TO:	**CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON MARCH 29, 2016**
FROM:	**JAY STANFORD, M.A., M.P.A. DIRECTOR, ENVIRONMENT FLEET & SOLID WASTE**
SUBJECT:	**LANDFILL GAS UTILIZATION – STATUS OF OPPORTUNITIES AND NEXT STEPS**

RECOMMENDATION

That, on the recommendation of the Director – Environment, Fleet & Solid Waste, the following actions be taken with respect to landfill gas utilization:

a) the Civic Administration **BE DIRECTED** to continue to explore all opportunities for the advantageous use of landfill gas;

b) in the meantime, the Civic Administration **BE AUTHORIZED** to pursue the following options for the use of landfill gas**;** it being understood that the list of options available to the City of London may expand as a result of the action directed in a), above:

i) Option 1: Prepare a Business Case to install a 500 kilowatt (0.5 megawatt) generator for electricity under the Feed-in-Tariff program offered by the Independent Electricity System Operator (IESO)
ii) Option 2: Review the potential to respond to a future Large Renewables Procurement 2 Request for Qualifications (LRP2 RFQ) for the purpose of generating electricity through a long term contract with IESO with a potential timeframe of mid to late 2017
iii) Option 3: Utilize landfill gas as an energy source to be used by a potential business to be located on City-owned lands near the Waste Management Resource Recovery Area
iv) Option 4: Utilize landfill gas as an energy source to be used as a feedstock for a future resource recovery technology to be established within the Waste Management Resource Recovery Area
v) Option 5: Utilize landfill gas to create renewable natural gas (RNG) as an energy source; and

c) the Civic Administration **BE DIRECTED** to prepare a Business Case for Option 1 (500 kilowatt generator) and report back to Civic Works Committee in June 2016 noting the business case will include how Option 1 impacts Options 2 through 5 as noted in parts ii) through v) above.

PREVIOUS REPORTS PERTINENT TO THIS MATTER

Relevant reports that can be found at www.london.ca under City Hall (Meetings) include:

- Update on Proposed Greenhouse Operation and Proposed Request for Proposals Process for Land Leases for City-Owned Land in the Vicinity of the W12A Landfill and Resource Recovery Area, June 2, 2015 meeting of the Corporate Services Committee (CSC), Agenda Item #8.

- Landfill Gas Utilization - Request for Qualifications, August 25, 2014 meeting of the Civic Works Committee (CWC), Agenda Item #20.

- Landfill Gas Utilization - Next Steps – Preparing for a Feed-In-Tariff Submission, March 18, 2013 meeting of the CWC, Agenda Item #12.

- Update on Landfill Gas Utilization, December 17, 2012 meeting of the CWC, Agenda Item #4.

- Request for Expressions of Interest for Partnership in Biogas Utilization, September 27, 2011 meeting of the Community and Neighbourhoods Committee (CNC), Agenda Item #11.

- Feed-In-Tariff Contract with the Ontario Power Authority for W12A Landfill Gas Power Plant, June 7, 2010 meeting of the Environment and Transportation Committee (ETC), Agenda Item #22.

STRATEGIC PLAN 2015-2019

Municipal Council has recognized the importance of solid waste management, climate change and other related environmental issues in its 2015-2019 - Strategic Plan for the City of London (2015 – 2019 Strategic Plan). With respect to this CWC Report, 3 of the 4 Areas of Focus address utilization of landfill gas generated at the W12A Landfill:

Building a Sustainable City
- Strong and healthy environment

Growing our Economy
- Local, regional, and global innovation

Leading in Public Service
- Excellent service delivery

BACKGROUND

PURPOSE

The purpose of this report is to provide the Civic Works Committee and Council with:

1. Outcome from the previous Request for Proposals (City RFP) for the sale of landfill gas utilization rights at the W12A Landfill Site and submission to the Ontario Power Authority's Large Renewables Procurement Request for Qualifications (LRP1 RFQ) process (Deferred Matters #27);
2. A status of opportunities for dealing with landfill gas from the W12A Landfill as an energy source; and
3. Developing a Business Case to install a 500 kilowatt (0.5 megawatt) generator for electricity.

CONTEXT

Landfill Gas Collection and Flaring at the W12A Landfill

The City of London has been collecting and flaring landfill gas on a voluntary basis since 2004. Landfill gas is produced by the anaerobic decomposition of organic waste material within the landfill, and typically consists of about 50 percent methane and 50 percent carbon dioxide. Methane is a potent greenhouse gas (GHG) with a global warming potential 25 times greater than carbon dioxide. The carbon dioxide component of landfill gas is not a concern itself, since it is biological in nature and part of the natural carbon cycle.

Landfill gas collection and destruction is now a provincial regulatory requirement for landfills like W12A, which comes into full effect on June 2016.

Since 2004, the landfill gas collection and flaring system has burned 32,280 tonnes of methane, which has avoided the release of an equivalent 805,000 tonnes of carbon dioxide. In 2015 alone, the flare avoided the release of an equivalent 107,000 tonnes of carbon dioxide – the equivalent of taking 26,750 cars off the roads.

Previous Work on Landfill Gas Utilization Projects

There have been several attempts to develop a landfill gas utilization project at the W12A Landfill. Details on attempts over the last few years are summarized in Appendix A. During this time, City staff have submitted complete details as part of various application processes and continue to meet all the technical requirements for the gas utilization projects. The challenges beyond City control have been:

- transformer station (electricity) capacity constraints
- special renewable natural gas premium payment proposed by Enbridge and Union Gas rejected by the Ontario Energy Board
- new rules/application processes by the Ontario Power Authority (OPA) on a couple of occasions

August 25, 2014 Council Direction

At its August 25, 2014 meeting, Council adopted the following recommendation with respect to the landfill gas utilization at the W12A Landfill:

a) *the Civic Administration BE DIRECTED to end negotiations with London District Renewable Energy Cooperative (LDREC) for a joint-venture partnership to construct a landfill gas power plant;*

b) *the Civic Administration BE AUTHORIZED to select a short list of private sector power developers who will receive a Request for Proposals for landfill gas utilization rights for the W12A Landfill noting that only developers who can demonstrate their ability to be considered a Qualified Applicant under Ontario Power Authority's Large Renewables Procurement Request (LRP 1 RFQ) process will be considered;*

c) *the Civic Administration BE AUTHORIZED to prepare and release a Request for Proposals (City RFP) for the sale of landfill gas utilization rights for the W12A Landfill;*

d) *the Civic Administration BE DIRECTED to report back to the Civic Works Committee on the outcome of the LRP 1 RFQ process and the City of London's Request for Proposals process; and,*

e) *Civic Administration BE AUTHORIZED to undertake all administrative acts in regard to this matter.*

DISCUSSION

1. Outcome from the previous Request for Proposals (City RFP) for the sale of landfill gas utilization rights at the W12A Landfill Site and submission to the Ontario Power Authority's Large Renewables Procurement 1 Request for Qualifications (LRP1 RFQ) process

When the LRP program was created by the OPA, its minimum project experience requirements prevented the City of London from directly developing and owning the power plant. Therefore, the City was required to approach power plant development through the sale of landfill gas utilization rights to project developers with direct experience in landfill gas projects.

The purpose of the City RFP process was to select a company that the City would sell landfill gas rights to and who would meet the requirements of the LRP1 RFQ. The OPA's LRP1 RFQ process had the following requirements for landfill gas proponents:

- A minimum project team size of three people with:
    - Experience with Planning, Developing, and Financing at least three previous energy facilities (renewable or non-renewable generation), or one Large Complex Infrastructure Project with a value of $100 million, if they have no energy-related experience.

  - At least one team member must be from the applicant
  - At least one team member must have experience developing in Ontario, engaging in community and municipal consultations, obtaining site access, regulatory and environmental approvals and other permits
  - At least one team member must have experience constructing in North America
- A tangible net worth of at least $600,000

London's RFP process resulted in two bids being received in August 2014. Through the evaluation process it was determined that only one bidder (Integrated Gas Recovery Services Inc. - IGRS) met the terms and conditions of the City.

In September 2014, IGRS submitted its response to LRP1 RFQ, on behalf of London. The work required for this submission was paid for by IGRS while the City paid the application fee ($2,000).

In total, 70 LRP 1 RFQ submissions were received by the OPA, and after two months of review for completeness and eligibility, on November 4, 2014, the OPA published its list of 43 Qualified Applicants from the LRP1 RFQ process. It was noted that there were no Qualified Applicants in Ontario for landfill gas power identified by the LRP1 process. The OPA did not divulge information at that time as to why IGRS and Toromont – the other Ontario leading landfill gas power plant developer – both failed to qualify for the LRP1 program.

In subsequent investigations by IGRS in late 2014, it was eventually determined that IGRS made a non-technical clerical error in their supporting documentation which resulted in their LRP1 RFQ submission being rejected by the OPA. Toromont also learned that similar non-technical clerical errors resulted in Toromont's LRP1 RFQ submission being rejected by the OPA. Additional technical details were not available from the OPA on these matters.

On May 20, 2015, CWC received updated comments on the City RFP process as part of the Deferred Matters discussion.

In parallel, in late 2014 and early 2015, City staff examined a number of different scenarios to use landfill gas as an energy source for a large proposed greenhouse project on lands near the W12A Landfill Site. This potential opportunity came to a conclusion in June 2015 with no further action being taken with this developer.

On March 10, 2016, the Independent Electricity System Operator (IESO – the successor organization to the OPA) announced that it had completed its evaluation of the 103 proposals received in response to the LRP I RFP and has offered 16 LRP I contracts to successful proponents. The results include:

- 5 wind contracts totalling 300 MW, with a weighted average price of 8.6 cents per kilowatt-hour;
- 7 solar contracts totalling 140 MW, with a weighted average price of 15.7 cents per kilowatt-hour; and
- 4 hydroelectric contracts totalling 15.5 MW, with a weighted average price of 17.6 cents per kilowatt-hour.

This oversubscription for the program was a good indication of desire for additional renewable energy projects in Ontario. However, this also shows the intense competition within the wind and solar power sectors, compared to the limited competition within the landfill gas and biogas sectors.

The IESO is beginning its process to review the LRP program, starting with a review of the qualifications aspects of the LRP program from March through to June 2016 and feedback to be provided in Q3 2016. The LRP program review will then move into a review of the proposal submission aspects in Q1 through Q2 2017.

2. Status of Opportunities for Landfill Gas Utilization at the W12A Landfill

There are a number of internal and external factors that influence future opportunities for landfill gas utilization:

- The W12A Landfill is expected to reach capacity by 2025 and Environmental Assessment is underway to look at London's future waste management options.

- It is difficult to predict the amount of landfill gas that will be available for use in the future until the Environmental Assessment is finished. The W12A Landfill could be expanded or closed. The amount organics going to the landfill could be reduced (e.g., introduction of Green Bin program) or increased (e.g., more garbage with organic content). There may be facilities sited in the Waste Management Resource Recovery Area beside the landfill that will produce biogas (e.g., anaerobic digester) that could be combined with landfill gas.

- Ontario is proposing that the waste management sector become "zero emissions" by 2030 (Draft Strategy for a Waste Free Ontario: Building the Circular Economy, 2015).

- Ontario has released a proposed *Climate Change Mitigation and Low-Carbon Economy Act* and an associated Cap and Trade Regulatory Proposal which places an emissions cap and associated pricing mechanism on large emitters (e.g., facilities emitting more than 25,000 tonnes per year of GHG emissions) as well as petroleum fuel distributors and natural gas distributors (i.e., Union Gas.)

- There is likely to remain intense competition within the wind and solar power sectors, whereas there has been limited uptake for landfill gas and biogas power projects from the IESO. In part, this is due to OPA's handling of the LRP 1 RFQ process for landfill gas power proponents.

Based on the above, City staff see the following five options for landfill gas utilization:

#	Options	Comments
Short Term Decision		
1	Install a 500 kilowatt (0.5 MW) generator for electricity at the W12A Landfill Site	This could be done either through a FIT contract (with a guaranteed price of 17.1 cents per kWh) or through a behind-the-meter power supply to the Materials Recovery Facility. The business case would evaluate both options. This could be done in a relatively short timeframe, as the approvals process timeline is shorter for FIT, and even shorter for a behind-the-meter application.
Longer Term Decision		
2	Review the potential to respond to a future Large Renewables Procurement 2 Request for Qualifications (LRP2 RFQ) for the purpose of generating electricity through a long term contract with IESO	The LRP2 application process may not be open until Q3 2017, which means that an LRP contract award may be in the Q1 2019 timeframe. Given that the landfill is predicted to be at capacity by 2025, there is a risk that there may not be sufficient landfill gas to satisfy a 20 year LRP contract depending upon future provincial policy regarding organic waste management.
3	Utilize landfill gas as an energy source to be used by a potential business to be located on City-owned lands near the Waste Management Resource Recovery Area	Landfill gas could be utilized directly as fuel for heat, power, and carbon dioxide fertilization for agricultural greenhouse operations.
		Table continued

#	Options	Comments
Longer Term Decision (continued)		
4	Utilize landfill gas as an energy source to be used as a feedstock for a future resource recovery technology to be established within the Waste Management Resource Recovery Area	Some future resource recovery technology options, such as the anaerobic digestion of organic waste, plasma gasification, gas phase reduction, etc., could make use of landfill gas in the production of bioenergy.
5	Utilize landfill gas to create renewable natural gas (RNG) as an energy source	With Ontario's new Cap & Trade program coming into effect, Union Gas will be looking into potential GHG emission reduction and offset projects, which may include incentives for supplying RNG – biogas and landfill gas upgraded to pipeline-quality methane content – into the natural gas distribution system.

A decision on pursuing one of options 2 to 5 will be a few years away given the previously listed internal and external factors that need to be resolved. It may be possible to proceed with Option 1 in the short term subject to a business case analysis demonstrating the financial viability of this option. A 0.5 megawatt power plant will only use a small portion of existing landfill gas flows (about 20%) and there would be sufficient gas generated for Option 1 for the next 20 years even if the W12A Landfill closed in 2025.

3. Developing a Business Case to install a 500 kilowatt (0.5 MW) generator for electricity

The business case to install a 500 kilowatt (0.5 MW) generator (about the size of a large trailer) at the W12A Landfill will include:

- Capital cost
- Operating cost
- Potential sources of financing including a Feed-in-Tariff Contract with IESO, Federal Gas Tax, landfill tipping fees and private sector
- Risk assessment
- Environmental factors
- Linkages to existing infrastructure at the Waste Management Resource Recovery Area
- Fit with neighbourhood

A landfill gas generator (1.6 Megawatt) was installed in 2012 at the Merrick Landfill Site, North Bay, Ontario

A landfill gas generator (1.6 Megawatt) was installed in 2013 at the Bensfort Road Landfill Site, Peterborough, Ontario

ACKNOWLEDGEMENTS

This report was prepared with assistance from Wesley Abbott, Division Manager, Solid Waste Management and Mike Losee, Manager – Solid Waste Engineering & Planning.

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Appendix A Background on Landfill Gas Utilization at the W12A Landfill

APPENDIX A
Background on Landfill Gas Utilization at the W12A Landfill

The following table summarizes the efforts to utilize landfill gas for renewable energy production:

Date	Event	Comment
2004	Ontario Power Authority (OPA) issues Request for Proposals (RFP) for renewable energy under Renewable Energy Supply (RES) 1 program; Ontario Power Authority (OPA) changes RES 1 rules (will take Greenhouse Gas Credit Emissions) during procurement process.	City initially plans to participate and issues RFP to developers but stops process because of difficulty in evaluating financial implications of changing rules and W12A Landfill well field was still under development making final gas flow difficult to estimate.
2005 to 2008	OPA introduction of RES II program which changes/evolves and is eventually replaced by Renewable Standard Offer Program (RSOP).	City continues to expand well field and evaluate options available including RES II and RSOP.
November 2009	OPA ends Standard Offer Program and announces Feed-in-Tariff (FIT) program.	OPA to offer 20 year contracts at fixed prices for approved power generation projects.
March 2010	City applies for FIT contract for 2.4 megawatt power plant.	London Hydro recommends use of Wonderland Transformer Station (TS) based on available capacity.
February 2011	OPA informs City of London of Transmission Availability Test failure; no contract offered.	London Hydro and Hydro One were not aware of transmission constraints.
February 2011	Proponents without transmission capacity placed on a “first-come, first-serve” list for new capacity.	W12A application is 82nd on the priority list for new capacity in southwestern Ontario.
September 2011	Enbridge Gas and Union Gas submit joint proposal to Ontario Energy Board (OEB) to offer incentives for renewable natural gas production.	Proposed rates were $13 per gigajoule, over double the market price at that time. Quantities limited to small fraction of total market to minimize customer impact.
November 2011	City issues Request for Expression of Interest (REOI) for Biogas Utilization, with a focus on upgrading landfill gas to renewable natural gas.	Focus was on landfill gas (LFG) upgrading, but respondents given option of proposing other utilization options.
January 2012	Five REOIs received from respondents.	Most respondents focused on LFG upgrading, but many point out that power generation under FIT would be less risky.
April 2012	OPA releases revised information about transmission capacity at Wonderland TS.	Outcome of OPA review of FIT program rules.
April 2012	OPA issues draft new rules for FIT program (FIT 2.0), which includes new points-based prioritization and tiered procurement approach (Small FIT < 500 kW & Large FIT).	New points system revives power generation option for W12A, although strong competition expected for limited new procurement target capacity.

Date	Event	Comment
July 2012	OEB reject the proposal for offering renewable natural gas incentives, asking Enbridge & Union Gas for more research on customer impact.	Union Gas unlikely to pursue this further with OEB, but offers to assist City of London to connect with willing buyer of renewable natural gas in the future.
August 2012	REOI respondents notified of suspension of investigation of biogas utilization.	Respondents informed that City investigating opportunities under FIT 2.0.
December 2012	OPA issues final new rules for FIT 2.1.	Points system revisions places greater emphasis on community/aboriginal partnership “set-aside” projects.
December 2012 – January 2013	OPA opens 30 day application window for Small FIT projects (< 500 kW).	826 MW of applications received for 200 MW Small FIT procurement target.
March 2013	City starts due diligence on London District Renewable Energy Cooperative (LDREC) to become a joint venture partner with the City of London.	LDREC was selected as a result of Request of Interest process; forming a joint venture with LDREC increases likelihood of being awarded a “set-aside” FIT contract to build a power plant.
November 2013	OPA announces FIT process terminated for projects over 500 kW; will develop new Large Renewable Procurement (LRP) process.	FIT (fixed price) process to be replaced with a new competitive price procurement process with rules to be developed.
January 2014 – April 2014	OPA consultations regarding rules for LRP and issue draft documents for comment.	City provides comments that draft rules are too restrictive on who can develop projects.
July, 2014	The first round of LRP procurements (LRP 1) started on July 14th with the release of the Request for Qualifications.	City does not qualify to directly develop landfill gas utilization projects over 1 MW and no advantage to having joint venture with LDREC.
August, 2014	London selects Integrated Gas Recovery Services Inc. (IGRS) to sell gas rights to (subject to IGRS winning LRP contract).	City received two bids through an RFP process but one did met the terms and conditions of the City.
November, 2014	IGRS submission to LRP was rejected (due to non-technical clerical error in submission).	Limited details provided by OPA.
November 2014 to April 2015	City staff examined a number of different scenarios to use landfill gas as an energy source for a large proposed greenhouse project on lands near the W12A Landfill Site.	This potential opportunity came to a conclusion in June 2015 with no further action being taken with this developer.