



City of Brandon Eastview Landfill Site Annual Report **2017**

City of Brandon Operational Services Division Sanitation Section

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Introduction

This annual report covers the period from January 1, 2017 to December 31, 2017, and has been prepared in accordance with our Environmental act license number 3149. The license was issued August 25, 2015 in accordance with *The Environment Act* (C.C.S.M.c.E125) under the direction of Manitoba Conservation. The Eastview Landfill Site operates as a Class 1 Waste Disposal Ground (WDG) under the Manitoba Environment Act.

The current facility layout and operations include:

- Former and active disposal areas;
- Full depot for residential and commercial waste, including contaminated soil, all directed to the tipping face;
- Leachate collection that is pumped to a wastewater treatment facility;
- Scale house and operator
- Snow removal dump site (City use only)
- Clean fill disposal;
- Concrete disposal area;
- Landfill gas collection system (waiting to be commissioned by Department of Labor);
- Material Recovery Facility (MRF);
- Separation of metals, propane tanks, tires, yard waste and tree brush from waste stream which is stored in designated areas of the site;
- Freon depleting device depot;
- Eco-Centre for used oil, filters and containers;
- Tree and wood chipping
- Composting
- E-Waste Depot
- Household hazardous waste depot

Below is a copy of the landfill section map.



The purpose of this report is to meet the operational reporting requirements by providing the following information at a minimum:

- Updates to the operating manual;
- Closure/Post closure plans and financial evaluation;
- Planned improvements
- Records of waste, recyclable materials, and compost quantities;
- A review of environmental monitoring data;
- Details on environmental protection programs;
- Operational information

Updates to the Operating Manual

The operations manual was submitted in 2008 to meet the requirements of the operating permit. The manual was completed internally by Sanitation administration and was to address at a minimum the following:

- Cell developing and sequencing;
- Waste receiving, placement and covering;
- Nuisance control;
- Surface water management;
- Landfill gas management;
- Leachate management;
- Monitoring and reporting: and

- Inspections and maintenance

The operating manual also provides criteria for the acceptance, handling and disposal of special wastes such as hydrocarbon impacted soils, mold and asbestos. The manual provides information for dealing with hot loads within City collection trucks, commercial haulers, and commercial and residential self-haulers.

The City of Brandon plans to review and update its Operating Manual in 2018 to ensure that the site's operations are accurately reflected.

Closure and Post Closure Plans

In 2014 the City of Brandon updated its closure and post closure plans which was awarded to and completed by Golder Associates after an RFP process. Information was provided, for review, to Golder Associates using historical data supplied by landfill staff. A landfill site visit was conducted by the consultant responsible for the plan to conduct a site assessment and through this consultation it was determined that the only operational change was the increased focus on the diversion of organic materials.

A criterion was established by the City of Brandon so that the assessment is based on the following:

- Current waste generation estimate received at the Eastview Landfill Site based on current population trends;
- An estimate of the remaining useable life of the landfill site based on waste generation and available airspace;
- Estimated closure costs;
- An estimation of ongoing maintenance costs following site closure (post closure); and
- Preparation and submission of a report providing costing models and site development drawings.

According to Golder the estimated useful life of the existing landfill site is 27 years or an estimated closure date of 2041. This was based on a number of factors including:

- The amount of air space currently available;
- Current population trends;
- Current diversion efforts;
- Current waste generation trends;
- Technology currently used for compaction of waste generated (currently 800 kg/m³); and
- Daily cover

Golder provided in its report provided detailed information on the requirements and procedures required during the closure of the current site along with post closure requirements. The following requirements are required during the closure of the Eastview Landfill Site:

1. Prior to the application of the final cover regrading to the final contours should take place in order to promote drainage away from the site and to discourage infiltration and local ponding of surface water.
2. The following final cover design has been proposed:
 - a. Topsoil of 0.15 m over subsoil
 - b. Subsoil of 0.35 m over protection layer
 - c. A barrier layer that is constructed by compacting clay soils to a thickness of no less than 0.60 m measured perpendicular to the compacted waste surface and achieving maximum permeability of 1×10^{-7} .
 - d. Contoured such that no water pools over the landfill cells.
 - e. Grade to achieve a minimum slope of 2% and not to exceed 30%
3. A policy be implemented to monitor top of waste elevations to assist in planning the placement of the final cover within a year of reaching the final elevations.
 - a. The policy will minimize the amount of leachate that will be generated and handled.
 - b. It will also allow for the initial settlement of the landfill to take place prior to placement of the final cap.
4. General allowance including decommissioning of site facilities such as upgrading the storm water control work and modification of the landfill gas collection system.
5. Submittal of a formal detailed Closure and Post Closure Plan which may include the following allowances:
 - a. Testing
 - b. Quality assurance/control
 - c. Legal fees

The following requirements are required during the post-closure phase for the Eastview Landfill Site:

1. That a post closure plan should operate for a period of no less than 25 years to ensure proper care of the site, associated infrastructure and environmental control systems.
2. Protect and maintain integrity of final cover system.
3. Providing repairs to final cover system as necessary to correct settlement, subsidence, erosion, leachate break-out
4. Protecting, maintain, and monitoring groundwater, leachate and landfill gas

A schedule of costs was included as part of the plan to allow management to prepare for the pending closure of the landfill in a fiscally responsible manner. It is estimated that

the average annual number of tonnes to be landfilled between 2015 and 2041 will be 49,500 tonnes. Working with Treasury, Sanitation administration needs to look at including these costs into its Capital Reserve planning.

The projected closure and post closure plans based on 2014 dollars in expected to be between \$5.3 million and \$6.5 million. This will require annual contribution to a capital recovery fund of between \$4.07 and \$4.96 on a per tonne basis. These costs are in addition to the costs already being covered through the landfill tipping fees.

2017 Closure and Post Closure Fees

In 2015 Sanitation presented to council and requested that a \$4.00 per tonne closure levy be put in place to cover the costs of closure. Council agreed to the request and the \$4.00 per tonne levy was implemented on January 1st 2016 on every tonne of material that enters the tipping face. The \$4.00 per tonne closure levy was maintained in the 2017 fee schedule for the landfill site.

In 2018, the City of Brandon will issue a bid opportunity to hire a consultant to update the Closure and Post-Closure plans to ensure that the \$4.00 per tonne levy implemented in 2016 is sufficient.

Planned Improvements and Major Projects in 2017

2017 Project Update: Design and Construction of New Landfill Cell #16

In 2017, the City of Brandon extended its agreement with KGS Group to include the design a new landfill cell, Cell #16 - the design was completed and posted for Tender in May 2017. Cell 16 is 222 m in length by 60 m in width and is joined to the liner of Cell 15 along its north edge, joined to the liners of Cells 13 and 14 along its east edge and joined to the liners of Cells 8 and 9 along its south edge.

Construction of the new cell commenced in July and was completed in November 2017. Throughout the fall of 2017 and winter of 2017/18, the City's residential collection trucks commenced placement of waste in Cell 16. Once the first lift of waste has been placed throughout the entire footprint of Cell 16, the cell will be opened up to accept refuse loads from commercial customers.

2017 Project Update: New Depot Bins

In 2017, twenty (20) new depot bins were purchased. These depot bins are compatible with the front load truck purchased in 2016 and have been useful in providing additional capacity at the City's existing depots. In addition, the new bins have been utilized for solid waste collection at several City of Brandon facilities as well as providing

temporary refuse and recycling collection for residents in areas impacted by major roadway construction.

Solid Waste Quantities

As part of the City of Brandon's Solid Waste Management System, the City owns and operates the Eastview Landfill Site located at NW 17-10-18, in the City of Brandon. This landfill is considered a Class 1 site, due to population (>5,000), services not only residents of the City, but also a number of municipalities within close proximity to the site along with commercial and industrial businesses. Starting in 2011 the Eastview Landfill Site started receiving solid waste from the RM of Cornwallis rather than it going to its own landfill. These types of partnerships could ultimately lead to the Eastview Landfill Site being considered more of a regional landfill rather than one mainly just for residents and businesses within the City of Brandon.

To segregate larger commercial vehicle traffic from residential traffic, waste from commercial haulers and City refuse collection was landfilled in cell 13 while cell 14 was used for waste hauled to site directly by residential customers and small businesses.

Active Cell

All waste generated within the City of Brandon is either hauled directly by City refuse trucks, commercial haulers or self-hauled by small businesses and residents. In 2017 the total amount of waste disposed of in the active cell was **36,127.16** tonnes which is down **4,525.16** tonnes from 2016.

Table 1: Eastview Landfill Material Quantities from 2013 to 2017

Materials	2013 Quantity (Tonnes)	2014 Quantity (Tonnes)	2015 Quantity (Tonnes)	2016 Quantity (Tonnes)	2017 Quantity (Tonnes)
Asbestos	322.58	412.30	139.56	294.34	163.45
Commercial Mixed Refuse	29,393.66	29,478.96	31,198.46	25,654.80	20,188.75
Residential Mixed Refuse	3,262.50	3,361.50	3,404.13	3,357.81	5,532.68
City Residential	10,296.96	9,976.70	10,233.13	11,024.75	9,155.07
City Internal	438.29	378.24	434.33	315.51	356.9
Wastewater Treatment Facility Sludge	353.93	477.80	426.71	409.75	730.31
Total	44,067.92	44,085.50	45,836.32	41,056.96	36,127.16

Asbestos is placed along the East side of the cell 11-12 where it is covered and surveyed. In order for anyone to bring asbestos to the landfill site for disposal they first need to

purchase a daily permit. A separate permit is required for each day that asbestos is being delivered on site. Contractors or anyone responsible for the disposal of asbestos must insure that safe handling of the material occurs when transporting and disposing.

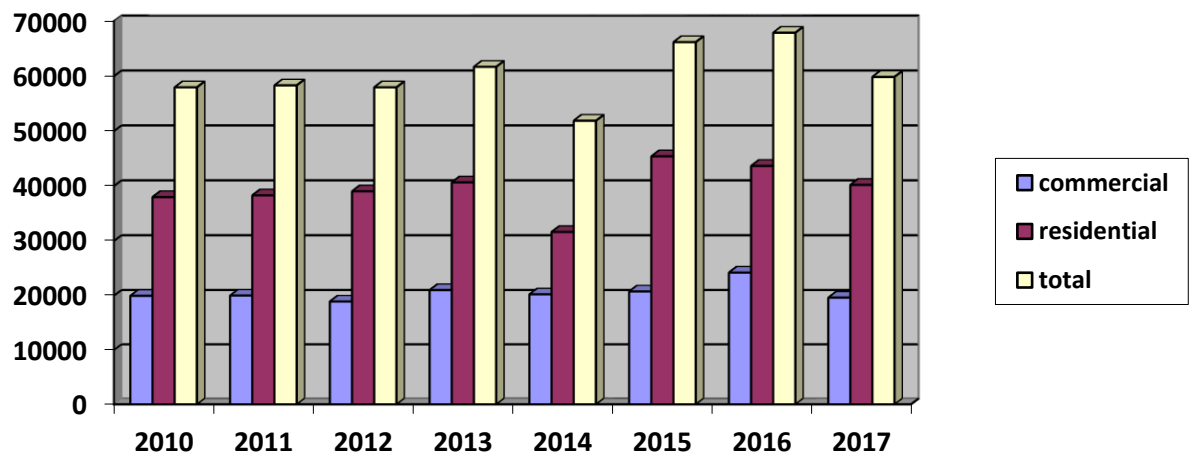
Residential refuse is the waste hauled to the landfill site by homeowners and/or occupants of residential property. This includes all material that is not considered recyclable, compostable or requires special handling. City residential is the waste hauled by City of Brandon refuse trucks and delivered to the active cell.

City internal waste is the refuse that is hauled to the landfill site and dropped off in the cell by other City departments.

Since 2010, the annual average for the total number of visitors entering the landfill has been 60,245. As illustrated in the following chart, the total number of visitors to the landfill site in 2017 was 59,877, with 40,225 of the visitors being residential and 19,652 of the visitors being commercial.

Although the total number of visitors in 2017 is consistent with the annual average seen since 2010, the number of commercial and residential visitors has decreased from 2016. Implementation of a new \$2 entrance fee for residential loads under 500kg, commencing January 1, 2017, is most likely the probable cause of this decrease. In addition, the commercial tipping fees increased from \$64 per tonne to \$75 per tonne on January 1, 2017 and may explain the decreased number of commercial visitors to the site as well. Furthermore, rainfall amounts in 2017 were only 65% of what is normal for the region and this decrease in rainfall would make incoming loads lighter due to less water weight.

Chart 1. Visitors to Eastview Landfill Site



Recycling and Organics Material Weights

During 2017, the Sanitation Department of the City of Brandon continued in its efforts to divert as much material from the active cell as possible. This effort is made in order to extend the useful life of the landfill and spread the costs of developing new cells over longer periods of time.

In 2014, the City assumed responsibility for the processing of residential and commercial recyclables within the MRF and awarded the shipping and marketing of recyclables to a third-party contractor. Processing of the recyclable material consists of the manual removal of residue (i.e. non-recyclable material) and old corrugated cardboard (OCC) from mixed recyclable material (or comingled material) on a sort line.

Comingled material, or mixed recycling, is comprised of the following materials collected from residential and commercial sources:

- Recyclable plastics (PET #1, HDPE #2, #4, #5 & #7 plastics)
- Newspaper & flyers
- Aluminum food and beverage containers
- Glass food and beverage containers
- Steel food and beverage containers
- Magazines and catalogues
- Gable top containers
- Boxboard
- Paper directories
- Corrugated cardboard
- Aseptic packaging

The MRF also accepts loads of OCC and shredded office paper (SOP) from commercial sources and in 2017, 1,208 tonnes of OCC and 168 tonnes of SOP were brought into the MRF by commercial haulers as single-stream loads.

Once sorted, comingled, OCC and SOP material are baled separately by MRF staff. The baled material is shipped by truck to the respective comingled processing plants for further sorting and OCC and SOP are shipped by truck by the Contractor to end market.

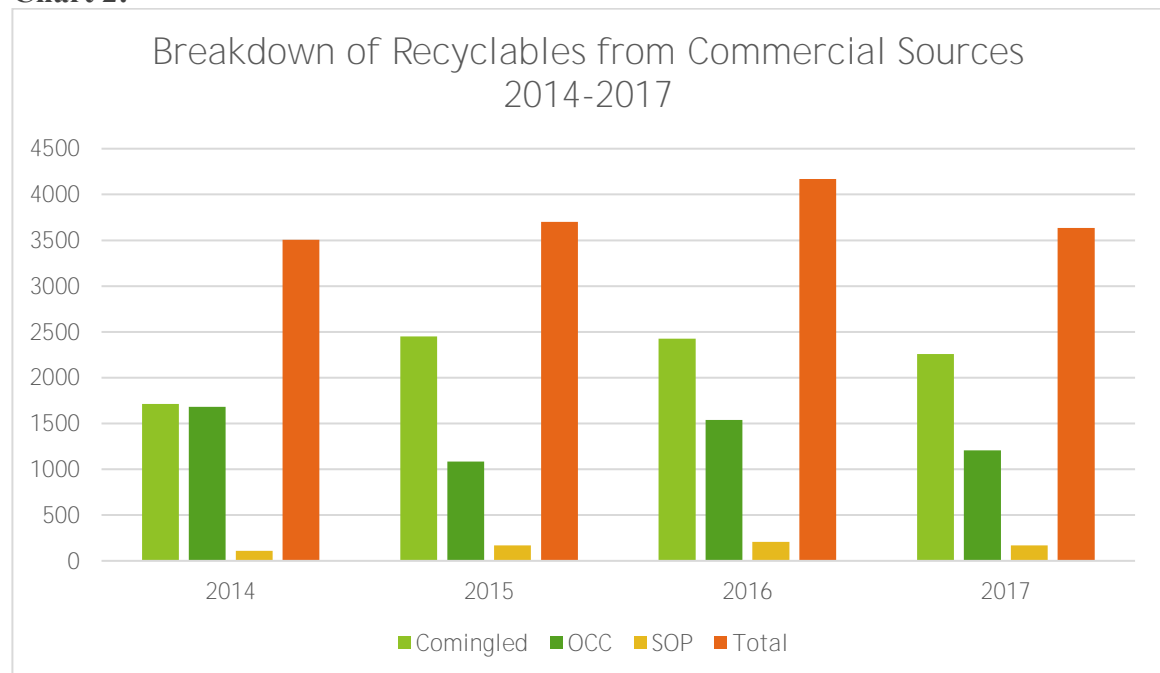
Table 2 shows the annual amounts of recyclable material from residential and commercial sources for the period of 2013 to 2017. After peaking at 8,200 total tonnes processed in 2012, the recycling facility saw a decrease in volumes during 2014-2015 (7,300 tonnes and 7,557 tonnes respectively) however this declining trend was reversed in 2016 with 8,111 tonnes, the largest annual quantity processed since the 2012 peak. The total amount of recyclable material collected in the MRF in 2017 (7,411.27) is consistent with the annual average of recycling totals collected at the facility during the period of 2013-2015.

Table 2: Recycling Comparison between 2013 to 2017

Materials	2013 Quantity (Tonnes)	2014 Quantity (Tonnes)	2015 Quantity (Tonnes)	2016 Quantity (Tonnes)	2017 Quantity (Tonnes)
Residential	3,910.12	3,828.67	3,854.00	3,940.00	3,777.06
Commercial	3,733.39	3,505.84	3,703.00	4,171.00	3,634.21
Total	7,643.51	7,334.51	7,557.00	8,111.00	7,411.27

The City of Brandon receives a rebate from the shipping and marketing contractor for the sale of OCC and SOP. The total amount of OCC shipped and marketed in 2017 was 2,487 tonnes, which means that approximately 1,279 tonnes of OCC was pulled from the comingled recycling stream on the MRF sort line. The 2017 Waste Audit performed by Multi-Material Stewardship Manitoba (MMSM) revealed that approximately 14% of the comingled material collected in residential blue bins is OCC.

Chart 2 shows the breakdown of comingled, OCC and SOP from commercial sources for the period of 2014 through to 2017.

Chart 2:

The City's agreement with the contractor responsible for the shipping and marketing of recyclables expired on December 31, 2017 therefore a bid opportunity was issued in December of 2017 so that this scope of work could be awarded under a new contract commencing in January 2018.

Compost Facility

Since the early 1990's the City of Brandon has been operating a yard and tree trimming collection facility. In the mid to late 1990's, the facility was upgraded to include a retention pond for the collection of any surface water runoff that originates from the compost piles.

In 2017, 6,273.42 tonnes of compostable material was collected on site and diverted from the active cell – this represents a decrease of 966.01 tonnes from the amount of compostable material collected in 2016. An absence of significant windstorms (a contributing factor in tree waste) and the decreased rainfall amounts experienced in the city in 2017 are thought to be the likely reason for the decreased tonnage.

Table 3: Organic Quantities between 2013 and 2017

Materials	2013 Quantity (Tonnes)	2014 Quantity (Tonnes)	2015 Quantity (Tonnes)	2016 Quantity (Tonnes)	2017 Quantity (Tonnes)
Residential	3,456.88	3,983.27	3,458.42	2,114.91	3,518.05
Commercial	5,773.05	6,315.99	4,630.46	3,225.20	1,477.60
Industrial	673.60	1,042.68	1,796.37	1,899.32	1,277.77
Total	9,903.53	11,341.94	9,885.25	7,239.43	6,273.42

Note: Industrial material is comprised of manure and bedding from sources such as the Keystone Centre. Both Residential and Commercial material is comprised of both yard waste and wood waste.

Yard waste and trees that are chipped are placed in windrows where they are processed into a reusable material using a compost turner pulled behind a loader. Once the windrowed material has completed the active composting phase, it is placed in a separate curing pile. Once the material has cured, it is mixed with black dirt, screened and then utilized by the City's Parks Department for landscaping purposes along City boulevards and other public areas.

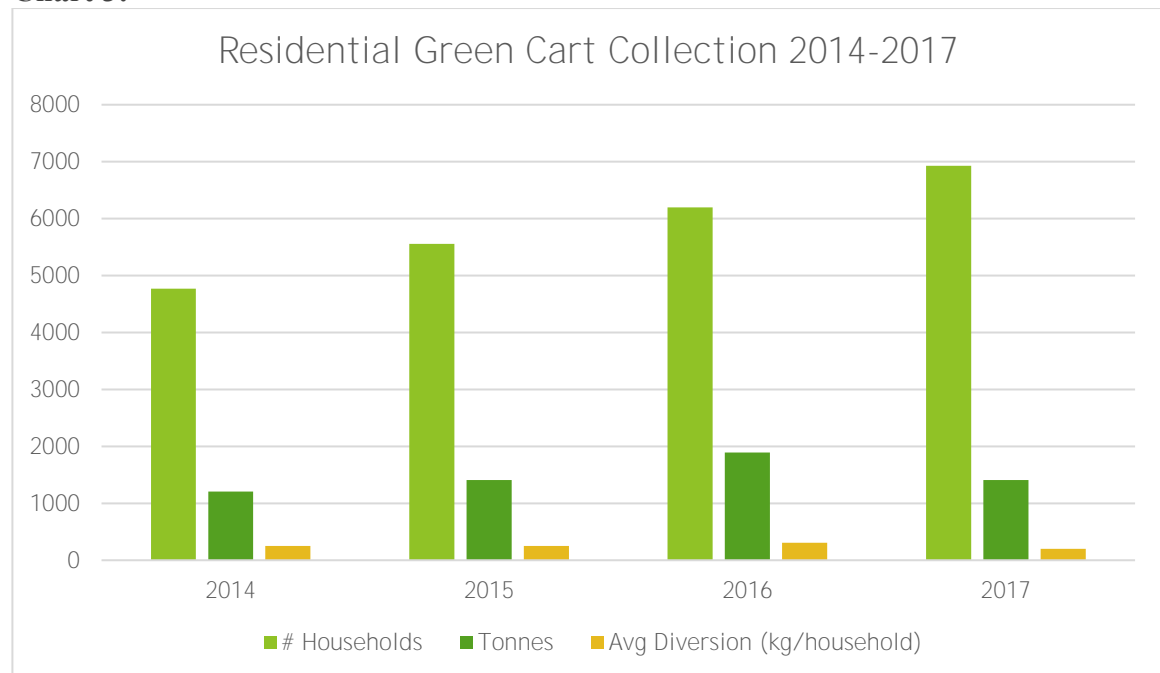
A total of 6 samples of processed compost product from 2017 was sent to A & L laboratories for analysis. The City of Brandon regularly gives away finished compost to the general public at special events such as Earth Day, Compost Day and other local environmentally-related events. In addition, finished compost material was available at the landfill entrance for residents to pick up free of charge until August of 2017. In total, 114.5 tonnes of finished compost was given away in 2017.

The City's Parks department used 46.35 tonnes of compost material in 2017 in their operations, some of which was delivered to the various community gardens located throughout the city. Compost was also made available for purchase as Soil Amendment in the 2017 City of Brandon Fee Schedule at a cost of \$22.50 per tonne. A total of 24.39

tonnes of compost was sold as soil amendment in 2017. All customers who purchased the product were instructed to mix one part soil amendment with three parts top soil.

By the end of 2017 there were 6,927 participating households registered and participating in the residential green cart program. Based on this participation, the average household participating in the green cart program in 2017 diverted approximately 203 kilograms. Chart 3 depicts the annual growth of the residential green cart collection program since 2014.

Chart 3:



In comparison, there are approximately 14,938 households that use the depots or self-haul compostable material to the landfill, which amounts to approximately 1,900 tonnes of organic material diverted from the landfill cell.

As more residents are taking part in the curbside residential green cart collection program, less organic material is being collected at the depots located throughout the City. As with the blue cart collection program for recyclable material, making a program more convenient for residents makes it easier to participate.

If the City of Brandon had full participation, or 14,938 households participating in the green cart program, there would be approximately 3,735 tonnes diverted from the tipping face, which amounts to approximately \$280,125 in landfill air space savings.

Table 4: Comparison of Collection Systems of Organic Materials

SYSTEM	2013 QUANTITY (TONNES)	%	2014 QUANTITY (TONNES)	%	2015 QUANTITY (TONNES)	%	2016 QUANTITY (TONNES)	%	2017 QUANTITY (TONNES)	%
DEPOTS	538.03	31	619.66	29	561.89	25	390.83	15	399.33	11
SELF-HAUL	392.41	22	294.94	14	297.98	13	334.39	13	1,500.48	43
CURBSIDE	815.61	47	1,208.86	57	1,411.02	62	1,899.32	72	1,618.25	46
TOTALS	1,746.05	100	2,123.46	100	2,270.89	100	2,624.54	100	3,518.06	100

From April to August in 2017, the City of Brandon rented a horizontal wood grinder to grind material from the stockpile of tree and wood waste collected on site. City staff operated the grinder and were successful in grinding 6,877.2 cubic metres of tree waste and 1,856.1 cubic metres of wood waste. In addition to using the ground tree waste in the compost operations (as previously described), tree chips are utilized on site as daily cover, insulation of the winter cover soil stockpile and as a protective surface for the compactor's path of travel from the landfill cell to the equipment storage area in the main building.

Landfill Gas Volume

In 2017, we collected and flared 77,763,752 (cfm) of landfill gas. This equates to approximately 13,156 tonnes of CO₂ being diverted from the landfill site during the year, which is a decrease of 5,682 tonnes from 2016. Moisture has the greatest effect on landfill gas generation therefore the decreased rainfall amounts experienced in 2017 at the site are the likely cause of the reduced landfill gas generation observed.

Given that the average passenger vehicle emits approximately 4.7 tonnes of CO₂ per year, the amount of CO₂ diverted from the landfill site in 2017 is equivalent to taking approximately 2,800 vehicles off the road.

Table 5: Annual Landfill Gas Generation, 2014-2017

	2014	2015	2016	2017
Annual CO2 equivalents	15,748	17,929	18,838	13,156
Landfill Gas Flow (scf)	89,654,006	91,325,592	92,123,944	77,763,752

Landfill and Collection Equipment

In 2017, the City of Brandon issued bid opportunities to replace the track dozer and wheel loader used in the landfill. The track dozer was delivered and put into use in January 2018 and the wheel loader was delivered and put into use in September 2017.

Residential Collection

The City of Brandon's residential curbside collection provides year-round weekly collection of residential recycling and refuse along with the weekly collection of green carts (for participating households) during the months of April through to November. Collection occurs on the same day each week (Tuesdays to Fridays) for each household, which has proven to be convenient for both residents and City operations.

The City of Brandon tracks bins issued to properties using a Bin Database, where the serial numbers assigned to each recycling, refuse and green bin are linked to the street address of the property they were issued. As per the Bin Database, there are 14,998 black bins (or refuse bins) in service and 14,855 blue bins (or recycling bins) in service. As there are approximately 14,938 households in the City of Brandon, the average rates of residential waste generation are as follows:

- Refuse: 613 kg/household
- Recycling: 253 kg/household

Waste Reduction and Diversion Initiatives

Residential Drop-off Area

At the Eastview Landfill Site there are a number of areas that are used for residential and commercial customers. Outside of the entrance gate, there are containers located for the drop-off of mixed recycling as well as yard waste.

Inside the landfill customers are able to drop off grass, trees, wood, metal, tires and glass in separate piles along the south side of the main landfill road. People delivering these items more often than not have loads mixed with other items that are non-recyclable. The scale operator is responsible for ensuring that each customer is notified of the need to separate each material into the proper pile and not to contaminate any pile with mixed refuse.

Customers entering the landfill with large amounts of recyclable materials are encouraged to deliver these items directly into the MRF.

Recycling Depots

The recycling depot system was first implemented in the City of Brandon in 1990. At that time there was only 3 locations for drop off and they were limited to only metals as that was the only product that could be sold locally. At that time materials were picked up on a weekly basis.

At its peak before the introduction of the new collection system nine (9) depots were located around the City of Brandon for residents to drop off their recyclable materials. The need to service these sites also grew from weekly to daily collection.

A major downfall of the depot network is the amount of illegal dumping that occurs at these sites. This has a negative impact on our recycling efforts as many loads become contaminated and, depending on the amount of contamination, may need to be landfilled. Unfortunately, due to the depots being unmanned, large volumes of items that are not recyclable end up at these locations. In 2017, the City of Brandon collected 506.26 tonnes of recyclable materials from its network of depots located throughout the City. The location of depots that accept recyclable materials are:

1. Sportsplex
2. 34th and Victoria
3. Capitol Theatre (also known as Landmark Cinemas)
4. Eastview landfill

As well as recyclables, the City also offers the collection of compostable material at the depots, at the following locations:

1. Sportsplex
2. 34th and Victoria
3. Westridge community center
4. 1st and Richmond
5. Rideau park
6. Eastview landfill

In 2017, the City purchased twenty (20) new depot bins to add to the twenty (20) bins that were purchased in 2016. All of the new bins are compatible with the front load truck that services the depots. During the 2017 construction season, the depot bins proved extremely helpful as they were used for refuse and recycling collection in residential areas experiencing major roadway re-construction as curbside collection was not possible in those areas.

At the end of December 2017, the recycling depot located at the Capitol Theatre was forced to close because the property owner required additional parking to accommodate the redevelopment of the Brandon Shoppers Mall. The recycling depot bins were removed from this location at the end of December and additional blue bins were placed at the 34th & Victoria and 1st & Richmond depots as a temporary measure until the City is able to secure an alternate depot location.

E-Waste

In June of 2007, the City of Brandon in partnership with Green Manitoba started a pilot project to start an E-waste collection program for residential customers. This program

would run from May to the end of September each year and became a year round program in 2010. City staff stack e-waste items on pallets and secures them for travel. Once enough pallets of e-waste products are collected to fill a truck, it is delivered to the Exner E-waste facility in Elie Manitoba for processing. Approximately 104.41 tonnes of e-waste was diverted from the landfill in 2017, which is a decrease from the 147.23 tonnes collected in 2016. Table 6 shows the total annual amounts of e-waste collected at the Eastview Landfill site since 2014.

Table 6: Annual Trend for E-Waste Collection

	2014 Quantity (tonnes)	2015 Quantity (tonnes)	2016 Quantity (tonnes)	2017 Quantity (tonnes)
Annual Total	129.52	178.52	147.23	104.41

Tires

Tire Stewardship Manitoba was launched in April of 2008 as a not-for-profit organization to help manage the problem of scrap tires. In 2017, 313.5 tonnes of scrap tires were removed from the Eastview Landfill Site, which is an increase from the 28.16 tonnes, removed in 2016.

Table 7 below shows the trend of scrap tire collection and removal from the landfill site since 2014. As shown, the amount of tires collected at the site in 2015 was significant at 522.06 tonnes. However this peak in 2015 was the result of the large backlog of stockpiled tires which was removed at the end of the 2015 calendar year thus skewing the quantity logged for that year.

Table 7: Annual Trend for Scrap Tire Collection & Removal

	2015 Quantity (tonnes)	2016 Quantity (tonnes)	2017 Quantity (tonnes)
Annual Total	522.06	28.16	313.5

Properly managed scrap tires reduce environmental risk and create jobs and economic opportunities in Manitoba. Manitoba's scrap tire products are sold locally and internationally. Scrap tires can be used to make flooring products for agricultural, recreational, and industrial use. They are used for artificial turf fields, rubberized asphalt, blast mats, geo-technical projects and energy recovery.

Metals

Table 8 below shows the annual trend of scrap metal collection and removal for the site. In 2017, 595.76 tonnes of metal was removed from the Eastview Landfill site by Gerrard

Metals, which represents a slight increase from the 580.40 tonnes removed from the site in 2016. All metals diverted and collected at the landfill site are loaded and hauled by Gerrard Metals for processing and then delivered to the end market.

Table 8: Annual Trend for Scrap Metal Collection & Removal

	2015 Quantity (tonnes)	2016 Quantity (tonnes)	2017 Quantity (tonnes)
Annual Total	387.33	580.40	595.76

Refrigeration & Air Conditioning Equipment

In 2017, a total of 463 devices containing refrigerant were delivered to the Eastview landfill for proper disposal, which is a decrease from the 641 devices collected at the site in 2016. Table 9 below shows the annual trend for the collection of refrigerant-containing devices at the landfill site since 2014.

Table 9: Annual Trend of Refrigeration Devices Collected

	2014 (# of units)	2015 (# of units)	2016 (# of units)	2017 (# of units)
Annual Total	374	567	641	463

Units containing refrigerant (or halocarbons) are stored in a segregated location on site until proper disposal. The City of Brandon issued and awarded a bid opportunity to a third-party contractor (Puresphera) in 2017 to both remove and destroy the refrigerants from the device and then recycle its components. Puresphera decommissioned a total of 4,636 devices throughout the 2017 calendar year, including:

- 2,123 refrigerators
- 462 freezers
- 1,341 air conditioners
- 630 water coolers
- 80 dehumidifiers

The proper removal and disposal of the refrigerants from these units has avoided the release of 6,485 tonnes equivalent CO₂ into the atmosphere. Furthermore, Puresphera's method of breaking down each device for further recycling has resulted in the following recoveries:

- Ferrous metals recycled: 186,532 kg
- Non-ferrous metals recycled: 29,208 kg
- Plastics: 27,268 kg
- Mercury: 346 g

- Recycled oil: 1,008 kg
- CFC's collected & destroyed: 1,651 kg

Extending Landfill Life

The main purpose in providing alternatives to disposal is to ensure the health and safety of residents not only in Brandon but that may be impacted by potential impacts to ground water supply. Through these efforts we gain the added benefit of extending the life of our current landfill. In the hierarchy of waste there are 7 options for handling waste with the least favored being disposal and the preferred option being prevention.



Environmental Protection Programs – Monitoring and Reporting

Leachate Management

In 1994 the Sanitation Department developed its first lined waste cell in phase 7 of the cell development plan. This cell was lined using a clay max liner. In addition to the liner a Leachate collection system was included in the design of this cell. The purpose of this collection system was to insure that Leachate that is produced as a result of precipitation and snow melt is contained on site before it can have a negative impact on the surrounding environment.

Also there are 8 manholes around the perimeter of the landfill that collects leachate before it is able to migrate into the ground water offsite.

Leachate is defined as the product of water percolating through refuse and collected in a lined refuse cell with perforated pipes that collect the Leachate and transport it to a manhole.

In addition to phase 7 completed in 1994 phases 11, 12 & 13 all drain into a manhole at the North end of cell 7, where it is then pumped directly to the Leachate storage tanks located directly west of the old scale building. This occurs approximately seven (7) months of the year.

Phases 8, 9 & 10 have been closed and capped with 3 to 5 feet of clay. We are not seeing the volume of Leachate coming out of these cells that we did when they were active.

This has reduced the need to have the manholes pumped on a regular basis. Where we used to pump these manholes weekly and sometime daily during periods of high precipitation we are now only required to pump as needed.

Development of cell 13 was planned in conjunction with cell 11 so that Leachate produced from cell 13 runs into cell 11 and then drains to the manhole at the north end. Once Leachate is contained in the storage tanks the waste water treatment facility can control the flow of the Leachate to its site for treatment.

Surface/ Ground Water Monitoring Program

In 2015, the ground water monitoring contract was issued for tender and KGS Group was awarded the contract to conduct a 3 year groundwater and surface water monitoring program at the Eastview Landfill Site. According to the contract, 30 groundwater wells (27 on site and 3 off site) and 3 surface water locations were sampled and reported on for the 2015 and 2016 calendar years.

Following consultation with Manitoba Sustainable Development (MSD), the City of Brandon issued a Scope Change to KGS Group to perform a comprehensive review of the water quality data collected from the site since 2009 and propose a streamlined monitoring and sampling program based on the Provincial Baseline Groundwater Chemistry Parameters. The proposed streamlined sampling and monitoring program was approved by MSD on December 4, 2017 and sampling according to the revised program was completed on December 8 and 12. The approved sampling and monitoring program included the following key items:

- Annual measurement of overburden (till and sand units) water levels within all 30 on-site groundwater monitoring wells;
- Establishment of a Primary Monitoring Network consisting of 10 on-site wells, 2 off-site wells, 3 surface water pond locations and a leachate monitoring location to be sampled on an annual basis;
- Establishment of a Secondary Monitoring Network consisting of 18 on-site wells and 1 off-site well sampled once every three years;
- Creation of set groundwater and surface water laboratory analytical packages, tailored to site conditions and current best practices.

A copy of the 2017 Water Quality Monitoring Report shall be provided with this annual report and the monitoring well locations for the site are provided in Figure 1 in the report.

Contaminated Soil Remediation Facility (S.R.F.)

Located at the landfill site north of the lime sludge pile is the soil remediation facility. At this location, contractors deliver soil contaminated with hydrocarbons from soil remediation projects or environmental accident sites. Soil is considered contaminated when it is found to be above the required CCME Guidelines.

The material is treated on site with the use of a romo plow attached to a track type dozer and once the level of hydrocarbons meets the guidelines stated in Guideline 96-05, Treatment Disposal of Petroleum Contaminated Soil, June 1996, revised April 2002, it becomes a beneficial product that can then be used as cover material in the cell. Eastview landfill received 493.14 tonnes of contaminated soil in 2017 – a decrease from the 1,619.08 tonnes collected by the site in 2016.

The site at the landfill has been developed to ensure that any surface water runoff is captured in the retention pond at the North end of the landfill.

A. Soil Receiving and Placement

The main objective of the S.R.F at the Eastview Landfill is to reduce hydrocarbon concentrations to acceptable levels such that the soils are suitable for appropriate re-use.

A permit is required for disposal of contaminated soils. Permits are sold and issued by the City of Brandon. Any loads of contaminated soil arriving at the landfill without a proper permit will not be accepted for remediation. The supervisor may also request lab analysis reports from the company doing the excavation.

1. Low Concentration Levels

Contaminated soil which contains levels below Manitoba Level III criteria for soil will be used directly as landfill cover material upon approval by the Site Supervisor and the local regional office of Manitoba Environment.

2. Permits

Upon arrival of a load of contaminated soil with proper permits, the Scale Operator shall record the permit number and attach it to any weigh tickets relating to the permit for documentation and invoicing.

3. Location

The S.R.F is clearly marked by signs and marker posts to prevent unauthorized access onto the treatment area and possible disturbance or compaction. When the driver is unfamiliar with location and placement procedures for the soil remediation facility, the

Scale Operator shall radio the site supervisor or any available site personnel to escort the driver to the S.R.F area and place the load accordingly depending on the particular type of contaminate.

4. Load Placement

All loads placed in the treatment area should be spread in an even layer in a manner that avoids compaction and inter-mixing of different soil shipments. Occasionally (depending on placement area available) soil may be placed in windrows which should not exceed 1 m in height. The windrows will require periodic mixing in a similar fashion to a treatment layer.

B. Soil Remediation Procedures

1. Treatment Layer

The final thickness of the treatment layer normally should not exceed 300 mm or the effective mixing depth of on-site equipment (rome plow), whichever is less.

2. Debris

Boulders and other large debris should be removed from the treatment layer to avoid potential damage to the tilling/aeration equipment, and to provide for optimum soil tillage.

3. Aeration

Handling of material will be done by employees that have read and understands the proper handling techniques that have been put forward in the GOG's and SOP's . The material is to be aerated by our rome plow which will be pulled with a track type dozer. Depending on the stability of soil more than 1 pass may be required to turn and fully aerate the impacted soil.

4. Irrigation

The treatment layer shall be thoroughly aerated (mixed) on a regular basis. In most cases, a tillage frequency of 1 to 2 weeks should provide optimum soil aeration. Periodic irrigation of the treatment layer may be necessary to avoid desiccation or prevent excessive windblown dust. However, saturation of the soil should be avoided to prevent run off from occurring and potential migration of contaminants outside S.R.F facility.

5. Equipment Contamination

After material has been aerated, the rome plow is to be placed in an area that will not interfere with ongoing work but must remain in the soil remediation facility. The track type dozer must be cleaned off so no contaminants leave the area and have the chance of falling off and contaminating other areas.

C. Inspections and Maintenance

Regular inspections shall be made by the operator at the time of aeration. S/he will report to the site supervisor any:

- Erosion, slope increase or damage to the berms surrounding the S.R.F area.
- Excessive “ponding” of surface water.
- Improper placement of contaminated loads.
- Visible signs of migration or leaching of surface water and/or contaminants.

Once reported to the supervisor s/he shall take corrective actions to insure the proper maintenance of the S.R.F

D. Surface Water Management

The Eastview Landfills S.R.F is designed to contain internal storm runoff and seepage in order to prevent offsite losses. Surface water is controlled by the use of ditches, along with a properly graded land surface. Prior to any discharge or removal of impounded surface water from the PCS treatment facility, thorough laboratory testing of the water for petroleum hydrocarbon compounds will be conducted and the results reviewed by Manitoba Environment.

E. Monitoring and Reporting

All contaminated soil material entering the landfill will be weighed and logged at the scale by the scale attendant. The attendant will log where the material originated, the hauler that has brought the material into the site and the final placement of the load. The weigh scales software program can generate reports on any contaminated soil entering the landfill based on a variety of parameters.

E.g. Origin, Company, Hauler, type of material etc.

Information is also transferred to an Excel spreadsheet by the Scale Operator at the end of each shift.

Household Hazardous Waste (HHW)

Since 1999 the City of Brandon in partnership with the Rotary Club of Brandon has been operating twice yearly HHW collection depots at the public works complex on Richmond Avenue East. Residents are encouraged to drop off any unwanted Household Hazardous Waste so that it can be disposed of in an environmentally responsible manner.

Starting on May 1st, 2012 the first phase of the Product Care Manitoba program was implemented with the following locations being allowed to accept paint and/or fluorescent lights for disposal.

1. Windsor Plywood – Paint only
2. J & G Rona – paint only
3. Janzen’s Paint & Decorating – paint only
4. General Paint – paint only

5. Brandon Home Hardware – paint only

The new HHW that was set up at the landfill in the fall of 2012 has seen a steady flow of visitors to the facility since it has opened. Landfill staff have been provided training from Product Care Manitoba and Miller Environmental during regular site visits to ensure the safe and proper handling of these potentially dangerous products takes place.

This program accepts the following:

1. Fluorescent lights
2. Flammable liquids/waste gasoline
3. Pesticides
4. Corrosives
5. Physically hazardous materials such as non-refillable gas cylinders

This program is operated by Product Care on behalf of product manufacturers and retailers in Manitoba in response to the provincial Household Hazardous Material and Prescribed Material Stewardship Regulation. The cost of the Manitoba HHW program is fully funded by Environmental Handling Fees that manufacturers and retailers pass onto the consumer.

Table 10 shows the annual trend of HHW material collected at the landfill's HHW depot since 2014. The quantity collected in 2017 of 35.56 tonnes represents a decrease from the 51.92 tonnes collected in 2016.

Table 10: Annual Trend of HHW Material Collected

	2014 Quantity (tonnes)	2015 Quantity (tonnes)	2016 Quantity (tonnes)	2017 Quantity (tonnes)
Annual Total	29.96	48.85	51.92	35.56

ECO Centre

In 2017, a total of 17,000 litres of used oil, 200 litres of glycol, 553 kg of used oil filters and 259 kg of used oil and antifreeze jugs were collected at the ECO centre. All used oil, filters and containers are collected on a regular basis by **Green For Life Environmental** where they are taken to be processed and recycled into a valuable new product.

A comparison of the annual totals for the used oil products collected at the landfill's ECO centre is provided in Table 11 below.

Table 11: Annual Trend of Used Oil Products Collected at ECO Centre

Used Oil Product	2015 Quantities	2016 Quantities	2017 Quantities
Used Oil	15,300 L	10,600 L	17,000 L
Glycol/ antifreeze	800 L	1,000 L	200 L
Used Oil Filters	1,368 kg	828 kg	553 kg
Used Oil & Antifreeze Containers	1,567 kg	1,176 kg	259 kg

The annual inspection of the ECO center by MARRC (Manitoba Association for Resource Recovery Corporation, the non-profit organization responsible for the recycling of used oil products) took place on October 23, 2017 and the inspector was impressed with our facility considering we have in excess of 900 customers dropping off used oil products annually.

Operational Information

Contingency Plan Implementation

In February of 2008 the Sanitation department adopted its new Landfill Contingency/Emergency Response Plan in order to meet the requirements of its new operating permit. As required by the permit it was developed and shall be maintained in accordance with the Industrial Emergency Response Planning Guide (MIAC September, 1996)

In 2017, there were no major incidents that occurred at the Eastview Landfill.

Weigh Scale Operations

The scale is operated by staff that is trained on the weigh scale program (PC Scale) to help expedite the flow of traffic in and out of the landfill site. The PC Scale program was implemented in July of 2014. The scale operator is responsible to both monitor and control the material accepted into the landfill. If any loads are considered suspicious by the operator he/she shall communicate with landfill operators to more closely monitor unloading.

All loads are weighed on the inbound scale and weighed again on the out bound scale to get a net weight that customers are then billed according to City of Brandon Fee Schedule. The scale operator is also responsible for setting up new customers and updating existing customer information as required. The scale operator communicates

with customers on the location that drop off will occur depending on the types and amounts of waste being delivered.

Based on information provided by the customer the scale operator shall segment loads by type of material to help determine the amounts of each type of waste that are entering the site on any given day. The scale operator shall also insure that all permits are taken out by haulers of special waste such as asbestos and contaminated soil to insure that safe disposal of this material takes place.

Training of new staff on weigh scale operations takes place with guidance from the scale operator to insure that all procedures and tasks are being completed in a consistent manner. Training will take place to insure proper opening procedures takes place, account setup, weighing procedures, reporting standards are being met, monitoring of loads and proper closing procedures takes place.

Nuisance Control

When activity is noticed at the landfill we first determine the type of nuisance. Once this occurs we have two (2) courses of action that we take. The landfill manager will be notified of the type of nuisance, the location of the sighting and number. He will then notify either animal control or the contractor to take the proper course of action in managing the situation.

In 2017, sightings of nuisances were within reasonable levels when compared to the activity seen in prior years. The Material Recovery Facility continues to be monitored on a monthly basis by the Poulin's, the contractor responsible for this service and no areas of concern were brought to our attention in 2017.

Odour and Noise Control

We do not have an issue with noise control in the landfill due to the location of our facility. We are located .5 miles from the nearest residential dwelling. The use of daily cover has proven successful in mitigating the unpleasant odours that can originate from the site. In 2017, the landfill site did receive an odour complaint from motorist travelling past the site on Victoria Avenue East. The Landfill Leadhand investigated to determine the probable source of the odour and concluded that the odour was originating from an industrial plant located east of the landfill.