The Corporation of the City of Kawartha Lakes
Agenda

Regular Council Meeting

CC2020-10
Tuesday, October 20, 2020
Open Session Commencing at 1:00 p.m. - Electronic Public Partipation
Council Chambers
City Hall
26 Francis Street, Lindsay, Ontario K9V 5R8

Members:

Mayor Andy Letham
Deputy Mayor Patrick O'Reilly
Councillor Ron Ashmore
Councillor Pat Dunn
Councillor Doug Elmslie
Councillor Tracy Richardson
Councillor Kathleen Seymour-Fagan
Councillor Andrew Veale
Councillor Emmett Yeo

Note: This will be an electronic participation meeting and public access to Council Chambers will not be available. Please visit the City of Kawartha Lakes YouTube Channel at https://www.youtube.com/c/CityofKawarthaLakes to view the proceedings.

Accessible formats and communication supports are available upon request. The City of Kawartha Lakes is committed to accessibility for persons with disabilities. Please contact AgendaItems@kawarthalakes.ca if you have an accessible accommodation request.

		Pages
1.	**Call to Order**	
2.	**Opening Ceremonies**	
2.1.	O Canada	
2.2.	Moment of Silent Reflection	
2.3.	Adoption of Open Session Agenda	
3.	**Disclosure of Pecuniary Interest**	
4.	**Notices and Information by Members of Council and Staff**	
4.1.	Council	
4.2.	Staff	
5.	**Council Minutes**	22 - 52
	Regular Council Meeting Minutes - September 15, 2020	
	That the Minutes of the September 15, 2020 Regular Council Meeting, be received and adopted.	
6.	**Deputations**	
6.1.	CC2020-10.6.1	53 - 55
	Proposed Direct Sale of City Owned Land on Juniper Street, Fenelon Falls **(Items 10.3.6 on the Agenda)** Anne Yorke	
6.2.	CC2020-10.6.2	56 - 58
	Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls **(Item 10.3.3 on the Agenda)** Doug Dickerson	

6.3. CC2020-10.6.3 59 - 61

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
(Item 10.3.2 on the Agenda)
Ronalee Switzer

6.4. CC2020-10.6.4 62 - 64

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
(Item 10.3.3 on the Agenda)
Richard Chartier

6.5. CC2020-10.6.5 65 - 67

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
(Item 10.3.4 on the Agenda)
Joy Epstein

7. Correspondence

8. Petitions

8.1. CC2020-10.8.1 68 - 68

Petition Regarding Highway 48 Speed Limit and Parking at Causeway
Joslyn Higginson

9. Presentations

9.1. COW2020-10.9.1

Pandemic Response and City Service Update
Ron Taylor, Chief Administrative Officer

10. Committee of the Whole

10.1. Correspondence Regarding Committee of the Whole Recommendations

10.2. Committee of the Whole Minutes 69 - 84

Committee of the Whole Minutes - October 6, 2020

That the Minutes of the October 6, 2020 Committee of the Whole Meeting be received and the recommendations, included in Section 10.3 of the Agenda, be adopted.

10.3. Business Arising from Committee of the Whole Minutes

10.3.1. CW2020-126

That the deputation of David Webb, **regarding City Services Performance Management**, be received.

10.3.2. CW2020-127

That the deputation of Ronalee Switzer, **regarding proposed direct sale of City owned lands on Juniper Street, Fenelon Falls**, be received.

10.3.3. CW2020-128

That the deputation of Richard Chartier and Doug Dickerson, **regarding the proposed direct sale of City owned lands on Juniper Street, Fenelon Falls**, be received.

10.3.4. CW2020-129

That the deputation of Joy Epstein, **regarding the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls**, be received.

10.3.5. CW2020-130

That the deputation of Sharon Larman, **regarding the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls**, be received.

10.3.6. CW2020-131

That the correspondence from Anne and John Yorke and the correspondence from Barbara and Cecil Young, **regarding the proposed direct sale of City owned lands on Juniper Street, Fenelon Falls**, be received.

10.3.7. CW2020-132

That the presentation by Jennifer Stover, Director of Corporate Services, **regarding the 2021 Budget Process**, be received.

10.3.8. CW2020-133

That Report CORP2020-014, **2021 Budget Process and Requests**, be received.

10.3.9. CW2020-134

That Council direct staff to review the option of utilizing the 2019 budget surplus, in its entirety, for a one time rebate on the 2021 tax bills for all ratepayers; and

That staff report back to Council on the result that the proposed tax rebate will have.

10.3.10. CW2020-135

That the presentation by Darryl Culley, President, Emergency Management and Training Inc., **regarding the Master Fire Plan**, be received.

10.3.11. CW2020-139

That Report LIC2020-001, **Charitable Road Tolls**, be received.

10.3.12. CW2020-140

That Report CORP2020-010, **Sanitary Sewer Flat Rate Charge**, be received.

10.3.13. CW2020-141

That Report CORP2020-011, **Purchasing Process and Policy**, be received; and

That the proposed Purchasing Policy be forwarded to Council for consideration at the October 20, 2020 Regular Council Meeting.

10.3.14. CW2020-142

That Report CORP2020-012, **Sustainable Procurement Policy**, be received; and

That the Sustainable Procurement Policy, as attached in Appendix A to Report CORP2020-012, be adopted and numbered for inclusion in the City's Policy Manual.

10.3.15. CW2020-143

That Report CS2020-010, **Release of Fenelon Falls Legacy C.H.E.S.T. Funds**, be received; and

That Kawartha Works Community Co-operative be approved for funding in the amount of $14,984.37 with the allocation to come from the Fenelon Falls Legacy C.H.E.S.T. Reserve (3.24350).

10.3.16. CW2020-144

That Report CS2020-011, **Coboconk Wellness Centre Feasibility Report**, be received;

That staff be directed to proceed with working with the Coboconk, Norland & Area Chamber of Commerce to develop the Coboconk Train Station into the Coboconk Wellness Centre;

That staff work with the Coboconk, Norland & Area Chamber of Commerce to secure the required external grant funding to proceed with the project; and

That the required $1,500.000.00 City contribution to this project be incorporated into the City's Asset Management and 10 Year Financial Plans and future capital budgets for when matching funds are secured for Council's consideration.

10.3.17. CW2020-145

That Report ED2020-021, **Correction of Legal Descriptions in Heritage By-laws**, be received;

That staff be directed to proceed with the process to amend the legal descriptions in the heritage designation by-laws for 37 Colborne Street, 13 Lindsay Street, 2 Lindsay Street South, 17025 Simcoe Street and 45 Russell Street West, including the preparation and circulation of the notices required under the Ontario Heritage Act and the preparation of the amending by-laws; and

That the amending by-laws be brought forward to Council at the next Regular Council meeting following the end of the notice period.

10.3.18. CW2020-146

That Report RD2020-003, **Recommendations for the Maintenance and Improvement of Road Drainage**, be received; and

That Staff be directed to present the in house ditching crew option for consideration in the 2022 Budget.

10.3.19. CW2020-148

That Report RD2020-009, **Bell Canada Alternate Locate Agreement**, be received; and

That the Mayor and Clerk be authorized to execute the Alternate Locate Agreement with Bell Canada on behalf of the City of Kawartha Lakes.

10.3.20. CW2020-149

That Report TR2020-002, **Addition of Fourth Route to Lindsay Transit**, be received; and

That Council approve expansion of transit service within Lindsay in alignment with the Transit Master Plan to commence January 2022 including required staffing and equipment needs.

10.3.21. CW2020-150

That Report EMS2020-001, **2021 Response Time Performance Plan**, be received; and

That Council approve the 2021 Response Time Performance Plan for submission under part VIII of Ontario Regulation 257/00 made under the Ambulance Act.

10.3.22. CW2020-151

That the Memorandum from Councillor Richardson, **regarding Traffic Calming** on **Glengarry Road, Bethany** be received;

That Glengarry Road in Bethany, Ontario be considered for addition to the Rural Traffic Calming 40 km speed area; and

That staff be directed to review and consider options to improve the functionality of Glengarry Road in Bethany, Ontario and report back to Council by Q1 2021.

10.3.23. CW2020-152

That the Memorandum from Councillor Veale, **regarding the Implementation of Automated Speed Enforcement Cameras**, be received;

That staff be directed to review the logistics, cost and procedures associated with the implementation of automated speed enforcement camera's in City of Kawartha Lakes school zones and safety community zones; and

That staff report back with their findings by Q2 2021.

10.3.24. CW2020-153

That the Memorandum from Councillor Ashmore, regarding the **Implementation of a Four Way Stop at Mary Street and Sturgeon Road South, Omemee,** be received; and

That staff investigate the intersection of Mary Street and Sturgeon Road South to be considered for a four way stop and report back in Q2 2021.

10.3.25. CW2020-154

That the Memorandum from Rod Sutherland, Director of Human Services, **Update from Community Pandemic Recovery Task Force**, be received.

10.4. Items Extracted from Committee of the Whole Minutes

10.4.1. CW2020-136

That the projects identified in Appendix A to Report CORP2020-014 be received for information purposes.

10.4.2. CW2020-137

That correspondence from Councillor Ashmore identifying roads for consideration under the Lifecycle Extension Program and Rural Resurfacing Program within the 2021 Budget be received; and

That the items identified in that correspondence be included in Appendix A to Report CORP2020-014 and forwarded to Council for consideration.

10.4.3. CW2020-138

That Report RS2020-022, **581 Highway 36, Lindsay**, be received.

10.4.4. CW2020-147

That Report RD2020-008, **Off Road Vehicle Use of Municipal Roads**, be received;

That ORV and ATV use on Municipal Highways in the City of Kawartha Lakes be reviewed in conjunction with the Trails Master Plan in 2021;

That the amendments to Section 2.07 and Section 4.01 of By-Law 2019-077, being a By-Law to Regulate the Operation of ATV's and ORV's on Municipal Highways, outlined in Appendix A be approved;

That the necessary By-Law to amend By-Law 2019-077 be forwarded to Council for approval; and

That a Task Force dedicated to the review of off road vehicle use of municipal roads be implemented and report back to Council on off road vehicle use by the end of Q1, 2021.

11. Planning Advisory Committee

11.1. Correspondence Regarding Planning Advisory Committee Recommendations

11.2. Planning Advisory Committee Minutes 85 - 94

Planning Advisory Committee Minutes - October 7, 2020

That the Minutes of the October 7, 2020 Planning Advisory Committee Meeting be received and the recommendations, included in Section 11.3 of the Agenda, be adopted.

11.3. Business Arising from Planning Advisory Committee Minutes

11.3.1. PAC2020-040

That Report PLAN2020-046, **respecting Part Lot 10, Concession 9, geographic Township of Emily, and identified as 1067 Tracey's Hill Road – Application D06-2020-022**, be received;

That a Zoning By-law Amendment respecting application D06-2020-022, substantially in the form attached as Appendix D to Report PLAN2020-046, be approved and adopted by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

11.3.2. PAC2020-041

That Report PLAN2020-047, **Part of Lot 15, Concession 4, Geographic Township of Ops, Bob Mark Tractor Holdings Inc. – Application D06-2020-019**, be received;

That the zoning by-law amendment, substantially in the form attached as Appendix D to Report PLAN2020-047, be referred to Council for approval and adoption; and

That the Mayor and Clerk be authorized to execute any documents required by the approval of this application.

11.3.3. PAC2020-042

That Report PLAN2020-050, **respecting Block C, Plan 507, geographic Township of Emily, City of Kawartha Lakes, Application No. D06-2020-016**, be received; and

That Zoning By-law Amendment Application D06-2020-016, Block C, Plan 507 geographic Township of Emily, City of Kawartha Lakes, be referred back to staff for further review and processing until such time that all comments have been received from all circulated Agencies and any other concerns or issues have been addressed.

11.3.4. PAC2020-043

That Report PLAN2020-045, **respecting Part of Lot 22, Concession 2, geographic Township of Ops, Wayne and Ann MacLeish – Applications D01-2020-004 and D06-2020-018**, be received;

That an Official Plan Amendment By-law, respecting Application D01-2020-004, substantially in the form attached as Appendix C to this report be approved for adoption by Council;

That a Zoning By-law Amendment By-law, respecting Application D06-2020-018, substantially in the form attached as Appendix D to this report be approved for adoption by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

11.3.5. PAC2020-044

That Report PLAN2020-051, **Part of Lots 14 and 15, Concession 9; Block J, Part Lots 8-17, Plan 80; Part 1, 57R-6577, geographic Township of Mariposa, City of Kawartha Lakes, identified as 1013 Eldon Road, Vandenberg – D06-2020-017**, be received;

That a Zoning By-law Amendment respecting application D06-2020-017, substantially in the form attached as Appendix D to Report PLAN 2020-051, be approved and adopted by Council; and

That the Mayor and Clerk be authorized to execute any documents required by the approval of this application.

11.4. Items Extracted from Planning Advisory Committee Minutes

12. Consent Matters

That all of the proposed resolutions shown in Section 12.1 of the Agenda be approved and adopted by Council in the order that they appear on the agenda and sequentially numbered.

12.1. Reports

12.1.1. RS2020-021 95 - 102

Acquisition of a portion of Centennial Park Road and Assumption as Public Highway
Christine Oliver, Law Clerk, Realty Services - Legal Services

That Report RS2020-021, **Acquisition of a portion of Centennial Park Road and Assumption as Public Highway**, be received;

That the City acquire Part of Lot 19, Concession North Portage Road, in the Geographic Township of Eldon, More Specifically Described as Part 5 on Plan 57R-3336, to become part of Centennial Park Road for assumption as a public highway;

That staff be directed to commence the process of obtaining ownership of the required land for nominal consideration, with all related costs payable at the property owner's expense;

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this decision; and

That the necessary by-law be forwarded to Council for Adoption.

12.1.2. CORP2020-013 103 - 107

Development Charge Reserve Debenture
Leanne Mitchell, Supervisor, Cost Accounting

That Report CORP2020-013, **Development Charge Reserve Debenture**, be received;

That Council approves funding the Development Charge Reserve deficit by debenture funding in the amount of $8,570,689;

That Council approves the following projects to be funded by this debenture:

Project Number	Description	Amount
WW1705	Wastewater Treatment	1,160,917
WW1803	Combined Water Dist and WW Collection	248,057
RD1801	Bridges	252,474
RD1703	Urban/Rural Reconstruction Projects	567,962
RD1701	Bridges	954,388
WW1701	Watermain Replacement	259,261
PR1518	Logie Park Improvements	3,036,490
PR1901	Bobcaygeon Beach Park	173,203
RD1803	Urban/Rural Reconstruction Projects	679,427
WW1903	Durham St. W. Mains	247,075
WW1903	Lindsay SPS	138,605
RD2003	Urban/Rural Reconstruction Projects	512,254
RD1606	Urban/Rural Reconstruction Projects	340,576
	Total	**8,570,689**

That future development charge collections from the following categories be used to finance the debt principle and interest payment; Roads, Parks and Recreation, Wastewater Treatment and Administrative Studies.

12.1.3. PUR2020-027 108 - 111

Request for Proposal 2020-03-CP Supply and Delivery of Six Four Ton Tow Behind Hot Box Reclaimer Units
Marielle van Engelen, Buyer
Todd Bryant, Manager of Fleet and Transit Services

That Report PUR2020-027, **Request for Proposal 2020-03 Supply and Delivery of Six Four Ton Tow Behind Hot Box Reclaimer Units**, be received;

That Amaco Construction Equipment Inc, Proposal A, including additional equipment, be selected for the award of Request for Proposal 2020-03-CP Supply and Delivery of Six Four Ton Tow Behind Hot Box Reclaimer Units as the highest scoring proponent; and

That upon receipt of the required documents that the Procurement Division be authorized to issue a purchase order.

12.1.4. PUR2020-029 112 - 114

2020-43-CP Future Waste Options Study
Linda Lee, Buyer
Tauhid Khan, Asset Management Coordinator

That Report PUR2020-029, **2020-43-CP Future Waste Options Study**, be received;

That Dillon Consulting Limited be selected for the award of 2020-43-CP Future Waste Options Study for the total quoted amount of $119,078.00 not including HST;

That subject to receipt of the required documents, the Director of Engineering and Corporate Assets be authorized to execute the agreement to award the contract; and

That the Procurement Division be authorized to issue a purchase order.

12.1.5. PLAN2020-048 115 - 136

Telecommunications Facility Endorsement Application – Rogers Communications Inc.
Ian Walker, Planning Officer - Large Developments

That Report PLAN2020-048, **Part of Lots 6 & 7, Concession 1, Geographic Township of Verulam, Shannon and Anne Connelly – Application D44-2020-003**, be received;

That the 75.0 metre self-supported telecommunication facility proposed by SpectraSite Inc. on behalf of Rogers Communications Inc., to be sited on property at 1988 Heights Road and generally outlined in Appendices A to D to Report PLAN2020-048, be endorsed by Council, conditional upon the applicant entering into a Telecommunication Facility Development Agreement with the City;

That Innovation, Science and Economic Development (ISED) Canada, the applicant, and all interested parties be advised of Council's decision; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the endorsement of this application.

12.1.6. ED2020-024 137 - 176

Commenting on the Proposed Regulations under the Ontario Heritage Act
Emily Turner, Economic Development Officer - Heritage Planning

That Report ED2020-024, **Commenting on the Proposed Regulations under the Ontario Heritage Act**, be received;

That the comments from the Kawartha Lakes Municipal Heritage Committee on the proposed regulations under the Ontario Heritage Act, R.S.O. 1990, c.O.18, be endorsed; and

That the comments be submitted through the Environmental Registry of Ontario.

12.1.7. ENG2020-018 177 - 398

Lindsay-Ops Landfill Electricity Generation System Optimization Study
Lisa Peimann, Executive Assistant, Engineering and Corporate Assets

That Report ENG2020-018, **Lindsay-Ops Landfill Electricity Generation System Optimization Study**, be received; and

That staff proceed with continued operation of the generator and implement recommendations in the study to optimize the operation where feasible.

12.1.8. ENG2020-020 399 - 404

Request for Speed Reduction – Yelverton Road, Glenarm Road (CKL Road 8), and CKL Road 46
Joseph Kelly, Senior Engineering Technician

THAT Report ENG2020-020, **Request for Speed Reduction– Yelverton Road, Glenarm Road (CKL Road 8), and CKL Road 46,** be received;

THAT the speed limit of Yelverton Road be posted at 50km/h from Highway 7a to a point 500m southerly;

THAT the speed limit of Glenarm Road (CKL Road 8) be reduced to 50km/h from a point 300m west of CKL Road 46 to a point 350m east of CKL Road 46;

THAT the speed limit of CKL Road 46 be reduced to 50km/h from a point 300m north of Glenarm Road to a point 350m south of Glenarm Road;

THAT the necessary By-law for the above recommendations be forwarded to Council for adoption; and

THAT the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application/agreement/decision.

12.1.9. ENG2020-022 405 - 412

Request for Speed Posting – Kings Wharf Road and Scotch Line Road
Joseph Kelly, Senior Engineering Technician

THAT Report ENG2020-022, **Request for Speed Posting – Kings Wharf Road and Scotch Line Road,** be received.

12.1.10. RD2020-010 413 - 420

County of Haliburton Boundary Road Agreement
Bryan Robinson, Director of Public Works

That Report RD2020-010, **County of Haliburton Boundary Road Agreement**, be received;

That By-law 2010-178 be repealed;

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this agreement; and

That a By-law, substantially in the form attached as Appendix B to Report RD2020-010 be forwarded to Council for adoption.

12.1.11. RD2020-011 421 - 436

Town of Bracebridge Boundary Road Agreement
Bryan Robinson, Director of Public Works

That Report RD2020-011**Town of Bracebridge Boundary Road Agreement**, be received;

That By-law 2008-157 be repealed;

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this agreement; and

That a By-law, substantially in the form attached as Appendix B to Report RD2020-011 be forwarded to Council for adoption.

12.2. Items Extracted from Consent

13. Other or New Business

14. By-Laws

That the By-Laws shown in Section 14.1 of the Agenda, namely: Items 14.1.1 to and including 14.1.19 be read a first, second and third time, passed, numbered, signed and the corporate seal attached.

14.1. By-Laws by Consent

14.1.1. CC2020-10.14.1.1 437 - 462

A By-Law to Approve the Submission of an Application to Ontario Infrastructure and Lands Corporation ("OILC" for the Long-Term Financing of Certain Capital Work(s) of the Corporation of the City of Kawartha Lakes (the "Municipality") and to Authorize the Entering into of a Rate Offer Letter Agreement Pursuant to which the Municipality will Issue Debentures to OILC

14.1.2. CC2020-10.14.1.2 463 - 466

A By-law to Amend By-Law 2010-091, being a By-Law to Designate 145 King Street, Woodville

14.1.3. CC2020-10.14.1.3 467 - 470

A By-Law to Amend By-Law 2010-092, being a By-Law to Designate 56 King Street, Woodville

14.1.4. CC2020-10.14.1.4 471 - 473

A By-Law to Amend By-Law 2010-093, being a By-law to Designate 121 King Street, Woodville, “Stoddart House”

14.1.5. CC2020-10.14.1.5 474 - 476

A By-Law to Amend By-Law 2010-094, being a By-Law to Designate 124 King Street, Woodville

14.1.6. CC2020-10.14.1.6 477 - 480

A By-Law to Amend Township of Emily By-Law 2000-14, being a By-Law to Designate the Interior and the Exterior of the Chapel Located with the Emily Cemetery, Township of Emily, 4249 Highway #7, on Concession 4 Part Lot 12, RP57R819 Part 1 to 2, Presently Owned by the Emily Cemetery Company, as a Designated Property Under the Act

14.1.7. CC2020-10.14.1.7 481 - 484

A By-Law to Provide for the Changing of Names of a Public Highway in the City of Kawartha Lakes to McCumber Court and Switzer Place

14.1.8. CC2020-10.14.1.8 485 - 487

A By-Law to Amend the Township of Emily Zoning By-Law 1996-30 to Rezone Land within the City of Kawartha Lakes (1067 Tracey's Hill Road)

14.1.9. CC2020-10.14.1.9 488 - 491

A By-Law to Amend the Township of Ops Zoning By-Law No. 93-30 to Rezone Land within the City Of Kawartha Lakes (2197 Little Britain Road)

14.1.10. CC2020-10.14.1.10 492 - 495

A By-Law to Amend the City of Kawartha Lakes Official Plan to Permit the Severance of a 4.1 Hectare Parcel of Prime Agricultural Land (1590 Elm Tree Road)

14.1.11. CC2020-10.14.1.11 496 - 498

A By-Law To Amend The Township of Ops Zoning By-Law No. 93-30 To Rezone Land Within The City Of Kawartha Lakes (1590 Elm Tree Road)

14.1.12. CC2020-10.14.1.12 499 - 501

A By-Law To Amend The Township of Mariposa Zoning By-Law No. 94-07 To Rezone Land Within The City Of Kawartha Lakes (1013 Eldon Road)

14.1.13. CC2020-10.14.1.13 502 - 505

A By-Law to Repeal and Replace By-Law 2010-178, Being a By-Law to Authorize the Execution of a Winter Maintenance Agreement with the County of Haliburton

14.1.14. CC2020-10.14.1.14 506 - 517

A By-Law to Repeal and Replace By-Law 2008-157, Being a By-Law to Authorize the Execution of a Boundary Road Agreement with the Town of Bracebridge

14.1.15. CC2020-10.14.1.15 518 - 519

A By-Law to Appoint an Inspector and Municipal Law Enforcement Officer for the City of Kawartha Lakes

14.1.16. CC2020-10.14.1.16 520 - 520

A By-Law to Repeal By-laws 2005-174 and 2016-189 Being By-Laws to Appoint Inspectors and Enforcement Officers for the City of Kawartha Lakes

14.1.17. CC2020-10.14.1.17 521 - 522

A By-law to Acquire Part of Lot 19, Concession North Portage Road, Further Described as Part 5 on 57R-3336, in the Geographic Township of Eldon, in the City of Kawartha Lakes, to Form Part of Centennial Park Road in the Geographic Township of Eldon, in the City of Kawartha Lakes and to Establish and Assume such Parcel Upon Receipt of Title as Part of the Public Highway Commonly known as Centennial Park Road

14.1.18. CC2020-10.14.1.18 523 - 525

A By-Law To Amend The United Townships of Laxton, Digby and Longford Zoning By-Law No. 32-83 To Rezone Land Within The City Of Kawartha Lakes (128 Curls Road)

14.1.19. CC2020-10.14.1.19 526 - 527

By-Law to Amend By-Law 2019-077, being a By-Law to Regulate the Operation of ATV's and ORV's on Municipal Highways in the City of Kawartha Lakes

14.2. By-Laws Extracted from Consent

15. Notice of Motion

16. Closed Session

16.1. Adoption of Closed Session Agenda

16.2. Disclosure of Pecuniary Interest in Closed Session Items

16.3. Move Into Closed Session

That Council convene into closed session at ___ p.m. pursuant to Section 239(2) of the Municipal Act, S.O. 2001 s.25, in order to consider matters identified in Section 16.3 of the Regular Council Meeting Agenda of Tuesday, October 20, 2020, namely Items 16.3.1 to and including 16.3.4.

16.3.1. CC2020-10.16.3.1

Closed Session Minutes, Regular Council Meeting September 15, 2020
Municipal Act, 2001 s.239(2)(c) Proposed or Pending Acquisition or Disposition of Land
Municipal Act, 2001 s.239(2)(f) Advice that is Subject to Solicitor-Client Privilege
Municipal Act, 2001 s.239(2)(k) A position, plan, procedure, criteria or instruction to be applied to any negotiations carried on or about to be carried on by or on behalf of the Municipality

16.3.2. LGL2020-010

McKenzie Drywall Inc. v. Laurin & Company a.k.a. Laurin Group, Kawartha Lakes Haliburton Housing Corporation and The Corporation of the City of Kawartha Lakes
Court File Number 19-106
Municipal Act, 2001 s.239(2)(e) Litigation Affecting the Municipality
Municipal Act, 2001 s.239(2)(f) Advice that is Subject to Solicitor-Client Privilege
Robyn Carlson, City Solicitor

16.3.3. ED2020-020

Lindsay Downtown BIA Board Appointment
Municipal Act, 2001, s.239(2) (b) Personal Matters about an Identifiable Individual
Carlie Arbour, Economic Development Officer - Community

16.3.4. CORP2020-015

Bargaining Mandate Volunteer Firefighters
Municipal Act, 2001, s.239(2)(d) Labour Relations or Employee Negotiations
Liana Patterson, Manager, Human Resources

17. Matters from Closed Session

18. Confirming By-Law

18.1. CC2020-10.18.1 528 - 528

By-Law to Confirm the Proceedings of the Regular Council Meeting, October 20, 2020

19. Adjournment

The Corporation of the City of Kawartha Lakes

Minutes

Regular Council Meeting

CC2020-09
Tuesday, September 15, 2020
Open Session Commencing at 1:00 p.m. – Electronic Public Participation
Council Chambers
City Hall
26 Francis Street, Lindsay, Ontario K9V 5R8

Members:
Mayor Andy Letham
Deputy Mayor Patrick O'Reilly
Councillor Ron Ashmore
Councillor Pat Dunn
Councillor Doug Elmslie
Councillor Tracy Richardson
Councillor Kathleen Seymour-Fagan
Councillor Andrew Veale
Councillor Emmett Yeo

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1. Call to Order

Mayor Letham called the Meeting to order at 1:00 p.m. Deputy Mayor P.O'Reilly and Councillors R. Ashmore, P. Dunn, D. Elmslie, P. O'Reilly, T. Richardson, K. Seymour-Fagan, A. Veale and E. Yeo were in attendance.

CAO R. Taylor, City Clerk C. Ritchie, Deputy Clerk S. O'Connell and Treasurer C. Daynes were in attendance in Council Chambers.

Directors C. Marshall, B. Robinson, J. Rojas, J. Stover, R. Sutherland, Chief of Fire Services M. Pankhurst and City Solicitor R. Carlson were in attendance electronically.

2. Opening Ceremonies

2.1 O Canada

The Meeting was opened with the observation of 'O Canada'.

2.2 Moment of Silent Reflection

The Mayor asked those in attendance to observe a Moment of Silent Reflection.

2.3 Adoption of Open Session Agenda

CR2020-251
Moved By Councillor Ashmore
Seconded By Deputy Mayor O'Reilly

That the Agenda for the Open Session of the Regular Council Meeting of Tuesday, September 15, 2020, be adopted as circulated and with the following amendments:

Additions:

Item 9.1.4
Correspondence Regarding Fireworks Ban (Item 9.3.23 on the Agenda)
Matthew Hutchinson, Owner and Lead Fireworks Specialist, Supernova Fireworks

Item 9.1.5
Correspondence Regarding New Road Names for Portions of Old Highway 7 at Meadowview Road (Item 9.3.13 on the Agenda)
Jeff Armitage

Item 9.1.6
Correspondence Regarding New Road Names for Portions of Old Highway 7 at

Meadowview Road (Item 9.3.13 on the Agenda)
Aaron Black

Item 9.1.7
Correspondence Regarding New Road Names for Portions of Old Highway 7 at Meadowview Road (Item 9.3.13 on the Agenda)
Sherry and Humberto Lazcano

Carried

3. Disclosure of Pecuniary Interest

There were no declarations of pecuniary interest disclosed.

4. Notices and Information by Members of Council and Staff

4.1 Council

Deputy Mayor O'Reilly:

- A drive-in concert will be held at the Lindsay Exhibition ("LEX") on September 19th in support of Big Brothers Big Sisters Kawartha Lakes.
- The Fall Invitational Holstein and Jersey Livestock Show and Sale will be held at the Lindsay Exhibition ("LEX") on October 5th and 6th.
- Kawartha Farm Fest will be held on October 3rd. The event will have nine sites that participants can visit and will highlight four local family farms.
- A drive-in concert will be held at the Lindsay Drive-In on September 30th and October 1st in support of the Academy Theatre. The event will feature James Barker.
- All of Council is invited to tour the Logie Street Park on September 16th at 10:30 a.m. It is anticipated that Logie Street Park will officially open on September 21st.
- The Terry Fox Run will be held virtually on September 20th. A golf tournament will be held on September 19th at the Lindsay Golf and Country Club in support of the Terry Fox Foundation.

Councillor Ashmore:

- A Public Information Centre for the King Street (Omemee) Reconstruction Project will be held at the Omemee Legion on September 23rd.

- The Omemee Blooms Garden Club will be hosting the first annual Scarecrow Festival. Residents of Omemee are invited to display scarecrows in their front yards for judging on September 26th.

Councillor Elmslie:

- On September 17th residents are invited to visit the Amphitheatre that has been built at the Fenelon Falls Fairgrounds. Once complete the Amphitheatre will a venue for concerts and outdoor theatre.

4.2 Staff

5. Council Minutes

Regular Council Meeting Minutes - August 20, 2020

CR2020-252
Moved By Councillor Yeo
Seconded By Councillor Elmslie

That the Minutes of the August 20, 2020 Regular Council Meeting, be received and adopted.

Carried

6. Deputations

6.1 CC2020-09.6.1

Request Regarding Block B, Plan 360, Adjacent to Vern Court and Benson Boulevard, Geographic Township of Laxton
(Item 11.1.1) on the Agenda
Jesse Dupuis

Jesse Dupuis requested that Council endorse their request to purchase Block B, Plan 360 which is adjacent to his property on Benson Boulevard. Mr. Dupuis advised that acquiring the land will alleviate the issues they have faced due to the use of Block B, Plan 360 as an access to water by other residents in the area. Mr. Dupuis confirmed that there is another parcel of land in the area that residents can use as a water access.

CR2020-253
Moved By Councillor Yeo
Seconded By Councillor Elmslie

That the deputation of Jessie Dupuis, **regarding a request relating to Block B, Plan 360, adjacent to Vern Court and Benson Boulevard, Geographic Township of Laxton**, be received.

Carried

6.2 CC2020-09.6.2

Proposed Direct Sale of City-Owned Property - Juniper Street, Fenelon Falls
(Item 9.3.10 on the Agenda)
Sandra Barrett

Sandra Barrett spoke on behalf of the Fenelon Community Housing Initiative ("FCHI") to give an overview of the their intended use of the surplus land on Juniper Street in Fenelon Falls should their proposed purchase be endorsed by Council. Ms. Barrett outlined that "FCHI" intends to construct rental housing which will be a mix of market rate and affordable housing. It was acknowledged that should "FCHI" acquire the land they would need to apply for a zoning by-law amendment for their intended use.

CR2020-254
Moved By Councillor Elmslie
Seconded By Deputy Mayor O'Reilly

That the deputation of Sandra Barrett, **regarding the proposed direct sale of City owned property on Juniper Street in Fenelon Falls**, be received.

Carried

7. Petitions

7.1 CC2020-09.7.1

Petition Regarding Block B, Plan 360, Adjacent to Vern Court and Benson Boulevard, Geographic Township of Laxton
(Item 11.1.1 on the Agenda)
Ludmila (Lucy) Stephanoff

CR2020-255
Moved By Councillor Yeo
Seconded By Councillor Seymour-Fagan

That the petition received from Ludmila (Lucy) Stephanoff, **regarding Block B, Plan 360, adjacent to Vern Court and Benson Boulevard**, be received.

Carried

7.2 CC2020-09.7.2

Petition Regarding Speed Limit Reduction on Thomas Drive
Blake Clarke
Bonnie Clarke

CR2020-256
Moved By Councillor Elmslie
Seconded By Councillor Dunn

That the petition received from Blake Clarke and Bonnie Clarke, regarding **a speed limit reduction on Thomas Drive**, be received and referred to Staff for review and report back by the end of Q2, 2021.

Carried

8. Presentations

8.1 CC2020-09.8.1

Update - City Pandemic Response Presentation
Ron Taylor, Chief Administrative Officer

CAO Ron Taylor provided an update on the City's response to the COVID-19 Pandemic. CAO Taylor provided a review of the City services that have been and will be reopening as well as the services that remain to be closed to the public. CAO Taylor provided an overview of the steps that are being taken as the focus is shifting from response to recovery; including a targeted 2020 year-end break even budget.

CR2020-257
Moved By Councillor Dunn
Seconded By Councillor Richardson

That the presentation by Ron Taylor, Chief Administrative Officer, **regarding the City's Pandemic Response**, be received.

Carried

8.2 CC2020-09.8.2

2019 Audited Financial Statement Presentation
Carolyn Daynes, Treasurer

Treasurer Carolyn Daynes, provided a overview of the 2019 Audit Financial Statements.

CR2020-258
Moved By Councillor Elmslie
Seconded By Councillor Ashmore

That the presentation by Carolyn Daynes, Treasurer, **regarding the 2019 Audited Statement Presentation**, be received.

Carried

8.2.1 CORP2020-008

2019 Surplus Disposition Report
Carolyn Daynes, Treasurer

CR2020-259
Moved By Councillor Elmslie
Seconded By Deputy Mayor O'Reilly

That Report CORP2020-008, **2019 Surplus Disposition Report**, be approved as circulated;

That the financial statements for 2019 be approved as circulated;

That Council authorizes the transfer of the 2019 Surplus of $2,999,743 to the Contingency Reserve committed for Council; and

That staff report back to Council during the 2021 budget deliberations on options for disposition of the 2019 surplus.

Carried

The meeting recessed at 2:50 p.m. and reconvened at 2:59 p.m.

9. Committee of the Whole

9.1 Correspondence Regarding Committee of the Whole Recommendations

CR2020-260
Moved By Councillor Richardson
Seconded By Councillor Veale

That the following correspondence listed in Section 9.1, being

- 9.1.1 Colleen Cook, regarding a fireworks ban
- 9.1.2 Andrea LaLonde, regarding a fireworks ban
- 9.1.3 Cathy Walker, regarding a fireworks ban

- 9.1.4 Matthew Hutchinson, Supernova Firworks, regarding a fireworks ban
- 9.1.5 Jeff Armitage, regarding new road names for portions of Old Highway 7 at Meadowview Road
- 9.1.6 Aaron Black, regarding new road names for portions of Old Highway 7 at Meadowview Road
- 9.1.7 Sherry and Humberto Lazcano, regarding new road names for portions of Old Highway 7 at Meadowview Road

be received.

Carried

9.1.1 CC2020-09.9.1.1

Correspondence Regarding Fireworks Ban
(Item 9.3.23 on the Agenda)
Colleen Cook

9.1.2 CC2020-09.9.1.2

Correspondence Regarding Fireworks Ban
(Item 9.3.23 on the Agenda)
Andrea LaLonde

9.1.3 CC2020-09.9.1.3

Correspondence Regarding Fireworks Ban
(Item 9.3.23 on the Agenda)
Cathy Walker

9.1.4 CC2020-09.9.1.4

Correspondence Regarding Fireworks Ban
(Item 9.3.23 on the Agenda)
Matthew Hutchinson, Owner and Lead Fireworks Specialist, Supernova Fireworks

9.1.5 CC2020-09.9.1.5

Correspondence Regarding New Road Names for Portions of Old Highway 7 at Meadowview Road
(Item 9.3.13 on the Agenda)
Jeff Armitage

9.1.6 CC2020-09.9.1.6

Correspondence Regarding New Road Names for Portions of Old Highway 7 at Meadowview Road
(Item 9.3.13 on the Agenda)
Aaron Black

9.1.7 CC2020-09.9.1.7

Correspondence Regarding New Road Names for Portions of Old Highway 7 at Meadowview Road
(Item 9.3.13 on the Agenda)
Sherry and Humberto Lazcano

9.2 Committee of the Whole Minutes

Committee of the Whole Meeting Minutes - September 1, 2020

CR2020-261
Moved By Councillor Yeo
Seconded By Councillor Elmslie

That the Minutes of the September 1, 2020 Committee of the Whole Meeting be received and the recommendations, included in Section 9.3 of the Agenda, save and except for Item 9.3.23, be adopted.

Carried

9.3 Business Arising from Committee of the Whole Minutes

9.3.1 CW2020-101

That the presentation by Emily Turner, Economic Development Officer - Heritage Planning, regarding **Standards and Guidelines for the Conservation of Historic Places in Canada**, be received.

Carried

9.3.2 CW2020-102

That Report ED2020-017, **Adoption of the Standards and Guidelines for the Conservation of Historic Places in Canada**, be received; and

That the Standards and Guidelines for the Conservation of Historic Places in Canada be adopted as the City's conservation standard for heritage properties.

Carried

9.3.3 CW2020-103

That Report ED2020-018, **Amendments to Non-Compliant Heritage By-laws**, be received;

That By-laws 2000-024, 2010-091, 2010-092, 2010-093, and 2010-094 be amended to be brought into compliance with the current requirements of the Ontario Heritage Act; and

That the necessary amending by-laws be brought forward for adoption.

Carried

9.3.4 CW2020-104

That the presentation by Aaron Sloan, Manager of Municipal Law Enforcement and Licensing, regarding **Charitable Road Tolls**, be received.

Carried

9.3.5 CW2020-105

That Staff report back to Council by the end of Q4, 2020, on Charitable Road Tolls; and

That the report back include an amendment to By-law 2015-199 that enhances safety requirements and creates a reporting requirement for a Charitable Road Toll Event.

Carried

9.3.6 CW2020-106

That the presentation by Aaron Sloan, Manager of Municipal Law Enforcement and Licensing, regarding **Backyard Chickens**, be received; and

That Staff report back to Council by the end of Q4, 2020 with the results of the public consultation and recommendations with regard to Backyard Chickens.

Carried

9.3.7 CW2020-107

That Report RS2020-011, **Proposed Surplus Declaration, Closure, and Sale of a Portion of Shoreline Road Allowance adjacent to 68 Greenwood Road, Kirkfield**, be received;

That the subject property, being the shoreline road allowance adjacent to 68 Greenwood Road, Kirkfield and legally described as Part of the Shoreline Road Allowance Lying in Front of Lot 8, Concession 4, in the Geographic Township of Laxton, City of Kawartha Lakes, be declared surplus to municipal needs;

That the closure of the portion of road allowance and sale to the adjoining landowner be supported, in principle, in accordance with the provisions of By-Law 2018-020, as amended, and the Municipal Act, 2001, and subject to the parties entering into a conditional Agreement of Purchase and Sale;

That staff be directed to commence the process to stop up and close the said portion of road allowance;

That a by-law (with any amendments deemed necessary) to close the road and authorize its disposition shall be passed if appropriate;

That a deeming by-law be passed contemporaneously with the disposition; and

That the Mayor and Clerk be authorized to sign all documents to facilitate the road closing and conveyance of the lands.

Carried

9.3.8 CW2020-108

That Report RS2020-013, **Proposed Surplus Declaration, Closure, and Sale of Portions of Shoreline Road Allowance adjacent to 72-76 Greenwood Road, Kirkfield**, be received;

That the subject property, being the shoreline road allowance adjacent to 72-76 Greenwood Road, Kirkfield and legally described as Part of the Original Shore Road Allowance Along Rush Lake Lying in Front of Lots 26, 27, and 28 on Plan 366, in the Geographic Township of Laxton, City of Kawartha Lakes, City of Kawartha Lakes, be declared surplus to municipal needs;

That the closure of the portion of road allowance and sale to the adjoining landowner be supported, in principle, in accordance with the provisions of By-Law 2018-020, as amended, and the Municipal Act, 2001, and subject to the parties entering into a conditional Agreement of Purchase and Sale;

That staff be directed to commence the process to stop up and close the said portion of road allowance;

That a by-law (with any amendments deemed necessary) to close the road and authorize its disposition shall be passed if appropriate;

That a deeming by-law be passed contemporaneously with the disposition; and

That the Mayor and Clerk be authorized to sign all documents to facilitate the road closing and conveyance of the lands.

Carried

9.3.9 CW2020-109

That Report RS2020-014, **Proposed Surplus Declaration, Closure, and Sale of a Portion of Road Allowance Known as Deane Street, Lindsay**, be received;

That the subject property, being a portion of road allowance known as Deane Street, and legally described as Deane Street on Plan 8P between Holtom Street and Dobson Street, Except Part 3 on Plan 57R-9577, in the Geographic Town of Lindsay, City of Kawartha Lakes, designated as Part 2 on Plan 57R-9577, be declared surplus to municipal needs;

That the closure of the portion of road allowance and sale to the adjoining landowner be supported, in principle, in accordance with the provisions of By-Law 2018-020, as amended, and the Municipal Act, 2001, and subject to the parties entering into a conditional Agreement of Purchase and Sale;

That Council set a price of $15,000.00 as consideration for the subject portion of road allowance;

That staff be directed to commence the process to stop up and close the said portion of road allowance;

That a by-law (with any amendments deemed necessary) to close the road and authorize its disposition shall be passed if appropriate; and

That the Mayor and Clerk be authorized to sign all documents to facilitate the road closing and conveyance of the lands.

Carried

9.3.10 CW2020-110

That Report RS2020-015, **Proposed Direct Sale of City-Owned Property – Juniper Street, Fenelon Falls**, be received;

That the sale of the City-owned property located on Juniper Street, Fenelon Falls and legally described as Lots 247, 248, 249, and 256 on Plan 57; Subject to R283173; Blake Street on Plan 100 Closed By R274935 Between Rock Street

and Hill Street; Part of Hill Street on Plan 100 Closed by R274935; designated as Part 7 on Plan 57R-6341, in the Geographic Village of Fenelon Falls, City of Kawartha Lakes to the Fenelon Community Housing Initiative, be supported, in principle, in accordance with the provisions of By-Law 2018-020, as amended, and the Municipal Act, 2001, and subject to the parties entering into a conditional Agreement of Purchase and Sale;

That the subject property be sold for no less than the appraised value, plus all costs associated with the transaction;

That a by-law (with any amendments deemed necessary) to authorize disposition of the subject property shall be passed if appropriate; and

That the Mayor and Clerk be authorized to sign all documents to and conveyance of the lands.

Carried

9.3.11 CW2020-111

That Report RS2020-016, **Proposed Amendments to Real Property Acquisition Policy**, be received; and

That Policy 205 CAO 044 be amended in accordance with Appendix A.

Carried

9.3.12 CW2020-112

That Report CA2020-001, **Update on Development Charges and Community Benefits Charges**, be received; and

That 2020 special project 921204601 (Community Benefits Charges Strategy) be renamed “Development Charges Background Study”, have its budget reset to $70,000, financed 90% by the Administration Studies Account of the Development Charges Reserve and 10% by the Contingency Reserve, and have its timeframe extended to June 30, 2022.

Carried

9.3.13 CW2020-113

That Report PLAN2020-042, **New Road Names for Portions of Old Highway 7 at Meadowview Road**, be received;

That the new service road (formerly Highway 7) created by the Ministry of Transportation north of Meadowview Road with its realignment of Highway 7 in the former Township of Emily be renamed to McCumber Court;

That the new service road (formerly Highway 7) created by the Ministry of Transportation south of Meadowview Road with its realignment of Highway 7 in the former Township of Emily be renamed to Switzer Place;

That the Office of the City Clerk send notice to all affected parties regarding the renaming of the service roads in accordance with the Notice By-law; and

That subject to any significant objections raised from the affected parties in the notice period, that a by-law to rename both service roads be prepared, approved, and adopted by Council.

Carried

9.3.14 CW2020-114

That Report ED2020-019, **Kawartha Lakes Cultural Centre Task Force**, be received;

That the request for deferral received from the Kawartha Lakes Arts Council and the Kawartha Cultural and Heritage Network of the **Kawartha Lakes Cultural Centre Task Force** and the 2020 Cultural Centre Feasibility study be granted;

That the $50,000 budgeted for the project be extended to reflect the new timeframe; and

That the Term of the Taskforce be extended one year to March 31, 2022.

Carried

9.3.15 CW2020-115

That Report HH2020-003, **2019 Annual Housing and Homelessness Plan (HHP) Report**, be received for information.

Carried

9.3.16 CW2020-116

That the Memorandum from Mayor Letham, **regarding an Update on Economic Recovery Task Force**, be received; and

That the Lindsay Downtown Phase 3 Reconstruction Project, and the Fenelon Falls Downtown Reconstruction Project, be included as priority projects for consideration in the 2021 budget.

Carried

9.3.17 CW2020-117

That the Memorandum from Rod Sutherland, Director of Human Services, **Update from Community Pandemic Recovery Task Force**, be received for information purposes.

Carried

9.3.18 CW2020-118

That the Memorandum from Councillor Ashmore, **regarding Heights Road from Highway 7 to Mount Horeb Road,** be received; and

That staff report back by Q4, 2020 on short term options for improvement of this road section including pulverizing to gravel, or life cycle extension consideration in the 2021 budget.

Carried

9.3.19 CW2020-119

That the Memorandum from Councillor Ashmore**, regarding an Online Petition Option**, be received;

That Staff create an online petition option, in addition to the current hard-copy process, for bringing petitions to Council; and

That Staff report back by Q4, 2020 with options for an online petition that meet the requirements of the Municipal Act.

Carried

9.3.20 CW2020-120

That the Memorandum from Councillor Ashmore and Councillor Richardson, **regarding Grassy Road Lifecycle Extension Program**, be received; and

That Grassy Road from Emily Park Road to Hawke Drive be considered for the Lifecycle Extension Program for 2021.

Carried

9.3.21 CW2020-121

That the Memorandum from Deputy Mayor O'Reilly, **regarding Logie Street Park Traffic Calming**, be received;

That concerns regarding both vehicular and pedestrian traffic entering and leaving Logie Street Park be considered; and

That staff be directed to compare and contrast available traffic calming measures and report back to Council in Q1, 2021.

Carried

9.3.22 CW2020-122

That the Memorandum from the Lindsay Legacy C.H.E.S.T. Fund Grant Committee, **regarding 2021 Lindsay Legacy CHEST Fund Grant Awards,** be received; and

That the grant award and distribution process for the 2021 year for the Lindsay Legacy C.H.E.S.T. Fund be suspended so funds can be utilized to assist with relief efforts to charitable and non profit organizations within the Town of Lindsay.

Carried

9.4 Items Extracted from Committee of the Whole Minutes

9.3.23 CW2020-123

CR2020-262
Moved By Councillor Ashmore
Seconded By Councillor Yeo

That the September 1, 2020 Memorandum from Mark Pankhurst, Fire Chief, **regarding open air burning and the discharge of fireworks**, be received.

Carried

CR2020-263
Moved By Councillor Elmslie
Seconded By Councillor Yeo

That staff bring forward a By-Law to restrict the times of discharge of consumer fireworks to between dusk and 11 pm:

1. Victoria Day, including the day preceding and following Victoria Day
2. Canada Day, including the day preceding and following Canada Day
3. Family Day, including the day preceding and following Family Day
4. Aboriginal Day, including the day preceding and following Aboriginal Day
5. Labour Day, including the day preceding and following Labour Day
6. New Years Eve, including the day preceding and following New Years Eve; and

That the By-Law include a special event permitting process, a Registry for the publication of the date and location of permitted events and a provision for penalties and fines to be imposed for contravention of the By-Law.

A recorded vote was requested by Councillor Ashmore.

Recorded	**For**	**Against**	**Absent**
Mayor Letham	X		
Deputy Mayor O'Reilly	X		
Councillor Ashmore		X	
Councillor Dunn	X		
Councillor Elmslie	X		
Councillor Richardson	X		
Councillor Seymour-Fagan	X		
Councillor Veale	X		
Councillor Yeo	X		
Results	**8**	**1**	**0**

Carried

10. Planning Advisory Committee

10.1 Correspondence Regarding Planning Advisory Committee Recommendations

10.2 Planning Advisory Committee Minutes

Planning Advisory Committee Meeting Minutes - September 2, 2020

CR2020-264
Moved By Councillor Veale
Seconded By Deputy Mayor O'Reilly

That the Minutes of the September 2, 2020 Planning Advisory Committee Meeting be received and the recommendations, included in Section 10.3 of the Agenda, be adopted.

Carried

10.3 Business Arising from Planning Advisory Committee Minutes

10.3.1 PAC2020-029

That Report PLAN2020-033, **Part of Lot 24, Concession 4, 57R-7234, Parts 9 to 14, Former Town of Lindsay, CIC Developments Inc. – Application D06-2020-020**, be received;

That the zoning by-law amendment, substantially in the form attached as Appendix D to Report PLAN2020-033, be referred to Council for approval and adoption; and

That the Mayor and Clerk be authorized to execute any documents required by the approval of this application.

Carried

10.3.2 PAC2020-030

That Report PLAN2020-034, **Part of Lot 32, Concessions 9 and 10 and Part of Lots 49 to 54, North Portage Road, geographic Township of Eldon, identified as 188 Talbot River Road, Kirkfield Lake Resort Ltd. - Application No. D06-2020-021,** be received;

That the Zoning By-law amendment, substantially in the form attached as Appendix C to Report Plan 2020-034, be approved and adopted; and

That the Mayor and Clerk be authorized to execute any documents required by the approval of these applications.

Carried

10.3.3 PAC2020-031

That Report PLAN2020-035, **Part of Lots 14 and 15, Concession 9; Block J, Part Lots 8-17, Plan 80; Part 1, 57R-6577, geographic Township of Mariposa, City of Kawartha Lakes, identified as 1013 Eldon Road, Vandenberg – D06-2020-017**, be received; and

That the application be referred back to staff until such time as all comments have been received from all circulated agencies and City Departments, and for further review and processing.

Carried

10.3.4 PAC2020-032

That Report PLAN2020-036, **Part of Lots 14 and 15, Concession 12, geographic Township of Emily, City of Kawartha Lakes, identified as 914 Centreline Road, Gingrich – D06-2020-010**, be received; and

That the application respecting the proposed Zoning By-law Amendment be referred back to staff until such time as all comments have been received and addressed from all circulated agencies, City Departments, and the public, and for further review and processing.

Carried

10.3.5 PAC2020-033

That Report PLAN2020-037, **Part of Lot 3, Concession 2, geographic Township of Laxton, City of Kawartha Lakes, identified as 128 Curls Road, DaCunha and Potter – D06-2020-011**, be received; and

That a Zoning By-law Amendment respecting application D06-2020-011, be prepared, approved and adopted by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

Carried

10.3.6 PAC2020-034

That Report PLAN2020-038, respecting **Part Lot 17, Concession 13, geographic Township of Manvers, and identified as 438 St. Mary's Road – Application D06-2020-013**, be received;

That a Zoning By-law Amendment respecting application D06-2020-013, substantially in the form attached as Appendix D to Report PLAN2020-038, be approved and adopted by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

Carried

10.3.7 PAC2020-035

That Report PLAN2020-039, **respecting Part of Lot 22, Concession 2, geographic Township of Ops, Wayne and Ann MacLeish – Applications D01-2020-004 and D06-2020-018**, be received; and

That Report PLAN2020-039 respecting Applications D01-2020-004 and D06-2020-018 be referred back to staff to address issues raised through the public consultation process and for further review and processing until such time that all comments have been received from all circulated agencies and City departments, and that any comments and concerns have been addressed.

Carried

10.3.8 PAC2020-036

That Report PLAN2020-040, **respecting Part Lot 2, North side of Glenelg Street, Town Plot, former Town of Lindsay, Application D06-2020-008**, be received;

That a Zoning By-law, respecting application D06-2020-008, substantially in the form attached as Appendix D to Report PLAN2020-040 be approved for adoption by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

Carried

10.3.9 PAC2020-037

That Report PLAN2020-041, **respecting Part Lot 2 Concession 8, geographic Township of Eldon, Application D06-2020-015**, be received;

That a Zoning By-law, respecting application D06-2020-015, substantially in the form attached as Appendix D to Report PLAN2020-041 be approved for adoption by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

Carried

10.4 Items Extracted from Planning Advisory Committee Minutes

11. Consent Matters

The following items were requested to be extracted from the Consent Agenda:

Councillor Ashmore Item 11.6

Moved By Deputy Mayor O'Reilly
Seconded By Councillor Ashmore

That all of the proposed resolutions shown in Section 11.1, 11.2 and 11.3 of the Agenda be approved and adopted by Council in the order that they appear on the agenda and sequentially numbered, save and except for Item 11.6.

Carried

11.1 Reports

11.1.1 RS2020-017

Block B on Plan 330, in the Geographic Township of Laxton, City of Kawartha Lakes
Laura Carnochan, Law Clerk - Realty Services

CR2020-265

That Report RS2020-017, **Block B on Plan 330, in the Geographic Township of Laxton, City of Kawartha Lakes**, be received.

Carried

11.1.2 RS2020-019

Authorize a Grant of Easement in favour of Enbridge Gas Inc. over a Parcel Legally Described as Part of Lot 2 on Plan 51, Part of Lot 3 to 4 on Plan 17, Part 1 on 57R-3305, Part 1 to 3 on 57R-3442, Part 1 to 2 on 57R-3379, subject to and together with R170129 and R167876, together with R372028, in the Geographic Village of Fenelon Falls, City of Kawartha Lakes (PIN 63155-0126)
Christine Oliver, Law Clerk - Realty Services

CR2020-266

That Report RS2020-019, **Authorize a Grant of Easement in favour of Enbridge Gas Inc. in Fenelon Falls, City of Kawartha Lakes (PIN 63155-0126)**, be received; and

That Council allow for the Mayor and Clerk to execute all documentation related to the Grant of Easement.

Carried

11.1.3 RS2020-020

Authorize a Grant of Easement in Favour of Enbridge Gas Inc. Over a Parcel Legally Described as Part 6 on Plan 98, Part of Lot 1 on Plan 17, Part of Lot 2 on Plan 17, Part 1 on 57R-1711 subject to R128917, Part of Lot 3 on Plan 17, Part 1 and 2 on 57R-3324 together with A31885, Part of Lot 4 on Plan 17 as in R173282, subject to A8323, together with R316562, R316563, in the Geographic Village of Fenelon Falls, City of Kawartha Lakes (PIN 63155-0099)
Christine Oliver, Law Clerk - Realty Services

CR2020-267

That Report RS2020-020, **Authorize a Grant of Easement in Favour of Enbridge Gas Inc. in the Geographic Village of Fenelon Falls, City of Kawartha Lakes (PIN 63155-0099)**, be received; and

That Council allow for the Mayor and Clerk to execute all documentation related to the Grant of Easement.

Carried

11.1.4 PUR2020-018

Single Source – Construction Management and SCADA Integration Services for the Lindsay Water Pollution Control Plant (WPCP) Upgrade and Expansion- Phase 1
Linda Lee, Buyer
Nafiur Fahman, Senior Engineering Technician

CR2020-268

That Report PUR2020-018, **Single Source –Construction Management and SCADA Integration Services for the Lindsay Water Pollution Control Plant (WPCP) Upgrade and Expansion**, be received;

That Council authorize the single source purchase to CIMA Canada Inc. of Bowmanville, for the Construction Management of the upgrade and expansion at the Lindsay Water Pollution Control Plant for the total amount of $997,800.00 not including HST;

That Council authorize the single source purchase to WSP Canada Inc. for the SCADA Integration Services for the Lindsay Water Pollution Control Plant upgrades for the total amount of $72,850.00 not including HST;

That the Mayor and Clerk be authorized to sign the agreement; and

That the Procurement Division be authorized to issue a purchase order.

Carried

11.1.5 PUR2020-024

Summary of Delegated Purchasing Authority for the Period March 19, 2020 to September 1, 2020
Launa Macey, Supervisor of Procurement

CR2020-269

That Report PUR2020-024, **Summary of the Delegated Purchasing Authority for the period March 19, 2020 to September 1, 2020**, be received for information purposes;

That the following transfer completed under the Delegated Purchasing Authority as per PUR2020-016 (2020-27-CP) Consulting Services for Facility Master Plan for the Kawartha Lakes Police Service be endorsed:

- **That** $50,000 from the Kawartha Lakes Police Services operating budget be allocated to the KLPS Police Contingency Reserve;
- **That** $50,000 be released from the KLPS Police Contingency Reserve and put into the Community Services budget for 953190107 Facility Master Plan; and
- **That** any unused funds be transferred back to the KLPS Police Contingency Reserve;

That the following transfer completed under the Delegated Purchasing Authority as per PUR2020-025 (2020-55-CQ) Renovations to Forbert Memorial Pool, Bobcaygeon be endorsed:

- **That** $75,022 from the Capital Contingency Reserve be allocated to the Community Services budget for 950200301 – Forbert Memorial Pool; and

- **That** any unused funds be transferred back to the Capital Contingency Reserve.

Carried

11.1.7 CA2020-003

Early-Start Approval for Selected 2021 Capital Projects
Adam Found, Manager of Corporate Assets

CR2020-270

That Report CA2020-003, **Early-Start Approval for Selected 2021 Capital Projects**, be received; and

That the proposed capital projects outlined in Tables 1-3 of Report CA2020-003 be approved and included in the forthcoming 2021 tax-supported capital budget and 2021 water-wastewater capital budget, whichever is applicable.

Carried

11.1.8 ENG2020-011

Request for Stop Control – Hopkins Road, David Drive, Richard Avenue and Linwood Road in Lindsay
Joseph Kelly, Senior Engineering Technician

CR2020-271

THAT Report ENG2020-011 **Request for Stop Control – Hopkins Road, David Drive, Richard Avenue and Linwood Road in Lindsay** be received;

THAT a stop sign be installed at the intersection of Hopkins Road and David Drive on the Hopkins Road (northern) approach;

THAT a stop sign be installed at the intersection of Hopkins Road and Richard Avenue on the Hopkins Road (southern) approach;

THAT a stop sign be installed at the intersection Richard Avenue and Linwood Road on the Linwood Road (southern) approach;

THAT the necessary By-laws for the above recommendations be forwarded to council for adoption; and

THAT the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application/agreement/decision.

Carried

11.1.9 ENG2020-019

Recommendations from the August 13, 2020 and September 3, 2020 Drainage Board Meetings
Mike Farquhar, Supervisor of Technical Services

CR2020-272

That Report ENG2020-019, **Recommendations from the August 13,2020 and September 3, 2020 Drainage Board Meeting**, be received;

That Council directs the appointed Engineering Firm D. M. Wills to proceed with an Engineer's Report for the MacEachern-Brown Municipal Drain under the provisions of the Drainage Act, R.S.O. 1990, c. D.17;

That the City proceed with the Request for Drain Improvement submitted by Ed Bagshaw for an improvement to the Hugh Davidson Municipal Drain and the City Clerk proceed by sending notices required under Section 5 and 78 of the Drainage Act, R.S.O. 1990, Chapter D. 17; and

That pursuant to Section 8(1) and 78(2) of the Drainage Act, R.S.O. 1990, Chapter D. 17, and subject to any objection from Kawartha Conservation, that M. Gerrits Consulting Inc. be appointed as the Drainage Engineer on a date 30 days from the notice to the Kawartha Conservation for the examination of the drainage works and to proceed with the requirements of the proposed improvement under section 78 of the Drainage Act, R.S.O. 1990, Chapter D. 17.

Carried

11.2 Correspondence

11.3 Memorandums

11.3.1 CC2020-09.11.3.1

Memorandum Regarding Land Use Planning Interim Procedures
Chris Marshall, Director of Development Services

CR2020-273

That the Memorandum from Chris Marshall, Director of Development Services, **regarding Land Use Planning Interim Procedures,** be received; and

That now that the State of Emergency has been lifted and the Planning Advisory Committee meetings are taking place on a monthly basis, the interim modification to the Planning Advisory Committee Terms of Reference be removed that

enabled planning applications to be forwarded directly to Council for consideration and approval.

Carried

11.3.2 CC2020-09.11.3.2

Memorandum Regarding Fenelon Falls Powerlinks Committee 2020 Funding Request
Craig Shanks, Director of Community Services

CR2020-274

That the Memorandum from the Fenelon Falls Powerlinks Committee, **regarding 2020 Funding Request,** be received; and

That $1,500,00 be released from the Fenelon Falls Powerlinks Reserve Fund to the Powerlinks Committee for the purpose of a Fenelon Falls Dam Lighting Study.

Carried

11.4 Items Extracted from Consent

11.1.6 CA2020-002

Gravel Resurfacing Plan for 2021-2030
Adam Found, Manager of Corporate Assets

CR2020-275
Moved By Councillor Ashmore
Seconded By Councillor Yeo

That Report CA2020-002, **Gravel Resurfacing Plan for 2021-2030**, be received; and

That the Gravel Resurfacing Plan 2021-2030, attached as Appendix A to Report CA2020-002, be adopted for the purpose of complementing the 5-Year Roads Capital Plan and informing future capital budgets.

Carried

12. Other or New Business

13. By-Laws

The mover requested the consent of Council to read the by-laws by number only.

CR2020-276
Moved By Councillor Yeo
Seconded By Councillor Seymour-Fagan

That the By-Laws shown in Section 13.1 of the Agenda, namely: Items 13.1.1 to and including 13.1.14 be read a first, second and third time, passed, numbered, signed and the corporate seal attached.

Carried

13.1 By-Laws by Consent

13.1.1 By-aw 2020-080

By-Law to Authorize Borrowings of Debentures $5,000,000.00

13.1.2 By-Law 2020-081

A By-Law to Repeal City of Kawartha Lakes By-Law 2020-033, being a By-Law Delegate Authority for Decisions to the Chief Administrative Officer in the City of Kawartha Lakes

13.1.3 By-Law 2020-082

A By-law to Repeal By-Law 2019-166, Being a By-Law Stop Up and Close Part of the Road Allowance Legally Described as Part of the Road Allowance between Concession 3 and Concession 4, in the Geographic Township of Verulam, City of Kawartha as Parts 1-10 on Plan 57R10775 Being Part of PIN:63123-0413 (LT)

13.1.4 By-Law 2020-083

A By-law to Authorize a Grant of Easement in Favour of Enbridge Gas Inc. Over a Parcel Legally Described as Part of Lot 2 on Plan 51, Part of Lot 3 to 4 on Plan 17, Part 1 on 57R-3305, Part 1 to 3 on 57R-3442, Part 1 to 2 on 57R-3379, subject to and together with R170129 and R167876, together with R372028, in the Geographic Village of Fenelon Falls, City of Kawartha Lakes, (PIN 63155-0126)

13.1.5 By-Law 2020-084

A By-law to Authorize a Grant of Easement in Favour of Enbridge Gas Inc. Over a Parcel Legally Described as Part 6 on Plan 98, Part of Lot 1 on Plan 17, Part of Lot 2 on Plan 17, Part 1 on 57R-1711 subject to R128917, Part of Lot 3 on Plan 17, Part 1 and 2 on 57R-3324 together with A31885, Part of Lot 4 on Plan 17 as

in R173282, subject to A8323, together with R316562, R316563, in the Geographic Village of Fenelon Falls, City of Kawartha Lakes (PIN 63155-0099)

13.1.6 By-Law 2020-085

A By-law to Stop Up and Close Part of the Road Allowance in Front of Lot 31, Concession 13, in the Geographic Township of Dalton, City of Kawartha Lakes, Designated as Part 1 on Plan 57R-10779, and to Authorize the Sale of the Land to the Abutting Owner

13.1.7 By-Law 2020-086

A By-law to Provide for the Erection of Stop Signs in the City of Kawartha Lakes Clifton Street and Kennedy Drive in the Geographic Village of Fenelon Falls

13.1.8 By-Law 2020-087

A By-law to Provide for the Erection of Stop Signs in the City of Kawartha Lakes (Hopkins Road, David Drive, Richard Avenue, and Linwood Road)

13.1.9 By-Law 2020-088

A By-Law to Amend the Town of Lindsay Zoning By-Law No. 2000-75 to Rezone Land within the City Of Kawartha Lakes (Vacant Land on Angeline Street North - CIC Developments Inc.)

13.1.10 By-Law 2020-089

A By-Law To Amend The Township of Eldon Zoning By-Law No. 94-14 To Rezone Land Within The City Of Kawartha Lakes (188 Talbot River Road - Kirkfield Lake Resort Inc.)

13.1.11 By-Law 2020-090

A By-Law To Amend The Township of Manvers Zoning By-Law No. 87-06 To Rezone Land Within The City Of Kawartha Lakes (438 St. Mary's Road)

13.1.12 By-Law 2020-091

A By-Law To Amend The Town of Lindsay Zoning By-Law No. 2000-75 To Rezone Land Within The City Of Kawartha Lakes (6 Glenelg Street West - Glenelg Developments Corporation)

13.1.13 By-Law 2020-092

A By-Law To Amend The Township of Eldon Zoning By-Law No. 94‑ 14 To Rezone Land Within The City Of Kawartha Lakes (112 Kirkfield Road - Yates)

13.1.14 By-Law 2020-093

A By-Law to Amend City of Kawartha Lakes By-law 2018-039, Being a By-Law to Regular Water and Wastewater Services

13.2 By-Laws Extracted from Consent

14. Notice of Motion

15. Closed Session

15.1 Adoption of Closed Session Agenda

CR2020-277
Moved By Councillor Yeo
Seconded By Councillor Elmslie

That the Closed Session agenda be adopted as circulated; and

That Council convene into closed session at 3:20 p.m. pursuant to Section 239(2) of the Municipal Act, S.O. 2001 s.25, in order to consider matters identified in Section 15.3 of the Regular Council Meeting Agenda of Tuesday, September 15, 2020, namely Items 15.3.1 to and including 15.3.5.

Carried

15.2 Disclosure of Pecuniary Interest in Closed Session Items

There were no declarations of pecuniary interest disclosed.

The meeting recessed at 3:20 p.m. and reconvened at 3:22 p.m.

15.3 Move Into Closed Session

16. Matters from Closed Session

Item 15.3.1

The Confidential Closed Session Minutes for the August 20, 2020 Regular Council Meeting were approved.

Item 15.3.2

The Solicitor was given direction regarding the acquisition of Lots 6 and 7 on Plan 102, Town of Lindsay, for the use as a multi-use public space.

Item 15.3.3

The Solicitor was given direction on the proposed License Agreement and permission to construct with Lafarge Canada Inc.

Item 15.3.4

The Solicitor received instruction to commence legal action in response to ongoing contravention of the City's zoning by-law at 6343 Highway 35.

Item 15.3.5

CR2020-284
Moved By Councillor Yeo
Seconded By Councillor Veale

That the Mayor and Clerk be authorized to execute a Shared Service Agreement between The Corporation of the County of Peterborough and the Corporation of the City of Kawartha Lakes.

Carried

17. Confirming By-Law

17.1 CC2020-09.17.1

By-law to Confirm the Proceedings of the Regular Council Meeting, September 15, 2020

CR2020-285
Moved By Councillor Dunn
Seconded By Councillor Elmslie

That a by-law to confirm the proceedings of a Regular Council Meeting held Tuesday, September 15, 2020 be read a first, second and third time, passed, numbered, signed and the corporate seal attached.

Carried

18. Adjournment

CR2020-286
Moved By Councillor Richardson
Seconded By Councillor Veale

That the Council Meeting adjourn at 4:13 p.m.

Carried

Read and adopted this 20 day of October, 2020.

Andy Letham, Mayor

Cathie Ritchie, City Clerk

Request to Speak before Council

Request to Make a Deputation/Presentation to Council/Committee
City of Kawartha Lakes
City Clerk's Office
26 Francis Street, PO Box 9000
Lindsay, ON K9V 5R8
705-324-9411

Name: *

Anne Yorke

Address: *

[redacted]

City/Town/Village:

[redacted]

Province: *

[redacted]

Postal Code:

[redacted]

Telephone: *

[redacted]

Email: *

[redacted]

There can be a maximum of two speakers for each deputation. Please list the name(s) of the individual(s) who will be speaking. The names that are listed here will be included on the Council Meeting Agenda.

Deputant One:

Anne Yorke

Deputant Two:

First Name, Last Name

Please provide details of the matter to which you wish to speak: *

The sale of lots on Junioer St Nature Preserve

Please attach any additional supporting documents you wish to provide and submit with this completed form.

Have you discussed this matter with City Staff?

- (●) Yes
- ( ) No

If yes, Which department and staff member(s) have you spoken to?

What action are you hoping will result from your presentation/deputation? *

Put a stop on the sale of this Nature Preserve

By signing this form you are acknowledging that all of the information you are providing on this form is true, and giving the City permission to collect your personal information for the principal purpose of a request to make a deputation to Committee or Council as outlined below.

Signature:

Anne Yorke

Date:

10/12/2020

The personal information is being collected by the City of Kawartha Lakes for the principal purpose of a request to make a deputation to Committee or Council pursuant to the City's procedural by-law. This information, including all attachments submitted may be circulated to members of Council, staff, the general public and posted on the City website. Questions about the collection of this information should be directed to the City Clerk or Deputy Clerk at 705 324-9411 ext. 1295 or 1322.

Do you agree to the publication of your name and contact information on the City's website and the City Council agenda? *

- ○ Yes
- ◉ No

Please complete this form and return to the City Clerk's Office by submitting it online or:
Fax: 705-324-8110 Email: agendaitems@kawarthalakes.ca

Request to Speak before Council

Request to Make a Deputation/Presentation to Council/Committee
City of Kawartha Lakes
City Clerk's Office
26 Francis Street, PO Box 9000
Lindsay, ON K9V 5R8
705-324-9411

Name: *

Doug Dickerson

Address: *

113 Wychwood Cres

City/Town/Village:

Fenelon Falls

Province: *

Ont

Postal Code:

K0M 1N0

Telephone: *

416-399-1219

Email: *

dougdickerson3@gmail.com

There can be a maximum of two speakers for each deputation. Please list the name(s) of the individual(s) who will be speaking. The names that are listed here will be included on the Council Meeting Agenda.

Deputant One:

Doug Dickerson

Deputant Two:

First Name, Last Name

Please provide details of the matter to which you wish to speak: *

October 20th council Meeting. Re proposed transfer of City lands to Fenelon Community Housing Initiative..

Please attach any additional supporting documents you wish to provide and submit with this completed form.

Have you discussed this matter with City Staff?

- ○ Yes
- ◉ No

If yes, Which department and staff member(s) have you spoken to?

What action are you hoping will result from your presentation/deputation? *

Commitment from Council to hold further consideration of proposed sale to FCHI until: 1) residents have report and details of proposed Fenelon Falls by-pass; 2) answered the many questions proposed by October 20th C of W deputations; 3) detailed community benefit(s); 4) how FCHI proposal fits into the surrounding residences.

By signing this form you are acknowledging that all of the information you are providing on this form is true, and giving the City permission to collect your personal information for the principal purpose of a request to make a deputation to Committee or Council as outlined below.

Signature:

Doug Dickerson

Date:

10/12/2020

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Do you agree to the publication of your name and contact information on the City's website and the City Council agenda? *

- (●) Yes
- ( ) No

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Request to Speak before Council

Request to Make a Deputation/Presentation to Council/Committee
City of Kawartha Lakes
City Clerk's Office
26 Francis Street, PO Box 9000
Lindsay, ON K9V 5R8
705-324-9411

Name: *

Ronalee Swizter

Address: *

109 Juniper Box 425

City/Town/Village:

Fenelon Falls

Province: *

Ontario

Postal Code:

K0M - 1N0

Telephone: *

17058871481

Email: *

evil_twinron22@hotmail.com

There can be a maximum of two speakers for each deputation. Please list the name(s) of the individual(s) who will be speaking. The names that are listed here will be included on the Council Meeting Agenda.

Deputant One:

Ronalee

Deputant Two:

First Name, Last Name

Please provide details of the matter to which you wish to speak: *

Juniper St

Please attach any additional supporting documents you wish to provide and submit with this completed form.

Have you discussed this matter with City Staff?

- (●) Yes
- ( ) No

If yes, Which department and staff member(s) have you spoken to?

What action are you hoping will result from your presentation/deputation? *

hoping someone will listen

By signing this form you are acknowledging that all of the information you are providing on this form is true, and giving the City permission to collect your personal information for the principal purpose of a request to make a deputation to Committee or Council as outlined below.

Signature:

Ronalee Switzer

Date:

10/13/2020

The personal information is being collected by the City of Kawartha Lakes for the principal purpose of a request to make a deputation to Committee or Council pursuant to the City's procedural by-law. This information, including all attachments submitted may be circulated to members of Council, staff, the general public and posted on the City website. Questions about the collection of this information should be directed to the City Clerk or Deputy Clerk at 705 324-9411 ext. 1295 or 1322.

Do you agree to the publication of your name and contact information on the City's website and the City Council agenda? *

- (●) Yes
- ( ) No

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Request to Speak before Council

Request to Make a Deputation/Presentation to Council/Committee
City of Kawartha Lakes
City Clerk's Office
26 Francis Street, PO Box 9000
Lindsay, ON K9V 5R8
705-324-9411

Name: *

Richard Chartier

Address: *

101 Juniper St

City/Town/Village:

Fenelon Falls

Province: *

Ontario

Postal Code:

K0M 1N0

Telephone: *

[redacted]

Email: *

[redacted]

There can be a maximum of two speakers for each deputation. Please list the name(s) of the individual(s) who will be speaking. The names that are listed here will be included on the Council Meeting Agenda.

Deputant One:

Richard Chartier

Deputant Two:

First Name, Last Name

Please provide details of the matter to which you wish to speak: *

OCTOBER 20th,2020 Meeting
RS2020-015, Proposed Direct Sale of City-Owned Property – Juniper Street, Fenelon Falls

Please attach any additional supporting documents you wish to provide and submit with this completed form.

Have you discussed this matter with City Staff?

- (●) Yes
- ( ) No

If yes, Which department and staff member(s) have you spoken to?

What action are you hoping will result from your presentation/deputation? *

A review on accountability and transparency of the processes of which this was carried through.

By signing this form you are acknowledging that all of the information you are providing on this form is true, and giving the City permission to collect your personal information for the principal purpose of a request to make a deputation to Committee or Council as outlined below.

Signature:

Richard Chartier

Date:

10/13/2020

The personal information is being collected by the City of Kawartha Lakes for the principal purpose of a request to make a deputation to Committee or Council pursuant to the City's procedural by-law. This information, including all attachments submitted may be circulated to members of Council, staff, the general public and posted on the City website. Questions about the collection of this information should be directed to the City Clerk or Deputy Clerk at 705 324-9411 ext. 1295 or 1322.

Do you agree to the publication of your name and contact information on the City's website and the City Council agenda? *

- (●) Yes
- ( ) No

Please complete this form and return to the City Clerk's Office by submitting it online or:
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Request to Speak before Council

Request to Make a Deputation/Presentation to Council/Committee
City of Kawartha Lakes
City Clerk's Office
26 Francis Street, PO Box 9000
Lindsay, ON K9V 5R8
705-324-9411

Name: *

Joy Epstein

Address: *

93 Juniper Street

City/Town/Village:

Fenelon Falls

Province: *

Ontario

Postal Code:

K0M1N0

Telephone: *

5145824958

Email: *

joyjepstein@gmail.com

There can be a maximum of two speakers for each deputation. Please list the name(s) of the individual(s) who will be speaking. The names that are listed here will be included on the Council Meeting Agenda.

Deputant One:

Joy Epstein

Deputant Two:

First Name, Last Name

Please provide details of the matter to which you wish to speak: *

Proposed surplus land sale on Juniper Street

Please attach any additional supporting documents you wish to provide and submit with this completed form.

Have you discussed this matter with City Staff?

- (●) Yes
- ( ) No

If yes, Which department and staff member(s) have you spoken to?

What action are you hoping will result from your presentation/deputation? *

Rescind decision for land sale.

By signing this form you are acknowledging that all of the information you are providing on this form is true, and giving the City permission to collect your personal information for the principal purpose of a request to make a deputation to Committee or Council as outlined below.

Signature:

Joy Epstein

Date:

10/14/2020

The personal information is being collected by the City of Kawartha Lakes for the principal purpose of a request to make a deputation to Committee or Council pursuant to the City's procedural by-law. This information, including all attachments submitted may be circulated to members of Council, staff, the general public and posted on the City website. Questions about the collection of this information should be directed to the City Clerk or Deputy Clerk at 705 324-9411 ext. 1295 or 1322.

Do you agree to the publication of your name and contact information on the City's website and the City Council agenda? *

- (●) Yes
- ( ) No

Please complete this form and return to the City Clerk's Office by submitting it online or:
Fax: 705-324-8110 Email: agendaitems@kawarthalakes.ca

PETITION TO CITY OF KAWARTHA LAKES
Highway 48 Speed Limit and Parking at Causeway

We, the residents of Kirkfield on Highway 48, Sapphire Lane and Mitchellview Rd. would like the speed limit over the causeway (crossing Mitchell Lake between Coboconk and Kirkfield), reduced to 50 km/h, for reasons of safety and visibility. The speed limit immediately before and immediately after the causeway is 50-60 km/h. We are also requesting that "No Parking" signs be posted on the shoulders at the residential (Kirkfield) end of the causeway; presently, cares are parking to fish off the causeway, causing a hazard due to poor visibility, and also leaving litter and debris behind.

NAME	ADDRESS	CONTACT EMAIL OR PHONE	SIGNATURE
STACEY & CAROL TEEL	50 Mitchellview Rd Kirkfield	705-308-8335 teel969@msn.com	
BOB & NANCY HEALE	46 Mitchellview Rd Kirkfield	705-928-3574	
Margarete Kasper	40 Mitchell view Rd KIRKFIELD	705-308-9447	
VERNE BRINSMEAD	10 ELVEN ST	(705) 438-5572	
LYNN RICHARDSON	34 Mitchellview Rd	705-438-1894	
STEVE TOT	8 Sapphire LANE	416-256-6570	
Paul Hickling	26 Mitchelview Rd.	416-4389857	
JANE SMYTH	26 MITCHELVIEW RD	416-292-9995	
Grant Smyth			
BRIAN CLUMPUS	6 SAPHIRRE LANE	905-706 2841	
FRED CLUMPUS	MITCHELVIEW ISLAND.	905-666-5140	
Chris Marr	6 Mitchelview	705-928-5652	
KIRDEN McDERMID	8 MITCHELL VIEW.	705 438 1012	
Mary McDermid	8 Mitchell View	705-438-1012	
FRANK VETRO	4 Sapphire LANE	647-545-5598	
JOSLYN HIGGINSON	4 Sapphire Ln	416-996-5679	

The Corporation of the City of Kawartha Lakes

Minutes

Committee of the Whole Meeting

COW2020-06
Tuesday, October 6, 2020
Open Session Commencing at 1:00 p.m. – Electronic Public Participation
Council Chambers
City Hall
26 Francis Street, Lindsay, Ontario K9V 5R8

Members:
Mayor Andy Letham
Deputy Mayor Patrick O'Reilly
Councillor Ron Ashmore
Councillor Pat Dunn
Councillor Doug Elmslie
Councillor Tracy Richardson
Councillor Kathleen Seymour-Fagan
Councillor Andrew Veale
Councillor Emmett Yeo

Accessible formats and communication supports are available upon request. The City of Kawartha Lakes is committed to accessibility for persons with disabilities. Please contact AgendaItems@kawarthalakes.ca if you have an accessible accommodation request.

1. Call to Order

Deputy Mayor O'Reilly called the Meeting to order at 1:03 p.m. Councillors R. Ashmore, P. Dunn, P. O'Reilly, T. Richardson, K. Seymour-Fagan, A. Veale and E. Yeo were in attendance in Council Chambers.

Mayor Letham attended electronically.

CAO R. Taylor, City Clerk C. Ritchie, Deputy Clerk S. O'Connell and Director of Corporate Services J. Stover were also in attendance in Council Chambers.

Directors C. Marshall, B. Robinson, J. Rojas, C. Shanks, R. Sutherland, City Solicitor R. Carlson, Paramedic Chief A. Rafton, Economic Development Officer E. Turner and Manager of Municipal Law Enforcement and Licensing A. Sloan were in attendance electronically.

2. Adoption of Agenda

CW2020-125
Moved By Councillor Elmslie
Seconded By Councillor Yeo

That the agenda be adopted as circulated and with the following amendments:

Additions:

Item 4.5	Deputation Regarding the Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls Sharon Larman
Item 5.1	Correspondence Regarding the Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls Anne and John Yorke
Item 5.2	Correspondence Regarding the Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls Barbara and Cecil Young

Carried

3. Disclosure of Pecuniary Interest

There were no declarations of pecuniary interest disclosed.

4. Deputations

4.1 COW2020-06.4.1

City Services Performance Management
David Webb

David Webb discussed performance management and how imposing standards for City Services and implementing performance measurements would assist the residents of Kawartha Lakes.

CW2020-126
Moved By Councillor Veale
Seconded By Councillor Richardson

That the deputation of David Webb, **regarding City Services Performance Management**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

4.2 COW2020-06.4.2

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
Ronalee Switzer

Ronalee Switzer spoke in opposition to the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls.

CW2020-127
Moved By Councillor Ashmore
Seconded By Councillor Dunn

That the deputation of Ronalee Switzer, **regarding proposed direct sale of City owned lands on Juniper Street, Fenelon Falls**, be received;and

That this recommendation be forwarded to Council for consideration at the next regular Council Meeting.

Carried

4.3 COW2020-06.4.3

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
Richard Chartier
Doug Dickerson

Richard Chartier and Doug Dickerson spoke in opposition to the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls.

CW2020-128
Moved By Councillor Elmslie
Seconded By Councillor Seymour-Fagan

That the deputation of Richard Chartier and Doug Dickerson, **regarding the proposed direct sale of City owned lands on Juniper Street, Fenelon Falls**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

4.4 COW2020-06.4.4

Proposed Direct Sale of City Owned Lands on Juniper Street
Joy Epstein

Joy Epstein spoke in opposition to the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls.

CW2020-129
Moved By Councillor Veale
Seconded By Councillor Richardson

That the deputation of Joy Epstein, **regarding the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

4.5 COW2020-06.4.5

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
Sharon Larman

Sharon Larman spoke in opposition the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls.

CW2020-130
Moved By Councillor Seymour-Fagan
Seconded By Councillor Ashmore

That the deputation of Sharon Larman, **regarding the proposed direct sale of City owned lands on Juniper Street in Fenelon Falls**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

5. Correspondence

5.1 COW2020-06.5.1

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
Anne and John Yorke

5.2 COW2020-06.5.2

Proposed Direct Sale of City Owned Lands on Juniper Street, Fenelon Falls
Barbara and Cecil Young

CW2020-131
Moved By Councillor Elmslie
Seconded By Councillor Dunn

That the correspondence from Anne and John Yorke and the correspondence from Barbara and Cecil Young, **regarding the proposed direct sale of City owned lands on Juniper Street, Fenelon Falls**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

6. Presentations

6.1 COW2020-06.6.1

2021 Budget Process Presentation
Jennifer Stover, Director of Corporate Services

Director Stover provided an overview of the process that will be followed for the 2021 Budget.

CW2020-132
Moved By Councillor Dunn
Seconded By Councillor Elmslie

That the presentation by Jennifer Stover, Director of Corporate Services, **regarding the 2021 Budget Process**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

6.1.1 Report CORP2020-014

2021 Budget Process and Requests
Jennifer Stover, Director of Corporate Services

CW2020-133
Moved By Councillor Yeo
Seconded By Councillor Elmslie

That Report CORP2020-014, **2021 Budget Process and Requests**, be received; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

CW2020-134
Moved By Mayor Letham
Seconded By Councillor Dunn

That Council direct staff to review the option of utilizing the 2019 budget surplus, in its entirety, for a one time rebate on the 2021 tax bills for all ratepayers; and

That staff report back to Council on the result that the proposed tax rebate will have; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

The Meeting recessed at 2:57 p.m. and recovened at 3:09 p.m.

City Clerk C. Ritchie departed the meeting at 2:57 p.m.

The Committee moved to Item 6.2 to accommodate the Timed Appointment.

6.2 COW2020-06.6.2

Master Fire Plan Presentation - Timed Appointment 3:00 p.m.
Darryl Culley, President, Emergency Management and Training Inc.

Darryl Culley, President, Emergency Management and Training Inc., provided an overview of the proposed draft Master Fire Plan. Mr. Culley provided a high-level overview of the recommendations contained within the draft Plan and how those recommendations could be implemented over a ten (10) year period.

CW2020-135
Moved By Councillor Elmslie
Seconded By Councillor Ashmore

That the presentation by Darryl Culley, President, Emergency Management and Training Inc., **regarding the Master Fire Plan**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

The Committee resumed consideration of Item 6.1.1, Report CORP2020-014.

Moved By Councillor Seymour-Fagan
Seconded By Councillor Yeo

That project items CAP22, CAP23, CAP24, CAP25 identified in Appendix A to Report CORP2020-014 be included as decision units in the draft 2021 budget for consideration.

Motion Failed

CW2020-136
Moved By Councillor Yeo
Seconded By Councillor Dunn

That the projects identified in Appendix A to Report CORP2020-014 be received for information purposes; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

CW2020-137
Moved By Councillor Ashmore
Seconded By Councillor Yeo

That correspondence from Councillor Ashmore identifying roads for consideration under the Lifecycle Extension Program and Rural Resurfacing Program within the 2021 Budget be received;

That the items identified in that correspondence be included in Appendix A to Report CORP2020-014 and forwarded to Council for consideration; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

7. Reports

7.1 RS2020-022

581 Highway 36, Lindsay
Robyn Carlson, City Solicitor

CW2020-138
Moved By Councillor Dunn
Seconded By Councillor Ashmore

That Report RS2020-022, **581 Highway 36, Lindsay**, be received; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.2 LIC2020-001

Charitable Road Tolls
Aaron Sloan, Manager of Law Enforcement and Licensing

CW2020-139
Moved By Councillor Elmslie
Seconded By Councillor Ashmore

That Report LIC2020-001, **Charitable Road Tolls**, be received; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

7.3 CORP2020-010

Sanitary Sewer Flat Rate Charge
Jennifer Stover, Director of Corporate Services
Bryan Robinson, Director of Public Works

CW2020-140
Moved By Councillor Yeo
Seconded By Councillor Seymour-Fagan

That Report CORP2020-010, **Sanitary Sewer Flat Rate Charge**, be received; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.4 CORP2020-011

Purchasing Process and Policy
Jennifer Stover, Director of Corporate Services

CW2020-141
Moved By Councillor Elmslie
Seconded By Councillor Dunn

That Report CORP2020-011, **Purchasing Process and Policy**, be received;

That the proposed Purchasing Policy be forwarded to Council for consideration at the October 20, 2020 Regular Council Meeting; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.5 CORP2020-012

Sustainable Procurement Policy
Jennifer Stover, Director of Corporate Services

CW2020-142
Moved By Councillor Seymour-Fagan
Seconded By Councillor Richardson

That Report CORP2020-012, **Sustainable Procurement Policy**, be received;

That the Sustainable Procurement Policy, as attached in Appendix A to Report CORP2020-012, be adopted and numbered for inclusion in the City's Policy Manual; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.6 CS2020-010

Release of Fenelon Falls Legacy C.H.E.S.T. Funds
LeAnn Donnelly, Executive Assistant, Community Services

CW2020-143
Moved By Councillor Elmslie
Seconded By Councillor Veale

That Report CS2020-010, **Release of Fenelon Falls Legacy C.H.E.S.T. Funds**, be received;

That Kawartha Works Community Co-operative be approved for funding in the amount of $14,984.37 with the allocation to come from the Fenelon Falls Legacy C.H.E.S.T. Reserve (3.24350); and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.7 CS2020-011

Coboconk Wellness Centre Feasibility Report
Craig Shanks, Director of Community Services

CW2020-144
Moved By Councillor Yeo
Seconded By Councillor Veale

That Report CS2020-011, **Coboconk Wellness Centre Feasibility Report**, be received;

That staff be directed to proceed with working with the Coboconk, Norland & Area Chamber of Commerce to develop the Coboconk Train Station into the Coboconk Wellness Centre;

That staff work with the Coboconk, Norland & Area Chamber of Commerce to secure the required external grant funding to proceed with the project;

That the required $1,500.000.00 City contribution to this project be incorporated into the City's Asset Management and 10 Year Financial Plans and future capital budgets for when matching funds are secured for Council's consideration; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.8 ED2020-021

Correction of Legal Descriptions in Heritage By-laws
Emily Turner, Economic Development Officer, Heritage Planning

CW2020-145
Moved By Councillor Richardson
Seconded By Councillor Ashmore

That Report ED2020-021, **Correction of Legal Descriptions in Heritage By-laws**, be received;

That staff be directed to proceed with the process to amend the legal descriptions in the heritage designation by-laws for 37 Colborne Street, 13 Lindsay Street, 2 Lindsay Street South, 17025 Simcoe Street and 45 Russell Street West, including the preparation and circulation of the notices required under the Ontario Heritage Act and the preparation of the amending by-laws;

That the amending by-laws be brought forward to Council at the next Regular Council meeting following the end of the notice period; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.9 RD2020-003

Recommendations for the Maintenance and Improvement of Road Drainage
David Lembke, Manager, Roads Operations

CW2020-146
Moved By Councillor Dunn
Seconded By Councillor Veale

That Report RD2020-003, **Recommendations for the Maintenance and Improvement of Road Drainage**, be received;

That Staff be directed to present the in house ditching crew option for consideration in the 2022 Budget; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.10 RD2020-008

Off Road Vehicle Use of Municipal Roads
David Lembke, Manager, Roads Operations

CW2020-147
Moved By Councillor Yeo
Seconded By Councillor Veale

That Report RD2020-008, **Off Road Vehicle Use of Municipal Roads**, be received;

That ORV and ATV use on Municipal Highways in the City of Kawartha Lakes be reviewed in conjunction with the Trails Master Plan in 2021;

That the amendments to Section 2.07 and Section 4.01 of By-Law 2019-077, being a By-Law to Regulate the Operation of ATV's and ORV's on Municipal Highways, outlined in Appendix A be approved;

That the necessary By-Law to amend By-Law 2019-077 be forwarded to Council for approval;

That a Task Force dedicated to the review of off road vehicle use of municipal roads be implemented and report back to Council on off road vehicle use by the end of Q1, 2021; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

The Meeting recessed at 5:25 p.m. and reconvened at 5:35 p.m.

7.11 RD2020-009

Bell Canada Alternate Locate Agreement
Oliver Vigelius, Manager, Roads Operations

CW2020-148
Moved By Councillor Elmslie
Seconded By Councillor Richardson

That Report RD2020-009, **Bell Canada Alternate Locate Agreement**, be received;

That the Mayor and Clerk be authorized to execute the Alternate Locate Agreement with Bell Canada on behalf of the City of Kawartha Lakes; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.12 TR2020-002

Addition of Fourth Route to Lindsay Transit
Todd Bryant, Manager, Fleet and Transit

CW2020-149
Moved By Councillor Dunn
Seconded By Councillor Elmslie

That Report TR2020-002, **Addition of Fourth Route to Lindsay Transit**, be received;

That Council approve expansion of transit service within Lindsay in alignment with the Transit Master Plan to commence January 2022 including required staffing and equipment needs; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

7.13 EMS2020-001

2021 Response Time Notification
Andrew Rafton, Chief, Paramedic Services

CW2020-150
Moved By Councillor Elmslie
Seconded By Councillor Yeo

That Report EMS2020-001, **2021 Response Time Performance Plan**, be received;

That Council approve the 2021 Response Time Performance Plan for submission under part VIII of Ontario Regulation 257/00 made under the Ambulance Act; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

8. Memorandums

8.1 COW2020-06.8.1

Traffic Calming on Glengarry Road, Bethany
Councillor Richardson

CW2020-151
Moved By Councillor Richardson
Seconded By Councillor Veale

That the Memorandum from Councillor Richardson, **regarding Traffic Calming** on **Glengarry Road, Bethany** be received;

That Glengarry Road in Bethany, Ontario be considered for addition to the Rural Traffic Calming 40 km speed area;

That staff be directed to review and consider options to improve the functionality of Glengarry Road in Bethany, Ontario and report back to Council by Q1 2021; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

8.2 COW2020-06.8.2

Implementation of Automated Speed Enforcement Cameras
Councillor Veale

CW2020-152
Moved By Councillor Veale
Seconded By Councillor Seymour-Fagan

That the Memorandum from Councillor Veale, **regarding the Implementation of Automated Speed Enforcement Cameras**, be received;

That staff be directed to review the logistics, cost and procedures associated with the implementation of automated speed enforcement camera's in City of Kawartha Lakes school zones and safety community zones;

That staff report back with their findings by Q2 2021; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

8.3 COW2020-06.8.3

Four Way Stop at Mary Street and Sturgeon Road South, Omemee
Councillor Ashmore

CW2020-153
Moved By Councillor Ashmore
Seconded By Councillor Seymour-Fagan

That the Memorandum from Councillor Ashmore, regarding the **Implementation of a Four Way Stop at Mary Street and Sturgeon Road South, Omemee,** be received;

That staff investigate the intersection of Mary Street and Sturgeon Road South to be considered for a four way stop and report back in Q2 2021; and

That this recommendation be forwarded to Council for consideration at the next Regular Council Meeting.

Carried

8.4 COW2020-06.8.4

Update from the Community Pandemic Recovery Task Force
Rod Sutherland, Director of Human Services

CW2020-154
Moved By Councillor Elmslie
Seconded By Councillor Yeo

That the Memorandum from Rod Sutherland, Director of Human Services, **Update from Community Pandemic Recovery Task Force**, be received; and

That this recommendation be brought forward to Council for consideration at the next Regular Council Meeting.

Carried

9. Closed Session

10. Matters from Closed Session

11. Adjournment

CW2020-155
Moved By Councillor Seymour-Fagan
Seconded By Councillor Dunn

That the Committee of the Whole Meeting adjourn at 5:52 p.m.

Carried

Andy Letham, Mayor

Cathie Ritchie, City Clerk

The Corporation of the City of Kawartha Lakes

Minutes

Planning Advisory Committee Meeting

PC2020-06
Wednesday, October 7, 2020
1:00 P.M.
Council Chambers
City Hall
26 Francis Street, Lindsay, Ontario K9V 5R8

Members:
Mayor Andy Letham
Deputy Mayor Patrick O'Reilly
Councillor Kathleen Seymour-Fagan
Councillor Andrew Veale
Mike Barkwell
Jason Willock

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1. Call to Order and Adoption of Agenda

Chairperson Deputy Mayor O'Reilly called the meeting to order at 1:00 p.m. Councillors K. Seymour-Fagan, and A. Veale and M. Barkwell, and J. Willock were in attendance.

Deputy Clerk and Recording Secretary J. Watts, Director of Development Services C. Marshall, Supervisor of Development Engineering C. Sisson, Planning Officer-Large Developments I. Walker, and Planners II J. Derworiz, D. Harding, M. LaHay and K. Stainton were also in attendance.

The Chair opened the meeting and introduced Planning Advisory Committee and the members of staff present.

PAC2020-039
Moved By Councillor Veale
Seconded By M. Barkwell

That the agenda be adopted as circulated.

Carried

2. Declarations of Pecuniary Interest

There were no declarations of pecuniary interest disclosed.

3. Public Meeting

The Chair stated that, as required under the Planning Act, a public meeting is being held prior to the City of Kawartha Lakes Council making decisions on the following planning matters.

3.1 PLAN2020-046

Kent Stainton, Planner II
An application to amend the Township of Emily Zoning By-law 1996-30 on land described as Part Lot 10, Concession 9, geographic Township of Emily, identified as 1067 Tracey’s Hill Road - Downey

3.1.1 Public Meeting

The Chair requested staff to advise on the manner of giving notice for the proposed Zoning By-law Amendment. He also asked staff to briefly describe the proposal and summarize the correspondence, if any, received to date.

Mr. Stainton confirmed that the required notice was given in accordance with the

Planning Act and circulated to each owner of land within 500 metres, and that a sign was posted on the subject property. He summarized the application, explaining that it proposes to change the zoning on a portion of the land from Agricultural (A1) Zone to Agricultural Exception 36 (A1-36) Zone to recognize a reduced minimum lot area and permit specific agricultural uses. The application will also change the zoning surrounding the woodlands on the property from Agricultural (A1) Zone to an Environmental Protection Exception 4 (EP-4) Zone to acknowledge the existing natural heritage features and permit passive, recreational activities. The rezoning would facilitate a future consent application for a lot addition with an abutting property. The application is consistent with the Provincial Policy Statement, conforms to the Growth Plan for the Greater Golden Horseshoe and the Kawartha Lakes Official Plan. Mr. Stainton summarized the comments received to date, as detailed in his report, noting that subsequent to the writing of the report additional comments were received from Kawartha Conservation and from the City's Agricultural Development Officer, Supervisor of Part 8 Sewage Systems, and the Building Division all with no objections. Staff are recommending that the application be referred to Council for approval.

The Chair inquired if the applicant wished to speak to the application.

Emma Drake of DM Wills Consulting Services, spoke as the applicant and provided reasoning for the application being improved economies of scale for the farming consolidation. She stated that they have reviewed the report and agreed with the analysis and recommendation.

The Chair inquired if anyone wished to speak to the application.

No other persons spoke to the application.

The Public Meeting concluded at 1:10pm.

3.1.2 Business Arising from the Public Meeting

PAC2020-040
Moved By Councillor Veale
Seconded By Councillor Seymour-Fagan

That Report PLAN2020-046, **respecting Part Lot 10, Concession 9, geographic Township of Emily, and identified as 1067 Tracey's Hill Road – Application D06-2020-022**, be received;

That a Zoning By-law Amendment respecting application D06-2020-022, substantially in the form attached as Appendix D to Report PLAN2020-046, be approved and adopted by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

Carried

3.2 PLAN2020-047

Ian Walker, Planning Officer - Large Developments
An application to amend the Township of Ops Zoning By-law 93-30 on land described as Part of Lot 15, Concession 5, geographic Township of Ops, identified as 2197 Little Britain Road - Bob Mark Tractor Holdings Inc.

3.2.1 Public Meeting

The Chair requested staff to advise on the manner of giving notice for the proposed Zoning By-law Amendment. He also asked staff to briefly describe the proposal and summarize the correspondence, if any, received to date.

Mr. Walker confirmed that the required notice was given in accordance with the Planning Act and circulated to each owner of land within 500 metres, and that a sign was posted on the subject property. He summarized the application, explaining that it proposes to permit various types of light, medium, and heavy industrial uses permitted in the 'M' zone as permitted uses, and to amend the development standards to allow the redevelopment of the property. The application is consistent with the Provincial Policy Statement, conforms to the Growth Plan for the Greater Golden Horseshoe and the Kawartha Lakes Official Plan. Mr. Walker summarized the comments received to date, as detailed in his report, noting that subsequent to the writing of the report additional comments were received from the Ministry of Transportation and the City's Part 8 Sewage Systems Supervisor both noting no concerns. Staff are recommending that the application be forwarded to Council for approval.

The Chair inquired if the applicant wished to speak to the application.

Kevin Duguay spoke as the applicant and noted the history of this application and its relationship to the existing tractor dealership at this property moving down the road to a newer larger location. He noted there is interest from potential buyers in this property, and the rezoning will assist in the eventual sale. He concluded noting his support of the staff recommendations and congratulated the City for the handling of a significant number of Planning applications recently.

The Chair inquired if anyone wished to speak to the application.

No other persons spoke to the application.

The Public Meeting concluded at 1:17pm.

3.2.2 Business Arising from the Public Meeting

PAC2020-041
Moved By J. Willock
Seconded By Councillor Veale

That Report PLAN2020-047, **Part of Lot 15, Concession 4, Geographic Township of Ops, Bob Mark Tractor Holdings Inc. – Application D06-2020-019**, be received;

That the zoning by-law amendment, substantially in the form attached as Appendix D to Report PLAN2020-047, be referred to Council for approval and adoption; and

That the Mayor and Clerk be authorized to execute any documents required by the approval of this application.

Carried

3.3 PLAN2020-050

Mark LaHay, Planner II
An application to amend the Township of Emily Zoning By-law 1996-30 on land described as Block C, Plan 507, geographic Township of Emily identified as Westview Drive - Rowles

3.3.1 Public Meeting

The Chair requested staff to advise on the manner of giving notice for the proposed Zoning By-law Amendment. He also asked staff to briefly describe the proposal and summarize the correspondence, if any, received to date.

Mr. LaHay confirmed that the required notice was given in accordance with the Planning Act and circulated to each owner of land within 500 metres, and that a sign was posted on the subject property. He summarized the application, explaining that it proposes to change the Community Facility Exception One (CF-1) Zone to an appropriate Rural Residential Type Three (RR3-*) Exception Zone to permit a residential use on the subject property. Staff are continuing to review consistency with the Provincial Policy Statement, conformity to the Growth Plan for the Greater Golden Horseshoe and the Kawartha Lakes Official Plan. Mr. LaHay summarized the comments received to date, as detailed in his report, noting that subsequent to the writing of the report additional comments were received from the following agencies/City departments:

- Ministry of Natural Resources and Forestry provided direction to access the natural heritage feature resources of their online mapping system
- Kawartha Conservation provided preliminary comments stating that they believed the application conformed with the applicable natural heritage policies
- Kawartha Lakes Building Division Part 8 - Sewage systems stating that the proposed filter bed is undersized, and recommended that the plan be revised to provide sufficient on-site sewage treatment

He also noted in addition to the comments in his report, several comments were received from area residents including:

- B. Pownall of 93 Westview Drive
- D. Ditchburn of 182 Westview Drive
- B. & T. Fisher of 9 Millbrook Ridge Road
- J. Jamieson & J. Anderson of 100 Westview Drive
- C. Young of 73 Westview Drive
- B. Calwell of 110 Westview Drive

These comments noted several concerns including:

- loss of formerly common access green space
- restrictive covenants and deeded access to Block C by neighbouring property owners
- location of driveway with preference of lot access to be from Pioneer Road
- location of proposed utility services (i.e. overhead hydro lines)
- setback requirements and location of the proposed well and septic systems and impacts on adjacent properties
- removal of trees on the property
- the tax sale process that saw the property leave common ownership

Correspondence in support, and in response to the public comments was also received from:

- J. Rowles of 116 Westview Drive
- Applicant R. Taylor
- Owner S. Rowles and family

In consideration of the comments and analysis contained in Mr. LaHay's report and at the Public Meeting, staff respectfully recommend that the application be

referred back to staff for further review and processing until such time that any comments and concerns have been addressed. He responded to questions from Committee members.

The Chair inquired if the applicant wished to speak to the application.

Richard Taylor spoke as the applicant, and stated that they are aware of the recommended referral back to staff, and do not object to it. He stated that they are looking to address the technical concerns with the septic system, and the other resident concerns. He questioned on whether there were any outstanding agency comments remaining. In conclusion, he made himself, their planner, and the applicant available for any questions. He responded to questions from the members of the committee.

The Chair inquired if anyone wished to speak to the application.

Joanne and Sabrina Rowles spoke as the owners of the property, and stated that they are confident in their ownership of the property, and that they pay property taxes on it.

Donald Ditchburn of 182 Westview Drive spoke as the past president of the Glen Home Owners Association Inc and provided an overview of the ownership history of the lot, including the tax sale process which saw the property move into private ownership. He stated he was pleased to see the environmental studies being done on the property due to the proximity of Potash creek. Overall, while he stated he does not have any strong objection with the Rowles family and is looking to restore relationship with them, he questioned if there is clear title to the property, as most properties in the neighbourhood have access to Block A-G, including Block C.

Jenn Rowles of 116 Westview Drive which is the abutting property and spoke in support of the application. She stated that she has no objection to her sister moving next door, as they have done a lot of work to prepare the property. She also noted that the restrictive covenant could not be enforced over 40 years, and that it has been 55 years.

No other persons spoke to the application.

The Public Meeting concluded at 1:44pm.

3.3.2 Business Arising from the Public Meeting

PAC2020-042
Moved By Councillor Veale
Seconded By Councillor Seymour-Fagan

That Report PLAN2020-050, **respecting Block C, Plan 507, geographic Township of Emily, City of Kawartha Lakes, Application No. D06-2020-016**, be received; and

That Zoning By-law Amendment Application D06-2020-016, Block C, Plan 507 geographic Township of Emily, City of Kawartha Lakes, be referred back to staff for further review and processing until such time that all comments have been received from all circulated Agencies and any other concerns or issues have been addressed.

Carried

4. Deputations

5. Correspondence

6. City of Kawartha Lakes Reports

6.1 PLAN2020-045

Jonathan Derworiz, Planner II
Applications to amend the City of Kawartha Lakes Official Plan and Township of Ops Zoning By-law 93-30 on land described as Part of Lot 22, Concession 2, geographic Township of Ops, identified as 1590 Elm Tree Road - MacLeish

Mr. Derworiz confirmed that a Public Meeting on this matter was held on September 2, 2020 in accordance with the Planning Act. He summarized the applications, explaining that they propose to sever approximately six hectares from the approximately 10-hectare site to facilitate development of a trucking terminal with eight bays, ancillary offices and related uses, including truck or tractor repair and sales, bulk agricultural and/or seed storage, and nursery or greenhouse uses. The applications are consistent with the Provincial Policy Statement, conforms to the Growth Plan for the Greater Golden Horseshoe and the Kawartha Lakes Official Plan. Mr. Derworiz summarized the comments received to date, as detailed in his report (including the previously outstanding comments from Kawartha Conservation and the Ministry of Transportation), noting that subsequent to the writing of the report no additional comments were received. Staff are recommending that the application be forwarded to Council for approval.

PAC2020-043
Moved By Councillor Veale
Seconded By Councillor Seymour-Fagan

That Report PLAN2020-045, **respecting Part of Lot 22, Concession 2, geographic Township of Ops, Wayne and Ann MacLeish – Applications D01-2020-004 and D06-2020-018**, be received;

That an Official Plan Amendment By-law, respecting Application D01-2020-004, substantially in the form attached as Appendix C to this report be approved for adoption by Council;

That a Zoning By-law Amendment By-law, respecting Application D06-2020-018, substantially in the form attached as Appendix D to this report be approved for adoption by Council; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application.

Carried

6.2 PLAN2020-051

David Harding, Planner II
An application to amend the Township of Mariposa Zoning By-law 94-07 on land described as Part of Lots 14 and 15, Concession 9; Block J, Part Lots 8-17, geographic Township of Mariposa, identified as 1013 Eldon Road, Oakwood - Vandenberg

Mr. Harding confirmed that a Public Meeting on this matter was held on September 2, 2020 in accordance with the Planning Act. He summarized the application, explaining that it proposes to rezone a strip of land abutting Eldon Road in Oakwood to residential use in order to facilitate the creation of three rural residential lots. One of the lots will contain the existing farmhouse, and all lots will be serviced by municipal water. The application is consistent with the Provincial Policy Statement, conforms to the Growth Plan for the Greater Golden Horseshoe and the Kawartha Lakes Official Plan. Mr. Harding summarized the comments received to date, as detailed in his report (including previously outstanding comments from the Ministry of Transportation), noting that subsequent to the writing of the report, no additional comments were received. Staff are recommending that the application be forwarded to Council for approval.

PAC2020-044
Moved By Councillor Veale
Seconded By M. Barkwell

That Report PLAN2020-051, **Part of Lots 14 and 15, Concession 9; Block J, Part Lots 8-17, Plan 80; Part 1, 57R-6577, geographic Township of Mariposa, City of Kawartha Lakes, identified as 1013 Eldon Road, Vandenberg – D06-2020-017**, be received;

That a Zoning By-law Amendment respecting application D06-2020-017, substantially in the form attached as Appendix D to Report PLAN 2020-051, be approved and adopted by Council; and

That the Mayor and Clerk be authorized to execute any documents required by the approval of this application.

Carried

7. Adjournment

PAC2020-045
Moved By J. Willock
Seconded By M. Barkwell

That the Planning Advisory Committee Meeting adjourn at 1:54 p.m.

Carried

Council Report

Report Number RS2020-021

Meeting Date: October 20, 2020

Title: Acquisition of a portion of Centennial Park Road and Assumption as Public Highway

Description: Acquisition of Part of Lot 19, Concession North Portage Road, in the Geographic Township of Eldon, More Specifically Described as Part 5 on Plan 57R-3336, to Become Part of Centennial Park Road and Assumption as Public Highway

Author and Title: Christine Oliver, Law Clerk, Realty Services – Legal Services

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Recommendations:

That Report RS2020-021, **Acquisition of a portion of Centennial Park Road and Assumption as Public Highway**, be received;

That the City acquire Part of Lot 19, Concession North Portage Road, in the Geographic Township of Eldon, More Specifically Described as Part 5 on Plan 57R-3336, to become part of Centennial Park Road for assumption as a public highway;

That staff be directed to commence the process of obtaining ownership of the required land for nominal consideration, with all related costs payable at the property owner's expense;

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this decision; and

That the necessary by-law be forwarded to Council for Adoption.

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

On September 29, 2020, Leslie Allan, solicitor for the owners of the property municipally known as 807 Centennial Park Road, in the Geographic Township of Eldon, contacted the City of Kawartha Lakes and advised that Part 5 on 57R-3336, which is in private ownership and part of 807 Centennial Park Road should be transferred to the City as part of Centennial Park Road.

Centennial Park Road is forced over 807 Centennial Park Road. Centennial Park Road is a fully assumed and maintained City road. The City has acquired ownership interests in a portion of Centennial Park Road.

The ownership of 807 Centennial Park Road indicates that it is subject to the right of public passage over it. The owner wishes to clear this title restriction.

Appendix A is a location map. Appendix B identifies Centennial Park Road in blue, the adjacent property in green and Part 5 on Plan 57R-3336 in red. Appendix C plan 57R-3336. Appendix D is the By-Law.

The purpose of this report is to advise Council that Public Works and Realty Services is supportive and recommends that the City proceed with the conveyance option.

Rationale:

The matter was referred to Public Works and Public Works confirmed Part 5 on Plan 57R-3336 should be part of Centennial Park Road.

Realty Services and Public Works has concluded that it is appropriate to obtain title to the necessary land. The owner is motivated to resolve this title issue prior to closing a sale of their land.

The property owners are agreeable to conveying the land for no consideration with the city's associated costs payable by the property owners.

Other Alternatives Considered:

Council may decide to not convey the land. This option is not recommended as it resolving a title discrepancy.

Alignment to Strategic Priorities

Good Government

- Ensure municipal assets are well maintained and well managed

Financial/Operation Impacts:

The land will be conveyed to the City for no consideration. The owner will be responsible for all costs associated with the transaction including the costs for the legal fees.

Consultations:

Director of Public Works

Attachments:

Appendix A – Location Map

Appendix A - Location Map.pdf

Appendix B – Map

Appendix B - Map.pdf

Appendix C – Plan 57R-3336

Appendix C - 57R3336.PDF

Appendix D – By-Law

Appendix D - Draft By-law for Centenni

Department Head E-Mail: rcarlson@kawarthalakes.ca

Department Head: Robyn Carlson

Appendix A
to
Report RS2020-021

File No.

Subject Properties

Upper Municipalities
Lower Tier Municipalties
Populated Places
Water Labels

2.87
Kilometers

1: 72,224

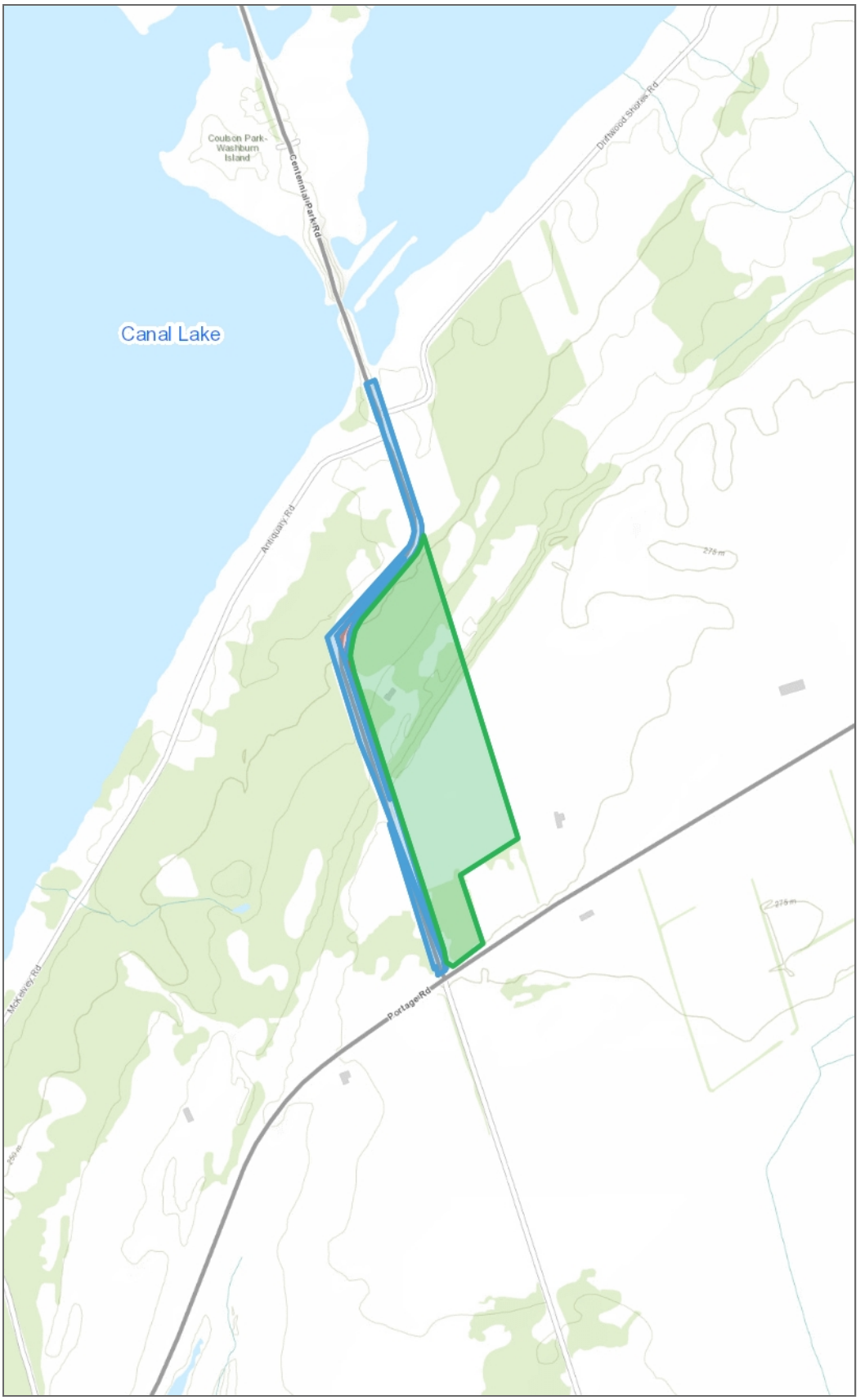
City of KAWARTHA LAKES
Catch the Kawartha spirit

THIS MAP IS NOT TO BE USED FOR NAVIGATION

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

© City Of Kawartha Lakes

Date: October 8, 2020



Appendix B
to
Report RS2020-021

File No.

Subject Properties

Upper Municipalities
Lower Tier Municipalties
Populated Places
Water Labels

0.72
Kilometers

1: 18,056

City of KAWARTHA LAKES
Catch the Kawartha spirit

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Date: October 8, 2020

CONCESSION
LOT
CARDEN
TOWNSHIP OF
LOT 20
LOT 19
CONCESSION
LOT 18
LOT IV
CONCESSION
LOT 3
LOT 4
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LOT 12
LOT 13
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LOT 21
LOT 22
LOT

Appendix	D
to	
Report	RS2020-021

The Corporation of the City of Kawartha Lakes

By-Law 2020-

A By-law to Acquire Part of Lot 19, Concession North Portage Road, Further Described as Part 5 on 57R-3336, in the Geographic Township of Eldon, in the City of Kawartha Lakes, to Form Part of Centennial Park Road in the Geographic Township of Eldon, in the City of Kawartha Lakes and to Establish and Assume such Parcel Upon Receipt of Title as Part of the Public Highway Commonly known as Centennial Park Road

Recitals

1. A portion of Centennial Park Road, Bobcaygeon, north of Portage Road and South Canal Lake and further described as Part of Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336, in the Geographic Township of Eldon, City of Kawartha Lakes is forced over private land.
2. This portion of Centennial Park Road is fully maintained and assumed for service by the City of Kawartha Lakes.
3. The public's right of passage over this property is reflected on title to the privately-owned land.
4. The owner wishes to transfer title of this property to the City for nominal consideration, with the owner to pay the City's cost of the transfer in order to clear its title.
5. It is appropriate for the City of Kawartha Lakes to acquire title in this circumstances and with these conditions.
6. Section 31 of the Municipal Act, 2001 authorizes Council to establish and assume a highway by by-law.
7. The Mayor and Clerk are authorized to execute all documents associated with the acquisition.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Acquisition of Land

2.01 **Acquisition:** The parcel of land described as Part Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336, is to be acquired by the Corporation of the City of Kawartha Lakes for nominal consideration. The costs associated with the transaction are the responsibility of the vendor.

2.02 **Documentation:** The Mayor and City Clerk are hereby authorized to execute the documentation that is necessary for the City of Kawartha Lakes to accept title to Part Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336.

Section 3.00: Highway Assumption

3.01 **Assumption:** The parcel of land acquired for highway purposes, more particularly described as Part Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336, is hereby established and assumed as a public highway and part of Centennial Park Road, in the Geographic Township of Eldon, City of Kawartha Lakes.

Section 4.00: Effective Date

4.01 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this 20th day of October, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

Council Report

Report Number CORP2020-013

Meeting Date: October 20, 2020

Title: Development Charge Reserve Debenture

Description: Treasury has predicted that the Development Charge Reserve will be in a negative balance at the end of year of 2020. This reserve cannot be in a deficit balance as per Generally Accepted Accounting Principles. This report requests Council to approve the use of debentures to balance the Development Charge Reserve to a surplus balance or zero.

Author and Title: Leanne Mitchell, Supervisor, Cost Accounting

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Recommendation(s):

That Report CORP2020-013, **Development Charge Reserve Debenture**, be received;

That Council approves funding the Development Charge Reserve deficit by debenture funding in the amount of $8,570,689;

That Council approves the following projects to be funded by this debenture:

Project Number	Description	Amount
WW1705	Wastewater Treatment	1,160,917
WW1803	Combined Water Dist and WW Collection	248,057
RD1801	Bridges	252,474
RD1703	Urban/Rural Reconstruction Projects	567,962

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Project Number	Description	Amount
RD1701	Bridges	954,388
WW1701	Watermain Replacement	259,261
PR1518	Logie Park Improvements	3,036,490
PR1901	Bobcaygeon Beach Park	173,203
RD1803	Urban/Rural Reconstruction Projects	679,427
WW1903	Durham St. W. Mains	247,075
WW1903	Lindsay SPS	138,605
RD2003	Urban/Rural Reconstruction Projects	512,254
RD1606	Urban/Rural Reconstruction Projects	340,576
	TOTAL	**8,570,689**

That future development charge collections from the following categories be used to finance the debt principle and interest payment; Roads, Parks and Recreation, Wastewater Treatment and Administrative Studies.

Background:

Council has supported the growth strategy which includes approving growth related capital projects prior to receiving Development Charges for the projects. This means that Development Charges (DC's) have not been collected from prospective developers in the areas where these capital projects are happening but there is growth projected or waiting to be approved. This has resulted in a negative balance in the Development Charge Reserve that must be addressed prior to the City's December 31, 2020 yearend. A reserve cannot be in a deficit balance, as per Generally Accepted Accounting Principles, and therefore the City must bring this balance to a surplus balance or zero. The only way this can be done is to debenture for the deficit balance and use future Development charges collected to pay for the principle and interest on this debt. The table below shows the estimated balances of the development charge reserve by category at December 31, 2020.

Development Charge Category	Estimated Dec 31, 2020 Balance
Administration	($ 2,828,569)
Airport	$ 190,362
Fire	($ 1,295,208)
Human Services	$ 848,735
Library	($ 238,874)
Paramedic	($ 219,654)
Parks and Recreation	$ 206,318
Police	$ 718,791
Roads	($ 2,980,135)
Sewage Collection	$ 4,641,199
Sewage Treatment	($ 7,667,108)
Transit	($ 325,430)
Water Distribution	($ 492,663)
Water Treatment	$ 1,167,071
By-Law Enforcement	$ 15
Parking	$ 110
Waste Diversion	$ 33
DC Collections (Sept to Dec)	$ 300,000
Total	**($7,975,007)**

Rationale:

Staff have been discussing the use of debenture financing to cover the Development Charge reserve deficit with Council for a number of years. In prior years, staff have been able to cover the deficit in the Development Charge Reserve with DC funding from projects that were not complete. In 2016, the City funded $10,132,940 in development charges by debenture and in 2019, the City funded $7,881,574, to bring the development charge reserve into a surplus

balance. In 2020, we are in the position where the development charge reserve is in a deficit balance and we need to fund the reserve using debenture proceeds. The current Development Charge Reserve deficit is approximately $8.3 Million. However, Staff has factored in approximately $300,000 in DC collections over the September to December 2020 period. Given these projections the amount of debenture funding required is approximately $8 Million. When considering this is an estimate, we are requesting $8.5 Million to ensure the Development Charge Reserve is not in deficit at the end of the year. After this debenture, the Development Charge Reserve has used approximately $26.5 Million in debenture financing to fund future growth.

An application is underway with Infrastructure Ontario to approve this debenture funding. Infrastructure Ontario only deals with funding projects and therefore Staff has been required to list projects that this funding will be used to finance. This does not mean Staff is changing these projects from Development Charge Reserve Funding to Debenture funding. This step is necessary due to Infrastructure Ontario's requirements and Staff's commitment to achieve the lowest interest rate possible. Infrastructure Ontario is offering a rate of 1.91% for a 20-year term. This is below the bank lending rate and locks the City into a 20-year term at a rate not possible to obtain utilizing the bank.

Staff have looked at the projects that have been funded over the last three to four years from DC's and have compiled a list of projects for Infrastructure Ontario purposes. The list is as follows:

Project Number	**Description**	**Amount**
WW1705	Wastewater Treatment	1,160,917
WW1803	Combined Water Dist and WW Collection	248.057
RD1801	Bridges	252,474
RD1703	Urban/Rural Reconstruction Projects	567,962
RD1701	Bridges	954,388
WW1701	Watermain Replacement	259,261
PR1518	Logie Park Improvements	3,036,490
PR1901	Bobcaygeon Beach Park	173,203
RD1803	Urban/Rural Reconstruction Projects	679,427
WW1903	Durham St. W. Mains	247,075
WW1903	Lindsay SPS	138,605
RD2003	Urban/Rural Reconstruction Projects	512,253
RD1606	Urban/Rural Reconstruction Projects	340,575.56
	TOTAL	**8,570,689**

Staff requires approval from Council, for Infrastructure Ontario purposes, to fund these projects and amounts from debenture. In reality Council is approving the

funding of the Development Charges Reserve deficit by applying it to specific projects. The funding for the debenture principle and interest payments will still come from the Development Charge Reserve. In addition, as discussed previously with Council, this debt will not be part of the City's overall annual repayment limit as it has a specific funding source.

Other Alternatives Considered:

Council may choose to fund the debenture with a Canadian bank and would not be required to assign projects to the funding. However, this would result in higher payments over the long term as the interest rate is higher and the term is shorter.

Council could choose not to fund the Development Charge Reserve deficit. This would result in a qualified opinion on the audited financial statements as a reserve cannot be in a deficit position at the end of the year. This would lead to problems with Federal and Provincial funding in the future so it is not recommended.

Financial/Operation Impacts:

There are no financial impacts to this motion. This further strengthens Councils commitment to have growth pay for growth as the payments will be funded from future Development Charges and not fall to the taxpayer on the tax levy or the user on the user rate for water and sewer projects. In keeping the deficit balance in the Development Charge Reserve this has restricted cash flow and Staff's ability to invest funds to earn investment income. By approving this motion, the cash flow will be restored and will enable future investment income to be earned.

Consultations:

Deloitte and Touche, LLP
Ministry of Municipal Affairs and Housing
Treasurer

Department Head E-Mail: jstover@kawarthalakes.ca

Department Head: Jennifer Stover, Director of Corporate Services

Council Report

Report Number PUR2020-027

Meeting Date: October 20, 2020

Title: Request for Proposal 2020-03-CP Supply and Delivery of Six Four Ton Tow Behind Hot Box Reclaimer Units

Author and Title: Marielle van Engelen, Buyer
Todd Bryant, Manager of Fleet and Transit Services

Recommendation(s):

That Report PUR2020-027, Request for Proposal 2020-03 Supply and Delivery of Six Four Ton Tow Behind Hot Box Reclaimer Units, be received;

That Amaco Construction Equipment Inc, Proposal A, including additional equipment, be selected for the award of Request for Proposal 2020-03-CP Supply and Delivery of Six Four Ton Tow Behind Hot Box Reclaimer Units as the highest scoring proponent; and

That upon receipt of the required documents that the Procurement Division be authorized to issue a purchase order.

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

Request for Proposal 2020-03-CP was released and advertised in accordance with the Purchasing Policy. The proposal closed on August 27, 2020 and was opened by Andy Letham, Mayor and Launa Macey, Supervisor of Procurement with the following results:

Proposal Received From
Amaco Construction Equipment Inc. Proposal A Mississauga, ON
Amaco Construction Equipment Inc. Proposal B Mississauga, ON
Cubex Ltd. Brantford, ON
Heat Design Equipment Inc. Kitchener, ON
Jade Equipment Company Ltd. Oro-Medonte, ON
Johnstone Brother Equipment Corp. Woodbridge, ON
Marathon Equipment Inc. Proposal A Burlington, ON
Marathon Equipment Inc. Proposal B Burlington, ON
FRS Canada (O/A MoveMobility Inc.) Mississauga, ON

As per the Purchasing Policy procurement awards for Request for Proposal valued at $100,000 or greater must be approved by Council.

The request for proposal document provided proponents the opportunity to provide more than one proposal for the requested requirement. The City was looking for either an air jacketed or oil jacketed unit. Pricing was requested for the additional features of a shoveling apron extension and a tool rack.

An evaluation committee carefully evaluated and scored each proposal by consensus, based on the criteria described within the request for proposal. Each

proposal was rated on the response to the technical requirement of the work; if the proponent is authorized by the manufacturer to sell parts, service and provide warranty repairs for the equipment specified; delivery timelines; warranty information and pricing.

Amaco Construction Equipment Inc., Proposal A, including additional features, was found to be the highest scoring proponent.

Rationale:

Staff recommends Amaco Construction Equipment Inc, Proposal A, including additional equipment, be selected for the award of Request for Proposal 2020-03-CP Supply and Delivery of Six Four Ton Tow Behind Hot Box Reclaimer Units as the highest scoring proponent.

Other Alternatives Considered:

No other alternative is being considered as a competitive procurement process was conducted and the highest scoring proponent is being recommended.

Alignment to Strategic Priorities

- Goal 1 Fiscally Responsible- This purchase of asphalt Reclaimers is focused on being fiscally responsible in our core service delivery. Fleet Services continues to make informed decisions to ensure a sound financial future.
- Goal 2 – Open and Transparent- We are committed to operating in an open, accessible and transparent manner. Annual performance measures, following set practices and policies ensure that operations stay on track and achieve strong performance results.
- Goal 3 – Partner and Collaborate- We continue to strengthen our relationships with external organizations to collaborate on projects and services. We support innovation and look for opportunities to partner to advance our common goals. We work with all levels of government to maximize investments.
- Goal 4 –Service Excellence- We serve our community with pride. We seek to understand and meet the needs of those we serve within our available resources. Fleet Services is committed to accessible, timely, knowledgeable, courteous and fair service.

Financial/Operation Impacts:

Capital Project Number	Project Budget	Other Committed Funds	Capital Project balance	Purchase Amount (excl. HST)	HST Payable	Total Amount	Project Balance
994200215	$360,000	$0	$360,000	$217,572	$3,829	$221,401	$138,599

Any remaining surplus or deficit will be dealt with through the capital close report presented to Council by the Treasury Department in accordance with the Capital Close Policy.

Consultations:

Junior Account

Department Head E-Mail: brobinson@kawarthalakes.ca

Department Head: Bryan Robinson, Director of Public Works

Department File: 2020-03-CP

Council Report

Report Number PUR2020-029

Meeting Date: **October 20, 2020**

Title: **2020-43-CP Future Waste Options Study**

Author and Title: **Linda Lee, Buyer**
Tauhid Khan, Asset Management Coordinator

Recommendation(s):

That Report PUR2020-029, **2020-43-CP Future Waste Options Study**, be received;

That Dillon Consulting Limited be selected for the award of 2020-43-CP Future Waste Options Study for the total quoted amount of $119,078.00 not including HST;

That subject to receipt of the required documents, the Director of Engineering and Corporate Assets be authorized to execute the agreement to award the contract; and

That the Procurement Division be authorized to issue a purchase order.

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

The City requires a consultant with experience in waste management planning and engineering to review options for future waste disposal after the Lindsay Ops landfill reaches its approved capacity. This report addresses that direction.

Request for Proposal 2020-43-CP Future Waste Options Study was released and advertised in accordance with the Purchasing Policy.

The Request for Proposal closed on August 6, 2020 and was opened by Launa Macey, Supervisor of Procurement, and witnessed by Jane Pyle, Executive Assistant to the CAO. Proposals were received from the following:

Consultant
Dillon Consulting Limited
2047330 Ontario Limited
Cambium Inc.
Tetra Tech Canada Inc.
WSP Canada Inc.

An evaluation committee carefully evaluated and scored each proposal by consensus, based on the criteria described within the Request for Proposal.

Dillon Consulting Limited was found to be the highest scoring proponent. References were checked and found to be favourable.

Rationale:

Staff recommend that Dillon Consulting Limited be selected, as the highest scoring proponent, for the award of Request for Proposal 2020-43-CP Future Waste Options Study.

Other Alternatives Considered:

No other alternative is being considered as a competitive procurement process was conducted, and the highest scoring proponent is being recommended.

Alignment to Strategic Priorities

The recommendation in the report contributes to council's adopted strategic plan namely:

1. Healthy Environment
2. A Vibrant and Growing Economy
3. Good Government

Financial/Operation Impacts:

Project Number	Project Budget	Other Committed Funds	Project Balance	Purchase Amount (excl. HST)	10% Contingency	HST Payable	Total Amount	Project Balance
921204501	$200,000	$0	$200,000	$119,078	$11,908	$2,305	$133,291	$66,709

Upon completion of the work, any remaining surplus or deficit will be dealt with through the Capital close report presented to Council by the Treasury Department in accordance with the Capital Close Policy.

Consultations:

Junior Accountant

Department Head E-Mail: jrojas@kawarthalakes.ca

Department Head: Juan Rojas, Director of Engineering and Corporate Assets

The Corporation of the City of Kawartha Lakes

Council Report

Report Number PLAN2020-048

Meeting Date:	**October 20, 2020**
Title:	Telecommunications Facility Endorsement Application – Rogers Communications Inc.
Description:	An application to endorse a proposed 75.0 metre self-supported Telecommunication Facility by SpectraSite Inc. on behalf of Rogers Communications Inc. at 1988 Heights Road, Verulam (Shannon and Anne Connelly)
Ward Number:	**Ward 6 – Verulam (Dunsford)**
Author and Title:	**Ian Walker, Planning Officer – Large Developments**

Recommendations:

That Report PLAN2020-048, **Part of Lots 6 & 7, Concession 1, Geographic Township of Verulam, Shannon and Anne Connelly – Application D44-2020-003**, be received;

That the 75.0 metre self-supported telecommunication facility proposed by SpectraSite Inc. on behalf of Rogers Communications Inc., to be sited on property at 1988 Heights Road and generally outlined in Appendices A to D to Report PLAN2020-048, be endorsed by Council, conditional upon the applicant entering into a Telecommunication Facility Development Agreement with the City;

That Innovation, Science and Economic Development (ISED) Canada, the applicant, and all interested parties be advised of Council's decision; and

That the Mayor and Clerk be authorized to execute any documents and agreements required by the endorsement of this application.

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

SpectraSite Inc. has submitted an application on behalf of Rogers Communications Inc. (Rogers) to permit a self-supported telecommunication facility with a height of 75.0 metres (246 feet) on a rural property located at 1988 Heights Road, near Dunsford. See Appendix 'A'. A site compound with an area of 225 square metres will house all electrical components. For access to the compound, Rogers will utilize a new entrance and gravel driveway. See Appendix 'B'.

Owner:	Shannon and Anne Connelly	
Agent:	SpectraSite Inc. on behalf of Rogers Communications Inc.	
Legal Description:	Part of Lots 6 & 7, Concession 1, Geographic Township of Verulam	
Official Plan:	'Rural' in the City of Kawartha Lakes Official Plan	
Zoning:	'General Rural (A1) Zone' in the Township of Verulam Zoning By-law 6-87	
Site Size:	596.0 square metres consisting of a 225.0 square metre compound and 371.0 square metre driveway	
Site Servicing:	A dedicated electrical connection is required to service the telecommunication facility.	
Existing Uses:	Portions of the property are used for agriculture.	
Adjacent Uses:	North:	Agricultural
	East:	Gil Mar Road; Agricultural; Wetland; Rural Residential
	South:	Agricultural; Wetland
	West:	Agricultural; Heights Road

Rationale:

The telecommunications industry is regulated by the federal government through the Radiocommunication Act, which is primarily administered by Innovation, Science and Economic Development (ISED) Canada (formerly Industry Canada) and Health Canada. Telecommunications systems are regulated by the federal government, and are therefore not subject to the requirements of Planning Act documents such as official plans or zoning by-laws. However, ISED Canada encourages the development of protocols by Local Land-Use Authorities (the municipality) to ensure that a clear process is established for the consideration of new telecommunications facilities within the community. Where a municipality has adopted a telecommunications policy, the applicant must receive

confirmation from the municipality that the proposal complies with their policy, before ISED will issue an approval for the facility.

In 2012, Council adopted a Telecommunications Policy for the installation of new telecommunication towers within the City of Kawartha Lakes. In 2018, the Telecommunications Policy (CP2018-014 Telecommunications and Antenna System Siting Policy) was updated in accordance with the current recommended ISED Canada standards, which were last updated in 2014. The policy provides a set of criteria to ensure that a clear process is established for the consideration of new telecommunications facilities within the community. All applications must be endorsed by Council and subject to any necessary conditions, for the applicant to receive an approval from ISED Canada.

The applicant has submitted the following reports and information in support of the application, which have been circulated to various City Departments and commenting agencies for review:

1. Site Selection Report, prepared by Rogers Communications Inc., stamp dated July 7, 2020. The report discusses and assesses the proposed telecommunication tower in context of the federal legislation and the City's Telecommunications Policy.
2. Site Plan Showing Proposed Rogers Compound Location, prepared by Alex Marton Limited, Ontario Land Surveyors, dated June 4, 2019.
3. Site Grading and Stormwater Management Plan, prepared by Alex Marton Limited, Ontario Land Surveyors, dated February 13, 2020.
4. Elevation Plan and Proposed Compound Layout Plan, prepared by Alex Marton Limited, Ontario Land Surveyors, not dated.
5. Copy of Entrance Permit #ENT-2019-092, dated December 13, 2019.
6. Copy of Kawartha Conservation Permit 2020-018, valid from January 31, 2020 to January 31, 2022.
7. Cost Estimates form, outlining the required securities for the landscaping and entrance permit works.
8. Public Consultation Summary letter, dated February 25, 2020.

Applicable Provincial Policies:

While telecommunication systems are a federally-led initiative, the Province also recognizes the importance of telecommunications infrastructure and encourages further systems development to meet current and projected service demands in its policy documents, including the Provincial Policy Statement, 2020 (PPS) and A Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2019 (Growth Plan). The proposed telecommunications facility fulfills the objectives of these policies.

Official Plan Conformity:

The property is designated ‘Rural’ and ‘Environmental Protection’ in the City of Kawartha Lakes Official Plan. The ‘Environmental Protection’ designation follows watercourses which traverse the property. The proposed tower is located within the ‘Rural’ designation.

While telecommunication systems are not subject to the requirements of the Official Plan, Section 28.10 of the Official Plan supports the erection of new telecommunication towers, as long as they are located outside of natural features and their respective buffers, and provided that there is a demonstrated need. Since the applicant has demonstrated that there is a need for this facility, the proposal fulfills the provisions of the land use policies, in accordance with the City’s Telecommunications Policy.

Zoning By-law Compliance:

The subject land is zoned ‘General Rural (A1) Zone in the Township of Verulam Zoning By-law 6-87. While telecommunication systems are not subject to the requirements of the Zoning By-law, the By-law does not regulate telecommunication systems.

Other Alternatives Considered:

No other alternatives have been taken into consideration.

Financial/Operation Impacts:

There are no financial considerations for the City.

Relationship of Recommendations to the 2020-2023 Strategic Plan:

The Council Adopted Strategic Plan identifies these Strategic Priorities:

- Priority 1 – A Vibrant and Growing Economy
- Priority 2 – An Exceptional Quality of Life
- Priority 3 – A Healthy Environment
- Priority 4 – Good Government

This application aligns with the Good Government priority by supporting community infrastructure which increases access to high speed broadband and cellular services available throughout Kawartha Lakes. It may also align with the Exceptional Quality of Life priority by enhancing accessibility to a range of services provided within the City.

Review of Accessibility Implications of Any Development or Policy:

There are no accessibility considerations for the City.

Servicing Implications:

There are no servicing considerations for the City.

Consultations:

Public Comments

The City's Telecommunications Policy requires that the applicant conduct the public consultation and information process as prescribed by ISED Canada. The City's policy requires notification through a local newspaper, and a mailout to all landowners within a minimum notification radius which is the greater of:

a) 120 metres; or
b) three times the height of the tower (225 metres).

Based on the above, the mailout radius is 225 metres from the base of the proposed tower. A notice was placed in the Kawartha Lakes This Week newspaper on October 17, 2019, with commenting up to November 16, 2019.

The applicant provided a letter dated February 25, 2020 for the City's review, noting that one inquiry was received from Councillor Ron Ashmore – Ward 6 with several general questions on behalf of a resident whom had contacted him with questions and concerns about the tower. SpectraSite Inc. had a telephone conservation with Councillor Ashmore to provide information to him about the proposal. A copy of the consultation summary is contained in Appendix 'C' to this report.

Agency Review Comments

The proposal was first assessed and circulated to all relevant agencies and City Departments through the City's Preconsultation process, to identify a full list of submission requirements and initial comments for consideration. As a result of the Preconsultation circulation, the telecommunications application was circulated to only the relevant agencies and City Departments which may have an interest in the application. The following comments have been received to date:

August 7, 2020	The Engineering and Corporate Assets Department advised they have no comments.
August 14, 2020	The Building Division advised they have no concerns.
August 18, 2020	The Fire and Rescue Division advised they have no issues.

August 28, 2020 The Economic Development Division advised they have no concerns from an agricultural perspective.

Development Services – Planning Division Comments:

Compliance with Telecommunication Tower Siting Criteria

Staff has reviewed the telecommunication facility application and concludes that the proposal complies with the siting criteria in following manner:

- ISED Canada has mandated that communications providers cannot have any dropped calls, given that the system is now being used for 911 or other emergency purposes in addition to personal communications. Given the topography of the area, Rogers requires a tower height of 75 metres in order to provide its services in accordance with the ISED Canada standards. The addition of this tower should provide improved service in this area.
- The applicant has investigated the possibility of co-locating other existing telecommunication towers. Since there are few towers in the area, all of the existing towers were either beyond the distance or below the height required to address coverage for Rogers, and co-location is not an option. Therefore, a new tower is necessary for technical reasons. The proposed tower structure has been designed to allow other carriers to co-locate in the future, should the need arise. Staff is satisfied that an additional tower is necessary to provide service for the area.
- The proposed tower fulfills all of the necessary setbacks from local roads, property lines, residential areas, and environmentally sensitive areas.
- While the tower will be visible in the skyline, the self-supported design should not make the tower obtrusive to the view of the area. Appendix ‘B’ contains a proposed tower and compound plan. The views of the tower are expected to be similar to those contained in the Site Selection Report and photo renderings. See Appendix ‘D’.

From Staff’s perspective, the proposed telecommunication facility fulfills the locational requirements of the City’s Telecommunications Policy.

Tower Lighting

With regard to the lighting, this tower may require painted striping or lighting. Final details of the lighting requirements are not available at this time. Any painting and/or lighting requirements will be provided by Transport Canada, for navigation and/or safety purposes. Staff advise that any night lighting should not include white flashing strobe lights.

Site Development Agreement

Staff would require that this telecommunications facility be subject to a limited Telecommunications Facility Development Agreement with the City. This Agreement would secure an approved site plan, lot grading and drainage plan,

securities for entrance works and landscaping (when necessary), and landscaping details as required. The agreement would also include provisions for the removal of the telecommunication facility once it is no longer being used. Staff views this agreement as serving more of an administrative function and therefore would not recommend that this agreement be registered against title.

Attachments:

The following attached documents may include scanned images of appendices, maps, and photographs. If you require an alternative format, please call Ian Walker, Planning Officer – Large Developments, (705) 324-9411 extension 1368.

Appendix A – Location Map

PLAN2020-048
Appendix A.pdf

Appendix B – Proposed Site Plan and Tower Drawings

PLAN2020-048
Appendix B.pdf

Appendix C – Summary of Public Consultation

PLAN2020-048
Appendix C.pdf

Appendix D – Site Selection Report with Photo Renderings

PLAN2020-048
Appendix D.pdf

Department Head E-Mail: cmarshall@kawarthalakes.ca

Department Head: Chris Marshall, Director, Development Services

Department File: D44-2020-003

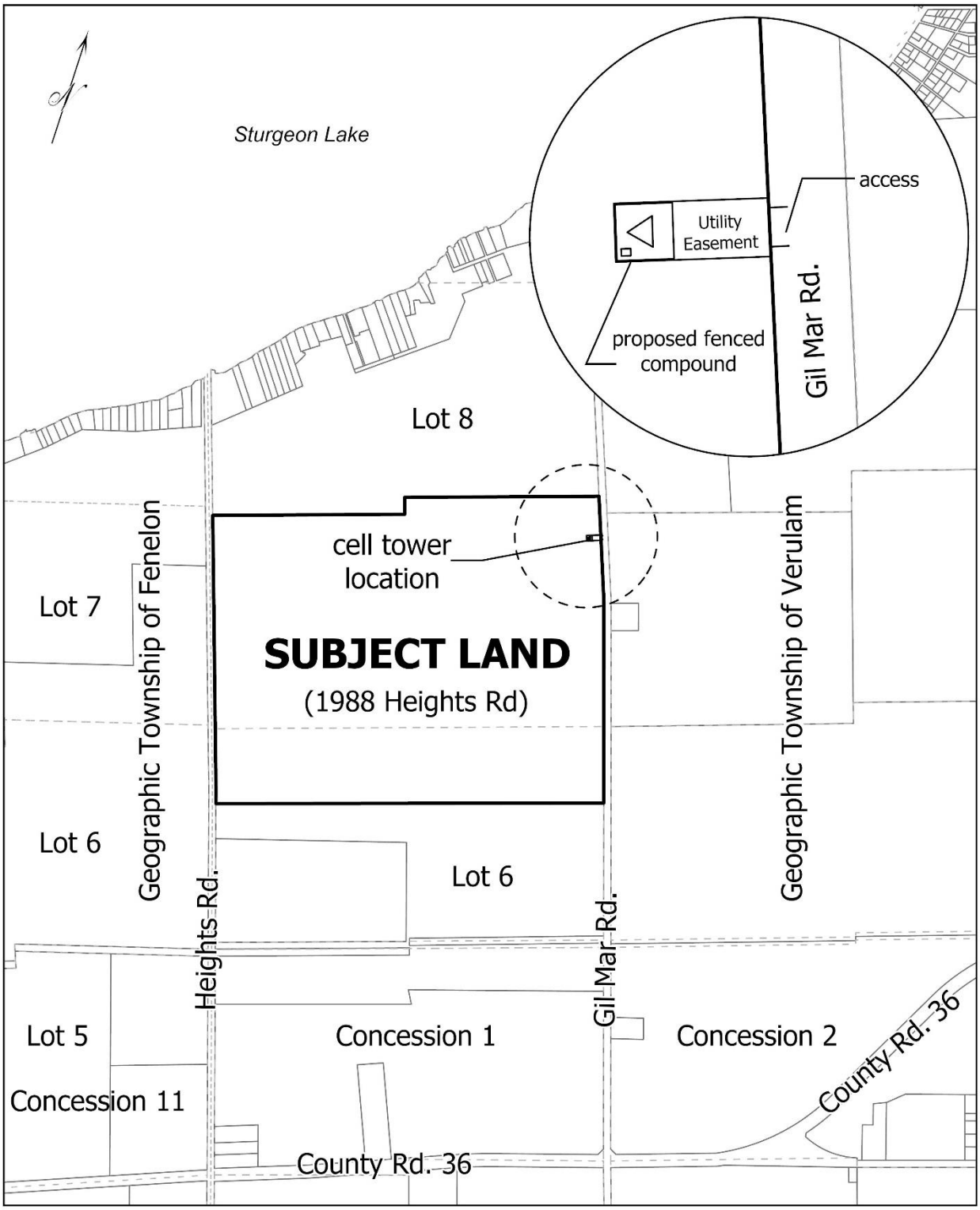
Appendix " A "

to

Report PLAN2020-048

File No: D44-2020-003

D44-2020-003

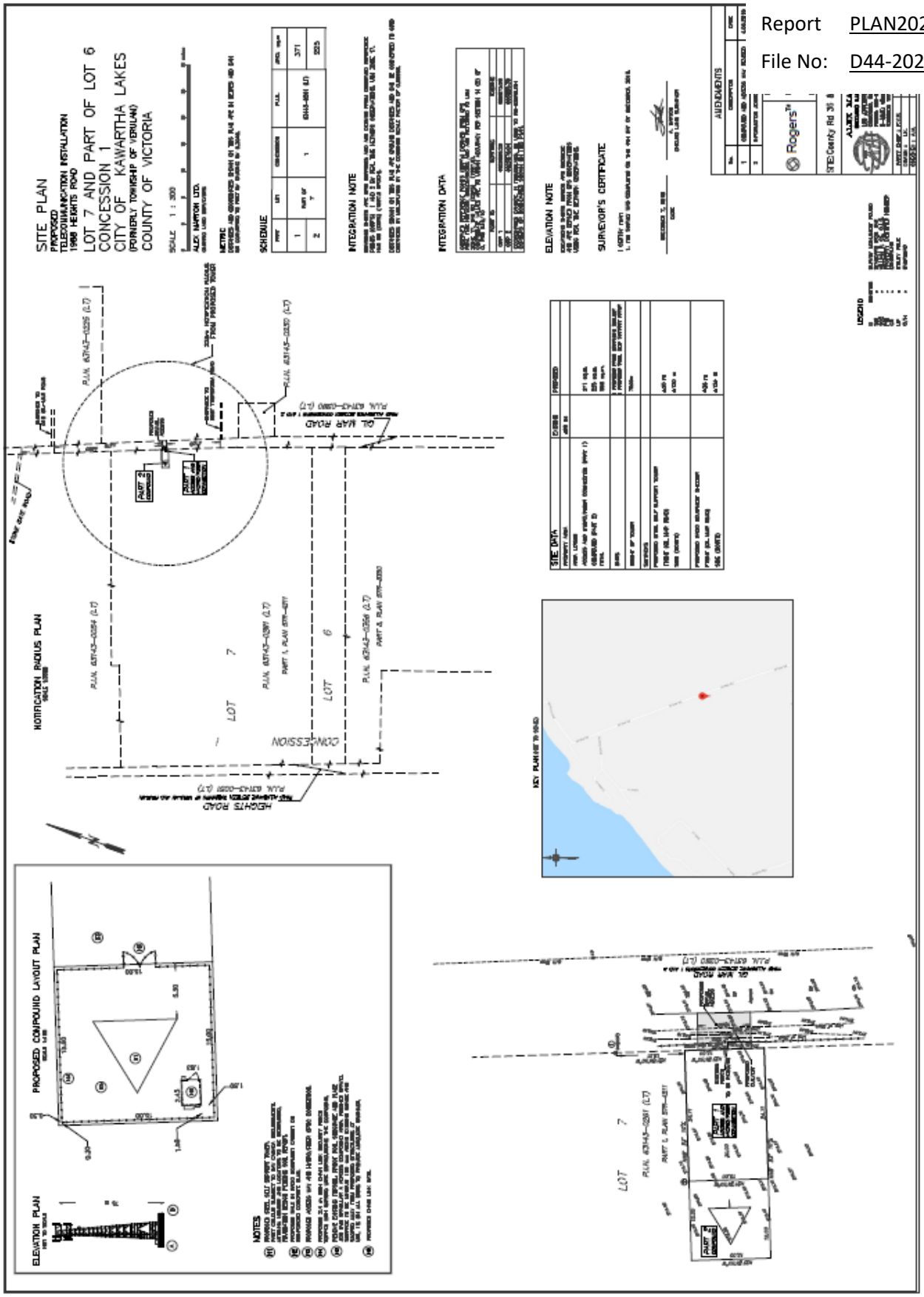


Appendix " B "

to

Report PLAN2020-048

File No: D44-2020-003



Appendix " C "
to
Report PLAN2020-048
File No: D44-2020-003

SpectraSite
291 Plymouth Trail
Newmarket, ON
L3Y 6G6

Laura Sterling
T: 905-251-8848
email: lauras@spectrasiteinc.com

February 25, 2020

Attention: Ian Walker
Planning Officer – Large Developments
Development Services – Planning Division,
City of Kawartha Lakes

RE: Proposed Rogers Communications Tower at 1998 Heights Rd. Verulam, City of Kawartha Lakes.

Summary of Public Consultation

We are pleased to provide the following summary of public consultation for Rogers proposed telecommunications tower at 1998 Heights Rd. Verulam, City of Kawartha Lakes. Public consultation began October 17th, 2019 when an ad was placed in the Kawartha Lakes This Week newspaper. Information packages were also mailed to all property owners within 225 meters of the tower base. We received one inquiry from the public. Below is a record of communication:

- **Ron Ashmore – Councilor Ward 6**
  - Nov. 7th – Ron had several general questions regarding the tower. We had a phone conversation with Ron and provided him with the information he required to provide answers to a resident who had contacted him with questions and concerns regarding the tower.

Request for Concurrence

At this time, we respectfully request the City of Kawartha Lakes provide a letter of concurrence for the proposed tower installation, to Innovation Science and Economic Development Canada (ISED). The letter of concurrence should confirm the applicant has completed municipal consultation, public consultation and address all relevant concerns to the satisfaction of the City. It has been a pleasure working with the City of Kawartha Lakes staff to complete municipal consultation for Rogers new tower installation.

Best Regards

Laura Sterling

Appendix " D "
to
Report PLAN2020-048
File No: D44-2020-003

Site Selection Report – Wireless Communications Site

Rogers Site Name: C6503, County Rd 36 & Gil Mar Rd

Proposed Location: 1988 Heights Rd. Kawartha Lakes, Ontario

Wireless Communications Site

Introduction

The on-going increase in the use of personal cellular phones and other wireless devices such as Blackberry, I-Phone and broadband internet for personal, business and emergency purposes requires the development of new wireless communication infrastructure including new antennas and their support structures to meet the demands of increased capacity and broadening services areas. Canadians currently use more than 27.6 million wireless devices on a daily basis. More importantly, each year Canadians place more than 6 million calls to 911 or other emergency numbers from their mobile phones.

Rogers Communications Inc. "Rogers" constantly strives to improve coverage and network quality for the sake of their clients. In the recent past, due to subscriber feedback, our Network Planning and Engineering departments have become aware of coverage deficiencies within the general area of Kawartha Lakes, at County Rd 36 & Gil Mar Rd.

This document outlines the site selection process in accordance with the requirements of Innovation, Science and Economic Development Canada's (ISED) formerly known as Industry Canada's Spectrum Management and Telecommunications Policy, CPC-2-0-03, Issue 5 (July 15, 2014) and provides a description of the system associated with the proposed wireless communication installation on property known as 1988 Heights Rd. Kawartha Lakes, Ontario.

Background & Coverage Requirement

The selection of a wireless communications site works similarly to fitting a piece into a puzzle. In this case, the puzzle is a complex radio network, situated in a rural setting. Client demand, radio frequency engineering principles, local topography and land use opportunities working in concert with one another to direct the geography of our sites.

In order to achieve a reliable wireless network, carriers must provide a seamless transmission signal to alleviate any gaps in coverage. Gaps in coverage are responsible for dropped calls, and unavailable service to clients. Rogers Communications Inc. would utilize the following proposed site location in order to provide high quality network signal for its high-speed wireless voice and data network.

Wireless communication carriers constantly strive to improve coverage and network quality for the sake of their clients. Our current coverage in Kawartha Lakes, in the County Rd 36 & Gil Mar Rd area is well below our acceptable standards and we need to respond to our customers' requests for improved coverage in these areas.

The site as proposed will achieve the necessary engineering coverage objectives for our network. The proposed location will enhance much relied upon communication services in the area such as EMS Response, Police and Fire; will significantly improve our wireless signal quality for the local residents; those traveling along the major roads as well provide local subscribers with Rogers' 4G wireless network coverage and capacity for products and services such as BlackBerry, iPhone, cellular phone and wireless internet through the Rogers Rocket Stick technology in the surrounding area.

Proposed Site Location

The Subject Property, with an approximate area of 90.46 Hectares is known as 1988 Heights Rd. Kawartha Lakes, Ontario.

The geographic coordinates for the site are as follows:
Latitude (NAD83) N 44° 27' 44.2"
Longitude (NAD 83) W 78° 39' 58.4"

Figure 1 - Location Map

As shown on Figure 1, the Subject Property is located in a rural area North of HWY 36 between Heights Rd. and Gil Mar Rd.

Proposed Facility Location

The proposed wireless communication installation will be located on a property known as 1988 Heights Rd. Kawartha Lakes, Ontario. The property is currently being used as rural residential.

A copy of Rogers' surveyed site plan has been attached for your reference and information.

Figure 2 – Proposed tower location on subject property is shown with yellow circle in aerial photo below.

Description of Proposed System

As determined by Rogers' radio frequency engineers, Rogers is proposing to construct a 75 meter high (approximately 246 feet) Self Support Tower, which will be able to meet our network requirements.

This particular site will be a 3-sectored LTE 700, 2100, 2600 MHz services, as well as the offset 3-sectored LTE 850 and 1900 MHz services for the initial provision of services using (6) antennas, allowing for loading of future LTE and other technologies.

The Self Support Tower design has been used throughout Southern Ontario and is appropriate for rural areas such as Kawartha Lakes. The design, construction and installation of the facility will be consistent with required engineering practices including structural adequacy.

We have included, for your consideration, photo simulations at the end of this report which illustrate the proposed installation from nearby locations and along major roads.

Rogers's installation as proposed will not affect the existing drainage patterns servicing the property's current use.

Access to the installation during construction and for maintenance purposes will be via a new driveway entrance to the proposed location on the subject property. The site would occupy a compound area of approximately 225 sq. meters, which will include both tower and equipment cabinet location as outlined on the site plan provided. The compound will also contain a walk-in equipment cabinet (WIC) containing radio equipment, backup battery power, maintenance tools, manuals and a first aid kit.

The installation would provide an opportunity to accommodate future technology services as well as potential co-location with other licensed carriers helping reduce the number of future structures in the area, which is encouraged by the City of Kawartha Lakes and ISED.

Co-location Assessment

Rogers Communications Inc. makes every effort to locate cellular sites where they will be the least visually obtrusive and always makes an initial effort to co-locate on existing structures. Apart from being encouraged by ISED, co-location is one of the cornerstones of Rogers' site development philosophy.

Other potential site locations were evaluated and opportunities to co-locate onto existing structures were investigated. However, the wireless communication structures in the surrounding area that were evaluated are all beyond the distance or below the height required in order to address the coverage deficiencies in the area; are not suitable for our network needs and would not improve our existing signal coverage to the expected quality levels.

As part of our initial site evaluation process Rogers looked for an existing structure in the area, which would be suitable to install antennas. Unfortunately, there are none.

Since there were no suitable structures readily available for co-location to accommodate our network coverage requirements, Rogers Communications Inc. had to consider the construction of its own installation.

A survey of installations in the surrounding area in relation to our proposed site location are illustrated on an aerial shown below - (Figure 3).

Figure 3 – Co-location Map

LEGEND:
Red Pin - Rogers Structures

The distance to the closest tower to the East and West of our proposed location are over 7.8 km. These towers are unsuitable for Rogers because they are too far away to meet the coverage objective for this site.

Please refer below for a sample of the installation for your reference (Figure 4). An additional package of viewscapes is attached to this report. It simulates the view of the proposed installation from major visible intersections. The process of simulating the proposed facility into the existing conditions of each viewscape was done by superimposing an image of the proposed structure on a photograph taken for each viewscape.

Figure 4 – Sample image of proposed installation

Municipal and Public Consultation Process

Rogers Communications Inc. is regulated and licensed by ISED to provide inter-provincial wireless voice and data services. As a federal undertaking, Rogers is required by ISED to consult with land-use authorities in siting antenna locations.

The consultation process established under ISED's authority is intended to allow the local land-use authorities the opportunity to address land-use concerns while respecting the federal government's exclusive jurisdiction in the siting and operation of wireless voice and data systems.

As the provisions of the Ontario Planning Act and other municipal by-laws and regulations do not apply to federal undertakings, wireless communication facilities are not required to obtain municipal permits of any kind. Rogers is however required to follow established and documented wireless protocols or processes set forth by land-use authorities.

The City of Kawartha Lakes has developed a protocol for establishing telecommunication facilities in the City. In fulfillment of the Cities request for public notification, Rogers will be providing an information package to all those property owners located within a radius of 225 metres (three times the tower height) from the leased area. Concurrent to the mailing of this information package, Rogers will place a notice in the local community newspaper; as well as hold a Community Open House allowing the opportunity for the public, the City and Rogers to exchange information relevant to the proposal. A copy of this information package will be provided to the City of Kawartha Lakes Planning Department.

Location of surrounding residential uses

There is one existing residential dwelling located approximately 132 meters from the proposed installation, as shown in Figure 5. This is the only residential dwelling that falls within the radius of 225 meters (three times the height of the tower) in proximity to the proposed installation.

Please refer to the following page providing an aerial which displays the surrounding residential dwellings. (Figure 5)

Figure 5 – Surrounding residential dwellings.

Federal Requirements

In addition to the requirements for consultation with municipal authorities and the public, Rogers must also fulfill other important obligations including the following:

Canadian Environmental Assessment Act

ISED requires that the installation and modification of antenna systems be done in a manner that complies with appropriate environmental legislation. This includes the Canadian Environmental Assessment Act, 2012 (CEAA 2012), where the antenna system is incidental to a physical activity or project designated under CEAA 2012, or is located on federal lands.

Rogers attests that the radio antenna system as proposed for this site is not located within federal lands or forms part of or incidental to projects that are designated by the Regulations Designating Physical Activities or otherwise designated by the Minister of the Environment as requiring an environmental assessment. In accordance with the Canadian Environmental Assessment Act, 2012, this installation is excluded from assessment.

For additional detailed information, please consult the Canadian Environmental Assessment Act at: http://laws-lois.justice.gc.ca/eng/acts/C-15.21/

Engineering Practices

Rogers attests that the radio antenna system as proposed for this site will be constructed in compliance with the National Building Code and The Canadian Standard Association, and respect good engineering practices including structural adequacy.

Transport Canada's Aeronautical Obstruction Marking Requirements

Rogers anticipates that the proposed installation will require markings or lighting and will submit the necessary applications to the appropriate parties to obtain required approvals.

In the instance where our structure requires lighting/marking, these requirements would be in compliance with CAR 621 Standards Obstruction Markings. The aforementioned standards provide for:

A combination of a medium intensity flashing white light during the day and steady burning aviation red light and/or flashing aviation red beacons at night

For additional detailed information, please consult Transport Canada at:
http://www.tc.gc.ca/eng/civilaviation/regserv/cars/part6-standards-standard621-3808.htm

Health Canada's Safety Code 6 Compliance

Health Canada is responsible for research and investigation to determine and promulgate the health protection limits for Exposure to the RF electromagnetic energy. Accordingly, Health Canada has developed a guideline entitled "Limits of Human Exposure to Radiofrequency Electromagnetic Field in the Frequency Range from 3kHz to 300 GHz – Safety Code 6". The exposure limits specified in Safety Code 6 were established from the results of hundreds of studies over the past several decades where the effects of RF energy on biological organisms were examined.

Radio communication, including technical aspects related to broadcasting, is under responsibility of the Ministry of Industry (ISED), which has the power to establish standards, rules, policies and procedures. ISED, under this authority, has adopted Safety Code 6 for the protection of the general public. As such, ISED requires all proponents and operators to ensure that their installations and apparatus comply with the Safety Code 6 at all times.

Rogers Communications Inc. attests that the radio antenna system described in this notification package will at all times comply with Health Canada's Safety Code 6 limits, as may be amended from time to time, for the protection of the general public including any combined effects of additional carrier co-locations and nearby installations within the local radio environment. In fact, emissions levels of Roger's wireless communication installations are far below the limits outlined in Safety Code 6.

More information in the area of RF exposure and health is available at the following web site: *Safety Code 6*: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct-eng.php and http://www.hc-sc.gc.ca/ewh-semt/radiation/cons/stations/index-eng.php

Innovation, Science and Economic Development Canada's Spectrum Management

Please be advised that the approval of this site and its design is under the exclusive jurisdiction of the Government of Canada through ISED. For more information on ISED's public consultation guidelines including CPC-2-0-03 Issue 5 contact (http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/sf08777e.html) or the local ISED office at spectrum.toronto@ic.gc.ca:

Toronto District Office
Room 909, 9th Floor
55 St. Clair Ave. E.
Toronto, ON
M4T 1M2
Tel.: 416-973-8215
Fax: 416-954-3553
Email: spectrum.toronto@ic.gc.ca

General information relating to antenna systems is available on ISED's Spectrum Management and Telecommunications website (http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/home)

Public consultation obligations

Rogers Communications Inc. is committed to effective public consultation. The public will be invited to provide comments to Rogers about this proposal by mail, electronic mail, phone or fax.

ISED's rules contain requirements for timely response to your questions, comments or concerns. We will acknowledge receipt of all communication within ***14 days*** and will provide a formal response to the Municipality and those members of the public who communicate to Rogers, within ***60 days***. The members of the public who communicated with Rogers will then have ***21days*** to review and reply to Rogers a final response.

Conclusion

Access to reliable wireless communications services is of great importance to residents' and travelers' safety and well-being in today's society. Wireless technology has fast become the preferred method of conducting business and personal communications among a large part of the population.

The trend of future telecom is to become truly "wireless", that is the delivery of the voice and data communications via conventional telephone lines, such as telephone poles along streets and roads, will be virtually obsolete. The current wireless infrastructure will be able to meet this trend and still provide a reliable system.

Rogers feels that the proposed site is well located to provide and improve wireless voice and data services in the targeted area. The proposed site is also situated and designed to have minimal impact on surrounding land uses.

Rogers looks forward to working with City of Kawartha Lakes in providing improved wireless services to the community.

Rogers Communications Inc.
Network Implementation

Proponent's Contact Information - Rogers Communications Inc.

SpectraSite Inc. – Acting as Agent for Rogers Communications Inc.
3307-89 Dunfield Avenue
Toronto, ON M4S 0A4

Contact: Laura Sterling
Phone: (905) 251-8848
lauras@spectrasiteinc.com

Council Report

Report Number ED2020-024

Meeting Date:	October 20, 2020
Title:	Commenting on the Proposed Regulations under the Ontario Heritage Act
Description:	Comments from the Kawartha Lakes Municipal Heritage Committee regarding proposed new regulations under the Ontario Heritage Act (Bill 108)
Author and Title:	Emily Turner, Economic Development Officer – Heritage Planning

Recommendation(s):

That Report ED2020-024, **Commenting on the Proposed Regulations under the Ontario Heritage Act**, be received;

That the comments from the Kawartha Lakes Municipal Heritage Committee on the proposed regulations under the Ontario Heritage Act, R.S.O. 1990, c.O.18, be endorsed; and

That the comments be submitted through the Environmental Registry of Ontario.

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

As part of the amendments to the Ontario Heritage Act which were passed as part of the More Homes, More Choice Act, 2019, S.O. 2019 (Bill 108), the provincial government is proposing new regulations which will help clarify some of the amendments. These new regulations were drafted by the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) in summer 2020 and posted on the Environmental Registry for comment on September 21, 2020. The commenting period closes on November 5, 2020. They were also circulated on behalf of the deputy minister to heritage planners and municipal heritage committees throughout the province so that they could provide input on the proposed new regulations. The proposed regulations are attached as Appendix A.

The Kawartha Lakes Municipal Heritage Committee reviewed the proposed regulations at its meeting of October 8, 2020 and passed the following resolution:

> **KLMHC2020-43**
> **Moved By** A. Hart
> **Seconded By** Councillor Ashmore
>
> **That** Report KLMHC2020-25, **Proposed Ontario Heritage Act Regulations**, be received; and
>
> **That** the Committee provide comment on the proposed regulations through the Chair; and
>
> **That** this recommendation be forwarded to Council for consideration.
>
> **Carried**

The Committee has provided comments in the form of a letter from the Vice-Chair. The letter is attached as Appendix B.

However, under the Committee's terms of reference, neither individual members nor the committee as a whole are permitted to make direct representations to the federal or provincial governments. This would include commenting directly on the Environmental Registry regarding proposed changes to legislation or its associated policies and regulation. In order for the Committee to provide comment on the proposed regulations, it would be required to comment through Council.

It is important that the Committee provide comment on the new regulations because they will have a significant impact on the way in which the municipality undertakes heritage planning once they come into force. Given that its terms of reference identify one of the roles of the Committee as providing recommendations regarding legislation and policies, it is appropriate that the Committee, through Council, provide comment on the proposed new regulations.

As the primary heritage body within the municipality, the Committee should be engaged with wider discussions in heritage planning which will impact the City's operations.

This report addresses that purpose.

Rationale:

On June 6, 2019, the More Homes, More Choice Act, 2019 received royal assent. This act, also known as Bill 108, made amendments to a number of pieces of planning related legislations, including the Ontario Heritage Act. The amendments to the Ontario Heritage Act are not yet in force.

Several of the amendments required additional details to be prescribed through regulations. These regulations change and clarify the processes for identifying, designating and managing proposed changes to properties of cultural heritage value. These regulations have the potential to significantly impact the way that municipalities approach the conservation of historic properties and their associated internal processes.

The regulations cover the following topics:

1. Principles to guide municipal decision making
2. Mandatory content for designation by-laws
3. 90-day timeline to issue a Notice of Intention to Designate
4. 120-day timeline to pass a designation by-law
5. 60-day timeline to confirm complete applications
6. Prescribed steps following Council's consent to a demolition or removal under s. 34.3
7. Information to be provided to LPAT upon appeal
8. Housekeeping amendments
9. Transition.

While some of the regulations, such as the housekeeping and transition regulations, will have a limited impact on the City's heritage planning program, other regulations, notably the 90-day timeline to issue a Notice of Intention to Designate when certain types of applications are filed under the Planning Act, have the potential to significantly impact heritage processes. The Municipal Heritage Committee has drafted comments which address some of the areas where the regulations will impact the municipality. Specifically, the Committee has concerns regarding the principles guiding decision making, the 90-day timeline to issue a notice of intention to designate and the general process of LPAT appeals. Comments from municipalities and their heritage committees across the province will allow the MHTSCI to fully appreciate the impact these changes will have and make adjustments or provide clarification accordingly.

The province intends to bring the amendments and associated regulations into force on January 1, 2021. The Ministry is also in the process of updating the

Ontario Heritage Toolkit which provides practical advice and recommendations regarding undertaking heritage planning in Ontario.

Other Alternatives Considered:

There are no recommended alternatives.

Alignment to Strategic Priorities

The four strategic priorities within the 2020-2023 Kawartha Lakes Strategic Plan are:

1. Healthy Environment
2. An Exceptional Quality of Life
3. A Vibrant and Growing Economy
4. Good Government

The recommendations of this report support the strategic priority an Exceptional Quality of Life by supporting and promoting arts, cultural and heritage. The comments provided by the Committee are important as part of the wider review process for regulations which will shape how the City preserves its built heritage.

Financial/Operation Impacts:

There are no financial or operational impacts resulting from the recommendations of this report.

Consultations:

Municipal Heritage Committee
Ministry of Heritage, Sport, Tourism and Culture Industries

Attachments:

Appendix A – Proposed Regulations under the Ontario Heritage Act

Proposed OHA Regulations.pdf

Appendix B – Municipal Heritage Committee Comments

Municipal Heritage Committee Comments

Department Head E-Mail: cmarshall@kawarthalakes.ca

Department Head: Chris Marshall, Director of Development Services

Caution:

This consultation draft is intended to facilitate dialogue concerning its contents. Should the decision be made to proceed with the proposal, the comments received during consultation will be considered during the final preparation of the regulation. The content, structure, form and wording of the consultation draft are subject to change as a result of the consultation process and as a result of review, editing and correction by the Office of Legislative Counsel.

CONSULTATION DRAFT

ONTARIO REGULATION

to be made under the

ONTARIO HERITAGE ACT

GENERAL

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3. Prescribed exceptions, s. 29 (1.2) of the Act
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SECTION 29 OF THE ACT AS MODIFIED FOR THE PURPOSES OF SUBSECTION 30.1 (1) OF THE ACT

PRINCIPLES

Principles

1. (1) The following provisions are prescribed for the purpose of section 26.0.1 of the Act:

1. Section 29 of the Act.

2. Section 30.1 of the Act.

3. Section 31 of the Act.

4. Section 32 of the Act.

5. Section 33 of the Act.

6. Section 34 of the Act.

(2) The following provisions are prescribed for the purpose of section 39.1.2 of the Act:

1. Section 41 of the Act.

2. Section 41.1 of the Act.

3. Section 42 of the Act.

(3) For the purpose of sections 26.0.1 and 39.1.2 of the Act, the following are the principles that a council of a municipality shall consider when the council exercises a decision-making authority under a provision set out in subsection (1) or (2):

1. Property that is determined to be of cultural heritage value or interest should be protected and conserved for all generations.

2. Decisions affecting the cultural heritage value or interest of a property or heritage conservation district should,

    i. minimize adverse impacts to the cultural heritage value or interest of the property or district,

    ii. be based on research, appropriate studies and documentary evidence, and

    iii. demonstrate openness and transparency by considering the views of all interested persons and communities.

3. Conservation of properties of cultural heritage value or interest should be achieved through identification, protection and wise management, including adaptive reuse where appropriate.

(4) For the purpose of this section,

"adaptive reuse" means the alteration of a property of cultural heritage value or interest to fit new uses or circumstances while retaining the heritage attributes of the property.

RULES RE SECTION 29 OF THE ACT

Prescribed events, s. 29 (1.2) of the Act

2. (1) For the purposes of subsection 29 (1.2) of the Act, the following events are prescribed in respect of a property in a municipality:

1. A council or planning board, as applicable, has completed giving notice in accordance with clause 22 (6.4) (a) of the *Planning Act* of a request for amendment referred to in that clause, if the subject land to which the amendment applies includes the property.

2. A council has completed giving notice in accordance with clause 34 (10.7) (a) of the *Planning Act* of an application for an amendment to a by-law referred to in that clause, if the subject land to which the amendment applies includes the property.

3. A council or planning board, as the approval authority, has completed giving notice in accordance with subsection 51 (19.4) of the *Planning Act* of an application referred to

in that clause, if the subject land to which the application applies includes the property.

Prescribed exceptions, s. 29 (1.2) of the Act

3. (1) The following exceptions are prescribed for the purposes of subsection 29 (1.2) of the Act:

1. If an event described in section 2 has occurred in respect of a property, the owner of the property and the council of the municipality may,

    i. at any time after the event, agree that the period of time under subsection 29 (1.2) of the Act does not apply to the property, or

    ii. within 90 days after the event, agree to extend the applicable period of time under subsection 29 (1.2) of the Act after which the council may not give a notice of intention to designate the property.

2. If an event described in section 2 has occurred in respect of a property and the day on which the event occurred falls within a period when an emergency has been declared to exist in the municipality in which the property is situate, or in any part thereof, under the *Emergency Management and Civil Protection Act* by the head of the council of the municipality, the 90-day period set out in subsection 29 (1.2) of the Act does not begin until the day immediately after the day on which the emergency has terminated.

3. If an event described in section 2 has occurred in respect of a property and during the 90-day period set out in subsection 29 (1.2) of the Act an emergency is declared to exist in the municipality in which the property is situate, or in any part thereof, under the *Emergency Management and Civil Protection Act* by the head of the council of the municipality, the following rules apply:

    i. The 90-day period is terminated on the day the emergency is declared.

    ii. A new 90-day period commences on the day immediately after the day on which the emergency is terminated.

4. If the following criteria are satisfied, the municipality may, within 15 days after the end of 90-day period set out in subsection 29 (1.2) of the Act, pass a resolution stating that the municipality has not consulted with its municipal heritage committee regarding the designation of the property and may elect, by the same resolution, that the period of time for the purposes of subsection 29 (1.2) is 180 days, and if the council passes such a resolution, the period of time for the purposes of subsection 29 (1.2) is the period set out in the resolution:

    i. An event described in section 2 has occurred in respect of the property.

    ii. The municipality has established a municipal heritage committee.

    iii. The municipality has not consulted with its municipal heritage committee regarding designation of the property in accordance with subsection 29 (2) of the Act by the end of the 90-day period set out in subsection 29 (1.2) of the Act.

5. If an event described in section 2 has occurred in respect of a property and after the occurrence of the event the council of the municipality in which the property is situate passes a resolution stating that the municipality has received new and relevant information relating to the property or the event, the following rules apply:

    i. If the resolution is passed within the 90-day period set out in subsection 29 (1.2), the council may elect, by the same resolution, that the period of time for the purposes of that subsection is 180 days after the resolution is passed and if the council so elects, the period of time for the purposes of that subsection is the period set out in the resolution.

    ii. If the resolution is passed at any time after the 90-day period set out in subsection 29 (1.2), the council may elect, by the same resolution, that the restriction imposed by subsection 29 (1.2) of the Act does not apply for a period of 180 days commencing on the day the resolution is passed and, if the council so elects, the restriction under subsection 29 (1.2) of the Act does not apply for the period set out in the resolution.

6. If an event described in section 2 has occurred in respect of a property, subsection 29 (1.2) of the Act no longer applies to restrict the council of the municipality in which

the property is situate from giving a notice of intention to designate the property as of the day on which the event is finally disposed of under the *Planning Act*.

(2) If the council passes a resolution referred to in paragraph 4 of subsection (1), the council of the municipality shall, within 15 days after the day on which the resolution was passed, ensure that notice of the new period of time set out in the resolution is served on the owner of the property, and the notice shall include the reasons for the new period of time.

(3) If the council passes a resolution under subparagraph 5 i of subsection (1), the council shall, within 15 days after the day on which the resolution was passed, ensure that notice of the new period of time set out in the resolution is served on the owner of the property, and the notice shall include the reasons for the new period of time.

(4) If the council passes a resolution under subparagraph 5 ii of subsection (1), the council shall, within 15 days after the day on which the resolution was passed, ensure that notice is served on the owner of the property and the notice shall contain,

(a) a statement explaining that the restriction imposed by subsection 29 (1.2) of the Act does not apply for a period of 180 days commencing on the day the resolution was passed; and

(b) the reasons why the restriction does not apply for that period of time.

(5) For the purposes of paragraph 5 of subsection (1), “new and relevant information” means information or materials that satisfy all of the following:

1. The information or materials affect or may affect,

    i. the determination of the cultural heritage value or interest of the property, or

    ii. an evaluation of the potential effect of the *Planning Act* application giving rise to the event on any cultural heritage value or interest of the property.

2. The information or materials are received by council after the relevant event occurred.

3. The information or materials do not form part of the information and materials that were provided to the municipality under the *Planning Act* for the purposes of the relevant event described in section 2.

Prescribed circumstances, s. 29 (8) para. 1

4. (1) The following circumstances and corresponding periods of time are prescribed for the purpose of paragraph 1 of subsection 29 (8) of the Act:

1. If, before the end of the 120-day period referred to in paragraph 1 of subsection 29 (8) of the Act, the council and the owner of the property agree to a period of time other than the period set out in that paragraph, the period of time for the purposes of that paragraph is the period that the council and the owner have agreed upon.

2. If any part of the 120-day period referred to in paragraph 1 of subsection 29 (8) of the Act falls within a period when an emergency has been declared to exist in the municipality in which the property is situate, or in any part thereof, under the *Emergency Management and Civil Protection Act* by the head of the council of the municipality, the period of time for the purposes of paragraph 1 of subsection 29 (8) of the Act is 120 days after the day on which the emergency has terminated.

3. If, during the 120-day period referred to in paragraph 1 of subsection 29 (8) of the Act, the council passes a resolution stating that the municipality has received new and relevant information relating to the property and elects, by the same resolution, that the period of time for the purposes of that paragraph is 180 days after the resolution is passed, the period of time for the purposes of that paragraph is the period set out in the resolution.

(2) If the council has passed a resolution referred to in paragraph 3 of subsection (1), the council shall ensure that notice of the new period of time is served on the owner of the property, and the notice shall include the reasons for the new period.

(3) For purposes of paragraph 3 of subsection (1), “new and relevant information” means information or materials that satisfy the following:

1. The information or material affects or may affect any of the matters set out in paragraph 2 of subsection 29 (8) of the Act.

2. The information or materials are received by council after notice of intention to designate the property has been published under clause 29 (3) (b) of the Act.

Designation by municipal by-law, requirements

5. (1) The following requirements are prescribed for the purpose of paragraph 2 of subsection 29 (8) of the Act:

1. The by-law must identify the property by,

    i. the municipal address of the property, if it exists,

    ii. the legal description of the property, including the property identifier number that relates to the property, and

    iii. a general description of where the property is located within the municipality, for example, the name of the neighbourhood in which the property is located and the nearest major intersection to the property.

2. The by-law must contain a site plan, scale drawing, aerial photograph or other image that identifies each area of the property that has cultural heritage value or interest.

3. The statement explaining the cultural heritage value or interest of the property must identify which of the criteria set out in subsection 1 (2) of Ontario Regulation 9/06 (Criteria for Determining Cultural Heritage Value or Interest) made under the Act are met and must explain how each criterion is met.

4. The description of the heritage attributes of the property must be brief and must explain how each heritage attribute contributes to the cultural heritage value or interest of the property.

5. The by-law may list any physical features of the property that are not heritage attributes.

(2) For clarity, the requirements set out in subsection (1) apply for the purposes of subsection 29 (8) of the Act, as set out in the Schedule.

AMENDMENT OF DESIGNATING BY-LAW

Amending by-laws, modified s. 29 of the Act

6. The Schedule sets out section 29 of the Act, as modified, that applies to an amending by-law for the purposes of subsection 30.1 (1) of the Act.

REAPPLICATION FOR REPEAL OF BY-LAW – SUBSECTION 32 (18) OF THE ACT

Prescribed circumstances and time periods

7. For the purposes of subsection 32 (18) of the Act, the following are the prescribed circumstances and applicable time periods in which an owner of property may not reapply to have a by-law or part thereof designating a property repealed, except with the consent of council:

1. In circumstances where a council refuses an application under paragraph 1 of subsection 32 (5) of the Act and a notice of appeal is not given within the time period specified in subsection 32 (7) of the Act, the time period is 12 months after the service of the notice of the council's decision under subparagraph 1 i of subsection 32 (5) of the Act.

2. In circumstances where an owner of the property appeals a decision of council to refuse the application under subsection 32 (7) of the Act and the Tribunal dismisses the appeal under paragraph 1 of subsection 32 (12) of the Act, the time period is 12 months after the date of the Tribunal's decision under paragraph 1 of subsection 32 (12) of the Act.

3. In circumstances where an owner of the property appeals a decision of council to refuse the application under subsection 32 (7) of the Act and the Tribunal dismisses the appeal under subsection 32 (13) of the Act, the time period is 12 months after the date of the Tribunal's decision under subsection 32 (13) of the Act.

4. In circumstances where a person appeals the council's decision to consent to an application and to pass a repealing by-law under subsection 32 (8) of the Act and the Tribunal allows the appeal in whole or in part under paragraph 2 of subsection 32 (12) of the Act, the time period is 12 months after the date of the Tribunal's decision under paragraph 2 of subsection 32 (12) of the Act.

INFORMATION AND MATERIAL – SUBSECTIONS 33 (2) AND 34 (2) OF THE ACT

Prescribed information and material

8. (1) For the purpose of subsections 33 (2) and 34 (2) of the Act, the following information and material shall accompany an application:

1. The name, address, telephone number and, if applicable, the email address of the applicant.

2. The name of the municipality from which consent is being requested.

3. A description of the property that is the subject of the application, including such information as the concession and lot numbers, reference plan and part numbers, and street names and numbers.

4. Photographs that depict the existing buildings, structures and heritage attributes that are affected by the application and their condition and context.

5. A site plan or sketch that illustrates the location of the proposed alteration, demolition or removal.

6. Drawings and written specifications of the proposed alteration, demolition or removal.

7. The reasons for the proposed alteration, demolition or removal and the potential impacts to the heritage attributes of the property.

8. All technical cultural heritage studies that are relevant to the proposed alteration, demolition or removal.

9. An affidavit or a sworn declaration by the applicant certifying that the information required under this section and provided by the applicant is accurate.

(2) The information or material referred to in subsection (1) must also include any information or material that is required to accompany an application by a municipal by-law, resolution or official plan.

(3) The owner of the property shall serve an application made under subsection 33 (1) or 34 (1) of the Act on the council of the municipality.

(4) Use of a municipality's electronic system to submit an application mentioned in subsection (3) is a method for the purpose of clause 67 (1) (d) of the Act.

(5) Service using a municipality's electronic system is effective on the day the application is submitted unless the application was submitted after 5 p.m., in which case it is effective on the following day. If the day on which service would be effective is a Saturday or a holiday, service is instead effective on the next day that is not a Saturday or a holiday.

(6) For the purpose of paragraph 2 of subsection 33 (7) of the Act and paragraph 2 of subsection 34 (4.3) of the Act, an application is considered to have commenced on the day that it is served on the council of the municipality.

REQUIRED STEPS – SECTION 34.3 OF THE ACT

Council consents to application under s. 34 of the Act

9. (1) The following steps are prescribed for the purposes of subsection 34.3 (1) of the Act:

1. After the demolition or removal of a building, structure or heritage attribute on the property is complete, the council of the municipality shall, in consultation with the municipal heritage committee established under section 28 of the Act, if one has been established, make one of the following determinations:

    i. The property continues to have cultural heritage value or interest and, despite the demolition or removal, the statement explaining the cultural heritage value or interest of the property and the description of the heritage attributes of the property are accurate and do not need to be amended.

    ii. The property continues to have cultural heritage value or interest but, as a result of the demolition or removal, the statement explaining the cultural heritage value or interest of the property or the description of the heritage attributes of the property is no longer accurate and needs to be amended.

    iii. The property no longer has cultural heritage value or interest as a result of the demolition or removal.

2. If the council makes the determination described in subparagraph 1 i, the clerk of the municipality shall ensure that notice of the determination is served on the Trust.

3. If the council makes the determination described in subparagraph 1 ii,

    i. the council shall,

        A. pass a by-law that amends the by-law made under section 29 of the Act designating the property to update the statement of cultural heritage value or interest and the description of the property's heritage attributes to reflect the changes resulting from the demolition or removal, and

        B. ensure that the amending by-law complies with the requirements set out in section 5 and includes a statement explaining the cultural heritage value or interest of the property and a description of the heritage attributes of the property, and

    ii. the clerk of the municipality shall,

        A. ensure that a copy of the amending by-law is served on the owner of the property,

        B. publish notice of the amending by-law in a newspaper having general circulation in the municipality, and

        C. ensure that a copy of the amending by-law is registered against the property affected by the amending by-law in the appropriate land registry office and that a copy of the registered amending by-law is served on the Trust.

4. If the council makes the determination described in subparagraph 1 iii,

    i. the council shall pass a by-law to repeal the by-law or the part thereof designating the property under section 29 of the Act, and

ii. the clerk of the municipality shall,

A. ensure that a copy of the repealing by-law is served on the owner of the property,

B. publish notice of the repealing by-law in a newspaper having general circulation in the municipality,

C. ensure that a copy of the repealing by-law is registered against the property affected by the repealing by-law in the appropriate land registry office and that a copy of the registered repealing by-law is served on the Trust, and

D. ensure that any reference to the property is deleted from the register referred to in subsection 27 (1) of the Act.

5. If, as part of the removal mentioned in paragraph 1, a building or structure is moved to another property,

i. the council of a municipality shall, in consultation with the municipal heritage committee established under section 28 of the Act, determine if the other property meets the criteria referred to in clause 29 (1) (a) of the Act,

ii. if it is determined under subparagraph i that the other property meets the criteria, the council of a municipality may pass a by-law designating the other property to be of cultural heritage value or interest, and

iii. if a designating by-law is passed under subparagraph ii, the council of a municipality shall ensure that the by-law complies with the requirements set out in section 5 and includes a statement explaining the cultural heritage value or interest of the property and a description of the heritage attributes of the property.

6. If a designating by-law is passed under subparagraph 5 ii, the clerk of the municipality shall,

i. ensure that a copy of the designating by-law is served on the owner of the property affected by the designating by-law,

ii. publish notice of the designating by-law in a newspaper having general circulation in the municipality, and

iii. ensure that a copy of the designating by-law is registered against the property affected by the designating by-law in the appropriate land registry office and that a copy of the registered designating by-law is served on the Trust.

(2) A by-law passed under this section comes into force on the day the by-law is passed.

(3) A designating by-law passed under subparagraph 5 ii of subsection (1) is deemed to be a by-law passed under subsection 29 (1) of the Act.

(4) For greater certainty, sections 29, 30.1 and 31 of the Act do not apply in respect of passing a by-law under this section, but sections 30.1 and 31 of the Act apply in respect of an amendment or repeal of a by-law or part thereof passed under this section.

RECORD OF DECISION

Record of decision under s. 29 of the Act

10. (1) If a notice of appeal under section 29 of the Act is given within the time period specified in subsection 29 (11) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 29 (8) of the Act to pass a by-law designating a property is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. A certified copy of the notice of intention to designate the property.

2. A certified copy of the by-law.

3. A certified copy of the notice referred to in paragraph 4 of subsection 29 (8) of the Act.

4. A copy of any report considered by council.

5. A statement by an employee of the municipality as to how the decision of council considered the principles set out in subsection 1 (3) when the council exercised its decision-making authority.

6. The original or a certified copy of all written submissions and comments related to the decision and the dates they were received.

7. If a public meeting was held that related to the decision,

    i. a copy of the minutes; and

    ii. a list of all persons and public bodies that made oral submissions that related to the decision and, if available, the record of those submissions.

8. Any additional material or information that the council considered in making its decision.

9. An affidavit or sworn declaration by an employee of the municipality that contains a certificate that all the material and information required under this section is accurate.

(3) The following material and information must be included in a record of the decision under subsection 29 (6) of the Act to be forwarded to the Tribunal as required by subsection 29 (14) of the Act:

1. The original or a certified copy of every notice of objection served on the clerk of the municipality under subsection 29 (5) of the Act, and the date on which each notice was served.

Record of decision under s. 30.1 of the Act

11. (1) References in this section to section 29 of the Act are references to that section as it applies to an amending by-law mentioned in subsection 30.1 (1) of the Act, as modified in the Schedule.

(2) The following rule applies if the council to a municipality proposes under section 30.1 of the Act to amend a by-law designating property and the exception set out in subsection 30.1 (2) of the Act does not apply to the amending by-law:

1. If a notice of appeal under section 30.1 of the Act is given within the time period specified in subsection 29 (11) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 29 (8) of the Act is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(3) The following material and information must be included in a record of the decision referred to in paragraph 1 of subsection (2):

1. A certified copy of the notice of proposed amendment to the by-law designating the property.

2. A certified copy of the by-law that is the subject to the proposed amendment.

3. A certified copy of the amending by-law.

4. A certified copy of the notice referred to in paragraph 4 of subsection 29 (8) of the Act.

5. The material and information described in paragraphs 4 to 9 of subsection 10 (2).

(4) The following material and information must be included in a record of the decision under subsection 29 (6) of the Act to be forwarded to the Tribunal as required by subsection 29 (14) of the Act:

1. The original or a certified copy of every notice of objection served on the clerk of the municipality under subsection 29 (5) of the Act and the date on which it was served.

(5) The following rule applies if the council to a municipality proposes under section 30.1 of the Act to amend a by-law designating property and the exception set out in subsection 30.1 (2) applies to the amending by-law:

1. If a notice of appeal is given within the time period specified in subsection 30.1 (10) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 30.1 (9) of the Act to pass an amending by-law is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(6) The following material and information must be included in a record of the decision referred to in paragraph 1 of subsection (5):

1. A certified copy of the notice referred to in subparagraph 1 ii of subsection 30.1 (9) of the Act.

2. The material and information described in paragraphs 1, 3, 4 and 5 of subsection (3).

(7) The following material and information must be included in a record of the decision under subsection 30.1 (7) of the Act to be forwarded to the Tribunal as required by subsection 30.1 (14) of the Act:

1. The original or a certified copy of every notice of objection filed with the clerk of the municipality under subsection 30.1 (6) of the Act and the date on which it was filed.

Record of decision under s. 31 of the Act

12. (1) If a notice of appeal under section 31 of the Act is given within the time period specified in subsection 31 (9) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 31 (8) of the Act to pass a repealing by-law is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. A certified copy of the notice of intention to repeal the by-law or part thereof designating property.

2. A certified copy of the repealing by-law.

3. A certified copy of the by-law that is subject to the repealing by-law.

4. A certified copy of the notice referred to in paragraph 2 of subsection 31 (8) of the Act.

5. The material and information described in paragraphs 4 to 9 of subsection 10 (2).

(3) The following material and information must be included in a record of the decision under subsection 31 (6) of the Act to be forwarded to the Tribunal as required by subsection 31 (13) of the Act:

1. The original or a certified copy of every notice of objection served on the clerk of the municipality under subsection 31 (5) of the Act and the date on which it was served.

Record of decision under s. 32 of the Act

13. The following material and information must be included in a record of the decision under subsection 32 (5) of the Act to be forwarded to the Tribunal as required by subsection 32 (11) of the Act:

1. A certified copy of the application to repeal a by-law or part thereof designating the property.

2. A certified copy of the notice of application referred to in subsection 32 (3) of the Act.

3. A certified copy of the by-law designating the property.

4. The original or a certified copy of every notice of objection served on the clerk of the municipality under subsection 32 (4) of the Act and the date it was served.

5. If the appeal relates to a decision to refuse the application, a certified copy of the notice referred to in subparagraph 1 ii of subsection 32 (5) of the Act.

6. If the appeal relates to a decision to consent to the application,

    i. a certified copy of the by-law repealing the by-law or part thereof, and

    ii. a certified copy of the notice referred to in subparagraph 2 ii of subsection 32 (5) of the Act.

7. The material and information described in paragraphs 4 to 9 of subsection 10 (2).

Record of decision under s. 33 of the Act

14. (1) If a notice of appeal under section 33 of the Act is given within the time period specified in subsection 33 (9) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 33 (6) of the Act is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. A certified copy of the by-law designating the property.

2. The original or a certified copy of the material and information described in section 8 received by the council, and any material or information that the council required under subsection 33 (3) of the Act.

3. A certified copy of the notice informing the applicant that the application is complete that was served on the applicant under subsection 33 (4) of the Act and the date it was served.

4. A certified copy of any records relating to a notification referred to in subsection 33 (5) of the Act.

5. A certified copy of the notice of the council's decision referred to in clause 33 (6) (b) of the Act.

6. The material and information described in paragraphs 4 to 9 of subsection 10 (2).

Record of decision under s. 34.1 of the Act

15. (1) If a notice of appeal under section 34.1 of the Act is given within the time period specified in subsection 34.1 (2) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 34 (4.2) of the Act is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. A certified copy of the by-law designating the property.

2. The original or a certified copy of the material and information described in section 8 received by the council, and any material or information that the council required under subsection 34 (3) of the Act.

3. A certified copy of the notice informing the applicant that the application is complete that was served on the applicant under subsection 34 (4) of the Act and the date it was served.

4. A certified copy of any records relating to a notification referred to in subsection 34 (4.1) of the Act.

5. The original or a certified copy of the notice of the council's decision referred to in clause 34 (4.2) (b) of the Act.

6. The material and information described in paragraphs 4 to 9 of subsection 10 (2).

Record of decision under s. 40.1 of the Act

16. (1) If a notice of appeal under section 40.1 of the Act is given within the time period specified in subsection 40.1 (4) of the Act, the clerk of the municipality shall ensure that the

record of the decision under subsection 40.1 (1) of the Act is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. A certified copy of the by-law made under subsection 40.1 (1) of the Act.

2. A certified copy of the notice referred to in subsection 40.1 (3) of the Act.

3. The material and information described in paragraphs 4, 6, 7, 8 and 9 of subsection 10 (2).

Record of decision under s. 41 of the Act

17. (1) If a notice of appeal under section 41 of the Act is given within the time period specified in subsection 41 (4) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 41 (1) of the Act is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. A certified copy of the by-law made under subsection 41 (1) of the Act.

2. A certified copy of the notice referred to in subsection 41 (3) of the Act.

3. A certified copy of the heritage conservation district plan adopted by a by-law under subsection 41.1 (1) of the Act.

4. A certified copy of the information referred to in clause 41.1 (6) (a) of the Act.

5. The original or a certified copy of all written submissions and comments related to the decision, including any written submissions referred to in subsection 41.1 (11) of the Act, and the dates they were received.

6. For every public meeting referred to in clause 41.1 (6) (b) of the Act that is held,

    i. a copy of the notice of the public meeting referred to in subsection 41.1 (7) of the Act,

    ii. a copy of the minutes, and

    iii. a list of all persons that made oral representations referred to in subsection 41.1 (9) of the Act and, if available, the record of those representations.

7. For every public meeting that is held that related to the decision but was not a meeting referred to in clause 41.1 (6) (b) of the Act,

    i. a copy of the minutes,

    ii. a list of all persons and public bodies that made oral submissions that related to the decision and, if available, the record of those submissions.

8. The material and information described in paragraphs 4, 5, 8 and 9 of subsection 10 (2).

Record of decision under s. 41.1 of the Act

18. (1) If a notice of appeal under section 41.1 of the Act is given within the time period specified in subsection 41 (4) of the Act, as made applicable by subsection 41.1 (4) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 41.1(2) of the Act is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. A certified copy of the by-law under subsection 41 (1) of the Act.

2. A certified copy of the by-law under subsection 41.1 (2) of the Act.

3. A certified copy of the heritage conservation district plan adopted under subsection 41.1 (2) of the Act.

4. A certified copy of the notice referred to in subsection 41.1 (3) of the Act.

5. A certified copy of the information referred to in clause 41.1 (6) (a) of the Act.

6. The original or a certified copy of all written submissions and comments related to the decision, including the written submissions referred to in subsection 41.1 (11) of the Act, and the dates they were received.

7. For every public meeting referred to in clause 41.1 (6) (b) of the Act that is held,

    i. a copy of the notice of the public meeting referred to in subsection 41.1 (7) of the Act,

    ii. a copy of the minutes, and

    iii. a list of all persons that made oral representations referred to in subsection 41.1 (9) of the Act and, if available, the record of those representations.

8. The material and information described in paragraphs 4, 5, 8 and 9 of subsection 10 (2).

Record of decision under s. 42 of the Act

19. (1) If a notice of appeal under section 42 of the Act is given within the time period specified in subsection 42 (7) of the Act, the clerk of the municipality shall ensure that the record of the decision under subsection 42 (4) of the Act is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

(2) The following material and information must be included in a record of the decision referred to in subsection (1):

1. If a heritage conservation district plan was adopted by a by-law under subsection 41.1 (1) or (2) of the Act, a certified copy of the plan.

2. The original or a certified copy of the information required under subsection 42 (2.2) of the Act.

3. A certified copy of the notice of receipt referred to in subsection 42 (3) of the Act.

4. If the council refused the application for a permit under section 42 of the Act, a copy of the notice referred to in clause 42 (4) (b) of the Act.

5. If the council approved the application for a permit under section 42 of the Act with terms or conditions attached, a copy of the permit.

6. The material and information described in paragraphs 4, 5, 6, 7, 8 and 9 of subsection 10 (2).

TRANSITION

Transitional rules

20. (1) Except as provided otherwise, references in this section to a provision of the Act are references to the provision as it read immediately before the day this section comes into force.

(2) A matter or proceeding that is mentioned in subsection (3) and commenced before the day this section comes into force shall be continued and disposed of under the Act as it read before that date.

(3) For the purposes of subsection (2), a matter or proceeding shall be deemed to have been commenced,

(a) in the case of the designation of property by by-law under section 29 of the Act, on the date of the publication of a notice of intention to designate under clause 29 (3) (b) of the Act;

(b) in the case of the amendment of a by-law designating property under section 30.1 of the Act,

(i) if subsection 30.1 (2) of the Act does not apply to the notice, on the date of the publication of the notice of proposed amendment under clause 29 (3) (b) of the Act, as made applicable by subsection 30.1 (1) of the Act, or

(ii) if subsection 30.1 (2) of the Act applies to the notice, on the day the notice of proposed amendment is received by the owner of the property;

(c) in the case of the repeal of a by-law or part thereof designating property under section 31 of the Act, on the date of the publication of a notice of intention to repeal a by-law or part thereof under clause 31 (3) (b) of the Act;

(d) in the case of an application to repeal a by-law or part thereof designating a property under section 32 of the Act, on the day the application is received by the council of the municipality;

(e) in the case of an application for consent to alter or permit the alteration under section 33 of the Act, on the day the application is received by the council of the municipality;

(f) in the case of an application for consent to demolish or remove or permit demolition or removal under section 34 of the Act, on the day the application is received by the council of the municipality;

(g) in the case of an application for consent to alter, demolish or remove or permit the alteration, demolition or removal under section 34.5 of the Act, on the day the application is received by the Minister;

(h) in the case of the designation of a study area under section 40.1 of the Act, the day on which the by-law is passed under that section;

(i) in the case of the designation of a heritage conservation district under section 41 of the Act, the day on which the by-law is passed under that section;

(j) in the case of the adoption of a heritage conservation district plan under subsection 41.1 (2) of the Act, the day on which the by-law is passed under that section;

(k) in the case of an application described in subsection 42 (2.1) of the Act, the day on which the application is received by the council of the municipality.

(4) Despite subsection (2), if a notice of intention to designate a property under subsection 29 (1) of the Act was published in accordance with clause 29 (3) (b) of the Act before the day this section comes into force and the council of the municipality has not passed a by-law designating the property and has not withdrawn the notice of intention to designate before that day, the notice of intention to designate the property is deemed to be withdrawn unless the council of the municipality passes a by-law designating the property within 365 days after the day this section comes in force in accordance with section 29 of the Act.

(5) For the purposes of subsection (4), if a person objects to a proposed designation under subsection 29 (5) of the Act, the 365-day period referred to in that subsection shall be counted by excluding every day that is after the day the person serves the notice of objection under subsection 29 (5) of the Act and that is before the earliest of the following:

1. The day the Review Board makes a report to council under subsection 29 (12) of the Act.

2. If the person who served the notice of objection withdraws the objection, the day on which the person serves notice of withdrawal in accordance with subsection 29 (15) of the Act.

(6) If a notice of intention to designate is deemed to be withdrawn under subsection (4), the municipality shall cause a notice of withdrawal,

(a) to be served on the owner of the property and on the Trust; and

(b) to be published in a newspaper having general circulation in the municipality.

(7) Despite subsection (2), the following rules apply if an application for consent to demolish or remove or permit demolition or removal under section 34 of the Act is received by the council of the municipality before the day this section comes into force and the council of a municipality has consented to the application under subclause 34 (2) (a) (i) or (i.1) of the Act or is deemed to have consented to the application under subsection 34 (4) of the Act or the Tribunal has ordered that the municipality give its consent under clause 34.1 (6) (b) of the Act:

1. If the council has not passed a repealing by-law under section 34.3 of the Act, the application shall be continued and disposed of in accordance with section 34.3 of the Act as it reads on and after the day this section comes into force.

2. If the council has passed a repealing by-law under section 34.3 of the Act, the application shall be continued and disposed of in accordance with section 34.3 of the Act as it read immediately before the day this section comes into force.

(8) Subsection 29 (1.2) of the Act, as it reads on and after the day this section comes into force, does not apply with respect to a property in a municipality if the event prescribed by section 2 of this Regulation occurred before the day this section comes into force.

Commencement

21. [Commencement]

SCHEDULE

SECTION 29 OF THE ACT AS MODIFIED FOR THE PURPOSES OF SUBSECTION 30.1 (1) OF THE ACT

Amendment of designating by-law

29. (1) The council of a municipality may, by by-law, amend a by-law designating a property within the municipality to be of cultural heritage value or interest if the amendment is made in accordance with the process set out in this section.

Notice required

(1.1) Subject to subsection (2), if the council of a municipality intends to amend a by-law designating a property within the municipality to be of cultural heritage value or interest, it shall cause a notice of proposed amendment to be given by the clerk of the municipality in accordance with subsection (3).

Consultation

(2) Where the council of a municipality has appointed a municipal heritage committee, the council shall, before giving a notice of proposed amendment, consult with its municipal heritage committee.

Notice of proposed amendment

(3) A notice of proposed amendment shall be,

(a) served on the owner of the property and on the Trust; and

(b) published in a newspaper having general circulation in the municipality.

Contents of notice

(4) A notice of proposed amendment that is served on the owner of property and on the Trust under clause (3) (a) shall contain,

(a) an adequate description of the property so that it may be readily ascertained;

(b) an explanation of the purpose and effect of the proposed amendment; and

(c) a statement that notice of objection to the notice of proposed amendment may be served on the clerk within 30 days after the date of publication of the notice of proposed amendment in a newspaper of general circulation in the municipality under clause (3) (b).

Same

(4.1) A notice of proposed amendment that is published in a newspaper of general circulation in a municipality under clause (3) (b) shall contain,

(a) an adequate description of the property so that it may be readily ascertained;

(b) an explanation of the purpose and effect of the proposed amendment;

(c) a statement that further information respecting the notice of proposed amendment is available from the municipality; and

(d) a statement that notice of objection to the notice of proposed amendment may be served on the clerk within 30 days after the date of publication of the notice of proposed amendment in a newspaper of general circulation in the municipality under clause (3) (b).

Objection

(5) A person who objects to a proposed amendment to a designating by-law shall, within 30 days after the date of publication of the notice of proposed amendment, serve on the clerk of the municipality a notice of objection setting out the reason for the objection and all relevant facts.

Consideration of objection by council

(6) If a notice of objection has been served under subsection (5), the council of the municipality shall consider the objection and make a decision whether or not to withdraw the notice of proposed amendment within 90 days after the end of the 30-day period under subsection (5).

Notice of withdrawal

(7) If the council of the municipality decides to withdraw the notice of proposed amendment, either of its own initiative at any time or after considering an objection under subsection (6), the council shall withdraw the notice by causing a notice of withdrawal,

(a) to be served on the owner of the property, on any person who objected under subsection (5) and on the Trust; and

(b) to be published in a newspaper having general circulation in the municipality.

If no notice of objection or no withdrawal

(8) If no notice of objection is served within the 30-day period under subsection (5) or a notice of objection is served within that period but the council decides not to withdraw the notice of proposed amendment, the council may pass a by-law amending the by-law designating the property, provided the following requirements are satisfied:

1. The amending by-law must be passed within 365 days after the date of publication of the notice of proposed amendment under clause (3) (b) or within such other period of time that is mutually agreed upon by the council and the owner of the property.

2. The by-law designating the property, as amended, must include a statement explaining the cultural heritage value or interest of the property and a description of the heritage attributes of the property and must comply with such requirements in relation to the statement and the description as may be prescribed and with such other requirements as may be prescribed.

3. The council must cause the following to be served on the owner of the property, on any person who objected under subsection (5) and on the Trust:

    i. A copy of the amending by-law.

    ii. A notice that any person who objects to the amending by-law may appeal to the Tribunal by giving the Tribunal and the clerk of the municipality, within 30 days after the date of publication under paragraph 4, a notice of appeal setting out the objection to the by-law and the reasons in support of the objection, accompanied by the fee charged under the *Local Planning Appeal Tribunal Act, 2017*.

4. The council must publish notice of the amending by-law in a newspaper having general circulation in the municipality, which must provide that any person who objects to the by-law may appeal to the Tribunal by giving the Tribunal and the clerk of the municipality, within 30 days after the date of publication under this paragraph, a notice of appeal setting out the objection to the by-law and the reasons in support of the objection, accompanied by the fee charged under the *Local Planning Appeal Tribunal Act, 2017*.

Deemed withdrawal

(9) If the council of the municipality has not passed an amending by-law under subsection (8) within the time set out in paragraph 1 of that subsection, the notice of proposed amendment is deemed to be withdrawn and the municipality shall cause a notice of withdrawal,

(a) to be served on the owner of the property, on any person who objected under subsection (5) and on the Trust; and

(b) to be published in a newspaper having general circulation in the municipality.

Same

(10) For clarity, the deemed withdrawal of a notice of proposed amendment under subsection (9) does not prevent the council from giving a new notice of proposed amendment in accordance with this section.

Appeal to Tribunal

(11) Any person who objects to the amending by-law may appeal to the Tribunal by giving the Tribunal and the clerk of the municipality, within 30 days after the date of publication under

paragraph 4 of subsection (8), a notice of appeal setting out the objection to the by-law and the reasons in support of the objection, accompanied by the fee charged under the *Local Planning Appeal Tribunal Act, 2017*.

If no notice of appeal

(12) If no notice of appeal is given within the time period specified in subsection (11),

(a) the amending by-law comes into force on the day following the last day of the period; and

(b) the clerk shall ensure that a copy of the amending by-law is registered against the properties affected by the by-law in the appropriate land registry office and that a copy of the registered by-law is served on the Trust.

If notice of appeal

(13) If a notice of appeal is given within the time period specified in subsection (11), the Tribunal shall hold a hearing and, before holding the hearing, shall give notice of the hearing to such persons or bodies and in such manner as the Tribunal may determine.

Forwarding of record of decision

(14) If the council of the municipality made a decision on a notice of objection under subsection (6) and if a notice of appeal is given within the time period specified in subsection (11), the clerk of the municipality shall ensure that the record of the decision under subsection (6) is forwarded to the Tribunal within 15 days after the notice of appeal is given to the clerk of the municipality.

Powers of Tribunal

(15) After holding the hearing, the Tribunal shall,

(a) dismiss the appeal; or

(b) allow the appeal in whole or in part and,

(i) repeal the amending by-law,

(ii) amend the amending by-law in such manner as the Tribunal may determine,

(iii) direct the council of the municipality to repeal the amending by-law, or

(iv) direct the council of the municipality to amend the amending by-law in accordance with the Tribunal's order.

Dismissal without hearing of appeal

(16) Despite the *Statutory Powers Procedure Act* and subsections (13) and (15), the Tribunal may, on its own motion or on the motion of any party, dismiss all or part of the appeal without holding a hearing on the appeal if,

(a) the Tribunal is of the opinion that,

(i) the reasons set out in the notice of appeal do not disclose any apparent ground upon which the Tribunal could allow all or part of the appeal, or

(ii) the appeal is not made in good faith, is frivolous or vexatious, or is made only for the purpose of delay;

(b) the appellant has not provided written reasons in support of the objection to the amending by-law;

(c) the appellant has not paid the fee charged under the *Local Planning Appeal Tribunal Act, 2017*; or

(d) the appellant has not responded to a request by the Tribunal for further information within the time specified by the Tribunal.

Representations

(17) Before dismissing all or part of an appeal on any of the grounds mentioned in subsection (16), the Tribunal shall,

(a) notify the appellant of the proposed dismissal; and

(b) give the appellant an opportunity to make representations with respect to the proposed dismissal.

Coming into force

(18) If one or more notices of appeal are given to the clerk within the time period specified in subsection (11),

(a) the amending by-law comes into force when all of such appeals have been withdrawn or dismissed;

(b) if the amending by-law is amended by the Tribunal under subclause (15) (b) (ii), the amending by-law, as amended by the Tribunal, comes into force on the day it is so amended; or

(c) if the amending by-law is amended by the council pursuant to subclause (15) (b) (iv), the amending by-law, as amended by the council, comes into force on the day it is so amended.

Registration of by-law

(19) The clerk of a municipality shall ensure that a copy of an amending by-law that comes into force under subsection (18) is registered against the properties affected by the by-law in the appropriate land registry office and that a copy of the registered by-law is served on the Trust.

October 9, 2020

Kevin Finnerty, Assistant Deputy Minister
Suite 1800
401 Bay Street
Toronto ON M7A 0A7

Dear Assistant Deputy Minister;

The Kawartha Lakes Municipal Heritage Committee has reviewed the proposed regulations under the Ontario Heritage Act currently posted on the Environmental Registry for comment. The Committee would like to offer the following comments:

- The Committee has concerns regarding the consultation with all interested parties as part of the guiding principles. While the Committee values an open and transparent process including robust consultation, there is concern regarding how the principles reconcile the potential for input that does not respect the heritage value of a property with the requirement to conserve heritage properties
- The Committee is concerned regarding the limited number of exceptions for extending the 90-day period to issue a notice of intention to designate. There are very few exceptions, outside of a state of emergency, to extend that period, which does not seem to take into consideration the timelines and circumstances that may arise as part of the municipal decision making process
- While the Committee is supportive of consistency in heritage by-laws across the province, there is a lack of clarity regarding what it means to provide a brief description of heritage attributes while at the same time explaining why each attribute is important. This does not seem to take into consideration the complex nature of some heritage properties, such as cultural heritage landscapes
- In general, the Committee is concerned regarding the reference of heritage appeals to the LPAT. While the Committee does not have concerns regarding the provision of documents to the Tribunal, it would like to express its concern in general with a body that does not have speciality in heritage matters undertaking appeals of this type.

The Committee is committed to the long-term preservation of our province's cultural heritage and appreciates the opportunity to provide comment on the regulations which will shape how heritage planning in undertaken in municipalities across Ontario.

Respectfully submitted,

Jim Garbutt
Vice Chair, Kawartha Lakes Municipal Heritage Committee
heritage@kawarthalakes.ca

The Corporation of the City of Kawartha Lakes

Council Report

Report Number ENG2020-018

Meeting Date: October 20, 2020

Title: Lindsay-Ops Landfill Electricity Generation System Optimization Study

Description:

Ward Number: All Wards

Author and Title: Lisa Peimann, Executive Assistant, Engineering and Corporate Assets

---

Recommendation(s):

That Report ENG2020-018, **Lindsay-Ops Landfill Electricity Generation System Optimization Study**, be received;

That staff proceed with continued operation of the generator and implement recommendations in the study to optimize the operation where feasible.

Department Head:

Financial/Legal/HR/Other:

Chief Administrative Officer:

Background:

The City of Kawartha Lakes owns the Power Generation, Landfill Gas Collection and Flaring System at the Lindsay-Ops Landfill. The Power Generation facility operates under Renewable Energy Approval Number 8446-9HSGRP. The system is currently operated, maintained and monitored by an external company.

Through the 2019 capital budget process a project was recommended to seek professional services to carry out a study to assess the existing operations and performance of the landfill gas utilization facility, including the recently expanded gas collection system, and provide recommendations for process, operational or other changes to maximize the overall benefit to the City.

A Request for Proposal (RFP) 2019-42-CP Lindsay-Ops Landfill Electricity Generation System Optimization Study was released and advertised in accordance with the Purchasing Policy.

The RFP closed on Thursday June 20, 2019 and staff recommended that The Greer Galloway Group Inc. be selected for the award.

A final report has been submitted by The Greer Galloway Group Inc. with optimization recommendations as requested.

Rationale:

The project scope and methodology was subdivided into the following tasks:

- Review existing hydro contracts
- Review existing operations and manuals
- Downtime reduction review
- Review hydro use
- System operating value
- Financial assessment review
- Similarity assessment
- Landfill gas characteristics
- Optimization goals
- Summary report

Attached as Appendix A is the summary report completed by Greer Galloway.

The analysis covered multiple possibilities for optimizing the operation and value of the landfill gas generation facility. Aspects reviewed included the Hydro One contract, the service call strategy, downtime events, energy use and efficiency, and the landfill gas collection wellfield. Some of the recommendations to optimize operations include:

- Conversion of the billing and generation contracts with Hydro One to Distributed Generation classification could potentially produce cost savings. These changes would need to be negotiated between the City and Hydro One.
- Training landfill staff to perform restarts on weekends, to reduce downtimes. There are times the generator stops running, the current policy prohibits service calls outside of regular operating hours to limit costs. In some cases, the generator requires a straightforward restart that could be accomplished by appropriately trained staff with limited teleconference support from the contractor. This has an immediate effect of returning the generator to activity and increasing the amount of generated electricity.
- Implementing recommendations that were made by Wintek Engineering to reduce the amount of times the generator is shut down.
- Expansion of the wellfield (gas collection) system. Greer Galloway's updated modelling of methane generation potential suggests that the current methane generation rates on the old landfill area may be higher than originally modelled and that the methane collection efficiency in the old landfill area is lower than previously assumed. The construction of additional vertical collector wells within the old landfill area is predicated to improve the overall quantity and quality of the landfill gas delivered to the generator. The approximate cost for this would be $30,000.

Staff have already started working on these recommendations, the following have been completed/are underway:

- The landfill crew leader has been trained by Comcor on how to restart the generator in order to reduce downtimes.
- Staff are awaiting a review from Hydro One to look into the possibility of migrating to a distributed generation classification to reduce costs.
  Staff are in conversations with Comcor to prioritize and implement recommendations by Wintek.

Overall, Greer Galloway "believe that the recommended measures will offer a substantial improvement to the financial performance of the system and justifies continued operation of the Lindsay-Ops Gas Generator".

Other Alternatives Considered:

An alternative is status quo without implementing the recommendations however potential revenue from operational improvements would not be realized.

The other alternative would be to decommission the generator. This would not be recommended because the generator provides value to the City in a number of ways as follows:

- Offsetting Hydro electrical expenses to the Wastewater Treatment Facility and Landfill otherwise paid through delivery of electricity from the grid.
- The generator minimizes greenhouses gas emissions to the atmosphere and promotes renewable energy within the City which supports the Healthy Environment Plan.
- It would be premature to consider decommissioning the generator at this point in time as the landfill has yet to reach maximum gas generation and therefore revenue.
- The generator provides redundancy for managing landfill gas. For instance, if the flare is not operating the generator provides added assurance that landfill gases will be managed as per legislation.

Therefore, having considered the alternatives it is our recommendation to continue use of the generator with consideration of the methods to optimize its operation as per the study.

Financial/Operation Impacts:

The economic analysis of the facility examined the assumptions made during the original business case. At the time, the generation potential of the landfill gas was estimated using the best available models. Using actual production numbers has allowed a more accurate evaluation of the generation potential and of Net Present Value.

The study indicates that the operation of the generator can be optimized with changes to the operating practices, contract agreements and wellfield. When taken in aggregate, the identified changes are predicted to increase Net Present Value from negative $722,388 to over $1,200,000 – a net increase of about $2 million. The simulations demonstrate the value of city staff training and strategic well-field expansion and suggest that these improvements will have a synergistic effect when taken together.

Relationship of Recommendation(s) To The 2020-2023 Strategic Plan:

The recommendations set out in this report would conserve City resources for actions that would support any of the four priorities in the Strategic Plan, being:

- A Vibrant and Growing Economy
- An Exceptional Quality of Life
- A Healthy Environment
- Good Government

Review of Accessibility Implications of Any Development or Policy:

N/A

Servicing Implications:

N/A

Consultations:

Manager, Environmental Services
Supervisor, Water and Wastewater Operations
Waste Technician 2

Attachments:

Appendix A – Greer Galloway – Lindsay Ops Landfill Electricity Generation System Optimization Study

Kawartha Lakes Biogas Report - Fina

Department Head E-Mail: jrojas@kawarthalakes.ca

Department Head: Juan Rojas, Director of Engineering and Corporate Assets

Department File:

GREER GALLOWAY
CONSULTING ENGINEERS

Lindsay-Ops Landfill Electricity Generation System Optimization Study

Prepared for:
The City of Kawartha Lakes
26 Francis Street
Lindsay, Ontario
K9V 5R6

Submitted by:

The Greer Galloway Group Inc.
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Project: 19-3-6414

June 2020

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Executive Summary

The City of Kawartha Lakes contracted The Greer Galloway Group to evaluate the performance of the electricity generation system at the Lindsay-Ops Landfill. The generator uses methane produced from the decomposition of landfilled waste to produce up to 0.335 MW of electricity which is primarily used in the operation of the City of Kawartha Lakes Wastewater Treatment Plant. Since being brought on-line in late 2015, there have been periods where generator has produced less than the expected quantity of electricity and the WWTP has received most of its power from the Hydro One grid. The objective of the study is to assess the existing operations and performance of the landfill gas generation facility, including the recently expanded gas collection system, and to provide recommendations for process, operational or other changes to maximize the overall benefit to the City.

The City of Kawartha Lakes has a Healthy Environment Plan that dovetails with the objectives of the generator – to increase capture of landfill emissions and put them to work offsetting other power sources. At the projected output without changes to the wellfield, 1,309 tonnes of carbon per year are offset from other generation sources by the operation of the generator. The size of the landfill requires that greenhouse gases be captured and may not be released to atmosphere. In the absence of alternatives, such as electricity generation, it must be flared. It is important to note that if modifications are not made and the generator is taken off-line, the on-going costs associated with mandatory operation of the flare system and well-field are approximately $43,612 annually, and this cost must be taken into account when assessing the net benefit of the generating facility to the City.

Our analysis covered multiple possibilities for optimizing the operation and value of the landfill gas generation facility. Aspects reviewed included the Hydro One contract, the service call strategy, downtime events, energy use and efficiency, and the landfill gas collection wellfield. Key findings include:

- Conversion of the billing and generation contracts to Distributed Generation classification or net metering could potentially produce cost savings. These changes would need to be negotiated between the City and Hydro One.
- There are multiple event types that will result in service calls including trips owing to low gas quantity/quality or trips tied to the power factor at the WWTP. The current policy prohibits service calls outside regular operating hours. Some generator trip events require a straightforward restart that could be accomplished by appropriately trained staff with limited teleconference support from the contractor. This has an immediate effect of returning the generator to activity and increasing the amount of generated electricity.
- Other sources of downtime include expected equipment aging, maintenance, and poor fuel quality. With trained staff, well management and wellfield maintenance, and spare parts review, the possible generation time may be increased to roughly 7,557 hours each year. This is nearly double the generation potential for 2018-19.
- Our updated modelling of methane generation potential suggests that the current methane generation rates in the old landfill area may be higher than originally modelled and that the methane collection efficiency in the old landfill area is lower than previously assumed. The construction of additional vertical collector wells within the old landfill area is predicted to improve the overall quantity and quality of the landfill gas delivered to the generator.

The economic analysis of the facility examined the assumptions made during the original business case. At the time, the generation potential of the landfill gas was estimated using the best available models. Using actual production numbers has allowed a more accurate evaluation of the generation potential and of Net Present Value.

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Our study indicates that the operation of the generator can be optimized with changes to operating practices, contract agreements, and wellfield. When taken in aggregate, the identified changes are predicted to increase Net Present Value from negative $722,388 to over $1,200,000 – a net increase of about $2 million. The simulations demonstrate the value of city staff training, and strategic well-field expansion and suggest that these improvements will have a synergistic effect when taken together.

Yours truly,

GREER GALLOWAY

CONSULTING ENGINEERS

Peter Zandbergen, P.Eng.

Consulting Engineers of Ontario
Professional Engineers Ontario

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Appendix A – LandGEM 3.02 Model Outputs
Appendix B – Wintek Report

1. Introduction

The City of Kawartha Lakes owns a generator at the Lindsay Ops Landfill site. The generator was commissioned in October 2015 and is primarily tasked with electricity generator for the adjacent Water Pollution Control Plant (WPCP). The original gas supply wells were supplemented by additional well to brought on-line in spring 2019.

The Greer Galloway Group has been retained by the City of Kawartha Lakes to complete an optimization study of the Lindsay-Ops Landfill Gas Power Generation Facility at 51 Wilson Road in Lindsay. The objective of the study is to assess the existing operations and performance of the landfill gas utilization facility, including the recently expanded gas collection system, and provide recommendations for process, operational or other changes to maximize the overall benefit to the City.

1.1 Project Scope and Methodology

The project is subdivided by the individual tasks to be performed.

Review existing hydro contracts

The Greer Galloway team will review the contracts the City has signed with Hydro One. Each of these contracts will be examined for opportunities to renegotiate rates or terms that will improve the energy cost offset at the WPCP or the revenue from selling energy to the grid. This will be achieved through review of agreements between Hydro One and other landfill gas generator operators.

Review existing operations and manuals

The current operations manuals will be reviewed by the Greer Galloway team to identify the processes used by the generator operators to manage the power generation. Opportunities to increase production of electricity from the harvested gas or to increase revenue by adjustment of supply timings will be highlighted.

Downtime reduction review

The statistics on downtime will be reviewed with the operators and the equipment manufacturers. This will identify operating conditions that may be adjusted to reduce downtime either from equipment maintenance operations or gas supply deficiencies. These statistics will rely on the initial months of data after the new wells are brought on-line in spring 2019. The conditions leading to downtime and the effects on the equipment and fuel supply will be examined to determine if opportunities exist to smooth the production and utilization of the energy to maximize the financial return.

Review hydro use

The records of use of electricity at both the WPCP and landfill facilities will be examined by the Greer Galloway team. Understanding when and how the electricity generated by the landfill gas is being used will provide insight to the opportunities to maximize the benefit of the generator system. Identifying peak use times and inefficient use of electricity will lead to recommendations on improving the use of generated power.

System operating value

The City may be able to take advantage of new policies and changes to existing frameworks at the provincial and federal levels with respect to green energy production and carbon offsets. The new programs will be investigated by the Greer Galloway team to identify those matching with the Lindsay Ops generator. For those programs, Greer Galloway will assist in funding applications to maximize the benefit to the City.

Financial assessment review

The team at Greer Galloway will review the assessments completed previously that were used to approve and justify continued operation of the landfill gas generation system. These assessments and

explanations will be adjusted and evaluated to reflect the current state of operations at the facility and provide accurate information to the City on the continued viability of the generator project.

Similarity assessment

Other municipal operators of landfill gas generators will be contacted by Greer Galloway to compare how their experience in operation of the equipment matches with that of the City of Kawartha Lakes. Understanding how other similar operators have maximized their production through efficient operations will provide additional recommendations to the City on improvements to their procedures and practices.

Landfill gas characteristics

To ensure the best possible use of the landfill gas, the characteristics of the landfill gas will be reviewed from the data supplied by the on-site equipment. Once the composition of representative samples is defined, recommendations will be made if additional equipment is required to refine the collected gases for optimal energy production. The variability of collected gas volume will be charted based on records. The variability and the previous assessments of downtime and hydro use will all be factored into a simulation to optimize the generation potential and maximize the revenue stream.

Optimization goals

When evaluating the options for the optimal use of the landfill gas consultations with the stakeholders will determine which criteria have the greatest weight. The Greer Galloway Group will consult with members of the City departments involved in the collection, generation, and use of the gas and its products to maximize the overall benefit factoring in the programs and policies of different levels of government. The optimization will take the form of Monte Carlo simulations using the distribution values uncovered by earlier research into the system aspects.

Summary Report

All the tasks will be summarized in a final report to stakeholders that will answer the underlying questions of continued viability of the generator facility and optimal use of the landfill gas. Process Model Optimization

1.2 Study Team

Peter Zandbergen, P.Eng. — Mechanical Engineer

Mr. Peter Zandbergen will be the Project Manager for this project. Mr. Zandbergen is a mechanical engineer for the Greer Galloway Group, with over ten (10) years of experience in project management and mechanical design. Mr. Zandbergen has completed building assessments for updating long-term capital planning; analysis of building systems coupled with construction cost data and financial trends to plan for future funding of building repairs and improvements. Mr. Zandbergen will utilize and coordinate the technical expertise and resources of the project team throughout the project to ensure all work is completed as scheduled and within budget. Mr. Zandbergen has strong communication and organization skills and works to ensure clients are satisfied, deadlines are met, and quality control is maintained. Mr. Zandbergen will report directly to the City and be responsible to ensure all project deliverables for this assignment are to the City's satisfaction.

For this project Mr. Zandbergen will take the mechanical lead in reviewing and making recommendations on operations and manuals, downtime, and gas utilization options. He will also be the lead author on the summary report with recommendations on the continued operation of the landfill gas generator.

Steve Blakey, P.Eng. — Director / Branch Manager

Mr. Steve Blakey has thirty-two (32) years of experience in consulting engineering; the past thirty (30) years in Canada as a municipal specialist. Mr. Blakey specializes in design engineering and project management.

Mr. Blakey has a Master of Science in Public Health and a Civil Engineering Degree; he is registered with the PEO as a P. Eng. and is Designated as a Consulting Engineer. Mr. Blakey is the Belleville Branch Manager and is responsible for the provision of professional services provided by Greer Galloway staff, including various municipal infrastructure works, water and wastewater planning and design, stormwater management, and solid waste management.

Mr. Blakey will ensure staff and resources are committed to the project, regularly reviewing the project with staff ensuring the Municipality receives a high level of service. Mr. Blakey will also assist the Project Manager with status reports and budget tracking.

Steve Lane, P.Eng. — Electrical Engineer

Mr. Steve Lane has over twenty (20) years of experience as an electrical engineer with expertise in building services design, backup power solutions, and municipal water/wastewater station design. With respect to building services, Mr. Lane has experience in electrical power distribution, interior/exterior lighting, emergency lighting and signage, and backup generators. Mr. Lane has broad knowledge of the electrical aspects of the Ontario Building Code (OBC), as well as the Ontario Electrical Safety Code (OESC) as they pertain to building design.

Mr. Lane will have the lead on the review and recommendation for energy use as produced by the landfill gas generation. He will also contribute to the review of Hydro One contracts to identify opportunities for improvements.

Dr. Charles Mitz, P.Geo. – Geologist

Dr. Charles Mitz is a Senior Hydrogeologist with a broad background in geoscience including characterization, monitoring and permitting of waste disposal sites throughout Ontario and in the management of multiple high-profile and multidisciplinary projects. Specific project experience includes the assessment of landfill gas generation and migration and in the design of a landfill gas collection system. He also brings an extensive background in the resource economics including mineral resource valuation.

Dr. Mitz is a licensed Professional Geoscientist who holds a Bachelor's Degree in Geological Science from Queen's University, a Master’s Degree in Civil Engineering from the University of Western Ontario, and a Doctorate in Medical Physics and Applied Radiation Sciences from McMaster University. He is also a licensed well technician under O.Reg. 903.

For this project his focus will be on generating a model of the landfill gas characteristics based on gas analysis records and deriving the process model for optimizing the operation of the landfill gas generator.

Shannon O'Rourke, B.Sc. — Mechanical Designer

Ms. Shannon O'Rourke is a mechanical engineering graduate of Queen's University with ten years of experience in manufacturing, process control, project management and quality system compliance. Since joining Greer Galloway, Ms. O'Rourke has been involved in Municipal Class Environmental Assessments for both water and wastewater projects including preparation of project file documentation and environmental study reports to comply with MCEA requirements. She has developed specific expertise in the creation of drinking water network models to evaluate the design and operation of existing water storage and distribution systems, and support infrastructure planning for future development. She has also completed numerous traffic and intersection studies to assess the potential impact of traffic generated by proposed commercial and residential subdivision developments as part of the development planning and approval processes.

For this project, Ms. O'Rourke will take the lead for the benchmark analysis including Hydro contract review and recommendations.

1.3 Acknowledgements

The Greer Galloway Group would like to acknowledge the following individuals for their contributions of time, expertise, and data to the successful completion of this project:

- Nikki Payne, Waste Technician II Waste Management, City of Kawartha Lakes,
- Lisa Peimann, Executive Assistant Engineering and Corporate Assets, City of Kawartha Lakes; and
- Matthew Dugan, M.A.Sc., P.Eng., Manager – Project Development and Southern Ontario Operations, Comcor Environmental Limited.

2. Existing System

The Facility is located entirely on the City-owned Lindsay – Ops Landfill Site and Water Pollution Control Plant. The property is legally described as part of Lots 25, 26 and 27, Concession 6, City of Kawartha Lakes, and the civic address is 51 Wilson Road, Lindsay. The total area of the property is approximately 92 hectares. The landfill site and WPCP are zoned as Rural. Land use surrounding the Facility within a 1,000 metre radius includes Prime Agricultural, Environmental Protection, and Industrial.

2.1 Waste Acceptance Rates

Waste acceptance rates are summarized on the following table:

Table 1 - Waste Acceptance Rates

Old landfill Area		North Expansion Area	
Year	**Waste Received (tonnes)**	**Year**	**Waste Received (tonnes)**
1980	12,159	2002	31,140
1981	18,999	2003	16,714
1982	19,359	2004	16,163
1983	19,251	2005	17,787
1984	19,449	2006	23,965
1985	21,510	2007	18,035
1986	28,530	2008	19,200[1]
1987	33,319	2009	19,200[1]
1988	38,909	2010	19,200[1]
1989	41,806	2011	19,200[1]
1990	35,075	2012	31,824
1991	20,489	2013	28,791
1992	15,665	2014	26,030
1993	17,164	2015	29,152
1994	12,220	2016	27,736
1995	14,201	2017	25,167
1996	13,334	2018	27,205[2]
1997	15,532		
1998	15,892		
1999	16,226		
2000	19,242		
2001	20,479		

1- Estimate of organic-containing wastes (Golder, 2008)
2- Data obtained from Golder, 2008 and Golder, 2019

Golder assumed that about 64% of the total waste received at the site would contain enough organics to be potentially methane generating. This is a reasonable assumption and consistent with limited information from recent waste audits carried out by the City of Kawartha Lakes.

2.2 Wellfield and Collection System

A combination of vertical wells and horizontal collectors extract landfill gas from the waste disposal areas and convey the captured gas to the generator using a network of buried high-density polyethylene (HDPE) piping. The collection system is sloped towards drainage locations for the collection of condensate removed from the landfill gas. The collection system is designed to be progressively expanded as filling operations continue at the Site. The existing collection system consists of approximately 35 vertical extraction wells located within the old landfill area and a further 12 wells in the north expansion area (five of which were constructed early in 2019). The system was intended to

collect on the order of 425 m3/hr (250 cfm) of landfill gas however actual gas collection has been lower. Monitoring data exists for 23 locations (12 in the north expansion area and 11 within the old landfill area). The main collection wells are briefly described below:

GW1-H - GW1-H is located within the northwest corner of the north expansion area (Cell 1). This well is currently valved off due to oxygen breakthrough, but it has yielded LFG with a methane content typically ranging from about 25% to 60% when the well was actively producing. When producing, the well has a measured vacuum of between 25 and 40 inches of H_2O. The well has potential to be re-connected to the collection system at low rate of extraction (i.e. a low vacuum at the wellhead).

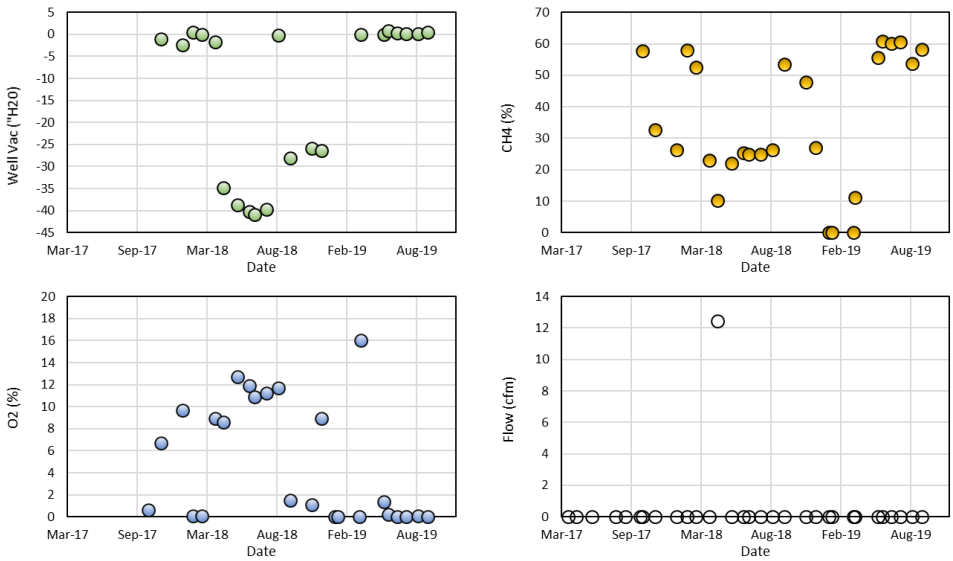

Figure 1 - Summarized Monitoring Results for GW1-H

GW2-H - GW2-H is located within the north central portion of the north expansion area (Cell 1). This well is currently producing at a rate of approximately 7.9 cfm with a methane content of about 37% and a measured vacuum of between 33 and 40 inches of H_2O. Oxygen levels are low and stable. In September 2019 this extraction well contributed 6.1% of total methane delivered to the generator.

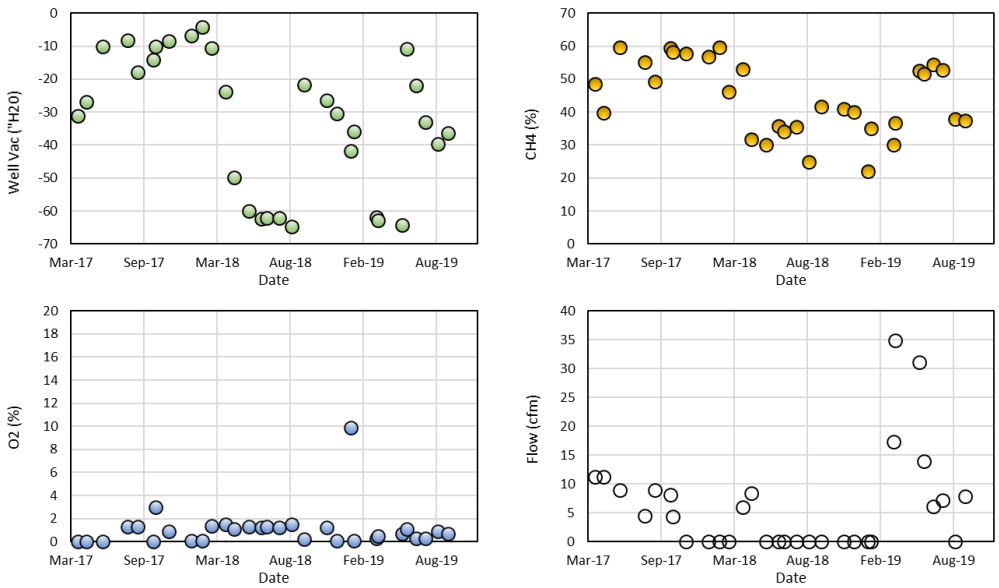

Figure 2 - Summarized Monitoring Results for GW2-H

GW3-H - GW3-H is located within the northeast corner of the north expansion area (Cell 1). This well is currently producing at a rate of approximately 6.7 cfm with a methane content of about 27% and a measured vacuum of between 33 and 40 inches of H_2O. Oxygen levels are low and stable but the methane content in this well has been declining. In September 2019 this extraction well contributed 3.8% of total methane.

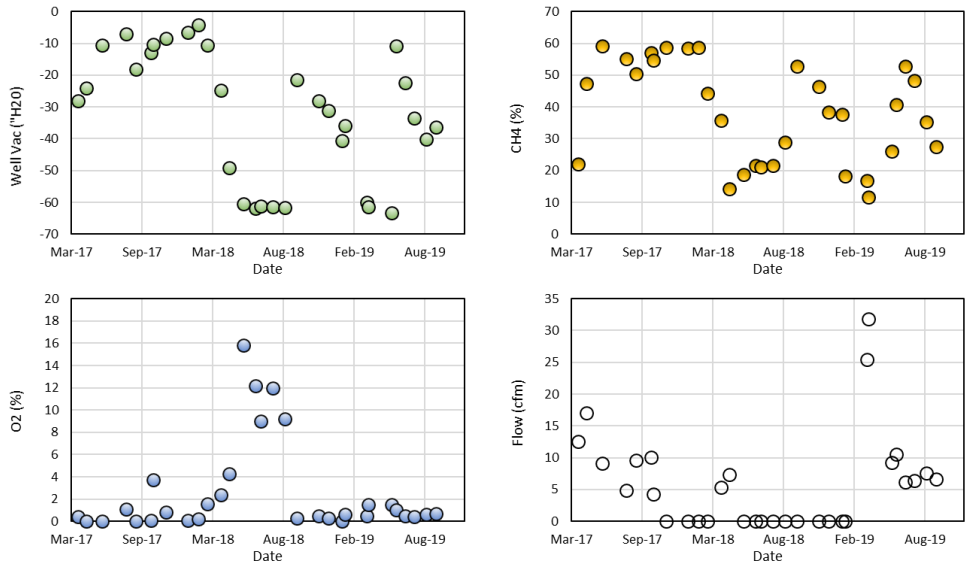

Figure 3 - Summarized Monitoring Results for GW3-H

GW4-H – This well is located within the northwest corner of the north expansion area, between Cells 1 and 2. This well is currently producing at a rate of approximately 8.2 cfm with a methane content of about 48% and a measured vacuum of between 33 and 39 inches of H_2O. Oxygen levels are low and stable. Methane content is stable. In September 2019, this extraction well contributed 8.1% of total methane delivered to the generator.

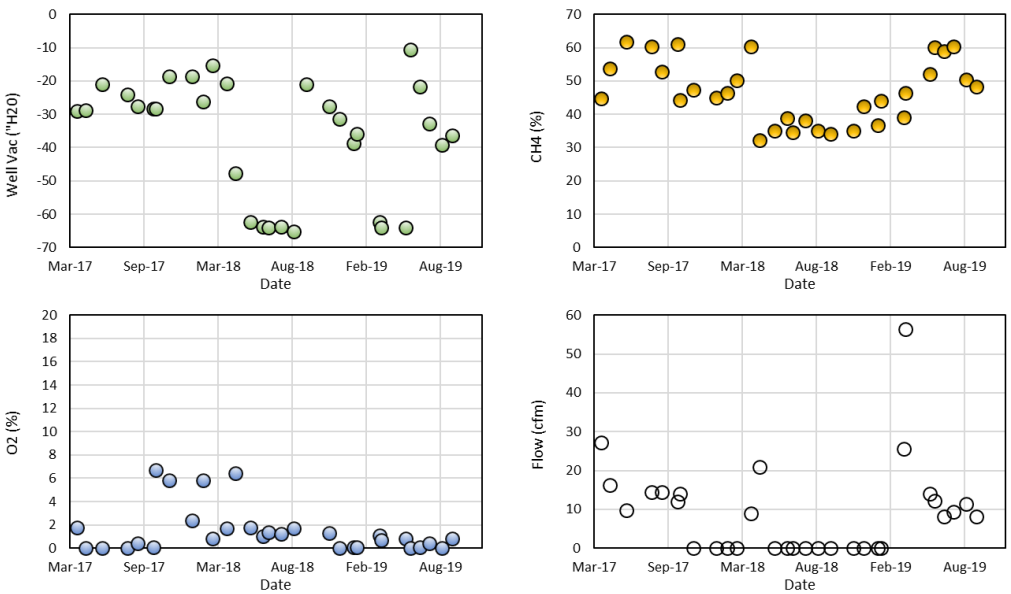

Figure 4 - Summarized Monitoring Results for GW4-H

GW5-H: GW5-H is located within the north central portion of the north expansion area (between Cells 1 and 2). This well is currently producing at a rate of approximately 8.1 cfm with a methane content of about 56% and a measured vacuum of between 22 and 39 inches of H_2O. Oxygen levels are low and stable. This extraction well has produced intermittently due to flooding in this area. In September 2019, GW5-H contributed 9.3% of total methane delivered to the generator.

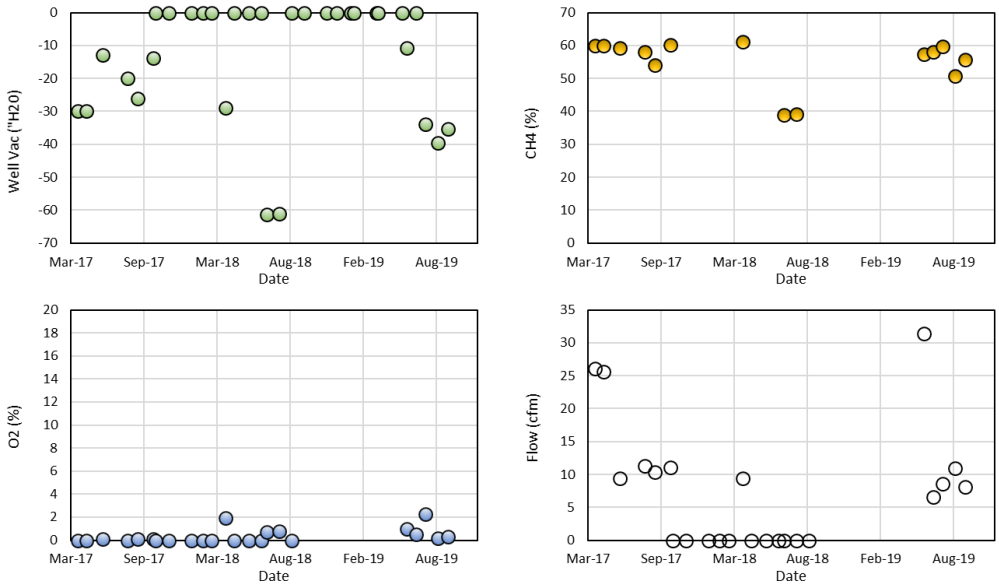

Figure 5 - Summarized Monitoring Results for GW5-H

GW6-H: is located within the northeast portion of the north expansion area (between Cells 1 and 2). This well is currently producing at a rate of approximately 7.1 cfm with a methane content of about 37% and a measured vacuum of between 23 and 40 inches of H_2O. Oxygen levels are low and stable. In September 2019, GW6-H contributed 5.7% of total methane delivered to the generator.

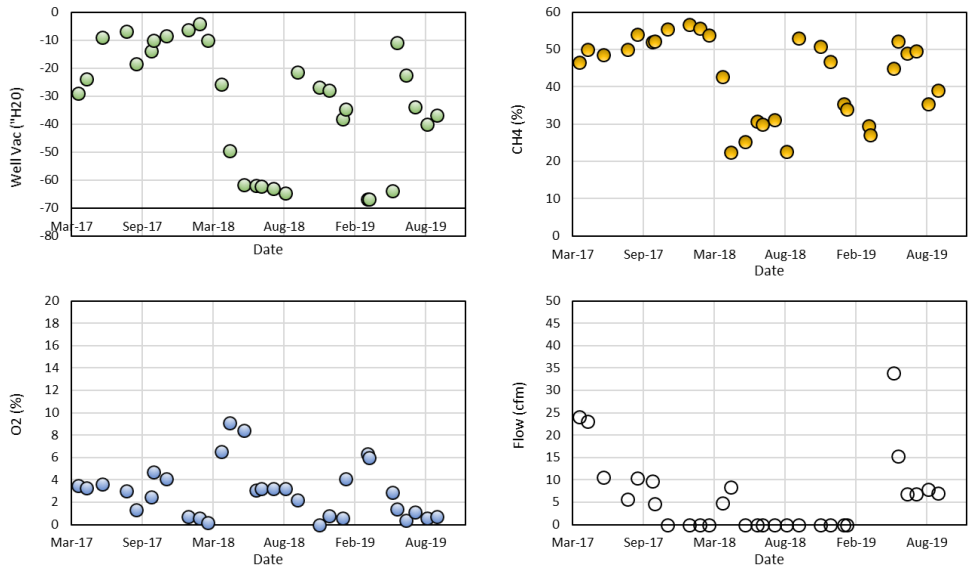

Figure 6 – Summarized Monitoring Results for GW6-H

GW7-H: is in the north expansion area (in the northeast corner of Cell 6). This well is currently producing at a rate of approximately 7.7 cfm with a methane content of about 54% and a measured vacuum of between 23 and 43 inches of H_2O. Oxygen levels are low and stable. The methane content is stable. In September 2019, GW7-H contributed 8.5% of total methane delivered to the generator.

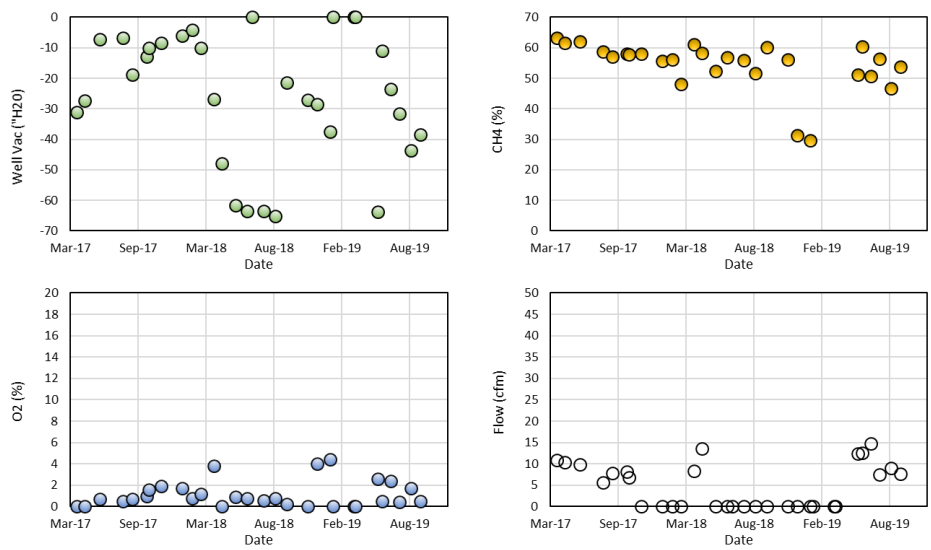

Figure 7 - Summarized Monitoring Results for GW7-H

GW8-1: is a new well (constructed in April, 2019) located in the eastern part of Cell 6 in the north expansion area. This well is currently producing at a rate of approximately 13.1 cfm with a methane content of about 41% and a measured vacuum of between 23 and 43 inches of H_2O. Oxygen levels are low and stable. The methane content is stable. In September 2019, GW8-1 contributed 11.2% of total methane delivered to the generator.

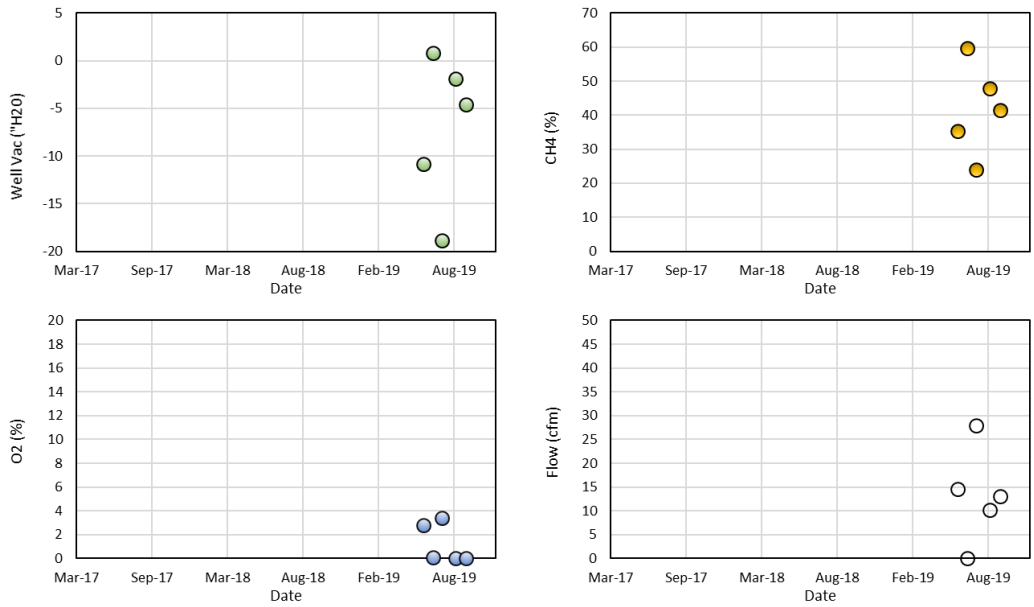

Figure 8 - Summarized Monitoring Results for GW8-1

GW9-1: is a new well (constructed in April, 2019) located in the north central part of Cell 6 in the north expansion area. This well is currently producing at a rate of approximately 20 cfm with a methane content of about 33% and a measured vacuum of between 24 and 39 inches of H_2O. Oxygen levels are low and stable. The methane content is stable but low. In September 2019, GW9-1 contributed 13.7% of total methane delivered to the generator.

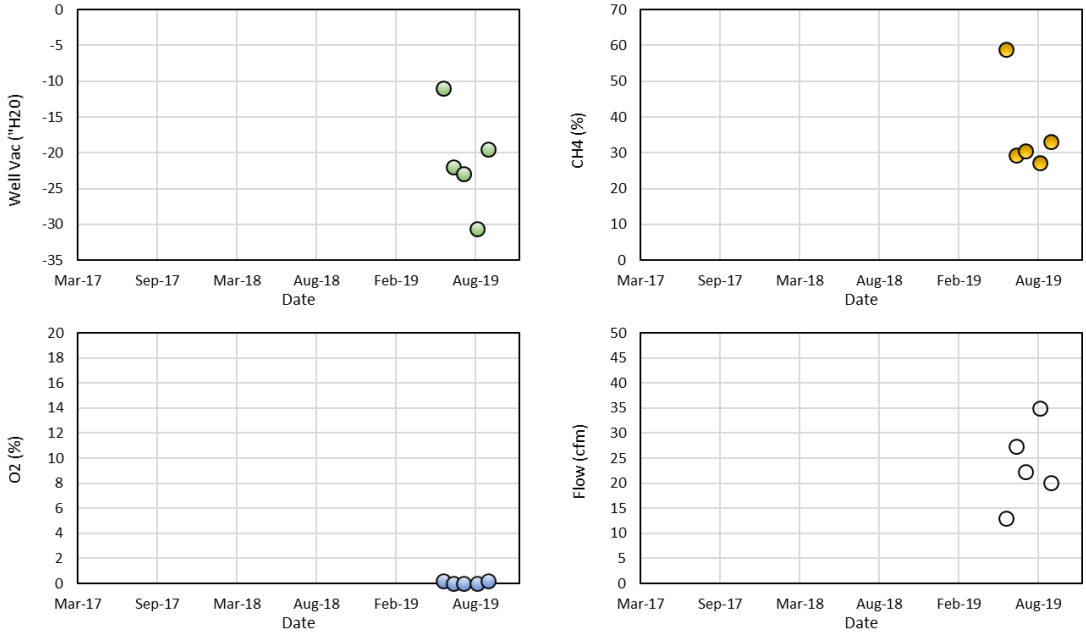

Figure 9 - Summarized Monitoring Results for GW9-1

GW11-1 is a new well (constructed in April, 2019) located in the western part of Cell 6 in the north expansion area. This well is currently valved off due to oxygen breakthrough, but it has yielded LFG

with a methane content typically ranging from about 29% to 43% at a low vacuum when the well was actively producing.

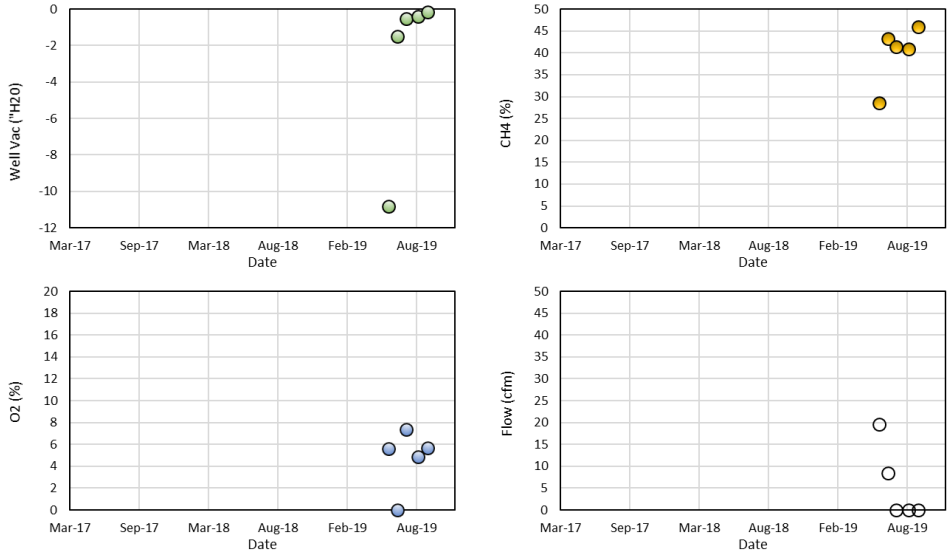

Figure 10 - Summarized Monitoring Results for GW11-1

GW12-1: is a new well (constructed in April, 2019) located in the east part of Cell 3 in the north expansion area. This well is currently valved off due to oxygen breakthrough, but it has yielded LFG with a methane content typically ranging from about 7% to 26% when the well was actively producing. Methane levels have increased since the well was shut in and this well is a candidate for reconnection to the collection system once this area of the landfill is capped.

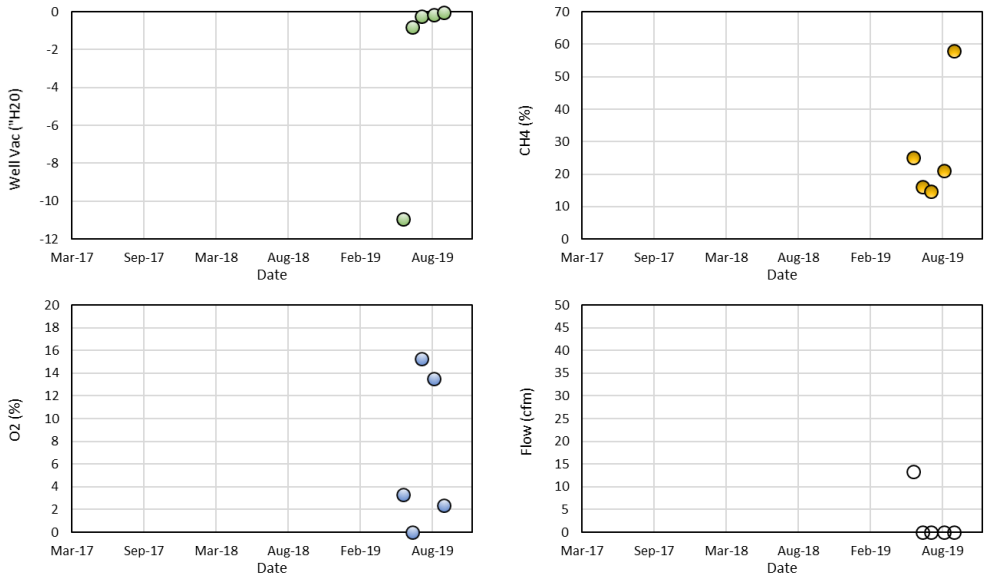

Figure 11 - Summarized Monitoring Results for GW12-1

GW13-1: is a new well (constructed in April, 2019) located in the western part of Cell 3 in the north expansion area. This well is currently valved off due to oxygen breakthrough, but it has yielded LFG with a methane content typically ranging from about 28% to 37% when the well was actively producing.

As with GW12-1, methane levels have increased since the well was shut in and this well is a candidate for reconnection to the collection system once this area of the landfill is capped.

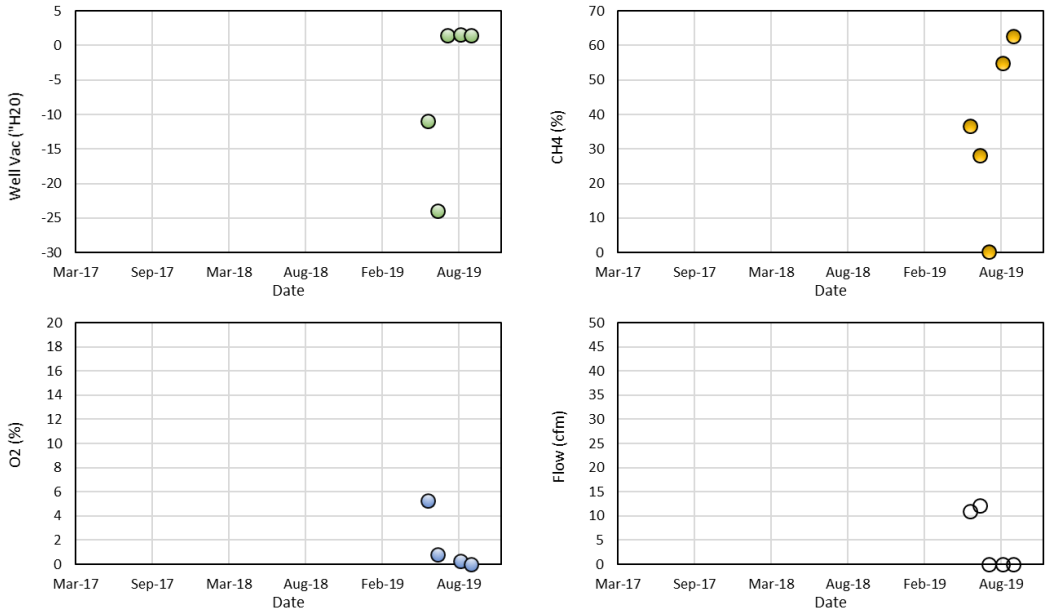

Figure 12 - Summarized Monitoring Results for GW13-1

GV25: is located in the southwest corner of the old landfill area. This collection point is currently producing intermittently at a low flow rate and a variable methane content ranging from 23 to 54%. Oxygen levels are high and variable. In September 2019, this collection point contributed a negligible amount of total methane delivered to the generator.

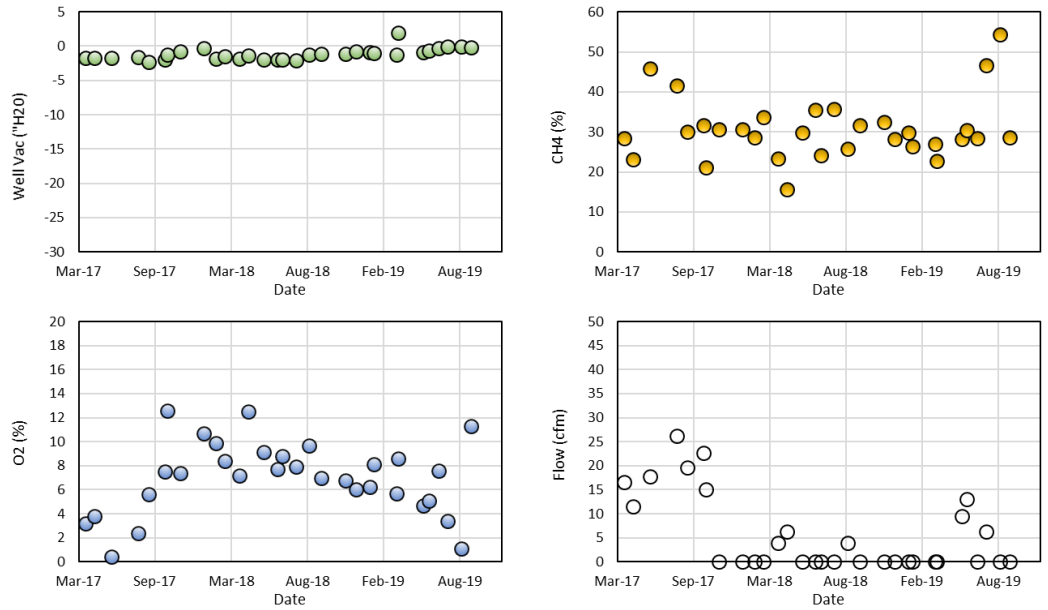

Figure 13 - Summarized Monitoring Results for GV-25

GV27: is located in the south central part of the old landfill area, near the base of the slope. This collection point is currently producing at approximately 9.5 cfm with a methane content of 49%. Oxygen levels are high and variable. In September 2019, this collection point contributed 9.5% of total methane delivered to the generator.

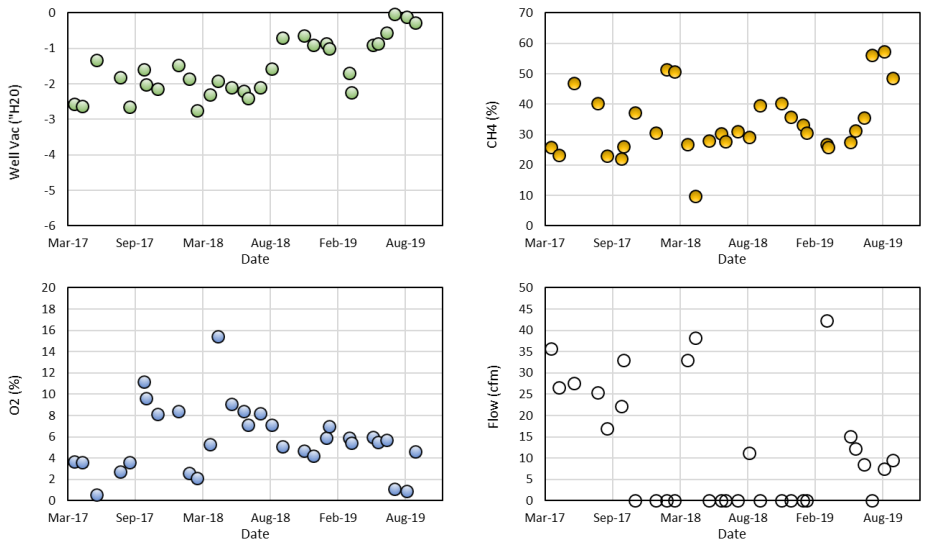

Figure 14 - Summarized Monitoring Results for GV27

GV29: is located in the southeast part of the old landfill area, near the base of the slope. This collection point is currently producing at approximately 12.5 cfm with a methane content of 48%. Oxygen levels are high and variable. In September 2019, this collection point contributed 12.3% of total methane delivered to the generator. As with GV27, the presence of elevated oxygen levels at this point combined with stable and high methane suggests leakage through the geomembrane into the shallow vent network.

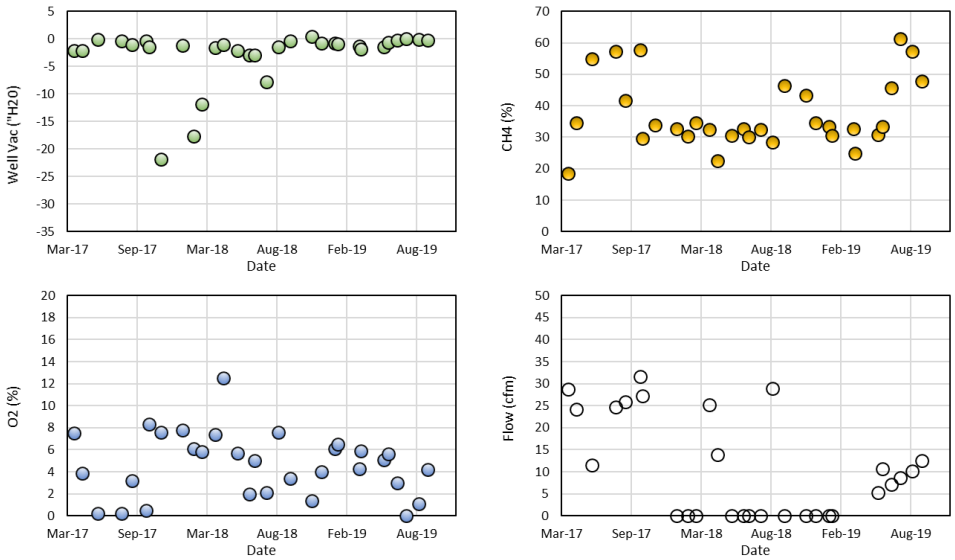

Figure 15 - Summarized Monitoring Results for GV29

GWT-1: is located within the north central portion of the old landfill area immediately to the north of the area capped with the geomembrane in 2007. This well is currently not producing but has produced at

a rate of between 3 and 21 cfm at a methane content between 32 and 53% during the early part of 2019. Oxygen levels are high and erratic. In September 2019, GWT-1 contributed a negligible amount of total methane delivered to the generator.

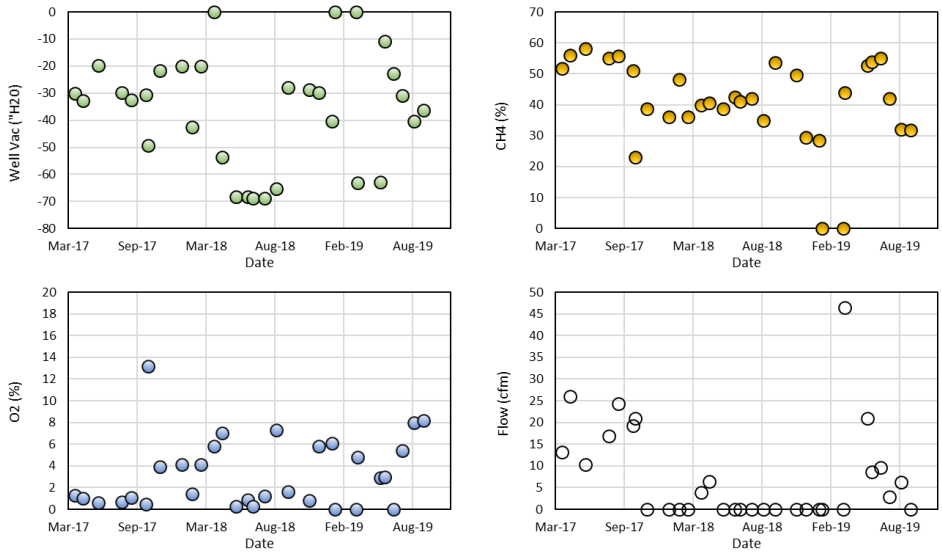

Figure 16 - Summarized Monitoring Results for GWT-1

GWT-2: is located within the northwest portion of the old landfill area immediately to the north of the area capped with the geomembrane in 2007. This well is currently producing at 7.4 cfm and a methane content of 59%. Oxygen levels are low and stable. In September 2019, GWT-2 contributed 9% of total methane delivered to the generator.

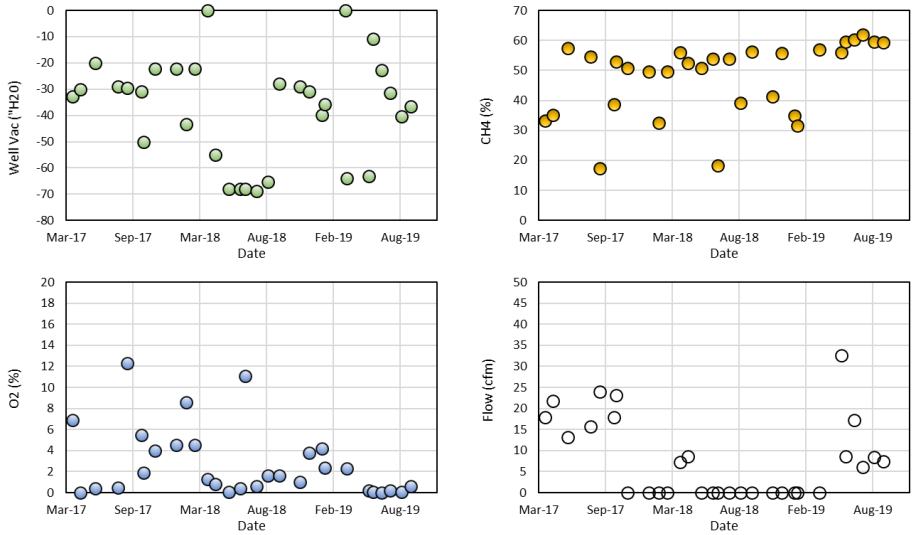

Figure 17 - Summarized Monitoring Results for GWT-2

A summary of all existing wells is provided on Table 2 below.

Table 2 - Existing Well Summary

Plant	Location	CH_4(%)	Trend	O_2(%)	Trend	% of total	Comment
GW1-H	New	…	…	…	…	…	Valve closed due to oxygen breakthrough
GW2-H	New	37.4	declining	0.7	stable	6.1	
GW3-H	New	27.4	declining	0.7	stable	3.8	
GW4-H	New	48.2	stable	0.8	stable	8.1	
GW5-H	New	55.6	stable	0.3	stable	9.3	
GW6-H	New	39.1	Stable	0.7	stable	5.7	
GW7-H	New	53.9	stable	0.5	stable	8.5	
GW8-1	New	41.5	stable	0.0	stable	11.2	New in 2019
GW9-1	New	33.1	declining	0.2	stable	13.7	New in 2019
GW11-1	New	…	…	…	…	…	New in 2019 Valve closed due to oxygen breakthrough
GW12-1	New	…	…	…	…	…	New in 2019 Valve closed due to oxygen breakthrough
GW13-H	New	…	…	…	…	…	New in 2019 Valve closed due to oxygen breakthrough
GV4	Old	…	…	…	…	…	Valve closed due to oxygen breakthrough
GV9	Old	…	…	…	…	…	Valve closed due to oxygen breakthrough
GV17	Old	…	…	…	…	…	Valve closed due to oxygen breakthrough
GV25	Old	…	…	…	…	…	Valve closed due to oxygen breakthrough
GV26	Old	…	…	…	…	…	Valve closed due to oxygen breakthrough
GV27	Old	48.6	stable to increasing	4.6	stable	9.5	Valve closed due to oxygen breakthrough
GV28	Old	…	…	…	…	…	Valve closed due to oxygen breakthrough
GV29	Old	47.9	stable	4.2	stable	12.3	Valve closed due to oxygen breakthrough
GV30	Old	…	…	…	…	…	Valve closed due to oxygen breakthrough
GWT1	Old	31.9	declining	8.2	increasing	2.6	
GWT2	Old	59.3	stable	0.6	stable	9.0	

Contributions to the useable gas are primarily from 12 wells; 8 in the north expansion area and 4 within the old landfill area. The remaining wells are either unavailable for monitoring or have been valved off due to poor gas quality (usually because of oxygen breakthrough). In September 2019, 66% of the methane was collected from wells within the north expansion area and 33% from the old landfill area. In May, 2019 (before the recently constructed wells in the north expansion area were brought online) the old landfill area contributed an even greater proportion (44%) of the total methane collected.

2.3 Methane Generation Potential

LFG is generated from the anaerobic decay of the organic components of waste. The amount of methane and the rate at which it is generated is therefore a function of the degradable organic content of the landfilled waste, along with factors such as temperature, moisture, and time. Landfill gas contains roughly equal parts of carbon dioxide (CO_2) and methane (CH_4) along with trace levels of other parameters including siloxanes.

An initial estimate of methane generation potential was prepared by Integrated Gas Recovery Services (IGRS) in 2003. It is our understanding that this report concluded that the Lindsay Operations landfill was too small and too shallow to allow for economic electricity generation at the site. This assumption was revisited by Golder Associates Ltd. In 2008 following the capping of most of the old landfill area with a geomembrane cover. This impermeable capping allowed for potentially higher collection efficiencies over the old landfill area and warranted a re-examination of the economic feasibility of LFG utilization for electricity generation.

Golder's assessment used the United States Environmental Protection Agency's (USEPA's) LandGEM model (USEPA. 2005a) to model methane and LFG generation. The LandGEM model uses a simple first-order equation, which assumes that methane generation follows an exponential trend. to model methane generation. and requires the following input parameters:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{l} kL_0 (\frac{M_i}{10})(e^{-kt_{ij}})$$

Where:

Q_{CH4} = estimated methane generation flow rate (in m^3 per year)

i = 1-year time increment

n = (year of the calculation) – (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (1/year)

L_0 = potential methane generation capacity (m^3 per tonne of waste)

M_i = mass of solid waste disposed in the ith year (tonne)

t_{ij} = age of the jth section of waste mass disposed in the ith year (decimal years)

L_0 = 127 m3/tonne of waste

K = 0.096/yr

Besides the waste acceptance rates, the model is dependent on the value selected for K which is a decay constant quantifying the rate that landfilled waste decays and produces methane, and L_0 which is the ultimate methane yield per tonne of waste disposed. Golder based their methane generation model on a K of 0.096/yr and L_0 of 127 m^3/tonne of waste. A collection efficiency of 75% was assumed.

The model (see Figure 18) predicted that the site would rapidly reach a stable methanogenic state (Phase IV after Farquhar and Rovers, 1973) with peak methane generation of 1,630 tonnes/year reached in 2033 immediately following the estimated closure of the landfill.

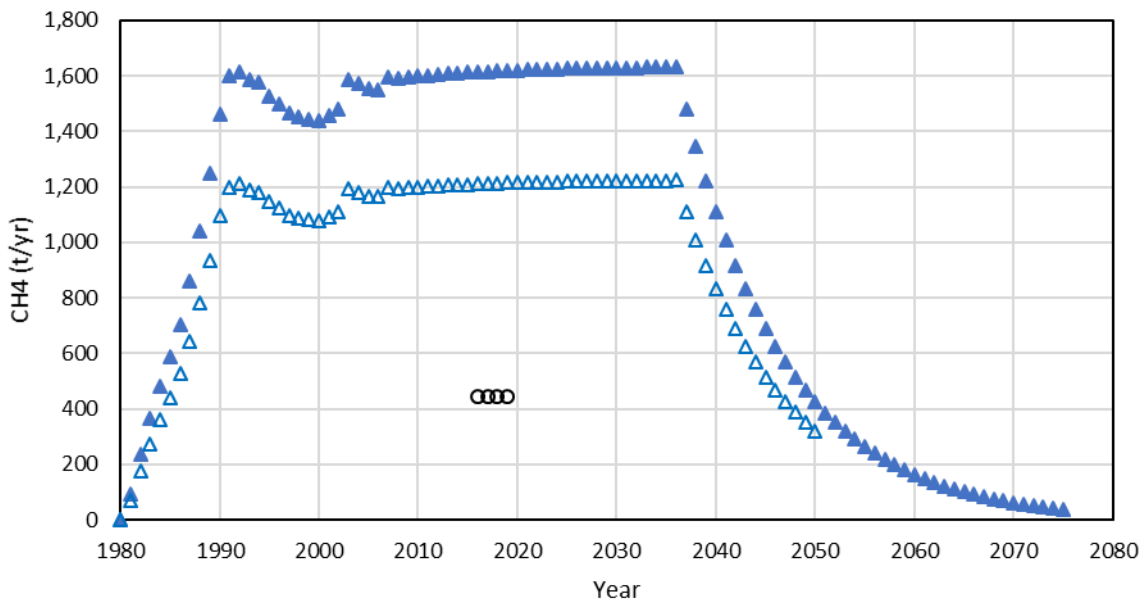

Figure 18 - Predicted Methane Generation Rate (Golder, 2008)

Filled triangles represent the methane generation rate while open triangles represent the estimated collectable methane. The open circles show the average methane collected during the initial 4 years of plant operation.

Greer Galloway re-analyzed the methane generation assumptions using more conservative parameters that reflect the tendency for LandGEM to overestimate methane generation rates (Scharff and Jacobs, 2006; Mou et al., 2015). The modelled assumptions are summarized below:

- Methane generation using k=0.096 and L_0= 127 (i.e. replicating the results of the Golder analysis)
- Methane generation using k=0.06 and L_0= 110 (Greer Galloway estimate taking into account the increasing diversion of organic wastes from landfills in Ontario)
- Methane generation using k=0.04 and L_0= 100 (USEPA default standards for LandGEM 3.02)

Modelling was carried out for a single undifferentiated landfill and using a two-compartment model partitioning methane generation between the old landfill area and the north expansion area. The Modelling was carried out using LandGEM 3.02 as insufficient waste characterization data exists to allow for the application of multi-phase models such as the Afvalzorg model (Krause et al, 2016) Fugitive emissions (methane loss to the atmosphere and methane oxidation within cover material) was estimated using the German EPER Model (Scharff and Jacobs, 2006):

$$M_e = M * BDC * BDC_f * F * D * C$$

Where,

M_e = amount of diffuse methane emission (tonnes CH_4/a)

M = annual amount of landfilled waste (tonnes/a)

BDC = proportion of biodegradable carbon (0.15)

BDC_f = proportion of biodegradable C converted (0.5)

F = calculation factor of carbon converted into CH4 (1.33)

D = collection efficiency:

- active degassing (0.4)
- no recovery (0.9)
- active LFG recovery and cover (0.1)

C = methane content (50%)

The model output (see Appendix A) was calibrated using methane collection data for the old and north expansion areas. Monitoring data shows that approximately two thirds of current methane yield is obtained from wells in the north expansion area with the remaining third obtained from the old landfill area. If the wellfield is constructed similarly in both areas, then the 2:1 ratio should mirror their respective methane generation rates corrected for the differences in cap (assume 80% for geomembrane vs. 60% for earth cover). Under these assumptions, the 2:1 ratio is obtained only for the model scenario using USEPA default values for k and L_0 (0.04/yr and 100 m^3/tonne, respectively). The modelled methane generation under different modelled scenarios is shown below on Figure 19 along with an estimated best fit generation curve for the entire site.

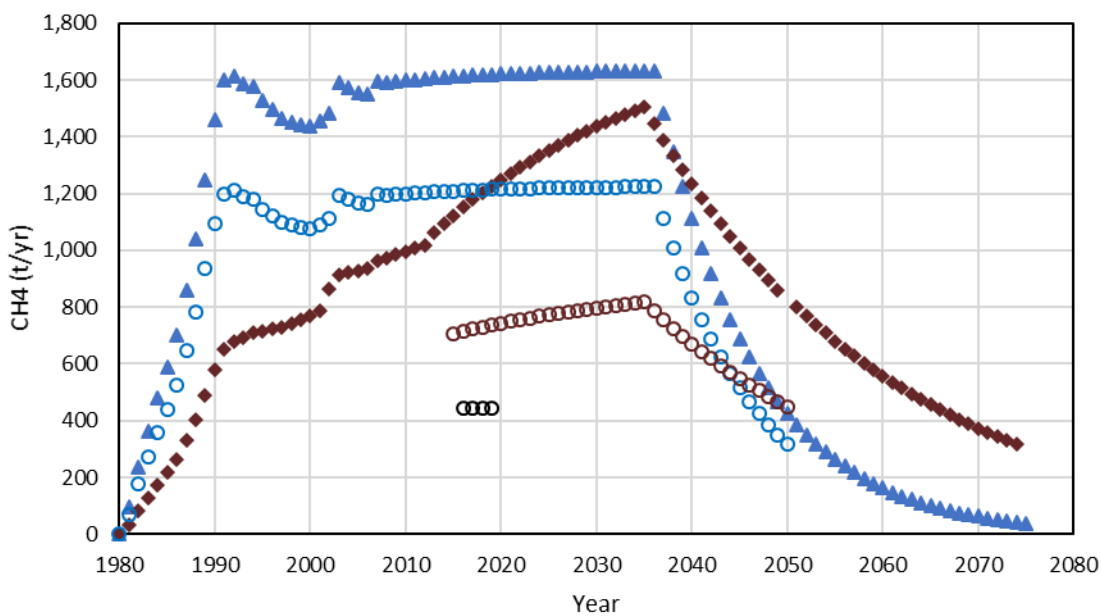

Figure 19 - Predicted Methane Generation Rate (Golder, 2008)

Filled blue triangles represent the methane generation rate under the original model while open blue triangles represent the estimated collectable methane (again under the original model parameters. The filled brown diamonds represent methane generation under our revised model while the open brown circles represent estimated collectable methane. The black open circles represent the actual collected methane over the first four years of operation.

2.4 Methane Collection Efficiency

Collection efficiency for the existing system is estimated according to:

$$CE = \frac{Q_c}{Q_p} * 100\%$$

Where:

CE = the collection efficiency expressed as a percentage (%)
Q_c = the normalized average collected flow rate of methane in the given calendar year (m^3/hr)
Q_p = the estimated generated methane flow rate in the given calendar year (m^3/hr)

The resulting value for CE ranges from 36% for the 2008 LandGem model to 57% for the current estimate of methane generation. In either case, the actual collection efficiency is lower than estimated (75% for the 2008 model and 75 and 60% for the old landfill and north expansion areas respectively under the current re-analysis). Under our revised generation model, the collection efficiency is the product of assumed collection efficiency over the old landfill area (assumed to be 75% reflecting the geomembrane cover over most of the area and consistent with Golder's 2008 assumptions) and the north expansion area (assumed to be 60% consistent with collection efficiencies for earth cover in other Canadian landfills). The resulting prediction is still substantially higher than that currently achieved at the site – raising the question why?

We consider the collection efficiency estimates for the north expansion area to be robust as this area has a good well coverage and it is unlikely that the collection efficiency in this area is substantially lower than 60%. This raises the possibility that the assumed 75% collection efficiency over the old landfill area might be an over-estimate. Supporting this speculation is the consistent good performance of Collection Well GWT-2 which has produced >50% methane for most of the period since the commissioning of the generation facility, and currently supplies close to 10% of the total methane collected. Most of the collection over the old landfill area uses the gas vents that appear to be shallow collectors designed primarily to prevent the build-up of gas pressures from damaging the geomembrane. The absence of deep vertical extraction wells over the old landfill area may have left substantial volumes of trapped methane in this area to be extracted only slowly as the methane migrates to the shallow vents. If correct, then the extraction efficiency over the old landfill area may be substantially lower than 75%.

2.5 Landfill Gas Treatment System

When the landfill gas is collected it may be taken through one of two paths; the flare path or the generation path. The path is common from the extraction wells through the moisture separator. From there, if gas is to be flared, no further conditioning is performed. The blower pulling the gas from the wells sends it to the flare where it mixes with combustion air and is burned with no additional energy recovered.

When used for generation, several additional steps of conditioning are completed to remove contaminants and optimize the gas condition for the genset. The blower sends the collected gas through a cooler and dryer to further reduce the moisture. The gas is processed through the siloxane filter to remove that specific contaminant which will negatively affect the performance and longevity of the genset. From the siloxane filter, the gas is fed to the genset to produce electricity. There are no

equipment redundancies in the gas treatment path. If the gas is not suitable for use in the genset either for condition (moisture, siloxane) or quality (CH_4 percentage), it is recirculated to the flare to be combusted.

2.6 Electricity Generating Equipment

Electrical power is generated from LFG through the use of an internal combustion engine generator. The generator is connected directly to the WWTP 600V power distribution and operated in parallel with the Hydro One utility connection. An underground 600V power feed connects the generator/flare facility to the WWTP.

2.7 Control System

Because the generator is directly tied to the WWTP distribution, and thus directly tied to the Hydro One grid, monitoring equipment is used to ensure that the generator is operating in a satisfactory condition. If abnormal conditions arise, the monitoring equipment will kick off the generator to ensure that the Hydro One grid is not adversely affected. Of particular importance to Hydro One is ensuring that the power factor observed at the service entrance is within acceptable limits. Power factor is heavily influenced by motor loads in the WWTP, the generator, and WWTP power factor correction capacitors. The power factor correction system consists of a bank of capacitors that can selectively connected to the grid to provide varying levels of correction depending on the amount of motor load in service. The power factor correction capacitors themselves may cause a generator shutdown if they are not synchronized with motor switching by causing over-correction.

2.8 Electrical Transmission System

The 600V underground feed between the WWTP and generator/flare facility is directly connected to the main WWTP electrical distribution, and serves as a bi-directional power path. When the generator is operating, generator/flare equipment (such as the gas blower) are essentially fed directly from the generator. After powering generator/flare equipment, the majority of the generator power is fed to the WWTP distribution system. When the generator is not operating, power flows from the WWTP to the generator/flare facility to supply required loads.

The WWTP is tied to Hydro One via a single connection point with a single bi-directional utility meter.

The generator serves to reduce the demands of energy imported from Hydro One. When the generator creates power in excess of that demanded by the WWTP, net power will flow out to the Hydro One grid.

3. Benchmark Analysis

3.1 Hydro Contract Review

3.1.1 Contract Review

The 0.335 MW Lindsay-Ops Landfill Gas Power Generation Facility began operations in 2016 under Renewable Energy Approval Number 8446-9HSGRP. The main component of the system is a Jenbacher biogas-fired generator, purchased used in 2012 from Glenridge Gas Utilization Inc. (a landfill gas utilization company in which St. Catharines Hydro is a main partner). Electricity generated at the Lindsay-Ops facility is used primarily to offset energy usage at the landfill site and the adjacent Water Pollution Control Plant (WPCP) at 48 Lagoon Road. Together, the two facilities consume more than 200,000 kWh of electricity per month, with the WPCP being responsible for approximately 92% of the total. The generation facility is connected to the Hydro One distribution grid and is governed by the terms of a connection agreement dated July 2, 2015.

A review of the connection agreement and current hydro billing for the Lindsay WPCP was conducted to provide information to assess the financial viability of the generation facility and identify opportunities for improving financial performance. The Hydro One Business Customer Centre was contacted to obtain a detailed explanation of current billing practices based on hourly metering data.

The following documents were reviewed:

1. "Connection Agreement for a Small Embedded Generation Facility or a Mid-Sized Embedded Generation Facility" dated July 2, 2015 between Hydro One Networks Inc. and the City of Kawartha Lakes

2. Schedules to the Connection Agreement:

   - Schedule A: Application and Connection Cost Agreement
   - Schedule E: Billing and Settlement Procedures

3. "Conditions of Service for Hydro One Networks Inc. Distribution Customers" (March 1, 2019)

4. Ontario Energy Board (OEB) documents:

   - Retail Settlement Code (Jan. 1, 2017)
   - Distribution System Code (March 14, 2019)
   - Standard Supply Service Code for Electricity Distributors (revised March 14, 2019)
   - Interim Rate Order EB-2017-0049 Hydro One Networks Inc. (revised June 11, 2019)

5. Independent Electricity System Operator (IESO) historical data for electricity pricing:

   - Hourly Ontario Energy Price (HOEP) and
   - Global Adjustment (GA)

6. Hydro One statements for the Lindsay-Ops Landfill/WPCP:

   - Invoices covering August, November and December 2018, and January through September 2019 billing periods (Account #200160856582)
   - Generation Payment Statements for November 2015 - October 2019 (Account #280001570225)

According to the Connection Agreement, the Lindsay-Ops Landfill is a "Small Embedded Generation Facility" (rated capacity greater than 10kW and not more than 1 MW, connected to a 44kV line), and the City of Kawartha Lakes is an "Embedded Retail Generator" with the intention to deliver and sell electricity to Hydro One (the "Distributor"). Under the terms of the agreement, payments for electricity supplied to the grid by the landfill generator are settled monthly in accordance with the Retail Settlement Code. Since the generator is connected to the grid indirectly through the WPCP, generation payments only result when the electricity generated exceeds the electricity consumed at the WPCP.

The City currently receives two hydro statements each month for the Lindsay-Ops facility: a generation payment statement, and a regular monthly invoice for standard electricity services provided by Hydro One. Monthly charges include a commodity price for electricity as well as distribution charges.

Interval metering on a sub-hourly (15-minute) basis is used to determine the net electricity consumed or supplied in each hour. For each hour where electricity is supplied to the grid, payments are calculated based on the metered generation multiplied by the hourly spot price (HOEP) set by IESO based on market prices.

Electricity costs for consumption (during hours when the generator output is insufficient to meet the needs of the WPCP) are calculated at the HOEP in a similar manner. However, for billing purposes, metered consumption is adjusted (increased) by a loss factor of 1.061 to account for distribution system losses and an additional Global Adjustment (GA) applies. The global adjustment is set monthly by IESO to reflect the difference between market prices and the actual costs of providing generating capacity through fixed-price contracts, maintaining infrastructure, administering the wholesale electricity market and delivering conservation programs. The result is that the cost per kWh of electricity consumed is higher than the price paid for electricity supplied to the grid.

Historical electricity prices including the global adjustment are shown in Table 3 below. For 2018, the average HOEP was 2.43 cents/kWh and the average global adjustment was 9.07 cents/kWh for a total

price of 11.5 cents/kWh on adjusted energy consumption. Factoring in the loss adjustment results in an electricity price of approximately 12.2 cents/kWh of metered consumption.

Table 3 - Average HOEP plus Average GA

Year	Average Ontario Energy Price (cents/kWh)	Average Global Adjustment (Actual) (cents/kWh)	TOTAL (cents/kWh)
2008	5.17	0.61	5.78
2009	3.16	3.06	6.22
2010	3.79	2.72	6.51
2011	3.15	4.02	7.17
2012	2.41	4.92	7.33
2013	2.65	5.92	8.57
2014	3.60	5.46	9.06
2015	2.36	7.78	10.14
2016	1.66	9.66	11.32
2017	1.58	9.97	11.55
2018	2.43	9.07	11.50

(http://www.ieso.ca/Power-Data/Price-Overview/Global-Adjustment)

In addition to the electricity cost and global adjustment, monthly hydro bills also include distribution charges made up of delivery and regulatory components. Hydro One rate schedules for distribution charges are approved by the Ontario Energy Board. Current billing rates are documented in Interim Rate Order EB-2017-0049 implemented July 1, 2019.

Delivery charges are assessed differently depending on the customer's billing classification. The available billing classifications are described in the Hydro One Conditions of Service document.

The current billing classification for the Lindsay-Ops facility is "General Service Demand Billed (GSd)". This classification applies to non-residential customers with average monthly maximum demands greater than 50kW. The monthly maximum demand for the Lindsay Ops facility ranges from 299 kW to 395 kW based on the hydro bills provided.

The delivery component includes fixed monthly service charges as well as variable charges based on the peak demand during the billing cycle. The current rate order also includes as part of the delivery component, a Global Adjustment Rate Rider based on kWh adjusted electricity consumption. However, on the monthly hydro bills this amount is included in the global adjustment. Delivery charges typically make up a significant percentage of the monthly hydro bills for the Lindsay-Ops facility (approximately 41% of total cost based on the July to September 2019 billing periods).

Regulatory charges are based mainly on consumption and make up a relatively small portion (2%) of the monthly hydro costs. Regulatory rates are consistent across the various billing classifications.

A small customer-supplied transformer credit based on monthly billing demand ($0.60/ kW) is also applied since the City owns its own transformer.

3.1.2 Review of Monthly Hydro Statements

Based on a review of hydro bills provided by the City for the Lindsay-Ops facility (August 2018, and November 2018 - September 2019 billing periods), total monthly hydro costs (not including HST) ranged

from approximately $38,575 in November 2018 (when the generator was down for an extended period of time) to $15,275 in August 2019 following the recent wellfield expansion. This represents a total monthly savings of approximately $23,300 achieved by offsetting about 133,000 kWh of electricity consumption at the WPCP. The electricity component including global adjustment accounted for more than 100% of this savings since both the peak demand and associated delivery charges were higher in August despite the lower overall cost. There were no generation payments for electricity supplied to the grid during either of these months.

Hourly interval metering data for the August 2019 billing period (Aug. 9th to Sept. 9th) was examined to confirm the detailed electricity cost calculations with the following results:

1. The peak demand during the month for billing purposes was 371 kW (August 13th at 10:00 EST). The distribution of hourly demands is shown in Figure 20 below. For comparison, the peak demand for the November 2018 billing period was 344 kW.

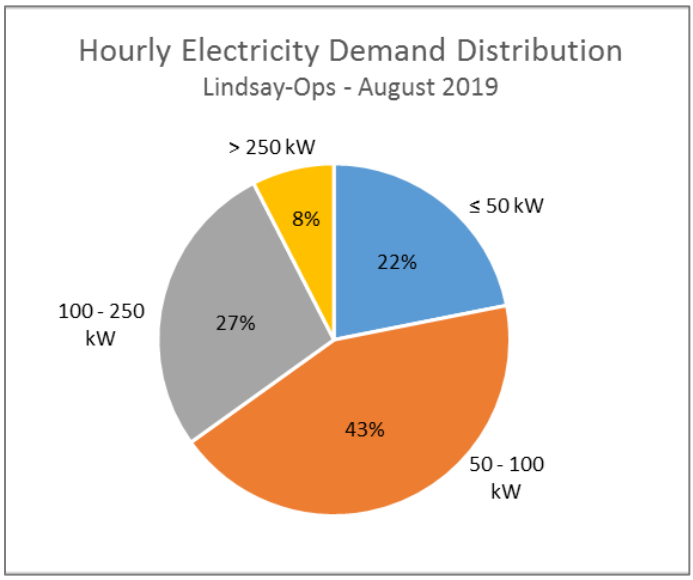

Figure 20 - Hourly Electricity Demand Distribution

2. The global adjustment was 7.21 cents/kWh at the beginning of the August billing period and increased to 12.93 cents/kWh hour on September 1st.
3. The weighted average electricity price based on actual consumption over the billing period was 1.51 cents/kWh (electricity only) and 9.11 cents/kWh including the global adjustment. The comparable prices based on the November 2018 billing period (see above) were 2.55 cents/kWh and 14.26 cents/kWh.
4. Table 4 below shows the range of hourly electricity prices over the billing period. Note that the HOEP was less than or equal to zero for 105 out 768 hours (approximately 14% of the time).

Table 4 - Hourly Electricity Costs - August 2019 Billing Period

	Invoice Weighted Average (¢ / kWh)	Average (¢ / kWh)	Minimum (¢ / kWh)	Maximum (¢ / kWh)
Electricity (HOEP)	1.51	1.41	-0.42	14.30
Electricity plus GA	9.11	10.23	6.80	27.23

Generation statements for the Lindsay facility for the past four years (November 2015 - October 2019) were also reviewed resulting in the following key observations:

1. The Lindsay-Ops facility supplied approximately 60,000 kWh of electricity to the grid over the 4-year period and received total generation payments of $852.06 (before HST). This translates into an average price of 1.41 cents/kWh.
2. Electricity was supplied to the grid during 37 out of 48 calendar months. There were no generation payments for the following 11 months:
   - November 2015
   - February, July, and December 2017
   - November 2018 through February 2019
   - April, June, and August 2019
3. The maximum electricity supplied to the grid during any calendar month was 11,336 kWh (in February 2018). Remaining months were all below 4,200 kWh.
4. The total excess electricity supplied to the grid over the 4-year period (~ 60,000 kWh) is less than the metered consumption (~ 74,000 kWh) during the August 2019 billing period.

3.1.3 Revenue Opportunities

From the above discussion, it is clear that the biggest opportunity for increasing revenue from the generating facility is to increase the output of the generator. Recommended strategies for increasing electricity production (e.g. through reduced downtime or improved gas supply) are covered in other areas of this report.

Additionally, since the price received for energy supplied to the grid is significantly lower than the price paid for energy consumed, offsetting power usage at the WPCP is preferable to generating excess electricity to supply the grid. The maximum benefit (in terms of hydro costs) would be derived by controlling the generator output to completely offset power usage at the WPCP ***in each hour*** before generating excess electricity to supply to grid, and shifting any excess generation to hours where electricity prices are likely to be high.

However, attempting to shift hourly electricity generation in response to treatment plant loads or variations in energy pricing is not considered feasible. It would require additional control systems along with storage of either the landfill gas or the electricity produced by the generator to avoid simply flaring any excess landfill gas not required for immediate use. Also, hourly electricity prices vary with market conditions and efforts to predict them would be of limited benefit. As an example, Figure 21 below illustrates the variation in the hourly electricity price (HOEP) and projected HOEP over several days in November 2019.

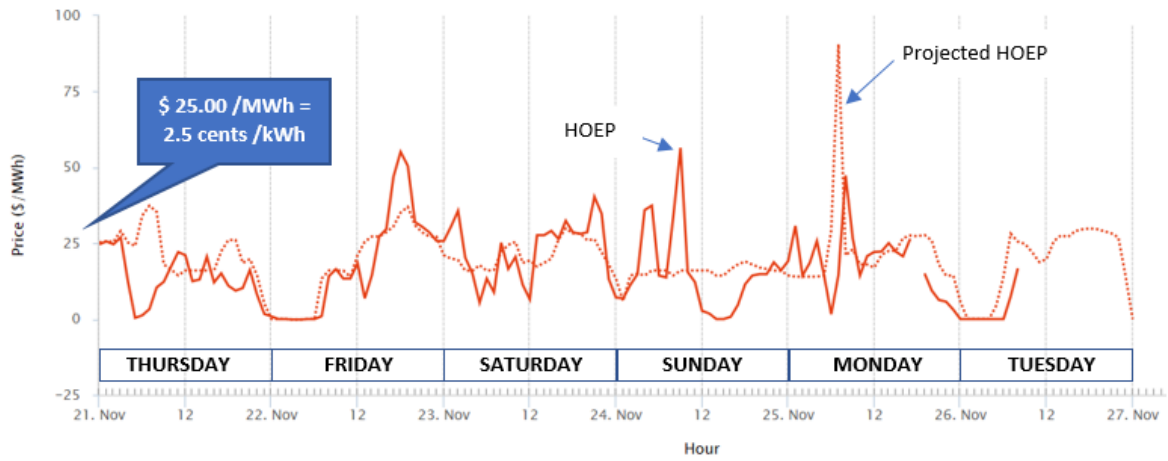

Figure 21 - HOEP and Projected HOEP (Nov. 21 - 27, 2019)

(Data Source: http://www.ieso.ca/power-data)

The delivery charges portion of the monthly hydro bill presents another opportunity for savings. Under the current rates for the "General Service - Demand Billed (GSd)" classification, delivery charges are approximately $8,000 per month based on typical peak demands of 370kW, regardless of the total amount of electricity generated during the month. Reducing billing demand is not a practical means of generating savings since typical peak demands in the range of 299 - 395 kW can result from only one hour of generator downtime during the month. That one-hour peak measure during the month is used to calculate the monthly demand charge regardless of how brief the outage lasted.

However, it may be possible to take advantage of reduced delivery rates available under the "Distributed Generation (DGen)" billing classification. Under the current rate order, the DGen classification has a higher fixed monthly service charge, but significantly lower variable rates based on billing demand. This could produce cost savings of approximately $3,500 to $4,600 per month based on current demands - roughly equivalent to the savings from generating an additional 35,000 kWh per month of electricity. Table 5 summarizes the rate differences between the two billing classifications.

Table 5 - Summary of Rate Differences - GSd and DGen Billing Classifications

	General Service - Demand (GSd)		Distributed Generation (Dgen)	
Fixed Charges				
Monthly Service Charge	$	114.96	$	179.90
Service Charge Rate Rider	$	(0.05)	$	0.05
Total Fixed	**$**	**114.91**	**$**	**179.95**
Variable Charges (per kW)				
Volumetric Rate	$	17.9552	$	7.8078
Volumetric Rate Rider	$	(0.2655)	$	(0.1097)
Retail Tx Rate - Network	$	1.9327	$	0.9395
Retail Tx Rate - Connection	$	1.6437	$	0.8007
Total Variable (per kW)	**$**	**21.27**	**$**	**9.44**

According to the "Conditions of Service for Hydro One Networks Inc. Distribution Customers" (March 1, 2019) document (section 3.4.11 B):

> "any Embedded Generation Facility with a name-plate capacity greater than 10 kW … will be classified under the ***Distributed Generation Rate classification***. This Rate classification is used for Embedded Generation Facilities whose associated load is supplied through a single point of Connection to the Distribution System. This classification does not apply to Load Displacement Embedded Generation Facilities."

Also, from the Conditions of Service document (section 4):

> "***Load Displacement*** means in relation a Generation Facility that is connected on the Customer side of the Ownership Demarcation Point, that the output of the Generation Facility is used or intended to be used exclusively for the Customer's own consumption;
>
> ***Load Displacement Generation Facility*** means an Embedded Generation Facility that is used exclusively for Load Displacement purposes at all times."

The Lindsay-Ops facility appears to meet the conditions for the Distributed Generation rate classification. It is classified as a "Small Embedded Generation Facility" with a "name-plate rated capacity more than 10 kW" in the Connection Agreement. The agreement also establishes the City of Kawartha Lakes as an "Embedded Retail Generator" and provides payment terms for purchasing the electricity supplied by the facility. Over the past 4 years, the City has received a series of monthly generation payments for electricity supplied to the grid. This suggests that Lindsay-Ops is not a Load Displacement Generation Facility as defined above.

A second, less attractive option to consider if the Distributed Generation classification is not available, is to change to a net metering arrangement. Rather than receiving monthly generation payments for electricity supplied to the grid, the City would receive a credit that could be carried forward for up to one year. Unlike monthly generation payments which are calculated at the HOEP, electricity credits under net metering are calculated at the HOEP plus global adjustment (and variable regulatory rate), producing savings of approximately 9 cents/kWh. Based on the maximum monthly generation to date of 11,366 kWh, this would result in savings of approximately $1,020 per month. This arrangement would not be advisable if monthly electricity generation in the future is expected to exceed the requirements of the WPCP.

3.1.4 Summary

The City of Kawartha Lakes Connection Agreement with Hydro identifies the Lindsay-Ops facility as a "Small Embedded Generation Facility" and the City as an "Embedded Retail Generator". The facility is currently billed under the General Service Demand classification as a load displacement customer. Our analysis of recent hydro bills shows that a potential cost savings of $3,500 to $4,600 per month could be realized if the facility were billed under the Distributed Generation classification instead. Recent discussions with Hydro One Business Customer Centre staff indicate that Hydro would be open to reviewing the current billing classification for the facility and that there would be no charge for this review. We recommend contacting the City's Hydro One account representative to review this potential cost saving opportunity.

3.2 System Operating Value

3.2.1 Government Incentives

Potential sources of funding to help offset future investment for improvements at the Lindsay-Ops generating station appear to be limited. The following is a partial list of potential programs reviewed for applicability.

1. **Save ON Energy Process and Systems Upgrades Program** - The IESO currently offers a suite of energy-efficiency incentives and rebates through the Save ON Energy Program. The Process and Systems Upgrades Program provides financial incentives for the implementation of energy efficiency and generation projects that are expected to deliver a minimum of 300 MWh of electricity savings per year. However, projects undertaken at a generation facility and waste energy recovery projects that transfer generated electricity to the grid are NOT eligible.

2. **Climate Action Incentive Fund (CAIF)** - an Environment and Climate Change Canada program funded through the proceeds of the federal carbon pollution pricing system consists of three funding streams: SME (Small- and Medium-sized Enterprises) Project Stream, MUSH (Municipalities, Universities, Schools and Hospitals) Retrofit Stream, and Rebate Stream. The MUSH Retrofit Stream provides funding for energy efficiency improvements and retrofits to reduce energy use, costs, and carbon pollution. Funding for municipalities, university/colleges and hospitals will be announced later in 2019-2020. The Lindsay-Ops facility could potentially be eligible for funding under this program.

3. **Low Carbon Economy Fund (LCEF)** - supports the Pan-Canadian Framework on Clean Growth and Climate Change by providing funding for initiatives that reduce greenhouse gas emissions and generate clean growth. It is composed of the Low Carbon Economy Leadership Fund and Low Carbon Economy Challenge. The Low Carbon Economy Leadership Fund allocated funding to provinces and territories and most agreements have been finalized. Applications for the Low Carbon Economy Challenge Champions stream closed Sept 28, 2018, and the first intake of the Partnerships stream, available to small municipalities, closed March 8, 2019. The program should be monitored for future intake options.

4. **Investing in Canada Infrastructure Program (ICIP) Green Stream** - the current intake (open until January 22, 2020) provides combined federal, provincial and other partner funding for small municipalities to improve water, wastewater and stormwater infrastructure. Eligible projects must increase capacity to treat and/or manage wastewater and stormwater or increase access to potable water, and eligible asset types are limited to water/wastewater/stormwater infrastructure. Therefore, the Lindsay-Ops landfill gas collection and generation system would NOT qualify under the current funding intake.

5. **Federation of Canadian Municipalities Green Municipal Fund** - offers low-interest loans in combination with grants to support capital projects that "demonstrate an innovative solution or approach to a municipal environmental issue … offer significant environmental benefits, a strong business case and social advantages, while being complemented by local policies and measurement systems." The Signature Initiative, which funds "transformative, best-in-class

municipal projects" that "reduce GHG emissions and protect the air, water or land", would be the most applicable to the Lindsay-Ops facility. Retrofit funding requires a 30% reduction in facility energy consumption with a maximum of 10% achieved through on-site renewable energy. Applications for Signature Initiatives under the Green Municipal Fund are accepted on a continuous, year-round basis as of April 1, 2020. Funding from this program may be used to implement programs to achieve the changes recommended in this report.

3.3 Municipal Similarity Assessment

A desktop review of similar landfill gas generation facilities was conducted. Primary sources of information included: the IESO Active Contracted Generation List (June 30, 2019) and other public documents (e.g. project descriptions, annual reports, newspaper articles etc.) available through online search. Attempts to contact landfill gas generating facilities directly were either unsuccessful or resulted in information which was not approved for disclosure.

All of the active landfill gas generation facilities for which information was publicly available were included on the IESO supplier list with 20-year supply contracts under various renewable energy procurement programs including:

- Renewable Energy Supply Contracts (RES1) - launched 2004
- Renewable Energy Standard Offer Program - launched 2006
- Feed-in Tariff Program (FIT1) - launched 2009 and closed to new applications by provincial government in 2016

Table 6 below summarizes the equipment and generating capacity at selected sites and includes additional notes concerning operations.

Table 6 - Landfill Gas Generation Plants

Landfill Site	Electricity Supplier Name	Capacity / Equipment	Commercial Operation Date	Contract Type	Notes
Merrick Landfill - North Bay	North Bay Hydro Services Inc.	1.6 MW CAT G3520C generator	2012	FIT1	Average generation of 814,145 kWh per month in 2015.
Bensfort Rd. Landfill - Peterborough	LFG Power Corporation (wholly owned subsidiary of Peterborough Utilities Inc.)	1.6 MW CAT G3520C generator	2013	FIT1	
Eastview Landfill - Guelph	Envida Community Energy Inc. (subsidiary of Guelph Hydro Inc.)	(3) x 925 kW CAT G3516LE generators	2005	RES1	Toromont Energy operates the plant under a performance-based operations and maintenance contract with graduated payments based on availability. - Reported gross availability is 98.75%

Landfill Site	Electricity Supplier Name	Capacity / Equipment	Commercial Operation Date	Contract Type	Notes
Glanbrook Landfill - Hamilton	Hamilton Renewable Power Inc. (HRPI) (subsidiary of City of Hamilton)	(2) x 1.6 MW CAT G3520C generators	2008	RESOP	- Administration through City staff with outsourced operations and maintenance. - Toromont's Run Ready Magazine (Spring 2019) quotes HRPI's vice president Frank Gazzola: "It's all about uptime, and we've achieved a very satisfactory uptime with the units at Glanbrook." - Reported uptime is over 95%. - HRPI receives 11 cents /kWh for electricity produced (plus 3.52 cents/kWh for on-peak generation).
Mapleward Rd. Landfill - Thunder Bay	Thunder Bay Renewable Power Inc. (affiliate of Synergy North - formerly Thunder Bay Hydro and Kenora Hydro)	(2) x 1.6 MW CAT G3520C generators	2010	RESOP	- In a September 2019 newspaper article, the president of Synergy North reports that the facility has been "barely breaking even" over the last 4 years, due to challenges with the gas supply. - City of Thunder Bay is in the process of adding 5 to 8 new gas collection wells.
Trail Road Landfill - Ottawa	Power Trail Inc. (partnership between Energy Ottawa Inc. and Integrated Gas Recovery Services Inc.)	(5) x 1 MW Jenbacher JGC320 generators (1) x 1MW generator added in 2012	2007	RES1	- City of Ottawa receives royalty payments for landfill gas and also realizes savings in costs that would otherwise be required to upgrade and maintain the gas collection system. -2017 proposal to add a 7th generator rejected by IESO
Waterloo Landfill	Toromont Energy Ltd.	6.2 MW CAT generators	2007	RESOP	- Generation plant owned and operated by Toromont Energy Ltd. has been producing electricity since 1999. - Reported availability greater than 98%. - Region of Waterloo receives a royalty for the landfill gas based on electricity revenues. - March 2019 news article reports plans to expand gas collection system beginning this year with funding assistance from Low Carbon Economy Fund.

All the listed facilities are larger than the Lindsay-Ops facility, with generating capacities ranging from 1.6MW to more than 6 MW. Most facilities are owned and/or operated through partnerships with local utility companies, established environmental or energy companies, or new companies formed specifically for the purpose of producing power to sell to the grid. Typically, the municipality owns the landfill site and receives payments for supplying the landfill gas. In the case of the Waterloo plant, which is owned and operated by Toromont Energy, the Region of Waterloo receives a royalty for the landfill gas based on electricity revenues. Operations and maintenance contracts for the generation facilities may include performance incentives based on facility availability. A Toromont project sheet notes that the company receives graduated payments per megawatt-hour based on availability for operations of the Eastview Landfill to Energy Plant in Guelph.

Facility uptime is recognized as a critical success factor and the generation plants for which information was available reported over 95% plant availability. The landfill gas supply is also highlighted as a factor influencing financial performance.

Several news articles (dated July 2014, and January 2018) about the Bluewater Power landfill gas generating facility at the closed Sarnia Landfill site in Lambton County reported that gas production from the landfill was not as high as originally anticipated leading to an earlier than forecasted closure of the generation plant. A more recent September 2019 newspaper article about the Mapleward Road landfill gas generating facility in Thunder Bay also reports revenue shortfalls due to gas supply challenges. It notes that the gas supply from the landfill is much lower than originally forecast and mentions plans to improve and expand the gas collection system. Several other sources also mention the need for ongoing maintenance, monitoring, and control of the gas collection system to maximize electricity production.

According to a July 2018 newspaper article, the City of London's plans for a landfill gas power plant were abandoned with the cancellation of its FIT5 contract. (The IESO archive confirms a FIT5 contract offer to the City of London for a 500 kW Landfill Gas Power Plant). A more recent September 2019 news article announces that the City is considering utilizing the landfill gas to produce and sell renewable natural gas.

The Lindsay-Ops facility has the distinctive advantage of being able to utilize the landfill gas to offset the electricity demands of the nearby sewage treatment plant. Combined with reduced downtime and improved operational efficiency, this should enable the Lindsay-Ops facility to be financially viable.

4. Process Optimization

4.1 Operations and Manuals Review

Under normal operating conditions, the generator is monitored by the SCADA system and alarms identify when intervention is required. This allows the generator to run without constant on-site personnel. When conditions require intervention by the operations personnel, a request for service is made by City staff and field technicians are dispatched with the objective of bringing the genset back on-line within 24 hours or starting the flare within 48 hours. When the technician arrives, minor troubleshooting will be completed prior to restarting the equipment. Spare components are stocked at the site to allow quick turn-around on minor maintenance activities.

In all cases, the operations manuals are not formatted to replace comprehensive operator training. The manuals are guides that qualified personnel can use as references when conducting troubleshooting and maintenance activities.

The operations manual for the Lindsay-Ops generation and flare system was provided. The manual carried a revision date of September 2016 and was provided by Enviro EMD. The manual details several aspects of the flare system, the gas blower and control system, and the SCADA system. There are fewer details and no visual representation of the generator system. Generator alarms are covered in the operations manual to amplify details from the SCADA system. There is an opportunity to augment

the data in the manual if staff from the City will have restored involvement in reset from minor generation interruptions. This aspect of operations is detailed in Sections 4.3 and 4.4 of this report.

A technical data package for the Jenbacher 208 was reviewed. The data package provides a detailed maintenance schedule but lacks operating instructions for start-up or other routine operations. High-level data on the DIA.NE fuel management system is included but no detailed guidance on use is provided. Detailed instructions on operation of the generator will not benefit staff from the City. Only high-level data for resets from minor interruptions is necessary at the City level. Detailed operations information is optimal for Comcor when performing more involved servicing. No changes to the Jenbacher O&M manual are recommended at this time.

A separate manual for Siloxane Skid was provided. The manual is produced by DCL International Inc. and has a revision date of May 2015. This manual provides information on the basic installation and operation of the equipment and a section for general troubleshooting. The data is straightforward and qualified personnel can use the manual to resolve minor alarm notifications. No changes to the Siloxane O&M manual are recommended at this time.

The Operation & Maintenance Manual for the newterra landfill gas conditioning system contains details on the components within the system. The sections of the document that outline the component pieces are useful if spare parts are required. Operations instructions for the blower, chiller, and glycol pumps are included with detailed instructions for operations. There is a detailed maintenance schedule and a comprehensive troubleshooting chart. Qualified personnel will be able to use the manual for routine operations. No changes are recommended at this time.

4.2 Wellfield Management/Expansion

If our analysis of methane generation rates is correct, the methane collection efficiency in the old landfill area is lower than previously predicted. Improved methane recovery may be obtained in this area by constructing a number of additional LFG collection wells. Such wells may be effective in improving the quality of LFG delivered to the generation plant and in bridging the period until the north landfill area reaches stable methane generation.

4.2.1 Contract Structure

Most landfill gas generating facilities in Ontario operate on a royalty basis with the operator owning the generating equipment and paying a royalty for landfill gas used. Given the small size of the Lindsay Operations landfill and the low potential electricity output we do not believe that a royalty-based contract will prove to be a practical option.

4.3 Service Call Strategy

The generator startup sequence is a manual process. Every generator re-start requires manual on-site intervention, which is currently handled by sending Comcor field personnel to site. This arrangement suffers from A) the cost for Comcor to travel to site, and B) the downtime realized in waiting for Comcor to arrive. Additionally, the existing service agreement does not allow for restarts to be initiated during the weekend. Thus, an outage that occurs on Friday could result in losing a whole weekend of electrical generation.

The restart process will vary depending on the cause of the shutdown. A breakdown of downtime causes is shown in Section 4.4. Some types of shutdown require the expertise of Comcor to resolve, however simple shutdowns (for example low fuel quantity) may require less expertise. It is proposed that consideration be given to training local staff to accomplish simple restarts and only call in Comcor when more specialized expertise required. The main benefit of this arrangement would be the reduction in downtime due to eliminating the travel time and weekend exclusion. Depending on the cost to carry out this work with CKL staff or a local subcontractor, there may also be a cost savings in labour. If such an arrangement were pursued, it should also examine the viability of providing weekend coverage to further reduce downtime.

4.4 Downtime Analysis

The analysis of the generator downtime is based on review of the two most recent annual reports provided by Comcor to the City. These reports cover the period from October 1, 2017 to September 30, 2019. The reports include sections on the genset downtime over the period. Planned shutdown events are considered in this summary where a more extensive downtime was prompted by the results of the shutdown.

Downtime hour calculations are taken from the Genset Operation Summary appendices in the annual reports. For each day in the reporting period, if the Jenbacher Gross Output is 0, the daily downtime is counted as 24 hours. Otherwise the downtime is the difference between Genset Blower daily run time and 24 hours rounded to the nearest hour.

The downtime has been divided into the following categories:

A. Normal Equipment run-in –Minor mechanical issues related to normal operation.
B. Delays by contract or procedural constraints – These downtime hours are counted when the restart of the generator was delayed by waiting for a business hour service call or when waiting for expense approval.
C. Failures of aging equipment – Equipment that has reached end of life and must be replaced.
D. Poor fuel quality or quantity – These are events identified as fluctuations in the gas collection or associated wellfield issues including the connection of the wellfield expansion.
E. Power grid forced trips – These trips are caused by Hydro One deactivating the generator owing to transient power events at the WPCP.
F. Unforeseen complications – The events in this category are characterized when a downtime event reveals equipment incompatibilities or prompts significant ancillary activities.
G. Planned Outages – Standard maintenance activities are included in this category.
H. Other –Downtime unattributed in the Comcor annual reports

The downtime hours for the reporting period are summarized:

Table 7 - Reported Downtime Hours

	A	B	C	D	E	F	G	H	Total
2017-18	309	299	540	552	0	626	24	559	2909
2018-19	226	363	79	210	224	2354	231	103	3790
Total	535	662	619	762	224	2980	255	662	6699

Total possible runtime is 8760 hours/year. This is not the same as Availability which is the percentage of generated electricity against the theoretical maximum.

4.4.1 Downtime Reduction Strategies

It is unreasonable to expect the system to reach a state where generation downtime is never incurred. The nature of having a system without redundancy positions all components as critical and the interruption of any component manifests as system downtime. Therefore, the focus of this analysis is to identify those areas where downtime can be reduced as far as practical. Special emphasis is placed on those areas where small and comparatively inexpensive changes can have the greatest effect.

A – Equipment Run-in

Fewer category A mechanical issues were reported in 2018-19. This is consistent with equipment reaching a stable operating condition although faults of this nature can never be eliminated. The spare parts made available at the site are enabling technicians to repair or replace elements of the system

without delays. It is reasonable to assume the downtime associated with normal equipment issues will remain constant around 275 hours/year

B – Contract or Procedure Delays

During the 2017-18 reporting period some equipment restarts were performed by City staff with remote guidance by Comcor personnel. This did not carry into the 2018-19 period. Without local staff to address minor trip events, downtime is increased, especially in the latter portion of the period and associated with power grid trips. Comcor reported five (5) separate events where the grid tripped the generator and because the downtime occurred over a weekend, personnel were not dispatched until the following business day. Each of those events represents 48 hours directly attributable to a procedure delay.

Power grid trips are acknowledged separately but they have occurred at a rate of approximately 4 events/month for the last 4 months of the last reporting period. It is reasonable to expect one trip of the type to fall on a weekend each month. Having a local qualified staff member on-hand to restart from minor events could prevent up to 576 hours of weekend downtime from power grid trips. If these trips are limited to one hour by having local staff guided to perform a restart, that represents only 48 hours over the course of a year.

The other factor related to contract and procedure delays is the turn-around time on expense requests. High value expense requests are processed within a week. This is good practice and should be maintained but will incur approximately 200 hours/year of downtime.

C – Aging Equipment

As the generator equipment ages, the effect of aging equipment can be expected to increase. As a newer system, the downtime percentage attributed to equipment wearing out is 10% of the total downtime based on analysis of the reported downtime data. Keeping this consistent for our projections will provide a reasonable calculation value. When all other downtime factors are assessed, the predictable downtime (Categories A, B, C, D, E, & G) is 830 hours/year. The portion of this attributed to aging equipment is rounded to 83 hours/year.

D – Poor Fuel Quality/Quantity

The downtime attributed to wellfield and poor quality and quantity of gas has been identified by Comcor in the past. The installation of new wells in 2019 is a step already taken to mitigate this issue. A reduction in the downtime owing to fuel issues can be noted in the most recent annual report. Since a full period with the new wells on-line is not available, the full impact of the new wells or possible future additions to the wellfield cannot be reliably quantified. If the rate from the most recent reporting period is maintained the downtime owing to fuel issues will remain at approximately 200 hours/year.

E – Power Grid Trips

Trips of this nature are the only category that could be eliminated. The 2017-18 data shows that modification to the staging of loads at the WPCP was able to reduce these trips to 0 for the period. The trips have only resurfaced after Hydro One completed operations in May of 2019. A further conversation between the City of Kawartha Lakes, Comcor, and Hydro One may identify the cause of the interruptions and bring the downtime back to 0. Prior to that occurring, if city staff are trained as outlined above, the downtime for this category may still be reduced to 48 hours/year.

A report prepared by Wintek Engineering (WW20-128.03, dated March 20, 2020) provided additional analysis of trips during the past year. 34 trip events were analyzed using data automatically recorded during trip events. 80% of trips were due to abnormal reactive power flows. The second most prevalent trip cause was loss of utility power.

The trip-data available to Wintek was limited and prevented obtaining a full understanding of the trip events related to abnormal reactive power flows. However there was enough data to identify patterns and to propose three failure modes:

1) The generator was at low power output or in the process of starting up and caused abnormal reactive power flow. This mode could also occur if the generator was inactive and abnormal

conditions occurred at the WWTP. If the generator was already inactive, this would not count as a generator shutdown, just a logging of an abnormal event at the WWTP.

2) The generator was operating normally and shutdown. The data strongly points to the WWTP aerator and power-factor correction capacitors as causing an abnormal reactive power flow.

3) The generator suffers a low fuel pressure condition and temporarily becomes a load on the electrical grid, causing abnormal reactive power flow.

The Wintek report further explains that the power-factor correction system in the WWTP pre-dates the installation of the generator, and thus the controls were not designed to account for the generator influence on the system. Some basic tests were performed by Wintek during a recent site visit which proved that the power-factor correction system could induce a trip-event.

Several recommendations were included in the Wintek report to mitigate the effects of the WWTP power-factor correction system, ranging from replacing the system, to adjusting the control narratives, to disabling the system. The recommendations would require investigation and cost-benefit analysis.

It was also recommended that the data logging mechanism be adjusted to provide more data during trip events to further understand the issues.

Refer to the Wintek report for further technical explanation and the detailed list of recommendations.

F – Unforeseen Outages

In each reporting period the largest cause of downtime was the unforeseen complications. In 2018-19, this was primarily the outage caused by the leaking turbocharger. The outage began on Nov 9 when the Genset tripped on knocking. Engine cylinder liner wear and the leak from the turbocharger compounded to significant retrofit and repair work. The genset was offline for 45 days (1080 hours).

The major unforeseen event in 2017-18 was the shorting of the main breaker at the OCWA plant. It prevented the use of the flare and genset for 12 days (288 hours).

One method for controlling the outages is to conduct an obsolescence review of critical path components. At the outset of the generator operation, a recommended list of spare parts was provided to the City by Comcor. The approved list of spares did not include all the recommended items, but this has not contributed to excess downtime. The level of spares should be maintained to avoid adding to this category of downtime.

The spare parts inventory is reported annually. When the inventory is reviewed, an added check can be made to confirm continued applicability and the ability to procure replacements. This is especially critical on more complex items such as motors and pumps. The inability to replace the component may extend downtime. If modified or replacement components are required, the review will highlight those gaps and provide a chance to acquire replacements before being required for critical events. This method does not account for obsolete components that are not held in stock. For that reason, the possibility still exists that foreseen failures can occur. To mitigate this effect, the best case from the two data sets is used.

The data from 2017-18 indicate unforeseen downtime as accounting for 25% of all downtime. When the data from other outages is counted, this can be expected to account for 208 hours/year.

G – Planned Outages

Planned outages are the most reliable downtime events. The increase seen in the 2018-19 reporting period is accounted by the downtime required for connecting the wellfield expansion and outages requested by Hydro One. In other years, the downtime will be controlled by the maintenance schedule. These are typically short duration events and should be included at a rate of 24 hours/year.

H – Other Unaccounted Outages

There are hours of downtime not accounted in the Comcor reports. Assuming these hours are distributed at the same frequency as the balance of the downtime hours, this category of downtime

represents the error factor in the analysis. In the previous reporting periods this has represented as little as 3% of all downtime or as much as 24%. Aggregating the two years of data and determining the percentage of downtime contributed through categories A through G provides an error factor of 165 hours/year of category H downtime.

4.4.2 Production and Utilization Optimization

The following strategies are recommended for implementation to minimize the downtime of the generator:

- Train City of Kawartha Lakes staff to perform guided restarts.
- Continue well management and wellfield maintenance to improve fuel quality and quantity.
- Consult with Hydro One to identify root cause of grid interruption trips and mitigate effects through staff training.
- Maintain spare parts and identify critical components for obsolescence.

Implementing strategies discussed above may reduce the generator downtime as shown in the following table:

Table 8 - Theoretical Downtime Hours

	A	B	C	D	E	F	G	H	Total
Theoretical	275	200	83	200	48	208	24	165	1203

With downtime at 1203 hours/year, the total runtime on the plant may achieve 7557 hours or 86% of total possible generation time. At the measured daily generation rate of 245 kW, that represents a total of 1,851,465 kWh of generation potential for a plant Availability of 63%, nearly double the 2018-19 Availability of 38%.

4.5 Energy Use Review

4.5.1 Peak Use Times

Under the current billing structure generated power is more valuable when used to offset WWTP load versus when it is exported to the grid. Refer to the discussion of Global Adjustment in section 3.1 for explanation of this billing.

Ideally, when there is insufficient LFG to run at 100% continuously, the LFG would be temporarily stored for later use. The generator would be activated according to the WWTP real-time demands, as well as real-time knowledge of the current market rate for electricity.

Practically, this would be challenging system to implement. The facility does not currently have the capability to accumulate and store LFG and the generator is not equipped with the necessary control logic. A further hinderance is that the startup sequence of the generator is a manual operation which takes significant time accomplish. The startup time (30 minutes minimum, several hours maximum) would not be able to respond to real-time variation in WWTP load and electrical market price variation.

4.5.2 Efficiency Opportunities

As indicated in 4.5.1, intelligently scheduling generator uptime to match peak use times is impractical. The best use of LFG in generating electricity is to run the generator as continuously as possible, utilizing whatever level of gas is currently available. The particular generator chosen for this facility is ideally suited to low methane values, which maximizes the likelihood that the generator can be operated at a particular time.

Although there is little flexibility on scheduling when the generator can be operated, an alternate strategy to maximize the cost-benefit of the generated electricity would be intentionally schedule WWTP loads to, when possible, activate only when the generator is operational. This would increase the chance that the generated electricity is offsetting imported energy instead of being exported. As

described in section 3, exported electricity does not attract the same price as is paid for imported energy.

The viability of such an efficiency scheme is beyond the scope of this report, since it would involve an audit of WWTP to determine which loads may be candidates for such scheduling. It would also depend on whether or not such loads currently have the necessary controls to allow scheduling.

4.6 Landfill Gas Characteristics

Detailed analysis of the landfill gas was reviewed in Section 2. The landfill gas is below the CH_4 concentration originally predicted. The weighted concentration from Table 2 is 45% Ch_4, but this concentration may be improved through additional cover on recently filled areas. After the gas is extracted from the wellfield, it is processed, as described in Section 2.5, to remove moisture for improved combustion and to remove siloxane that can damage the generator.

4.7 Process SWOT Assessment

A SWOT analysis examines the factors that influence the successful implementation of a program or project. By categorizing the factors according to their position relative to the project and their effect on project success, the team can make informed decisions about how to leverage advantages and mitigate problems. The factors are segmented into four categories as follows:

- **S**trengths – positive factors internal to the project
- **W**eaknesses – negative factors internal to the project
- **O**pportunities – positive factors external to the project
- **T**hreats – negative factors external to the project

Figure 22 - SWOT diagram

The SWOT analysis in this report is conducted with the goal of maximizing generator availability; reaching the point where the generator is producing its rated power output as often as possible. Factors are determined as internal or external relative to the generator.

4.7.1 Strengths

Having a strong and knowledgeable partner in Comcor Environmental Limited (Comcor) is an asset to the City of Kawartha Lakes. Comcor bring technical experience and operational resources to the operation of the landfill generator. The knowledge base allows rapid response and recommendations during troubleshooting operations. Staff are familiar with the configuration of the installation and procedures. Comcor's relationship with the equipment and site positions them to make strong recommendations to address weaknesses and threats and identify additional opportunities to maximize the generator availability.

The generator itself is the optimal equipment for the site. The design report acknowledges the gas composition is typically 45% CH4 and may range from 35% to 50%. The Jenbacher JGC 208 will operate with CH4 concentrations as low as 30%.

4.7.2 Weaknesses

Over the past two reporting years the generator experienced a downtime percentage of 33% in 2017-18 and 43% in 2018-19. This could represent up to 928,550 kWh in 2019 at the current average generating level of 245 kW. A certain level of downtime is anticipated owing to regular maintenance and routine equipment fatigue. Mitigation of the downtime may be achieved by cross-trained personnel, reduction of grid interruption trips, well management and maintenance, and faster turn-around on requests for expenditure as discussed in Section 4.4.

When the system was commissioned, a recommended spare parts list was prepared and provided to the City of Kawartha Lakes for approval. The full list was not approved which opens the possibility of critical spare parts being unavailable when required. To date, this situation has not been encountered. To mitigate the possibility of future repairs being impeded by a missing critical component, a fund may be developed to spread out the purchase of the spare parts that were no approved on the initial list. This way costs can be managed while improving future responsiveness. The spare parts list should also be reviewed annually.

When the equipment has a downtime event during weekend hours, the service call is delayed to the next business day to prevent after-hours call outs. As discussed in the downtime reduction strategies, training of City of Kawartha Lakes staff to perform limited re-start procedures can mitigate the generation hours lost to genset trips that can otherwise be reset efficiently.

4.7.3 Opportunities

The amount of gas captured by the wells has already been a subject of review by the City of Kawartha Lakes and Comcor. This has resulted in additional wells added to the collection system. As discussed later in this report (Section 5.3.3), further expansion of the wellfield to concentrate collection in areas that are showing high gas production can improve the quantity of gas and increase the energy generated.

The landfill is expected to continue accepting waste until 2035 although future waste diversion programs may extend that date. As fill continues to be added, the potential for methane capture is extended. If no further waste is added to the landfill after 2035, the period of stable methane generation and collection potential will typically last for 20 years (ASTDR 2008). Continued investment to maintain and expand the well-field into newly opened and filled sections of the landfill will allow the generator to continue operation until 2055 barring significant mechanical failure.

Increasing the cover on the landfill will allow methane to be concentrated for collection. Current cover is done with re-useable steel plates. When a cell is permanently closed, the plates are replaced with soil cover and the cell is capped with a geomembrane. This will promote collection of the methane within the cell and increase the available fuel for the generator.

Selective and planned well installation can increase the collection of methane. As new material is added to the landfill, new wells can be added to take advantage of the methane generation. Coordination of the long-term methane collection plan and well-field expansions with the waste positioning will allow landfill cells to be optimized so wells can be added and brought on-line efficiently. This may allow smaller regular increases to the system rather than large sections coming on-line after longer intervals.

By implementing the increased operator training discussed in Section 4.3 generation potential is increased by the reduction of downtime owing to simple shutdown causes and basic re-start. By having staff locally who are trained to restart the generator system after it trips owing to low-gas conditions or power grid interruptions the generator can be returned to service within hours, maximizing the use of the landfill gas and the electricity generated.

4.7.4 Threats

A recurring note during review of the downtime records is the response time for expenditure requests. This has been noted particularly in relation to dry-ice blasting of cylinder liners. The policies and procedures of the City of Kawartha Lakes in relation to budget and procurements are independent of this report. Within the framework of the existing conditions, the team managing and maintaining the generator has researched alternative solutions to manage costs. During future budget cycles, it will be necessary to maintain or increase the budget level to ensure cuts to the program are not implemented that may extend reviews of expense requests or force prioritizing repairs.

An additional threat is the low concentration of CH_4 in the collected gas. Steps have been taken to concentrate the gas by improving cover conditions. Mechanical additions to the equipment to refine the landfill gas and concentrate will impact the energy efficiency of the installation and should not be considered at this time.

5. Economic Analysis

As part of this analysis we evaluated several scenarios:

- The Net Present Value (NPV) of the original business case
- The NPV of the original business case re-baselined using actual data for methane content and without the inflation of electricity prices
- The NPV of the actual realized performance
- The NPV of terminating electricity generation and decommissioning the system
- The NPV under different optimization scenarios

Each of these is described in the following subsections.

5.1 Overview of Main Assumptions

We assessed the system relative to financial projections on which the initial business case was based. Our initial step was to re-examine those projections based on actual experience since 2016. All calculations are presented in constant 2017 dollars with the discount rate assumed to be equal to the rate of inflation unless otherwise noted. Effective gas flow is the product of nominal gas flow (approximately 115 cfm) and plant availability

The electromechanical efficiency of the generating plant (i.e. the efficiency with which the generator converts contained energy in the LFG to kilowatt hours of electricity) was estimated using existing data from the site. The kilowatt hours exported were graphed against the contained methane and a simple regression used to derive the following equation:

$$Qe = 3.894M - 5722$$

Where,

Q_e = kWh exported

M = cubic metres of contained methane (calculated from the BTU records at the plant)

Optimization inputs are estimated to reflect the range of performance likely achievable rather than the best- or worst-case scenarios. Overall financial performance is measured using the modelled net present value (NPV) which is the sum of revenues and expenditures over the period from 2016 to 2035 discounted for the cost of capital and the rate of inflation. Because the rate of inflation and the cost of capital were assumed to be the same, the NPV in our analysis is the simple sum of costs and revenues expressed in 2017 dollars.

5.2 Modelled Baseline Scenarios

5.2.1 Original Business Case

The original business case was based on a discounted cash flow analysis assuming average gas flow of 115 cfm containing 50% methane and a plant availability of 80%. The pro forma analysis also assumed an initial realized price of 11.1¢/kWh increasing at an annual rate of 3% with annual operating costs of $140,000/a increasing at an annual rate of 2%. A single major engine overhaul/rebuild for $175,000 was assumed after 10 years of operations. These assumptions yielded a net present value (NPV) of $1,596,219 after 20 years (i.e. in 2035) including capital cost recovery. Ignoring capital costs and related interest (i.e. ignoring sunk costs) yielded an NPV of $2,718,101 over the same period.

5.2.2 Original Business Case Re-baselined

The original business case was based on the price of electricity increasing at an annual rate of 3% with annual operating costs increasing at an annual rate of 2%. The modelling of a long-term relative acceleration of electricity costs is not necessarily wrong, but it would require an extraordinarily strong case to be prudent. For the re-baselined business case we have assumed that both the realized price of electricity and the operating costs increase at the same rate. The initial assumptions were based on a throughput of 115 cfm and 50% methane content. Actual methane content has averaged about 40% and this lower value was used in the re-baselined analysis. Actual throughput has been lower than 115 cfm but this has been affected by the methane content and plant availability, so this assumption has been left unchanged. Annual operating costs were assumed to be $124,400 until 2021 with the costs then increasing to $137,348. An additional allowance of $15,000/a was assumed for call-outs and unexpected maintenance. Actual annual costs have been $156,400 with an additional $30,815/a for call-outs and unexpected maintenance. For the re-baselined case, we have taken the actual annual operating costs of $156,400 plus $23,000 for call-outs.

The re-baselined analysis yields an NPV of $549,862 more than $2,000,000 lower than the original business case.

Table 9 - Re-baselined Financial Projections

Parameter	Initial Estimate	Re-baselined	Difference in NPV
Gas flow	115	115	nc [Note 1]
Methane content (%)	50	40	($1,131,520)
Plant availability (%)	80	80	nc
Initial Price/kWh ($-approximate)	11.5	11.5	nc
Rate of increase in electricity cost (%)	1% net of inflation	0	($544,925)
Operating cost ($/a)	$149,361	$179,400	($600,779)
NPV	$2,718,101	$549,862	($2,168,239)[Note 2]

Notes:

1) Gas flow and methane content are not independent parameters as an increase in gas flow is accompanied by a decrease in methane content due to increased dilution. A limiting methane content is therefore inescapably accompanied by a limit in gas flow.
2) The differences in NPV for individual changes in baseline values do not add up to the total difference
3) All costs in 2017 dollars

The re-baselined estimate yields an NPV (excluding sunk costs) of approximately $549,862. This represents a reduction of approximately $2,277,224 compared to the initial estimates – most of which can be attributed to the reduced methane content in the landfill gas (40% vs the initial estimate of 50%). The assumed divergence between the annual increase in electricity cost vs. the annual increase in operating costs contributed $544,925 to the initial NPV estimates. The increase in operating costs also results in a significant ($600,779) reduction in NPV. We note that the NPV estimate is equally sensitive to changes in plant availability, gas flow, and methane content as all three of these parameters are interrelated and each affects revenue in the same manner.

5.2.3 Continue As-Is (i.e. Do Nothing)

The difference between initial assumptions/estimates and observed performance is summarized on the following table:

Table 10 - Initial Financial Projections vs. 2016-2019 Performance

Parameter	Initial Estimate	Re-baselined	2016-2019 Actual	Difference from Original Estimate(%)
Gas flow	115	115	80 (approx.)	-30%
Methane content (%)	50	40	40	-20%
Plant availability (%)	80	80	56	-33%
Price/kWh ($-approximate)	11.5	11.5	11.5	nc
Rate of increase in electricity cost (%)	3	2	2	Note 1
Operating cost ($/a)	$149,361	$179,400	187,215	+ 25%
Rate of increase in operating cost (%)	2	2	N/A	Note 1
NPV	$2,718,101	$549,862	($722,388)	($3,440,489)

Notes:

1) Insufficient data for a reliable estimate
2) All costs in 2017 dollars

The actual performance has fallen short of the revised baseline estimate primarily due to plant availability averaging about 56% compared to the baseline estimate of 80%. This results in a negative NPV of ($722,388). Therefore, the viability of the landfill gas generating plant hinges on the ability to achieve a marked improvement on the current trend. The elevated operating costs (compared to the revised baseline) are mostly correlated to the shortfall in plant availability.

5.2.4 Terminate Electricity Generation (i.e. Shut Down)

If no improvement to the existing trend is possible then the decommissioning of the generation plant would avoid future operating losses of $631,498 to 2035 (assuming that the system is decommissioned in 2020). Salvage value is assumed to be minimal and roughly equal to the decommissioning costs. The amount of operating losses avoided in this case is lower than the ($722,388) under the observed trend because this number (the $722,388) includes the years 2016-2019 for which operating losses are sunk costs.

In the event the generation plant was decommissioned, there would be on-going costs associated with the mandatory continued operation of the flare system and the well-field. The base cost to operate the flare and well-field is $43,612 (2017 dollars) each year. Each year there are additional extra costs which have ranged from $2,000 in 2016 to $21,770 (which includes an exceptional $15,600 repair to a pump drain trap requiring confined space entry) in 2018.

5.3 Modelled Scenarios to Improve System NPV

5.3.1 Attribution of Wellfield and Flare Operations and Maintenance

The City's current contract with Comcor includes monthly and annual reporting along with operation of the wellfield and flare. As emissions reporting is mandatory for large landfills in Ontario, a portion of these costs would be incurred by the City regardless of whether or not the generating plant is operating. This means that the costs avoided under the plant shut down alternative are overstated by

approximately $6,500/month (Comcor, personal communication). If we reduce the nominal operations and maintenance costs by the "sunk" $6,500/month this substantially increases the NPV of the plant to $525,611.

5.3.2 Increase Plant Availability

Improving plant availability offers the best opportunity to achieve meaningful increases in financial performance. The current 4-year average availability is 66.4% and the average over the past 2 years is even lower at 53.8%. At the current methane concentration delivered to the plant, each percent increase in plant availability adds $2,518 in annual revenue (based on a realized price of 0.115/kWh) and about $50,000 to the 20-year NPV.

The following strategies are recommended for implementation to minimize the downtime of the generator:

- Train City of Kawartha Lakes staff to perform guided restarts.
- Continue well management and wellfield maintenance to improve fuel quality and quantity.
- Consult with Hydro One to identify root cause of grid interruption trips and mitigate effects through staff training.
- Maintain spare parts and identify critical components for obsolescence.

Implementing strategies discussed above may reduce the generator downtime as shown in the following table:

Table 11 - Theoretical Downtime Distribution

	A	B	C	D	E	F	G	H	Total
Theoretical	275	200	83	200	48	208	24	165	1203

With downtime at 1203 hours/year, the total runtime on the plant may achieve 7557 hours or 86% of total possible generation time. At the measured daily generation rate of 245 kW, that represents a total of 1,851,465 kWh of generation potential for a plant Availability of 63%, nearly double the 2018-19 Availability of 38%.

Table 12 - Reported Downtime Hours

	A	B	C	D	E	F	G	H	Total
2017-18	309	299	540	552	0	626	24	559	2909
2018-19	226	363	79	210	224	2354	231	103	3790
Total	535	662	619	762	224	2980	255	662	6699

Total possible runtime hours are 8760 hours/year. This is not the same as Availability which is the percentage of generated electricity against the theoretical maximum.

We have assumed that these measures will result in a 33% reduction in plant downtime for an NPV increase of $520,024 to $1,045,635.

5.3.3 Wellfield Expansion

As discussed in Section 2.4, we suspect that the methane collection efficiency in the old landfill area is lower than previously predicted. Improved methane recovery may be obtained in this area by constructing a number of additional LFG collection wells that could be tied into the existing collection piping.

For the purpose of our modelling we have assumed the construction of an additional four vertical collector wells within the old landfill area and further assumed that these will provide at least one well with performance as good as that obtained from Collection Well GWT-2 which has produced >50% methane for most of the period since the commissioning of the generation facility, and currently supplies close to 10% of the total methane collected. The simulation assumes a construction cost of $30,000 for each well.

In reality, we would expect better results in the short term and the increase in methane content may also be expected to reduce the number of shut-downs in the generation plant. Over the longer term, the new wells will become depleted, but they may help bridge the interval of time before the new wells in the north landfill area reach peak methane generation. For the purpose of modelling we have assumed that the new wells would provide a 25% increase in methane collected in the first year declining to a 10% increase by the 4th year and continuing thereafter.

Under these assumptions, wellfield expansion in the old landfill area is predicted to increase NPV by $224,134 to $1,269,769.

5.3.4 Aggregate Effect

The combination of accounting for mandated costs, taking recommended measures to increase plant availability, and the construction of new vertical LFG collection wells in the old landfill area is predicted to increase the plant NPV from ($722,388) to $1,269,769 s shown on the following table:

Table 13 - Initial Financial Projections vs. 2016-2019 Performance

Parameter	NPV	Change in NPV relative to Actual Performance	Change in NPV relative to Rebaseline
Initial Case	$2,718,101		
Re-baselined Case	$549,862		
Actual Performance	($722,388)		
Shut-down	($631,498)		
Revised Attribution of O&M Costs	$525,611	$1,247,999	($24,251)
Revised Attribution plus Increased Plant Availability	$1,045,635	$1,768,023	$495,773
Revised Attribution plus Increased Plant Availability plus Wellfield Expansion	$1,269,769	$1,901,267	$719,907

Notes:

1) All costs in 2017 dollars

We note that the largest change in NPV results from the attribution of O&M costs that the City of Kawartha Lakes would be legally mandated to incur whether or not the electricity generation plant is maintained. Changes in operating procedures to reduce plant downtime offers the next largest increase, followed by the wellfield expansion. The relative effect of these measures is shown on the following figure:

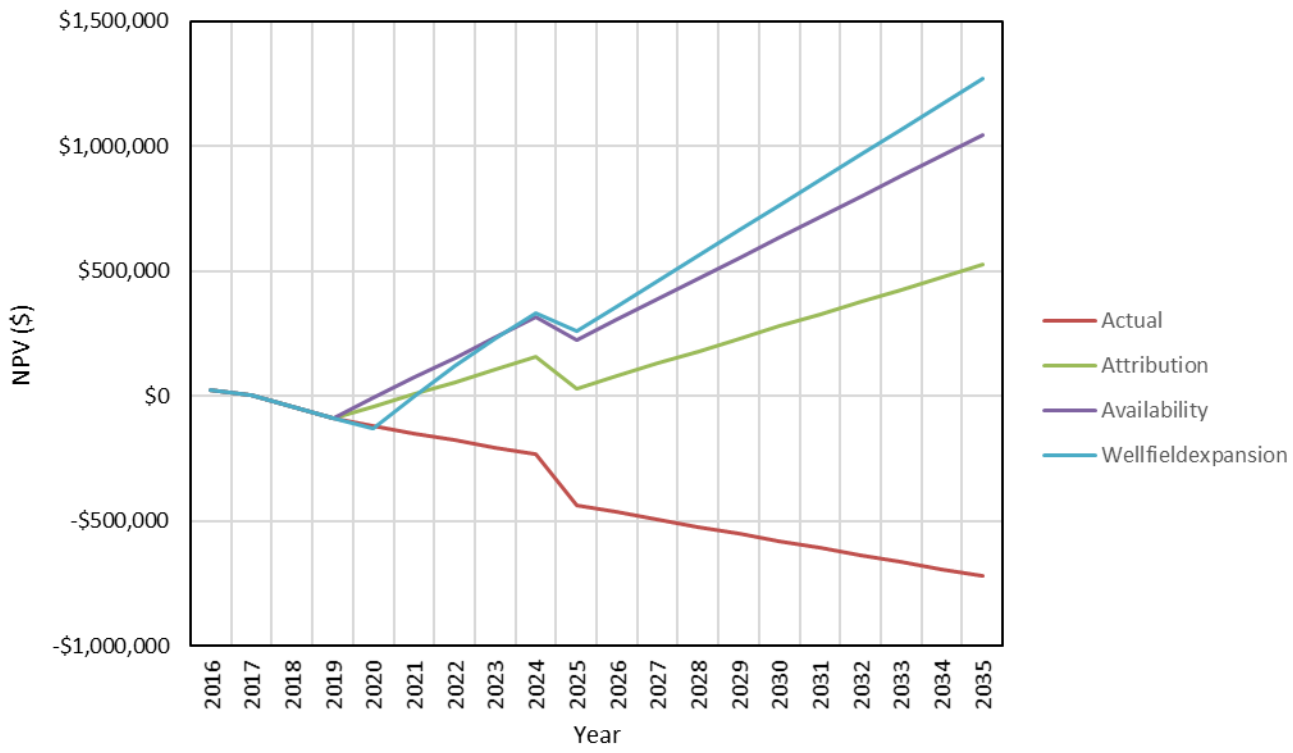

Figure 23 - Change in NPV vs. Time for Modelled Optimization Scenarios

As shown, the proposed measures yield a near-immediate improvement in financial performance. While the largest increase is due to the attribution of the "sunk" portion of O&M costs, the measures to improve the quantity and quality of the collected LFG and to improve plant availability represent a real increase in revenues to the City. Our modelling suggests that the relative contribution of the proposed collection wells in the old landfill area is marginal compared to the contribution provided by measures to improve plant availability. However, a simple comparison overlooks the fact that the two are inter-related since many of the generator trips are the caused by methane concentration falling too low. For this reason, we suggest that the recommended measures be taken in concert.

5.4 Sources of Uncertainty

While we have attempted to take a conservative approach in our analysis, there remain sources of uncertainty that are un-knowable at this stage. These include methane generation rates within the landfilled wastes, the achievable methane collection efficiency, electricity prices, inflation, future operations and maintenance costs, and the effectiveness of the recommended actions.

6. Environmental Aspects

The City of Kawartha Lakes is committed to environmentally sustainable projects and policies including waste diversion and emissions capture. The City's Healthy Environment Plan (2019) sets targets for emissions reductions and capture. Improvements to the wellfield and gas capture system will improve capture and provide additional fuel for the genset.

Without changes to the wellfield, at the projected output of 1,851,465 kWh/year generated (Section 4.4.2), 1,309 tonne of carbon are not required from other generation sources (www.epa.gov). The Healthy Environment Plan targets waste diversion increases from 39% to 70% by 2048 for a 20,110

tonne reduction to greenhouse gas. Operating the generator at optimal conditions, can increase the waste-related removal of carbon by 5%.

Continued operation of the genset will contribute to the environmental goals of the City of Kawartha Lakes.

7. Recommendations

Throughout this report several recommendations have been identified to improve the genset output and the value provided by operating the landfill gas generator. The recommendations are summarized below:

- It is recommended to have the operations manual amended to include data on the genset components. This will allow operators access to complete data.
- It is recommended to have City of Kawartha Lakes staff trained for low-risk restarts. This will allow downtime reductions owing to nuisance trips.
- The Wintek report made recommendations to mitigate the effects of the WWTP power-factor correction system, ranging from replacing the system, to adjusting the control narratives, to disabling the system. Implementing these recommendations will reduce the number of times the genset is tripped off owing to operating fluctuations at the WWTP.
- It is also recommended that the data logging mechanism for the power switch be adjusted to provide more data during trip events. This will provide additional data when evaluating the impacts of changes to the system.
- It is recommended to conduct an obsolescence review of critical path components. This will inform spare parts inventories to further mitigate or reduce downtime events.
- Further wellfield expansion is recommended to maximize the landfill gas collection and subsequent power generation. A test well added to the older landfill section in place of one of the shallow existing wells will quantify the increase to collection and generator output and provide justification for additional wells. This approximate cost will be $30,000.

7.1.1 Decision Points

In support the recommendations there will be decision points that will guide the optimization of the generator.

Immediate Timeline (3 to 6 months):

- Will city staff be trained to perform routine restarts?

Moderate Timeline (6 to 12 months)

- Will the City of Kawartha Lakes apply for the Climate Action Incentive Fund?
- Will the City of Kawartha Lakes apply for the Green Municipal Fund?
- Will an additional test well be dug in the old landfill?

Extended Timeline (12+ month)

- Will additional wells be added in the old landfill?
- Will the City of Kawartha Lakes proceed with applying for DGen status and review of Hydro One contract?

8. Summary

The landfill gas generator at Lindsay-Ops Landfill can provide useful energy for some time to come. The value can be enhanced with modifications to the wellfield and staff responsibilities. Reducing downtime through staff training, continued wellfield improvement and power factor correction system modifications will improve the net present value and provide the opportunity to increase the return on investment.

The performance envisaged in the original business case cannot be achieved because the actual LFG contains only 40% methane and the estimate assumed that electricity price would increase at greater than the rate of inflation. When we correct for these factors the re-baselined NPV falls to $549,862. The alternatives, to continue operations as-is or decommission the generator, will result in loss of sunk costs and loss of potential future revenues.

Actual performance has fallen considerably short of even the re-baselined value due largely to poor plant availability. However, the financial performance is better than the numbers suggest since costs related to the operation and maintenance of the LFG collection system would have to be incurred regardless. When we re-attribute this portion of the operating costs as a savings due to the plant, the NPV resets to $525,611.

Reviewing the contract with Hydro One will provide additional savings and possible additional revenues if the generator output is maximized. The operations contract does not represent a significant route to improved financial performance at this time but may be revisited in the future as circumstances change.

Further improvements to operational value may be realized through a series of measures to improve plant availability along with improving the quantity and quality of the collected LFG through the construction of a number of additional collector wells within the old landfill area. Primary benefits will be seen through staff training to recover from minor genset trips, increasing landfill gas collection, and rapid turn-around on expense approvals. These measures could reasonably be expected to increase plant availability by 63% and result in a further improvement of expected NPV of $520,024 to $1,045,635. Implementation of all measures will need to be coordinated to ensure the maximum benefit is achieved. Selective implementation will reduce the increases in NPV.

The operation of the generator also has the potential to offset 1,300 tonne of greenhouse emissions from other generation sources to operate the Waste Water Treatment Plant. The City of Kawartha Lakes has targeted reduced emissions as part of the Healthy Environment Plan and the generator is one of many paths to achieve the goal.

While it is not possible, in our opinion, to realize the originally envisaged financial performance, we believe that the recommended measures will offer a substantial improvement to the financial performance of the system and justifies continued operation of the Lindsay-Ops Landfill Gas Generator.

Respectfully Submitted,

THE GREER GALLOWAY GROUP INC.
CONSULTING ENGINEERS

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Shannon O'Rourke

9. References

Conestoga-Rovers & Associates, 2010. Landfill Gas Management Facilities Design Guidelines; Technical Report prepared for British Columbia Ministry of Environment, 230 p.

Mou, Z., C. Scheutz and P. Kjeldsen, 2016. Evaluation and application of site-specific data to revise the first-order decay model for estimating landfill gas generation and emissions at Daish landfills; Journal of the Air and Waste Management Associateion, 65:6, 686-698

Scharff, H., and J. Jacobs, 2006. Applying guidance for methane emission estimation for landfills; Waste management 26, 417-426

Golder Associates ltd. 2008. Landfill Gas Utilization Assessment, Lindsay Ops Landfill, City of Kawartha lakes, Ontario; Technical report prepared for the City of Kawartha Lakes and dated September 25, 2008

Ontario Ministry of Northern Development and Mines. Ontario Geological Survey 2006. 1:250 000 Scale Bedrock Geology of Ontario Content MRD126-REV.

Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV

Krause, M. J., Giles W. Chickering & Timothy G. Townsend, 2016. Translating landfill methane generation parameters among first-order decay models, Journal of the Air & Waste Management Association, 66:11, 1084-1097, DOI: 10.1080/10962247.2016.1200158

Appendix A
LandGEM 3.02 Model Outputs

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Thursday, November 28, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**2001**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.040**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2001	20,479	22,527	0	0
2002	31,140	34,254	20,479	22,527
2003	16,714	18,385	51,619	56,781
2004	16,163	17,779	68,333	75,166
2005	17,787	19,566	84,496	92,946
2006	23,965	26,362	102,283	112,511
2007	18,035	19,839	126,248	138,873
2008	19,200	21,120	144,283	158,711
2009	19,200	21,120	163,483	179,831
2010	19,200	21,120	182,683	200,951
2011	19,200	21,120	201,883	222,071
2012	31,824	35,006	221,083	243,191
2013	28,791	31,670	252,907	278,198
2014	26,030	28,633	281,698	309,868
2015	29,152	32,067	307,728	338,501
2016	27,736	30,510	336,880	370,568
2017	25,167	27,684	364,616	401,078
2018	27,205	29,926	389,783	428,761
2019	27,205	29,926	416,988	458,687
2020	27,205	29,926	444,193	488,612
2021	27,205	29,926	471,398	518,538
2022	27,205	29,926	498,603	548,463
2023	27,205	29,926	525,808	578,389
2024	27,205	29,926	553,013	608,314
2025	27,205	29,926	580,218	638,240
2026	27,205	29,926	607,423	668,165
2027	27,205	29,926	634,628	698,091
2028	27,205	29,926	661,833	728,016
2029	27,205	29,926	689,038	757,942
2030	27,205	29,926	716,243	787,867
2031	27,205	29,926	743,448	817,793
2032	27,205	29,926	770,653	847,718
2033	27,205	29,926	797,858	877,644
2034	27,205	29,926	825,063	907,569
2035	0	0	852,268	937,495
2036	0	0	852,268	937,495
2037	0	0	852,268	937,495
2038	0	0	852,268	937,495
2039	0	0	852,268	937,495
2040	0	0	852,268	937,495

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2041	0	0	852,268	937,495
2042	0	0	852,268	937,495
2043	0	0	852,268	937,495
2044	0	0	852,268	937,495
2045	0	0	852,268	937,495
2046	0	0	852,268	937,495
2047	0	0	852,268	937,495
2048	0	0	852,268	937,495
2049	0	0	852,268	937,495
2050	0	0	852,268	937,495
2051	0	0	852,268	937,495
2052	0	0	852,268	937,495
2053	0	0	852,268	937,495
2054	0	0	852,268	937,495
2055	0	0	852,268	937,495
2056	0	0	852,268	937,495
2057	0	0	852,268	937,495
2058	0	0	852,268	937,495
2059	0	0	852,268	937,495
2060	0	0	852,268	937,495
2061	0	0	852,268	937,495
2062	0	0	852,268	937,495
2063	0	0	852,268	937,495
2064	0	0	852,268	937,495
2065	0	0	852,268	937,495
2066	0	0	852,268	937,495
2067	0	0	852,268	937,495
2068	0	0	852,268	937,495
2069	0	0	852,268	937,495
2070	0	0	852,268	937,495
2071	0	0	852,268	937,495
2072	0	0	852,268	937,495
2073	0	0	852,268	937,495
2074	0	0	852,268	937,495
2075	0	0	852,268	937,495
2076	0	0	852,268	937,495
2077	0	0	852,268	937,495
2078	0	0	852,268	937,495
2079	0	0	852,268	937,495
2080	0	0	852,268	937,495

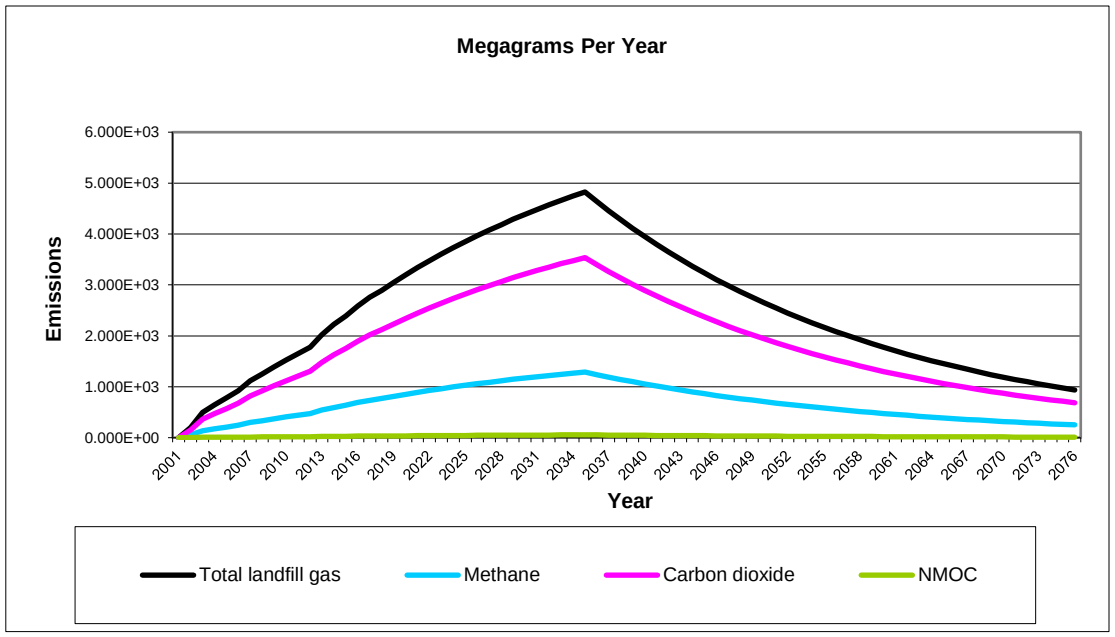
Pollutant Parameters

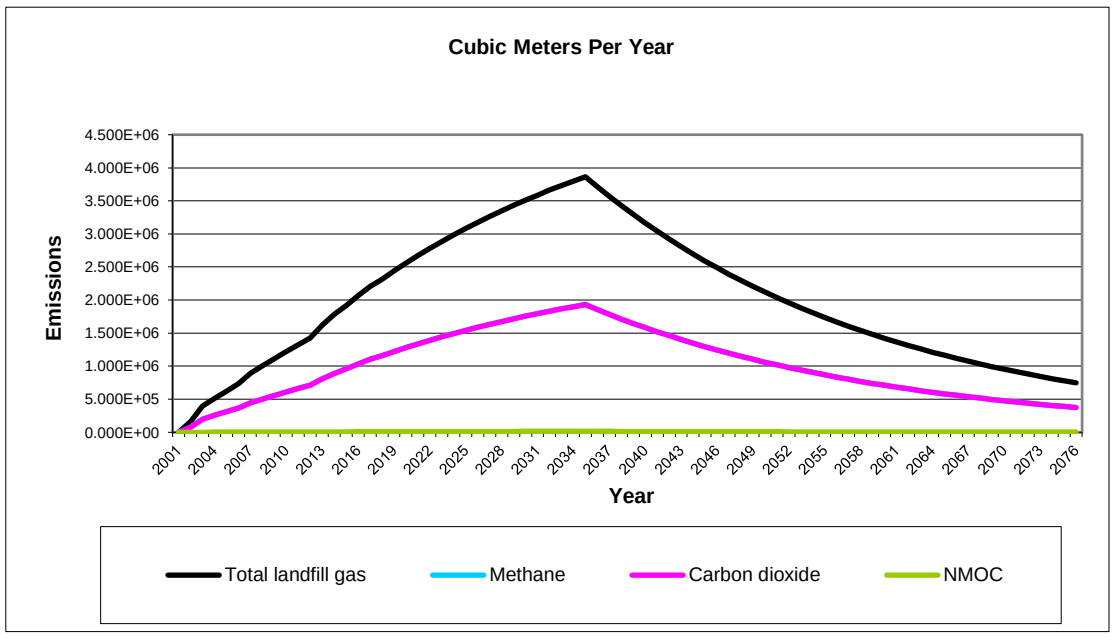
	Compound	Gas / Pollutant Default Parameters: Concentration (*ppmv*)	Molecular Weight	User-specified Pollutant Parameters: Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

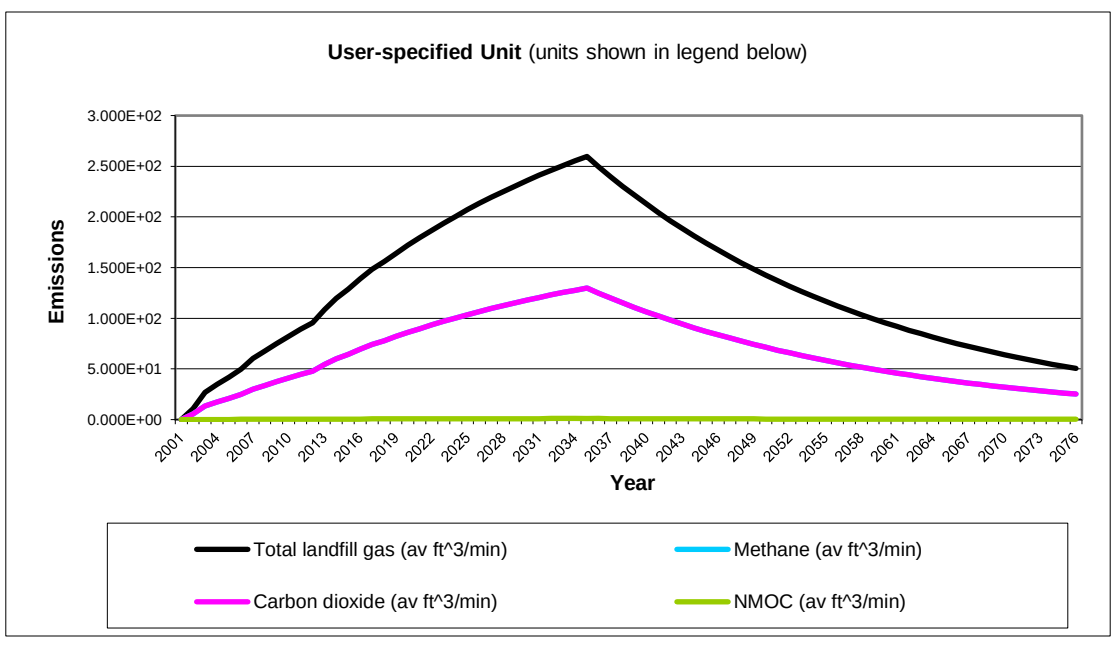
Pollutant Parameters (Continued)

	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
4.500E+06
4.000E+06
3.500E+06
3.000E+06
2.500E+06
2.000E+06
1.500E+06
1.000E+06
5.000E+05
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	2.010E+02	1.609E+05	1.081E+01	5.368E+01	8.046E+04	5.406E+00
2003	4.987E+02	3.993E+05	2.683E+01	1.332E+02	1.997E+05	1.341E+01
2004	6.431E+02	5.150E+05	3.460E+01	1.718E+02	2.575E+05	1.730E+01
2005	7.765E+02	6.218E+05	4.178E+01	2.074E+02	3.109E+05	2.089E+01
2006	9.206E+02	7.372E+05	4.953E+01	2.459E+02	3.686E+05	2.477E+01
2007	1.120E+03	8.966E+05	6.024E+01	2.991E+02	4.483E+05	3.012E+01
2008	1.253E+03	1.003E+06	6.740E+01	3.346E+02	5.016E+05	3.370E+01
2009	1.392E+03	1.115E+06	7.490E+01	3.718E+02	5.573E+05	3.745E+01
2010	1.526E+03	1.222E+06	8.210E+01	4.076E+02	6.109E+05	4.105E+01
2011	1.654E+03	1.325E+06	8.901E+01	4.419E+02	6.624E+05	4.451E+01
2012	1.778E+03	1.424E+06	9.566E+01	4.749E+02	7.119E+05	4.783E+01
2013	2.021E+03	1.618E+06	1.087E+02	5.397E+02	8.090E+05	5.436E+01
2014	2.224E+03	1.781E+06	1.196E+02	5.940E+02	8.904E+05	5.982E+01
2015	2.392E+03	1.915E+06	1.287E+02	6.390E+02	9.577E+05	6.435E+01
2016	2.584E+03	2.069E+06	1.390E+02	6.903E+02	1.035E+06	6.952E+01
2017	2.755E+03	2.206E+06	1.482E+02	7.359E+02	1.103E+06	7.412E+01
2018	2.894E+03	2.317E+06	1.557E+02	7.731E+02	1.159E+06	7.786E+01
2019	3.048E+03	2.440E+06	1.640E+02	8.141E+02	1.220E+06	8.198E+01
2020	3.195E+03	2.558E+06	1.719E+02	8.534E+02	1.279E+06	8.595E+01
2021	3.337E+03	2.672E+06	1.795E+02	8.913E+02	1.336E+06	8.976E+01
2022	3.473E+03	2.781E+06	1.869E+02	9.276E+02	1.390E+06	9.343E+01
2023	3.604E+03	2.886E+06	1.939E+02	9.626E+02	1.443E+06	9.694E+01
2024	3.729E+03	2.986E+06	2.006E+02	9.961E+02	1.493E+06	1.003E+02
2025	3.850E+03	3.083E+06	2.071E+02	1.028E+03	1.541E+06	1.036E+02
2026	3.966E+03	3.176E+06	2.134E+02	1.059E+03	1.588E+06	1.067E+02
2027	4.078E+03	3.265E+06	2.194E+02	1.089E+03	1.633E+06	1.097E+02
2028	4.185E+03	3.351E+06	2.251E+02	1.118E+03	1.675E+06	1.126E+02
2029	4.287E+03	3.433E+06	2.307E+02	1.145E+03	1.717E+06	1.153E+02
2030	4.386E+03	3.512E+06	2.360E+02	1.172E+03	1.756E+06	1.180E+02
2031	4.481E+03	3.588E+06	2.411E+02	1.197E+03	1.794E+06	1.206E+02
2032	4.573E+03	3.661E+06	2.460E+02	1.221E+03	1.831E+06	1.230E+02
2033	4.660E+03	3.732E+06	2.507E+02	1.245E+03	1.866E+06	1.254E+02
2034	4.744E+03	3.799E+06	2.553E+02	1.267E+03	1.900E+06	1.276E+02
2035	4.825E+03	3.864E+06	2.596E+02	1.289E+03	1.932E+06	1.298E+02
2036	4.636E+03	3.712E+06	2.494E+02	1.238E+03	1.856E+06	1.247E+02
2037	4.454E+03	3.567E+06	2.397E+02	1.190E+03	1.783E+06	1.198E+02
2038	4.280E+03	3.427E+06	2.303E+02	1.143E+03	1.714E+06	1.151E+02
2039	4.112E+03	3.293E+06	2.212E+02	1.098E+03	1.646E+06	1.106E+02
2040	3.951E+03	3.164E+06	2.126E+02	1.055E+03	1.582E+06	1.063E+02
2041	3.796E+03	3.039E+06	2.042E+02	1.014E+03	1.520E+06	1.021E+02
2042	3.647E+03	2.920E+06	1.962E+02	9.741E+02	1.460E+06	9.811E+01
2043	3.504E+03	2.806E+06	1.885E+02	9.359E+02	1.403E+06	9.426E+01
2044	3.367E+03	2.696E+06	1.811E+02	8.992E+02	1.348E+06	9.056E+01
2045	3.235E+03	2.590E+06	1.740E+02	8.640E+02	1.295E+06	8.701E+01
2046	3.108E+03	2.489E+06	1.672E+02	8.301E+02	1.244E+06	8.360E+01
2047	2.986E+03	2.391E+06	1.606E+02	7.976E+02	1.195E+06	8.032E+01
2048	2.869E+03	2.297E+06	1.543E+02	7.663E+02	1.149E+06	7.717E+01
2049	2.756E+03	2.207E+06	1.483E+02	7.362E+02	1.104E+06	7.415E+01
2050	2.648E+03	2.121E+06	1.425E+02	7.074E+02	1.060E+06	7.124E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	2.544E+03	2.037E+06	1.369E+02	6.796E+02	1.019E+06	6.845E+01
2052	2.445E+03	1.958E+06	1.315E+02	6.530E+02	9.788E+05	6.576E+01
2053	2.349E+03	1.881E+06	1.264E+02	6.274E+02	9.404E+05	6.318E+01
2054	2.257E+03	1.807E+06	1.214E+02	6.028E+02	9.035E+05	6.071E+01
2055	2.168E+03	1.736E+06	1.167E+02	5.791E+02	8.681E+05	5.833E+01
2056	2.083E+03	1.668E+06	1.121E+02	5.564E+02	8.341E+05	5.604E+01
2057	2.001E+03	1.603E+06	1.077E+02	5.346E+02	8.014E+05	5.384E+01
2058	1.923E+03	1.540E+06	1.035E+02	5.137E+02	7.699E+05	5.173E+01
2059	1.848E+03	1.479E+06	9.941E+01	4.935E+02	7.397E+05	4.970E+01
2060	1.775E+03	1.421E+06	9.551E+01	4.742E+02	7.107E+05	4.775E+01
2061	1.706E+03	1.366E+06	9.176E+01	4.556E+02	6.829E+05	4.588E+01
2062	1.639E+03	1.312E+06	8.817E+01	4.377E+02	6.561E+05	4.408E+01
2063	1.574E+03	1.261E+06	8.471E+01	4.205E+02	6.304E+05	4.235E+01
2064	1.513E+03	1.211E+06	8.139E+01	4.041E+02	6.056E+05	4.069E+01
2065	1.453E+03	1.164E+06	7.820E+01	3.882E+02	5.819E+05	3.910E+01
2066	1.396E+03	1.118E+06	7.513E+01	3.730E+02	5.591E+05	3.756E+01
2067	1.342E+03	1.074E+06	7.218E+01	3.584E+02	5.372E+05	3.609E+01
2068	1.289E+03	1.032E+06	6.935E+01	3.443E+02	5.161E+05	3.468E+01
2069	1.238E+03	9.917E+05	6.663E+01	3.308E+02	4.959E+05	3.332E+01
2070	1.190E+03	9.528E+05	6.402E+01	3.178E+02	4.764E+05	3.201E+01
2071	1.143E+03	9.155E+05	6.151E+01	3.054E+02	4.577E+05	3.076E+01
2072	1.098E+03	8.796E+05	5.910E+01	2.934E+02	4.398E+05	2.955E+01
2073	1.055E+03	8.451E+05	5.678E+01	2.819E+02	4.225E+05	2.839E+01
2074	1.014E+03	8.120E+05	5.456E+01	2.708E+02	4.060E+05	2.728E+01
2075	9.742E+02	7.801E+05	5.242E+01	2.602E+02	3.901E+05	2.621E+01
2076	9.360E+02	7.495E+05	5.036E+01	2.500E+02	3.748E+05	2.518E+01
2077	8.993E+02	7.201E+05	4.839E+01	2.402E+02	3.601E+05	2.419E+01
2078	8.641E+02	6.919E+05	4.649E+01	2.308E+02	3.460E+05	2.324E+01
2079	8.302E+02	6.648E+05	4.467E+01	2.218E+02	3.324E+05	2.233E+01
2080	7.976E+02	6.387E+05	4.291E+01	2.131E+02	3.194E+05	2.146E+01
2081	7.664E+02	6.137E+05	4.123E+01	2.047E+02	3.068E+05	2.062E+01
2082	7.363E+02	5.896E+05	3.962E+01	1.967E+02	2.948E+05	1.981E+01
2083	7.074E+02	5.665E+05	3.806E+01	1.890E+02	2.832E+05	1.903E+01
2084	6.797E+02	5.443E+05	3.657E+01	1.816E+02	2.721E+05	1.828E+01
2085	6.530E+02	5.229E+05	3.514E+01	1.744E+02	2.615E+05	1.757E+01
2086	6.274E+02	5.024E+05	3.376E+01	1.676E+02	2.512E+05	1.688E+01
2087	6.028E+02	4.827E+05	3.243E+01	1.610E+02	2.414E+05	1.622E+01
2088	5.792E+02	4.638E+05	3.116E+01	1.547E+02	2.319E+05	1.558E+01
2089	5.565E+02	4.456E+05	2.994E+01	1.486E+02	2.228E+05	1.497E+01
2090	5.347E+02	4.281E+05	2.877E+01	1.428E+02	2.141E+05	1.438E+01
2091	5.137E+02	4.114E+05	2.764E+01	1.372E+02	2.057E+05	1.382E+01
2092	4.936E+02	3.952E+05	2.655E+01	1.318E+02	1.976E+05	1.328E+01
2093	4.742E+02	3.797E+05	2.551E+01	1.267E+02	1.899E+05	1.276E+01
2094	4.556E+02	3.648E+05	2.451E+01	1.217E+02	1.824E+05	1.226E+01
2095	4.377E+02	3.505E+05	2.355E+01	1.169E+02	1.753E+05	1.178E+01
2096	4.206E+02	3.368E+05	2.263E+01	1.123E+02	1.684E+05	1.131E+01
2097	4.041E+02	3.236E+05	2.174E+01	1.079E+02	1.618E+05	1.087E+01
2098	3.882E+02	3.109E+05	2.089E+01	1.037E+02	1.554E+05	1.044E+01
2099	3.730E+02	2.987E+05	2.007E+01	9.964E+01	1.494E+05	1.003E+01
2100	3.584E+02	2.870E+05	1.928E+01	9.573E+01	1.435E+05	9.641E+00
2101	3.443E+02	2.757E+05	1.853E+01	9.198E+01	1.379E+05	9.263E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2102	3.308E+02	2.649E+05	1.780E+01	8.837E+01	1.325E+05	8.900E+00
2103	3.179E+02	2.545E+05	1.710E+01	8.491E+01	1.273E+05	8.551E+00
2104	3.054E+02	2.446E+05	1.643E+01	8.158E+01	1.223E+05	8.216E+00
2105	2.934E+02	2.350E+05	1.579E+01	7.838E+01	1.175E+05	7.894E+00
2106	2.819E+02	2.258E+05	1.517E+01	7.531E+01	1.129E+05	7.584E+00
2107	2.709E+02	2.169E+05	1.457E+01	7.235E+01	1.085E+05	7.287E+00
2108	2.603E+02	2.084E+05	1.400E+01	6.952E+01	1.042E+05	7.001E+00
2109	2.500E+02	2.002E+05	1.345E+01	6.679E+01	1.001E+05	6.727E+00
2110	2.402E+02	1.924E+05	1.293E+01	6.417E+01	9.619E+04	6.463E+00
2111	2.308E+02	1.848E+05	1.242E+01	6.166E+01	9.242E+04	6.209E+00
2112	2.218E+02	1.776E+05	1.193E+01	5.924E+01	8.879E+04	5.966E+00
2113	2.131E+02	1.706E+05	1.146E+01	5.691E+01	8.531E+04	5.732E+00
2114	2.047E+02	1.639E+05	1.101E+01	5.468E+01	8.197E+04	5.507E+00
2115	1.967E+02	1.575E+05	1.058E+01	5.254E+01	7.875E+04	5.291E+00
2116	1.890E+02	1.513E+05	1.017E+01	5.048E+01	7.566E+04	5.084E+00
2117	1.816E+02	1.454E+05	9.769E+00	4.850E+01	7.270E+04	4.884E+00
2118	1.745E+02	1.397E+05	9.386E+00	4.660E+01	6.985E+04	4.693E+00
2119	1.676E+02	1.342E+05	9.018E+00	4.477E+01	6.711E+04	4.509E+00
2120	1.610E+02	1.290E+05	8.664E+00	4.302E+01	6.448E+04	4.332E+00
2121	1.547E+02	1.239E+05	8.325E+00	4.133E+01	6.195E+04	4.162E+00
2122	1.487E+02	1.190E+05	7.998E+00	3.971E+01	5.952E+04	3.999E+00
2123	1.428E+02	1.144E+05	7.685E+00	3.815E+01	5.719E+04	3.842E+00
2124	1.372E+02	1.099E+05	7.383E+00	3.666E+01	5.494E+04	3.692E+00
2125	1.318E+02	1.056E+05	7.094E+00	3.522E+01	5.279E+04	3.547E+00
2126	1.267E+02	1.014E+05	6.816E+00	3.384E+01	5.072E+04	3.408E+00
2127	1.217E+02	9.746E+04	6.548E+00	3.251E+01	4.873E+04	3.274E+00
2128	1.169E+02	9.364E+04	6.292E+00	3.124E+01	4.682E+04	3.146E+00
2129	1.124E+02	8.997E+04	6.045E+00	3.001E+01	4.498E+04	3.022E+00
2130	1.079E+02	8.644E+04	5.808E+00	2.883E+01	4.322E+04	2.904E+00
2131	1.037E+02	8.305E+04	5.580E+00	2.770E+01	4.153E+04	2.790E+00
2132	9.965E+01	7.979E+04	5.361E+00	2.662E+01	3.990E+04	2.681E+00
2133	9.574E+01	7.666E+04	5.151E+00	2.557E+01	3.833E+04	2.576E+00
2134	9.199E+01	7.366E+04	4.949E+00	2.457E+01	3.683E+04	2.475E+00
2135	8.838E+01	7.077E+04	4.755E+00	2.361E+01	3.539E+04	2.378E+00
2136	8.491E+01	6.800E+04	4.569E+00	2.268E+01	3.400E+04	2.284E+00
2137	8.159E+01	6.533E+04	4.389E+00	2.179E+01	3.266E+04	2.195E+00
2138	7.839E+01	6.277E+04	4.217E+00	2.094E+01	3.138E+04	2.109E+00
2139	7.531E+01	6.031E+04	4.052E+00	2.012E+01	3.015E+04	2.026E+00
2140	7.236E+01	5.794E+04	3.893E+00	1.933E+01	2.897E+04	1.947E+00
2141	6.952E+01	5.567E+04	3.740E+00	1.857E+01	2.784E+04	1.870E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	1.473E+02	8.046E+04	5.406E+00	2.307E+00	6.437E+02	4.325E-02
2003	3.655E+02	1.997E+05	1.341E+01	5.725E+00	1.597E+03	1.073E-01
2004	4.713E+02	2.575E+05	1.730E+01	7.384E+00	2.060E+03	1.384E-01
2005	5.691E+02	3.109E+05	2.089E+01	8.915E+00	2.487E+03	1.671E-01
2006	6.747E+02	3.686E+05	2.477E+01	1.057E+01	2.949E+03	1.981E-01
2007	8.206E+02	4.483E+05	3.012E+01	1.286E+01	3.586E+03	2.410E-01
2008	9.181E+02	5.016E+05	3.370E+01	1.438E+01	4.013E+03	2.696E-01
2009	1.020E+03	5.573E+05	3.745E+01	1.598E+01	4.459E+03	2.996E-01
2010	1.118E+03	6.109E+05	4.105E+01	1.752E+01	4.887E+03	3.284E-01
2011	1.213E+03	6.624E+05	4.451E+01	1.899E+01	5.299E+03	3.561E-01
2012	1.303E+03	7.119E+05	4.783E+01	2.041E+01	5.695E+03	3.826E-01
2013	1.481E+03	8.090E+05	5.436E+01	2.320E+01	6.472E+03	4.348E-01
2014	1.630E+03	8.904E+05	5.982E+01	2.553E+01	7.123E+03	4.786E-01
2015	1.753E+03	9.577E+05	6.435E+01	2.746E+01	7.662E+03	5.148E-01
2016	1.894E+03	1.035E+06	6.952E+01	2.967E+01	8.278E+03	5.562E-01
2017	2.019E+03	1.103E+06	7.412E+01	3.163E+01	8.825E+03	5.929E-01
2018	2.121E+03	1.159E+06	7.786E+01	3.323E+01	9.270E+03	6.228E-01
2019	2.234E+03	1.220E+06	8.198E+01	3.499E+01	9.762E+03	6.559E-01
2020	2.342E+03	1.279E+06	8.595E+01	3.668E+01	1.023E+04	6.876E-01
2021	2.445E+03	1.336E+06	8.976E+01	3.831E+01	1.069E+04	7.181E-01
2022	2.545E+03	1.390E+06	9.343E+01	3.987E+01	1.112E+04	7.474E-01
2023	2.641E+03	1.443E+06	9.694E+01	4.137E+01	1.154E+04	7.755E-01
2024	2.733E+03	1.493E+06	1.003E+02	4.282E+01	1.195E+04	8.026E-01
2025	2.822E+03	1.541E+06	1.036E+02	4.420E+01	1.233E+04	8.286E-01
2026	2.907E+03	1.588E+06	1.067E+02	4.553E+01	1.270E+04	8.535E-01
2027	2.988E+03	1.633E+06	1.097E+02	4.681E+01	1.306E+04	8.775E-01
2028	3.067E+03	1.675E+06	1.126E+02	4.804E+01	1.340E+04	9.006E-01
2029	3.142E+03	1.717E+06	1.153E+02	4.923E+01	1.373E+04	9.227E-01
2030	3.215E+03	1.756E+06	1.180E+02	5.036E+01	1.405E+04	9.440E-01
2031	3.284E+03	1.794E+06	1.206E+02	5.145E+01	1.435E+04	9.644E-01
2032	3.351E+03	1.831E+06	1.230E+02	5.250E+01	1.465E+04	9.841E-01
2033	3.415E+03	1.866E+06	1.254E+02	5.350E+01	1.493E+04	1.003E+00
2034	3.477E+03	1.900E+06	1.276E+02	5.447E+01	1.520E+04	1.021E+00
2035	3.536E+03	1.932E+06	1.298E+02	5.540E+01	1.546E+04	1.038E+00
2036	3.398E+03	1.856E+06	1.247E+02	5.323E+01	1.485E+04	9.978E-01
2037	3.265E+03	1.783E+06	1.198E+02	5.114E+01	1.427E+04	9.586E-01
2038	3.137E+03	1.714E+06	1.151E+02	4.914E+01	1.371E+04	9.210E-01
2039	3.014E+03	1.646E+06	1.106E+02	4.721E+01	1.317E+04	8.849E-01
2040	2.895E+03	1.582E+06	1.063E+02	4.536E+01	1.265E+04	8.502E-01
2041	2.782E+03	1.520E+06	1.021E+02	4.358E+01	1.216E+04	8.169E-01
2042	2.673E+03	1.460E+06	9.811E+01	4.187E+01	1.168E+04	7.849E-01
2043	2.568E+03	1.403E+06	9.426E+01	4.023E+01	1.122E+04	7.541E-01
2044	2.467E+03	1.348E+06	9.056E+01	3.865E+01	1.078E+04	7.245E-01
2045	2.371E+03	1.295E+06	8.701E+01	3.714E+01	1.036E+04	6.961E-01
2046	2.278E+03	1.244E+06	8.360E+01	3.568E+01	9.954E+03	6.688E-01
2047	2.188E+03	1.195E+06	8.032E+01	3.428E+01	9.564E+03	6.426E-01
2048	2.103E+03	1.149E+06	7.717E+01	3.294E+01	9.189E+03	6.174E-01
2049	2.020E+03	1.104E+06	7.415E+01	3.165E+01	8.828E+03	5.932E-01
2050	1.941E+03	1.060E+06	7.124E+01	3.040E+01	8.482E+03	5.699E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.865E+03	1.019E+06	6.845E+01	2.921E+01	8.150E+03	5.476E-01
2052	1.792E+03	9.788E+05	6.576E+01	2.807E+01	7.830E+03	5.261E-01
2053	1.721E+03	9.404E+05	6.318E+01	2.697E+01	7.523E+03	5.055E-01
2054	1.654E+03	9.035E+05	6.071E+01	2.591E+01	7.228E+03	4.857E-01
2055	1.589E+03	8.681E+05	5.833E+01	2.489E+01	6.945E+03	4.666E-01
2056	1.527E+03	8.341E+05	5.604E+01	2.392E+01	6.672E+03	4.483E-01
2057	1.467E+03	8.014E+05	5.384E+01	2.298E+01	6.411E+03	4.307E-01
2058	1.409E+03	7.699E+05	5.173E+01	2.208E+01	6.159E+03	4.139E-01
2059	1.354E+03	7.397E+05	4.970E+01	2.121E+01	5.918E+03	3.976E-01
2060	1.301E+03	7.107E+05	4.775E+01	2.038E+01	5.686E+03	3.820E-01
2061	1.250E+03	6.829E+05	4.588E+01	1.958E+01	5.463E+03	3.671E-01
2062	1.201E+03	6.561E+05	4.408E+01	1.881E+01	5.249E+03	3.527E-01
2063	1.154E+03	6.304E+05	4.235E+01	1.808E+01	5.043E+03	3.388E-01
2064	1.109E+03	6.056E+05	4.069E+01	1.737E+01	4.845E+03	3.255E-01
2065	1.065E+03	5.819E+05	3.910E+01	1.669E+01	4.655E+03	3.128E-01
2066	1.023E+03	5.591E+05	3.756E+01	1.603E+01	4.473E+03	3.005E-01
2067	9.833E+02	5.372E+05	3.609E+01	1.540E+01	4.297E+03	2.887E-01
2068	9.447E+02	5.161E+05	3.468E+01	1.480E+01	4.129E+03	2.774E-01
2069	9.077E+02	4.959E+05	3.332E+01	1.422E+01	3.967E+03	2.665E-01
2070	8.721E+02	4.764E+05	3.201E+01	1.366E+01	3.811E+03	2.561E-01
2071	8.379E+02	4.577E+05	3.076E+01	1.313E+01	3.662E+03	2.460E-01
2072	8.050E+02	4.398E+05	2.955E+01	1.261E+01	3.518E+03	2.364E-01
2073	7.735E+02	4.225E+05	2.839E+01	1.212E+01	3.380E+03	2.271E-01
2074	7.431E+02	4.060E+05	2.728E+01	1.164E+01	3.248E+03	2.182E-01
2075	7.140E+02	3.901E+05	2.621E+01	1.119E+01	3.120E+03	2.097E-01
2076	6.860E+02	3.748E+05	2.518E+01	1.075E+01	2.998E+03	2.014E-01
2077	6.591E+02	3.601E+05	2.419E+01	1.033E+01	2.881E+03	1.935E-01
2078	6.333E+02	3.460E+05	2.324E+01	9.920E+00	2.768E+03	1.860E-01
2079	6.084E+02	3.324E+05	2.233E+01	9.531E+00	2.659E+03	1.787E-01
2080	5.846E+02	3.194E+05	2.146E+01	9.158E+00	2.555E+03	1.717E-01
2081	5.617E+02	3.068E+05	2.062E+01	8.799E+00	2.455E+03	1.649E-01
2082	5.396E+02	2.948E+05	1.981E+01	8.454E+00	2.358E+03	1.585E-01
2083	5.185E+02	2.832E+05	1.903E+01	8.122E+00	2.266E+03	1.522E-01
2084	4.981E+02	2.721E+05	1.828E+01	7.804E+00	2.177E+03	1.463E-01
2085	4.786E+02	2.615E+05	1.757E+01	7.498E+00	2.092E+03	1.405E-01
2086	4.598E+02	2.512E+05	1.688E+01	7.204E+00	2.010E+03	1.350E-01
2087	4.418E+02	2.414E+05	1.622E+01	6.921E+00	1.931E+03	1.297E-01
2088	4.245E+02	2.319E+05	1.558E+01	6.650E+00	1.855E+03	1.246E-01
2089	4.078E+02	2.228E+05	1.497E+01	6.389E+00	1.782E+03	1.198E-01
2090	3.919E+02	2.141E+05	1.438E+01	6.139E+00	1.713E+03	1.151E-01
2091	3.765E+02	2.057E+05	1.382E+01	5.898E+00	1.645E+03	1.106E-01
2092	3.617E+02	1.976E+05	1.328E+01	5.667E+00	1.581E+03	1.062E-01
2093	3.475E+02	1.899E+05	1.276E+01	5.444E+00	1.519E+03	1.021E-01
2094	3.339E+02	1.824E+05	1.226E+01	5.231E+00	1.459E+03	9.805E-02
2095	3.208E+02	1.753E+05	1.178E+01	5.026E+00	1.402E+03	9.421E-02
2096	3.082E+02	1.684E+05	1.131E+01	4.829E+00	1.347E+03	9.051E-02
2097	2.962E+02	1.618E+05	1.087E+01	4.639E+00	1.294E+03	8.697E-02
2098	2.845E+02	1.554E+05	1.044E+01	4.458E+00	1.244E+03	8.356E-02
2099	2.734E+02	1.494E+05	1.003E+01	4.283E+00	1.195E+03	8.028E-02
2100	2.627E+02	1.435E+05	9.641E+00	4.115E+00	1.148E+03	7.713E-02
2101	2.524E+02	1.379E+05	9.263E+00	3.953E+00	1.103E+03	7.411E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	2.425E+02	1.325E+05	8.900E+00	3.798E+00	1.060E+03	7.120E-02
2103	2.330E+02	1.273E+05	8.551E+00	3.650E+00	1.018E+03	6.841E-02
2104	2.238E+02	1.223E+05	8.216E+00	3.506E+00	9.782E+02	6.573E-02
2105	2.151E+02	1.175E+05	7.894E+00	3.369E+00	9.399E+02	6.315E-02
2106	2.066E+02	1.129E+05	7.584E+00	3.237E+00	9.030E+02	6.067E-02
2107	1.985E+02	1.085E+05	7.287E+00	3.110E+00	8.676E+02	5.829E-02
2108	1.907E+02	1.042E+05	7.001E+00	2.988E+00	8.336E+02	5.601E-02
2109	1.833E+02	1.001E+05	6.727E+00	2.871E+00	8.009E+02	5.381E-02
2110	1.761E+02	9.619E+04	6.463E+00	2.758E+00	7.695E+02	5.170E-02
2111	1.692E+02	9.242E+04	6.209E+00	2.650E+00	7.393E+02	4.968E-02
2112	1.625E+02	8.879E+04	5.966E+00	2.546E+00	7.103E+02	4.773E-02
2113	1.562E+02	8.531E+04	5.732E+00	2.446E+00	6.825E+02	4.586E-02
2114	1.500E+02	8.197E+04	5.507E+00	2.350E+00	6.557E+02	4.406E-02
2115	1.442E+02	7.875E+04	5.291E+00	2.258E+00	6.300E+02	4.233E-02
2116	1.385E+02	7.566E+04	5.084E+00	2.170E+00	6.053E+02	4.067E-02
2117	1.331E+02	7.270E+04	4.884E+00	2.085E+00	5.816E+02	3.908E-02
2118	1.279E+02	6.985E+04	4.693E+00	2.003E+00	5.588E+02	3.754E-02
2119	1.228E+02	6.711E+04	4.509E+00	1.924E+00	5.369E+02	3.607E-02
2120	1.180E+02	6.448E+04	4.332E+00	1.849E+00	5.158E+02	3.466E-02
2121	1.134E+02	6.195E+04	4.162E+00	1.776E+00	4.956E+02	3.330E-02
2122	1.089E+02	5.952E+04	3.999E+00	1.707E+00	4.762E+02	3.199E-02
2123	1.047E+02	5.719E+04	3.842E+00	1.640E+00	4.575E+02	3.074E-02
2124	1.006E+02	5.494E+04	3.692E+00	1.576E+00	4.395E+02	2.953E-02
2125	9.663E+01	5.279E+04	3.547E+00	1.514E+00	4.223E+02	2.837E-02
2126	9.284E+01	5.072E+04	3.408E+00	1.454E+00	4.058E+02	2.726E-02
2127	8.920E+01	4.873E+04	3.274E+00	1.397E+00	3.898E+02	2.619E-02
2128	8.570E+01	4.682E+04	3.146E+00	1.343E+00	3.746E+02	2.517E-02
2129	8.234E+01	4.498E+04	3.022E+00	1.290E+00	3.599E+02	2.418E-02
2130	7.911E+01	4.322E+04	2.904E+00	1.239E+00	3.458E+02	2.323E-02
2131	7.601E+01	4.153E+04	2.790E+00	1.191E+00	3.322E+02	2.232E-02
2132	7.303E+01	3.990E+04	2.681E+00	1.144E+00	3.192E+02	2.145E-02
2133	7.017E+01	3.833E+04	2.576E+00	1.099E+00	3.067E+02	2.060E-02
2134	6.742E+01	3.683E+04	2.475E+00	1.056E+00	2.946E+02	1.980E-02
2135	6.477E+01	3.539E+04	2.378E+00	1.015E+00	2.831E+02	1.902E-02
2136	6.223E+01	3.400E+04	2.284E+00	9.749E-01	2.720E+02	1.827E-02
2137	5.979E+01	3.266E+04	2.195E+00	9.367E-01	2.613E+02	1.756E-02
2138	5.745E+01	3.138E+04	2.109E+00	9.000E-01	2.511E+02	1.687E-02
2139	5.520E+01	3.015E+04	2.026E+00	8.647E-01	2.412E+02	1.621E-02
2140	5.303E+01	2.897E+04	1.947E+00	8.308E-01	2.318E+02	1.557E-02
2141	5.095E+01	2.784E+04	1.870E+00	7.982E-01	2.227E+02	1.496E-02

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Thursday, November 28, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**2001**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.096**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**127**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2001	20,479	22,527	0	0
2002	31,140	34,254	20,479	22,527
2003	16,714	18,385	51,619	56,781
2004	16,163	17,779	68,333	75,166
2005	17,787	19,566	84,496	92,946
2006	23,965	26,362	102,283	112,511
2007	18,035	19,839	126,248	138,873
2008	19,200	21,120	144,283	158,711
2009	19,200	21,120	163,483	179,831
2010	19,200	21,120	182,683	200,951
2011	19,200	21,120	201,883	222,071
2012	31,824	35,006	221,083	243,191
2013	28,791	31,670	252,907	278,198
2014	26,030	28,633	281,698	309,868
2015	29,152	32,067	307,728	338,501
2016	27,736	30,510	336,880	370,568
2017	25,167	27,684	364,616	401,078
2018	27,205	29,926	389,783	428,761
2019	27,205	29,926	416,988	458,687
2020	27,205	29,926	444,193	488,612
2021	27,205	29,926	471,398	518,538
2022	27,205	29,926	498,603	548,463
2023	27,205	29,926	525,808	578,389
2024	27,205	29,926	553,013	608,314
2025	27,205	29,926	580,218	638,240
2026	27,205	29,926	607,423	668,165
2027	27,205	29,926	634,628	698,091
2028	27,205	29,926	661,833	728,016
2029	27,205	29,926	689,038	757,942
2030	27,205	29,926	716,243	787,867
2031	27,205	29,926	743,448	817,793
2032	27,205	29,926	770,653	847,718
2033	27,205	29,926	797,858	877,644
2034	27,205	29,926	825,063	907,569
2035	0	0	852,268	937,495
2036	0	0	852,268	937,495
2037	0	0	852,268	937,495
2038	0	0	852,268	937,495
2039	0	0	852,268	937,495
2040	0	0	852,268	937,495

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2041	0	0	852,268	937,495
2042	0	0	852,268	937,495
2043	0	0	852,268	937,495
2044	0	0	852,268	937,495
2045	0	0	852,268	937,495
2046	0	0	852,268	937,495
2047	0	0	852,268	937,495
2048	0	0	852,268	937,495
2049	0	0	852,268	937,495
2050	0	0	852,268	937,495
2051	0	0	852,268	937,495
2052	0	0	852,268	937,495
2053	0	0	852,268	937,495
2054	0	0	852,268	937,495
2055	0	0	852,268	937,495
2056	0	0	852,268	937,495
2057	0	0	852,268	937,495
2058	0	0	852,268	937,495
2059	0	0	852,268	937,495
2060	0	0	852,268	937,495
2061	0	0	852,268	937,495
2062	0	0	852,268	937,495
2063	0	0	852,268	937,495
2064	0	0	852,268	937,495
2065	0	0	852,268	937,495
2066	0	0	852,268	937,495
2067	0	0	852,268	937,495
2068	0	0	852,268	937,495
2069	0	0	852,268	937,495
2070	0	0	852,268	937,495
2071	0	0	852,268	937,495
2072	0	0	852,268	937,495
2073	0	0	852,268	937,495
2074	0	0	852,268	937,495
2075	0	0	852,268	937,495
2076	0	0	852,268	937,495
2077	0	0	852,268	937,495
2078	0	0	852,268	937,495
2079	0	0	852,268	937,495
2080	0	0	852,268	937,495

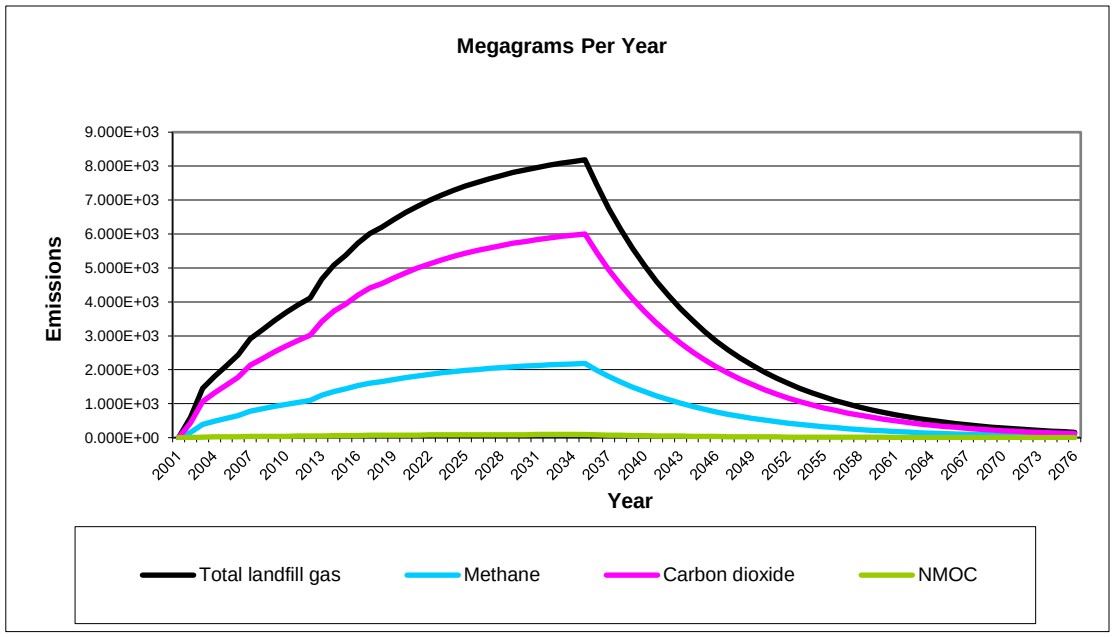
Pollutant Parameters

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
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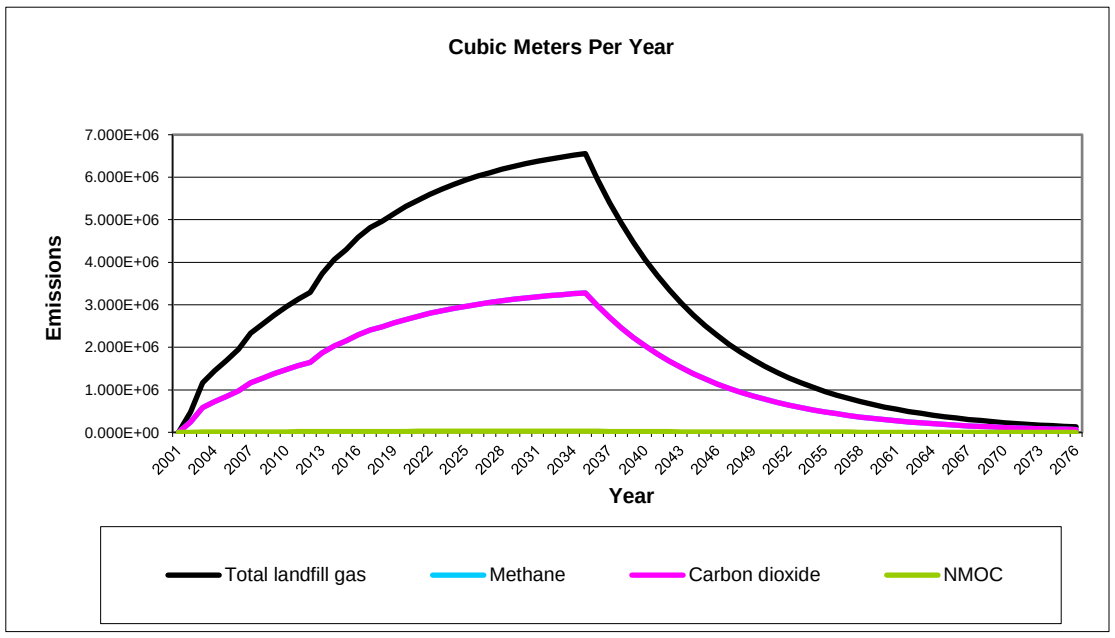
8.000E+03
7.000E+03
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
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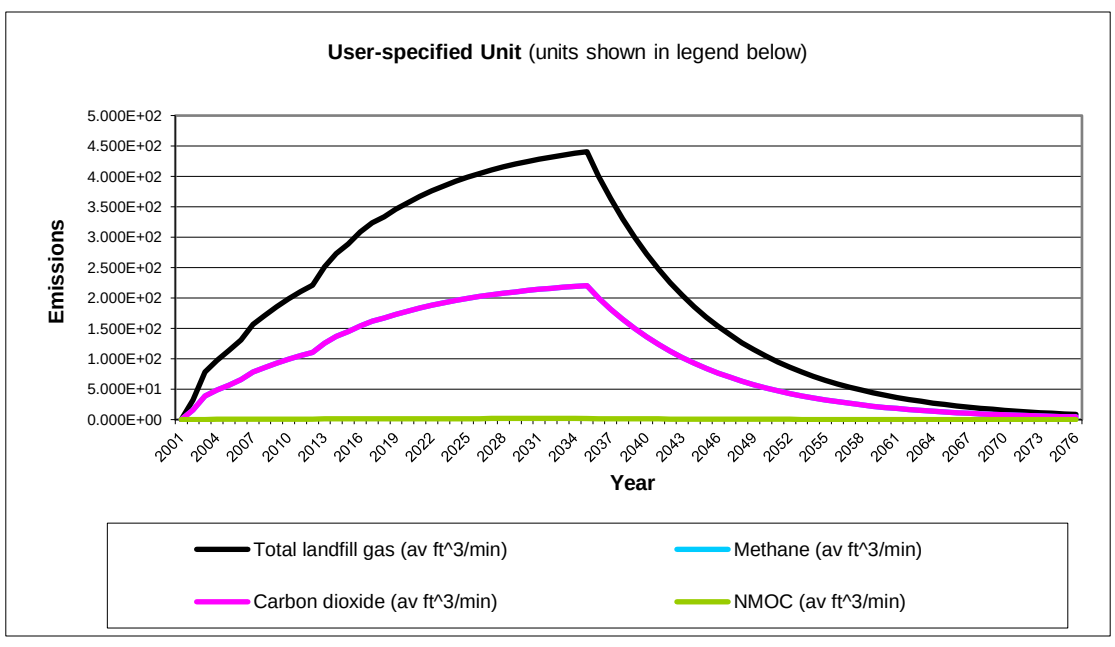
6.000E+06
5.000E+06
4.000E+06
3.000E+06
2.000E+06
1.000E+06
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
5.000E+02
4.500E+02
4.000E+02
3.500E+02
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	5.975E+02	4.784E+05	3.215E+01	1.596E+02	2.392E+05	1.607E+01
2003	1.451E+03	1.162E+06	7.808E+01	3.877E+02	5.811E+05	3.904E+01
2004	1.806E+03	1.446E+06	9.717E+01	4.824E+02	7.231E+05	4.859E+01
2005	2.112E+03	1.691E+06	1.136E+02	5.642E+02	8.457E+05	5.682E+01
2006	2.438E+03	1.952E+06	1.312E+02	6.512E+02	9.761E+05	6.558E+01
2007	2.914E+03	2.333E+06	1.568E+02	7.783E+02	1.167E+06	7.839E+01
2008	3.173E+03	2.541E+06	1.707E+02	8.476E+02	1.271E+06	8.537E+01
2009	3.443E+03	2.757E+06	1.852E+02	9.197E+02	1.379E+06	9.262E+01
2010	3.688E+03	2.953E+06	1.984E+02	9.851E+02	1.477E+06	9.921E+01
2011	3.911E+03	3.131E+06	2.104E+02	1.045E+03	1.566E+06	1.052E+02
2012	4.113E+03	3.293E+06	2.213E+02	1.099E+03	1.647E+06	1.106E+02
2013	4.665E+03	3.735E+06	2.510E+02	1.246E+03	1.868E+06	1.255E+02
2014	5.078E+03	4.066E+06	2.732E+02	1.356E+03	2.033E+06	1.366E+02
2015	5.372E+03	4.302E+06	2.890E+02	1.435E+03	2.151E+06	1.445E+02
2016	5.731E+03	4.589E+06	3.083E+02	1.531E+03	2.295E+06	1.542E+02
2017	6.016E+03	4.817E+06	3.237E+02	1.607E+03	2.409E+06	1.618E+02
2018	6.199E+03	4.964E+06	3.335E+02	1.656E+03	2.482E+06	1.668E+02
2019	6.426E+03	5.145E+06	3.457E+02	1.716E+03	2.573E+06	1.729E+02
2020	6.631E+03	5.310E+06	3.568E+02	1.771E+03	2.655E+06	1.784E+02
2021	6.818E+03	5.459E+06	3.668E+02	1.821E+03	2.730E+06	1.834E+02
2022	6.987E+03	5.595E+06	3.759E+02	1.866E+03	2.798E+06	1.880E+02
2023	7.142E+03	5.719E+06	3.842E+02	1.908E+03	2.859E+06	1.921E+02
2024	7.282E+03	5.831E+06	3.918E+02	1.945E+03	2.915E+06	1.959E+02
2025	7.409E+03	5.933E+06	3.986E+02	1.979E+03	2.966E+06	1.993E+02
2026	7.524E+03	6.025E+06	4.048E+02	2.010E+03	3.013E+06	2.024E+02
2027	7.629E+03	6.109E+06	4.105E+02	2.038E+03	3.055E+06	2.052E+02
2028	7.725E+03	6.185E+06	4.156E+02	2.063E+03	3.093E+06	2.078E+02
2029	7.811E+03	6.255E+06	4.203E+02	2.086E+03	3.127E+06	2.101E+02
2030	7.890E+03	6.318E+06	4.245E+02	2.107E+03	3.159E+06	2.122E+02
2031	7.961E+03	6.375E+06	4.283E+02	2.127E+03	3.188E+06	2.142E+02
2032	8.026E+03	6.427E+06	4.318E+02	2.144E+03	3.214E+06	2.159E+02
2033	8.085E+03	6.474E+06	4.350E+02	2.160E+03	3.237E+06	2.175E+02
2034	8.139E+03	6.517E+06	4.379E+02	2.174E+03	3.259E+06	2.189E+02
2035	8.188E+03	6.556E+06	4.405E+02	2.187E+03	3.278E+06	2.203E+02
2036	7.438E+03	5.956E+06	4.002E+02	1.987E+03	2.978E+06	2.001E+02
2037	6.757E+03	5.411E+06	3.636E+02	1.805E+03	2.705E+06	1.818E+02
2038	6.139E+03	4.916E+06	3.303E+02	1.640E+03	2.458E+06	1.651E+02
2039	5.577E+03	4.466E+06	3.000E+02	1.490E+03	2.233E+06	1.500E+02
2040	5.066E+03	4.057E+06	2.726E+02	1.353E+03	2.028E+06	1.363E+02
2041	4.603E+03	3.686E+06	2.476E+02	1.229E+03	1.843E+06	1.238E+02
2042	4.181E+03	3.348E+06	2.250E+02	1.117E+03	1.674E+06	1.125E+02
2043	3.799E+03	3.042E+06	2.044E+02	1.015E+03	1.521E+06	1.022E+02
2044	3.451E+03	2.763E+06	1.857E+02	9.218E+02	1.382E+06	9.283E+01
2045	3.135E+03	2.510E+06	1.687E+02	8.374E+02	1.255E+06	8.434E+01
2046	2.848E+03	2.281E+06	1.532E+02	7.607E+02	1.140E+06	7.662E+01
2047	2.587E+03	2.072E+06	1.392E+02	6.911E+02	1.036E+06	6.960E+01
2048	2.350E+03	1.882E+06	1.265E+02	6.278E+02	9.411E+05	6.323E+01
2049	2.135E+03	1.710E+06	1.149E+02	5.704E+02	8.549E+05	5.744E+01
2050	1.940E+03	1.553E+06	1.044E+02	5.182E+02	7.767E+05	5.219E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.762E+03	1.411E+06	9.482E+01	4.707E+02	7.056E+05	4.741E+01
2052	1.601E+03	1.282E+06	8.614E+01	4.276E+02	6.410E+05	4.307E+01
2053	1.454E+03	1.165E+06	7.825E+01	3.885E+02	5.823E+05	3.913E+01
2054	1.321E+03	1.058E+06	7.109E+01	3.529E+02	5.290E+05	3.555E+01
2055	1.200E+03	9.612E+05	6.458E+01	3.206E+02	4.806E+05	3.229E+01
2056	1.090E+03	8.732E+05	5.867E+01	2.913E+02	4.366E+05	2.934E+01
2057	9.907E+02	7.933E+05	5.330E+01	2.646E+02	3.966E+05	2.665E+01
2058	9.000E+02	7.207E+05	4.842E+01	2.404E+02	3.603E+05	2.421E+01
2059	8.176E+02	6.547E+05	4.399E+01	2.184E+02	3.274E+05	2.199E+01
2060	7.428E+02	5.948E+05	3.996E+01	1.984E+02	2.974E+05	1.998E+01
2061	6.748E+02	5.403E+05	3.630E+01	1.802E+02	2.702E+05	1.815E+01
2062	6.130E+02	4.909E+05	3.298E+01	1.637E+02	2.454E+05	1.649E+01
2063	5.569E+02	4.459E+05	2.996E+01	1.488E+02	2.230E+05	1.498E+01
2064	5.059E+02	4.051E+05	2.722E+01	1.351E+02	2.026E+05	1.361E+01
2065	4.596E+02	3.680E+05	2.473E+01	1.228E+02	1.840E+05	1.236E+01
2066	4.175E+02	3.343E+05	2.246E+01	1.115E+02	1.672E+05	1.123E+01
2067	3.793E+02	3.037E+05	2.041E+01	1.013E+02	1.519E+05	1.020E+01
2068	3.446E+02	2.759E+05	1.854E+01	9.205E+01	1.380E+05	9.270E+00
2069	3.131E+02	2.507E+05	1.684E+01	8.362E+01	1.253E+05	8.422E+00
2070	2.844E+02	2.277E+05	1.530E+01	7.597E+01	1.139E+05	7.651E+00
2071	2.584E+02	2.069E+05	1.390E+01	6.901E+01	1.034E+05	6.950E+00
2072	2.347E+02	1.880E+05	1.263E+01	6.270E+01	9.398E+04	6.314E+00
2073	2.132E+02	1.707E+05	1.147E+01	5.696E+01	8.537E+04	5.736E+00
2074	1.937E+02	1.551E+05	1.042E+01	5.174E+01	7.756E+04	5.211E+00
2075	1.760E+02	1.409E+05	9.468E+00	4.701E+01	7.046E+04	4.734E+00
2076	1.599E+02	1.280E+05	8.602E+00	4.270E+01	6.401E+04	4.301E+00
2077	1.452E+02	1.163E+05	7.814E+00	3.879E+01	5.815E+04	3.907E+00
2078	1.319E+02	1.057E+05	7.099E+00	3.524E+01	5.283E+04	3.549E+00
2079	1.199E+02	9.598E+04	6.449E+00	3.202E+01	4.799E+04	3.225E+00
2080	1.089E+02	8.720E+04	5.859E+00	2.909E+01	4.360E+04	2.929E+00
2081	9.893E+01	7.922E+04	5.323E+00	2.642E+01	3.961E+04	2.661E+00
2082	8.987E+01	7.197E+04	4.835E+00	2.401E+01	3.598E+04	2.418E+00
2083	8.165E+01	6.538E+04	4.393E+00	2.181E+01	3.269E+04	2.196E+00
2084	7.417E+01	5.939E+04	3.991E+00	1.981E+01	2.970E+04	1.995E+00
2085	6.738E+01	5.396E+04	3.625E+00	1.800E+01	2.698E+04	1.813E+00
2086	6.121E+01	4.902E+04	3.293E+00	1.635E+01	2.451E+04	1.647E+00
2087	5.561E+01	4.453E+04	2.992E+00	1.485E+01	2.227E+04	1.496E+00
2088	5.052E+01	4.045E+04	2.718E+00	1.349E+01	2.023E+04	1.359E+00
2089	4.590E+01	3.675E+04	2.469E+00	1.226E+01	1.838E+04	1.235E+00
2090	4.170E+01	3.339E+04	2.243E+00	1.114E+01	1.669E+04	1.122E+00
2091	3.788E+01	3.033E+04	2.038E+00	1.012E+01	1.517E+04	1.019E+00
2092	3.441E+01	2.755E+04	1.851E+00	9.192E+00	1.378E+04	9.257E-01
2093	3.126E+01	2.503E+04	1.682E+00	8.350E+00	1.252E+04	8.410E-01
2094	2.840E+01	2.274E+04	1.528E+00	7.586E+00	1.137E+04	7.640E-01
2095	2.580E+01	2.066E+04	1.388E+00	6.892E+00	1.033E+04	6.941E-01
2096	2.344E+01	1.877E+04	1.261E+00	6.261E+00	9.384E+03	6.305E-01
2097	2.129E+01	1.705E+04	1.146E+00	5.688E+00	8.525E+03	5.728E-01
2098	1.934E+01	1.549E+04	1.041E+00	5.167E+00	7.745E+03	5.204E-01
2099	1.757E+01	1.407E+04	9.455E-01	4.694E+00	7.036E+03	4.727E-01
2100	1.596E+01	1.278E+04	8.589E-01	4.264E+00	6.392E+03	4.295E-01
2101	1.450E+01	1.161E+04	7.803E-01	3.874E+00	5.807E+03	3.902E-01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	1.318E+01	1.055E+04	7.089E-01	3.519E+00	5.275E+03	3.544E-01
2103	1.197E+01	9.585E+03	6.440E-01	3.197E+00	4.792E+03	3.220E-01
2104	1.087E+01	8.707E+03	5.851E-01	2.905E+00	4.354E+03	2.925E-01
2105	9.879E+00	7.910E+03	5.315E-01	2.639E+00	3.955E+03	2.657E-01
2106	8.974E+00	7.186E+03	4.828E-01	2.397E+00	3.593E+03	2.414E-01
2107	8.153E+00	6.529E+03	4.387E-01	2.178E+00	3.264E+03	2.193E-01
2108	7.407E+00	5.931E+03	3.985E-01	1.978E+00	2.965E+03	1.992E-01
2109	6.729E+00	5.388E+03	3.620E-01	1.797E+00	2.694E+03	1.810E-01
2110	6.113E+00	4.895E+03	3.289E-01	1.633E+00	2.447E+03	1.644E-01
2111	5.553E+00	4.447E+03	2.988E-01	1.483E+00	2.223E+03	1.494E-01
2112	5.045E+00	4.040E+03	2.714E-01	1.348E+00	2.020E+03	1.357E-01
2113	4.583E+00	3.670E+03	2.466E-01	1.224E+00	1.835E+03	1.233E-01
2114	4.164E+00	3.334E+03	2.240E-01	1.112E+00	1.667E+03	1.120E-01
2115	3.782E+00	3.029E+03	2.035E-01	1.010E+00	1.514E+03	1.018E-01
2116	3.436E+00	2.752E+03	1.849E-01	9.179E-01	1.376E+03	9.244E-02
2117	3.122E+00	2.500E+03	1.680E-01	8.338E-01	1.250E+03	8.398E-02
2118	2.836E+00	2.271E+03	1.526E-01	7.575E-01	1.135E+03	7.629E-02
2119	2.576E+00	2.063E+03	1.386E-01	6.882E-01	1.032E+03	6.931E-02
2120	2.341E+00	1.874E+03	1.259E-01	6.252E-01	9.371E+02	6.296E-02
2121	2.126E+00	1.703E+03	1.144E-01	5.680E-01	8.513E+02	5.720E-02
2122	1.932E+00	1.547E+03	1.039E-01	5.160E-01	7.734E+02	5.196E-02
2123	1.755E+00	1.405E+03	9.442E-02	4.687E-01	7.026E+02	4.721E-02
2124	1.594E+00	1.277E+03	8.577E-02	4.258E-01	6.383E+02	4.289E-02
2125	1.448E+00	1.160E+03	7.792E-02	3.869E-01	5.799E+02	3.896E-02
2126	1.316E+00	1.054E+03	7.079E-02	3.514E-01	5.268E+02	3.539E-02
2127	1.195E+00	9.571E+02	6.431E-02	3.193E-01	4.786E+02	3.215E-02
2128	1.086E+00	8.695E+02	5.842E-02	2.900E-01	4.348E+02	2.921E-02
2129	9.865E-01	7.899E+02	5.307E-02	2.635E-01	3.950E+02	2.654E-02
2130	8.962E-01	7.176E+02	4.822E-02	2.394E-01	3.588E+02	2.411E-02
2131	8.141E-01	6.519E+02	4.380E-02	2.175E-01	3.260E+02	2.190E-02
2132	7.396E-01	5.923E+02	3.979E-02	1.976E-01	2.961E+02	1.990E-02
2133	6.719E-01	5.380E+02	3.615E-02	1.795E-01	2.690E+02	1.808E-02
2134	6.104E-01	4.888E+02	3.284E-02	1.630E-01	2.444E+02	1.642E-02
2135	5.545E-01	4.440E+02	2.984E-02	1.481E-01	2.220E+02	1.492E-02
2136	5.038E-01	4.034E+02	2.710E-02	1.346E-01	2.017E+02	1.355E-02
2137	4.577E-01	3.665E+02	2.462E-02	1.222E-01	1.832E+02	1.231E-02
2138	4.158E-01	3.329E+02	2.237E-02	1.111E-01	1.665E+02	1.118E-02
2139	3.777E-01	3.025E+02	2.032E-02	1.009E-01	1.512E+02	1.016E-02
2140	3.431E-01	2.748E+02	1.846E-02	9.166E-02	1.374E+02	9.231E-03
2141	3.117E-01	2.496E+02	1.677E-02	8.327E-02	1.248E+02	8.386E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	4.379E+02	2.392E+05	1.607E+01	6.860E+00	1.914E+03	1.286E-01
2003	1.064E+03	5.811E+05	3.904E+01	1.666E+01	4.649E+03	3.123E-01
2004	1.324E+03	7.231E+05	4.859E+01	2.074E+01	5.785E+03	3.887E-01
2005	1.548E+03	8.457E+05	5.682E+01	2.425E+01	6.766E+03	4.546E-01
2006	1.787E+03	9.761E+05	6.558E+01	2.799E+01	7.809E+03	5.247E-01
2007	2.136E+03	1.167E+06	7.839E+01	3.345E+01	9.333E+03	6.271E-01
2008	2.326E+03	1.271E+06	8.537E+01	3.643E+01	1.016E+04	6.829E-01
2009	2.523E+03	1.379E+06	9.262E+01	3.953E+01	1.103E+04	7.410E-01
2010	2.703E+03	1.477E+06	9.921E+01	4.234E+01	1.181E+04	7.937E-01
2011	2.866E+03	1.566E+06	1.052E+02	4.490E+01	1.253E+04	8.416E-01
2012	3.014E+03	1.647E+06	1.106E+02	4.722E+01	1.317E+04	8.851E-01
2013	3.419E+03	1.868E+06	1.255E+02	5.356E+01	1.494E+04	1.004E+00
2014	3.721E+03	2.033E+06	1.366E+02	5.830E+01	1.626E+04	1.093E+00
2015	3.937E+03	2.151E+06	1.445E+02	6.168E+01	1.721E+04	1.156E+00
2016	4.200E+03	2.295E+06	1.542E+02	6.580E+01	1.836E+04	1.233E+00
2017	4.409E+03	2.409E+06	1.618E+02	6.907E+01	1.927E+04	1.295E+00
2018	4.543E+03	2.482E+06	1.668E+02	7.117E+01	1.986E+04	1.334E+00
2019	4.709E+03	2.573E+06	1.729E+02	7.377E+01	2.058E+04	1.383E+00
2020	4.860E+03	2.655E+06	1.784E+02	7.613E+01	2.124E+04	1.427E+00
2021	4.997E+03	2.730E+06	1.834E+02	7.828E+01	2.184E+04	1.467E+00
2022	5.121E+03	2.798E+06	1.880E+02	8.022E+01	2.238E+04	1.504E+00
2023	5.234E+03	2.859E+06	1.921E+02	8.199E+01	2.287E+04	1.537E+00
2024	5.337E+03	2.915E+06	1.959E+02	8.360E+01	2.332E+04	1.567E+00
2025	5.430E+03	2.966E+06	1.993E+02	8.506E+01	2.373E+04	1.594E+00
2026	5.514E+03	3.013E+06	2.024E+02	8.639E+01	2.410E+04	1.619E+00
2027	5.591E+03	3.055E+06	2.052E+02	8.759E+01	2.444E+04	1.642E+00
2028	5.661E+03	3.093E+06	2.078E+02	8.869E+01	2.474E+04	1.662E+00
2029	5.725E+03	3.127E+06	2.101E+02	8.968E+01	2.502E+04	1.681E+00
2030	5.782E+03	3.159E+06	2.122E+02	9.058E+01	2.527E+04	1.698E+00
2031	5.835E+03	3.188E+06	2.142E+02	9.141E+01	2.550E+04	1.713E+00
2032	5.882E+03	3.214E+06	2.159E+02	9.215E+01	2.571E+04	1.727E+00
2033	5.926E+03	3.237E+06	2.175E+02	9.283E+01	2.590E+04	1.740E+00
2034	5.965E+03	3.259E+06	2.189E+02	9.344E+01	2.607E+04	1.752E+00
2035	6.001E+03	3.278E+06	2.203E+02	9.400E+01	2.623E+04	1.762E+00
2036	5.451E+03	2.978E+06	2.001E+02	8.540E+01	2.382E+04	1.601E+00
2037	4.952E+03	2.705E+06	1.818E+02	7.758E+01	2.164E+04	1.454E+00
2038	4.499E+03	2.458E+06	1.651E+02	7.048E+01	1.966E+04	1.321E+00
2039	4.087E+03	2.233E+06	1.500E+02	6.403E+01	1.786E+04	1.200E+00
2040	3.713E+03	2.028E+06	1.363E+02	5.817E+01	1.623E+04	1.090E+00
2041	3.373E+03	1.843E+06	1.238E+02	5.284E+01	1.474E+04	9.905E-01
2042	3.064E+03	1.674E+06	1.125E+02	4.801E+01	1.339E+04	8.999E-01
2043	2.784E+03	1.521E+06	1.022E+02	4.361E+01	1.217E+04	8.175E-01
2044	2.529E+03	1.382E+06	9.283E+01	3.962E+01	1.105E+04	7.427E-01
2045	2.298E+03	1.255E+06	8.434E+01	3.599E+01	1.004E+04	6.747E-01
2046	2.087E+03	1.140E+06	7.662E+01	3.270E+01	9.122E+03	6.129E-01
2047	1.896E+03	1.036E+06	6.960E+01	2.971E+01	8.287E+03	5.568E-01
2048	1.723E+03	9.411E+05	6.323E+01	2.699E+01	7.529E+03	5.059E-01
2049	1.565E+03	8.549E+05	5.744E+01	2.452E+01	6.840E+03	4.595E-01
2050	1.422E+03	7.767E+05	5.219E+01	2.227E+01	6.213E+03	4.175E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.292E+03	7.056E+05	4.741E+01	2.023E+01	5.645E+03	3.793E-01
2052	1.173E+03	6.410E+05	4.307E+01	1.838E+01	5.128E+03	3.446E-01
2053	1.066E+03	5.823E+05	3.913E+01	1.670E+01	4.659E+03	3.130E-01
2054	9.684E+02	5.290E+05	3.555E+01	1.517E+01	4.232E+03	2.844E-01
2055	8.797E+02	4.806E+05	3.229E+01	1.378E+01	3.845E+03	2.583E-01
2056	7.992E+02	4.366E+05	2.934E+01	1.252E+01	3.493E+03	2.347E-01
2057	7.261E+02	3.966E+05	2.665E+01	1.137E+01	3.173E+03	2.132E-01
2058	6.596E+02	3.603E+05	2.421E+01	1.033E+01	2.883E+03	1.937E-01
2059	5.992E+02	3.274E+05	2.199E+01	9.387E+00	2.619E+03	1.760E-01
2060	5.444E+02	2.974E+05	1.998E+01	8.528E+00	2.379E+03	1.599E-01
2061	4.945E+02	2.702E+05	1.815E+01	7.747E+00	2.161E+03	1.452E-01
2062	4.493E+02	2.454E+05	1.649E+01	7.038E+00	1.963E+03	1.319E-01
2063	4.081E+02	2.230E+05	1.498E+01	6.394E+00	1.784E+03	1.199E-01
2064	3.708E+02	2.026E+05	1.361E+01	5.809E+00	1.620E+03	1.089E-01
2065	3.368E+02	1.840E+05	1.236E+01	5.277E+00	1.472E+03	9.891E-02
2066	3.060E+02	1.672E+05	1.123E+01	4.794E+00	1.337E+03	8.986E-02
2067	2.780E+02	1.519E+05	1.020E+01	4.355E+00	1.215E+03	8.163E-02
2068	2.526E+02	1.380E+05	9.270E+00	3.956E+00	1.104E+03	7.416E-02
2069	2.294E+02	1.253E+05	8.422E+00	3.594E+00	1.003E+03	6.737E-02
2070	2.084E+02	1.139E+05	7.651E+00	3.265E+00	9.109E+02	6.121E-02
2071	1.894E+02	1.034E+05	6.950E+00	2.966E+00	8.276E+02	5.560E-02
2072	1.720E+02	9.398E+04	6.314E+00	2.695E+00	7.518E+02	5.051E-02
2073	1.563E+02	8.537E+04	5.736E+00	2.448E+00	6.830E+02	4.589E-02
2074	1.420E+02	7.756E+04	5.211E+00	2.224E+00	6.205E+02	4.169E-02
2075	1.290E+02	7.046E+04	4.734E+00	2.020E+00	5.637E+02	3.787E-02
2076	1.172E+02	6.401E+04	4.301E+00	1.836E+00	5.121E+02	3.441E-02
2077	1.064E+02	5.815E+04	3.907E+00	1.668E+00	4.652E+02	3.126E-02
2078	9.670E+01	5.283E+04	3.549E+00	1.515E+00	4.226E+02	2.840E-02
2079	8.785E+01	4.799E+04	3.225E+00	1.376E+00	3.839E+02	2.580E-02
2080	7.981E+01	4.360E+04	2.929E+00	1.250E+00	3.488E+02	2.344E-02
2081	7.250E+01	3.961E+04	2.661E+00	1.136E+00	3.169E+02	2.129E-02
2082	6.587E+01	3.598E+04	2.418E+00	1.032E+00	2.879E+02	1.934E-02
2083	5.984E+01	3.269E+04	2.196E+00	9.374E-01	2.615E+02	1.757E-02
2084	5.436E+01	2.970E+04	1.995E+00	8.516E-01	2.376E+02	1.596E-02
2085	4.938E+01	2.698E+04	1.813E+00	7.736E-01	2.158E+02	1.450E-02
2086	4.486E+01	2.451E+04	1.647E+00	7.028E-01	1.961E+02	1.317E-02
2087	4.076E+01	2.227E+04	1.496E+00	6.385E-01	1.781E+02	1.197E-02
2088	3.703E+01	2.023E+04	1.359E+00	5.800E-01	1.618E+02	1.087E-02
2089	3.364E+01	1.838E+04	1.235E+00	5.269E-01	1.470E+02	9.877E-03
2090	3.056E+01	1.669E+04	1.122E+00	4.787E-01	1.335E+02	8.973E-03
2091	2.776E+01	1.517E+04	1.019E+00	4.349E-01	1.213E+02	8.152E-03
2092	2.522E+01	1.378E+04	9.257E-01	3.951E-01	1.102E+02	7.406E-03
2093	2.291E+01	1.252E+04	8.410E-01	3.589E-01	1.001E+02	6.728E-03
2094	2.081E+01	1.137E+04	7.640E-01	3.261E-01	9.096E+01	6.112E-03
2095	1.891E+01	1.033E+04	6.941E-01	2.962E-01	8.264E+01	5.552E-03
2096	1.718E+01	9.384E+03	6.305E-01	2.691E-01	7.507E+01	5.044E-03
2097	1.561E+01	8.525E+03	5.728E-01	2.445E-01	6.820E+01	4.582E-03
2098	1.418E+01	7.745E+03	5.204E-01	2.221E-01	6.196E+01	4.163E-03
2099	1.288E+01	7.036E+03	4.727E-01	2.018E-01	5.629E+01	3.782E-03
2100	1.170E+01	6.392E+03	4.295E-01	1.833E-01	5.114E+01	3.436E-03
2101	1.063E+01	5.807E+03	3.902E-01	1.665E-01	4.645E+01	3.121E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	9.656E+00	5.275E+03	3.544E-01	1.513E-01	4.220E+01	2.836E-03
2103	8.772E+00	4.792E+03	3.220E-01	1.374E-01	3.834E+01	2.576E-03
2104	7.969E+00	4.354E+03	2.925E-01	1.248E-01	3.483E+01	2.340E-03
2105	7.240E+00	3.955E+03	2.657E-01	1.134E-01	3.164E+01	2.126E-03
2106	6.577E+00	3.593E+03	2.414E-01	1.030E-01	2.875E+01	1.931E-03
2107	5.975E+00	3.264E+03	2.193E-01	9.361E-02	2.611E+01	1.755E-03
2108	5.428E+00	2.965E+03	1.992E-01	8.504E-02	2.372E+01	1.594E-03
2109	4.931E+00	2.694E+03	1.810E-01	7.725E-02	2.155E+01	1.448E-03
2110	4.480E+00	2.447E+03	1.644E-01	7.018E-02	1.958E+01	1.316E-03
2111	4.070E+00	2.223E+03	1.494E-01	6.376E-02	1.779E+01	1.195E-03
2112	3.697E+00	2.020E+03	1.357E-01	5.792E-02	1.616E+01	1.086E-03
2113	3.359E+00	1.835E+03	1.233E-01	5.262E-02	1.468E+01	9.863E-04
2114	3.051E+00	1.667E+03	1.120E-01	4.780E-02	1.334E+01	8.961E-04
2115	2.772E+00	1.514E+03	1.018E-01	4.343E-02	1.212E+01	8.140E-04
2116	2.518E+00	1.376E+03	9.244E-02	3.945E-02	1.101E+01	7.395E-04
2117	2.288E+00	1.250E+03	8.398E-02	3.584E-02	9.999E+00	6.718E-04
2118	2.078E+00	1.135E+03	7.629E-02	3.256E-02	9.084E+00	6.103E-04
2119	1.888E+00	1.032E+03	6.931E-02	2.958E-02	8.252E+00	5.545E-04
2120	1.715E+00	9.371E+02	6.296E-02	2.687E-02	7.497E+00	5.037E-04
2121	1.558E+00	8.513E+02	5.720E-02	2.441E-02	6.811E+00	4.576E-04
2122	1.416E+00	7.734E+02	5.196E-02	2.218E-02	6.187E+00	4.157E-04
2123	1.286E+00	7.026E+02	4.721E-02	2.015E-02	5.621E+00	3.777E-04
2124	1.168E+00	6.383E+02	4.289E-02	1.830E-02	5.106E+00	3.431E-04
2125	1.061E+00	5.799E+02	3.896E-02	1.663E-02	4.639E+00	3.117E-04
2126	9.643E-01	5.268E+02	3.539E-02	1.511E-02	4.214E+00	2.832E-04
2127	8.760E-01	4.786E+02	3.215E-02	1.372E-02	3.829E+00	2.572E-04
2128	7.958E-01	4.348E+02	2.921E-02	1.247E-02	3.478E+00	2.337E-04
2129	7.230E-01	3.950E+02	2.654E-02	1.133E-02	3.160E+00	2.123E-04
2130	6.568E-01	3.588E+02	2.411E-02	1.029E-02	2.870E+00	1.929E-04
2131	5.967E-01	3.260E+02	2.190E-02	9.347E-03	2.608E+00	1.752E-04
2132	5.421E-01	2.961E+02	1.990E-02	8.492E-03	2.369E+00	1.592E-04
2133	4.924E-01	2.690E+02	1.808E-02	7.714E-03	2.152E+00	1.446E-04
2134	4.474E-01	2.444E+02	1.642E-02	7.008E-03	1.955E+00	1.314E-04
2135	4.064E-01	2.220E+02	1.492E-02	6.367E-03	1.776E+00	1.193E-04
2136	3.692E-01	2.017E+02	1.355E-02	5.784E-03	1.614E+00	1.084E-04
2137	3.354E-01	1.832E+02	1.231E-02	5.254E-03	1.466E+00	9.849E-05
2138	3.047E-01	1.665E+02	1.118E-02	4.774E-03	1.332E+00	8.948E-05
2139	2.768E-01	1.512E+02	1.016E-02	4.337E-03	1.210E+00	8.129E-05
2140	2.515E-01	1.374E+02	9.231E-03	3.940E-03	1.099E+00	7.385E-05
2141	2.285E-01	1.248E+02	8.386E-03	3.579E-03	9.985E-01	6.709E-05

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Thursday, November 28, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**2001**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.060**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**110**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2001	20,479	22,527	0	0
2002	31,140	34,254	20,479	22,527
2003	16,714	18,385	51,619	56,781
2004	16,163	17,779	68,333	75,166
2005	17,787	19,566	84,496	92,946
2006	23,965	26,362	102,283	112,511
2007	18,035	19,839	126,248	138,873
2008	19,200	21,120	144,283	158,711
2009	19,200	21,120	163,483	179,831
2010	19,200	21,120	182,683	200,951
2011	19,200	21,120	201,883	222,071
2012	31,824	35,006	221,083	243,191
2013	28,791	31,670	252,907	278,198
2014	26,030	28,633	281,698	309,868
2015	29,152	32,067	307,728	338,501
2016	27,736	30,510	336,880	370,568
2017	25,167	27,684	364,616	401,078
2018	27,205	29,926	389,783	428,761
2019	27,205	29,926	416,988	458,687
2020	27,205	29,926	444,193	488,612
2021	27,205	29,926	471,398	518,538
2022	27,205	29,926	498,603	548,463
2023	27,205	29,926	525,808	578,389
2024	27,205	29,926	553,013	608,314
2025	27,205	29,926	580,218	638,240
2026	27,205	29,926	607,423	668,165
2027	27,205	29,926	634,628	698,091
2028	27,205	29,926	661,833	728,016
2029	27,205	29,926	689,038	757,942
2030	27,205	29,926	716,243	787,867
2031	27,205	29,926	743,448	817,793
2032	27,205	29,926	770,653	847,718
2033	27,205	29,926	797,858	877,644
2034	27,205	29,926	825,063	907,569
2035	0	0	852,268	937,495
2036	0	0	852,268	937,495
2037	0	0	852,268	937,495
2038	0	0	852,268	937,495
2039	0	0	852,268	937,495
2040	0	0	852,268	937,495

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2041	0	0	852,268	937,495
2042	0	0	852,268	937,495
2043	0	0	852,268	937,495
2044	0	0	852,268	937,495
2045	0	0	852,268	937,495
2046	0	0	852,268	937,495
2047	0	0	852,268	937,495
2048	0	0	852,268	937,495
2049	0	0	852,268	937,495
2050	0	0	852,268	937,495
2051	0	0	852,268	937,495
2052	0	0	852,268	937,495
2053	0	0	852,268	937,495
2054	0	0	852,268	937,495
2055	0	0	852,268	937,495
2056	0	0	852,268	937,495
2057	0	0	852,268	937,495
2058	0	0	852,268	937,495
2059	0	0	852,268	937,495
2060	0	0	852,268	937,495
2061	0	0	852,268	937,495
2062	0	0	852,268	937,495
2063	0	0	852,268	937,495
2064	0	0	852,268	937,495
2065	0	0	852,268	937,495
2066	0	0	852,268	937,495
2067	0	0	852,268	937,495
2068	0	0	852,268	937,495
2069	0	0	852,268	937,495
2070	0	0	852,268	937,495
2071	0	0	852,268	937,495
2072	0	0	852,268	937,495
2073	0	0	852,268	937,495
2074	0	0	852,268	937,495
2075	0	0	852,268	937,495
2076	0	0	852,268	937,495
2077	0	0	852,268	937,495
2078	0	0	852,268	937,495
2079	0	0	852,268	937,495
2080	0	0	852,268	937,495

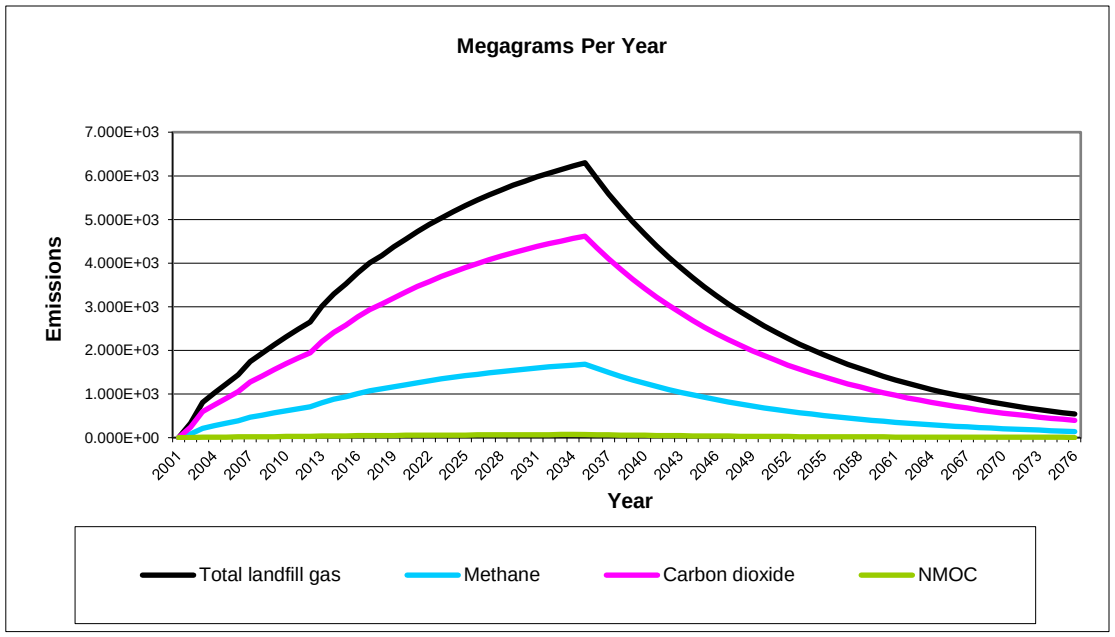
Pollutant Parameters

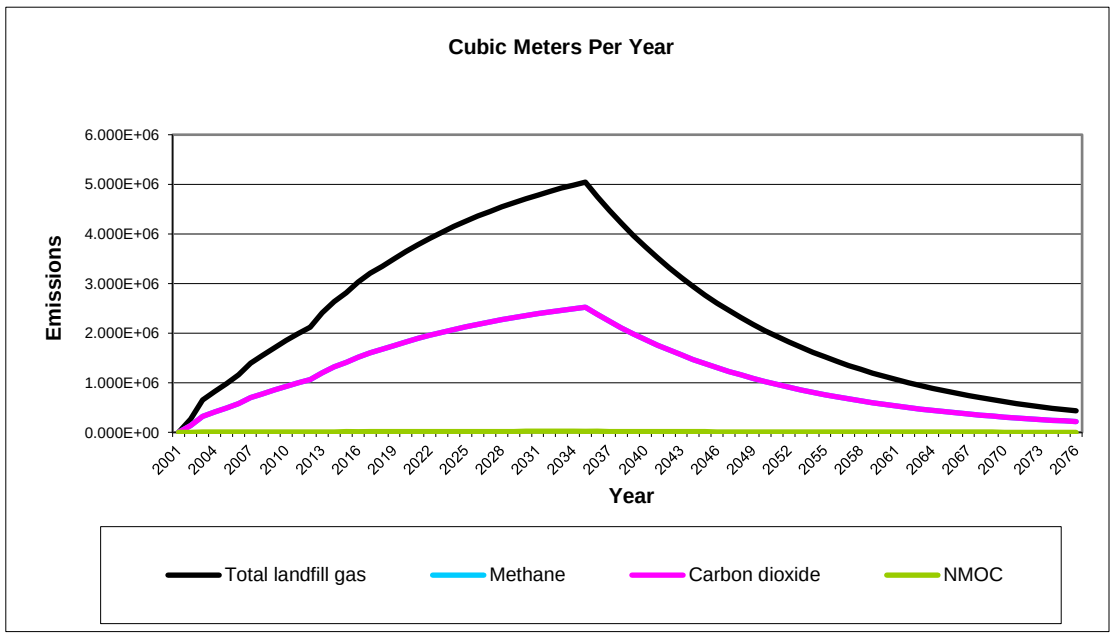
	Compound	Gas / Pollutant Default Parameters: Concentration (*ppmv*)	Molecular Weight	User-specified Pollutant Parameters: Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

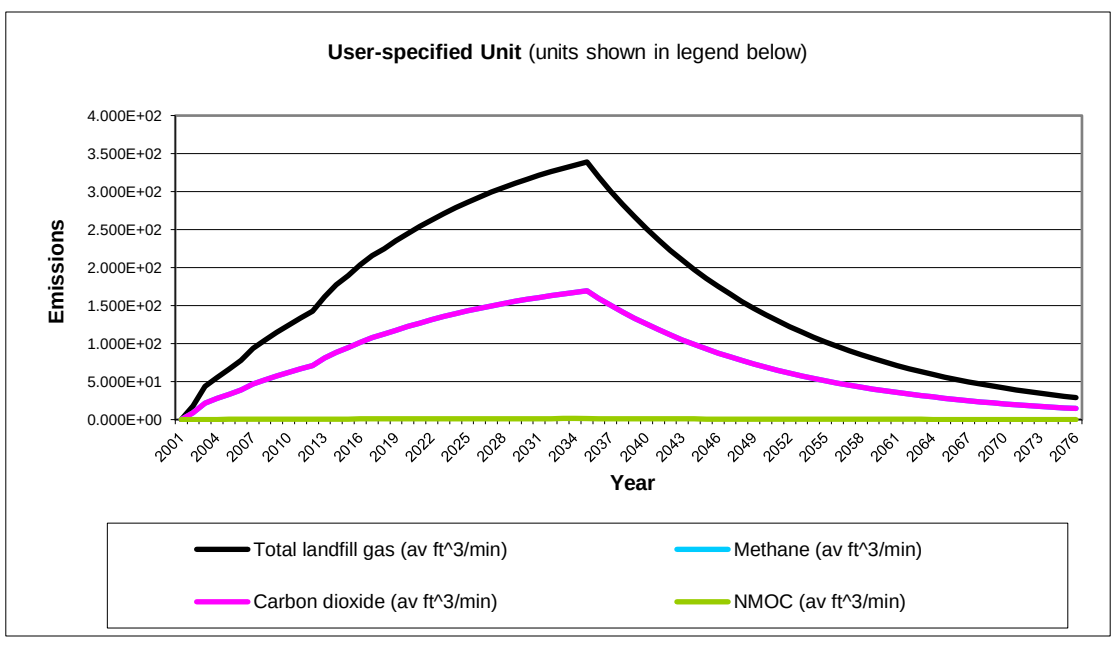
Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
7.000E+03
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
6.000E+06
5.000E+06
4.000E+06
3.000E+06
2.000E+06
1.000E+06
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
4.000E+02
3.500E+02
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	3.286E+02	2.632E+05	1.768E+01	8.778E+01	1.316E+05	8.841E+00
2003	8.092E+02	6.480E+05	4.354E+01	2.162E+02	3.240E+05	2.177E+01
2004	1.030E+03	8.250E+05	5.543E+01	2.752E+02	4.125E+05	2.772E+01
2005	1.230E+03	9.847E+05	6.616E+01	3.285E+02	4.923E+05	3.308E+01
2006	1.444E+03	1.156E+06	7.767E+01	3.856E+02	5.780E+05	3.883E+01
2007	1.744E+03	1.397E+06	9.383E+01	4.659E+02	6.983E+05	4.692E+01
2008	1.932E+03	1.547E+06	1.039E+02	5.160E+02	7.735E+05	5.197E+01
2009	2.128E+03	1.704E+06	1.145E+02	5.683E+02	8.518E+05	5.723E+01
2010	2.312E+03	1.851E+06	1.244E+02	6.175E+02	9.256E+05	6.219E+01
2011	2.485E+03	1.990E+06	1.337E+02	6.638E+02	9.950E+05	6.686E+01
2012	2.649E+03	2.121E+06	1.425E+02	7.075E+02	1.060E+06	7.125E+01
2013	3.005E+03	2.406E+06	1.617E+02	8.027E+02	1.203E+06	8.084E+01
2014	3.292E+03	2.636E+06	1.771E+02	8.794E+02	1.318E+06	8.856E+01
2015	3.518E+03	2.817E+06	1.893E+02	9.397E+02	1.409E+06	9.464E+01
2016	3.781E+03	3.028E+06	2.034E+02	1.010E+03	1.514E+06	1.017E+02
2017	4.006E+03	3.208E+06	2.155E+02	1.070E+03	1.604E+06	1.078E+02
2018	4.177E+03	3.344E+06	2.247E+02	1.116E+03	1.672E+06	1.124E+02
2019	4.370E+03	3.499E+06	2.351E+02	1.167E+03	1.750E+06	1.176E+02
2020	4.552E+03	3.645E+06	2.449E+02	1.216E+03	1.823E+06	1.225E+02
2021	4.723E+03	3.782E+06	2.541E+02	1.262E+03	1.891E+06	1.271E+02
2022	4.885E+03	3.912E+06	2.628E+02	1.305E+03	1.956E+06	1.314E+02
2023	5.037E+03	4.033E+06	2.710E+02	1.345E+03	2.017E+06	1.355E+02
2024	5.180E+03	4.148E+06	2.787E+02	1.384E+03	2.074E+06	1.394E+02
2025	5.315E+03	4.256E+06	2.860E+02	1.420E+03	2.128E+06	1.430E+02
2026	5.442E+03	4.358E+06	2.928E+02	1.454E+03	2.179E+06	1.464E+02
2027	5.562E+03	4.454E+06	2.992E+02	1.486E+03	2.227E+06	1.496E+02
2028	5.675E+03	4.544E+06	3.053E+02	1.516E+03	2.272E+06	1.527E+02
2029	5.781E+03	4.629E+06	3.110E+02	1.544E+03	2.314E+06	1.555E+02
2030	5.881E+03	4.709E+06	3.164E+02	1.571E+03	2.354E+06	1.582E+02
2031	5.975E+03	4.784E+06	3.215E+02	1.596E+03	2.392E+06	1.607E+02
2032	6.063E+03	4.855E+06	3.262E+02	1.620E+03	2.428E+06	1.631E+02
2033	6.147E+03	4.922E+06	3.307E+02	1.642E+03	2.461E+06	1.654E+02
2034	6.225E+03	4.985E+06	3.349E+02	1.663E+03	2.493E+06	1.675E+02
2035	6.300E+03	5.044E+06	3.389E+02	1.683E+03	2.522E+06	1.695E+02
2036	5.933E+03	4.751E+06	3.192E+02	1.585E+03	2.375E+06	1.596E+02
2037	5.587E+03	4.474E+06	3.006E+02	1.492E+03	2.237E+06	1.503E+02
2038	5.262E+03	4.213E+06	2.831E+02	1.405E+03	2.107E+06	1.415E+02
2039	4.955E+03	3.968E+06	2.666E+02	1.324E+03	1.984E+06	1.333E+02
2040	4.667E+03	3.737E+06	2.511E+02	1.247E+03	1.868E+06	1.255E+02
2041	4.395E+03	3.519E+06	2.365E+02	1.174E+03	1.760E+06	1.182E+02
2042	4.139E+03	3.314E+06	2.227E+02	1.106E+03	1.657E+06	1.113E+02
2043	3.898E+03	3.121E+06	2.097E+02	1.041E+03	1.561E+06	1.049E+02
2044	3.671E+03	2.940E+06	1.975E+02	9.806E+02	1.470E+06	9.876E+01
2045	3.457E+03	2.768E+06	1.860E+02	9.235E+02	1.384E+06	9.300E+01
2046	3.256E+03	2.607E+06	1.752E+02	8.697E+02	1.304E+06	8.759E+01
2047	3.066E+03	2.455E+06	1.650E+02	8.190E+02	1.228E+06	8.249E+01
2048	2.888E+03	2.312E+06	1.554E+02	7.713E+02	1.156E+06	7.768E+01
2049	2.720E+03	2.178E+06	1.463E+02	7.264E+02	1.089E+06	7.316E+01
2050	2.561E+03	2.051E+06	1.378E+02	6.841E+02	1.025E+06	6.890E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	2.412E+03	1.931E+06	1.298E+02	6.443E+02	9.657E+05	6.489E+01
2052	2.272E+03	1.819E+06	1.222E+02	6.068E+02	9.095E+05	6.111E+01
2053	2.139E+03	1.713E+06	1.151E+02	5.714E+02	8.565E+05	5.755E+01
2054	2.015E+03	1.613E+06	1.084E+02	5.381E+02	8.066E+05	5.420E+01
2055	1.897E+03	1.519E+06	1.021E+02	5.068E+02	7.597E+05	5.104E+01
2056	1.787E+03	1.431E+06	9.614E+01	4.773E+02	7.154E+05	4.807E+01
2057	1.683E+03	1.348E+06	9.054E+01	4.495E+02	6.738E+05	4.527E+01
2058	1.585E+03	1.269E+06	8.527E+01	4.233E+02	6.345E+05	4.263E+01
2059	1.493E+03	1.195E+06	8.030E+01	3.987E+02	5.976E+05	4.015E+01
2060	1.406E+03	1.126E+06	7.563E+01	3.755E+02	5.628E+05	3.781E+01
2061	1.324E+03	1.060E+06	7.122E+01	3.536E+02	5.300E+05	3.561E+01
2062	1.247E+03	9.983E+05	6.707E+01	3.330E+02	4.991E+05	3.354E+01
2063	1.174E+03	9.401E+05	6.317E+01	3.136E+02	4.701E+05	3.158E+01
2064	1.106E+03	8.854E+05	5.949E+01	2.953E+02	4.427E+05	2.974E+01
2065	1.041E+03	8.338E+05	5.602E+01	2.781E+02	4.169E+05	2.801E+01
2066	9.807E+02	7.853E+05	5.276E+01	2.619E+02	3.926E+05	2.638E+01
2067	9.236E+02	7.395E+05	4.969E+01	2.467E+02	3.698E+05	2.484E+01
2068	8.698E+02	6.965E+05	4.680E+01	2.323E+02	3.482E+05	2.340E+01
2069	8.191E+02	6.559E+05	4.407E+01	2.188E+02	3.280E+05	2.204E+01
2070	7.714E+02	6.177E+05	4.150E+01	2.061E+02	3.089E+05	2.075E+01
2071	7.265E+02	5.817E+05	3.909E+01	1.941E+02	2.909E+05	1.954E+01
2072	6.842E+02	5.479E+05	3.681E+01	1.828E+02	2.739E+05	1.841E+01
2073	6.443E+02	5.160E+05	3.467E+01	1.721E+02	2.580E+05	1.733E+01
2074	6.068E+02	4.859E+05	3.265E+01	1.621E+02	2.430E+05	1.632E+01
2075	5.715E+02	4.576E+05	3.075E+01	1.526E+02	2.288E+05	1.537E+01
2076	5.382E+02	4.310E+05	2.896E+01	1.438E+02	2.155E+05	1.448E+01
2077	5.069E+02	4.059E+05	2.727E+01	1.354E+02	2.029E+05	1.364E+01
2078	4.773E+02	3.822E+05	2.568E+01	1.275E+02	1.911E+05	1.284E+01
2079	4.495E+02	3.600E+05	2.419E+01	1.201E+02	1.800E+05	1.209E+01
2080	4.234E+02	3.390E+05	2.278E+01	1.131E+02	1.695E+05	1.139E+01
2081	3.987E+02	3.193E+05	2.145E+01	1.065E+02	1.596E+05	1.073E+01
2082	3.755E+02	3.007E+05	2.020E+01	1.003E+02	1.503E+05	1.010E+01
2083	3.536E+02	2.832E+05	1.903E+01	9.446E+01	1.416E+05	9.513E+00
2084	3.330E+02	2.667E+05	1.792E+01	8.896E+01	1.333E+05	8.959E+00
2085	3.136E+02	2.511E+05	1.687E+01	8.378E+01	1.256E+05	8.437E+00
2086	2.954E+02	2.365E+05	1.589E+01	7.890E+01	1.183E+05	7.946E+00
2087	2.782E+02	2.227E+05	1.497E+01	7.430E+01	1.114E+05	7.483E+00
2088	2.620E+02	2.098E+05	1.409E+01	6.997E+01	1.049E+05	7.047E+00
2089	2.467E+02	1.976E+05	1.327E+01	6.590E+01	9.878E+04	6.637E+00
2090	2.323E+02	1.861E+05	1.250E+01	6.206E+01	9.303E+04	6.250E+00
2091	2.188E+02	1.752E+05	1.177E+01	5.845E+01	8.761E+04	5.886E+00
2092	2.061E+02	1.650E+05	1.109E+01	5.504E+01	8.251E+04	5.544E+00
2093	1.941E+02	1.554E+05	1.044E+01	5.184E+01	7.770E+04	5.221E+00
2094	1.828E+02	1.464E+05	9.833E+00	4.882E+01	7.318E+04	4.917E+00
2095	1.721E+02	1.378E+05	9.261E+00	4.598E+01	6.892E+04	4.630E+00
2096	1.621E+02	1.298E+05	8.722E+00	4.330E+01	6.490E+04	4.361E+00
2097	1.527E+02	1.222E+05	8.214E+00	4.078E+01	6.112E+04	4.107E+00
2098	1.438E+02	1.151E+05	7.735E+00	3.840E+01	5.756E+04	3.868E+00
2099	1.354E+02	1.084E+05	7.285E+00	3.617E+01	5.421E+04	3.642E+00
2100	1.275E+02	1.021E+05	6.861E+00	3.406E+01	5.105E+04	3.430E+00
2101	1.201E+02	9.616E+04	6.461E+00	3.208E+01	4.808E+04	3.231E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2102	1.131E+02	9.056E+04	6.085E+00	3.021E+01	4.528E+04	3.042E+00
2103	1.065E+02	8.529E+04	5.730E+00	2.845E+01	4.264E+04	2.865E+00
2104	1.003E+02	8.032E+04	5.397E+00	2.679E+01	4.016E+04	2.698E+00
2105	9.446E+01	7.564E+04	5.082E+00	2.523E+01	3.782E+04	2.541E+00
2106	8.896E+01	7.124E+04	4.786E+00	2.376E+01	3.562E+04	2.393E+00
2107	8.378E+01	6.709E+04	4.508E+00	2.238E+01	3.354E+04	2.254E+00
2108	7.890E+01	6.318E+04	4.245E+00	2.108E+01	3.159E+04	2.123E+00
2109	7.431E+01	5.950E+04	3.998E+00	1.985E+01	2.975E+04	1.999E+00
2110	6.998E+01	5.604E+04	3.765E+00	1.869E+01	2.802E+04	1.883E+00
2111	6.591E+01	5.277E+04	3.546E+00	1.760E+01	2.639E+04	1.773E+00
2112	6.207E+01	4.970E+04	3.339E+00	1.658E+01	2.485E+04	1.670E+00
2113	5.845E+01	4.681E+04	3.145E+00	1.561E+01	2.340E+04	1.572E+00
2114	5.505E+01	4.408E+04	2.962E+00	1.470E+01	2.204E+04	1.481E+00
2115	5.184E+01	4.151E+04	2.789E+00	1.385E+01	2.076E+04	1.395E+00
2116	4.882E+01	3.910E+04	2.627E+00	1.304E+01	1.955E+04	1.313E+00
2117	4.598E+01	3.682E+04	2.474E+00	1.228E+01	1.841E+04	1.237E+00
2118	4.330E+01	3.468E+04	2.330E+00	1.157E+01	1.734E+04	1.165E+00
2119	4.078E+01	3.266E+04	2.194E+00	1.089E+01	1.633E+04	1.097E+00
2120	3.841E+01	3.075E+04	2.066E+00	1.026E+01	1.538E+04	1.033E+00
2121	3.617E+01	2.896E+04	1.946E+00	9.661E+00	1.448E+04	9.730E-01
2122	3.406E+01	2.728E+04	1.833E+00	9.099E+00	1.364E+04	9.164E-01
2123	3.208E+01	2.569E+04	1.726E+00	8.569E+00	1.284E+04	8.630E-01
2124	3.021E+01	2.419E+04	1.625E+00	8.070E+00	1.210E+04	8.127E-01
2125	2.845E+01	2.278E+04	1.531E+00	7.600E+00	1.139E+04	7.654E-01
2126	2.680E+01	2.146E+04	1.442E+00	7.157E+00	1.073E+04	7.208E-01
2127	2.523E+01	2.021E+04	1.358E+00	6.741E+00	1.010E+04	6.789E-01
2128	2.377E+01	1.903E+04	1.279E+00	6.348E+00	9.515E+03	6.393E-01
2129	2.238E+01	1.792E+04	1.204E+00	5.978E+00	8.961E+03	6.021E-01
2130	2.108E+01	1.688E+04	1.134E+00	5.630E+00	8.439E+03	5.670E-01
2131	1.985E+01	1.590E+04	1.068E+00	5.302E+00	7.948E+03	5.340E-01
2132	1.869E+01	1.497E+04	1.006E+00	4.993E+00	7.485E+03	5.029E-01
2133	1.761E+01	1.410E+04	9.472E-01	4.703E+00	7.049E+03	4.736E-01
2134	1.658E+01	1.328E+04	8.921E-01	4.429E+00	6.638E+03	4.460E-01
2135	1.561E+01	1.250E+04	8.401E-01	4.171E+00	6.252E+03	4.201E-01
2136	1.471E+01	1.178E+04	7.912E-01	3.928E+00	5.888E+03	3.956E-01
2137	1.385E+01	1.109E+04	7.451E-01	3.699E+00	5.545E+03	3.726E-01
2138	1.304E+01	1.044E+04	7.017E-01	3.484E+00	5.222E+03	3.509E-01
2139	1.228E+01	9.836E+03	6.609E-01	3.281E+00	4.918E+03	3.304E-01
2140	1.157E+01	9.263E+03	6.224E-01	3.090E+00	4.631E+03	3.112E-01
2141	1.089E+01	8.724E+03	5.861E-01	2.910E+00	4.362E+03	2.931E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	2.409E+02	1.316E+05	8.841E+00	3.773E+00	1.053E+03	7.073E-02
2003	5.931E+02	3.240E+05	2.177E+01	9.291E+00	2.592E+03	1.742E-01
2004	7.551E+02	4.125E+05	2.772E+01	1.183E+01	3.300E+03	2.217E-01
2005	9.012E+02	4.923E+05	3.308E+01	1.412E+01	3.939E+03	2.646E-01
2006	1.058E+03	5.780E+05	3.883E+01	1.657E+01	4.624E+03	3.107E-01
2007	1.278E+03	6.983E+05	4.692E+01	2.002E+01	5.586E+03	3.753E-01
2008	1.416E+03	7.735E+05	5.197E+01	2.218E+01	6.188E+03	4.158E-01
2009	1.559E+03	8.518E+05	5.723E+01	2.443E+01	6.814E+03	4.579E-01
2010	1.694E+03	9.256E+05	6.219E+01	2.654E+01	7.405E+03	4.975E-01
2011	1.821E+03	9.950E+05	6.686E+01	2.853E+01	7.960E+03	5.348E-01
2012	1.941E+03	1.060E+06	7.125E+01	3.041E+01	8.484E+03	5.700E-01
2013	2.202E+03	1.203E+06	8.084E+01	3.450E+01	9.625E+03	6.467E-01
2014	2.413E+03	1.318E+06	8.856E+01	3.780E+01	1.054E+04	7.085E-01
2015	2.578E+03	1.409E+06	9.464E+01	4.039E+01	1.127E+04	7.571E-01
2016	2.771E+03	1.514E+06	1.017E+02	4.341E+01	1.211E+04	8.137E-01
2017	2.936E+03	1.604E+06	1.078E+02	4.599E+01	1.283E+04	8.621E-01
2018	3.061E+03	1.672E+06	1.124E+02	4.795E+01	1.338E+04	8.988E-01
2019	3.203E+03	1.750E+06	1.176E+02	5.017E+01	1.400E+04	9.404E-01
2020	3.336E+03	1.823E+06	1.225E+02	5.226E+01	1.458E+04	9.796E-01
2021	3.462E+03	1.891E+06	1.271E+02	5.423E+01	1.513E+04	1.017E+00
2022	3.580E+03	1.956E+06	1.314E+02	5.609E+01	1.565E+04	1.051E+00
2023	3.692E+03	2.017E+06	1.355E+02	5.783E+01	1.613E+04	1.084E+00
2024	3.797E+03	2.074E+06	1.394E+02	5.948E+01	1.659E+04	1.115E+00
2025	3.895E+03	2.128E+06	1.430E+02	6.102E+01	1.702E+04	1.144E+00
2026	3.989E+03	2.179E+06	1.464E+02	6.248E+01	1.743E+04	1.171E+00
2027	4.076E+03	2.227E+06	1.496E+02	6.386E+01	1.781E+04	1.197E+00
2028	4.159E+03	2.272E+06	1.527E+02	6.515E+01	1.818E+04	1.221E+00
2029	4.237E+03	2.314E+06	1.555E+02	6.637E+01	1.852E+04	1.244E+00
2030	4.310E+03	2.354E+06	1.582E+02	6.752E+01	1.884E+04	1.266E+00
2031	4.379E+03	2.392E+06	1.607E+02	6.860E+01	1.914E+04	1.286E+00
2032	4.444E+03	2.428E+06	1.631E+02	6.961E+01	1.942E+04	1.305E+00
2033	4.505E+03	2.461E+06	1.654E+02	7.057E+01	1.969E+04	1.323E+00
2034	4.563E+03	2.493E+06	1.675E+02	7.148E+01	1.994E+04	1.340E+00
2035	4.617E+03	2.522E+06	1.695E+02	7.233E+01	2.018E+04	1.356E+00
2036	4.348E+03	2.375E+06	1.596E+02	6.811E+01	1.900E+04	1.277E+00
2037	4.095E+03	2.237E+06	1.503E+02	6.415E+01	1.790E+04	1.202E+00
2038	3.856E+03	2.107E+06	1.415E+02	6.041E+01	1.685E+04	1.132E+00
2039	3.632E+03	1.984E+06	1.333E+02	5.689E+01	1.587E+04	1.066E+00
2040	3.420E+03	1.868E+06	1.255E+02	5.358E+01	1.495E+04	1.004E+00
2041	3.221E+03	1.760E+06	1.182E+02	5.046E+01	1.408E+04	9.459E-01
2042	3.033E+03	1.657E+06	1.113E+02	4.752E+01	1.326E+04	8.908E-01
2043	2.857E+03	1.561E+06	1.049E+02	4.475E+01	1.249E+04	8.389E-01
2044	2.690E+03	1.470E+06	9.876E+01	4.215E+01	1.176E+04	7.900E-01
2045	2.534E+03	1.384E+06	9.300E+01	3.969E+01	1.107E+04	7.440E-01
2046	2.386E+03	1.304E+06	8.759E+01	3.738E+01	1.043E+04	7.007E-01
2047	2.247E+03	1.228E+06	8.249E+01	3.520E+01	9.821E+03	6.599E-01
2048	2.116E+03	1.156E+06	7.768E+01	3.315E+01	9.249E+03	6.215E-01
2049	1.993E+03	1.089E+06	7.316E+01	3.122E+01	8.711E+03	5.853E-01
2050	1.877E+03	1.025E+06	6.890E+01	2.941E+01	8.204E+03	5.512E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.768E+03	9.657E+05	6.489E+01	2.769E+01	7.726E+03	5.191E-01
2052	1.665E+03	9.095E+05	6.111E+01	2.608E+01	7.276E+03	4.889E-01
2053	1.568E+03	8.565E+05	5.755E+01	2.456E+01	6.852E+03	4.604E-01
2054	1.477E+03	8.066E+05	5.420E+01	2.313E+01	6.453E+03	4.336E-01
2055	1.391E+03	7.597E+05	5.104E+01	2.178E+01	6.077E+03	4.083E-01
2056	1.310E+03	7.154E+05	4.807E+01	2.052E+01	5.723E+03	3.846E-01
2057	1.233E+03	6.738E+05	4.527E+01	1.932E+01	5.390E+03	3.622E-01
2058	1.162E+03	6.345E+05	4.263E+01	1.820E+01	5.076E+03	3.411E-01
2059	1.094E+03	5.976E+05	4.015E+01	1.714E+01	4.781E+03	3.212E-01
2060	1.030E+03	5.628E+05	3.781E+01	1.614E+01	4.502E+03	3.025E-01
2061	9.702E+02	5.300E+05	3.561E+01	1.520E+01	4.240E+03	2.849E-01
2062	9.137E+02	4.991E+05	3.354E+01	1.431E+01	3.993E+03	2.683E-01
2063	8.605E+02	4.701E+05	3.158E+01	1.348E+01	3.761E+03	2.527E-01
2064	8.104E+02	4.427E+05	2.974E+01	1.269E+01	3.542E+03	2.380E-01
2065	7.632E+02	4.169E+05	2.801E+01	1.196E+01	3.335E+03	2.241E-01
2066	7.187E+02	3.926E+05	2.638E+01	1.126E+01	3.141E+03	2.110E-01
2067	6.769E+02	3.698E+05	2.484E+01	1.060E+01	2.958E+03	1.988E-01
2068	6.374E+02	3.482E+05	2.340E+01	9.986E+00	2.786E+03	1.872E-01
2069	6.003E+02	3.280E+05	2.204E+01	9.404E+00	2.624E+03	1.763E-01
2070	5.654E+02	3.089E+05	2.075E+01	8.857E+00	2.471E+03	1.660E-01
2071	5.324E+02	2.909E+05	1.954E+01	8.341E+00	2.327E+03	1.563E-01
2072	5.014E+02	2.739E+05	1.841E+01	7.855E+00	2.191E+03	1.472E-01
2073	4.722E+02	2.580E+05	1.733E+01	7.398E+00	2.064E+03	1.387E-01
2074	4.447E+02	2.430E+05	1.632E+01	6.967E+00	1.944E+03	1.306E-01
2075	4.188E+02	2.288E+05	1.537E+01	6.561E+00	1.830E+03	1.230E-01
2076	3.944E+02	2.155E+05	1.448E+01	6.179E+00	1.724E+03	1.158E-01
2077	3.715E+02	2.029E+05	1.364E+01	5.819E+00	1.623E+03	1.091E-01
2078	3.498E+02	1.911E+05	1.284E+01	5.480E+00	1.529E+03	1.027E-01
2079	3.295E+02	1.800E+05	1.209E+01	5.161E+00	1.440E+03	9.675E-02
2080	3.103E+02	1.695E+05	1.139E+01	4.861E+00	1.356E+03	9.111E-02
2081	2.922E+02	1.596E+05	1.073E+01	4.578E+00	1.277E+03	8.581E-02
2082	2.752E+02	1.503E+05	1.010E+01	4.311E+00	1.203E+03	8.081E-02
2083	2.592E+02	1.416E+05	9.513E+00	4.060E+00	1.133E+03	7.610E-02
2084	2.441E+02	1.333E+05	8.959E+00	3.824E+00	1.067E+03	7.167E-02
2085	2.299E+02	1.256E+05	8.437E+00	3.601E+00	1.005E+03	6.750E-02
2086	2.165E+02	1.183E+05	7.946E+00	3.391E+00	9.461E+02	6.357E-02
2087	2.039E+02	1.114E+05	7.483E+00	3.194E+00	8.910E+02	5.986E-02
2088	1.920E+02	1.049E+05	7.047E+00	3.008E+00	8.391E+02	5.638E-02
2089	1.808E+02	9.878E+04	6.637E+00	2.833E+00	7.902E+02	5.310E-02
2090	1.703E+02	9.303E+04	6.250E+00	2.668E+00	7.442E+02	5.000E-02
2091	1.604E+02	8.761E+04	5.886E+00	2.512E+00	7.009E+02	4.709E-02
2092	1.510E+02	8.251E+04	5.544E+00	2.366E+00	6.601E+02	4.435E-02
2093	1.422E+02	7.770E+04	5.221E+00	2.228E+00	6.216E+02	4.177E-02
2094	1.340E+02	7.318E+04	4.917E+00	2.098E+00	5.854E+02	3.933E-02
2095	1.261E+02	6.892E+04	4.630E+00	1.976E+00	5.513E+02	3.704E-02
2096	1.188E+02	6.490E+04	4.361E+00	1.861E+00	5.192E+02	3.489E-02
2097	1.119E+02	6.112E+04	4.107E+00	1.753E+00	4.890E+02	3.285E-02
2098	1.054E+02	5.756E+04	3.868E+00	1.651E+00	4.605E+02	3.094E-02
2099	9.923E+01	5.421E+04	3.642E+00	1.555E+00	4.337E+02	2.914E-02
2100	9.345E+01	5.105E+04	3.430E+00	1.464E+00	4.084E+02	2.744E-02
2101	8.801E+01	4.808E+04	3.231E+00	1.379E+00	3.846E+02	2.584E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	8.289E+01	4.528E+04	3.042E+00	1.298E+00	3.622E+02	2.434E-02
2103	7.806E+01	4.264E+04	2.865E+00	1.223E+00	3.411E+02	2.292E-02
2104	7.351E+01	4.016E+04	2.698E+00	1.152E+00	3.213E+02	2.159E-02
2105	6.923E+01	3.782E+04	2.541E+00	1.085E+00	3.026E+02	2.033E-02
2106	6.520E+01	3.562E+04	2.393E+00	1.021E+00	2.850E+02	1.915E-02
2107	6.140E+01	3.354E+04	2.254E+00	9.619E-01	2.684E+02	1.803E-02
2108	5.783E+01	3.159E+04	2.123E+00	9.059E-01	2.527E+02	1.698E-02
2109	5.446E+01	2.975E+04	1.999E+00	8.531E-01	2.380E+02	1.599E-02
2110	5.129E+01	2.802E+04	1.883E+00	8.035E-01	2.242E+02	1.506E-02
2111	4.830E+01	2.639E+04	1.773E+00	7.567E-01	2.111E+02	1.418E-02
2112	4.549E+01	2.485E+04	1.670E+00	7.126E-01	1.988E+02	1.336E-02
2113	4.284E+01	2.340E+04	1.572E+00	6.711E-01	1.872E+02	1.258E-02
2114	4.035E+01	2.204E+04	1.481E+00	6.320E-01	1.763E+02	1.185E-02
2115	3.800E+01	2.076E+04	1.395E+00	5.952E-01	1.661E+02	1.116E-02
2116	3.578E+01	1.955E+04	1.313E+00	5.606E-01	1.564E+02	1.051E-02
2117	3.370E+01	1.841E+04	1.237E+00	5.279E-01	1.473E+02	9.896E-03
2118	3.174E+01	1.734E+04	1.165E+00	4.972E-01	1.387E+02	9.319E-03
2119	2.989E+01	1.633E+04	1.097E+00	4.682E-01	1.306E+02	8.777E-03
2120	2.815E+01	1.538E+04	1.033E+00	4.409E-01	1.230E+02	8.265E-03
2121	2.651E+01	1.448E+04	9.730E-01	4.153E-01	1.159E+02	7.784E-03
2122	2.496E+01	1.364E+04	9.164E-01	3.911E-01	1.091E+02	7.331E-03
2123	2.351E+01	1.284E+04	8.630E-01	3.683E-01	1.028E+02	6.904E-03
2124	2.214E+01	1.210E+04	8.127E-01	3.469E-01	9.677E+01	6.502E-03
2125	2.085E+01	1.139E+04	7.654E-01	3.267E-01	9.113E+01	6.123E-03
2126	1.964E+01	1.073E+04	7.208E-01	3.076E-01	8.583E+01	5.767E-03
2127	1.849E+01	1.010E+04	6.789E-01	2.897E-01	8.083E+01	5.431E-03
2128	1.742E+01	9.515E+03	6.393E-01	2.729E-01	7.612E+01	5.115E-03
2129	1.640E+01	8.961E+03	6.021E-01	2.570E-01	7.169E+01	4.817E-03
2130	1.545E+01	8.439E+03	5.670E-01	2.420E-01	6.751E+01	4.536E-03
2131	1.455E+01	7.948E+03	5.340E-01	2.279E-01	6.358E+01	4.272E-03
2132	1.370E+01	7.485E+03	5.029E-01	2.146E-01	5.988E+01	4.023E-03
2133	1.290E+01	7.049E+03	4.736E-01	2.021E-01	5.639E+01	3.789E-03
2134	1.215E+01	6.638E+03	4.460E-01	1.904E-01	5.311E+01	3.568E-03
2135	1.144E+01	6.252E+03	4.201E-01	1.793E-01	5.001E+01	3.360E-03
2136	1.078E+01	5.888E+03	3.956E-01	1.688E-01	4.710E+01	3.165E-03
2137	1.015E+01	5.545E+03	3.726E-01	1.590E-01	4.436E+01	2.980E-03
2138	9.559E+00	5.222E+03	3.509E-01	1.497E-01	4.178E+01	2.807E-03
2139	9.002E+00	4.918E+03	3.304E-01	1.410E-01	3.934E+01	2.643E-03
2140	8.478E+00	4.631E+03	3.112E-01	1.328E-01	3.705E+01	2.490E-03
2141	7.984E+00	4.362E+03	2.931E-01	1.251E-01	3.489E+01	2.345E-03

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Thursday, November 28, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**2001**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.096**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**127**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2001	20,479	22,527	0	0
2002	31,140	34,254	20,479	22,527
2003	16,714	18,385	51,619	56,781
2004	16,163	17,779	68,333	75,166
2005	17,787	19,566	84,496	92,946
2006	23,965	26,362	102,283	112,511
2007	18,035	19,839	126,248	138,873
2008	19,200	21,120	144,283	158,711
2009	19,200	21,120	163,483	179,831
2010	19,200	21,120	182,683	200,951
2011	19,200	21,120	201,883	222,071
2012	31,824	35,006	221,083	243,191
2013	28,791	31,670	252,907	278,198
2014	26,030	28,633	281,698	309,868
2015	29,152	32,067	307,728	338,501
2016	27,736	30,510	336,880	370,568
2017	25,167	27,684	364,616	401,078
2018	27,205	29,926	389,783	428,761
2019	27,205	29,926	416,988	458,687
2020	27,205	29,926	444,193	488,612
2021	27,205	29,926	471,398	518,538
2022	27,205	29,926	498,603	548,463
2023	27,205	29,926	525,808	578,389
2024	27,205	29,926	553,013	608,314
2025	27,205	29,926	580,218	638,240
2026	27,205	29,926	607,423	668,165
2027	27,205	29,926	634,628	698,091
2028	27,205	29,926	661,833	728,016
2029	27,205	29,926	689,038	757,942
2030	27,205	29,926	716,243	787,867
2031	27,205	29,926	743,448	817,793
2032	27,205	29,926	770,653	847,718
2033	27,205	29,926	797,858	877,644
2034	27,205	29,926	825,063	907,569
2035	0	0	852,268	937,495
2036	0	0	852,268	937,495
2037	0	0	852,268	937,495
2038	0	0	852,268	937,495
2039	0	0	852,268	937,495
2040	0	0	852,268	937,495

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2041	0	0	852,268	937,495
2042	0	0	852,268	937,495
2043	0	0	852,268	937,495
2044	0	0	852,268	937,495
2045	0	0	852,268	937,495
2046	0	0	852,268	937,495
2047	0	0	852,268	937,495
2048	0	0	852,268	937,495
2049	0	0	852,268	937,495
2050	0	0	852,268	937,495
2051	0	0	852,268	937,495
2052	0	0	852,268	937,495
2053	0	0	852,268	937,495
2054	0	0	852,268	937,495
2055	0	0	852,268	937,495
2056	0	0	852,268	937,495
2057	0	0	852,268	937,495
2058	0	0	852,268	937,495
2059	0	0	852,268	937,495
2060	0	0	852,268	937,495
2061	0	0	852,268	937,495
2062	0	0	852,268	937,495
2063	0	0	852,268	937,495
2064	0	0	852,268	937,495
2065	0	0	852,268	937,495
2066	0	0	852,268	937,495
2067	0	0	852,268	937,495
2068	0	0	852,268	937,495
2069	0	0	852,268	937,495
2070	0	0	852,268	937,495
2071	0	0	852,268	937,495
2072	0	0	852,268	937,495
2073	0	0	852,268	937,495
2074	0	0	852,268	937,495
2075	0	0	852,268	937,495
2076	0	0	852,268	937,495
2077	0	0	852,268	937,495
2078	0	0	852,268	937,495
2079	0	0	852,268	937,495
2080	0	0	852,268	937,495

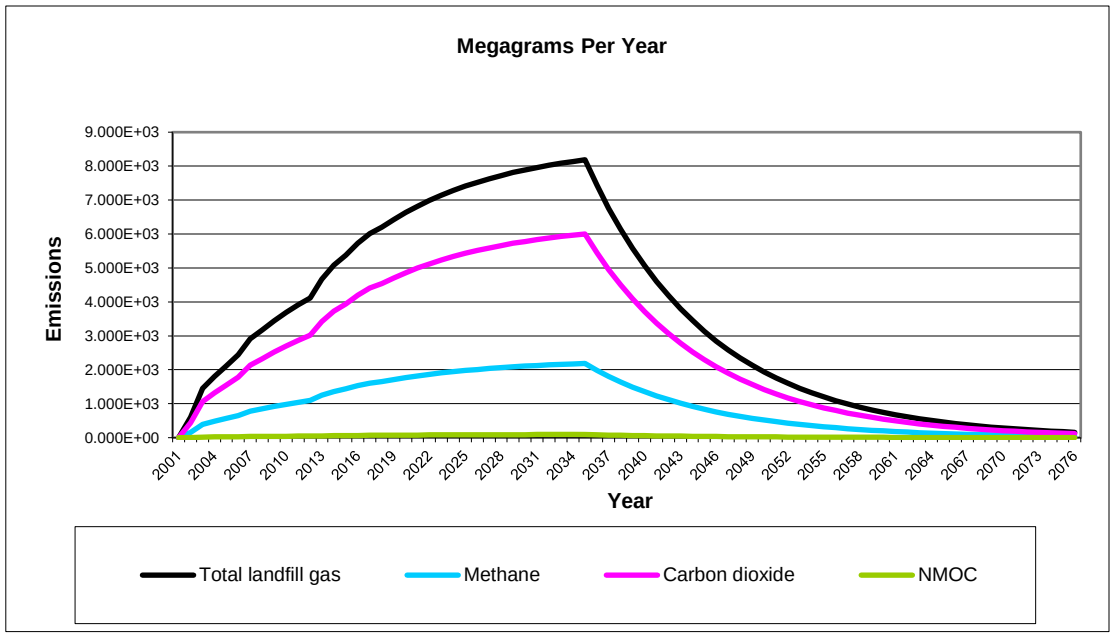
Pollutant Parameters

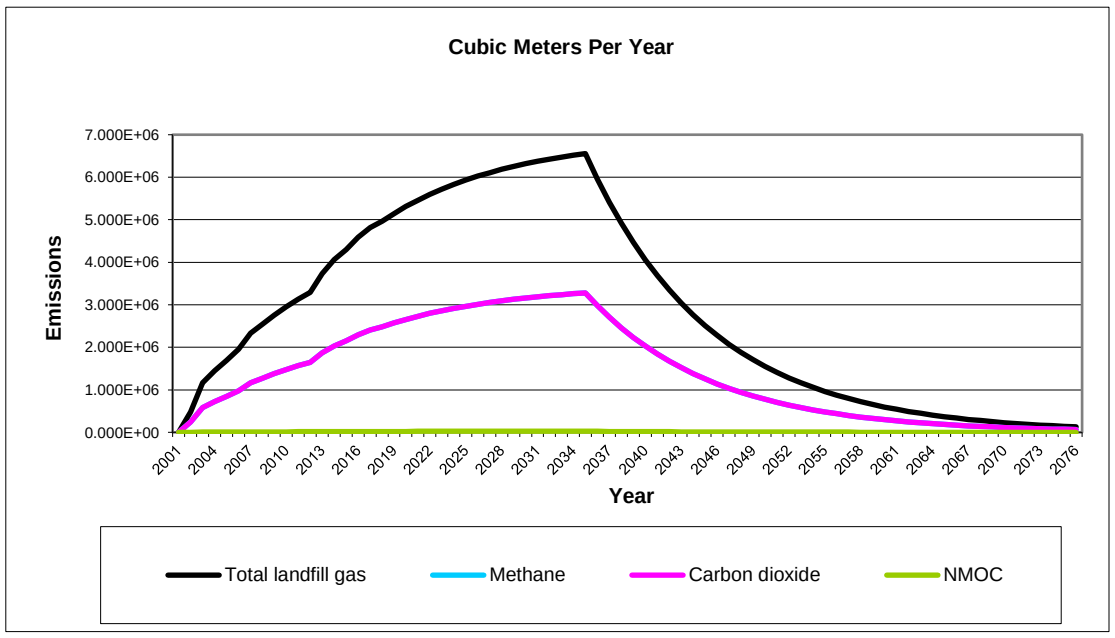
	Compound	Gas / Pollutant Default Parameters: Concentration (*ppmv*)	Molecular Weight	User-specified Pollutant Parameters: Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

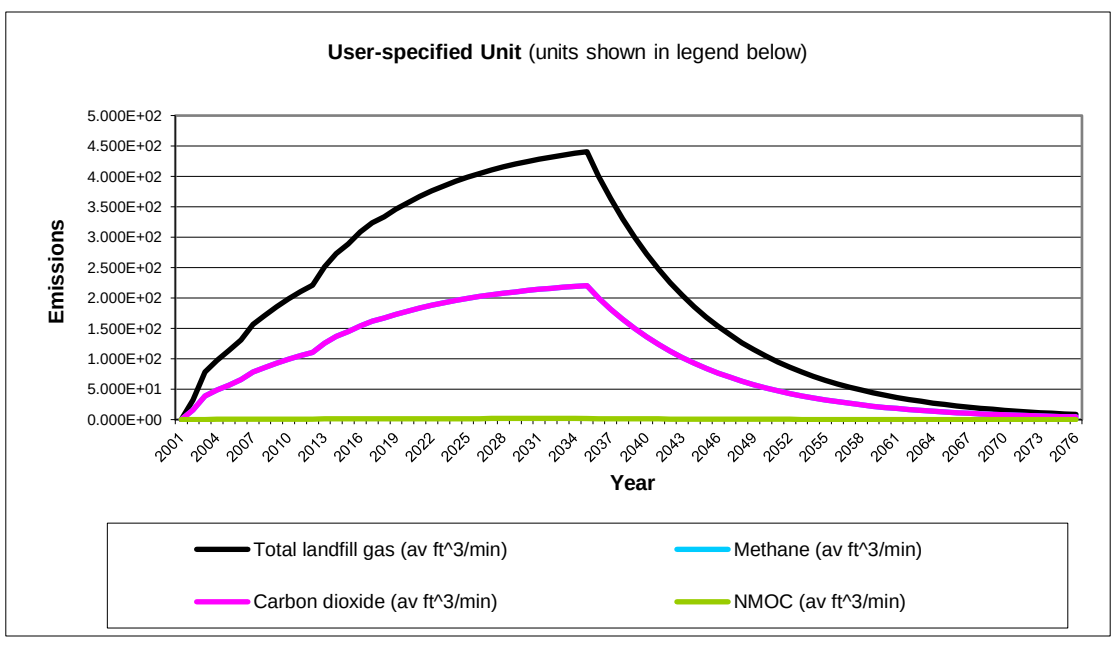
Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
9.000E+03
8.000E+03
7.000E+03
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
7.000E+06
6.000E+06
5.000E+06
4.000E+06
3.000E+06
2.000E+06
1.000E+06
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
5.000E+02
4.500E+02
4.000E+02
3.500E+02
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	5.975E+02	4.784E+05	3.215E+01	1.596E+02	2.392E+05	1.607E+01
2003	1.451E+03	1.162E+06	7.808E+01	3.877E+02	5.811E+05	3.904E+01
2004	1.806E+03	1.446E+06	9.717E+01	4.824E+02	7.231E+05	4.859E+01
2005	2.112E+03	1.691E+06	1.136E+02	5.642E+02	8.457E+05	5.682E+01
2006	2.438E+03	1.952E+06	1.312E+02	6.512E+02	9.761E+05	6.558E+01
2007	2.914E+03	2.333E+06	1.568E+02	7.783E+02	1.167E+06	7.839E+01
2008	3.173E+03	2.541E+06	1.707E+02	8.476E+02	1.271E+06	8.537E+01
2009	3.443E+03	2.757E+06	1.852E+02	9.197E+02	1.379E+06	9.262E+01
2010	3.688E+03	2.953E+06	1.984E+02	9.851E+02	1.477E+06	9.921E+01
2011	3.911E+03	3.131E+06	2.104E+02	1.045E+03	1.566E+06	1.052E+02
2012	4.113E+03	3.293E+06	2.213E+02	1.099E+03	1.647E+06	1.106E+02
2013	4.665E+03	3.735E+06	2.510E+02	1.246E+03	1.868E+06	1.255E+02
2014	5.078E+03	4.066E+06	2.732E+02	1.356E+03	2.033E+06	1.366E+02
2015	5.372E+03	4.302E+06	2.890E+02	1.435E+03	2.151E+06	1.445E+02
2016	5.731E+03	4.589E+06	3.083E+02	1.531E+03	2.295E+06	1.542E+02
2017	6.016E+03	4.817E+06	3.237E+02	1.607E+03	2.409E+06	1.618E+02
2018	6.199E+03	4.964E+06	3.335E+02	1.656E+03	2.482E+06	1.668E+02
2019	6.426E+03	5.145E+06	3.457E+02	1.716E+03	2.573E+06	1.729E+02
2020	6.631E+03	5.310E+06	3.568E+02	1.771E+03	2.655E+06	1.784E+02
2021	6.818E+03	5.459E+06	3.668E+02	1.821E+03	2.730E+06	1.834E+02
2022	6.987E+03	5.595E+06	3.759E+02	1.866E+03	2.798E+06	1.880E+02
2023	7.142E+03	5.719E+06	3.842E+02	1.908E+03	2.859E+06	1.921E+02
2024	7.282E+03	5.831E+06	3.918E+02	1.945E+03	2.915E+06	1.959E+02
2025	7.409E+03	5.933E+06	3.986E+02	1.979E+03	2.966E+06	1.993E+02
2026	7.524E+03	6.025E+06	4.048E+02	2.010E+03	3.013E+06	2.024E+02
2027	7.629E+03	6.109E+06	4.105E+02	2.038E+03	3.055E+06	2.052E+02
2028	7.725E+03	6.185E+06	4.156E+02	2.063E+03	3.093E+06	2.078E+02
2029	7.811E+03	6.255E+06	4.203E+02	2.086E+03	3.127E+06	2.101E+02
2030	7.890E+03	6.318E+06	4.245E+02	2.107E+03	3.159E+06	2.122E+02
2031	7.961E+03	6.375E+06	4.283E+02	2.127E+03	3.188E+06	2.142E+02
2032	8.026E+03	6.427E+06	4.318E+02	2.144E+03	3.214E+06	2.159E+02
2033	8.085E+03	6.474E+06	4.350E+02	2.160E+03	3.237E+06	2.175E+02
2034	8.139E+03	6.517E+06	4.379E+02	2.174E+03	3.259E+06	2.189E+02
2035	8.188E+03	6.556E+06	4.405E+02	2.187E+03	3.278E+06	2.203E+02
2036	7.438E+03	5.956E+06	4.002E+02	1.987E+03	2.978E+06	2.001E+02
2037	6.757E+03	5.411E+06	3.636E+02	1.805E+03	2.705E+06	1.818E+02
2038	6.139E+03	4.916E+06	3.303E+02	1.640E+03	2.458E+06	1.651E+02
2039	5.577E+03	4.466E+06	3.000E+02	1.490E+03	2.233E+06	1.500E+02
2040	5.066E+03	4.057E+06	2.726E+02	1.353E+03	2.028E+06	1.363E+02
2041	4.603E+03	3.686E+06	2.476E+02	1.229E+03	1.843E+06	1.238E+02
2042	4.181E+03	3.348E+06	2.250E+02	1.117E+03	1.674E+06	1.125E+02
2043	3.799E+03	3.042E+06	2.044E+02	1.015E+03	1.521E+06	1.022E+02
2044	3.451E+03	2.763E+06	1.857E+02	9.218E+02	1.382E+06	9.283E+01
2045	3.135E+03	2.510E+06	1.687E+02	8.374E+02	1.255E+06	8.434E+01
2046	2.848E+03	2.281E+06	1.532E+02	7.607E+02	1.140E+06	7.662E+01
2047	2.587E+03	2.072E+06	1.392E+02	6.911E+02	1.036E+06	6.960E+01
2048	2.350E+03	1.882E+06	1.265E+02	6.278E+02	9.411E+05	6.323E+01
2049	2.135E+03	1.710E+06	1.149E+02	5.704E+02	8.549E+05	5.744E+01
2050	1.940E+03	1.553E+06	1.044E+02	5.182E+02	7.767E+05	5.219E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.762E+03	1.411E+06	9.482E+01	4.707E+02	7.056E+05	4.741E+01
2052	1.601E+03	1.282E+06	8.614E+01	4.276E+02	6.410E+05	4.307E+01
2053	1.454E+03	1.165E+06	7.825E+01	3.885E+02	5.823E+05	3.913E+01
2054	1.321E+03	1.058E+06	7.109E+01	3.529E+02	5.290E+05	3.555E+01
2055	1.200E+03	9.612E+05	6.458E+01	3.206E+02	4.806E+05	3.229E+01
2056	1.090E+03	8.732E+05	5.867E+01	2.913E+02	4.366E+05	2.934E+01
2057	9.907E+02	7.933E+05	5.330E+01	2.646E+02	3.966E+05	2.665E+01
2058	9.000E+02	7.207E+05	4.842E+01	2.404E+02	3.603E+05	2.421E+01
2059	8.176E+02	6.547E+05	4.399E+01	2.184E+02	3.274E+05	2.199E+01
2060	7.428E+02	5.948E+05	3.996E+01	1.984E+02	2.974E+05	1.998E+01
2061	6.748E+02	5.403E+05	3.630E+01	1.802E+02	2.702E+05	1.815E+01
2062	6.130E+02	4.909E+05	3.298E+01	1.637E+02	2.454E+05	1.649E+01
2063	5.569E+02	4.459E+05	2.996E+01	1.488E+02	2.230E+05	1.498E+01
2064	5.059E+02	4.051E+05	2.722E+01	1.351E+02	2.026E+05	1.361E+01
2065	4.596E+02	3.680E+05	2.473E+01	1.228E+02	1.840E+05	1.236E+01
2066	4.175E+02	3.343E+05	2.246E+01	1.115E+02	1.672E+05	1.123E+01
2067	3.793E+02	3.037E+05	2.041E+01	1.013E+02	1.519E+05	1.020E+01
2068	3.446E+02	2.759E+05	1.854E+01	9.205E+01	1.380E+05	9.270E+00
2069	3.131E+02	2.507E+05	1.684E+01	8.362E+01	1.253E+05	8.422E+00
2070	2.844E+02	2.277E+05	1.530E+01	7.597E+01	1.139E+05	7.651E+00
2071	2.584E+02	2.069E+05	1.390E+01	6.901E+01	1.034E+05	6.950E+00
2072	2.347E+02	1.880E+05	1.263E+01	6.270E+01	9.398E+04	6.314E+00
2073	2.132E+02	1.707E+05	1.147E+01	5.696E+01	8.537E+04	5.736E+00
2074	1.937E+02	1.551E+05	1.042E+01	5.174E+01	7.756E+04	5.211E+00
2075	1.760E+02	1.409E+05	9.468E+00	4.701E+01	7.046E+04	4.734E+00
2076	1.599E+02	1.280E+05	8.602E+00	4.270E+01	6.401E+04	4.301E+00
2077	1.452E+02	1.163E+05	7.814E+00	3.879E+01	5.815E+04	3.907E+00
2078	1.319E+02	1.057E+05	7.099E+00	3.524E+01	5.283E+04	3.549E+00
2079	1.199E+02	9.598E+04	6.449E+00	3.202E+01	4.799E+04	3.225E+00
2080	1.089E+02	8.720E+04	5.859E+00	2.909E+01	4.360E+04	2.929E+00
2081	9.893E+01	7.922E+04	5.323E+00	2.642E+01	3.961E+04	2.661E+00
2082	8.987E+01	7.197E+04	4.835E+00	2.401E+01	3.598E+04	2.418E+00
2083	8.165E+01	6.538E+04	4.393E+00	2.181E+01	3.269E+04	2.196E+00
2084	7.417E+01	5.939E+04	3.991E+00	1.981E+01	2.970E+04	1.995E+00
2085	6.738E+01	5.396E+04	3.625E+00	1.800E+01	2.698E+04	1.813E+00
2086	6.121E+01	4.902E+04	3.293E+00	1.635E+01	2.451E+04	1.647E+00
2087	5.561E+01	4.453E+04	2.992E+00	1.485E+01	2.227E+04	1.496E+00
2088	5.052E+01	4.045E+04	2.718E+00	1.349E+01	2.023E+04	1.359E+00
2089	4.590E+01	3.675E+04	2.469E+00	1.226E+01	1.838E+04	1.235E+00
2090	4.170E+01	3.339E+04	2.243E+00	1.114E+01	1.669E+04	1.122E+00
2091	3.788E+01	3.033E+04	2.038E+00	1.012E+01	1.517E+04	1.019E+00
2092	3.441E+01	2.755E+04	1.851E+00	9.192E+00	1.378E+04	9.257E-01
2093	3.126E+01	2.503E+04	1.682E+00	8.350E+00	1.252E+04	8.410E-01
2094	2.840E+01	2.274E+04	1.528E+00	7.586E+00	1.137E+04	7.640E-01
2095	2.580E+01	2.066E+04	1.388E+00	6.892E+00	1.033E+04	6.941E-01
2096	2.344E+01	1.877E+04	1.261E+00	6.261E+00	9.384E+03	6.305E-01
2097	2.129E+01	1.705E+04	1.146E+00	5.688E+00	8.525E+03	5.728E-01
2098	1.934E+01	1.549E+04	1.041E+00	5.167E+00	7.745E+03	5.204E-01
2099	1.757E+01	1.407E+04	9.455E-01	4.694E+00	7.036E+03	4.727E-01
2100	1.596E+01	1.278E+04	8.589E-01	4.264E+00	6.392E+03	4.295E-01
2101	1.450E+01	1.161E+04	7.803E-01	3.874E+00	5.807E+03	3.902E-01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	1.318E+01	1.055E+04	7.089E-01	3.519E+00	5.275E+03	3.544E-01
2103	1.197E+01	9.585E+03	6.440E-01	3.197E+00	4.792E+03	3.220E-01
2104	1.087E+01	8.707E+03	5.851E-01	2.905E+00	4.354E+03	2.925E-01
2105	9.879E+00	7.910E+03	5.315E-01	2.639E+00	3.955E+03	2.657E-01
2106	8.974E+00	7.186E+03	4.828E-01	2.397E+00	3.593E+03	2.414E-01
2107	8.153E+00	6.529E+03	4.387E-01	2.178E+00	3.264E+03	2.193E-01
2108	7.407E+00	5.931E+03	3.985E-01	1.978E+00	2.965E+03	1.992E-01
2109	6.729E+00	5.388E+03	3.620E-01	1.797E+00	2.694E+03	1.810E-01
2110	6.113E+00	4.895E+03	3.289E-01	1.633E+00	2.447E+03	1.644E-01
2111	5.553E+00	4.447E+03	2.988E-01	1.483E+00	2.223E+03	1.494E-01
2112	5.045E+00	4.040E+03	2.714E-01	1.348E+00	2.020E+03	1.357E-01
2113	4.583E+00	3.670E+03	2.466E-01	1.224E+00	1.835E+03	1.233E-01
2114	4.164E+00	3.334E+03	2.240E-01	1.112E+00	1.667E+03	1.120E-01
2115	3.782E+00	3.029E+03	2.035E-01	1.010E+00	1.514E+03	1.018E-01
2116	3.436E+00	2.752E+03	1.849E-01	9.179E-01	1.376E+03	9.244E-02
2117	3.122E+00	2.500E+03	1.680E-01	8.338E-01	1.250E+03	8.398E-02
2118	2.836E+00	2.271E+03	1.526E-01	7.575E-01	1.135E+03	7.629E-02
2119	2.576E+00	2.063E+03	1.386E-01	6.882E-01	1.032E+03	6.931E-02
2120	2.341E+00	1.874E+03	1.259E-01	6.252E-01	9.371E+02	6.296E-02
2121	2.126E+00	1.703E+03	1.144E-01	5.680E-01	8.513E+02	5.720E-02
2122	1.932E+00	1.547E+03	1.039E-01	5.160E-01	7.734E+02	5.196E-02
2123	1.755E+00	1.405E+03	9.442E-02	4.687E-01	7.026E+02	4.721E-02
2124	1.594E+00	1.277E+03	8.577E-02	4.258E-01	6.383E+02	4.289E-02
2125	1.448E+00	1.160E+03	7.792E-02	3.869E-01	5.799E+02	3.896E-02
2126	1.316E+00	1.054E+03	7.079E-02	3.514E-01	5.268E+02	3.539E-02
2127	1.195E+00	9.571E+02	6.431E-02	3.193E-01	4.786E+02	3.215E-02
2128	1.086E+00	8.695E+02	5.842E-02	2.900E-01	4.348E+02	2.921E-02
2129	9.865E-01	7.899E+02	5.307E-02	2.635E-01	3.950E+02	2.654E-02
2130	8.962E-01	7.176E+02	4.822E-02	2.394E-01	3.588E+02	2.411E-02
2131	8.141E-01	6.519E+02	4.380E-02	2.175E-01	3.260E+02	2.190E-02
2132	7.396E-01	5.923E+02	3.979E-02	1.976E-01	2.961E+02	1.990E-02
2133	6.719E-01	5.380E+02	3.615E-02	1.795E-01	2.690E+02	1.808E-02
2134	6.104E-01	4.888E+02	3.284E-02	1.630E-01	2.444E+02	1.642E-02
2135	5.545E-01	4.440E+02	2.984E-02	1.481E-01	2.220E+02	1.492E-02
2136	5.038E-01	4.034E+02	2.710E-02	1.346E-01	2.017E+02	1.355E-02
2137	4.577E-01	3.665E+02	2.462E-02	1.222E-01	1.832E+02	1.231E-02
2138	4.158E-01	3.329E+02	2.237E-02	1.111E-01	1.665E+02	1.118E-02
2139	3.777E-01	3.025E+02	2.032E-02	1.009E-01	1.512E+02	1.016E-02
2140	3.431E-01	2.748E+02	1.846E-02	9.166E-02	1.374E+02	9.231E-03
2141	3.117E-01	2.496E+02	1.677E-02	8.327E-02	1.248E+02	8.386E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2001	0	0	0	0	0	0
2002	4.379E+02	2.392E+05	1.607E+01	6.860E+00	1.914E+03	1.286E-01
2003	1.064E+03	5.811E+05	3.904E+01	1.666E+01	4.649E+03	3.123E-01
2004	1.324E+03	7.231E+05	4.859E+01	2.074E+01	5.785E+03	3.887E-01
2005	1.548E+03	8.457E+05	5.682E+01	2.425E+01	6.766E+03	4.546E-01
2006	1.787E+03	9.761E+05	6.558E+01	2.799E+01	7.809E+03	5.247E-01
2007	2.136E+03	1.167E+06	7.839E+01	3.345E+01	9.333E+03	6.271E-01
2008	2.326E+03	1.271E+06	8.537E+01	3.643E+01	1.016E+04	6.829E-01
2009	2.523E+03	1.379E+06	9.262E+01	3.953E+01	1.103E+04	7.410E-01
2010	2.703E+03	1.477E+06	9.921E+01	4.234E+01	1.181E+04	7.937E-01
2011	2.866E+03	1.566E+06	1.052E+02	4.490E+01	1.253E+04	8.416E-01
2012	3.014E+03	1.647E+06	1.106E+02	4.722E+01	1.317E+04	8.851E-01
2013	3.419E+03	1.868E+06	1.255E+02	5.356E+01	1.494E+04	1.004E+00
2014	3.721E+03	2.033E+06	1.366E+02	5.830E+01	1.626E+04	1.093E+00
2015	3.937E+03	2.151E+06	1.445E+02	6.168E+01	1.721E+04	1.156E+00
2016	4.200E+03	2.295E+06	1.542E+02	6.580E+01	1.836E+04	1.233E+00
2017	4.409E+03	2.409E+06	1.618E+02	6.907E+01	1.927E+04	1.295E+00
2018	4.543E+03	2.482E+06	1.668E+02	7.117E+01	1.986E+04	1.334E+00
2019	4.709E+03	2.573E+06	1.729E+02	7.377E+01	2.058E+04	1.383E+00
2020	4.860E+03	2.655E+06	1.784E+02	7.613E+01	2.124E+04	1.427E+00
2021	4.997E+03	2.730E+06	1.834E+02	7.828E+01	2.184E+04	1.467E+00
2022	5.121E+03	2.798E+06	1.880E+02	8.022E+01	2.238E+04	1.504E+00
2023	5.234E+03	2.859E+06	1.921E+02	8.199E+01	2.287E+04	1.537E+00
2024	5.337E+03	2.915E+06	1.959E+02	8.360E+01	2.332E+04	1.567E+00
2025	5.430E+03	2.966E+06	1.993E+02	8.506E+01	2.373E+04	1.594E+00
2026	5.514E+03	3.013E+06	2.024E+02	8.639E+01	2.410E+04	1.619E+00
2027	5.591E+03	3.055E+06	2.052E+02	8.759E+01	2.444E+04	1.642E+00
2028	5.661E+03	3.093E+06	2.078E+02	8.869E+01	2.474E+04	1.662E+00
2029	5.725E+03	3.127E+06	2.101E+02	8.968E+01	2.502E+04	1.681E+00
2030	5.782E+03	3.159E+06	2.122E+02	9.058E+01	2.527E+04	1.698E+00
2031	5.835E+03	3.188E+06	2.142E+02	9.141E+01	2.550E+04	1.713E+00
2032	5.882E+03	3.214E+06	2.159E+02	9.215E+01	2.571E+04	1.727E+00
2033	5.926E+03	3.237E+06	2.175E+02	9.283E+01	2.590E+04	1.740E+00
2034	5.965E+03	3.259E+06	2.189E+02	9.344E+01	2.607E+04	1.752E+00
2035	6.001E+03	3.278E+06	2.203E+02	9.400E+01	2.623E+04	1.762E+00
2036	5.451E+03	2.978E+06	2.001E+02	8.540E+01	2.382E+04	1.601E+00
2037	4.952E+03	2.705E+06	1.818E+02	7.758E+01	2.164E+04	1.454E+00
2038	4.499E+03	2.458E+06	1.651E+02	7.048E+01	1.966E+04	1.321E+00
2039	4.087E+03	2.233E+06	1.500E+02	6.403E+01	1.786E+04	1.200E+00
2040	3.713E+03	2.028E+06	1.363E+02	5.817E+01	1.623E+04	1.090E+00
2041	3.373E+03	1.843E+06	1.238E+02	5.284E+01	1.474E+04	9.905E-01
2042	3.064E+03	1.674E+06	1.125E+02	4.801E+01	1.339E+04	8.999E-01
2043	2.784E+03	1.521E+06	1.022E+02	4.361E+01	1.217E+04	8.175E-01
2044	2.529E+03	1.382E+06	9.283E+01	3.962E+01	1.105E+04	7.427E-01
2045	2.298E+03	1.255E+06	8.434E+01	3.599E+01	1.004E+04	6.747E-01
2046	2.087E+03	1.140E+06	7.662E+01	3.270E+01	9.122E+03	6.129E-01
2047	1.896E+03	1.036E+06	6.960E+01	2.971E+01	8.287E+03	5.568E-01
2048	1.723E+03	9.411E+05	6.323E+01	2.699E+01	7.529E+03	5.059E-01
2049	1.565E+03	8.549E+05	5.744E+01	2.452E+01	6.840E+03	4.595E-01
2050	1.422E+03	7.767E+05	5.219E+01	2.227E+01	6.213E+03	4.175E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.292E+03	7.056E+05	4.741E+01	2.023E+01	5.645E+03	3.793E-01
2052	1.173E+03	6.410E+05	4.307E+01	1.838E+01	5.128E+03	3.446E-01
2053	1.066E+03	5.823E+05	3.913E+01	1.670E+01	4.659E+03	3.130E-01
2054	9.684E+02	5.290E+05	3.555E+01	1.517E+01	4.232E+03	2.844E-01
2055	8.797E+02	4.806E+05	3.229E+01	1.378E+01	3.845E+03	2.583E-01
2056	7.992E+02	4.366E+05	2.934E+01	1.252E+01	3.493E+03	2.347E-01
2057	7.261E+02	3.966E+05	2.665E+01	1.137E+01	3.173E+03	2.132E-01
2058	6.596E+02	3.603E+05	2.421E+01	1.033E+01	2.883E+03	1.937E-01
2059	5.992E+02	3.274E+05	2.199E+01	9.387E+00	2.619E+03	1.760E-01
2060	5.444E+02	2.974E+05	1.998E+01	8.528E+00	2.379E+03	1.599E-01
2061	4.945E+02	2.702E+05	1.815E+01	7.747E+00	2.161E+03	1.452E-01
2062	4.493E+02	2.454E+05	1.649E+01	7.038E+00	1.963E+03	1.319E-01
2063	4.081E+02	2.230E+05	1.498E+01	6.394E+00	1.784E+03	1.199E-01
2064	3.708E+02	2.026E+05	1.361E+01	5.809E+00	1.620E+03	1.089E-01
2065	3.368E+02	1.840E+05	1.236E+01	5.277E+00	1.472E+03	9.891E-02
2066	3.060E+02	1.672E+05	1.123E+01	4.794E+00	1.337E+03	8.986E-02
2067	2.780E+02	1.519E+05	1.020E+01	4.355E+00	1.215E+03	8.163E-02
2068	2.526E+02	1.380E+05	9.270E+00	3.956E+00	1.104E+03	7.416E-02
2069	2.294E+02	1.253E+05	8.422E+00	3.594E+00	1.003E+03	6.737E-02
2070	2.084E+02	1.139E+05	7.651E+00	3.265E+00	9.109E+02	6.121E-02
2071	1.894E+02	1.034E+05	6.950E+00	2.966E+00	8.276E+02	5.560E-02
2072	1.720E+02	9.398E+04	6.314E+00	2.695E+00	7.518E+02	5.051E-02
2073	1.563E+02	8.537E+04	5.736E+00	2.448E+00	6.830E+02	4.589E-02
2074	1.420E+02	7.756E+04	5.211E+00	2.224E+00	6.205E+02	4.169E-02
2075	1.290E+02	7.046E+04	4.734E+00	2.020E+00	5.637E+02	3.787E-02
2076	1.172E+02	6.401E+04	4.301E+00	1.836E+00	5.121E+02	3.441E-02
2077	1.064E+02	5.815E+04	3.907E+00	1.668E+00	4.652E+02	3.126E-02
2078	9.670E+01	5.283E+04	3.549E+00	1.515E+00	4.226E+02	2.840E-02
2079	8.785E+01	4.799E+04	3.225E+00	1.376E+00	3.839E+02	2.580E-02
2080	7.981E+01	4.360E+04	2.929E+00	1.250E+00	3.488E+02	2.344E-02
2081	7.250E+01	3.961E+04	2.661E+00	1.136E+00	3.169E+02	2.129E-02
2082	6.587E+01	3.598E+04	2.418E+00	1.032E+00	2.879E+02	1.934E-02
2083	5.984E+01	3.269E+04	2.196E+00	9.374E-01	2.615E+02	1.757E-02
2084	5.436E+01	2.970E+04	1.995E+00	8.516E-01	2.376E+02	1.596E-02
2085	4.938E+01	2.698E+04	1.813E+00	7.736E-01	2.158E+02	1.450E-02
2086	4.486E+01	2.451E+04	1.647E+00	7.028E-01	1.961E+02	1.317E-02
2087	4.076E+01	2.227E+04	1.496E+00	6.385E-01	1.781E+02	1.197E-02
2088	3.703E+01	2.023E+04	1.359E+00	5.800E-01	1.618E+02	1.087E-02
2089	3.364E+01	1.838E+04	1.235E+00	5.269E-01	1.470E+02	9.877E-03
2090	3.056E+01	1.669E+04	1.122E+00	4.787E-01	1.335E+02	8.973E-03
2091	2.776E+01	1.517E+04	1.019E+00	4.349E-01	1.213E+02	8.152E-03
2092	2.522E+01	1.378E+04	9.257E-01	3.951E-01	1.102E+02	7.406E-03
2093	2.291E+01	1.252E+04	8.410E-01	3.589E-01	1.001E+02	6.728E-03
2094	2.081E+01	1.137E+04	7.640E-01	3.261E-01	9.096E+01	6.112E-03
2095	1.891E+01	1.033E+04	6.941E-01	2.962E-01	8.264E+01	5.552E-03
2096	1.718E+01	9.384E+03	6.305E-01	2.691E-01	7.507E+01	5.044E-03
2097	1.561E+01	8.525E+03	5.728E-01	2.445E-01	6.820E+01	4.582E-03
2098	1.418E+01	7.745E+03	5.204E-01	2.221E-01	6.196E+01	4.163E-03
2099	1.288E+01	7.036E+03	4.727E-01	2.018E-01	5.629E+01	3.782E-03
2100	1.170E+01	6.392E+03	4.295E-01	1.833E-01	5.114E+01	3.436E-03
2101	1.063E+01	5.807E+03	3.902E-01	1.665E-01	4.645E+01	3.121E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	9.656E+00	5.275E+03	3.544E-01	1.513E-01	4.220E+01	2.836E-03
2103	8.772E+00	4.792E+03	3.220E-01	1.374E-01	3.834E+01	2.576E-03
2104	7.969E+00	4.354E+03	2.925E-01	1.248E-01	3.483E+01	2.340E-03
2105	7.240E+00	3.955E+03	2.657E-01	1.134E-01	3.164E+01	2.126E-03
2106	6.577E+00	3.593E+03	2.414E-01	1.030E-01	2.875E+01	1.931E-03
2107	5.975E+00	3.264E+03	2.193E-01	9.361E-02	2.611E+01	1.755E-03
2108	5.428E+00	2.965E+03	1.992E-01	8.504E-02	2.372E+01	1.594E-03
2109	4.931E+00	2.694E+03	1.810E-01	7.725E-02	2.155E+01	1.448E-03
2110	4.480E+00	2.447E+03	1.644E-01	7.018E-02	1.958E+01	1.316E-03
2111	4.070E+00	2.223E+03	1.494E-01	6.376E-02	1.779E+01	1.195E-03
2112	3.697E+00	2.020E+03	1.357E-01	5.792E-02	1.616E+01	1.086E-03
2113	3.359E+00	1.835E+03	1.233E-01	5.262E-02	1.468E+01	9.863E-04
2114	3.051E+00	1.667E+03	1.120E-01	4.780E-02	1.334E+01	8.961E-04
2115	2.772E+00	1.514E+03	1.018E-01	4.343E-02	1.212E+01	8.140E-04
2116	2.518E+00	1.376E+03	9.244E-02	3.945E-02	1.101E+01	7.395E-04
2117	2.288E+00	1.250E+03	8.398E-02	3.584E-02	9.999E+00	6.718E-04
2118	2.078E+00	1.135E+03	7.629E-02	3.256E-02	9.084E+00	6.103E-04
2119	1.888E+00	1.032E+03	6.931E-02	2.958E-02	8.252E+00	5.545E-04
2120	1.715E+00	9.371E+02	6.296E-02	2.687E-02	7.497E+00	5.037E-04
2121	1.558E+00	8.513E+02	5.720E-02	2.441E-02	6.811E+00	4.576E-04
2122	1.416E+00	7.734E+02	5.196E-02	2.218E-02	6.187E+00	4.157E-04
2123	1.286E+00	7.026E+02	4.721E-02	2.015E-02	5.621E+00	3.777E-04
2124	1.168E+00	6.383E+02	4.289E-02	1.830E-02	5.106E+00	3.431E-04
2125	1.061E+00	5.799E+02	3.896E-02	1.663E-02	4.639E+00	3.117E-04
2126	9.643E-01	5.268E+02	3.539E-02	1.511E-02	4.214E+00	2.832E-04
2127	8.760E-01	4.786E+02	3.215E-02	1.372E-02	3.829E+00	2.572E-04
2128	7.958E-01	4.348E+02	2.921E-02	1.247E-02	3.478E+00	2.337E-04
2129	7.230E-01	3.950E+02	2.654E-02	1.133E-02	3.160E+00	2.123E-04
2130	6.568E-01	3.588E+02	2.411E-02	1.029E-02	2.870E+00	1.929E-04
2131	5.967E-01	3.260E+02	2.190E-02	9.347E-03	2.608E+00	1.752E-04
2132	5.421E-01	2.961E+02	1.990E-02	8.492E-03	2.369E+00	1.592E-04
2133	4.924E-01	2.690E+02	1.808E-02	7.714E-03	2.152E+00	1.446E-04
2134	4.474E-01	2.444E+02	1.642E-02	7.008E-03	1.955E+00	1.314E-04
2135	4.064E-01	2.220E+02	1.492E-02	6.367E-03	1.776E+00	1.193E-04
2136	3.692E-01	2.017E+02	1.355E-02	5.784E-03	1.614E+00	1.084E-04
2137	3.354E-01	1.832E+02	1.231E-02	5.254E-03	1.466E+00	9.849E-05
2138	3.047E-01	1.665E+02	1.118E-02	4.774E-03	1.332E+00	8.948E-05
2139	2.768E-01	1.512E+02	1.016E-02	4.337E-03	1.210E+00	8.129E-05
2140	2.515E-01	1.374E+02	9.231E-03	3.940E-03	1.099E+00	7.385E-05
2141	2.285E-01	1.248E+02	8.386E-03	3.579E-03	9.985E-01	6.709E-05

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Thursday, November 28, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate (*$year^{-1}$*)
L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)
t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**2001**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.060**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**110**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2001	20,479	22,527	0	0
2002	31,140	34,254	20,479	22,527
2003	16,714	18,385	51,619	56,781
2004	16,163	17,779	68,333	75,166
2005	17,787	19,566	84,496	92,946
2006	23,965	26,362	102,283	112,511
2007	18,035	19,839	126,248	138,873
2008	19,200	21,120	144,283	158,711
2009	19,200	21,120	163,483	179,831
2010	19,200	21,120	182,683	200,951
2011	19,200	21,120	201,883	222,071
2012	31,824	35,006	221,083	243,191
2013	28,791	31,670	252,907	278,198
2014	26,030	28,633	281,698	309,868
2015	29,152	32,067	307,728	338,501
2016	27,736	30,510	336,880	370,568
2017	25,167	27,684	364,616	401,078
2018	27,205	29,926	389,783	428,761
2019	27,205	29,926	416,988	458,687
2020	27,205	29,926	444,193	488,612
2021	27,205	29,926	471,398	518,538
2022	27,205	29,926	498,603	548,463
2023	27,205	29,926	525,808	578,389
2024	27,205	29,926	553,013	608,314
2025	27,205	29,926	580,218	638,240
2026	27,205	29,926	607,423	668,165
2027	27,205	29,926	634,628	698,091
2028	27,205	29,926	661,833	728,016
2029	27,205	29,926	689,038	757,942
2030	27,205	29,926	716,243	787,867
2031	27,205	29,926	743,448	817,793
2032	27,205	29,926	770,653	847,718
2033	27,205	29,926	797,858	877,644
2034	27,205	29,926	825,063	907,569
2035	0	0	852,268	937,495
2036	0	0	852,268	937,495
2037	0	0	852,268	937,495
2038	0	0	852,268	937,495
2039	0	0	852,268	937,495
2040	0	0	852,268	937,495

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2041	0	0	852,268	937,495
2042	0	0	852,268	937,495
2043	0	0	852,268	937,495
2044	0	0	852,268	937,495
2045	0	0	852,268	937,495
2046	0	0	852,268	937,495
2047	0	0	852,268	937,495
2048	0	0	852,268	937,495
2049	0	0	852,268	937,495
2050	0	0	852,268	937,495
2051	0	0	852,268	937,495
2052	0	0	852,268	937,495
2053	0	0	852,268	937,495
2054	0	0	852,268	937,495
2055	0	0	852,268	937,495
2056	0	0	852,268	937,495
2057	0	0	852,268	937,495
2058	0	0	852,268	937,495
2059	0	0	852,268	937,495
2060	0	0	852,268	937,495
2061	0	0	852,268	937,495
2062	0	0	852,268	937,495
2063	0	0	852,268	937,495
2064	0	0	852,268	937,495
2065	0	0	852,268	937,495
2066	0	0	852,268	937,495
2067	0	0	852,268	937,495
2068	0	0	852,268	937,495
2069	0	0	852,268	937,495
2070	0	0	852,268	937,495
2071	0	0	852,268	937,495
2072	0	0	852,268	937,495
2073	0	0	852,268	937,495
2074	0	0	852,268	937,495
2075	0	0	852,268	937,495
2076	0	0	852,268	937,495
2077	0	0	852,268	937,495
2078	0	0	852,268	937,495
2079	0	0	852,268	937,495
2080	0	0	852,268	937,495

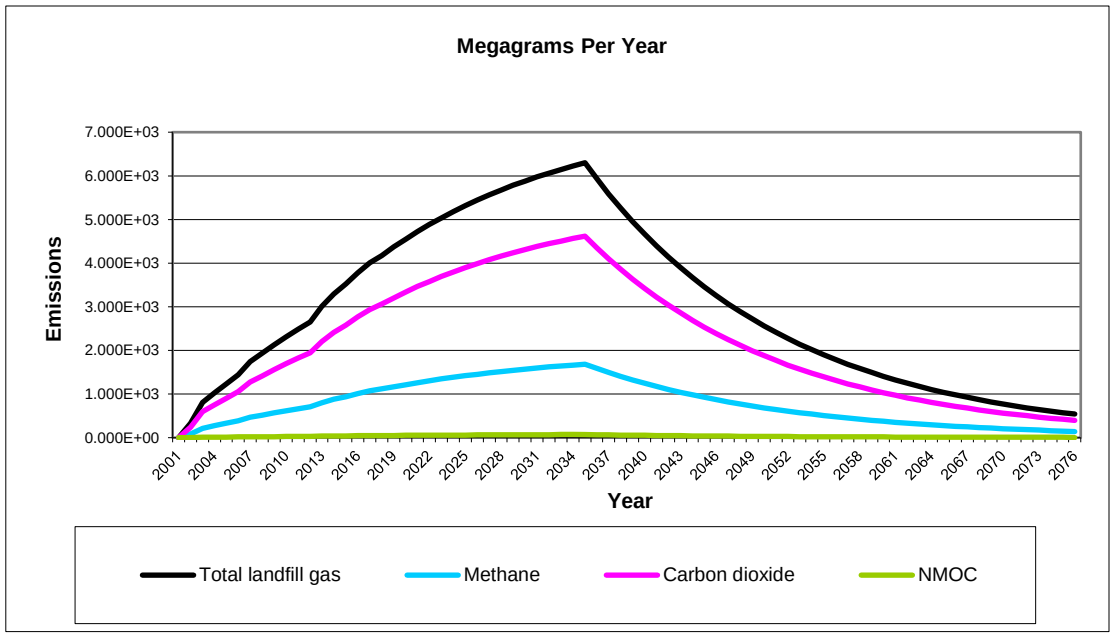
Pollutant Parameters

	Compound	Gas / Pollutant Default Parameters: Concentration (*ppmv*)	Molecular Weight	User-specified Pollutant Parameters: Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
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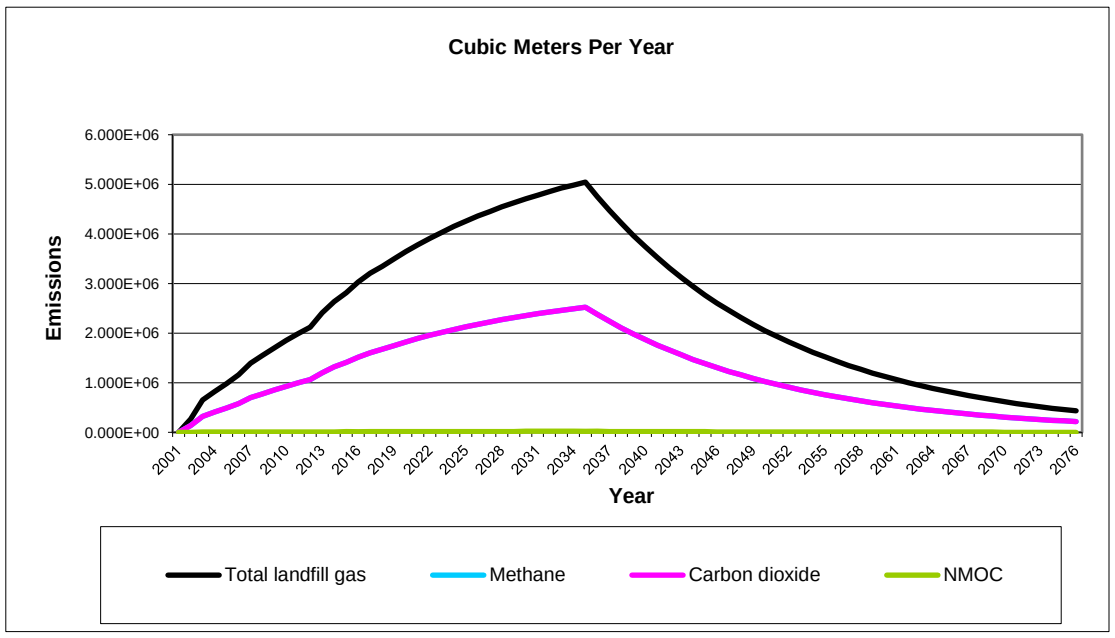
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
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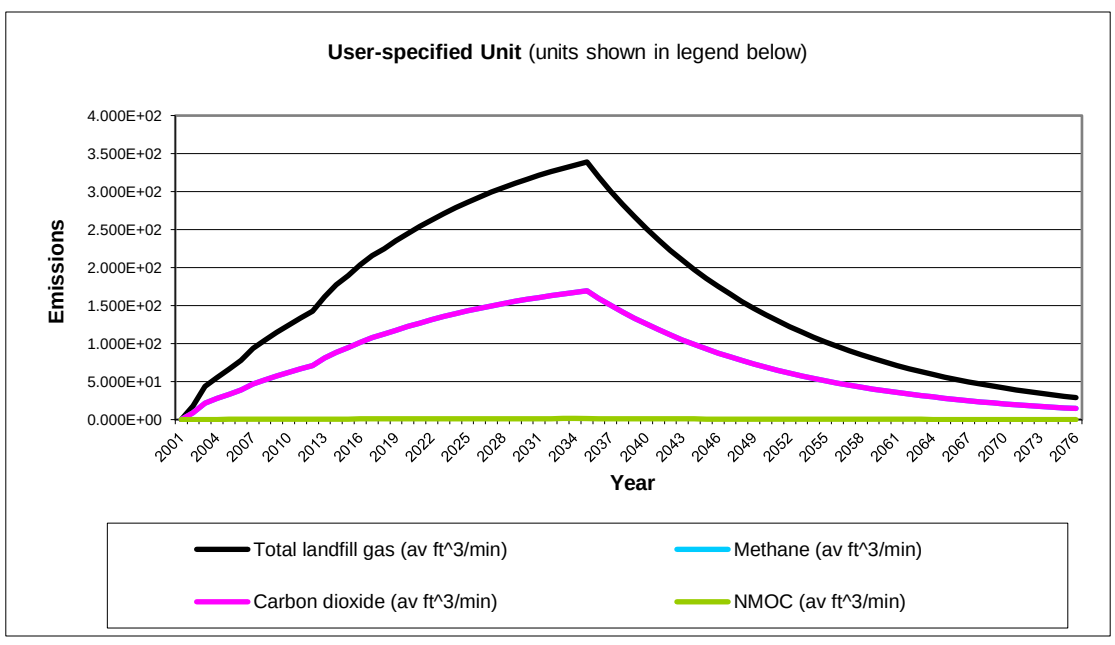
5.000E+06
4.000E+06
3.000E+06
2.000E+06
1.000E+06
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
4.000E+02
3.500E+02
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	3.286E+02	2.632E+05	1.768E+01	8.778E+01	1.316E+05	8.841E+00
2003	8.092E+02	6.480E+05	4.354E+01	2.162E+02	3.240E+05	2.177E+01
2004	1.030E+03	8.250E+05	5.543E+01	2.752E+02	4.125E+05	2.772E+01
2005	1.230E+03	9.847E+05	6.616E+01	3.285E+02	4.923E+05	3.308E+01
2006	1.444E+03	1.156E+06	7.767E+01	3.856E+02	5.780E+05	3.883E+01
2007	1.744E+03	1.397E+06	9.383E+01	4.659E+02	6.983E+05	4.692E+01
2008	1.932E+03	1.547E+06	1.039E+02	5.160E+02	7.735E+05	5.197E+01
2009	2.128E+03	1.704E+06	1.145E+02	5.683E+02	8.518E+05	5.723E+01
2010	2.312E+03	1.851E+06	1.244E+02	6.175E+02	9.256E+05	6.219E+01
2011	2.485E+03	1.990E+06	1.337E+02	6.638E+02	9.950E+05	6.686E+01
2012	2.649E+03	2.121E+06	1.425E+02	7.075E+02	1.060E+06	7.125E+01
2013	3.005E+03	2.406E+06	1.617E+02	8.027E+02	1.203E+06	8.084E+01
2014	3.292E+03	2.636E+06	1.771E+02	8.794E+02	1.318E+06	8.856E+01
2015	3.518E+03	2.817E+06	1.893E+02	9.397E+02	1.409E+06	9.464E+01
2016	3.781E+03	3.028E+06	2.034E+02	1.010E+03	1.514E+06	1.017E+02
2017	4.006E+03	3.208E+06	2.155E+02	1.070E+03	1.604E+06	1.078E+02
2018	4.177E+03	3.344E+06	2.247E+02	1.116E+03	1.672E+06	1.124E+02
2019	4.370E+03	3.499E+06	2.351E+02	1.167E+03	1.750E+06	1.176E+02
2020	4.552E+03	3.645E+06	2.449E+02	1.216E+03	1.823E+06	1.225E+02
2021	4.723E+03	3.782E+06	2.541E+02	1.262E+03	1.891E+06	1.271E+02
2022	4.885E+03	3.912E+06	2.628E+02	1.305E+03	1.956E+06	1.314E+02
2023	5.037E+03	4.033E+06	2.710E+02	1.345E+03	2.017E+06	1.355E+02
2024	5.180E+03	4.148E+06	2.787E+02	1.384E+03	2.074E+06	1.394E+02
2025	5.315E+03	4.256E+06	2.860E+02	1.420E+03	2.128E+06	1.430E+02
2026	5.442E+03	4.358E+06	2.928E+02	1.454E+03	2.179E+06	1.464E+02
2027	5.562E+03	4.454E+06	2.992E+02	1.486E+03	2.227E+06	1.496E+02
2028	5.675E+03	4.544E+06	3.053E+02	1.516E+03	2.272E+06	1.527E+02
2029	5.781E+03	4.629E+06	3.110E+02	1.544E+03	2.314E+06	1.555E+02
2030	5.881E+03	4.709E+06	3.164E+02	1.571E+03	2.354E+06	1.582E+02
2031	5.975E+03	4.784E+06	3.215E+02	1.596E+03	2.392E+06	1.607E+02
2032	6.063E+03	4.855E+06	3.262E+02	1.620E+03	2.428E+06	1.631E+02
2033	6.147E+03	4.922E+06	3.307E+02	1.642E+03	2.461E+06	1.654E+02
2034	6.225E+03	4.985E+06	3.349E+02	1.663E+03	2.493E+06	1.675E+02
2035	6.300E+03	5.044E+06	3.389E+02	1.683E+03	2.522E+06	1.695E+02
2036	5.933E+03	4.751E+06	3.192E+02	1.585E+03	2.375E+06	1.596E+02
2037	5.587E+03	4.474E+06	3.006E+02	1.492E+03	2.237E+06	1.503E+02
2038	5.262E+03	4.213E+06	2.831E+02	1.405E+03	2.107E+06	1.415E+02
2039	4.955E+03	3.968E+06	2.666E+02	1.324E+03	1.984E+06	1.333E+02
2040	4.667E+03	3.737E+06	2.511E+02	1.247E+03	1.868E+06	1.255E+02
2041	4.395E+03	3.519E+06	2.365E+02	1.174E+03	1.760E+06	1.182E+02
2042	4.139E+03	3.314E+06	2.227E+02	1.106E+03	1.657E+06	1.113E+02
2043	3.898E+03	3.121E+06	2.097E+02	1.041E+03	1.561E+06	1.049E+02
2044	3.671E+03	2.940E+06	1.975E+02	9.806E+02	1.470E+06	9.876E+01
2045	3.457E+03	2.768E+06	1.860E+02	9.235E+02	1.384E+06	9.300E+01
2046	3.256E+03	2.607E+06	1.752E+02	8.697E+02	1.304E+06	8.759E+01
2047	3.066E+03	2.455E+06	1.650E+02	8.190E+02	1.228E+06	8.249E+01
2048	2.888E+03	2.312E+06	1.554E+02	7.713E+02	1.156E+06	7.768E+01
2049	2.720E+03	2.178E+06	1.463E+02	7.264E+02	1.089E+06	7.316E+01
2050	2.561E+03	2.051E+06	1.378E+02	6.841E+02	1.025E+06	6.890E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	2.412E+03	1.931E+06	1.298E+02	6.443E+02	9.657E+05	6.489E+01
2052	2.272E+03	1.819E+06	1.222E+02	6.068E+02	9.095E+05	6.111E+01
2053	2.139E+03	1.713E+06	1.151E+02	5.714E+02	8.565E+05	5.755E+01
2054	2.015E+03	1.613E+06	1.084E+02	5.381E+02	8.066E+05	5.420E+01
2055	1.897E+03	1.519E+06	1.021E+02	5.068E+02	7.597E+05	5.104E+01
2056	1.787E+03	1.431E+06	9.614E+01	4.773E+02	7.154E+05	4.807E+01
2057	1.683E+03	1.348E+06	9.054E+01	4.495E+02	6.738E+05	4.527E+01
2058	1.585E+03	1.269E+06	8.527E+01	4.233E+02	6.345E+05	4.263E+01
2059	1.493E+03	1.195E+06	8.030E+01	3.987E+02	5.976E+05	4.015E+01
2060	1.406E+03	1.126E+06	7.563E+01	3.755E+02	5.628E+05	3.781E+01
2061	1.324E+03	1.060E+06	7.122E+01	3.536E+02	5.300E+05	3.561E+01
2062	1.247E+03	9.983E+05	6.707E+01	3.330E+02	4.991E+05	3.354E+01
2063	1.174E+03	9.401E+05	6.317E+01	3.136E+02	4.701E+05	3.158E+01
2064	1.106E+03	8.854E+05	5.949E+01	2.953E+02	4.427E+05	2.974E+01
2065	1.041E+03	8.338E+05	5.602E+01	2.781E+02	4.169E+05	2.801E+01
2066	9.807E+02	7.853E+05	5.276E+01	2.619E+02	3.926E+05	2.638E+01
2067	9.236E+02	7.395E+05	4.969E+01	2.467E+02	3.698E+05	2.484E+01
2068	8.698E+02	6.965E+05	4.680E+01	2.323E+02	3.482E+05	2.340E+01
2069	8.191E+02	6.559E+05	4.407E+01	2.188E+02	3.280E+05	2.204E+01
2070	7.714E+02	6.177E+05	4.150E+01	2.061E+02	3.089E+05	2.075E+01
2071	7.265E+02	5.817E+05	3.909E+01	1.941E+02	2.909E+05	1.954E+01
2072	6.842E+02	5.479E+05	3.681E+01	1.828E+02	2.739E+05	1.841E+01
2073	6.443E+02	5.160E+05	3.467E+01	1.721E+02	2.580E+05	1.733E+01
2074	6.068E+02	4.859E+05	3.265E+01	1.621E+02	2.430E+05	1.632E+01
2075	5.715E+02	4.576E+05	3.075E+01	1.526E+02	2.288E+05	1.537E+01
2076	5.382E+02	4.310E+05	2.896E+01	1.438E+02	2.155E+05	1.448E+01
2077	5.069E+02	4.059E+05	2.727E+01	1.354E+02	2.029E+05	1.364E+01
2078	4.773E+02	3.822E+05	2.568E+01	1.275E+02	1.911E+05	1.284E+01
2079	4.495E+02	3.600E+05	2.419E+01	1.201E+02	1.800E+05	1.209E+01
2080	4.234E+02	3.390E+05	2.278E+01	1.131E+02	1.695E+05	1.139E+01
2081	3.987E+02	3.193E+05	2.145E+01	1.065E+02	1.596E+05	1.073E+01
2082	3.755E+02	3.007E+05	2.020E+01	1.003E+02	1.503E+05	1.010E+01
2083	3.536E+02	2.832E+05	1.903E+01	9.446E+01	1.416E+05	9.513E+00
2084	3.330E+02	2.667E+05	1.792E+01	8.896E+01	1.333E+05	8.959E+00
2085	3.136E+02	2.511E+05	1.687E+01	8.378E+01	1.256E+05	8.437E+00
2086	2.954E+02	2.365E+05	1.589E+01	7.890E+01	1.183E+05	7.946E+00
2087	2.782E+02	2.227E+05	1.497E+01	7.430E+01	1.114E+05	7.483E+00
2088	2.620E+02	2.098E+05	1.409E+01	6.997E+01	1.049E+05	7.047E+00
2089	2.467E+02	1.976E+05	1.327E+01	6.590E+01	9.878E+04	6.637E+00
2090	2.323E+02	1.861E+05	1.250E+01	6.206E+01	9.303E+04	6.250E+00
2091	2.188E+02	1.752E+05	1.177E+01	5.845E+01	8.761E+04	5.886E+00
2092	2.061E+02	1.650E+05	1.109E+01	5.504E+01	8.251E+04	5.544E+00
2093	1.941E+02	1.554E+05	1.044E+01	5.184E+01	7.770E+04	5.221E+00
2094	1.828E+02	1.464E+05	9.833E+00	4.882E+01	7.318E+04	4.917E+00
2095	1.721E+02	1.378E+05	9.261E+00	4.598E+01	6.892E+04	4.630E+00
2096	1.621E+02	1.298E+05	8.722E+00	4.330E+01	6.490E+04	4.361E+00
2097	1.527E+02	1.222E+05	8.214E+00	4.078E+01	6.112E+04	4.107E+00
2098	1.438E+02	1.151E+05	7.735E+00	3.840E+01	5.756E+04	3.868E+00
2099	1.354E+02	1.084E+05	7.285E+00	3.617E+01	5.421E+04	3.642E+00
2100	1.275E+02	1.021E+05	6.861E+00	3.406E+01	5.105E+04	3.430E+00
2101	1.201E+02	9.616E+04	6.461E+00	3.208E+01	4.808E+04	3.231E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2102	1.131E+02	9.056E+04	6.085E+00	3.021E+01	4.528E+04	3.042E+00
2103	1.065E+02	8.529E+04	5.730E+00	2.845E+01	4.264E+04	2.865E+00
2104	1.003E+02	8.032E+04	5.397E+00	2.679E+01	4.016E+04	2.698E+00
2105	9.446E+01	7.564E+04	5.082E+00	2.523E+01	3.782E+04	2.541E+00
2106	8.896E+01	7.124E+04	4.786E+00	2.376E+01	3.562E+04	2.393E+00
2107	8.378E+01	6.709E+04	4.508E+00	2.238E+01	3.354E+04	2.254E+00
2108	7.890E+01	6.318E+04	4.245E+00	2.108E+01	3.159E+04	2.123E+00
2109	7.431E+01	5.950E+04	3.998E+00	1.985E+01	2.975E+04	1.999E+00
2110	6.998E+01	5.604E+04	3.765E+00	1.869E+01	2.802E+04	1.883E+00
2111	6.591E+01	5.277E+04	3.546E+00	1.760E+01	2.639E+04	1.773E+00
2112	6.207E+01	4.970E+04	3.339E+00	1.658E+01	2.485E+04	1.670E+00
2113	5.845E+01	4.681E+04	3.145E+00	1.561E+01	2.340E+04	1.572E+00
2114	5.505E+01	4.408E+04	2.962E+00	1.470E+01	2.204E+04	1.481E+00
2115	5.184E+01	4.151E+04	2.789E+00	1.385E+01	2.076E+04	1.395E+00
2116	4.882E+01	3.910E+04	2.627E+00	1.304E+01	1.955E+04	1.313E+00
2117	4.598E+01	3.682E+04	2.474E+00	1.228E+01	1.841E+04	1.237E+00
2118	4.330E+01	3.468E+04	2.330E+00	1.157E+01	1.734E+04	1.165E+00
2119	4.078E+01	3.266E+04	2.194E+00	1.089E+01	1.633E+04	1.097E+00
2120	3.841E+01	3.075E+04	2.066E+00	1.026E+01	1.538E+04	1.033E+00
2121	3.617E+01	2.896E+04	1.946E+00	9.661E+00	1.448E+04	9.730E-01
2122	3.406E+01	2.728E+04	1.833E+00	9.099E+00	1.364E+04	9.164E-01
2123	3.208E+01	2.569E+04	1.726E+00	8.569E+00	1.284E+04	8.630E-01
2124	3.021E+01	2.419E+04	1.625E+00	8.070E+00	1.210E+04	8.127E-01
2125	2.845E+01	2.278E+04	1.531E+00	7.600E+00	1.139E+04	7.654E-01
2126	2.680E+01	2.146E+04	1.442E+00	7.157E+00	1.073E+04	7.208E-01
2127	2.523E+01	2.021E+04	1.358E+00	6.741E+00	1.010E+04	6.789E-01
2128	2.377E+01	1.903E+04	1.279E+00	6.348E+00	9.515E+03	6.393E-01
2129	2.238E+01	1.792E+04	1.204E+00	5.978E+00	8.961E+03	6.021E-01
2130	2.108E+01	1.688E+04	1.134E+00	5.630E+00	8.439E+03	5.670E-01
2131	1.985E+01	1.590E+04	1.068E+00	5.302E+00	7.948E+03	5.340E-01
2132	1.869E+01	1.497E+04	1.006E+00	4.993E+00	7.485E+03	5.029E-01
2133	1.761E+01	1.410E+04	9.472E-01	4.703E+00	7.049E+03	4.736E-01
2134	1.658E+01	1.328E+04	8.921E-01	4.429E+00	6.638E+03	4.460E-01
2135	1.561E+01	1.250E+04	8.401E-01	4.171E+00	6.252E+03	4.201E-01
2136	1.471E+01	1.178E+04	7.912E-01	3.928E+00	5.888E+03	3.956E-01
2137	1.385E+01	1.109E+04	7.451E-01	3.699E+00	5.545E+03	3.726E-01
2138	1.304E+01	1.044E+04	7.017E-01	3.484E+00	5.222E+03	3.509E-01
2139	1.228E+01	9.836E+03	6.609E-01	3.281E+00	4.918E+03	3.304E-01
2140	1.157E+01	9.263E+03	6.224E-01	3.090E+00	4.631E+03	3.112E-01
2141	1.089E+01	8.724E+03	5.861E-01	2.910E+00	4.362E+03	2.931E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2001	0	0	0	0	0	0
2002	2.409E+02	1.316E+05	8.841E+00	3.773E+00	1.053E+03	7.073E-02
2003	5.931E+02	3.240E+05	2.177E+01	9.291E+00	2.592E+03	1.742E-01
2004	7.551E+02	4.125E+05	2.772E+01	1.183E+01	3.300E+03	2.217E-01
2005	9.012E+02	4.923E+05	3.308E+01	1.412E+01	3.939E+03	2.646E-01
2006	1.058E+03	5.780E+05	3.883E+01	1.657E+01	4.624E+03	3.107E-01
2007	1.278E+03	6.983E+05	4.692E+01	2.002E+01	5.586E+03	3.753E-01
2008	1.416E+03	7.735E+05	5.197E+01	2.218E+01	6.188E+03	4.158E-01
2009	1.559E+03	8.518E+05	5.723E+01	2.443E+01	6.814E+03	4.579E-01
2010	1.694E+03	9.256E+05	6.219E+01	2.654E+01	7.405E+03	4.975E-01
2011	1.821E+03	9.950E+05	6.686E+01	2.853E+01	7.960E+03	5.348E-01
2012	1.941E+03	1.060E+06	7.125E+01	3.041E+01	8.484E+03	5.700E-01
2013	2.202E+03	1.203E+06	8.084E+01	3.450E+01	9.625E+03	6.467E-01
2014	2.413E+03	1.318E+06	8.856E+01	3.780E+01	1.054E+04	7.085E-01
2015	2.578E+03	1.409E+06	9.464E+01	4.039E+01	1.127E+04	7.571E-01
2016	2.771E+03	1.514E+06	1.017E+02	4.341E+01	1.211E+04	8.137E-01
2017	2.936E+03	1.604E+06	1.078E+02	4.599E+01	1.283E+04	8.621E-01
2018	3.061E+03	1.672E+06	1.124E+02	4.795E+01	1.338E+04	8.988E-01
2019	3.203E+03	1.750E+06	1.176E+02	5.017E+01	1.400E+04	9.404E-01
2020	3.336E+03	1.823E+06	1.225E+02	5.226E+01	1.458E+04	9.796E-01
2021	3.462E+03	1.891E+06	1.271E+02	5.423E+01	1.513E+04	1.017E+00
2022	3.580E+03	1.956E+06	1.314E+02	5.609E+01	1.565E+04	1.051E+00
2023	3.692E+03	2.017E+06	1.355E+02	5.783E+01	1.613E+04	1.084E+00
2024	3.797E+03	2.074E+06	1.394E+02	5.948E+01	1.659E+04	1.115E+00
2025	3.895E+03	2.128E+06	1.430E+02	6.102E+01	1.702E+04	1.144E+00
2026	3.989E+03	2.179E+06	1.464E+02	6.248E+01	1.743E+04	1.171E+00
2027	4.076E+03	2.227E+06	1.496E+02	6.386E+01	1.781E+04	1.197E+00
2028	4.159E+03	2.272E+06	1.527E+02	6.515E+01	1.818E+04	1.221E+00
2029	4.237E+03	2.314E+06	1.555E+02	6.637E+01	1.852E+04	1.244E+00
2030	4.310E+03	2.354E+06	1.582E+02	6.752E+01	1.884E+04	1.266E+00
2031	4.379E+03	2.392E+06	1.607E+02	6.860E+01	1.914E+04	1.286E+00
2032	4.444E+03	2.428E+06	1.631E+02	6.961E+01	1.942E+04	1.305E+00
2033	4.505E+03	2.461E+06	1.654E+02	7.057E+01	1.969E+04	1.323E+00
2034	4.563E+03	2.493E+06	1.675E+02	7.148E+01	1.994E+04	1.340E+00
2035	4.617E+03	2.522E+06	1.695E+02	7.233E+01	2.018E+04	1.356E+00
2036	4.348E+03	2.375E+06	1.596E+02	6.811E+01	1.900E+04	1.277E+00
2037	4.095E+03	2.237E+06	1.503E+02	6.415E+01	1.790E+04	1.202E+00
2038	3.856E+03	2.107E+06	1.415E+02	6.041E+01	1.685E+04	1.132E+00
2039	3.632E+03	1.984E+06	1.333E+02	5.689E+01	1.587E+04	1.066E+00
2040	3.420E+03	1.868E+06	1.255E+02	5.358E+01	1.495E+04	1.004E+00
2041	3.221E+03	1.760E+06	1.182E+02	5.046E+01	1.408E+04	9.459E-01
2042	3.033E+03	1.657E+06	1.113E+02	4.752E+01	1.326E+04	8.908E-01
2043	2.857E+03	1.561E+06	1.049E+02	4.475E+01	1.249E+04	8.389E-01
2044	2.690E+03	1.470E+06	9.876E+01	4.215E+01	1.176E+04	7.900E-01
2045	2.534E+03	1.384E+06	9.300E+01	3.969E+01	1.107E+04	7.440E-01
2046	2.386E+03	1.304E+06	8.759E+01	3.738E+01	1.043E+04	7.007E-01
2047	2.247E+03	1.228E+06	8.249E+01	3.520E+01	9.821E+03	6.599E-01
2048	2.116E+03	1.156E+06	7.768E+01	3.315E+01	9.249E+03	6.215E-01
2049	1.993E+03	1.089E+06	7.316E+01	3.122E+01	8.711E+03	5.853E-01
2050	1.877E+03	1.025E+06	6.890E+01	2.941E+01	8.204E+03	5.512E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.768E+03	9.657E+05	6.489E+01	2.769E+01	7.726E+03	5.191E-01
2052	1.665E+03	9.095E+05	6.111E+01	2.608E+01	7.276E+03	4.889E-01
2053	1.568E+03	8.565E+05	5.755E+01	2.456E+01	6.852E+03	4.604E-01
2054	1.477E+03	8.066E+05	5.420E+01	2.313E+01	6.453E+03	4.336E-01
2055	1.391E+03	7.597E+05	5.104E+01	2.178E+01	6.077E+03	4.083E-01
2056	1.310E+03	7.154E+05	4.807E+01	2.052E+01	5.723E+03	3.846E-01
2057	1.233E+03	6.738E+05	4.527E+01	1.932E+01	5.390E+03	3.622E-01
2058	1.162E+03	6.345E+05	4.263E+01	1.820E+01	5.076E+03	3.411E-01
2059	1.094E+03	5.976E+05	4.015E+01	1.714E+01	4.781E+03	3.212E-01
2060	1.030E+03	5.628E+05	3.781E+01	1.614E+01	4.502E+03	3.025E-01
2061	9.702E+02	5.300E+05	3.561E+01	1.520E+01	4.240E+03	2.849E-01
2062	9.137E+02	4.991E+05	3.354E+01	1.431E+01	3.993E+03	2.683E-01
2063	8.605E+02	4.701E+05	3.158E+01	1.348E+01	3.761E+03	2.527E-01
2064	8.104E+02	4.427E+05	2.974E+01	1.269E+01	3.542E+03	2.380E-01
2065	7.632E+02	4.169E+05	2.801E+01	1.196E+01	3.335E+03	2.241E-01
2066	7.187E+02	3.926E+05	2.638E+01	1.126E+01	3.141E+03	2.110E-01
2067	6.769E+02	3.698E+05	2.484E+01	1.060E+01	2.958E+03	1.988E-01
2068	6.374E+02	3.482E+05	2.340E+01	9.986E+00	2.786E+03	1.872E-01
2069	6.003E+02	3.280E+05	2.204E+01	9.404E+00	2.624E+03	1.763E-01
2070	5.654E+02	3.089E+05	2.075E+01	8.857E+00	2.471E+03	1.660E-01
2071	5.324E+02	2.909E+05	1.954E+01	8.341E+00	2.327E+03	1.563E-01
2072	5.014E+02	2.739E+05	1.841E+01	7.855E+00	2.191E+03	1.472E-01
2073	4.722E+02	2.580E+05	1.733E+01	7.398E+00	2.064E+03	1.387E-01
2074	4.447E+02	2.430E+05	1.632E+01	6.967E+00	1.944E+03	1.306E-01
2075	4.188E+02	2.288E+05	1.537E+01	6.561E+00	1.830E+03	1.230E-01
2076	3.944E+02	2.155E+05	1.448E+01	6.179E+00	1.724E+03	1.158E-01
2077	3.715E+02	2.029E+05	1.364E+01	5.819E+00	1.623E+03	1.091E-01
2078	3.498E+02	1.911E+05	1.284E+01	5.480E+00	1.529E+03	1.027E-01
2079	3.295E+02	1.800E+05	1.209E+01	5.161E+00	1.440E+03	9.675E-02
2080	3.103E+02	1.695E+05	1.139E+01	4.861E+00	1.356E+03	9.111E-02
2081	2.922E+02	1.596E+05	1.073E+01	4.578E+00	1.277E+03	8.581E-02
2082	2.752E+02	1.503E+05	1.010E+01	4.311E+00	1.203E+03	8.081E-02
2083	2.592E+02	1.416E+05	9.513E+00	4.060E+00	1.133E+03	7.610E-02
2084	2.441E+02	1.333E+05	8.959E+00	3.824E+00	1.067E+03	7.167E-02
2085	2.299E+02	1.256E+05	8.437E+00	3.601E+00	1.005E+03	6.750E-02
2086	2.165E+02	1.183E+05	7.946E+00	3.391E+00	9.461E+02	6.357E-02
2087	2.039E+02	1.114E+05	7.483E+00	3.194E+00	8.910E+02	5.986E-02
2088	1.920E+02	1.049E+05	7.047E+00	3.008E+00	8.391E+02	5.638E-02
2089	1.808E+02	9.878E+04	6.637E+00	2.833E+00	7.902E+02	5.310E-02
2090	1.703E+02	9.303E+04	6.250E+00	2.668E+00	7.442E+02	5.000E-02
2091	1.604E+02	8.761E+04	5.886E+00	2.512E+00	7.009E+02	4.709E-02
2092	1.510E+02	8.251E+04	5.544E+00	2.366E+00	6.601E+02	4.435E-02
2093	1.422E+02	7.770E+04	5.221E+00	2.228E+00	6.216E+02	4.177E-02
2094	1.340E+02	7.318E+04	4.917E+00	2.098E+00	5.854E+02	3.933E-02
2095	1.261E+02	6.892E+04	4.630E+00	1.976E+00	5.513E+02	3.704E-02
2096	1.188E+02	6.490E+04	4.361E+00	1.861E+00	5.192E+02	3.489E-02
2097	1.119E+02	6.112E+04	4.107E+00	1.753E+00	4.890E+02	3.285E-02
2098	1.054E+02	5.756E+04	3.868E+00	1.651E+00	4.605E+02	3.094E-02
2099	9.923E+01	5.421E+04	3.642E+00	1.555E+00	4.337E+02	2.914E-02
2100	9.345E+01	5.105E+04	3.430E+00	1.464E+00	4.084E+02	2.744E-02
2101	8.801E+01	4.808E+04	3.231E+00	1.379E+00	3.846E+02	2.584E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	8.289E+01	4.528E+04	3.042E+00	1.298E+00	3.622E+02	2.434E-02
2103	7.806E+01	4.264E+04	2.865E+00	1.223E+00	3.411E+02	2.292E-02
2104	7.351E+01	4.016E+04	2.698E+00	1.152E+00	3.213E+02	2.159E-02
2105	6.923E+01	3.782E+04	2.541E+00	1.085E+00	3.026E+02	2.033E-02
2106	6.520E+01	3.562E+04	2.393E+00	1.021E+00	2.850E+02	1.915E-02
2107	6.140E+01	3.354E+04	2.254E+00	9.619E-01	2.684E+02	1.803E-02
2108	5.783E+01	3.159E+04	2.123E+00	9.059E-01	2.527E+02	1.698E-02
2109	5.446E+01	2.975E+04	1.999E+00	8.531E-01	2.380E+02	1.599E-02
2110	5.129E+01	2.802E+04	1.883E+00	8.035E-01	2.242E+02	1.506E-02
2111	4.830E+01	2.639E+04	1.773E+00	7.567E-01	2.111E+02	1.418E-02
2112	4.549E+01	2.485E+04	1.670E+00	7.126E-01	1.988E+02	1.336E-02
2113	4.284E+01	2.340E+04	1.572E+00	6.711E-01	1.872E+02	1.258E-02
2114	4.035E+01	2.204E+04	1.481E+00	6.320E-01	1.763E+02	1.185E-02
2115	3.800E+01	2.076E+04	1.395E+00	5.952E-01	1.661E+02	1.116E-02
2116	3.578E+01	1.955E+04	1.313E+00	5.606E-01	1.564E+02	1.051E-02
2117	3.370E+01	1.841E+04	1.237E+00	5.279E-01	1.473E+02	9.896E-03
2118	3.174E+01	1.734E+04	1.165E+00	4.972E-01	1.387E+02	9.319E-03
2119	2.989E+01	1.633E+04	1.097E+00	4.682E-01	1.306E+02	8.777E-03
2120	2.815E+01	1.538E+04	1.033E+00	4.409E-01	1.230E+02	8.265E-03
2121	2.651E+01	1.448E+04	9.730E-01	4.153E-01	1.159E+02	7.784E-03
2122	2.496E+01	1.364E+04	9.164E-01	3.911E-01	1.091E+02	7.331E-03
2123	2.351E+01	1.284E+04	8.630E-01	3.683E-01	1.028E+02	6.904E-03
2124	2.214E+01	1.210E+04	8.127E-01	3.469E-01	9.677E+01	6.502E-03
2125	2.085E+01	1.139E+04	7.654E-01	3.267E-01	9.113E+01	6.123E-03
2126	1.964E+01	1.073E+04	7.208E-01	3.076E-01	8.583E+01	5.767E-03
2127	1.849E+01	1.010E+04	6.789E-01	2.897E-01	8.083E+01	5.431E-03
2128	1.742E+01	9.515E+03	6.393E-01	2.729E-01	7.612E+01	5.115E-03
2129	1.640E+01	8.961E+03	6.021E-01	2.570E-01	7.169E+01	4.817E-03
2130	1.545E+01	8.439E+03	5.670E-01	2.420E-01	6.751E+01	4.536E-03
2131	1.455E+01	7.948E+03	5.340E-01	2.279E-01	6.358E+01	4.272E-03
2132	1.370E+01	7.485E+03	5.029E-01	2.146E-01	5.988E+01	4.023E-03
2133	1.290E+01	7.049E+03	4.736E-01	2.021E-01	5.639E+01	3.789E-03
2134	1.215E+01	6.638E+03	4.460E-01	1.904E-01	5.311E+01	3.568E-03
2135	1.144E+01	6.252E+03	4.201E-01	1.793E-01	5.001E+01	3.360E-03
2136	1.078E+01	5.888E+03	3.956E-01	1.688E-01	4.710E+01	3.165E-03
2137	1.015E+01	5.545E+03	3.726E-01	1.590E-01	4.436E+01	2.980E-03
2138	9.559E+00	5.222E+03	3.509E-01	1.497E-01	4.178E+01	2.807E-03
2139	9.002E+00	4.918E+03	3.304E-01	1.410E-01	3.934E+01	2.643E-03
2140	8.478E+00	4.631E+03	3.112E-01	1.328E-01	3.705E+01	2.490E-03
2141	7.984E+00	4.362E+03	2.931E-01	1.251E-01	3.489E+01	2.345E-03

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Thursday, November 28, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate (*$year^{-1}$*)
L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)
t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**2001**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.040**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2001	20,479	22,527	0	0
2002	31,140	34,254	20,479	22,527
2003	16,714	18,385	51,619	56,781
2004	16,163	17,779	68,333	75,166
2005	17,787	19,566	84,496	92,946
2006	23,965	26,362	102,283	112,511
2007	18,035	19,839	126,248	138,873
2008	19,200	21,120	144,283	158,711
2009	19,200	21,120	163,483	179,831
2010	19,200	21,120	182,683	200,951
2011	19,200	21,120	201,883	222,071
2012	31,824	35,006	221,083	243,191
2013	28,791	31,670	252,907	278,198
2014	26,030	28,633	281,698	309,868
2015	29,152	32,067	307,728	338,501
2016	27,736	30,510	336,880	370,568
2017	25,167	27,684	364,616	401,078
2018	27,205	29,926	389,783	428,761
2019	27,205	29,926	416,988	458,687
2020	27,205	29,926	444,193	488,612
2021	27,205	29,926	471,398	518,538
2022	27,205	29,926	498,603	548,463
2023	27,205	29,926	525,808	578,389
2024	27,205	29,926	553,013	608,314
2025	27,205	29,926	580,218	638,240
2026	27,205	29,926	607,423	668,165
2027	27,205	29,926	634,628	698,091
2028	27,205	29,926	661,833	728,016
2029	27,205	29,926	689,038	757,942
2030	27,205	29,926	716,243	787,867
2031	27,205	29,926	743,448	817,793
2032	27,205	29,926	770,653	847,718
2033	27,205	29,926	797,858	877,644
2034	27,205	29,926	825,063	907,569
2035	0	0	852,268	937,495
2036	0	0	852,268	937,495
2037	0	0	852,268	937,495
2038	0	0	852,268	937,495
2039	0	0	852,268	937,495
2040	0	0	852,268	937,495

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2041	0	0	852,268	937,495
2042	0	0	852,268	937,495
2043	0	0	852,268	937,495
2044	0	0	852,268	937,495
2045	0	0	852,268	937,495
2046	0	0	852,268	937,495
2047	0	0	852,268	937,495
2048	0	0	852,268	937,495
2049	0	0	852,268	937,495
2050	0	0	852,268	937,495
2051	0	0	852,268	937,495
2052	0	0	852,268	937,495
2053	0	0	852,268	937,495
2054	0	0	852,268	937,495
2055	0	0	852,268	937,495
2056	0	0	852,268	937,495
2057	0	0	852,268	937,495
2058	0	0	852,268	937,495
2059	0	0	852,268	937,495
2060	0	0	852,268	937,495
2061	0	0	852,268	937,495
2062	0	0	852,268	937,495
2063	0	0	852,268	937,495
2064	0	0	852,268	937,495
2065	0	0	852,268	937,495
2066	0	0	852,268	937,495
2067	0	0	852,268	937,495
2068	0	0	852,268	937,495
2069	0	0	852,268	937,495
2070	0	0	852,268	937,495
2071	0	0	852,268	937,495
2072	0	0	852,268	937,495
2073	0	0	852,268	937,495
2074	0	0	852,268	937,495
2075	0	0	852,268	937,495
2076	0	0	852,268	937,495
2077	0	0	852,268	937,495
2078	0	0	852,268	937,495
2079	0	0	852,268	937,495
2080	0	0	852,268	937,495

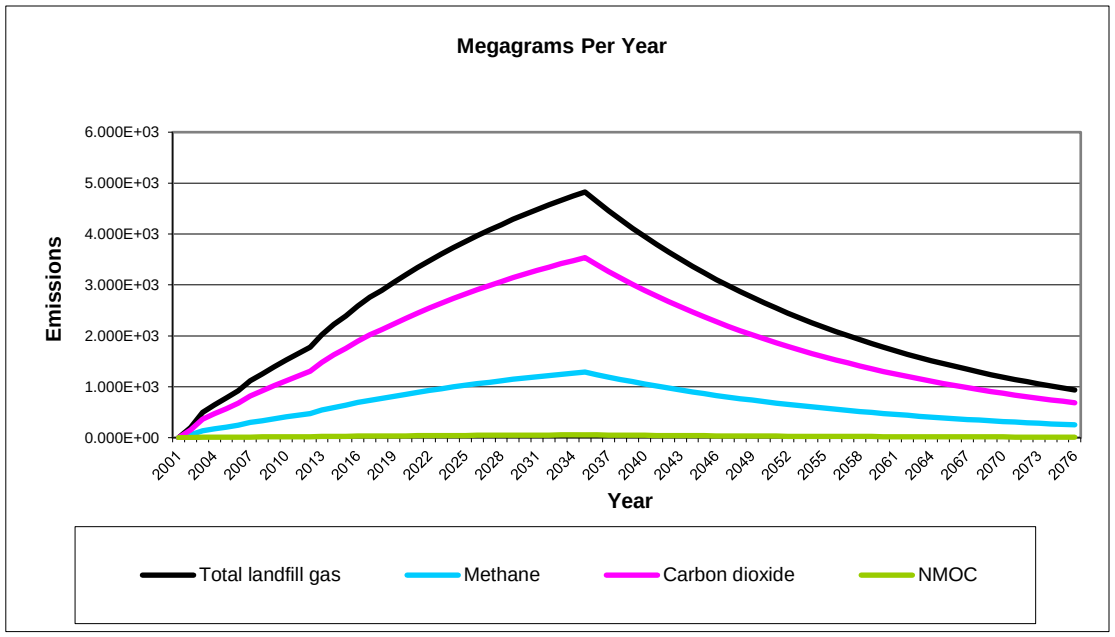
Pollutant Parameters

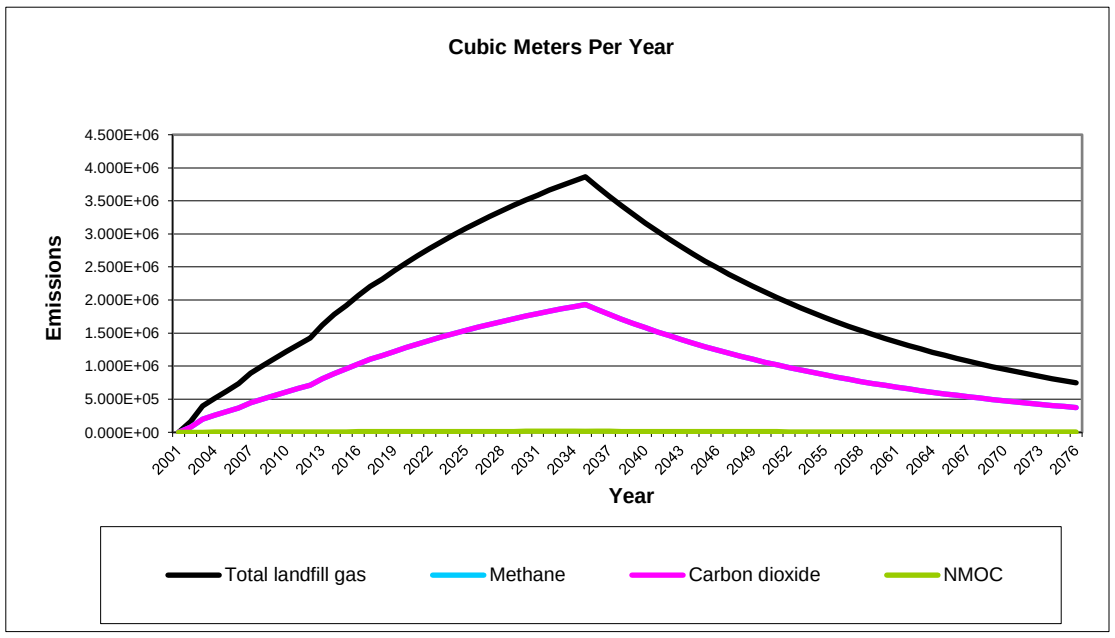
		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

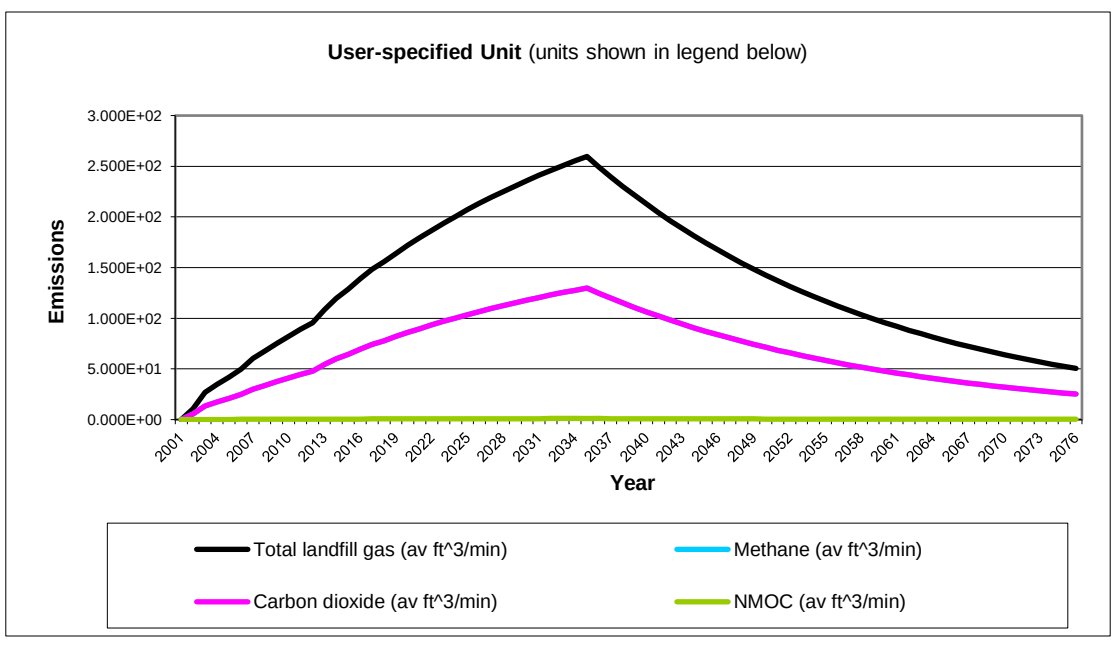
Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
4.500E+06
4.000E+06
3.500E+06
3.000E+06
2.500E+06
2.000E+06
1.500E+06
1.000E+06
5.000E+05
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055 2058 2061 2064 2067 2070 2073 2076
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	2.010E+02	1.609E+05	1.081E+01	5.368E+01	8.046E+04	5.406E+00
2003	4.987E+02	3.993E+05	2.683E+01	1.332E+02	1.997E+05	1.341E+01
2004	6.431E+02	5.150E+05	3.460E+01	1.718E+02	2.575E+05	1.730E+01
2005	7.765E+02	6.218E+05	4.178E+01	2.074E+02	3.109E+05	2.089E+01
2006	9.206E+02	7.372E+05	4.953E+01	2.459E+02	3.686E+05	2.477E+01
2007	1.120E+03	8.966E+05	6.024E+01	2.991E+02	4.483E+05	3.012E+01
2008	1.253E+03	1.003E+06	6.740E+01	3.346E+02	5.016E+05	3.370E+01
2009	1.392E+03	1.115E+06	7.490E+01	3.718E+02	5.573E+05	3.745E+01
2010	1.526E+03	1.222E+06	8.210E+01	4.076E+02	6.109E+05	4.105E+01
2011	1.654E+03	1.325E+06	8.901E+01	4.419E+02	6.624E+05	4.451E+01
2012	1.778E+03	1.424E+06	9.566E+01	4.749E+02	7.119E+05	4.783E+01
2013	2.021E+03	1.618E+06	1.087E+02	5.397E+02	8.090E+05	5.436E+01
2014	2.224E+03	1.781E+06	1.196E+02	5.940E+02	8.904E+05	5.982E+01
2015	2.392E+03	1.915E+06	1.287E+02	6.390E+02	9.577E+05	6.435E+01
2016	2.584E+03	2.069E+06	1.390E+02	6.903E+02	1.035E+06	6.952E+01
2017	2.755E+03	2.206E+06	1.482E+02	7.359E+02	1.103E+06	7.412E+01
2018	2.894E+03	2.317E+06	1.557E+02	7.731E+02	1.159E+06	7.786E+01
2019	3.048E+03	2.440E+06	1.640E+02	8.141E+02	1.220E+06	8.198E+01
2020	3.195E+03	2.558E+06	1.719E+02	8.534E+02	1.279E+06	8.595E+01
2021	3.337E+03	2.672E+06	1.795E+02	8.913E+02	1.336E+06	8.976E+01
2022	3.473E+03	2.781E+06	1.869E+02	9.276E+02	1.390E+06	9.343E+01
2023	3.604E+03	2.886E+06	1.939E+02	9.626E+02	1.443E+06	9.694E+01
2024	3.729E+03	2.986E+06	2.006E+02	9.961E+02	1.493E+06	1.003E+02
2025	3.850E+03	3.083E+06	2.071E+02	1.028E+03	1.541E+06	1.036E+02
2026	3.966E+03	3.176E+06	2.134E+02	1.059E+03	1.588E+06	1.067E+02
2027	4.078E+03	3.265E+06	2.194E+02	1.089E+03	1.633E+06	1.097E+02
2028	4.185E+03	3.351E+06	2.251E+02	1.118E+03	1.675E+06	1.126E+02
2029	4.287E+03	3.433E+06	2.307E+02	1.145E+03	1.717E+06	1.153E+02
2030	4.386E+03	3.512E+06	2.360E+02	1.172E+03	1.756E+06	1.180E+02
2031	4.481E+03	3.588E+06	2.411E+02	1.197E+03	1.794E+06	1.206E+02
2032	4.573E+03	3.661E+06	2.460E+02	1.221E+03	1.831E+06	1.230E+02
2033	4.660E+03	3.732E+06	2.507E+02	1.245E+03	1.866E+06	1.254E+02
2034	4.744E+03	3.799E+06	2.553E+02	1.267E+03	1.900E+06	1.276E+02
2035	4.825E+03	3.864E+06	2.596E+02	1.289E+03	1.932E+06	1.298E+02
2036	4.636E+03	3.712E+06	2.494E+02	1.238E+03	1.856E+06	1.247E+02
2037	4.454E+03	3.567E+06	2.397E+02	1.190E+03	1.783E+06	1.198E+02
2038	4.280E+03	3.427E+06	2.303E+02	1.143E+03	1.714E+06	1.151E+02
2039	4.112E+03	3.293E+06	2.212E+02	1.098E+03	1.646E+06	1.106E+02
2040	3.951E+03	3.164E+06	2.126E+02	1.055E+03	1.582E+06	1.063E+02
2041	3.796E+03	3.039E+06	2.042E+02	1.014E+03	1.520E+06	1.021E+02
2042	3.647E+03	2.920E+06	1.962E+02	9.741E+02	1.460E+06	9.811E+01
2043	3.504E+03	2.806E+06	1.885E+02	9.359E+02	1.403E+06	9.426E+01
2044	3.367E+03	2.696E+06	1.811E+02	8.992E+02	1.348E+06	9.056E+01
2045	3.235E+03	2.590E+06	1.740E+02	8.640E+02	1.295E+06	8.701E+01
2046	3.108E+03	2.489E+06	1.672E+02	8.301E+02	1.244E+06	8.360E+01
2047	2.986E+03	2.391E+06	1.606E+02	7.976E+02	1.195E+06	8.032E+01
2048	2.869E+03	2.297E+06	1.543E+02	7.663E+02	1.149E+06	7.717E+01
2049	2.756E+03	2.207E+06	1.483E+02	7.362E+02	1.104E+06	7.415E+01
2050	2.648E+03	2.121E+06	1.425E+02	7.074E+02	1.060E+06	7.124E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	2.544E+03	2.037E+06	1.369E+02	6.796E+02	1.019E+06	6.845E+01
2052	2.445E+03	1.958E+06	1.315E+02	6.530E+02	9.788E+05	6.576E+01
2053	2.349E+03	1.881E+06	1.264E+02	6.274E+02	9.404E+05	6.318E+01
2054	2.257E+03	1.807E+06	1.214E+02	6.028E+02	9.035E+05	6.071E+01
2055	2.168E+03	1.736E+06	1.167E+02	5.791E+02	8.681E+05	5.833E+01
2056	2.083E+03	1.668E+06	1.121E+02	5.564E+02	8.341E+05	5.604E+01
2057	2.001E+03	1.603E+06	1.077E+02	5.346E+02	8.014E+05	5.384E+01
2058	1.923E+03	1.540E+06	1.035E+02	5.137E+02	7.699E+05	5.173E+01
2059	1.848E+03	1.479E+06	9.941E+01	4.935E+02	7.397E+05	4.970E+01
2060	1.775E+03	1.421E+06	9.551E+01	4.742E+02	7.107E+05	4.775E+01
2061	1.706E+03	1.366E+06	9.176E+01	4.556E+02	6.829E+05	4.588E+01
2062	1.639E+03	1.312E+06	8.817E+01	4.377E+02	6.561E+05	4.408E+01
2063	1.574E+03	1.261E+06	8.471E+01	4.205E+02	6.304E+05	4.235E+01
2064	1.513E+03	1.211E+06	8.139E+01	4.041E+02	6.056E+05	4.069E+01
2065	1.453E+03	1.164E+06	7.820E+01	3.882E+02	5.819E+05	3.910E+01
2066	1.396E+03	1.118E+06	7.513E+01	3.730E+02	5.591E+05	3.756E+01
2067	1.342E+03	1.074E+06	7.218E+01	3.584E+02	5.372E+05	3.609E+01
2068	1.289E+03	1.032E+06	6.935E+01	3.443E+02	5.161E+05	3.468E+01
2069	1.238E+03	9.917E+05	6.663E+01	3.308E+02	4.959E+05	3.332E+01
2070	1.190E+03	9.528E+05	6.402E+01	3.178E+02	4.764E+05	3.201E+01
2071	1.143E+03	9.155E+05	6.151E+01	3.054E+02	4.577E+05	3.076E+01
2072	1.098E+03	8.796E+05	5.910E+01	2.934E+02	4.398E+05	2.955E+01
2073	1.055E+03	8.451E+05	5.678E+01	2.819E+02	4.225E+05	2.839E+01
2074	1.014E+03	8.120E+05	5.456E+01	2.708E+02	4.060E+05	2.728E+01
2075	9.742E+02	7.801E+05	5.242E+01	2.602E+02	3.901E+05	2.621E+01
2076	9.360E+02	7.495E+05	5.036E+01	2.500E+02	3.748E+05	2.518E+01
2077	8.993E+02	7.201E+05	4.839E+01	2.402E+02	3.601E+05	2.419E+01
2078	8.641E+02	6.919E+05	4.649E+01	2.308E+02	3.460E+05	2.324E+01
2079	8.302E+02	6.648E+05	4.467E+01	2.218E+02	3.324E+05	2.233E+01
2080	7.976E+02	6.387E+05	4.291E+01	2.131E+02	3.194E+05	2.146E+01
2081	7.664E+02	6.137E+05	4.123E+01	2.047E+02	3.068E+05	2.062E+01
2082	7.363E+02	5.896E+05	3.962E+01	1.967E+02	2.948E+05	1.981E+01
2083	7.074E+02	5.665E+05	3.806E+01	1.890E+02	2.832E+05	1.903E+01
2084	6.797E+02	5.443E+05	3.657E+01	1.816E+02	2.721E+05	1.828E+01
2085	6.530E+02	5.229E+05	3.514E+01	1.744E+02	2.615E+05	1.757E+01
2086	6.274E+02	5.024E+05	3.376E+01	1.676E+02	2.512E+05	1.688E+01
2087	6.028E+02	4.827E+05	3.243E+01	1.610E+02	2.414E+05	1.622E+01
2088	5.792E+02	4.638E+05	3.116E+01	1.547E+02	2.319E+05	1.558E+01
2089	5.565E+02	4.456E+05	2.994E+01	1.486E+02	2.228E+05	1.497E+01
2090	5.347E+02	4.281E+05	2.877E+01	1.428E+02	2.141E+05	1.438E+01
2091	5.137E+02	4.114E+05	2.764E+01	1.372E+02	2.057E+05	1.382E+01
2092	4.936E+02	3.952E+05	2.655E+01	1.318E+02	1.976E+05	1.328E+01
2093	4.742E+02	3.797E+05	2.551E+01	1.267E+02	1.899E+05	1.276E+01
2094	4.556E+02	3.648E+05	2.451E+01	1.217E+02	1.824E+05	1.226E+01
2095	4.377E+02	3.505E+05	2.355E+01	1.169E+02	1.753E+05	1.178E+01
2096	4.206E+02	3.368E+05	2.263E+01	1.123E+02	1.684E+05	1.131E+01
2097	4.041E+02	3.236E+05	2.174E+01	1.079E+02	1.618E+05	1.087E+01
2098	3.882E+02	3.109E+05	2.089E+01	1.037E+02	1.554E+05	1.044E+01
2099	3.730E+02	2.987E+05	2.007E+01	9.964E+01	1.494E+05	1.003E+01
2100	3.584E+02	2.870E+05	1.928E+01	9.573E+01	1.435E+05	9.641E+00
2101	3.443E+02	2.757E+05	1.853E+01	9.198E+01	1.379E+05	9.263E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	3.308E+02	2.649E+05	1.780E+01	8.837E+01	1.325E+05	8.900E+00
2103	3.179E+02	2.545E+05	1.710E+01	8.491E+01	1.273E+05	8.551E+00
2104	3.054E+02	2.446E+05	1.643E+01	8.158E+01	1.223E+05	8.216E+00
2105	2.934E+02	2.350E+05	1.579E+01	7.838E+01	1.175E+05	7.894E+00
2106	2.819E+02	2.258E+05	1.517E+01	7.531E+01	1.129E+05	7.584E+00
2107	2.709E+02	2.169E+05	1.457E+01	7.235E+01	1.085E+05	7.287E+00
2108	2.603E+02	2.084E+05	1.400E+01	6.952E+01	1.042E+05	7.001E+00
2109	2.500E+02	2.002E+05	1.345E+01	6.679E+01	1.001E+05	6.727E+00
2110	2.402E+02	1.924E+05	1.293E+01	6.417E+01	9.619E+04	6.463E+00
2111	2.308E+02	1.848E+05	1.242E+01	6.166E+01	9.242E+04	6.209E+00
2112	2.218E+02	1.776E+05	1.193E+01	5.924E+01	8.879E+04	5.966E+00
2113	2.131E+02	1.706E+05	1.146E+01	5.691E+01	8.531E+04	5.732E+00
2114	2.047E+02	1.639E+05	1.101E+01	5.468E+01	8.197E+04	5.507E+00
2115	1.967E+02	1.575E+05	1.058E+01	5.254E+01	7.875E+04	5.291E+00
2116	1.890E+02	1.513E+05	1.017E+01	5.048E+01	7.566E+04	5.084E+00
2117	1.816E+02	1.454E+05	9.769E+00	4.850E+01	7.270E+04	4.884E+00
2118	1.745E+02	1.397E+05	9.386E+00	4.660E+01	6.985E+04	4.693E+00
2119	1.676E+02	1.342E+05	9.018E+00	4.477E+01	6.711E+04	4.509E+00
2120	1.610E+02	1.290E+05	8.664E+00	4.302E+01	6.448E+04	4.332E+00
2121	1.547E+02	1.239E+05	8.325E+00	4.133E+01	6.195E+04	4.162E+00
2122	1.487E+02	1.190E+05	7.998E+00	3.971E+01	5.952E+04	3.999E+00
2123	1.428E+02	1.144E+05	7.685E+00	3.815E+01	5.719E+04	3.842E+00
2124	1.372E+02	1.099E+05	7.383E+00	3.666E+01	5.494E+04	3.692E+00
2125	1.318E+02	1.056E+05	7.094E+00	3.522E+01	5.279E+04	3.547E+00
2126	1.267E+02	1.014E+05	6.816E+00	3.384E+01	5.072E+04	3.408E+00
2127	1.217E+02	9.746E+04	6.548E+00	3.251E+01	4.873E+04	3.274E+00
2128	1.169E+02	9.364E+04	6.292E+00	3.124E+01	4.682E+04	3.146E+00
2129	1.124E+02	8.997E+04	6.045E+00	3.001E+01	4.498E+04	3.022E+00
2130	1.079E+02	8.644E+04	5.808E+00	2.883E+01	4.322E+04	2.904E+00
2131	1.037E+02	8.305E+04	5.580E+00	2.770E+01	4.153E+04	2.790E+00
2132	9.965E+01	7.979E+04	5.361E+00	2.662E+01	3.990E+04	2.681E+00
2133	9.574E+01	7.666E+04	5.151E+00	2.557E+01	3.833E+04	2.576E+00
2134	9.199E+01	7.366E+04	4.949E+00	2.457E+01	3.683E+04	2.475E+00
2135	8.838E+01	7.077E+04	4.755E+00	2.361E+01	3.539E+04	2.378E+00
2136	8.491E+01	6.800E+04	4.569E+00	2.268E+01	3.400E+04	2.284E+00
2137	8.159E+01	6.533E+04	4.389E+00	2.179E+01	3.266E+04	2.195E+00
2138	7.839E+01	6.277E+04	4.217E+00	2.094E+01	3.138E+04	2.109E+00
2139	7.531E+01	6.031E+04	4.052E+00	2.012E+01	3.015E+04	2.026E+00
2140	7.236E+01	5.794E+04	3.893E+00	1.933E+01	2.897E+04	1.947E+00
2141	6.952E+01	5.567E+04	3.740E+00	1.857E+01	2.784E+04	1.870E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2001	0	0	0	0	0	0
2002	1.473E+02	8.046E+04	5.406E+00	2.307E+00	6.437E+02	4.325E-02
2003	3.655E+02	1.997E+05	1.341E+01	5.725E+00	1.597E+03	1.073E-01
2004	4.713E+02	2.575E+05	1.730E+01	7.384E+00	2.060E+03	1.384E-01
2005	5.691E+02	3.109E+05	2.089E+01	8.915E+00	2.487E+03	1.671E-01
2006	6.747E+02	3.686E+05	2.477E+01	1.057E+01	2.949E+03	1.981E-01
2007	8.206E+02	4.483E+05	3.012E+01	1.286E+01	3.586E+03	2.410E-01
2008	9.181E+02	5.016E+05	3.370E+01	1.438E+01	4.013E+03	2.696E-01
2009	1.020E+03	5.573E+05	3.745E+01	1.598E+01	4.459E+03	2.996E-01
2010	1.118E+03	6.109E+05	4.105E+01	1.752E+01	4.887E+03	3.284E-01
2011	1.213E+03	6.624E+05	4.451E+01	1.899E+01	5.299E+03	3.561E-01
2012	1.303E+03	7.119E+05	4.783E+01	2.041E+01	5.695E+03	3.826E-01
2013	1.481E+03	8.090E+05	5.436E+01	2.320E+01	6.472E+03	4.348E-01
2014	1.630E+03	8.904E+05	5.982E+01	2.553E+01	7.123E+03	4.786E-01
2015	1.753E+03	9.577E+05	6.435E+01	2.746E+01	7.662E+03	5.148E-01
2016	1.894E+03	1.035E+06	6.952E+01	2.967E+01	8.278E+03	5.562E-01
2017	2.019E+03	1.103E+06	7.412E+01	3.163E+01	8.825E+03	5.929E-01
2018	2.121E+03	1.159E+06	7.786E+01	3.323E+01	9.270E+03	6.228E-01
2019	2.234E+03	1.220E+06	8.198E+01	3.499E+01	9.762E+03	6.559E-01
2020	2.342E+03	1.279E+06	8.595E+01	3.668E+01	1.023E+04	6.876E-01
2021	2.445E+03	1.336E+06	8.976E+01	3.831E+01	1.069E+04	7.181E-01
2022	2.545E+03	1.390E+06	9.343E+01	3.987E+01	1.112E+04	7.474E-01
2023	2.641E+03	1.443E+06	9.694E+01	4.137E+01	1.154E+04	7.755E-01
2024	2.733E+03	1.493E+06	1.003E+02	4.282E+01	1.195E+04	8.026E-01
2025	2.822E+03	1.541E+06	1.036E+02	4.420E+01	1.233E+04	8.286E-01
2026	2.907E+03	1.588E+06	1.067E+02	4.553E+01	1.270E+04	8.535E-01
2027	2.988E+03	1.633E+06	1.097E+02	4.681E+01	1.306E+04	8.775E-01
2028	3.067E+03	1.675E+06	1.126E+02	4.804E+01	1.340E+04	9.006E-01
2029	3.142E+03	1.717E+06	1.153E+02	4.923E+01	1.373E+04	9.227E-01
2030	3.215E+03	1.756E+06	1.180E+02	5.036E+01	1.405E+04	9.440E-01
2031	3.284E+03	1.794E+06	1.206E+02	5.145E+01	1.435E+04	9.644E-01
2032	3.351E+03	1.831E+06	1.230E+02	5.250E+01	1.465E+04	9.841E-01
2033	3.415E+03	1.866E+06	1.254E+02	5.350E+01	1.493E+04	1.003E+00
2034	3.477E+03	1.900E+06	1.276E+02	5.447E+01	1.520E+04	1.021E+00
2035	3.536E+03	1.932E+06	1.298E+02	5.540E+01	1.546E+04	1.038E+00
2036	3.398E+03	1.856E+06	1.247E+02	5.323E+01	1.485E+04	9.978E-01
2037	3.265E+03	1.783E+06	1.198E+02	5.114E+01	1.427E+04	9.586E-01
2038	3.137E+03	1.714E+06	1.151E+02	4.914E+01	1.371E+04	9.210E-01
2039	3.014E+03	1.646E+06	1.106E+02	4.721E+01	1.317E+04	8.849E-01
2040	2.895E+03	1.582E+06	1.063E+02	4.536E+01	1.265E+04	8.502E-01
2041	2.782E+03	1.520E+06	1.021E+02	4.358E+01	1.216E+04	8.169E-01
2042	2.673E+03	1.460E+06	9.811E+01	4.187E+01	1.168E+04	7.849E-01
2043	2.568E+03	1.403E+06	9.426E+01	4.023E+01	1.122E+04	7.541E-01
2044	2.467E+03	1.348E+06	9.056E+01	3.865E+01	1.078E+04	7.245E-01
2045	2.371E+03	1.295E+06	8.701E+01	3.714E+01	1.036E+04	6.961E-01
2046	2.278E+03	1.244E+06	8.360E+01	3.568E+01	9.954E+03	6.688E-01
2047	2.188E+03	1.195E+06	8.032E+01	3.428E+01	9.564E+03	6.426E-01
2048	2.103E+03	1.149E+06	7.717E+01	3.294E+01	9.189E+03	6.174E-01
2049	2.020E+03	1.104E+06	7.415E+01	3.165E+01	8.828E+03	5.932E-01
2050	1.941E+03	1.060E+06	7.124E+01	3.040E+01	8.482E+03	5.699E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2051	1.865E+03	1.019E+06	6.845E+01	2.921E+01	8.150E+03	5.476E-01
2052	1.792E+03	9.788E+05	6.576E+01	2.807E+01	7.830E+03	5.261E-01
2053	1.721E+03	9.404E+05	6.318E+01	2.697E+01	7.523E+03	5.055E-01
2054	1.654E+03	9.035E+05	6.071E+01	2.591E+01	7.228E+03	4.857E-01
2055	1.589E+03	8.681E+05	5.833E+01	2.489E+01	6.945E+03	4.666E-01
2056	1.527E+03	8.341E+05	5.604E+01	2.392E+01	6.672E+03	4.483E-01
2057	1.467E+03	8.014E+05	5.384E+01	2.298E+01	6.411E+03	4.307E-01
2058	1.409E+03	7.699E+05	5.173E+01	2.208E+01	6.159E+03	4.139E-01
2059	1.354E+03	7.397E+05	4.970E+01	2.121E+01	5.918E+03	3.976E-01
2060	1.301E+03	7.107E+05	4.775E+01	2.038E+01	5.686E+03	3.820E-01
2061	1.250E+03	6.829E+05	4.588E+01	1.958E+01	5.463E+03	3.671E-01
2062	1.201E+03	6.561E+05	4.408E+01	1.881E+01	5.249E+03	3.527E-01
2063	1.154E+03	6.304E+05	4.235E+01	1.808E+01	5.043E+03	3.388E-01
2064	1.109E+03	6.056E+05	4.069E+01	1.737E+01	4.845E+03	3.255E-01
2065	1.065E+03	5.819E+05	3.910E+01	1.669E+01	4.655E+03	3.128E-01
2066	1.023E+03	5.591E+05	3.756E+01	1.603E+01	4.473E+03	3.005E-01
2067	9.833E+02	5.372E+05	3.609E+01	1.540E+01	4.297E+03	2.887E-01
2068	9.447E+02	5.161E+05	3.468E+01	1.480E+01	4.129E+03	2.774E-01
2069	9.077E+02	4.959E+05	3.332E+01	1.422E+01	3.967E+03	2.665E-01
2070	8.721E+02	4.764E+05	3.201E+01	1.366E+01	3.811E+03	2.561E-01
2071	8.379E+02	4.577E+05	3.076E+01	1.313E+01	3.662E+03	2.460E-01
2072	8.050E+02	4.398E+05	2.955E+01	1.261E+01	3.518E+03	2.364E-01
2073	7.735E+02	4.225E+05	2.839E+01	1.212E+01	3.380E+03	2.271E-01
2074	7.431E+02	4.060E+05	2.728E+01	1.164E+01	3.248E+03	2.182E-01
2075	7.140E+02	3.901E+05	2.621E+01	1.119E+01	3.120E+03	2.097E-01
2076	6.860E+02	3.748E+05	2.518E+01	1.075E+01	2.998E+03	2.014E-01
2077	6.591E+02	3.601E+05	2.419E+01	1.033E+01	2.881E+03	1.935E-01
2078	6.333E+02	3.460E+05	2.324E+01	9.920E+00	2.768E+03	1.860E-01
2079	6.084E+02	3.324E+05	2.233E+01	9.531E+00	2.659E+03	1.787E-01
2080	5.846E+02	3.194E+05	2.146E+01	9.158E+00	2.555E+03	1.717E-01
2081	5.617E+02	3.068E+05	2.062E+01	8.799E+00	2.455E+03	1.649E-01
2082	5.396E+02	2.948E+05	1.981E+01	8.454E+00	2.358E+03	1.585E-01
2083	5.185E+02	2.832E+05	1.903E+01	8.122E+00	2.266E+03	1.522E-01
2084	4.981E+02	2.721E+05	1.828E+01	7.804E+00	2.177E+03	1.463E-01
2085	4.786E+02	2.615E+05	1.757E+01	7.498E+00	2.092E+03	1.405E-01
2086	4.598E+02	2.512E+05	1.688E+01	7.204E+00	2.010E+03	1.350E-01
2087	4.418E+02	2.414E+05	1.622E+01	6.921E+00	1.931E+03	1.297E-01
2088	4.245E+02	2.319E+05	1.558E+01	6.650E+00	1.855E+03	1.246E-01
2089	4.078E+02	2.228E+05	1.497E+01	6.389E+00	1.782E+03	1.198E-01
2090	3.919E+02	2.141E+05	1.438E+01	6.139E+00	1.713E+03	1.151E-01
2091	3.765E+02	2.057E+05	1.382E+01	5.898E+00	1.645E+03	1.106E-01
2092	3.617E+02	1.976E+05	1.328E+01	5.667E+00	1.581E+03	1.062E-01
2093	3.475E+02	1.899E+05	1.276E+01	5.444E+00	1.519E+03	1.021E-01
2094	3.339E+02	1.824E+05	1.226E+01	5.231E+00	1.459E+03	9.805E-02
2095	3.208E+02	1.753E+05	1.178E+01	5.026E+00	1.402E+03	9.421E-02
2096	3.082E+02	1.684E+05	1.131E+01	4.829E+00	1.347E+03	9.051E-02
2097	2.962E+02	1.618E+05	1.087E+01	4.639E+00	1.294E+03	8.697E-02
2098	2.845E+02	1.554E+05	1.044E+01	4.458E+00	1.244E+03	8.356E-02
2099	2.734E+02	1.494E+05	1.003E+01	4.283E+00	1.195E+03	8.028E-02
2100	2.627E+02	1.435E+05	9.641E+00	4.115E+00	1.148E+03	7.713E-02
2101	2.524E+02	1.379E+05	9.263E+00	3.953E+00	1.103E+03	7.411E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2102	2.425E+02	1.325E+05	8.900E+00	3.798E+00	1.060E+03	7.120E-02
2103	2.330E+02	1.273E+05	8.551E+00	3.650E+00	1.018E+03	6.841E-02
2104	2.238E+02	1.223E+05	8.216E+00	3.506E+00	9.782E+02	6.573E-02
2105	2.151E+02	1.175E+05	7.894E+00	3.369E+00	9.399E+02	6.315E-02
2106	2.066E+02	1.129E+05	7.584E+00	3.237E+00	9.030E+02	6.067E-02
2107	1.985E+02	1.085E+05	7.287E+00	3.110E+00	8.676E+02	5.829E-02
2108	1.907E+02	1.042E+05	7.001E+00	2.988E+00	8.336E+02	5.601E-02
2109	1.833E+02	1.001E+05	6.727E+00	2.871E+00	8.009E+02	5.381E-02
2110	1.761E+02	9.619E+04	6.463E+00	2.758E+00	7.695E+02	5.170E-02
2111	1.692E+02	9.242E+04	6.209E+00	2.650E+00	7.393E+02	4.968E-02
2112	1.625E+02	8.879E+04	5.966E+00	2.546E+00	7.103E+02	4.773E-02
2113	1.562E+02	8.531E+04	5.732E+00	2.446E+00	6.825E+02	4.586E-02
2114	1.500E+02	8.197E+04	5.507E+00	2.350E+00	6.557E+02	4.406E-02
2115	1.442E+02	7.875E+04	5.291E+00	2.258E+00	6.300E+02	4.233E-02
2116	1.385E+02	7.566E+04	5.084E+00	2.170E+00	6.053E+02	4.067E-02
2117	1.331E+02	7.270E+04	4.884E+00	2.085E+00	5.816E+02	3.908E-02
2118	1.279E+02	6.985E+04	4.693E+00	2.003E+00	5.588E+02	3.754E-02
2119	1.228E+02	6.711E+04	4.509E+00	1.924E+00	5.369E+02	3.607E-02
2120	1.180E+02	6.448E+04	4.332E+00	1.849E+00	5.158E+02	3.466E-02
2121	1.134E+02	6.195E+04	4.162E+00	1.776E+00	4.956E+02	3.330E-02
2122	1.089E+02	5.952E+04	3.999E+00	1.707E+00	4.762E+02	3.199E-02
2123	1.047E+02	5.719E+04	3.842E+00	1.640E+00	4.575E+02	3.074E-02
2124	1.006E+02	5.494E+04	3.692E+00	1.576E+00	4.395E+02	2.953E-02
2125	9.663E+01	5.279E+04	3.547E+00	1.514E+00	4.223E+02	2.837E-02
2126	9.284E+01	5.072E+04	3.408E+00	1.454E+00	4.058E+02	2.726E-02
2127	8.920E+01	4.873E+04	3.274E+00	1.397E+00	3.898E+02	2.619E-02
2128	8.570E+01	4.682E+04	3.146E+00	1.343E+00	3.746E+02	2.517E-02
2129	8.234E+01	4.498E+04	3.022E+00	1.290E+00	3.599E+02	2.418E-02
2130	7.911E+01	4.322E+04	2.904E+00	1.239E+00	3.458E+02	2.323E-02
2131	7.601E+01	4.153E+04	2.790E+00	1.191E+00	3.322E+02	2.232E-02
2132	7.303E+01	3.990E+04	2.681E+00	1.144E+00	3.192E+02	2.145E-02
2133	7.017E+01	3.833E+04	2.576E+00	1.099E+00	3.067E+02	2.060E-02
2134	6.742E+01	3.683E+04	2.475E+00	1.056E+00	2.946E+02	1.980E-02
2135	6.477E+01	3.539E+04	2.378E+00	1.015E+00	2.831E+02	1.902E-02
2136	6.223E+01	3.400E+04	2.284E+00	9.749E-01	2.720E+02	1.827E-02
2137	5.979E+01	3.266E+04	2.195E+00	9.367E-01	2.613E+02	1.756E-02
2138	5.745E+01	3.138E+04	2.109E+00	9.000E-01	2.511E+02	1.687E-02
2139	5.520E+01	3.015E+04	2.026E+00	8.647E-01	2.412E+02	1.621E-02
2140	5.303E+01	2.897E+04	1.947E+00	8.308E-01	2.318E+02	1.557E-02
2141	5.095E+01	2.784E+04	1.870E+00	7.982E-01	2.227E+02	1.496E-02

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Wednesday, November 27, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1980**	
Landfill Closure Year (with 80-year limit)	**2001**	
Actual Closure Year (without limit)	***2001***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.096**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**127**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1980	12,159	13,375	0	0
1981	18,999	20,899	12,159	13,375
1982	19,359	21,295	31,158	34,274
1983	19,251	21,176	50,517	55,569
1984	19,449	21,394	69,768	76,745
1985	21,510	23,661	89,217	98,139
1986	28,530	31,383	110,727	121,800
1987	33,319	36,651	139,257	153,183
1988	38,909	42,800	172,576	189,834
1989	41,806	45,987	211,485	232,634
1990	35,075	38,583	253,291	278,620
1991	20,489	22,538	288,366	317,203
1992	15,665	17,232	308,855	339,741
1993	17,164	18,880	324,520	356,972
1994	12,220	13,442	341,684	375,852
1995	14,201	15,621	353,904	389,294
1996	13,334	14,667	368,105	404,916
1997	15,532	17,085	381,439	419,583
1998	15,892	17,481	396,971	436,668
1999	16,226	17,849	412,863	454,149
2000	19,242	21,166	429,089	471,998
2001	20,479	22,527	448,331	493,164
2002	0	0	468,810	515,691
2003	0	0	468,810	515,691
2004	0	0	468,810	515,691
2005	0	0	468,810	515,691
2006	0	0	468,810	515,691
2007	0	0	468,810	515,691
2008	0	0	468,810	515,691
2009	0	0	468,810	515,691
2010	0	0	468,810	515,691
2011	0	0	468,810	515,691
2012	0	0	468,810	515,691
2013	0	0	468,810	515,691
2014	0	0	468,810	515,691
2015	0	0	468,810	515,691
2016	0	0	468,810	515,691
2017	0	0	468,810	515,691
2018	0	0	468,810	515,691
2019	0	0	468,810	515,691

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2020	0	0	468,810	515,691
2021	0	0	468,810	515,691
2022	0	0	468,810	515,691
2023	0	0	468,810	515,691
2024	0	0	468,810	515,691
2025	0	0	468,810	515,691
2026	0	0	468,810	515,691
2027	0	0	468,810	515,691
2028	0	0	468,810	515,691
2029	0	0	468,810	515,691
2030	0	0	468,810	515,691
2031	0	0	468,810	515,691
2032	0	0	468,810	515,691
2033	0	0	468,810	515,691
2034	0	0	468,810	515,691
2035	0	0	468,810	515,691
2036	0	0	468,810	515,691
2037	0	0	468,810	515,691
2038	0	0	468,810	515,691
2039	0	0	468,810	515,691
2040	0	0	468,810	515,691
2041	0	0	468,810	515,691
2042	0	0	468,810	515,691
2043	0	0	468,810	515,691
2044	0	0	468,810	515,691
2045	0	0	468,810	515,691
2046	0	0	468,810	515,691
2047	0	0	468,810	515,691
2048	0	0	468,810	515,691
2049	0	0	468,810	515,691
2050	0	0	468,810	515,691
2051	0	0	468,810	515,691
2052	0	0	468,810	515,691
2053	0	0	468,810	515,691
2054	0	0	468,810	515,691
2055	0	0	468,810	515,691
2056	0	0	468,810	515,691
2057	0	0	468,810	515,691
2058	0	0	468,810	515,691
2059	0	0	468,810	515,691

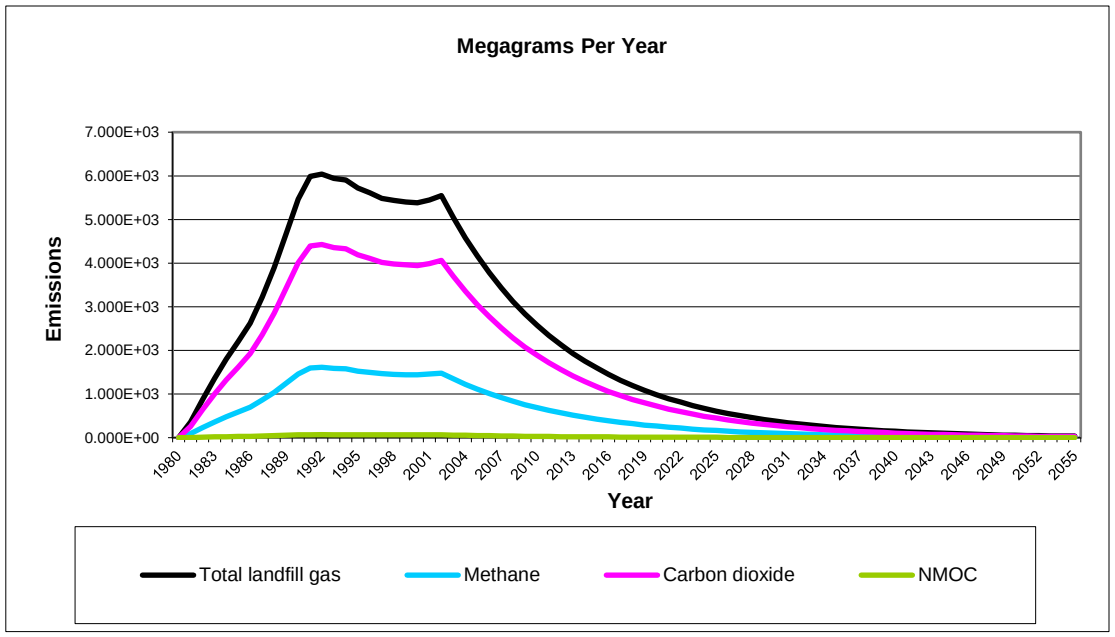
Pollutant Parameters

	Compound	Gas / Pollutant Default Parameters: Concentration (*ppmv*)	Molecular Weight	User-specified Pollutant Parameters: Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
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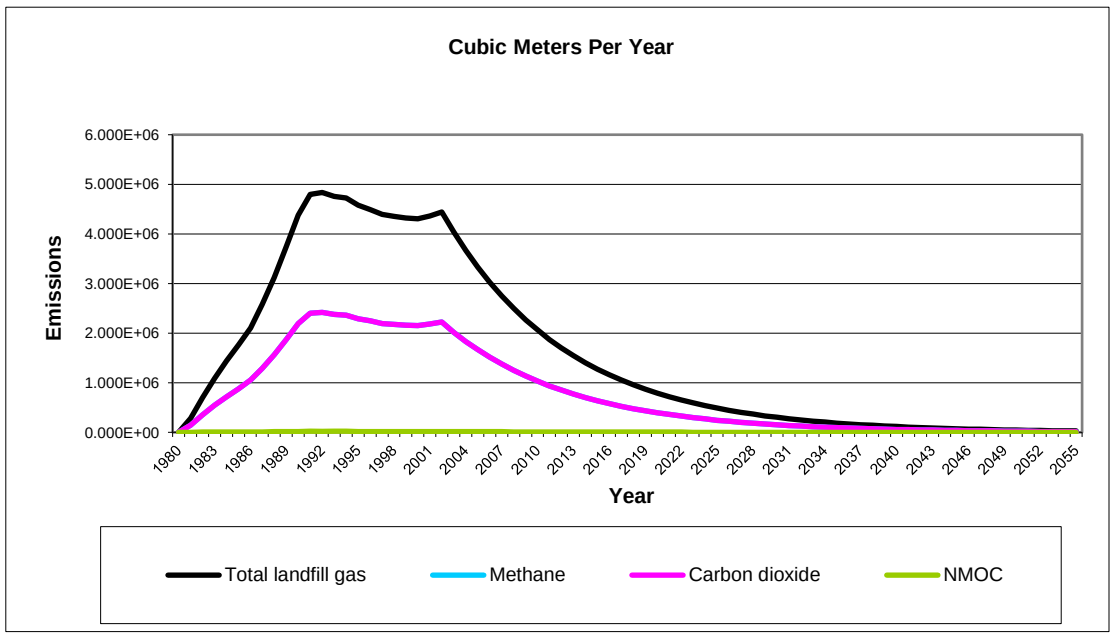
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
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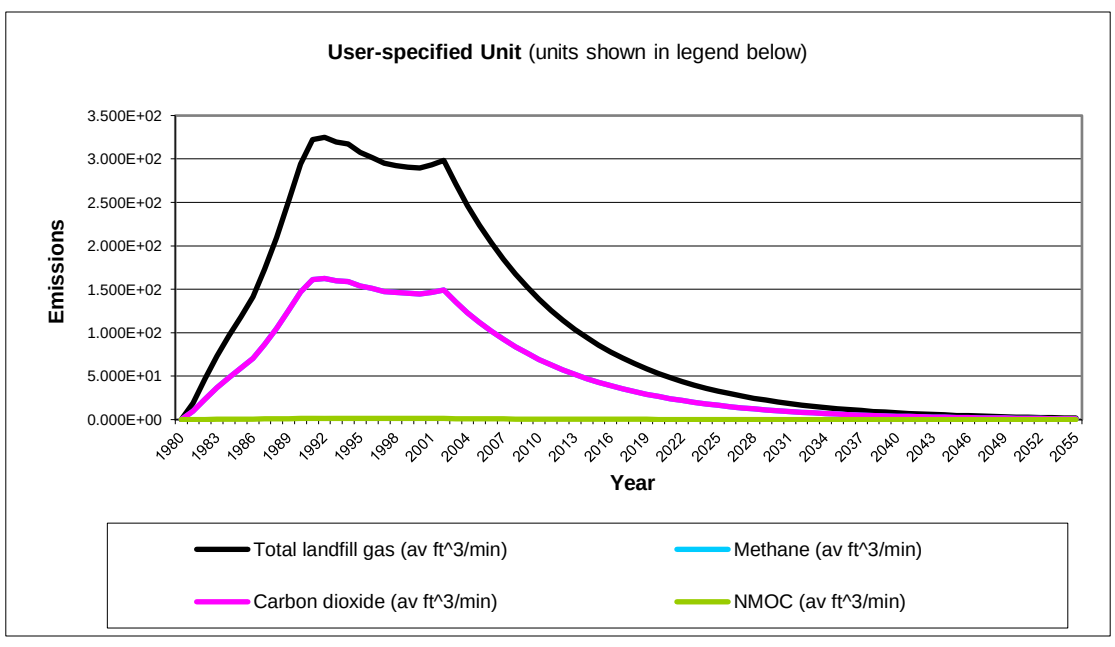
5.000E+06
4.000E+06
3.000E+06
2.000E+06
1.000E+06
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
3.500E+02
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	3.547E+02	2.841E+05	1.909E+01	9.475E+01	1.420E+05	9.543E+00
1982	8.766E+02	7.019E+05	4.716E+01	2.341E+02	3.510E+05	2.358E+01
1983	1.361E+03	1.090E+06	7.323E+01	3.636E+02	5.450E+05	3.662E+01
1984	1.798E+03	1.440E+06	9.675E+01	4.803E+02	7.199E+05	4.837E+01
1985	2.201E+03	1.762E+06	1.184E+02	5.879E+02	8.812E+05	5.921E+01
1986	2.627E+03	2.104E+06	1.413E+02	7.017E+02	1.052E+06	7.067E+01
1987	3.219E+03	2.578E+06	1.732E+02	8.598E+02	1.289E+06	8.659E+01
1988	3.896E+03	3.120E+06	2.096E+02	1.041E+03	1.560E+06	1.048E+02
1989	4.675E+03	3.743E+06	2.515E+02	1.249E+03	1.872E+06	1.258E+02
1990	5.467E+03	4.377E+06	2.941E+02	1.460E+03	2.189E+06	1.471E+02
1991	5.990E+03	4.796E+06	3.223E+02	1.600E+03	2.398E+06	1.611E+02
1992	6.039E+03	4.836E+06	3.249E+02	1.613E+03	2.418E+06	1.625E+02
1993	5.943E+03	4.759E+06	3.198E+02	1.588E+03	2.380E+06	1.599E+02
1994	5.900E+03	4.724E+06	3.174E+02	1.576E+03	2.362E+06	1.587E+02
1995	5.716E+03	4.578E+06	3.076E+02	1.527E+03	2.289E+06	1.538E+02
1996	5.608E+03	4.490E+06	3.017E+02	1.498E+03	2.245E+06	1.509E+02
1997	5.483E+03	4.391E+06	2.950E+02	1.465E+03	2.195E+06	1.475E+02
1998	5.434E+03	4.352E+06	2.924E+02	1.452E+03	2.176E+06	1.462E+02
1999	5.401E+03	4.325E+06	2.906E+02	1.443E+03	2.162E+06	1.453E+02
2000	5.380E+03	4.308E+06	2.894E+02	1.437E+03	2.154E+06	1.447E+02
2001	5.449E+03	4.363E+06	2.932E+02	1.455E+03	2.182E+06	1.466E+02
2002	5.547E+03	4.442E+06	2.985E+02	1.482E+03	2.221E+06	1.492E+02
2003	5.040E+03	4.035E+06	2.711E+02	1.346E+03	2.018E+06	1.356E+02
2004	4.578E+03	3.666E+06	2.463E+02	1.223E+03	1.833E+06	1.232E+02
2005	4.159E+03	3.331E+06	2.238E+02	1.111E+03	1.665E+06	1.119E+02
2006	3.779E+03	3.026E+06	2.033E+02	1.009E+03	1.513E+06	1.016E+02
2007	3.433E+03	2.749E+06	1.847E+02	9.169E+02	1.374E+06	9.234E+01
2008	3.118E+03	2.497E+06	1.678E+02	8.330E+02	1.249E+06	8.389E+01
2009	2.833E+03	2.269E+06	1.524E+02	7.567E+02	1.134E+06	7.621E+01
2010	2.574E+03	2.061E+06	1.385E+02	6.875E+02	1.030E+06	6.923E+01
2011	2.338E+03	1.872E+06	1.258E+02	6.245E+02	9.361E+05	6.290E+01
2012	2.124E+03	1.701E+06	1.143E+02	5.674E+02	8.504E+05	5.714E+01
2013	1.930E+03	1.545E+06	1.038E+02	5.154E+02	7.726E+05	5.191E+01
2014	1.753E+03	1.404E+06	9.432E+01	4.682E+02	7.019E+05	4.716E+01
2015	1.593E+03	1.275E+06	8.568E+01	4.254E+02	6.376E+05	4.284E+01
2016	1.447E+03	1.159E+06	7.784E+01	3.864E+02	5.793E+05	3.892E+01
2017	1.314E+03	1.052E+06	7.071E+01	3.511E+02	5.262E+05	3.536E+01
2018	1.194E+03	9.561E+05	6.424E+01	3.189E+02	4.781E+05	3.212E+01
2019	1.085E+03	8.686E+05	5.836E+01	2.897E+02	4.343E+05	2.918E+01
2020	9.854E+02	7.891E+05	5.302E+01	2.632E+02	3.945E+05	2.651E+01
2021	8.952E+02	7.169E+05	4.817E+01	2.391E+02	3.584E+05	2.408E+01
2022	8.133E+02	6.512E+05	4.376E+01	2.172E+02	3.256E+05	2.188E+01
2023	7.388E+02	5.916E+05	3.975E+01	1.974E+02	2.958E+05	1.988E+01
2024	6.712E+02	5.375E+05	3.611E+01	1.793E+02	2.687E+05	1.806E+01
2025	6.098E+02	4.883E+05	3.281E+01	1.629E+02	2.441E+05	1.640E+01
2026	5.540E+02	4.436E+05	2.980E+01	1.480E+02	2.218E+05	1.490E+01
2027	5.032E+02	4.030E+05	2.708E+01	1.344E+02	2.015E+05	1.354E+01
2028	4.572E+02	3.661E+05	2.460E+01	1.221E+02	1.830E+05	1.230E+01
2029	4.153E+02	3.326E+05	2.235E+01	1.109E+02	1.663E+05	1.117E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	3.773E+02	3.021E+05	2.030E+01	1.008E+02	1.511E+05	1.015E+01
2031	3.428E+02	2.745E+05	1.844E+01	9.156E+01	1.372E+05	9.221E+00
2032	3.114E+02	2.494E+05	1.675E+01	8.318E+01	1.247E+05	8.377E+00
2033	2.829E+02	2.265E+05	1.522E+01	7.556E+01	1.133E+05	7.610E+00
2034	2.570E+02	2.058E+05	1.383E+01	6.865E+01	1.029E+05	6.914E+00
2035	2.335E+02	1.870E+05	1.256E+01	6.236E+01	9.348E+04	6.281E+00
2036	2.121E+02	1.698E+05	1.141E+01	5.666E+01	8.492E+04	5.706E+00
2037	1.927E+02	1.543E+05	1.037E+01	5.147E+01	7.715E+04	5.184E+00
2038	1.751E+02	1.402E+05	9.418E+00	4.676E+01	7.009E+04	4.709E+00
2039	1.590E+02	1.273E+05	8.556E+00	4.248E+01	6.367E+04	4.278E+00
2040	1.445E+02	1.157E+05	7.773E+00	3.859E+01	5.784E+04	3.886E+00
2041	1.312E+02	1.051E+05	7.061E+00	3.506E+01	5.255E+04	3.531E+00
2042	1.192E+02	9.548E+04	6.415E+00	3.185E+01	4.774E+04	3.208E+00
2043	1.083E+02	8.674E+04	5.828E+00	2.893E+01	4.337E+04	2.914E+00
2044	9.840E+01	7.880E+04	5.294E+00	2.628E+01	3.940E+04	2.647E+00
2045	8.940E+01	7.158E+04	4.810E+00	2.388E+01	3.579E+04	2.405E+00
2046	8.121E+01	6.503E+04	4.370E+00	2.169E+01	3.252E+04	2.185E+00
2047	7.378E+01	5.908E+04	3.970E+00	1.971E+01	2.954E+04	1.985E+00
2048	6.703E+01	5.367E+04	3.606E+00	1.790E+01	2.684E+04	1.803E+00
2049	6.089E+01	4.876E+04	3.276E+00	1.626E+01	2.438E+04	1.638E+00
2050	5.532E+01	4.430E+04	2.976E+00	1.478E+01	2.215E+04	1.488E+00
2051	5.025E+01	4.024E+04	2.704E+00	1.342E+01	2.012E+04	1.352E+00
2052	4.565E+01	3.656E+04	2.456E+00	1.219E+01	1.828E+04	1.228E+00
2053	4.147E+01	3.321E+04	2.231E+00	1.108E+01	1.661E+04	1.116E+00
2054	3.768E+01	3.017E+04	2.027E+00	1.006E+01	1.509E+04	1.014E+00
2055	3.423E+01	2.741E+04	1.842E+00	9.143E+00	1.370E+04	9.208E-01
2056	3.110E+01	2.490E+04	1.673E+00	8.306E+00	1.245E+04	8.365E-01
2057	2.825E+01	2.262E+04	1.520E+00	7.546E+00	1.131E+04	7.600E-01
2058	2.566E+01	2.055E+04	1.381E+00	6.855E+00	1.028E+04	6.904E-01
2059	2.331E+01	1.867E+04	1.254E+00	6.228E+00	9.335E+03	6.272E-01
2060	2.118E+01	1.696E+04	1.140E+00	5.658E+00	8.480E+03	5.698E-01
2061	1.924E+01	1.541E+04	1.035E+00	5.140E+00	7.704E+03	5.176E-01
2062	1.748E+01	1.400E+04	9.405E-01	4.669E+00	6.999E+03	4.702E-01
2063	1.588E+01	1.272E+04	8.544E-01	4.242E+00	6.358E+03	4.272E-01
2064	1.443E+01	1.155E+04	7.762E-01	3.854E+00	5.776E+03	3.881E-01
2065	1.311E+01	1.049E+04	7.051E-01	3.501E+00	5.247E+03	3.526E-01
2066	1.191E+01	9.534E+03	6.406E-01	3.180E+00	4.767E+03	3.203E-01
2067	1.082E+01	8.661E+03	5.820E-01	2.889E+00	4.331E+03	2.910E-01
2068	9.827E+00	7.869E+03	5.287E-01	2.625E+00	3.934E+03	2.643E-01
2069	8.927E+00	7.148E+03	4.803E-01	2.385E+00	3.574E+03	2.401E-01
2070	8.110E+00	6.494E+03	4.363E-01	2.166E+00	3.247E+03	2.182E-01
2071	7.368E+00	5.900E+03	3.964E-01	1.968E+00	2.950E+03	1.982E-01
2072	6.693E+00	5.360E+03	3.601E-01	1.788E+00	2.680E+03	1.801E-01
2073	6.080E+00	4.869E+03	3.271E-01	1.624E+00	2.434E+03	1.636E-01
2074	5.524E+00	4.423E+03	2.972E-01	1.475E+00	2.212E+03	1.486E-01
2075	5.018E+00	4.018E+03	2.700E-01	1.340E+00	2.009E+03	1.350E-01
2076	4.559E+00	3.651E+03	2.453E-01	1.218E+00	1.825E+03	1.226E-01
2077	4.142E+00	3.316E+03	2.228E-01	1.106E+00	1.658E+03	1.114E-01
2078	3.763E+00	3.013E+03	2.024E-01	1.005E+00	1.506E+03	1.012E-01
2079	3.418E+00	2.737E+03	1.839E-01	9.130E-01	1.369E+03	9.195E-02
2080	3.105E+00	2.487E+03	1.671E-01	8.294E-01	1.243E+03	8.353E-02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	2.821E+00	2.259E+03	1.518E-01	7.535E-01	1.129E+03	7.589E-02
2082	2.563E+00	2.052E+03	1.379E-01	6.845E-01	1.026E+03	6.894E-02
2083	2.328E+00	1.864E+03	1.253E-01	6.219E-01	9.321E+02	6.263E-02
2084	2.115E+00	1.694E+03	1.138E-01	5.650E-01	8.468E+02	5.690E-02
2085	1.921E+00	1.539E+03	1.034E-01	5.132E-01	7.693E+02	5.169E-02
2086	1.746E+00	1.398E+03	9.392E-02	4.663E-01	6.989E+02	4.696E-02
2087	1.586E+00	1.270E+03	8.532E-02	4.236E-01	6.349E+02	4.266E-02
2088	1.441E+00	1.154E+03	7.751E-02	3.848E-01	5.768E+02	3.875E-02
2089	1.309E+00	1.048E+03	7.041E-02	3.496E-01	5.240E+02	3.521E-02
2090	1.189E+00	9.521E+02	6.397E-02	3.176E-01	4.760E+02	3.198E-02
2091	1.080E+00	8.649E+02	5.811E-02	2.885E-01	4.325E+02	2.906E-02
2092	9.813E-01	7.857E+02	5.279E-02	2.621E-01	3.929E+02	2.640E-02
2093	8.914E-01	7.138E+02	4.796E-02	2.381E-01	3.569E+02	2.398E-02
2094	8.098E-01	6.485E+02	4.357E-02	2.163E-01	3.242E+02	2.179E-02
2095	7.357E-01	5.891E+02	3.958E-02	1.965E-01	2.946E+02	1.979E-02
2096	6.684E-01	5.352E+02	3.596E-02	1.785E-01	2.676E+02	1.798E-02
2097	6.072E-01	4.862E+02	3.267E-02	1.622E-01	2.431E+02	1.633E-02
2098	5.516E-01	4.417E+02	2.968E-02	1.473E-01	2.209E+02	1.484E-02
2099	5.011E-01	4.013E+02	2.696E-02	1.339E-01	2.006E+02	1.348E-02
2100	4.552E-01	3.645E+02	2.449E-02	1.216E-01	1.823E+02	1.225E-02
2101	4.136E-01	3.312E+02	2.225E-02	1.105E-01	1.656E+02	1.113E-02
2102	3.757E-01	3.009E+02	2.021E-02	1.004E-01	1.504E+02	1.011E-02
2103	3.413E-01	2.733E+02	1.836E-02	9.117E-02	1.367E+02	9.182E-03
2104	3.101E-01	2.483E+02	1.668E-02	8.283E-02	1.241E+02	8.342E-03
2105	2.817E-01	2.256E+02	1.516E-02	7.524E-02	1.128E+02	7.578E-03
2106	2.559E-01	2.049E+02	1.377E-02	6.836E-02	1.025E+02	6.884E-03
2107	2.325E-01	1.862E+02	1.251E-02	6.210E-02	9.308E+01	6.254E-03
2108	2.112E-01	1.691E+02	1.136E-02	5.642E-02	8.456E+01	5.682E-03
2109	1.919E-01	1.536E+02	1.032E-02	5.125E-02	7.682E+01	5.162E-03
2110	1.743E-01	1.396E+02	9.378E-03	4.656E-02	6.979E+01	4.689E-03
2111	1.584E-01	1.268E+02	8.520E-03	4.230E-02	6.340E+01	4.260E-03
2112	1.439E-01	1.152E+02	7.740E-03	3.843E-02	5.760E+01	3.870E-03
2113	1.307E-01	1.047E+02	7.032E-03	3.491E-02	5.233E+01	3.516E-03
2114	1.187E-01	9.507E+01	6.388E-03	3.171E-02	4.754E+01	3.194E-03
2115	1.079E-01	8.637E+01	5.803E-03	2.881E-02	4.318E+01	2.902E-03
2116	9.799E-02	7.846E+01	5.272E-03	2.617E-02	3.923E+01	2.636E-03
2117	8.902E-02	7.128E+01	4.789E-03	2.378E-02	3.564E+01	2.395E-03
2118	8.087E-02	6.476E+01	4.351E-03	2.160E-02	3.238E+01	2.175E-03
2119	7.347E-02	5.883E+01	3.953E-03	1.962E-02	2.941E+01	1.976E-03
2120	6.674E-02	5.344E+01	3.591E-03	1.783E-02	2.672E+01	1.795E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
1980	0	0	0	0	0	0
1981	2.600E+02	1.420E+05	9.543E+00	4.073E+00	1.136E+03	7.634E-02
1982	6.424E+02	3.510E+05	2.358E+01	1.006E+01	2.808E+03	1.886E-01
1983	9.976E+02	5.450E+05	3.662E+01	1.563E+01	4.360E+03	2.929E-01
1984	1.318E+03	7.199E+05	4.837E+01	2.065E+01	5.760E+03	3.870E-01
1985	1.613E+03	8.812E+05	5.921E+01	2.527E+01	7.050E+03	4.737E-01
1986	1.925E+03	1.052E+06	7.067E+01	3.016E+01	8.415E+03	5.654E-01
1987	2.359E+03	1.289E+06	8.659E+01	3.696E+01	1.031E+04	6.928E-01
1988	2.856E+03	1.560E+06	1.048E+02	4.473E+01	1.248E+04	8.385E-01
1989	3.426E+03	1.872E+06	1.258E+02	5.367E+01	1.497E+04	1.006E+00
1990	4.006E+03	2.189E+06	1.471E+02	6.276E+01	1.751E+04	1.176E+00
1991	4.390E+03	2.398E+06	1.611E+02	6.877E+01	1.918E+04	1.289E+00
1992	4.426E+03	2.418E+06	1.625E+02	6.934E+01	1.934E+04	1.300E+00
1993	4.356E+03	2.380E+06	1.599E+02	6.824E+01	1.904E+04	1.279E+00
1994	4.324E+03	2.362E+06	1.587E+02	6.774E+01	1.890E+04	1.270E+00
1995	4.190E+03	2.289E+06	1.538E+02	6.563E+01	1.831E+04	1.230E+00
1996	4.110E+03	2.245E+06	1.509E+02	6.438E+01	1.796E+04	1.207E+00
1997	4.019E+03	2.195E+06	1.475E+02	6.295E+01	1.756E+04	1.180E+00
1998	3.983E+03	2.176E+06	1.462E+02	6.239E+01	1.741E+04	1.170E+00
1999	3.958E+03	2.162E+06	1.453E+02	6.201E+01	1.730E+04	1.162E+00
2000	3.943E+03	2.154E+06	1.447E+02	6.177E+01	1.723E+04	1.158E+00
2001	3.993E+03	2.182E+06	1.466E+02	6.256E+01	1.745E+04	1.173E+00
2002	4.066E+03	2.221E+06	1.492E+02	6.369E+01	1.777E+04	1.194E+00
2003	3.693E+03	2.018E+06	1.356E+02	5.786E+01	1.614E+04	1.085E+00
2004	3.355E+03	1.833E+06	1.232E+02	5.256E+01	1.466E+04	9.853E-01
2005	3.048E+03	1.665E+06	1.119E+02	4.775E+01	1.332E+04	8.951E-01
2006	2.769E+03	1.513E+06	1.016E+02	4.338E+01	1.210E+04	8.132E-01
2007	2.516E+03	1.374E+06	9.234E+01	3.941E+01	1.099E+04	7.387E-01
2008	2.285E+03	1.249E+06	8.389E+01	3.580E+01	9.988E+03	6.711E-01
2009	2.076E+03	1.134E+06	7.621E+01	3.253E+01	9.074E+03	6.097E-01
2010	1.886E+03	1.030E+06	6.923E+01	2.955E+01	8.243E+03	5.539E-01
2011	1.714E+03	9.361E+05	6.290E+01	2.684E+01	7.489E+03	5.032E-01
2012	1.557E+03	8.504E+05	5.714E+01	2.439E+01	6.803E+03	4.571E-01
2013	1.414E+03	7.726E+05	5.191E+01	2.215E+01	6.181E+03	4.153E-01
2014	1.285E+03	7.019E+05	4.716E+01	2.013E+01	5.615E+03	3.773E-01
2015	1.167E+03	6.376E+05	4.284E+01	1.828E+01	5.101E+03	3.427E-01
2016	1.060E+03	5.793E+05	3.892E+01	1.661E+01	4.634E+03	3.114E-01
2017	9.633E+02	5.262E+05	3.536E+01	1.509E+01	4.210E+03	2.829E-01
2018	8.751E+02	4.781E+05	3.212E+01	1.371E+01	3.824E+03	2.570E-01
2019	7.950E+02	4.343E+05	2.918E+01	1.245E+01	3.474E+03	2.334E-01
2020	7.222E+02	3.945E+05	2.651E+01	1.131E+01	3.156E+03	2.121E-01
2021	6.561E+02	3.584E+05	2.408E+01	1.028E+01	2.867E+03	1.927E-01
2022	5.960E+02	3.256E+05	2.188E+01	9.337E+00	2.605E+03	1.750E-01
2023	5.415E+02	2.958E+05	1.988E+01	8.483E+00	2.367E+03	1.590E-01
2024	4.919E+02	2.687E+05	1.806E+01	7.706E+00	2.150E+03	1.445E-01
2025	4.469E+02	2.441E+05	1.640E+01	7.001E+00	1.953E+03	1.312E-01
2026	4.060E+02	2.218E+05	1.490E+01	6.360E+00	1.774E+03	1.192E-01
2027	3.688E+02	2.015E+05	1.354E+01	5.778E+00	1.612E+03	1.083E-01
2028	3.351E+02	1.830E+05	1.230E+01	5.249E+00	1.464E+03	9.839E-02
2029	3.044E+02	1.663E+05	1.117E+01	4.768E+00	1.330E+03	8.938E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	2.765E+02	1.511E+05	1.015E+01	4.332E+00	1.209E+03	8.120E-02
2031	2.512E+02	1.372E+05	9.221E+00	3.935E+00	1.098E+03	7.377E-02
2032	2.282E+02	1.247E+05	8.377E+00	3.575E+00	9.974E+02	6.702E-02
2033	2.073E+02	1.133E+05	7.610E+00	3.248E+00	9.061E+02	6.088E-02
2034	1.884E+02	1.029E+05	6.914E+00	2.951E+00	8.232E+02	5.531E-02
2035	1.711E+02	9.348E+04	6.281E+00	2.681E+00	7.478E+02	5.025E-02
2036	1.554E+02	8.492E+04	5.706E+00	2.435E+00	6.794E+02	4.565E-02
2037	1.412E+02	7.715E+04	5.184E+00	2.212E+00	6.172E+02	4.147E-02
2038	1.283E+02	7.009E+04	4.709E+00	2.010E+00	5.607E+02	3.767E-02
2039	1.166E+02	6.367E+04	4.278E+00	1.826E+00	5.094E+02	3.422E-02
2040	1.059E+02	5.784E+04	3.886E+00	1.659E+00	4.627E+02	3.109E-02
2041	9.619E+01	5.255E+04	3.531E+00	1.507E+00	4.204E+02	2.825E-02
2042	8.738E+01	4.774E+04	3.208E+00	1.369E+00	3.819E+02	2.566E-02
2043	7.939E+01	4.337E+04	2.914E+00	1.244E+00	3.469E+02	2.331E-02
2044	7.212E+01	3.940E+04	2.647E+00	1.130E+00	3.152E+02	2.118E-02
2045	6.552E+01	3.579E+04	2.405E+00	1.026E+00	2.863E+02	1.924E-02
2046	5.952E+01	3.252E+04	2.185E+00	9.324E-01	2.601E+02	1.748E-02
2047	5.407E+01	2.954E+04	1.985E+00	8.471E-01	2.363E+02	1.588E-02
2048	4.912E+01	2.684E+04	1.803E+00	7.695E-01	2.147E+02	1.442E-02
2049	4.463E+01	2.438E+04	1.638E+00	6.991E-01	1.950E+02	1.310E-02
2050	4.054E+01	2.215E+04	1.488E+00	6.351E-01	1.772E+02	1.190E-02
2051	3.683E+01	2.012E+04	1.352E+00	5.770E-01	1.610E+02	1.082E-02
2052	3.346E+01	1.828E+04	1.228E+00	5.242E-01	1.462E+02	9.825E-03
2053	3.040E+01	1.661E+04	1.116E+00	4.762E-01	1.328E+02	8.926E-03
2054	2.761E+01	1.509E+04	1.014E+00	4.326E-01	1.207E+02	8.109E-03
2055	2.509E+01	1.370E+04	9.208E-01	3.930E-01	1.096E+02	7.367E-03
2056	2.279E+01	1.245E+04	8.365E-01	3.570E-01	9.960E+01	6.692E-03
2057	2.070E+01	1.131E+04	7.600E-01	3.243E-01	9.048E+01	6.080E-03
2058	1.881E+01	1.028E+04	6.904E-01	2.946E-01	8.220E+01	5.523E-03
2059	1.709E+01	9.335E+03	6.272E-01	2.677E-01	7.468E+01	5.018E-03
2060	1.552E+01	8.480E+03	5.698E-01	2.432E-01	6.784E+01	4.558E-03
2061	1.410E+01	7.704E+03	5.176E-01	2.209E-01	6.163E+01	4.141E-03
2062	1.281E+01	6.999E+03	4.702E-01	2.007E-01	5.599E+01	3.762E-03
2063	1.164E+01	6.358E+03	4.272E-01	1.823E-01	5.087E+01	3.418E-03
2064	1.057E+01	5.776E+03	3.881E-01	1.656E-01	4.621E+01	3.105E-03
2065	9.605E+00	5.247E+03	3.526E-01	1.505E-01	4.198E+01	2.821E-03
2066	8.726E+00	4.767E+03	3.203E-01	1.367E-01	3.814E+01	2.562E-03
2067	7.927E+00	4.331E+03	2.910E-01	1.242E-01	3.465E+01	2.328E-03
2068	7.202E+00	3.934E+03	2.643E-01	1.128E-01	3.147E+01	2.115E-03
2069	6.543E+00	3.574E+03	2.401E-01	1.025E-01	2.859E+01	1.921E-03
2070	5.944E+00	3.247E+03	2.182E-01	9.311E-02	2.598E+01	1.745E-03
2071	5.400E+00	2.950E+03	1.982E-01	8.459E-02	2.360E+01	1.586E-03
2072	4.905E+00	2.680E+03	1.801E-01	7.684E-02	2.144E+01	1.440E-03
2073	4.456E+00	2.434E+03	1.636E-01	6.981E-02	1.948E+01	1.309E-03
2074	4.048E+00	2.212E+03	1.486E-01	6.342E-02	1.769E+01	1.189E-03
2075	3.678E+00	2.009E+03	1.350E-01	5.762E-02	1.607E+01	1.080E-03
2076	3.341E+00	1.825E+03	1.226E-01	5.234E-02	1.460E+01	9.811E-04
2077	3.035E+00	1.658E+03	1.114E-01	4.755E-02	1.327E+01	8.913E-04
2078	2.757E+00	1.506E+03	1.012E-01	4.320E-02	1.205E+01	8.097E-04
2079	2.505E+00	1.369E+03	9.195E-02	3.924E-02	1.095E+01	7.356E-04
2080	2.276E+00	1.243E+03	8.353E-02	3.565E-02	9.946E+00	6.683E-04

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	2.067E+00	1.129E+03	7.589E-02	3.239E-02	9.036E+00	6.071E-04
2082	1.878E+00	1.026E+03	6.894E-02	2.942E-02	8.209E+00	5.515E-04
2083	1.706E+00	9.321E+02	6.263E-02	2.673E-02	7.457E+00	5.010E-04
2084	1.550E+00	8.468E+02	5.690E-02	2.428E-02	6.775E+00	4.552E-04
2085	1.408E+00	7.693E+02	5.169E-02	2.206E-02	6.154E+00	4.135E-04
2086	1.279E+00	6.989E+02	4.696E-02	2.004E-02	5.591E+00	3.757E-04
2087	1.162E+00	6.349E+02	4.266E-02	1.821E-02	5.079E+00	3.413E-04
2088	1.056E+00	5.768E+02	3.875E-02	1.654E-02	4.614E+00	3.100E-04
2089	9.592E-01	5.240E+02	3.521E-02	1.503E-02	4.192E+00	2.817E-04
2090	8.714E-01	4.760E+02	3.198E-02	1.365E-02	3.808E+00	2.559E-04
2091	7.916E-01	4.325E+02	2.906E-02	1.240E-02	3.460E+00	2.325E-04
2092	7.192E-01	3.929E+02	2.640E-02	1.127E-02	3.143E+00	2.112E-04
2093	6.533E-01	3.569E+02	2.398E-02	1.023E-02	2.855E+00	1.918E-04
2094	5.935E-01	3.242E+02	2.179E-02	9.298E-03	2.594E+00	1.743E-04
2095	5.392E-01	2.946E+02	1.979E-02	8.447E-03	2.356E+00	1.583E-04
2096	4.898E-01	2.676E+02	1.798E-02	7.674E-03	2.141E+00	1.438E-04
2097	4.450E-01	2.431E+02	1.633E-02	6.971E-03	1.945E+00	1.307E-04
2098	4.043E-01	2.209E+02	1.484E-02	6.333E-03	1.767E+00	1.187E-04
2099	3.673E-01	2.006E+02	1.348E-02	5.753E-03	1.605E+00	1.078E-04
2100	3.336E-01	1.823E+02	1.225E-02	5.227E-03	1.458E+00	9.797E-05
2101	3.031E-01	1.656E+02	1.113E-02	4.748E-03	1.325E+00	8.901E-05
2102	2.754E-01	1.504E+02	1.011E-02	4.314E-03	1.203E+00	8.086E-05
2103	2.502E-01	1.367E+02	9.182E-03	3.919E-03	1.093E+00	7.346E-05
2104	2.273E-01	1.241E+02	8.342E-03	3.560E-03	9.932E-01	6.673E-05
2105	2.065E-01	1.128E+02	7.578E-03	3.234E-03	9.023E-01	6.062E-05
2106	1.876E-01	1.025E+02	6.884E-03	2.938E-03	8.197E-01	5.508E-05
2107	1.704E-01	9.308E+01	6.254E-03	2.669E-03	7.447E-01	5.003E-05
2108	1.548E-01	8.456E+01	5.682E-03	2.425E-03	6.765E-01	4.545E-05
2109	1.406E-01	7.682E+01	5.162E-03	2.203E-03	6.146E-01	4.129E-05
2110	1.278E-01	6.979E+01	4.689E-03	2.001E-03	5.583E-01	3.751E-05
2111	1.161E-01	6.340E+01	4.260E-03	1.818E-03	5.072E-01	3.408E-05
2112	1.054E-01	5.760E+01	3.870E-03	1.652E-03	4.608E-01	3.096E-05
2113	9.578E-02	5.233E+01	3.516E-03	1.500E-03	4.186E-01	2.813E-05
2114	8.701E-02	4.754E+01	3.194E-03	1.363E-03	3.803E-01	2.555E-05
2115	7.905E-02	4.318E+01	2.902E-03	1.238E-03	3.455E-01	2.321E-05
2116	7.181E-02	3.923E+01	2.636E-03	1.125E-03	3.139E-01	2.109E-05
2117	6.524E-02	3.564E+01	2.395E-03	1.022E-03	2.851E-01	1.916E-05
2118	5.927E-02	3.238E+01	2.175E-03	9.285E-04	2.590E-01	1.740E-05
2119	5.384E-02	2.941E+01	1.976E-03	8.435E-04	2.353E-01	1.581E-05
2120	4.891E-02	2.672E+01	1.795E-03	7.663E-04	2.138E-01	1.436E-05

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Wednesday, November 27, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate (*$year^{-1}$*)
L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)
t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1980**	
Landfill Closure Year (with 80-year limit)	**2001**	
Actual Closure Year (without limit)	***2001***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.060**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**110**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1980	12,159	13,375	0	0
1981	18,999	20,899	12,159	13,375
1982	19,359	21,295	31,158	34,274
1983	19,251	21,176	50,517	55,569
1984	19,449	21,394	69,768	76,745
1985	21,510	23,661	89,217	98,139
1986	28,530	31,383	110,727	121,800
1987	33,319	36,651	139,257	153,183
1988	38,909	42,800	172,576	189,834
1989	41,806	45,987	211,485	232,634
1990	35,075	38,583	253,291	278,620
1991	20,489	22,538	288,366	317,203
1992	15,665	17,232	308,855	339,741
1993	17,164	18,880	324,520	356,972
1994	12,220	13,442	341,684	375,852
1995	14,201	15,621	353,904	389,294
1996	13,334	14,667	368,105	404,916
1997	15,532	17,085	381,439	419,583
1998	15,892	17,481	396,971	436,668
1999	16,226	17,849	412,863	454,149
2000	19,242	21,166	429,089	471,998
2001	20,479	22,527	448,331	493,164
2002	0	0	468,810	515,691
2003	0	0	468,810	515,691
2004	0	0	468,810	515,691
2005	0	0	468,810	515,691
2006	0	0	468,810	515,691
2007	0	0	468,810	515,691
2008	0	0	468,810	515,691
2009	0	0	468,810	515,691
2010	0	0	468,810	515,691
2011	0	0	468,810	515,691
2012	0	0	468,810	515,691
2013	0	0	468,810	515,691
2014	0	0	468,810	515,691
2015	0	0	468,810	515,691
2016	0	0	468,810	515,691
2017	0	0	468,810	515,691
2018	0	0	468,810	515,691
2019	0	0	468,810	515,691

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2020	0	0	468,810	515,691
2021	0	0	468,810	515,691
2022	0	0	468,810	515,691
2023	0	0	468,810	515,691
2024	0	0	468,810	515,691
2025	0	0	468,810	515,691
2026	0	0	468,810	515,691
2027	0	0	468,810	515,691
2028	0	0	468,810	515,691
2029	0	0	468,810	515,691
2030	0	0	468,810	515,691
2031	0	0	468,810	515,691
2032	0	0	468,810	515,691
2033	0	0	468,810	515,691
2034	0	0	468,810	515,691
2035	0	0	468,810	515,691
2036	0	0	468,810	515,691
2037	0	0	468,810	515,691
2038	0	0	468,810	515,691
2039	0	0	468,810	515,691
2040	0	0	468,810	515,691
2041	0	0	468,810	515,691
2042	0	0	468,810	515,691
2043	0	0	468,810	515,691
2044	0	0	468,810	515,691
2045	0	0	468,810	515,691
2046	0	0	468,810	515,691
2047	0	0	468,810	515,691
2048	0	0	468,810	515,691
2049	0	0	468,810	515,691
2050	0	0	468,810	515,691
2051	0	0	468,810	515,691
2052	0	0	468,810	515,691
2053	0	0	468,810	515,691
2054	0	0	468,810	515,691
2055	0	0	468,810	515,691
2056	0	0	468,810	515,691
2057	0	0	468,810	515,691
2058	0	0	468,810	515,691
2059	0	0	468,810	515,691

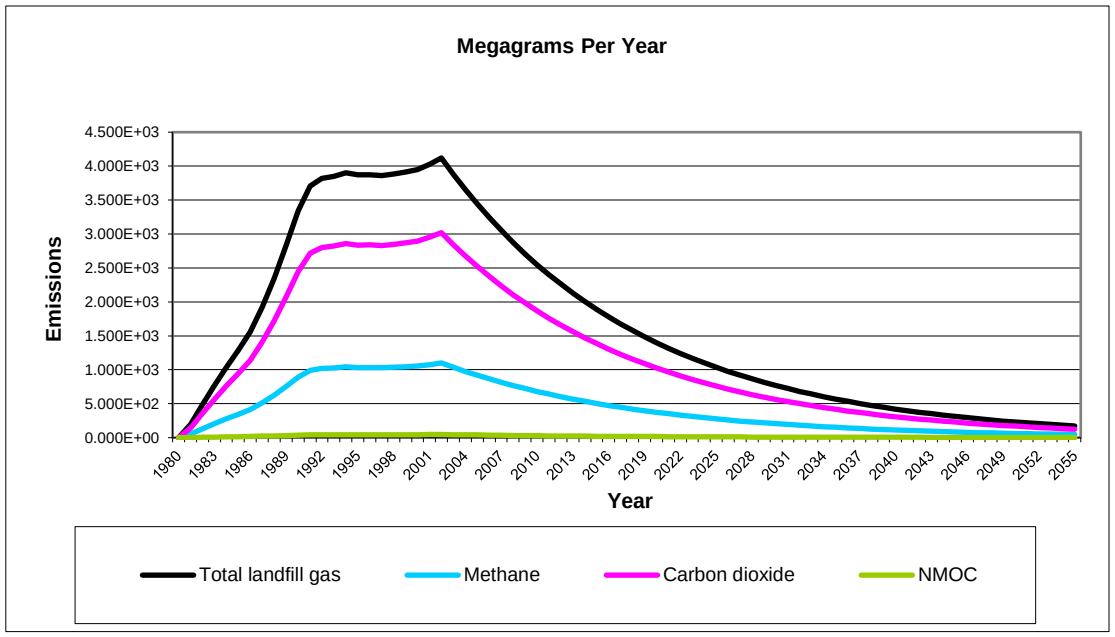
Pollutant Parameters

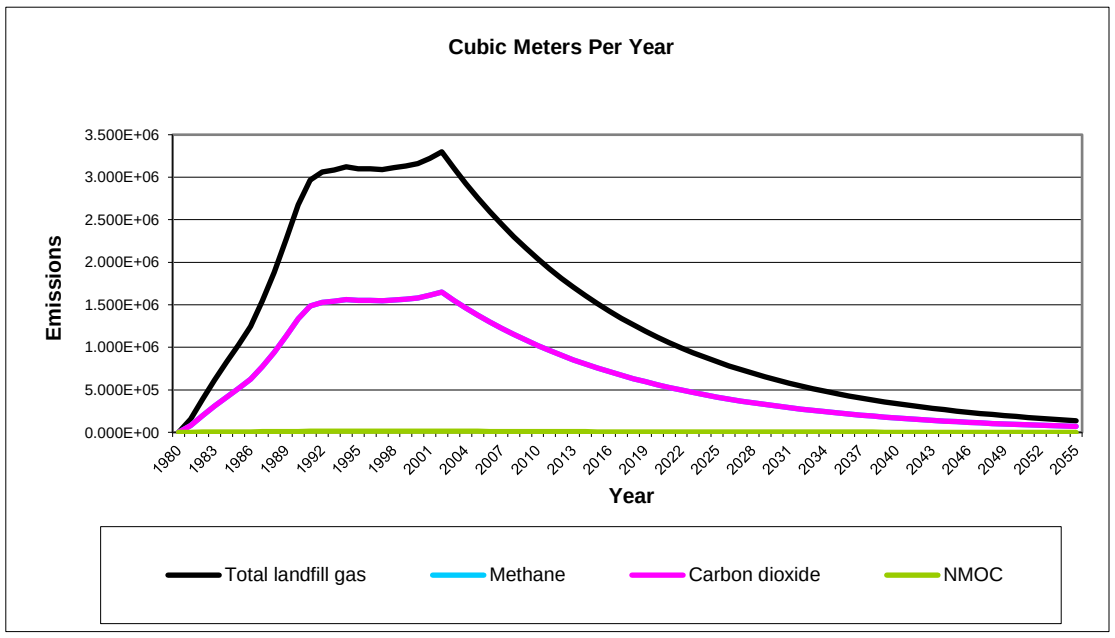
		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

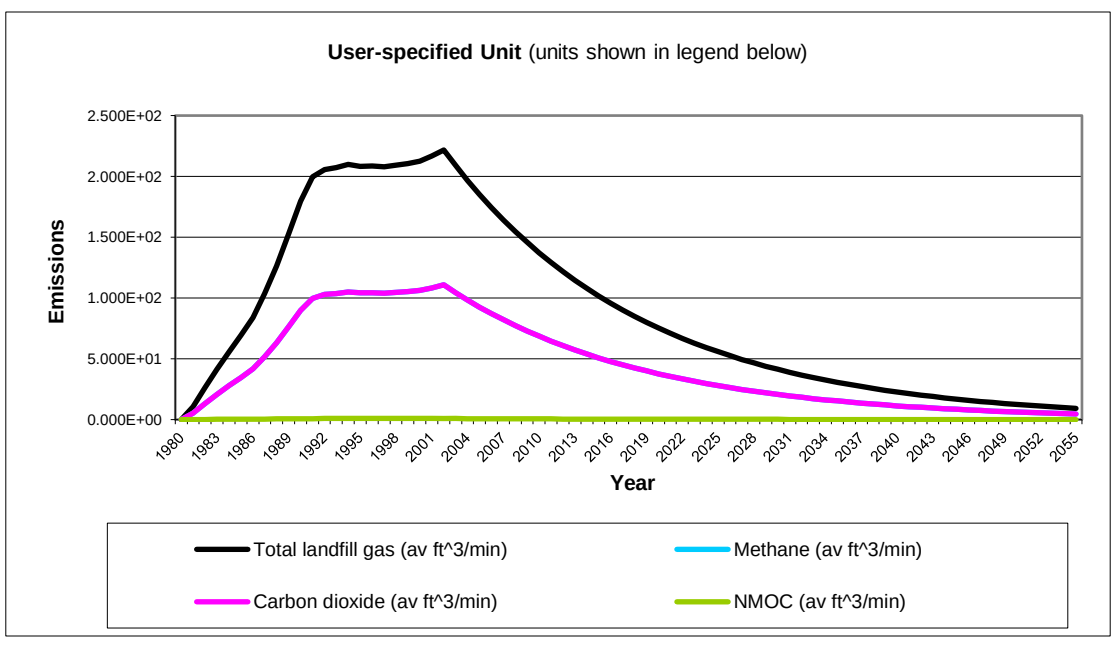
Pollutant Parameters (Continued)

	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
4.500E+03
4.000E+03
3.500E+03
3.000E+03
2.500E+03
2.000E+03
1.500E+03
1.000E+03
5.000E+02
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
3.500E+06
3.000E+06
2.500E+06
2.000E+06
1.500E+06
1.000E+06
5.000E+05
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	1.951E+02	1.562E+05	1.050E+01	5.212E+01	7.812E+04	5.249E+00
1982	4.887E+02	3.913E+05	2.629E+01	1.305E+02	1.956E+05	1.315E+01
1983	7.709E+02	6.173E+05	4.147E+01	2.059E+02	3.086E+05	2.074E+01
1984	1.035E+03	8.287E+05	5.568E+01	2.764E+02	4.144E+05	2.784E+01
1985	1.287E+03	1.030E+06	6.923E+01	3.437E+02	5.152E+05	3.462E+01
1986	1.557E+03	1.247E+06	8.377E+01	4.159E+02	6.234E+05	4.189E+01
1987	1.924E+03	1.541E+06	1.035E+02	5.140E+02	7.704E+05	5.176E+01
1988	2.347E+03	1.879E+06	1.263E+02	6.269E+02	9.396E+05	6.313E+01
1989	2.835E+03	2.270E+06	1.525E+02	7.571E+02	1.135E+06	7.625E+01
1990	3.340E+03	2.675E+06	1.797E+02	8.922E+02	1.337E+06	8.986E+01
1991	3.709E+03	2.970E+06	1.995E+02	9.906E+02	1.485E+06	9.977E+01
1992	3.822E+03	3.060E+06	2.056E+02	1.021E+03	1.530E+06	1.028E+02
1993	3.850E+03	3.083E+06	2.072E+02	1.028E+03	1.542E+06	1.036E+02
1994	3.902E+03	3.124E+06	2.099E+02	1.042E+03	1.562E+06	1.050E+02
1995	3.870E+03	3.099E+06	2.082E+02	1.034E+03	1.550E+06	1.041E+02
1996	3.873E+03	3.101E+06	2.084E+02	1.035E+03	1.551E+06	1.042E+02
1997	3.861E+03	3.092E+06	2.078E+02	1.031E+03	1.546E+06	1.039E+02
1998	3.886E+03	3.112E+06	2.091E+02	1.038E+03	1.556E+06	1.045E+02
1999	3.915E+03	3.135E+06	2.106E+02	1.046E+03	1.567E+06	1.053E+02
2000	3.947E+03	3.161E+06	2.124E+02	1.054E+03	1.580E+06	1.062E+02
2001	4.026E+03	3.224E+06	2.166E+02	1.075E+03	1.612E+06	1.083E+02
2002	4.120E+03	3.299E+06	2.217E+02	1.101E+03	1.650E+06	1.108E+02
2003	3.880E+03	3.107E+06	2.088E+02	1.036E+03	1.554E+06	1.044E+02
2004	3.654E+03	2.926E+06	1.966E+02	9.761E+02	1.463E+06	9.830E+01
2005	3.441E+03	2.756E+06	1.852E+02	9.192E+02	1.378E+06	9.258E+01
2006	3.241E+03	2.595E+06	1.744E+02	8.657E+02	1.298E+06	8.719E+01
2007	3.052E+03	2.444E+06	1.642E+02	8.153E+02	1.222E+06	8.211E+01
2008	2.874E+03	2.302E+06	1.547E+02	7.678E+02	1.151E+06	7.733E+01
2009	2.707E+03	2.168E+06	1.456E+02	7.231E+02	1.084E+06	7.282E+01
2010	2.549E+03	2.041E+06	1.372E+02	6.810E+02	1.021E+06	6.858E+01
2011	2.401E+03	1.923E+06	1.292E+02	6.413E+02	9.613E+05	6.459E+01
2012	2.261E+03	1.811E+06	1.217E+02	6.040E+02	9.053E+05	6.083E+01
2013	2.129E+03	1.705E+06	1.146E+02	5.688E+02	8.526E+05	5.729E+01
2014	2.005E+03	1.606E+06	1.079E+02	5.357E+02	8.029E+05	5.395E+01
2015	1.889E+03	1.512E+06	1.016E+02	5.045E+02	7.562E+05	5.081E+01
2016	1.779E+03	1.424E+06	9.570E+01	4.751E+02	7.121E+05	4.785E+01
2017	1.675E+03	1.341E+06	9.012E+01	4.474E+02	6.707E+05	4.506E+01
2018	1.578E+03	1.263E+06	8.488E+01	4.214E+02	6.316E+05	4.244E+01
2019	1.486E+03	1.190E+06	7.993E+01	3.968E+02	5.948E+05	3.997E+01
2020	1.399E+03	1.120E+06	7.528E+01	3.737E+02	5.602E+05	3.764E+01
2021	1.318E+03	1.055E+06	7.089E+01	3.520E+02	5.276E+05	3.545E+01
2022	1.241E+03	9.937E+05	6.677E+01	3.315E+02	4.968E+05	3.338E+01
2023	1.169E+03	9.358E+05	6.288E+01	3.122E+02	4.679E+05	3.144E+01
2024	1.101E+03	8.813E+05	5.922E+01	2.940E+02	4.407E+05	2.961E+01
2025	1.037E+03	8.300E+05	5.577E+01	2.769E+02	4.150E+05	2.788E+01
2026	9.762E+02	7.817E+05	5.252E+01	2.607E+02	3.908E+05	2.626E+01
2027	9.193E+02	7.361E+05	4.946E+01	2.456E+02	3.681E+05	2.473E+01
2028	8.658E+02	6.933E+05	4.658E+01	2.313E+02	3.466E+05	2.329E+01
2029	8.154E+02	6.529E+05	4.387E+01	2.178E+02	3.265E+05	2.193E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	7.679E+02	6.149E+05	4.131E+01	2.051E+02	3.074E+05	2.066E+01
2031	7.232E+02	5.791E+05	3.891E+01	1.932E+02	2.895E+05	1.945E+01
2032	6.810E+02	5.453E+05	3.664E+01	1.819E+02	2.727E+05	1.832E+01
2033	6.414E+02	5.136E+05	3.451E+01	1.713E+02	2.568E+05	1.725E+01
2034	6.040E+02	4.837E+05	3.250E+01	1.613E+02	2.418E+05	1.625E+01
2035	5.689E+02	4.555E+05	3.061E+01	1.519E+02	2.278E+05	1.530E+01
2036	5.357E+02	4.290E+05	2.882E+01	1.431E+02	2.145E+05	1.441E+01
2037	5.045E+02	4.040E+05	2.715E+01	1.348E+02	2.020E+05	1.357E+01
2038	4.751E+02	3.805E+05	2.556E+01	1.269E+02	1.902E+05	1.278E+01
2039	4.475E+02	3.583E+05	2.408E+01	1.195E+02	1.792E+05	1.204E+01
2040	4.214E+02	3.375E+05	2.267E+01	1.126E+02	1.687E+05	1.134E+01
2041	3.969E+02	3.178E+05	2.135E+01	1.060E+02	1.589E+05	1.068E+01
2042	3.738E+02	2.993E+05	2.011E+01	9.984E+01	1.496E+05	1.005E+01
2043	3.520E+02	2.819E+05	1.894E+01	9.402E+01	1.409E+05	9.469E+00
2044	3.315E+02	2.655E+05	1.784E+01	8.855E+01	1.327E+05	8.918E+00
2045	3.122E+02	2.500E+05	1.680E+01	8.339E+01	1.250E+05	8.398E+00
2046	2.940E+02	2.354E+05	1.582E+01	7.853E+01	1.177E+05	7.909E+00
2047	2.769E+02	2.217E+05	1.490E+01	7.396E+01	1.109E+05	7.449E+00
2048	2.608E+02	2.088E+05	1.403E+01	6.965E+01	1.044E+05	7.015E+00
2049	2.456E+02	1.967E+05	1.321E+01	6.560E+01	9.833E+04	6.606E+00
2050	2.313E+02	1.852E+05	1.244E+01	6.178E+01	9.260E+04	6.222E+00
2051	2.178E+02	1.744E+05	1.172E+01	5.818E+01	8.721E+04	5.859E+00
2052	2.051E+02	1.643E+05	1.104E+01	5.479E+01	8.213E+04	5.518E+00
2053	1.932E+02	1.547E+05	1.039E+01	5.160E+01	7.735E+04	5.197E+00
2054	1.819E+02	1.457E+05	9.788E+00	4.860E+01	7.284E+04	4.894E+00
2055	1.713E+02	1.372E+05	9.218E+00	4.577E+01	6.860E+04	4.609E+00
2056	1.614E+02	1.292E+05	8.682E+00	4.310E+01	6.460E+04	4.341E+00
2057	1.520E+02	1.217E+05	8.176E+00	4.059E+01	6.084E+04	4.088E+00
2058	1.431E+02	1.146E+05	7.700E+00	3.823E+01	5.730E+04	3.850E+00
2059	1.348E+02	1.079E+05	7.251E+00	3.600E+01	5.396E+04	3.626E+00
2060	1.269E+02	1.016E+05	6.829E+00	3.390E+01	5.082E+04	3.415E+00
2061	1.195E+02	9.572E+04	6.431E+00	3.193E+01	4.786E+04	3.216E+00
2062	1.126E+02	9.015E+04	6.057E+00	3.007E+01	4.507E+04	3.028E+00
2063	1.060E+02	8.490E+04	5.704E+00	2.832E+01	4.245E+04	2.852E+00
2064	9.985E+01	7.995E+04	5.372E+00	2.667E+01	3.998E+04	2.686E+00
2065	9.403E+01	7.530E+04	5.059E+00	2.512E+01	3.765E+04	2.530E+00
2066	8.856E+01	7.091E+04	4.765E+00	2.365E+01	3.546E+04	2.382E+00
2067	8.340E+01	6.678E+04	4.487E+00	2.228E+01	3.339E+04	2.244E+00
2068	7.854E+01	6.289E+04	4.226E+00	2.098E+01	3.145E+04	2.113E+00
2069	7.397E+01	5.923E+04	3.980E+00	1.976E+01	2.961E+04	1.990E+00
2070	6.966E+01	5.578E+04	3.748E+00	1.861E+01	2.789E+04	1.874E+00
2071	6.560E+01	5.253E+04	3.530E+00	1.752E+01	2.627E+04	1.765E+00
2072	6.178E+01	4.947E+04	3.324E+00	1.650E+01	2.474E+04	1.662E+00
2073	5.819E+01	4.659E+04	3.131E+00	1.554E+01	2.330E+04	1.565E+00
2074	5.480E+01	4.388E+04	2.948E+00	1.464E+01	2.194E+04	1.474E+00
2075	5.161E+01	4.132E+04	2.777E+00	1.378E+01	2.066E+04	1.388E+00
2076	4.860E+01	3.892E+04	2.615E+00	1.298E+01	1.946E+04	1.307E+00
2077	4.577E+01	3.665E+04	2.463E+00	1.223E+01	1.833E+04	1.231E+00
2078	4.310E+01	3.452E+04	2.319E+00	1.151E+01	1.726E+04	1.160E+00
2079	4.059E+01	3.251E+04	2.184E+00	1.084E+01	1.625E+04	1.092E+00
2080	3.823E+01	3.061E+04	2.057E+00	1.021E+01	1.531E+04	1.028E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2081	3.600E+01	2.883E+04	1.937E+00	9.617E+00	1.442E+04	9.686E-01
2082	3.391E+01	2.715E+04	1.824E+00	9.057E+00	1.358E+04	9.121E-01
2083	3.193E+01	2.557E+04	1.718E+00	8.530E+00	1.279E+04	8.590E-01
2084	3.007E+01	2.408E+04	1.618E+00	8.033E+00	1.204E+04	8.090E-01
2085	2.832E+01	2.268E+04	1.524E+00	7.565E+00	1.134E+04	7.619E-01
2086	2.667E+01	2.136E+04	1.435E+00	7.124E+00	1.068E+04	7.175E-01
2087	2.512E+01	2.011E+04	1.351E+00	6.710E+00	1.006E+04	6.757E-01
2088	2.366E+01	1.894E+04	1.273E+00	6.319E+00	9.471E+03	6.364E-01
2089	2.228E+01	1.784E+04	1.199E+00	5.951E+00	8.920E+03	5.993E-01
2090	2.098E+01	1.680E+04	1.129E+00	5.604E+00	8.400E+03	5.644E-01
2091	1.976E+01	1.582E+04	1.063E+00	5.278E+00	7.911E+03	5.316E-01
2092	1.861E+01	1.490E+04	1.001E+00	4.971E+00	7.450E+03	5.006E-01
2093	1.753E+01	1.403E+04	9.429E-01	4.681E+00	7.017E+03	4.714E-01
2094	1.650E+01	1.322E+04	8.880E-01	4.409E+00	6.608E+03	4.440E-01
2095	1.554E+01	1.245E+04	8.363E-01	4.152E+00	6.223E+03	4.181E-01
2096	1.464E+01	1.172E+04	7.876E-01	3.910E+00	5.861E+03	3.938E-01
2097	1.379E+01	1.104E+04	7.417E-01	3.682E+00	5.519E+03	3.709E-01
2098	1.298E+01	1.040E+04	6.985E-01	3.468E+00	5.198E+03	3.493E-01
2099	1.223E+01	9.791E+03	6.578E-01	3.266E+00	4.895E+03	3.289E-01
2100	1.151E+01	9.220E+03	6.195E-01	3.076E+00	4.610E+03	3.098E-01
2101	1.084E+01	8.684E+03	5.834E-01	2.897E+00	4.342E+03	2.917E-01
2102	1.021E+01	8.178E+03	5.495E-01	2.728E+00	4.089E+03	2.747E-01
2103	9.618E+00	7.702E+03	5.175E-01	2.569E+00	3.851E+03	2.587E-01
2104	9.058E+00	7.253E+03	4.873E-01	2.419E+00	3.627E+03	2.437E-01
2105	8.530E+00	6.831E+03	4.590E-01	2.279E+00	3.415E+03	2.295E-01
2106	8.034E+00	6.433E+03	4.322E-01	2.146E+00	3.216E+03	2.161E-01
2107	7.566E+00	6.058E+03	4.071E-01	2.021E+00	3.029E+03	2.035E-01
2108	7.125E+00	5.705E+03	3.834E-01	1.903E+00	2.853E+03	1.917E-01
2109	6.710E+00	5.373E+03	3.610E-01	1.792E+00	2.687E+03	1.805E-01
2110	6.319E+00	5.060E+03	3.400E-01	1.688E+00	2.530E+03	1.700E-01
2111	5.951E+00	4.766E+03	3.202E-01	1.590E+00	2.383E+03	1.601E-01
2112	5.605E+00	4.488E+03	3.016E-01	1.497E+00	2.244E+03	1.508E-01
2113	5.278E+00	4.227E+03	2.840E-01	1.410E+00	2.113E+03	1.420E-01
2114	4.971E+00	3.981E+03	2.675E-01	1.328E+00	1.990E+03	1.337E-01
2115	4.682E+00	3.749E+03	2.519E-01	1.250E+00	1.874E+03	1.259E-01
2116	4.409E+00	3.530E+03	2.372E-01	1.178E+00	1.765E+03	1.186E-01
2117	4.152E+00	3.325E+03	2.234E-01	1.109E+00	1.662E+03	1.117E-01
2118	3.910E+00	3.131E+03	2.104E-01	1.044E+00	1.566E+03	1.052E-01
2119	3.683E+00	2.949E+03	1.981E-01	9.837E-01	1.474E+03	9.907E-02
2120	3.468E+00	2.777E+03	1.866E-01	9.264E-01	1.389E+03	9.330E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	1.430E+02	7.812E+04	5.249E+00	2.240E+00	6.250E+02	4.199E-02
1982	3.581E+02	1.956E+05	1.315E+01	5.610E+00	1.565E+03	1.052E-01
1983	5.650E+02	3.086E+05	2.074E+01	8.850E+00	2.469E+03	1.659E-01
1984	7.585E+02	4.144E+05	2.784E+01	1.188E+01	3.315E+03	2.227E-01
1985	9.430E+02	5.152E+05	3.462E+01	1.477E+01	4.121E+03	2.769E-01
1986	1.141E+03	6.234E+05	4.189E+01	1.788E+01	4.987E+03	3.351E-01
1987	1.410E+03	7.704E+05	5.176E+01	2.209E+01	6.163E+03	4.141E-01
1988	1.720E+03	9.396E+05	6.313E+01	2.694E+01	7.517E+03	5.051E-01
1989	2.077E+03	1.135E+06	7.625E+01	3.254E+01	9.079E+03	6.100E-01
1990	2.448E+03	1.337E+06	8.986E+01	3.835E+01	1.070E+04	7.189E-01
1991	2.718E+03	1.485E+06	9.977E+01	4.258E+01	1.188E+04	7.982E-01
1992	2.801E+03	1.530E+06	1.028E+02	4.388E+01	1.224E+04	8.224E-01
1993	2.822E+03	1.542E+06	1.036E+02	4.421E+01	1.233E+04	8.286E-01
1994	2.859E+03	1.562E+06	1.050E+02	4.479E+01	1.250E+04	8.397E-01
1995	2.837E+03	1.550E+06	1.041E+02	4.444E+01	1.240E+04	8.330E-01
1996	2.838E+03	1.551E+06	1.042E+02	4.447E+01	1.241E+04	8.335E-01
1997	2.830E+03	1.546E+06	1.039E+02	4.433E+01	1.237E+04	8.310E-01
1998	2.848E+03	1.556E+06	1.045E+02	4.461E+01	1.245E+04	8.363E-01
1999	2.869E+03	1.567E+06	1.053E+02	4.494E+01	1.254E+04	8.424E-01
2000	2.893E+03	1.580E+06	1.062E+02	4.532E+01	1.264E+04	8.494E-01
2001	2.951E+03	1.612E+06	1.083E+02	4.622E+01	1.290E+04	8.664E-01
2002	3.020E+03	1.650E+06	1.108E+02	4.730E+01	1.320E+04	8.867E-01
2003	2.844E+03	1.554E+06	1.044E+02	4.455E+01	1.243E+04	8.350E-01
2004	2.678E+03	1.463E+06	9.830E+01	4.195E+01	1.170E+04	7.864E-01
2005	2.522E+03	1.378E+06	9.258E+01	3.951E+01	1.102E+04	7.406E-01
2006	2.375E+03	1.298E+06	8.719E+01	3.721E+01	1.038E+04	6.975E-01
2007	2.237E+03	1.222E+06	8.211E+01	3.504E+01	9.776E+03	6.569E-01
2008	2.107E+03	1.151E+06	7.733E+01	3.300E+01	9.207E+03	6.186E-01
2009	1.984E+03	1.084E+06	7.282E+01	3.108E+01	8.671E+03	5.826E-01
2010	1.868E+03	1.021E+06	6.858E+01	2.927E+01	8.166E+03	5.487E-01
2011	1.760E+03	9.613E+05	6.459E+01	2.757E+01	7.690E+03	5.167E-01
2012	1.657E+03	9.053E+05	6.083E+01	2.596E+01	7.243E+03	4.866E-01
2013	1.561E+03	8.526E+05	5.729E+01	2.445E+01	6.821E+03	4.583E-01
2014	1.470E+03	8.029E+05	5.395E+01	2.302E+01	6.424E+03	4.316E-01
2015	1.384E+03	7.562E+05	5.081E+01	2.168E+01	6.049E+03	4.065E-01
2016	1.304E+03	7.121E+05	4.785E+01	2.042E+01	5.697E+03	3.828E-01
2017	1.228E+03	6.707E+05	4.506E+01	1.923E+01	5.365E+03	3.605E-01
2018	1.156E+03	6.316E+05	4.244E+01	1.811E+01	5.053E+03	3.395E-01
2019	1.089E+03	5.948E+05	3.997E+01	1.706E+01	4.759E+03	3.197E-01
2020	1.025E+03	5.602E+05	3.764E+01	1.606E+01	4.482E+03	3.011E-01
2021	9.657E+02	5.276E+05	3.545E+01	1.513E+01	4.221E+03	2.836E-01
2022	9.095E+02	4.968E+05	3.338E+01	1.425E+01	3.975E+03	2.671E-01
2023	8.565E+02	4.679E+05	3.144E+01	1.342E+01	3.743E+03	2.515E-01
2024	8.066E+02	4.407E+05	2.961E+01	1.264E+01	3.525E+03	2.369E-01
2025	7.597E+02	4.150E+05	2.788E+01	1.190E+01	3.320E+03	2.231E-01
2026	7.154E+02	3.908E+05	2.626E+01	1.121E+01	3.127E+03	2.101E-01
2027	6.738E+02	3.681E+05	2.473E+01	1.055E+01	2.945E+03	1.978E-01
2028	6.345E+02	3.466E+05	2.329E+01	9.940E+00	2.773E+03	1.863E-01
2029	5.976E+02	3.265E+05	2.193E+01	9.361E+00	2.612E+03	1.755E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	5.628E+02	3.074E+05	2.066E+01	8.816E+00	2.460E+03	1.653E-01
2031	5.300E+02	2.895E+05	1.945E+01	8.303E+00	2.316E+03	1.556E-01
2032	4.991E+02	2.727E+05	1.832E+01	7.819E+00	2.181E+03	1.466E-01
2033	4.701E+02	2.568E+05	1.725E+01	7.364E+00	2.054E+03	1.380E-01
2034	4.427E+02	2.418E+05	1.625E+01	6.935E+00	1.935E+03	1.300E-01
2035	4.169E+02	2.278E+05	1.530E+01	6.531E+00	1.822E+03	1.224E-01
2036	3.926E+02	2.145E+05	1.441E+01	6.151E+00	1.716E+03	1.153E-01
2037	3.698E+02	2.020E+05	1.357E+01	5.793E+00	1.616E+03	1.086E-01
2038	3.482E+02	1.902E+05	1.278E+01	5.455E+00	1.522E+03	1.023E-01
2039	3.280E+02	1.792E+05	1.204E+01	5.138E+00	1.433E+03	9.630E-02
2040	3.089E+02	1.687E+05	1.134E+01	4.838E+00	1.350E+03	9.069E-02
2041	2.909E+02	1.589E+05	1.068E+01	4.557E+00	1.271E+03	8.541E-02
2042	2.739E+02	1.496E+05	1.005E+01	4.291E+00	1.197E+03	8.044E-02
2043	2.580E+02	1.409E+05	9.469E+00	4.041E+00	1.127E+03	7.575E-02
2044	2.430E+02	1.327E+05	8.918E+00	3.806E+00	1.062E+03	7.134E-02
2045	2.288E+02	1.250E+05	8.398E+00	3.584E+00	1.000E+03	6.719E-02
2046	2.155E+02	1.177E+05	7.909E+00	3.376E+00	9.417E+02	6.327E-02
2047	2.029E+02	1.109E+05	7.449E+00	3.179E+00	8.869E+02	5.959E-02
2048	1.911E+02	1.044E+05	7.015E+00	2.994E+00	8.352E+02	5.612E-02
2049	1.800E+02	9.833E+04	6.606E+00	2.820E+00	7.866E+02	5.285E-02
2050	1.695E+02	9.260E+04	6.222E+00	2.655E+00	7.408E+02	4.977E-02
2051	1.596E+02	8.721E+04	5.859E+00	2.501E+00	6.977E+02	4.688E-02
2052	1.503E+02	8.213E+04	5.518E+00	2.355E+00	6.570E+02	4.415E-02
2053	1.416E+02	7.735E+04	5.197E+00	2.218E+00	6.188E+02	4.157E-02
2054	1.333E+02	7.284E+04	4.894E+00	2.089E+00	5.827E+02	3.915E-02
2055	1.256E+02	6.860E+04	4.609E+00	1.967E+00	5.488E+02	3.687E-02
2056	1.183E+02	6.460E+04	4.341E+00	1.853E+00	5.168E+02	3.473E-02
2057	1.114E+02	6.084E+04	4.088E+00	1.745E+00	4.867E+02	3.270E-02
2058	1.049E+02	5.730E+04	3.850E+00	1.643E+00	4.584E+02	3.080E-02
2059	9.878E+01	5.396E+04	3.626E+00	1.547E+00	4.317E+02	2.901E-02
2060	9.303E+01	5.082E+04	3.415E+00	1.457E+00	4.066E+02	2.732E-02
2061	8.761E+01	4.786E+04	3.216E+00	1.372E+00	3.829E+02	2.573E-02
2062	8.251E+01	4.507E+04	3.028E+00	1.292E+00	3.606E+02	2.423E-02
2063	7.770E+01	4.245E+04	2.852E+00	1.217E+00	3.396E+02	2.282E-02
2064	7.318E+01	3.998E+04	2.686E+00	1.146E+00	3.198E+02	2.149E-02
2065	6.891E+01	3.765E+04	2.530E+00	1.080E+00	3.012E+02	2.024E-02
2066	6.490E+01	3.546E+04	2.382E+00	1.017E+00	2.836E+02	1.906E-02
2067	6.112E+01	3.339E+04	2.244E+00	9.575E-01	2.671E+02	1.795E-02
2068	5.756E+01	3.145E+04	2.113E+00	9.017E-01	2.516E+02	1.690E-02
2069	5.421E+01	2.961E+04	1.990E+00	8.492E-01	2.369E+02	1.592E-02
2070	5.105E+01	2.789E+04	1.874E+00	7.998E-01	2.231E+02	1.499E-02
2071	4.808E+01	2.627E+04	1.765E+00	7.532E-01	2.101E+02	1.412E-02
2072	4.528E+01	2.474E+04	1.662E+00	7.093E-01	1.979E+02	1.330E-02
2073	4.264E+01	2.330E+04	1.565E+00	6.680E-01	1.864E+02	1.252E-02
2074	4.016E+01	2.194E+04	1.474E+00	6.291E-01	1.755E+02	1.179E-02
2075	3.782E+01	2.066E+04	1.388E+00	5.925E-01	1.653E+02	1.111E-02
2076	3.562E+01	1.946E+04	1.307E+00	5.580E-01	1.557E+02	1.046E-02
2077	3.354E+01	1.833E+04	1.231E+00	5.255E-01	1.466E+02	9.850E-03
2078	3.159E+01	1.726E+04	1.160E+00	4.949E-01	1.381E+02	9.277E-03
2079	2.975E+01	1.625E+04	1.092E+00	4.661E-01	1.300E+02	8.736E-03
2080	2.802E+01	1.531E+04	1.028E+00	4.389E-01	1.225E+02	8.228E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	2.639E+01	1.442E+04	9.686E-01	4.134E-01	1.153E+02	7.748E-03
2082	2.485E+01	1.358E+04	9.121E-01	3.893E-01	1.086E+02	7.297E-03
2083	2.340E+01	1.279E+04	8.590E-01	3.666E-01	1.023E+02	6.872E-03
2084	2.204E+01	1.204E+04	8.090E-01	3.453E-01	9.632E+01	6.472E-03
2085	2.076E+01	1.134E+04	7.619E-01	3.252E-01	9.071E+01	6.095E-03
2086	1.955E+01	1.068E+04	7.175E-01	3.062E-01	8.543E+01	5.740E-03
2087	1.841E+01	1.006E+04	6.757E-01	2.884E-01	8.046E+01	5.406E-03
2088	1.734E+01	9.471E+03	6.364E-01	2.716E-01	7.577E+01	5.091E-03
2089	1.633E+01	8.920E+03	5.993E-01	2.558E-01	7.136E+01	4.795E-03
2090	1.538E+01	8.400E+03	5.644E-01	2.409E-01	6.720E+01	4.515E-03
2091	1.448E+01	7.911E+03	5.316E-01	2.269E-01	6.329E+01	4.252E-03
2092	1.364E+01	7.450E+03	5.006E-01	2.136E-01	5.960E+01	4.005E-03
2093	1.284E+01	7.017E+03	4.714E-01	2.012E-01	5.613E+01	3.772E-03
2094	1.210E+01	6.608E+03	4.440E-01	1.895E-01	5.286E+01	3.552E-03
2095	1.139E+01	6.223E+03	4.181E-01	1.785E-01	4.979E+01	3.345E-03
2096	1.073E+01	5.861E+03	3.938E-01	1.681E-01	4.689E+01	3.150E-03
2097	1.010E+01	5.519E+03	3.709E-01	1.583E-01	4.416E+01	2.967E-03
2098	9.515E+00	5.198E+03	3.493E-01	1.491E-01	4.158E+01	2.794E-03
2099	8.961E+00	4.895E+03	3.289E-01	1.404E-01	3.916E+01	2.631E-03
2100	8.439E+00	4.610E+03	3.098E-01	1.322E-01	3.688E+01	2.478E-03
2101	7.948E+00	4.342E+03	2.917E-01	1.245E-01	3.473E+01	2.334E-03
2102	7.485E+00	4.089E+03	2.747E-01	1.173E-01	3.271E+01	2.198E-03
2103	7.049E+00	3.851E+03	2.587E-01	1.104E-01	3.081E+01	2.070E-03
2104	6.638E+00	3.627E+03	2.437E-01	1.040E-01	2.901E+01	1.949E-03
2105	6.252E+00	3.415E+03	2.295E-01	9.794E-02	2.732E+01	1.836E-03
2106	5.888E+00	3.216E+03	2.161E-01	9.223E-02	2.573E+01	1.729E-03
2107	5.545E+00	3.029E+03	2.035E-01	8.686E-02	2.423E+01	1.628E-03
2108	5.222E+00	2.853E+03	1.917E-01	8.180E-02	2.282E+01	1.533E-03
2109	4.918E+00	2.687E+03	1.805E-01	7.704E-02	2.149E+01	1.444E-03
2110	4.631E+00	2.530E+03	1.700E-01	7.255E-02	2.024E+01	1.360E-03
2111	4.362E+00	2.383E+03	1.601E-01	6.833E-02	1.906E+01	1.281E-03
2112	4.108E+00	2.244E+03	1.508E-01	6.435E-02	1.795E+01	1.206E-03
2113	3.869E+00	2.113E+03	1.420E-01	6.060E-02	1.691E+01	1.136E-03
2114	3.643E+00	1.990E+03	1.337E-01	5.707E-02	1.592E+01	1.070E-03
2115	3.431E+00	1.874E+03	1.259E-01	5.375E-02	1.500E+01	1.008E-03
2116	3.231E+00	1.765E+03	1.186E-01	5.062E-02	1.412E+01	9.488E-04
2117	3.043E+00	1.662E+03	1.117E-01	4.767E-02	1.330E+01	8.936E-04
2118	2.866E+00	1.566E+03	1.052E-01	4.490E-02	1.252E+01	8.415E-04
2119	2.699E+00	1.474E+03	9.907E-02	4.228E-02	1.180E+01	7.925E-04
2120	2.542E+00	1.389E+03	9.330E-02	3.982E-02	1.111E+01	7.464E-04

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Wednesday, November 27, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1980**	
Landfill Closure Year (with 80-year limit)	**2001**	
Actual Closure Year (without limit)	***2001***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.040**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1980	12,159	13,375	0	0
1981	18,999	20,899	12,159	13,375
1982	19,359	21,295	31,158	34,274
1983	19,251	21,176	50,517	55,569
1984	19,449	21,394	69,768	76,745
1985	21,510	23,661	89,217	98,139
1986	28,530	31,383	110,727	121,800
1987	33,319	36,651	139,257	153,183
1988	38,909	42,800	172,576	189,834
1989	41,806	45,987	211,485	232,634
1990	35,075	38,583	253,291	278,620
1991	20,489	22,538	288,366	317,203
1992	15,665	17,232	308,855	339,741
1993	17,164	18,880	324,520	356,972
1994	12,220	13,442	341,684	375,852
1995	14,201	15,621	353,904	389,294
1996	13,334	14,667	368,105	404,916
1997	15,532	17,085	381,439	419,583
1998	15,892	17,481	396,971	436,668
1999	16,226	17,849	412,863	454,149
2000	19,242	21,166	429,089	471,998
2001	20,479	22,527	448,331	493,164
2002	0	0	468,810	515,691
2003	0	0	468,810	515,691
2004	0	0	468,810	515,691
2005	0	0	468,810	515,691
2006	0	0	468,810	515,691
2007	0	0	468,810	515,691
2008	0	0	468,810	515,691
2009	0	0	468,810	515,691
2010	0	0	468,810	515,691
2011	0	0	468,810	515,691
2012	0	0	468,810	515,691
2013	0	0	468,810	515,691
2014	0	0	468,810	515,691
2015	0	0	468,810	515,691
2016	0	0	468,810	515,691
2017	0	0	468,810	515,691
2018	0	0	468,810	515,691
2019	0	0	468,810	515,691

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2020	0	0	468,810	515,691
2021	0	0	468,810	515,691
2022	0	0	468,810	515,691
2023	0	0	468,810	515,691
2024	0	0	468,810	515,691
2025	0	0	468,810	515,691
2026	0	0	468,810	515,691
2027	0	0	468,810	515,691
2028	0	0	468,810	515,691
2029	0	0	468,810	515,691
2030	0	0	468,810	515,691
2031	0	0	468,810	515,691
2032	0	0	468,810	515,691
2033	0	0	468,810	515,691
2034	0	0	468,810	515,691
2035	0	0	468,810	515,691
2036	0	0	468,810	515,691
2037	0	0	468,810	515,691
2038	0	0	468,810	515,691
2039	0	0	468,810	515,691
2040	0	0	468,810	515,691
2041	0	0	468,810	515,691
2042	0	0	468,810	515,691
2043	0	0	468,810	515,691
2044	0	0	468,810	515,691
2045	0	0	468,810	515,691
2046	0	0	468,810	515,691
2047	0	0	468,810	515,691
2048	0	0	468,810	515,691
2049	0	0	468,810	515,691
2050	0	0	468,810	515,691
2051	0	0	468,810	515,691
2052	0	0	468,810	515,691
2053	0	0	468,810	515,691
2054	0	0	468,810	515,691
2055	0	0	468,810	515,691
2056	0	0	468,810	515,691
2057	0	0	468,810	515,691
2058	0	0	468,810	515,691
2059	0	0	468,810	515,691

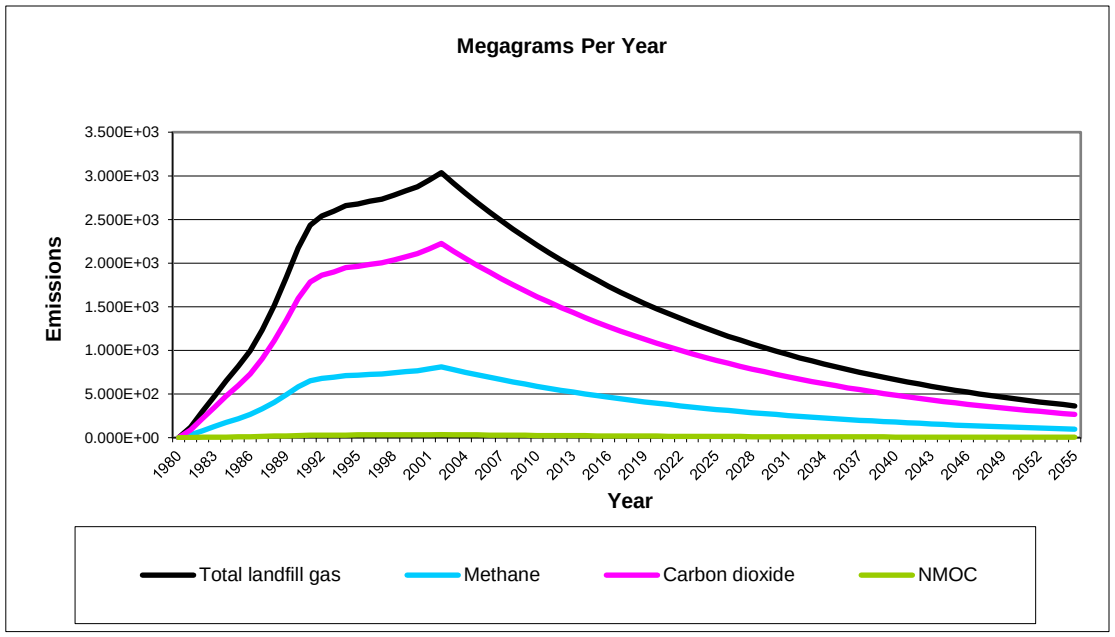
Pollutant Parameters

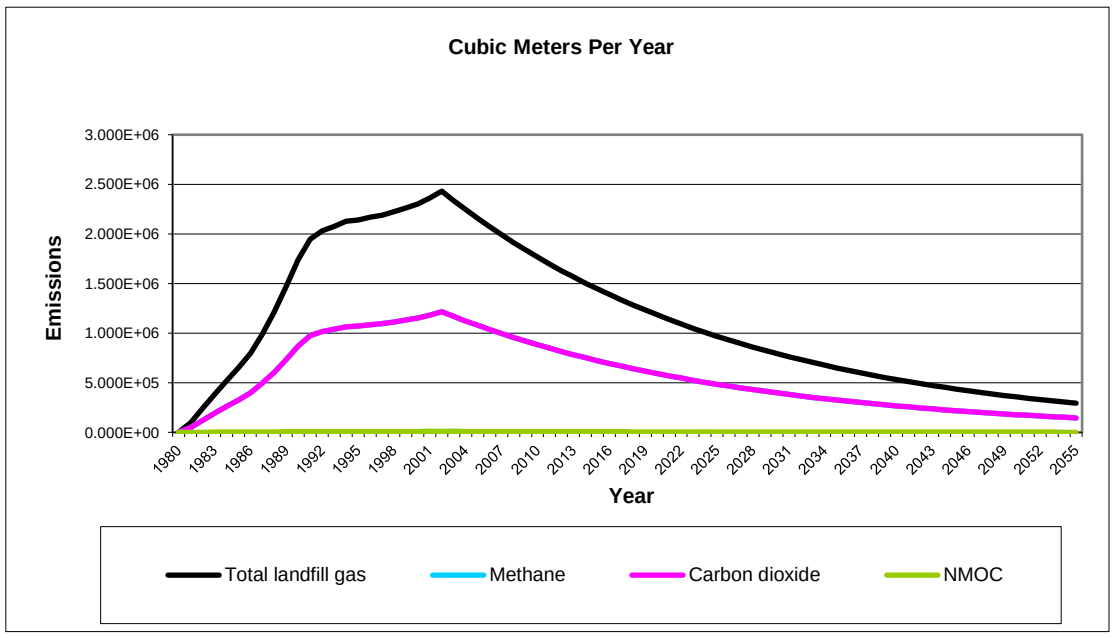
		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

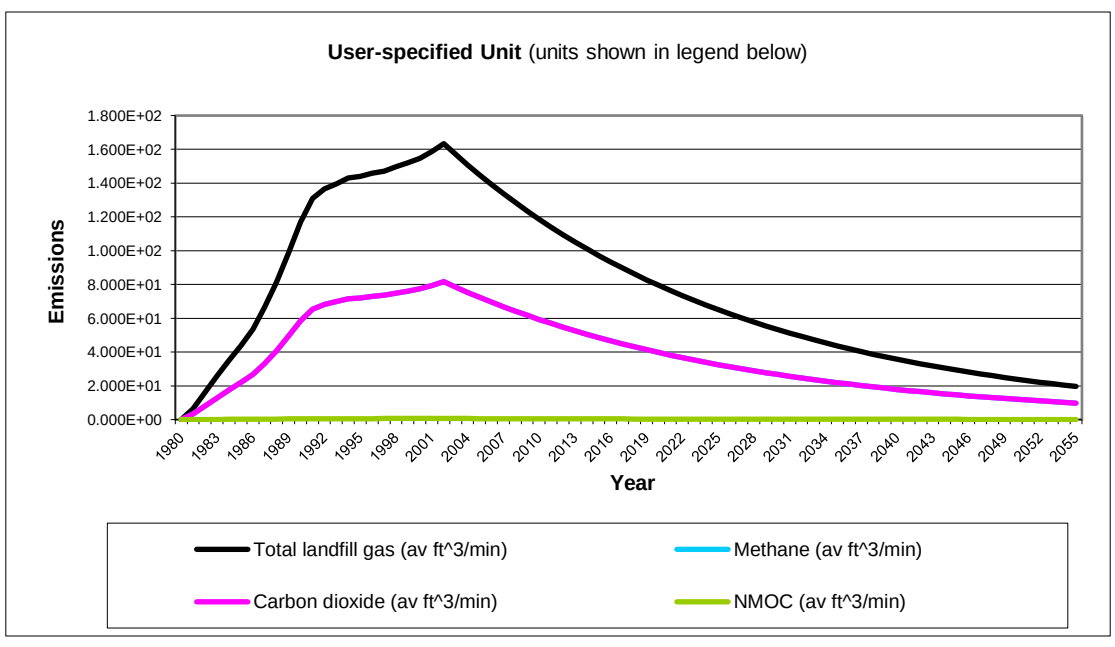
Pollutant Parameters (Continued)

	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
3.500E+03
3.000E+03
2.500E+03
2.000E+03
1.500E+03
1.000E+03
5.000E+02
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
3.000E+06
2.500E+06
2.000E+06
1.500E+06
1.000E+06
5.000E+05
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
1.800E+02
1.600E+02
1.400E+02
1.200E+02
1.000E+02
8.000E+01
6.000E+01
4.000E+01
2.000E+01
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	1.193E+02	9.554E+04	6.420E+00	3.187E+01	4.777E+04	3.210E+00
1982	3.011E+02	2.411E+05	1.620E+01	8.042E+01	1.205E+05	8.099E+00
1983	4.792E+02	3.838E+05	2.578E+01	1.280E+02	1.919E+05	1.289E+01
1984	6.494E+02	5.200E+05	3.494E+01	1.735E+02	2.600E+05	1.747E+01
1985	8.148E+02	6.524E+05	4.384E+01	2.176E+02	3.262E+05	2.192E+01
1986	9.939E+02	7.959E+05	5.347E+01	2.655E+02	3.979E+05	2.674E+01
1987	1.235E+03	9.888E+05	6.644E+01	3.298E+02	4.944E+05	3.322E+01
1988	1.513E+03	1.212E+06	8.143E+01	4.042E+02	6.059E+05	4.071E+01
1989	1.836E+03	1.470E+06	9.878E+01	4.904E+02	7.350E+05	4.939E+01
1990	2.174E+03	1.741E+06	1.170E+02	5.807E+02	8.705E+05	5.849E+01
1991	2.433E+03	1.948E+06	1.309E+02	6.499E+02	9.742E+05	6.545E+01
1992	2.539E+03	2.033E+06	1.366E+02	6.781E+02	1.016E+06	6.830E+01
1993	2.593E+03	2.076E+06	1.395E+02	6.926E+02	1.038E+06	6.975E+01
1994	2.660E+03	2.130E+06	1.431E+02	7.104E+02	1.065E+06	7.155E+01
1995	2.675E+03	2.142E+06	1.439E+02	7.146E+02	1.071E+06	7.197E+01
1996	2.710E+03	2.170E+06	1.458E+02	7.238E+02	1.085E+06	7.290E+01
1997	2.734E+03	2.190E+06	1.471E+02	7.304E+02	1.095E+06	7.356E+01
1998	2.780E+03	2.226E+06	1.495E+02	7.424E+02	1.113E+06	7.477E+01
1999	2.827E+03	2.263E+06	1.521E+02	7.550E+02	1.132E+06	7.604E+01
2000	2.875E+03	2.302E+06	1.547E+02	7.679E+02	1.151E+06	7.734E+01
2001	2.951E+03	2.363E+06	1.588E+02	7.882E+02	1.182E+06	7.939E+01
2002	3.036E+03	2.431E+06	1.634E+02	8.110E+02	1.216E+06	8.168E+01
2003	2.917E+03	2.336E+06	1.570E+02	7.792E+02	1.168E+06	7.848E+01
2004	2.803E+03	2.244E+06	1.508E+02	7.487E+02	1.122E+06	7.540E+01
2005	2.693E+03	2.156E+06	1.449E+02	7.193E+02	1.078E+06	7.244E+01
2006	2.587E+03	2.072E+06	1.392E+02	6.911E+02	1.036E+06	6.960E+01
2007	2.486E+03	1.991E+06	1.337E+02	6.640E+02	9.953E+05	6.687E+01
2008	2.388E+03	1.913E+06	1.285E+02	6.380E+02	9.563E+05	6.425E+01
2009	2.295E+03	1.838E+06	1.235E+02	6.130E+02	9.188E+05	6.173E+01
2010	2.205E+03	1.765E+06	1.186E+02	5.889E+02	8.827E+05	5.931E+01
2011	2.118E+03	1.696E+06	1.140E+02	5.658E+02	8.481E+05	5.699E+01
2012	2.035E+03	1.630E+06	1.095E+02	5.436E+02	8.149E+05	5.475E+01
2013	1.955E+03	1.566E+06	1.052E+02	5.223E+02	7.829E+05	5.260E+01
2014	1.879E+03	1.504E+06	1.011E+02	5.018E+02	7.522E+05	5.054E+01
2015	1.805E+03	1.445E+06	9.712E+01	4.822E+02	7.227E+05	4.856E+01
2016	1.734E+03	1.389E+06	9.331E+01	4.633E+02	6.944E+05	4.666E+01
2017	1.666E+03	1.334E+06	8.965E+01	4.451E+02	6.672E+05	4.483E+01
2018	1.601E+03	1.282E+06	8.614E+01	4.276E+02	6.410E+05	4.307E+01
2019	1.538E+03	1.232E+06	8.276E+01	4.109E+02	6.159E+05	4.138E+01
2020	1.478E+03	1.183E+06	7.952E+01	3.948E+02	5.917E+05	3.976E+01
2021	1.420E+03	1.137E+06	7.640E+01	3.793E+02	5.685E+05	3.820E+01
2022	1.364E+03	1.092E+06	7.340E+01	3.644E+02	5.462E+05	3.670E+01
2023	1.311E+03	1.050E+06	7.052E+01	3.501E+02	5.248E+05	3.526E+01
2024	1.259E+03	1.008E+06	6.776E+01	3.364E+02	5.042E+05	3.388E+01
2025	1.210E+03	9.689E+05	6.510E+01	3.232E+02	4.845E+05	3.255E+01
2026	1.163E+03	9.309E+05	6.255E+01	3.105E+02	4.655E+05	3.127E+01
2027	1.117E+03	8.944E+05	6.010E+01	2.984E+02	4.472E+05	3.005E+01
2028	1.073E+03	8.594E+05	5.774E+01	2.867E+02	4.297E+05	2.887E+01
2029	1.031E+03	8.257E+05	5.548E+01	2.754E+02	4.128E+05	2.774E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	9.907E+02	7.933E+05	5.330E+01	2.646E+02	3.966E+05	2.665E+01
2031	9.518E+02	7.622E+05	5.121E+01	2.542E+02	3.811E+05	2.561E+01
2032	9.145E+02	7.323E+05	4.920E+01	2.443E+02	3.661E+05	2.460E+01
2033	8.786E+02	7.036E+05	4.727E+01	2.347E+02	3.518E+05	2.364E+01
2034	8.442E+02	6.760E+05	4.542E+01	2.255E+02	3.380E+05	2.271E+01
2035	8.111E+02	6.495E+05	4.364E+01	2.167E+02	3.247E+05	2.182E+01
2036	7.793E+02	6.240E+05	4.193E+01	2.082E+02	3.120E+05	2.096E+01
2037	7.487E+02	5.996E+05	4.028E+01	2.000E+02	2.998E+05	2.014E+01
2038	7.194E+02	5.760E+05	3.870E+01	1.922E+02	2.880E+05	1.935E+01
2039	6.912E+02	5.535E+05	3.719E+01	1.846E+02	2.767E+05	1.859E+01
2040	6.641E+02	5.318E+05	3.573E+01	1.774E+02	2.659E+05	1.786E+01
2041	6.380E+02	5.109E+05	3.433E+01	1.704E+02	2.555E+05	1.716E+01
2042	6.130E+02	4.909E+05	3.298E+01	1.637E+02	2.454E+05	1.649E+01
2043	5.890E+02	4.716E+05	3.169E+01	1.573E+02	2.358E+05	1.584E+01
2044	5.659E+02	4.531E+05	3.045E+01	1.512E+02	2.266E+05	1.522E+01
2045	5.437E+02	4.354E+05	2.925E+01	1.452E+02	2.177E+05	1.463E+01
2046	5.224E+02	4.183E+05	2.810E+01	1.395E+02	2.091E+05	1.405E+01
2047	5.019E+02	4.019E+05	2.700E+01	1.341E+02	2.009E+05	1.350E+01
2048	4.822E+02	3.861E+05	2.594E+01	1.288E+02	1.931E+05	1.297E+01
2049	4.633E+02	3.710E+05	2.493E+01	1.238E+02	1.855E+05	1.246E+01
2050	4.451E+02	3.564E+05	2.395E+01	1.189E+02	1.782E+05	1.197E+01
2051	4.277E+02	3.425E+05	2.301E+01	1.142E+02	1.712E+05	1.151E+01
2052	4.109E+02	3.290E+05	2.211E+01	1.098E+02	1.645E+05	1.105E+01
2053	3.948E+02	3.161E+05	2.124E+01	1.055E+02	1.581E+05	1.062E+01
2054	3.793E+02	3.037E+05	2.041E+01	1.013E+02	1.519E+05	1.020E+01
2055	3.644E+02	2.918E+05	1.961E+01	9.735E+01	1.459E+05	9.804E+00
2056	3.502E+02	2.804E+05	1.884E+01	9.353E+01	1.402E+05	9.420E+00
2057	3.364E+02	2.694E+05	1.810E+01	8.986E+01	1.347E+05	9.050E+00
2058	3.232E+02	2.588E+05	1.739E+01	8.634E+01	1.294E+05	8.695E+00
2059	3.106E+02	2.487E+05	1.671E+01	8.295E+01	1.243E+05	8.354E+00
2060	2.984E+02	2.389E+05	1.605E+01	7.970E+01	1.195E+05	8.027E+00
2061	2.867E+02	2.296E+05	1.542E+01	7.658E+01	1.148E+05	7.712E+00
2062	2.754E+02	2.206E+05	1.482E+01	7.357E+01	1.103E+05	7.410E+00
2063	2.646E+02	2.119E+05	1.424E+01	7.069E+01	1.060E+05	7.119E+00
2064	2.543E+02	2.036E+05	1.368E+01	6.792E+01	1.018E+05	6.840E+00
2065	2.443E+02	1.956E+05	1.314E+01	6.525E+01	9.781E+04	6.572E+00
2066	2.347E+02	1.880E+05	1.263E+01	6.270E+01	9.398E+04	6.314E+00
2067	2.255E+02	1.806E+05	1.213E+01	6.024E+01	9.029E+04	6.067E+00
2068	2.167E+02	1.735E+05	1.166E+01	5.788E+01	8.675E+04	5.829E+00
2069	2.082E+02	1.667E+05	1.120E+01	5.561E+01	8.335E+04	5.600E+00
2070	2.000E+02	1.602E+05	1.076E+01	5.343E+01	8.008E+04	5.381E+00
2071	1.922E+02	1.539E+05	1.034E+01	5.133E+01	7.694E+04	5.170E+00
2072	1.846E+02	1.478E+05	9.934E+00	4.932E+01	7.392E+04	4.967E+00
2073	1.774E+02	1.421E+05	9.544E+00	4.738E+01	7.103E+04	4.772E+00
2074	1.704E+02	1.365E+05	9.170E+00	4.553E+01	6.824E+04	4.585E+00
2075	1.638E+02	1.311E+05	8.811E+00	4.374E+01	6.556E+04	4.405E+00
2076	1.573E+02	1.260E+05	8.465E+00	4.203E+01	6.299E+04	4.233E+00
2077	1.512E+02	1.210E+05	8.133E+00	4.038E+01	6.052E+04	4.067E+00
2078	1.452E+02	1.163E+05	7.814E+00	3.879E+01	5.815E+04	3.907E+00
2079	1.395E+02	1.117E+05	7.508E+00	3.727E+01	5.587E+04	3.754E+00
2080	1.341E+02	1.074E+05	7.213E+00	3.581E+01	5.368E+04	3.607E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2081	1.288E+02	1.031E+05	6.931E+00	3.441E+01	5.157E+04	3.465E+00
2082	1.238E+02	9.910E+04	6.659E+00	3.306E+01	4.955E+04	3.329E+00
2083	1.189E+02	9.522E+04	6.398E+00	3.176E+01	4.761E+04	3.199E+00
2084	1.142E+02	9.149E+04	6.147E+00	3.052E+01	4.574E+04	3.073E+00
2085	1.098E+02	8.790E+04	5.906E+00	2.932E+01	4.395E+04	2.953E+00
2086	1.055E+02	8.445E+04	5.674E+00	2.817E+01	4.223E+04	2.837E+00
2087	1.013E+02	8.114E+04	5.452E+00	2.707E+01	4.057E+04	2.726E+00
2088	9.736E+01	7.796E+04	5.238E+00	2.601E+01	3.898E+04	2.619E+00
2089	9.354E+01	7.490E+04	5.033E+00	2.499E+01	3.745E+04	2.516E+00
2090	8.987E+01	7.196E+04	4.835E+00	2.401E+01	3.598E+04	2.418E+00
2091	8.635E+01	6.914E+04	4.646E+00	2.306E+01	3.457E+04	2.323E+00
2092	8.296E+01	6.643E+04	4.464E+00	2.216E+01	3.322E+04	2.232E+00
2093	7.971E+01	6.383E+04	4.289E+00	2.129E+01	3.191E+04	2.144E+00
2094	7.658E+01	6.132E+04	4.120E+00	2.046E+01	3.066E+04	2.060E+00
2095	7.358E+01	5.892E+04	3.959E+00	1.965E+01	2.946E+04	1.979E+00
2096	7.070E+01	5.661E+04	3.804E+00	1.888E+01	2.830E+04	1.902E+00
2097	6.792E+01	5.439E+04	3.654E+00	1.814E+01	2.719E+04	1.827E+00
2098	6.526E+01	5.226E+04	3.511E+00	1.743E+01	2.613E+04	1.756E+00
2099	6.270E+01	5.021E+04	3.373E+00	1.675E+01	2.510E+04	1.687E+00
2100	6.024E+01	4.824E+04	3.241E+00	1.609E+01	2.412E+04	1.621E+00
2101	5.788E+01	4.635E+04	3.114E+00	1.546E+01	2.317E+04	1.557E+00
2102	5.561E+01	4.453E+04	2.992E+00	1.485E+01	2.227E+04	1.496E+00
2103	5.343E+01	4.278E+04	2.875E+00	1.427E+01	2.139E+04	1.437E+00
2104	5.134E+01	4.111E+04	2.762E+00	1.371E+01	2.055E+04	1.381E+00
2105	4.932E+01	3.950E+04	2.654E+00	1.317E+01	1.975E+04	1.327E+00
2106	4.739E+01	3.795E+04	2.550E+00	1.266E+01	1.897E+04	1.275E+00
2107	4.553E+01	3.646E+04	2.450E+00	1.216E+01	1.823E+04	1.225E+00
2108	4.375E+01	3.503E+04	2.354E+00	1.168E+01	1.751E+04	1.177E+00
2109	4.203E+01	3.366E+04	2.261E+00	1.123E+01	1.683E+04	1.131E+00
2110	4.038E+01	3.234E+04	2.173E+00	1.079E+01	1.617E+04	1.086E+00
2111	3.880E+01	3.107E+04	2.087E+00	1.036E+01	1.553E+04	1.044E+00
2112	3.728E+01	2.985E+04	2.006E+00	9.957E+00	1.492E+04	1.003E+00
2113	3.582E+01	2.868E+04	1.927E+00	9.567E+00	1.434E+04	9.635E-01
2114	3.441E+01	2.755E+04	1.851E+00	9.192E+00	1.378E+04	9.257E-01
2115	3.306E+01	2.647E+04	1.779E+00	8.831E+00	1.324E+04	8.894E-01
2116	3.177E+01	2.544E+04	1.709E+00	8.485E+00	1.272E+04	8.545E-01
2117	3.052E+01	2.444E+04	1.642E+00	8.152E+00	1.222E+04	8.210E-01
2118	2.932E+01	2.348E+04	1.578E+00	7.833E+00	1.174E+04	7.888E-01
2119	2.817E+01	2.256E+04	1.516E+00	7.525E+00	1.128E+04	7.579E-01
2120	2.707E+01	2.168E+04	1.456E+00	7.230E+00	1.084E+04	7.282E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	8.745E+01	4.777E+04	3.210E+00	1.370E+00	3.822E+02	2.568E-02
1982	2.207E+02	1.205E+05	8.099E+00	3.457E+00	9.643E+02	6.479E-02
1983	3.512E+02	1.919E+05	1.289E+01	5.502E+00	1.535E+03	1.031E-01
1984	4.759E+02	2.600E+05	1.747E+01	7.455E+00	2.080E+03	1.397E-01
1985	5.971E+02	3.262E+05	2.192E+01	9.354E+00	2.610E+03	1.753E-01
1986	7.284E+02	3.979E+05	2.674E+01	1.141E+01	3.183E+03	2.139E-01
1987	9.050E+02	4.944E+05	3.322E+01	1.418E+01	3.955E+03	2.658E-01
1988	1.109E+03	6.059E+05	4.071E+01	1.738E+01	4.847E+03	3.257E-01
1989	1.346E+03	7.350E+05	4.939E+01	2.108E+01	5.880E+03	3.951E-01
1990	1.593E+03	8.705E+05	5.849E+01	2.496E+01	6.964E+03	4.679E-01
1991	1.783E+03	9.742E+05	6.545E+01	2.793E+01	7.793E+03	5.236E-01
1992	1.861E+03	1.016E+06	6.830E+01	2.915E+01	8.132E+03	5.464E-01
1993	1.900E+03	1.038E+06	6.975E+01	2.977E+01	8.305E+03	5.580E-01
1994	1.949E+03	1.065E+06	7.155E+01	3.054E+01	8.519E+03	5.724E-01
1995	1.961E+03	1.071E+06	7.197E+01	3.072E+01	8.569E+03	5.758E-01
1996	1.986E+03	1.085E+06	7.290E+01	3.111E+01	8.679E+03	5.832E-01
1997	2.004E+03	1.095E+06	7.356E+01	3.139E+01	8.758E+03	5.885E-01
1998	2.037E+03	1.113E+06	7.477E+01	3.191E+01	8.903E+03	5.982E-01
1999	2.072E+03	1.132E+06	7.604E+01	3.245E+01	9.053E+03	6.083E-01
2000	2.107E+03	1.151E+06	7.734E+01	3.301E+01	9.208E+03	6.187E-01
2001	2.163E+03	1.182E+06	7.939E+01	3.388E+01	9.452E+03	6.351E-01
2002	2.225E+03	1.216E+06	8.168E+01	3.486E+01	9.725E+03	6.534E-01
2003	2.138E+03	1.168E+06	7.848E+01	3.349E+01	9.344E+03	6.278E-01
2004	2.054E+03	1.122E+06	7.540E+01	3.218E+01	8.977E+03	6.032E-01
2005	1.974E+03	1.078E+06	7.244E+01	3.092E+01	8.625E+03	5.795E-01
2006	1.896E+03	1.036E+06	6.960E+01	2.971E+01	8.287E+03	5.568E-01
2007	1.822E+03	9.953E+05	6.687E+01	2.854E+01	7.962E+03	5.350E-01
2008	1.750E+03	9.563E+05	6.425E+01	2.742E+01	7.650E+03	5.140E-01
2009	1.682E+03	9.188E+05	6.173E+01	2.635E+01	7.350E+03	4.939E-01
2010	1.616E+03	8.827E+05	5.931E+01	2.531E+01	7.062E+03	4.745E-01
2011	1.552E+03	8.481E+05	5.699E+01	2.432E+01	6.785E+03	4.559E-01
2012	1.492E+03	8.149E+05	5.475E+01	2.337E+01	6.519E+03	4.380E-01
2013	1.433E+03	7.829E+05	5.260E+01	2.245E+01	6.263E+03	4.208E-01
2014	1.377E+03	7.522E+05	5.054E+01	2.157E+01	6.018E+03	4.043E-01
2015	1.323E+03	7.227E+05	4.856E+01	2.072E+01	5.782E+03	3.885E-01
2016	1.271E+03	6.944E+05	4.666E+01	1.991E+01	5.555E+03	3.732E-01
2017	1.221E+03	6.672E+05	4.483E+01	1.913E+01	5.337E+03	3.586E-01
2018	1.173E+03	6.410E+05	4.307E+01	1.838E+01	5.128E+03	3.446E-01
2019	1.127E+03	6.159E+05	4.138E+01	1.766E+01	4.927E+03	3.310E-01
2020	1.083E+03	5.917E+05	3.976E+01	1.697E+01	4.734E+03	3.181E-01
2021	1.041E+03	5.685E+05	3.820E+01	1.630E+01	4.548E+03	3.056E-01
2022	9.999E+02	5.462E+05	3.670E+01	1.566E+01	4.370E+03	2.936E-01
2023	9.607E+02	5.248E+05	3.526E+01	1.505E+01	4.198E+03	2.821E-01
2024	9.230E+02	5.042E+05	3.388E+01	1.446E+01	4.034E+03	2.710E-01
2025	8.868E+02	4.845E+05	3.255E+01	1.389E+01	3.876E+03	2.604E-01
2026	8.520E+02	4.655E+05	3.127E+01	1.335E+01	3.724E+03	2.502E-01
2027	8.186E+02	4.472E+05	3.005E+01	1.282E+01	3.578E+03	2.404E-01
2028	7.865E+02	4.297E+05	2.887E+01	1.232E+01	3.437E+03	2.310E-01
2029	7.557E+02	4.128E+05	2.774E+01	1.184E+01	3.303E+03	2.219E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	7.261E+02	3.966E+05	2.665E+01	1.137E+01	3.173E+03	2.132E-01
2031	6.976E+02	3.811E+05	2.561E+01	1.093E+01	3.049E+03	2.048E-01
2032	6.702E+02	3.661E+05	2.460E+01	1.050E+01	2.929E+03	1.968E-01
2033	6.439E+02	3.518E+05	2.364E+01	1.009E+01	2.814E+03	1.891E-01
2034	6.187E+02	3.380E+05	2.271E+01	9.692E+00	2.704E+03	1.817E-01
2035	5.944E+02	3.247E+05	2.182E+01	9.312E+00	2.598E+03	1.746E-01
2036	5.711E+02	3.120E+05	2.096E+01	8.947E+00	2.496E+03	1.677E-01
2037	5.487E+02	2.998E+05	2.014E+01	8.596E+00	2.398E+03	1.611E-01
2038	5.272E+02	2.880E+05	1.935E+01	8.259E+00	2.304E+03	1.548E-01
2039	5.065E+02	2.767E+05	1.859E+01	7.935E+00	2.214E+03	1.487E-01
2040	4.867E+02	2.659E+05	1.786E+01	7.624E+00	2.127E+03	1.429E-01
2041	4.676E+02	2.555E+05	1.716E+01	7.325E+00	2.044E+03	1.373E-01
2042	4.493E+02	2.454E+05	1.649E+01	7.038E+00	1.963E+03	1.319E-01
2043	4.317E+02	2.358E+05	1.584E+01	6.762E+00	1.886E+03	1.268E-01
2044	4.147E+02	2.266E+05	1.522E+01	6.497E+00	1.813E+03	1.218E-01
2045	3.985E+02	2.177E+05	1.463E+01	6.242E+00	1.741E+03	1.170E-01
2046	3.828E+02	2.091E+05	1.405E+01	5.997E+00	1.673E+03	1.124E-01
2047	3.678E+02	2.009E+05	1.350E+01	5.762E+00	1.608E+03	1.080E-01
2048	3.534E+02	1.931E+05	1.297E+01	5.536E+00	1.545E+03	1.038E-01
2049	3.395E+02	1.855E+05	1.246E+01	5.319E+00	1.484E+03	9.971E-02
2050	3.262E+02	1.782E+05	1.197E+01	5.111E+00	1.426E+03	9.580E-02
2051	3.134E+02	1.712E+05	1.151E+01	4.910E+00	1.370E+03	9.204E-02
2052	3.012E+02	1.645E+05	1.105E+01	4.718E+00	1.316E+03	8.843E-02
2053	2.893E+02	1.581E+05	1.062E+01	4.533E+00	1.265E+03	8.497E-02
2054	2.780E+02	1.519E+05	1.020E+01	4.355E+00	1.215E+03	8.163E-02
2055	2.671E+02	1.459E+05	9.804E+00	4.184E+00	1.167E+03	7.843E-02
2056	2.566E+02	1.402E+05	9.420E+00	4.020E+00	1.122E+03	7.536E-02
2057	2.466E+02	1.347E+05	9.050E+00	3.863E+00	1.078E+03	7.240E-02
2058	2.369E+02	1.294E+05	8.695E+00	3.711E+00	1.035E+03	6.956E-02
2059	2.276E+02	1.243E+05	8.354E+00	3.566E+00	9.947E+02	6.684E-02
2060	2.187E+02	1.195E+05	8.027E+00	3.426E+00	9.557E+02	6.422E-02
2061	2.101E+02	1.148E+05	7.712E+00	3.291E+00	9.183E+02	6.170E-02
2062	2.019E+02	1.103E+05	7.410E+00	3.162E+00	8.822E+02	5.928E-02
2063	1.940E+02	1.060E+05	7.119E+00	3.038E+00	8.477E+02	5.695E-02
2064	1.863E+02	1.018E+05	6.840E+00	2.919E+00	8.144E+02	5.472E-02
2065	1.790E+02	9.781E+04	6.572E+00	2.805E+00	7.825E+02	5.258E-02
2066	1.720E+02	9.398E+04	6.314E+00	2.695E+00	7.518E+02	5.051E-02
2067	1.653E+02	9.029E+04	6.067E+00	2.589E+00	7.223E+02	4.853E-02
2068	1.588E+02	8.675E+04	5.829E+00	2.488E+00	6.940E+02	4.663E-02
2069	1.526E+02	8.335E+04	5.600E+00	2.390E+00	6.668E+02	4.480E-02
2070	1.466E+02	8.008E+04	5.381E+00	2.296E+00	6.406E+02	4.304E-02
2071	1.408E+02	7.694E+04	5.170E+00	2.206E+00	6.155E+02	4.136E-02
2072	1.353E+02	7.392E+04	4.967E+00	2.120E+00	5.914E+02	3.974E-02
2073	1.300E+02	7.103E+04	4.772E+00	2.037E+00	5.682E+02	3.818E-02
2074	1.249E+02	6.824E+04	4.585E+00	1.957E+00	5.459E+02	3.668E-02
2075	1.200E+02	6.556E+04	4.405E+00	1.880E+00	5.245E+02	3.524E-02
2076	1.153E+02	6.299E+04	4.233E+00	1.806E+00	5.039E+02	3.386E-02
2077	1.108E+02	6.052E+04	4.067E+00	1.736E+00	4.842E+02	3.253E-02
2078	1.064E+02	5.815E+04	3.907E+00	1.668E+00	4.652E+02	3.126E-02
2079	1.023E+02	5.587E+04	3.754E+00	1.602E+00	4.470E+02	3.003E-02
2080	9.826E+01	5.368E+04	3.607E+00	1.539E+00	4.294E+02	2.885E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	9.441E+01	5.157E+04	3.465E+00	1.479E+00	4.126E+02	2.772E-02
2082	9.071E+01	4.955E+04	3.329E+00	1.421E+00	3.964E+02	2.664E-02
2083	8.715E+01	4.761E+04	3.199E+00	1.365E+00	3.809E+02	2.559E-02
2084	8.373E+01	4.574E+04	3.073E+00	1.312E+00	3.659E+02	2.459E-02
2085	8.045E+01	4.395E+04	2.953E+00	1.260E+00	3.516E+02	2.362E-02
2086	7.729E+01	4.223E+04	2.837E+00	1.211E+00	3.378E+02	2.270E-02
2087	7.426E+01	4.057E+04	2.726E+00	1.163E+00	3.246E+02	2.181E-02
2088	7.135E+01	3.898E+04	2.619E+00	1.118E+00	3.118E+02	2.095E-02
2089	6.855E+01	3.745E+04	2.516E+00	1.074E+00	2.996E+02	2.013E-02
2090	6.587E+01	3.598E+04	2.418E+00	1.032E+00	2.879E+02	1.934E-02
2091	6.328E+01	3.457E+04	2.323E+00	9.914E-01	2.766E+02	1.858E-02
2092	6.080E+01	3.322E+04	2.232E+00	9.525E-01	2.657E+02	1.785E-02
2093	5.842E+01	3.191E+04	2.144E+00	9.151E-01	2.553E+02	1.715E-02
2094	5.613E+01	3.066E+04	2.060E+00	8.793E-01	2.453E+02	1.648E-02
2095	5.393E+01	2.946E+04	1.979E+00	8.448E-01	2.357E+02	1.584E-02
2096	5.181E+01	2.830E+04	1.902E+00	8.117E-01	2.264E+02	1.521E-02
2097	4.978E+01	2.719E+04	1.827E+00	7.798E-01	2.176E+02	1.462E-02
2098	4.783E+01	2.613E+04	1.756E+00	7.493E-01	2.090E+02	1.404E-02
2099	4.595E+01	2.510E+04	1.687E+00	7.199E-01	2.008E+02	1.349E-02
2100	4.415E+01	2.412E+04	1.621E+00	6.917E-01	1.930E+02	1.296E-02
2101	4.242E+01	2.317E+04	1.557E+00	6.645E-01	1.854E+02	1.246E-02
2102	4.076E+01	2.227E+04	1.496E+00	6.385E-01	1.781E+02	1.197E-02
2103	3.916E+01	2.139E+04	1.437E+00	6.134E-01	1.711E+02	1.150E-02
2104	3.762E+01	2.055E+04	1.381E+00	5.894E-01	1.644E+02	1.105E-02
2105	3.615E+01	1.975E+04	1.327E+00	5.663E-01	1.580E+02	1.061E-02
2106	3.473E+01	1.897E+04	1.275E+00	5.441E-01	1.518E+02	1.020E-02
2107	3.337E+01	1.823E+04	1.225E+00	5.227E-01	1.458E+02	9.799E-03
2108	3.206E+01	1.751E+04	1.177E+00	5.022E-01	1.401E+02	9.414E-03
2109	3.080E+01	1.683E+04	1.131E+00	4.825E-01	1.346E+02	9.045E-03
2110	2.960E+01	1.617E+04	1.086E+00	4.636E-01	1.293E+02	8.691E-03
2111	2.844E+01	1.553E+04	1.044E+00	4.454E-01	1.243E+02	8.350E-03
2112	2.732E+01	1.492E+04	1.003E+00	4.280E-01	1.194E+02	8.022E-03
2113	2.625E+01	1.434E+04	9.635E-01	4.112E-01	1.147E+02	7.708E-03
2114	2.522E+01	1.378E+04	9.257E-01	3.951E-01	1.102E+02	7.406E-03
2115	2.423E+01	1.324E+04	8.894E-01	3.796E-01	1.059E+02	7.115E-03
2116	2.328E+01	1.272E+04	8.545E-01	3.647E-01	1.017E+02	6.836E-03
2117	2.237E+01	1.222E+04	8.210E-01	3.504E-01	9.776E+01	6.568E-03
2118	2.149E+01	1.174E+04	7.888E-01	3.367E-01	9.392E+01	6.311E-03
2119	2.065E+01	1.128E+04	7.579E-01	3.235E-01	9.024E+01	6.063E-03
2120	1.984E+01	1.084E+04	7.282E-01	3.108E-01	8.670E+01	5.825E-03

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Wednesday, November 27, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1980**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.096**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**127**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1980	12,159	13,375	0	0
1981	18,999	20,899	12,159	13,375
1982	19,359	21,295	31,158	34,274
1983	19,251	21,176	50,517	55,569
1984	19,449	21,394	69,768	76,745
1985	21,510	23,661	89,217	98,139
1986	28,530	31,383	110,727	121,800
1987	33,319	36,651	139,257	153,183
1988	38,909	42,800	172,576	189,834
1989	41,806	45,987	211,485	232,634
1990	35,075	38,583	253,291	278,620
1991	20,489	22,538	288,366	317,203
1992	15,665	17,232	308,855	339,741
1993	17,164	18,880	324,520	356,972
1994	12,220	13,442	341,684	375,852
1995	14,201	15,621	353,904	389,294
1996	13,334	14,667	368,105	404,916
1997	15,532	17,085	381,439	419,583
1998	15,892	17,481	396,971	436,668
1999	16,226	17,849	412,863	454,149
2000	19,242	21,166	429,089	471,998
2001	20,479	22,527	448,331	493,164
2002	31,140	34,254	468,810	515,691
2003	16,714	18,385	499,950	549,945
2004	16,163	17,779	516,664	568,330
2005	17,787	19,566	532,827	586,110
2006	23,965	26,362	550,614	605,675
2007	18,035	19,839	574,579	632,037
2008	19,200	21,120	592,614	651,875
2009	19,200	21,120	611,814	672,995
2010	19,200	21,120	631,014	694,115
2011	19,200	21,120	650,214	715,235
2012	19,200	21,120	669,414	736,355
2013	19,200	21,120	688,614	757,475
2014	19,200	21,120	707,814	778,595
2015	19,200	21,120	727,014	799,715
2016	19,200	21,120	746,214	820,835
2017	19,200	21,120	765,414	841,955
2018	19,200	21,120	784,614	863,075
2019	19,200	21,120	803,814	884,195

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2020	19,200	21,120	823,014	905,315
2021	19,200	21,120	842,214	926,435
2022	19,200	21,120	861,414	947,555
2023	19,200	21,120	880,614	968,675
2024	19,200	21,120	899,814	989,795
2025	19,200	21,120	919,014	1,010,915
2026	19,200	21,120	938,214	1,032,035
2027	19,200	21,120	957,414	1,053,155
2028	19,200	21,120	976,614	1,074,275
2029	19,200	21,120	995,814	1,095,395
2030	19,200	21,120	1,015,014	1,116,515
2031	19,200	21,120	1,034,214	1,137,635
2032	19,200	21,120	1,053,414	1,158,755
2033	19,200	21,120	1,072,614	1,179,875
2034	19,200	21,120	1,091,814	1,200,995
2035	19,200	21,120	1,111,014	1,222,115
2036	0	0	1,130,214	1,243,235
2037	0	0	1,130,214	1,243,235
2038	0	0	1,130,214	1,243,235
2039	0	0	1,130,214	1,243,235
2040	0	0	1,130,214	1,243,235
2041	0	0	1,130,214	1,243,235
2042	0	0	1,130,214	1,243,235
2043	0	0	1,130,214	1,243,235
2044	0	0	1,130,214	1,243,235
2045	0	0	1,130,214	1,243,235
2046	0	0	1,130,214	1,243,235
2047	0	0	1,130,214	1,243,235
2048	0	0	1,130,214	1,243,235
2049	0	0	1,130,214	1,243,235
2050	0	0	1,130,214	1,243,235
2051	0	0	1,130,214	1,243,235
2052	0	0	1,130,214	1,243,235
2053	0	0	1,130,214	1,243,235
2054	0	0	1,130,214	1,243,235
2055	0	0	1,130,214	1,243,235
2056	0	0	1,130,214	1,243,235
2057	0	0	1,130,214	1,243,235
2058	0	0	1,130,214	1,243,235
2059	0	0	1,130,214	1,243,235

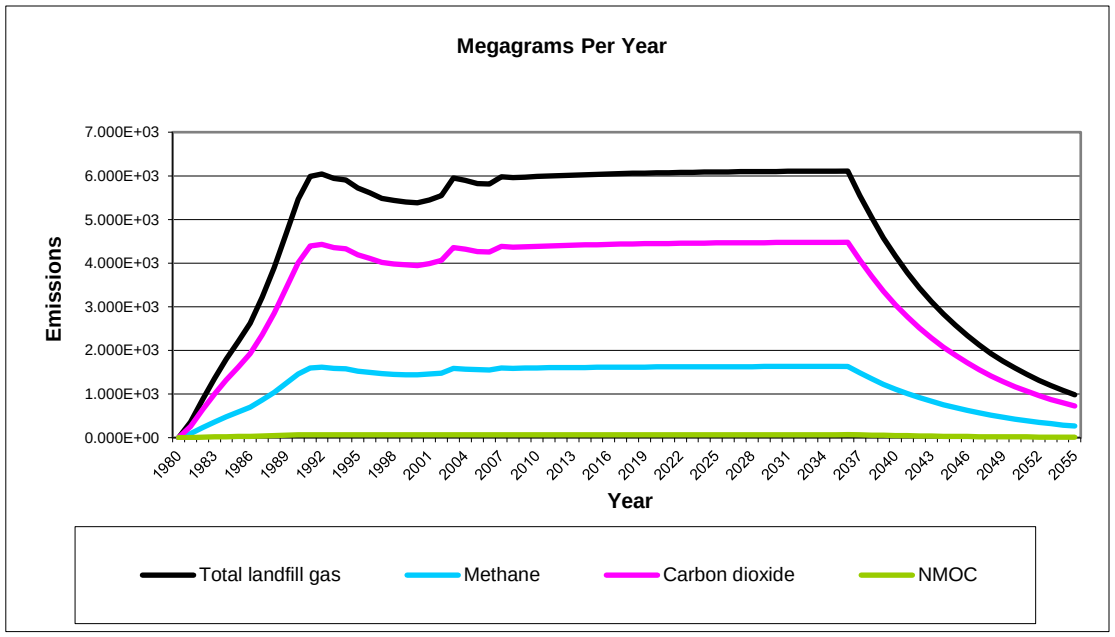
Pollutant Parameters

	Compound	Gas / Pollutant Default Parameters: Concentration (*ppmv*)	Molecular Weight	User-specified Pollutant Parameters: Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
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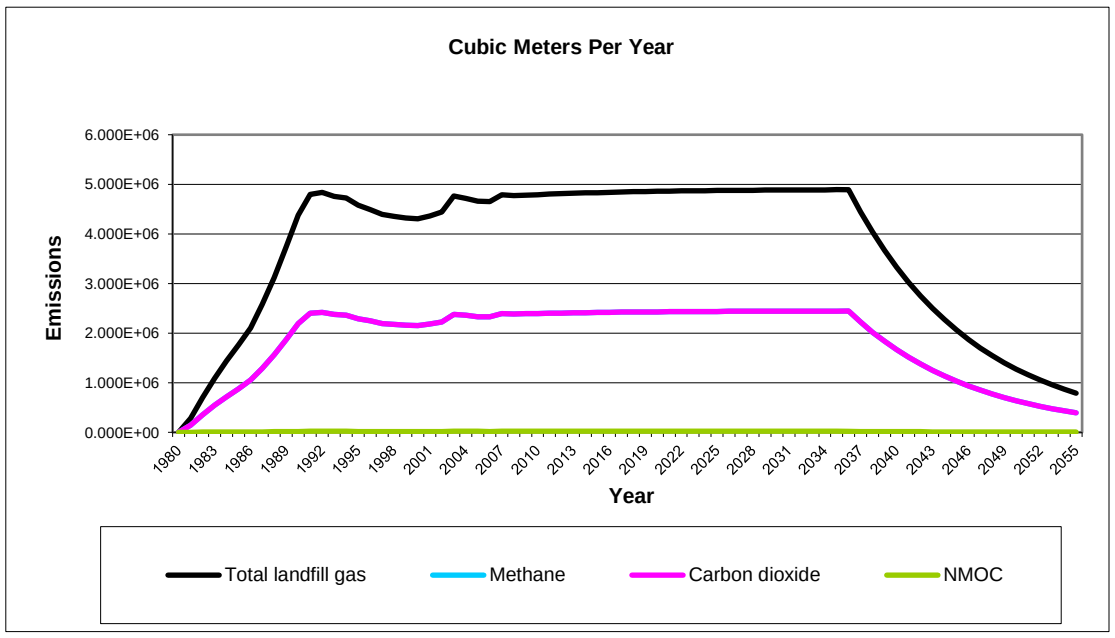
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
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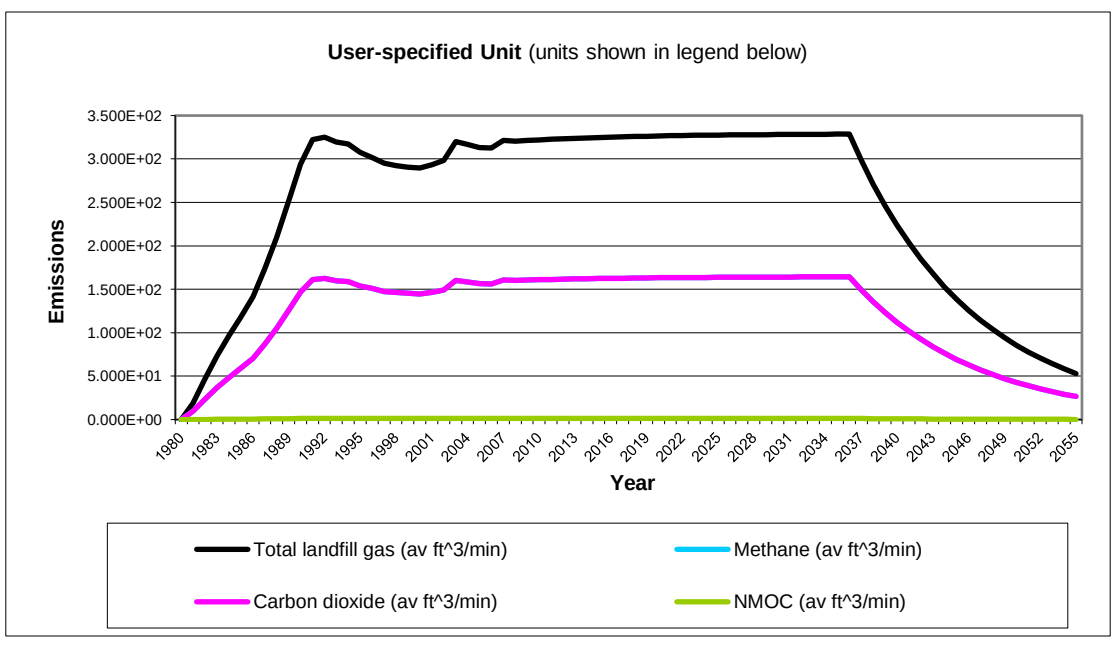
5.000E+06
4.000E+06
3.000E+06
2.000E+06
1.000E+06
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
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3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	3.547E+02	2.841E+05	1.909E+01	9.475E+01	1.420E+05	9.543E+00
1982	8.766E+02	7.019E+05	4.716E+01	2.341E+02	3.510E+05	2.358E+01
1983	1.361E+03	1.090E+06	7.323E+01	3.636E+02	5.450E+05	3.662E+01
1984	1.798E+03	1.440E+06	9.675E+01	4.803E+02	7.199E+05	4.837E+01
1985	2.201E+03	1.762E+06	1.184E+02	5.879E+02	8.812E+05	5.921E+01
1986	2.627E+03	2.104E+06	1.413E+02	7.017E+02	1.052E+06	7.067E+01
1987	3.219E+03	2.578E+06	1.732E+02	8.598E+02	1.289E+06	8.659E+01
1988	3.896E+03	3.120E+06	2.096E+02	1.041E+03	1.560E+06	1.048E+02
1989	4.675E+03	3.743E+06	2.515E+02	1.249E+03	1.872E+06	1.258E+02
1990	5.467E+03	4.377E+06	2.941E+02	1.460E+03	2.189E+06	1.471E+02
1991	5.990E+03	4.796E+06	3.223E+02	1.600E+03	2.398E+06	1.611E+02
1992	6.039E+03	4.836E+06	3.249E+02	1.613E+03	2.418E+06	1.625E+02
1993	5.943E+03	4.759E+06	3.198E+02	1.588E+03	2.380E+06	1.599E+02
1994	5.900E+03	4.724E+06	3.174E+02	1.576E+03	2.362E+06	1.587E+02
1995	5.716E+03	4.578E+06	3.076E+02	1.527E+03	2.289E+06	1.538E+02
1996	5.608E+03	4.490E+06	3.017E+02	1.498E+03	2.245E+06	1.509E+02
1997	5.483E+03	4.391E+06	2.950E+02	1.465E+03	2.195E+06	1.475E+02
1998	5.434E+03	4.352E+06	2.924E+02	1.452E+03	2.176E+06	1.462E+02
1999	5.401E+03	4.325E+06	2.906E+02	1.443E+03	2.162E+06	1.453E+02
2000	5.380E+03	4.308E+06	2.894E+02	1.437E+03	2.154E+06	1.447E+02
2001	5.449E+03	4.363E+06	2.932E+02	1.455E+03	2.182E+06	1.466E+02
2002	5.547E+03	4.442E+06	2.985E+02	1.482E+03	2.221E+06	1.492E+02
2003	5.948E+03	4.763E+06	3.200E+02	1.589E+03	2.381E+06	1.600E+02
2004	5.891E+03	4.717E+06	3.170E+02	1.574E+03	2.359E+06	1.585E+02
2005	5.824E+03	4.663E+06	3.133E+02	1.556E+03	2.332E+06	1.567E+02
2006	5.809E+03	4.652E+06	3.126E+02	1.552E+03	2.326E+06	1.563E+02
2007	5.977E+03	4.786E+06	3.216E+02	1.596E+03	2.393E+06	1.608E+02
2008	5.956E+03	4.769E+06	3.204E+02	1.591E+03	2.385E+06	1.602E+02
2009	5.971E+03	4.781E+06	3.212E+02	1.595E+03	2.391E+06	1.606E+02
2010	5.985E+03	4.792E+06	3.220E+02	1.599E+03	2.396E+06	1.610E+02
2011	5.997E+03	4.802E+06	3.226E+02	1.602E+03	2.401E+06	1.613E+02
2012	6.008E+03	4.811E+06	3.233E+02	1.605E+03	2.406E+06	1.616E+02
2013	6.018E+03	4.819E+06	3.238E+02	1.608E+03	2.410E+06	1.619E+02
2014	6.028E+03	4.827E+06	3.243E+02	1.610E+03	2.413E+06	1.621E+02
2015	6.036E+03	4.833E+06	3.248E+02	1.612E+03	2.417E+06	1.624E+02
2016	6.044E+03	4.839E+06	3.252E+02	1.614E+03	2.420E+06	1.626E+02
2017	6.051E+03	4.845E+06	3.255E+02	1.616E+03	2.423E+06	1.628E+02
2018	6.057E+03	4.850E+06	3.259E+02	1.618E+03	2.425E+06	1.629E+02
2019	6.063E+03	4.855E+06	3.262E+02	1.619E+03	2.427E+06	1.631E+02
2020	6.068E+03	4.859E+06	3.265E+02	1.621E+03	2.429E+06	1.632E+02
2021	6.073E+03	4.863E+06	3.267E+02	1.622E+03	2.431E+06	1.634E+02
2022	6.077E+03	4.866E+06	3.270E+02	1.623E+03	2.433E+06	1.635E+02
2023	6.081E+03	4.869E+06	3.272E+02	1.624E+03	2.435E+06	1.636E+02
2024	6.084E+03	4.872E+06	3.274E+02	1.625E+03	2.436E+06	1.637E+02
2025	6.088E+03	4.875E+06	3.275E+02	1.626E+03	2.437E+06	1.638E+02
2026	6.090E+03	4.877E+06	3.277E+02	1.627E+03	2.438E+06	1.638E+02
2027	6.093E+03	4.879E+06	3.278E+02	1.628E+03	2.440E+06	1.639E+02
2028	6.096E+03	4.881E+06	3.280E+02	1.628E+03	2.441E+06	1.640E+02
2029	6.098E+03	4.883E+06	3.281E+02	1.629E+03	2.441E+06	1.640E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	6.100E+03	4.884E+06	3.282E+02	1.629E+03	2.442E+06	1.641E+02
2031	6.102E+03	4.886E+06	3.283E+02	1.630E+03	2.443E+06	1.641E+02
2032	6.103E+03	4.887E+06	3.284E+02	1.630E+03	2.444E+06	1.642E+02
2033	6.105E+03	4.888E+06	3.284E+02	1.631E+03	2.444E+06	1.642E+02
2034	6.106E+03	4.889E+06	3.285E+02	1.631E+03	2.445E+06	1.643E+02
2035	6.107E+03	4.890E+06	3.286E+02	1.631E+03	2.445E+06	1.643E+02
2036	6.108E+03	4.891E+06	3.286E+02	1.632E+03	2.446E+06	1.643E+02
2037	5.549E+03	4.444E+06	2.986E+02	1.482E+03	2.222E+06	1.493E+02
2038	5.041E+03	4.037E+06	2.712E+02	1.347E+03	2.018E+06	1.356E+02
2039	4.580E+03	3.667E+06	2.464E+02	1.223E+03	1.834E+06	1.232E+02
2040	4.161E+03	3.332E+06	2.239E+02	1.111E+03	1.666E+06	1.119E+02
2041	3.780E+03	3.027E+06	2.034E+02	1.010E+03	1.513E+06	1.017E+02
2042	3.434E+03	2.750E+06	1.847E+02	9.172E+02	1.375E+06	9.237E+01
2043	3.119E+03	2.498E+06	1.678E+02	8.332E+02	1.249E+06	8.392E+01
2044	2.834E+03	2.269E+06	1.525E+02	7.570E+02	1.135E+06	7.624E+01
2045	2.575E+03	2.062E+06	1.385E+02	6.877E+02	1.031E+06	6.926E+01
2046	2.339E+03	1.873E+06	1.258E+02	6.247E+02	9.364E+05	6.292E+01
2047	2.125E+03	1.701E+06	1.143E+02	5.676E+02	8.507E+05	5.716E+01
2048	1.930E+03	1.546E+06	1.039E+02	5.156E+02	7.728E+05	5.193E+01
2049	1.754E+03	1.404E+06	9.435E+01	4.684E+02	7.021E+05	4.717E+01
2050	1.593E+03	1.276E+06	8.571E+01	4.255E+02	6.378E+05	4.286E+01
2051	1.447E+03	1.159E+06	7.787E+01	3.866E+02	5.794E+05	3.893E+01
2052	1.315E+03	1.053E+06	7.074E+01	3.512E+02	5.264E+05	3.537E+01
2053	1.194E+03	9.564E+05	6.426E+01	3.190E+02	4.782E+05	3.213E+01
2054	1.085E+03	8.689E+05	5.838E+01	2.898E+02	4.344E+05	2.919E+01
2055	9.858E+02	7.894E+05	5.304E+01	2.633E+02	3.947E+05	2.652E+01
2056	8.955E+02	7.171E+05	4.818E+01	2.392E+02	3.586E+05	2.409E+01
2057	8.136E+02	6.515E+05	4.377E+01	2.173E+02	3.257E+05	2.189E+01
2058	7.391E+02	5.918E+05	3.977E+01	1.974E+02	2.959E+05	1.988E+01
2059	6.714E+02	5.377E+05	3.613E+01	1.793E+02	2.688E+05	1.806E+01
2060	6.100E+02	4.884E+05	3.282E+01	1.629E+02	2.442E+05	1.641E+01
2061	5.541E+02	4.437E+05	2.981E+01	1.480E+02	2.219E+05	1.491E+01
2062	5.034E+02	4.031E+05	2.709E+01	1.345E+02	2.016E+05	1.354E+01
2063	4.573E+02	3.662E+05	2.461E+01	1.222E+02	1.831E+05	1.230E+01
2064	4.155E+02	3.327E+05	2.235E+01	1.110E+02	1.663E+05	1.118E+01
2065	3.774E+02	3.022E+05	2.031E+01	1.008E+02	1.511E+05	1.015E+01
2066	3.429E+02	2.746E+05	1.845E+01	9.159E+01	1.373E+05	9.224E+00
2067	3.115E+02	2.494E+05	1.676E+01	8.321E+01	1.247E+05	8.380E+00
2068	2.830E+02	2.266E+05	1.523E+01	7.559E+01	1.133E+05	7.613E+00
2069	2.571E+02	2.059E+05	1.383E+01	6.867E+01	1.029E+05	6.916E+00
2070	2.336E+02	1.870E+05	1.257E+01	6.239E+01	9.351E+04	6.283E+00
2071	2.122E+02	1.699E+05	1.142E+01	5.667E+01	8.495E+04	5.708E+00
2072	1.928E+02	1.543E+05	1.037E+01	5.149E+01	7.717E+04	5.185E+00
2073	1.751E+02	1.402E+05	9.421E+00	4.677E+01	7.011E+04	4.711E+00
2074	1.591E+02	1.274E+05	8.559E+00	4.249E+01	6.369E+04	4.280E+00
2075	1.445E+02	1.157E+05	7.776E+00	3.860E+01	5.786E+04	3.888E+00
2076	1.313E+02	1.051E+05	7.064E+00	3.507E+01	5.257E+04	3.532E+00
2077	1.193E+02	9.551E+04	6.417E+00	3.186E+01	4.775E+04	3.209E+00
2078	1.084E+02	8.677E+04	5.830E+00	2.894E+01	4.338E+04	2.915E+00
2079	9.844E+01	7.882E+04	5.296E+00	2.629E+01	3.941E+04	2.648E+00
2080	8.943E+01	7.161E+04	4.811E+00	2.389E+01	3.580E+04	2.406E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2081	8.124E+01	6.505E+04	4.371E+00	2.170E+01	3.253E+04	2.185E+00
2082	7.380E+01	5.910E+04	3.971E+00	1.971E+01	2.955E+04	1.985E+00
2083	6.705E+01	5.369E+04	3.607E+00	1.791E+01	2.684E+04	1.804E+00
2084	6.091E+01	4.878E+04	3.277E+00	1.627E+01	2.439E+04	1.639E+00
2085	5.534E+01	4.431E+04	2.977E+00	1.478E+01	2.216E+04	1.489E+00
2086	5.027E+01	4.025E+04	2.705E+00	1.343E+01	2.013E+04	1.352E+00
2087	4.567E+01	3.657E+04	2.457E+00	1.220E+01	1.828E+04	1.229E+00
2088	4.149E+01	3.322E+04	2.232E+00	1.108E+01	1.661E+04	1.116E+00
2089	3.769E+01	3.018E+04	2.028E+00	1.007E+01	1.509E+04	1.014E+00
2090	3.424E+01	2.742E+04	1.842E+00	9.146E+00	1.371E+04	9.211E-01
2091	3.111E+01	2.491E+04	1.674E+00	8.309E+00	1.245E+04	8.368E-01
2092	2.826E+01	2.263E+04	1.520E+00	7.548E+00	1.131E+04	7.602E-01
2093	2.567E+01	2.056E+04	1.381E+00	6.857E+00	1.028E+04	6.906E-01
2094	2.332E+01	1.868E+04	1.255E+00	6.230E+00	9.338E+03	6.274E-01
2095	2.119E+01	1.697E+04	1.140E+00	5.659E+00	8.483E+03	5.700E-01
2096	1.925E+01	1.541E+04	1.036E+00	5.141E+00	7.707E+03	5.178E-01
2097	1.749E+01	1.400E+04	9.408E-01	4.671E+00	7.001E+03	4.704E-01
2098	1.589E+01	1.272E+04	8.547E-01	4.243E+00	6.360E+03	4.273E-01
2099	1.443E+01	1.156E+04	7.765E-01	3.855E+00	5.778E+03	3.882E-01
2100	1.311E+01	1.050E+04	7.054E-01	3.502E+00	5.249E+03	3.527E-01
2101	1.191E+01	9.537E+03	6.408E-01	3.181E+00	4.769E+03	3.204E-01
2102	1.082E+01	8.664E+03	5.822E-01	2.890E+00	4.332E+03	2.911E-01
2103	9.830E+00	7.871E+03	5.289E-01	2.626E+00	3.936E+03	2.644E-01
2104	8.930E+00	7.151E+03	4.805E-01	2.385E+00	3.575E+03	2.402E-01
2105	8.113E+00	6.496E+03	4.365E-01	2.167E+00	3.248E+03	2.182E-01
2106	7.370E+00	5.902E+03	3.965E-01	1.969E+00	2.951E+03	1.983E-01
2107	6.695E+00	5.361E+03	3.602E-01	1.788E+00	2.681E+03	1.801E-01
2108	6.083E+00	4.871E+03	3.273E-01	1.625E+00	2.435E+03	1.636E-01
2109	5.526E+00	4.425E+03	2.973E-01	1.476E+00	2.212E+03	1.487E-01
2110	5.020E+00	4.020E+03	2.701E-01	1.341E+00	2.010E+03	1.350E-01
2111	4.560E+00	3.652E+03	2.454E-01	1.218E+00	1.826E+03	1.227E-01
2112	4.143E+00	3.318E+03	2.229E-01	1.107E+00	1.659E+03	1.115E-01
2113	3.764E+00	3.014E+03	2.025E-01	1.005E+00	1.507E+03	1.013E-01
2114	3.419E+00	2.738E+03	1.840E-01	9.133E-01	1.369E+03	9.198E-02
2115	3.106E+00	2.487E+03	1.671E-01	8.297E-01	1.244E+03	8.356E-02
2116	2.822E+00	2.260E+03	1.518E-01	7.538E-01	1.130E+03	7.591E-02
2117	2.564E+00	2.053E+03	1.379E-01	6.848E-01	1.026E+03	6.896E-02
2118	2.329E+00	1.865E+03	1.253E-01	6.221E-01	9.325E+02	6.265E-02
2119	2.116E+00	1.694E+03	1.138E-01	5.651E-01	8.471E+02	5.692E-02
2120	1.922E+00	1.539E+03	1.034E-01	5.134E-01	7.696E+02	5.171E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	2.600E+02	1.420E+05	9.543E+00	4.073E+00	1.136E+03	7.634E-02
1982	6.424E+02	3.510E+05	2.358E+01	1.006E+01	2.808E+03	1.886E-01
1983	9.976E+02	5.450E+05	3.662E+01	1.563E+01	4.360E+03	2.929E-01
1984	1.318E+03	7.199E+05	4.837E+01	2.065E+01	5.760E+03	3.870E-01
1985	1.613E+03	8.812E+05	5.921E+01	2.527E+01	7.050E+03	4.737E-01
1986	1.925E+03	1.052E+06	7.067E+01	3.016E+01	8.415E+03	5.654E-01
1987	2.359E+03	1.289E+06	8.659E+01	3.696E+01	1.031E+04	6.928E-01
1988	2.856E+03	1.560E+06	1.048E+02	4.473E+01	1.248E+04	8.385E-01
1989	3.426E+03	1.872E+06	1.258E+02	5.367E+01	1.497E+04	1.006E+00
1990	4.006E+03	2.189E+06	1.471E+02	6.276E+01	1.751E+04	1.176E+00
1991	4.390E+03	2.398E+06	1.611E+02	6.877E+01	1.918E+04	1.289E+00
1992	4.426E+03	2.418E+06	1.625E+02	6.934E+01	1.934E+04	1.300E+00
1993	4.356E+03	2.380E+06	1.599E+02	6.824E+01	1.904E+04	1.279E+00
1994	4.324E+03	2.362E+06	1.587E+02	6.774E+01	1.890E+04	1.270E+00
1995	4.190E+03	2.289E+06	1.538E+02	6.563E+01	1.831E+04	1.230E+00
1996	4.110E+03	2.245E+06	1.509E+02	6.438E+01	1.796E+04	1.207E+00
1997	4.019E+03	2.195E+06	1.475E+02	6.295E+01	1.756E+04	1.180E+00
1998	3.983E+03	2.176E+06	1.462E+02	6.239E+01	1.741E+04	1.170E+00
1999	3.958E+03	2.162E+06	1.453E+02	6.201E+01	1.730E+04	1.162E+00
2000	3.943E+03	2.154E+06	1.447E+02	6.177E+01	1.723E+04	1.158E+00
2001	3.993E+03	2.182E+06	1.466E+02	6.256E+01	1.745E+04	1.173E+00
2002	4.066E+03	2.221E+06	1.492E+02	6.369E+01	1.777E+04	1.194E+00
2003	4.359E+03	2.381E+06	1.600E+02	6.829E+01	1.905E+04	1.280E+00
2004	4.318E+03	2.359E+06	1.585E+02	6.764E+01	1.887E+04	1.268E+00
2005	4.268E+03	2.332E+06	1.567E+02	6.686E+01	1.865E+04	1.253E+00
2006	4.258E+03	2.326E+06	1.563E+02	6.670E+01	1.861E+04	1.250E+00
2007	4.380E+03	2.393E+06	1.608E+02	6.862E+01	1.914E+04	1.286E+00
2008	4.365E+03	2.385E+06	1.602E+02	6.838E+01	1.908E+04	1.282E+00
2009	4.376E+03	2.391E+06	1.606E+02	6.855E+01	1.912E+04	1.285E+00
2010	4.386E+03	2.396E+06	1.610E+02	6.871E+01	1.917E+04	1.288E+00
2011	4.395E+03	2.401E+06	1.613E+02	6.885E+01	1.921E+04	1.291E+00
2012	4.403E+03	2.406E+06	1.616E+02	6.898E+01	1.924E+04	1.293E+00
2013	4.411E+03	2.410E+06	1.619E+02	6.910E+01	1.928E+04	1.295E+00
2014	4.418E+03	2.413E+06	1.621E+02	6.920E+01	1.931E+04	1.297E+00
2015	4.424E+03	2.417E+06	1.624E+02	6.930E+01	1.933E+04	1.299E+00
2016	4.429E+03	2.420E+06	1.626E+02	6.939E+01	1.936E+04	1.301E+00
2017	4.434E+03	2.423E+06	1.628E+02	6.947E+01	1.938E+04	1.302E+00
2018	4.439E+03	2.425E+06	1.629E+02	6.954E+01	1.940E+04	1.304E+00
2019	4.443E+03	2.427E+06	1.631E+02	6.961E+01	1.942E+04	1.305E+00
2020	4.447E+03	2.429E+06	1.632E+02	6.967E+01	1.944E+04	1.306E+00
2021	4.451E+03	2.431E+06	1.634E+02	6.972E+01	1.945E+04	1.307E+00
2022	4.454E+03	2.433E+06	1.635E+02	6.977E+01	1.946E+04	1.308E+00
2023	4.457E+03	2.435E+06	1.636E+02	6.981E+01	1.948E+04	1.309E+00
2024	4.459E+03	2.436E+06	1.637E+02	6.985E+01	1.949E+04	1.309E+00
2025	4.461E+03	2.437E+06	1.638E+02	6.989E+01	1.950E+04	1.310E+00
2026	4.464E+03	2.438E+06	1.638E+02	6.993E+01	1.951E+04	1.311E+00
2027	4.466E+03	2.440E+06	1.639E+02	6.996E+01	1.952E+04	1.311E+00
2028	4.467E+03	2.441E+06	1.640E+02	6.998E+01	1.952E+04	1.312E+00
2029	4.469E+03	2.441E+06	1.640E+02	7.001E+01	1.953E+04	1.312E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	4.470E+03	2.442E+06	1.641E+02	7.003E+01	1.954E+04	1.313E+00
2031	4.472E+03	2.443E+06	1.641E+02	7.005E+01	1.954E+04	1.313E+00
2032	4.473E+03	2.444E+06	1.642E+02	7.007E+01	1.955E+04	1.313E+00
2033	4.474E+03	2.444E+06	1.642E+02	7.009E+01	1.955E+04	1.314E+00
2034	4.475E+03	2.445E+06	1.643E+02	7.010E+01	1.956E+04	1.314E+00
2035	4.476E+03	2.445E+06	1.643E+02	7.012E+01	1.956E+04	1.314E+00
2036	4.477E+03	2.446E+06	1.643E+02	7.013E+01	1.957E+04	1.315E+00
2037	4.067E+03	2.222E+06	1.493E+02	6.371E+01	1.777E+04	1.194E+00
2038	3.695E+03	2.018E+06	1.356E+02	5.788E+01	1.615E+04	1.085E+00
2039	3.357E+03	1.834E+06	1.232E+02	5.258E+01	1.467E+04	9.856E-01
2040	3.049E+03	1.666E+06	1.119E+02	4.777E+01	1.333E+04	8.954E-01
2041	2.770E+03	1.513E+06	1.017E+02	4.340E+01	1.211E+04	8.134E-01
2042	2.517E+03	1.375E+06	9.237E+01	3.942E+01	1.100E+04	7.390E-01
2043	2.286E+03	1.249E+06	8.392E+01	3.582E+01	9.992E+03	6.713E-01
2044	2.077E+03	1.135E+06	7.624E+01	3.254E+01	9.077E+03	6.099E-01
2045	1.887E+03	1.031E+06	6.926E+01	2.956E+01	8.246E+03	5.541E-01
2046	1.714E+03	9.364E+05	6.292E+01	2.685E+01	7.491E+03	5.033E-01
2047	1.557E+03	8.507E+05	5.716E+01	2.439E+01	6.806E+03	4.573E-01
2048	1.415E+03	7.728E+05	5.193E+01	2.216E+01	6.183E+03	4.154E-01
2049	1.285E+03	7.021E+05	4.717E+01	2.013E+01	5.617E+03	3.774E-01
2050	1.168E+03	6.378E+05	4.286E+01	1.829E+01	5.103E+03	3.428E-01
2051	1.061E+03	5.794E+05	3.893E+01	1.662E+01	4.636E+03	3.115E-01
2052	9.636E+02	5.264E+05	3.537E+01	1.510E+01	4.211E+03	2.830E-01
2053	8.754E+02	4.782E+05	3.213E+01	1.371E+01	3.826E+03	2.571E-01
2054	7.953E+02	4.344E+05	2.919E+01	1.246E+01	3.476E+03	2.335E-01
2055	7.225E+02	3.947E+05	2.652E+01	1.132E+01	3.157E+03	2.121E-01
2056	6.563E+02	3.586E+05	2.409E+01	1.028E+01	2.868E+03	1.927E-01
2057	5.963E+02	3.257E+05	2.189E+01	9.341E+00	2.606E+03	1.751E-01
2058	5.417E+02	2.959E+05	1.988E+01	8.486E+00	2.367E+03	1.591E-01
2059	4.921E+02	2.688E+05	1.806E+01	7.709E+00	2.151E+03	1.445E-01
2060	4.470E+02	2.442E+05	1.641E+01	7.003E+00	1.954E+03	1.313E-01
2061	4.061E+02	2.219E+05	1.491E+01	6.362E+00	1.775E+03	1.193E-01
2062	3.690E+02	2.016E+05	1.354E+01	5.780E+00	1.612E+03	1.083E-01
2063	3.352E+02	1.831E+05	1.230E+01	5.251E+00	1.465E+03	9.842E-02
2064	3.045E+02	1.663E+05	1.118E+01	4.770E+00	1.331E+03	8.941E-02
2065	2.766E+02	1.511E+05	1.015E+01	4.333E+00	1.209E+03	8.123E-02
2066	2.513E+02	1.373E+05	9.224E+00	3.937E+00	1.098E+03	7.379E-02
2067	2.283E+02	1.247E+05	8.380E+00	3.576E+00	9.978E+02	6.704E-02
2068	2.074E+02	1.133E+05	7.613E+00	3.249E+00	9.064E+02	6.090E-02
2069	1.884E+02	1.029E+05	6.916E+00	2.952E+00	8.235E+02	5.533E-02
2070	1.712E+02	9.351E+04	6.283E+00	2.681E+00	7.481E+02	5.026E-02
2071	1.555E+02	8.495E+04	5.708E+00	2.436E+00	6.796E+02	4.566E-02
2072	1.413E+02	7.717E+04	5.185E+00	2.213E+00	6.174E+02	4.148E-02
2073	1.283E+02	7.011E+04	4.711E+00	2.010E+00	5.609E+02	3.769E-02
2074	1.166E+02	6.369E+04	4.280E+00	1.826E+00	5.095E+02	3.424E-02
2075	1.059E+02	5.786E+04	3.888E+00	1.659E+00	4.629E+02	3.110E-02
2076	9.622E+01	5.257E+04	3.532E+00	1.507E+00	4.205E+02	2.826E-02
2077	8.741E+01	4.775E+04	3.209E+00	1.369E+00	3.820E+02	2.567E-02
2078	7.941E+01	4.338E+04	2.915E+00	1.244E+00	3.471E+02	2.332E-02
2079	7.214E+01	3.941E+04	2.648E+00	1.130E+00	3.153E+02	2.118E-02
2080	6.554E+01	3.580E+04	2.406E+00	1.027E+00	2.864E+02	1.925E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	5.954E+01	3.253E+04	2.185E+00	9.327E-01	2.602E+02	1.748E-02
2082	5.409E+01	2.955E+04	1.985E+00	8.474E-01	2.364E+02	1.588E-02
2083	4.914E+01	2.684E+04	1.804E+00	7.698E-01	2.148E+02	1.443E-02
2084	4.464E+01	2.439E+04	1.639E+00	6.993E-01	1.951E+02	1.311E-02
2085	4.056E+01	2.216E+04	1.489E+00	6.353E-01	1.772E+02	1.191E-02
2086	3.684E+01	2.013E+04	1.352E+00	5.772E-01	1.610E+02	1.082E-02
2087	3.347E+01	1.828E+04	1.229E+00	5.243E-01	1.463E+02	9.828E-03
2088	3.041E+01	1.661E+04	1.116E+00	4.763E-01	1.329E+02	8.929E-03
2089	2.762E+01	1.509E+04	1.014E+00	4.327E-01	1.207E+02	8.111E-03
2090	2.509E+01	1.371E+04	9.211E-01	3.931E-01	1.097E+02	7.369E-03
2091	2.280E+01	1.245E+04	8.368E-01	3.571E-01	9.964E+01	6.694E-03
2092	2.071E+01	1.131E+04	7.602E-01	3.244E-01	9.051E+01	6.082E-03
2093	1.882E+01	1.028E+04	6.906E-01	2.947E-01	8.223E+01	5.525E-03
2094	1.709E+01	9.338E+03	6.274E-01	2.678E-01	7.470E+01	5.019E-03
2095	1.553E+01	8.483E+03	5.700E-01	2.433E-01	6.786E+01	4.560E-03
2096	1.411E+01	7.707E+03	5.178E-01	2.210E-01	6.165E+01	4.142E-03
2097	1.282E+01	7.001E+03	4.704E-01	2.008E-01	5.601E+01	3.763E-03
2098	1.164E+01	6.360E+03	4.273E-01	1.824E-01	5.088E+01	3.419E-03
2099	1.058E+01	5.778E+03	3.882E-01	1.657E-01	4.622E+01	3.106E-03
2100	9.609E+00	5.249E+03	3.527E-01	1.505E-01	4.199E+01	2.822E-03
2101	8.729E+00	4.769E+03	3.204E-01	1.367E-01	3.815E+01	2.563E-03
2102	7.930E+00	4.332E+03	2.911E-01	1.242E-01	3.466E+01	2.329E-03
2103	7.204E+00	3.936E+03	2.644E-01	1.129E-01	3.149E+01	2.115E-03
2104	6.545E+00	3.575E+03	2.402E-01	1.025E-01	2.860E+01	1.922E-03
2105	5.946E+00	3.248E+03	2.182E-01	9.314E-02	2.598E+01	1.746E-03
2106	5.401E+00	2.951E+03	1.983E-01	8.462E-02	2.361E+01	1.586E-03
2107	4.907E+00	2.681E+03	1.801E-01	7.687E-02	2.145E+01	1.441E-03
2108	4.458E+00	2.435E+03	1.636E-01	6.983E-02	1.948E+01	1.309E-03
2109	4.050E+00	2.212E+03	1.487E-01	6.344E-02	1.770E+01	1.189E-03
2110	3.679E+00	2.010E+03	1.350E-01	5.763E-02	1.608E+01	1.080E-03
2111	3.342E+00	1.826E+03	1.227E-01	5.236E-02	1.461E+01	9.815E-04
2112	3.036E+00	1.659E+03	1.115E-01	4.757E-02	1.327E+01	8.916E-04
2113	2.758E+00	1.507E+03	1.013E-01	4.321E-02	1.206E+01	8.100E-04
2114	2.506E+00	1.369E+03	9.198E-02	3.926E-02	1.095E+01	7.359E-04
2115	2.277E+00	1.244E+03	8.356E-02	3.566E-02	9.949E+00	6.685E-04
2116	2.068E+00	1.130E+03	7.591E-02	3.240E-02	9.039E+00	6.073E-04
2117	1.879E+00	1.026E+03	6.896E-02	2.943E-02	8.211E+00	5.517E-04
2118	1.707E+00	9.325E+02	6.265E-02	2.674E-02	7.460E+00	5.012E-04
2119	1.551E+00	8.471E+02	5.692E-02	2.429E-02	6.777E+00	4.553E-04
2120	1.409E+00	7.696E+02	5.171E-02	2.207E-02	6.157E+00	4.137E-04

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Wednesday, November 27, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate (*$year^{-1}$*)

L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)

t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1980**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.060**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**110**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1980	12,159	13,375	0	0
1981	18,999	20,899	12,159	13,375
1982	19,359	21,295	31,158	34,274
1983	19,251	21,176	50,517	55,569
1984	19,449	21,394	69,768	76,745
1985	21,510	23,661	89,217	98,139
1986	28,530	31,383	110,727	121,800
1987	33,319	36,651	139,257	153,183
1988	38,909	42,800	172,576	189,834
1989	41,806	45,987	211,485	232,634
1990	35,075	38,583	253,291	278,620
1991	20,489	22,538	288,366	317,203
1992	15,665	17,232	308,855	339,741
1993	17,164	18,880	324,520	356,972
1994	12,220	13,442	341,684	375,852
1995	14,201	15,621	353,904	389,294
1996	13,334	14,667	368,105	404,916
1997	15,532	17,085	381,439	419,583
1998	15,892	17,481	396,971	436,668
1999	16,226	17,849	412,863	454,149
2000	19,242	21,166	429,089	471,998
2001	20,479	22,527	448,331	493,164
2002	31,140	34,254	468,810	515,691
2003	16,714	18,385	499,950	549,945
2004	16,163	17,779	516,664	568,330
2005	17,787	19,566	532,827	586,110
2006	23,965	26,362	550,614	605,675
2007	18,035	19,839	574,579	632,037
2008	19,200	21,120	592,614	651,875
2009	19,200	21,120	611,814	672,995
2010	19,200	21,120	631,014	694,115
2011	19,200	21,120	650,214	715,235
2012	19,200	21,120	669,414	736,355
2013	19,200	21,120	688,614	757,475
2014	19,200	21,120	707,814	778,595
2015	19,200	21,120	727,014	799,715
2016	19,200	21,120	746,214	820,835
2017	19,200	21,120	765,414	841,955
2018	19,200	21,120	784,614	863,075
2019	19,200	21,120	803,814	884,195

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2020	19,200	21,120	823,014	905,315
2021	19,200	21,120	842,214	926,435
2022	19,200	21,120	861,414	947,555
2023	19,200	21,120	880,614	968,675
2024	19,200	21,120	899,814	989,795
2025	19,200	21,120	919,014	1,010,915
2026	19,200	21,120	938,214	1,032,035
2027	19,200	21,120	957,414	1,053,155
2028	19,200	21,120	976,614	1,074,275
2029	19,200	21,120	995,814	1,095,395
2030	19,200	21,120	1,015,014	1,116,515
2031	19,200	21,120	1,034,214	1,137,635
2032	19,200	21,120	1,053,414	1,158,755
2033	19,200	21,120	1,072,614	1,179,875
2034	19,200	21,120	1,091,814	1,200,995
2035	19,200	21,120	1,111,014	1,222,115
2036	0	0	1,130,214	1,243,235
2037	0	0	1,130,214	1,243,235
2038	0	0	1,130,214	1,243,235
2039	0	0	1,130,214	1,243,235
2040	0	0	1,130,214	1,243,235
2041	0	0	1,130,214	1,243,235
2042	0	0	1,130,214	1,243,235
2043	0	0	1,130,214	1,243,235
2044	0	0	1,130,214	1,243,235
2045	0	0	1,130,214	1,243,235
2046	0	0	1,130,214	1,243,235
2047	0	0	1,130,214	1,243,235
2048	0	0	1,130,214	1,243,235
2049	0	0	1,130,214	1,243,235
2050	0	0	1,130,214	1,243,235
2051	0	0	1,130,214	1,243,235
2052	0	0	1,130,214	1,243,235
2053	0	0	1,130,214	1,243,235
2054	0	0	1,130,214	1,243,235
2055	0	0	1,130,214	1,243,235
2056	0	0	1,130,214	1,243,235
2057	0	0	1,130,214	1,243,235
2058	0	0	1,130,214	1,243,235
2059	0	0	1,130,214	1,243,235

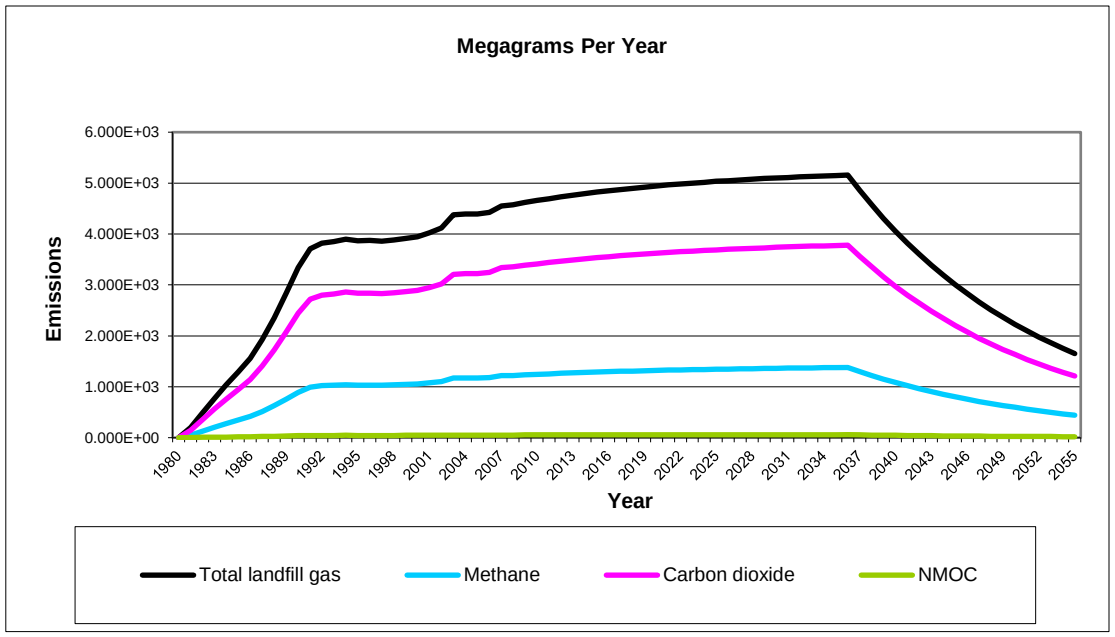
Pollutant Parameters

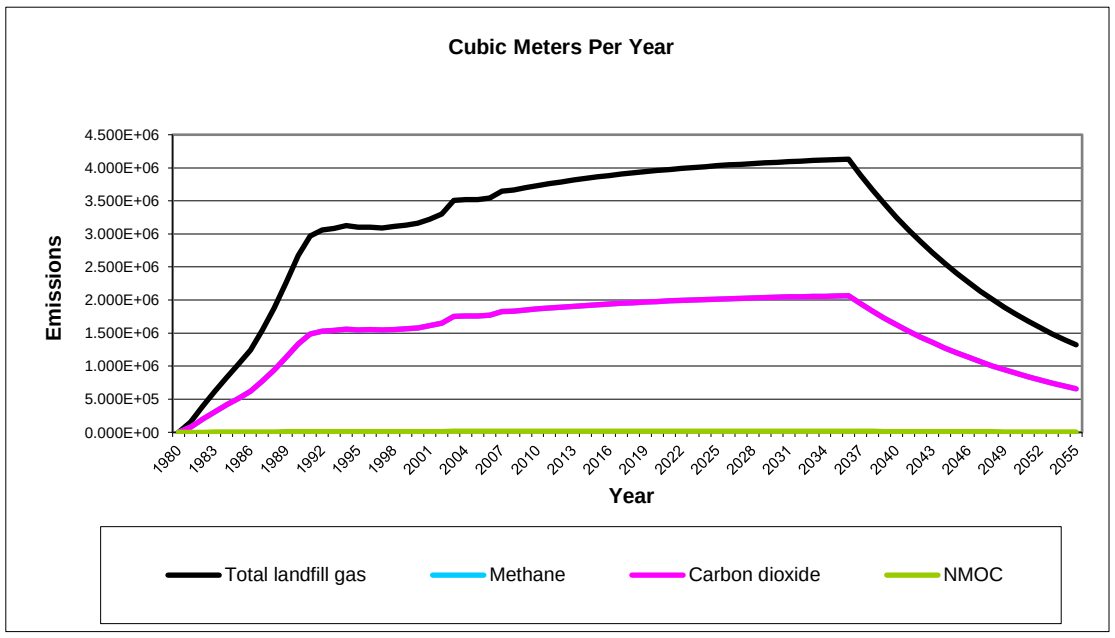
		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
6.000E+03
5.000E+03
4.000E+03
3.000E+03
2.000E+03
1.000E+03
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
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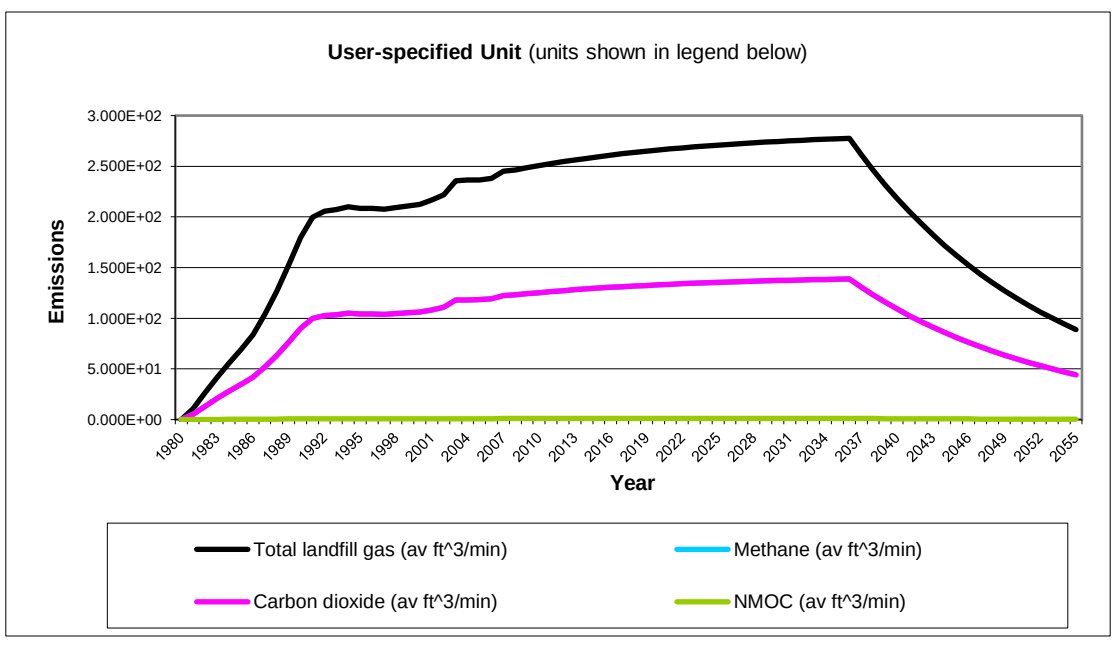
4.000E+06
3.500E+06
3.000E+06
2.500E+06
2.000E+06
1.500E+06
1.000E+06
5.000E+05
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
3.000E+02
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	1.951E+02	1.562E+05	1.050E+01	5.212E+01	7.812E+04	5.249E+00
1982	4.887E+02	3.913E+05	2.629E+01	1.305E+02	1.956E+05	1.315E+01
1983	7.709E+02	6.173E+05	4.147E+01	2.059E+02	3.086E+05	2.074E+01
1984	1.035E+03	8.287E+05	5.568E+01	2.764E+02	4.144E+05	2.784E+01
1985	1.287E+03	1.030E+06	6.923E+01	3.437E+02	5.152E+05	3.462E+01
1986	1.557E+03	1.247E+06	8.377E+01	4.159E+02	6.234E+05	4.189E+01
1987	1.924E+03	1.541E+06	1.035E+02	5.140E+02	7.704E+05	5.176E+01
1988	2.347E+03	1.879E+06	1.263E+02	6.269E+02	9.396E+05	6.313E+01
1989	2.835E+03	2.270E+06	1.525E+02	7.571E+02	1.135E+06	7.625E+01
1990	3.340E+03	2.675E+06	1.797E+02	8.922E+02	1.337E+06	8.986E+01
1991	3.709E+03	2.970E+06	1.995E+02	9.906E+02	1.485E+06	9.977E+01
1992	3.822E+03	3.060E+06	2.056E+02	1.021E+03	1.530E+06	1.028E+02
1993	3.850E+03	3.083E+06	2.072E+02	1.028E+03	1.542E+06	1.036E+02
1994	3.902E+03	3.124E+06	2.099E+02	1.042E+03	1.562E+06	1.050E+02
1995	3.870E+03	3.099E+06	2.082E+02	1.034E+03	1.550E+06	1.041E+02
1996	3.873E+03	3.101E+06	2.084E+02	1.035E+03	1.551E+06	1.042E+02
1997	3.861E+03	3.092E+06	2.078E+02	1.031E+03	1.546E+06	1.039E+02
1998	3.886E+03	3.112E+06	2.091E+02	1.038E+03	1.556E+06	1.045E+02
1999	3.915E+03	3.135E+06	2.106E+02	1.046E+03	1.567E+06	1.053E+02
2000	3.947E+03	3.161E+06	2.124E+02	1.054E+03	1.580E+06	1.062E+02
2001	4.026E+03	3.224E+06	2.166E+02	1.075E+03	1.612E+06	1.083E+02
2002	4.120E+03	3.299E+06	2.217E+02	1.101E+03	1.650E+06	1.108E+02
2003	4.380E+03	3.507E+06	2.356E+02	1.170E+03	1.754E+06	1.178E+02
2004	4.393E+03	3.518E+06	2.364E+02	1.173E+03	1.759E+06	1.182E+02
2005	4.397E+03	3.521E+06	2.365E+02	1.174E+03	1.760E+06	1.183E+02
2006	4.426E+03	3.544E+06	2.381E+02	1.182E+03	1.772E+06	1.191E+02
2007	4.553E+03	3.646E+06	2.450E+02	1.216E+03	1.823E+06	1.225E+02
2008	4.577E+03	3.665E+06	2.463E+02	1.223E+03	1.833E+06	1.231E+02
2009	4.619E+03	3.698E+06	2.485E+02	1.234E+03	1.849E+06	1.242E+02
2010	4.658E+03	3.730E+06	2.506E+02	1.244E+03	1.865E+06	1.253E+02
2011	4.695E+03	3.759E+06	2.526E+02	1.254E+03	1.880E+06	1.263E+02
2012	4.729E+03	3.787E+06	2.545E+02	1.263E+03	1.894E+06	1.272E+02
2013	4.762E+03	3.813E+06	2.562E+02	1.272E+03	1.907E+06	1.281E+02
2014	4.793E+03	3.838E+06	2.579E+02	1.280E+03	1.919E+06	1.289E+02
2015	4.822E+03	3.861E+06	2.594E+02	1.288E+03	1.931E+06	1.297E+02
2016	4.849E+03	3.883E+06	2.609E+02	1.295E+03	1.942E+06	1.304E+02
2017	4.875E+03	3.904E+06	2.623E+02	1.302E+03	1.952E+06	1.311E+02
2018	4.899E+03	3.923E+06	2.636E+02	1.309E+03	1.962E+06	1.318E+02
2019	4.922E+03	3.941E+06	2.648E+02	1.315E+03	1.971E+06	1.324E+02
2020	4.943E+03	3.958E+06	2.660E+02	1.320E+03	1.979E+06	1.330E+02
2021	4.964E+03	3.975E+06	2.671E+02	1.326E+03	1.987E+06	1.335E+02
2022	4.983E+03	3.990E+06	2.681E+02	1.331E+03	1.995E+06	1.340E+02
2023	5.001E+03	4.004E+06	2.690E+02	1.336E+03	2.002E+06	1.345E+02
2024	5.018E+03	4.018E+06	2.700E+02	1.340E+03	2.009E+06	1.350E+02
2025	5.033E+03	4.031E+06	2.708E+02	1.344E+03	2.015E+06	1.354E+02
2026	5.048E+03	4.043E+06	2.716E+02	1.349E+03	2.021E+06	1.358E+02
2027	5.063E+03	4.054E+06	2.724E+02	1.352E+03	2.027E+06	1.362E+02
2028	5.076E+03	4.065E+06	2.731E+02	1.356E+03	2.032E+06	1.365E+02
2029	5.088E+03	4.075E+06	2.738E+02	1.359E+03	2.037E+06	1.369E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	5.100E+03	4.084E+06	2.744E+02	1.362E+03	2.042E+06	1.372E+02
2031	5.111E+03	4.093E+06	2.750E+02	1.365E+03	2.046E+06	1.375E+02
2032	5.122E+03	4.101E+06	2.756E+02	1.368E+03	2.051E+06	1.378E+02
2033	5.132E+03	4.109E+06	2.761E+02	1.371E+03	2.055E+06	1.380E+02
2034	5.141E+03	4.117E+06	2.766E+02	1.373E+03	2.058E+06	1.383E+02
2035	5.150E+03	4.124E+06	2.771E+02	1.376E+03	2.062E+06	1.385E+02
2036	5.158E+03	4.130E+06	2.775E+02	1.378E+03	2.065E+06	1.388E+02
2037	4.857E+03	3.890E+06	2.613E+02	1.297E+03	1.945E+06	1.307E+02
2038	4.575E+03	3.663E+06	2.461E+02	1.222E+03	1.832E+06	1.231E+02
2039	4.308E+03	3.450E+06	2.318E+02	1.151E+03	1.725E+06	1.159E+02
2040	4.057E+03	3.249E+06	2.183E+02	1.084E+03	1.624E+06	1.091E+02
2041	3.821E+03	3.060E+06	2.056E+02	1.021E+03	1.530E+06	1.028E+02
2042	3.599E+03	2.882E+06	1.936E+02	9.612E+02	1.441E+06	9.680E+01
2043	3.389E+03	2.714E+06	1.823E+02	9.052E+02	1.357E+06	9.117E+01
2044	3.192E+03	2.556E+06	1.717E+02	8.525E+02	1.278E+06	8.586E+01
2045	3.006E+03	2.407E+06	1.617E+02	8.029E+02	1.203E+06	8.086E+01
2046	2.831E+03	2.267E+06	1.523E+02	7.561E+02	1.133E+06	7.615E+01
2047	2.666E+03	2.135E+06	1.434E+02	7.121E+02	1.067E+06	7.171E+01
2048	2.511E+03	2.010E+06	1.351E+02	6.706E+02	1.005E+06	6.754E+01
2049	2.364E+03	1.893E+06	1.272E+02	6.316E+02	9.466E+05	6.361E+01
2050	2.227E+03	1.783E+06	1.198E+02	5.948E+02	8.915E+05	5.990E+01
2051	2.097E+03	1.679E+06	1.128E+02	5.601E+02	8.396E+05	5.641E+01
2052	1.975E+03	1.581E+06	1.063E+02	5.275E+02	7.907E+05	5.313E+01
2053	1.860E+03	1.489E+06	1.001E+02	4.968E+02	7.447E+05	5.003E+01
2054	1.752E+03	1.403E+06	9.424E+01	4.679E+02	7.013E+05	4.712E+01
2055	1.650E+03	1.321E+06	8.875E+01	4.406E+02	6.605E+05	4.438E+01
2056	1.554E+03	1.244E+06	8.358E+01	4.150E+02	6.220E+05	4.179E+01
2057	1.463E+03	1.172E+06	7.872E+01	3.908E+02	5.858E+05	3.936E+01
2058	1.378E+03	1.103E+06	7.413E+01	3.680E+02	5.517E+05	3.707E+01
2059	1.298E+03	1.039E+06	6.981E+01	3.466E+02	5.195E+05	3.491E+01
2060	1.222E+03	9.786E+05	6.575E+01	3.264E+02	4.893E+05	3.287E+01
2061	1.151E+03	9.216E+05	6.192E+01	3.074E+02	4.608E+05	3.096E+01
2062	1.084E+03	8.679E+05	5.831E+01	2.895E+02	4.339E+05	2.916E+01
2063	1.021E+03	8.174E+05	5.492E+01	2.726E+02	4.087E+05	2.746E+01
2064	9.613E+02	7.698E+05	5.172E+01	2.568E+02	3.849E+05	2.586E+01
2065	9.053E+02	7.249E+05	4.871E+01	2.418E+02	3.625E+05	2.435E+01
2066	8.526E+02	6.827E+05	4.587E+01	2.277E+02	3.414E+05	2.294E+01
2067	8.029E+02	6.430E+05	4.320E+01	2.145E+02	3.215E+05	2.160E+01
2068	7.562E+02	6.055E+05	4.068E+01	2.020E+02	3.028E+05	2.034E+01
2069	7.121E+02	5.702E+05	3.831E+01	1.902E+02	2.851E+05	1.916E+01
2070	6.707E+02	5.370E+05	3.608E+01	1.791E+02	2.685E+05	1.804E+01
2071	6.316E+02	5.058E+05	3.398E+01	1.687E+02	2.529E+05	1.699E+01
2072	5.948E+02	4.763E+05	3.200E+01	1.589E+02	2.382E+05	1.600E+01
2073	5.602E+02	4.486E+05	3.014E+01	1.496E+02	2.243E+05	1.507E+01
2074	5.276E+02	4.225E+05	2.838E+01	1.409E+02	2.112E+05	1.419E+01
2075	4.968E+02	3.978E+05	2.673E+01	1.327E+02	1.989E+05	1.337E+01
2076	4.679E+02	3.747E+05	2.517E+01	1.250E+02	1.873E+05	1.259E+01
2077	4.407E+02	3.529E+05	2.371E+01	1.177E+02	1.764E+05	1.185E+01
2078	4.150E+02	3.323E+05	2.233E+01	1.109E+02	1.662E+05	1.116E+01
2079	3.908E+02	3.130E+05	2.103E+01	1.044E+02	1.565E+05	1.051E+01
2080	3.681E+02	2.947E+05	1.980E+01	9.832E+01	1.474E+05	9.902E+00

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2081	3.466E+02	2.776E+05	1.865E+01	9.259E+01	1.388E+05	9.325E+00
2082	3.264E+02	2.614E+05	1.756E+01	8.720E+01	1.307E+05	8.782E+00
2083	3.074E+02	2.462E+05	1.654E+01	8.212E+01	1.231E+05	8.270E+00
2084	2.895E+02	2.318E+05	1.558E+01	7.734E+01	1.159E+05	7.789E+00
2085	2.727E+02	2.183E+05	1.467E+01	7.283E+01	1.092E+05	7.335E+00
2086	2.568E+02	2.056E+05	1.382E+01	6.859E+01	1.028E+05	6.908E+00
2087	2.418E+02	1.937E+05	1.301E+01	6.460E+01	9.683E+04	6.506E+00
2088	2.278E+02	1.824E+05	1.225E+01	6.084E+01	9.119E+04	6.127E+00
2089	2.145E+02	1.718E+05	1.154E+01	5.729E+01	8.588E+04	5.770E+00
2090	2.020E+02	1.618E+05	1.087E+01	5.396E+01	8.088E+04	5.434E+00
2091	1.902E+02	1.523E+05	1.024E+01	5.081E+01	7.617E+04	5.118E+00
2092	1.792E+02	1.435E+05	9.639E+00	4.786E+01	7.173E+04	4.820E+00
2093	1.687E+02	1.351E+05	9.078E+00	4.507E+01	6.755E+04	4.539E+00
2094	1.589E+02	1.272E+05	8.549E+00	4.244E+01	6.362E+04	4.275E+00
2095	1.496E+02	1.198E+05	8.051E+00	3.997E+01	5.991E+04	4.026E+00
2096	1.409E+02	1.129E+05	7.582E+00	3.764E+01	5.643E+04	3.791E+00
2097	1.327E+02	1.063E+05	7.141E+00	3.545E+01	5.314E+04	3.570E+00
2098	1.250E+02	1.001E+05	6.725E+00	3.339E+01	5.005E+04	3.363E+00
2099	1.177E+02	9.426E+04	6.333E+00	3.144E+01	4.713E+04	3.167E+00
2100	1.109E+02	8.877E+04	5.965E+00	2.961E+01	4.439E+04	2.982E+00
2101	1.044E+02	8.360E+04	5.617E+00	2.789E+01	4.180E+04	2.809E+00
2102	9.832E+01	7.873E+04	5.290E+00	2.626E+01	3.937E+04	2.645E+00
2103	9.260E+01	7.415E+04	4.982E+00	2.473E+01	3.707E+04	2.491E+00
2104	8.721E+01	6.983E+04	4.692E+00	2.329E+01	3.492E+04	2.346E+00
2105	8.213E+01	6.576E+04	4.419E+00	2.194E+01	3.288E+04	2.209E+00
2106	7.734E+01	6.193E+04	4.161E+00	2.066E+01	3.097E+04	2.081E+00
2107	7.284E+01	5.833E+04	3.919E+00	1.946E+01	2.916E+04	1.960E+00
2108	6.860E+01	5.493E+04	3.691E+00	1.832E+01	2.747E+04	1.845E+00
2109	6.460E+01	5.173E+04	3.476E+00	1.726E+01	2.587E+04	1.738E+00
2110	6.084E+01	4.872E+04	3.273E+00	1.625E+01	2.436E+04	1.637E+00
2111	5.730E+01	4.588E+04	3.083E+00	1.531E+01	2.294E+04	1.541E+00
2112	5.396E+01	4.321E+04	2.903E+00	1.441E+01	2.161E+04	1.452E+00
2113	5.082E+01	4.069E+04	2.734E+00	1.357E+01	2.035E+04	1.367E+00
2114	4.786E+01	3.832E+04	2.575E+00	1.278E+01	1.916E+04	1.287E+00
2115	4.507E+01	3.609E+04	2.425E+00	1.204E+01	1.805E+04	1.213E+00
2116	4.245E+01	3.399E+04	2.284E+00	1.134E+01	1.700E+04	1.142E+00
2117	3.998E+01	3.201E+04	2.151E+00	1.068E+01	1.601E+04	1.075E+00
2118	3.765E+01	3.015E+04	2.026E+00	1.006E+01	1.507E+04	1.013E+00
2119	3.546E+01	2.839E+04	1.908E+00	9.471E+00	1.420E+04	9.538E-01
2120	3.339E+01	2.674E+04	1.796E+00	8.919E+00	1.337E+04	8.982E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
1980	0	0	0	0	0	0
1981	1.430E+02	7.812E+04	5.249E+00	2.240E+00	6.250E+02	4.199E-02
1982	3.581E+02	1.956E+05	1.315E+01	5.610E+00	1.565E+03	1.052E-01
1983	5.650E+02	3.086E+05	2.074E+01	8.850E+00	2.469E+03	1.659E-01
1984	7.585E+02	4.144E+05	2.784E+01	1.188E+01	3.315E+03	2.227E-01
1985	9.430E+02	5.152E+05	3.462E+01	1.477E+01	4.121E+03	2.769E-01
1986	1.141E+03	6.234E+05	4.189E+01	1.788E+01	4.987E+03	3.351E-01
1987	1.410E+03	7.704E+05	5.176E+01	2.209E+01	6.163E+03	4.141E-01
1988	1.720E+03	9.396E+05	6.313E+01	2.694E+01	7.517E+03	5.051E-01
1989	2.077E+03	1.135E+06	7.625E+01	3.254E+01	9.079E+03	6.100E-01
1990	2.448E+03	1.337E+06	8.986E+01	3.835E+01	1.070E+04	7.189E-01
1991	2.718E+03	1.485E+06	9.977E+01	4.258E+01	1.188E+04	7.982E-01
1992	2.801E+03	1.530E+06	1.028E+02	4.388E+01	1.224E+04	8.224E-01
1993	2.822E+03	1.542E+06	1.036E+02	4.421E+01	1.233E+04	8.286E-01
1994	2.859E+03	1.562E+06	1.050E+02	4.479E+01	1.250E+04	8.397E-01
1995	2.837E+03	1.550E+06	1.041E+02	4.444E+01	1.240E+04	8.330E-01
1996	2.838E+03	1.551E+06	1.042E+02	4.447E+01	1.241E+04	8.335E-01
1997	2.830E+03	1.546E+06	1.039E+02	4.433E+01	1.237E+04	8.310E-01
1998	2.848E+03	1.556E+06	1.045E+02	4.461E+01	1.245E+04	8.363E-01
1999	2.869E+03	1.567E+06	1.053E+02	4.494E+01	1.254E+04	8.424E-01
2000	2.893E+03	1.580E+06	1.062E+02	4.532E+01	1.264E+04	8.494E-01
2001	2.951E+03	1.612E+06	1.083E+02	4.622E+01	1.290E+04	8.664E-01
2002	3.020E+03	1.650E+06	1.108E+02	4.730E+01	1.320E+04	8.867E-01
2003	3.210E+03	1.754E+06	1.178E+02	5.029E+01	1.403E+04	9.426E-01
2004	3.220E+03	1.759E+06	1.182E+02	5.044E+01	1.407E+04	9.454E-01
2005	3.222E+03	1.760E+06	1.183E+02	5.048E+01	1.408E+04	9.462E-01
2006	3.244E+03	1.772E+06	1.191E+02	5.082E+01	1.418E+04	9.525E-01
2007	3.337E+03	1.823E+06	1.225E+02	5.227E+01	1.458E+04	9.798E-01
2008	3.355E+03	1.833E+06	1.231E+02	5.255E+01	1.466E+04	9.850E-01
2009	3.385E+03	1.849E+06	1.242E+02	5.303E+01	1.479E+04	9.940E-01
2010	3.414E+03	1.865E+06	1.253E+02	5.348E+01	1.492E+04	1.002E+00
2011	3.441E+03	1.880E+06	1.263E+02	5.390E+01	1.504E+04	1.010E+00
2012	3.466E+03	1.894E+06	1.272E+02	5.430E+01	1.515E+04	1.018E+00
2013	3.490E+03	1.907E+06	1.281E+02	5.467E+01	1.525E+04	1.025E+00
2014	3.513E+03	1.919E+06	1.289E+02	5.503E+01	1.535E+04	1.031E+00
2015	3.534E+03	1.931E+06	1.297E+02	5.536E+01	1.544E+04	1.038E+00
2016	3.554E+03	1.942E+06	1.304E+02	5.567E+01	1.553E+04	1.044E+00
2017	3.573E+03	1.952E+06	1.311E+02	5.597E+01	1.561E+04	1.049E+00
2018	3.591E+03	1.962E+06	1.318E+02	5.625E+01	1.569E+04	1.054E+00
2019	3.607E+03	1.971E+06	1.324E+02	5.651E+01	1.577E+04	1.059E+00
2020	3.623E+03	1.979E+06	1.330E+02	5.676E+01	1.583E+04	1.064E+00
2021	3.638E+03	1.987E+06	1.335E+02	5.699E+01	1.590E+04	1.068E+00
2022	3.652E+03	1.995E+06	1.340E+02	5.721E+01	1.596E+04	1.072E+00
2023	3.665E+03	2.002E+06	1.345E+02	5.741E+01	1.602E+04	1.076E+00
2024	3.677E+03	2.009E+06	1.350E+02	5.761E+01	1.607E+04	1.080E+00
2025	3.689E+03	2.015E+06	1.354E+02	5.779E+01	1.612E+04	1.083E+00
2026	3.700E+03	2.021E+06	1.358E+02	5.796E+01	1.617E+04	1.086E+00
2027	3.710E+03	2.027E+06	1.362E+02	5.812E+01	1.622E+04	1.090E+00
2028	3.720E+03	2.032E+06	1.365E+02	5.828E+01	1.626E+04	1.092E+00
2029	3.729E+03	2.037E+06	1.369E+02	5.842E+01	1.630E+04	1.095E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	3.738E+03	2.042E+06	1.372E+02	5.856E+01	1.634E+04	1.098E+00
2031	3.746E+03	2.046E+06	1.375E+02	5.868E+01	1.637E+04	1.100E+00
2032	3.754E+03	2.051E+06	1.378E+02	5.880E+01	1.641E+04	1.102E+00
2033	3.761E+03	2.055E+06	1.380E+02	5.892E+01	1.644E+04	1.104E+00
2034	3.768E+03	2.058E+06	1.383E+02	5.902E+01	1.647E+04	1.106E+00
2035	3.774E+03	2.062E+06	1.385E+02	5.912E+01	1.649E+04	1.108E+00
2036	3.780E+03	2.065E+06	1.388E+02	5.922E+01	1.652E+04	1.110E+00
2037	3.560E+03	1.945E+06	1.307E+02	5.577E+01	1.556E+04	1.045E+00
2038	3.353E+03	1.832E+06	1.231E+02	5.252E+01	1.465E+04	9.845E-01
2039	3.157E+03	1.725E+06	1.159E+02	4.946E+01	1.380E+04	9.272E-01
2040	2.974E+03	1.624E+06	1.091E+02	4.658E+01	1.300E+04	8.732E-01
2041	2.800E+03	1.530E+06	1.028E+02	4.387E+01	1.224E+04	8.223E-01
2042	2.637E+03	1.441E+06	9.680E+01	4.131E+01	1.153E+04	7.744E-01
2043	2.484E+03	1.357E+06	9.117E+01	3.891E+01	1.085E+04	7.293E-01
2044	2.339E+03	1.278E+06	8.586E+01	3.664E+01	1.022E+04	6.869E-01
2045	2.203E+03	1.203E+06	8.086E+01	3.451E+01	9.627E+03	6.469E-01
2046	2.075E+03	1.133E+06	7.615E+01	3.250E+01	9.067E+03	6.092E-01
2047	1.954E+03	1.067E+06	7.171E+01	3.061E+01	8.539E+03	5.737E-01
2048	1.840E+03	1.005E+06	6.754E+01	2.882E+01	8.041E+03	5.403E-01
2049	1.733E+03	9.466E+05	6.361E+01	2.715E+01	7.573E+03	5.088E-01
2050	1.632E+03	8.915E+05	5.990E+01	2.556E+01	7.132E+03	4.792E-01
2051	1.537E+03	8.396E+05	5.641E+01	2.408E+01	6.717E+03	4.513E-01
2052	1.447E+03	7.907E+05	5.313E+01	2.267E+01	6.326E+03	4.250E-01
2053	1.363E+03	7.447E+05	5.003E+01	2.135E+01	5.957E+03	4.003E-01
2054	1.284E+03	7.013E+05	4.712E+01	2.011E+01	5.610E+03	3.770E-01
2055	1.209E+03	6.605E+05	4.438E+01	1.894E+01	5.284E+03	3.550E-01
2056	1.139E+03	6.220E+05	4.179E+01	1.784E+01	4.976E+03	3.343E-01
2057	1.072E+03	5.858E+05	3.936E+01	1.680E+01	4.686E+03	3.149E-01
2058	1.010E+03	5.517E+05	3.707E+01	1.582E+01	4.413E+03	2.965E-01
2059	9.510E+02	5.195E+05	3.491E+01	1.490E+01	4.156E+03	2.793E-01
2060	8.956E+02	4.893E+05	3.287E+01	1.403E+01	3.914E+03	2.630E-01
2061	8.435E+02	4.608E+05	3.096E+01	1.321E+01	3.686E+03	2.477E-01
2062	7.943E+02	4.339E+05	2.916E+01	1.244E+01	3.472E+03	2.333E-01
2063	7.481E+02	4.087E+05	2.746E+01	1.172E+01	3.269E+03	2.197E-01
2064	7.045E+02	3.849E+05	2.586E+01	1.104E+01	3.079E+03	2.069E-01
2065	6.635E+02	3.625E+05	2.435E+01	1.039E+01	2.900E+03	1.948E-01
2066	6.249E+02	3.414E+05	2.294E+01	9.789E+00	2.731E+03	1.835E-01
2067	5.885E+02	3.215E+05	2.160E+01	9.219E+00	2.572E+03	1.728E-01
2068	5.542E+02	3.028E+05	2.034E+01	8.682E+00	2.422E+03	1.627E-01
2069	5.219E+02	2.851E+05	1.916E+01	8.176E+00	2.281E+03	1.533E-01
2070	4.915E+02	2.685E+05	1.804E+01	7.700E+00	2.148E+03	1.443E-01
2071	4.629E+02	2.529E+05	1.699E+01	7.252E+00	2.023E+03	1.359E-01
2072	4.359E+02	2.382E+05	1.600E+01	6.829E+00	1.905E+03	1.280E-01
2073	4.106E+02	2.243E+05	1.507E+01	6.432E+00	1.794E+03	1.206E-01
2074	3.866E+02	2.112E+05	1.419E+01	6.057E+00	1.690E+03	1.135E-01
2075	3.641E+02	1.989E+05	1.337E+01	5.704E+00	1.591E+03	1.069E-01
2076	3.429E+02	1.873E+05	1.259E+01	5.372E+00	1.499E+03	1.007E-01
2077	3.230E+02	1.764E+05	1.185E+01	5.059E+00	1.411E+03	9.483E-02
2078	3.041E+02	1.662E+05	1.116E+01	4.765E+00	1.329E+03	8.931E-02
2079	2.864E+02	1.565E+05	1.051E+01	4.487E+00	1.252E+03	8.411E-02
2080	2.698E+02	1.474E+05	9.902E+00	4.226E+00	1.179E+03	7.921E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	2.540E+02	1.388E+05	9.325E+00	3.980E+00	1.110E+03	7.460E-02
2082	2.393E+02	1.307E+05	8.782E+00	3.748E+00	1.046E+03	7.026E-02
2083	2.253E+02	1.231E+05	8.270E+00	3.530E+00	9.847E+02	6.616E-02
2084	2.122E+02	1.159E+05	7.789E+00	3.324E+00	9.274E+02	6.231E-02
2085	1.998E+02	1.092E+05	7.335E+00	3.131E+00	8.734E+02	5.868E-02
2086	1.882E+02	1.028E+05	6.908E+00	2.948E+00	8.225E+02	5.526E-02
2087	1.772E+02	9.683E+04	6.506E+00	2.777E+00	7.746E+02	5.205E-02
2088	1.669E+02	9.119E+04	6.127E+00	2.615E+00	7.295E+02	4.902E-02
2089	1.572E+02	8.588E+04	5.770E+00	2.463E+00	6.870E+02	4.616E-02
2090	1.480E+02	8.088E+04	5.434E+00	2.319E+00	6.470E+02	4.347E-02
2091	1.394E+02	7.617E+04	5.118E+00	2.184E+00	6.093E+02	4.094E-02
2092	1.313E+02	7.173E+04	4.820E+00	2.057E+00	5.738E+02	3.856E-02
2093	1.237E+02	6.755E+04	4.539E+00	1.937E+00	5.404E+02	3.631E-02
2094	1.165E+02	6.362E+04	4.275E+00	1.824E+00	5.090E+02	3.420E-02
2095	1.097E+02	5.991E+04	4.026E+00	1.718E+00	4.793E+02	3.221E-02
2096	1.033E+02	5.643E+04	3.791E+00	1.618E+00	4.514E+02	3.033E-02
2097	9.727E+01	5.314E+04	3.570E+00	1.524E+00	4.251E+02	2.856E-02
2098	9.161E+01	5.005E+04	3.363E+00	1.435E+00	4.004E+02	2.690E-02
2099	8.627E+01	4.713E+04	3.167E+00	1.352E+00	3.770E+02	2.533E-02
2100	8.125E+01	4.439E+04	2.982E+00	1.273E+00	3.551E+02	2.386E-02
2101	7.652E+01	4.180E+04	2.809E+00	1.199E+00	3.344E+02	2.247E-02
2102	7.206E+01	3.937E+04	2.645E+00	1.129E+00	3.149E+02	2.116E-02
2103	6.786E+01	3.707E+04	2.491E+00	1.063E+00	2.966E+02	1.993E-02
2104	6.391E+01	3.492E+04	2.346E+00	1.001E+00	2.793E+02	1.877E-02
2105	6.019E+01	3.288E+04	2.209E+00	9.429E-01	2.631E+02	1.767E-02
2106	5.669E+01	3.097E+04	2.081E+00	8.880E-01	2.477E+02	1.665E-02
2107	5.338E+01	2.916E+04	1.960E+00	8.363E-01	2.333E+02	1.568E-02
2108	5.028E+01	2.747E+04	1.845E+00	7.876E-01	2.197E+02	1.476E-02
2109	4.735E+01	2.587E+04	1.738E+00	7.417E-01	2.069E+02	1.390E-02
2110	4.459E+01	2.436E+04	1.637E+00	6.985E-01	1.949E+02	1.309E-02
2111	4.199E+01	2.294E+04	1.541E+00	6.578E-01	1.835E+02	1.233E-02
2112	3.955E+01	2.161E+04	1.452E+00	6.195E-01	1.728E+02	1.161E-02
2113	3.724E+01	2.035E+04	1.367E+00	5.835E-01	1.628E+02	1.094E-02
2114	3.508E+01	1.916E+04	1.287E+00	5.495E-01	1.533E+02	1.030E-02
2115	3.303E+01	1.805E+04	1.213E+00	5.175E-01	1.444E+02	9.700E-03
2116	3.111E+01	1.700E+04	1.142E+00	4.873E-01	1.360E+02	9.135E-03
2117	2.930E+01	1.601E+04	1.075E+00	4.590E-01	1.280E+02	8.603E-03
2118	2.759E+01	1.507E+04	1.013E+00	4.322E-01	1.206E+02	8.102E-03
2119	2.598E+01	1.420E+04	9.538E-01	4.071E-01	1.136E+02	7.630E-03
2120	2.447E+01	1.337E+04	8.982E-01	3.834E-01	1.070E+02	7.186E-03

Summary Report

Landfill Name or Identifier: CLK Lindsay Ops

Date: Wednesday, November 27, 2019

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,

Q_{CH4} = annual methane generation in the year of the calculation *(m^3/year)*
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate (*$year^{-1}$*)
L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the ith year (*Mg*)
t_{ij} = age of the jth section of waste mass M_i accepted in the ith year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1980**	
Landfill Closure Year (with 80-year limit)	**2035**	
Actual Closure Year (without limit)	***2035***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.040**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1980	12,159	13,375	0	0
1981	18,999	20,899	12,159	13,375
1982	19,359	21,295	31,158	34,274
1983	19,251	21,176	50,517	55,569
1984	19,449	21,394	69,768	76,745
1985	21,510	23,661	89,217	98,139
1986	28,530	31,383	110,727	121,800
1987	33,319	36,651	139,257	153,183
1988	38,909	42,800	172,576	189,834
1989	41,806	45,987	211,485	232,634
1990	35,075	38,583	253,291	278,620
1991	20,489	22,538	288,366	317,203
1992	15,665	17,232	308,855	339,741
1993	17,164	18,880	324,520	356,972
1994	12,220	13,442	341,684	375,852
1995	14,201	15,621	353,904	389,294
1996	13,334	14,667	368,105	404,916
1997	15,532	17,085	381,439	419,583
1998	15,892	17,481	396,971	436,668
1999	16,226	17,849	412,863	454,149
2000	19,242	21,166	429,089	471,998
2001	20,479	22,527	448,331	493,164
2002	31,140	34,254	468,810	515,691
2003	16,714	18,385	499,950	549,945
2004	16,163	17,779	516,664	568,330
2005	17,787	19,566	532,827	586,110
2006	23,965	26,362	550,614	605,675
2007	18,035	19,839	574,579	632,037
2008	19,200	21,120	592,614	651,875
2009	19,200	21,120	611,814	672,995
2010	19,200	21,120	631,014	694,115
2011	19,200	21,120	650,214	715,235
2012	19,200	21,120	669,414	736,355
2013	19,200	21,120	688,614	757,475
2014	19,200	21,120	707,814	778,595
2015	19,200	21,120	727,014	799,715
2016	19,200	21,120	746,214	820,835
2017	19,200	21,120	765,414	841,955
2018	19,200	21,120	784,614	863,075
2019	19,200	21,120	803,814	884,195

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2020	19,200	21,120	823,014	905,315
2021	19,200	21,120	842,214	926,435
2022	19,200	21,120	861,414	947,555
2023	19,200	21,120	880,614	968,675
2024	19,200	21,120	899,814	989,795
2025	19,200	21,120	919,014	1,010,915
2026	19,200	21,120	938,214	1,032,035
2027	19,200	21,120	957,414	1,053,155
2028	19,200	21,120	976,614	1,074,275
2029	19,200	21,120	995,814	1,095,395
2030	19,200	21,120	1,015,014	1,116,515
2031	19,200	21,120	1,034,214	1,137,635
2032	19,200	21,120	1,053,414	1,158,755
2033	19,200	21,120	1,072,614	1,179,875
2034	19,200	21,120	1,091,814	1,200,995
2035	19,200	21,120	1,111,014	1,222,115
2036	0	0	1,130,214	1,243,235
2037	0	0	1,130,214	1,243,235
2038	0	0	1,130,214	1,243,235
2039	0	0	1,130,214	1,243,235
2040	0	0	1,130,214	1,243,235
2041	0	0	1,130,214	1,243,235
2042	0	0	1,130,214	1,243,235
2043	0	0	1,130,214	1,243,235
2044	0	0	1,130,214	1,243,235
2045	0	0	1,130,214	1,243,235
2046	0	0	1,130,214	1,243,235
2047	0	0	1,130,214	1,243,235
2048	0	0	1,130,214	1,243,235
2049	0	0	1,130,214	1,243,235
2050	0	0	1,130,214	1,243,235
2051	0	0	1,130,214	1,243,235
2052	0	0	1,130,214	1,243,235
2053	0	0	1,130,214	1,243,235
2054	0	0	1,130,214	1,243,235
2055	0	0	1,130,214	1,243,235
2056	0	0	1,130,214	1,243,235
2057	0	0	1,130,214	1,243,235
2058	0	0	1,130,214	1,243,235
2059	0	0	1,130,214	1,243,235

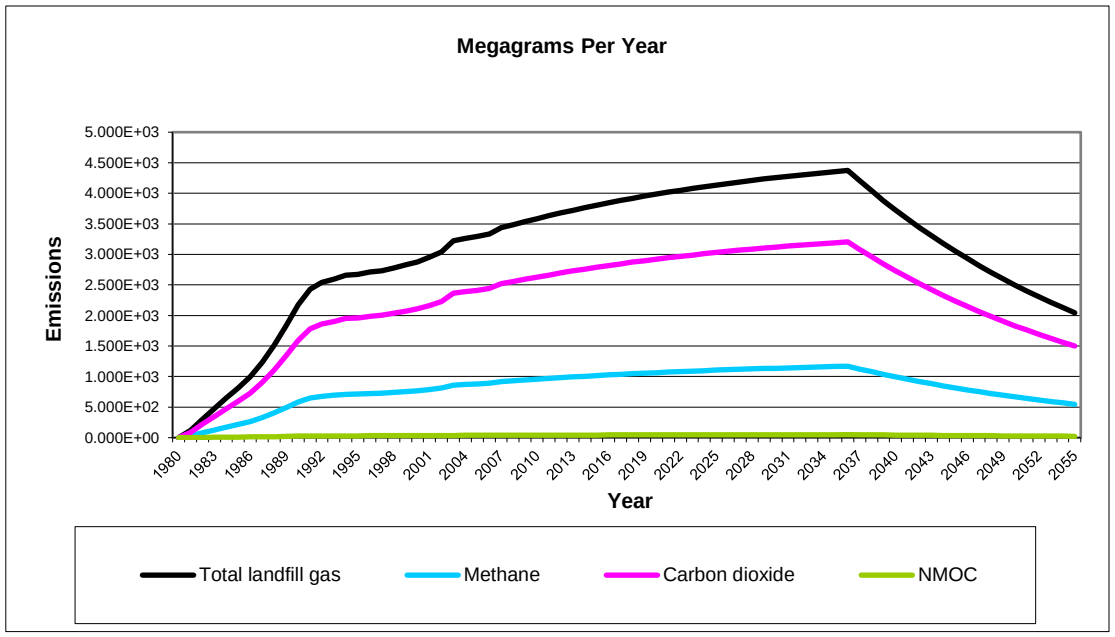
Pollutant Parameters

	Compound	Gas / Pollutant Default Parameters: Concentration (*ppmv*)	Molecular Weight	User-specified Pollutant Parameters: Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
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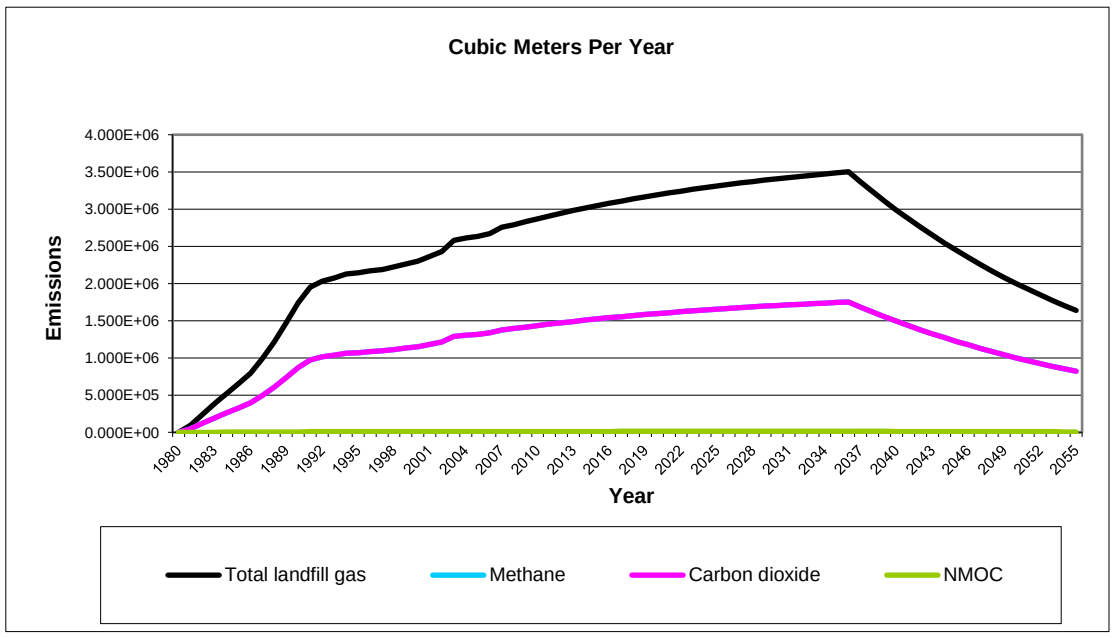
4.500E+03
4.000E+03
3.500E+03
3.000E+03
2.500E+03
2.000E+03
1.500E+03
1.000E+03
5.000E+02
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
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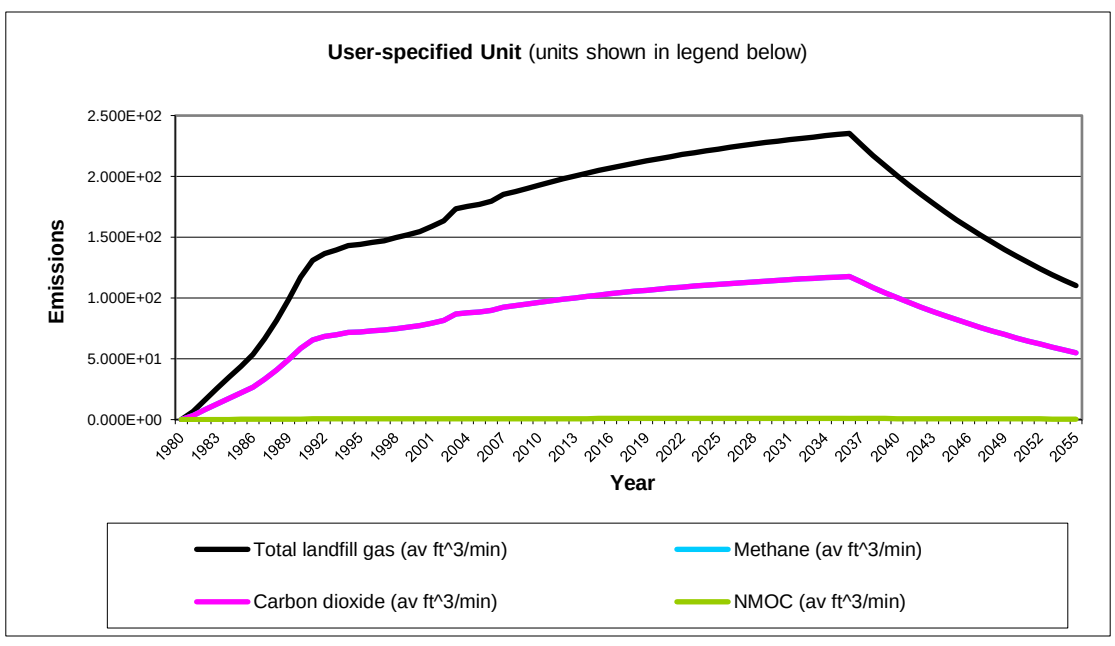
3.500E+06
3.000E+06
2.500E+06
2.000E+06
1.500E+06
1.000E+06
5.000E+05
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
2.500E+02
2.000E+02
1.500E+02
1.000E+02
5.000E+01
0.000E+00
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013 2016 2019 2022 2025 2028 2031 2034 2037 2040 2043 2046 2049 2052 2055
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
1980	0	0	0	0	0	0
1981	1.193E+02	9.554E+04	6.420E+00	3.187E+01	4.777E+04	3.210E+00
1982	3.011E+02	2.411E+05	1.620E+01	8.042E+01	1.205E+05	8.099E+00
1983	4.792E+02	3.838E+05	2.578E+01	1.280E+02	1.919E+05	1.289E+01
1984	6.494E+02	5.200E+05	3.494E+01	1.735E+02	2.600E+05	1.747E+01
1985	8.148E+02	6.524E+05	4.384E+01	2.176E+02	3.262E+05	2.192E+01
1986	9.939E+02	7.959E+05	5.347E+01	2.655E+02	3.979E+05	2.674E+01
1987	1.235E+03	9.888E+05	6.644E+01	3.298E+02	4.944E+05	3.322E+01
1988	1.513E+03	1.212E+06	8.143E+01	4.042E+02	6.059E+05	4.071E+01
1989	1.836E+03	1.470E+06	9.878E+01	4.904E+02	7.350E+05	4.939E+01
1990	2.174E+03	1.741E+06	1.170E+02	5.807E+02	8.705E+05	5.849E+01
1991	2.433E+03	1.948E+06	1.309E+02	6.499E+02	9.742E+05	6.545E+01
1992	2.539E+03	2.033E+06	1.366E+02	6.781E+02	1.016E+06	6.830E+01
1993	2.593E+03	2.076E+06	1.395E+02	6.926E+02	1.038E+06	6.975E+01
1994	2.660E+03	2.130E+06	1.431E+02	7.104E+02	1.065E+06	7.155E+01
1995	2.675E+03	2.142E+06	1.439E+02	7.146E+02	1.071E+06	7.197E+01
1996	2.710E+03	2.170E+06	1.458E+02	7.238E+02	1.085E+06	7.290E+01
1997	2.734E+03	2.190E+06	1.471E+02	7.304E+02	1.095E+06	7.356E+01
1998	2.780E+03	2.226E+06	1.495E+02	7.424E+02	1.113E+06	7.477E+01
1999	2.827E+03	2.263E+06	1.521E+02	7.550E+02	1.132E+06	7.604E+01
2000	2.875E+03	2.302E+06	1.547E+02	7.679E+02	1.151E+06	7.734E+01
2001	2.951E+03	2.363E+06	1.588E+02	7.882E+02	1.182E+06	7.939E+01
2002	3.036E+03	2.431E+06	1.634E+02	8.110E+02	1.216E+06	8.168E+01
2003	3.223E+03	2.581E+06	1.734E+02	8.608E+02	1.290E+06	8.670E+01
2004	3.260E+03	2.611E+06	1.754E+02	8.709E+02	1.305E+06	8.771E+01
2005	3.291E+03	2.635E+06	1.771E+02	8.791E+02	1.318E+06	8.854E+01
2006	3.337E+03	2.672E+06	1.795E+02	8.913E+02	1.336E+06	8.976E+01
2007	3.441E+03	2.755E+06	1.851E+02	9.191E+02	1.378E+06	9.257E+01
2008	3.483E+03	2.789E+06	1.874E+02	9.304E+02	1.395E+06	9.370E+01
2009	3.535E+03	2.831E+06	1.902E+02	9.442E+02	1.415E+06	9.509E+01
2010	3.585E+03	2.870E+06	1.929E+02	9.575E+02	1.435E+06	9.643E+01
2011	3.633E+03	2.909E+06	1.954E+02	9.703E+02	1.454E+06	9.772E+01
2012	3.679E+03	2.946E+06	1.979E+02	9.826E+02	1.473E+06	9.896E+01
2013	3.723E+03	2.981E+06	2.003E+02	9.944E+02	1.490E+06	1.001E+02
2014	3.765E+03	3.015E+06	2.026E+02	1.006E+03	1.507E+06	1.013E+02
2015	3.806E+03	3.048E+06	2.048E+02	1.017E+03	1.524E+06	1.024E+02
2016	3.845E+03	3.079E+06	2.069E+02	1.027E+03	1.539E+06	1.034E+02
2017	3.883E+03	3.109E+06	2.089E+02	1.037E+03	1.555E+06	1.045E+02
2018	3.919E+03	3.138E+06	2.108E+02	1.047E+03	1.569E+06	1.054E+02
2019	3.954E+03	3.166E+06	2.127E+02	1.056E+03	1.583E+06	1.064E+02
2020	3.987E+03	3.193E+06	2.145E+02	1.065E+03	1.596E+06	1.073E+02
2021	4.019E+03	3.218E+06	2.162E+02	1.074E+03	1.609E+06	1.081E+02
2022	4.050E+03	3.243E+06	2.179E+02	1.082E+03	1.622E+06	1.089E+02
2023	4.080E+03	3.267E+06	2.195E+02	1.090E+03	1.633E+06	1.097E+02
2024	4.108E+03	3.289E+06	2.210E+02	1.097E+03	1.645E+06	1.105E+02
2025	4.135E+03	3.311E+06	2.225E+02	1.105E+03	1.656E+06	1.112E+02
2026	4.162E+03	3.332E+06	2.239E+02	1.112E+03	1.666E+06	1.120E+02
2027	4.187E+03	3.353E+06	2.253E+02	1.118E+03	1.676E+06	1.126E+02
2028	4.211E+03	3.372E+06	2.266E+02	1.125E+03	1.686E+06	1.133E+02
2029	4.234E+03	3.391E+06	2.278E+02	1.131E+03	1.695E+06	1.139E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	4.257E+03	3.409E+06	2.290E+02	1.137E+03	1.704E+06	1.145E+02
2031	4.278E+03	3.426E+06	2.302E+02	1.143E+03	1.713E+06	1.151E+02
2032	4.299E+03	3.442E+06	2.313E+02	1.148E+03	1.721E+06	1.156E+02
2033	4.319E+03	3.458E+06	2.324E+02	1.154E+03	1.729E+06	1.162E+02
2034	4.338E+03	3.474E+06	2.334E+02	1.159E+03	1.737E+06	1.167E+02
2035	4.356E+03	3.488E+06	2.344E+02	1.164E+03	1.744E+06	1.172E+02
2036	4.374E+03	3.502E+06	2.353E+02	1.168E+03	1.751E+06	1.177E+02
2037	4.202E+03	3.365E+06	2.261E+02	1.122E+03	1.682E+06	1.130E+02
2038	4.037E+03	3.233E+06	2.172E+02	1.078E+03	1.617E+06	1.086E+02
2039	3.879E+03	3.106E+06	2.087E+02	1.036E+03	1.553E+06	1.044E+02
2040	3.727E+03	2.984E+06	2.005E+02	9.955E+02	1.492E+06	1.003E+02
2041	3.581E+03	2.867E+06	1.927E+02	9.565E+02	1.434E+06	9.633E+01
2042	3.441E+03	2.755E+06	1.851E+02	9.190E+02	1.377E+06	9.255E+01
2043	3.306E+03	2.647E+06	1.778E+02	8.830E+02	1.323E+06	8.892E+01
2044	3.176E+03	2.543E+06	1.709E+02	8.483E+02	1.272E+06	8.544E+01
2045	3.051E+03	2.443E+06	1.642E+02	8.151E+02	1.222E+06	8.209E+01
2046	2.932E+03	2.348E+06	1.577E+02	7.831E+02	1.174E+06	7.887E+01
2047	2.817E+03	2.256E+06	1.516E+02	7.524E+02	1.128E+06	7.578E+01
2048	2.706E+03	2.167E+06	1.456E+02	7.229E+02	1.084E+06	7.281E+01
2049	2.600E+03	2.082E+06	1.399E+02	6.946E+02	1.041E+06	6.995E+01
2050	2.498E+03	2.001E+06	1.344E+02	6.673E+02	1.000E+06	6.721E+01
2051	2.400E+03	1.922E+06	1.291E+02	6.412E+02	9.610E+05	6.457E+01
2052	2.306E+03	1.847E+06	1.241E+02	6.160E+02	9.234E+05	6.204E+01
2053	2.216E+03	1.774E+06	1.192E+02	5.919E+02	8.872E+05	5.961E+01
2054	2.129E+03	1.705E+06	1.145E+02	5.687E+02	8.524E+05	5.727E+01
2055	2.045E+03	1.638E+06	1.101E+02	5.464E+02	8.190E+05	5.503E+01
2056	1.965E+03	1.574E+06	1.057E+02	5.249E+02	7.868E+05	5.287E+01
2057	1.888E+03	1.512E+06	1.016E+02	5.044E+02	7.560E+05	5.079E+01
2058	1.814E+03	1.453E+06	9.761E+01	4.846E+02	7.263E+05	4.880E+01
2059	1.743E+03	1.396E+06	9.378E+01	4.656E+02	6.979E+05	4.689E+01
2060	1.675E+03	1.341E+06	9.010E+01	4.473E+02	6.705E+05	4.505E+01
2061	1.609E+03	1.288E+06	8.657E+01	4.298E+02	6.442E+05	4.328E+01
2062	1.546E+03	1.238E+06	8.317E+01	4.129E+02	6.189E+05	4.159E+01
2063	1.485E+03	1.189E+06	7.991E+01	3.967E+02	5.947E+05	3.996E+01
2064	1.427E+03	1.143E+06	7.678E+01	3.812E+02	5.714E+05	3.839E+01
2065	1.371E+03	1.098E+06	7.377E+01	3.662E+02	5.490E+05	3.688E+01
2066	1.317E+03	1.055E+06	7.088E+01	3.519E+02	5.274E+05	3.544E+01
2067	1.266E+03	1.014E+06	6.810E+01	3.381E+02	5.068E+05	3.405E+01
2068	1.216E+03	9.738E+05	6.543E+01	3.248E+02	4.869E+05	3.271E+01
2069	1.168E+03	9.356E+05	6.286E+01	3.121E+02	4.678E+05	3.143E+01
2070	1.123E+03	8.989E+05	6.040E+01	2.998E+02	4.494E+05	3.020E+01
2071	1.079E+03	8.637E+05	5.803E+01	2.881E+02	4.318E+05	2.901E+01
2072	1.036E+03	8.298E+05	5.575E+01	2.768E+02	4.149E+05	2.788E+01
2073	9.956E+02	7.973E+05	5.357E+01	2.659E+02	3.986E+05	2.678E+01
2074	9.566E+02	7.660E+05	5.147E+01	2.555E+02	3.830E+05	2.573E+01
2075	9.191E+02	7.360E+05	4.945E+01	2.455E+02	3.680E+05	2.472E+01
2076	8.830E+02	7.071E+05	4.751E+01	2.359E+02	3.535E+05	2.375E+01
2077	8.484E+02	6.794E+05	4.565E+01	2.266E+02	3.397E+05	2.282E+01
2078	8.152E+02	6.527E+05	4.386E+01	2.177E+02	3.264E+05	2.193E+01
2079	7.832E+02	6.271E+05	4.214E+01	2.092E+02	3.136E+05	2.107E+01
2080	7.525E+02	6.026E+05	4.049E+01	2.010E+02	3.013E+05	2.024E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	7.230E+02	5.789E+05	3.890E+01	1.931E+02	2.895E+05	1.945E+01
2082	6.946E+02	5.562E+05	3.737E+01	1.855E+02	2.781E+05	1.869E+01
2083	6.674E+02	5.344E+05	3.591E+01	1.783E+02	2.672E+05	1.795E+01
2084	6.412E+02	5.135E+05	3.450E+01	1.713E+02	2.567E+05	1.725E+01
2085	6.161E+02	4.933E+05	3.315E+01	1.646E+02	2.467E+05	1.657E+01
2086	5.919E+02	4.740E+05	3.185E+01	1.581E+02	2.370E+05	1.592E+01
2087	5.687E+02	4.554E+05	3.060E+01	1.519E+02	2.277E+05	1.530E+01
2088	5.464E+02	4.375E+05	2.940E+01	1.460E+02	2.188E+05	1.470E+01
2089	5.250E+02	4.204E+05	2.825E+01	1.402E+02	2.102E+05	1.412E+01
2090	5.044E+02	4.039E+05	2.714E+01	1.347E+02	2.020E+05	1.357E+01
2091	4.846E+02	3.881E+05	2.607E+01	1.294E+02	1.940E+05	1.304E+01
2092	4.656E+02	3.728E+05	2.505E+01	1.244E+02	1.864E+05	1.253E+01
2093	4.474E+02	3.582E+05	2.407E+01	1.195E+02	1.791E+05	1.203E+01
2094	4.298E+02	3.442E+05	2.313E+01	1.148E+02	1.721E+05	1.156E+01
2095	4.130E+02	3.307E+05	2.222E+01	1.103E+02	1.653E+05	1.111E+01
2096	3.968E+02	3.177E+05	2.135E+01	1.060E+02	1.589E+05	1.067E+01
2097	3.812E+02	3.053E+05	2.051E+01	1.018E+02	1.526E+05	1.026E+01
2098	3.663E+02	2.933E+05	1.971E+01	9.783E+01	1.466E+05	9.853E+00
2099	3.519E+02	2.818E+05	1.893E+01	9.400E+01	1.409E+05	9.467E+00
2100	3.381E+02	2.707E+05	1.819E+01	9.031E+01	1.354E+05	9.096E+00
2101	3.249E+02	2.601E+05	1.748E+01	8.677E+01	1.301E+05	8.739E+00
2102	3.121E+02	2.499E+05	1.679E+01	8.337E+01	1.250E+05	8.396E+00
2103	2.999E+02	2.401E+05	1.613E+01	8.010E+01	1.201E+05	8.067E+00
2104	2.881E+02	2.307E+05	1.550E+01	7.696E+01	1.154E+05	7.751E+00
2105	2.768E+02	2.217E+05	1.489E+01	7.394E+01	1.108E+05	7.447E+00
2106	2.660E+02	2.130E+05	1.431E+01	7.104E+01	1.065E+05	7.155E+00
2107	2.555E+02	2.046E+05	1.375E+01	6.826E+01	1.023E+05	6.874E+00
2108	2.455E+02	1.966E+05	1.321E+01	6.558E+01	9.830E+04	6.605E+00
2109	2.359E+02	1.889E+05	1.269E+01	6.301E+01	9.445E+04	6.346E+00
2110	2.266E+02	1.815E+05	1.219E+01	6.054E+01	9.074E+04	6.097E+00
2111	2.178E+02	1.744E+05	1.172E+01	5.816E+01	8.718E+04	5.858E+00
2112	2.092E+02	1.675E+05	1.126E+01	5.588E+01	8.377E+04	5.628E+00
2113	2.010E+02	1.610E+05	1.082E+01	5.369E+01	8.048E+04	5.408E+00
2114	1.931E+02	1.547E+05	1.039E+01	5.159E+01	7.733E+04	5.195E+00
2115	1.856E+02	1.486E+05	9.984E+00	4.956E+01	7.429E+04	4.992E+00
2116	1.783E+02	1.428E+05	9.592E+00	4.762E+01	7.138E+04	4.796E+00
2117	1.713E+02	1.372E+05	9.216E+00	4.575E+01	6.858E+04	4.608E+00
2118	1.646E+02	1.318E+05	8.855E+00	4.396E+01	6.589E+04	4.427E+00
2119	1.581E+02	1.266E+05	8.507E+00	4.224E+01	6.331E+04	4.254E+00
2120	1.519E+02	1.217E+05	8.174E+00	4.058E+01	6.083E+04	4.087E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1980	0	0	0	0	0	0
1981	8.745E+01	4.777E+04	3.210E+00	1.370E+00	3.822E+02	2.568E-02
1982	2.207E+02	1.205E+05	8.099E+00	3.457E+00	9.643E+02	6.479E-02
1983	3.512E+02	1.919E+05	1.289E+01	5.502E+00	1.535E+03	1.031E-01
1984	4.759E+02	2.600E+05	1.747E+01	7.455E+00	2.080E+03	1.397E-01
1985	5.971E+02	3.262E+05	2.192E+01	9.354E+00	2.610E+03	1.753E-01
1986	7.284E+02	3.979E+05	2.674E+01	1.141E+01	3.183E+03	2.139E-01
1987	9.050E+02	4.944E+05	3.322E+01	1.418E+01	3.955E+03	2.658E-01
1988	1.109E+03	6.059E+05	4.071E+01	1.738E+01	4.847E+03	3.257E-01
1989	1.346E+03	7.350E+05	4.939E+01	2.108E+01	5.880E+03	3.951E-01
1990	1.593E+03	8.705E+05	5.849E+01	2.496E+01	6.964E+03	4.679E-01
1991	1.783E+03	9.742E+05	6.545E+01	2.793E+01	7.793E+03	5.236E-01
1992	1.861E+03	1.016E+06	6.830E+01	2.915E+01	8.132E+03	5.464E-01
1993	1.900E+03	1.038E+06	6.975E+01	2.977E+01	8.305E+03	5.580E-01
1994	1.949E+03	1.065E+06	7.155E+01	3.054E+01	8.519E+03	5.724E-01
1995	1.961E+03	1.071E+06	7.197E+01	3.072E+01	8.569E+03	5.758E-01
1996	1.986E+03	1.085E+06	7.290E+01	3.111E+01	8.679E+03	5.832E-01
1997	2.004E+03	1.095E+06	7.356E+01	3.139E+01	8.758E+03	5.885E-01
1998	2.037E+03	1.113E+06	7.477E+01	3.191E+01	8.903E+03	5.982E-01
1999	2.072E+03	1.132E+06	7.604E+01	3.245E+01	9.053E+03	6.083E-01
2000	2.107E+03	1.151E+06	7.734E+01	3.301E+01	9.208E+03	6.187E-01
2001	2.163E+03	1.182E+06	7.939E+01	3.388E+01	9.452E+03	6.351E-01
2002	2.225E+03	1.216E+06	8.168E+01	3.486E+01	9.725E+03	6.534E-01
2003	2.362E+03	1.290E+06	8.670E+01	3.700E+01	1.032E+04	6.936E-01
2004	2.390E+03	1.305E+06	8.771E+01	3.743E+01	1.044E+04	7.017E-01
2005	2.412E+03	1.318E+06	8.854E+01	3.779E+01	1.054E+04	7.083E-01
2006	2.445E+03	1.336E+06	8.976E+01	3.831E+01	1.069E+04	7.181E-01
2007	2.522E+03	1.378E+06	9.257E+01	3.951E+01	1.102E+04	7.405E-01
2008	2.553E+03	1.395E+06	9.370E+01	3.999E+01	1.116E+04	7.496E-01
2009	2.591E+03	1.415E+06	9.509E+01	4.058E+01	1.132E+04	7.607E-01
2010	2.627E+03	1.435E+06	9.643E+01	4.116E+01	1.148E+04	7.715E-01
2011	2.662E+03	1.454E+06	9.772E+01	4.171E+01	1.164E+04	7.818E-01
2012	2.696E+03	1.473E+06	9.896E+01	4.223E+01	1.178E+04	7.917E-01
2013	2.728E+03	1.490E+06	1.001E+02	4.274E+01	1.192E+04	8.012E-01
2014	2.759E+03	1.507E+06	1.013E+02	4.323E+01	1.206E+04	8.103E-01
2015	2.789E+03	1.524E+06	1.024E+02	4.370E+01	1.219E+04	8.191E-01
2016	2.818E+03	1.539E+06	1.034E+02	4.415E+01	1.232E+04	8.275E-01
2017	2.846E+03	1.555E+06	1.045E+02	4.458E+01	1.244E+04	8.356E-01
2018	2.872E+03	1.569E+06	1.054E+02	4.499E+01	1.255E+04	8.434E-01
2019	2.898E+03	1.583E+06	1.064E+02	4.539E+01	1.266E+04	8.509E-01
2020	2.922E+03	1.596E+06	1.073E+02	4.578E+01	1.277E+04	8.581E-01
2021	2.946E+03	1.609E+06	1.081E+02	4.614E+01	1.287E+04	8.650E-01
2022	2.968E+03	1.622E+06	1.089E+02	4.650E+01	1.297E+04	8.716E-01
2023	2.990E+03	1.633E+06	1.097E+02	4.684E+01	1.307E+04	8.780E-01
2024	3.011E+03	1.645E+06	1.105E+02	4.716E+01	1.316E+04	8.841E-01
2025	3.031E+03	1.656E+06	1.112E+02	4.748E+01	1.325E+04	8.900E-01
2026	3.050E+03	1.666E+06	1.120E+02	4.778E+01	1.333E+04	8.956E-01
2027	3.068E+03	1.676E+06	1.126E+02	4.807E+01	1.341E+04	9.010E-01
2028	3.086E+03	1.686E+06	1.133E+02	4.835E+01	1.349E+04	9.063E-01
2029	3.103E+03	1.695E+06	1.139E+02	4.862E+01	1.356E+04	9.113E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2030	3.120E+03	1.704E+06	1.145E+02	4.887E+01	1.363E+04	9.161E-01
2031	3.135E+03	1.713E+06	1.151E+02	4.912E+01	1.370E+04	9.207E-01
2032	3.151E+03	1.721E+06	1.156E+02	4.936E+01	1.377E+04	9.252E-01
2033	3.165E+03	1.729E+06	1.162E+02	4.958E+01	1.383E+04	9.294E-01
2034	3.179E+03	1.737E+06	1.167E+02	4.980E+01	1.389E+04	9.335E-01
2035	3.193E+03	1.744E+06	1.172E+02	5.001E+01	1.395E+04	9.375E-01
2036	3.205E+03	1.751E+06	1.177E+02	5.022E+01	1.401E+04	9.413E-01
2037	3.080E+03	1.682E+06	1.130E+02	4.825E+01	1.346E+04	9.044E-01
2038	2.959E+03	1.617E+06	1.086E+02	4.635E+01	1.293E+04	8.689E-01
2039	2.843E+03	1.553E+06	1.044E+02	4.454E+01	1.242E+04	8.348E-01
2040	2.732E+03	1.492E+06	1.003E+02	4.279E+01	1.194E+04	8.021E-01
2041	2.624E+03	1.434E+06	9.633E+01	4.111E+01	1.147E+04	7.706E-01
2042	2.522E+03	1.377E+06	9.255E+01	3.950E+01	1.102E+04	7.404E-01
2043	2.423E+03	1.323E+06	8.892E+01	3.795E+01	1.059E+04	7.114E-01
2044	2.328E+03	1.272E+06	8.544E+01	3.646E+01	1.017E+04	6.835E-01
2045	2.236E+03	1.222E+06	8.209E+01	3.503E+01	9.774E+03	6.567E-01
2046	2.149E+03	1.174E+06	7.887E+01	3.366E+01	9.391E+03	6.310E-01
2047	2.064E+03	1.128E+06	7.578E+01	3.234E+01	9.022E+03	6.062E-01
2048	1.983E+03	1.084E+06	7.281E+01	3.107E+01	8.669E+03	5.824E-01
2049	1.906E+03	1.041E+06	6.995E+01	2.985E+01	8.329E+03	5.596E-01
2050	1.831E+03	1.000E+06	6.721E+01	2.868E+01	8.002E+03	5.377E-01
2051	1.759E+03	9.610E+05	6.457E+01	2.756E+01	7.688E+03	5.166E-01
2052	1.690E+03	9.234E+05	6.204E+01	2.648E+01	7.387E+03	4.963E-01
2053	1.624E+03	8.872E+05	5.961E+01	2.544E+01	7.097E+03	4.769E-01
2054	1.560E+03	8.524E+05	5.727E+01	2.444E+01	6.819E+03	4.582E-01
2055	1.499E+03	8.190E+05	5.503E+01	2.348E+01	6.552E+03	4.402E-01
2056	1.440E+03	7.868E+05	5.287E+01	2.256E+01	6.295E+03	4.229E-01
2057	1.384E+03	7.560E+05	5.079E+01	2.168E+01	6.048E+03	4.064E-01
2058	1.330E+03	7.263E+05	4.880E+01	2.083E+01	5.811E+03	3.904E-01
2059	1.277E+03	6.979E+05	4.689E+01	2.001E+01	5.583E+03	3.751E-01
2060	1.227E+03	6.705E+05	4.505E+01	1.923E+01	5.364E+03	3.604E-01
2061	1.179E+03	6.442E+05	4.328E+01	1.847E+01	5.154E+03	3.463E-01
2062	1.133E+03	6.189E+05	4.159E+01	1.775E+01	4.952E+03	3.327E-01
2063	1.089E+03	5.947E+05	3.996E+01	1.705E+01	4.757E+03	3.197E-01
2064	1.046E+03	5.714E+05	3.839E+01	1.638E+01	4.571E+03	3.071E-01
2065	1.005E+03	5.490E+05	3.688E+01	1.574E+01	4.392E+03	2.951E-01
2066	9.655E+02	5.274E+05	3.544E+01	1.512E+01	4.219E+03	2.835E-01
2067	9.276E+02	5.068E+05	3.405E+01	1.453E+01	4.054E+03	2.724E-01
2068	8.912E+02	4.869E+05	3.271E+01	1.396E+01	3.895E+03	2.617E-01
2069	8.563E+02	4.678E+05	3.143E+01	1.341E+01	3.742E+03	2.514E-01
2070	8.227E+02	4.494E+05	3.020E+01	1.289E+01	3.596E+03	2.416E-01
2071	7.905E+02	4.318E+05	2.901E+01	1.238E+01	3.455E+03	2.321E-01
2072	7.595E+02	4.149E+05	2.788E+01	1.190E+01	3.319E+03	2.230E-01
2073	7.297E+02	3.986E+05	2.678E+01	1.143E+01	3.189E+03	2.143E-01
2074	7.011E+02	3.830E+05	2.573E+01	1.098E+01	3.064E+03	2.059E-01
2075	6.736E+02	3.680E+05	2.472E+01	1.055E+01	2.944E+03	1.978E-01
2076	6.472E+02	3.535E+05	2.375E+01	1.014E+01	2.828E+03	1.900E-01
2077	6.218E+02	3.397E+05	2.282E+01	9.741E+00	2.717E+03	1.826E-01
2078	5.974E+02	3.264E+05	2.193E+01	9.359E+00	2.611E+03	1.754E-01
2079	5.740E+02	3.136E+05	2.107E+01	8.992E+00	2.509E+03	1.686E-01
2080	5.515E+02	3.013E+05	2.024E+01	8.639E+00	2.410E+03	1.619E-01

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2081	5.299E+02	2.895E+05	1.945E+01	8.301E+00	2.316E+03	1.556E-01
2082	5.091E+02	2.781E+05	1.869E+01	7.975E+00	2.225E+03	1.495E-01
2083	4.891E+02	2.672E+05	1.795E+01	7.662E+00	2.138E+03	1.436E-01
2084	4.699E+02	2.567E+05	1.725E+01	7.362E+00	2.054E+03	1.380E-01
2085	4.515E+02	2.467E+05	1.657E+01	7.073E+00	1.973E+03	1.326E-01
2086	4.338E+02	2.370E+05	1.592E+01	6.796E+00	1.896E+03	1.274E-01
2087	4.168E+02	2.277E+05	1.530E+01	6.529E+00	1.822E+03	1.224E-01
2088	4.005E+02	2.188E+05	1.470E+01	6.273E+00	1.750E+03	1.176E-01
2089	3.848E+02	2.102E+05	1.412E+01	6.027E+00	1.682E+03	1.130E-01
2090	3.697E+02	2.020E+05	1.357E+01	5.791E+00	1.616E+03	1.086E-01
2091	3.552E+02	1.940E+05	1.304E+01	5.564E+00	1.552E+03	1.043E-01
2092	3.412E+02	1.864E+05	1.253E+01	5.346E+00	1.491E+03	1.002E-01
2093	3.279E+02	1.791E+05	1.203E+01	5.136E+00	1.433E+03	9.628E-02
2094	3.150E+02	1.721E+05	1.156E+01	4.935E+00	1.377E+03	9.250E-02
2095	3.027E+02	1.653E+05	1.111E+01	4.741E+00	1.323E+03	8.888E-02
2096	2.908E+02	1.589E+05	1.067E+01	4.555E+00	1.271E+03	8.539E-02
2097	2.794E+02	1.526E+05	1.026E+01	4.377E+00	1.221E+03	8.204E-02
2098	2.684E+02	1.466E+05	9.853E+00	4.205E+00	1.173E+03	7.883E-02
2099	2.579E+02	1.409E+05	9.467E+00	4.040E+00	1.127E+03	7.573E-02
2100	2.478E+02	1.354E+05	9.096E+00	3.882E+00	1.083E+03	7.276E-02
2101	2.381E+02	1.301E+05	8.739E+00	3.730E+00	1.041E+03	6.991E-02
2102	2.287E+02	1.250E+05	8.396E+00	3.583E+00	9.997E+02	6.717E-02
2103	2.198E+02	1.201E+05	8.067E+00	3.443E+00	9.605E+02	6.454E-02
2104	2.112E+02	1.154E+05	7.751E+00	3.308E+00	9.228E+02	6.201E-02
2105	2.029E+02	1.108E+05	7.447E+00	3.178E+00	8.867E+02	5.957E-02
2106	1.949E+02	1.065E+05	7.155E+00	3.054E+00	8.519E+02	5.724E-02
2107	1.873E+02	1.023E+05	6.874E+00	2.934E+00	8.185E+02	5.499E-02
2108	1.799E+02	9.830E+04	6.605E+00	2.819E+00	7.864E+02	5.284E-02
2109	1.729E+02	9.445E+04	6.346E+00	2.708E+00	7.556E+02	5.077E-02
2110	1.661E+02	9.074E+04	6.097E+00	2.602E+00	7.259E+02	4.878E-02
2111	1.596E+02	8.718E+04	5.858E+00	2.500E+00	6.975E+02	4.686E-02
2112	1.533E+02	8.377E+04	5.628E+00	2.402E+00	6.701E+02	4.503E-02
2113	1.473E+02	8.048E+04	5.408E+00	2.308E+00	6.438E+02	4.326E-02
2114	1.415E+02	7.733E+04	5.195E+00	2.217E+00	6.186E+02	4.156E-02
2115	1.360E+02	7.429E+04	4.992E+00	2.130E+00	5.943E+02	3.993E-02
2116	1.307E+02	7.138E+04	4.796E+00	2.047E+00	5.710E+02	3.837E-02
2117	1.255E+02	6.858E+04	4.608E+00	1.967E+00	5.487E+02	3.686E-02
2118	1.206E+02	6.589E+04	4.427E+00	1.890E+00	5.271E+02	3.542E-02
2119	1.159E+02	6.331E+04	4.254E+00	1.815E+00	5.065E+02	3.403E-02
2120	1.113E+02	6.083E+04	4.087E+00	1.744E+00	4.866E+02	3.270E-02

Appendix B
Wintek Report

WINTEK Engineering Ltd.
ELECTRICAL ENGINEERING SOLUTIONS

2778 Dufferin Street, Suit 104,
Toronto, ON M6B 3R7
Tel: (416) 556-0766
Fax: (866) 876-5758
Email: wintek@wintek-eng.com

March 20, 2020

Nikki Payne
Waste Technician II
Waste Management,
City of Kawartha Lakes
705-324-9411ext 1144
npayne@kawarthalakes.com

CC:
Brent Martin, Ontario Clean Water Agency
Kris Betts, Comcor Environmental

Project Name: City of Kawartha Lakes – Lindsay OPS Landfill – Nuisance Trips Investigation Report - SEL-351

WINTEK Reference: WW20-128.03

The City of Kawartha retained WINTEK Engineering Ltd. to investigate the cause of nuisance tripping of the SEL-351 relay at the Lindsay OPS Landfill.

1. Background

The City of Kawartha Lakes provided WINTEK Engineering Ltd. with a record of 39 SEL Event files recorded over a period from May 6, 2019 to December 1, 2019. These events were generated by the SEL-351 protection relay and provide a short 245ms (approximately 15 cycle) snapshot of the operating conditions during each event. It should be noted that only 65ms (approximately 4 cycles) of the operating conditions are captured before the event is triggered. Therefore, although the data provides a snapshot of information regarding the operating conditions before the events were triggered, it does not allow for an in-depth analysis of the cause of the events.

On February 18, 2020, WINTEK Engineering Ltd. was on site to gather additional information and complete testing on different operating procedures at the plant. At that time, WINTEK downloaded an additional 30 Event files recorded between December 11, 2019 and February 14, 2020. WINTEK was also able to capture 4 events while completing our testing.

2. Observations

2.1. SEL Events

The SEL-351 relay is programmed to generate an event file when an overcurrent and / or TRIP signal is detected. When an event file is triggered, the current and voltage waveforms, along with any change in value of the TRIP or protection signals are recorded and stored for the 245ms period after the event trigger. Approximately 65ms of that data includes the operating conditions before the event is triggered is also captured. Of the 69 Event files that we were able to obtain, 34

of the files included a TRIP signal. If a TRIP signal is initiated, the landfill gas generator breaker will be opened by the SEL-351, and the generator will be taken offline. Note that the SEL-351 can initiate a TRIP signal independently of the landfill gas generator, and will open the landfill gas generator breaker even when the landfill gas generator is not operating.

Although the TRIP signal can be initiated by multiple protection settings, it was observed that the main cause of these signals was from the 3PWR1 setting, which monitors the reverse reactive power of the wave form. The reverse reactive power relay was the cause for approximately 80% of the TRIP signals recorded. Further review of these event files shows that in all cases the TRIP signal functioned properly, as the reactive power was above the allowable limit as directed by Hydro One. By observing the current and voltage waveforms in these event files, there were three typical patterns noted:

- Voltage and current appear in normal steady state with no apparent changes after the TRIP signal is initiated.
- Voltage appears in normal steady state and the current increases after the TRIP signal is initiated.
- Voltage appears in normal steady state and the current decreases after the TRIP signal is initiated.

The second most prevalent cause of the TRIP signals were due to the SV2T setting which monitors under voltage. Review of these files validates that the voltage and current waveforms dropped to zero, which is consistent with a loss of Utility power.

2.2. Generator and SEL-351 Conditions

In addition to the SEL-351 protection, the landfill gas generator has its own protection to ensure that it operates within its designated ranges. For this reason, the landfill gas generator can receive an internal fault and shutdown without any input or TRIP signal from the SEL-351. Similarly, the SEL-351 logic is not tied to the landfill gas generators operation. This means that the SEL-351 can initiate a TRIP signal and open the landfill gas generator breaker even when the generator is offline.

The landfill gas generator is set to output power at a unity power factor. From the data received from COMCOR, it was observed that the reactive power output ranged between -20kVAR and 30kVAR at a wide variety of generating levels. This corresponds to a general power factor of greater than 0.99 either lagging or leading.

During our site visit, we discovered that there is an operating condition where the landfill gas generator has low fuel pressure which can cause the generator to stop generating resulting in the generator motor acting as a load. During this condition, the landfill gas generator is not able to control the power factor. It will run for a short time prior to the SEL-351 initiating a TRIP signal and / or the generator controller shutting down the generator. We were able to confirm the occurrence of this condition by comparing the SEL Event files and the generators operation log.

2.3. Power Factor Correction & Aerators

The treatment plant currently operates with approximately 12 aerators, each of which are approximately 20HP, drawing typically around 20Amps at 600Volts during full rated operation.

These aerators generally all run at the same time and switching is performed manually to repair or maintain the aerators.

To offset the low power factor of the aerators, the plant has a power factor correction capacitor banks installed. The controls for the bank are designed to measure the power factor and then calculate what is needed to get the system as close to unity power factor as possible within the limits of the hardware. The correction hardware consists of 3 banks of capacitors:

125 kVAR
40 kVAR
40 kVAR

The power factor correction logic operates by switching on and off combinations of the capacitors. This offers the following correction possibilities as needed to offset the aerators that are online:

kVARs correction	Approx. number of aerators
40	2
80	4
125	6
165	8
205	10

From the controls narrative, there is a power factor set point, plus a power factor dead band that determines how the switching takes place. The logic narrative explains that to turn the capacitors on, the power factor must be less than 0.96 (lagging) minus the 0.02 dead band. At this point, the controls will turn on the next available correction value (increasing kVARs). Similarly, when the power factor is above 0.96 (lagging) plus the dead band, the controls will step down to the next lowest correction setting (removing kVARs). All of this happens slowly since the capacitors cannot be switched on and off quickly (using the arrangement in this design). The time variable in the controls narrative is listed as 30 seconds.

During our recent site visit, we tested the theory that shutting off multiple aerators within a short period of time could be one cause of the reverse reactive power trip. In order to rule out the aerators as the cause, the capacitor controls were disabled and aerators turned on and off. No trips were observed while switching 5 aerators on and off.

The next step was to repeat the test with the capacitor controls enabled. With the capacitor controls enabled the same test was repeated (aerators switched off and then back on again) and the SEL-351 relay tripped. Both of these tests were performed while the land fill gas generator was operating.

3. Analysis

The main cause of the SEL TRIP signals is due to the reverse reactive power setting which is required by Hydro One. With only a small 65ms snapshot of the waveform before the TRIP signal is sent, it is difficult to gain a full understanding of the operating conditions that cause the TRIP by viewing the data.

As noted in the observations there were three patterns of waveforms detected in the Event files.

The Events where the voltage and current waveforms are stable and in steady state would likely indicated that the landfill gas generator was either at a very low output or not operating at the time of the TRIP. Without additional information, it is not possible to identify the cause of the high reverse reactive power values which cause the SEL-351 to TRIP. If the landfill gas generator is at a low power output, or starting up, it may not be able to control its power factor accurately. This could lead to the landfill gas generator unintentionally supplying reactive power for a short period of time and therefore causing a TRIP from the SEL-351. The other possible case could be that the landfill gas generator is not online and the SEL-351 produces a trip signal due to operational conditions within the plant. This case is not within the intended protection scheme of the SEL-351, as it is only required to provide monitoring for the generation.

The Events where the voltage is stable and in steady state, but the current increases after the TRIP signal is initiated is consistent with the landfill gas generator being taken offline as the generator breaker is opened by the SEL-351. Although it was observed that the SEL-351 responded properly, since the reverse reactive current was above the Hydro One limit, without additional information it is not possible to isolate the cause for these TRIP signals. With the landfill gas generator running at higher capacities, its power factor control should be able to keep the generator output close to unity. After speaking with staff, it is possible that these events can be attributed to switching on and off some of the aerators for maintenance and / or repair.

Our testing of the aerator switching proved two facts. The first is that the there is high probability that simply shutting off multiple aerators with the capacitors under automatic control will cause the SEL-351 relay to trip. The second is that even with the land fill gas generator online and in theory maintaining the power factor at unity, the SEL-351 still tripped (likely due to low load on the generator).

It is clear that the power factor correction logic presently implemented and operating with the land fill gas generator may be contributing to the problem. The controls narrative indicates that the capacitors are controlled based on the power factor. It is assumed that the power factor is measured at the “customer metering” as shown on the single line drawing E-002 Lindsay Water & Sewer Commission Lindsay WCP Upgrade. These controls pre-date the landfill gas generator installation and operated as intended when installed, however, with the land fill gas generator supplying most of the load, controlling the capacitors based on the PF from the small (40-50 kW) Utility only contribution is not appropriate.

If multiple aerators are switched off within a short period of time, due to the relative slow switching reaction time of the capacitor bank, it is possible for the capacitors to overcompensate and produce reverse reactive power which is sent into the Utilities grid. Since the reverse reactive power relay of the SEL-351 operates much faster, the system does not have time to re-stabilize before a TRIP signal is sent to isolate the landfill gas generator.

Finally, the last event pattern occurs when the voltage appears in normal steady state and the current decreases after the TRIP signal is initiated. This sequence is likely due to the landfill gas generator operation during a low fuel pressure condition. COMCOR had noted that during a low fuel pressure condition, the landfill gas generator can act as a load for a short period of time before it either recovers or shuts down. When this happens, the generator cannot properly control its power factor and is likely the cause of the SEL-351 TRIP condition.

4. Recommendations

The TRIP events generated by the SEL-351 that are attributed to a loss of Utility (grid) power are not avoidable. Although they require the SEL-351 to be reset before the landfill gas generator can be turned on, this protection is required to ensure that the generator does not generate during a loss of Utility power. This is a HONI requirement.

Similarly, the low fuel pressure condition which causes the landfill gas generator to act as a load also cannot be avoided (from an electrical engineering standpoint). The landfill gas generator controls do have a delay to allow the generator a period of time to recover in this low-pressure situation, but the reverse reactive power setting on the SEL relay will act before the generator is taken offline if the reactive power produced by the Generator is above the Hydro One limit requirements.

Recommendation 1: We recommend a consultation with the Generator Manufacturer to discuss the options of changing the delay settings to perhaps limit or eliminate the reverse reactive power produced by the generator during this low-pressure situation (i.e. shutting the generator faster on low pressure situations). This may not be possible as but is worth a discussion with the generator manufacturer to investigate options.

The power factor correction capacitor banks are responsible for the SEL-351 TRIP during the switching of aerators for maintenance and repair.

Recommendation 2: In order to limit tripping in this scenario, we recommend that a procedure is developed and implemented. The procedure shall ensure that the capacitor banks are temporarily taken offline during any maintenance or switching of the aerators. This can be implemented by posting the procedure and training maintenance staff. The capacitor banks shall be manually disabled before performing any switching of aerators. Alternatively, a maintenance switch could be designed and installed with the capacitor bank controller PLC which would allow maintenance staff to select maintenance mode, automatically disabling the capacitor banks while in maintenance mode. This would limit the number of nuisance TRIP events that occur do to operations within the plant.

Recommendation 3: A review of the cost / benefits of the existing power factor correction system should be considered. It may be worth considering eliminating the capacitor banks but without a detailed cost / benefit analysis, it is difficult to evaluate the cost implications of doing this.

It could potentially be more cost effective to replace the existing capacitor banks with a more sophisticated system. A capacitor bank system with the ability to react more quickly, more accurately track the plant's power factor, reduce the chance of overcompensating and possibly causing the SEL-351 to TRIP.

A simpler solution may be to simply disable the power factor correction whenever the land fill gas generator is running. The PLC would need an input to monitor the operation of the land fill gas generator and disable the capacitor bank during its operation. It is not clear from the drawings provided if the PLC that controls the capacitor banks can tell if the landfill gas generator is producing power, so this signal may need to be added.

Alternatively, if an analysis is completed which recommends that the power factor correction stay active during the landfill gas generators operation, the amount of available PF correction should be limited based on the amount of power being consumed from the Utility. For example, if the plant is operating at

400kW then all 205kVAR of the capacitor bank can be utilized. If the landfill gas generator is operating at 300kW, therefore reducing the Utility consumption to 100kW, then only 80kVAR of the capacitor bank should be available for power factor correction. This would reduce the chances of the capacitor bank overcompensating at causing a reverse reactive power condition. As mentioned above it is not advisable to make any decisions without completing additional testing and having a good understanding of the cost / benefit of the power factor correction.

Recommendation 4: Since the SEL-351 is only required to provide protection to the Utility from the landfill gas generator, additional logic should be implemented to 'AND' any TRIP signal with a status signal from the landfill gas generator. This would avoid any TRIP signals being sent while the landfill gas generator is offline. Although this would not reduce the nuisance TRIPs, it would reduce the frequency of the SEL-351 requiring a reset in order to start generation. Similarly, as there are currently no requirements for resetting the SEL-351, it would be beneficial to implement an automatic reset sequence. This would eliminate the need for staff to reset the SEL-351 before starting the landfill gas generator.

Recommendation 5: Finally, to provide a better understanding and allow for further analysis in the future, it is recommended that the SEL-351 setting for generating event files be modified. Currently the settings for the length of events is set at the minimum which only provides 15 cycles (245ms) of operating conditions during an event. This setting can be increased to 30 or 60 cycles to provide more information and allow for better diagnoses in the future. Similarly, the setting for the length of pre-fault in the event report is 4 cycles (65ms). This setting can be increased to up to 14 cycles to provide additional information and insight into the operating conditions before the Event occurs allowing for greater analysis.

It is recommended that any modifications to the SEL-351 settings be discussed with Hydro One and approved before implementing. It is also important the re-programming of the relay be completed by a qualified third party.

If there are any questions / concerns, please do not hesitate to contact the undersigned.

Best regards,

WINTEK Engineering Ltd.

Per:
Chris Politis, P.Eng.
Principal

LICENSED PROFESSIONAL ENGINEER
C. POLITIS
100109702
2020/03/20
PROVINCE OF ONTARIO

The Corporation of the City of Kawartha Lakes

Council Report

Report Number ENG2020-020

Meeting Date: October 20, 2020

Title: Request for Speed Reduction – Yelverton Road, Glenarm Road (CKL Road 8), and CKL Road 46

Description: Request for Speed Reduction

Ward Number: Ward 4 and 8

Author and Title: Joseph Kelly, Senior Engineering Tech

Recommendation(s):

THAT Report ENG2020-020 **Request for Speed Reduction– Yelverton Road, Glenarm Road (CKL Road 8), and CKL Road 46** be received;

THAT the speed limit of Yelverton Road be posted at 50km/h from Highway 7a to a point 500m southerly;

THAT the speed limit of Glenarm Road (CKL Road 8) be reduced to 50km/h from a point 300m west of CKL Road 46 to a point 350m east of CKL Road 46;

THAT the speed limit of CKL Road 46 be reduced to 50km/h from a point 300m north of Glenarm Road to a point 350m south of Glenarm Road;

THAT the necessary By-law for the above recommendations be forwarded to Council for adoption; and

THAT the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this application/agreement/decision.

Department Head: _____

Legal/Other: _____

Chief Administrative Officer: _____

Background:

At the Council Meeting of January 28, 2020 Council adopted the following resolution:

CC2020-01.11.1
That the petition received from Mike Smith, **regarding a speed limit reduction on Yelverton Road**, be received and referred to staff for review and report back by the end of Q2, 2020.

This report addresses this direction. The petition can be seen in Appendix A.

This report also addresses the similar issue of a speed limit reduction in Argyle, which staff has received numerous complaints regarding safety concerns.

Yelverton Road south of Highway 7A is a rural local road that is currently unposted for speed.

This report also addresses concerns received from the Public in regards to the speed limit within the Hamlet of Argyle.

The Hamlet of Argyle has a traffic control light at the intersection of Glenarm Road (CKL Road 8) and CKL Road 46 which are both rural arterial roads. The built up areas of these roads in Argyle are currently posted at 60 km/h.

Rationale:

The Highway Traffic Act allows for a rate of speed of 50km/h within a “built-up area” which is defined when not less than 50 percent of the frontage upon one side of the highway for a distance of not less than 200 meters is occupied by dwellings, buildings used for business purposes, schools or churches. In addition, the Ontario Traffic Manual (OTM) requires speed zones of under 70 km/h to be a minimum of 500m in length.

Yelverton Road from Highway 7a to a point 500m southerly meets the requirements to be considered a built-up area. A map can be seen in Appendix B.

The Hamlet of Argyle meets the requirement to be considered a built-up area. With a popular bakery/market, and a number of new dwellings, the speed limit of 60km/h is no longer appropriate. A map can be seen in Appendix C.

As a result of the justification review carried out by staff, it is recommended that the speed limit of Yelverton Road be posted at 50 km/h

from Highway 7a to a point 500m southerly. It is recommended that the speed limit of the Hamlet of Argyle be reduced to 50km/h.

Other Alternatives Considered:

Post Yelverton Road at 60 km/h. This is not recommended due the narrow width of the road and shoulders relative to the potential of pedestrians from the number of dwellings.

Financial/Operation Impacts:

Cost to change/add 10 signs through the operational budget of Public Works and to be implemented by Public Works .

Relationship of Recommendation(s) To The 2020-2023 Strategic Plan:

Providing life safety and protection, is a priority objective of the City under the Council Adopted Strategic Plan Goal of an Exceptional Quality of Life.

Consultations:

N/A

Attachments:

Appendix A – Yelverton Petition

ENG2020-020 - Appendix A.pdf

Appendix B – Yelverton Key Map

ENG2020-020 - Appendix B.pdf

Appendix C – Argyle Key Map

ENG2020-020 - Appendix C.pdf

Department Head E-Mail: jrojas@city.kawarthalakes.on.ca

Department Head: Juan Rojas, Director of Engineering & Corporate Assets

Department File: Engineering

DEC. 14, 2019

Person Submitting the Petition

Name:	MIKE SMITH
Address:	284 YELVERTON RD JANETVILLE
Phone:	705-277-3605 705-328-4045

RECEIVED
DEC 18 2019
OFFICE OF THE CITY CLERK
KAWARTHA LAKES

Petition

To: the Council of the City of Kawartha Lakes, 26 Francis Street, Lindsay, ON K9V 5R8.

I/We the undersigned, petition the Council of the City of Kawartha Lakes as follows:

We the residents of the hamlet of Yelverton are petitioning the City of Kawartha Lakes to impose a speed limit on Yelverton Road.

#	Name	Contact Information	Signature
	MIKE SMITH	mike.smith.902@outlook.com	
	RAY McCULLOUGH	316 YELVERTON RD	Ray McCullough
	Phyliss McCullough	307 Yelverton Rd	Phyliss McCullough
	GEORGE McCULLOUGH	307 YELVERTON RD.	G McCullough
	Gloria LeMieux	312 Yelverton Rd	Gloria LeMieux
	Steve Kroetsch	286 Yelverton Rd	
	Ginny Oosterhoff	295 Yelverton Rd	Ginny Oosterhoff
		173 YELVERTON	
	Gail Prouse	228 Yelverton Rd	Gail Prouse
	Debbie Farquharson	292 Yelverton Rd	Debbie Farquharson
	Jamie Farquharson	292 Yelverton Rd	J Farquharson
	Crystal Farquharson	292 Yelverton Rd	Crystal Farquharson
	Lynn Bain	293 Yelverton Rd	Lynn Bain
	Anne Smith	284 Yelverton Rd.	Anne Smith

Page ___ of ___

Signatories to a Petition are deemed to have waived any expectation of privacy as a result of the record being created for review by the general public. Questions about the collection and disclosure of personal information contained in this petition should be directed to the Office of the City Clerk at 705-324-9411 extension 1295 or 1322. All signature pages submitted must include the petition request for the signatures to be considered valid.

Appendix B
Yelverton Road Speed Posting
Key Map

Map produced by the City of Kawartha Lakes Engineering Department with data obtained under license. Reproduction without permission is prohibited.

The foregoing information is given for convenience only and it should be clearly understood that you must satisfy yourself as to whether the premises and the existing or proposed use thereof are, or would be, in conformity with all applicable by-laws and regulations of the municipality.

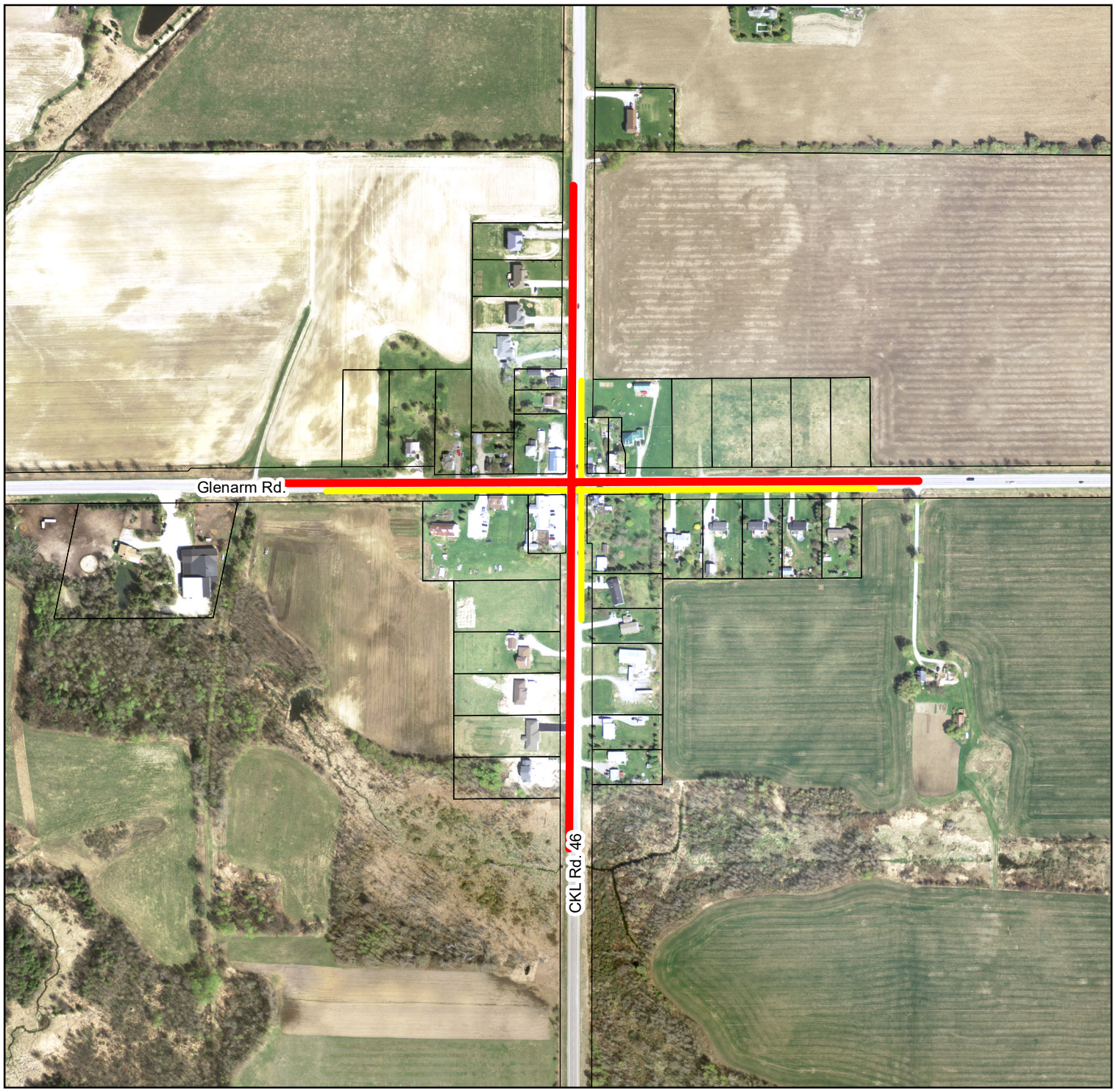
All distances and locations are approximate and are not of survey quality. This map is illustrative only. Do not rely on it as being a precise indicator of privately or publicly owned land, routes, locations or features, nor as a guide to navigate.

Proposed 50 km/h speed posting

0 125 250 Meters

Projection: Transverse Mercator
Coordinate System: NAD83, Zone 17

Appendix C
Argyle Speed Posting
Key Map



Current 60 km/h speed posting

Proposed 50 km/h speed posting

0 125 250
40 Meters

Map produced by the City of Kawartha Lakes Engineering Department with data obtained under license. Reproduction without permission is prohibited.

The foregoing information is given for convenience only and it should be clearly understood that you must satisfy yourself as to whether the premises and the existing or proposed use thereof are, or would be, in conformity with all applicable by-laws and regulations of the municipality.

All distances and locations are approximate and are not of survey quality. This map is illustrative only. Do not rely on it as being a precise indicator of privately or publicly owned land, routes, locations or features, nor as a guide to navigate.

Projection: Transverse Mercator
Coordinate System: NAD83, Zone 17

The Corporation of the City of Kawartha Lakes

Council Report

Report Number ENG2020-022

Meeting Date: October 20, 2020

Title: Request for Speed Posting – Kings Wharf Road and Scotch Line Road

Description: Request for Speed Reduction

Ward Number: Ward 6

Author and Title: Joseph Kelly, Senior Engineering Tech

Recommendation(s):

THAT Report ENG2020-022 **Request for Speed Posting – Kings Wharf Road and Scotch Line Road** be received.

Department Head: _____

Legal/Other: _____

Chief Administrative Officer: _____

Background:

At the Council Meeting of July 28, 2020 Council adopted the following resolution:

CC2020-07.10.4.2
That the Memorandum from Councillor Ron Ashmore, regarding **speed reductions along Kings Wharf Road and Scotch Line road** be received;
That Staff prepare a report regarding these two roads in order to determine if they meet the requirements for a speed reduction to 60 km/hr; and
That Staff bring their findings to Council by the end of Q2, 2021.

This report addresses those directions. The memorandum can be seen in Appendix A.

Both Kings Wharf Road and Scotch Line Road are similar roads in that they are rural, local, low volume, hard top roads with narrow platform (standard lane width plus narrow to no shoulder/recoverable slopes). These represent typical rural local roads in the Municipality and as such they are unposted for speed.

There are residential dwellings fronting sporadically on the roads, however, not clustered enough to be considered a built-up area in any section.

Rationale:

The only roads which meet the requirements for an 80km/h speed posting are the rural arterial road network, which are designed for higher volumes and higher speeds. Although a reasonable driver would assume that driving over 80km/h on a typical rural local road would be a traffic violation, it is also expected that drivers drive appropriately for the conditions of the road and the surrounding environment. It is not reasonable for the Municipality to post speeds at all typical rural local roads. It would represent a burden on the tax base and on enforcement.

Although unposted roads serve the purpose of unburdening police and public works with the costs of enforcing speeds and maintaining signs on low volume roads, Engineering staff uses good engineering judgment by considering the following criteria for posting speeds of 60km/h or lower on rural local roads:

- Are traffic volumes sufficiently high to pose a risk?
- Has a change in use presented new conflict potential?
- Is public demand from users of the road sufficiently high?
- Are collision frequencies or rates higher than similar roads to indicate an elevated risk?

Through this rationale it does not appear the volumes would meet any meaningful threshold, staff is not aware of change in use or change in traffic patterns that has emerged to present new conflict potential (demand for

pedestrian use had not been sufficiently expressed). Staff has not received a petition for the speed postings as is the standard. Staff requested clarity from Councilor Ashmore regarding the memo and how it relates to resident input. Staff then received a single request from residents on each road. Council may wish to consider if public demand is sufficient enough based on these two e-mails which can be seen in Appendix B.

Collision rates were calculated using 15 years of available collision data. Collision rates allow for comparing collisions on different roads while accounting for length, time, and traffic volumes. According to best practiced methods, rates less than 1.6 collisions per million vehicle kilometers are considered a low rate. This section of Kings Wharf Road has a collision rate of 0.9 collisions per million vehicle kilometer and Scotch Line Road has a collision rate of 0.5 collisions per million vehicle kilometer. The roads do not warrant a road posting on collision history alone. Collision rate calculations can be seen in Appendix C.

As a result of the justification review carried out by staff, it is recommended that these sections of Kings Wharf Road and Scotch Line Road remain unposted for speed.

Other Alternatives Considered:

N/A

Financial/Operation Impacts:

N/A

Relationship of Recommendation(s) To The 2020-2023 Strategic Plan:

Providing life safety and protection, is a priority objective of the City under the Council Adopted Strategic Plan Goal of An Exceptional Quality of Life.

Consultations:

N/A

Attachments:

Appendix A – Council Memorandum

ENG2020-022 - Appendix A.pdf

Appendix B – Email Concerns

ENG2020-022 - Appendix B.pdf

Appendix C – Collision Rates

ENG2020-022 - Appendix C.pdf

Department Head E-Mail: jrojas@city.kawarthalakes.on.ca

Department Head: Juan Rojas, Director of Engineering & Corporate Assets

Department File: Engineering

Council Memorandum

Date: July 28, 2020

To: Council

From: Councillor Ashmore

Re: Speed Reductions along Kings Wharf Road and Scotch Line Road

Recommendation

That the Memorandum from Councillor Ron Ashmore, regarding **speed reductions along Kings Wharf Road and Scotch Line road** be received;

That Staff prepare a report regarding these two roads in order to determine if they meet the requirements for a speed reduction to 60 km/hr; and

That Staff bring their findings to Council by the end of Q2, 2021.

Rationale

Residents along Kings Wharf Road, specifically from Heights Road to Sturgeon road, and Scotch Line road, from Highway 36 to County Rd 24, have expressed a desire to reduce the speed limit from 80 to 60 km /hr.

Safety concerns for children and Mennonite traffic have been raised as a direct result of the speed.

Mrvhsk#Nhoo|

Iurp= Fduuh#Jdkdjdq#?fduuhjdkdjdqC krwp dlfrp A
Vhqw= Vxqgd|#Vhswhp ehu#53/#5353#k=88#SP
Wr= Mrvhsk#Nhoo|
Ff= Urq#Dvkp ruh
Vxemhfw= Vshhg#lp lw#Nlqj Ó#Z kdu#Jg

Mr. Kelly,

My name is [redacted] I am writing this letter in regards to the speed limit on King's Wharf Rd. My husband [redacted] and I have lived here for 13 years with our [redacted] children. We have been concerned for quite sometime with the speed of the traffic going by our home. Currently the speed limit is 80 km/hr. We are wanting it reduced 60 km/hr. My children enjoy riding bikes and taking their dogs for walks but, unfortunately cars and trucks go speeding by most times at speeds greater then 80 km/hr. Vehicles don't slow down! It is a great safety concern.There are also many Mennonite families that travel along our road on there horse and buggy and riding their bikes. I have seen many horses be spooked by a speeding car and buggies being pulled into the ditch. There is also high volume of farming traffic on road that cars speed by.
I have taught my children how to be safe on the road but I can't protect them from cars going by at 100 km/hr. We live on a side road, it is not a major highway.
I appreciate you considering the speed limit change for my family, the other families with young children, and the Mennonite community.
Sincerely,
[redacted]
[redacted] King's Wharf Rd.
Sent from my iPad

Mrvhsk#Nhoo|

Iurp=	Urq#Dvkp ruh
Vhqw=	P rqgd|#Vhswhp ehu#54#5353#8=75#SP
Wr=	Mrvhsk#Nhoo|
Vxemhfw=	IZ =#Vfrwfk#Dlqh#rdg1

Joe please see attached email forwarded from [redacted] resident on Scotch Line Road thank you

Sent from my Samsung Galaxy smartphone.

-------- Original message --------
From: [redacted]
Date: 2020-09-21 5:24 p.m. (GMT-05:00)
To: Ron Ashmore
Subject: Scotch Line road.

Hi Ron, here is the letter you asked for.

I live on Scotch Line road and have a concern about the speed limit on our road.
It is my understanding that the speed limit on rural roads is 80km an hour unless otherwise posted. There is one 50km an hour speed limit sign at the north end of Scotch Line road just before the hills that go down toward 24. So I would think that that sign is the start of the 50km zone, due to the hills.
I believe that 80km an hour is much too fast for Scotch Line road. It is only 21 feet wide at the best, that is measured from grass to grass. I know it is a tight fit when two vehicles approach each other. I couldn't imagine two vehicles passing each other at 80km an hour. I personally never go over 60 km an hour on Scotch Line.
For at least 80 percent of county road 24 the speed limit is 60km. That is a road that is much wider than Scotch Line and beautifully paved. It is 22 feet wide from inside the white lines and there is another 5-6 feet for a bike lane and shoulder on each side. In total there is at least 32 feet before the ditch. If the speed limit on 24 is only 60km an hour how could Scotch line be 80km an hour when it is much narrower and not in the condition 24 is.
Then you have highway 36. It is posted at 80km an hour. It again is a road that is in very good condition and much wider than Scotch Line road. For those reasons I don't understand how the speed on Scotch Line could be the same as highway 36.
There are also a lot of people that walk on our road, most of the people that walk live on the road. Some are pushing infants in a stroller. It isn't safe to see a vehicle go by people walking on the road at 80km an hour on such a narrow road.
We also get a lot of traffic from people that don't live on the road going to the golf course during the summer months. There are also many that go down the road to the boat launch at the north end of Scotch Line road.
When I sit out side I can see how fast people go past my house. It seems they are on a race track. I feel the speed limit on Scotch Line should be reduced to 50km an hour due to the width and condition of the road, and also for the fact that many walk on this road and it has high traffic from spring to fall.

Thanks,

[redacted]

Sent from my iPhone

Collision Rates for 15 years of Collision Data (2000-2015)
((1 000 000 x No of Collisions)/(365xAADTxYearsxLength))=Collisions per million vehicles km

Road	Collisions	AADT	Length(km)	Collision Rate
Kings Wharf*	4	241	3.5	0.866145
Scotch Line	3	241	4.2	0.541341

*Kings Wharf between Heights Road and Sturgeon Road

Council Report

Report Number RD2020-010

Meeting Date:	October 20, 2020
Title:	County of Haliburton Boundary Road Agreement
Description:	Enter into a Boundary Road Agreement with the County of Haliburton
Author and Title:	Bryan Robinson, Director of Public Works

Recommendation(s):

That Report RD2020-010, **County of Haliburton Boundary Road Agreement**, be received;

That By-law 2010-178 be repealed;

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this agreement; and

That a By-law, substantially in the form attached as Appendix B to Report RD2020-010 be forwarded to Council for adoption.

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

Where neighbouring municipalities share boundary roads, those municipalities must agree to responsibility and accountability related to the operational maintenance and capital improvement of such roads. Historically, the City of Kawartha Lakes and the County of Haliburton have mutually agreed that maintenance on Kawartha Lakes County Road 503 (CR 503), from Kawartha Lakes Road 121 easterly to the County of Peterborough Boundary and sections of Kawartha Lakes Rd 121 from Kawartha Lakes CR 503 northerly to the municipal boundary, be implemented by the County of Haliburton.

Since creation of the agreement, the City of Kawartha Lakes has assumed maintenance of the identified sections of Kawartha Lakes Rd 121, but still sees merit in entering into an agreement for the Section of Kawartha Lakes CR 503 before it exits the City of Kawartha Lakes boundary.

This arrangement has worked well in the past and Public Works is content to continue with this agreement.

Rationale:

It is advantageous for the City of Kawartha Lakes to enter into a maintenance agreement with the County of Haliburton. Maintenance is performed by the County of Haliburton with the associated costs paid by the City of Kawartha Lakes. This agreement avoids the need to duplicate resources. The agreement also documents the terms and conditions of the arrangements and the levels of service to be provided. This protects the City of Kawartha Lakes and the County of Haliburton in the event of a claim against the municipality for potentially adverse road condition. Therefore, it is Staff's recommendation to enter into this agreement for a term of five (5) years and that the current By-Law 2010-178 be repealed upon execution of the proposed draft agreement.

Other Alternatives Considered:

Each Municipality could perform maintenance on their respective roads, however this would result in duplication, inefficient use of resources and increased cost.

Alignment to Strategic Priorities

The recommendations set out in this Report would support the following priorities in the 2020 – 2023 Strategic Plan, being:

A Good Government

- Develop agreement to ensure current levels of service is maintained.
- Ensuring Kawartha Lakes Road 503 is well maintained and well managed.

Financial/Operation Impacts:

The lump sum price of $1,854.00 annually for the services is intended to cover all plowing and material application operations. The work being carried out also includes urban corner clearing, winter drainage (where wings are used to open ditches), and localized snow removal (<20m³ / location). Additional snow removal made necessary due to lock of road side storage capacity shall be done by Haliburton at the expense of Kawartha Lakes upon approval from Kawartha Lakes. Incidental winter maintenance normally performed by the road crews in winter, e.g. sign repair, pot hole patching, debris pick-up, culvert steaming, etc., is not included and will be performed by Kawartha Lakes.

Servicing Implications:

Approval of this report will enable the most efficient way for Public Works to provide Council's approved level of service for the roads identified in the agreement.

Consultations:

City Solicitor
Insurance Risk Management Coordinator
Supervisor, Technical Services
Director of Engineering and Corporate Assets

Attachments:

Appendix A – Boundary Road Agreement

Haliburton CKL
2020-2025 Agreemer

Appendix B – Draft By-law

2020-XXX By-Law
for Winter Maintena

Department Head E-Mail:

Department Head:

Department File: L04 - Agreements

Appendix: A
To Report: RD2020-

THIS AGREEMENT made this _____ day of _____ 2020

BETWEEN:

The Corporation of the City of Kawartha Lakes
("Kawartha Lakes")

- and -

The Corporation of the County of Haliburton
("Haliburton")

Whereas Haliburton proposes to carry out winter maintenance services on Kawartha Lakes Road 503;

And whereas in order to streamline services in both a productive and cost effective manner, Haliburton and Kawartha Lakes have agreed as follows:

1. Haliburton will perform winter maintenance on Kawartha Lake Road 503, from County Road 121 easterly to the County of Peterborough boundary.

2. Haliburton shall maintain and make available as requested to Kawartha Lakes all winter maintenance documents, including patrol/inspection records and winter operation records.

3. **Term**: The term of this Agreement shall be five (5) years from November 1, 2020 to November 1, 2025. This Agreement shall automatically renew at the expiration of the term or any extension of the term for a further one-year period on the same terms and conditions unless either party provides 180 days notice in writing of its intention to terminate the Agreement at the expiration of the current term.

4. **Level of Service**: Haliburton will provide winter maintenance services to a standard which meets or exceeds provincially enacted Minimum Municipal Maintenance Standards (Ontario Regulation 239/02, as amended) during the term of this Agreement.

5. **Insurance**: Haliburton shall, at its own expense, obtain and keep in force throughout the term of this Agreement the following insurance coverage:

   i. Commercial General Liability insurance in an amount of not less than Fifteen Million Dollars ($15,000,000.00) inclusive per occurrence. Coverage shall include but is not limited to bodily injury, death and damage to property including loss of use thereof, products and completed operations liability, blanket contractual liability, contingent employers' liability, non-owned automobile liability and contain a cross liability and severability of interest clause. *The Corporation of the City of Kawartha Lakes)* shall be named as an additional insured on the policy;

   ii. Standard Form Automobile Liability insurance for an amount not less than Ten Million Dollars ($10,000,000.00) inclusive per occurrence for Third Party Liability including bodily injury, death and damage to property covering all licensed vehicles used in any manner in connection with the performance of the terms of this Agreement.

Haliburton agrees to provide Kawartha Lakes with proof of the insurance required under this Agreement on an annual basis on or before October 1st in the form of a certificate of insurance. All policies shall be endorsed to provide Kawartha Lakes with not less than thirty (30) Days' written notice of cancellation, change or amendment restricting coverage. All policies shall be with insurers licensed to underwrite insurance in the Province of Ontario. All policies shall apply as primary and not as excess of any insurance available to Kawartha Lakes.

6. **Indemnity**: The parties agree to indemnify and save the other harmless from and against any claims, actions, causes of actions, losses, injuries, costs, expenses including legal expenses, howsoever styled, attributable to their negligence in performing the services required under this Agreement at all times and throughout the term of this Agreement

7. **Authority**: The parties warrant that they have taken all necessary steps, done all acts, passed all by-laws and obtained all approvals required to give it the authority to enter into this Agreement.

8. **Scope of Work:** The lump sum price for the services is intended to cover all patrol, ploughing and material application operations. The work being carried out also includes patrol, and promptly notifying CKL of incidental winter maintenance (deficiencies), urban corner clearing, winter drainage (where wings are used to open ditches), and localized snow removal (< 20 m^3 / location). Additional snow removal made necessary due to lack of road side storage capacity shall be done by Haliburton at the expense of Kawartha Lakes upon obtaining approval from Kawartha Lakes. Incidental winter maintenance normally performed by the road crews in winter, e.g. sign repair, pothole patching, debris pick-up, culvert steaming, etc., is not included and will be performed by Kawartha Lakes.

9. **Payment**: Kawartha Lakes hereby agrees to pay to Haliburton $1,854.00 payable in two instalments. The first payment of $742.00 is payable on or about January 1st, and the second payment of $1,112.00 is payable on or about June 15th. These payments represent total payment for the provision of winter maintenance services. Costs shall be reviewed on an annual basis and any change in costs is only effective if reduced into writing by way of amendment to this agreement.

10. **Emergencies:** Notwithstanding anything in this Agreement, in the event of an emergency situation Kawartha Lakes shall be allowed to react to the situation which Haliburton would **otherwise be responsible.**

11. **Binding**: This Agreement shall ensure to the benefit of and bind the parties and their respective heirs, successors and permitted assigns.

12. **Entire Agreement:** This Agreement contains the entire agreement between the parties and supersedes all previous negotiations, understandings and agreements, verbal or written, with respect to any matters referred to in this Agreement.

IN WITNESS WHEREOF the parties by their duly authorized representatives have set forth their signatures on the dates herein written below:

Signed and sealed this _____ day of _____, 2020

THE CORPORATION OF THE CITY OF KAWARTHA LAKES

_____
Mayor

_____
Clerk

Signed and sealed this _____ day of _____, 2020

THE CORPORATION OF THE COUNTY OF HALIBURTON

_____
Warden

_____
Clerk

Appendix: B
To Report: RD2020-010

The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-law to Repeal and Replace By-law 2010-178, Being a By-law to authorize the execution of a winter maintenance agreement with the County of Haliburton

Recitals

1. The City of Kawartha Lakes and the County of Haliburton have mutually agreed that, for an annual fee, Haliburton County would perform winter maintenance on Kawartha Lakes Road 508.
2. Council deems it appropriate to continue with this arrangement.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 201_-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

"Director of Public Works" means the person who holds that position and his or her delegate(s) or, in the event of organizational changes, another person designated by Council.

"Mayor" means the Chief Executive Office of the City.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Approvals

2.01 **Approvals:** The Winter Maintenance Agreement between the City of Kawartha Lakes and the County of Haliburton appended to this By-law as an agreement is approved.

2.02 The Mayor and Clerk are authorized and directed to sign the Winter Maintenance Agreement between the City of Kawartha Lakes and the County of Haliburton and to affix the City's corporate seal to it.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Public Works is responsible for the administration of this by-law

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

Section 4.00: Repeals

4.01 **Repeal:** By-law 2010-178 is repealed.

By-law read a first, second and third time, and finally passed, this ___ day of ____, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

Council Report

Report Number RD2020-011

Meeting Date: October 20, 2020

Title: Town of Bracebridge Boundary Road Agreement

Description: Enter into a Boundary Road Agreement with the Town of Bracebridge

Author and Title: Bryan Robinson, Director of Public Works

Recommendation(s):

That Report RD2020-011**Town of Bracebridge Boundary Road Agreement**, be received;

That By-law 2008-157 be repealed;

That the Mayor and Clerk be authorized to execute any documents and agreements required by the approval of this agreement; and

That a By-law, substantially in the form attached as Appendix B to Report RD2020-011 be forwarded to Council for adoption.

Department Head:_____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

Where neighbouring municipalities share boundary roads, those municipalities must agree to responsibility and accountability related to the operational maintenance and capital improvement of such roads. Historically, the City of Kawartha Lakes and the Town of Bracebridge have mutually agreed that maintenance on Miriam Drive (Longford Boundary Road), from the boundary of the Town of Bracebridge, southerly to a point 1.8 kilometres southerly, be implemented by the Town of Bracebridge.

This arrangement has worked well in the past and Public Works is content to continue with this agreement.

Rationale:

It is advantageous for the City of Kawartha Lakes to enter into a maintenance agreement with the Town of Bracebridge. Maintenance is performed by the Town of Bracebridge with the associated costs paid by the City of Kawartha Lakes. This agreement avoids the need to duplicate resources. The agreement also documents the terms and conditions of the arrangements and the levels of service to be provided. This protects the City of Kawartha Lakes and the Town of Bracebridge in the event of a claim against the municipality for potentially adverse road condition. Therefore, it is Staff's recommendation to enter into this agreement for a term of ten (10) years and that the existing By-Law 2008-157 be repealed upon execution of the proposed draft agreement.

Other Alternatives Considered:

Each Municipality could perform maintenance on their respective roads, however this would result in duplication, inefficient use of resources and increased cost.

Alignment to Strategic Priorities

The recommendations set out in this Report would support the following priorities in the 2020 – 2023 Strategic Plan, being:

A Good Government

- Develop agreement to ensure current levels of service is maintained.
- Ensuring Miriam Drive (Longford Boundary Road) is well maintained and well managed.

Financial/Operation Impacts:

Bracebridge agrees to invoice Kawartha Lakes for the Summer Maintenance and Winter Maintenance covered by this Agreement based on the following:

Winter Maintenance	Time	Equipment / Labour
Each Snowplow Billed at	0.5 hours	Combo Unit
	0.5 hours	Operator
Each Sanding Billed at	0.5 hours	Combo Unit
	0.5 hours	Operator
	Sand Applied to the Road (average 0.75 tonnes)	

The cost associated with Summer Maintenance are to be charged by the material used and hourly rates for labour and equipment.

The Costs associated with work performed by contractors will be billed at cost.

From time-to-time, Winter Maintenance operations will require a greater amount of time and material due to extreme weather events.

Payments are to be made on an annual basis on or about January 30th in the succeeding year and may be offset by the services of the other municipality such that a payment may be made for the difference only.

Servicing Implications:

Approval of this report will enable the most efficient way for Public Works to provide Council's approved level of service for the roads identified in the agreement.

Consultations:

City Solicitor
Insurance Risk Management Coordinator
Supervisor, Technical Services
Director of Engineering and Corporate Assets

Attachments:

Appendix A – Boundary Road Agreement

DRAFT - Boundary Road Agreement - C

Appendix B – Draft By-law

2020-XXX By-Law for Boundary Road

Department Head E-Mail:

Department Head:

Department File: L04 - Agreements

Appendix A
To Report: RD2020-011

Boundary Road Agreement between the Town of Bracebridge and the Corporation of the City of Kawartha Lakes

This Agreement made this day of , 2020.

BETWEEN

The Corporation of the Town of Bracebridge
(hereinafter referred to as "Bracebridge")

OF THE FIRST PART

AND:

The Corporation of the City of Kawartha Lakes
(hereinafter referred to as "Kawartha Lakes")

OF THE SECOND PART

WHEREAS, Section 27 of the *Municipal Act* provides that by-laws may be passed by municipalities respecting highways that fall under their jurisdiction:

AND WHEREAS, Section 28 of the *Municipal Act* sets out the highways over which a municipality has jurisdiction:

AND WHEREAS, Section 29.1 of the *Municipal Act* provides that municipalities having joint jurisdiction over a boundary line highway ("Boundary Road") may enter into an agreement to keep any part of the highway in repair for its whole width and to indemnify the other municipality from any loss or damage arising from the lack or repair for that part:

AND WHEREAS, A Boundary Road exists on the boundary between the Corporation of the City of Kawartha Lakes and The Corporation of the Town of Bracebridge as set out in Schedules 'A' and 'B' which road has been assumed by the respective municipalities or been transferred to them by the Province:

AND WHEREAS, The road systems adjacent to the Boundary Roads have been assessed to determine the most efficient way to link maintenance activities on Boundary Roads with maintenance activities on the balance of road systems for both municipalities:

AND WHEREAS, The Corporation of the City of Kawartha Lakes or the Corporation of the Town of Bracebridge will by this agreement provide winter and summer maintenance services on the boundary portions of all said Boundary Roads as set out in Schedules 'A' and 'B' commencing October 29, 2020:

AND WHEREAS, The Corporation of the City of Kawartha Lakes or the Corporation of the Town of Bracebridge accounting process applies uniform costs for all maintenance and construction activities on both its Boundary Roads and all other roads under its jurisdiction:

NOW THEREFORE IN CONSIDERATION of the covenants in this Agreement and for other good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), the parties hereto agree as follows:

1. INTERPRETATION

1.1. Gender, Plural: All words in this agreement are deemed to include any number or gender as the context requires.

1.2. Proper Law: This Agreement shall be interpreted according to the laws of the Province of Ontario.

1.3. Headings: Article, clause and/or paragraph headings are for reference purposes only and shall not in any way modify or limit the statements contained in any article, clause or paragraph.

1.4. Legislation: Reference to federal or provincial statutes or municipal by-laws are deemed to refer to the relevant legislation as amended, including successor legislation.

1.5. "Winter Maintenance": Includes all usual winter maintenance including snow plowing /removal, application of sand and/or salt mixture, sign maintenance, and all other activities identified under Ontario Regulation 239/02, as amended, and other nominal winter maintenance.

1.6. "Summer Maintenance": Includes all usual summer maintenance including pothole repair, debris removal, shoulder repair, storm water management, and all other activities identified under Ontario Regulation 239/02, as amended, and other nominal summer maintenance.

2. SCOPE

2.1. The parties agree that this Agreement covers all Summer Maintenance and Winter Maintenance.

2.2. Capital work, which shall include major bridge repair and road reconstruction, is considered separate from Summer Maintenance and Winter Maintenance. Prior approval, upon one (1) years' notice, shall be obtained regarding capital expenditures on all Boundary Roads where costs are to be shared 50/50 and the municipality having responsibility for the affected section of Boundary Road shall manage such projects unless alternative arrangements are made.

3. TERM

3.1. The parties agree to provide Summer Maintenance and Winter Maintenance on the portions of the Boundary Road as set out in Schedules 'A' and 'B' for ten (10) years from the date of execution of this Agreement.

3.2. The parties agree that this Agreement shall automatically renew at the expiration of the term for a further ten (10) year period on the same Terms and Conditions unless either party provides one-hundred and eighty (180) days notice in writing of its intention to terminate the Agreement at the expiration of the current term.

3.3. The parties agree that such notice may only be provided between May 31 and August 31 of any year throughout the term of the Agreement.

4. PROVISION OF THE SERVICES

4.1. Level of Service

The parties covenant and agree to provide all contemplated road maintenance for the road section noted in Schedules 'A' and 'B' in accordance with section 44(4) of the *Municipal Act*, (the "Minimum Maintenance Standards for Municipal Highways") where such standards apply and in the event that there is no applicable Minimum Maintenance Standard shall meet the standard of what is reasonable in the circumstances.

4.2. General Service Requirements

4.2.1. Enforcement of Individual Municipal Bylaws Dealing with the Roads

Notwithstanding the joint jurisdiction over the Road, it is specifically acknowledged in accordance with section 28 of the Act, that the bylaws passed by each of Bracebridge and Kawartha Lakes relating to their respective portions of the Road, such as, but not limited to, entrances, setbacks and parking shall remain in force and effect unless a bylaw passed by the Councils of both Bracebridge and Kawartha Lakes shall designate otherwise.

4.2.2. Emergencies

Notwithstanding anything in this Agreement, in the event of an emergency situation, the non-responsible municipality shall be allowed to react to the situation which the other municipality would otherwise be responsible. The costs of such emergency action shall be apportioned as set out in Section 5: Payment.

5. PAYMENT

5.1. Bracebridge agrees to invoice Kawartha Lakes for the Summer Maintenance and Winter Maintenance covered by this Agreement based on the following:

Winter Maintenance	Time	Equipment / Labour
Each Snowplow Billed at	0.5 hours	Combo Unit
	0.5 hours	Operator
Each Sanding Billed at	0.5 hours	Combo Unit
	0.5 hours	Operator
	Sand Applied to the Road (average 0.75 tonnes)	

5.2. The costs associated with Summer Maintenance are to be charged by the material used and hourly rates for labour and equipment.

5.3. The costs associated with work performed by contractors will be billed at cost.

5.4. From time-to-time, Winter Maintenance operations will require a greater amount of time and material due to extreme weather events.

5.5. Each invoice will include the following information:

5.5.1. Dates on which the road was winter maintained;

5.5.2. Dates on which the road was summer maintained;

5.5.3. Type of maintenance that was performed and equipment used;

5.5.4. The hourly charge out rates for equipment will be in accordance with the rates approved annually by the District Municipality of Muskoka;

5.5.5. The hourly labour rates will be in accordance with the weighted wage rate approved annually by the District Municipality of Muskoka; and

5.5.6. Material costs.

5.6. Payments are to be made on an annual basis on or about January 30th in the succeeding year and may be offset by the services of the other municipality such that a payment may be made for the difference only.

5.7. Special Projects

Both parties agree that prior to undertaking a single expenditure in excess of $5,000.00 for a special project in any year, that the work be approved of by the other municipality and that any amount in excess of $5,000.00 shall be shared equally between the two parties and further that each party shall furnish the other with an annual detailed statement of costs on their portion of boundary road.

5.8. Capital Projects

One (1) years' prior approval shall be obtained regarding capital expenditures on the Boundary Road.

Costs for the agreed capital works are to be shared equally between both parties.

The municipality having jurisdiction for the section of Boundary Road shall manage such projects unless alternative arrangements are made.

And further, that all surface treatment, slurry, and micro applications are to be treated as Capital work on a project-by-project approval basis.

Capital projects shall be invoiced monthly on the basis of 50% of each progress certificate as paid by the responsible municipality for authorized work.

6. INDEMNITY, INSURANCE AND SECURITY

6.1. Bracebridge shall, at its own expense, obtain and keep in force during the term of this Agreement liability insurance satisfactory to Kawartha Lakes including the following terms and minimum coverage underwritten by an insurer licensed to conduct business in the Province of Ontario:

6.1.1. Municipal general liability insurance on an occurrence basis for an amount of not less than Fifteen Million Dollars ($15,000,000);

6.1.2. Inclusion of the other party as an Additional Insured with respect to the operations of the named insured;

6.1.3. Cross liability and severability of interest clauses;

6.1.4. Policies shall not be invalidated as respects the interests of the Additional Insured by reason of any breach or violation on any warranties, representations, declarations or conditions;

6.1.5. Non-owned automobile coverage with a limit of at least Ten Million Dollars ($10,000,000) including contractual non-owned coverage;

6.1.6. Products and completed operation coverage with an aggregate limit of not less than Fifteen Million Dollars ($15,000,000);

6.1.7. Automobile liability insurance for an amount not less than Ten Million Dollars ($10,000,000) on forms meeting statutory requirements covering all licensed vehicles used in any manner in connection with the performance of the terms of this Agreement; and

6.1.8. A thirty (30) day written notice of cancellation, termination ~~or material change~~.

6.2. Bracebridge agrees to provide Kawartha Lakes with proof of the insurance required under this Agreement on an annual basis on or before October 1st in the form of an insurance certificate.

6.3. The parties warrant that they have taken all necessary steps, done all acts, passed all by-laws, and obtained all approvals required to give it the authority to enter into this Agreement.

7. AMENDMENTS

7.1. Recommended amendments to this Agreement shall be made in writing and agreed upon by both parties.

7.2. Either party may, upon 180 days' written notice to the other, withdraw from this Agreement or make proposals for change to take effect 180 days after the beginning of the notice period. Where there is mutual agreement in writing, on a shorter notice for change, this clause shall not prohibit early implementation of such change.

7.3. The Bracebridge Director of Public Works, in consultation with the Director of Corporate Services/Clerk, is delegated authority to make minor amendments to this Agreement for execution of the Mayor and Director of Corporate Services/Clerk.

8. NOTICE

8.1. All notices, requests, demands, consents, approvals, and other communications which may or are required to be served or given hereunder (for the provision collectively called "Notices"), shall be in writing and shall be delivered personally or by prepaid registration post, addressed to the party or parties to receive such notice as follows:

If intended for the Town, to:

Director of Public Works
The Corporation of the Town of Bracebridge
1000 Taylor Court
Bracebridge, ON
P1L 1 R6

And if intended for the City, to:

Director of Public Works
The Corporation of the City of Kawartha Lakes
P.O. Box 9000
26 Francis Street
Lindsay, ON
K9V 5R8

8.2. All service of notification shall be effective from the date of personal delivery or on the next following business day after posting of the registered letter.

8.3. Receipt of notice shall be deemed on the earlier of the date of delivery or five (5) days following the date of mailing of the notice. Either party may change its address for notice by give notice of change of address pursuant to this section.

9. DISPUTE RESOLUTION

9.1. In the event of any dispute arising between the parties hereto relating to any matter which is the subject of this Agreement, such dispute shall be settled by the persons named in Section 8: Notice. In the event that the dispute cannot be settled within 30 days, then the dispute will be submitted to arbitration by notice given by either party to the other.

9.2. Upon such notice being given, the dispute shall be determined by the award of three arbitrators or a majority of them, one to be named by each party within twenty-one (21) days of the giving of such notice and the third to be selected by these two (2) arbitrators within seven (7) days after both have been nominated.

9.3. If either party shall neglect or refuse to name its arbitrator within the time specified or to proceed with the arbitration, the arbitrator named by the other party shall proceed with the arbitration.

9.4. The arbitrator(s) shall have all the powers given by the *Arbitration Act* of Ontario and may at any time proceed in such manner as they may see fit on such notice as they deem reasonable in the absence of either party if such party fails to attend.

9.5. Each party shall pay its own costs and shall share equally in the costs of the arbitration.

9.6. The cost of the arbitrators are not limited to those set forth under the Arbitration Act of Ontario and the arbitrators shall be able to charge their usual professional charges.

10. GENERAL

10.1. Notwithstanding anything in this Agreement, neither party shall be in default with respect to the performance of any of the terms of this Agreement if any non-performance is due to any force majeure, strike, lock-out, labour dispute, civil commotion, ware or similar event, invasion, the exercise of military power, act of God, government regulations or controls, inability to obtain any material or service or any cause beyond the reasonable control of the party (unless such lack of control results from a deficiency in financial resources). Otherwise, time shall be of the essence of this Agreement and all the obligations contained herein.

10.2. The rights and liabilities of the parties shall ensure to the benefit of and be binding upon the parties and their respective successors and approved assigns.

10.3. This Agreement contains the entire agreement between the parties. There is no covenant, promise, agreement, condition, precedent or subsequent, warranty or representation or understanding, whether oral or written, other than as set forth in this Agreement. This Agreement fully replaces and supersedes any Agreement or other contractual arrangement between the parties related to the subject matter of this Agreement.

10.4. If any provision, clause, or part of this Agreement, or the application of this Agreement under certain circumstances, is held by a court or tribunal of competent jurisdiction to be invalid, the remainder of this Agreement, or the application of that provision, clause or part under other circumstances, shall not be affected.

10.5. The parties hereto agree to execute such additional documents and to pass such additional by-laws as may be necessary in order to give effect to the meaning and intent to this Agreement.

11. COMPLETE AGREEMENT

11.1. This Agreement may only be changed by written amendment, signed and sealed by authorized representatives of both parties.

11.2. The boundary road agreement between Bracebridge and Kawartha Lakes dated September 25, 2008 is terminated immediately upon the effective date of this Agreement.

12. SCHEDULES

12.1. Schedules ‘A’ and ‘B’ inclusive, attached hereto, are incorporated within and form part of this Agreement.

Boundary Road Agreement between the Town of Bracebridge and the Corporation of the City of Kawartha Lakes

IN WITNESS WHEREOF, the parties have caused to be affixed their corporate seals under the hands of their authorized officers on their behalf. Copies of this Agreement will be treated as originals. This agreement can be executed and transmitted electronically.

Authorized by Motion 20-GC-XXX and Confirmation By-law 2020-XXX dated February , 2020

The Corporation of the Town of Bracebridge

Date:

Graydon Smith,
Mayor

Date:

Lori McDonald,
Director of Corporate Services/Clerk

The Corporation of the City of Kawartha Lakes

Date:

Andy Letham,
Mayor

Date:

Cathie Ritchie,
City Clerk

Boundary Road Agreement between the Town of Bracebridge and the Corporation of the City of Kawartha Lakes

SCHEDULE 'A'

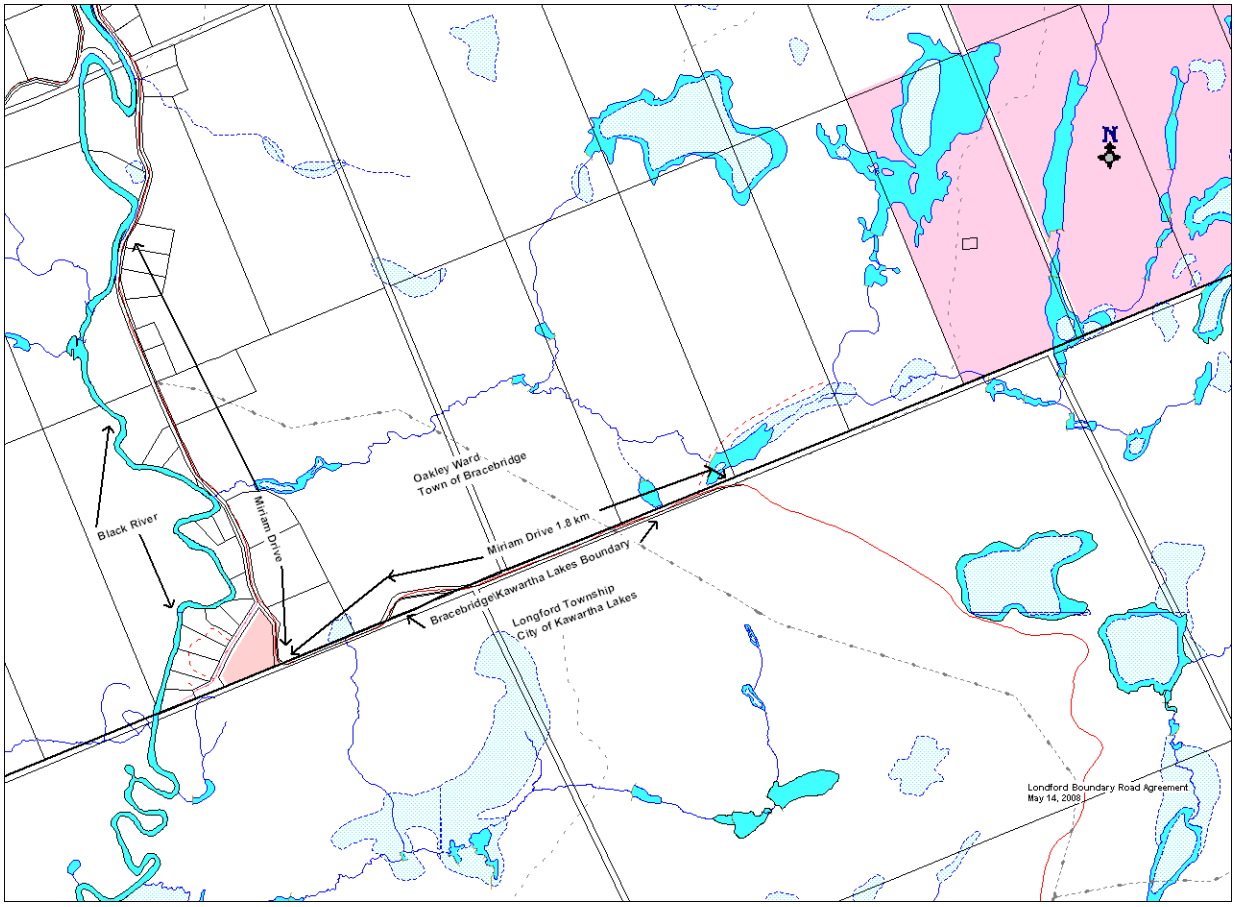
Boundary Road

BOUNDARY ROAD NUMBER	FROM	TO	HWY CLASS	LENGTH	RESPONSIBLE MUNICIPALITY
Miriam Drive (Longford Boundary Road)	The boundary of the Town of Bracebridge, southerly	A point 1.8 kilometres southerly	5	1.8 kilometres	Town of Bracebridge (Year-round)

Boundary Road Agreement between the Town of Bracebridge and the Corporation of the City of Kawartha Lakes

SCHEDULE 'B'

Map of Road Area Subject to Agreement



Appendix: B
To Report: RD2020-011

The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-law to Repeal and Replace By-law 2008-157, Being a By-law to authorize the execution of a Boundary Road Agreement with the Town of Bracebridge

Recitals

1. The City of Kawartha Lakes and the Town of Bracebridge have mutually agreed that, for an annual fee, the Town of Bracebridge would perform maintenance on Miriam Drive (Longford Boundary Road).

2. Council deems it appropriate to continue with this arrangement.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 201_-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

"Director of Public Works" means the person who holds that position and his or her delegate(s) or, in the event of organizational changes, another person designated by Council.

"Mayor" means the Chief Executive Office of the City.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Approvals

2.01 **Approvals:** The Boundary Road Agreement between the City of Kawartha Lakes and the Town of Bracebridge appended to this By-law as an agreement is approved.

2.02 The Mayor and Clerk are authorized and directed to sign the Boundary Road Agreement between the City of Kawartha Lakes and the Town of Bracebridge and to affix the City's corporate seal to it.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Public Works is responsible for the administration of this by-law

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

Section 4.00: Repeals

4.01 **Repeal:** By-law 2008-157 is repealed.

By-law read a first, second and third time, and finally passed, this ___ day of ____, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

The Corporation of the City of Kawartha Lakes

BY-LAW NUMBER 2020-095

A BY-LAW TO APPROVE THE SUBMISSION OF AN APPLICATION TO ONTARIO INFRASTRUCTURE AND LANDS CORPORATION ("OILC") FOR THE LONG-TERM FINANCING OF CERTAIN CAPITAL WORK(S) OF THE CORPORATION OF THE CITY OF KAWARTHA LAKES (THE "MUNICIPALITY"); AND TO AUTHORIZE THE ENTERING INTO OF A RATE OFFER LETTER AGREEMENT PURSUANT TO WHICH THE MUNICIPALITY WILL ISSUE DEBENTURES TO OILC

WHEREAS the *Municipal Act*, *2001* (Ontario), as amended, (the "**Act**") provides that a municipal power shall be exercised by by-law unless the municipality is specifically authorized to do otherwise;

AND WHEREAS the Council of the Municipality has passed the by-law(s) enumerated in column (1) of Schedule "A" attached hereto and forming part of this By-law ("**Schedule "A"**) authorizing the capital work(s) described in column (2) of Schedule "A" ("**Capital Work(s)**") in the amount of the respective estimated expenditure set out in column (3) of Schedule "A" , subject in each case to approval by OILC of the long-term financing for such Capital Work(s) requested by the Municipality in the Application as hereinafter defined;

AND WHEREAS before the Council of the Municipality approved the Capital Work(s) in accordance with section 4 of Ontario Regulation 403/02 (the "**Regulation**"), the Council of the Municipality had its Treasurer calculate an updated limit in respect of its then most recent annual debt and financial obligation limit received from the Ministry of Municipal Affairs and Housing (as so updated, the "**Updated Limit"**), and, on the basis of the authorized estimated expenditure for the Capital Work or each Capital Work, as the case may be, as set out in column (3) of Schedule "A" (the "**Authorized Expenditure**" for any such Capital Work), the Treasurer calculated the estimated annual amount payable in respect of the Capital Work or each Capital Work, as the case may be, and determined that the estimated annual amount payable in respect of the Capital Work or each Capital Work, as the case may be, did not cause the Municipality to exceed the Updated Limit, and accordingly the approval of the Local Planning Appeal Tribunal pursuant to the Regulation, was not required before any such Capital Work was authorized by the Council of the Municipality;

AND WHEREAS subsection 401(1) of the Act provides that a municipality may incur a debt for municipal purposes, whether by borrowing money or in any other way, and may issue debentures and prescribed financial instruments and enter prescribed financial agreements for or in relation to the debt;

AND WHEREAS the Act also provides that a municipality shall authorize long-term borrowing by the issue of debentures or through another municipality under section 403 or 404 of the Act;

AND WHEREAS OILC has invited Ontario municipalities desirous of obtaining long-term debt financing in order to meet capital expenditures incurred on or after the year that is five years prior to the year of an application in connection with eligible capital works to make application to OILC for such financing by completing and submitting an application in the form provided by OILC;

AND WHEREAS the Municipality has completed and submitted or is in the process of submitting an application to OILC, as the case may be to request financing for the Capital Work(s) by way of long-term borrowing through the issue of debentures to OILC, substantially in the form of Schedule "B" hereto and forming part of this By-law (the "**Application**");

AND WHEREAS OILC has accepted and has approved or will notify the Municipality only if it accepts and approves the Application, as the case may be;

AND WHEREAS at least five (5) business days prior to the passing of the debenture by-law in connection with the issue of Debentures as defined below, OILC will provide the Municipality with a rate offer letter agreement substantially in the form as provided to the Municipality on or prior to the date of this By-law (the "**Rate Offer Letter Agreement**");

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE CITY OF KAWARTHA LAKES ENACTS AS FOLLOWS:

1. The Council of the Municipality hereby confirms, ratifies and approves the execution by the Treasurer of the Application and the submission by such authorized official of the Application, duly executed by such authorized official, to OILC for the long-term financing of the Capital Work(s) in the maximum principal amount of $22,122,012.72, with such changes thereon as such authorized official may hereafter, approve such execution and delivery to be conclusive evidence of such approval.

2. The Mayor and the Treasurer are hereby authorized to execute and deliver for and on behalf of the Municipality the Rate Offer Letter Agreement under the authority of this By-law in respect of the Capital Work(s) on such terms and conditions as such authorized officials may approve, such execution and delivery to be conclusive evidence of such approval.

3. Subject to the terms and conditions of the Rate Offer Letter Agreement, the Mayor and the Treasurer are hereby authorized to long-term borrow for the Capital Work(s) and to issue debentures to OILC on the terms and conditions provided in the Rate Offer Letter Agreement (the "**Debentures**"); provided that the principal amount of the Debentures issued in respect of the Capital Work or of each Capital Work, as the case may be, does not exceed the Authorized Expenditure for such Capital Work and does not exceed the related loan amount set out in column (4) of Schedule "A" in respect of such Capital Work.

4. In accordance with the provisions of section 25 of the *Ontario Infrastructure and Lands Corporation Act, 2011*, as amended from time to time hereafter, the

Municipality is hereby authorized to agree in writing with OILC that the Minister of Finance is entitled, without notice to the Municipality, to deduct from money appropriated by the Legislative Assembly of Ontario for payment to the Municipality, amounts not exceeding the amounts that the Municipality fails to pay to OILC on account of any unpaid indebtedness of the Municipality to OILC under the Debentures (the "**Obligations**") and to pay such amounts to OILC from the Consolidated Revenue Fund.

5. For the purposes of meeting the Obligations, the Municipality shall provide for raising in each year as part of the general levy, the amounts of principal and interest payable in each year under the Debentures issued pursuant to the Rate Offer Letter Agreement, to the extent that the amounts have not been provided for by any other available source including other taxes or fees or charges imposed on persons or property by a by-law of any municipality.

6. (a) The Mayor and the Treasurer are hereby authorized to execute and deliver the Rate Offer Letter Agreement, and to issue the Debentures, one or more of the Clerk and the Treasurer are hereby authorized to generally do all things and to execute all other documents and papers in the name of the Municipality in order to perform the terms and conditions that apply to the Municipality as set out in the Rate Offer Letter Agreement and to perform the Obligations of the Municipality under the Debentures, and the Treasurer is authorized to affix the Municipality's municipal seal to any such documents and papers.

   (b) The money realized in respect of the Debentures, including any premium, and any earnings derived from the investment of that money, after providing for the expenses related to the issue of the Debentures, if any, shall be apportioned and applied to the respective Capital Work and to no other purpose except as permitted by the Act.

7. This By-law takes effect on the day of passing.

ENACTED AND PASSED this _____day of _____, A.D. 20_____.

_____	_____
Andy Letham	Cathie Ritchie
Mayor	City Clerk

Schedule "A"
to By-Law Number 2020-095
(Capital Work(s))

(1)	(2)	(3)	(4)
By-Law Number	**Description of Capital Work**	**Estimated Expenditure**	**Loan Amount**
2016-986	Water Distribution & WW collection	$3,020,123	$538,633.87
2016-986	Wastewater Treatment	$5,961,780.11	$1,657,976.11
2017-952	Combined Water Distribution and Wastewater Collection	$3,902,222.75	$1,110,460.85
2019-042	FF WTP Membranes, Controls & Pumps	$1,267,734.9	$1,267,734.9
2019-042	Russel St. W. Mains	$1,254,271.2	$826,176
2017-958	Bridges	$2,871,036.54	$901,626.24
2019-060	Bridges	$696,970.89	$ 649,000
2017-958	Arena & Pool Upgrades	$3,200,522.97	$ 1,787,626.97
2019-060	Landfill Siteworks	$2,109,092.05	$2,109,092.05
2015-010	Urban/Rural Reconstruction Projects	$4,231,495.28	$168,280
2019-060	Urban/Arterial Resurfacing	$4,503,697.82	$2,534,717.11
2016-986	Wastewater Treatment	$5,961,780.11	$1,160,917.00
2017-952	Combined Water Distribution and Wastewater Collection	$3,902,222.75	$248,057.00
2017-958	Bridges	$2,891,036.54	$252,474.00
2016-1007	Urban/Rural Reconstruction Projects	$5,742,790.73	$567,962.00
2016-1007	Bridges	$2,630,617.52	$954,388.00
2016-986	Watermain Replacement	$521,932.94	$259,261.00
2015-010	Logie Park Improvements	$4,378,639.85	$3,036,490.00
2019-060	Bobcaygeon Beach Park	$328,883.49	$173,203.20
2017-958	Urban/Rural Reconstruction Projects	$5,633,707.67	$679,427.14
2019-042	Durham St. W. Mains	$680,948.35	$247,075.35
2019-042	Lindsay SPS	$193,852.67	$138,604.87
2019-684	Urban/Rural Reconstruction Projects	$5,122,535.00	$512,253.50
2015-1382	Urban/Rural Reconstruction Projects	$3,303,543.42	$340,575.56

Schedule “B”
to By-Law Number 2020-095

Please insert the OILC Application into Schedule “B”.

LoanApplication517
.pdf

Infrastructure Ontario

Webloans Loan Application PDF

FA Number 1541

Application for Kawartha Lakes, The Corporation of The City of

Projects

ID	SIT Project ID	Project Name	Construction/Purchase Start	Construction/Purchase End	Project Cost	OILC Loan Amount
1313	1	Bridge Reconstruction	01/01/2018	12/31/2020	$2,891,036.54	901,626.24
1314	1	Bridge Reconstruction	01/01/2019	12/31/2020	$649,000.00	649,000.00
1315	3	Arena Pool Upgrades	01/01/2018	12/31/2020	$3,200,522.97	1,787,626.97
1316	4	Landfill Siteworks	01/01/2019	12/31/2020	$2,109,092.05	2,109,092.05
1317	5	Urban Rural Reconstruction Projects	01/01/2015	12/31/2019	$4,231,495.28	168,280.00
1318	6	Urban Arterial Resurfacing	01/01/2019	12/31/2020	$301,835.74	301,835.74
1319	6	Urban Arterial Resurfacing	01/01/2019	12/31/2020	$2,172,775.00	1,222,775.00
1320	6	Urban Arterial Resurfacing	01/01/2019	12/31/2020	$1,960,106.37	1,010,106.37
1321	9	Water Distribution and WW Collection	01/01/2017	06/30/2020	$3,020,123.24	538,633.87
1322	10	Wastewater Treatment	01/01/2017	12/31/2020	$5,961,780.11	1,657,976.11
1323	11	Combined Water Distribution and Wastewater Collection	01/01/2018	12/31/2020	$3,902,222.75	1,110,460.85
1324	12	Fenelon Falls WTP Membranes Controls and Pumps	01/01/2019	12/31/2020	$1,267,734.90	1,267,734.90
1325	13	Watermain Replacement	01/01/2019	12/31/2020	$1,218,000.00	826,176.00
1326	14	Roads Projects DC Funded	01/01/2016	12/31/2020	$2,100,218.20	2,100,218.20
1327	15	Bridge Projects DC Funded	01/01/2017	12/31/2020	$1,206,862.00	1,206,862.00
1328	16	Water Projects DC Funded	01/01/2017	12/31/2020	$506,336.35	506,336.35
1329	17	Sewer Projects DC Funded	01/01/2017	12/31/2020	$1,547,578.87	1,547,578.87
1330	18	Parks Projects DC Funded	01/01/2015	12/31/2020	$3,209,693.20	3,209,693.20

Details of Project Bridge Reconstruction

Project Category Municipal Bridge Infrastructure

Project Name Bridge Reconstruction

Construction/Purchase Start 01/01/2018

Construction/Purchase End 12/31/2020

Energy Conservation ☐

Project Address 1 Various Locations in Kawartha Lakes

Project Address 2

City / Town

Province	ON
Postal Code	
Description	Perch Creek Bridge(41073), Ricketts Bridge(300030, Centennial Park Bridge(33016), Wellington St Bridge & Second FF Area Bridge - Build, Rehabilitation and reconstruction of bridges and similar Municipal structures.
Comments and/or Special Requests	
Project Life Span (Years)	40

Project Financial Information

Project Cost (A) $2,891,036.54

Other Project Funding / Financing (B):

Description	Timing	Amount
Reserves	Existing	$690,147.00
Development Charges	Existing	$260,000.00
Already Debentured	Existing	$1,039,263.30

Other Project Funding/Financing Total (B) $1,989,410.30

OILC Loan Amount (A-B) $901,626.24

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$901,626.24	10	Serial
Long-term Borrowing Total	$901,626.24		

Details of Project Bridge Reconstruction

Project Category	Municipal Bridge Infrastructure
Project Name	Bridge Reconstruction
Construction/Purchase Start	01/01/2019
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Lindsay

Project Address 2	
City / Town	Lindsay
Province	ON
Postal Code	
Description	Wellington St. Bridge - Rehabilitation - Structure Appraisal Program-Includes resurfacing of Wellington St. from William St. to Lindsay St.
Comments and/or Special Requests	
Project Life Span (Years)	40

Project Financial Information

Project Cost (A)	$649,000.00
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$649,000.00

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$649,000.00	10	Serial
Long-term Borrowing Total	$649,000.00		

Details of Project Arena Pool Upgrades

Project Category	Cultural Infrastructure
Work Type	Other Cultural Infra. Project
Other Description	Arena & Pool Upgrade
Project Name	Arena Pool Upgrades
Construction/Purchase Start	01/01/2018
Construction/Purchase End	12/31/2020

Energy Conservation	☐
Project Address 1	Various Locations in Kawartha Lakes
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	Upgrades to various arenas within the City which include washrooms, electrical, dehumidifiers, ice pad, dressing rooms and score clocks
Comments and/or Special Requests	
Project Life Span (Years)	50

Project Financial Information

Project Cost (A) $3,200,522.97

Other Project Funding / Financing (B):

Description	Timing	Amount
Tax Levy	Existing	$309,578.00
Reserves	Existing	$1,103,318.00

Other Project Funding/Financing Total (B) $1,412,896.00

OILC Loan Amount (A-B) $1,787,626.97

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,787,626.97	10	Serial
Long-term Borrowing Total	$1,787,626.97		

Details of Project Landfill Siteworks

Project Category	Waste Management Infrastrcuture
Project Name	Landfill Siteworks

Construction/Purchase Start	01/01/2019
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	51 Wilson Rd
Project Address 2	
City / Town	Lindsay
Province	ON
Postal Code	K9V 4R3
Description	Lindsay/Ops Landfill Cell 4/5 Phase II of II - Replacement and Expansion - Required to sustain landfill service; otherwise landfill would need to be closed
Comments and/or Special Requests	
Project Life Span (Years)	20

Project Financial Information

Project Cost (A)	$2,109,092.05
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$2,109,092.05

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$2,109,092.05	10	Serial
Long-term Borrowing Total	$2,109,092.05		

Details of Project Urban Rural Reconstruction Projects

Project Category	Municipal Roads Infrastructure
Project Name	Urban Rural Reconstruction Projects

Construction/Purchase Start	01/01/2015
Construction/Purchase End	12/31/2019
Energy Conservation	☐
Project Address 1	Various Locations in Kawartha Lakes
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	Resurfacing of urban and rural roads based on the Roads Study.
Comments and/or Special Requests	
Project Life Span (Years)	10

Project Financial Information

Project Cost (A) $4,231,495.28

Other Project Funding / Financing (B):

Description	Timing	Amount
Tax Levy	Existing	$118,023.00
Reserves	Existing	$1,586,474.00
Development Charges	Existing	$1,067,965.00
Already Debentured	Existing	$1,290,753.28

Other Project Funding/Financing Total (B) $4,063,215.28

OILC Loan Amount (A-B) $168,280.00

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$168,280.00	10	Serial
Long-term Borrowing Total	$168,280.00		

Details of Project Urban Arterial Resurfacing

Project Category	Municipal Roads Infrastructure
Project Name	Urban Arterial Resurfacing
Construction/Purchase Start	01/01/2019
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Verulam
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	CKL Rd. 6 (Zion Rd. to CKL Rd. 28) Resurfacing
Comments and/or Special Requests	
Project Life Span (Years)	10

Project Financial Information

Project Cost (A)	$301,835.74
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$301,835.74

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$301,835.74	10	Serial
Long-term Borrowing Total	$301,835.74		

Details of Project Urban Arterial Resurfacing

Project Category	Municipal Roads Infrastructure
Project Name	Urban Arterial Resurfacing
Construction/Purchase Start	01/01/2019
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Fenelon Falls
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	CKL Rd. 21 (Hwy 35 to CKL Rd 8) Resurfacing
Comments and/or Special Requests	
Project Life Span (Years)	10

Project Financial Information

Project Cost (A) $2,172,775.00

Other Project Funding / Financing (B):

Description	Timing	Amount
Reserves	Existing	$950,000.00

Other Project Funding/Financing Total (B) $950,000.00

OILC Loan Amount (A-B) $1,222,775.00

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,222,775.00	10	Serial

Long-term Borrowing Total	$1,222,775.00

Details of Project Urban Arterial Resurfacing

Project Category	Municipal Roads Infrastructure
Project Name	Urban Arterial Resurfacing
Construction/Purchase Start	01/01/2019
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Emily
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	CKL Rd. 17 (Colony Rd to CKL Rd 10) Resurfacing
Comments and/or Special Requests	
Project Life Span (Years)	10

Project Financial Information

Project Cost (A)	$1,960,106.37

Other Project Funding / Financing (B):

Description	Timing	Amount
Reserves	Existing	$950,000.00

Other Project Funding/Financing Total (B)	$950,000.00
OILC Loan Amount (A-B)	$1,010,106.37

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,010,106.37	10	Serial
Long-term Borrowing Total	$1,010,106.37		

Details of Project Water Distribution and WW Collection

Project Category Sewage Treatment Infrastructure

Project Name Water Distribution and WW Collection

Construction/Purchase Start 01/01/2017

Construction/Purchase End 06/30/2020

Energy Conservation ☐

Project Address 1 Lindsay

Project Address 2

City / Town

Province ON

Postal Code

Description St. Paul St., Sylvan Cres, Melbourne St. E and Elgin St. - Water and Sanitary Replacement and Upgrades

Comments and/or Special Requests

Project Life Span (Years) 60

Project Financial Information

Project Cost (A) $3,020,123.24

Other Project Funding / Financing (B):

Description	Timing	Amount
Reserves	Existing	$1,495,079.37
Grant	Existing	$986,410.00
Other Project Funding/Financing Total (B)		$2,481,489.37

OILC Loan Amount (A-B) $538,633.87

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$0.00	20	Serial
Long-term Borrowing Total	$0.00		

Details of Project Wastewater Treatment

Project Category	Sewage Treatment Infrastructure
Project Name	Wastewater Treatment
Construction/Purchase Start	01/01/2017
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Various Locations in Kawartha Lakes
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	Lindsay WPCP, Colborne St, Ridout St, Coboconk and Bobcaygeon - Sanitary Pumping Station Upgrades
Comments and/or Special Requests	
Project Life Span (Years)	60

Project Financial Information

Project Cost (A) $5,961,780.11

Other Project Funding / Financing (B):

Description	Timing		Amount
Development Charges	Existing	452	$4,303,804.00
Other Project Funding/Financing Total (B)			$4,303,804.00

OILC Loan Amount (A-B)	$1,657,976.11

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,657,976.11	20	Serial
Long-term Borrowing Total	$1,657,976.11		

Details of Project Combined Water Distribution and Wastewater Collection

Project Category	Clean Water Infrastructure
Project Name	Combined Water Distribution and Wastewater Collection
Construction/Purchase Start	01/01/2018
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Lindsay
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	Bay St, Durham St, George St, Hamilton St, St. Paul St, Denniston St, Colborne St, King St, Kawartha Drive, Hillside Dr, Angeline St, Kent St Intersection - Water Distribution and Wastewater Collection Upgrades
Comments and/or Special Requests	
Project Life Span (Years)	60

Project Financial Information

Project Cost (A)	$3,902,222.75

Other Project Funding / Financing (B):

Description	Timing	Amount

Description	Timing	Amount
Grant	Existing	$1,087,900.00
Reserves	Existing	$2,223.00
Development Charges	Existing	$385,077.00
Already Debentured	Existing	$1,316,561.90
Other Project Funding/Financing Total (B)		$2,791,761.90
OILC Loan Amount (A-B)		$1,110,460.85

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,110,460.85	20	Serial
Long-term Borrowing Total	$1,110,460.85		

Details of Project Fenelon Falls WTP Membranes Controls and Pumps

Project Category	Clean Water Infrastructure
Project Name	Fenelon Falls WTP Membranes Controls and Pumps
Construction/Purchase Start	01/01/2019
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	99 Francis St. W.
Project Address 2	
City / Town	Fenelon Falls
Province	ON
Postal Code	K0M 1N0
Description	Fenelon Falls WTP Membranes, Controls & Pumps-Replacement
Comments and/or Special Requests	
Project Life Span (Years)	60

Project Financial Information

Project Cost (A)	$1,267,734.90
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$1,267,734.90

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,267,734.90	20	Serial
Long-term Borrowing Total	$1,267,734.90		

Details of Project Watermain Replacement

Project Category	Clean Water Infrastructure
Project Name	Watermain Replacement
Construction/Purchase Start	01/01/2019
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Lindsay
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	Russell St. W. Mains (Lindsay St. to Victoria Ave) - Replacement
Comments and/or Special Requests	
Project Life Span (Years)	60

Project Financial Information

Project Cost (A) $1,218,000.00

Other Project Funding / Financing (B):

Description	Timing	Amount
Reserves	Existing	$74,524.00
Grant	Existing	$317,300.00

Other Project Funding/Financing Total (B) $391,824.00

OILC Loan Amount (A-B) $826,176.00

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$826,176.00	20	Serial
Long-term Borrowing Total	$826,176.00		

Details of Project Roads Projects DC Funded

Project Category Municipal Roads Infrastructure

Project Name Roads Projects DC Funded

Construction/Purchase Start 01/01/2016

Construction/Purchase End 12/31/2020

Energy Conservation ☐

Project Address 1 Various Locations in Kawartha Lakes

Project Address 2

City / Town

Province ON

Postal Code

Description

RD1606 - Urban/Rural Reconstruction
RD1703 - Urban/Rural Reconstruction
RD1803 - Urban/Rural Reconstruction
RD2003 - Urban/Rural Reconstruction
Replenish of development charge revenue reserve funded projects.

Comments and/or Special Requests

Project Life Span (Years)	20

Project Financial Information

Project Cost (A)	$2,100,218.20
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$2,100,218.20

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$2,100,218.20	20	Serial
Long-term Borrowing Total	$2,100,218.20		

Details of Project Bridge Projects DC Funded

Project Category	Municipal Bridge Infrastructure
Project Name	Bridge Projects DC Funded
Construction/Purchase Start	01/01/2017
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Various Locations in Kawartha Lakes
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	RD1701 - Bridge Reconstruction RD1801 - Bridge Reconstruction Replenishment of development charge revenue reserves funded projects.
Comments and/or Special Requests	

Project Life Span (Years)	20

Project Financial Information

Project Cost (A)	$1,206,862.00
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$1,206,862.00

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,206,862.00	20	Serial
Long-term Borrowing Total	$1,206,862.00		

Details of Project Water Projects DC Funded

Project Category	Clean Water Infrastructure
Project Name	Water Projects DC Funded
Construction/Purchase Start	01/01/2017
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Various Locations in Kawartha Lakes
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	WW1701 - Watermain Replacement WW1903 - Durham St. W. Mains Replenishment of development charge revenue reserves funded projects
Comments and/or Special Requests	

Project Life Span (Years)	20

Project Financial Information

Project Cost (A)	$506,336.35
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$506,336.35

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$506,336.35	20	Serial
Long-term Borrowing Total	$506,336.35		

Details of Project Sewer Projects DC Funded

Project Category	Sewage Treatment Infrastructure
Project Name	Sewer Projects DC Funded
Construction/Purchase Start	01/01/2017
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Various Locations in Kawartha Lakes
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	WW1705 - Wastewater Treatment - Sanitary Pumping Station Upgrades WW1803 - Combined Water Distribution and Wastewater Collection WW1903 - Lindsay SPS - Lindsay Colborne St./Rivera SPS - Expansion
Comments and/or Special Requests	

Project Life Span (Years)	20

Project Financial Information

Project Cost (A)	$1,547,578.87
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$1,547,578.87

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$1,547,578.87	20	Serial
Long-term Borrowing Total	$1,547,578.87		

Details of Project Parks Projects DC Funded

Project Category	Recreation Infrastructure
Work Type	Public Parks and Public Trails
Project Name	Parks Projects DC Funded
Construction/Purchase Start	01/01/2015
Construction/Purchase End	12/31/2020
Energy Conservation	☐
Project Address 1	Various Locations in Kawartha Lakes
Project Address 2	
City / Town	
Province	ON
Postal Code	
Description	PR1518 - Logie Park Improvements - Develop and Expand Logie St. Park in Lindsay PR1901 - Bobcaygeon Beach Park - Develop and Expand Bobcaygeon Beach Park in Bobcaygeon Replenishment of development charge revenue reserves funded projects.
Comments and/or Special Requests	

Project Life Span (Years)	20

Project Financial Information

Project Cost (A)	$3,209,693.20
Other Project Funding / Financing (B):	
Other Project Funding/Financing Total (B)	$0.00
OILC Loan Amount (A-B)	$3,209,693.20

Only include long-term borrowing in this section. If you anticipate that you will require short-term financing during the construction phase of the project, the information will be gathered as part of the Financing Agreement.

Required Date	Amount	Term	Type
12/01/2020	$3,209,693.20	20	Serial
Long-term Borrowing Total	$3,209,693.20		

Debt and Re-payments Summary

Has there been any new/undisclosed debt acquired since last FIR was submitted? ☐ Yes ☑ No

Please describe any re-financing plans for any existing "interest only" debt, if applicable.

Non Re-payments of Loans or Debenture

In the last 10 years, has the borrower ever failed to make a loan payment or debenture repayment on time to any lender, including the Provincial Government?

If yes, please provide details.

OILC Loan Repayment Information

Please indicate the source(s) of revenue you plan to use to repay the OILC Loan

Taxation	37.00
User Fees	24.00
Service Charges	0.00
Development Charges	39.00
Connection Fees	0.00
Repayment Subsidies	0.00
Other	
Total	100.00%

Documentation and Acknowledgements

Please ensure all required documents are submitted with the signed application. OILC requires originals as noted below to be mailed or couriered. Also, please retain a copy of all documents submitted to OILC for your records.

To obtain templates for documents see listed below.

- Loan Application Signature Page signed and dated by the appropriate individual (original to be submitted)
- Certificate and sealed copy of OILC template By-law authorizing project borrowing and applying for a loan (original with seal)
- Certificate of Treasurer Regarding Litigation using the OILC template (original, signed & sealed)
- Updated Certified Annual Repayment Limit Calculation (original)

☑ I acknowledge and agree that all of the above referenced documents must be submitted in the form required by OILC and understand that the application will not be processed until such documents have been fully completed and received by Infrastructure Ontario.

Please note: OILC retains the right to request and review any additional information or documents at its discretion.

Confidential Information

OILC is an institution to which the Freedom of Information and Protection of Privacy Act (Ontario) applies. Information and supporting documents submitted by the Borrower to process the loan application will be kept secure and confidential, subject to any applicable laws or rules of a court or tribunal having jurisdiction.

Infrastructure Ontario

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The Corporation of the City of Kawartha Lakes

By-Law 2020-XXX

A By-law to Amend By-Law 2010-091, being a By-law to Designate 145 King Street, Woodville

Recitals

1. Section 30.1 of the Ontario Heritage Act, R.S.O. 1990, provides that a Council of a municipality may amend a by-law designating a property within the bounds of a municipality to correct a legal description of a property, clarify the statement of a property's cultural heritage value, or to make it consistent with the requirements of the Act.

2. A notice of the proposed amendment has been served on the owner of the property in accordance with subsection 30.1(4) of the Act.

3. No objection to the proposed amendment has been served on the Clerk of the Municipality.

4. An amendment is required to clarify the statement of cultural heritage value for the property located at 145 King Street and make the by-law consistent with the requirements of the Act.

5. These changes require an amendment to the original by-law.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-XXX.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: All defined terms in the amending By-law take their meaning from By-law 2010-091 of the City of Kawartha Lakes.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Amendments

2.01 **Amendments to Schedule A:** Schedule A of By-law 2010-091 shall be deleted and substituted for Schedule A attached to this By-law.

2.02 **Amendments to Schedule B:** Schedule B of By-law 2010-091 shall be deleted from the By-law.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Development Services is responsible for the administration of this by-law.

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this XXX day of XXX, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

Schedule 'A' to By-law 2020-XXX
Being a By-law to Amend By-law 2010-091, being a By-law to Designate 145 King Street, Woodville

Property

145 King Street, Woodville – Morrison House

Legal Description

PT BLK B S OF KING ST PL 119 AS IN R447923; KAWARTHA LAKES

PIN: 63180-0097

Statement of Cultural Heritage Value

145 King Street, known locally as both Morrison House and Quality Hill House, has architectural value as a representative example of a Victorian residential building. It retains a number of architecturally significant features including: two over two double-hung windows with inlaid brick lintels solid pine window sills and decorative brick surrounds; bay windows; and a stately entrance with transom windows. It also retains decorative gingerbread trim in the gables which is typical of this style of house. Constructed in 1867, the plans for the house came from Scotland and it was considered such a fine structure at the time of its construction that a drawing of it appeared in the 1881 Victoria County Atlas. A decorative medallion in the drawing room ceiling is believed to be based on a design by the prominent eighteenth century Scottish architect, Robert Adam. The property also has historical significance due to its connections to the history of Woodville and the local Scottish community. Morrison House was constructed in 1867 for Scottish immigrant John Morrison, who served as Reeve of Eldon between 1860 and 1861 and was elected to the first Dominion Parliament as the Liberal MP for Victoria North. He was instrumental in changing the name of the village from what was then known as Irish Corners to Woodville. In 1870, a Minister of Parliament from Scotland gave out the land grants in the drawing room of this house to many Scottish immigrants.

Heritage Attributes

Exterior:

- Two-and-a-half storey construction
- Gable roof
- Buff brick exterior
- Gingerbread trim
- Wide pine planked tongue and groove soffits
- Fenestration including:
    - Original wooden windows
    - Shutters
    - Voussoirs
    - Front bay window
- Front entrance including:
    - Transom and sidelights

- Large square-cut ashlar field stones in foundation
- Decorative brickwork around most windows
- Quoins
- Chimneys

Interior

- Main Jacobean staircase banister
- Three faux marble fireplace mantles in the library, dining room and drawing room
- Medallion on the drawing room ceiling
- Arched window in the staircase landing

The Corporation of the City of Kawartha Lakes

By-Law 2020-XXX

A By-law to Amend By-Law 2010-092, being a By-law to Designate 56 King Street, Woodville

Recitals

1. Section 30.1 of the Ontario Heritage Act, R.S.O. 1990, provides that a Council of a municipality may amend a by-law designating a property within the bounds of a municipality to correct a legal description of a property, clarify the statement of a property's cultural heritage value, or to make it consistent with the requirements of the Act.

2. A notice of the proposed amendment has been served on the owner of the property in accordance with subsection 30.1(4) of the Act.

3. No objection to the proposed amendment has been served on the Clerk of the Municipality.

4. An amendment is required to clarify the statement of cultural heritage value for the property located at 56 King Street and make the by-law consistent with the requirements of the Act.

5. These changes require an amendment to the original by-law.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-XXX.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: All defined terms in the amending By-law take their meaning from By-law 2010-092 of the City of Kawartha Lakes.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Amendments

2.01 **Amendments to Schedule A:** Schedule A of By-law 2010-092 shall be deleted and substituted for Schedule A attached to this By-law.

2.02 **Amendments to Schedule B:** Schedule B of By-law 2010-092 shall be deleted from the By-law.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Development Services is responsible for the administration of this by-law.

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this XXX day of XXX, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

Schedule 'A' to By-law 2020-XXX
Being a By-law to Amend By-law 2010-092 Being a By-law to Designate 56 King Street, Woodville

Property

56 King Street, Woodville

Legal Description

PLAN 119 PT BLK C RP 57R2654;PART 1 RP 57R4801 PART 1 RP;57R10155 PART 3

PIN: 63179-0446

Statement of Cultural Heritage Value

56 King Street was constructed in Woodville in 1837 and is an excellent, representative example of a Georgian style house. Constructed on a center hall plan, It demonstrates the typical symmetrical massing and restrained ornamentation of Georgian houses and key features of this style. These include six over six sash windows with shutters, a central entrance with transom and sidelights and symmetrical chimneys. The property has also retained a number of original interior features including three fireplaces, original pine floors, original Peter Robinson windows and a spiral, tower style staircase and original cooking fireplace in basement. The property also has historical significance as the Presbyterian manse and contextual significance as part of the historic landscape of King Street in Woodville and in its connections to the former Presbyterian Church.

Heritage Attributes

Exterior

- Two-storey construction
- Gable roof
- Red brick exterior
- Stone foundation
- Fenestration including:
    - Double-hung six over six Colonial windows
    - Peter Robinson windows
    - Shutters
    - Voussoirs
- Chimneys
- Return eaves
- Front entrance with sidelights and transom

Interior

- Fireplaces including:
    - Mantle and hearth of fireplace with faux marble finish located in the living room in the northwest side of the house;
    - Original additional hearths found in two other fireplaces

- Original pine floors
- Enclosed spiral, tower style staircase and inset window
- Fireplace, brickwork and hearth in second storey front room

The Corporation of the City of Kawartha Lakes

By-Law 2020-XXX

A By-law to Amend By-Law 2010-093, being a By-law to Designate 121 King Street, Woodville, "Stoddart House"

Recitals

1. Section 30.1 of the Ontario Heritage Act, R.S.O. 1990, provides that a Council of a municipality may amend a by-law designating a property within the bounds of a municipality to correct a legal description of a property, clarify the statement of a property's cultural heritage value, or to make it consistent with the requirements of the Act.

2. A notice of the proposed amendment has been served on the owner of the property in accordance with subsection 30.1(4) of the Act.

3. No objection to the proposed amendment has been served on the Clerk of the Municipality.

4. An amendment is required to clarify the statement of cultural heritage value for the property located at 121 King Street and make the by-law consistent with the requirements of the Act.

5. These changes require an amendment to the original by-law.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-XXX.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: All defined terms in the amending By-law take their meaning from By-law 2010-093 of the City of Kawartha Lakes.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Amendments

2.01 **Amendments to Schedule A:** Schedule A of By-law 2010-093 shall be deleted and substituted for Schedule A attached to this By-law.

2.02 **Amendments to Schedule B:** Schedule B of By-law 2010-093 shall be deleted from the By-law.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Development Services is responsible for the administration of this by-law.

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this XXX day of XXX, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

Schedule 'A' to By-law 2020-XXX
Being a By-law to Amend By-law 2010-093 Being a By-law to Designate 121 King Street, Woodville, "Stoddart House"

Property

121 King Street, Woodville

Legal Description

PLAN 119 LOTS 13 & 14

PIN# 63180-0134

Statement of Cultural Heritage Value

Traditionally known as the "Stoddart House", this house was built in the 1870s by Dr. Grant with solid brick exterior walls on field stone foundation. It is an excellent and representative example of a Victorian residential building and is currently in original condition. The house is one of the oldest and most ornate Victorian homes in Woodville. The house features a Queen Anne Revival style wrap-around verandah on three sides which contains decorative brackets, gingerbread trims and railings, and slats of gingerbread trim between posts and brackets that are characteristic of the Queen Anne revival style. Two sets of ornate stained glass windows decorate the two storeys of the front façade of the home. The property has historical significance because of its associations with the Stoddart family and their businesses within the community of Woodville and in Victoria County. The Stoddart family has operated funeral establishments in the area in 1858 and, after the construction of the house, ran a cabinet making and funeral business from this building. They continue to operate their funeral business in the county from a different location. The property also has contextual significance as part of the historic landscape of King Street in Woodville.

Heritage Attributes

- One and a half storey construction
- Gable roof
- Red brick construction
- Wrap around porch with decorative woodwork including:
    - Chamfered columns
    - Brackets
    - Spindlework
- Fenestration including:
    - Stained glass
    - Transoms
    - Rounded windows
    - Buff brick voussoirs
- Buff brick quoins
- Decorative bargeboard in the centre gable
- Symmetrical massing

The Corporation of the City of Kawartha Lakes

By-Law 2020-XXX

A By-law to Amend By-Law 2010-094, being a By-law to Designate 124 King Street, Woodville

Recitals

1. Section 30.1 of the Ontario Heritage Act, R.S.O. 1990, provides that a Council of a municipality may amend a by-law designating a property within the bounds of a municipality to correct a legal description of a property, clarify the statement of a property's cultural heritage value, or to make it consistent with the requirements of the Act.

2. A notice of the proposed amendment has been served on the owner of the property in accordance with subsection 30.1(4) of the Act.

3. No objection to the proposed amendment has been served on the Clerk of the Municipality.

4. An amendment is required to clarify the statement of cultural heritage value for the property located at 124 King Street and make the by-law consistent with the requirements of the Act.

5. These changes require an amendment to the original by-law.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-XXX.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: All defined terms in the amending By-law take their meaning from By-law 2010-094 of the City of Kawartha Lakes.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Amendments

2.01 **Amendments to Schedule A:** Schedule A of By-law 2010-094 shall be deleted and substituted for Schedule A attached to this By-law.

2.02 **Amendments to Schedule B:** Schedule B of By-law 2010-094 shall be deleted from the By-law.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Development Services is responsible for the administration of this by-law.

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this XXX day of XXX, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

Schedule 'A' to By-law 2020-XXX
Being a By-law to Amend By-law 2010-094 Being a By-law to Designate 124 King Street, Woodville

Property

124 King Street, Woodville

Legal Description

LT 8 N/S KING ST AND W/S NAPPADALE ST PL 119; KAWARTHA LAKES

PIN: 63179-0221

Statement of Cultural Heritage Value

124 King Street in Woodville has cultural heritage value as a representative and intact example of a late Victorian house. Constructed in 1879, the house retains many of its architectural features. These include its L-shaped massing, buff brick quoins, rounded windows, moulded decorative window hoods, corner porch, and entrance with transom window. The house was built for the daughter of Woodville Postmaster John Morrison, who also served as Reeve of Eldon between 1860 and 1861, whose own house is located across the road. The property has contextual value as part of the historic streetscape of King Street in Woodville. The street which forms the main thoroughfare through town retains a wide array of late nineteenth century residential properties and this property contributes to that intact historic landscape.

Heritage Attributes

- One and a half storey construction
- Gable roof
- Red brick exterior
- Rusticated buff brick quoins
- Fenestration including:
    - Rounded and rectangular windows
    - Buff brick decorative hood moulds
- Front porch including columns and entablature
- Entrance with transom

The Corporation of the City of Kawartha Lakes

By-Law 2020-XXX

A By-law to Amend Township of Emily By-Law 2000-14, being a By-law to Designate the Interior and the Exterior of the Chapel Located with the Emily Cemetery, Township of Emily, 4249 Highway #7, on Concession 4 Part Lot 12, RP57R819 Part 1 to 2, Presently Owned by the Emily Cemetery Company, as a Designated Property Under the Act

Recitals

1. Section 30.1 of the Ontario Heritage Act, R.S.O. 1990, provides that a Council of a municipality may amend a by-law designating a property within the bounds of a municipality to correct a legal description of a property, clarify the statement of a property's cultural heritage value, or to make it consistent with the requirements of the Act.

2. A notice of the proposed amendment has been served on the owner of the property in accordance with subsection 30.1(4) of the Act.

3. No objection to the proposed amendment has been served on the Clerk of the Municipality.

4. An amendment is required to clarify the statement of cultural heritage value for the property located at 4249 Highway 7 and to make the by-law consistent with the requirements of the Act.

5. These changes require an amendment to the original by-law.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-XXX.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

"Director of Development Services" means the person who holds that position and his or her delegate(s) or, in the event of organizational changes, another person designated by Council.

"Property" means property as set out in Section 2.01.

“Township of Emily” means the former Corporation of the Township of Emily, now amalgamated into the City of Kawartha Lakes.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words “include” and “including” are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Amendments

2.01 **Amendment to Schedule A:** Schedule A of Township of Emily By-law 2000-14 shall be deleted and substituted for Schedule A attached to this By-law.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Development Services is responsible for the administration of this by-law.

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this XXX day of XXX, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

Schedule 'A' to By-law 2020-XXX

Being a By-law to Amend By-law 2004-14 (former Corporation of the Township of Emily) Being a By-law to Designate the Interior and Exterior of the Chapel Located within the Emily Cemetery, Township of Emily, 4249 Highway #7, on Concession 4 Part Lot 12, RP57r819 Part 1 to 2, Presently Owned by the Emily Cemetery Company, as Designated Property Under the Act

Property

4249 Highway 7, Emily Township

Legal Description

CON 4 PT LOT 12 RP 57R819; PART 1 TO 2

PIN: 63256-0436

Statement of Cultural Heritage Value

4249 Highway 7, known locally as the Emily Cemetery Chapel, is an excellent and representative example of a cemetery chapel constructed in the English Gothic style. It retains many of its original features that are key aspects of this architectural type including its stone wall structure, lancet windows, and bell-cote. Many of its features are original with minor restorations. Designed by Toronto architect George Roper Gouinlock, the building has historical significance as part of the Emily Cemetery which opened in 1872 when the community identified the need for a non-denominational buried ground. The chapel was constructed in 1929 and donated to the cemetery by Flora McCrae Eaton, Lady Eaton, as a memorial to her family and was originally named the McCrea Memorial Chapel. Lady Eaton was born in Omemee in 1880 and is an important figure locally because of her significant impact on the architectural development of Omemee in the early twentieth century. The first ceremony in this chapel took place in 1929 when the cemetery groundskeeper, Stephen Paragreen, passed away. The property has contextual significance as a defining built feature of the Emily Cemetery and as a local landmark in Emily Township. It retains an important contextual relationship with the surrounding cemetery grounds.

Heritage Attributes

Exterior

- One-storey stone construction
- Gable roof
- Cut stone walls
- South facing main entrance including:
    - Double oak lancet-shaped doors with wrought iron hinges
    - Limestone and granite elements
- Fenestration including:
    - Lancet windows
    - Rusticated surrounds

- Bell-cote with date stone (1928) and corbels
- Stone chimney
- Iron door knob
- Brackets
- Soffits and fascia
- Buttresses

Interior

- Open scissor truss timber roof
- Hardwood floor
- Wooden pews with trefoils
- Grouped lancets on the north elevation
- Stained glass

The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-law to Provide for the Changing of Names of a Public Highway in the City of Kawartha Lakes to McCumber Court and Switzer Place

Recitals

1. Section 10 of the Municipal Act, 2001, S.O. 2001, c. 25, provides that the Council of a municipality may provide service or thing that the municipality considers necessary or desirable for the public, which would include naming of a public road.
2. A request was received from the Ministry of Transportation to rename and readdress two newly created service roads following the realignment of Highway 7 at Meadowview Road on the boundary between the geographic Township of Emily, and the Township of Selwyn.
3. This matter was approved by Council Resolution CR2020-261 on September 15, 2020, by the adoption of the September 1, 2020 Committee of the Whole Recommendation CW2020-113.
4. Notice of the intention of City Council to pass this by-law was given in accordance with the provisions of City's Notice By-law 2015-095.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal Council for the City;

1.02 **Interpretation Rules:**

(a) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

(b) Except as otherwise provided in section 1.01, the words and terms used in this by-law have the same meaning as the words and terms used in the Municipal Act, 2001 and the Highway Traffic Act, R.S.O. 1990, c.H.8.

(c) The appendices attached to this by-law form part of the by-law, and are enforceable as such.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Highway Name Change & Readdressing

2.01 McCumber Court: The new service road, within the road allowance of Highway 7, created by the realignment of Highway 7, along part of the eastern boundary of Lot 23, Concession 2, geographic Township of Emily, be named McCumber Court.

2.02 Switzer Place: The new service road, within the road allowance of Highway 7, created by the realignment of Highway 7, along part of the eastern boundary of Lot 23, Concession 1, geographic Township of Emily, be named Switzer Place.

2.03 Readdressing: The following civic addresses in the City of Kawartha Lakes are hereby assigned new street names and are renumbered according to the table below and the attached Reference Map attached as "Appendix A":

Former Address	New Address
7688 Highway 7	94 Switzer Place
7692 Highway 7	90 Switzer Place
7694 Highway 7	88 Switzer Place
7698 Highway 7	86 Switzer Place
7702 Highway 7	82 Switzer Place
7708 Highway 7	78 Switzer Place
7712 Highway 7	74 Switzer Place
7716 Highway 7	70 Switzer Place
7798 Highway 7	10 Switzer Place
7800 Highway 7	8 Switzer Place
7832 Highway 7	12 McCumber Court
7842 Highway 7	20 McCumber Court

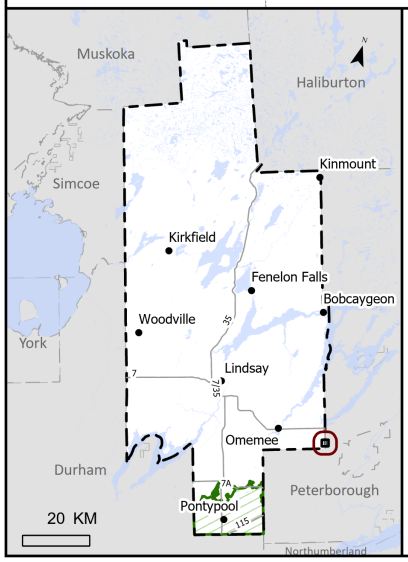
Section 3.00: Effective Date

3.01 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this 20th day of October, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

Appendix A to
Naming By-law for N



Hwy 7 Realignment - Emily Township
City of Kawartha Lakes/ Peterborough County

Hwy 7 Realignment Data
(Ministry of Transportation - MTO)

Properties identified for address change

Teranet Parcel Data - May 2020

Data Source: MTO; Teranet; LIO-OGDE
Map Projection & Datum: WGS 1984 Web Mercator Auxiliary Sphere
Units: Meters

KAWARTHA LAKES

Produced by the City of Kawartha Lakes
GIS Division, Development Services
Copyright 2020

Scale: 1:2,250,000

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Map produced by the City of Kawartha Lakes GIS and Mapping Division with data obtained under license. Reproduction without permission is prohibited. All distances and locations are approximate and are not of survey quality. Do not rely on it as being a precise indicator of privately or publicity owned land, routes, locations or features, nor as a guide to navigate. This Map is illustrative only. The City of Kawartha Lakes does not warrant the accuracy, completeness, content, or currency of the information provided.

The Corporation of the City of Kawartha Lakes

By-Law 2020 -

A By-Law To Amend The Township of Emily Zoning By-Law No. 1996-30 To Rezone Land Within The City Of Kawartha Lakes

File D06-2020-022, Report PLAN2020-046, respecting Part Lot 10, Concession 9, geographic Township of Emily, identified as 1067 Tracey's Hill Road

Recitals:

1. Section 34 of the Planning Act, R.S.O. 1990, c.P.13 authorizes Council to determine the appropriate zoning categories and provisions assigned to land.

2. Council has received an application to amend the categories and provisions relating to a specific parcel of land to:

   (a) rezone the land containing the dwelling to an agricultural exception zone category and establish applicable development standards;

   (b) rezone the balance of the lands containing the woodlands to an environmental protection zone and establish applicable development standards,

   in order to facilitate a future Consent application

3. A public meeting to solicit public input has been held.

4. Council deems it appropriate to rezone the Property.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1:00 Zoning Details

1.01 **Property Affected**: The Property affected by this by-law is described as Part Lot 10, Concession 9, geographic Township of Emily, City of Kawartha Lakes.

1.02 **Textual Amendment:** By-law No. 1996-30 of the Township of Emily is further amended by adding the following subsections to Sections 5.3 and 7.3:

"5.3.4 ENVIRONMENTAL PROTECTION EXCEPTION FOUR (EP-4) ZONE

5.3.4.1 Notwithstanding Sections 5.1 & 5.2, land zoned "EP-4" may also be used for passive, recreational uses specific to recreational trails and boardwalks.

7.3.36 AGRICULTURAL EXCEPTION THIRTY SIX (A1-36) ZONE

7.3.36.1 Notwithstanding subsections 3.21, 7.1.1, 7.2.1.7, 7.2.1.9, 7.2.1.10 and 7.2.1.11, on land zoned “A1-36” the permitted uses are limited to the following:

a) Agricultural Use;
b) Agricultural produce storage facility or seasonal fruit, flower or farm produce outlet for goods grown or produced on the farm;
c) Home Occupation;
d) Bed and Breakfast Establishment; and,
e) Single detached dwelling.

7.3.36.2 Notwithstanding 7.2.1.1, 7.2.1.7, 7.2.1.9, 7.2.1.10 and 7.2.1.11, land zoned “A1-36” shall have a minimum lot area of 4.2 hectares.

1.03 **Schedule Amendment**: Schedule ‘A’ to By-law No. 1996-30 of the Township of Emily is further amended to change the zone category on a portion of the property from Agricultural (A1) Zone to Agricultural Exception Thirty Six (A1-36) Zone for the land referred to as A1-36, as shown on Schedule ‘A’ attached to this By-law; and to change the zone category on another portion of the property from Agricultural (A1) Zone to Environmental Protection Exception Four (EP-4) Zone for the land referred to as EP-4, as shown on Schedule ‘A’ attached to this By-law.

Section 2:00 Effective Date

2.01 **Effective Date**: This By-law shall come into force and take effect on the date it is finally passed, subject to the provisions of Section 34 of the Planning Act R.S.O. 1990, c.P.13.

By-law read a first, second and third time, and finally passed, this 20th day of October, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

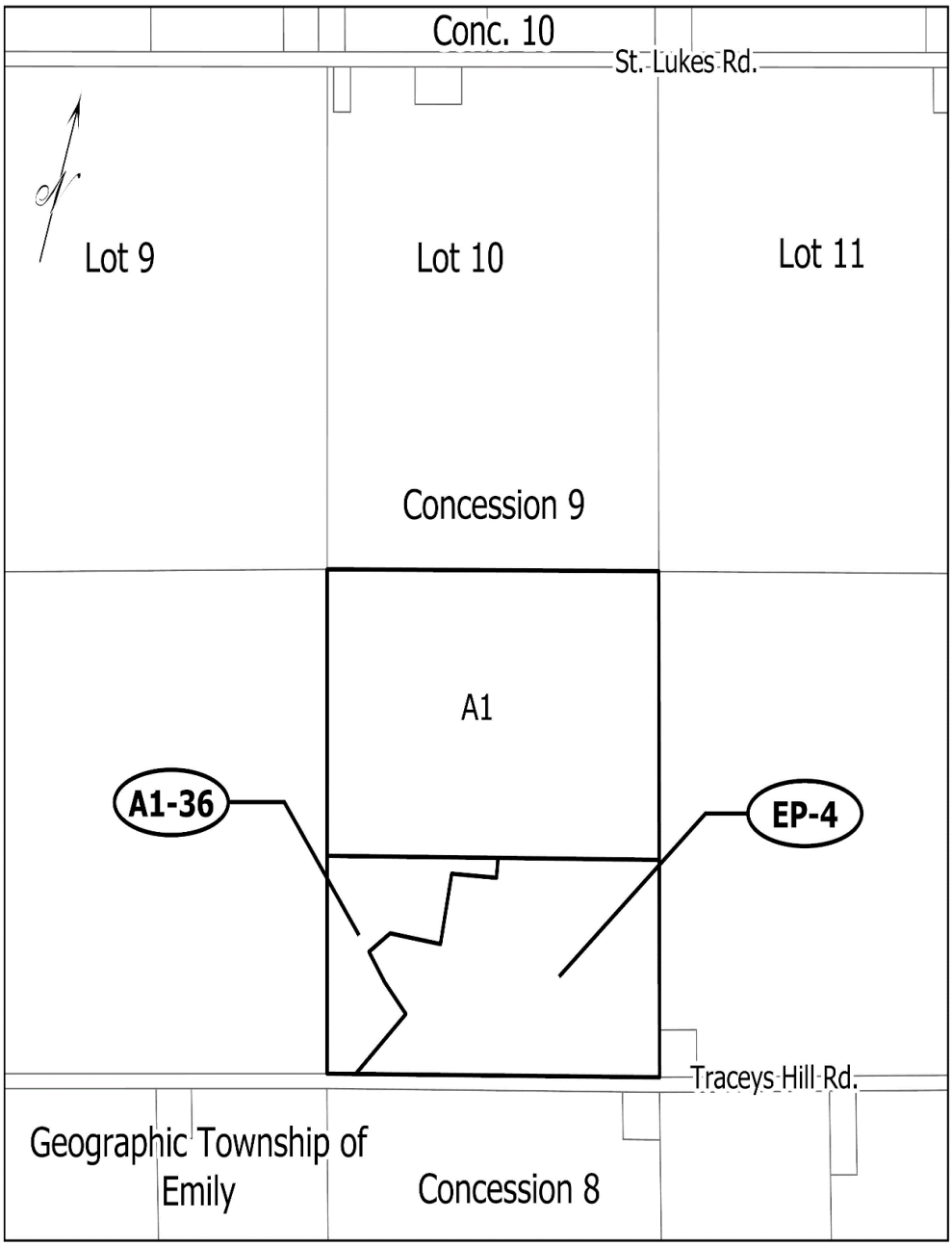
THE CORPORATION OF THE CITY OF

KAWARTHA LAKES

THIS IS SCHEDULE 'A' TO BY-LAW _____ PASSED

THIS _____ DAY OF _____ 2020.

MAYOR _____ CLERK _____



The Corporation of the City of Kawartha Lakes

By-Law 2020 -

A By-law to Amend the Township of Ops Zoning By-law No. 93-30 to Rezone Land within the City Of Kawartha Lakes

[File D06-2020-019, Report PLAN2020-047, respecting Part of Lot 15, Concession 4, Geographic Township of Ops, identified as 2197 Little Britain Road – Bob Mark New Holland Inc.]

Recitals:

1. Section 34 of the Planning Act, R.S.O. 1990, c.P.13 authorizes Council to determine the appropriate zoning categories and provisions assigned to land.

2. Council has received an application to amend the categories and provisions relating to a specific parcel of land to permit a range of dry industrial uses on the subject land.

3. A public meeting to solicit public input has been held.

4. Council deems it appropriate to rezone the Property.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1:00 Zoning Details

1.01 **Property Affected**: The Property affected by this by-law is described as Part of Lot 15, Concession 4, Geographic Township of Ops, City of Kawartha Lakes.

1.02 **Textual Amendment**: By-law No. 93-30 of the Township of Ops is further amended to add the following section to Section 12.3:

‘12.3.9 General Industrial Exception Nine (M-9) Zone

Notwithstanding Subsection 2.22 or the permitted uses and zone provisions in the General Industrial (M) Zone to the contrary, within the General Industrial Exception Nine (M-9) Zone, the following shall apply:

a. Notwithstanding subsection 12.1, on land zoned M-9 only the following uses are permitted:

Residential:
- prohibited

Non Residential Uses:

Light Industrial:

- an assembly plant
- an equipment storage building
- a printing or publishing establishment
- a warehouse

Medium Industrial:
- a body shop
- a commercial garage
- a contractors yard
- a machine shop or welding shop
- a maintenance garage
- a manufacturing plant
- a private gasoline pump island
- a processing plant
- a tradesman's shop
- a public works yard
- a truck terminal or depot
- an open storage area accessory to an M use

Heavy Industrial:
- a bulk storage tank

Other Industrial Uses:
- a building supply outlet
- a farm implement sales and supply establishment
- a light or heavy equipment sales and rental outlet
- a factory outlet
- a merchandise service shop
- a parking lot
- a storage lot for recreational vehicles

b. Notwithstanding subsection 2.22 and 12.2, and the definition of ‘Lot Line, Front’ in subsection 19.116; on land zoned M-9 the following zoning provisions shall apply to the subject lands:

• Lot Area (minimum):	7,500 square metres
• Lot Frontage (minimum):	22 metres
• The easterly lot line along Little Britain Road shall be deemed to be the ‘Lot Line, Front’	
• Front Yard, East (minimum):	12 metres
• Exterior Side Yard, North (minimum):	14 metres for all new development; and 12 metres for the existing development
• Exterior Side Yard, South (minimum):	9 metres or the existing, whichever is less
• Landscaped Area (minimum):	20% or the existing, whichever is less
• Open Storage Area:	Shall be permitted in any yard other than the Exterior Side Yard, South

1.03 **Schedule Amendment**: Schedule ‘A’ to By-law No. 93-30 of the Township of Ops is further amended to change the zone category from the ‘Agricultural Support (AS) Zone’ to the ‘General Industrial Exception Nine (M-9) Zone’ for the land referred to as ‘M-9’, as shown on Schedule ‘A’ attached to this By-law.

Section 2:00 Effective Date

2.01 **Effective Date**: This By-law shall come into force and take effect on the date it is finally passed, subject to the provisions of Section 34 of the Planning Act R.S.O. 1990, c.P.13.

By-law read a first, second and third time, and finally passed, this ** day of ***, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

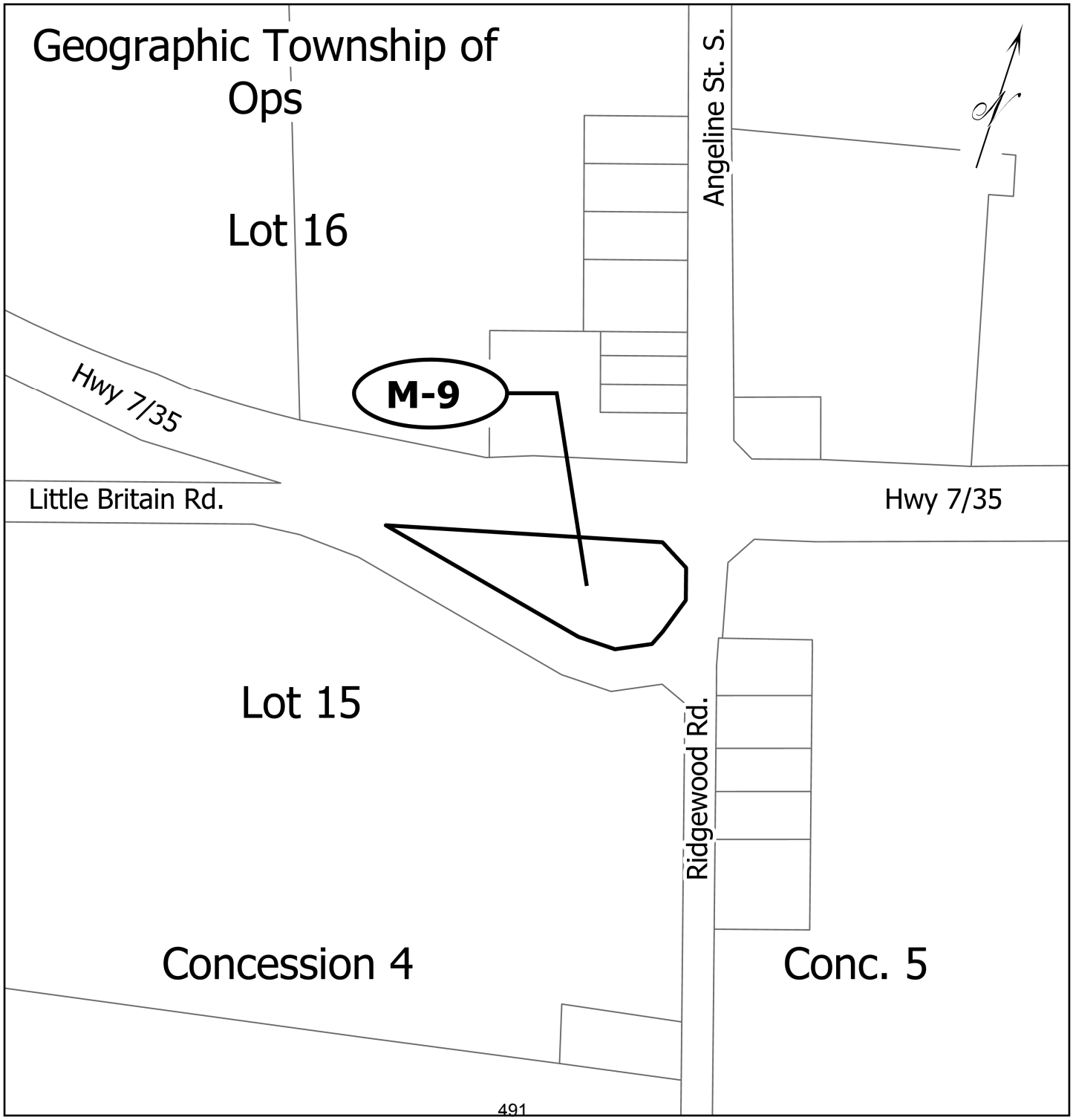
THE CORPORATION OF THE CITY OF

KAWARTHA LAKES

THIS IS SCHEDULE 'A' TO BY-LAW _____ PASSED

THIS _____ DAY OF _____ 2020.

MAYOR _____ CLERK _____



The Corporation of the City of Kawartha Lakes

By-Law 2020-__

A By-Law to Amend the City of Kawartha Lakes Official Plan to permit the severance of a 4.1 hectare parcel of Prime Agricultural land

[File D01-2020-004, Report PLAN2020-045, respecting Part of Lot 22, Concession 2, geographic Township of Ops – Wayne and Ann MacLeish]

Recitals:

1. Sections 17 and 22 of the Planning Act, R.S.O. 1990, c. P.13, authorize Council to consider the adoption of an amendment to an Official Plan.

2. Council has received an application to amend the City of Kawartha Lakes Official Plan to permit the severance of Prime Agricultural land located at 1590 Elm Tree Road. The severed parcel is proposed to be approximately 4.1 hectares and the retained is proposed to be approximately 5.9 hectares. The intent of the severance is to facilitate use of the severed land as an agriculturally supportive trucking terminal use. The lot will be subject to site plan control.

3. A public meeting to solicit public input has been held.

4. Council deems it appropriate to adopt Official Plan Amendment Number 40

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-0XX.

Section 1:00 Official Plan Amendment Details

1.01 **Property Affected**: The property affected by this By-law is described as Part of Lot 22, Concession 2, Geographic Township of Ops, now in the City of Kawartha Lakes, 1590 Elm Tree Road.

1.02 **Amendment**: Amendment No. 40 to the City of Kawartha Lakes Official Plan, attached hereto as Schedule ‘A’ and forming a part of this By-law is hereby adopted.

Section 2:00 Effective Date

2.01 **Force and Effect**: This By-law shall come into force and take effect on the date it is finally passed, subject to the approval of the City of Kawartha Lakes in accordance with the provisions of Section 17 and 22 of the Planning Act, R. S. O. 1990, c. P.13.

By-law read a first, second and third time, and finally passed, this XX day of October, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

Schedule ‘A’ to By-law No. 2020-__

The Corporation of the City of Kawartha Lakes

Amendment No. 40 To The City of Kawartha Lakes Official Plan

Part A – The Preamble

A. Purpose

The purpose of the Official Plan Amendment is to permit the severance of the Prime Agricultural land located at 1590 Elm Tree Road. The lands are also subject to a Zoning By-Law Amendment application.

The effect of the change would permit the severance of lands resulting in a retained lot of approximately 5.9 hectares and a severed lot of approximately 4.1 hectares.

B. Location

The land to be severed is approximately 10 hectares and located at 1590 Elm Tree Road in the Geographic Township of Ops.

C. Basis

Council has enacted this Official Plan Amendment in response to an application submitted by D.M. Wills & Associated Limited on behalf of the property owner to permit the severance of the land and facilitate the development of an agricultural-supporting trucking terminal on the severed lot. The retained lot would continue operating as residential and agricultural with a single detached dwelling, livestock building and detached accessory building.

1590 Elm Tree Road is designated “Prime Agricultural” as shown on Schedule “A-3” of the City of Kawartha Lakes Official Plan and this designation will be maintained. This land is also subject to a Zoning By-law Amendment application.

The proposed use and amendment to the City of Kawartha Lakes Official Plan are justified and represent good planning for the following reasons:

1. The proposed development conforms to relevant provincial policy documents being the Growth Plan for the Greater Golden Horseshoe and is consistent with the Provincial Policy Statement.

2. The proposed development conforms to the goals and objectives of the “Prime Agricultural” designation as set out in the City of Kawartha Lakes Official Plan.

3. The proposed site concept is compatible and integrates well with the surrounding area.

4. The applicant has submitted background reports to demonstrate the appropriateness of the proposed development with respect to servicing and the protection of the environment.

Part B - The Amendment

D. Introductory Statement

All of this part of the document entitled Part B – The Amendment, consisting of the following text and the attached map constitutes Amendment No. 40 to the City of Kawartha Lakes Official Plan.

E. Details of the Amendment

1. Section 32 is of the City of Kawartha Lakes Official Plan is hereby amended to include the following provision:

   "32.1.54 Prime Agricultural lands at Part of Lot 2, Concession 22 in the Former Township of Ops may be severed resulting in a retained parcel of approximately 5.9 hectares and a severed parcel of approximately 4.1 hectares. The severed lot is to be used in accordance with Prime Agricultural policies as outlined in the City of Kawartha Lakes Official Plan."

F. Implementation and Interpretation

The implementation and interpretation of this amendment shall be in accordance with the relevant policies of the Official Plan.

The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-Law To Amend The Township of Ops Zoning By-Law No. 93-30 To Rezone Land Within The City Of Kawartha Lakes

[File D06-2020-018, Report PLAN2020-045, respecting Part of Lot 22, Concession 2, geographic Township of Ops – Wayne and Ann MacLeish]

Recitals:

1. Section 34 of the Planning Act, R.S.O. 1990, c.P.13 authorizes Council to determine the appropriate zoning categories and provisions assigned to land.

2. Council has received an application to amend the categories and provisions relating to a specific parcel of land to:

   (a) rezone part of the severed land to an agricultural support exception zone with holding provision and establish applicable development standards;

   (b) permit use of the site as follows: trucking terminal; truck and tractor repair and sales; bulk agricultural/seed storage; or greenhouse. The nature of the permitted uses shall be agriculturally-supportive;

   (c) rezone the balance of the severed land to hazard lane zone to prohibit development within a natural heritage feature,

   in order to fulfill a condition of provisional consent

3. A public meeting to solicit public input has been held.

4. Council deems it appropriate to rezone the Property.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-0XX.

Section 1:00 Zoning Details

1.01 **Property Affected**: The property affected by this By-law is described as Part of Lot 22, Concession 2, Geographic Township of Ops, now in the City of Kawartha Lakes, 1590 Elm Tree Road.

1.02 **Textual Amendment:** By-law No. 93-30 of the Township of Ops is further amended by adding the following subsections to Section 17.3:

"17.3.11 AGRICULTURAL SUPPORT EXCEPTION ELEVEN (AS-11) ZONE

17.3.11.1 Notwithstanding the permitted uses and zone provisions in the Agricultural Support (AS) Zone, to the contrary, within the Agricultural Support Exception Eleven (AS-11) Zone, the following uses shall also be permitted:

Non-Residential Uses

- Trucking Terminal
- Truck and Tractor Repair and Sales
- Bulk Agricultural/Seed Storage
- Nursery

17.3.11.2 Notwithstanding 2.17, land zoned “AS-11” shall have a minimum of 42 parking spaces of which four are demarcated as accessible.

17.3.11.3 On lands zoned AS-11(H), the removal of the Holding Symbol (H) shall be considered by Council once the owner has entered into a site plan agreement to the satisfaction of the City of Kawartha Lakes.

1.03 **Schedule Amendment**: Schedule ‘A’ to By-law No. 93-30 of the Township of Ops is further amended to change the zone category on a portion of the property from Agricultural (A) Zone to Agricultural Support Exception Eleven - Holding (AS-11(H)) Zone for the land referred to as AS-11(H), as shown on Schedule ‘A’ attached to this By-law; and to change the zone category on another portion of the property from Agricultural (A) Zone to Hazard Land (HL) Zone for the land referred to as HL, as shown on Schedule ‘A’ attached to this By-law.

Section 2:00 Effective Date

2.01 **Effective Date**: This By-law shall come into force and take effect on the date it is finally passed, subject to the provisions of Sections 34 and 36 of the Planning Act R.S.O. 1990, c.P.13.

By-law read a first, second and third time, and finally passed, this XX day of October, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

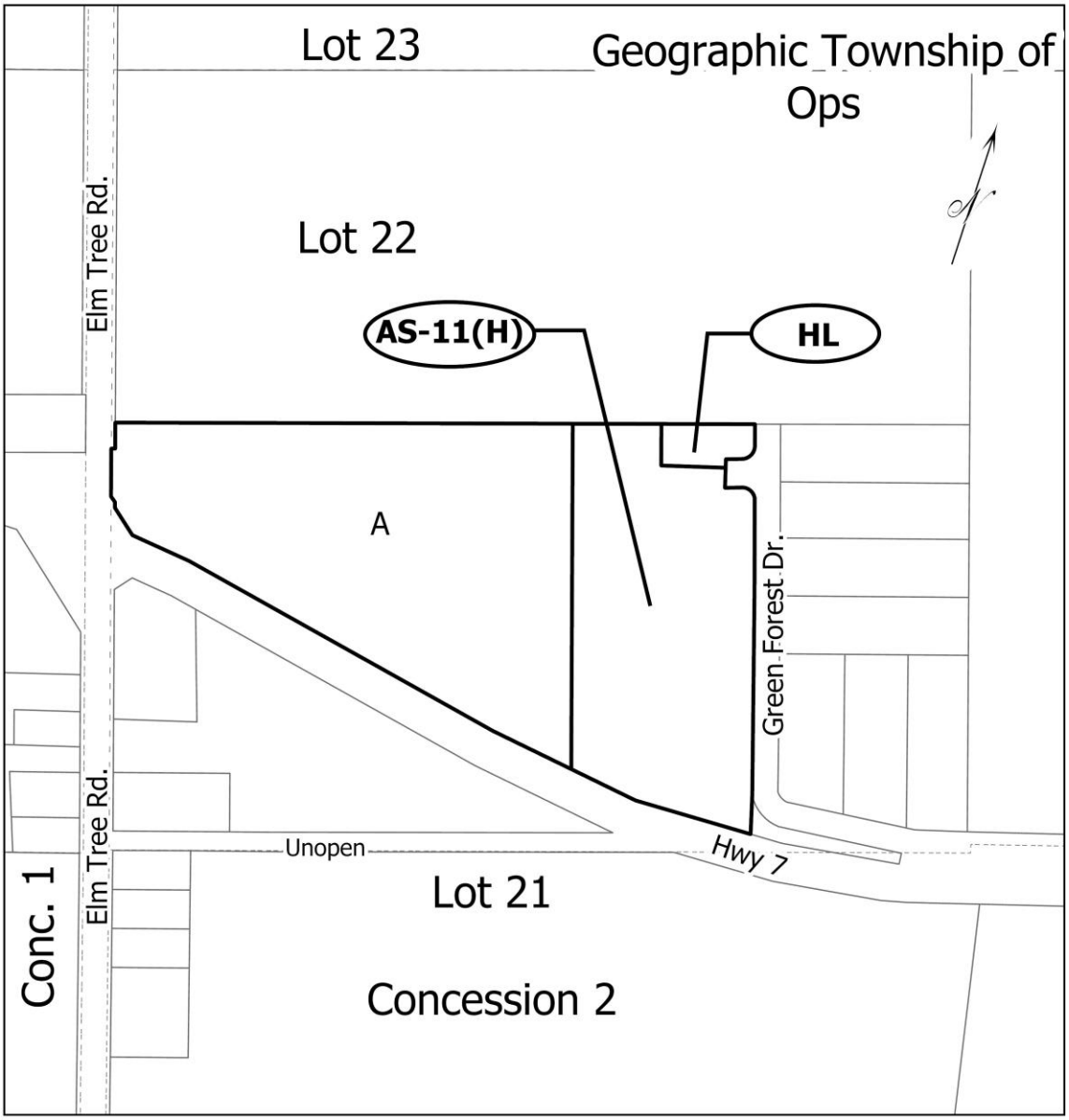
THE CORPORATION OF THE CITY OF

KAWARTHA LAKES

THIS IS SCHEDULE 'A' TO BY-LAW _____ PASSED

THIS _____ DAY OF _____ 2020.

MAYOR _____ CLERK _____



The Corporation of the City of Kawartha Lakes

By-Law 2020 -

A By-Law To Amend The Township of Mariposa Zoning By-Law No. 94-07 To Rezone Land Within The City Of Kawartha Lakes

File D06-2020-017, Report PLAN2020-051, respecting Part of Lots 14 and 15, Concession 9, Block J, Part Lots 8-17, Plan 80; Part 1, 57R-6577, geographic Township of Mariposa, City of Kawartha Lakes, identified as 1013 Eldon Road - Vandenberg

Recitals:

1. Section 34 of the Planning Act, R.S.O. 1990, c.P.13 authorizes Council to determine the appropriate zoning categories and provisions assigned to land.

2. Council has received an application to amend the categories and provisions relating to a specific parcel of land to:

   (a) rezone a portion of the land to a rural residential zone category; and

   (b) prohibit livestock and manure storage within and nearby the agricultural buildings on the agricultural land.

3. A public meeting to solicit public input has been held.

4. Council deems it appropriate to rezone the Property.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1:00 Zoning Details

1.01 **Property Affected**: The Property affected by this by-law is described as Part of Lots 14 and 15, Concession 9, Block J, Part Lots 8-17, Plan 80; Part 1, 57R-6577, geographic Township of Mariposa, City of Kawartha Lakes.

1.02 **Textual Amendment**: By-law No. 94-07 of the Township of Mariposa is further amended to add the following subsection to Section 8.3:

"8.3.36 Agricultural Exception Thirty-Six (A1-36) Zone

8.3.36.1 Notwithstanding subsections 8.1.1.1 and 8.1.1.6, livestock is not permitted within the agricultural buildings existing on the date of passing of this By-law.

8.3.36.2 Manure is not permitted to be stored within 30 metres of the agricultural buildings existing on the date of passing of this By-law."

1.03 **Textual Amendment**: By-law No. 94-07 of the Township of Mariposa is further amended to add the following subsection to Section 11.3:

"10.3.11 Hamlet Residential Type Exception Eleven (HR-11) Zone

10.3.11.1 Notwithstanding subsection 10.1.1, on land zoned HR-11 the only permitted uses shall be a single detached dwelling, a bed and breakfast establishment, a home occupation, and a public park.

10.3.11.2 Notwithstanding subsection 3.1.2.2, one accessory building may be erected 1 metre from a residential building located on the same lot."

1.04 **Schedule Amendment**: Schedule 'A' to By-law No. 94-07 of the Township of Mariposa is further amended to change the zone category on a portion of the property from Agricultural (A1) Zone to Hamlet Residential Exception Eight (HR-8) Zone for the land referred to as 'HR-8', as shown on Schedule 'A' attached to this By-law; to change the zone category on a portion of the property from Agricultural (A1) Zone to Hamlet Residential Exception Eleven (HR-11) Zone for the land referred to as 'HR-11', as shown on Schedule 'A' attached to this By-law; and to change the zone category on the balance of the land from Agricultural (A1) Zone to Agricultural Exception Thirty-Six (A1-36) Zone for the land referred to as 'A1-36', as shown on Schedule 'A' attached to this By-law.

Section 2:00 Effective Date

2.01 **Effective Date**: This By-law shall come into force and take effect on the date it is finally passed, subject to the provisions of Section 34 of the Planning Act R.S.O. 1990, c.P.13.

By-law read a first, second and third time, and finally passed, this ** day of ***, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

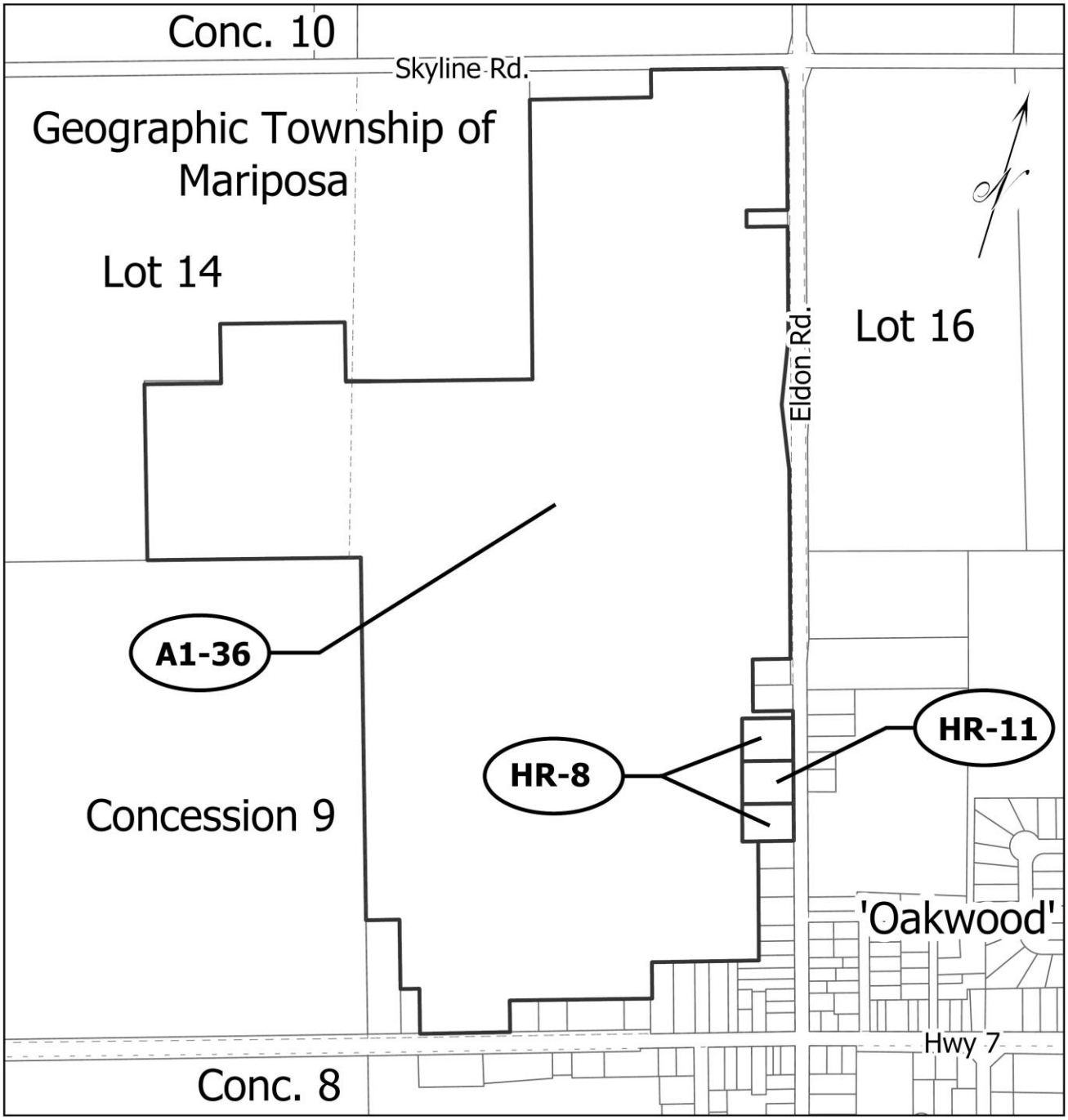
THE CORPORATION OF THE CITY OF

KAWARTHA LAKES

THIS IS SCHEDULE 'A' TO BY-LAW _____ PASSED

THIS _____ DAY OF _____ 2020.

MAYOR _____ CLERK _____



The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-law to Repeal and Replace By-law 2010-178, Being a By-law to authorize the execution of a winter maintenance agreement with the County of Haliburton

Recitals

1. The City of Kawartha Lakes and the County of Haliburton have mutually agreed that, for an annual fee, Haliburton County would perform winter maintenance on Kawartha Lakes Road 508.
2. Council deems it appropriate to continue with this arrangement.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

"Director of Public Works" means the person who holds that position and his or her delegate(s) or, in the event of organizational changes, another person designated by Council.

"Mayor" means the Chief Executive Office of the City.

1.02 **Interpretation Rules:**

(a) The Schedule attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Approvals

2.01 **Approvals:** The Winter Maintenance Agreement between the City of Kawartha Lakes and the County of Haliburton appended to this By-law as an agreement is approved.

2.02 The Mayor and Clerk are authorized and directed to sign the Winter Maintenance Agreement between the City of Kawartha Lakes and the County of Haliburton and to affix the City's corporate seal to it.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Public Works is responsible for the administration of this by-law

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

Section 4.00: Repeals

4.01 **Repeal:** By-law 2010-178 is repealed.

By-law read a first, second and third time, and finally passed, this ___ day of ____, 2020.

Schedule A

RD2020-010 County of Haliburton Boun

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

THIS AGREEMENT made this _____ day of _____ 2020

BETWEEN:

The Corporation of the City of Kawartha Lakes
("Kawartha Lakes")

- and -

The Corporation of the County of Haliburton
("Haliburton")

Whereas Haliburton proposes to carry out winter maintenance services on Kawartha Lakes Road 503;

And whereas in order to streamline services in both a productive and cost effective manner, Haliburton and Kawartha Lakes have agreed as follows:

1. Haliburton will perform winter maintenance on Kawartha Lake Road 503, from County Road 121 easterly to the County of Peterborough boundary.

2. Haliburton shall maintain and make available as requested to Kawartha Lakes all winter maintenance documents, including patrol/inspection records and winter operation records.

3. **Term**: The term of this Agreement shall be five (5) years from November 1, 2020 to November 1, 2025. This Agreement shall automatically renew at the expiration of the term or any extension of the term for a further one-year period on the same terms and conditions unless either party provides 180 days notice in writing of its intention to terminate the Agreement at the expiration of the current term.

4. **Level of Service**: Haliburton will provide winter maintenance services to a standard which meets or exceeds provincially enacted Minimum Municipal Maintenance Standards (Ontario Regulation 239/02, as amended) during the term of this Agreement.

5. **Insurance**: Haliburton shall, at its own expense, obtain and keep in force throughout the term of this Agreement the following insurance coverage:

   i. Commercial General Liability insurance in an amount of not less than Fifteen Million Dollars ($15,000,000.00) inclusive per occurrence. Coverage shall include but is not limited to bodily injury, death and damage to property including loss of use thereof, products and completed operations liability, blanket contractual liability, contingent employers' liability, non-owned automobile liability and contain a cross liability and severability of interest clause. *The Corporation of the City of Kawartha Lakes)* shall be named as an additional insured on the policy;

   ii. Standard Form Automobile Liability insurance for an amount not less than Ten Million Dollars ($10,000,000.00) inclusive per occurrence for Third Party Liability including bodily injury, death and damage to property covering all licensed vehicles used in any manner in connection with the performance of the terms of this Agreement.

   Haliburton agrees to provide Kawartha Lakes with proof of the insurance required under this Agreement on an annual basis on or before October 1st in the form of a certificate of insurance. All policies shall be endorsed to provide Kawartha Lakes with not less than thirty (30) Days' written notice of cancellation, change or amendment restricting coverage. All policies shall be with insurers licensed to underwrite insurance in the Province of Ontario. All policies shall apply as primary and not as excess of any insurance available to Kawartha Lakes.

6. **Indemnity**: The parties agree to indemnify and save the other harmless from and against any claims, actions, causes of actions, losses, injuries, costs, expenses including legal expenses, howsoever styled, attributable to their negligence in performing the services required under this Agreement at all times and throughout the term of this Agreement

7. **Authority**: The parties warrant that they have taken all necessary steps, done all acts, passed all by-laws and obtained all approvals required to give it the authority to enter into this Agreement.

8. **Scope of Work:** The lump sum price for the services is intended to cover all patrol, ploughing and material application operations. The work being carried out also includes patrol, and promptly notifying CKL of incidental winter maintenance (deficiencies), urban corner clearing, winter drainage (where wings are used to open ditches), and localized snow removal (< 20 m^3 / location). Additional snow removal made necessary due to lack of road side storage capacity shall be done by Haliburton at the expense of Kawartha Lakes upon obtaining approval from Kawartha Lakes. Incidental winter maintenance normally performed by the road crews in winter, e.g. sign repair, pothole patching, debris pick-up, culvert steaming, etc., is not included and will be performed by Kawartha Lakes.

9. **Payment**: Kawartha Lakes hereby agrees to pay to Haliburton $1,854.00 payable in two instalments. The first payment of $742.00 is payable on or about January 1st, and the second payment of $1,112.00 is payable on or about June 15th. These payments represent total payment for the provision of winter maintenance services. Costs shall be reviewed on an annual basis and any change in costs is only effective if reduced into writing by way of amendment to this agreement.

10. **Emergencies:** Notwithstanding anything in this Agreement, in the event of an emergency situation Kawartha Lakes shall be allowed to react to the situation which Haliburton would **otherwise be responsible.**

11. **Binding**: This Agreement shall ensure to the benefit of and bind the parties and their respective heirs, successors and permitted assigns.

12. **Entire Agreement:** This Agreement contains the entire agreement between the parties and supersedes all previous negotiations, understandings and agreements, verbal or written, with respect to any matters referred to in this Agreement.

IN WITNESS WHEREOF the parties by their duly authorized representatives have set forth their signatures on the dates herein written below:

Signed and sealed this _____ day of _____, 2020

THE CORPORATION OF THE CITY OF KAWARTHA LAKES

_____
Mayor

_____
Clerk

Signed and sealed this _____ day of _____, 2020

THE CORPORATION OF THE COUNTY OF HALIBURTON

_____
Warden

_____
Clerk

The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-law to Repeal and Replace By-law 2008-157, Being a By-law to authorize the execution of a Boundary Road Agreement with the Town of Bracebridge

Recitals

1. The City of Kawartha Lakes and the Town of Bracebridge have mutually agreed that, for an annual fee, the Town of Bracebridge would perform maintenance on Miriam Drive (Longford Boundary Road).

2. Council deems it appropriate to continue with this arrangement.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 201_-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

"Director of Public Works" means the person who holds that position and his or her delegate(s) or, in the event of organizational changes, another person designated by Council.

"Mayor" means the Chief Executive Office of the City.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Approvals

2.01 **Approvals:** The Boundary Road Agreement between the City of Kawartha Lakes and the Town of Bracebridge appended to this By-law as an agreement is approved.

2.02 The Mayor and Clerk are authorized and directed to sign the Boundary Road Agreement between the City of Kawartha Lakes and the Town of Bracebridge and to affix the City's corporate seal to it.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Public Works is responsible for the administration of this by-law

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

Section 4.00: Repeals

4.01 **Repeal:** By-law 2008-157 is repealed.

By-law read a first, second and third time, and finally passed, this ___ day of ____, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

Appendix A - By-law for Boundary

Boundary Road Agreement between the Town of Bracebridge and the Corporation of the City of Kawartha Lakes

This Agreement made this day of , 2020.

BETWEEN

The Corporation of the Town of Bracebridge
(hereinafter referred to as "Bracebridge")

OF THE FIRST PART

AND:

The Corporation of the City of Kawartha Lakes
(hereinafter referred to as "Kawartha Lakes")

OF THE SECOND PART

WHEREAS, Section 27 of the *Municipal Act* provides that by-laws may be passed by municipalities respecting highways that fall under their jurisdiction:

AND WHEREAS, Section 28 of the *Municipal Act* sets out the highways over which a municipality has jurisdiction:

AND WHEREAS, Section 29.1 of the *Municipal Act* provides that municipalities having joint jurisdiction over a boundary line highway ("Boundary Road") may enter into an agreement to keep any part of the highway in repair for its whole width and to indemnify the other municipality from any loss or damage arising from the lack or repair for that part:

AND WHEREAS, A Boundary Road exists on the boundary between the Corporation of the City of Kawartha Lakes and The Corporation of the Town of Bracebridge as set out in Schedules 'A' and 'B' which road has been assumed by the respective municipalities or been transferred to them by the Province:

AND WHEREAS, The road systems adjacent to the Boundary Roads have been assessed to determine the most efficient way to link maintenance activities on Boundary Roads with maintenance activities on the balance of road systems for both municipalities:

AND WHEREAS, The Corporation of the City of Kawartha Lakes or the Corporation of the Town of Bracebridge will by this agreement provide winter and summer maintenance services on the boundary portions of all said Boundary Roads as set out in Schedules 'A' and 'B' commencing October 29, 2020:

AND WHEREAS, The Corporation of the City of Kawartha Lakes or the Corporation of the Town of Bracebridge accounting process applies uniform costs for all maintenance and construction activities on both its Boundary Roads and all other roads under its jurisdiction:

NOW THEREFORE IN CONSIDERATION of the covenants in this Agreement and for other good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), the parties hereto agree as follows:

1. INTERPRETATION

1.1. Gender, Plural: All words in this agreement are deemed to include any number or gender as the context requires.

1.2. Proper Law: This Agreement shall be interpreted according to the laws of the Province of Ontario.

1.3. Headings: Article, clause and/or paragraph headings are for reference purposes only and shall not in any way modify or limit the statements contained in any article, clause or paragraph.

1.4. Legislation: Reference to federal or provincial statutes or municipal by-laws are deemed to refer to the relevant legislation as amended, including successor legislation.

1.5. "Winter Maintenance": Includes all usual winter maintenance including snow plowing /removal, application of sand and/or salt mixture, sign maintenance, and all other activities identified under Ontario Regulation 239/02, as amended, and other nominal winter maintenance.

1.6. "Summer Maintenance": Includes all usual summer maintenance including pothole repair, debris removal, shoulder repair, storm water management, and all other activities identified under Ontario Regulation 239/02, as amended, and other nominal summer maintenance.

2. SCOPE

2.1. The parties agree that this Agreement covers all Summer Maintenance and Winter Maintenance.

2.2. Capital work, which shall include major bridge repair and road reconstruction, is considered separate from Summer Maintenance and Winter Maintenance. Prior approval, upon one (1) years' notice, shall be obtained regarding capital expenditures on all Boundary Roads where costs are to be shared 50/50 and the municipality having responsibility for the affected section of Boundary Road shall manage such projects unless alternative arrangements are made.

3. TERM

3.1. The parties agree to provide Summer Maintenance and Winter Maintenance on the portions of the Boundary Road as set out in Schedules 'A' and 'B' for ten (10) years from the date of execution of this Agreement.

3.2. The parties agree that this Agreement shall automatically renew at the expiration of the term for a further ten (10) year period on the same Terms and Conditions unless either party provides one-hundred and eighty (180) days notice in writing of its intention to terminate the Agreement at the expiration of the current term.

3.3. The parties agree that such notice may only be provided between May 31 and August 31 of any year throughout the term of the Agreement.

4. PROVISION OF THE SERVICES

4.1. Level of Service

The parties covenant and agree to provide all contemplated road maintenance for the road section noted in Schedules 'A' and 'B' in accordance with section 44(4) of the *Municipal Act*, (the "Minimum Maintenance Standards for Municipal Highways") where such standards apply and in the event that there is no applicable Minimum Maintenance Standard shall meet the standard of what is reasonable in the circumstances.

4.2. General Service Requirements

4.2.1. Enforcement of Individual Municipal Bylaws Dealing with the Roads

Notwithstanding the joint jurisdiction over the Road, it is specifically acknowledged in accordance with section 28 of the Act, that the bylaws passed by each of Bracebridge and Kawartha Lakes relating to their respective portions of the Road, such as, but not limited to, entrances, setbacks and parking shall remain in force and effect unless a bylaw passed by the Councils of both Bracebridge and Kawartha Lakes shall designate otherwise.

4.2.2. Emergencies

Notwithstanding anything in this Agreement, in the event of an emergency situation, the non-responsible municipality shall be allowed to react to the situation which the other municipality would otherwise be responsible. The costs of such emergency action shall be apportioned as set out in Section 5: Payment.

5. PAYMENT

5.1. Bracebridge agrees to invoice Kawartha Lakes for the Summer Maintenance and Winter Maintenance covered by this Agreement based on the following:

Winter Maintenance	Time	Equipment / Labour
Each Snowplow Billed at	0.5 hours	Combo Unit
	0.5 hours	Operator
Each Sanding Billed at	0.5 hours	Combo Unit
	0.5 hours	Operator
	Sand Applied to the Road (average 0.75 tonnes)	

5.2. The costs associated with Summer Maintenance are to be charged by the material used and hourly rates for labour and equipment.

5.3. The costs associated with work performed by contractors will be billed at cost.

5.4. From time-to-time, Winter Maintenance operations will require a greater amount of time and material due to extreme weather events.

5.5. Each invoice will include the following information:

5.5.1. Dates on which the road was winter maintained;

5.5.2. Dates on which the road was summer maintained;

5.5.3. Type of maintenance that was performed and equipment used;

5.5.4. The hourly charge out rates for equipment will be in accordance with the rates approved annually by the District Municipality of Muskoka;

5.5.5. The hourly labour rates will be in accordance with the weighted wage rate approved annually by the District Municipality of Muskoka; and

5.5.6. Material costs.

5.6. Payments are to be made on an annual basis on or about January 30th in the succeeding year and may be offset by the services of the other municipality such that a payment may be made for the difference only.

5.7. Special Projects

Both parties agree that prior to undertaking a single expenditure in excess of $5,000.00 for a special project in any year, that the work be approved of by the other municipality and that any amount in excess of $5,000.00 shall be shared equally between the two parties and further that each party shall furnish the other with an annual detailed statement of costs on their portion of boundary road.

5.8. Capital Projects

One (1) years' prior approval shall be obtained regarding capital expenditures on the Boundary Road.

Costs for the agreed capital works are to be shared equally between both parties.

The municipality having jurisdiction for the section of Boundary Road shall manage such projects unless alternative arrangements are made.

And further, that all surface treatment, slurry, and micro applications are to be treated as Capital work on a project-by-project approval basis.

Capital projects shall be invoiced monthly on the basis of 50% of each progress certificate as paid by the responsible municipality for authorized work.

6. INDEMNITY, INSURANCE AND SECURITY

6.1. Bracebridge shall, at its own expense, obtain and keep in force during the term of this Agreement liability insurance satisfactory to Kawartha Lakes including the following terms and minimum coverage underwritten by an insurer licensed to conduct business in the Province of Ontario:

6.1.1. Municipal general liability insurance on an occurrence basis for an amount of not less than Fifteen Million Dollars ($15,000,000);

6.1.2. Inclusion of the other party as an Additional Insured with respect to the operations of the named insured;

6.1.3. Cross liability and severability of interest clauses;

6.1.4. Policies shall not be invalidated as respects the interests of the Additional Insured by reason of any breach or violation on any warranties, representations, declarations or conditions;

6.1.5. Non-owned automobile coverage with a limit of at least Ten Million Dollars ($10,000,000) including contractual non-owned coverage;

6.1.6. Products and completed operation coverage with an aggregate limit of not less than Fifteen Million Dollars ($15,000,000);

6.1.7. Automobile liability insurance for an amount not less than Ten Million Dollars ($10,000,000) on forms meeting statutory requirements covering all licensed vehicles used in any manner in connection with the performance of the terms of this Agreement; and

6.1.8. A thirty (30) day written notice of cancellation, termination ~~or material change~~.

6.2. Bracebridge agrees to provide Kawartha Lakes with proof of the insurance required under this Agreement on an annual basis on or before October 1st in the form of an insurance certificate.

6.3. The parties warrant that they have taken all necessary steps, done all acts, passed all by-laws, and obtained all approvals required to give it the authority to enter into this Agreement.

7. AMENDMENTS

7.1. Recommended amendments to this Agreement shall be made in writing and agreed upon by both parties.

7.2. Either party may, upon 180 days' written notice to the other, withdraw from this Agreement or make proposals for change to take effect 180 days after the beginning of the notice period. Where there is mutual agreement in writing, on a shorter notice for change, this clause shall not prohibit early implementation of such change.

7.3. The Bracebridge Director of Public Works, in consultation with the Director of Corporate Services/Clerk, is delegated authority to make minor amendments to this Agreement for execution of the Mayor and Director of Corporate Services/Clerk.

8. NOTICE

8.1. All notices, requests, demands, consents, approvals, and other communications which may or are required to be served or given hereunder (for the provision collectively called "Notices"), shall be in writing and shall be delivered personally or by prepaid registration post, addressed to the party or parties to receive such notice as follows:

If intended for the Town, to:

Director of Public Works
The Corporation of the Town of Bracebridge
1000 Taylor Court
Bracebridge, ON
P1L 1 R6

And if intended for the City, to:

Director of Public Works
The Corporation of the City of Kawartha Lakes
P.O. Box 9000
26 Francis Street
Lindsay, ON
K9V 5R8

8.2. All service of notification shall be effective from the date of personal delivery or on the next following business day after posting of the registered letter.

8.3. Receipt of notice shall be deemed on the earlier of the date of delivery or five (5) days following the date of mailing of the notice. Either party may change its address for notice by give notice of change of address pursuant to this section.

9. DISPUTE RESOLUTION

9.1. In the event of any dispute arising between the parties hereto relating to any matter which is the subject of this Agreement, such dispute shall be settled by the persons named in Section 8: Notice. In the event that the dispute cannot be settled within 30 days, then the dispute will be submitted to arbitration by notice given by either party to the other.

9.2. Upon such notice being given, the dispute shall be determined by the award of three arbitrators or a majority of them, one to be named by each party within twenty-one (21) days of the giving of such notice and the third to be selected by these two (2) arbitrators within seven (7) days after both have been nominated.

9.3. If either party shall neglect or refuse to name its arbitrator within the time specified or to proceed with the arbitration, the arbitrator named by the other party shall proceed with the arbitration.

9.4. The arbitrator(s) shall have all the powers given by the *Arbitration Act* of Ontario and may at any time proceed in such manner as they may see fit on such notice as they deem reasonable in the absence of either party if such party fails to attend.

9.5. Each party shall pay its own costs and shall share equally in the costs of the arbitration.

9.6. The cost of the arbitrators are not limited to those set forth under the Arbitration Act of Ontario and the arbitrators shall be able to charge their usual professional charges.

10. GENERAL

10.1. Notwithstanding anything in this Agreement, neither party shall be in default with respect to the performance of any of the terms of this Agreement if any non-performance is due to any force majeure, strike, lock-out, labour dispute, civil commotion, ware or similar event, invasion, the exercise of military power, act of God, government regulations or controls, inability to obtain any material or service or any cause beyond the reasonable control of the party (unless such lack of control results from a deficiency in financial resources). Otherwise, time shall be of the essence of this Agreement and all the obligations contained herein.

10.2. The rights and liabilities of the parties shall ensure to the benefit of and be binding upon the parties and their respective successors and approved assigns.

10.3. This Agreement contains the entire agreement between the parties. There is no covenant, promise, agreement, condition, precedent or subsequent, warranty or representation or understanding, whether oral or written, other than as set forth in this Agreement. This Agreement fully replaces and supersedes any Agreement or other contractual arrangement between the parties related to the subject matter of this Agreement.

10.4. If any provision, clause, or part of this Agreement, or the application of this Agreement under certain circumstances, is held by a court or tribunal of competent jurisdiction to be invalid, the remainder of this Agreement, or the application of that provision, clause or part under other circumstances, shall not be affected.

10.5. The parties hereto agree to execute such additional documents and to pass such additional by-laws as may be necessary in order to give effect to the meaning and intent to this Agreement.

11. COMPLETE AGREEMENT

11.1. This Agreement may only be changed by written amendment, signed and sealed by authorized representatives of both parties.

11.2. The boundary road agreement between Bracebridge and Kawartha Lakes dated September 25, 2008 is terminated immediately upon the effective date of this Agreement.

12. SCHEDULES

12.1. Schedules ‘A’ and ‘B’ inclusive, attached hereto, are incorporated within and form part of this Agreement.

IN WITNESS WHEREOF, the parties have caused to be affixed their corporate seals under the hands of their authorized officers on their behalf. Copies of this Agreement will be treated as originals. This agreement can be executed and transmitted electronically.

Authorized by Motion 20-GC-XXX and Confirmation By-law 2020-XXX dated February , 2020

The Corporation of the Town of Bracebridge

Date:

Graydon Smith,
Mayor

Date:

Lori McDonald,
Director of Corporate Services/Clerk

The Corporation of the City of Kawartha Lakes

Date:

Andy Letham,
Mayor

Date:

Cathie Ritchie,
City Clerk

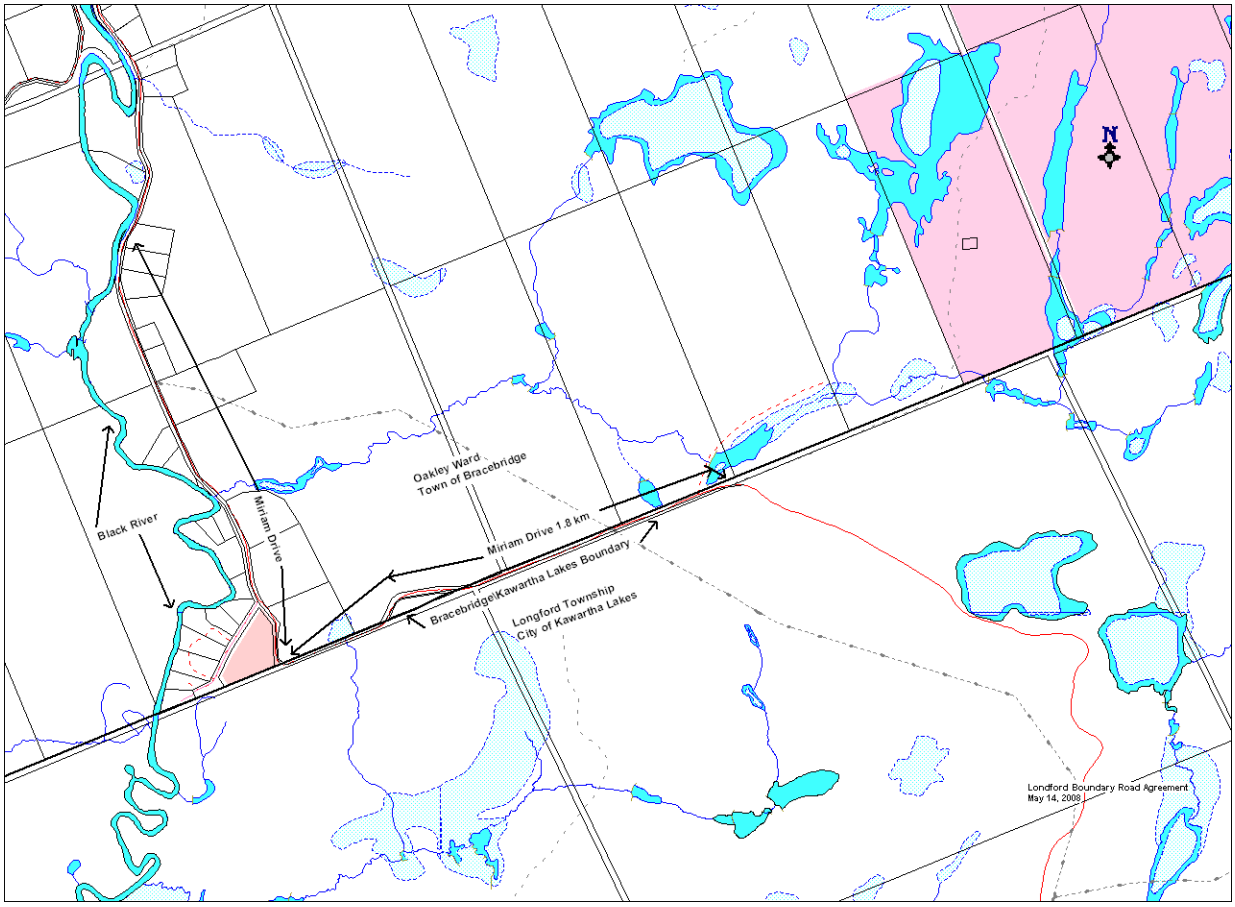
SCHEDULE 'A'

Boundary Road

BOUNDARY ROAD NUMBER	FROM	TO	HWY CLASS	LENGTH	RESPONSIBLE MUNICIPALITY
Miriam Drive (Longford Boundary Road)	The boundary of the Town of Bracebridge, southerly	A point 1.8 kilometres southerly	5	1.8 kilometres	Town of Bracebridge (Year-round)

SCHEDULE 'B'

Map of Road Area Subject to Agreement



The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-Law to Appoint an Inspector and Municipal Law Enforcement Officer for the City of Kawartha Lakes

Recitals

1. Section 3 of the Building Code Act, 1992, S.O. 1992, c.23 requires the council of every municipality to appoint a Chief Building Official and such inspectors as they are necessary for the enforcement of the Act in the areas in which the municipality has jurisdiction.
2. Section 15 of the Police Services Act, R.S.O., 1990, c.P.15 authorizes municipal councils to appoint municipal law enforcement officers, who are peace officers for the purpose of enforcing their by-laws.
3. Council considers it advisable to appoint an individual to serve as both an inspector and municipal law enforcement officer.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-Law 2020-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this By-Law,

"**City", "City of Kawartha Lakes" or "Kawartha Lakes"** means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"Council" or "City Council" means the municipal council for the City;

"Chief Building Official" means the person who holds that position and his or her delegate(s) or, in the event of organizational changes, another person designated by Council.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this By-Law form part of the By-Law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this By-Law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this By-Law to be illegal or unenforceable, that portion of this By-Law shall be considered to be severed from the balance of the By-Law, which shall continue to operate in full force and effect.

Section 2.00: Appointments

2.01 **Building Inspector:** Luke Williams is appointed as an inspector for the City of Kawartha Lakes in accordance with section 3 of the Building Code Act 1992, S.O. 1992, c.23.

2.02 **Municipal Law Enforcement Officer:** Luke Williams is appointed as a Municipal Law Enforcement Officer for the City of Kawartha Lakes in accordance with section 15 of the Police Services Act R.S.O. 1990, c.P.15.

2.03 **Reporting Relationship:** Luke Williams shall report to and be under the direction of the Chief Building Official.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-Law:** The Chief Building Official is responsible for the administration of this By-Law.

3.02 **Effective Date:** This By-Law shall come into force on the date it is finally passed.

By-Law read a first, second and third time, and finally passed, this 20 day of October, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-Law to Repeal By-laws 2005-174 and 2016-189 Being By-Laws to Appoint Inspectors and Enforcement Officers for the City of Kawartha Lakes

Recitals

1. By-Laws 2005-174 and 2006-189 appointed certain persons as Building Inspectors and Enforcement Officers for the City of Kawartha Lakes.
2. Council deems it appropriate to repeal By-Laws 2005-174 and 2016-189 due to changes in staffing.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"Council" or "City Council" means the municipal council for the City;

Section 2.00: Repeal

2.01 **Repeal:** By-Laws 2005-174 and 2016-189 are repealed.

Section 3.00: Effective Date

3.01 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-Law read a first, second and third time, and finally passed, this 20 day of October, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

The Corporation of the City of Kawartha Lakes

By-Law 2020-

A By-law to Acquire Part of Lot 19, Concession North Portage Road, Further Described as Part 5 on 57R-3336, in the Geographic Township of Eldon, in the City of Kawartha Lakes, to Form Part of Centennial Park Road in the Geographic Township of Eldon, in the City of Kawartha Lakes and to Establish and Assume such Parcel Upon Receipt of Title as Part of the Public Highway Commonly known as Centennial Park Road

Recitals

1. A portion of Centennial Park Road, Bobcaygeon, north of Portage Road and South Canal Lake and further described as Part of Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336, in the Geographic Township of Eldon, City of Kawartha Lakes is forced over private land.
2. This portion of Centennial Park Road is fully maintained and assumed for service by the City of Kawartha Lakes.
3. The public's right of passage over this property is reflected on title to the privately-owned land.
4. The owner wishes to transfer title of this property to the City for nominal consideration, with the owner to pay the City's cost of the transfer in order to clear its title.
5. It is appropriate for the City of Kawartha Lakes to acquire title in this circumstances and with these conditions.
6. Section 31 of the Municipal Act, 2001 authorizes Council to establish and assume a highway by by-law.
7. The Mayor and Clerk are authorized to execute all documents associated with the acquisition.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words “include” and “including” are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Acquisition of Land

2.01 **Acquisition:** The parcel of land described as Part Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336, is to be acquired by the Corporation of the City of Kawartha Lakes for nominal consideration. The costs associated with the transaction are the responsibility of the vendor.

2.02 **Documentation:** The Mayor and City Clerk are hereby authorized to execute the documentation that is necessary for the City of Kawartha Lakes to accept title to Part Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336.

Section 3.00: Highway Assumption

3.01 **Assumption:** The parcel of land acquired for highway purposes, more particularly described as Part Lot 19, Concession North Portage Road, further described as Part 5 on 57R-3336, is hereby established and assumed as a public highway and part of Centennial Park Road, in the Geographic Township of Eldon, City of Kawartha Lakes.

Section 4.00: Effective Date

4.01 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this 20th day of October, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

The Corporation of the City of Kawartha Lakes

By-Law 2020 -

A By-Law To Amend The United Townships of Laxton, Digby and Longford Zoning By-Law No. 32-83 To Rezone Land Within The City Of Kawartha Lakes

File D06-2020-011, Report PLAN2020-037, respecting Part Lot 3, Concession 2, geographic Township of Laxton, City of Kawartha Lakes, identified as 128 Curls Road – DaCunha and Potter.

Recitals:

1. Section 34 of the Planning Act, R.S.O. 1990, c.P.13 authorizes Council to determine the appropriate zoning categories and provisions assigned to land.

2. Council has received an application to amend the categories and provisions relating to a specific parcel of land to permit residential use.

3. A public meeting to solicit public input has been held.

4. Council deems it appropriate to rezone the Property.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1:00 Zoning Details

1.01 **Property Affected**: The Property affected by this by-law is described as Part Lot 3, Concession 2, geographic Township of Laxton, City of Kawartha Lakes.

1.02 **Textual Amendment**: By-law No. 32-83 of the United Townships of Laxton, Digby and Longford is further amended to add the following section to Section 5.3:

"5.3.4 Limited Service Residential Exception Four (LSR-4) Zone

Notwithstanding Sections 5.2(f) and 18.2(b), on land zoned LSR-4 the following provisions shall apply:

a. Minimum flankage yard 5.3 metres
b. In addition to the accessory building location requirements specified in Section 18.1(b) an accessory building may be erected in the front yard."

1.03 **Schedule Amendment**: Schedule 'A' to By-law No. 32-83 of the United Townships of Laxton, Digby and Longford is further amended to change the zone category of the property from Open Space (01) Zone to Limited Service Residential Exception Four (LSR-4) Zone for the land referred to as 'LSR-4', as shown on Schedule 'A' attached to this By-law.

Section 2:00 Effective Date

2.01 **Effective Date**: This By-law shall come into force and take effect on the date it is finally passed, subject to the provisions of Section 34 of the Planning Act R.S.O. 1990, c.P.13.

By-law read a first, second and third time, and finally passed, this ** day of ***, 2020.

_____	_____
Andy Letham, Mayor	Cathie Ritchie, City Clerk

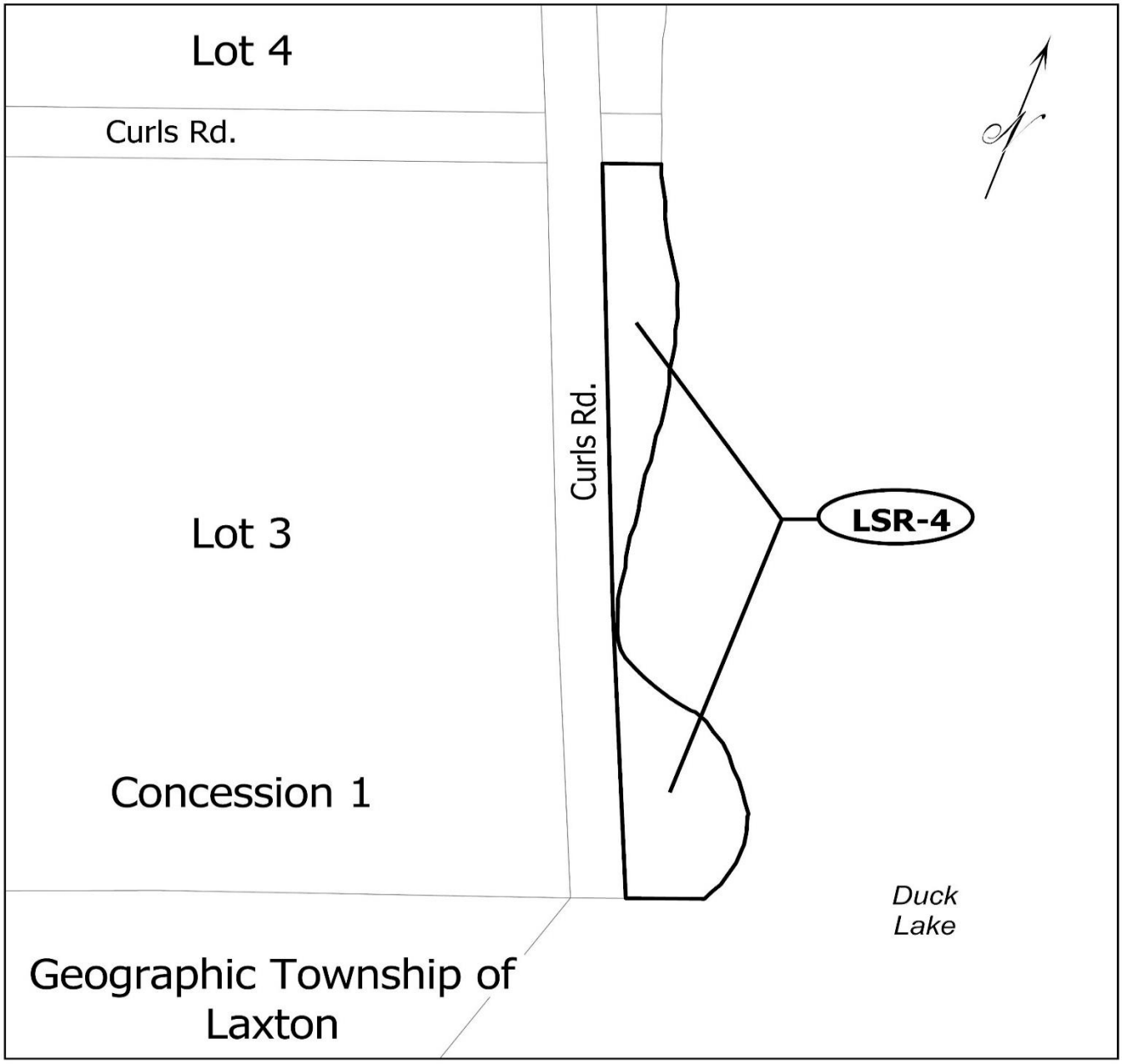
THE CORPORATION OF THE CITY OF

KAWARTHA LAKES

THIS IS SCHEDULE 'A' TO BY-LAW _____ PASSED

THIS _____ DAY OF _____ 2020.

MAYOR _____ CLERK _____



The Corporation of the City of Kawartha Lakes

By-Law 2020-___

A By-Law to Amend By-Law 2019-077 being a By-law to Regulate the Operation of ATVs and ORVs on Municipal Highways in the City of Kawartha Lakes

Recitals

1. The Corporation of the City of Kawartha Lakes adopted By-Law 2019-077 on April 23, 2019 to regulate the operation of ATVs and ORVs on Municipal Highways in the City of Kawartha Lakes.
2. Amendments to Section 2.07 and 4.01(b) of By-Law 2019-077 were endorsed by Committee of the Whole on October 6, 2020 through CW2020-146 and approved by Council on October 20, 2020 through CR2020-__.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-__.

Section 1.00: Definitions and Interpretation

1.01 **Definitions**: In this by-law,

"City", "City of Kawartha Lakes" or "Kawartha Lakes" means The Corporation of the City of Kawartha Lakes and includes its entire geographic area;

"City Clerk" means the person appointed by Council to carry out the duties of the clerk described in section 228 of the Municipal Act, 2001;

"Council" or "City Council" means the municipal council for the City;

"Director of Public Services" means the person who holds that position and his or her delegate(s) or, in the event of organizational changes, another person designated by Council.

1.02 **Interpretation Rules:**

(a) The Schedules attached to this by-law form part of the by-law, and are enforceable as such.

(b) The words "include" and "including" are not to be read as limiting the meaning of a word or term to the phrases or descriptions that follow.

1.03 **Statutes:** References to laws in this by-law are meant to refer to the statutes, as amended from time to time, that are applicable within the Province of Ontario.

1.04 **Severability:** If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-

law shall be considered to be severed from the balance of the by-law, which shall continue to operate in full force and effect.

Section 2.00: Amendments to By-law 2019-077

2.01 **Amendment to Section 2.07**:That Section 2.07 of By-Law 2019-077 be amended to read as follows:

2.07 No person shall operate an ORV on a highway without wearing a motorcycle helmet as required by the Highway Traffic Act, R.S.O. 1990, as amended.

2.02 **Amendment to Section 4.01 (b)**: That Section 4.01 (b) be amended to read as follows:

4.01 (b) 50 km/hr if the speed limit established under the Highway Traffic Act or by municipal by-law for that part of the Highway is greater than 50 km/hr.

Section 3.00: Administration and Effective Date

3.01 **Administration of the By-law:** The Director of Public Works is responsible for the administration of this by-law.

3.02 **Effective Date:** This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this 20 day of October, 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk

The Corporation of the City of Kawartha Lakes

By-law 2020-XXX

A By-Law to Confirm the Proceedings of a Regular Meeting of Council, Tuesday, October 20, 2020

Recitals

1. The Municipal Act, 2001, S.O. 2001 c. 25 as amended, provides that the powers of a municipal corporation are exercised by its Council.

2. The Municipal Act, also provides that the Council's powers must be exercised by by-law.

3. For these reasons, the proceedings of the Council of The Corporation of the City of Kawartha Lakes at this meeting should be confirmed and adopted by by-law.

Accordingly, the Council of The Corporation of the City of Kawartha Lakes enacts this By-law 2020-XXX.

Section 1.00: Confirmation

1.01 The actions of the Council at the following meeting:

Tuesday, October 20, 2020, Open Session, Regular Council Meeting

and each motion, resolution and other action passed or taken by the Council at that meeting is, except where prior approval of the Ontario Municipal Board is required, adopted, ratified and confirmed as if all such proceedings had been expressly embodied in this By-law.

1.02 The Mayor and the proper officials of the City are authorized and directed to do all things necessary to give effect to the actions of the Council referred to in Section 1.01 of this By-law. In addition, the Clerk is authorized and directed to affix the corporate seal to any documents which require it.

Section 2.00: General

2.01 This By-law shall come into force on the date it is finally passed.

By-law read a first, second and third time, and finally passed, this 20th day of October 2020.

Andy Letham, Mayor	Cathie Ritchie, City Clerk