Supports Item No. 3
CS&B Committee Agenda
March 26, 2009

CITY OF **VANCOUVER**

ADMINISTRATIVE REPORT

CITY OF VANCOUVER

Report Date:	February 25, 2009
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Meeting Date:	March 26, 2009

TO:	Standing Committee on City Services and Budgets
FROM:	General Manager of Engineering Services and the General Manager of Business Planning and Services
SUBJECT:	Results of the Vancouver Landfill Financial Evaluation and Estimation of Greenhouse Gas Emissions Consulting Studies

RECOMMENDATION

THAT the Deloitte and Touche LLP study titled, "Financial/Business Evaluation of Various Filling Scenarios for the Vancouver Landfill" and the CH2M Hill Inc. study titled, "Comparison of Greenhouse Gas Emissions from Waste-to-Energy Facilities and the Vancouver Landfill" be forwarded to Metro Vancouver staff and published on the City's website to inform the public of the significant financial implications of the future regional municipal solid waste disposal options contained in Metro Vancouver's proposed amendments to the Greater Vancouver Regional Solid Waste Management Plan.

CITY MANAGER'S COMMENTS

The City Manager recommends approval of the foregoing.

COUNCIL POLICY

On May 3, 1994, Council agreed to support the Regional Solid Waste Management Plan.

SUMMARY

Metro Vancouver and the City of Vancouver solid waste facilities currently operate under the 1995 Greater Vancouver Regional Solid Waste Management Plan (SWMP). The region's member municipalities are party to the SWMP, which is approved by the provincial government. The Vancouver Landfill (owned and operated by the City of Vancouver, and situated in Delta) is identified as a long term disposal facility under the current SWMP (1995).

In January 2008, Metro Vancouver proposed amendments to the Greater Vancouver Regional Solid Waste Management Plan which would have significant impacts on the future utilization and value of the Vancouver Landfill which is owned and operated by the City of Vancouver. These proposed amendments ranged from closing the Vancouver Landfill to municipal solid waste by 2020, to sending the entire region's municipal solid waste to the Vancouver Landfill, which would effectively double its current permitted capacity. Following this, Metro Vancouver identified Waste-to-Energy (WTE) facilities as the primary means of solid waste disposal, rather than landfilling.

In January 2008, Vancouver City Council instructed staff to:

> "... *issue an RFP for a multifaceted consulting study to examine and assess the financial, regulatory and environmental implications of the Metro Vancouver Board proposal to make the Vancouver Landfill the only interim and long term residual waste management facility for the entire region."*

The City retained Deloitte and Touche LLP ("Deloitte") and CH2M Hill Inc. ("CH2M") to complete the financial evaluation of various filling scenarios and the estimation of GHG emissions from the Vancouver Landfill compared to a Waste-to-Energy facility respectively.

Based on a comprehensive and sophisticated financial analysis, Deloitte determined that the Vancouver Landfill is a very important asset to the City, with a net present value to Vancouver taxpayers in the range of $700 million. This value is calculated as Vancouver's continued use of the Vancouver Landfill for municipal solid waste disposal, compared to the alternative cost of disposal through the regional system.

Deloitte concluded that:

> *The Landfill is a very important asset in that it provides Vancouver with a significantly lower cost disposal option for its municipal solid waste ("MSW") than the regional system alternative. The costs are well understood and relatively certain. From a financial standpoint, Vancouver's best course of action is to minimize the use of the Landfill by catchment areas other than Vancouver and Delta, thereby extending the Landfill's life for Vancouver and Delta's use.*[1]

[1] Financial/Business Evaluation of Various Filling Scenarios for the Vancouver Landfill, Deloitte and Touche, November 2008

Deloitte also noted that there is considerably more long-term flexibility associated with landfilling. In addition to the large capital investment required to construct WTE facilities, a fixed volume of municipal solid waste is required to maximize operational efficiencies and minimize operating costs, meaning higher costs typically occur when WTE is operated at less than full capacity. This reduces long-term flexibility with respect to municipal solid waste disposal options.

To assess in more detail the environmental impacts of landfilling compared to WTE facilities, CH2M Hill Inc, ("CH2M") was retained by the City to estimate and compare the greenhouse gas ("GHG") emissions from each of the two options. CH2M concluded that the GHG emissions from the Vancouver Landfill were slightly higher than those from a WTE facility based on Metro Vancouver's 2004 waste composition data. However, after Metro Vancouver's planned diversion strategies are implemented, the GHG emissions from a WTE facility are notably higher than from the Vancouver Landfill. Lower landfill emissions are attributed to less degradable organics in the municipal solid waste stream after diversion is achieved, whereas the higher WTE emissions result from the higher proportion of plastics remaining after diversion. (The term "diversion" refers to the redirection of recyclable and reusable materials from landfill disposal.)

While GHG impacts are an important consideration for Council in making decisions relating to municipal solid waste disposal, there is considerable uncertainty in estimating these GHG emissions. Therefore, it is concluded that GHG emissions alone cannot be used to identify the best municipal solid waste disposal option and are not technically supportable as a rationale to move from landfilling to waste-to-energy.

The conclusions of the Deloitte and CH2M studies are important considerations in deciding the future of the Vancouver Landfill. This report recommends that these studies be forwarded to Metro Vancouver staff and published on the City's website so that they may inform the public discussion on this subject.

PURPOSE

The purpose of this report is to report back to Council on the findings of two consulting engagements:

- the *Financial and Business Evaluation of Various Filling Scenarios for the Vancouver Landfill*, undertaken by Deloitte and Touche, LLP, and
- the *Comparison of Greenhouse Gas Emissions from Waste-to-Energy Facilities and the Vancouver Landfill*, undertaken by CH2M Hill.

The purpose of this consulting work is to provide Council with the background and analytical information they need to make informed decisions on future municipal solid waste disposal options for Vancouver.

BACKGROUND

Vancouver Landfill & Other Regional Solid Waste Disposal Facilities

The City of Vancouver owns and operates the Vancouver Landfill ("Landfill") located in Delta. The Landfill operates in accordance with Operational Certificate MR-01611 issued by the Ministry of Environment and under the provisions of the 1995 Greater Vancouver Regional Solid Waste Management Plan ("SWMP"). The Operational Certificate sets out the environmental requirements for operation, closure and post-closure of the Landfill while the SWMP identifies the Landfill as a long term disposal facility for the region.

In operation since 1966, the Landfill is one of three facilities that receive municipal solid waste (MSW) for disposal from Metro Vancouver. Owned by the City of Vancouver, the Landfill is authorized to receive 750,000 tonnes per year of MSW corresponding to approximately 40% of the region's total quantity of MSW and currently operates near capacity. Owned by Metro Vancouver, the other two facilities are the Burnaby Waste-to-Energy ("WTE") facility and the Cache Creek Landfill located approximately 400 km east of Vancouver. The WTE facility and the Cache Creek Landfill accept 20% and 40% of the region's MSW respectively. The Cache Creek Landfill is scheduled to close by 2010.

Metro Vancouver's Regional Municipal Solid Waste Planning

Currently, the Vancouver Landfill serves a strong regional role, accepting MSW from the municipalities of Vancouver, Delta, Richmond, South Surrey, White Rock and UBC/UEL (as agreed to in the 1989 Tripartite Agreement between Vancouver, Greater Vancouver Sewerage & Drainage District and the Corporation of Delta). The Landfill also accepts bottom ash from the Burnaby WTE facility for beneficial use as interim cover and road sub-base.

Over the past three years, the Landfill has operated at or near capacity due to the increase in MSW transferred from Metro Vancouver to assist in extending the life of Cache Creek Landfill.

In early 2008, the Metro Vancouver Board of Directors made a series of decisions that have extremely significant implications for the City of Vancouver as detailed below.

- In January 2008, the GVS&DD Board approved their Commissioner's recommendations to abandon plans to replace the Cache Creek Landfill through continued landfilling in the interior of British Columbia. Instead, Metro Vancouver Board decided to focus its attention on the development of WTE facilities as the sole long term solution. This decision included the proposed closure of the Vancouver Landfill to MSW by 2020. (The useful life of the Vancouver Landfill, and therefore the benefits to Vancouver ratepayers, extends well past this date to approximately 2048.)
- In February 2008, the Metro Vancouver Board proposed that the entire region's MSW (1.5 million tonnes per year) be disposed of at the Vancouver Landfill and/or Washington State landfill(s), in the interim between the pending closure of the Cache Creek Landfill and the commissioning of a new WTE facility projected for 2015. (This would significantly shorten the remaining useful life of the Vancouver Landfill, and therefore decrease the benefits to Vancouver ratepayers.)

Evaluation of the Financial Value and Greenhouse Gas Impacts of the Vancouver Landfill

At its January 28, 2008 meeting, Vancouver City Council passed the following recommendation:

> *"THAT the General Manager of Engineering Services issue an RFP for a multifaceted consulting study to examine and assess the financial, regulatory and environmental implications of the Metro Vancouver Board proposal to make the Vancouver Landfill the only interim and long term residual waste management facility for the entire region."*

On June 9, 2008, Council passed a recommendation to retain Deloitte and Touche LLP ("Deloitte") for consulting services for a financial and business evaluation to determine the value of the Landfill to Vancouver taxpayers.

At the same time, the City commissioned CH2M Hill Inc. ("CH2M") to undertake a study to estimate and compare the greenhouse gas ("GHG") emissions from the Vancouver Landfill, to GHG emissions from Metro Vancouver's proposed WTE facilities. This work built on CH2M's 2008 detailed design of the Vancouver Landfill Gas Control Upgrades, which involved modeling landfill gas generation over the life of the Landfill.

DISCUSSION

Value of the Vancouver Landfill to Vancouver: Deloitte's Conclusions

Deloitte was retained to determine the value of the Landfill to Vancouver taxpayers, and to assess the financial implications for the City of Vancouver and its ratepayers of changing the role of the Landfill within the regional MSW management system. Deloitte compared the qualitative and quantitative factors affecting a number of different scenarios to identify the preferred alternatives and strategies for maximizing the financial benefits of Landfill ownership to Vancouver ratepayers.

In consultation with City staff, Deloitte compared the implications of eight different scenarios that varied according to the role of the Vancouver Landfill in the regional MSW disposal system. After a preliminary analysis showed that a number of these scenarios led to very similar outcomes, Deloitte focused their work on comparing the following four scenarios outlined in Figure 1. It is noted that these scenarios were developed for illustrative purposes and do not reflect actionable choices.

FIGURE 1. VANCOUVER LANDFILL SCENARIOS EVALUATED BY DELOITTE

Scenario Name	Scenario Description
Scenario 1: Partial WTE	Vancouver and Delta retain autonomy over disposal of their MSW, as agreed to in the 1989 Tripartite Agreement, and continue to landfill MSW at the Landfill. Metro Vancouver utilizes excess capacity up to the permitted capacity of 750,000 tonnes per year until such time as the WTE facilities come on line. After closure of the Landfill, Vancouver disposes of its MSW in the regional system. The rationale is for Vancouver and Delta to continue to utilize the Landfill as long as possible, yet retain a role in the regional system. *This scenario is closest to the current arrangement.*
Scenario 3: Regional WTE	Metro Vancouver is allowed to landfill all regional MSW at the Landfill (exceeding its current permitted capacity) until WTE facilities are built. Vancouver and Delta take their MSW to WTE facilities, when capacity is available. The rationale is for Vancouver and Delta to participate fully in the regional system, and assist Metro Vancouver in avoiding waste export prior to WTE capacity being available. *This scenario is closest to Metro Vancouver's January 2008 proposal to move to a full regional WTE system.*
Scenario 6: Vancouver/Delta Landfill	Vancouver and Delta retain autonomy over disposal of their own MSW, as agreed to in the 1989 Tripartite Agreement, and continue to use the Landfill. No other MSW is accepted at the Landfill thereby preserving landfill capacity. *This scenario effectively eliminates the participation of the Vancouver Landfill in the regional MSW disposal system.*
Scenario 8: Business as Usual	Vancouver and Delta retain autonomy over disposal of their MSW, as agreed to in the 1989 Tripartite Agreement, and continue to landfill MSW at the Landfill. Metro Vancouver utilizes excess capacity up to the permitted capacity of 750,000 tonnes per year and WTE does not come on line at all. *This is effectively current practice.*

Highest Value Scenario

Deloitte concluded that *Scenario 6*, which involves withdrawing the Vancouver Landfill from participation in the regional MSW disposal system, provides the highest value to Vancouver ratepayers. This is because Vancouver Landfill is a relatively low-cost means of disposing of municipal solid waste, compared to the other regional options. It follows then, that the longer the City can extend the life of the Landfill (e.g. by limiting the amount of capacity that is used up each year), the greater the value to the City of Vancouver.

Lowest Value Scenario

The scenario that has the lowest projected value for Vancouver taxpayers is *Scenario 3*, representing Metro Vancouver's regional WTE plan as proposed in January 2008. This scenario has the highest overall cost to Vancouver ratepayers, and the greatest amount of uncertainty surrounding total costs. There are a number of key assumptions underlying this uncertainty, including:

- the actual capital and operating costs associated with Metro Vancouver WTE facilities,
- the commissioning date of Metro Vancouver WTE facilities, and
- the revenue generated by Metro Vancouver WTE facilities through the sale of electricity and/or heat generation.

Comparing the Scenarios

Figure 2 expresses Deloitte's findings in terms of the total cost of each of the four scenarios to Vancouver ratepayers, defined as the net present value of operating, closure and post-closure costs, over a 40 year period. For each scenario, a range of values is depicted by a rectangle, which represents the risk or degree of uncertainty associated with the expected total cost. In interpreting these findings, scenarios that have a lower overall cost, and a lower risk exposure, are the most attractive to the City.

FIGURE 2. DELOITTE CONCLUSIONS RE: VALUE OF EACH VANCOUVER LANDFILL SCENARIO

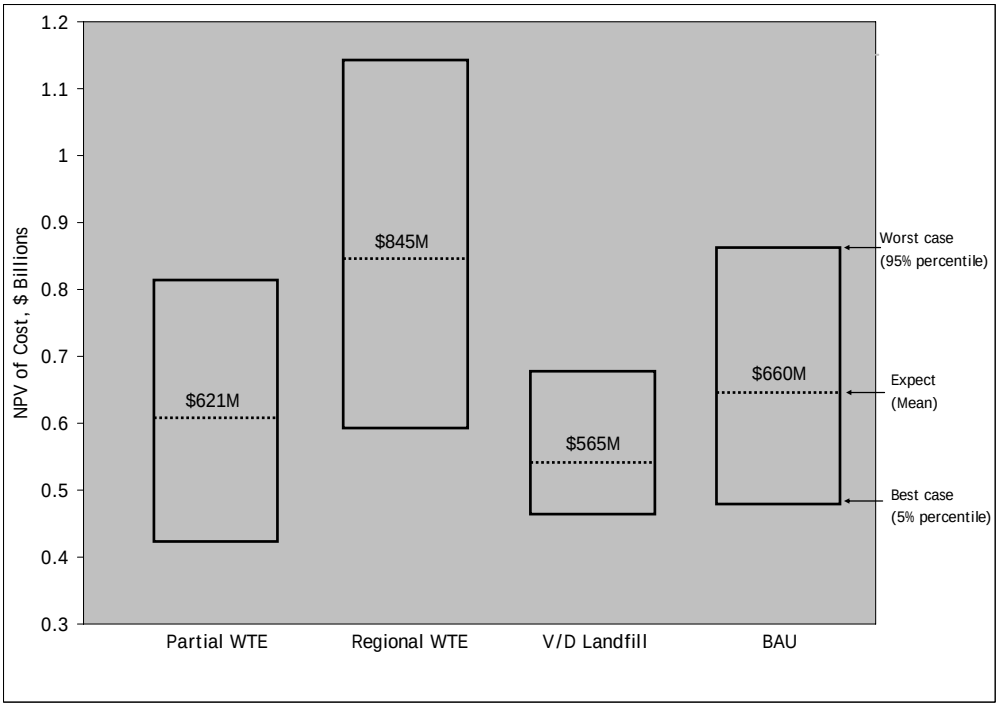
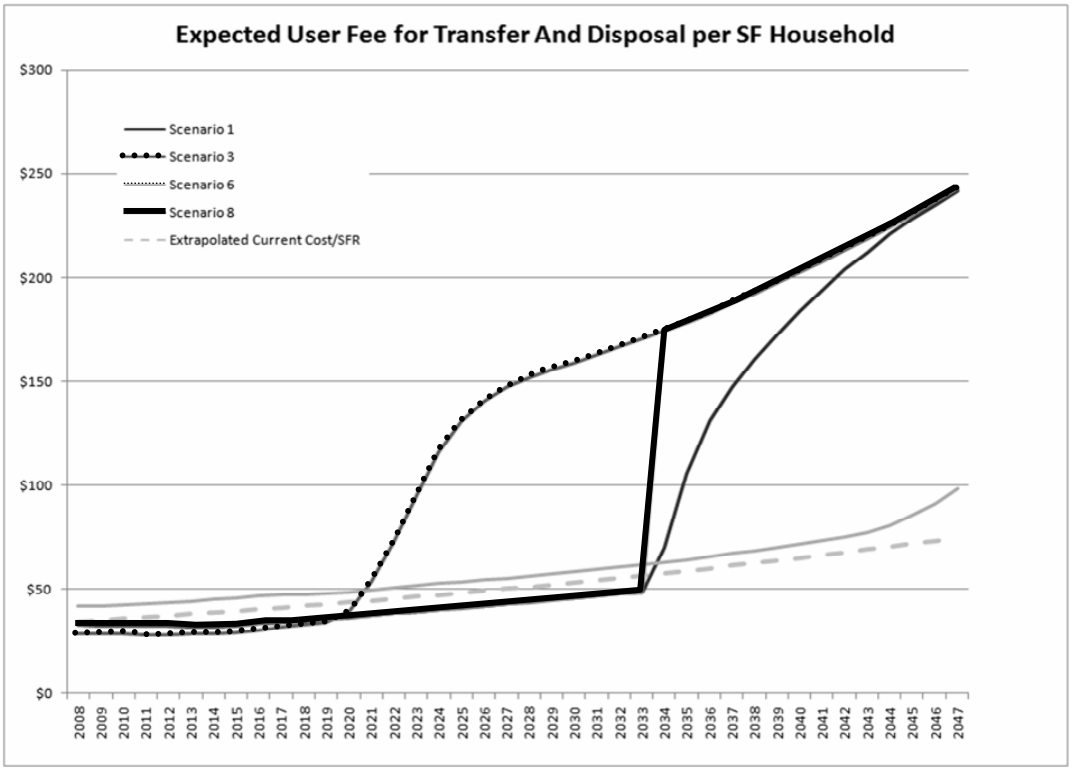


Figure 3 expresses Deloitte's findings in terms of the impact of the various scenarios on the average Vancouver household. The chart shows the amount paid by an average household that is associated with the transfer and disposal of MSW, over a 40 year period. Consistent with the conclusions shown in Figure 2, *Scenario 6* is the lowest cost to Vancouver ratepayers, and *Scenario 3* is the highest cost.

The Partial WTE, Regional WTE and Business as Usual Scenarios all show sharp increases in the expected user fees at the point in time when the Landfill closes and Vancouver MSW is disposed of at WTE facilities. In comparison, the Vancouver/Delta Landfill scenario expected user fees do not experience a sharp increase because the Landfill does not close within the 40 year analysis period.

FIGURE 3. DELOITTE CONCLUSIONS RE: IMPACT ON AVERAGE HOUSEHOLD OF EACH VANCOUVER LANDFILL SCENARIO



Deloitte's Key Recommendations

The following summarizes Deloitte's key recommendations regarding the Vancouver Landfill.

- Vancouver should strive to continue the disposal of its MSW by landfilling it at Vancouver Landfill to minimize costs to ratepayers
- Vancouver should avoid committing to dispose of its MSW at the proposed regional WTE facilities (or other regional disposal plan) until the cost to Vancouver ratepayers can be determined with greater certainty
- Vancouver should strive to limit the utilization of the Landfill to dispose of MSW from outside Vancouver and Delta to maximize the remaining capacity and remaining landfill life that is available for Vancouver and Delta's use.

GHG Emissions: Comparison of Vancouver Landfill to Waste-to-Energy: CH2M's Conclusions

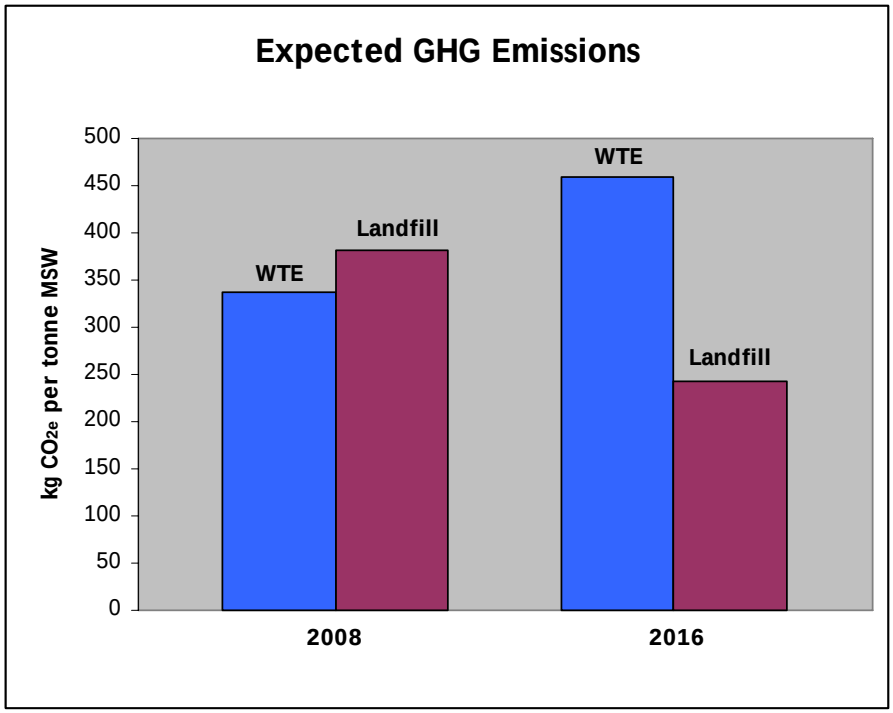
In their study, Deloitte assessed several qualitative factors to determine their impact on the results of the scenario comparison and found that:

> *"Most factors were found to be non-differentiating, including GHG emissions and regional air quality, where it is not possible to differentiate the environmental impacts of Vancouver landfilling its garbage at the [Vancouver Landfill] or disposing of it through WTE based on available information."*

To further explore the GHG impacts in particular, the City commissioned CH2M to estimate and compare the GHG emissions from the Landfill to a WTE facility. The main source of GHG emissions from a landfill results from methane in the LFG, which is generated by the decomposition of organic matter in the MSW and then emitted to atmosphere. In WTE facilities, GHG emissions result from the burning of MSW and are strongly influenced by plastic content. CH2M estimated the GHG emissions on a per tonne of municipal solid waste basis to allow meaningful comparison between the two disposal options. The emissions are reported in "kilograms of carbon dioxide equivalents per tonne of municipal solid waste."

Based on their research, CH2M concludes that GHG emissions from the Landfill in 2008 are slightly higher than GHG emissions from a WTE facility. However, importantly, these findings are based on Metro Vancouver's 2004 waste composition data. If waste composition is adjusted to reflect the diversion targets identified by Metro Vancouver, it is concluded that a WTE facility would have higher GHG emissions, as seen in Figure 4.

FIGURE 4. CH2M COMPARISONS OF GHG EMISSIONS FROM WASTE-TO-ENERGY VS LANDFILL SOLID WASTE DISPOSAL METHODS



NOTE TO FIGURE 4: The difference in projected GHG emissions between 2008 and 2016 is due in large part to the assumption made about significantly increased diversion rates over these eight years.

In their proposed SWMP amendment, Metro Vancouver is planning to increase their current 52% diversion rate to 70% by 2015, focusing on wood, paper products, food and yard waste, plastics and electronics. In 2016, the GHG emissions from a WTE facility are estimated to be notably higher than the Landfill. Lower Landfill emissions are attributed to less degradable organics in the MSW stream after diversion is achieved, whereas the higher WTE emissions result from the higher proportion of plastics remaining after diversion.

This conclusion is consistent with the conclusion reached by Metro Vancouver's report titled, *Environmental Life Cycle Assessment of Solid Waste Management: Evaluation of Two Waste Disposal Scenarios for the Metro Vancouver Region* (Sheltair Group, 2008) which compared landfilling to WTE and concluded that the "base case GHG emissions are in the same range for each scenario…". Further, Sheltair's sensitivity analysis showed that landfill GHG emission results are strongly influenced by landfill gas collection efficiencies and by consideration of carbon storage, while the WTE GHG emission results are most affected by offset energy sources.

To gain a better understanding of the actual GHG emissions from the Landfill, additional work is planned in 2009 to attempt to quantify methane emissions from the Landfill surface. However, the methodologies to conduct this work are quite new and under debate in the scientific community.

CONCLUSIONS

The results of the Deloitte study confirm that the Vancouver Landfill is a very important and valuable asset to the City of Vancouver and its ratepayers. At the same time, the work of CH2M and others has shown that under Metro Vancouver's diversion assumptions, the GHG emissions associated with landfilling are lower than those associated with WTE, and that because there is considerable uncertainty inherent in making these comparisons, it is not appropriate to use estimates of GHG emissions to support Metro Vancouver's decision to shift from landfilling to waste-to-energy.

Because these findings are so significant, and because the regional WTE plan proposed by Metro Vancouver would have considerable impacts on regional ratepayers, staff recommends that Council make these studies available to Metro Vancouver staff and publish them on the City's website to inform the public discussion on this subject.

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