



ADMINISTRATIVE REPORT

Report Date: May 17, 2011
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Meeting Date: May 31, 2011

TO: Vancouver City Council
FROM: General Manager of Engineering Services
SUBJECT: Vancouver Landfill: Phase 2 Closure and Landfill Gas Collection Works

RECOMMENDATION

- A. THAT the General Manager of Engineering Services be directed to proceed with the Vancouver Landfill Phase 2 Closure and Landfill Gas Collection Works Project.
- B. THAT Council approve an initial project budget of \$4,678,000 with \$1,780,000 previously approved in the 2010/2011 Capital Budgets, with a further \$1,938,000 to be funded from the Solid Waste Capital Reserve, which is held for this purpose, and \$960,000 as a loan from the Capital Financing Fund to be repaid through tipping fees as an operating cost.

CITY MANAGER'S COMMENTS

The City Manager supports the report recommendations. Effectively managing landfill gas at the Vancouver Landfill is critical to achieving the City's community greenhouse gas reduction targets and also critical to ensuring that the operation of the Vancouver Landfill does not negatively impact Delta residents.

The work proposed in this Council report is necessary and anticipated, and will be funded from the Solid Waste Capital Reserve, established specifically for this purpose, and through waste tipping fees.

COUNCIL POLICY

On March 1, 2011, Vancouver City Council endorsed the general approach outlined in Metro Vancouver's draft Integrated Solid Waste and Resource Management Plan (ISWRMP), and the municipal actions included in the ISWRMP.

The City's responsibilities under the ISWRMP include various actions to reduce municipal solid waste, and also responsibilities to operate Vancouver Landfill (VLF) as a regional disposal facility for waste-to-energy and other residual wastes with a target of reducing the annual quantity of waste disposed at VLF to 100,000 tonnes per year by 2020.

On January 5, 2011 Vancouver City Council adopted various Greenest City 2020 targets, including reducing total waste to landfill or incinerator by 50% from 2008 levels, and reducing community-based greenhouse gas emissions by 33% from 2007 levels.

SUMMARY

On March 1, 2011, the General Manager of Engineering Services provided Council with a report reference on solid waste management including information on landfill gas (LFG) collection efficiency at the Vancouver Landfill (VLF).

Historically the City's landfill operations have focused on minimizing cost, maximizing landfill capacity and enhancing opportunities to collect LFG.

The ISWRMP paves the way for a new approach to waste management that emphasizes minimizing waste generation, and maximizing recycling, resource and energy recovery from remaining waste. This approach and City Council's Greenest City goals along with recognition of impacts on the host municipality, Delta, indicate a need to shift our priorities in the operation of VLF.

This report outlines a proposed strategy for increasing LFG collection that is a combination of previously planned activities to close a section of VLF that will reach capacity this summer, and expedited actions to increase LFG collection efficiency to a target of 75% collection by the end of 2012, three years ahead of the B.C. Landfill Gas Management Regulation requirement.

The report seeks Council authority to initiate projects with initial costs of \$4,678,000 and total estimated costs of approximately \$25,000,000 over two years with recoveries of approximately \$5,000,000 from Metro Vancouver. The proposed costs are significant but have been anticipated and are required for landfill closure and to meet regulatory requirements. Cost attributed to closure are provided from the Solid Waste Capital Reserve, a reserve established for this purpose and funded through tipping fees. Other costs will be funded by a loan from the Capital Financing Fund to be repaid on a business case through tipping fees with interest over five years. 2012 proposed expenditures will be included in the 2012 - 2014 Capital Plan process.

PURPOSE

The purpose of this report is to seek Council approval to proceed with consulting and construction projects at Vancouver Landfill.

BACKGROUND

Vancouver Landfill Background

The City of Vancouver owns and operates the Vancouver Landfill (VLF) in Delta.

Landfilling at VLF commenced in the mid 1960s. In 1999, Vancouver and the Corporation of Delta entered into an agreement to among other things fix the footprint of the landfill at the 1999 area rather than expanding as planned, and refill the site to a maximum height of 39 metres. Unfilled lands at the site are being transferred to Delta to be preserved as part of Burns Bog. The 1999 Agreement is in place until 2037.

The site is being filled in nine phases (as shown below in Figure 1) with Phase 1 of the site filled to capacity in 2006.



Figure 1: Vancouver Landfill Fill Plan

An impermeable membrane has been installed on top of Phase 1 to prevent moisture entering the waste and to increase LFG capture. A layer of topsoil was installed on top of the impermeable membrane to promote plant growth. The Phase 1 Closure Project was approved by Council in 2005, and the total project cost was approximately \$12 million plus \$5 million for LFG collection infrastructure including upgrades to the LFG flare and compressor system.

LFG is approximately 50% methane and 50% carbon dioxide. Methane is a greenhouse gas (GHG) with a GHG potential of approximately 20 times carbon dioxide. LFG can be burned to generate power or alternatively flared to reduce GHG impacts and prevent odours. Currently, more than 90% of the LFG from VLF is being beneficially used by Maxim Power Corp. at Village Farms Greenhouses (immediately south of VLF across Highway 99) to generate electricity, powering the equivalent of approximately 5,000 homes. Recovered heat from the generators is used to heat the green houses.

DISCUSSION

Waste Management Philosophy and Regional Context

Historically the City has focussed on at-source waste reduction and recycling initiatives such as home composting, multi-material recycling and yard and food waste composting aimed primarily at the residential sector. Any residual Vancouver waste has been and continues to be disposed of at VLF along with waste from the western portion of the Region including Richmond, Delta, the University Endowment Lands and part of Surrey.

Under the draft Integrated Solid Waste and Resource Management Plan (ISWRMP), Metro Vancouver has set an aspirational target of 80% waste diversion by 2020 compared to the current rate of approximately 55%. Once that target is achieved, the total regional waste stream is expected to be approximately 900,000 tonnes per year compared to the current total of approximately 1,100,000 tonnes per year. Vancouver has set a Greenest City 2020 goal

of reducing waste to landfill or incinerator by 50% compared to 2008. This goal aligns well with the ISWRMP targets.

Vancouver's primary efforts over the next few years will be to minimize waste going to landfill or incinerator. For instance, staff will be reporting to Council in the near future with plans for expanded food waste composting, construction waste diversion through deconstruction over demolition, increasing materials diversion through enhanced product stewardship programs, community based social marketing to support reduced waste generation and increased recycling, etc.; all part of Greenest City 2020 planning.

In parallel it is critical to have systems and strategies in place to minimize environmental impacts of residuals management and maximize the efficiency of the Region's residuals management system. Under the draft ISWRMP, almost all residual waste is proposed to be managed through waste-to-energy facilities with a maximum 2020 target VLF disposal rate of 100,000 tonnes per year, down from its current rate of approximately 450,000 tonnes per year.

Under the draft ISWRMP, by 2020, materials disposed at VLF will be only residuals from waste-to-energy facilities, and other non-combustible materials such as sewage treatment plant residuals, water treatment plant residuals and any waste that cannot be processed through waste-to-energy facilities due to: minimum thresholds for new waste-to-energy capacity, seasonal fluctuations, weather or other unexpected events.

The rate of filling at VLF and whether the ultimate capacity is attained is uncertain given the variables at play and therefore maximizing VLF capacity is no longer a significant priority.

Landfill Management and LFG Capture

Historically the City's landfill operations have focused on minimizing cost and maximizing landfill capacity while taking steps to collect LFG. Currently, LFG collection efficiency is not being optimized and is below the 2016 B.C. Landfill Gas Management Regulation target of 75% capture.

Two technical issues have contributed to reduce LFG collection:

- Phase 1: When this section was closed it was sealed with an impermeable barrier on the top and on the external faces. On the western facing interior face, soil cover was used because ultimately this face will be covered with waste. Insufficient soil was installed on the face allowing gas migration out of the landfill.
- Phase 2: Phase 2 was left to settle for two years prior to refilling to permitted maximum height and then capping. This was a sensible approach given the drivers at the time, but not effective at capturing the early peak in LFG production

Phase 1 LFG Collection Upgrades

A number of actions have already been initiated to support increased LFG capture. Additional soil is being installed on the western facing interior face of Phase 1 so that the cover thickness meets the requirements for final cover.

Some additional work has been identified that will increase LFG collection from Phase 1 to help achieve the 75% collection target. The work includes replacing older wells that were installed between 1999 to 2006, and are no longer fully functioning due to their age.

A road located on demolition materials at the toe of Phase 1 did not receive final cover or gas collection infrastructure during Phase 1 closure. An impermeable membrane and gas collection piping will be installed under the road to allow collection of gas from the demolition layer that underlies all of Phase 1.

Phase 2 Closure and Landfill Gas Management

The Landfill's Operational Certificate requires that final cover be installed in any area within one year of waste placement finishing. Filling of Phase 2 is expected to be completed by September 2011. Construction of the final cover system in Phase 2 will take place during the spring and summer of 2012, thus meeting regulatory requirements.

The design and installation of vertical gas collection wells in Phase 2 was approved as part of the 2010/2011 Capital Budgets. These wells are being installed in advance of the remainder of the closure works, and are expected to be operational by the end of 2011. The wells will later be connected into the final cover system when it is built in 2012.

Ongoing Operations

To ensure LFG collection is maximized in the future various additional actions are being undertaken. For example, the VLF fill plan is being reviewed to ensure that individual landfill phases are small enough to allow regular landfill closure with the goal of closure construction occurring every one or two years at most compared to every three or four years under the current fill plan.

Target Landfill Gas Collection Efficiency

Under the B.C. Landfill Gas Management Regulation of December 2008, Landfills are required to develop plans to target 75% LFG capture by 2016. In 2009, the estimated LFG collection efficiency at VLF was approximately 45% increasing to approximately 50% in 2010.

By the end of 2011, based on the Phase 2 verticals and Phase 1 replacement wells being completed, the LFG collection efficiency at VLF is targeted to be approximately 55% - 60%.

By the end of 2012, based on Phase 2 closure and other upgrades being complete, the LFG collection efficiency at VLF is targeted to be 75%, achieving the regulatory target collection efficiency 3 years ahead of the requirement.

FINANCIAL IMPLICATIONS

The Solid Waste Capital Reserve (SWCR) was established to fund closure and post closure care at VLF, and is funded through surplus tipping fee revenues from Vancouver commercial waste. The SWCR balance as of the beginning of 2011 was approximately \$76 million. Costs attributed to closure are funded directly from the SWCR. Other costs are funded as loans from the Capital Financing Fund. Capital Financing Fund loans for landfill projects are repaid with interest by VLF users on a business case through tipping fees.

Under the Vancouver-Delta-Metro Vancouver Tri-Partite Agreement, Metro Vancouver and Vancouver split closure costs proportionally based on waste in place. Vancouver's share of closure costs is currently approximately 75%.

The following table includes proposed costs for consulting work, City project management and construction expenditures for 2011. Full-project costs are estimated for consulting, and City project management because the City will enter into a consulting contract this year. Only 2011 construction costs are included in the budget because the City will not enter into 2012 construction contracts until next year.

Item	Cost
Consulting	\$1,640,000
City Project Management	\$190,000
2011 Gas Construction	\$2,848,000
Total	\$4,678,000

Some of the work described in this report, specifically vertical LFG collection wells in Phase 2, and 2011 Phase 2 closure design costs were included in the 2010/2011 Capital Budgets to be provided from the SWCR. Funding of \$1,780,000 from the 2010/2011 Capital Budgets is available to credit against the total project costs.

Of the proposed required funding, \$960,000 is operational capital to be provided as a loan from the Capital Financing Fund and \$1,938,000 is Phase 2 closure work to be provided from the SWCR. The Capital Financing Fund loan to be repaid over five years with interest.

The total estimated project costs including 2012 costs is \$25,000,000 with Metro Vancouver recoveries estimated at \$5,000,000. Estimated costs for 2012 requirements will be included as part of the 2012 Capital Planning process, with detailed costs determined in advance of the 2012 Capital Budget.

As a reference, the estimated GHG emission reductions achieved through the work proposed in this report is approximately 125,000 tonnes of CO₂ per year for a period of 5 to 10 years. Based on the open market cost of GHG offsets, the value of these emission reductions would be in the range of \$3,000,000 per year.

As part of the implementation of this project, staff will review the potential to use any emission reductions beyond regulatory requirements to offset other City emissions or potentially for sale to others through agencies such as Pacific Carbon Trust.

PERSONNEL IMPLICATIONS

The proposed project budget includes funding for a temporary full-time position to manage the project.

ENVIRONMENTAL IMPLICATIONS

LFG collection and utilization is the single most important action that the City can take to reduce community GHG emissions, and is therefore a key action to meet our 2020 GHG reduction target. The emission reductions associated with the work proposed in this report are equivalent to the annual GHG emissions of approximately 30,000 cars.

Given that Phase 2 of VLF will reach capacity in 2011, closure of Phase 2 in 2012 is a requirement of the Landfill's Ministry of Environment Operational Certificate (permit).

Implementing the proposed projects is expected to achieve regulatory requirements for LFG collection three years ahead of the requirements of the B.C. Landfill Gas Management Regulation.

Uncollected LFG has the potential to create odours negatively affecting Delta and Delta residents. Increasing LFG collection will help reduce community impacts of hosting VLF.

Under the City's contract with Maxim Power, Maxim has rights to a fixed amount of gas until 2022. The contracted amount currently exceeds what is collected. Once the work described in this report is completed, the amount of collected LFG is expected to exceed Maxim's contracted amount. Once the Maxim contract amount is exceeded, the City has the option to either extend Maxim's contract or alternatively publicly tender for the sale of excess LFG. One possible alternative use for excess LFG would be contracting with Fortis B.C. to substitute LFG for natural gas to heat City buildings reducing City operational GHG emissions.

CONCLUSION

The proposed actions to install closure infrastructure on Phase 2 of the Landfill as well as upgrades to LFG collection systems in the remainder of the site will substantially improve LFG collection efficiency at VLF, and ensure that the regulatory requirements for the site are met and exceeded. These actions are also critical to minimizing the potential for landfill odours in Delta.

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