

**BEAVER REGIONAL WASTE
MANAGEMENT SERVICES COMMISSION**

**2017 ANNUAL REPORT
RYLEY CLASS II LANDFILL**

Compiled March 2018



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- Appendix B: Environmental Monitoring Reports, Spring and Fall 2017
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1.0 INTRODUCTION

1.1 OWNERSHIP

The Beaver Regional Landfill is solely owned by the Beaver Regional Waste Management Services Commission (the “Commission”) – a Regional Services Commission incorporated under the provisions of Part 15.1 of the Municipal Government Act, currently operating as Beaver Municipal Solutions. The landfill site is comprised of all of the NE, SE, and NW quarters of 10-50-17-W4 excepting the 21.3-acre parcel in quarter NW-10 owned by Mr. Doyle Booth. No other parties have any stake or share in the ownership of this facility. Please refer to Figure 1. Landfill Location within Beaver County, and Figure 2. 2017 Aerial Photography Showing Site Location and Approved Landfill Boundary.

1.2 APPROVAL AND REPORTING REQUIREMENTS

This annual report for 2017 has been compiled and submitted to Alberta Environment and Parks (AEP) to satisfy the Approval conditions and requirements as outlined in the August 29, 2007 Approval, No. 20754-01-00, a copy of which is provided in Appendix A.

The Approval contains the following reporting requirements:

- **Section 4.10.9** - The approval holder shall submit an Annual Landfill Operation Report which shall include, at a minimum, all of the following:
 - A summary of the information monitored as required in TABLE 4.10-A, TABLE 4.10-B, and TABLE 4.10-C;
 - A summary of the dates when the landfill closed or restricted access to the working face due to wind conditions;
 - A summary of the waste types stored, including their origin;
 - A summary of the landfill gas monitoring data interpretation as per Section 4.10.6;
 - All landfill scheduled inspection records;
 - A summary of the performance of the landfill run-on and run-off control systems, and;
 - A summary of any changes to the Operations Plan since the last Annual Landfill Operations Report.

- **Section 4.11.7** - The approval holder shall compile an Annual Groundwater Monitoring Program Summary Report which shall include, at a minimum, all of the following information in the Standards for Landfills in Alberta, June 2007, as amended.

2.0 FORMAT

This annual report is intended to satisfy the regulatory requirements as expressed in the Approval, and to provide a summary of the principal activities conducted during 2017. This information is provided in the following format:

- A brief description of the Landfill;
- A summary of the regulatory setting of the Landfill;
- Summaries of the principal development, operating, environmental monitoring and closure activities undertaken at the Landfill by the Commission in 2017;
- A summary of the major interactions between the Commission and the public and regulatory communities during 2017;
- Reporting data required by the Approval, and;
- Appendices providing the details of information summarized and referenced in the foregoing sections of the report.

3.0 LANDFILL DESCRIPTION

Section 1.1.2(h) of the Approval defines the Landfill as being “... *all buildings, structures, storage facilities, material handling facilities, process and pollution abatement equipment, vessels, cells, roadways, berms, monitor wells, pipelines and other installations, and includes the land, located on the NE, SE, and NW of Section 10, Township 50, Range 17, West of the 4th Meridian, that is being or has been used or held for or in connection with the Beaver Regional Class II landfill...*”.

The Landfill is located approximately 3km north of Highway 14, and approximately 2km northeast of the Village of Ryley. The permitted site is surrounded by the following land uses:

- To the north by municipal Township Road 502, to the north of which is agricultural land;
- To the west by Secondary Highway 854, to the west of which lies a Class I waste management facility which is owned and operated by Clean Harbors Environmental Services Inc.;
- To the southwest by agricultural land and the sewage lagoon operated by the Village of Ryley;
- To the south by agricultural land; and
- To the east by municipal Range Road 172, to the east of which is agricultural land.

4.0 REGULATORY SETTING

4.1 REGULATORY HISTORY

The regulatory history of the Landfill is summarized as follows:

- **September 12, 1989** – a small portion of the site (now known as Stage 1) was permitted for waste disposal through Permit to Operate a Waste Management Facility W1075, as issued by the Vegreville Health Unit under the Alberta Public Health Act;
- **May 3, 1994** – an Approval to Develop/Permit to Operate was issued by Vegreville Health Unit for the development of Stage 2, including related site infrastructure;
- **July 12, 1994** – a Development Permit was issued for Stage 2 by Beaver County;
- **March 1996** – application was filed with the East Central Health Authority to “...construct and operate such additional stages as are necessary to develop out the balance of the Lands...”. This application was subsequently re-filed with Alberta Environmental Protection in 1997 due to the transfer of legislative jurisdiction for landfills from Alberta Health to Alberta Environmental Protection in 1996;
- **August 13, 1996** – a development Permit was issued to the Commission by Beaver County for landfill development on the “balance of the Lands” within NE ¼ - 10 – 50 – 17 – W4M;
- **November 1996** – additional development conditions were added to the August 1996 Development Permit by the Development Appeal Board;
- **May 29, 1998** – the Amending Approval to Permit W1075 was issued to the Commission by Alberta Environmental Protection;
- **July 13, 1999** – the Alberta Environmental Appeal Board recommended to the Minister of Environment that the Amending Approval to Permit W1075 be modified, and that additional requirements be placed on the Commission;
- **August 25, 1999** – the Alberta Minister of Environment responded to the recommendations of the Environmental Appeal Board with a Ministerial Order which varied the Amending Approval to Permit W1075;
- **July 24, 2000** – Alberta Environment confirmed that the Commission response to the Ministerial Order complied with the requirements in that order;
- **September 17, 2001** – a new Development Permit was issued for the development of the remainder of the landfill, superseding all previous development permits;
- **November 16, 2005** – an application for the Approval Renewal was filed with Alberta Environment as required under the provisions of the Alberta Activities Designation Regulation;

- **November 16, 2005** – Amendment 20754-00-04 was issued by Alberta Environment to remove the chloride concentration limits for the recirculation of leachate in the Stage 1 cell;
- **June 28, 2006** – Ministerial Order 13/006 was issued by the Minister of Environment accepting the Alberta Environment Appeals Board recommendation to uphold the Director's decision on Amendment 20754-00-04, subject to conditions for the submission of supplementary clarification reports;
- **August 22, 2006** - the term of Amending Approval 20754 was extended to September 1, 2007 by letter from Alberta Environment;
- **August 31, 2006** – Five reports were filed with Alberta Environment to satisfy the Ministerial Order 13/006 conditions;
- **September 18, 2006** – Alberta Environment acknowledged receipt of the five reports as required to satisfy the conditions of Ministerial Order 13/006, and;
- **August 29, 2007** – The new and current Operating Approval No. 20754-01-00 was issued;
- **December 17 and 18, 2008** – Alberta Environment Appeals Board heard an appeal from a local resident;
- **January 21, 2009** – Ministerial Order 03/2009 was issued in response to recommendations from the Environment Appeals Board setting out additional conditions for Approval 20754-00-00;
- **June 19, 2009** – Response to Ministerial Order 03/2009, three reports and a revised Operations Plan were submitted to the Director;
- **December 23, 2009** – Alberta Environment acknowledged receipt of the three reports as required to satisfy the conditions of Ministerial Order 03/2009, and suggested further changes to the Operations Plan;
- **June 2, 2010** – A revised Operations Plan was submitted to the Director incorporating changes to the storm water management reporting protocols as suggested by the Office of the Director;
- **March 27, 2017** – Submitted application for renewal of Operating Approval No. 20754-01-00;
- **August 15, 2017** – Alberta Environment and Parks extended the expiry date for Operating Approval No. 20754-01-00 to September 1, 2018;
- **November 29, 2017** – A development permit was issued from Beaver County to the Commission to increase the height of the Landfill to match what was issued from AEP.

Operation of the Landfill is currently bound by the requirements of the regulatory authorizations described in Section 1 of this report. The principal requirements of the regulatory authorizations governing the Landfill are summarized in the following sub-sections of the report.

4.2 ALBERTA ENVIRONMENT APPROVAL

Operation of the Landfill is authorized by Alberta Environment in the form of Approval 0020754-01-00 under the *Alberta Environmental Protection and Enhancement Act*. The Approval contains conditions relating to a number of operational, monitoring and closure aspects of the Landfill.

4.3 DEVELOPMENT PERMIT

Operation and development of the Landfill is in accordance with the development permit No. 2001-09-17-01 issued by Beaver County on September 17, 2001, and in accordance with the County's land use bylaw 98-801. The land use bylaw was amended in December 2001 with respect to lines and grades, and again in June 2004 to remove operating hour restrictions to accommodate tentative staging and operational requirements. Further amended in November 29, 2017 to increase the height to match the existing AEP permit.

5.0 DEVELOPMENT AND IMPROVEMENTS

5.1 CELL DEVELOPMENT

The Commission did undertake new cell construction during 2017. The construction report for Cell 8B and 7A will be provided to AEP by separate submission.

5.2 SITE IMPROVEMENTS

The Commission did not undertake additional closure activities during 2017.

6.0 REPORTING REQUIREMENTS

6.1 STORM WATER CONTROL SYSTEMS

The storm water control system is designed to prevent surface run-off from leaving the landfill property. Surface run-off is directed by ditches to the northeast and west storm water ponds. Storm water is pumped from the northeast pond to the west pond as needed to prevent overflow and to allow for release. Figure 3. Basic Landfill Plan 2017 identifies the storm water collection ponds employed at the landfill during 2017.

Storm water from the west storm water detention pond was released to the designated release point in the tributary to Bible Creek as per the Stored Water Release Notification Protocol (June 17, 2009). In 2017, there were two release events, advance notification was provided to AEP and affected neighbour(s) by letters dated February 16, 2017 and November 28, 2017. The storm water was released from the West Detention Pond March 1, 2017 to April 7, 2017 releasing approximately 104,500 m³, and December 4, 2017 to January 2, 2018 releasing approximately 79,650 m³. The total storm water released in 2017 is calculated to be

approximately 184,150 m³. A copy of each release letter including the storm water analytical report is provided in Appendix C.

6.2 APPROVAL TABLE 4.10-A (OPERATIONS – MONITORING AND REPORTING REQUIREMENTS)

6.2.1 Weight and Type of Solid Waste Received and Removed

The types and quantities of waste received during 2017 are summarized in Table 1.

Table 1. Summary of Waste Quantities Received During 2017.

WASTE TYPE	*QUANTITY (tonnes)
MSW	416,317.89
C & D	1,070.02
Contaminated Soil	350,834.61
Special Waste	12,515.75
Liquid Waste <i>(Containerized – see description in 6.2.2 below)</i>	1,591.76
Total	782,330.03

*Note: Totals reflect the amount of waste placed in the landfill. Other materials accepted at the landfill for recycling or re-use (e.g. scrap metal, wood waste, clean concrete, used oil) are detailed in Section 6.3.9.

6.2.2 Volume and Type of Liquid Waste Received

A total of 1,591.76 tonnes of liquid waste was received at the Landfill during 2017. This waste was comprised of outdated liquor received in containers of less than 5 litres each.

6.2.3 Hazardous Wastes Detection

A minimum target frequency of 10% of all inbound loads of MSW and C&D waste are randomly inspected for hazardous and prohibited wastes. Identification is by visual inspection and/or by interviews with waste haulers. Daily load inspections are performed and documented. Details of these inspections are documented and retained in the Operating Record.

In addition, the landfill attendants and equipment operators are constantly monitoring the tipping face and all offloading vehicles for any indications of the presence of unacceptable materials. Any offending materials are immediately recovered and removed from the site in accordance with the provisions of the Operations Plan.

Table 2 below summarizes the loads and waste permit applications that were rejected during 2017. Details of all material rejected are recorded and retained in the official Operating Record.

Table 2. Summary of Rejected Loads and Waste Permit Applications During 2017.

Month	Waste Material	Reason for Rejection	Source
April	Contaminated Soil	Exceeds Class 2 limits	Waste Permit Application
May	Contaminated Soil	Exceeds Class 2 limits	Waste Permit Application
August	Special Waste	Unsuitable Material for Landfill	Waste Permit Application
October	Contaminated Soil	Exceeds Class 2 limits	Waste Permit Application

It should be noted the Commission does not operate a Household Hazardous Waste (HHW) program at this time but cooperates with Beaver County to provide an annual community round-up. Additionally, in the event that HHW is left at the landfill inadvertently by site users it is removed for recycling or disposal by approved processors at an approved facility. Manifests and reports related to this material are maintained in the Operating Record.

6.2.4 Location of Waste Deposited

Waste received during 2017 was placed in landfill cells 1, 2, 3, 4-1, 4-2, 5, 7A and 8. Figure 3. Basic Landfill Plan 2017 illustrates the location of all landfill cells that were used during 2017 operations. Survey data from 2017 is presented in tabular form in Appendix E. Figure 6. December 2017 Contours offers a visual contour map that provides an illustration of the waste placed at the landfill by the end of 2017.

Detailed coordinates for the placement of all manifested wastes (i.e. contaminated soils and wastes requiring special handling) are documented and retained in the Operating Record. A monthly summary of reports is prepared and retained in the Operating Record to document the landfilling progress and the locations in which waste was deposited during the month. A daily record is maintained using GPS coordinates to document the location of waste deposited during the day.

6.2.5 Working Face Width

As in previous years, a working face width of 20 m was used as an operating target for routine operations during 2017. The face was surveyed and staked during the year to assist in achieving this target. No significant deviations from this target are identified in the site operating records.

6.2.6 Daily Cover Thickness

In accordance with the provisions of Section 1.5.4 of the Operations Plan, daily cover was applied when required to ensure that no waste was left exposed for more than 24 hours. When daily cover was required, it was applied at a

minimum thickness of 150 mm. Due to the cohesive nature of the clay cover materials available at the site, actual cover thicknesses are expected to have generally exceeded this minimum.

Clay from onsite stockpiles and contaminated soils meeting the minimum requirements were utilized for daily cover in 2017. This was done in such a manner as to ensure that there would not be any leaching from the contaminated soils to the storm water detention ponds.

6.2.7 Intermediate Soil Cover

During 2017, inside intermediate soil cover was placed to an average thickness of about 300 mm over lifts of waste to provide a solid base for truck and equipment traffic and subsequent lifts of waste. This intermediate cover is breached prior to placement of subsequent lifts of waste to accommodate downward migration of leachate and upward migration of landfill gas. On landfill stages that are not actively accepting waste, intermediate soil cover is used to maintain access roads for truck and equipment traffic.

Intermediate side cover was also placed upon outside slopes to an average thickness of 300 mm over lifts of waste to completely cover waste from view and wind. Maintenance of this cover is completed as needed on all landfill slopes.

Other intermediate soil cover uses included construction of access roads and ramps within the active landfill cells. Table 3 summarizes where approximately 129,220 tonnes of intermediate soil cover were used during 2017.

Table 3. Intermediate Soil Cover Used During 2017

Location of Use	Total (tonnes)
Cell 1	1,014
Cell 2	0
Cell 3	0
Cell 4-1	1,040
Cell 4-2	0
Cell 5	5,876
Cell 7A	22,022
Cell 8	99,268
Totals	129,220

Information regarding the inventory of topsoil and subsoil stockpiled at the Landfill for future closure and reclamation is included in section 6.3.14.

6.2.8 Reclamation Test Plots

As per Section 3.2.5 of the 2005 Approval Application, information describing the work completed on the reclamation test plots was provided as part of the 2012 Annual Report. The majority of this information was contained in a report prepared by Paragon Soil and Environmental Consulting. The purpose of the test plots was to demonstrate and evaluate the effectiveness of alternative capping and reclamation configurations to support vegetation on a sustainable basis.

During 2013, the Commission (through AECOM) provided technical information to AESRD to support the cap configuration approved within the 2005 Approval Application as follows:

- Barrier – compacted clay: 600 mm
- Subsoil: 290 mm
- Topsoil: 130 mm

Based on information provided by the Commission (through AECOM), AESRD approved this cap configuration. The Commission has incorporated the configuration into its closure activities since 2014.

6.2.9 Leachate Level Management

The Approval requires that leachate be removed from the sumps when levels exceed 300 mm above the lowest point on the liner excluding the sumps. The Approval also requires monthly monitoring of leachate levels within the Landfill. However, monitoring and removal of leachate were done at least weekly during 2017, or more frequently during periods of high leachate accumulation to reduce the time that leachate accumulates on the liner system.

Use of both on-site recirculation and disposal continued through 2017 whereby 2,991.97 m³ were recirculated within the landfill and 1,932 m³ were hauled off-site for disposal at a licensed deep-well facility. The quantity of leachate removed from each landfill cell is shown in Table 4. Leachate level measurements and disposal records from licensed deep well disposal facilities are retained in the Operating Record.

Table 4. Summary of Leachate Quantity Removed from Landfill Cells During 2017.

Month	Cell 1	Cell 2	Cell 3	Cell 4-1	Cell 4-2	Cell 7A	Cell 8	Total
January	36.57	24.76	1.36	39.53	15.90		0.00	118.12
February	29.99	21.13	0.00	30.67	14.99		0.00	96.77
March	32.26	21.81	0.00	29.53	17.27		38.16	139.02
April	26.58	15.90	1.36	29.99	14.09		56.20	144.12
May	29.99	20.45	0.00	28.17	15.68		998.00	1092.28
June	29.08	16.36	0.00	33.53	15.36		657.00	751.32
July	22.72	10.68	0.00	34.08	15.22		137.60	220.29
August	24.99	4.32	0.00	29.53	10.45	54.52	83.20	207.01
September	23.40	4.09	0.00	39.53	10.90	9.09	0.00	87.01
October	21.54	2.70	1.59	42.14	14.11	99.96	363.47	545.50
November	31.42	2.39	0.00	51.11	19.72	290.78	364.38	759.79
December	23.13	1.64	23.17	41.23	14.33	177.65	481.60	762.74
Total	331.65	146.21	27.48	429.03	178.01	631.99	3179.61	4923.97

Notes: 1. All volumes in m³.

2. Spike in leachate quantity extracted from Cell 8 between May and June 2017 was a result of Cell 8B construction and is not expected to represent normal annual volumes.

3. As of August 2017, leachate from Cell 8A flows into Cell 8B which has a sump to collect leachate.

4. As of August 2017, Cell 7A was completed and includes a sump.

5. Cell 5 leachate flows into Cell 8 and is collected from the Cell 8 sump.

6.2.10 Leachate Quality

As per Section 4.10 of Approval 20754-01-00, Table 4.10-B: Leachate Monitoring and Reporting Requirements, leachate samples from each of the active sumps are to be analyzed annually. For the 2017 reporting year, the Commission prepared data tables and trend charts incorporating leachate data from 2007 to present to better illustrate leachate quality on an ongoing basis. Review of the data by the Commission noted the following:

- Cell 1: Leachate quality appears relatively consistent.
- Cell 2: Leachate quality appears relatively consistent.
- Cell 3: Due to a blockage in the Cell 3 leachate extraction pipe the leachate was not sampled from 2011 to 2014. Sampling resumed in 2015. Recent leachate quality appears relatively consistent.
- Cell 4-1: Leachate quality appears relatively consistent.
- Cell 4-2: Leachate quality appears relatively consistent.
- Cell 7: 2017 represents the first year of testing.
- Cell 8: Leachate quality appears relatively consistent.

Data tables and charts are included in Appendix F. The approximate locations of the leachate collection sumps are illustrated on Figure 5. Leachate Extraction, Landfill Gas and Groundwater Monitoring Well Locations.

6.2.11 Landfill Gas Monitoring

The landfill gas-monitoring network is comprised of four sub-surface monitoring probes at the locations illustrated in Figure 5. Landfill gas monitoring was conducted in accordance with the Landfill Gas Monitoring Plan set out in the Operations Plan. Field monitoring was conducted by C.E. Moell and Associates on behalf of the Commission on June 26, 2017 and October 6, 2017. For convenience, the conclusions from the Spring and Fall 2017 reports has been included below.

Spring 2017 Landfill Gas Monitoring Conclusion:

“Field measurements from the landfill gas monitoring system indicate the absence of either detectable methane or abnormal pneumatic pressures within the shallow subsurface bounding landfill areas.”

Fall 2017 Landfill Gas Monitoring Conclusion:

“Field measurements from the landfill gas monitoring system indicate the absence of either detectable methane or abnormal pneumatic pressures within the shallow subsurface bounding landfill areas. High groundwater levels in one of the monitoring probes are attributed to overflow from an adjacent drainage ditch.”

As such, no recommendations arose from the 2017 landfill gas monitoring events. The summary of the gas monitoring procedures and details of monitoring results are provided in Section 4.0 of the C.E. Moell & Associates spring and fall monitoring reports included in Appendix B.

6.3 MISCELLANEOUS DATA

6.3.1 Wastes Requiring Special Handling

Wastes requiring special handling were accepted at the landfill during 2017 including contaminated soils, abattoir wastes (cattle under 30 months – non SRM), animal carcasses (cattle under 30 months – non SRM), asbestos, and other restricted non-hazardous wastes. Wastes requiring special handling require approval from the Operations Manager, General Manager or designate prior to acceptance and must be accompanied by a special waste manifest. Handling and disposal is done in accordance with the approved Operations Plan and the Commission's Health and Safety Policy. Detailed coordinates for the placement of all manifested wastes (i.e. contaminated soils and wastes requiring special handling) are documented and retained in the Operating Record. A monthly summary of reports is prepared and retained in the Operating Record to document the landfilling progress and the locations in which waste was deposited during the month. A daily record is maintained using GPS coordinates to document the location of waste deposited during the day. The Beaver Regional Landfill is not accepting any SRM wastes. In addition, acceptance of asbestos-containing waste was suspended during 2017 and had not resumed at year's end.

6.3.2 Revisions to the Operations Plan

There were no changes or revisions to the Operations Plan in the year 2017. A full review of the Operations Plan is ongoing and the Commission will provide a copy of the revised Operations Plan to AEP for review and approval upon completion.

6.3.3 Emergency Response

One emergency response activity did occur at the landfill during 2017. On August 17, 2017, fire crews from Beaver Emergency Services Commission were dispatched to extinguish a fire in the landfill. The fire was extinguished without incident and the source of the fire could not be determined by Emergency Responders.

6.3.4 Complaints

There were no formal complaints regarding the landfill operation received during 2017 through AEP. A summary table of contraventions reportable to AEP is maintained in the Operating Record.

6.3.5 Environmental and Compliance Audits

Internal landfill inspections are performed weekly by landfill staff and are reviewed by the Operations Manager. Monthly internal audits are completed by the Operations Manager, the Health, Safety and Environment Coordinator or designate. Results are tabulated with assignment to the responsible staff member to rectify any fault or omission.

The following external audits were performed in 2017:

- Personnel from the Beaver Emergency Services Commission conducted a fire inspection on June 9, 2017, and identified five concerns. All concerns were addressed by the Commission and the actions taken were deemed compliant by follow-up inspection on July 21, 2017. The Fire Inspection report is included in Appendix C.

6.3.6 Other Operational Issues

As part of normal operations, landfill scales are calibrated annually to ensure accurate weight reporting for customers and AEP. Calibration was completed on June 28, 2017 all scale inspections passed and the scales were successfully re-certified. Calibration records for permanent scales used during 2017 are included in Appendix C.

The most recent annual fly over was conducted on June 30, 2017. Information from this survey has been used within this annual report.

6.3.7 Supervising Operator and Certified Operators

The operations management of the Beaver Regional Landfill is under the direction and control of the Operations Manager Mark Lowe, Certificate No. 362. The following certified operators are responsible for overseeing and performing daily routine landfilling operations activities:

- Landfill Operator: Mr. Mark Lowe, Certificate No. 362
- Landfill Operator: Mr. Richard Dueck, Certificate No. 0123
- Landfill Operator: Mr. Nick Baker, Certificate No. 516
- Landfill Operator: Mr. Arno Purin, Certificate No. 246 and SWANA No. 93918 –Certified Landfill Technical Associate Certificate
- Landfill Operator: Mr. Malcolm Swinamer, Certificate No. 471
- Landfill Operator: Mr. Weston Magnuson, Certificate No. 523
- Landfill Operator: Ms. Shauna Candlish, Certificate No. 517

The Operations Manager reports to the General Manager of the Beaver Regional Waste Management Services Commission, Pierre Breau, P. Eng. The General Manager is responsible for all Commission operations and administrative services. An organizational chart is included in Appendix D.

6.3.8 Communities Serviced and Estimated Populations

The Beaver Regional Landfill provides direct waste disposal services for the communities that comprise the Commission (i.e. Beaver County, the Town of Tofield, the Town of Viking, the Village of Holden and the Village of Ryley). The Landfill also provides disposal services for several regional communities. The

populations of these communities as published by Statistics Canada for the most recent census are presented in Table 6. In addition, the Landfill receives waste from a variety of private commercial haulers which are not specifically associated with individual communities.

Table 6. Summary of Community / Regional Populations.

Community	Population
Beaver County	5,905
Town of Tofield	2,081
Town of Viking	1,083
Village of Holden	350
Village of Ryley	483
Town of Vermilion	4,545
Vermilion River County	8,116
Cold Lake	16,914
Bonnyville	6,837
Municipal District of Bonnyville (no.87)	11,836
Parkland County*	32,097
Town of Stony Plain*	17,189
City of Edmonton**	932,500

* The Commission services one of four transfer stations in Parkland County, which also serves the Town of Stony Plain.

** The City of Edmonton has two primary options for disposal; the waste received at the Commission landfill only represents a portion of their total disposal requirements.

6.3.9 Waste Storage and Recycling

During 2017, all wastes received at the landfill were disposed into the active landfill Cell, or were diverted into one of the various recycling activities operated by the Commission at the Landfill, including:

- Pesticide container recycling is operated by Beaver County and Alberta Agriculture as a service to the local farm community. Pesticide containers (triple-rinsed) are received and stored in a dedicated pesticide container storage building and containers are shredded and removed from the site on an annual basis.
- Tire recycling facility operated in cooperation with the Alberta Recycling Management Authority. Old tires are received, sorted and stored in bunkers for recycling and removed as volumes dictate.
- As part of the Alberta Used Oil Management Association (AUOMA), used oil is received and stored in a dedicated used oil tank while used oil filters and empty plastic oil jugs are received and stored in dedicated 205 litre barrels for recycling. The oil tank and filter barrels are serviced as required by Safety-Kleen Canada Inc. or GFL Environmental. Used oil

from landfill equipment and vehicles is re-used in a used oil burner to create heat for the main landfill shop. Excess used oil is added to the used oil tank for recycling.

- Electronics recycling bin operated in cooperation with the Alberta Recycling Management Authority. Electronic components are received and stored in an enclosed roll-off container for removal and recycling as required.
- Wet cell batteries recycling operated in cooperation with DBS Environmental. Used batteries are received and stored in a special container for removal and recycling as required.
- White goods and miscellaneous metals are received and stored in an open stockpile for recycling. Any appliances containing refrigerant gases are separated, and the refrigerant removed by a certified technician prior to recycling. All metals are baled or loose loaded and shipped to a steel foundry for recycling on an annual basis or as volumes require. 320.92 tonnes were processed in 2017.
- Clean concrete is received and stockpiled for future recycling. Periodically, depending on the accumulated volume, a portable crusher is brought in to crush the concrete for re-use as a road base construction material. During 2017, 391.65 tonnes of clean concrete were accepted.
- Paint recycling is operated in cooperation with the Alberta Recycling Management Authority. Waste paint and waste paint material is received and stored in a special container for removal and recycling as required by DBS Environmental.

6.3.10 Fugitive Waste Retrieval Reporting

Fugitive litter recovery is done on an ongoing basis by the landfill staff. Additional temporary staff are brought in to assist when required. The Commission aggressively controls fugitive litter at the tipping face through a combination of measures as outlined in the Operations Plan.

A fugitive waste retrieval log is maintained and reported in the Monthly Activities Summary Report. These reports have been placed in the Operating Record.

6.3.11 Groundwater Monitoring

Groundwater monitoring was conducted in the spring and fall of 2017 by C.E. Moell and Associates on behalf of the Commission in accordance with the approved Groundwater Monitoring Plan. The current groundwater-monitoring network includes:

- 28 on-site groundwater monitoring wells around the Landfill;
- A groundwater interceptor trench, and;

- Two privately owned off-site dug-out systems.

The detailed reports prepared by C.E. Moell and Associates describe and interpret the results of the 2017 monitoring events and are provided in Appendix B.

For convenience, the recommendations from the 2017 spring and fall reports are included below.

Spring 2017 Recommendations:

“As changes in groundwater chemistry observed during the current event are partially attributable to the purging of wells completed in low-permeability deposits, passive sampling should be instituted for those remaining wells where purging prior to sampling has been standard practice. Wells applicable to this recommendation are 96-2A, 96-3A and 97-1B.”

“The current owner of the former Dennis Wood property should be contacted for authorization to re-establish biannual sampling of the dugout water.”

Fall 2017 Recommendations:

“As the chemistry of groundwater delivered by wells 96-3A and 97-1B continues to deteriorate (due to downward movement of higher-mineralized groundwater through leaky annuli), both wells should be properly abandoned (decommissioned and sealed). Replacement wells are not considered necessary because both locations are adequately monitored by functional wells remaining at each site.”

“The current owner of the former Dennis Wood property should be contacted to determine if biannual sampling of the dugout water can be re-established.”

The Commission has accepted the recommended changes to the groundwater monitoring program and will implement them during 2018 unless directed otherwise by AEP upon review of this annual report. New owner of Dennis Wood’s property was contacted and no response has been received to date.

6.3.12 Closure and Post-Closure care

No closure activity in 2017.

6.3.13 Estimate of Landfill Space Remaining

The ultimate capacity of the Landfill (N.E ¼ and SE ¼ - 10 as approved) is estimated to be 36,177,000 m³ (Reference Table 3 – Section 3.1.1.3 of the 2005 Approval Renewal Application document.). As calculated from monthly volume surveys conducted by Commission staff and verified by Amec Foster Wheeler Environment and Infrastructure, the net volume of air space

consumed in 2017 was 664,317 m³. The cumulative air space consumed from commencement of operations in 1995 through to December 31, 2017 is calculated to be 7,508,015 m³. The total air space remaining (developed and developable) in the Landfill (NE ¼ and SE ¼- 10 combined as approved) is calculated to be 28,668,985 m³. The 2017 year end survey tables are included in Appendix E while Figure 6. December 2017 Contours offers a visual contour map that provides an illustration of the waste placed at the landfill by the end of 2017.

6.3.14 Topsoil and Subsoil Management

The Commission employs both physical survey and fly-over survey to verify and track the inventory of topsoil, clay and subsoil contained in stockpiles at the Landfill for future closure and reclamation activities. As mentioned in Section 6.3.6 of this report, the most recent soil inventory data was collected during the annual fly-over survey conducted by Amec Foster Wheeler Environment and Infrastructure on June 30, 2017. From this, the soil inventory has been updated and quantities maintained in the Operating Record.

6.4 OTHER REPORTING

A visitor's log is kept at the Scale for anyone entering the landfill site. Copies of the log are incorporated into the monthly reports which are placed and retained in the Operating Record.

7.0 CLOSURE

This report has been prepared by the Beaver Regional Waste Management Services Commission, owner and operator of the landfill facility, incorporating information provided by the Commission's respective consultants of record. The information provided in this report is, to the best of my knowledge, an accurate representation of the 2017 activities at the Beaver Regional Landfill.

Respectfully submitted,
Beaver Regional Waste Management Services Commission



Mark Lowe
Operations Manager
March 29, 2018