



City of
Peterborough

To: **Members of the Committee of the Whole**

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

Meeting Date: **December 4, 2017**

Subject: **Report USDIR17-014**
Neal Drive Odour Study

Purpose

To provide information and a recommended solution to the problem of odours on Neal Drive.

Recommendations

That Council approve the recommendations outlined in Report USDIR17-014 dated December 4, 2017 of the Director of Utility Services as follows:

- a) That the results of the Odour Study on Neal Drive as detailed in Report USDIR17-014 be accepted;
- b) That staff be requested to initiate the detailed design, any necessary approval applications and construction of a Carbon Absorption Unit to resolve the odour problems presently being encountered on Neal Drive;
- c) That the preferred site for a Carbon Absorption Unit at 400 Plastics Drive be approved;
- d) That funding for the work detailed in Recommendation B come from funds already allocated in the draft 2018 County/City Waste Management Facility budget;
- e) That AECOM be assigned the detailed design work including the submission of any required approval applications; and

- f) That staff report back to both Council and the Waste Management Committee on the progress of this work and any future requirement for additional funds.

Budget and Financial Implications

The estimated capital cost to purchase and install a carbon unit is \$244,000.

The life cycle cost of a carbon absorption system is influenced by the longevity of the media and electrical usage to operate the fan. Based on estimates of the replacement frequency of the media, servicing requirements and electricity costs, the 20-year operating costs are estimated at \$473,000.

No specific funds (capital or operating) have been included in the draft Landfill Budget to account for the installation and operation of a carbon absorption unit as described in this report. However, there is much work that still needs to be done including preliminary and detailed design and obtaining approvals such as an Environmental Compliance Agreement (ECA) through the MOECC. These efforts could take anywhere from 6–18 months to complete and, accordingly, only the design and ECA application funds are required at this time.

The design and ECA application will cost an estimated \$75,000 and it is proposed to source these funds from the Consulting allocation within the 2018 draft budget. It may be that additional funds are required in 2018 to accommodate this work as well as the regularly scheduled monitoring consulting work that is undertaken at the Landfill. Staff will keep close tabs on this account and report to the Waste Management Committee and City Council if a change in funding allocation is required.

Likewise, it is anticipated the capital funds will not be required until later in 2018 (possibility the third quarter) and if staff is successful in reducing the costs of eliminating the excess soil at the Landfill, capital funds will be available in the 2018 budget to undertake the construction of the carbon absorption unit.

Discussion

Odour complaints from the industries along Neal Drive have been received. The leachate from the County/City Waste Management Facility (the “Landfill”) flows via a forcemain from the Landfill to a point where it enters the gravity system along Neal Drive. Given the implications to the Landfill, staff was asked by the Waste Management Committee to investigate the complaints.

Overview

Leachate from the Landfill is pumped up Bensfort Road to the intersection of Bensfort Road and Neal Drive. From there, the leachate enters a gravity sewer that flows east underneath Neal Drive toward Ashburnham Drive. Wastewater from the residential neighbourhood north of the Highway 115 and from the sewer under Pido Road also enters the system through local connections and gravity sewers however, the largest

source of effluent in the Neal Drive gravity sewer is the Landfill. It is suspected that the leachate being discharged into the Neal Drive sewer is the source of the odour contributing to the complaints from the neighbouring businesses.

Consultant Hired

In May, 2017, the City engaged the consulting firm of AECOM Canada Ltd. (AECOM) to investigate the odour complaints along Neal Drive. This firm was selected because of their expertise in this area. Notices (Appendix A) were delivered to the affected properties along Neal Drive informing the people of the study that was underway and the actions that were being taken.

The objective of the study was to analyze the operation of the sewer along Bensfort Road and Neal Drive, review the operation of the leachate collection system at the Landfill, identify the source and cause of the odour complaints along Neal Drive and to recommend an approach to control/prevent odour emissions from the sewer system.

Study

AECOM initiated the field work for this study on May 17, 2017.

Data was collected on hydrogen sulphide concentrations and headspace air pressure in the sewer. Gas sampling was undertaken in the north and south leachate wells at the Landfill as well as selected maintenance hole locations on the Neal Drive sewer. Odour panel testing was conducted from the gas samples to determine the intensity of the odour at the Landfill wells and the Neal Drive sewer. Hydrogen sulphide was collected in two stages using gas detection instruments in selected maintenance hole locations. Pressure and temperature data was also collected. Liquid samples of leachate were analyzed for a range of odour causing compounds. Ventilation modelling was completed to identify areas where positive pressure occurs and to quantify the volume of air and induced negative pressure needed to control positive differential pressure areas within the Neal Drive sewer.

To assist in understanding the collection and pumping of the leachate, AECOM examined the operation of the leachate collection and pumping system at the Landfill including the operation of the leachate pumps and leachate flows.

Results

Based on the analysis undertaken, AECOM has concluded that the high flow caused by the pumping of leachate from the Landfill creates a positive air pressure within the Neal Drive sewer. Positive pressure in this instance means the pressure inside the sewer is greater than the atmospheric pressure outside the sewer and, accordingly, odorous air is forced to escape using the path of least resistance which includes maintenance hole covers and vent stacks on nearby industrial buildings. Odour lids have been installed along Neal Drive in an effort to block air from exiting through holes and openings in the maintenance holes. With this method of escape closed off, the positively pressurized air will find its way out of the sewer through other available openings with vent stacks on

the nearby industrial buildings which connect to the Neal Drive sewer being the most likely other available outlet for air pressure release.

Possible Solutions

Six possible odour control solutions, as listed below, were considered to resolve the Neal Drive odour emission problem:

- Chemical addition;
- Photoionization;
- Biofilters;
- Bioscrubbers;
- Carbon Absorption; and
- Dual-stage Treatment Systems.

A preliminary analysis indicated that Carbon Absorption, Biofilters and a Dual-stage Treatment were the solutions most applicable to the conditions found in the Neal Drive sewer.

To evaluate the three solutions on their effectiveness and suitability for implementation the following list of criteria was used:

- Reliability;
- Effectiveness and removal efficiency;
- Lifecycle cost;
- Size and footprint; and
- Equipment maintenance requirements.

A selection matrix was developed to allow a comparison of the three potential solutions.

Recommended Solution

AECOM has recommended the Carbon Absorption Unit as its preferred means of dealing with the Neal Drive odour problem.

Carbon adsorption units are one of the oldest methods of odour control and typically utilize formulated carbon based dry media. The media absorbs a wide variety of odorous compounds including hydrogen sulphide and odour caused by organic compounds. The odorous gases are collected and held within the media pores where through oxidation the contaminants are converted to a harmless solid substance which remains in the media. Carbon media removes nearly 99.9% of all inlet odour compounds until the media capacity to do so has been reached. For collection system airflows where odour loading is low to moderate, typical dry media life is 2 to 5 years, though this is entirely dependent upon the inlet concentration.

Operation of carbon absorption odour control units is straightforward. The media bed can be arranged for either vertical or horizontal airflow through the treatment vessel.

The estimated capital cost to purchase and install a carbon unit is \$244,000. The life cycle cost of a carbon absorption system is influenced by the longevity of the media and electrical usage to operate the fan. Based on estimates of the replacement frequency of the media, servicing requirements and electricity costs, the 20-year operating costs are estimated at \$473,000.

Site Selection

In addition to the selection of the preferred odour control solution, a site selection process was undertaken to identify the preferred site for installation of the odour control system. Carbon absorption units are sized based on the mass inlet loading of odourous compounds and the inlet air velocity. It is estimated that a complete system will fit within a 5 metre by 3 metre footprint.

The following four possible sites were identified by the Consultant:

- The northeast corner of Bensfort Road and Neal Drive;
- The southeast corner of Plastics Road and Neal Drive;
- Near maintenance hole 4 on the gravity sewer from the residential area; and
- The southeast corner of Pido Road and Neal Drive.

After a review of each site, the consultant's preferred location is on Plastics Road and Neal Drive (the City owned property at 400 Plastics Road) for placement of the unit.

Next Steps

The initial step after finalization of the Study recommendations was to present this matter to the Waste Management Committee. This was done on November 6, 2017 at which time the Waste Management Committee accepted the results of the Odour Study on Neil Drive as described in this report.

A site for the carbon absorption unit at the intersection of Plastics Road and Neal Drive has been suggested. This site is owned by the City and is located in proximity to a maintenance hole on the Neal Drive sewer. The foot print of the proposed Carbon absorption unit is such that its location on the property of 400 Plastics Road will not preclude development of the rest of the property.

The structure design will need to include soil tests to determine suitability for construction and the extent of any contamination that may be present. An air by-pass duct will need to be install between adjacent maintenance holes in proximity to the preferred carbon absorption site to allow air to jump around and be extracted from the identified area of high differential pressure.

Preliminary and detailed design of the odour control system will be completed followed by construction. Permits and approvals (such as an Environmental Compliance Approval for air and noise) will need to be obtained.

It is proposed to begin this process of implementation immediately using funds presently available in the Capital Budget for the Landfill and to come back to the Waste Management Committee and City Council for additional funds if needed. It is hoped that a successful resolution of the excess soil on the Landfill site (i.e. a solution that is cheaper than presently envisioned) will free up some already committed capital funds to be used on the resolution of the Neal Drive odour problems.

To undertake the detailed design, it is proposed to continue with AECOM. Section 9.1.2 d) of Purchasing By-law 14-127 allows for a non-competitive process “when it is necessary to ensure continuity of responsibility...”. In this instance, AECOM have undertaken all the work to arrive at the preferred solution and site. It is prudent to have AECOM continue to complete the detailed design and prepare tender documents on the solution they have recommended. The Director of Corporate Services is in agreement with this proposal.

Submitted by,

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Director, Utility Services

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Attachments:
Appendix A: Notices sent to properties on Neal Drive related to the Odour Study