at the site also poses challenges for the future. As discussed, wood waste is currently managed through open burning. If in the future the Regional District is no longer able to continue burning the wood waste, the current stockpile would not be considered “clean” enough to allow the product to be diverted to the Skookumchuck co-generation facility

Since implementing daily checks of the site and hiring a contractor to clean-up and organize the diversion areas, the RDEK has seen an improvement in the condition of the marshalling area. As well, new signs have been installed to encourage the users of the site to take ownership in the cleanliness and order of the area.

No Reuse Centre is provided at the Canal Flats Transfer Station and Marshalling Area; however, a community notice board is available for people to post ads for items for sale or services for hire.



Photo 4-7 – Wood waste Stockpiles at Canal Flats Marshalling Area



Photo 4-8 - Scrap Metal Stockpile at Canal Flats Marshalling Area

4.2 Central Subregion

Spanning the lower Western portion of the RDEK, the Central subregion consists of Electoral Areas B, C, and E and the municipalities of Kimberley and Cranbrook.

The RDEK operates one landfill (commercial vehicles only), two attended transfer stations, and 11 unattended transfer stations – two of which contain marshalling areas – in the Central subregion.

Additionally, the Region’s materials recovery facility (South Sky Recycling Center) and the Region’s demolition, salvage, and metal recycling facility (Columbia Recycle Ltd) are located in this subregion.

A user-fee structure is in place for the Central subregion, and is enforced at the Central Subregion Landfill, the Cranbrook Transfer Station, and the Kimberley Transfer station; items which are subject to a user-fee at these sites include the following:

<u>WASTE</u>	<u>RECYCLABLES</u>
- Animal Carcasses	- Asphalt
- Asbestos	- Concrete
- Biomedical Waste	- Tires
- Construction/Demolition Waste	
- Food Processing Waste	
- Land Clearing Waste	
- Soil	
- Septage Sludge	
- Steel Cables	

Loads containing banned recyclable materials and uncovered or unsecured loads are subject to a double charge. Auto hulks, mobile home hulks, and tires larger than 25” are not accepted at sites in the Central subregion.

As of 2016, waste from the Elk Valley is buried at the Central Subregion Landfill. The Elk Valley pays the Central subregion tipping fees of approximately \$300,000 per year, which is transferred into a ‘Diversion Fund.’ The purpose of this fund is to aid in establishing further diversion initiatives in the Central subregion, offsetting the airspace consumed by waste from the Elk Valley subregion. The ‘Diversion Fund’ currently funds diversion pilot programs such as the ‘Wood Re-use Pilot Program’ at Kimberley transfer station and the ‘Mattress Recycling Program’ at Cranbrook Transfer Station. If successful, these programs and future programs will be implemented throughout the entire Regional District.

4.2.1 Central Subregion Landfill

The Central Subregion Landfill is located north of Cranbrook, in Fort Steele B.C. Based on the RDEK's Environmental Services 2016 Annual Solid Waste Report, the Central Subregion Landfill has approximately 75 years of operating lifespan remaining based on an approximate diversion rate of 25%. The lifespan could have a substantially longer tenure provided the RDEK continue to expand and pursue further diversion initiatives.

The landfill is open only to commercial and contractor vehicles and is open 7 days per week. Waste from all transfer stations from the Central and Elk Valley subregions is received at the site. Diversion areas set up at the landfill include concrete, wood waste, tires, scrap metal, and white goods. There are no yellow bins or reuse centers at the Central Subregion Landfill as public traffic is not permitted.

Waste from curbside collection, commercial bins, and rural transfer stations is handled at the active face. Waste and recycling collection and transport in this region is contracted to Southeast Disposal, pictured in the photo below.



Photo 4-9 – Southeast Disposal truck at Active Face of Central Subregion Landfill

As seen in Photo 4-10, the composition of waste received at the active face is diverse. As pictures indicate, a large amount of divertible materials including wood waste, paper, and beverage containers were observed at the active face. The landfill contractor often removes items from the active face prior to compaction (such as the fridge pictured below) and transports them to the appropriate diversion area.



Photo 4-10 - Active Face at Central Subregion Landfill

Scrap Metal hauled to site by contractors or removed from the active face is stockpiled on site and diverted to Columbia Recycle. Tires are stockpiled at the site and collected / hauled away by a Tire Stewardship BC Contractor.

The Central landfill is the regional site for concrete diversion. The material is broken up using an excavator into 12" minus material that is used on-site.

Clean wood waste and green waste is diverted and chipped at the site, as seen in Photo 4-11. As discussed in the Columbia Valley Landfill section, the RDEK chips and loads the wood waste which is trucked by Paper Excellence to a cogeneration facility in Skookumchuck.

Some green waste is kept on site and is blended with yard and garden waste for windrow composting. The RDEK uses the compost as a source of biocover for the landfill. Biocover effectively acts as an operational cover supplement for the landfill while mitigating landfill gas emissions through methane degradation.



Photo 4-11 - Chipped wood waste and Clean Wood Waste Stockpiles at the Central Subregion Landfill.

4.2.2 Attended Transfer Stations

There are two attended transfer stations in the Central subregion which are located in Kimberley and Cranbrook. Both sites are scaled facilities, with two attendants at each site – one located in the scale house and one operating equipment/managing the site. Both the Kimberley and Cranbrook Transfer Stations are open 8:30 am -5:30 pm, 7 days per week.

In addition to a covered tipping platform and yellow bin recycling areas, these sites offer increased diversion opportunities in the form of reuse centers, tires, propane tanks, wood waste, green waste, scrap metal, appliances/white goods, concrete, and soil.

As seen in Photo 4-12, clean wood waste at the attended sites is far less contaminated than the wood diverted at unattended marshalling areas. Wood waste from this transfer station is transferred to the Central Subregion Landfill for processing and chipping before being hauled to Skookumchuck to the cogeneration facility.



Photo 4-12 - Clean Wood waste at the Kimberley Transfer Station (Attended Site)

A wood re-use pilot project has been initiated at the Kimberley transfer station to encourage re-use of building materials, as shown in Photo 4-13. The program is essentially a re-use centre contained in a sea can.

Additionally, a pilot program has been initiated at the Cranbrook Transfer Station for Mattress Diversion and recycling (shown in Photo 4-14).



Photo 4-13 - Wood Re-use Pilot Project at the Kimberley Transfer Station

Mattresses are collected in Cranbrook in a 53' semi-trailer. Once the trailer is full, it will be hauled to Calgary to a recycling facility. The tipping fee per mattress at the recycler is \$11.00, excluding a \$900 haul from Cranbrook to Calgary. Additionally, a storage / parking fee of \$700/month is billed to the RDEK for the trailer. This economic model will be updated if the pilot program initiative is adopted to a full time service.



Photo 4-14- Mattress Reuse Pilot Project at Cranbrook Transfer Station

4.2.3 Unattended Transfer Stations

There are 9 unattended transfer stations in the Central subregion which consist of only Transtor bins, yellow bin recycling and small bins/barrels for ashes. All of the unattended transfer stations are visited daily by an RDEK staff member for a site inspection and minor site clean-up.

As shown in Figure 2-1, transfer stations are located in the following communities:

- | | | |
|---------------|-----------|---------------|
| - Sheep Creek | - Moyie | - Grasmere |
| - Fort Steele | - Wardner | - Baynes Lake |
| - Green Bay | - Newgate | - Elko |

Unlike the Columbia Valley subregion, Transtor bins are used at these sites (instead of roll-off bins). The advantage to Transtor bins is they can be emptied (whether completely full or not) into compacting trucks/trailers increasing hauling efficiencies. The bins are equipped with two openings to accommodate for bulky waste such as mattresses, as seen in Photo 4-15.



Photo 4-15 - Transtor Bin at Fort Steele Transfer Station

4.2.4 Marshalling Areas

There are two unattended transfer stations with marshalling areas in the Central subregion: Tie Lake and Wasa. These sites are visited daily (during week days) by an RDEK staff member. A contractor is brought in periodically for site clean-up and organization. This contractor is responsible for moving items from the diversion area that are considered to be waste to the MSW bin.

Services that are provided at these sites include: Transtor bins for MSW, Yellow Bins for recycling, wood waste diversion, and scrap metal/ large appliance diversion.

Similar to the Canal Flats site, wood waste at the Tie Lake and Wasa sites is managed through a burn permit. The piles are separated into small piles rather than one large pile to mitigate the risk of an uncontrollable fire at the site.



Photo 4-16 - Wood Waste piles at the Wasa Transfer station

Asphalt shingles and demolition materials are not accepted at the Wasa or Tie Lake sites; however, these items were observed to be present during SHA's site investigation, as shown in Photo 4-16.

4.3 Elk Valley Subregion

The Elk Valley subregion spans the Eastern boundary of the RDEK and consists of Electoral Area A and the City of Fernie, District of Elkford and District of Sparwood.

There are no unattended transfer stations within this subregion and thus the sites are not visited daily by RDEK staff. Attended Transfer stations are located in Elkford and Fernie, as well as at the Sparwood Landfill. The contract for waste hauling from Elkford, Fernie and Sparwood to the Central Subregion Landfill, as well as transfer station operations, is currently held by Waste Management. Southeast Disposal manages recycling for the region and operates the Sparwood Landfill.

A user fee structure is in place for the Elk Valley, and is enforced at the Fernie, Sparwood and Elkford transfer stations; items which are subject to a user fee at these sites include the following:

<u>WASTE</u>	<u>RECYCLING</u>
- Animal Carcasses	- Asphalt
- Asbestos	- Auto Hulk
- Biomedical Waste	- Concrete
- Construction Demolition Waste	- Mobile Home Hulk
- Food Processing Waste	- Tires
- Land Clearing Waste	
- Septic Sludge	
- Soil	
- Steel Cables	

Although the above outlined materials are subject to a user-fee, the materials are only accepted and managed at Sparwood Landfill. If these materials arrive at Elkford and Fernie sites, they are directed to Sparwood.

Loads containing banned recyclable materials and uncovered or unsecured loads are subject to a Double Charge. Tires larger than 25" are not accepted at sites in the Elk Valley subregion.

Unlike the Central and Columbia Valley subregions, waste from the Elk Valley is transported out of region to the Central Subregion Landfill. Historically, this waste was transported out of province to Alberta; however, as of 2016, the Elk Valley has reached an agreement with the Central subregion.

Like the Columbia Valley, the tourist population contributes to waste generation in the Elk Valley subregion. In some communities, it is estimated that an additional 20,000 people visit each weekend during the summer and winter months.

4.3.1 Sparwood Landfill

The Sparwood Landfill consists of both a public transfer station and landfill site. The landfill is a DLC only site which buries approximately 300 tonnes of waste per year. Based on the Environmental Services 2016 Annual Report, the Sparwood Landfill is estimated to have a remaining lifespan of 55 years.



Photo 4-17 - Active Face at Sparwood Landfill

Services to residents include a tipping floor for MSW, and diversion areas for metal, compost, clean wood waste, tires, batteries, large appliances, scrap metal and a reuse centre. Also provided at the landfill entrance are Yellow Bins for recycling. As discussed in the following section, MSW tipped at the Sparwood site is transferred to the Central Subregion Landfill where it is buried.



Photo 4-18 - Diversion Area at the Sparwood Transfer Station / Landfill

Clean wood waste and green waste is currently burned on site under a permit held by the RDEK. In 2019 this burn permit will no longer be valid and the district will likely look to other options for wood waste management.

4.3.2 Attended Transfer Stations

Both the Fernie Transfer Station and Elkford Transfer station are attended sites. Waste management holds the contract for services at the sites. Bins are pulled daily and are transferred to the Central Subregion Landfill for burial. Tipping fees from the Elk Valley are paid to the Central subregion. These fees, approximately \$300,000 annually, are put into a Diversion Fund intended to fund diversion initiatives in the Central subregion (such as the Mattress Pilot Program discussed above).



Photo 4-19 - Scale House at the Elkford Transfer Station

Services to residents include a tipping floor for MSW (seen in Photo 4-20), bins or diversion areas for metal, compost, clean wood, tires, batteries, large appliances, and propane tanks, Yellow Bins for recycling (Photo 4-21), and a reuse centre.



Photo 4-20 - MSW Tipping Area at the Fernie Transfer Station



Photo 4-21 - Yellow Bin Recycling area at the Fernie Transfer Station

4.3.3 Unattended Transfer Stations

There are no unattended transfer stations in the Elk Valley.

5. QUANTIFYING THE SYSTEM

5.1 Waste Generation and Disposal

As the ultimate goal for many solid waste systems is “Zero Waste,” the waste disposal rate is an important tool used for measuring a systems performance.

As seen in Figure 5-1 below, and as reported by Environmental Reporting BC, disposal rates for British Columbia Regional Districts range from 297 kilograms per capita in the Cowichan Valley Regional District, to 922 kilograms per capita in the Peace River Regional District. The provincial average is 498 kilograms per capita. The Regional District of East Kootenay is in the mid-range of waste disposal rate in British Columbia, sitting slightly above the provincial average at 562 kilograms per capita.

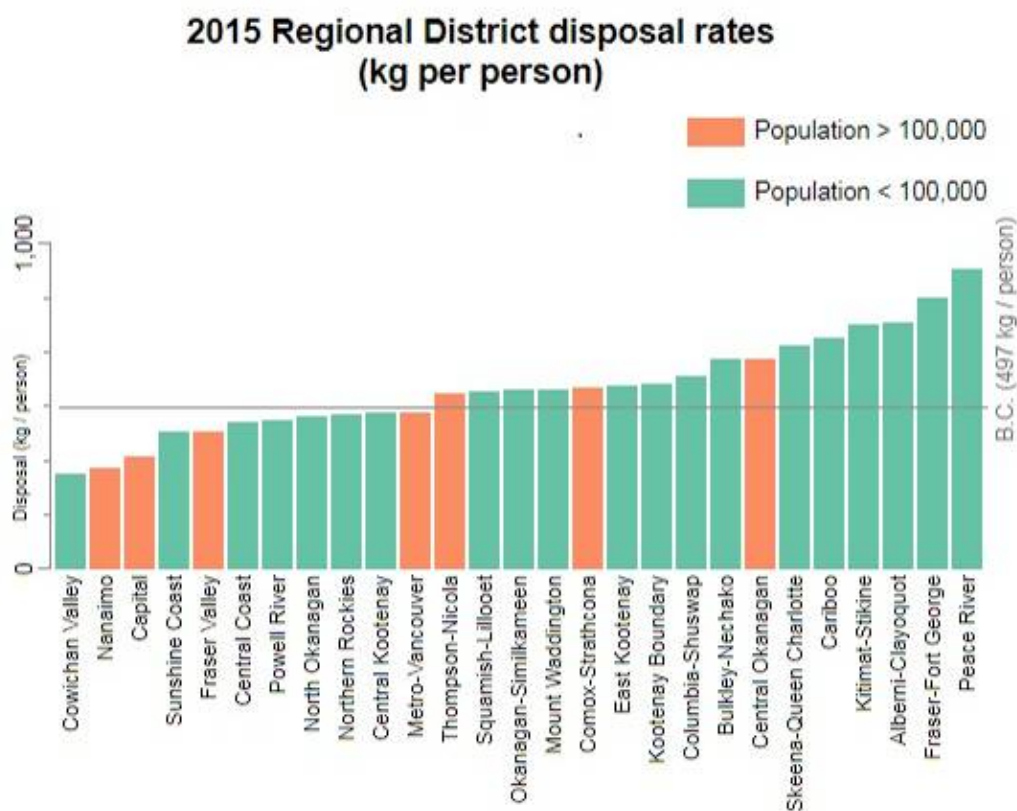


Figure 5-1 2015 Regional District Disposal Rates (Retrieved from Environmental Reporting BC)

Historically, the disposal rate in the RDEK has fluctuated between 983 kilograms per capita in 2010 to 562 kilograms per capita in 2015, as per data reported by Environmental Reporting BC and illustrated in Figure 5-2 below. It appears the region is in a downward trend, with decreases in disposal rates observed over the past 5 years. It should be noted however, that the information provided by Environmental Reporting BC is most reliable for most recent years.

Disposal rates in East Kootenay (kg per person)

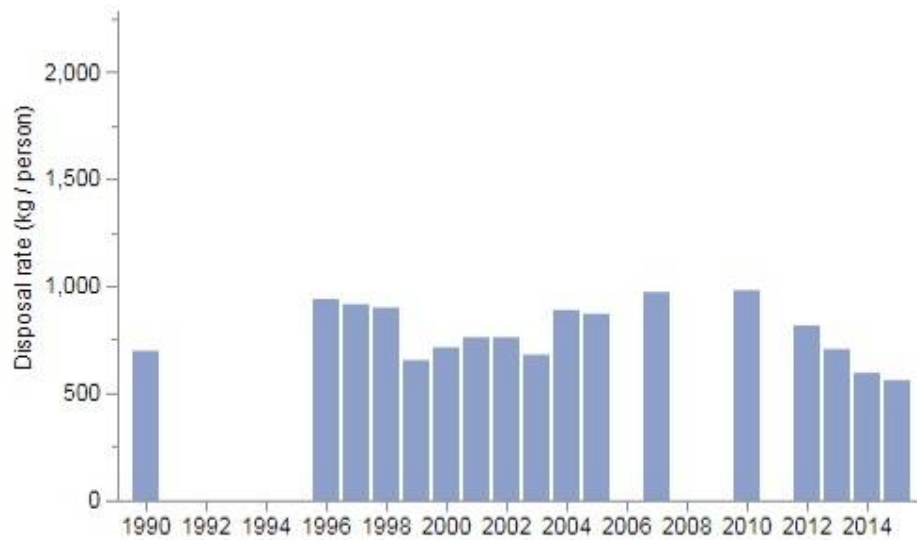


Figure 5-2 Historical Disposal Rates for the RDEK (Retrieved from Environmental Reporting BC)

Scale data was provided by the RDEK for landfills in all three subregions. It should be noted that differences exist between the scale data calculated disposal rate and the BC Waste Disposal Calculator (Environmental Reporting BC) disposal rate. The difference is believed to be due to the populations used. The B.C. Waste Disposal Calculator specifies a population of 70,000 for the RDEK (an increase of 20%); whereas the census population for the RDEK is 60,439. It is SHA's understanding the increase in population used in the B.C. Waste Disposal Calculator is an attempt to factor in the seasonal population; however, for SHA's purposes the disposal rate was calculated using the census population listed by Stats Canada. Figure 5-3 displays historic disposal trends from the provided scale data.

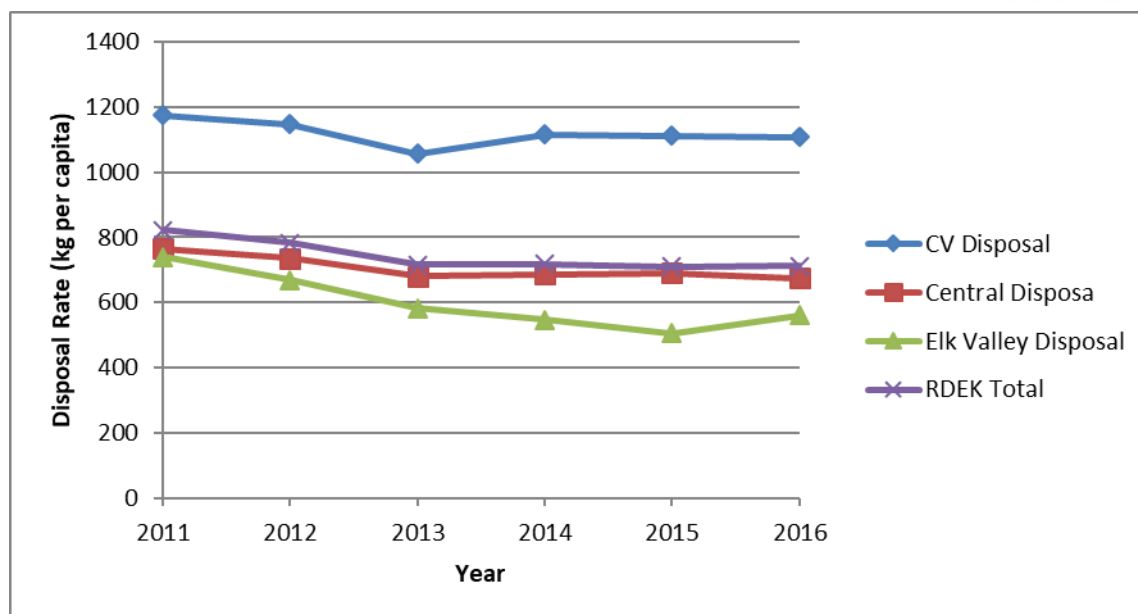


Figure 5-3 - Waste Disposal Rates between 2010 - 2016 for the RDEK (calculated from scale data).

Similar to trends illustrated in Figure 5-2, Figure 5-3 illustrates disposal rate trends for the RDEK calculated from scale data. Overall, the disposal rate for the district appears to have stabilized over recent years, with a slight downward trend observed.

Table 5-1- 2016 Disposal and Diversion Data in the RDEK – summarizes the scale data of waste disposed and diverted (shown in metric tonnes) by landfill site and material type.

In 2016 the Columbia Valley generated 14,600 MT of waste, of which 4,097 MT was diverted and 10,503 MT was buried; the Central subregion generated 38,499 MT of waste, of which 14,610 was diverted and 23,888 was buried; the Elk Valley subregion generated 18,744 MT of waste, of which 10,029 MT was diverted and 8,715 was buried/disposed, as seen in Table 5-1. Table 5-1 represents waste generated by region, not by landfill. Therefore, waste generated in the Elk Valley which was buried at the Central Subregion Landfill is included in the waste generation statistics for the Elk Valley (and is not included in the statistics for the Central subregion).

As shown, the bulk of waste disposed at all three landfills is characterized as Municipal Solid Waste, followed by Construction and Demolition Waste. Recyclable materials and organic materials (yard and garden, clean wood, and green waste) make up a large portion of materials diverted, as does soil. Not represented in the above table are weights for white goods (appliances) as they were not available.

From the data shown in Table 5-1, waste generation and waste disposal rates for the three subregions were calculated. As mentioned, these disposal rates differ from those reported by Environmental Reporting BC due to the difference in the population number used to calculate the per-capita waste disposal rate.

From the scale data and as shown in Table 5-2, the waste disposal rates calculated for the Central (674 kg/person) and Elk Valley subregions (561 kg/person) are significantly lower than disposal rate calculated for the Columbia Valley subregion (1,108 kg/person). It is not known to what extent tourism affects the disposal rates in the Columbia Valley, however, it is assumed there is a large shadow population that contributes to the subregion's waste generation that is not captured in the per capita rates.

When looking at the diversion rates as a percentage, the Elk Valley has the highest rate of diversion at 54%; followed by the Central subregion at 38% and the Columbia Valley at 28%. This is interesting to note as there are no unattended transfer stations in the Elk Valley and – in contrast – there are no attended transfer stations in the Columbia Valley.

Table 5-1- 2016 Disposal and Diversion Data in the RDEK

2016 Disposal Data by Subregion			
Material	Columbia Valley	Central	Elk Valley
WASTE DISPOSED (MT)			
Const. Demo	1,276	768	245
Asphalt	170	-	54
Concrete	-	-	61
Animal Carcass	-	19	
Glass	10	140	
Septic Sludge	0	65	1
MSW	9,047	22,896	8,354
Total Disposed	10,503	23,888	8,715
WASTE DIVERTED (MT)			
Roofing / Shingles	354	925	34
Land Clearing Waste	242	503	26
Green Woodwaste	114	220	-
Yard & Garden Waste	232	3,798	257
Clean Wood Waste	812	2,796	2,219
Scrap metal	179	895	751
White Goods	-	-	-
Contam Soil	12	506	19
Soil or Dirt	83	763	5,281
Gravel	8	5	
Asphalt	-	77	
Concrete	737	281	
Recycling	1,325	3,842	1,442
Total Diverted	4,097	14,610	10,029
Total Waste Generated	14,600	38,499	18,744

Table 5-2 - Waste Generation and Disposal Rates based on Scale Data from RDEK

Waste Disposal Data by Subregion					
Subregion	Population	Total Waste Generated (MT)	Total Diverted (MT)	Total Disposed (MT)	Disposal Rate (kg per capita)
Columbia Valley	9,482	14,600	4,097	10,503	1,108
Central	35,431	38,499	14,610	23,888	674
Elk Valley	15,526	18,744	10,029	8,715	561
RDEK Total	60,439	71,843	28,737	43,106	713

5.2 Waste Composition

The RDEK has not conducted a waste composition study or a waste audit.

The RDEK's neighboring district, Columbia-Shuswap Regional District, hired TRI Environmental Consulting Inc to perform a waste composition study in 2013. The study audited the Salmon Arm, Golden, Revelstoke and Sicamous Refuse Disposal Sites. On average, the largest amount of material (by weight) was compostable organics (32.6%) followed by paper (18.5%), plastic (16.7%), metals (5.3%), building materials (4.7%), electronic waste (4.0%), and household hazardous waste (2.7%).

While the CSRD is similar in geography when compared to the RDEK, some cautions should be made when comparing the two districts; including:

- CSRD system includes tipping fees; RDEK does not
- CSRD does not have any unattended transfer stations; RDEK has 15 unmanned sites
- CSRD has disposal bans on construction and demo waste & recyclable wastes

6. FINANCES

The five-year Solid Waste financial plans are seen in Table 6-3, Table 6-5, and Table 6-7.

As per the Financial Plan, in 2016 the combined overall costs to the RDEK for the solid waste system are as follows:

Revenue 2016:		Expenditures 2016:	
Columbia Valley	\$1,670,746	Columbia Valley	\$1,526,879
Central	\$4,947,118	Central	\$3,305,319
Elk Valley	\$3,073,824	Elk Valley	\$1,895,921
Total Revenue	\$9,691,688	Total Expenditures	\$6,728,119

As shown in the financial plans, transfers to reserves as well as department repayment results in net neutral revenue vs. expenditures for each of the subregions from 2017 forward.

From information included in the 2016 Environmental Services Annual Report, total costs and unit costs (per tonne) for diversion and disposal were calculated; these costs are summarized below in Table 6-1 and 6-2 and are outlined in detail in Sections 6.1 through 6.3:

The costs presented in the below tables were retrieved from the 2016 Environmental Services Annual report. Disposal costs include administration services, landfill and transfer station operations and hauling. Diversion costs include the cost of diverting shingles, concrete, yard waste, soil, wood waste, and scrap metal at transfer stations which accept these items. The diversion costs also include wood grinding and burning as well as site maintenance at the marshalling areas in the Columbia Valley and Central subregions. Recycling costs include collection, receiving, storing, processing, transporting and marketing of recyclables. The RDEK pays a contract rate for recycling services of \$275 per tonne; the recycling costs shown in Table 6 -1 below include the diversionary credit paid to the RDEK which is received from bringing the recyclable materials to market.

The unit costs outlined in Table 6-2 are based on 2016 tonnages received and recorded by the RDEK and do not include the amount of wood waste that is burned (and not represented in the diversion amounts).

Table 6-1 - 2016 Costs for Solid Waste Management in the RDEK

Subregion	Annual Disposal Cost	Annual Diversion Cost	Annual Recycling Cost	Approximate Total Annual System Cost
Columbia Valley	\$ 798,476	\$ 363,468	\$ 249,925	\$ 1,411,869
Central	\$ 1,289,531	\$ 1,104,405	\$ 734,399	\$ 3,128,335
Elk Valley	\$ 710,338	\$ 546,785	\$ 278,920	\$ 1,536,043
RDEK Total	\$ 2,798,345.00	\$ 2,014,658.00	\$ 1,263,244.00	\$ 6,076,247.00

Table 6-2 - Disposal, Diversion, and Recycling Costs for the RDEK Summarized

Subregion	Columbia Valley Subregion	Central Subregion	Elk Valley Subregion
Disposal (\$/Tonne)	\$ 76.03	\$ 53.98	\$ 81.51
Diversion (\$/Tonne)	\$ 131.09	\$ 102.56	\$ 63.67
Recycling (\$/Tonne)	\$ 188.68	\$ 191.14	\$ 193.47
Total System	\$ 96.70	\$ 81.26	\$ 81.95

Disposal costs range from \$53.98 per tonne in the Central subregion to \$81.51 per tonne in the Elk Valley.

Diversion costs range from \$63.67 per tonne in the Elk Valley to \$131.09 in the Columbia Valley. There are no unattended transfer stations in the Elk Valley, and only three sites total. Additionally, the

Columbia Valley and the Central subregion incur additional diversion costs for the wood waste diversion program (Skookumchuck co-generation facility).

Recycling costs in 2016 ranged from \$188.68 in the Columbia Valley to \$193.47 in the Elk Valley.

The lowest total system costs are seen in the Central subregion and the Elk Valley subregion, at \$81.26 and \$81.95 respectively. The total system costs in the Columbia Valley are approximately \$15 more per tonne than the other two subregion's, at \$96.70 per tonne.

6.1 Columbia Valley Subregion

The five-year Financial Plan for the Columbia Valley subregion is seen in Table 6-3, below. As shown, the system is funded mostly through tax requisition. Fees and Charges make up between 14-21% of the system's revenue. When compared to the other subregions (discussed below), the Columbia Valley receives the greatest amount of revenue through Fees and Charges.

Table 6-3 - Columbia Valley Financial Plan – Solid Waste

Columbia Valley - Solid Waste						
Five Year Financial Plan						
Revenue	2016 Actual	2017 Budget	2018 Budget	2019 Budget	2020 Budget	2021 Budget
Requisition	\$ 1,020,484	\$ 1,071,506	\$ 1,243,827	\$ 1,302,720	\$ 1,340,370	\$ 1,369,227
Payments in lieu of Taxes	\$ 3,572	\$ 3,600	\$ 3,600	\$ 3,600	\$ 3,600	\$ 3,600
Local Government Grants	\$ 79,615	\$ 36,000	\$ 36,000	\$ 36,000	\$ 36,000	\$ 36,000
Fees and Charges	\$ 344,014	\$ 236,200	\$ 236,200	\$ 236,200	\$ 236,200	\$ 236,200
Interest	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Prior Period Surplus	\$ 222,061	\$ 133,867	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Total Revenue	\$ 1,670,746	\$ 1,482,173	\$ 1,620,627	\$ 1,679,520	\$ 1,717,170	\$ 1,746,027
Expenditures						
Legislative	\$ 267	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600
Salaries & Benefits	\$ 114,579	\$ 143,018	\$ 145,871	\$ 148,785	\$ 151,567	\$ 154,408
Administration	\$ 45,323	\$ 42,010	\$ 41,110	\$ 41,440	\$ 41,780	\$ 42,210
Operations & Maintenance	\$ 1,010,202	\$ 1,096,281	\$ 137,690	\$ 1,127,983	\$ 1,162,142	\$ 1,187,353
Vehicle & Hauling	\$ 291,932	\$ 279,608	\$ 278,536	\$ 278,536	\$ 278,536	\$ 278,536
Consulting	\$ 7,233	\$ 36,500	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000
Grants	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Telephone & Utilities	\$ 5,827	\$ 5,800	\$ 5,800	\$ 5,800	\$ 5,800	\$ 5,800
Interest and Bank Charges	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000
Shared Overhead	\$ 18,517	\$ 17,662	\$ 18,020	\$ 18,376	\$ 18,745	\$ 19,120
Total Expenses	\$ 1,526,879	\$ 1,654,479	\$ 1,675,627	\$ 1,669,520	\$ 1,707,170	\$ 1,736,027
Revenues less Expenditures	\$ 143,867	-\$ 172,306	-\$ 55,000	\$ 10,000	\$ 10,000	\$ 10,000
Transfer to Reserves	-\$ 10,000	-\$ 10,000	-\$ 10,000	-\$ 10,000	-\$ 10,000	-\$ 10,000
Transfers From Reserves		\$ 218,306	\$ 65,000			
Capital Expenditures		-\$ 36,000				
Surplus (Deficit)	\$ 133,867	\$ -	\$ -	\$ -	\$ -	\$ -

The 2016 Solid Waste System costs for Diversion, Recycling and Disposal, as outlined in the 2016 Environmental Services Annual Report, are shown in Table 6-4 below.

The disposal costs outlined include personnel administration, common services, landfill and transfer station operations and waste hauling. Recycling costs include collection, transport, storage processing and marketing of recyclables through the yellow bin program. Diversion costs include the cost of diverting roofing shingles, concrete, land clearing waste, soil, clean wood waste, scrap metal and yard and garden waste at the Columbia Valley Landfill as well as grinding and hauling wood waste to Skookumchuck.

Table 6-4 – Diversion, Recycling and Disposal Costs - Columbia Valley Subregion

Columbia Valley Subregion				
2016	Diversion	Recycling	Disposal	Total
Amount (MT)	2,773	1,325	10,503	14,600
Annual Cost	\$ 363,468	249,925	\$ 798,476	\$ 1,411,869
Cost per Tonne	\$ 131.09	\$ 188.68	\$ 76.03	\$ 96.70

As shown, the calculated per tonne cost for diversion programs is \$131.09; the cost per tonne for recycling is \$188.68 and the cost per tonne of disposal is \$76.03. The overall system costs have been calculated to be \$96.70 per tonne managed.

6.2 Central Subregion

The five-year Financial Plan for the Central subregion is seen in Table 6-5, below. As shown, the system is mostly funded through tax requisition. Fees and Charges make up between 9 -15% of the systems revenue (based on amounts shown in Table 6-5).

Table 6-5 - Central Subregion Financial Plan - Solid Waste

Central Subregion - Solid Waste						
Five Year Financial Plan						
Revenue	2016 Actual	2017 Budget	2018 Budget	2019 Budget	2020 Budget	2021 Budget
Requisition	\$ 3,663,193	\$ 3,605,622	\$ 3,573,002	\$ 3,601,077	\$ 3,635,430	\$ 3,645,151
Payments in lieu of Taxes	\$ 9,144					
Fees and Charges	\$ 461,825	\$ 664,500	\$ 664,500	\$ 664,500	\$ 664,500	\$ 664,500
Interest	\$ 6,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000
Prior Period Surplus	\$ 806,956	\$ 712,697	\$ 150,000	\$ 150,000	\$ 170,000	\$ 170,000
Total Revenue	\$ 4,947,118	\$ 4,991,819	\$ 4,396,502	\$ 4,424,577	\$ 4,478,930	\$ 4,488,651
Expenditures						
Legislative		\$ 600	\$ 600	\$ 600	\$ 600	\$ 600
Salaries & Benefits	\$ 229,154	\$ 242,363	\$ 247,200	\$ 252,145	\$ 257,030	\$ 262,016
Administration	\$ 59,865	\$ 61,750	\$ 59,000	\$ 60,000	\$ 60,000	\$ 60,500
Operations & Maintenance	\$ 2,537,913	\$ 2,874,476	\$ 2,951,600	\$ 2,897,100	\$ 3,018,421	\$ 3,022,004
Vehicle & Hauling	\$ 400,667	\$ 434,324	\$ 432,500	\$ 432,500	\$ 435,000	\$ 435,000
Consulting	\$ 9,051	\$ 106,500	\$ 70,000	\$ 70,000	\$ 70,000	\$ 70,000
Telephone & Utilities	\$ 17,513	\$ 18,000	\$ 18,000	\$ 19,000	\$ 19,000	\$ 19,000
Interest and Bank Charges	\$ 20,534	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000
Shared Overhead	\$ 30,623	\$ 30,985	\$ 31,602	\$ 32,232	\$ 32,879	\$ 33,531
Total Expenses	\$ 3,305,319	\$ 3,788,998	\$ 3,830,502	\$ 3,783,577	\$ 3,912,930	\$ 3,922,651
Revenues less Expenditures	\$ 1,641,799	\$ 1,202,821	\$ 566,000	\$ 641,000	\$ 566,000	\$ 566,000
Transfer to Reserves	-\$ 621,000	-\$ 846,000	-\$ 566,000	-\$ 641,000	-\$ 566,000	-\$ 566,000
Capital Expenditures	-\$ 308,102	-\$ 356,821				
Surplus (Deficit)	\$ 712,697	\$ -	\$ -	\$ -	\$ -	\$ -

The 2016 Solid Waste System costs for Diversion, Recycling and Disposal, as outlined in the 2016 Environmental Services Annual Report are shown in Table 6-6.

The disposal costs outlined include personnel administration, common services, landfill and transfer station operations and waste hauling. Recycling costs include collection, transport, storage processing and marketing of recyclables through the yellow bin program. Diversion costs include the cost of diverting roofing shingles, concrete, land clearing waste, soil, clean wood waste (including grinding for diversion for Skookumchuck), scrap metal and yard and garden waste at the Central Subregion Landfill.

Table 6-6 – Diversion, Recycling and Disposal Costs – Central Subregion

Central Subregion				
2016	Diversion	Recycling	Disposal	Total
Amount (MT)	10,768	3,842	23,889	38,499
Annual Cost	\$ 1,104,405	734,399	\$ 1,289,531	\$ 3,128,335
Cost per Tonne	\$ 102.56	\$ 191.14	\$ 53.98	\$ 81.26

As shown, the calculated cost per tonne of diversion in the Central subregion is \$102.56; the cost per tonne of recycling is \$191.14; and the cost per tonne of disposal is a \$53.98. This results in an overall system cost of \$81.26 per tonne managed.

6.3 Elk Valley Subregion

The five-year Financial Plan for the Elk Valley subregion is seen in Table 6-7, below. As shown, the system is almost entirely funded through tax requisition. Fees and Charges do not significantly contribute to the system's revenue, ranging from 2% to 10% based on the financial plan information presented below.

The 2016 Solid Waste System costs for Diversion, Recycling and Disposal, as outlined in the 2016 Environmental Services Annual Report are shown in Table 6-7.

The disposal costs outlined include personnel administration, common services, landfill and transfer station operations and waste hauling. Recycling costs include collection, transport, storage processing and marketing of recyclables through the yellow bin program. Diversion costs include the cost of diverting roofing shingles, concrete, land clearing waste, soil, clean wood waste, scrap metal and yard and garden waste at the Sparwood Transfer Station, the Elkford Transfer Station and the Fernie Transfer Station.

As shown, the calculated cost per tonne of diversion in the Central subregion is \$63.67; the cost per tonne of recycling is \$193.47; and the cost per tonne of disposal is \$81.51. This results in an overall system cost of \$81.95 per tonne managed.

Table 6-7 -Elk Valley Financial Plan - Solid Waste

Elk Valley - Solid Waste						
Five Year Financial Plan						
Revenue	2016 Actual	2017 Budget	2018 Budget	2019 Budget	2020 Budget	2021 Budget
Requisition	\$ 2,105,433	\$ 2,276,487	\$ 2,274,541	\$ 2,275,186	\$ 2,276,946	\$ 2,264,970
Payments in lieu of Taxes	\$ 22,481					
Fees and Charges	\$ 298,415	\$ 65,000	\$ 65,000	\$ 65,000	\$ 65,000	\$ 65,000
Interest						
Prior Period Surplus	\$ 647,495	\$ 563,345	\$ 300,000	\$ 300,000	\$ 300,000	\$ 300,000
Total	\$ 3,073,824	\$ 2,904,832	\$ 2,639,541	\$ 2,640,186	\$ 2,641,946	\$ 2,629,970
Expenditures						
Legislative		\$ 600	\$ 600	\$ 600	\$ 600	\$ 600
Salaries & Benefits	\$ 70,133	\$ 83,781	\$ 85,454	\$ 87,163	\$ 88,713	\$ 90,299
Administration	\$ 42,791	\$ 43,856	\$ 42,070	\$ 42,535	\$ 43,010	\$ 43,400
Operations & Maintenance	\$ 1,489,469	\$ 1,547,632	\$ 1,560,361	\$ 1,581,631	\$ 1,606,161	\$ 1,590,957
Vehicle & Hauling	\$ 148,290	\$ 190,104	\$ 189,000	\$ 189,000	\$ 189,000	\$ 189,000
Consulting	\$ 54,676	\$ 89,000	\$ 17,000	\$ 17,000	\$ 17,000	\$ 17,000
Telephone & Utilities	\$ 18,355	\$ 19,456	\$ 19,456	\$ 19,456	\$ 19,456	\$ 20,500
Interest and Bank Charges	\$ 62,600	\$ 56,000	\$ 51,000	\$ 48,000	\$ 48,000	\$ 48,000
Shared Overhead	\$ 9,607	\$ 9,845	\$ 10,042	\$ 10,243	\$ 10,448	\$ 10,656
Total Expenses	\$ 1,895,921	\$ 2,040,274	\$ 1,974,983	\$ 1,995,628	\$ 2,022,388	\$ 2,010,412
Revenues less Expenditures	\$ 1,177,903	\$ 864,558	\$ 664,558	\$ 644,558	\$ 619,558	\$ 619,558
Dept Principal Repayment	-\$ 614,558	-\$ 614,558	-\$ 614,558	-\$ 69,558	-\$ 69,558	-\$ 69,558
Transfer to Reserves		-\$ 250,000	-\$ 50,000	-\$ 575,000	-\$ 550,000	-\$ 550,000
Surplus (Deficit)	\$ 563,345	\$ -	\$ -	\$ -	\$ -	\$ -

Table 6-8 - Diversion, Recycling and Disposal Costs - Elk Valley Subregion

Elk Valley Subregion				
2016	Diversion	Recycling	Disposal	Total
Amount (MT)	8,588	1,442	8,715	18,744
Annual Cost	\$ 546,785	278,920	\$ 710,338	\$ 1,536,043
Cost per Tonne	\$ 63.67	\$ 193.47	\$ 81.51	\$ 81.95

7. BENCHMARKING COMPARISON

To assess how the RDEK solid waste program compares to other typical rural / urban regional districts in B.C., SHA undertook a benchmarking survey. This involved analyzing cost and performance data from eight other regional districts, including:

- Columbia Shuswap Regional District
- Regional District of Fraser Fort George
- District of Squamish
- Peace River Regional District
- Regional District of Kitimat Stikine
- Regional District of Nanaimo
- Regional District of Mount Waddington
- Thompson-Nicola Regional District

The benchmarking analysis identified the following metrics for each of the above regional districts/municipalities:

- Service Population
- Population Density
- Total MSW Tonnage
- Total Tonnage Landfilled
- Total Tonnage Recycled
- Total Tonnage Organics Diverted
- Per Capita MSW Generation Rate
- Per Capita Disposal Rate
- Per Capita Recycling Rate
- Total System Cost per Tonne
- Total System Cost per Person
- Landfill Cost Per Tonne Landfilled
- Recycling Cost Per Tonne Recycled
- Composting Cost per Tonne Composted
- Tipping Fees

The cost information was generally obtained from the five-year budgets, using 2016 actual costs whenever possible. Unit costs were then obtained for each benchmarking index by dividing the annual cost for that service by the total tonnes processed through the system, be it landfill, recycled, composted etc. Per capita costs were obtained by dividing by the current service population, usually obtained from the BC Statistics 2016 population estimates.

7.1 Overview of Regional Districts

Columbia Shuswap Regional District: The Columbia Shuswap Regional District (CSRD) operates a number of regional landfills at Salmon Arm, Revelstoke, Golden and Sicamous. Similar to the TNRD, these landfills receive waste from the host communities as well as a number of satellite transfer stations. Transfer stations are located in Seymour Arm, Scotch Creek, Skimilkin (Tappen), Glenemma, Falkland, Malakwa, Trout Lake and Parson.

The CSRD conducted a review of its SWMP in 2014 and an update was completed in 2015. The review was intended to build on the 2009 SWMP, which mainly targeted organic waste diversion. There is an existing private sector in-vessel composting facility in Salmon Arm and private collection of ICI organic waste is currently in place. The CSRD developed an organics diversion strategy in 2015 which includes plans for curbside collection of residential organics in Salmon Arm by 2018. Other municipalities are to have organics collection at a later date. The 2016 per capita disposal rate in the CSRD was 595 kg.

Regional District of Nanaimo:

The Regional District of Nanaimo (RDN) operates a Regional Landfill which is located about 5 km south of downtown Nanaimo, which has been receiving waste from the Regional District of Nanaimo since 1991. The site accepts both commercial and self-haulers. Wood waste, yard, garden waste and controlled waste are deposited separately from regular garbage as yard waste, clean wood waste, scrap metal, cardboard, and paper are hauled to third party recycling facilities for processing.

The RDN also operates the Church Road Transfer Station (CRTS), which is located about four km southwest of downtown Parksville. The facility opened in 1991, and is approximately two hectares in size. CRTS receives garbage, yard waste, wood waste, construction/demolition waste, and recyclables from communities in the northern portion of the Regional District of Nanaimo. Garbage brought to the CRTS is transferred to the Regional Landfill. Recyclables are transferred to the Vancouver Island Recycling Centre in Nanaimo, and food waste, kitchen waste, and yard waste are transferred to the Nanaimo Organic Waste Composting Facility in South Nanaimo.

The RDN Solid Waste Management Plan (SWMP) is currently under review, with the most recent plan amendment occurring in 2010. The RDN has met its SWMP target of 70% diversion and is considering an 80% diversion target. The RDN implemented an organic diversion strategy that included a disposal ban on commercial organics in 2006. Region-wide curbside single-family residential collection program was implemented in 2010/2011. RDN bans the following materials from disposal: gypsum, land clearing waste, corrugated cardboard, recyclable paper, scrap metal, tires, commercial organic waste, garden waste, wood waste, stewardship materials, household plastic containers, metal food and beverage containers. The RDN per capita disposal rate as of 2016 was one of the lowest in B.C. at 341 kg.

Peace River Regional District:

The Peace River Regional District (PRRD) operates a large network of landfills and transfer stations. The PRRD system is based around three natural controlled landfill sites at Fort St. John, Dawson Creek (Bessborough) and Chetwynd. The PRRD also operates a series of transfer stations to service the rural areas.

The PRRD SWMP was reviewed in 2008 and approved by the MOE in 2009. The plan targets to reduce disposal by 26% to 42% over three phases. Phase 1 focuses on upgrading transfer stations to offer more services like recycling, yard waste, and bulky items. In addition, planned diversion initiatives such as a recycling program to divert multi-materials from landfills and development of a wood waste management plan with pilot composting project are to be implemented.

The PRRD currently diverts yard waste and wood waste and is considering composting yard waste and biosolids to produce cover material. Consideration of a food waste collection service will not be considered for several years. The PRRD disposal rate as of 2016 was the highest of the regional districts surveyed at 848 kg per capita. It must be kept in mind that a large proportion of waste in the PRRD is from the oil and gas sector and consequently residential diversion has minimal impact on overall disposal. The PRRD aims to reach a disposal rate of 716 kg per capita.

Regional District of Kitimat Stikine:

The RDKS operates 6 landfills: Hazelton, Kitwanga, Stewart, Mezidian, Iskut, and Forceman. Thornhill landfill was recently closed and the RDKS now operates a transfer station at the site. Other area landfills include Terrace, Kitimat, and Stewart landfills which are overseen by the respective member municipalities.

The RDKS SWMP was completed in 1995. RDKS currently provides curbside collection of garbage and recyclables for the region. There is currently only residential collection of organics in the Terrace area. RDKS has banned organic waste in the Forceman Ridge Landfill and operates a composting facility at the site. The per capita disposal rate in the RDKS in 2016 was estimated to be 613 kg.

Regional District of Fraser Fort George:

The Regional District of Fraser Fort George (RDFFG) operates two municipal solid waste landfills and one select waste landfill. The Foothills Boulevard Regional Landfill in Prince George currently receives 96% of the municipal solid waste disposed of in the RDFFG. The Mackenzie Regional Landfill provides disposal services to the northern part of the region and also offers marshalling areas for tires, fridges/freezers, metal, oil & filters, and anti-freeze. The Legrand Select Waste Landfill accepts select inert waste from both private and public sectors. Inert waste includes demolition, land-clearing debris and construction waste.

The RDFFG operates 18 regional transfer stations and most transfer stations provide opportunities for recycling, centralized composting of yard and garden waste, "Swap shed" waste exchange areas, residential waste disposal by way of on-site transfer stations and limited commercial waste disposal. Some sites take oil, antifreeze, batteries, propane cylinders, tires, refrigerators and scrap metal.

Municipal garbage collection is provided by all municipalities and in addition to RDFFG services, Recycle BC provides residential curbside recycling in the City of Prince George. Various private sector recycling companies also operate in the Prince George area and EPR programs have been established in Prince George and to a limited extent in other municipalities. A large-scale yard waste composting facility is operational at the Foothills Boulevard landfill. Yard waste is being diverted at Mackenzie and Valemount waste management facilities.

During 2015, the RDFFG conducted a review of the 2008 SWMP. The 2008 Plan identified a target of 50% diversion of waste from landfilling and this target remains relevant for the 2015 Plan. To achieve 50% diversion, the 2015 Plan aims to achieve a per capita disposal rate of 570 kg by 2020. The 2016 per capita disposal rate in the RDFFG was estimated to be 840 kg.

District of Squamish: The District of Squamish (DoS) operates a very well integrated solid waste management system operated by their contractor, Carney's Waste Systems. Residuals are landfilled at Squamish's engineered landfill, which underwent a \$6 million upgrade in 2011.

The District of Squamish (DoS) provides bi-weekly residential curbside garbage and recycling collection through a contract with Carney's Waste Systems. In addition, the DoS currently provides bi-weekly residential curbside organics collection for single-family homes, duplexes and some townhouses. The Yard waste collection program was replaced by the tote-based organics (yard waste + food scraps) collection program in 2015. Organics totes are collected by trucks with auto-load arms operated by a single driver. These trucks are lower cost to operate but cannot collect yard waste bags, bins or bundles - only totes. Organic waste from curbside collection is brought to Sea to Sky Soils composting facility. In addition, residents can drop off recycling and compost free of charge at either the landfill or the Carney's depot on Queens Way. Townhouse and apartment complexes that receive commercial waste collection can contact their provider to discuss options for organics collection. The 2016 per capita disposal rate in the DoS was 734 kg.

Regional District of Mount Waddington:

The Regional District of Mount Waddington (RDMW) operates the 7 Mile Landfill & Recycling Facility in Port McNeill. The site acts as a drop-off facility for product stewardship programs such as used oil, paint, household and hazardous waste, electronics, car tires, and old batteries. The RDMW also operates 2 transfer stations: Malcom Island transfer station and Woss transfer station.

The RDMW SWMP was last prepared in 1996 and the Stage 1 Plan review was completed in 2011. The plan targets a 50% diversion rate. The RDMW is currently composting clean wood and garden waste mixed with biosolids. The compost is used as a biocover at 7 Mile landfill. There are no immediate plans to collect/compost food waste. The 2016 per capita disposal rate in the RDMW was 692 kg.

Thompson-Nicola Regional District

The Thompson-Nicola Regional District operates two landfills located in Heffley Creek and Lower Nicola. The TNRD also operates 10 Eco-Depots (full service sites) and 18 smaller transfer stations. The City of Kamloops owns and operates three landfills within the municipality, and there are two additional private landfills within the Region.

Most TNRD transfer stations accept mixed recycling, stewardship materials and yard waste. Additionally, most larger communities have access to curbside collection of single stream recycling and garbage.

The TNRD is currently updating their Regional Solid Waste Management Plan. The 2016 waste disposal rate was calculated to be 621 kg per capita.

7.2 Results of Benchmarking Analysis

The results of the benchmarking analysis are tabulated in Table 7-1. The following paragraphs discuss each of the comparative parameters.

Table 7-1 - Results of Benchmarking Analysis

		Regional District of Nanaimo	Peace River Regional District	Columbia Shuswap Regional District	Regional District of Kitimat-Stikine	Regional District of Fraser Fort George	District of Squamish	Regional District of Mount Waddington	Thompson-Nicola Regional District	Regional District of Eas Kootenay	Central Subregion (RDEK)	Columbia Valley Subregion (RDEK)	Elk Valley Subregion (RDEK)
Service Population	persons	157,599	66,504	51,572	20,120	95,216	19,067	11,500	129,642	60,439	35,431	9,482	15,526
Density	persons/km ²	71.9	0.5	1.7	0.4	1.8	181.8	0.6	2.9	2.2	-		
Total MSW Tonnage	tonnes/yr	114,266	62,903	57,876	20,120	115,074	32,908	11,265	120,306	71,843	38,499	14,600	18,744
Total Tonnage Landfilled	tonnes/yr	53,764	56,425	30,698	12,325	80,005	13,987	7,959	80,520	43,106	23,889	10,503	8,715
Total Tonnage Recycled / Diverted	tonnes/yr	46,328	6,478	17,822	4,274	28,765	16,020	1,145	40,327	17,538	7,797	2,940	6,802
Total Tonnage Organics Diverted	tonnes/yr	14,174	n/a	9,356	3,521	6,304	2,901	2,161	13,537	11,199	6,814	1,158	3,228
Per Capita MSW Generation Rate	kg/person/yr	725	946	1,067	1,000	1,209	1,726	980	928	1,189	1,087	1,540	1,207
Per Capita Disposal Rate	kg/person/yr	341	848	595	613	840	734	692	621	713	674	1,108	561
Per Capita Recycling Rate	kg/person/yr	294	97	346	75	302	840	100	311	290	220	310	438
Total System Cost	\$	\$15,652,000	\$9,023,743	\$4,500,000	\$3,077,696	\$19,329,630	\$2,992,368	\$1,002,881	\$17,765,024.00	\$6,076,247	\$3,128,335	\$1,411,869	\$1,536,043
Total System Cost Per Tonne MSW	\$/tonne	\$136.98	\$192.67	\$92.75	\$152.97	\$167.98	\$90.93	\$89.03	\$147.67	\$84.58	\$81.26	\$96.70	\$81.95
Total System Cost Per Person	\$/person/yr	\$102.62	\$135.69	\$86.89	\$152.97	\$203.01	\$156.94	\$87.21	\$137.03	\$100.54	\$88.29	\$148.90	\$98.93
Landfill Cost Per Tonne Landfilled	\$/tonne	\$177.35	\$59.25	\$65.15	\$42.99	\$180.29	\$97.17	\$71.26	\$47.40	\$64.92	\$53.98	\$76.03	\$81.51
Recycling Cost Per Tonne Recycled	\$/tonne	-	\$306.60	\$76.39	no data	\$27.81	\$72 - \$130	\$252.33	-	\$114.07	\$125.86	\$149.71	\$82.33
Composting Cost Per Tonne Composted	\$/tonne	\$47 - \$127	n/a	\$6.41	\$123.23	\$76.59	\$103.75	\$39.71	\$103.40	n/a	n/a	n/a	n/a

Population: The Regional Districts / Populations considered ranged in size from 11,500 people in the Regional District of Mount Waddington to 157,599 people in the Regional District of Nanaimo. The service population for the RDEK as a whole is 60,439 which is distributed between the three subregions as follows: Central subregion 35,431, Columbia Valley subregion 9,482 and Elk Valley subregion 15,526.

Population Density: Population density is a measure of how many people there are per unit area. Population density ranged from a low of 0.4 persons/km² in the Regional District of Kitimat Stikine to a highly dense area such as the District of Squamish with 181.8 persons/km². The RDEK has a population density of 2.2 persons/km². This is a useful metric because it gives an indication of the transportation distances and number of facilities required to service a region. As expected, a low-density area would require greater hauling distances and more facilities to service the region.

Total MSW Tonnage: The total tonnes of MSW produced, including residuals, recyclables and organics ranged from 11,265 in the Regional District of Mount Waddington to 120,306 tonnes in the TNRD.

Total Tonnage Landfilled: The total tonnes of landfilled waste ranged from 7,959 in Mount Waddington to 80,520 tonnes in the TNRD.

Total Tonnage Recycled: The tonnages recycled ranged from 1,145 tonnes in the Regional District of Mount Waddington to 46,328 tonnes in the Regional District of Nanaimo.

Total Tonnage Organics Diverted: The total tonnage of organics diverted ranged from none in the Peace River Regional District to 14,174 tonnes in the District of Nanaimo. The Regional District of East Kootenay accepts yard waste and wood waste at some of their facilities which is either composted or chipped and hauled to Skookumchuck for energy generation; however, much of the yard waste and wood waste is not captured in the recovered diversion amounts as it is managed through burn permits.

Per Capita MSW Generation Rate: The per capita waste generation rate ranges from a low of 682 kg per person in the Regional District of Nanaimo to a high of 1,726 kg per person in the District of Squamish. The RDEK per capita waste generation is 1,189 kg per person. Specifically, the Columbia Valley subregion has the second highest waste generation rate per capita at 1,540 kg per person per year.

Per Capita Disposal Rate: This metric measures the amount of garbage disposed of in landfill. In SHA's opinion, it is the best metric of how wasteful a society is. Disposal rates reported here include waste from the residential sector, institutional, commercial, and light industrial sources as well as waste from construction, demolition and renovation activities. Waste that is reused or recycled is not included. The Ministry of Environment's 'Municipal Solid Waste Disposal in B.C.' reports the estimated amount of municipal solid waste disposed per person from each regional district and for British Columbia. The most recent data is from 2015 indicated that the per capita disposal rate range from 314 kg /person/year in the District of Nanaimo to 922 kg/person per year in the Peace River Regional District.

The RDEK was the fourth least wasteful jurisdiction of the eight surveyed with a disposal rate of 562 kg/person/year in 2015, as reported by the Ministry of Environment and shown in Figure 7-1. The

MOE does not provide a per capita disposal rate for the District of Squamish and therefore it is excluded from Figure 5-1. Additionally, the MOE Waste Disposal Calculator uses a higher total population for the RDEK than what is reported in the census; thus, reducing the per capita disposal rate.

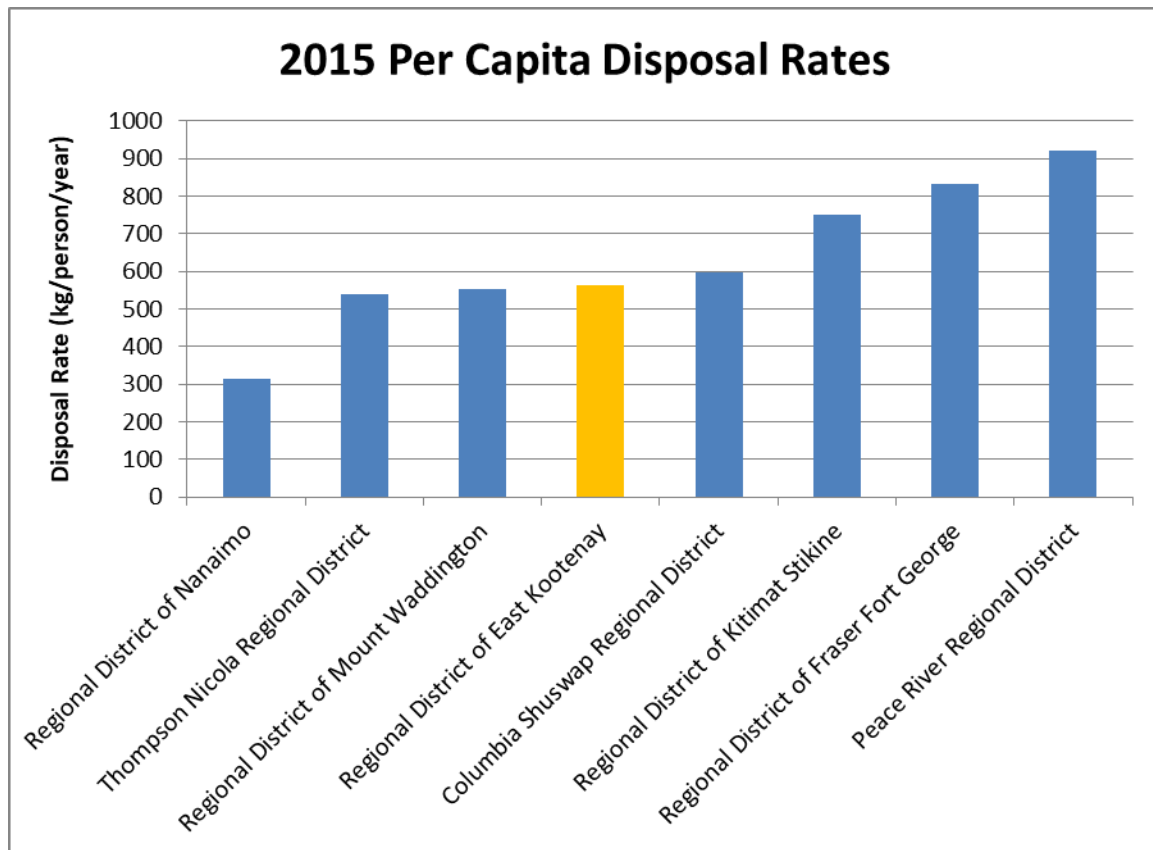


Figure 7-1 - 2015 Per Capita Disposal rates

Since the MOE has not published results for 2016, SHA performed an analysis with 2016 tonnage reported to SHA by the regional districts and used population data to estimate the 2016 per capita disposal rates. It must be kept in mind that the methodology employed by SHA is different than the methodology employed by the MOE in calculating waste generation and disposal. As all each Regional District tracks disposal tonnages differently the 2016 disposal rates are estimates only.

As seen in Figure 7-2, the RDEK has the fourth highest disposal rate of the nine surveyed, based on 2016 tonnages and the 2016 census, with a disposal rate of 713 kg per capita.

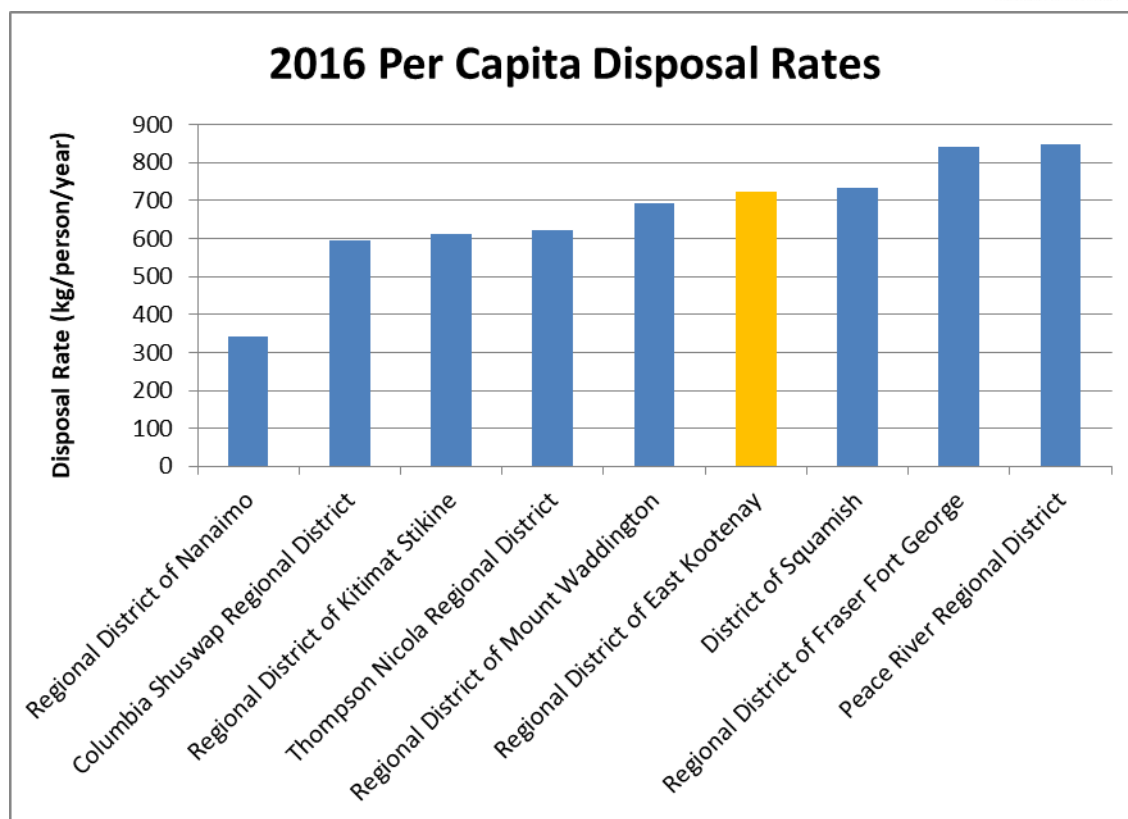


Figure 7-2 - 2016 Per Capita Disposal Rates

Per Capita Recycling Rate:

The recycling rate ranged from 75 kg/person/year in the Regional District of Kitimat Stikine to 840 kg/person per year in the District of Squamish. As a whole, the RDEK recycling rate was in the middle of the regional district's surveyed, at 290 kg per capita; however, the Elk Valley subregion has the second highest recycling rate at 438 kilograms per capita.

The recycling rate however, can be a misleading metric as it is dependent on the amount of solid waste generated. This means a low recycling rate could be linked to a low waste generation rate, and now minimal participation. A much better metric to use in evaluating environmental sustainability is per capita disposal rate (i.e. the amount of garbage not recycled).

A comparison of RDEK's per capita MSW generation rate, disposal rate, and recycling rate to other regional districts is shown in Figure 7-3.

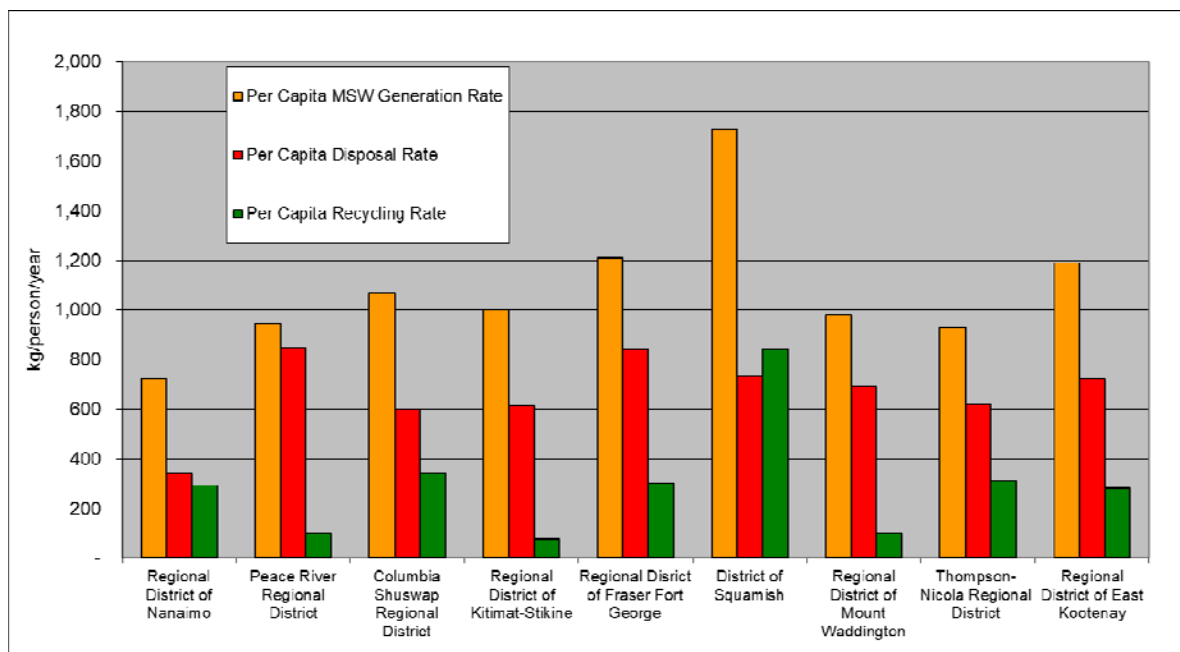


Figure 7-3 - Comparison between 2016 Waste Generation, Disposal and Recycling Rates

Total System Cost: In itself, total system cost is not a useful metric as it is population dependent. It does emphasize the fact that management of solid waste is a very costly service, costing most regional districts millions of dollars each year.

Total System Cost Per Tonne: This system cost measures the overall cost of the waste management system including transfer station operation, hauling, recycling and landfill. System costs range from a low \$84.58/tonne for the Regional District of East Kootenay to \$192.67/tonne for the Peace River Regional District.

Total System Cost per Person: From a tax payers perspective, the total system cost per person is undoubtedly the most important metric because it measures how much money a household has to pay for solid waste disposal each year, either through taxation, tipping fees or both. The per person costs range from a low of \$86.89 per person for Columbia Shuswap Regional District to \$203.01 for the Regional District of Fraser Fort George. The per person costs for the entire RDEK are approximately \$100 per person, which make results in the third lowest total system cost per person. Within the RDEK, the highest costs incurred in the Columbia Valley subregion at \$148.90 per person and lowest costs are incurred in the Central subregion at \$88.29 per person.

Landfill Cost per Tonne Landfilled: The per tonne cost to operate and maintain landfill facilities ranges from a low of \$42.99 in the Regional District of Kitimat Stikine to \$180.29 in the Regional District of Fraser Fort George. The cost of landfill operations is primarily a function of whether the facility is natural control or engineered, and in part a function of economy of scale. The cost per tonne landfilled in the RDEK is \$64.92.

Recycling Cost per Tonne Recycled: This metric measures the unit expenditures on recycling and diversion programs. The costs range from a low of \$27.81/tonne in the Regional District of Fraser Fort George to \$306.60/tonne in the Peace River Regional District. The per tonne of recycling / diversion activities in the RDEK is \$114.07. One of the biggest factors is the method of material collection. For instance, the Regional District of Fraser Fort George has no curbside collection and thus has a low recycling cost per tonne. Recycling cost per tonne is also a function of the processing costs, distance and shipping costs to market.

Composting Cost per Tonne Composted: Composting costs can vary depending on a number of factors including what materials are being composted, operational costs, hauling costs, and economies of scale. Of the regional districts studied, the composting cost per tonne composted ranged from \$6.41 in the Columbia Shuswap Regional District to maximum of \$127 in the Regional District of Nanaimo. The RDEK composting cost has not been included in this analysis.

Tipping Fees: A tipping fee is a charge levied for disposal of waste and is based on weight and type of material. Differential tipping fees have been in place in most regional districts for quite some time. The fees are consistent with the user pay strategy for refuse disposal and allow for incentives (decreased disposal fees) for taking the time to separate recyclable waste from the garbage. Likewise, there are disincentives (increased disposal fees) for disposing of recyclables mixed with refuse at a disposal facility. Table 7-2 lists the tipping fees for each material in each regional district. As seen in Table 7-2, the District of Squamish has some of the highest tipping fees for MSW, but low or no charge for recyclable/diverted materials such as organics, yard and garden waste, cardboard, asphalt shingles, and metals. This tipping fee structure has evidently helped to divert recyclables from the waste stream as the District of Squamish has the highest percentage of waste diverted out of the regional districts evaluated. The Regional District of East Kootenay has some of the lowest user-fees compared to the regional districts evaluated. This is especially evident for MSW, as the RDEK is the only regional district in this evaluation to allow free disposal of this type of waste.

Table 7-2 - Tipping Fee Schedule Comparison between Regional Districts

Material	Units	District of Squamish	Regional District of Nanaimo	Regional District of Mount Waddington	Regional District of Fraser Fort George	Thompson-Nicola Regional District	Columbia Shuswap Regional District	Regional District of Central Kootenay	Regional District of Kootenay Boundary	Regional District of Okanagan-Similkameen	Regional District of East Kootenay
MSW sorted	\$/tonne	\$150	\$125	\$125	\$82	\$80	\$80	85-100	\$110	\$110	\$0
MSW unsorted (ex. containing recyclables)	\$/tonne	\$320	\$250	\$125	\$82	double user fee	\$160	Double charge if contains >10% recyclables	no data	no data	min \$100 or double charge (Commercial Only)
Demolition and Land Clearing	\$/tonne	\$150	\$360	\$125	\$82	\$160	\$240	\$200	\$175	\$90 - \$700	\$200
Asbestos	\$/tonne	not accepted	\$500	\$125 if securely packaged \$325 if not securely packaged	\$301	cost of disposal plus user fee	\$160	\$100- \$170	\$110- \$175	no charge if deposited in designated area OR \$200 per tonne	\$100
Organic waste (food)	\$/tonne	no charge	\$110	no data	no data	no data	no data	no data	\$40	\$0 - \$60	\$0
Yard and Garden waste	\$/tonne	\$65	\$55	no charge	no charge	no charge	\$35	\$50	\$5 per load	\$0 - \$60	\$0
Clean Wood	\$/tonne	\$65	\$250	\$28	no charge	\$100	\$35	\$50	\$50	\$0 - \$60	\$0
Contaminated Wood		\$85	\$250	\$125	\$150	\$100	\$35	\$50	no data	\$0 - \$60	\$0
Corrugated Cardboard	\$/tonne	no charge	\$55	\$250	no charge	no charge	\$0 residential \$80 Commercial	no data	no charge	no charge	no data
Mattresses	\$/mattress	\$15	\$6	\$11	no data	\$5	\$15	no data	no data	\$10	\$0
Asphalt Shingles	\$/tonne	no charge	\$125	no data	no data	\$100	\$100	no data	\$60	\$60	\$0 - \$40
Metals	\$/tonne	no charge	\$55	no charge	no charge	no charge	\$35	\$40	\$30		\$0

8. BYLAWS

8.1 Regional and Municipal Bylaws

There are a number of bylaws with regards to the solid waste system in the Regional District of East Kootenay.

Regional District Bylaws:

Bylaw No. 2053 – Tipping Fee Schedule for Solid Wastes, outlines the user fee schedule and site regulations for the Central subregion.

Bylaw No 2087 - Amends RDEK bylaw 2052 and bylaw 1278. Bylaw No. 2052 outlines the tipping fee schedule for the Columbia Valley subregion while Bylaw No 1278 – Columbia Valley subregion Waste Management Local Service Establishment Bylaw – outlines regulations for Columbia Valley sites.

RDEK Bylaw - No. 1573 – outlines the user fee schedule and disposal regulations for the Elk Valley subregion..

District of Elkford:

Bylaw 742 – Solid Waste Removal Charges, outlines the fee schedule for carts and containers for solid waste collection in Elkford.

City of Kimberley:

Bylaw No 2520 – Solid Waste Regulations and Rates, outlines general bylaws for solid waste in the City of Kimberley, including storage of waste, disposal and disposal restrictions, and collection.

City of Cranbrook:

Bylaw No 3784 – Solid Waste Collection and Disposal Bylaw, outlines monthly collection and landfill fees for residential and commercial users.

City of Fernie:

Bylaw No. 1845 – Consolidated Waste Regulation Bylaw, outlines requirements for disposal, collection, items prohibited from disposal, recycling programs, rates and charges for residents of the City of Fernie.

8.2 Provincial Policies and Legislation

Solid waste management is regulated by the Province of BC.

8.2.1 Environmental Management Act

The *Environmental Management Act* governs the management of waste in British Columbia. The act provides the authority for introducing wastes into the environment in a manner that protects human health and the environment. The act enables the use of permits, regulations and codes of practice to authorize discharges to the environment and enforcement options to encourage compliance.

8.2.2 Recycling Regulation

This regulation requires producers of the designated products to develop a program for their end-of-life collection and recovery of materials and to consult stakeholders when developing their plans. The current list of designated products currently includes most beverage containers, most household hazardous waste, and household goods powered by electricity and batteries.

8.2.3 Open Burning Smoke Control Regulation

This regulation applies to fires for purposes such as land clearing, silviculture, forestry, wildlife habitat enhancement, and domestic range improvement. The intent of the regulation is to reduce smoke emissions and impacts without requiring an Air Emission Permit from the BC Government. The regulation outlines when and how open burning can occur. This regulation is currently under review.

8.2.4 Organic Matter Recycling Regulation (OMRR)

The Organic Matter Recycling Regulation of B.C. (OMRR) governs the production, quality and land application of certain types of organic matter. It provides guidance for compost producers on composting requirements to ensure the protection of soil quality and drinking water sources. This regulation was updated in 2016.

8.2.5 Landfill Criteria for Municipal Solid Waste

BC's Landfill Criteria for Municipal Solid Waste applies to all new landfills and both lateral and vertical expansions of existing landfills, designed and constructed for the disposal of MSW. The criteria were updated in 2015.

8.2.6 Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills

These guidelines are intended to assist landfill owners and operators to design and implement an environmental monitoring program for groundwater and surface water as required by the *Landfill Criteria for Municipal Solid Waste, Second Edition*.

8.2.7 Landfill Gas Management Regulation

The Landfill Gas Management Regulation applies to all regulated landfill sites that:

- Have 100,000 tonnes or more of municipal solid waste in place, or
- Receive 10,000 or more tonnes of municipal solid waste for disposal into the landfill site in any calendar year after 2008.

This regulation requires owners of applicable landfills to conduct an initial landfill gas (LFG) generation assessment. Based on the outcome of that assessment, a landfill gas management design plan may be required for the landfill site. Once the design plan is accepted by the Province, the owner of the landfill is required to install the appropriate landfill gas management facilities.

9. ISSUES AND OPPORTUNITIES

The RDEK's solid waste system is readily accessible and available to all residents – whether through curbside collection or via transfer stations in all communities. Residents are able to self-haul their waste and recycling whenever it is convenient to them. “Reuse” is popular and there is high participation at various share sheds / Reuse centers at the RDEK's facilities.

Throughout the review a few opportunities improvement to the system came to light; such as:

1. The unattended transfer station system makes it nearly impossible for the RDEK to enforce disposal bans on materials. By nature, the unattended sites do not encourage separation of materials or participation in diversion programs.
2. There is currently little or no incentive for the public to reduce the amount of waste they are producing and consequently little or no incentive to increase recycling and diversion. While it is generally understood to be “the right thing to do” the RDEK's system is based more on opting-in than enforcement.
3. The tax based fee structure does not incentivize waste reduction. Investigation towards a user-fee platform is recommended.
4. The RDEK is paying for removal and transport of materials which can be accepted at local EPR depots (ex: tires). In some cases, items that could have been returned to depots are being landfilled (ex: small electronics, bottles, cardboard, etc) as seen in transfer station bins.
5. New wood waste diversion opportunities may need to be sought out if burn permits for marshalling areas are no longer allowed in the future.
6. Public awareness regarding waste reduction, reuse and recycling could be improved.
7. A waste composition study may identify opportunities for education and diversion.

Summary: It is the RDEK's goal of making diversion and recycling of all materials easier for residents and businesses in the RD as well as implementing programs and systems that make it more attractive for Recycle BC and other to get more involved in the East Kootenay.

This report is intended to outline the “state of the union” of the RDEK solid waste management system. Following this report, Sperling Hansen Associates will undertake technical analyses to evaluate options and opportunities for the RDEK. Included in this analysis will be a review of:

- Reduction and Reuse Programs
- Centralized Composting
- Existing EPR programs and Opportunities to Partner
- Regional Unmanned Transfer Station System
- Review of potential implementation of User-Pay Fees
- Columbia Valley Waste Handling System
- Columbia Valley Transfer Station Siting Analysis
- Opportunities to Enhance Residual Waste Management
- Recommendations to advance current waste management practices.

SHA will review potential options and opportunities for the RDEK and suggest recommendations for changes to the system, understanding that many of the components are intertwined.

It has been a pleasure working with the RDEK on the first stage of our solid waste system review. Should you have any questions on this report or require further assistance or information, please feel free to contact the undersigned at 778-471-7088.

We look forward to working with you further,

Sincerely,

SPERLING HANSEN ASSOCIATES