



City of  
**Peterborough**

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**TO: Members of the Waste Management Steering Committee**

**FROM: W. H. Jackson, Director of Utility Services**

**MEETING DATE: November 14, 2011**

**SUBJECT: Report WMC11-007  
Leachate Management System Operation**

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## **PURPOSE**

The purpose of this report is to present the November 9, 2011 Technical Memorandum from Urban & Environmental Management Inc. regarding the operation of the leachate management system at the Peterborough County/City Waste Management Facility (PCCWMF).

## **RECOMMENDATION**

That the Waste Management Committee endorse the recommendation as outlined in Report WMC11-007 dated November 14, 2011, of the Director of Utility Services as follows:

That Report WMC11-007 providing the Committee with a copy of the Urban & Environmental Management Inc. November 9, 2011 report entitled Leachate Management System (LMS) Operations for the Peterborough County/City Waste Management Facility be received for information.

## **BUDGET AND FINANCIAL IMPLICATIONS**

There are no budget or financial implications as a result of this report.

## **BACKGROUND**

The Waste Management Steering Committee at its meeting of September 16, 2011 under Other Business passed the following:

*That a report be requested on the viability of the leachate system to determine if modifications should be undertaken during the Bensfort Road reconstruction.*

The attached report from Urban & Environmental Management Inc. dated November 9, 2011 provides a detailed description of the leachate management system at the Peterborough City/County Waste Management Facility.

Submitted by,

W. H. Jackson  
Director, Utility Services

### **Attachment:**

1. Report dated November 9, 2011 entitled "Leachate Management System (LMS) Operation" from Urban & Environmental Management Inc.

## TECHNICAL MEMORANDUM

<b>Project:</b>	Leachate Management System	
<b>Client:</b>	Peterborough City/County Waste Management Facility (PCCWMF)	
<b>Subject:</b>	Leachate Management System(LMS) Operation	
<b>Date:</b>	November 9, 2011	UEM Project #08-017

The purpose of this Technical Memorandum is to summarize the operation of the leachate management system at the PCCWMF. The report was requested by the City in response to an Action Item from the Waste Management Steering Committee Meeting of September 16, 2011. The action item requested a report on leachate management system (LMS) design and operation, and concerns that recent odours from the PCCWMS could have been due to a problem with the LMS.

### BACKGROUND

The PCCWMF contains two independent waste disposal fill areas, the originally approved South Fill Area (SFA), and the North Fill Area (NFA) which was approved in June 2005. The SFA is expected to reach its approved capacity in 2012.

In 2009 and 2010 the infrastructure required to operate the NFA, including the stormwater management pond, ditches, roads and leachate management system for Cell 2, the first operating cell in the NFA, was constructed. The infrastructure was designed and constructed in accordance with the Ministry of Environment’s “Landfill Standards – A Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites” (May 1998).

### SOUTH FILL AREA (SFA) LEACHATE MANAGEMENT SYSTEM

The SFA leachate management system comprises a leachate collection system that conveys leachate through a granular drainage blanket and network of pipes and access manholes to a duplex pumping station. The pumps consist of two (2) 600V 3 phase 7.5HP (5.6KW) submersible Flygt grinder pumps, each capable of pumping 5.8l/s. When operated simultaneously, the combined flow from both pumps is about 9 l/s. Portable standby power for one pump is provided.

The SFA LMS also includes a perimeter lift station known as MH-13 which lifts leachate from the collection system into the main SFA pumping station.

### NORTH FILL AREA (NFA) LEACHATE MANAGEMENT SYSTEM

The NFA is comprised of three waste disposal cells (Cells 2-4). Cell 2 and associated infrastructure was constructed in 2009 and 2010. The Cell 2 LMS includes:

- a) a recompacted soil liner and leachate collection system;
- b) a pumping station, metering system, associated controls and standby power; and
- c) a forcemain and connection to the existing forcemain on Bensfort Road that accepts leachate from the SFA;

Waste disposal in Cell 2 commenced in October 2010. Cells 3 and 4 will be constructed progressively as needed to accommodate future disposal needs.

#### **RECOMPACTED SOIL LINER**

The base and side walls of the NFA have a recompacted soil liner. The fill area is designed as a hydraulic trap to induce groundwater flow into the landfill, inhibiting leachate flow outward.

#### **LEACHATE COLLECTION SYSTEM**

A full underdrain system was constructed on the liner in Cell 2 such that leachate will not mound more than 0.3 metres above the top of the landfill base when the collection system is operated and maintained as designed. The leachate collection system may be generally described as follows:

- A network of 200 mm diameter perforated pipes, DR13.5, spaced at less than 50 m within a 500 mm thick layer of 50 mm clear stone.
- Two geotextile (filter fabric) layers one above and one below the drainage blanket to act as separating layers to reduce the risk of clogging of the drainage layer and collection pipes. A 150 mm thick granular protective layer was placed immediately above the upper geotextile.
- The leachate collection system directs leachate via a 300 mm diameter solid pipe to the NFA Pumping Station located near the southeast corner of Cell 2, which pumps leachate via 100 mm diameter pipes through a meter chamber and then via a 150 mm diameter pipe through a connecting manhole on Bensfort Road and into the 150 mm diameter forcemain on Bensfort Road that discharges to the City sanitary sewer and ultimately to the Peterborough Water Pollution Control Plant where it is treated.

Leachate collection pipes are accessible through a series of manholes. All manholes are equipped with vent pipes which will be connected to the future landfill gas system in the NFA. In the meantime, the vent pipes are open to the atmosphere. However, in the near term, if odours are found to emanate from these manholes or vent pipes, carbon filters or rain caps can be installed to minimize odours.

#### **LEACHATE FLOW**

The two pumps for the NFA are Flygt submersible, Model NP3171. Each pump will theoretically discharge at a rate of 15.1 l/s against a Total Dynamic Head of 63.9m. With both pumps operating, the theoretical pumping rate will increase to 17.2 l/s. The pumping station forcemain has the hydraulic capacity to discharge at 17.2 l/s.

The wet well that houses the pumps is a 3 m diameter, 12 m high pre-cast, reinforced concrete chamber. At a design leachate inflow rate of 1.41 l/s the pumping station operates every 59 minutes. With a future potential inflow rate of 12.4l/s (leachate plus future compost pond water), the pump cycle time would decrease to 34 minutes.

A Siemens SITRAN PROBE LR level controller is used to control pump operation. The control levels include duty pump on and off, second pump on and off, high level alarm and all pumps off.

Leachate flows are measured using a 100 mm diameter flow meter located in chamber adjacent to the NFA pumping station. The chamber houses the meter, various valves and fittings, sump, pig insertion fitting and provides space for staff to access and maintain system components. Also included in the chamber is the leachate by-pass tanker filler pipe connection to allow leachate to be loaded into a tanker truck directly from the pumping station discharge piping should the forcemain be out of service.

Power for the pumps and flow meter is obtained from the electrical building adjacent to the pumping station. Standby power is provided by a permanent stand alone weather enclosed 100 kw standby diesel gen set located next to the control building.

The forcemain from the NFA connects to the 150mm diameter forcemain located on Bensfort Road, about 980 downstream from where the SFA forcemain enters the Bensfort Road forcemain, at manhole MHF2.

#### **MANHOLES MPG1, MHG2, MHF1**

Manholes MHG1 & MHG2 are used for maintenance of the storm water pond overflow pipe from a future compost facility that may be constructed on City owned property north of the landfill.

MHF1 houses the air relief vacuum valve for pressure testing the forcemain between the NFA PS and the connection to the Bensfort Road forcemain at MHF2.

#### **RADIO CONTROL AND ALARM SYSTEM**

Flows and pressures generated by the NFA and SFA pumping stations are interconnected via a radio wave system connected via antennae at each pumping station location to allow operation of only one pumping station at a time. For example, if the SFA pumping station is operating, the NFA pumping station will be locked out. When the SFA pumping cycle is complete, the NFA pumps will operate and vice versa. Check valves in the connection chamber (MHF2) will prevent any backflow into the idle pumping system when the other station is active.

The SCADA (supervisory control and data acquisition) system is comprised of two remote pump station nodes and a GUI (graphical user interface) computer terminal located at the weigh scales. The NFA and SFA controls are linked together via license free 900 MHz frequency hopping radios utilizing an existing 100 foot tower located in close proximity of the weigh scale building. Remote access to the SCADA system is provided via secure VPN (virtual private network) internet connection with a static IP address.

#### **LEACHATE DISCHARGE OFF SITE**

Leachate from the NFA and SFA is pumped about 6.2 km through a 150 mm diameter forcemain that travels northward along Bensfort Road. A number of air/vacuum relief chambers are located on the forcemain to allow for pressure surges and vacuums, testing and cleaning by the

City. During re-construction of Bensfort Road (currently underway), air valves on the Bensfort Road forcemain are being replaced with stainless steel mechanisms due to the leachate.

The Bensfort Road forcemain discharges to a 525 mm diameter City sanitary sewer located on Neal Drive at Bensfort Road just south of the Hwy #115 by-pass. The leachate ultimately discharges to the Peterborough Water Pollution Control Plant.

#### **LANDFILL GAS AND ODOUR MANAGEMENT**

The infrastructure of the SFA includes a landfill gas collection and flaring system comprised of 22 vertical collection wells, associated lateral and header pipes, valve and control chambers, condensate traps, an enclosed gas flare system and associated blower. When the SFA reaches its approved capacity, up to 22 new vertical gas wells will be installed at the SFA.

The NFA will incorporate a Landfill Gas Control System that will be progressively installed with development of the NFA. Conceptual details of gas control facilities for the NFA were provided to the MOE in 2009 and are similar to those presently installed in the SFA. A landfill gas utilization facility will be constructed on site in the near future.

Maintenance of Landfill Gas Control System components is undertaken regularly and includes repairs to gas wells, balancing of gas wells to maintain efficient operation, and maintenance to system components.

The surface of the landfill is monitored annually to identify areas with high concentrations of Total Hydrocarbon (THC) which are indicators of areas where landfill gas may be escaping. The area of the site with the highest concentration of THC is typically found to be un-vegetated due to the presence of gas seeping through the cover. LCS manholes are also sometimes found to be high in THC due to landfill gas entering the leachate collection system. When gas is found to be seeping out of manhole covers, the cover is either sealed or connected to the gas collection system where a vacuum is applied to eliminate odours.

#### **POSSIBLE SOURCES OF ODOUR AND ACTIONS THAT CAN REDUCE OR ELIMINATE ODOURS**

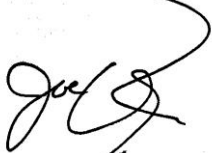
The following describes possible sources of odours at the landfill and the measures that are taken to reduce or eliminate the odour at source:

1. When the SFA reaches its approved capacity in 2012, additional gas collection wells will be installed after final cover has been placed. These wells will be located so that the entire SFA is under vacuum pressure so that gas seepage is minimized if not eliminated.
2. If gases are found seeping out of leachate collection system manholes, new pipe connections to manholes will be made to address odours these point sources of odour.
3. Development of the NFA will include phased installation of a gas collection system as the landfill develops. Vertical extraction wells will be installed in completed cells. The first phase of the gas collection system in the NFA will likely be installed in about 2013. It is anticipated about 50 wells will be installed to optimize the collection of gas.

4. Validated odour complaints provide an indicator to assess trends that may relate to the effectiveness of landfill gas collection. Review of odour complaints will also consider other possible sources of odour in the vicinity of the Site. In the event odours are traced to the landfill, they will act as a trigger to review options to modify site control systems or operation.
5. In areas where surface levels of THC are high and the area is seen to have vegetative stress additional cover will be placed to minimize odour generation. If the problem is not resolved the need for additional gas wells will be assessed.
6. Failed gas extraction wells will be replaced or repaired.
7. Where necessary the landfill gas extraction vacuum pressure will be increased to reduce gas outflow from the site
8. Surface emission monitoring will continue to be undertaken to identify hot spots where gas may be seeping through the cover. These areas will be covered with additional soil and/or additional gas wells may be installed as needed.
9. In the future, the NFA will incorporate a Landfill Gas Control System. Until that time, if odours are an issue, additional cover soil will be placed on the active fills area.
10. If the source of odour in the NFA is found to be a leachate system manhole, the source of the odour will be determined and remedial measures taken. These measures could include installation of rain caps in the manhole, use of carbon filters, use of deodorizers, etc.
11. Maintenance of Landfill Gas Control System components will continue to be undertaken regularly to maintain efficient operation, and maintenance to system components.

Respectfully Submitted,

**URBAN & ENVIRONMENTAL MANAGEMENT INC.**



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