Agenda – Council – March 19, 2008

Report – Standing Policy Committee on Infrastructure Renewal and Public Works – March 4, 2008

Item No. 6 Brady Road Landfill Gas Capture Program
File WT-3

STANDING COMMITTEE RECOMMENDATION:

On March 12, 2008, the Executive Policy Committee concurred in the recommendation of the Standing Policy Committee on Infrastructure Renewal and Public Works and submits the following to Council:

1. That the Brady Road Landfill Gas Capture Program be approved as a new capital project in the amount of $150,000.00 in 2008 to obtain environmental approvals, review project delivery models and to finalize a business case.

2. That the $150,000.00 less any contribution from other governments be funded from retained earnings in the Solid Waste Disposal Utility.

3. That an agreement for cost sharing this project with the senior levels of government be negotiated and brought forward to Council for approval.

4. That the Winnipeg Public Service pursue opportunities to sell the captured landfill gas to a third party such as Manitoba Hydro and to investigate further the sale of greenhouse gas reduction credits.

5. That the Proper Officers of the City be authorized to do all things necessary to implement the intent of the foregoing.

Report – Standing Policy Committee on Infrastructure Renewal and Public Works – March 4, 2008

DECISION MAKING HISTORY:

EXECUTIVE POLICY COMMITTEE RECOMMENDATION:

On March 12, 2008, the Executive Policy Committee concurred in the recommendation of the Standing Policy Committee on Infrastructure Renewal and Public Works and submitted the matter to Council.

STANDING COMMITTEE RECOMMENDATION:

On March 4, 2008, the Standing Policy Committee on Infrastructure Renewal and Public Works concurred in the recommendation of the Winnipeg Public Service and submitted the matter to the Executive Policy Committee and Council.

Re: BRADY ROAD LANDFILL GAS CAPTURE PROGRAM

FOR SUBMISSION TO: THE STANDING POLICY COMMITTEE ON INFRASTRUCTURE RENEWAL AND PUBLIC WORKS

ORIGINAL REPORT SIGNED BY: Barry D. MacBride, P. Eng.
Director of the Water and Waste Department

REPORT DATE: February 26, 2008

RECOMMENDATION(S):

1. That Council approve the Brady Road Landfill Gas Capture Program as a new capital project in the amount of $150,000 in 2008 to obtain environmental approvals, review project delivery models and to finalize a business case.
2. That the $150,000 less any contribution from other governments be funded from retained earnings in the Solid Waste Disposal Utility.
3. That an agreement for cost sharing this project with the senior levels of government be negotiated and brought forward to Council for approval.
4. That the Public Service pursue opportunities to sell the captured landfill gas to a third party such as Manitoba Hydro and to investigate further the sale of greenhouse gas reduction credits.

Report Summary

KEY ISSUES:

Landfill gas (LFG) is created as garbage decomposes in a landfill. LFG is a greenhouse gas (GHG) and a contributor to global warming. Numerous landfills in Canada and the U.S. have landfill gas projects in place. The Brady Road landfill is one of the largest single sources of GHG in Manitoba. The Water and Waste Department has determined that a landfill gas capture program is feasible at the Brady Road Landfill. This project alone would reduce more GHG than is generated by all other City operations combined.

The simplest option is to construct a system of capture wells, collection piping, and a blower/flare to burn the gas reducing the harmful effects. The cost of such a system is $8.9 million dollars with operating costs of $200,000 per year.

As an enhancement to flaring, the gas collected could be sold to a third party:
a) be used directly in modified boilers for heating,
b) used as fuel for an engine driven generator to create electricity.

At the present state of development of this project, there is no assured financial business case for proceeding. However the project does have a significant environmental benefit and it complies with Council policy. Given the lack of funding and

lack of a business case to proceed with the entire project, it is recommended that $150,000 be allocated to allow the Department to proceed to obtain environmental approvals, review project delivery models and finalize the business case for the project including application for funding from senior governments.

IMPLICATIONS OF THE RECOMMENDATION(S):

General Implications

- [x] None
- [ ] For the organization overall and/or for other departments
- [ ] For the community and/or organizations external to the City of Winnipeg
- [ ] Involves a multi-year contract

Comment(s):

Policy Implications

- [x] No
- [ ] Yes

Comment(s):

Regulatory Implications

- [x] None
- [ ] Eliminates or reduces regulatory impact
- [ ] Proposes regulatory impact

Comment(s):

Environmental Implications

- [ ] No
- [x] Yes

Comment(s): From an environmental perspective, this is the single most effective action the City can take to address the issue of climate change. The City's own emissions from civic operations are estimated to be 57,000 tonnes per year. While the Brady Road Landfill is not included in the City's corporate inventory, the estimated GHG reduction of 97,000 tonnes per year represents more GHG than all other City operations combined. Moving ahead with this project would demonstrate strong leadership from the City of Winnipeg in dealing with climate change

Human Resources Implications

- [x] No
- [ ] Yes

Comment(s):

Financial Implications

- [ ] Within approved current and/or capital budget

[x] Current and/or capital budget adjustment required
Comment(s): Funds are available from retained earnings in the Solid Waste Disposal Utility.

REPORT

REASON FOR THE REPORT:

Council must authorize any change to the capital budget.

HISTORY:

On November 25, 1998, the City of Winnipeg committed to the Federation of Canadian Municipalities Partners for Climate Protection (PCP) program. This commitment requires Winnipeg to submit a climate change action plan detailing how specific greenhouse gas reduction targets will be met, and how progress will be measured.

On December 12, 2001 Council adopted Plan Winnipeg 2020 Vision that contains a commitment to sound Solid Waste Management practices (5A-02) such as recovering energy and material from solid waste if proven to be cost effective and sustainable.

In 2003 Manitoba Hydro and the City of Winnipeg entered into a partnership to investigate landfill gas capture at Brady Road Landfill.

In 2004 and 2005 a study, including field testing, was completed and the resulting "Investigation of Landfill Gas Opportunities at the City of Winnipeg, Brady Road Landfill Site" report was prepared. This investigation was funded by the Federation of Canadian Municipalities (50%), Manitoba Hydro (25%), and the City (25%).

On September 27, 2006 Council adopted the Climate Change Action Plan that included a number of strategies to reduce greenhouse gas emissions from municipal operations by 20% in ten years. While not included in the inventory, the Brady Road Landfill Gas Capture Project is mentioned in the plan.

DISCUSSION:

Landfill gas (LFG) is created by the organic component of garbage as it decomposes in the absence of oxygen. Methane is a major constituent (50% by volume) of LFG and is a harmful greenhouse gas (GHG) that contributes to global warming and climate change. As of December 2005, there are over 350 landfills in the United States and 44 in Canada that capture and utilize LFG.

The investigation of landfill gas opportunities at the Brady Road Landfill Site report concluded that a LFG capture project was feasible under certain circumstances.

The investigation included a pilot system consisting of six extraction wells, piping and a temporary blower/flare installation. Measurements were kept on extraction rates and gas quality that provided data to be used to design a full scale project. During the test, it was estimated that the system recovered 50% of the LFG generated in the pilot area.

A full scale system must be designed and have controls such that it matches the generation of landfill gas in the landfill and does not draw air into the landfill. The systems can capture 50% to 75% of the LFG generated.

Project Description

Based on the investigations, the full scale project would include 70 to 75 gas wells that would draw LFG from the garbage in the landfill. The LFG would be drawn through a series of collection pipes to a central location and flared (burned) off. To enhance the environmental benefits of this project, the LFG could also be used to create electricity or heat buildings. It is estimated that this system will capture 1,700 cubic metres of LFG per hour. The flaring or utilization of the LFG will convert the methane to carbon dioxide and would substantially reduce the negative environmental impact.[1]

The project will achieve approximately 97,000 metric tonnes per year of carbon dioxide equivalent (CO_2e) emission reduction. The project will also reduce odour associated with the Brady Road Landfill operation.

The project includes the cost of adding a thicker clay layer to sections of the landfill to increase LFG recovery.

From an environmental perspective, this is the single most effective action the City can take to address the issue of climate change. The City's own emissions from civic operations are 57,000 tonnes. While the Brady Road Landfill is not included in the City's corporate inventory, the estimated GHG reduction of 97,000 tonnes represents more GHG's than all other City operations combined. Moving ahead with this project would demonstrate strong leadership from the City of Winnipeg in dealing with climate change.

This project will require submission of a Province of Manitoba Environment Act proposal for licensing. This must be done prior to construction starting and may require a public consultation process.

Risk - Cost Estimates

The total capital cost of this project is estimated to be $8.9 million. This cost includes the $150,000 preliminary funding recommended in this report. The cost to operate and maintain the wells and blower/flare equipment is estimated to be $200,000 per year and will be included in the annual operating budget for the Solid Waste Disposal Utility. It is

[1] Methane (CH_4) has 21 times the global warming potential (GWP) of carbon dioxide (CO_2)

intended that the City sell both the gas and the greenhouse gas credits as described later in this report.

The cost of $8.9 million presented in this report is based on the consultants' preliminary design updated in 2008. This cost estimate assumes construction will take place in 2009. While we believe the cost estimate is conservative, there is a risk that the costs could be higher as the detailed design proceeds or the construction is delayed.

Opportunities and risks – Senior Government Funding

Favourable preliminary discussions have taken place with the provincial government and there is a willingness to share in the cost of the project. Further discussions need to take place to finalize the cost sharing arrangements and the ownership of the emission credits. A detailed funding agreement would be developed and brought back to Council for final approval.

Cost Recovery, Rates, and Financing

As discussed below, depending on the sale of landfill gas and greenhouse gas credits, the project has the possibility of generating a positive return on the capital investment made. If this turns out to be the case, there will be no impact on landfill tipping rates. This is important because the majority of revenue at the landfill comes from the mill rate supported garbage collection budget. In any case, the Department reviews rates regularly and will seek Council's approval should a rate change be necessary.

Financing for the City share of the $8.9 million project costs will have to come from the Solid Waste Disposal Utility. Currently, the utility does not have sufficient cash to fund the total of the City's share of the development. Funding this development will result in a shortage of cash funding available to fund other capital projects currently listed in the 2009-2013 capital forecast. Accordingly, the utility may have to adjust the capital financing (defer projects or borrow in future years). Alternatively, the Utility could consider a public private partnership for the landfill gas project (see Project Delivery below) to avoid the cash outlay. Part of this initial phase will be to explore financing alternatives.

Opportunities and risks – GHG Credits

The greenhouse gas emission reductions could be sold in the form of credits[2]. The current market value of these credits is between $1 and $4 per tonne. There is risk associated with this revenue stream since the prices do fluctuate with supply and demand. The prices have been as low as $1 and as high as $10 per tonne. At $4 per tonne, the sale of the credits is could generate $389,000 per year in revenue to offset costs. We believe that it is likely the value of the credits will increase with future

[2] The Chicago Climate Change Exchange is one such market (http://www.chicagoclimatex.com). Environment Canada has also experimented and promoted sale and purchase of credits. As well there are private brokers marketing these credits.

regulations as a result of the attention to climate change by government. To breakeven (with no allowance for the sale of gas or contributions from senior levels of government), revenue of $14 to $15 per tonne is required.

If the City chooses to sell the GHG credit, the City cannot then also claim the credits in achieving its own reduction targets. However, methane emissions from Winnipeg's landfill are not accounted for in the corporate inventory. Under the Partners for Climate Protection protocols, they are considered to be part of the community inventory, covering the community as a whole. However, the City of Winnipeg, as the owner and operator of the landfill, recognizes that it is the only organization that can realistically initiate a plan to address these GHG emissions.

Opportunities and risks – Sale of the gas

As an enhancement to flaring, the project could provide LFG for a utilization project by Manitoba Hydro or another third party. These utilization options could include;

a) Constructing a pipeline to a large natural gas customer such as the University of Manitoba and burning the LFG in boilers to generate steam for heating, or

b) Generating electricity.

These utilization options, if feasible, would enhance the environmental and economic benefits of this project. Manitoba Hydro is currently reviewing these options.

Opportunities and risks – Project Delivery Model

There are several business models possible for development of the project.

a) The public model is one where the municipality undertakes the complete program of landfill gas recover and energy utilization. The risk is totally with the municipality.

b) A public/private model (P3) is where the private sector is provided access to complete and operate the project. The private developer takes on considerable risk related to quantities and quality of LFG, as well as the revenues from the sale of the LFG and emission credits. The pricing of proposals from the private sector will reflect this total risk transfer. The private developer would have to involve Manitoba Hydro in the project since they are the sole electrical and natural gas supplier in Manitoba.

c) A public/utility model is where the municipality develops and proves the LFG extraction system (and incur the risk around quantity and quality of gas) and subsequently for a utility such as Manitoba Hydro to utilize the landfill gas for electrical generation or heating. The utility could take the risk around markets and prices for the electricity or gas or energy produced.

Manitoba Hydro has been a partner since the inception of this project and played a key role in funding and having the project progress to this point. Manitoba Hydro has indicated a willingness to continue to partner with the City in this manner and wants to move this project forward. Manitoba Hydro also has expertise in utilizing the LFG and emission credit marketing. For these reasons the public/utility model appears to have the most favourable balance of risk and opportunities to successfully deliver this project.

Opportunities and risks – Diversion of organics

Several jurisdictions have implemented measures to reduce organics entering their landfills. The measures include things such as yard waste bans and centralized composting for all organics. While these initiatives have positive impacts including a reduction of greenhouse gases, they do impact the long term viability of landfill gas recovery systems.

At the same time, the project as described collects LFG from areas previously land filled with proven production capability. Accordingly, even with diversion of organics, the system will generate LFG for many years.

Opportunities and risks – Financial

In the worst case, without the sale of the landfill gas or the greenhouse gas reduction credits to a third party this project does not generate any revenue to cost the capital and operating costs. The net present value (cost) of the project over 10 years, discounted at 6% is ($10.4) million.

In the case of selling the landfill gas at $1.50 per GJ and greenhouse gas reduction credits at $8 per tonne, the net present value (surplus) of the project over 10 years, discounted at 5.25% is $1.8 million.

Initial Work

Overall at this point, the cost to proceed with the total $8.9 million project is significant without more certainty around the cost sharing, gas utilization and greenhouse gas credits. At the same time, the environmental benefits of doing something are significant and consistent with Council's climate action plan.

Accordingly, to keep the project proceeding forward, it is recommended that Council approve a new capital project in the amount of $150,000 as a first phase of the $8.9 million project. An allowance of $100,000 is included to address environmental approval requirements which may include public consultation and $50,000 will be used to assess P3 alternatives, business case and for other contingencies, developing the agreement for funding contributions from senior levels of government, seek environmental licensing, determine the final project business model and the sale of

emission credits and LFG. Another report will be prepared for Council's consideration when this work is complete later in 2008.

FINANCIAL IMPACT:

The following financial impact statement for this project has been prepared in accordance with the recommendation adopted by Council on December 13, 2000

Financial Impact Statement

Date: February 25, 2008

Project Name:
Brady Road Landfill Gas Capture

First Year of Program **2008**

	2008	2009	2010	2011	2012
Capital					
Capital Expenditures Required	$ 150,000	$ -	$ -	$ -	$ -
Less: Existing Budgeted Costs		-	-	-	-
Additional Capital Budget Required	$ 150,000	$ -	$ -	$ -	$ -
Funding Sources:					
Debt - Internal	$ -	$ -	$ -	$ -	$ -
Debt - External	-	-	-	-	-
Grants (50% from Senior Gov'ts)	$ -	-	-	-	-
Reserves, Equity, Surplus	$ 150,000	-	-	-	-
Other - Enter Description Here	-	-	-	-	-
Total Funding	$ 150,000	$ -	$ -	$ -	$ -
Total Additional Capital Budget Required	$ 150,000				
Total Additional Debt Required	$ -				
Current Expenditures/Revenues					
Direct Costs	$ -	$ -	$ -	$ -	$ -
Less: Incremental Revenue/Recovery	-	-	-	-	-
Net Cost/(Benefit)	$ -	$ -	$ -	$ -	$ -
Less: Existing Budget Amounts	-	-	-	-	-
Net Budget Adjustment Required	$ -	$ -	$ -	$ -	$ -

Additional Comments: Funding for capital available in the Solid Waste Disposal Utility.

"Original signed by L. Fisher, C.A. for"
Moira L. Geer, C.A.
Manager of Finance & Administration

IN PREPARING THIS REPORT THERE WAS:

Internal Consultation With and Concurrence By: N/A

Environmental Coordinator

External Consultation With: N/A

THIS REPORT SUBMITTED BY:

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