TORONTO

STAFF REPORT
ACTION REQUIRED

Biosolids Master Plan Update - Highland Creek Treatment Plant

Date:	March 31, 2010
To:	Public Works and Infrastructure Committee
From:	General Manager, Toronto Water
Wards:	All Wards
Reference Number:	P:\2010\Cluster B\TW\pw10004

SUMMARY

This report summarizes the findings contained in the Biosolids Master Plan (BMP) Update for Highland Creek Treatment Plant and recommends an accelerated implementation of the preferred biosolids management option to reduce existing greenhouse gas emissions and realise certain cost savings. Some of the savings are to be applied to the implementation of emission scrubbing technologies that will allow the City to set, for this facility, voluntary emissions standards that are more stringent than the applicable regulatory standards.

The purpose of the BMP Update is to plan for the future management of biosolids from each of the City's four wastewater treatment plants in a manner that is sustainable, reliable, environmentally sound, cost effective and flexible. The BMP Update was undertaken as a Class Environmental Assessment to fulfill the requirements of Phase 1 and 2 of the Municipal Engineers Association Class Environmental Assessment Master Planning process.

RECOMMENDATIONS

The General Manager of Toronto Water recommends that:

1. City Council approve the Biosolids Master Plan Update Environmental Assessment for Highland Creek Wastewater Treatment Plant and direct staff to implement the recommended biosolids management strategy contained therein.

2. Subject to the adoption of the recommendation in (1) above, authorize the General Manager of Toronto Water to make the necessary provisions in the 2011

Capital Budget to expedite the implementation of the recommended biosolids strategy by 2015 to realize operational and capital cost savings and to apply some of those savings to the addition of innovative air pollution control technologies that will achieve a higher green house gas and pollutant emissions reduction in excess of regulatory standards.

Financial Impact

There are no financial implications resulting from the adoption of this report as there is funding available in the approved Toronto Water 2010 Capital Budget and 10 year forecast.

DECISION HISTORY

At its meeting on March 8, 2005, Works Committee requested that the General Manager of Toronto Water, together with the Medical Officer of Health, undertake a peer review of the decision model and methodology used to determine the recommended management options in the Biosolids and Residuals Master Plan (BRMP).
http://www.toronto.ca/legdocs/2005/minutes/committees/wks/wks050308.pdf

At its May 26, 2005 meeting, the Works Committee approved the model to undertake the peer review proposed by staff and requested that staff develop a Terms of Reference for the hiring of a facilitator to undertake a peer review of the BRMP and that the Terms of Reference be presented to the Works Committee prior to its release. City Council subsequently endorsed this recommendation at its meeting on June 14, 15 and 16, 2005.
http://www.toronto.ca/legdocs/2005/minutes/committees/wks/wks050526.pdf

At its July 11, 2005 meeting, the Board of Health requested that this report be prepared jointly by Toronto Water and the Medical Officer of Health and that it be presented to both the Board of Health and the Works Committee for consideration.
http://www.toronto.ca/legdocs/2005/minutes/committees/hl/hl050711.pdf

At its meeting on April 25, 26 and 27, 2006, City Council amended and approved the Draft Terms of Reference for the Peer Review of the Biosolids and Residuals Master Plan Decision Making Model.
http://www.toronto.ca/legdocs/2006/agendas/council/cc060425/cofa.pdf

At its meeting on July 15, 16 and 17, 2008, City Council approved The Terms of Reference to update and finalize the Biosolids Master Plan taking into account the findings of the Peer Review Report.
http://www.toronto.ca/legdocs/mmis/2008/pw/reports/2008-06-27-pw17-cr.pdf

At its meeting on November 30, December 1, 2, 4 and 7, 2009, City Council approved the Biosolids Master Plan Environmental Assessment for Ashbridges Bay, Humber and North Toronto Treatment Plants and requested staff report back to Public Works and Infrastructure Committee on the feasibility of accelerating the biosolids management

strategy for Highland Creek TP, as detailed in the Biosolids Master Plan, in order to realize certain capital and operating cost savings.
http://www.toronto.ca/legdocs/mmis/2009/cc/decisions/2009-11-30-cc42-dd.htm

At its meeting on January 5, 2010, Public Works and Infrastructure Committee requested staff also consider and report back on the feasibility of biosolids truck haulage using a future shoreline road as well as the construction of facilities that would be required for transportation of biosolids by rail.
http://www.toronto.ca/legdocs/mmis/2010/pw/decisions/2010-01-05-pw29-dd.htm

ISSUE BACKGROUND

In the fall of 2002, the City of Toronto initiated a Biosolids and Residuals Master Plan (BRMP) that was to provide direction on the future management of biosolids and water residuals generated by the City's water and wastewater treatment plants to the year 2025. The BRMP was undertaken in accordance with the Class Environmental Assessment process as defined in the *Environmental Assessment Act*. A draft of the BRMP was released for 30-day public comment on September 16, 2004. The public comment period was subsequently extended by Works Committee.

As a result of public concerns regarding the recommended biosolids management strategies identified in the draft BRMP, Works Committee requested that the General Manager of Toronto Water, together with the Medical Officer of Health, undertake a peer review of the decision-making model and methodology used to assess the various biosolids management options in the BRMP.

City staff consulted with other municipalities, industry experts and scientific organizations to establish the best methodology for completing a review of the BRMP. It was determined that the most objective way to undertake a peer review would be to form a panel with selected qualified, independent panel members whose expertise match the specific needs of the project. Panel members were chosen with the help of an independent facilitator, hired by the City through a Request for Proposal (RFP).

The Panel met during the fall of 2007 and concluded that the decision-making model used in the draft BRMP was reasonable and commonly used in master plans and Environmental Assessments. The report recommended some process improvements in order to provide more clarity to the Master Plan. The Panel's critical comments are summarized as follows:

- Review criteria and criteria weights used in decision-making and document the steps taken to define impacts and assign scores for each management option, so that results can be easily replicated.
- Utilize a statistically valid survey tool to obtain broader public input.
- Review and update industry best practices and viable biosolids management options.
- Change the planning horizon from 20 years to 50 years.

A Terms of Reference based on the panel's recommendations was prepared by staff in 2008. The City's consultant, AECOM, completed the work in accordance with the Terms of Reference in the fall of 2009 as part of the original BRMP project.

The final Biosolids Master Plan can be viewed at the following web sites:
http://www.toronto.ca/wes/techservices/involved/wws/biosolids/pdf/master_plan_report_with_app_a_vol_1_to_m.pdf
http://www.toronto.ca/wes/techservices/involved/wws/biosolids/pdf/master_plan_app_a_vol_2.pdf
http://www.toronto.ca/wes/techservices/involved/wws/biosolids/pdf/master_plan_app_a_vol_3.pdf

Decision Making Model Used to Determine Recommended Strategies

Evaluation criteria in the BMP Update are based on three major criteria groups, environmental, social and cost impacts, commonly referred to as the "Triple Bottom Line" approach. Although in this type of model, weightings are usually evenly distributed, for the BMP Update, the environmental (40%) and social (40%) impact criteria were weighed more heavily. This approach was used in order to reflect the level of importance of each criteria group to the public and consulted stakeholders.

Public Consultation

An extensive multi-faceted approach to public consultation was undertaken during the drafting of the BRMP as well as the BMP Update. For both the BRMP and the BMP Update, a dedicated website was maintained and updated regularly, project newsletters and a dedicated email and phone line was established. During the drafting of the BRMP, a Biosolids and Residuals Master Plan Advisory Committee was formed with representation that included interested stakeholders, community members, City Councillors and various regulatory bodies.

In addition, a total of 18 Public Information Sessions were held during the drafting of the BRMP and the BMP Update. These sessions were held near each of the major treatment plants as well as in rural areas where Toronto biosolids are agriculturally land applied. Sessions were advertised in local community papers, the Toronto Star, in newsletters and mail outs and on the City's website. Meeting minutes and a consolidated list of questions asked by the public at these meetings along with responses provided by the Project Team were posted on the website and mailed to those who attended the Public Information Sessions.

For the Highland Creek TP community, four separate sessions were held to obtain input. In addition, the Highland Creek TP Neighbourhood Liaison Committee was kept periodically informed of the progress of the BMP and its findings.

Highland Creek TP - Current Operation

Currently, biosolids generated at the Highland Creek TP are managed using two 35 year old multiple hearth incinerators. The resulting inorganic non-hazardous ash is stored onsite in lagoons and hauled once annually over a week long period to the City's Green Lane Landfill site.

During the preparation of the BMP Update, these incinerators were found to be in need of urgent repair to ensure their continued and safe operation within applicable regulatory requirements and standards. Staff immediately commenced the development of major maintenance and refurbishment work of these incinerators, which is currently underway. This work is needed to extend the service life of the facility for another 5 to10 years.

Impact of O.Reg.419/05:

The current and/or any future incineration facility at the Highland Creek TP is subject to the air emissions requirements of O.Reg 419/05 (Air Pollution – Local Air Quality). O.Reg. 419/05 includes a move to "effects-based" air standards, some of which are up to 100 times more stringent than previous standards; more accurate dispersion models that can more realistically assess the concentrations of contaminants under a range of weather related conditions; and more detailed emissions reporting to demonstrate compliance. The regulation includes the phase in of increasingly more stringent standards for a wide range of containments. The current applicable standards, Schedule 2, took effect on February 1, 2010 and will remain in effect until January 31, 2020, after which a more stringent Schedule 3 will apply. At any time, the Ministry of Environment can amend or introduce new standards for any contaminant of concern.

The major refurbishment work that is currently underway will ensure the facility meets the requirements under Schedule 2 of the regulation. It is uncertain whether the current multiple hearth incinerators and the existing emissions control equipment can meet the Schedule 3 requirements that take effect on February 1, 2020, even after major refurbishments are completed,

COMMENTS

The BMP Update recommendation for the Highland Creek TP is to continue to operate the existing multiple hearth incinerators over the next 5-10 years to take advantage of the major maintenance and refurbishment work currently underway, and to commence within five years the process of replacing them with new modernized fluidized bed incinerators with energy recovery and state of the art scrubbing technology that meets/exceeds MOE emission standards.

This strategy maximizes the remaining useful life of the existing infrastructure, ensures that a reasonable return on investment in major maintenance works is achieved and ensures replacement infrastructure is in place before the end of the 10 year useful life of the existing equipment.

This option is recommended for the following reasons:

Reliability: The existing multiple hearth incinerator technology (used at HCTP) is outdated and even after refurbishment will continue to breakdown due the highly mechanical nature of the design. Engineering firms in the industry no longer consider this technology as a viable biosolids management alternative. The fluidized bed technology being recommended in the BMP Update has been successfully installed and operated in many municipalities world wide. The installation of a new fluidized bed incinerator with state of the art scrubbing technology will provide a reduction in emissions significantly below current regulatory standards, a higher combustion efficiency at a lower operating cost and superior reliability compared to the existing multiple hearth incinerators.

The Air Pollution Control (APC) technology recommended in the 2009 BMP Update consists of a single Venturi scrubber and activated carbon bed. These types of APC systems in combination with fluidized bed technology have a proven track record of successful long-term operation and are widely utilized in North America including both Peel and Durham Regions.

Public Consultation: Feedback received at public meetings as well as independent public opinion research indicates that residents in the area surrounding the Highland Creek TP prefer incineration to any beneficial use and/or disposal option that involves hauling of biosolids through the community. All off-site options considered in the BMP require increasing traffic by an additional 4-5 trucks a day, 365 days a year, through the predominantly residential community surrounding the Highland Creek TP. The residents living within the community have stated they are opposed to increased truck traffic on their local streets. Residents already experience high volumes of truck traffic generated by the industries located within the Industrial Park in which the Highland Creek TP is situated.

In response to the recommendations of the Peer Review Panel, Ipsos Reid Public Affairs was retained to survey public opinion on biosolids management and wastewater treatment in the City of Toronto. The key objective of the survey was to understand the public's priority of concerns related to wastewater plant operation and better understand how the public at large and around each of the four wastewater treatment plants view wastewater treatment plants and the identified biosolids management options.

The results of the survey are included in the appendices to the BMP and were used in the decision making process to ensure that the input of Torontonians was captured and to confirm assigned weights to each of the criteria groups.

Diversification: Continued incineration at Highland Creek TP helps diversify the range of management options available to the City and mitigates risks resulting from the loss of beneficial use or landfill disposal sites used to manage biosolids from the Ashbridges Bay TP. Staff are very concerned with introducing the volume of biosolids from the Highland Creek TP into the present beneficial use and landfill disposal markets. Currently, 48% of

Ashbridges Bay TP biosolids are beneficially used. Council has approved a target of 100% beneficial use for Ashbridges Bay TP biosolids and it is forecasted that all available capacity within present markets will be required to achieve this objective. Furthermore, redirecting the Highland Creek TP biosolids to the City's Green Lane Landfill will jeopardize the feasibility of using this option as the contingency disposal site for Ashbridges Bay TP as recommended in the BMP Update.

Review of Additional Options as Requested by Committee and Council

At its meeting on November 30, December 1, 2, 4 and 7, 2009, City Council requested staff report back to Public Works and Infrastructure Committee on the feasibility of:

1. Accelerating the implementation of the biosolids management strategy for Highland Creek TP to realize capital and operating cost savings.
2. Providing options and costs to achieve higher air emission control standards for the proposed new facility.

At its January 5, 2010 meeting, Public Works and Infrastructure Committee requested staff prepare an additional report to address the feasibility of:

3. Transporting biosolids by rail from the Highland Creek TP.
4. Hauling biosolids by truck along a dedicated shoreline road/trail being contemplated by TRCA.

1. Accelerated Implementation for Capital and Operating Cost Savings

The design and construction of a new fluidized bed incinerator could be completed within five years, approximately four years sooner than planned. The total capital and operating cost savings would be approximately $15M over the ten year period (2010 to 2020) resulting from $4M in avoided capital costs (for refurbishment of the existing infrastructure) and $11M in operational cost savings (primarily natural gas). Annual operational cost savings of a fluidized bed incinerator over the existing multiple hearths is estimated at $1.5M per year (based on 2020 dollars).

The accelerated schedule would have the added benefit of reducing GHG emissions four years sooner thereby eliminating 20,600 kg of CO2/d based on the emission scrubbing technology assumed in the BMP Update.

2. Options and Costs to Achieve Higher Emission Control Standards

The state of the art Air Pollution Control (APC) systems recommended in the BMP Update for Highland Creek TP provide emission reductions that meet and/or exceed all Ontario regulatory standards for municipal wastewater biosolids incinerators. In addition, there are alternative available technologies that can be installed to remove specific air containments and reduce emissions to levels significantly lower than required by present environmental regulations.

The pollutant reduction efficiency for the Air Pollution Control (APC) systems recommended in the BMP Update for Highland Creek TP is illustrated in table 1 below:

Table 1-Removal Efficiency of Pollutants for Fluidized Bed Incinerator with APC System

Pollutants	Removal Efficiency
Particulate/metals	> 99.9%
NOx (Nitrogen Oxide)	0%
N_2O (Nitrous Oxide)	0%
SO_2 (Sulphur Dioxide)	0%
HCl (Hydrochloric Acid)	70%
Mercury	95%
Dioxin/furans	92%

Particulates and Heavy Metals

Particulates and heavy metals in the incinerator flue gas can be removed using a variety of technologies such as Venturi scrubbers, wet electrostatic precipitators (ESP) and baghouses.

A Venturi scrubber uses water to surround the particulate, causing it to increase in mass and drop out of suspension. The particulate is then transferred to the ash handling system.

In wet ESPs, the flue gas travels between electrically charged parallel plates and wires which attract particles in the flue gas. The particulate is collected and transferred to the ash handling system.

Baghouses use electrostatic filtration principles to remove solids from the flue gas inlet. The filtration area is maximized by configuring the fabric filter media into a series of long bags that are tightly packed into a housing compartment. Bag houses have the highest particulate and metal removal efficiency.

Nitrogen Oxide (NOx) and Nitrous Oxide (N_2O)

There are several available technologies that can reduce the amount of NOx and N_2O emissions from municipal biosolids incinerators. Generally, the normal combustion control process associated with fluidized incinerators generates NOx and N_2O levels below regulatory standards. Therefore, it is common that no specific APC technology is installed to remove these pollutants.

A Selective Catalytic Reduction (SCR) system can be used to further reduce NOx and N_2O (which is a greenhouse gas contributor). A SCR system injects ammonia into the flue gas to reduce NOx emissions by 30-50% and N_2O emissions by 80%.

Sulphur Dioxide (SO2) and (Hydrochloric Acid) HCl

Acid gases in the form of SO_2 and HCl are generated in the incineration of municipal biosolids. A Venturi scrubber will achieve approximately 70% removal efficiency for HCl but very little reduction of SO_2. Both compounds can be further reduced with the addition of limestone. Limestone added to the fluidized bed of the incinerator during the combustion process will be converted to lime, which neutralizes both SO_2 and HCl.

Another option for removal is direct lime injection in the flue gas to react directly with the SO_2 and HCl. This produces a material that is easily captured and collected by the APC equipment and directed to the ash handling system.

Mercury and Dioxins and Furans

Mercury removal, using an activated carbon bed, is recommended in the BMP Update to meet stringent air quality requirements. It is estimated that a fluidized bed incinerator with the Biosolids Master Plan APC equipment, using a Venturi scrubber with activated carbon bed, will achieve 95% and 92% removal of mercury and dioxin compounds, respectively. Activated carbon will also remove other trace organic compounds that may be present in the emissions.

Another method to remove mercury, dioxins and other trace organic compounds involves the use of activated carbon injection in which powdered activated carbon (PAC) is added to the flue gas in the scrubber. Once the PAC has reached with the flue gas, a baghouse is used to remove the spent PAC from the flue gas stream.

Table 2 below outlines innovative APC alternatives. For each alternative, the contaminant percentage reduction that can be achieved is included as well as the additional capital and operating cost compared to the base case APC system for the fluidized bed incinerator as recommended in the BMP Update. Staff are recommending the installation of both Alternative 1 (wet system) and Alternative 2 (NO_x and N_2O Control) in combination at a cost of $7.5 million to significantly reduce emissions.

Table 2. Innovative APC Technologies and their Pollutant Removal Efficiency Compared to BMP Recommended Strategy

Pollutants	Base Case *BMP Recommended Strategy*	Alternative 1 *Wet System*	Alternative 2 *NO_x and N_2O Control*	Both Alternative 1 and 2 in combination	Alternative 3 *Dry System*	Alternative 4 *Enhanced Wet System*
Particulates/metals	>99.9%	>99.9%	> 99.9%	> 99.9%	>99.998%	>99.998%
NOx	0%	0%	30% to 50%	30% to 50%	40 - 60%	40 - 60%
N_2O	0%	0%	80%	80%	80%	80%
SO_2	0%	50 - 70%	0%	50 - 70%	50 - 60%	90%
HCl	70%	91%	70%	91%	94 - 95.5%	99.7%
Mercury	95%	95%	95%	95%	90%	95%
Dioxin/furans	92%	92%	92%	92%	90%	92%

Incremental Capital Cost Relative to Base Case	**N/A**	**$2.5 M**	**$5.0 M**	**$7.5 M**	**$10.0 M**	**$11.0 M**
Incremental Annual Operating Cost Relative to Base Case	**N/A**	**$30,000**	**$130,000**	**$160,000**	**$270,000**	**$400,000**

Table 3 below outlines the additional greenhouse gas reduction that can be achieved by implementing alternatives 2, 3 or 4 compared to the existing multiple hearth incinerators and the BMP base case.

Table 3. Comparison of Greenhouse Gas Generation for Biosolids Management Options for Highland Creek TP

	Existing (Multiple Hearth Incineration)[1,2]	**Fluidized Bed Incineration (BMP Recommendation)[1,2]**	**Fluidized Bed Incineration (Alternatives 2, 3 or 4)[1]**
Greenhouse Gas Generation (CO_2 equivalent)	38,500 kg/d	17,900 kg/d	8,900 kg/d
Percentage Reduction in GHG from Current Multiple Hearth Operation	N/A	54%	77%

Notes:

1. Including ash haulage to landfill.
2. From Toronto Biosolids Master Plan (AECOM, 2009).

It should be noted that further new technologies that achieve equal or better emission reductions may become technically viable by the time the design phase of this project commences.

Given Council's commitment to climate change initiatives, staff have assessed the feasibility of adopting more stringent emission criteria than required by regulation and recommend that the proposed fluidized bed incinerator include a combined wet system with NO_x and N_2O Control. Compared to the conventional state of the art emissions controls recommended in the BMP Update, this emission control combination will achieve a further 50% reduction in GHG emissions, 30–50% reduction in NO_x, 80% reduction in N_2O, 50–70% reduction in SO_2 and 30% reduction in HCl (all as illustrated in table 2 above)**.**

The added $7.5M in capital cost and $160,000 in annual operating costs combined with a four year acceleration of the project will achieve a 29,600 kg CO2/d reduction in GHG to the current Multiple Hearth Incinerators.

3. Transporting Biosolids by Rail from Highland Creek TP

Various transportation options, including rail, were assessed in the BMP Update but were screened out early in the process due to cost and logistical constraints. As directed by Council, the rail option has been reviewed in greater detail and the findings are summarized below.

The capital costs associated with building the infrastructure required to properly handle and transport biosolids by rail cars from Highland Creek TP is estimated to be between $77.2 million to $114.1 million. Table 4 below outlines the construction costs to build facilities associated with using rail to transport biosolids from Highland Creek TP.

Table 4. Capital Costs associated with Rail Transport of Biosolids from Highland Creek TP

Component	Estimated Cost (millions)
Rail infrastructure at HCTP site	$3.0 to $5.0
Rail loading facility at HCTP site	$30.0 to $45.0
Rail spur at biosolids unloading site	$1.3 to $3.0
Rail yard and land at unloading site	$5.0 to $10.0
Rail unloading facility	$20.0 to $25.0
Engineering Design and Supervision (15%)	$9.0 to 13.1
Environmental Assessment for loading and unloading facilities and site selection	$2.0 to $3.0
Contingency Allowance (10%)	$6.9 to $10.0
Total (not including CN Rail service cost)	**$77.2 to $114.1**

The Highland Creek TP is located directly adjacent to a CN Railway track referred to as the Kingston Subdivision (a high-speed mainline). To avoid additional truck traffic from the Highland Creek TP through the neighbouring residential community, the potential to haul biosolids from the plant using rail was reviewed. The rail concept is based on hauling 124 wet tonnes of dewatered biosolids per day, which equates to two rail cars approximately once every five days. For planning purposes, an unspecified destination point in Ontario, 250 km from the plant, was assumed. This option requires the construction of a new railway spur from the high-speed mainline leading to the Highland Creek TP property and a new on-site biosolids rail loading facility complete with odour control technology.

Loading and Unloading Infrastructure

Due to the physical characteristics of dewatered biosolids (similar to wet soil), biosolids would need to be pumped to elevated hoppers with live-bottom bins that release into gondola-type (open top with removable cover) rail cars. Individual rail cars would need to be shuttled under the bins for filling and then covered for transport. For logistical and economic reasons, it is anticipated that between 6 to10 full rail cars would need to be

stockpiled (minimum 15 days of production) on site prior to being hauled. Because the rail cars would be sequentially filled at the loading station, the City would need to purchase a car progressioner to move the rail cars in and out of the loading facility.

Noise and Odour Issues: As this operation would produce increased noise and odour impacts at the Highland Creek TP facility, an odour control facility and sound barriers would be necessary to reduce the migration of odours and off-site noise. Odour control could be provided during filling of rail cars by constructing a building surrounding the hopper facility. Odourous air would be withdrawn from the building and treated through an in-ground biofilter. Based on experience with biofilters at the Ashbridges Bay TP, the in-ground biofilter would be sizable and could require additional land. However, odours from the filled rail cars waiting in storage would not be treated and odour reduction would be limited to what could be contained by the covers. Additional operations and maintenance staff would be required to operate and maintain the loading facility, and to operate the car progressioner to move the rail cars.

Unloading Biosolids from Railcars: Similarly, an unloading facility near an existing rail line at the destination site would be required to transfer biosolids from the rail cars to trucks in order to haul to an end use management destination. Construction of the unloading facility would require an Environmental Assessment, land acquisition, and would need to accommodate many rail cars to facilitate the infrequent service by CN Rail due to the low volume of material. A clam bucket on a crane would be used to remove the biosolids from the rail car and would either transfer the biosolids directly into waiting trucks or into a storage/transfer station for loaded onto trucks at a later date by front end loaders.

Due to the height of the crane system and the associated building required to fully enclose both the rail car and the truck being loaded, the cost of this system including odour control is prohibitive. Therefore, the site would need to be close enough to an existing rail line but sufficiently remote from adjacent land users to avoid risk of odour and noise impacts. Also, since dewatered biosolids cake typically exhibits a sharp increase in odours approximately 48 hours after processing, unloading rail cars that have been sitting in storage or in transit for several days will be extremely odourous.

Maintenance and Regulatory Requirements: Since CN Rail owns the rail cars, CN may choose to rotate the cars for various uses rather than dedicating them to the City. Whether or not the rail cars are shared, the unloading facility would need to be serviced with water supply to wash the cars after unloading, a wastewater collection system, a wastewater treatment system, a suitable receiving stream to accept the treated effluent and sufficient electricity. The wastewater treatment facility would require a Certificate of Approval from the Ontario Ministry of Environment and would likely be subject to more stringent effluent criterion than the City's wastewater treatment plants.

This analysis assumes a facility of approximately 25,000 m^2 in size with significant surrounding land area to ensure an adequate buffer around the property from existing or potential future adjacent land users.

Environmental Assessments: Due to the potential for significant social and environmental impacts including odours at the unloading and storage facility (transfer station), an Environmental Assessment (EA) under Ontario Environmental Assessment Act, will be required to select a preferred location. It is estimated the EA would require a minimum of 18 to 24 months to complete and there could be significant public opposition which could extend the completion of the EA process.

An EA would also be required for the Highland Creek TP site due to potential noise (from rail car movement and rail switching) and odours during loading and on-site storage. In addition, the on-site full rail cars may be viewed by the MOE as on-site storage and would be subject to strict regulatory standards to mitigate impacts to the environment.

Rail Infrastructure

To load biosolids at the Highland Creek TP, a railway spur line would need to be constructed from the high-speed CN Rail mainline onto the Highland Creek TP site.

CN rail would only make the rail switch when there are sufficient cars to collect, estimated to be a minimum of between 6 to 8 rail cars. Therefore, in addition to the connecting spur, it is estimated that approximately 12 cars would need to be stored on-site at any given time. This would require 2 or 3 parallel tracks utilizing a long narrow corridor, estimated at 4,500 m^2. An assessment would be required to determine whether the existing plant property could accommodate both the spur line and the storage area.

Industrial customers who gain service off of a high-speed line normally do so via an industrial siding which is parallel to the mainline. This siding allows the railway to operate trains on the mainline without being delayed by local industrial service. This is particularly important on mainlines which serve a scheduled passenger service, such as GO Transit. Accordingly, the railway may deem it necessary to either provide the switching service at night (i.e., during off-peak passenger train hours) or to construct an additional industrial siding track within the rail corridor, which has a significantly higher cost than what has been assumed in this analysis.

CN Rail has indicated that the Highland Creek TP site is difficult to service by rail due to drainage and elevation issues. It is outside their ability to prepare a siding plan and an engineering consultant would need to be retained to survey the land and prepare a detailed siding plan taking the site's constraints into account prior to proceeding any further with this alternative.

End Use Management of Biosolids

Although it is possible to transport biosolids from Highland Creek TP using rail, the end destination of the material remains a significant constraint. In the preparation of the BMP Update, a great deal of consideration was given to end use management options and their availability.

Council has mandated that biosolids generated from Ashbridges Bay TP should be directed to 100% beneficial use. In doing so, any new opportunities for beneficial use would first be directed towards the Ashbridges Bay TP program. In 2009, approximately 48% of biosolids generated at Ashbridges Bay TP were directed to beneficial use and the remaining 52% were directed to landfill.

Currently, none of the City's existing service providers are able to receive biosolids by rail. This means that biosolids would need to be transferred to trucks in order to reach any of the current beneficial use or disposal destinations - thereby resulting in double-handling. Although the cost of truck haulage would depend on the haul distance, the cost for short distance truck haulage alone could exceed $1.5M per year.

Undetermined Additional Costs

In addition, unknown operational and service costs include:

- Additional staffing at loading and unloading facilities;
- Maintenance of on-site rail and biosolids handling infrastructure at both locations;
- CN Rail service agreement, fees and transportation cost; and
- Engineering fees associated with siding plan requested by CN Rail.

Given the high capital costs, unknown operating costs, significant operational and logistical constraints, rail haulage from the Highland Creek TP is not recommended.

4. Hauling Biosolids By Truck Along Proposed Shoreline Road Access

At the Toronto Regional Conservation Authority (TRCA) Board meeting on January 29, 2010, TRCA staff presented a report (Attachment 1) responding to Public Works and Infrastructure Committee's request. TRCA looked at four different options for a route along the waterfront from Bluffers Park to East Point Park. Only Option A as outlined in Table 5 included a roadway meeting minimum standards suitable for biosolids truck traffic.

The options developed by TRCA addressed the need for shoreline protection, retrofits to TRCA's existing shoreline works, a bridge crossing, lighting and public amenities such as ancillary trail connections, washrooms, shelters and rest areas. The various options offered differing standards and levels of public amenities. All the options would require a Full Environmental Assessment that could take up to 2 years to complete.

The TRCA Board decided to receive the staff report with the following recommendation:

"AND FURTHER THAT the City of Toronto be advised that while the TRCA considers the waterfront trail as an important initiative, that for environmental reasons it cannot support the use of the waterfront trail for moving waste management trucks to and/or from the Highland Creek plant, even on an emergency basis."

Staff have therefore ruled out the shoreline road/trail as an option for transporting biosolids from the Highland Creek TP.

The estimates to construct the four options as considered by the TRCA are shown in Table 5. These costs range from $40.2 million to $77.6 million. These estimates do not

include the annual cost to maintain the roadway for year round truck traffic or the cost for biosolids management options (i.e. hauling costs, landfill tipping fees).

Table 5. TRCA'S Cost Estimates for 4 Different Waterfront Road Access Options

ITEMS FOR CONSIDERATION	Option A	Option B	Option C	Option D
Trails	$5,552,359	$969,230	$1,051,630	$1,051,630
Lighting (1 per 50m)	$1,938,460	$0	$0	$0
Shore Protection	$41,625,596	$38,720,996	$27,648,496	$24,720,000
Retrofits	$3,553,500	$3,064,250	$3,064,250	$2,575,000
Shoreline Transfers/Legal Fees	$2,291,750	$2,291,750	$1,519,250	$1,261,750
Fish Habitat Compensation	$3,132,560	$2,842,100	$1,734,850	$1,497,620
Bridge	$360,500	$206,000	$206,000	$206,000
Morningside Outfall Retrofit	$154,500	$154,500	$154,500	$154,500
Public Washroom/Shelter	$1,411,100	$0	$0	$0
Access Roads	$463,500	$463,500	$463,500	$463,500
Waterline	$195,700	$0	$0	$0
Sub-total in 2010 funds	**$60,679,525**	**$48,712,326**	**$35,842,476**	**$31,930,000**
Environmental Assessment/ Consulting Fee (5%)	$3,033,976	$2,435,616	$1,792,124	$1,596,500
Additional Amenities (eg. benches, receptacles, water fountains)	$1,000,000	$0	$0	$0
Contingency (20%)	$12,942,700	$10,229,588	$7,526,920	$6,705,300
GRAND TOTAL	**$77,656,201**	**$61,377,530**	**$45,161,519**	**$40,231,800**

If the shoreline trail/road had been approved by TRCA, the lack of viable beneficial use end destinations would require the biosolids to be landfilled. As mentioned earlier in this report, the Highland Creek biosolids would compete with the Ashbridges Bay biosolids for the available beneficial use/disposal options.

In addition, it is not clear how the local and neighbouring communities would respond to biosolids truck traffic along the shoreline road/trail nor has there been any assessment of the measures required to mitigate potential environmental risks associated with year round biosolids truck traffic along more than 8 kilometres of shoreline.

CONCLUSION

An opportunity exists to accelerate the construction of a new fluidized bed incineration unit at Highland Creek TP (as recommended by the BMP Update) to generate capital and operating cost savings of $15 million. It is recommended that $7.5 million of these savings be used to install additional innovative air pollution control technologies to significantly reduce the emissions from the facility. This approach provides a diversified,

sustainable biosolids management program across all of the City's four wastewater treatment plants.

CONTACT

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SIGNATURE

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ATTACHMENTS

Attachment 1: TRCA Report, January 29, 2010 "Scarborough Waterfront Access Plan"