

Keremeos Landfill

2023 Annual Report



Operational Certificate: 15278



Prepared by:

Regional District of Okanagan-Similkameen

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Appendices

Appendix I – 2023 Environmental Monitoring Report

1. EXECUTIVE SUMMARY

The Keremeos Landfill is located within the RDOS, approximately two kilometers north of the Village of Keremeos, British Columbia. The site is located on the north bank of the Similkameen River at the junction of Similkameen River Valley and the smaller Keremeos Creek valley. The estimated closed landfilled area is 8 hectares.

The Keremeos Landfill is a natural attenuation landfill. The Keremeos Landfill property does not have a leachate collection system nor a landfill gas collection system.

The Keremeos Landfill was previously approved to operate as a landfill for the disposal of municipal solid waste and other wastes authorized by the Regional Waste Manager at a maximum rate of 6,000 tonnes per year. The Keremeos Landfill received waste from Keremeos, Olalla, Hedley, Cawston, and the adjacent areas until June 2007. The Keremeos Facility now serves as a transfer station and discontinued burial on site. All waste is shipped to the Campbell Mountain Landfill (Operational Certificate 15274).

A modified shipping container for used motor oil and antifreeze was obtained in 2020 through the BC Used Oil Management Association (BCUOMA). Used oil and antifreeze began to be collected in 2020.

The RDOS is working with the Province to receive approval on the necessary Closure Plan to complete the final closure layer on top of the area previously used for landfilling activity at the Keremeos Transfer Station. Final cover and works are intended to be installed once approvals from the Province are received. In 2019, clause 2.2.3 of the Operational Certificate was amended by the Province to allow the final closure works to be completed June 30, 2022.

The Keremeos Transfer Station (KTS) currently operates under Operational Certificate (OC) No. 15278 (January 8, 2015) issued to RDOS by the British Columbia Ministry of Environment and Climate Change Strategy (BC Moe). This report was prepared in accordance with the annual landfill reporting requirements outlined in Section 3.0 of the OC. Table 1 provides the concordance between sections in the OC related to monitoring and reporting and their locations in this current document.

EcoScape Environmental Consultants Ltd. (EECL) was retained by the Regional District of Okanagan-Similkameen (RDOS) to prepare the environmental monitoring section of the 2023 Environmental Monitoring Report for the Keremeos Transfer Station (KTS); their report is provided in the attached Appendix I.

Table 1: Operational Certificate 15278 Concordance Table

Approved Schedule Condition	Corresponding Report Information Section
Section 3 Monitoring and Reporting Requirements	
3.1 Municipal Solid Waste Measurement	
3.1.1 Provide and maintain a weigh scale and record the weight of refuse discharged to the landfill over a 24-hour period.	No waste landfilled at this site.
3.2.1 Record the weight of recyclable and reusable materials not being discharged and that are being separated, stored or processed at the landfill over a 24-hour period.	Table 2
3.2 Groundwater Monitoring Program	
3.2 The Regional District must implement and maintain a groundwater and surface water monitoring program prepared by a qualified professional.	2023 Environmental Monitoring Report
3.3 Vegetation Monitoring	2023 Environmental Monitoring Report
3.4 Sampling and Analyses	
3.4.1 Sampling is to be carried out in accordance with the procedures described in the 'British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples, 2003 Edition'	2023 Environmental Monitoring Report
3.4.2 Analyses are to be carried out in accordance with procedures described in the 'British Columbia Laboratory Manual (2009 Permittee Edition)'	Analyses completed by CARO Analytical in Kelowna, BC a CALA Accredited Laboratory
3.5 Quality Assurance	
3.5 Quality Assurance	2023 Environmental Monitoring Report
3.6 Changes to the Sampling and Monitoring Program	
3.6 Changes to the Sampling and Monitoring Program	2023 Environmental Monitoring Report
3.7 Annual Report	
3.7 (a) Executive Summary	I. Executive Summary
3.7 (b) The type and tonnage of waste received, recycled, stored on site and discharged / landfilled for the year	2.3 Transfer Station Activities, 2.4 Waste Disposal, Table 2

3.7 (c) Any proposed changes to the Design, Operations and Closure Plan and the environmental monitoring program	2.5 2023 Operation Plan, and 2023 Environmental Monitoring Report
3.7 (d) Review of the preceding year of an operations update which summarizes landfill development work and airspace filled, work completed in the subject reporting year and work planned for the subsequent year. A summary of any new information or changes to the facilities and plans, assessments, surveys, programs and reports.	2.3 Transfer Station Activities, 2.5 2023 Operation Plan, 3 Conclusions and Recommendations
3.7 (e) Occurrences or observations of wildlife (medium and large carnivores) at the facility;	2023 Environmental Monitoring Report
3.7 (f) A statement regarding the facility's progress in reducing the regional solid waste stream being landfilled and the objectives of the Regional Solid Waste Management Plan	2.3 Transfer Station Activities, Table 2
3.7 (g) An outline of the current Environmental Monitoring Program and a compendium of all environmental monitoring data in accordance with the Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills and Landfill Criteria for Municipal Solid Waste. Must document any effect of the discharge on the quality of the receiving environment using appropriate statistical and graphical analysis. Trend analyses, as well as an evaluation of the impacts of the discharges on the receiving environment	2023 Environmental Monitoring Report
3.7 (h) A list of training programs completed for landfill operators during the previous year.	None in 2023

2. TRANSFER STATION OPERATION AND MANAGEMENT

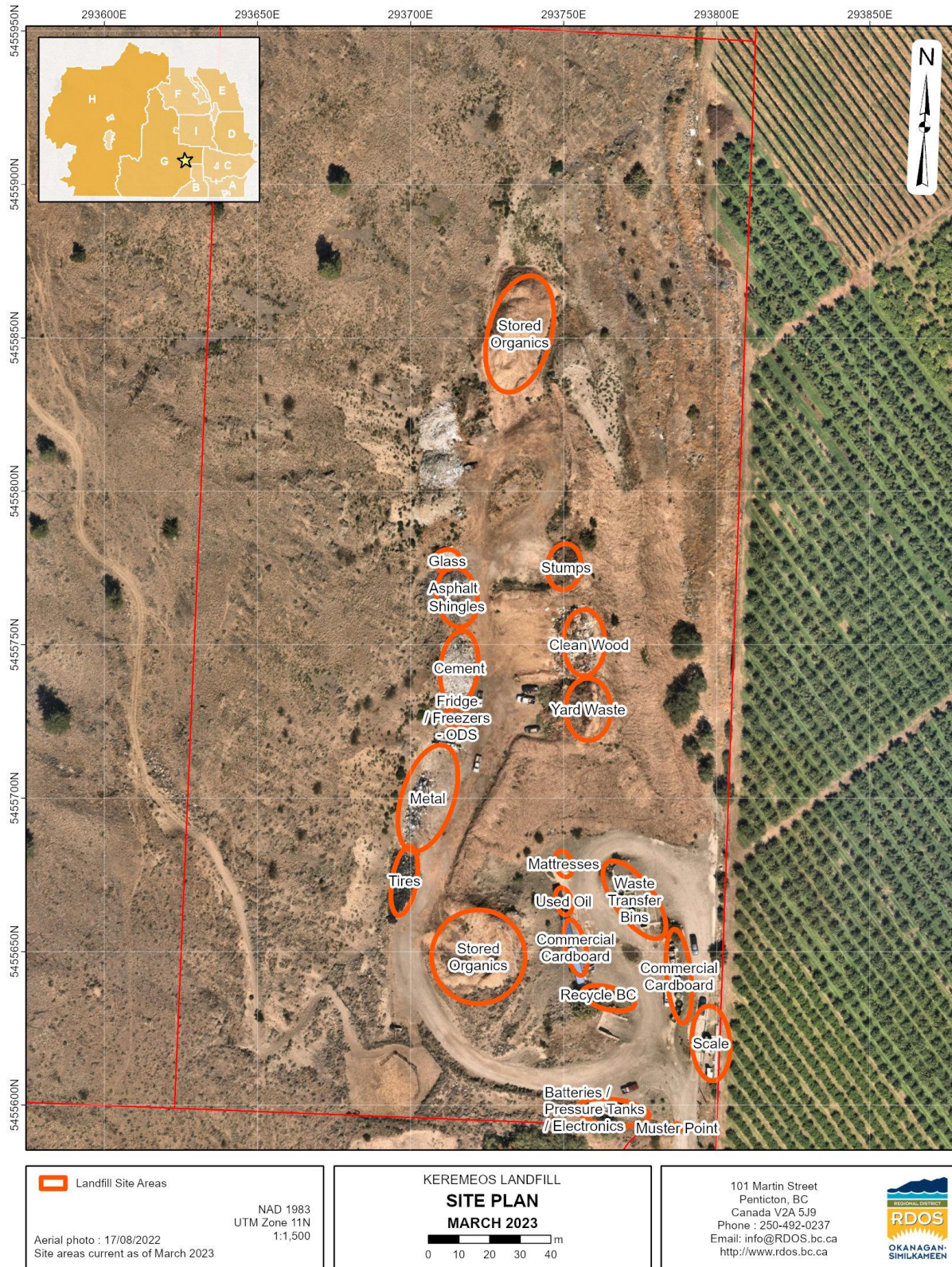
The following section details the operation and management of the Site.

2.1 KTS OPERATIONS

The KTS is currently operated by the RDOS. The transfer station currently serves Keremeos, Olalla, Hedley, Cawston, and adjacent areas. Collected waste is disposed of at the Campbell Mountain Landfill in Penticton, BC or mixed Demolition, Land Clearing, and Construction Waste (DLC) is redirected to the Okanagan Falls Sanitary Facility. Commercial loads of waste or mixed DLC material are not received at the Transfer Station and directed to Campbell Mountain Landfill or Okanagan Falls Landfill as applicable.

The KTS operated from 10:00 am to 4:00 pm on Sundays' year around and noon till 4:00 pm on Wednesdays from March 1st to end of November. If a Statutory holiday falls on an opening day, the Site stays open or moves the opening to another day on the same week. The site is maintained (push-up piles, clear snow and load out recyclables) after hours of operation under Contract. Transfer Station bins are serviced under Contract (transport to Campbell Mountain dispose of materials and return to Keremeos).

Figure 1: 2023 March - Site Plan of Keremeos Landfill



2.2 KTS FACILITIES

The KTS entrance is located at the southeast corner and is accessed from El Rancho Road via Keremeos Bypass Road. The gate at the entrance is locked when the KTS is closed to prevent unauthorized vehicle entrance and waste disposal. The RDOS installed a Scale at the entrance of the Keremeos Site in 2013, during hours of operation the Site is staffed by a Scale Attendant and a Spotter in an RDOS Vehicle.

In addition to the attendant station and Scale, the following facilities are maintained at the KTS:

- Small Vehicle Transfer station 3 bay 40 yard containers
- Small roll off for mattresses
- Asphalt shingles stockpile
- Scrap metal pile
- Battery and Pressurized tank storage
- Electronics, Small Appliances and Lighting Equipment
- Used tire storage
- Wood and yard waste pile
- Mattress transfer bin
- Glass storage
- Concrete/Rubble Stockpile
- Lock Block Bunker for overflow
- Used oil converted container (commenced in 2020 and supplied by BCUOMA)

2.3 TRANSFER STATION ACTIVITIES

In keeping with the Regional Solid Waste Management Plan, recyclable/compostable materials, collected at the KTS, are segregated prior to being transported off-site for recycling or composting. The following materials were collected and recycled from the KTS, during the reporting period:

- RecycleBC Residential Recycling
- Commercial Cardboard and Glass
- Soil
- Concrete and Asphalt Roofing
- Batteries and Electronic Waste
- Metal
- Tires and Pressurized Tanks
- White Wood, Yard Waste, Agricultural Organics and tree stumps
- Mattresses
- Used Oil and Antifreeze (commenced in 2020)

In 2023, Keremeos Landfill Transfer Station received 2490 tonnes of materials, with 665 tonnes hauled for disposal to the Campbell Mountain Landfill and 1306 tonnes diverted. An increase of approximately 17.6% of materials received in 2023 compared to 2022. In 2022, 2050 tonnes of materials was received at the Transfer Station, with 1082 tonnes diverted and 968 tonnes hauled to Campbell Mountain.

Table 2 Tonnage of Waste and Diverted Materials Summary

Tonnes - Disposed at Campbell Mountain Landfill	2016	2017	2018	2019	2020	2021	2022	2023
Agricultural Plastics (For Disposal Campbell Mnt)	36.475	27.35	33.61	45.58	42.87	34.66	17.88	51.50
Gypsum			26.995	20.74	17.11	19.62	10.34	11.24
Illegal Dumping	1.505	0	0.42	0.19	2.14	1.55	1.0	0
Invasive / Infested Vegetation	0.5	0.23	0.815	0.11	0.32	0.48	0.78	3.44
Refuse (for disposal to CML)	355.7	452.7	434.1	441.3	499.0	499.2	930.51	593.99
Preserved Wood	13.3	11.36	9.21	12.47	8.6	11.74	7.5	6.79
Tar and Gravel Roofing				6.9	0.58	0	0	0
TOTAL – Disposed to Campbell Mountain Landfill	407.5	491.66	505.11	527.31	570.66	567.24	968.01	665.13
Tonnes - Diverted Onsite	2016	2017	2018	2019	2020	2021	2022	2023
Asphalt Roofing	81.71	0	78.57	145.05	198.48	123.19	73.38	58.74
Batteries	1.7	4.48	2.83	1.86	0.89	2.87	2.7	
Bulky Waste	0	0	0	0	0	0.14	0	1.53
CURBSIDE BULKY WASTE				19.51	0	0	0	0
Mattress / Box spring Diversion				231.15	270.85	366.7		284.82
Metal	206.14	97.63	144.14	121.2	161.1	188.71	166.67	202.10
Wood Salvage				0.27	0.47	0	0	0
Tree Stumps (m3 converted)	34.2	0	0	0	0	3.51	2.26	3.52
White Wood (m3 converted)	227.24	332.12	254.09	367.4	151.6	394.74	184.23	229.85
Organics (m3 converted) Yard Waste	226.1	345.8	462.59	483.3	249.1	320.67	285.31	352.56
Yard Waste Small Dimension		1.79	1.215	16.33	35.62	36.19	29.06	31.84
Processed Organics - White Wood	0.16		0	0	0	0	0	0
Small Pressurized Tanks (units converted) 1 and 5 lb	0.1674	0.19215	0.0684	0.0504	0.1557	.40	0	0
Large Pressurized Tanks (units converted) 10 lbs and up	2.52	2.5976	1.3736	6.4464	1.6728	3.58	6.59	3.96
Tires	6.662	12.474	6.215	20.59045	10.84	16.28	227.05	213.21
Rims with Tires(units converted)	1.826	3.663	1.529	2.04	2.52	4.25	7.86	3.03
Tires Oversized	0.13	0.31	0.09	0.12	1.21	0	.02	0.34
Cardboard/Recycling	31.22	31.5	5.79	13.81	47.89	11.78	20.02	17.38
Clean Fill / Sod	3.005	2.05	6.985	6.37	35.51	35.81	22.59	8.12
Concrete/Asphalt/Ceramic/Rock	35.23	40.38	37.05	34.74	38.1	58.05	46.16	36.67
Concrete Non-Recyclable				1.85			-	
Glass	4.345	5.95	2.88	1.39	2.48	.59	0.22	1.05
Used Motor Oil					1.76	4.06	0.9	

Antifreeze (Glycol)	0	0	0	0	0	0	0.2	
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Tonnes - Diverted Onsite (cont.)	2016	2017	2018	2019	2020	2021	2022	2023
Blue Bag Recyclables	20.09	24.09	53.955	69.26	0	0	0	70.48
MMBC Fibre	0	0	0	0.12	5.37	1.534	2.65	3.567
MMBC Containers	0	0	0	2.72	1.57	2.892	2.75	2.191
MMBC Film Plastic	1.3	1.09	1.62	0.7	0.38	.960	0.374	
MMBC Polystyrene Coloured	0	0.02	0.04	0.05	0.03	.065	.028	.026
MMBC Polystyrene White	0.5	0.52	0.804	0.94	0.62	.752	0.659	.671
MMBC Glass	2.3	1.29	0	0.64	3.69	3.652	3.26	3.153
RecycleBC Other Flexible Plastic				0.77	0.51	.858	1.22	1.649
TOTAL - Diverted Onsite	886.5	907.9	1061.8	1548.7	1222.4	1582.23	1082.38	1306.38
TOTALS RECEIVED	1294.0	1399.6	1566.9	2076.0	1793.1	2149.47	2050.39	2489.63

Supplemental Information	2016	2017	2018	2019	2020	2021	2022	2023
Agricultural Organics (tonnes incl. Organics)	20.5	9.1	5.31	29.21	18.43	4.35	23.8	27.44
Electronic Waste (tonnes incl. Campbell Mountain)	13.1	14.49	15.58	16.03	13.04	11.45		
Mattress / Box spring Diversion (units)	0	0	0	368	429	366	496	284
Refrigeration Units (units)	219	273	248	322	389	358	214	196
Loads Received at Scale (number)	9,813	10,480	12,835	13,343	14,604	16,124	15,159	16,369

tonnes/m³tonnes/m³tonnes/m³

tonnes/unit

tonnes/unit

tonnes/unit

tonnes/unit

Notes:

The tonnage data from recycled Asphalt Roofing, Batteries, Household Hazardous Waste, Metal, Tree Stumps, White Wood, Organics, Propane Tanks, Tires, Rims on Tires, RecycleBC and Stewardship materials supplied by contractors.

Table 3: Loads Recorded Per Month in 2022

Loads	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
2021	909	531	1629	1436	1913	1532	1506	1747	1674	1613	1288	346	16,124
2022	426	677	1721	1489	1710	1693	1689	1521	1553	1792	621	267	15,159
2023	754	788	1155	1805	1700	1604	1082	1779	1651	1721	1396	626	16,061

2.4 WASTE DISPOSAL

Since 2007, the KTS has operated as a transfer station and no longer landfills waste.

2.5 2022 OPERATION PLAN

The KTS continued to operate as a transfer station in 2023.

In 2023 the KTS operated from 10:00 am to 4:00 pm on Sunday's year around and 10:00 am till 4:00 pm on Wednesdays from March 1st to end of November.

2.6 LANDFILL CLOSURE

In late 2017 the Regional District of Okanagan Similkameen (RDOS) submitted a Landfill Closure Plan to the Ministry of Environment for the Keremeos Landfill. The closure plan proposed the use of only granular material as a final cover, instead of the more commonly used granular cover topped with a vegetative organic material.

The Province requested that additional monitoring wells be installed near the boundary of the landfill to show that leachate potentially generated by the landfill is not having an adverse impact on the surrounding environment, before approval of the alternate cover would be considered. In March 2020, two new monitoring wells were installed under the supervision of a hydrogeological Engineer who determined the optimal locations for the wells where they would have the highest chance of encountering leachate.

The monitoring wells were sampled 3 times in 2023. The test results showed that the landfill is having little to no impact on the groundwater surrounding the landfill and minimal leachate is migrating off site. In March 2022, the RDOS submitted the results from the two new monitoring wells to the Ministry of Environment. The RDOS is still awaiting approval from the Ministry of Environment to proceed with the proposed closure plan.

2.7 OPERATION AND MAINTENANCE EXPENDITURES

The operational and maintenance expenditures included KTS operator costs, labour costs and other expenses. The construction of works identified in the draft Closure Plan were budgeted to be spent in 2020 but this work has been delayed to allow for the RDOS and Province to determine the closure works

required. The allocated Gas Tax Funding has been carried forward to offset the required closure costs as required. A summary 2023 financial statement for the KTS is presented below.

Table 4: Financial Summary for 2023 for KTS

GL Account	2023 Actual	2023 Budget
Revenues		
1-3400-1000 - TAX REQUISITION	(260,426)	(260,426)
1-3400-1800 - GRANT IN LIEU OF TAXES	(1,296)	-
1-3400-2700 - INTEREST INCOME	(18,259)	-
1-3400-2920 – GRANT REVENUE	(115,913)	(110,000)
1-3400-4600 - FEES - REFUSE DISPOSAL	41	-
1-3400-4630 - SCRAP METAL RECYCLING	(27,035)	(40,000)
1-3400-4640 - MMBC REVENUE	(1,554)	-
1-3400-6000 - TRANSFER FROM RESERVE	-	(12,758)
1-3400-6070-TRANSFER FROM RESERVE - GAS TAX	-	-
1-3400-8900 Federal Grants	-	-
1-3400-9000- Miscellaneous Revenue	(2,513)	(5,177)
1-3400-9000- Miscellaneous Revenue	(232)	-
1-3400-9990 - PRIOR YEARS SURPLUS	(19,476)	(19,476)
TOTAL REVENUES	(446,663)	(447,837)
Expenses		
2-3400-1000 - SALARIES & WAGES	80,033	104,125
2-3400-1001- SALARIES & WAGES – NEW FTE	-	6,605
2-3400-1400 - ADMINISTRATION CHARGES	19,018	19,018
2-3400-2500 - OPERATIONS	18,963	19,200
2-3400-2501 OPERATIONS – SHAWDOW BID	-	-
2-3400-2591 - TIPPING FEES	77,889	74,309
2-3400-3000 - CONSULTANTS	11,874	-
2-3400-3521 - CONTRACT SERVICES - OPERATIONS	46,862	53,733
2-3400-3522 - CONTRACT SERVICES - RECYCLING	32,289	23,400
2-3400-3523 - CONTRACT-SHINGLES, GLASS, CONCRETE RECYCL	-	-
2-3400-3524 – TRANSFER STATION CONTRACTOR	64,969	67,951
2-3400-3525 - CONTRACT SERVICES - WOOD WASTE CHIPPING	30,002	30,000
2-3400-3526 – CONTRACT SERVICES - KEREMEOS	2,150	4,000
2-3400-4000 - EDUCATION & TRAINING	-	-
2-3400-4100 - MEMBERSHIP & DUES	-	-
2-3400-5000 - ENVIRONMENTAL CONTROL	3,654	3,300
2-3400-5100 - ENVIRONMENTAL MONITORING	8,186	3,800
2-3400-5400 DEPRECIATION	-	-
2-3400-5501 INSTALL OF SECURITY CAMERAS/FENCE	-	-
2-3400-5500 - CAPITAL EXPENDITURES	-	-
2-3400-5502 – CLOSURE PLAN (Gas Tax & Recoverable funding)	-	-

2-3400-5503 – MISC CAPITAL WORKS AS REQUIRED	-	-
2-3400-6000 - INSURANCE - PROPERTY	593	384
2-3400-6050 - INSURANCE - LIABILITY	1,402	1,607
2-3400-6150 - INSURANCE - ENVIRONMENTAL	2,629	3,551
2-3400-6200-LEGAL FEES	-	-
2-3400-8010 - ADVERTISING - PUBLIC EDUCATION	-	600
2-3400-8200 - TRAVEL/LEASING	2,501	2,100
2-3400-8500 - UTILITIES	5,046	3,551
2-3400-9200 - TRANSFER TO RESERVE CAPITAL	7,242	7,242
2-3400-9202-TRANSFER TO VEHICLE REPLACEMENT RESERVE	-	-
2-3400-9205 - TRANSFER TO RESERVES RE INTEREST	18,259	-
2-3400-9290-TRANSFER TO OPERATING RESERVE	13,103	19,476
TOTAL EXPENSES	446,663	447,837

Capital - Refuse Disposal - Keremeos Areas "B"&"G" - 3401

Revenues		
Account Name	Actuals	Budget
1-1-3401-2915 - COMMUNITY WORKS GAS TAX (DO NOT USE)	\$ -	\$ (25,650)
1-1-3401-6000 - TRANSFER FROM CAPITAL RESERVE	\$ -	\$ (25,000)
1-1-3401-6070 - TRANSFER FROM RESERVE - GAS TAX	\$ (3,656)	\$ -
1-1-3401-6290 - TRANSFER FROM OPERATING RESERVE	\$ (5,277)	\$ (12,285)
1-1-3401-8050 - USER FEES	\$ -	\$ (19,350)
Total	\$ (8,933)	\$ (82,285)
Expenses		
Account Name	Actuals	Budget
1-2-3401-1400 - ADMINISTRATION CHARGES	\$ 285	\$ 285
1-2-3401-5501 - INSTALLATION OF SECURITY CAMERA & FENCE	\$ -	\$ 25,000
1-2-3401-5502 - CLOSURE PLAN IMPLEMENTATION	\$ 3,656	\$ 45,000
1-2-3401-5503 - MISC CAPITAL WORK AS REQUIRED	\$ 4,992	\$ 12,000
Total	\$ 8,933	\$ 82,285

2.8

2.9 LEACHATE AND LANDFILL GAS MANAGEMENT

The KTS has operated as a natural control landfill. Leachate generated from precipitation infiltrating into the landfilled waste is attenuated within the overburden soils beneath and adjacent to the landfill footprint. Therefore, a leachate collection system has not been installed at the KTS. More information on testing is provided in the attached 2022 Environmental Monitoring Report by EcoScape Environmental Consultants Ltd.

No landfill gas management system has been designed for or installed at the KTS. An assessment of the landfill gas production rate was completed by GHD in 2017 within the Keremeos Landfill Closure Plan. Peak landfill gas generation was calculated to have occurred in 2008 at 216 tonne per year.

The landfill is assumed to have in place a total of 154,217 tonnes of municipal solid waste when it ceased landfilling of waste in 2007. It is under the 1000 tonnes per year generation of landfill gas. Under the Landfill Gas Management Regulation, the Keremeos Landfill is not a regulated landfill site and is not required to install a landfill gas collection system.

The GHG Keremeos Landfill Closure Plan 2017 assessment estimates 129 tonnes of landfill gas generated for 2020. As municipal solid waste is no longer buried on the site, the landfill gas generated each year will continue to decline.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 OPERATION CONCLUSIONS

C1 The Transfer Station accepted 2489 tonnes of material in 2023. Materials received increased by 17% compared from 2022.

3.2 OPERATION RECOMMENDATIONS

RI Implement the works required for completing the Closure Plan. Pending approval by the Province.

3.3 ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

The attached 2023 Environmental Monitoring Report by EcoScape Environmental Consultants Ltd. contains additional Environmental Conclusions and Recommendations within their report.

4. REFERENCES

GHD Limited, August 9, 2017. "Keremeos Landfill Closure Plan".

Sperling Hansen Associates. (2000). "Keremeos Landfill Hydrogeological Assessment and Operations and Closure Plan".

Sperling Hansen Associates. (2006). "Keremeos Landfill closure Plan - Final Report".

Appendix I – 2023 Environmental Monitoring Report