Committee of the Whole Report

Report Number:	**WM2022-004**
Meeting Date:	February 8, 2022
Title:	**2021 Lindsay Ops Landfill Gas Generator Summary**
Description:	An operational review of the Lindsay Ops landfill gas generator for the year of 2021
Author and Title:	David Kerr, Manager of Environmental Services

Recommendation(s):

That Report WM2022-004, **2021 Lindsay Ops Landfill Gas Generator Summary**, be received;

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

Department Head: _____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

At the Council Meeting of October 20, 2020, Council adopted the following resolution:

> CR2020-333
>
> 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; and
>
> That staff present an annual report to Council on the Lindsay-Ops Landfill Electricity Generation System.

This report follows that direction.

To put this report into context, we have provided a summary overview of the generator and its operational performance over the 2021 calendar year. This is the 2nd annual report provided to council on the operation of the generator. The first report was provided to council on February 9, 2021.

Overview

It is a provincial requirement for a landfill the size of Lindsay Ops, to have a methane collection system. There is not only a flare installed at the Lindsay Ops landfill to manage methane onsite, but since 2015, the City has also owned and operated a landfill gas generator. The generator converts methane gas from the Lindsay Ops landfill into electrical power. This power is in turn used to supply electricity to the Lindsay Ops landfill and adjacent Lindsay Water Pollution Control Plant (WPCP).

The benefits of having both a flare and generator onsite, is that if for any reason the generator is down for maintenance or other, methane is routed to the flare where it is burned, thus meeting the regulatory requirement.

The gas facility (including collection system, generator, and flare) is located on the Lindsay Ops landfill property, west of the current fill area. The operation of this facility, including maintenance and monitoring, is currently contracted to Comcor Environmental Limited (Comcor) and is administered by Waste Management Operations. Comcor is in

the final year of their contract, expiring December 31st of 2022. Staff will be proceeding with formal procurement, for operations beyond the end of this year.

As per Council's direction, the User Rate (Water and Wastewater) covers the bulk percentage of the costs associated with the operation of the landfill gas generator, while the Waste Management Division assumes the remainder of the costs, and those of the flare and collection system. The percentage paid by the user rate is dependent on the amount of energy the Lindsay Water Pollution Control Plant (WPCP) consumes from the generator's production, and is reviewed annually.

Performance in 2021

In 2021, the generator was out of service for approximately 117 days. These downtimes are a combination of pre-scheduled maintenance, alarms and other issues that arose from continual operation of the equipment.

One major source of downtimes is low pressure and landfill gas quality. Overall, the generator operates effectively but is unable to operate at optimal rates due to lower volumes of methane/low quality of the landfill gas. As the landfill continues to be built-up, more methane will be generated and more gas wells will be installed, both will have a positive impact on the generator's operation.

Rationale:

When waste is first deposited in a landfill, it undergoes aerobic (oxygen) decomposition and during this stage little methane is produced. Typically, within one-year anaerobic (lack of oxygen) conditions are met and methane-producing bacteria begin to decompose the waste and generate methane. The expectation is that with time, as the Lindsay Ops landfill increases in age and size, there will be many future years of optimal methane production. Any future expansion of the wellfield will also work in bettering the operation of the generation facility.

The landfill gas generator provides a sustainable green alternative energy source that is greatly utilized onsite, due to the considerable energy demands of the WPCP and landfill buildings. The generator also provides redundancy onsite, so if either the flare or generator are unable to run, the other can operate. This is very important in ensuring the site remains in compliance with the landfill site's Environmental Compliance Approval (ECA), which requires methane to either be flared or converted to energy

through the generator. In 2021, approximately 1.1 million kilowatt hours (kWh) of electricity were produced from the methane gas to service the on-site needs of City operations. This accounted for approximately 40% of the electrical demands of the Lindsay Ops landfill and Lindsay WPCP.

As further discussed in the financial operation impact section of this report, there is a strong business case to continue operating the generator based on regulatory needs, reduction of greenhouse gases, operational redundancy and offsetting electrical costs. It is expected that through additional operation in 2022 and beyond, that the cost savings will be able to be more accurately predicted. For these reasons, we continue to recommend operation of the generator over the course of 2022 to better evaluate its long-term performance and benefit to the City.

Other Alternatives Considered:

There are no other alternatives being considered at this time.

Alignment to Strategic Priorities

The Lindsay Ops landfill gas generator is a component of the Healthy Environment Plan and overall Strategic Priority of a Healthy Environment. This is because it produces renewable energy and reduces the corporate carbon footprint and the City's greenhouse gases. It also contributes to environmentally efficient municipal infrastructure as it offsets a large portion of the electricity required by Lindsay's Water Pollution Control Plant (WPCP), therefore reducing the energy consumption required for municipal operations.

Financial/Operation Impacts:

The City budgeted $250,000 in 2021 for the operation and maintenance of the landfill gas generator, flare and wellfield. Of this budget, $200,000 is allocated to the generator.

Electricity demands for the Lindsay WPCP and Lindsay Ops landfill are significant and for the period of December 8th, 2020 to December 7th, 2021, Hydro One costs came to a total of $353,000. The total amount of kilowatt hours (kWh) consumed during this time was approximately 2.9 million kWh. Of this, 1.1 million kWh were delivered from the generator, while the remainder were sourced from the Hydro One grid.

The kWh contributed by the generator, provided the City with an approximate savings of $200,000 in Hydro One billing costs, for the year of 2021. This is an estimation using

the approximate $/kWh for each billing period. The $200,000 that was saved in Hydro One billing costs, was instead spent on the operation and maintenance of the generator, as the annual cost of the generator to the City is $200,000. This means the generator was cost neutral in 2021. Supporting information for the reduction in Hydro One billing costs is outlined in the chart below:

Billing Period	Hydro One Bill Total (A)	Hydro One Bill Total kWh (B)	Total kWh Generator Produced (C)	Total Amount of kWh Consumed (B+C)	Estimated $/kWh (D)	Estimated Cost Savings* (C x D)
Dec 8 - Jan 8	$42,469.37	249,224	30,838	280,062	0.17	$5,255
Jan 9 – Feb 8	$29,511.23	159,924	108,140	268,064	0.18	$19,955
Feb 9 - Mar 10	$38,396.39	203,570	41,570	245,140	0.19	$7,841
Mar 11 – Apr 9	$40,197.82	215,258	34,933	250,191	0.19	$6,523
Apr 10 – May 7	$16,532.17	80,127	135,813	215,940	0.21	$28,021
May 7 – Jun 9	$27,629.25	136,169	115,867	252,036	0.20	$23,510
Jun 10 – Jul 9	$34,982.73	185,040	41,647	226,687	0.19	$7,874
Jul 10 – Aug 10	$18,998.44	81,660	142,214	223,874	0.23	$33,087
Aug 10 – Sept 10	$27,393.47	132,431	96,884	229,315	0.21	$20,041
Sept 10 – Oct 7	$19,630.86	101,996	119,898	221,894	0.19	$23,076
Oct 8 – Nov 9	$28,750.99	156,305	108,176	264,481	0.18	$19,898
Nov 10 – Dec 7	$28,750.99	127,417	119,002	246,419	0.23	$6,487

*It is important to note that these costs are estimated based on variable billing costs.

If the generator performance improves as we expect it will, the benefit to the City will be even greater.

Consultations:

Manager, Water and Wastewater
Waste Technician 2

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Department Head: Bryan Robinson, Director of Public Works