INFORMATION REPORT

TO:	Mayor and Members Board of Health
COMMITTEE DATE:	January 10, 2022
SUBJECT/REPORT NO:	Clean Air Hamilton Annual Progress Report (BOH22001) (City Wide)
WARD(S) AFFECTED:	City Wide
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COUNCIL DIRECTION

Clean Air Hamilton reports annually to Board of Health (BOH) on the trends in local air quality and the actions undertaken by members of Clean Air Hamilton to address local air quality in Hamilton.

The “Clean Air Hamilton 2020 Air Quality Progress Report”, attached as Appendix “A” to Report BOH22001 provides further details.

INFORMATION

Clean Air Hamilton (CAH) is a community initiative to improve air quality in the City of Hamilton. It has a diverse membership with representation from environmental organizations, industry, businesses, academia, citizens and different levels of government including federal, provincial and municipal.

Initiated in 1998, CAH works to improve air quality throughout the City of Hamilton with an objective to meet all ambient air quality criteria. Public Health Services’ staff in the Healthy Environments Division supports the work of CAH and other work related to air quality and climate change across the corporation and the community.

The CAH committee aims to accomplish its objectives through sound science-based decision-making, using the most up-to-date information and tools available. CAH's work focusses on education and outreach, advocacy, air quality monitoring, and to continue to update the Hamilton Airshed Modelling System (HAMS). This will help identify major sources, and distribution, of air pollution in order to prioritize action for maximum air quality improvement and exposure reduction. CAH continues to follow the previously developed five strategic themes related to air quality improvement:

- Governance & Structure;
- Air Zone Management;
- Transportation;
- Air Monitoring; and,
- Dust and Particulate Matter (PM) Mitigation.

Throughout 2020, CAH continued to work on actions identified in the Air Quality Task Force's (AQTF) 2018 workshop which identified three main areas of focus including:

- Education;
- Air Quality Monitoring; and,
- Hamilton Airshed Modelling System.

These actions were assigned responsibility and helped create a three-year workplan for completion. By the end of 2020, CAH has completed seven of the fourteen actions within the 2019-2022 work plan. These actions included:

- Completion of a Communication and Education Awareness Strategy for Clean Air Hamilton to implement;
- Completed one of three Upwind Downwind (UWDW) virtual lunch and learns (in replacement of large in-person UWDW conference);
- Fresh Air for Kids 2020/2021 program work completed by Green Venture and Corr Research Inc. More details on page 3 of this report;
- Friendly Streets Initiative 2019 program completed by Environment Hamilton (see 2019 CAH progress report for more details).
- Trees Please program completed by Environment Hamilton. More details on page 3 of this report;
- Ministry of Environment, Conservation and Parks (MECP) deployment of 4 operational T640 devices to monitor PM levels and air quality; and,
- Hamilton's Airshed Model Urban and Rural Sub-Regional Analysis.

Further details on air quality activities related to CAH and its members can be found in Appendix "A" to Report BOH19039.

Clean Air Hamilton Programs 2020

A. Fresh Air for Kids (FAFK)

FAFK aims to educate students on air quality, map neighbourhood air quality using a mobile monitoring unit from the MECP. The program teaches students about the monitoring of local air quality using hand-held devices and creates and delivers an environmental anti-idling campaign. As a result of the COVID-19 pandemic, the FAFK program was adapted to the virtual learning environment, where four sessions were provided using different strategies:

1. Pre-recorded videos and PDF activity sheets;
2. Providing other sessions through pre-booked live video calls; and
3. Creating online versions of student/teacher surveys, and student pledges.

Throughout the 2020-2021 school year, seven schools participated, out of which three completed the full four modules of the program. Despite the pandemic, FAFK engaged 218 students throughout this project year.

B. Trees Please!

Trees Please is a citizen science project with all data collected being completed by teams of volunteers who have been trained on proper tree identification and inventorying. The project comprised two main parts:

1. Tree inventory development (measuring, identifying and noting any challenges on trees); and
2. Collecting air quality data, specifically particulate matter (PM) levels.

The tree inventory is completed using iTree Eco, a free software program from the USDA Forest Service that calculates tree benefits. For air quality data, the project uses Dylos air quality monitoring devices that measures PM levels.

The goal of this project is to engage residents on local issues around air quality and urban forest health, by helping community members to understand that trees can help improve air quality and provide many other benefits. In 2020, the project was able to meet program goals, despite the pandemic, including:

1. Inventorying 451 trees in the Parkside Neighbourhood;
2. Organizing air quality monitoring walkabouts and distributing flyers;
3. Increasing the native tree canopy through a Free Tree giveaway (31 trees in total). This is in addition to a larger community-wide giveaway of 600 native trees and shrubs; and
4. Organizing a community tree planting in the fall of 2020, planting 200 native trees with 15 volunteers.

Air Quality Improvement Projects 2021

City staff in the Healthy Environments Division have worked with Procurement staff to update CAH funding to align with Procurement Policy (By-law No. 20-205). This included creating a competitive Request for Proposal (RFP) document and process. In total the City of Hamilton received four bids. As with previous years, the applications were scored by three adjudicators specializing in air quality, community planning and project management. Two applications were successful through the 2021 funding application process including:

1. Green Venture and Corr Research Inc. Fresh Air for Kids ($11,700); and
2. University of Toronto's Air Quality Research Project in Hamilton – ($7,000).

The results of these programs will be reported in the Clean Air Hamilton 2021 Air Quality Progress Report and presented to the Board of Health in 2022.

Upwind Downwind Lunch & Learn

The COVID-19 pandemic meant that Clean Air Hamilton's signature event, the Upwind Downwind (UWDW) Conference 2020 and the Clean Air Fair were cancelled. Rather than abandoning the plans altogether, CAH shifted gears and moved to run a series of virtual Lunch & Learns featuring speakers and topics from UWDW. The first one was held in December 2020 on the topic of *Transboundary Air Quality*, featuring:

1. Zac Adelman, Executive Director, Lake Michigan Air Directors Consortium (LADCO) who presented on *Perspectives on Air Quality in the Great Lakes Region in 2020*; and
2. Paul Miller, Executive Director, Northeast States for Coordinated Air Use Management (NESCAUM), from Boston, MA who presented on *Trucks, Air Quality, and Climate*.

Through these Lunch & Learns, CAH is able to provide the community with ongoing education and awareness about local and international air quality issues.

Air Quality in Hamilton

The MECP monitors air quality using the network of air quality monitoring stations across Hamilton. This network consists of provincially-owned air quality monitoring stations, air monitors owned and operated by members of the Hamilton Air Monitoring Network (HAMN), as well as two air-pointer monitors owned and operated by the City of Hamilton.

Air quality data is submitted to CAH and Hamilton Public Health Services (PHS) annually, which is reported to Board of Health and the community. The air quality data submitted continues to show a significant reduction city-wide in many of the monitored air pollutants since 1996. Based on the 2020 air quality data submitted, the following

concentrations and trends were observed for the following criteria air contaminants:

Total Suspended Particulate (TSP)

- Total suspended particulate (TSP) includes all particulate material with a diameter less than approximately 45 micrometres (µm). A substantial portion of TSP is composed of road dust, soil particles and emissions from industrial activities and transportation sources;
- The two Industry Stations in Hamilton show a decreasing trend of TSP and all stations (two City & two Industry) are below the annual objectives.

Inhalable Particulate Matter (PM_{10})

- Inhalable particulate matter (PM_{10}) has a diameter of 10 µm or less. PM_{10} makes up 40-50% of TSP in Hamilton and is primarily derived from vehicle exhaust emissions, industrial stack and fugitive dusts (non-stack), and the finer fraction of re-entrained road dust;
- The two Industry and two City stations located in Hamilton show decreasing trends since 2018.

Respirable Particulate Matter ($PM_{2.5}$)

- $PM_{2.5}$ makes up about 60% of PM_{10} and in most cities is derived from residential and transportation sectors. In Hamilton, there would also be some industrial contributions. Another significant portion of $PM_{2.5}$ is regionally generated emissions that can travel hundreds of kilometres via wind from where they originated. These transboundary flows play a significant role in Ontario's air quality and according to the Hamilton Airshed Modelling System (HAMS), transboundary emissions in Hamilton for $PM_{2.5}$ amounted to approximately 91%;
- The Hamilton Mountain and Hamilton Downtown air quality stations show a decreasing trend of $PM_{2.5}$, whereas the Hamilton West station shows an increase between 2019 to 2020;
- MECP data shows that Hamilton Downtown continues to have the highest concentrations of $PM_{2.5}$ relative to other municipalities across Ontario that have air quality stations measuring $PM_{2.5}$.

Ozone (O_3)

- The number of hourly exceedances greater than 50 parts per billion (ppb) increased in 2020 in comparison to 2019 for the Hamilton Downtown, Hamilton Mountain, and Hamilton West monitoring stations, but is below 2018 levels;
- Hamilton's 30-year ozone trend is comparable to many other municipalities in Ontario. Recent 2020 concentrations show Hamilton having one of the lowest concentrations of O_3, compared to other jurisdictions.

Sulphur Dioxide (SO_2)

- Concentrations since 2016 have shown a slight increase for Industrial Site 1, with

the annual average being recorded above the provincial Annual Objective;
- Conversely, SO_2 monitored at the Hamilton Downtown station has been decreasing since 2018 and was below the annual objective in 2020;
- While SO_2 concentrations in downtown Hamilton are achieving the provincial Annual Objectives, the average concentrations are higher compared to other Ontario municipalities.

Note: In 2018 the Province of Ontario approved a decision (EBR# 013-0903) to reduce the SO_2 standards to:
- 1-hour average air standard to 100 micrograms per cubic meter ($\mu g/m^3$) based on respiratory morbidity associated with exposure; and
- Annual average air standard for SO_2 to 10 $\mu g/m^3$, based on vegetation damage with exposure to this substance.

This decision contains a phase-in period with the air standard and will take effect on July 1, 2023[1].

Nitrogen Dioxide (NO_2)
- Sectors producing the majority of NO_2 emissions are transportation and industry. The level of vehicle use across Hamilton has increased slightly during the past decade, however overall NO_2 levels have decreased most likely due to improved vehicle engine technologies;
- NO_2 concentrations have shown a significant decrease since 1999. In recent years, the Hamilton Downtown air monitoring station recorded a steep decrease for 2019 to 2020. There is an increasing trend observed at Industrial Site 1 since 2018;
- NO_2 concentrations in Hamilton are higher when compared to other Ontario municipalities.

Benzene
- Benzene is a carcinogenic (cancer-causing) volatile organic compound (VOC) that is emitted from some operations within the steel industry, specifically coke ovens and coke oven by-product plant operations. Gasoline can also be up to 5% benzene. Vapours containing benzene may be released during pumping at gasoline stations. Transboundary benzene levels amount to 70% according to HAMS;
- Concentrations of benzene for all monitoring stations (Industry 1, 2, 3, and Hamilton Downtown) remain above the Annual Objective.

Benzo[a]pyrene (BaP)
- BaP, also a carcinogen, is emitted when carbon-based fuels such as coke, oil,

[1] Environmental Registry (2018). Regulatory amendments related to air emissions of sulphur dioxide and other items. Retrieved from https://ero.ontario.ca/notice/013-0903

wood, coal and diesel fuel are burned. BaP-generating activities include coke oven operations within the steel industry, incomplete combustion producing smoke such as vehicle traffic, burning of refuse, cooking, tobacco smoking, and wood burning;

- BaP has an increasing trend at all three monitoring stations (Industry 1, Industry 2, and Industry 3) and concentrations are above the Annual Objective;
- It is important to note that source apportionment for BaP from HAMS shows that industrial sources amount to 47% for BaP emissions, while transboundary emissions contribute to 29% of BaP concentrations in the City of Hamilton.

It is important to note that there is significant amount of transboundary (air emission sources outside of Hamilton) contributions to local airshed pollution concentrations in Hamilton. For example, and as noted above, HAMS estimated that transboundary sources contribute approximately 90% of $PM_{2.5}$, 70% of Benzene, and 29% of BaP concentrations locally across Hamilton. However, local industrial, on-road and off-road transportation emissions continue to contribute to localized air pollution and downwind airsheds as well.

2020 Air Quality Alerts

Two different air quality alerts are issued during periods of poor air quality in Ontario. A *Special Air Quality Statement* is issued when the Air Quality Health Index (AQHI) is a high risk (>6) and is forecast to last for 1-2 hours. If the high-risk AQHI level is forecasted to persist for at least 3 hours or longer, then a *Smog and Air Health Advisory* will be issued by the Province of Ontario.

In 2020, Hamilton did not experience any *Special Air Quality Statements* or *Smog and Air Health Advisory* instances[2]. For more information on current and historical air quality concentrations in Hamilton and across Ontario see: http://www.airqualityontario.com/.

Clean Air Hamilton notes that air pollution concentrations can be different at a local neighbourhood level and some areas of Hamilton can and do experience higher air pollution concentrations than others across the City.

Future Actions

There has been substantial improvement in Hamilton's overall air quality since the 1970s; however, air pollution continues to contribute to adverse health impacts to Hamilton residents. Recent improvements and information related to air pollution distribution at the hyper-local level is also providing evidence that some neighbourhoods across Hamilton experience higher levels of air pollution compared to others. Continued

[2] Ministry of Environment, Conservation, and Parks (2021). SAQS & SAHA 2015 TO 2021. Retrieved from http://www.airqualityontario.com/aqhi/advisories_stats.php

actions are imperative to further improve air quality in the City of Hamilton. Collaboration from individuals, organizations, industries, the City of Hamilton and other levels of government are required to reach our goals.
In the future, Clean Air Hamilton plans to:

- Continue to support and undertake all the recommendations of the Air Quality Task Force (BOH13029) and BOH report (BOH18016) in the areas of air modelling and monitoring, planning education and outreach, green infrastructure and advocating for government policies that encourage and facilitate behavioural change to active and sustainable transportation and alternative forms of efficiency and renewable energy for buildings;
- Continue to support and encourage Hamiltonians to reduce their transportation emissions through the use of alternatives including: public transit, bicycles, walking, hybrid or electric vehicles, etc. and support policies such as complete streets and transportation demand management;
- Encourage the continued efforts of the MECP and industry to reduce air borne contaminants in the City of Hamilton and the Province of Ontario;
- Organize additional UWDW Lunch & Learn sessions to educate and engage the City of Hamilton community on a broad range of air quality topics; and
- Continue to expand air quality monitoring activities by undertaking projects with community organizations and academic institutions in the City of Hamilton to better understand air pollution concentrations at the neighbourhood level.

APPENDICES AND SCHEDULES ATTACHED

Appendix “A” to Report BOH22001: Clean Air Hamilton Annual Progress Report 2020