



STAFF REPORT ACTION REQUIRED

Highland Creek Wastewater Treatment Plant - Biosolids Class Environmental Assessment

Date:	February 9, 2016
To:	Public Works and Infrastructure Committee
From:	General Manager, Toronto Water
Wards:	All Wards
Reference Number:	P:\2016\Cluster B\TW\PWI16003

SUMMARY

This report seeks Council approval of the recommendations contained in the Highland Creek Treatment Plant (HCTP) Schedule B Class Environmental Assessment (EA) on the future long-term biosolids management strategy for the facility.

The study is a detailed assessment of health, environmental, community and cost impacts of three short listed biosolids management options and recommends the replacement of the existing 40-year old incinerators at the HCTP with current state of the art incinerators and emissions scrubbing technology. The study concludes that:

- all three alternatives have very small overall health impacts and there are no appreciable health impact differences between each of the alternatives;
- all three alternatives achieve notable reductions in health risks related to inhalation and multi-media exposure (due to air emissions) compared to the existing situation;
- all three alternatives achieve significant reductions in air emissions (based on air quality modelling of 43 chemicals of concern) with modern state of the art incineration being the lowest emitter of Green House Gas (GHG);
- new state of the art incinerators has the lowest noise, odour and traffic impact on the community and has the greatest public support within the community (Wards 43 & 44) surrounding the facility; and
- new state of the art incinerators has the lowest capital and operating costs – and therefore lowest life-cycle cost of the three options.

The Request for Proposals (RFP) for this study was developed with the input of Toronto Public Health (TPH) and the Toronto Energy and Environment Division (EED). TPH wrote the terms of reference and led the development of the Health Impact Assessments for the alternatives under study. The EED wrote the requirements for Cumulative Impact Assessment regarding air emissions incorporating the City's in-house developed air model.

RECOMMENDATIONS

The General Manager Toronto Water recommends the following:

1. City Council receive the "Executive Summary of the Highland Creek Wastewater Treatment Plant Biosolids Schedule B Class Environmental Assessment Study" appended to this report as Attachment 1.
2. City Council endorse the recommendations of the Environmental Assessment Study and request the General Manager, Toronto Water to finalize the Environmental Study Report for the Highland Creek Wastewater Treatment Plant Biosolids Class EA and submit it to the Ontario Ministry of the Environment and Climate Change for the obligatory 30 day public review period in accordance with the requirements of the Environmental Assessment Act.
3. Subject to the completion of the Class EA process for the Highland Creek Wastewater Treatment Plant Biosolids Class Study, City Council authorize the General Manager, Toronto Water to proceed to undertake the detailed design and construction of the preferred option.

Financial Impact

There is no financial impact resulting from the recommendations in this report. Funds in the amount of \$146.23 million for the design and construction of the preferred alternative are included in the 2016 Toronto Water ten-year Capital Plan

DECISION HISTORY

At its meeting on July 22, 23 and 24, 2003, City Council authorized the Commissioner of Works and Emergency Services to award and retain engineering consulting services for the preparation of a Biosolids and Residual Master Plan (BRMP) as per the Scope of Work outlined in Request for Proposal No. 9121-03-7236.

<http://www.toronto.ca/legdocs/2003/agendas/council/cc030722/wks6rpt/cl012.pdf>

At its meeting on March 8, 2005, Works Committee requested that the General Manager of Toronto Water, together with the Medical Officer of Health (MOH),

undertake a peer review of the decision model and methodology used in the BRMP to assess the recommended management options.

<http://www.toronto.ca/legdocs/2005/minutes/committees/wks/wks050308.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 (BMP) 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 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 preferred biosolids management strategy for Highland Creek Treatment Plant (HCTP). Staff were also asked to report back on the options and costs of achieving higher emissions control standards than those assumed in the BMP and required by regulation.

<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 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>

At its meeting on June 8 and 9, 2010, City Council directed staff to implement a Beneficial Use biosolids management strategy for HCTP with Landfilling as a contingency option. Council also directed a specific haul route and asked that the General Manager report back on the potential use of enclosed van dumpsters or tanker trailers.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2010.PW33.4>

At its meeting on March 23, 2011, Public Works and Infrastructure Committee requested that staff report back on a number of issues including the logistical issues of pursuing beneficial use at HCTP, feasibility of the selected haul route, area impacted by air contaminants, trucking options, cost comparison and environmental impacts between land application and Fluidized Bed incineration and legal issues with respect to the BMP under the Provincial Environmental Assessment Act. Committee also requested the Medical Officer of Health to report to the Public Works and Infrastructure Committee on the potential health impacts of the available biosolids management options

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.PW2.9>

On April 26th 2011, the Public Works and Infrastructure Committee received the report from the MOH on the Rapid Health Impact Assessment for Biosolids Management at the HCTP.

<http://www.toronto.ca/legdocs/mmis/2011/pw/bgrd/backgroundfile-37363.pdf>

At its May 17, 18 and 19, 2011 meeting City Council considered a report from the General Manager of Toronto Water recommending City Council approve the recommendations contained in the Biosolids Master Plan, specifically, the replacement of existing Multiple Hearth incinerators at HCTP with new modern Fluidized Bed incinerators with state of the art scrubbing technology. City Council instead directed staff to implement Beneficial Use as the primary biosolids management strategy and Landfill Disposal as a contingency option for the HCTP.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.PW3.4>

At its November 14, 2012 meeting, Public Works and Infrastructure Committee received for information a report detailing staffs' discussion with the Ministry of the Environment (MOE) regarding City Council's May 2011 direction to staff and staff's intent to move forward with a Schedule B Class Environmental Assessment for HCTP as a result of these discussions.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.PW19.12>

At its November 13, 14, 15 and 18, 2013 meeting City Council approved the preparation of a Schedule B Class Environmental Assessment (Class EA) as well as the scope of work jointly prepared by Toronto Water with input from Toronto Public Health and the Environment and Energy Division to examine all reasonable and feasible biosolids management alternatives for the HCTP.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2013.PW25.6>

On October 26th 2015, the Board of Health adopted the report from the MOH on the Health Impact Assessment of Biosolids Management Plan for HCTP.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.HL7.6>

ISSUE BACKGROUND

(1) Current Biosolids Management at Highland Creek TP

The HCTP is located in southeastern Scarborough situated adjacent to the waterfront trail, parkland, and residential areas. The HCTP processes 15 percent of Toronto's wastewater and produces an average of 110 tonnes of biosolids per day that need to be managed.

Currently, biosolids generated at the HCTP are managed using two Multiple Hearth incinerators constructed in the mid 1970s that are nearing the end of their service life. In 2005-2006 the existing HCTP incinerators were found to be in urgent need of repair and the MOE issued an order requiring the City to expeditiously undertake certain repairs.

To ensure the continued and safe operation of the aging equipment and to meet the requirements of the MOE order, staff developed and implemented certain critical repairs to improve reliability and operability. Implementation of these repairs began in 2007 and will be completed in 2016. Components of the work have had to be scheduled around routine maintenance shutdowns, are intended to extend the service

life of the facility approximately 10 years and ensure safe and reliable operation while the construction of any new replacement facilities recommended under this Class EA study are completed.

(2) Biosolids and Residuals Master Plan (known as the Biosolids Master Plan)

In the fall of 2002, the City of Toronto initiated a Biosolids and Residuals Master Plan (later referred to as the Biosolids Master Plan – BMP) that was to provide direction on the future management of biosolids generated by the City's wastewater treatment plants to the year 2025. The BMP was undertaken in accordance with the Municipal Engineers Association Class Environmental Assessment (Class EA) process as defined in the Environmental Assessment Act.

Peer Review and Biosolids Master Plan

In 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 making model and methodology used to assess the various biosolids management options in the BMP.

In 2007, the Peer Review Panel concluded that the decision-making model used in the draft BMP was a reasonable model that is commonly used in Master Plans and Environmental Assessments. The report recommended some improvements that could be made to the decision making model to provide more clarity to the Master Plan.

In 2008, Council approved a Terms of Reference to update the BMP taking into account the comments and recommendations of the Peer Review Panel. In October 2009, the BMP update was completed, taking into account the Peer Review findings, and released for 30-day public review to fulfill the requirements of the Class Environmental Assessment Master Planning Process. The preferred option recommended by the BMP for the HCTP was to replace the existing aging incinerators with state of the art Fluidized Bed Technology. This option scored the highest using the methodology developed during the public consultation process and modified through the Council directed peer review process.

In December 2009, the BMP was brought forward to City Council for approval. Council approved the BMP recommendations and strategies for three of the City's four wastewater treatment plants, but not the recommendations related to the HCTP. Council directed staff to undertake additional analysis of the incineration and truck haulage (beneficial use) options.

In May of 2011, after receiving the additional technical information including a confidential attachment, Council directed staff to implement a beneficial use program with a truck loading facility at HCTP using landfill as a contingency option.

Biosolids Truck Loading and Odour Control Conceptual Design Report

In March 2012, and in keeping with Council direction, staff released a Request for Quotation (RFQ) to retain Consulting services to prepare a conceptual design for the Council directed biosolids truck loading facility and associated odour control facility at HCTP. The scope of services included an investigation of the current digester capacity and enhancements needed to ensure biosolids generated from HCTP would meet regulatory standards for agricultural land application (beneficial use), as well as the development of a design plan and the associated estimated costs of the proposed works. The final Conceptual Design Report was completed in May 2013.

MOE Discussions

Staff met with the MOE during the summer of 2012 to discuss the implementation of the Council directed solution for the HCTP truck loading facility and the final acceptance of the BMP as the EA approval vehicle to move forward with implementation. Acknowledgement by the MOE that the BMP fully documented a traceable and transparent process by which the recommended solutions were arrived at was considered critical in order for the City to mitigate the risk of Part II orders and MOE conditions related to implementation.

The Environmental Assessment Act allows an interested person, Aboriginal community, or government agency to make a request to the Ontario Minister of the Environment for a higher level assessment of a Class EA project if they feel there are significant outstanding issues that have not been adequately addressed and could be addressed through an individual environmental assessment process. This is known as a Part II Order Request.

Staff were concerned with potential implementation delays given the anticipated Part II Order requests resulting from local community concerns with truck haulage of biosolids through the neighbourhood. The Class EA process requires the City to consider all comments received from the public and review agencies and consider proposed mitigation measures during the planning process.

After consulting with the MOE in the summer of 2012, it was clear that to avoid exposing the entire BMP to potential Part II Orders (which at that time would affect all four wastewater treatment plants), a separate process consistent with Class EA requirements was needed. As such the BMP was closed and a new Schedule B Class Environmental Assessment specifically for the implementation of the proposed HCTP biosolids management undertakings was recommended to Council. This process would require an assessment of the potential environmental effects of all viable biosolids management options (including the "Do Nothing" option), proposed mitigation measures and consultation with the public, agencies and all other identified stakeholders before selecting a preferred solution.

(3) HCTP Schedule B Biosolids Management Class EA

At the end of February 2014, through a Request for Proposal (RFP) issued in November 2013 and awarded in February 2014, the City retained Consulting services to undertake the new biosolids Class EA work for the HCTP. The City Project Team for this Class EA included staff from Toronto Public Health (TPH) and the Toronto Energy and Environment Division (EED) in addition to Toronto Water (TW) and Engineering & Construction Services (ECS). Both TPH and EED assisted in the preparation of the RFP.

The Schedule B Class EA looked at all viable biosolids management options and included a Health Impact Assessment that was overseen by TPH as well as a Cumulative (Air) Impact Assessment that was overseen by the EED. TPH used their Health Impact Assessment Framework originally developed in 2007 and improved significantly over the years. EED provided the use of their in-house air emissions model that has been used extensively to assess emissions to air impacts in neighbourhoods throughout the City. The results of the Cumulative Impact Assessment and the Health Impact Assessment were used by the project team to assess all biosolids management options and arrive at a preferred biosolids management strategy for the HCTP.

Throughout the process, consultation with stakeholders including the public and specifically the surrounding community was undertaken. A project web site was maintained and kept up to date with relevant project information such as minutes of Public Meetings and technical memorandums. Three public meetings were held and over 635 individual comment sheets and letters were received, documented and captured within the Class EA study.

COMMENTS

All documentation related to the Highland Creek Treatment Plant (HCTP) Class EA is accessible through the following City's project web site:

<http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=7f5411b440eb5410VgnVCM10000071d60f89RCRD>

The study included an inventory of all known biosolids management strategies and technologies that resulted in a short-list of three potentially viable management options. All three short-listed management options are feasible, allowable within existing regulations and demonstrated/proven in Ontario. The short-listed options included:

- **Alternative 1:** Replacement with on-site fluidized bed incineration and modern emissions scrubbing technology;

- **Alternative 2:** Construction of a truck loading facility and added digester capacity to haul biosolids off-site for beneficial use and/or disposal at a landfill site; and
- **Alternative 3:** Construction of an on-site biosolids dryer and truck loading facility to produce and transport pellets for beneficial use and/or disposal as well as added digester capacity.

The EA study concludes that replacement of the existing Multiple Hearth Incinerators to new Fluidized Bed Incinerators is the preferred option. This is based on the summary of findings presented in Table 1 below:

Table 1: Summary of Findings

Criterion	Alternative 1: On-site Fluidized Bed Incineration	Alternative 2: Biosolids and Haulage Off-site for Management	Alternative 3: Pelletization and Haulage Off-site of Fertilizer Product
Health impacts of each alternative.	All alternatives have a very small health impact and the differences among the alternatives do not result in appreciable differences in health impacts.		
Air quality impacts compared to existing "do nothing" alternative.	All alternatives achieve significant reduction in air emissions and associated health impacts compared to the existing conditions.		
Reduction of greenhouse gas emissions (GHG)	All alternatives achieve a significant reduction in GHG emissions compared to the existing. The GHG reduction ranges from 62% for an on-site pelletizer to 87% for upgrading to modern fluidized bed incineration.		
Minimize environmental and community impacts during construction	All alternatives will confine construction activities to the plant site and therefore contribute minimal impacts off-site.		
Provide a reliable and sustainable biosolids management solution	Most reliable	Least reliable	Good reliability

Recover soil and fertilizer value	Lowest opportunity	Good opportunity	Good opportunity
Minimize use of energy and other resources	Lowest use of diesel fuel and natural gas, lower electricity consumption than Alternative. 3.	Highest diesel fuel use, low electricity consumption.	Moderate diesel fuel, high natural gas and electricity consumption.
Community Opinion	Strong community support	Strong community opposition	Strong community opposition
Biosolids Management Staff Working Conditions	Best staff working conditions	Less favourable staff working conditions	Significantly less favourable staff working conditions
Capital and Life-Cycle Cost	\$107 million; \$267 million	\$112.5 million; \$387.7 million	\$148 million; \$346 million

Study Details:

The above findings are derived from an extensive EA study which is summarized below.

Haulage:

As each of the three short-listed management options require varying amounts of haulage of ash, biosolids or pellets through the neighbouring community, an assessment of transport options was completed and haulage by truck was identified as the only viable mode of transportation.

The frequency of truck traffic would vary depending on the volume of material to be hauled under each of the three options. The finding are as follows:

Table 2: Truck Haulage Frequency

<u>Transport of ash</u> resulting from Fluidized bed Incinerations	89 trucks over a 1 to 2 week summer period each year
<u>Transport of biosolids</u> from a truck loading and haulage program	1,365 trucks per year – 5.25 per day, 5 days per week, 52 weeks per year
<u>Transport of dried pellets</u> from a pelletizer facility	395 trucks per year – 1.52 per day, 5 days per week, 52 weeks per year

The study also assessed the available haulage routes through the community between the HCTP and Highway 401. Haulage beyond the entry to Highway 401 was not considered in the Health Impact Assessment on the local community but taken into account in the calculations of greenhouse gases. Two routes were short-listed for detailed evaluation and the findings indicate that although the route along Beechgrove Drive, Lawrence Avenue and Port Union Road is preferred from a Health Impact Assessment perspective, both are viable.

Cumulative Air Quality Assessment:

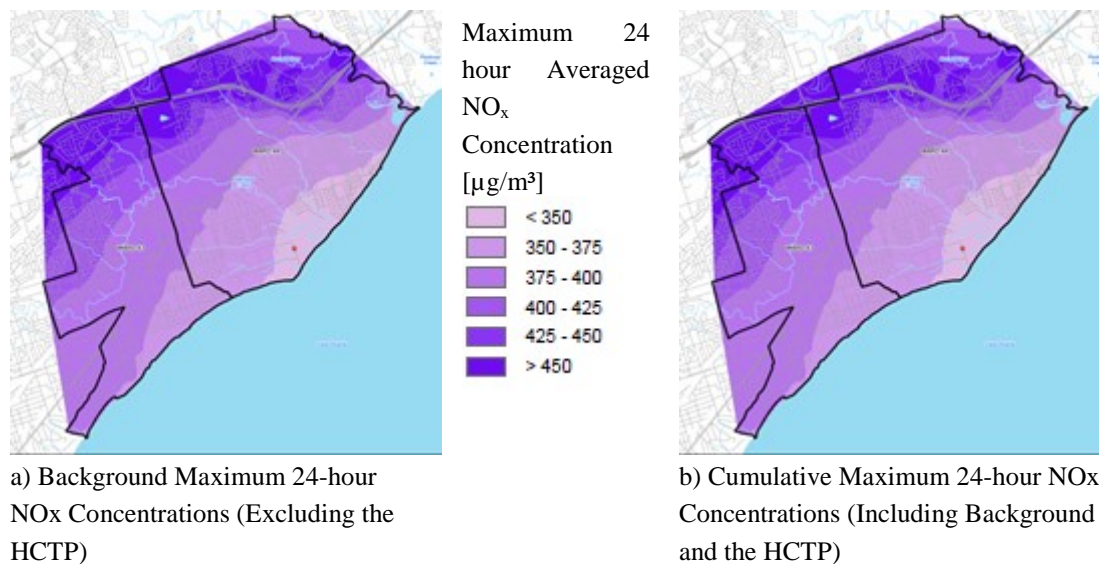
Cumulative Air Quality Modelling was conducted to model the contribution of each alternative to air quality in the Study Area. In particular, the cumulative air quality modelling "added" each alternative to the existing background air quality conditions in the Wards to assess the "cumulative risks" within the Study Area. Modelling predicts that all three of the short-listed biosolids management alternatives being considered for the HCTP will have negligible impact to air quality within the Wards 43 and 44 study area.

An emissions inventory of Contaminants of Concern (COCs) was developed from an US Environmental Protection Agency (EPA) National Emissions Inventory as well as Ontario and Canadian data sets including the National Pollutant Release Inventory (NPRI), City-wide and regional gas consumption rates, traffic data and other City information. These emission data sets were merged to provide a cohesive and wide-ranging profile of emission contributions to air quality within the airshed of Wards 43 and 44. A complete list of the COCs is included in the Air Quality Impact Assessment available through the project web site.

The COCs in the background air quality (i.e., not including HCTP contributions) in the study area airshed primarily come from other sources, including highway and road traffic, rail, industry and residential sources. Most of the emissions from the three short-listed biosolids management alternatives either reduce or do not significantly change the concentration levels of COCs in the local airshed. Furthermore, each biosolids management alternative decreases the majority of predicted COC concentrations when compared to the current base case multiple hearth incinerators. Mercury which is one of the COCs, for example, will be significantly reduced as a result of new proposed scrubbing technology that would be included with the Fluidized

Bed Incinerator option. Figure 1 below demonstrates that with any of the biosolids management options, changes to background NO_x concentrations (generic term for the mono-nitrogen oxides – and also a COC) would be so low that they cannot be distinguished regardless of the alternative selected. NO_x concentrations remain highest along the Highway 401 corridor and are lowest along the shoreline of Ward 44 where the HCTP is located.

Figure 1: Predicted Concentrations of NO_x over a 24 hour averaging period with and without HCTP Contributions.



Health Impact Assessment (HIA):

Health Impact Assessment (HIA) is a process that identifies how a specific policy, project or program could affect health determinants and health outcomes in human communities, and how those effects may be distributed within the population. The purpose of a HIA is to provide evidence to assist in decision-making, with the ultimate goal of enhancing the health benefits of the policy, project or program and mitigating potential harms.

This HIA was led by Toronto Public Health (TPH) and was undertaken to address community concerns about potential health impacts of the project as well as assist in distinguishing between alternatives. The HIA examined the potential for the proposed biosolids management alternatives to affect a number of health determinants in the study area. A Human Health Risk Assessment (HHRA) and the Cumulative Air Quality Assessment were used to inform the HIA which in turn was used to inform the Class EA. A HIA Stakeholder Group made up of representatives of various interested organizations was assembled and met twice to provide feedback on the focus of the HIA and to help identify issues of concern. The Stakeholder Group identified air quality, traffic safety, soil quality, neighbourhood characteristics, and stress and risk perception (noise and odours) as the most important health factors to focus on in the

HIA. A team of HIA external experts from across the country reviewed and supported the HIA methodology and final report.

Overall, the HIA concluded that the health impacts associated with the alternatives are very small and the differences among the alternatives do not result in appreciable differences in health impacts. All alternatives evaluated achieve significant reductions in air emissions compared to the current multiple hearth incinerators. Among the three alternatives, modern fluidized bed incineration is expected to produce the highest release of air emissions, while haulage off-site of biosolids, or pellets from the pelletizer, are expected to increase risks related to traffic (namely, safety, odour and noise).

The contribution of the existing HCTP incinerator facilities to the overall health risk from air pollution is very small. All the alternatives contribute less than 1% to the total cumulative risk in the study area and are predicted to reduce the air quality impacts when compared to the current situation. While there are differences among the alternatives, the contribution from Contaminants of Concern (COCs) to respiratory and cardiovascular induced hospitalizations and mortality is very small (less than 0.0004% contribution). The risks predicted for the other COCs contributed from the alternatives are well below a health-based benchmarks (greater than 1000% below benchmarks).

Long-term accumulation of chemicals in soil, dust, and backyard resulting from each of the short listed alternative was assessed. The study concluded that, while there were differences, human health risk due to exposure to air, soil, dust and home grown produce are, similar to air, extremely small and several orders of magnitude below health benchmarks.

Impacts on traffic safety, odour, noise, neighbourhood characteristics and stress and risk perception were assessed for all three alternatives. While there were differences, all impacts are very small.

The HIA identified differences in equity impacts associated with the route used by the trucks servicing the HCTP. Compared to Route 1 (along Morningside Ave), Route 4 (along Port Union Rd) had the lower predicted impact on the community in relation to pedestrian safety, noise and vulnerable populations.

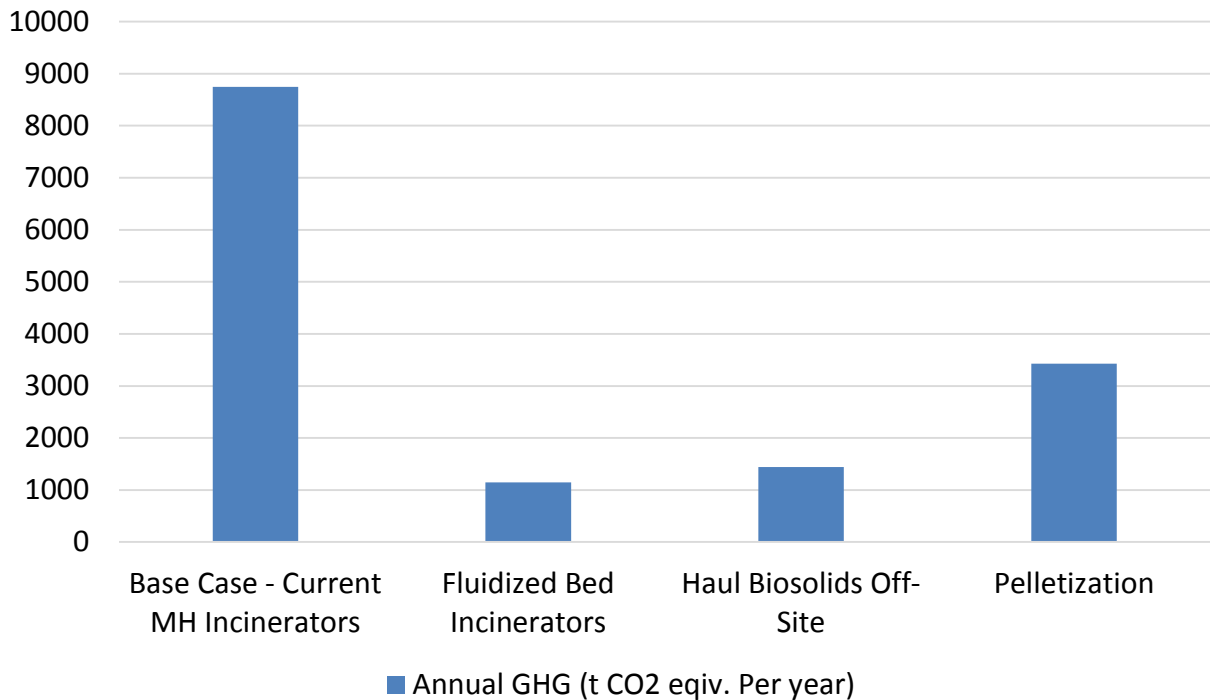
Additional details on the results of the HIA are summarized in the Board of Health report, available at:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2015.HL7.6>

Environmental Issues:

All alternatives represent less than 0.1% of typical per capital greenhouse gas emissions (GHG) (based on a service area of 500,000) and less than 0.04% of the City's reduction goal. The GHG contributions for each short listed alternative are as follows:

Figure 2: Greenhouse Gas Emissions



The predicted COC concentration in air and deposition of most COCs contributed from a fluidized bed incinerator alone would be lower than those from existing multiple hearth incineration emissions. This is because newer fluidized bed equipment has an improved combustion process, significantly reduced supplemental fuel usage and would incorporate mercury removal technology.

The off-site haulage of biosolids result in a decrease of many COCs, but an increase in barium, cobalt and polycyclic aromatic hydrocarbons (PAHs). These COCs are due to higher emissions from the diesel fueled trucks. This is also true for pelletization which results in slightly lower concentrations and deposition of COCs compared to biosolids haulage because fewer trucks are required to haul the pellets off-site.

Overall, air emissions modelling predicts that the biosolids management alternatives will not have an impact on air quality in the study area.

With respect to energy usage, the study concluded that the dryer/pelletizer would be the highest consumer of electricity and natural gas while the Beneficial Use/Haulage alternative would be the highest consumer of diesel fuel.

Long term reliability of each alternative is a critical environmental criterion as failures can result in loss of ability to remove biosolids from the HCTP and therefore rapid degradation of the HCTP effluent (and resulting impact on the Toronto shoreline), increased off-site odours and failure to meet regulatory requirements. The assessment summary is as follows:

Table 3: Reliability Risk Mitigation

Alternative	Event	Mitigation	Overall Risk
Fluidized Bed Incineration	Maintenance shut-down for incinerator repair	Full redundant capacity would be provided.	Same as existing
Haul biosolids off-site	Reliance on contractors. Highly weather sensitive option. Dependent on suitable outlets/markets. Further distances may be required to locate reliable sites as the most viable local options are already taken up by the ABTP biosolids program.	Limited (3 to 4 days) on-site storage. Use of multiple contractors. Haulage to landfill.	Least reliable
Pelletization and Pellet management	Reliance on technology (City's ABTP up-time experience of 75%) and contractors. Weather sensitive option. Dependent on identifying suitable outlets/markets.	Limited (3 to 4 days) on-site storage. Ability to bag and store at application site – although long term storage is problematic due to pellet reheating. Haulage to landfill.	Less reliable than existing

With respect to the risk and impacts due to spills, the EA concludes that none of the materials (ash, biosolids or pellets) would cause a significant environmental impact if spilled. The biosolids haulage option has most potential for spills of material and/or fuel due to number of trucks. Overall the risk of environmental impact due to a spill is very small.

Community/Social and Other Impacts:

Under this category, the study considered community opinion, working conditions for City staff, nuisance impacts (noise, odour, traffic, mud) and community impacts during construction.

A total of three public meetings were held during the EA study. The vast majority of attendees for each Public Meeting were from within the Wards 43 and 44 study area.

Table 4: PIC Attendance and Comments

	No. of Attendees (Signed In)	Number of Comments Received
Public Information Centre No. 1	70	31
Public Information Centre No. 2	62	54
Public Information Centre No. 3	120	552 (Comment period closed January 15, 2016)

The content of comments received during and after the third public meeting at which all the findings were presented is as follows:

545 submissions supported the modernization of the existing incineration facility and seven letters supported haulage of biosolids off-site for beneficial use (includes one industry submission). The four local community associations wrote letters supporting the modernization of the existing incineration facility and opposing the haulage of biosolids through the community.

The most frequent comments received fall into the following categories:

- Strong support for modernizing the existing incineration facility;
- Strong opposition to additional truck traffic through community;
- Concerns about the health impacts of land application of biosolids or pellets

With respect to working conditions for City staff, the incinerator option was assumed to have the same impacts as the existing, the haulage facility was deemed to pose some added impact due to exposure to the biosolids during truck loading, and the pelletizer option was deemed the worst due to odours within the pelletization facility.

With respect to non-health related nuisance impacts associated with noise, traffic, odour and mud, the incinerator option has the least impacts (same as existing), the biosolids haulage option has the most potential impacts due to trucks, and the pelletizer facility has some impact. In general, all impacts are expected to be of short duration and infrequent.

With respect to construction related impacts, most can be mitigated as all construction activity is confined to the HCTP site.

Economic Impacts – Cost:

The following summarizes the capital, annual operating and maintenance costs, and 25-year lifecycle costs for each of the alternatives assessed in the EA study. Conversion of the existing Multiple Hearth Incinerators to Fluidized Bed Incinerators with modern emissions controls involves the lowest capital cost, lowest Operations and Maintenance ("O&M") cost, and therefore the lowest 25-year lifecycle cost.

Table 5: Cost Estimates

Alternative:	Upgrade to modern Fluidized Bed Incinerators	Truck loading facility and haulage program to Beneficial Use and/or landfill	Pelletizer, pellet truck loading facility and haulage to Beneficial Use and/or landfill
Total Capital	\$107,000,000	\$112,500,000	\$148,000,000 ⁶⁷
Annual O&M Total	\$4,670,000 ¹²	\$8,438,000 ⁴⁵	\$5,808,000 ⁸
25-y Life Cycle Cost	\$267,000,000 ³	\$387,700,000 ³	\$346,000,000 ³

Some of the assumptions are as follows:

1. Includes O&M cost of existing digesters and two new fluidized bed incinerators.
2. Ash haulage based on current hauling cost (\$54/wet tonne), Green Lane tipping fee (\$59.6/wet tonne), and ash generation of 2,820 tonne/y.
3. Financial analysis based on 2.5% inflation and 0% interest (i.e. operating on a cash flow basis).
4. Includes O&M for the existing and new digesters, as well as new truck loading facility.
5. Based on the average of \$130/wet tonne of all biosolids hauling contracts currently in place for the Ashbridges Bay Treatment Plant (excluding pellets), and biosolids generation of 54,615 wet tonnes/year.
6. Pellet truck loading facility based on the biosolids truck loading facility at the HCTP from the Conceptual Design Report (CH2M, 2013) and pro-rated for pellets; including 35% contingency and 12% design allowance.
7. Based on the average cost per wet tonnes (\$54/tonne) of pellets hauling contract currently in place for the Ashbridges bay Treatment Plant (with Veolia and pellet generation of 15,800 tonne/y).
8. For the existing and new digesters, as well as new pelletizer and pellet loading facility.

Scoring of Alternatives:

A criteria weighting and scoring system was developed to help confirm/validate the apparent preferred option derived from the above noted findings. Four goal categories were identified and these were weighted based on the feedback received from the public as well as the expertise of the project team. The final average weightings used are as follows:

Table 6: Weighting Factors

Value Weights for Goal Categories Goal	Average Proposed Weight to Use for Evaluation 1
Protect public health	33%
Minimize impacts to the environment	27%
Minimize community impacts	24%
Minimize cost	16%

¹Of note, the weightings used in the Biosolids Masterplan were 16% for Costs, 42% Environmental and 42% Social.

A score of 1 to 5 was assigned to each of the 19 identified criteria. The following scoring system was used:

For each criteria, the scoring considered the following:

- Risk and/or potential impacts for that criteria
- Approaches to mitigating risks and/or impacts
- Scoring rationale, based on degree of risk and/or mitigation required.

Scores were generally assigned as follows depending on the specific criteria:

Table 7: Scoring Key

Score	Definition
5	Impacts and/or risks (of the alternative) are negligible with minimal additional mitigation required, or option would result in a net benefit
4	Impacts and/or risks are minor with little mitigation required.
3	Impacts and/or risks are moderate with some mitigation required.
2	Impacts and/or risks are major with significant mitigation required.
1	Impacts and/or risks are severe with extensive mitigation require

The final scoring table contained in the EA study is as follows:

Table 8: Scoring Summary

Goal and Weighting	Performance Objective	Criteria	Alternative 1 Fluidized Bed Incineration		Alternative 2 Haul Biosolids Off-Site		Alternative 3 Pelletization	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Protect Public Health (33%)	Minimize Impacts to the Health of Members of the Community	1. Minimize health impacts from air emissions	5	33%	5	33%	5	33%
		2. Minimize stress related health impacts	5		5		5	
		3. Minimize risk of unsafe traffic conditions	5		5		5	
		4. Minimize health impacts from contamination of soils	5		5		5	
		5. Minimize health impacts that may result due to changes to the neighbourhood characteristics	5		5		5	
		6. Minimize risk of increasing health inequities	5		5		5	
Minimize Impacts to the Environment (27%)	Protect Air Quality	7. Minimize environmental impacts due to air emissions	5	24%	5	22%	5	25%
	Protect Global Climate	8. Minimize greenhouse gas emissions	5		5		5	
	Protect Surface Water, Groundwater, Land and	9. Recover soil conditioning and fertilizer value of biosolids	2		4		5	

Goal and Weighting	Performance Objective	Criteria	Alternative 1 Fluidized Bed Incineration		Alternative 2 Haul Biosolids Off-Site		Alternative 3 Pelletization	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
	Terrestrial Resources	10. Minimize impact of spills or other adverse events during processing, handling, transportation and management	5		4		5	
		11. Minimize impacts during construction	5		5		5	
	Ensure a Reliable and Sustainable End Use	12. Minimize risks caused by service disruptions in the end use market	5		2		3	
		13. Minimize the use of non-renewable resources and energy sources	4		3		4	

Goal and Weighting	Performance Objective	Criteria	Alternative 1 Fluidized Bed Incineration		Alternative 2 Haul Biosolids Off-Site		Alternative 3 Pelletization	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Minimize Community Impacts (24%)	Maximize Quality of Community Life	14. Minimize potential sources of nuisance odours	5	23%	3	15%	3	15%
		15. Minimize potential for other nuisance community impacts (noise, traffic, dust, mud, aesthetics)	5		4		5	
		16. Minimize impacts during construction			4		4	
		17. Minimize negative public opinion and perception of risk	5		1		2	
	Maximize Quality of HCTP Working Conditions, Staff Health and Safety	18. Minimize odours, noise, dust and other potential exposures associated with the operation of biosolids facilities at the HCTP	5		4		2	
Minimize cost (16%)	Minimize cost	19. Minimize capital, operating and lifecycle costs.	5	16%	3.4	11%	3.9	12%
Total Weighted Score				96%		81%		85%

The above scoring confirms the apparent finding of the EA study that Alternative 1 – conversion to Fluidized Bed Incineration – is the preferred future biosolids management option for the Highland Creek Treatment Plant.

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Attachment 1 - Executive Summary of the Highland Creek Treatment Plant Biosolids
Class EA Study