



**CITY OF HAMILTON**

**PUBLIC HEALTH SERVICES**  
**Health Protection Division**

<b>TO:</b> Mayor and Members Board of Health	<b>WARD(S) AFFECTED:</b> CITY WIDE
<b>COMMITTEE DATE:</b> December 2, 2013	
<b>SUBJECT/REPORT NO:</b> Air Quality Task Force Action Plan (BOH13029) (City Wide)	
<b>SUBMITTED BY:</b> Elizabeth Richardson, MD, MHSc, FRCPC Medical Officer of Health Public Health Services Department	<b>PREPARED BY:</b> Matt Lawson 905-546-2424, Ext.5823
<b>SIGNATURE:</b>	Sally Radisic 905-546-2424, Ext.5549  Brian Montgomery 905-546-2424 Ext.1275

**RECOMMENDATION**

- (a) That the Medical Officer of Health, in partnership with Clean Air Hamilton be directed, pending identification of a funding source, to procure the development of an advanced airshed model for the City of Hamilton as described as “Recommendation 1” of the Air Quality Task Force Action Plan;
- (b) That Public Health Services staff, in partnership with Clean Air Hamilton be directed, pending identification of a funding source, to procure neighbourhood mobile monitoring surveys in identified neighbourhoods, as described in “Recommendation 2” of the Air Quality Task Force Action Plan;

- (c) That Public Health Services staff work with Planning and Economic Development staff to develop air quality-related guidelines for new and redeveloping neighbourhood land use planning, as described in “Recommendation 3” of the Air Quality Task Force Action Plan;
- (d) That Public Health Services staff work with Municipal Law Enforcement Staff, with assistance from Legal Services to review the Town of Oakville’s Particulate Matter Reduction By-law, and report back on how it could be adapted for a similar by-law in Hamilton;
- (e) That Public Health Services staff, with support from Municipal Law Enforcement staff review the Streets By-Law (No. 86-077) and report back to the Board of Health on possible areas of improvement, as described in “Recommendation 9” of the Air Quality Task Force Action Plan;
- (f) That the Board of Health support the recommendation in the Street Sweeping Program enhancement recommendation referred to the 2014 budget deliberation, to address corresponding budget requirements for the service level increase to the Industrial Zone Neighbourhoods, as recommended in Report PW13055; and as described in “Recommendation 10” of the Air Quality Task Force Action Plan;
- (g) That Clean Air Hamilton continues to coordinate education programming among community partners with regard to the promotion of green infrastructure to citizens, organizations and government, Air Quality Outreach Program within Hamilton schools, promotion of programs to encourage community-based environmental monitoring, as described in “Recommendations 4, 7 and 8” of the Air Quality Task Force Action Plan;
- (h) That Public Health Services staff work with the Ontario Ministry of the Environment and Clean Air Hamilton to develop and conduct particulate matter control workshops for local businesses and industries, as described in “Recommendation 10” of the Air Quality Task Force Action Plan.

## **EXECUTIVE SUMMARY**

In December 2012, Council requested that Clean Air Hamilton (CAH) establish an Air Quality Task Force (AQTF) to investigate and make recommendations to the City on actions that can be taken to reduce air pollution in Hamilton. The AQTF met monthly between January to July 2013, and prepared 10 recommendations in an Action Plan that were reviewed by all members of CAH. The AQTF Action Plan included recommendations in the areas of air modelling and monitoring, planning, education and

outreach, green infrastructure, and updating of municipal by-laws aimed at decreasing particulate matter in the environment. This report summarizes the recommendations of the AQTF, and articulates how these can be achieved by Public Health Services (PHS) in collaboration with other City departments and community stakeholders.

**Alternatives for Consideration – See Page 7****FINANCIAL / STAFFING / LEGAL IMPLICATIONS (for Recommendation(s) only)**

**Financial:** Appendix A attached identifies 10 recommendations for the City to undertake to address local air pollution. The AQTF believes an effective response includes a suite of different actions to address air pollution in Hamilton. The recommendations range in costs from \$8K to \$250K. If all eight recommendations are approved, the total costs will be approximately \$295,000.

PHS has submitted a 2014 Capital Budget request for \$125K to procure the development of a Hamilton-based airshed model to be undertaken over two years (2014-2015) identified as recommendation (a). PHS will seek matching funding from interested stakeholders and partners (industry, Ministry of the Environment, Environment Canada, Health Canada, and community environmental groups).

PHS has submitted a 2014 Capital Budget request for \$95K to continue the mobile neighbourhood air monitoring identified as identified in recommendation (c).

The education and outreach component of the plan is estimated to cost approximately \$55,000; which would be sourced from PHS existing operating budget.

Public Works has submitted a request for a 2014 budget enhancement for the \$20,000 cost to improve street sweeping operations in Hamilton's industrial core. Full details of the budget enhancement request for street sweeping can be reviewed in report PW13055.

**Staffing:** No new staff are required for Hamilton PHS in undertaking the recommendations identified in this staff report.

**Legal:** Improving air quality and air quality management is regulated in Ontario and Canada by Environment Canada and the Ontario Ministry of the Environment.

Ontario's local air quality regulation (O. Reg. 419/05: Air Pollution – Local Air Quality) works within the province's air management framework by regulating air contaminants released into communities by various sources, including local industrial and commercial

facilities. The regulation aims to limit exposure to substances released into air that can affect human health and the environment.

An airshed approach to air quality management systems (AQMS) has been proposed by the Canadian Council of Ministers of the Environment (CCME). Ontario has been engaged in the process to develop a national AQMS including airshed zone management (AZM) and regional airshed coordination. The AZM portion is intended to serve as guidance for jurisdictions, which are encouraged to implement measures to support air quality improvement. Details of AZM governance and guidance are still under development.

#### **HISTORICAL BACKGROUND** (Chronology of events)

**May 2012:** Following a presentation by Lorna Moreau representing the SOOT group, a discussion by the Board of Health (BOH) members ensued and the following motion was passed recommending:

- (a) That staff bring forward the Terms of Reference and Action Plan to the Board of Health, and a funding request be submitted to the Ministry of the Environment to assist with the costs of a pollution study; and
- (b) That staff be directed to establish an Air Quality Task Force, which is to include key stakeholders to determine whether pollution in neighbourhoods near Hamilton's industrial core is impacting human health; and report back to the Board of Health.

**July 2012:** Professor Brian McCarry, PhD., Chair of Clean Air Hamilton (CAH) presented the CAH *Air Quality Progress Report, 2011* to the Board of Health. Professor McCarry notified Council that he is aware of the motions passed at the May 2012, Board of Health meeting and indicated that CAH would be pleased to participate if a task force on air quality is formed.

**December 2012:** Council requested that Clean Air Hamilton establish a working group (ie. Air Quality Task Force) to investigate and make recommendations to the City on actions that can be taken to reduce air pollution in Hamilton.

**January 2013 to present:** Members of AQTF met monthly to develop recommendations in the Action Plan and review the recommendations with all members of CAH.

## **POLICY IMPLICATIONS/LEGISLATED REQUIREMENTS**

Addressing air quality is recognized by the Ontario Public Health Standards (2008) in reducing exposure to health hazards and increasing public awareness of air quality.

Addressing air quality is recognized in the following Corporate Strategic Directions and policies:

- *Vision2020* – addresses the goals of improving air quality and personal health and well-being outlined in Vision 2020.
- *2012 – 2015 Corporate Strategic Plan* - Strategic Objective 6.1 Enhance Overall Sustainability.
- *Corporate Air Quality & Climate Change Strategic Plan* – addresses the air quality and reduction of air pollutants and protecting health components of the Corporate Strategic Plan.

*2013 Public Health Services Departmental Business Plan* - the plan requires staff to establish an Air Quality Task Force, which is to include key stakeholders to determine whether pollution in neighbourhoods near Hamilton's industrial core is impacting human health, and report back to the Board of Health.

*City of Hamilton Official Plan* - Section 3.6.2 Air Quality and Climate Change component of the City's Official Urban Plan recognizes the improvement of air quality through several goals and policies.

Actions on air quality through the AQTF recommendations also support the goals and actions of other City policies including the Corporate Energy Policy, Green Fleet Policy, Corporate Smog Response, the Transportation Master Plan, the Cycling Master Plan, the Pedestrian Master Plan, the Water & Wastewater Master Plan, and the Solid Waste Master Plan.

## **RELEVANT CONSULTATION**

### **Clean Air Hamilton:**

CAH formed the AQTF which was comprised of the following individuals:

Denis Corr – Corr Research Associates

Matthew Lawson – City of Hamilton, PHS

Karen Logan – Hamilton Industrial Environmental Association

Lynda Lukasik – Environment Hamilton

George McKibbon – McKibbon Wakefield Planning Associates

Brian Montgomery – City of Hamilton, PHS  
Sally Radisic – City of Hamilton, PHS  
Andy Sebestyen – U.S. Steel Canada

**Planning and Economic Development:**

Planning and Economic Development staff are supportive of the creation of a set of Hamilton specific guidelines that address and strive to avoid or minimize local air quality issues. Planning staff would like to assist with the creation of the project work plan that will outline the project’s timeframe, key stakeholders and an implementation strategy as it relates to a set of Hamilton Air Quality Assessment Guidelines for Land Use Planning.

**Municipal Law Enforcement:**

Municipal Law Enforcement (MLE) was consulted on the recommendations related to by-law review and development. MLE is supportive of the review of the existing “Streets” by-law, but has indicated to PHS that they do not have resources to lead the development and enforcement of any new by-laws related to fugitive dust control.

**Public Works Department:**

Public Works staff was consulted on the issue of increasing street sweeping practices and referred PHS staff to report PW13055 that recommends a Street Sweeping Program enhancement be referred to the 2014 budget deliberation.

**ANALYSIS / RATIONALE FOR RECOMMENDATION**

(include Performance Measurement/Benchmarking Data, if applicable)

There have been numerous studies from all over the world confirming the adverse effects of air pollution on the health of a population<sup>1</sup>. In Ontario, it is estimated that short-term and long-term exposure to air pollution contributes to more than 5,800 premature deaths, 16,000 hospital admissions, 60,000 emergency room visits and at least 29 million minor illness days per year<sup>2</sup>. In addition, long-term exposure to PM<sub>2.5</sub> is estimated to contribute to approximately 9,500 premature deaths across Canada<sup>3</sup>.

In Hamilton, it is estimated that air pollution contributes to approximately 186 premature deaths, 395 respiratory hospital admissions and 322 cardiovascular hospital admissions each year<sup>4</sup>.

Air quality in the City of Hamilton is influenced by pollution coming into the City from long-range trans-boundary sources, local emissions generated from energy use, industrial releases, emissions from transportation sources and by meteorological conditions and atmospheric processes<sup>5</sup>. Therefore, it is important to stress that air pollution issues in the City of Hamilton are complex with multiple sources generated by

different contributors impacting local air quality; accordingly measures to reduce air pollution must take into account this complexity.

Clean Air Hamilton (2013) reports that despite long-term reductions over recent decades, the annual values for pollutants known to be hazardous to human health (PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, benzene and benzo[a]pyren) have all shown modest increases over the past three to four years. Moreover, in Hamilton, mobile air monitoring studies report that higher pollutant exposures were measured along arterial roads, major highways and intersections due to emissions from automobiles, light-duty and heavy-duty trucks<sup>5</sup>. Therefore, the recommendations outlined in this report; built upon air monitoring and modelling, planning, education and outreach, green infrastructure and municipal action, are intended to work synergistically to achieve air pollution reductions in the City of Hamilton.

#### **ALTERNATIVES FOR CONSIDERATION**

(include Financial, Staffing, Legal and Policy Implications and pros and cons for each alternative)

**A)** Undertake actions on planning, education and outreach recommendations of the AQTF Report without air monitoring or airshed modeling.

**Financial:** The costs of taking action on planning, education and outreach are estimated to be approximately \$55,000. This funding is the approximate amount of funding that CAH receives from PHS toward operating expenses. There would be no net financial impact.

**Staffing:** No staffing implications

**Legal:** Supports Ontario Public Health Standards on increasing public awareness of air quality but not to reducing exposure to health hazards of air quality.

**Policy Implications:** Supports education and outreach on air quality, but does not address multi sources of air pollutants in a strategic fashion, or increase understanding of local airshed to create comprehensive actions.

**Pros:** Low cost.

**Cons:** Does not identify sources of air pollution or create comprehensive cost-effective actions to reduce local air pollution; and therefore may be considered band-aid solutions towards improved air quality by the community.

**B)** Undertake airshed and air monitoring recommendations of the AQTF Report without outreach and education.

**Financial:** The estimated cost of recommended airshed modeling and air monitoring is \$345,000.

**Staffing:** No staffing implications

**Legal:** Supports Ontario Public Health Standards on reducing exposure to health hazards of air quality but does not to increasing public awareness of air quality.

**Policy Implications:** Support addressing multi sources of air pollutants in a strategic fashion or increase understanding of local airshed to create comprehensive actions. Would not address education and outreach on air quality in the community.

**Pros:** Help identify multi sources and locations of air pollutants to create comprehensive cost-effective strategies to address in local airshed. Increased understanding of local airsheds and air pollutants in community.

**Cons:** Would not support on-going education and awareness in community on air quality and taking local action.

**C)** Do not undertake any recommendations of the AQTF Report.

**Financial:** No financial implications

**Staffing:** No staffing implications

**Legal:** Does not support Ontario Public Health Standards on reducing exposure to health hazards and increasing public awareness of air quality.

**Policy Implications:** This would not support the request of BOH to Clean Air Hamilton on actions the City can take to address local air pollution.

**Pros:** None

**Cons:** This would not support the continuing leadership of Hamilton on addressing air quality or the needs of the community on addressing air quality. This would not support increase understanding of the local airshed or identification of enhanced actions to address local air quality and health improvements.



**ALIGNMENT TO THE 2012 – 2015 STRATEGIC PLAN:**

**Strategic Priority #1**

A Prosperous & Healthy Community

*WE enhance our image, economy and well-being by demonstrating that Hamilton is a great place to live, work, play and learn.*

**Strategic Objective**

- 1.4 Improve the City's transportation system to support multi-modal mobility and encourage inter-regional connections.
- 1.5 Support the development and implementation of neighbourhood and City wide strategies that will improve the health and well-being of residents.
- 1.6 Enhance Overall Sustainability (financial, economic, social and environmental).

**Strategic Priority #2**

Valued & Sustainable Services

*WE deliver high quality services that meet citizen needs and expectations, in a cost effective and responsible manner.*

**Strategic Objective**

- 2.2 Improve the City's approach to engaging and informing citizens and stakeholders.

**Strategic Priority #3**

Leadership & Governance

*WE work together to ensure we are a government that is respectful towards each other and that the community has confidence and trust in.*

**Strategic Objective**

- 3.1 Engage in a range of inter-governmental relations (IGR) work that will advance partnerships and projects that benefit the City of Hamilton.

**APPENDICES / SCHEDULES**

Appendix A – Action Plan - Report of the Air Quality Task Force (AQFT)

**References:**

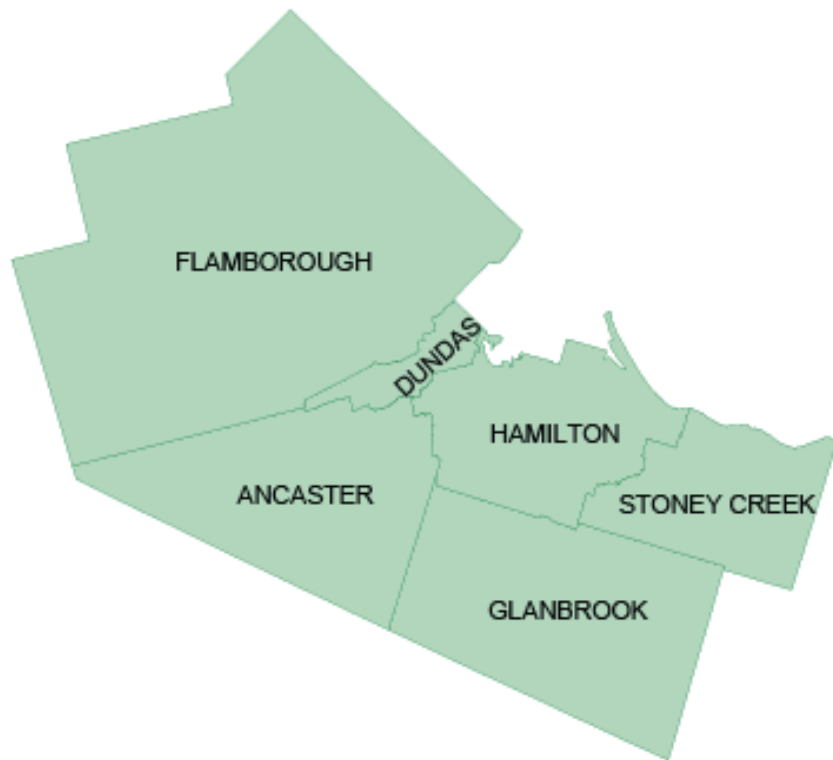
1. Kunzli and Perez, 2009
2. Ontario Medical Association, 2005
3. Canadian Medical Association, 2008
4. SENES, 2012
5. CAH, 2013

# ACTION PLAN

## Report of the Air Quality Task Force (AQTF)

### Hamilton Area Airshed

December 2013



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## Executive Summary

The Air Quality Task Force (AQTF) working group consisted of members from Clean Air Hamilton (CAH) who since 1998 have been working to improve air quality throughout the City of Hamilton. For well over a decade, CAH has provided City Council, City staff and the community with science-based information essential for better decision-making in the promotion and protection of air quality. The AQTF was established as a result of the motion passed on December 3<sup>rd</sup>, 2012 by the Hamilton Board of Health with the mandate to: “...investigate and make recommendations to the City on actions that can be taken to reduce air pollution in Hamilton.” This motion was brought forth as a result of local citizen concern about: “...residing in neighbourhoods in close proximity to Hamilton’s industrial core as they relate to air quality” (City of Hamilton Public Health Services BOH 12035, 2012).

Therefore, with their collective and extensive knowledge of air quality issues in the City of Hamilton, the AQTF developed a list of 10 recommendations: “on actions that can be taken to reduce air pollution in Hamilton” (Appendix A).

The AQTF believes an effective response going forward will include a suite of different actions intended to address the complicated interaction of Hamilton's unique geography, multiple sources of air pollution and the distribution of various land uses and transportation infrastructure within the City of Hamilton.

Further, many of the efforts to date have involved simple actions which have resulted in significant air quality improvements. However, further improvements in air quality may be dependent on more complex strategies required to address the complexity of Hamilton's airshed.

Air quality in the City of Hamilton is influenced by pollution coming into the City from long-range trans-boundary sources, local emissions generated from energy use, industrial releases, emissions from transportation sources and by meteorological conditions and atmospheric processes (CAH, 2013). Therefore, it is important to stress that air pollution issues in the City of Hamilton are complex with multiple sources generated by different contributors impacting local air quality; accordingly measures to reduce air pollution must take into account this complexity.

The AQTF emphasizes the importance of providing City of Hamilton residents with the tools to inform individual actions to reduce personal exposures. In order to be able to provide the public with such information, the AQTF recognizes the important role of air quality modeling as a tool designed to provide the information required to guide individual choices.

There have been numerous studies from all over the world confirming the adverse effects of air pollution on the health of a population (Kunzli and Perez, 2009). Short spikes or peaks in air pollution have been linked to school and work absenteeism, asthma symptoms, hospital admissions and emergency department visits for heart and

lung conditions, and premature deaths. Furthermore, increases in heart and lung cancer and reduced life expectancy have been statistically linked to chronic PM<sub>2.5</sub> exposure (Pope et al., 2002).

In Ontario, it is estimated that short-term and long-term exposure to air pollution contributes to more than 5,800 premature deaths, 16,000 hospital admissions, 60,000 emergency room visits and at least 29 million minor illness days per year (Ontario Medical Association, 2005). In addition, long-term exposure to PM<sub>2.5</sub> is estimated to contribute to approximately 9,500 premature deaths across Canada (Canadian Medical Association, 2008).

In Hamilton, it is estimated that air pollution contributes to approximately 186 premature deaths, 395 respiratory hospital admissions and 322 cardiovascular hospital admissions each year (SENES, 2012).

Clean Air Hamilton (2013) reports that despite long-term reductions over recent decades, the annual values for pollutants known to be hazardous to human health - PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, benzene and benzo[a]pyrene - have all shown modest increases over the past three to four years. Moreover, in Hamilton, mobile air monitoring studies report that higher pollutant exposures were measured along arterial roads, major highways and intersections due to emissions from automobiles, light-duty and heavy-duty trucks (CAH, 2013). Therefore, monitoring has been instrumental in providing helpful information on key air pollutant types and sources in the City of Hamilton.

This report presents and describes components of an action plan that looks to the individual, community, and all levels of government to take steps toward a comprehensive approach to air pollution reduction in the City of Hamilton.

## **Background**

On December 3<sup>rd</sup>, 2012, the Hamilton Board of Health passed a motion that received and approved the following recommendation: *“That Clean Air Hamilton establishes a working group to investigate and make recommendations to the City on actions that can be taken to reduce air pollution in Hamilton.”* Members of Clean Air Hamilton (CAH) were informed of the motion passed by the Board of Health, mandating that CAH form a task force to investigate and bring forward recommendations on actions that can be taken to reduce air pollution in Hamilton.

## **Air Quality Task Force (AQTF)**

Participation on this task force was open to interested members of Clean Air Hamilton. The task force Chairperson, a member of Clean Air Hamilton, led the group toward satisfying the mandate from the Board of Health. The Air Quality Task Force (AQTF) met on a monthly basis in 2013.

The AQTF consulted with stakeholders in order to develop its recommendations to the Board of Health about what actions should be taken to improve air quality.

The AQTF developed this action plan which contains recommendations in the following areas:

- i. Air monitoring and modelling;
- ii. Planning;
- iii. Education & outreach; and
- iv. Municipal action

## **Vision**

Through the collective involvement of citizens, community and government in the City of Hamilton (Figure 1), the AQTF supports: “*actions that can be taken to reduce air pollution in Hamilton*” and that have the potential to result in:

- Improved human health due to decreased exposure to air pollutants
- A sustainable environment which receives fewer and lower emissions and produces less detriment to the local airshed
- A higher quality of life for individuals who live and/or work in the City of Hamilton
- A legacy for future generations that includes a cleaner environment

## **Airshed Management System**

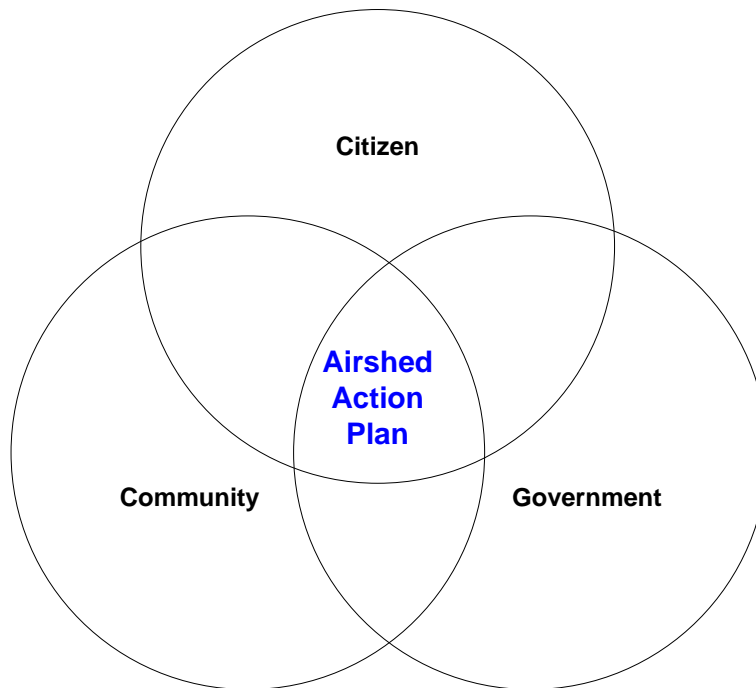
An airshed has been described as: “a defined physical geographical area which is covered by a volume of air that has similar characteristics and into which air pollutants are deposited and often remain for a period of time” (Balsillie, 2010). It is important to note that the area may be made up of many jurisdictions since emissions from one jurisdiction have the potential to impact air quality in other jurisdictions.

It is recognized that multiple emission sources, including those from the transportation, industrial and residential sectors, all contribute to air pollution concerns and will only increase with population growth. In order to address these multiple emission sources, an integrated approach with multi-stakeholder participation is essential.

Stakeholder engagement and involvement with respect to control actions taken in response to evidence-based results, air monitoring and modeling, education and outreach, as well as planning are all critical to improving air quality in the City of Hamilton.

The AQTF brings forward 10 recommendations “*on actions that can be taken to reduce air pollution in Hamilton*” (Appendix A). The 10 recommendations have been organized from one to ten with each recommendation building on the previous one thereby creating an integrated and comprehensive approach to air pollution reduction for the City of Hamilton to apply. Therefore, ordering of recommendations has been done in a systematic manner rather than one of priority.

Figure 1. Collaborative partnership to reduce air pollution in Hamilton



### Components of the Action Plan

i) Air Modelling and Monitoring

There are now advanced air quality models available that can be used to determine the contribution of air pollution to the geographical distribution of ambient air concentrations that residents are exposed to right down to a neighbourhood level. Emissions from multiple sources including transportation, industry, agriculture/biogenic emissions, community and residential and long-range sources (i.e. transboundary) can be accounted for in these air quality models. Moreover, existing inventories and data including those from the US EPA, Environment Canada, Ministry of Environment, the Hamilton Air Monitoring



Network (HAMN) and Ministry of Transportation will be incorporated into the air quality modelling system.

Air quality modelling is an essential tool since it not only explains current air quality conditions, it can also predict air quality using forecast conditions. Air quality models use data on emission sources and data on atmospheric processes and terrain characteristics to forecast ambient air quality and the contribution of different sectors to local air quality. Therefore, numerous potential future scenarios such as new policy implementation and/or proposed new sources of emissions can be estimated beforehand with the use of air quality modelling to inform effective mitigation strategies. With the use of advanced air quality modelling, the City of Hamilton could gain a better understanding of the contribution of emissions from different sectors and would be able to predict potential impacts of policies pertaining to new development, land use and transportation on air quality. Members of the Hamilton Industrial Environmental Association (HIEA) have already expressed readiness to invest in an advanced airshed model. The great value of advanced airshed modelling has already been recognized by neighbouring municipalities such as Halton and Peel Region, which have put such systems in place. Therefore, the AQTF brings forward:

### **RECOMMENDATION 1**

**Commit to partnerships with interested stakeholders to fund the development of an advanced air model for the City of Hamilton.**

Because air modelling is dependent on air monitoring data, the AQTF brings forward:

### **RECOMMENDATION 2**

**Strengthen air monitoring activities through additional:**

- a. Neighbourhood mobile monitoring surveys;**
- b. Number and location of air monitors;**
- c. Monitoring strategies and technologies.**

#### ii) Planning

Land-use planning is critical for managing air quality levels in the City of Hamilton. By considering land-use planning early on in the process, future localized air quality issues impacting sensitive land uses can be avoided or

minimized. The importance of this early involvement in land-use planning has been recognized and outlined by Halton Region in two draft reports.

The first includes the Draft Air Quality Assessment Guidelines (Appendix B) which provide a framework for the municipal decision-making practice pertaining to sensitive land uses and residential, industrial, transportation and utility development applications in order to uncover the potential for harmful impacts to air quality.

The second includes the Draft Land Use Compatibility Guidelines (Appendix C) which are set out to protect and improve the health and quality of life of people within the area by endorsing the implementation of Regional Official Plan Amendment 38 (ROPA 38) policies on land use compatibility. This policy aims to minimize the negative impacts of air pollution from industrial, transportation and utility sources on sensitive land uses. Therefore, guidance is offered to developers with respect to land use compatibility issues via the planning and development approval process such that appropriate development is advanced and factors such as intensification, mixed use communities, and transit supportive urban form are taken into consideration.

Therefore, the AQTF brings forward:

### **RECOMMENDATION 3**

**Develop appropriate air quality related guidelines for new and redeveloping neighbourhood land use planning. These guidelines should consider the potential impacts of personal transportation, arterial roads, 400 series highways and site specific and technical standards for industrial emissions.**

In addition, the US EPA (2013) reports that vegetation can reduce ground level ozone by reducing air temperatures, reducing power plant emissions associated with air conditioning, and removing air pollutants. It is noted that green infrastructure features can reduce particulate matter by absorbing and filtering it. Moreover, a study on the benefits of green infrastructure conducted in the City of Philadelphia has found green infrastructure has the potential to reduce ozone and particulate pollution levels significantly enough to reduce mortality, hospital

admissions, and work loss days (Stratus Consulting Inc., 2009). Not only do green roofs reduce air pollution but they also reduce urban heat-island impact, control storm water runoff and lower energy consumption (City of Hamilton, 2011). The City of Toronto has recognized the importance of green roofs and street shading by implementing supportive bylaws. Therefore, the AQTF brings forward:

#### **RECOMMENDATION 4**

**Promote green infrastructure (i.e. green roofs, street shading) to be supported by citizens, organizations and government.**

#### iii) Education & Outreach

Air quality data must be shared with key stakeholders, including community members and government, effectively such that knowledge and awareness of air quality conditions in the City of Hamilton can be increased and collective air pollution reduction and risk management strategies can be undertaken. Paying careful attention to the manner in which environmental health information is presented will allow citizens to incorporate important information into their health decision-making processes (Peters, Hibbard, Slovic, Dieckmann, 2007). Therefore, the AQTF brings forward:

#### **RECOMMENDATION 5**

**Provide individuals with tools to minimize their personal exposure. These tools should include a real-time map of air quality conditions in the City of Hamilton to encourage alternative modes of transportation such that citizens have the opportunity to select pedestrian and cycling routes which would minimize their personal exposure to air pollution.**

Since previous engagement with local business operators about fugitive dusts and environmental impacts has fostered air pollution reduction measures (CAH, 2010), the AQTF brings forward:

## **RECOMMENDATION 6**

**Develop and conduct particulate matter control workshops in partnership with the Ontario Ministry of the Environment for local businesses and industries.**

Because health decision-making processes in adulthood are shaped by early life course experiences (Umberson, Crosnoe, Reczek, 2010), the AQTF brings forward:

## **RECOMMENDATION 7**

**Expand the Air Quality Outreach Program within Hamilton schools such that air quality curriculum (ie., benefits of anti-idling, active transportation commuting routes, etc.) is promoted.**

In view of the fact that community-based environmental monitoring empowers community members with respect to influencing air quality and striving for change (Ottinger, 2010), the AQTF brings forward:

## **RECOMMENDATION 8**

**Promote programs that encourage community-based environmental monitoring and engagement within the City of Hamilton.**

### iv) Municipal Actions

As noted earlier in the report,  $PM_{2.5}$  levels have shown modest increases over the past three to four years in Hamilton (CAH, 2013). Research has found that fine particulate matter is harmful to human health (Pope et al., 2002). This increase in  $PM_{2.5}$  suggests that further opportunities for improvement are needed. Recognizing that  $PM_{2.5}$  comes from many different sources, the AQTF brings forward:

## **RECOMMENDATION 9**

**Support the revision, updating and enforcement of existing bylaws to minimize the generation and dispersion of airborne particulate matter.**

Given that street washing has been identified as an effective strategy to mitigate curb side particulate matter (Amato et. al., 2009). The AQTF brings forward:

## **RECOMMEDATION 10**

**Implement strategies to improve street cleaning by taking into account factors such as cleaning schedules and equipment effectiveness.**

## **Conclusion**

Although there has been a downward trend in pollutant levels since the mid-1990s, recent (3-4 year) increases in PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, benzene and benzo[a]pyrene are of concern and require direct attention. The AQTF was mandated to investigate and bring forward recommendations on actions that can be taken to reduce air pollution in Hamilton. Since multiple emission sources including those from the transportation, industrial and residential sectors contribute to air pollution in Hamilton, an integrated approach with citizens, community and government is essential. After consulting with stakeholders, the AQTF has brought forward 10 recommendations in this action plan to reduce air pollution in Hamilton. These 10 recommendations - built upon air monitoring and modelling, planning, education and outreach, green infrastructure and municipal action - are expected to work synergistically to achieve air pollution reductions in the City of Hamilton. Careful consideration of each recommendation in ascending order is necessary to understand the benefits of an integrated and comprehensive action plan to address air pollution in the City of Hamilton.

Appendix A  
**AQTF Recommendations**

Component	Recommendation #	Description	Preliminary Cost Estimates (\$)	Timeframe
Air Monitoring and Modelling	1	Commit to partnerships with interested stakeholders to fund the development of an advanced air model for the City of Hamilton.	250 000/3	over 2 year period
	2	Strengthen air monitoring activities through additional: a. neighbourhood mobile monitoring surveys; b. number and location of air monitors; c. monitoring stations and technologies.	100 000	1 year
Planning	3	Develop appropriate air quality related guidelines for new and redeveloping neighbourhood land use planning. These guidelines should consider the potential impacts of personal transportation, arterial roads, 400 series highways and site specific and technical standards for industrial emissions.	50 000	1 year
	4	Promote green infrastructure (i.e. green roofs, street shading) to be supported by citizens, organizations and government.		
Education & Outreach	5	Provide individuals with tools to minimize their personal exposure. These tools should include a real-time map of air quality conditions in the City of Hamilton to encourage alternative modes of transportation such that citizens have the opportunity to select pedestrian and cycling routes which would minimize their personal exposure to air pollution.	10 000 15 000	1st year every year after
	6	Develop and conduct particulate matter control workshops in partnership with the Ontario Ministry of the Environment for local businesses and industries.	8 000	
	7	Expand the Air Quality Outreach Program within Hamilton schools such that air quality curriculum (i.e. benefits of anti-idling, active transportation commuting routes) is promoted.	12 000	
	8	Promote programs that encourage community-based environmental monitoring and engagement within the City of Hamilton.	20 000	
Municipal Action	9	Support the revision, updating and enforcement of existing bylaws to minimize the generation and dispersion of airborne particulate matter.		
	10	Implement strategies to improve street cleaning by taking into account factors such as cleaning schedules and equipment effectiveness.	20 000 - 66000	1 year

TOTAL		
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**Appendix B Draft Air Quality Assessment Guidelines**

Retrieved from:  
[www.halton.ca/common/pages/UserFile.aspx?fileId=94341](http://www.halton.ca/common/pages/UserFile.aspx?fileId=94341)

## **Appendix C Draft Land Use Compatibility Guidelines**

Retrieved from:

<http://www.halton.ca/common/pages/UserFile.aspx?fileId=94338>



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