

**DATE:** March 3, 2015

**FILE:** 5360-20/Comox Valley

**TO:** Chair and Directors  
Comox Valley Regional District (Comox Strathcona Waste Management) Board

**FROM:** Debra Oakman, CMA  
Chief Administrative Officer

**RE:** Landfill Gas Flare System

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### **Purpose**

To provide information related to the purchase of an open flare for the Comox Valley Waste Management Centre (CVWMC) landfill gas system.

### **Policy analysis**

The Comox Strathcona Waste Management (CSWM) 2012 Solid Waste Management Plan was approved by the Ministry of Environment (MoE) in May 2013 and induces the following sections related to landfill gas:

18.4.1 regarding “to close and cap the existing landfill cell using engineered systems for managing leachate, landfill gas and stormwater.”

19.2 regarding Integrated Resource Recovery “provide other benefits such as greenhouse gas emissions reductions”

At the February 12, 2015 CSWM board meeting the following recommendation was approved:

*THAT as a result of a competitive process, a contract be awarded to Perennial Energy for the supply of a landfill gas flare system as part of the Phase 1 closure project at the Comox Valley waste management centre in an amount US\$ 255,158 excluding applicable taxes and customs brokerage.*

*AND FURTHER THAT the chair and corporate legislative officer be authorized to execute the purchase agreement.*

### **Executive summary**

As part of the phase 1 closure project an open candlestick flare is planned for installation at the CVWMC for flaring of landfill gas following the project. In addition, an alternative use for the landfill gas is currently being studied, including the future sale of gas, the generation and sale of electricity along with other beneficial end uses. Once the alternative use is implemented the candlestick flare will no longer operate continuously and only be used during maintenance or repairs.

Enclosed flares have a longer retention time for the landfill gas and higher uniform temperature which results in a higher destruction efficiency than open flares, however enclosed flares are typically used when there is no alternative use for the landfill gas.

An open candlestick flare was selected for the CVWMC phase 1 closure project as it is significantly less costly than an enclosed flare and the gas will ultimately be used for an alternative beneficial use.

Currently there is no data comparing the effects on birds for candlestick versus enclosed flares. The effect on birds depends heavily on the geography around the flare (where birds roost, and flight

patterns) and also likely the size of the flare. If determined to have negative effects, there are options available to deter birds such as screens and anti-roosting designs. In addition the CSWM service currently utilizes Pacific Northwest Raptors (PNR) Ltd. to actively manage birds at the landfill. Depending on future bird control requirements PNRs scope could be amended to include bird management at the new flare.

**Recommendation from the chief administrative officer:**

For informational purposes only.

Respectfully:

***D. Oakman***

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Debra Oakman, CMA  
Chief Administrative Officer

**History/background factors**

Landfill gas (LFG) is generated as waste is decomposed anaerobically. A major component of landfill gas is methane which is “approximately 25 times more heat absorptive than carbon dioxide on a mass basis.”<sup>1</sup> Due to the estimated volume of landfill gas production at the CVWMC a landfill gas management system is recommended to be constructed.

EBA consulting engineers are currently evaluating the most beneficial end use of the landfill gas. To properly assess the end use, flow rate and composition (percent methane) must be verified before investing in the recommended technology. Current end uses under investigation include:

- Sale of Gas – Including cleaning up gas of contaminants and tie into existing gas pipelines
- Power – Micro turbines, reciprocating engines
- Heat – Greenhouse, boilers, furnaces
- CHP – Combined heat and power
- Vehicle Fleet - Convert to compressed natural gas or liquid natural gas

An open candlestick flare (as shown in Figure #1 below) is a temporary solution utilized to immediately reduce the negative impacts of methane on the environment, and to act as a backup to the permanent system. The destruction efficiency is difficult to measure (compared to an enclosed flare), and open flares are not recommended for the final end use.

One of the particular advantages of the open candlestick flare is its relatively large turn-down ratio, allowing the flare to operate at much lower than full design capacity which allows for a higher level of control flexibility.<sup>1</sup>

The CVWMC is planning to implement an alternative use for the landfill gas based on EBA’s recommendation and validation of flow rate and composition calculations. For this reason, a candlestick flare was chosen for temporary flaring of the landfill gas. The candlestick flare would then act as a backup for the chosen alternative use of the gas (i.e. during maintenance and repairs).

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<sup>1</sup> **Conestoga-Rovers & Associates.** *Landfill Gas Management Facilities Design Guidelines.* Richmond : British Columbia Ministry of Environment, 2010

The flare height is design at 25' with safe working limits for personnel and equipment at 6' above ground level.

Figure #1: Candlestick flare



An enclosed flare (as shown in figure #2 below) has a confirmed higher destruction efficiency due to the uniform combustion temperature and calculated retention time for landfill gas, however enclosed flares are only recommended when they are the end use of the landfill gas and no alternatives for the landfill gas are planned.

Figure #2: Enclosed Flare



*Environmental implications for birds*

Both open and enclosed flare systems can be problematic to bird populations. There are currently no statistics on birds injured or killed by methane burners. It is known that flares that are sporadic in operation can cause harm to birds if they use the flare as a perch. The CVWMC flare is planned to be operated continuously until alternatives for the landfill gas are determined and operational. After which the flare will only be used during maintenance and repairs. The flare size will be continuous; the preference is to match gas extraction with production so the flare can operate at a steady state. Enclosed flares can produce a colourless plume which has also been noted to “knock out” or asphyxiate birds passing over.

The open flare planned at the CVWMC is similar to flares installed at other east coast Vancouver Island landfills. It is not anticipated that the open flare at the CVWMC will pose an increased risk to birds in the area.

**Financial factors**

EBA engineering consultants estimate the cost of adding the enclosed flame apparatus at approximately \$100,000 to \$125,000 CAD. A larger pad is also required for the enclosed flare.

**Legal factors**

The MoE’s *Landfill Gas Regulation* requires the collection and destruction of landfill gas by 2016.

**Sustainability implications**

Flaring the methane from landfill gas is a benefit to the social and community well-being by removing a substantial amount of greenhouse gas from the environment.

Typically landfill gas is composed of 45-58% methane and 35-45% carbon dioxide. Because landfill carbon dioxide does not derive from fossil fuel but is part of the natural carbon cycle, it is typically not considered a contributor to the greenhouse gas effect. Due to its higher infrared absorption capacity, methane is a much stronger greenhouse gas than carbon dioxide. Because of the methane contribution, landfill gas that is not flared or utilized can be a major contributor to the greenhouse effect.

**Intergovernmental factors**

None

**Interdepartmental involvement**

Engineering services branch is leading this work

**Citizen/public relations**

The flare station will be located at the north end of the landfill property adjacent to the Biosolids composting facility. This area is away from the public and out of the line of sight from the Village of Cumberland.

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