SUBJECT: Corporate Air Quality and Climate Change Strategic Plan – Phase I (PED06336) (City Wide)

RECOMMENDATION:

a) That Council endorse the Corporate Air Quality and Climate Change Strategic Plan, as outlined in the Corporate Air Quality and Climate Change Strategic Plan – Phase I Report, attached as Appendix A to Report PED06336, and support:

i) The creation of an internal Air Quality and Climate Change Working Group of representative Departments to develop the Corporate Air Quality and Climate Change Strategic Plan Phase II that will address the implementation details of the long-term Plan.

b) That the City develops a City-Wide Hamilton Air Quality and Climate Change Plan and works with the community to engage and develop the City-wide Plan through:

i) Hosting a Hamilton Climate Change Roundtable to engage citizens on climate change and activities to reduce greenhouse gases at the community level. The roundtable forum could assist in the development of a Climate Change Advisory Committee for the City.

Lee Ann Coveyduck
General Manager
Planning and Economic Development Department

EXECUTIVE SUMMARY:
In 2004-2005, the City received several enquiries from citizens asking for Hamilton’s Plan with respect to Air Quality and Climate Change. Planning and Economic Development staff was requested to come to Council with a Climate Change Plan in April 2005. This request was extended with a presentation to Council in 2006. The Corporate Air Quality and Climate Change Strategic Plan Phase I has evolved from Council’s recent staff direction, and to meet the previous commitments of the City under the Federation of Canadian Municipalities Partners for Climate Protection Program, Council’s Strategic Plan, Vision 2020, the Clean Air Hamilton Strategic Plan, and the Provincial Policy Statement.

A proposed Corporate Air Quality and Climate Change Strategic Plan has five (5) categories of action that express the municipality’s objectives and commitments.

**Figure 1: The Corporate Air Quality and Climate Change Plan**

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The City of Hamilton currently delivers a variety of policies and programs that address air quality and climate change. Some have been expressly created for that purpose, while many others contribute to air quality and climate change issues as they pursue other goals. The report identifies many of these programs and classifies them under the action categories in the attempt to initiate a strategic plan that channels Corporate efforts to more effectively address both air quality and climate change.

A Corporate Air Quality and Climate Change Strategic Plan, will be a long term plan with phased implementation. Phase I is the identification of current actions undertaken by the Corporation, compiling the activities into action categories, setting out the strategic directions and clarifying the roles and responsibilities of City Departments with respect to air quality and climate change.

Phase II, will focuses on long-term implementation details and new strategic actions. An Inter-Departmental Working group will be formed to address the implementation of the plan. A report outlining the resource needs and strategy will be presented to Council in 2007 before implementation of the Plan begins.
Municipalities have an important role to play in improving air quality and retarding climate change given their legislated powers and services they provide citizens. Municipal corporations are in a position to make improvements in local air quality and reduce greenhouse gas emissions through day to day policy and program delivery. Not only can local governments take corporate action, but they also have a wide range of tools (regulatory, leadership, communication, education, etc.) to encourage other community sectors within their jurisdiction to take action on air quality and climate change.

Measures to retard climate change emissions usually translate directly into local air quality benefits. For example, reducing fossil fuel combustion, a cause of climate change emissions, also minimizes the release of most conventional forms of air pollution.

**BACKGROUND:**

**Air Quality**

There is a perception in Ontario that Hamilton has a serious air quality problem due to the visible industrial base of the City. Analysis, however, shows that pollutant levels are generally similar to or slightly higher than other cities in Southern Ontario.

The sources of key air pollutants within Hamilton are:

- The transportation sector for NO\textsubscript{2}, volatile organic compounds (VOCs)\textsuperscript{1} and CO;
- The industrial sector for PM\textsubscript{10/2.5}, SO\textsubscript{2}, VOCs and NO\textsubscript{x};
- Road dust for PM\textsubscript{10/2.5}; and,
- Area sources such as homes and small businesses.

Air quality in Hamilton is impacted by a number of factors which include:

- **Transportation Sources.** The roads in and around Hamilton are heavily used by automobiles and diesel trucks with increased numbers of miles driven by commuters and the increased truck traffic (gasoline and diesel powered vehicles);
- **Industrial Sources.** Hamilton is home to a large number of industries from the large, integrated steel mills to medium-size and small industries;
- **Trans-boundary Air Pollution.** Originating from sources in the mid-western United States, pollutants are brought to Ontario by prevailing winds; Hamilton is impacted in a manner similar to many other communities in south-western Ontario; and,

\textsuperscript{1} Volatile organic compounds (VOCs) react with nitrogen oxides (NO\textsubscript{x}) in the presence of sunlight to produce ground-level ozone, a major component of smog.
• **Hamilton’s Location and Topography.** The escarpment and the city’s location at the west end of Lake Ontario, together with local weather conditions (e.g., thermal inversions) can result in higher levels of air pollutants in the downtown area.

Pollution abatement technologies and strategies continue to be implemented by companies within the industrial sector resulting in measurable improvements to Hamilton’s air quality; however there still remains significant need to reduce emissions, particularly from the transportation sector.

Air quality in Hamilton continues to present a significant risk to public health despite progress made. A 2002 study conducted for Clean Air Hamilton and the City estimated that the five key air pollutants – nitrogen dioxide (NO\(_2\)), ground-level ozone (O\(_3\)), inhalable particulate matter (PM\(_{10}\)), sulphur dioxide (SO\(_2\)) and carbon monoxide (CO) – contribute to about 100 premature deaths and 620 hospital admissions each year in Hamilton.

While these numbers are substantial in themselves, they also represent a much greater number of acute and chronic health impacts that are more difficult to identify. Recent studies suggest that everyone can be affected by poor air quality. Young children, the elderly, and those with pre-existing health conditions such as diabetes may be more susceptible to air pollution. As a result, the Ontario Medical Association declared air-pollution “a public health crisis” and has undertaken research on the cost of poor air quality and health issues.

Hamilton has made a clear and consistent commitment to improve air quality. Since 1997, it has committed a staff position and at least $40,000 a year to support the work of Clean Air Hamilton. It has also demonstrated its commitment with Corporate policies such as: purchasing street-cleaners that are more effective at capturing particulate matter that accumulates on the roads; investing in hybrid electric and natural gas powered vehicles; responding to smog advisories; considering air emissions in the planning of infrastructure and transportation corridors; examining energy management of buildings; and undertaking tree planting.

The City’s commitment to clean air is clearly reflected in its Vision 2020 goal “To ensure the City has the best air quality of any major urban centre in Ontario”.

**Climate Change**

Climate change is presently one of the greatest global environmental concerns. Climate change refers to the long term fluctuation in average weather patterns resulting from the release of greenhouse gases (GHGs), such as carbon dioxide (CO\(_2\)), methane (CH\(_4\)), nitrous oxide (N\(_2\)O), and hydrofluorocarbons (HFCs).

Hamilton has a high concentration of heavy industry and transportation corridors which are contributing local sources of greenhouse gases. These emissions alter the chemical composition of the atmosphere, resulting in an intensification of the earth’s natural greenhouse effect.
Harsh weather conditions – such as droughts, winter storms, floods, heat waves and tornadoes – could be more frequent and severe across southern Ontario. Aging infrastructure within cities increases the vulnerability of municipalities to the impacts of severe weather brought about by climate change. Significant economic impacts due to climate change are anticipated from extreme weather events, smog, and intense rainstorms, which increase infrastructure costs.

Hotter weather will increase ozone concentrations and smog, aggravating pollution-related health problems. Increased warmer weather allows vector-borne disease carriers such as mosquitoes, ticks, and rodents to expand their range and survive the winter. Higher CO₂ levels have been shown to increase ragweed pollen and worsen hay fever.

Demand for water will also increase with summers continuing to get hotter, putting pressure on Hamilton’s water supply infrastructure. Warmer lake water provides more hospitable environment for pathogens, degrading natural water quality.

As a driving force of climate change, greenhouse gas emissions are a critical measure of human influence. By curbing greenhouse gas emissions, we can lessen and delay the negative impacts of climate change. Climate change strategies are focused on decreasing the emissions of greenhouse gases by direct or indirect means.

**Figure 2: Canada’s Greenhouse Gas Emissions**

![Graph showing Canada's greenhouse gas emissions]

In 2004, Canada’s GHG emissions were 758 Mt, which is a 25.6% increase over 1990 emissions, and 34.6% above the Kyoto target of 563 Mt.

The City’s commitment to climate change is clearly reflected in its Vision 2020 goal “To reduce greenhouse gas emissions (20 percent of 1994 levels in municipal operations and six percent of 1994 levels City-wide).
Air Quality & Climate Change are Related

Air quality and climate change are related in a number of ways. While the emissions that contribute to poor air quality and climate change are different, many of the sources of these emissions are the same. For example, the transportation sector is the most significant source of NO\textsubscript{2}, and is also responsible for approximately 26% of the greenhouse gases emitted in Canada. Many of the actions that might be taken to reduce greenhouse gases in the transportation sector can have a positive impact on air quality.

Climate change is expected to increase the frequency and duration of heat waves in Southern Ontario, with higher temperatures and increased humidity. These weather conditions are expected to increase the levels of both ground-level ozone and fine particulate matter, increasing the amount of smog days. In addition, heat waves encourage greater use of electricity (through increased air conditioning) which, when generated in coal-fired power plants, can increase emissions that contribute to air pollution.

ANALYSIS/RATIONALE:

Air Quality and Climate Change Action Plan

The City currently delivers a variety of policies and programs that address air quality and the reduction of greenhouse gases. Some Corporate actions have been expressly created for that purpose, while many others make a contribution to air quality and climate change issues as they pursue other goals.

An overall strategy is required to bring the current policies and programs together and translate a Corporate effort to more effectively address both air quality and climate change in the form of a strategic plan.

The Region’s Climate Protection Action Plan and the City’s Greenhouse Gas Reduction Program are the two programs addressing climate change which existed prior to amalgamation in 2001. However, these programs have not yet been combined or updated since amalgamation. The Corporation has simply maintained its network of sustainability and air quality programs which contribute to addressing climate change. The City has supported local groups such as Clean Air Hamilton and Green Venture in undertaking research and community programs addressing air quality.

By virtue of its pre-amalgamation commitments, the City of Hamilton is a member of the Partners for Climate Protection (PCP) Program which is a partnership of municipalities under the Federation of Canadian Municipalities (FCM) that work to develop and implement strategies to reduce greenhouse gas emissions. The City of Hamilton has achieved two milestones under the five milestone PCP Climate Change Partnership Campaign and further work is required to be fully compliant.

A Corporate Air Quality and Climate Change Strategic Plan is a long range plan with a phased approach to implementation. Phase I is the identification of current actions
undertaken by the Corporation, compiling the activities into categories under a proposed strategic plan, and setting out the strategic directions and the roles and responsibilities of City Departments with respect to air quality and climate change.

The objectives of Phase I are to:

- Identify current and future activities and directions within the Corporation that address air quality and/or climate change;
- Clarify the City’s corporate and community leadership roles in air quality and climate change issues, and Departmental relationships and dependencies;
- Organize the scope and direction of activities by the City, in a strategic manner, to address air quality and climate change;
- Develop a framework model of actions by the City to address air quality and climate change;
- Engage City Departments on actions and reinforce and expand their activities;
- Define roles and responsibilities of Departments and encourage partnerships within and outside the Corporation; and,
- Make recommendations to implement the Air Quality and Climate Change Plan by the Corporation.

Phase II of the strategic plan, will focus on long term implementation details and new strategic actions of the Corporation. Specifically Phase II will:

- Establish an Inter-Departmental Working Group on Air Quality and Climate Change to develop the implementation of the strategic plan;
- Present new programs or amendments to current programs that address air quality and climate change;
- Identify and clarify responsible Departments for actions;
- Engage with the community in the development of a City-wide Air Quality and Climate Change Plan and actions;
- Identify resource needs for the implementation of the strategic plan;
- Provide details on the delivery of the strategic plan in a phased approach; and,
- Develop the monitoring, evaluation and reporting on the strategic plan.

The proposed Corporate Air Quality and Climate Change Strategic Plan (attached as Appendix B to Report PED06336) has five (5) categories:

I. Research that Informs Policies and Strategies

To review information on the impacts of air quality and climate change, and to develop, and assess Corporate policies and programs to respond and undertake action.
II. Response, Engagement and Communication

1) To respond to the community and to internal Corporate concerns regarding air quality and climate change issues that will impact the economy, health and environment of Hamilton.

2) To respond to external policies (e.g. Federal, Provincial, other municipalities) and Federal and Provincial regulations that will influence the Corporation’s operations and to ensure local compliance.

3) To respond to external project development and planning proposals that may impact the local airshed and climate of Hamilton. A consideration of air quality and climate change impacts resulting in changes in infrastructure and operations, leading to adaptation, is advised under the decision-making and approvals context.

4) To communicate and promote the actions that the Corporation is undertaking to address air quality and climate change.

III. Adaptation to Smog and Climate Change

Adaptation covers all actions aimed at addressing the impacts of air pollutants and climate change. Adaptation can involve taking actions to modify existing facilities, structures, services, and operations to minimize the impacts and disruptions caused by air pollutants and climate change.

Adaptation, in preparing for actual or expected events, does not need to be dramatic or disruptive but can include minor changes to already established activities and practices within an organization.

IV. Reducing Emissions, Key Pollutants and Greenhouse Gases

Reduction, or mitigation, is directed at reducing atmospheric concentrations of air pollutants and greenhouse gases resulting from municipal operations and services (i.e. areas of direct control or influence by the Corporation).

Reduction strategies should:

- Encourage action to reduce greenhouse gas emissions and improve air quality in corporate operations, and,
- Encourage actions by citizens and industries to reduce their own personal emissions to improve air quality and retard climate change.

Phase I has been drafted in the format of action categories to identify and compile the current programs undertaken by the Corporation. Phase II will further detail and articulate the strategy under the same action categories.
V. Delivering Air Quality and Climate Change Programs

To implement Phase II of the Corporate Air Quality and Climate Change Strategic Plan for the City of Hamilton, new or redirected resources and collaboration amongst Departments and Divisions is needed. The formation of an Inter-Departmental working group is proposed by this Report (PED06336) to formalize partnerships within the Corporation and clarify primary roles. The Group will be responsible for the Phase II implementation details of the plan.

Phase I of the Plan delivery defines roles and responsibilities of City Departments by recognizing corporate leads in different components of the strategy, respecting those Departments’ mandates and functions (see Appendix C to Report PED06336). The Corporate Air Quality and Climate Change Strategic Plan encourages lead Departments to undertake further actions and develop new programs to address air quality and climate change in the delivery of their normal services.

An Inter-Departmental Air Quality and Climate Change Working group would coordinate and be responsible for the actions of the corporation to address air quality and climate change. It is recommended that this group be formed by Departments to network and collaborate and further the proposed Corporate Air Quality and Climate Change Strategic Plan. This group will return to Council in 2007 with an outline of resources required for moving into Phase II of the Plan. Phase II of a Corporate Air Quality and Climate Change Strategic Plan will develop the implementation details and specific actions of the Plan.

The five (5) key categories of the proposed plan should not be considered as separate actions. In fact, information should flow amongst categories to ensure activities by the City under each area are updated and continuously improved upon through knowledge sharing.

Partnerships in Air Quality and Climate Change

Local actions on clean air and climate change and successful cooperation among the public, industry and all levels of government are essential for reducing air pollutants and greenhouse gases.

A Corporate Air Quality and Climate Change Strategic Plan is not an isolated plan or effort. It is dependent upon and should support activities undertaken by partners outside the Corporation.

Such partners include international and non-governmental organizations, the Federal and Provincial levels of government, and organizations such as:

- The Federation of Canadian Municipalities
- The Association of Ontario Municipalities
- The Ontario Medical Association
- The Ontario Professional Planners Institute
• The Canadian Climate Impact and Adaptation Research Network.

They also include other municipalities and community groups such as:

• Clean Air Hamilton
• Green Venture
• Environment Hamilton
• The Hamilton Community Foundation
• Local industries and academics.

The City should continue to support programs and partnerships that educate and initiate action to improve the local air quality and reduce greenhouse gases within the Corporation and in the City of Hamilton. Through partnerships and community engagement the corporate plan can be a component to build upon and create a Hamilton Action Plan on Air Quality and Climate Change that engages the citizens of Hamilton.

A recommended first step in formalizing these partnerships and engaging the community on climate change and its associated impacts is the undertaking of a round table community forum. The forum would raise awareness of climate change in Hamilton and create dialogue amongst groups, assist in the creation of a Climate Change Advisory Committee that could advise the City on issues of climate change, and undertake a larger community action plan for all of Hamilton on climate change.

**ALTERNATIVES FOR CONSIDERATION:**

a) The **status quo** is not a recommended approach. The City could continue developing and implementing programs that address air quality and climate change, but response and implementation of these activities could be haphazard. The City would also not be seen as addressing air quality and climate change in a strategic, co-ordinated and co-operative manner. A strategic plan would save the City further costs and resources by focussing programs on common goals – improving air quality and reducing greenhouse gases (climate change).

b) Proceed with a Corporate Air Quality and Climate Change Strategic Plan **without undertaking an overall City of Hamilton Air Quality and Climate Change Plan** is not recommended. The City would be seen as addressing air quality and climate change in its own internal operations but not fully engaging the local community in addressing air quality and climate change impacts in a larger City plan of action. Milestone 3 – implementing a local plan of the Partners for Climate Change Partnership Campaign would not be achieved.

c) **Agree with the need for a Strategic Plan, but no implementation** is not recommended. The rationale would be similar to undertaking the status quo and the City would be perceived as paying “lip service” to issues that the community wishes to be engaged on. A plan without implementation would not shelter the City from increased economic, social and environmental costs and risks of climate change and air quality.
FINANCIAL/STAFFING/LEGAL IMPLICATIONS:

The Corporate Air Quality and Climate Change Strategic Plan is a long range plan. Phase I, identified by this report, simply identifies current resources (Departments), actions, policies and programs within the Corporation that can or do address air quality improvements and climate change and can serve as a foundation for the areas identified under the key categories of the proposed Corporate Air Quality and Climate Change Strategic Plan.

Phase I of the proposed Corporate Air Quality and Climate Change Strategic Plan does not request additional financial resources. All Corporate Departments have a role to play in the Corporate Air Quality and Climate Change Strategic Plan.

An Inter-Departmental Air Quality and Climate Change Work Group would co-ordinate and be responsible for the actions of the corporation to address air quality and climate change. Members of the group would be from the Departments (Planning and Economic Development, Public Works, Public Health) and Divisions within the Corporation able to engage and promote actions to reduce air pollutants and greenhouse gases and adapt to climate change within City operations, policies and programs.

In order to move forward towards Phase II, it is recommended that the Inter-Departmental working group be formed of staff to work together to identify the resources required to implement the Plan and to return to Council in 2007 with a report outlining the resource needs for implementation of Phase II.

The Corporate Air Quality and Climate Change Strategic Plan Phase II, requires corporate leadership in order to ensure actions are in line with the direction of the Air Quality and Climate Change Plan. Phase I identifies roles and responsibilities of Departments with respect to the action categories (see Appendix C to Report PED06336). These Departments (Planning and Economic Development, Public Health, and Public Works) will serve as “corporate champions” on the action categories to ensure activities are in line with the directions of the Corporate Air Quality and Climate Change Strategic Plan.

The Corporate Air Quality and Climate Change Strategic Plan Phase II will focus on the implementation details of the plan. If Phase I is accepted by Council, the Corporate Air Quality and Climate Change Strategic Plan Phase II will require additional resources to all Departments in order for the implementation and integration of strategies to address air quality and climate change amongst the Corporation.

Specific resource needs will be identified by the Inter-Departmental working group in the Corporate Air Quality and Climate Change Strategic Plan Phase II and presented for future Council and Budget decisions.
POLICIES AFFECTING PROPOSAL:

The Corporate Air Quality and Climate Change Plan will bind the Corporation to undertake actions that address the air quality and climate change of municipal areas over which the Corporation has direct or indirect influence.

The Corporate Air Quality and Climate Change Strategic Plan will help the City of Hamilton meet the commitments made under the Federation of Canadian Municipalities Partners for Climate Protection Program, Council’s Strategic Plan, Vision 2020, the Clean Air Hamilton Strategic Plan, and the Provincial Policy Statement.

RELEVANT CONSULTATION:

Through the development of the Corporate Air Quality and Climate Change Plan, consultation with City Departments was undertaken with Public Health, Public Works, Planning and Economic Development, Emergency Services and Corporate Services.

The report was circulated for review and comment to Public Health (Health Protection), Public Works (Capital Planning and Implementation, Fleet and Facilities, Waste Management, Water and Wastewater), Planning and Economic Development (Long Range Planning), Emergency Services (Emergency Planning) and Corporate Services (Financial Services - Purchasing).

Comments received were incorporated into the report.

CITY STRATEGIC COMMITMENT:

The Corporate Air Quality and Climate Change Strategic Plan aims to achieve the VISION 2020 goals that are related to air quality and climate change:

- To ensure that the City of Hamilton has the best air quality of any major urban area in Ontario; and,
- To reduce greenhouse gas emissions (by 20 percent of 1994 levels in municipal operations and by 6 percent of 1994 levels City wide).

The Corporate Air Quality and Climate Change Strategic Plan addresses the following VISION 2020 theme areas:

- Improving Air Quality
- Consuming Less Energy
- Changing Our Modes of Transportation
- Land Use Issues in Urban Areas
- Natural Areas and Corridors
- Improving the Quality of Water Resources
- Reducing and Managing Waste
- Personal Health and Well-being
- Local Economy.
By evaluating the “Triple Bottom Line”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

Community Well-Being is enhanced.  ☑ Yes  ☐ No

Partnerships with stakeholders outside of the Corporation and co-ordinating efforts with the broader Hamilton community (local government, industry and community groups) are essential for reducing air pollutants and greenhouse gases in the City.

Environmental Well-Being is enhanced.  ☑ Yes  ☐ No

The Impacts of air pollutants and climate change are reduced or mitigated by actions undertaken by the Corporation. The Plan aims to ensure that the City of Hamilton has the best air quality of any major urban area in Ontario and reduce greenhouse gases. Areas identified under the Plan encourage energy conservation and alternative transportation means, promote green space and compact form, improve water quality, respond to impacts, and improve infrastructure.

Economic Well-Being is enhanced.  ☑ Yes  ☐ No

Undertaking a plan to address air quality improvements and climate change improves the health and economy of Hamilton. The Ontario Medical Association has estimated that the economic impact of smog (poor air quality) in Hamilton on individual health in 2005 was $2.13 M in Health Care and $1.73 M in lost productivity from employees’ sickness or the need to stay at home taking care of their children affected by poor air quality.

Significant economic impacts due to climate change are anticipated as more extreme weather events, smog, and intense rainstorms increase infrastructure costs and weather–related business. Undertaking a strategic plan will assist in mitigating impacts and reduce greenhouse gas emissions that cause climate variability.

Does the option you are recommending create value across all three bottom lines?  ☑ Yes  ☐ No

The reduction of air pollutants and greenhouse gas emissions affect all three “bottom lines” of sustainability – economy, environment and social. Reductions that help retard climate change and improve air quality have other social/health, economic and environmental benefits to the community.

Efforts to reduce air pollutants and greenhouse gas emissions from municipal operations could produce economic benefits for the Corporation and improve the quality of life in the City. They could produce energy and operating costs savings, encourage renewal of physical assets, and improve the delivery of municipal services.
Do the options you are recommending make Hamilton a City of choice for high performance public servants?
☑ Yes  ☐ No

The ability to live in a breathable and sustainable city is of added value to employees who also are members of the community within Hamilton. A city with high air quality and actions to address the impacts of climate change will attract individuals looking to raise a family in a quality environment and a nurturing community.

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Executive Summary

Air quality has been an issue in cities since the Industrial revolution. A number of municipalities have begun to recognize and undertake comprehensive strategies to address poor air quality. The City of Hamilton has addressed a range of air quality issues since the mid 1990s. Through the support of the Hamilton Air Quality Initiative (HAQI) and Clean Air Hamilton, the City has been seen as a leader in air quality improvement initiatives.

Climate Change emerged as a global issue in 1992 with the United Nations Framework Convention on Climate Change. Climate Change has become a prominent issue in Canada since 1997 with the creation of the Kyoto Protocol, which Canada ratified in 2003, to address global climate change.

Air quality and climate change were once perceived as separate issues, one local and the other global in scale. However, research and strategic actions over the past decade show they are linked (e.g. fossil fuel use) and similar impacts (e.g. health, economic, social, infrastructure) can occur locally as smog episodes, increased rainfall, increased heat, etc.

Hamilton has set out specific goals related to air quality and climate change as part of VISION 2020. These goals are:

- To ensure the City has the best air quality of any major urban centre in Ontario;
- To have effective plans that identify, reduce and manage risks; and,
- To reduce greenhouse gas emissions (20 percent of 1994 levels in municipal operations and six percent of 1994 levels City-wide).

Although the Corporation has addressed selected air quality and climate change issues through a variety of policies and programs, a coherent strategy has not been developed. This report proposes a Corporate Air Quality and Climate Change Strategic Plan that would focus actions by the City to address key air pollutants and reduce greenhouse gases.

The Corporate Air Quality and Climate Change Strategic Plan has 5 action categories:

I. Research that Informs Policies and Strategies;

II. Response, Engagement & Communication;

III. Adaptation to Smog & Climate Change;

IV. Reducing Emissions, Key Pollutants & Greenhouse Gases; and;

V. Delivering Air Quality and Climate Change Programs.

This report presents the 5 action categories and associated programs and policies as separate and discrete areas to be addressed by the actions of City Departments. However this representation may be misleading, as all the categories and areas of the proposed plan are linked to one another, and to a complex array of social, economic, health and environmental impacts and benefits.

Partnerships with stakeholders outside of the Corporation and co-ordinating efforts with the broader Hamilton community (local government, industry and community groups) are essential for reducing air pollutants and greenhouse gases in the City.
PART 1 - BACKGROUND

Introduction

Clean air is compromised by the presence of a wide range of air pollutants that come from a variety of sources such as industries and vehicles, and can have significant direct and indirect impacts on the health, the environment and the economy of Hamilton. The impact of air pollutants can be exacerbated by increased temperature and humidity brought about by changes in the local climate.

Many municipalities in southern Ontario have recognized problems of poor air quality, and have developed focussed strategies to address these challenges. Hamilton has a long history with municipal initiatives to address poor air quality, beginning in the early to mid 1990s with the formation of the Hamilton Air Quality Initiative (HAQI) and its current form as Clean Air Hamilton.

Many municipalities in southern Ontario have also created advisory committees or a corporate implementation structure to develop recommendations for action. Implementing such recommendations has resulted in local air quality research, pilot projects, corporate policy directives, and public education campaigns. As in the case of Clean Air Hamilton, some municipalities have also created targeted funding initiatives for community-based actions.

Increasing awareness of climate change and its associated impacts such as extreme weather patterns and influence on local air quality has resulted in municipalities starting to reduce the amounts of greenhouse gas produced by their operations and services, as well as educate the public on climate change. A few municipalities have also begun to understand the need to adapt and mitigate the risks of impacts from climate change.

Where local air quality is a concern, greenhouse gas reduction strategies can be developed in concert with clean air initiatives.
Air Quality Issues

Air Quality has significant direct and indirect impacts on community health, the environment and the economy of Hamilton. These impacts may be experienced in the area near the pollutant source(s) or at great distances through the influence of wind and weather patterns. A 2005 report from the Ontario Ministry of the Environment indicated that about 50% of all contaminants in the air in Ontario (and in Hamilton) were the result of long-range, trans-boundary pollutants from sources in the mid-west region of the United States. Hamilton has a unique microclimate given the proximity of the Niagara Escarpment and Lake Ontario that tends to contain and trap both local and trans-boundary air pollutants over the city.

Sources of air pollutants are varied but primarily stem from the industrial and transportation sectors. The key pollutants are released when fossil fuels such as coal, oil, gasoline, diesel and natural gas are burned for the purposes of transportation or energy in both industrial and personal uses.

There is a perception in Ontario that Hamilton has a serious air quality problem due to the visible industrial base of the city. Analysis, however, shows that local air pollutant levels are generally similar to, or slightly higher than other cities in Southern Ontario. Trends analysis shows that since 1990, air quality improvements have been less dramatic than in the previous two decades. Pollution abatement technologies and strategies continue to be implemented by companies within the industrial sector where measurable improvements to Hamilton’s air quality have occurred. There still remains significant need to reduce air emissions from the transportation sector.

<table>
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<tr>
<th>Hamilton’s Six Key Air Pollutants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen dioxide (NO₂)</td>
</tr>
<tr>
<td>Inhalable particulate matter (PM₁₀)</td>
</tr>
<tr>
<td>Sulphur dioxide (SO₂)</td>
</tr>
</tbody>
</table>

According to Clean Air Hamilton:

- The transportation sector is the leading source of Nitrogen Oxide (NOₓ) emissions within the city, followed closely by the industrial sector.
- The industrial sector is the leading source of directly-emitted particulate matter followed by road dust and area sources such as fireplaces, home heating and businesses.
- Industry is by far the leading source of Volatile Organic Compounds, Sulphur Dioxide, and Carbon Monoxide.

**SMOG:** The term “smog” refers to the noxious mixture of air pollutants made up primarily of ground level ozone and airborne particulate matter. Smog days have historically been associated with hot humid summer days when air levels of ozone are high, but smog can also arise when levels of airborne particulate matter are high, which can be experienced all year round.
Air Quality Impacts

Health Impacts

There exists strong scientific evidence linking air pollutants like ozone, nitrogen oxides, carbon monoxide and airborne particulates to significant human health problems. Health estimates demonstrate that air pollution continues to present a substantial risk to the respiratory and cardiovascular health of Hamilton residents.

In 1997 and 2003, Clean Air Hamilton undertook research regarding air pollution and health on Hamiltonians. It has been estimated that five key air pollutants – nitrogen dioxide, ground level ozone, fine particulate matter, sulphur dioxide and carbon monoxide -- contribute to approximately 100 premature deaths and 620 hospital admissions in Hamilton each year.

In 1998, the Ontario Medical Association (OMA) declared air-pollution “a public health crisis.”¹ According to a 2005 report from the OMA, air pollution was responsible for an estimated 5,800 premature deaths, almost 17,000 hospital admissions and close to 60,000 emergency room visits in Ontario in 2005.² Severe health outcomes are, however, only the tip of the iceberg, as air pollution is also responsible for such impacts as chronic bronchitis in children as well as innumerable respiratory problems in sensitive populations such as the elderly.

Table 1: 2005 Illness Cost of Air Pollution – (Ontario Medical Association)
Regional Data for Hamilton-Wentworth Regional Municipality

<table>
<thead>
<tr>
<th></th>
<th>Individuals in 2005</th>
<th>Individuals in 2026 (Projected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature Deaths</td>
<td>290</td>
<td>500</td>
</tr>
<tr>
<td>Hospital Admissions</td>
<td>810</td>
<td>1,200</td>
</tr>
<tr>
<td>Emergency Visits</td>
<td>2,840</td>
<td>4,250</td>
</tr>
</tbody>
</table>

According to the most recent scientific research, there is no ‘safe level’ for air pollution.
There is no level below which there are no adverse health effects.

- GTA Clean Air Council

**Natural Environment**

Air pollution is harmful to the health of animals and plants. Air pollution may shift an ecosystem to become dramatically different than the one we are familiar with or dependent on. Air pollution is considered to be the second most important stress on ecosystems and wildlife, after changes in land use.

Plants impacted by ground-level ozone and acid rain caused by nitrogen oxide (NO$_x$) and sulphur dioxide (SO$_2$) emissions grow more slowly and can become vulnerable to disease, pests, drought and cold. Some plants and stages of plant growth (i.e., new growth) are more sensitive to air pollution than others. This is of particular concern for the agriculture sector where reduction in crop productivity or survival can have significant and detrimental impacts on the economic viability of operations.

Air pollution harms wildlife in two main ways; the quality of the habitat in which they live, and the availability and quality of their food supply. For example, acid rain deposits into lakes can cause a reduction in fish stocks, a loss of food sources for birds, and increased nutrient loads leading to eutrophication and algae blooms. These impacts reduce human enjoyment of recreational pursuits such as wildlife viewing, fishing and hunting. Moreover, toxics such as mercury can be released into the water or air and accumulate in terrestrial and aquatic animals and plants, impacting wildlife and ecosystems further.

**Economy**

A 2005 Ontario Medical Association report estimated the cost of air pollution to the economy of Ontario at $16 Billion per year. The economic impact of smog in Hamilton on individual health in 2005 was $2.13 M in Health Care and $1.73 M in lost productivity from employees’ sickness or having to stay at home to take care of their children affected by poor air quality.

According to the GTA Clean Air Council, municipal governments have an opportunity to protect human health, save money, provide benefits to employees and citizens and meet climate change reduction goals. The Corporation of the City of Hamilton can contribute to cleaner air by taking action at the local level to reduce its emissions as owners/operators of corporate fleets, local utilities, waste and water treatment plants and through land use and transportation planning.

Clean air strategies help in the fight against climate change, as measures which promote efficient land use changes, more efficient use of fossil fuels and/or a switch to cleaner sources of energy will reduce emissions of both smog-causing and greenhouse gases.

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Climate Change refers to the long term change in average weather patterns resulting from the release of substantial amounts of greenhouse gases (GHGs), such as carbon dioxide, methane, nitrous oxide, etc. These emissions alter the chemical composition of the atmosphere, resulting in intensification of the earth’s natural greenhouse effect.

Table 2: Key Greenhouse Gases (GHGs) and Sources

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>Carbon Dioxide</td>
<td>Fossil fuel combustion, forest clearing, cement production, etc.</td>
</tr>
<tr>
<td>CH₄</td>
<td>Methane</td>
<td>Landfills, production and distribution of natural gas &amp; petroleum, fermentation from livestock, sewage waste treatment, fossil fuel combustion, etc.</td>
</tr>
<tr>
<td>N₂O</td>
<td>Nitrous Oxide</td>
<td>Fossil fuel combustion, fertilizers, nylon production, manure, etc.</td>
</tr>
<tr>
<td>HFC's</td>
<td>Hydrofluorocarbons</td>
<td>Refrigeration gases, aluminium smelting, semiconductor manufacturing, etc.</td>
</tr>
<tr>
<td>PFC's</td>
<td>Perfluorocarbons</td>
<td>Aluminium production, semiconductor industry, etc.</td>
</tr>
<tr>
<td>SF₆</td>
<td>Sulfur Hexafluoride</td>
<td>Electrical transmission and distribution systems, circuit breakers, magnesium production, etc</td>
</tr>
</tbody>
</table>

Climate change can be caused by natural processes, such as a change in the sun’s strength, and by human activities. Scientific consensus has been reached that due to increased fossil fuel use and permanent forest loss since pre-industrial times, atmospheric concentrations of greenhouse gases have grown significantly, leading to accelerated changes in our climate. Hamilton has a high concentration of heavy industry and transportation corridors which are contributing local sources of greenhouse gases.

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4 Environment Canada: Climate Change (accessed May 2006 online at [http://www.ec.gc.ca/climate/home-e.html](http://www.ec.gc.ca/climate/home-e.html))
The increase of greenhouse gases in the atmosphere is bringing more than just warmer summers and milder winters. Climate change has a destabilizing effect on weather patterns, increasing the frequency and intensity of extreme weather events like heat waves, storms, and droughts, floods, blackouts, forest fires and other weather-related disasters. The summer of 2005 demonstrates the extreme weather which is likely to become commonplace in the next 50 years.  

Climate variability may increase stagnant air masses over a region, causing the build up of noxious pollutants that register as air quality concerns. Stagnant air masses are the result of high-pressure systems that bring high temperature, humid conditions and high amounts of particulate matter on their approach to Hamilton. In parts of southern Ontario, the frequency of “offensive” or “oppressive” air masses could increase 5 – 8 times current levels with climate change.  

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5 The Clean Air Partnership: *Adapting to Climate Change in Toronto*, 2006.
According to the GTA Clean Air Council, climate change will be accompanied by:

- A doubling in the number of hot days (above 32°C) in the Toronto-Niagara region by the 2030’s; surpassing 50 days by the 2080’s.
- A longer growing season and slight increases in annual average precipitation.
- Longer periods of droughts punctuated by heavier rainstorms.
- Greater rates of evaporation and less winter ice cover, leading to lower lake levels in the Great Lakes and inland lakes and rivers.
- More favourable conditions for a number of pests (insects, vermin, etc.).
- More extreme weather events (storms, floods).

Of equal concern are the indirect effects that climate change could have on air quality in Hamilton by affecting community energy usage. Warmer summer temperatures lead to greater use of air conditioning, and depending upon the fuel or electricity energy mix, there could be an associated increase in local and trans-boundary air emissions. The use of air conditioners and local consumption of energy also increases the urban heat island effect, accelerating smog formation with its attendant impacts on human health.

**The Urban Heat Island Effect**

On hot summer days, cities can be up to 4 to 7 degrees Celsius hotter than their suburban and rural surroundings. This phenomenon occurs because urban development replaces trees and natural surfaces with large amounts of paved and dark coloured surfaces like roofs, roads, and parking lots that absorb, rather than reflect, the sun's heat. This causes ambient air temperatures to rise. Cars, factories and air conditioning can add more heat and pollutants to the dome of elevated temperatures that build up over a city.

Measures to reduce greenhouse gas emissions usually translate directly into local air quality benefits. This is because the focus is on reducing fossil fuel combustion, the main cause of greenhouse gas emissions, also minimizes the release of most conventional forms of air pollution. The following image illustrates the connection between air pollutants and greenhouse gases from the combustion of fossil fuels:

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7 GTA Clean Air Council: *A Model Clean Air Plan for the Living City*, 2005.
Greenhouse Gas (GHG) Emissions

As a driving force of climate change, greenhouse gas emissions are a critical measure of human influence. By measuring and curbing greenhouse gas emissions, we can lessen and delay the negative impacts of climate change. For this reason, climate change strategies are focused on decreasing the emissions of greenhouse gases by direct or indirect means.

What is one tonne of GHGs?
- The volume of one tonne of GHGs would fill a two-storey, three-bedroom house
- One metric tonne equals the weight of about 5,700 hockey pucks
- The average Canadian produces approximately 5 tonnes of greenhouse gas emissions each year so one tonne is a reduction of about 20%
- An automobile produces approximately 5 tonnes/year of CO2 equivalents
- 1 Mt (mega tonne) is 1 million tonnes of carbon. 1 Mt of carbon is equivalent to 3.67 million tonnes of carbon dioxide. Carbon dioxide, the most abundant greenhouse gas produced, is used as the standard to which greenhouse gases are measured against and is referred to as CO2e.
The Federal Government recognizes that there is strong consensus in the international scientific community that climate change is occurring and that the impacts are already being felt in some regions. Since the 2006 election, the Government of Canada has been committed to the development and implementation of a Made-in-Canada plan for reducing greenhouse gases and ensuring clean air, water, land and energy for Canadians. As part of this plan the new conservative government has pledged to develop a new Canadian Clean Air Act, in conjunction with the provinces and territories, municipalities and Aboriginal communities. In Ontario, the McGuinty government is investing in a wide variety of initiatives and partnerships to provide a firm scientific foundation for actions to reduce air pollution and mitigate climate change. The Federation of Canadian Municipalities (FCM) acknowledges that municipal governments can play a critical role in reducing greenhouse gas emissions. FCM has endorsed the World Mayors and Municipal Leaders Declaration on Climate Change which commits municipal government to implementing policies and operational changes that will contribute to reducing global greenhouse gas emissions by 30 percent by 2020 and 80 percent by 2050, when compared to 1990 levels. Air Quality and Climate Change issues transcend political jurisdictions and it is the responsibility of every level of government to do all that is possible to protect the health and quality of life of their citizens through mitigation and adaptation.

Municipal governments have a critical role to play in climate protection. According to the Federation of Canadian Municipalities, up to half of Canada’s greenhouse gas emissions (360 million tonnes) are under the direct or indirect control or influence of municipal governments. Municipalities directly control decisions that produce some 38 Mt of greenhouse gas emissions from municipal operations, residential waste, and landfill sites. Greenhouse gas emissions under the indirect (regulatory, public policy, and community awareness) control of municipal governments total 322 Mt.

Figure 2:


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Climate Change Impacts

According to the Federation of Canadian Municipalities (2005), Climate Change will affect the design and delivery of the following municipal operations:

- Transportation
- Public Safety
- Parks and Recreation
- Water and sewage
- Solid waste management
- Pest control
- Construction
- Municipal buildings
- Emergency Measures
- Energy Use
- Building Codes
- Land Use Planning
- Snow removal

Health Impacts

Hotter and more variable weather will increase ozone concentrations and smog, aggravating existing heat and air pollution-related health problems. Warmer weather allows vector-borne disease carriers such as mosquitoes, ticks, and rodents to expand their range and survive the winter in larger numbers. Higher CO\textsubscript{2} levels have been shown to increase ragweed pollen and worsen hay fever.

Demand for water will increase with summers continuing to get hotter, putting pressure on Hamilton’s water supply. Warmer lake water provides more hospitable environment for pathogens, degrading our drinking water source quality. Polluted sediment may be re-suspended with the necessary dredging of navigation routes as a result of dropping lake levels.

Natural Environment

Climate change is one of the greatest global environmental concerns. Impacts on agriculture will be seen in the response of crops, livestock, soils, weeds and insects to the warmer conditions. An estimated three- to five-week extension of the frost-free season could benefit commercial agriculture in Ontario. However, it is also expected that dry soil conditions will intensify in Ontario, and may result in reduced yields\textsuperscript{11}. City trees already stressed by the urban environment will be further damaged by extreme and prolonged summer heat causing drought and increased risks of pests and disease.

Water levels in Ontario’s inland and Great Lakes are expected to decline, potentially affecting the quality of drinking water, the use of lakes for transportation, recreation and fishing, and the ability to generate hydroelectric power. Storm sewers and sanitary systems may not be able to deal with increased precipitation or storms. Diminished recharge of groundwater may cause small streams and wells to dry up and reduce the size of wetlands.

\textsuperscript{11} Government of Canada: Climate Change, (accessed April 2006 online at \texttt{http://www.climatechange.gc.ca/})
Harsh weather conditions – such as droughts, winter storms, floods, heat waves and tornadoes – could be more frequent and more severe across southern Ontario. Infrastructure within cities built to lesser standards increases the vulnerability of municipalities and buildings to the impacts of severe weather brought about by climate change.

**Economy**

Significant economic impacts due to climate change are anticipated as more extreme weather events, extreme heat and smog, and intense rainstorms increase infrastructure costs and weather–related business losses associated with stormwater management, electricity generation and transmission.

Improved energy efficiency in new buildings and land use districts can dramatically reduce fuel costs while providing the same energy services, freeing up money for other programs or priorities while reducing air pollution. Many energy-efficiency investments have a pay-back period of as little as 3-5 years.\(^{12}\)

Individuals and households that live below the poverty line have few resources (live in older housing, unable to afford air conditioning, less access to communication and information channels) to protect themselves from weather extremes or natural disasters. Recovery from disasters is more difficult for low-income households that have limited or no insurance coverage or savings.

**The Municipality’s Role**

Municipalities have an important role to play in improving air quality and retarding climate change given their legislated powers and the types and level of services they provide citizens, including public works, planning, and health services.

Municipalities are in a position to make improvements in local air quality and reduce greenhouse gas emissions. Not only can local governments take corporate action by reducing energy consumption in municipal operations, but they also have a wide range of tools to encourage all other sectors within their jurisdiction to take action on air quality and climate change.

Regulatory tools, including urban growth policies, by-laws, zoning, building and development permits, licenses, and standards are commonly used to influence community activities.

Local governments can motivate action in the community by demonstrating leadership in their operations, through standards and policies for municipal developments. Such as the use of fiscal incentives, reduced transit pass costs to employees, or subsidies to tree planting programs for homeowners. Hamilton has had a Smog Alert Response Plan since

1999 for reducing emissions in municipal operations during periods of poor local air quality. In 2004 the City adopted an idling policy for its operations of corporate fleets.

Local governments can engage the community in education and awareness initiatives. Educational initiatives not only promote community action, but are also important when implementing a wide range of programs in municipal operations. Hamilton has already formed partnerships with some local environmental organizations to support education activities. The tree planting and Commuter Challenge programs are examples of community engagement, education and awareness of air quality and climate change issues.

By 2012, the Federation of Canadian Municipalities estimates that communities could cut greenhouse gas emissions by 20 to 50 Mt from municipal operations and community-wide initiatives with investments in environmental infrastructure and sustainable transportation infrastructure. Municipal governments can reduce emissions through:

- land-use, energy, and transportation planning;
- infrastructure design;
- green procurement;
- building retrofits;
- water conservation;
- solid waste diversion; and
- renewable energy.

Measures such as enhancing the use of cleaner fuels, community transportation demand management and community greening all have important environmental, health, economic and quality of life benefits, worth pursuing even if climate change were not an issue. Indirect benefits to the community may even exceed the direct ones. These include savings involved in converting commuters from their cars to transit, representing major savings in insurance, road repair, and vehicle maintenance. Reducing the reliance by both the City and its citizens on oil and gas at a time when the cost of this fuel can increase is another major gain. Controlling urban sprawl through compact urban design, greenspace preservation, and promoting intensification and re-urbanization reduces the need for roads and salt as well as promotes a healthy lifestyle through increased walking and cycling. The greatest benefit of reducing greenhouse gases and air pollutants is likely the positive impact of the resulting cleaner air on our health and that of our ecosystem.
PART 2 – Action Plan

City of Hamilton Actions on Air Quality & Climate Change

The quality of air we breathe is important to the public. The ability to live in a breathable city is of added value to families and communities. The City of Hamilton has recognized this since the early 1990s and has advocated this important community indicator through Vision 2020 and by supporting local groups engaging in the issues of air quality and climate change such as Clean Air Hamilton and Green Venture.

<table>
<thead>
<tr>
<th>VISION 2020 Goals for Air Quality and Climate Change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>To ensure the City has the best air quality of any major urban centre in Ontario;</td>
</tr>
<tr>
<td>To have effective plans that identify, reduce and manage risks; and,</td>
</tr>
<tr>
<td>To reduce greenhouse gas emissions (20 percent of 1994 levels in municipal operations and six percent of 1994 levels City-wide).</td>
</tr>
</tbody>
</table>

The following highlights some of the actions that the City of Hamilton has undertaken to address air quality and climate change;

- In 1992 adopts the Vision 2020 Strategy and in 1993 establishes a goal for air quality “to ensure the City (Region) has the best air quality of any major urban center in Ontario”
- Becoming a signatory to the Canadian Declaration on Climate Change and the Urban Environment in 1995.
- Members of the Federation of Canadian Municipalities (FCM) 20% Club since 1996, which provided a forum for municipal governments to demonstrate leadership on climate change and share knowledge and experience with other municipal governments. The FCM 20% Club became Partners for Climate Protection in 1999;
- Conducting an Air Quality Initiative Study of the region to identify priorities in air quality management and makes recommendations related to air quality initiatives in 1996 and commits to reducing carbon dioxide emissions in Hamilton-Wentworth by 20%.
- In 1999, the City (former Region) completed partial inventories to determine CO$_2$ emissions (CO$_2$ is a measure of all greenhouse gases, such as nitrous oxide and methane, adjusted to equivalent CO$_2$ units) from municipal operations and activities. Emissions were determined for the baseline year of 1994 and for 1998.
- Prior to amalgamation, the Region had a Climate Change Action Plan (1997) and the City of Hamilton had a Greenhouse Gas Reduction Program (1999). The Climate Protection Action Plan (ENV95002 (C)) for Regional operations included programs and activities in waste management, transportation, energy and land use.
- Endorsing the Model Resolution by Municipal Governments to ratify the Kyoto Protocol in 2002.
- Renews Vision 2020 strategy (with climate change component) in 2003.
- Launching an on-line City Action Inventory under the Vision 2020 Strategy that includes actions on air quality and climate change.
- Achieving two of the milestones in the Climate Change Partnership Campaign.

<table>
<thead>
<tr>
<th>The Climate Change Partnership Campaign has 5 milestones:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Creating a greenhouse gas emissions inventory and forecast;</td>
</tr>
<tr>
<td>2. Setting an emissions reductions target;</td>
</tr>
<tr>
<td>3. Developing a local action plan;</td>
</tr>
<tr>
<td>4. Implementing the local action plan or a set of activities; and</td>
</tr>
<tr>
<td>5. Monitoring progress and reporting results.</td>
</tr>
</tbody>
</table>

Milestones can be implemented either in numeric order or in the order that is most appropriate for the community. While many municipal governments start by completing a greenhouse gas inventory, others have moved immediately to actions aimed at reducing greenhouse gas emissions.

The following proposed Corporate Air Quality and Climate Change Strategic Plan process seeks to fully address all 5 milestones and build upon the milestones Hamilton has achieved.

This report will highlight some of the actions the City has or will undertake to provide examples to the action categories and areas recognized under a Corporate Air Quality and Climate Change Strategic Plan.

**The Triple Bottom Line & Air Quality and Climate Change**

The reduction of air pollutants and greenhouse gas emissions affect all three “bottom lines” of sustainability – economy, environment and social. Reductions that help retard climate change and improve air quality have other social/health, economic and environmental benefits to the community.

Efforts to reduce air pollutants and greenhouse gas emissions from municipal operations could produce economic benefits for the Corporation and improve the quality of life in the City. They could produce energy and operating costs savings, encourage renewal of physical assets, and improve the delivery of municipal services.
City Departments currently deliver a variety of policies and programs that address air quality and climate change. Some have been expressly created for that purpose, while many others make a direct contribution to air quality and climate change issues as they pursue other goals. A clear, coherent strategy is needed to bring the current policies and programs together and translate corporate effort to more effectively address both air quality and climate change by a strategic action plan.

The undertaking of a Corporate Air Quality and Climate Change Strategic Plan will involve two phases. Phase I is the identification of the strategic directions and the roles and responsibilities of City Departments with respect to air quality and climate change. This is represented in this report. Phase II will be the implementation details and specific actions of the long–term Plan (highlighted briefly in Category V of the Plan) which will follow Phase I.

The key objectives of Phase I through this report are;

- Identify current and future activities and directions within the Corporation that address air quality and/or climate change.
- Clarify the City’s corporate and community leadership roles in air quality and climate change issues, and Departmental relationships and dependencies.
- Organize the scope and direction of activities by the City, in a strategic manner, to address air quality and climate change.
- Develop a framework model of actions by the City to address air quality and climate change.
- Engage City Departments on actions and reinforce and expand their activities.
- Define roles and responsibilities of Departments and encourage partnerships within and outside the Corporation.
- Make recommendations to implement the Air Quality and Climate Change Plan by the Corporation.

The Corporate Air Quality and Climate Change Strategic Plan consists of 5 action categories that summarize the main functions that any organization, department or group would become involved with to address air quality and climate change issues. These are;

I. Research that Informs Policies and Strategies;
II. Response, Engagement & Communication;
III. Adaptation to Smog & Climate Change;
IV. Reducing Emissions, Key Pollutants & Greenhouse Gases; and;
V. Delivering Air Quality and Climate Change Programs.
The report provides examples of associated City actions, policies and programs that address the action categories. The report defines City Departments that may serve as corporate leads to the needs of the proposed plan’s action categories and identifies Departments that play a supportive role to each category’s actions either due to their mandate or ability to respond to identified issues.

The 5 action categories of the proposed plan should not be considered as separate. Information must flow amongst and between categories to ensure activities by the City and Departments under each area are efficient, effective and continuously improved upon through knowledge sharing.

Appendix A contains a chart that outlines and visualizes the structure of the Corporate Air Quality and Climate Change Strategic Plan. This chart is a framework model of the Plan and should be consulted when reading this report.
Corporate Roles and Responsibilities

The identified action categories of the Corporate Air Quality and Climate Change Strategic Plan require corporate leadership in order to co-ordinate responses amongst Departments within the Corporation and ensure activities are in line with the direction of the Air Quality & Climate Change Plan.

The following tables identify City Departments that could best serve the corporate leadership role of each action category. Departments that can support and address specific areas under the respective action categories are also noted.

It is not expected that the Departments identified as “corporate leaders” under each action category be responsible for knowledge on every issue under their respective action category. Corporate leaders are encouraged to direct responses and actions to address specific air quality and climate change issues outside their realm of knowledge to those Departments whose actions, under their mandate and main function, address the specific air quality and climate change issues identified.

For example, the Planning and Economic Development Department can undertake research on overall air quality and climate change issues, but cannot undertake specific research related to issues of energy management or tree planting or respond to enquiries on those topics, but would refer research and response to Public Works. Similarly Public Works could not be expected to respond to an enquiry on Disease Vectors or Smog Alerts, but would refer response to Public Health.

<table>
<thead>
<tr>
<th>Lead Department</th>
<th>Roles &amp; Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Economic Development</td>
<td>Air Quality &amp; Climate Change:</td>
</tr>
<tr>
<td></td>
<td>▪ Data Collection, Information Gathering, Analysis &amp; Modeling</td>
</tr>
<tr>
<td></td>
<td>▪ Policy Analysis</td>
</tr>
<tr>
<td></td>
<td>▪ Risk Management</td>
</tr>
<tr>
<td></td>
<td><strong>Supporting Departments</strong></td>
</tr>
<tr>
<td>Public Health</td>
<td>▪ Health effects &amp; impacts</td>
</tr>
<tr>
<td></td>
<td>▪ Disease Vectors</td>
</tr>
<tr>
<td>Public Works</td>
<td>▪ Risk management</td>
</tr>
<tr>
<td></td>
<td>▪ Infrastructure</td>
</tr>
<tr>
<td></td>
<td>▪ Fleet Greening</td>
</tr>
<tr>
<td></td>
<td>▪ Waste Management &amp; Reduction</td>
</tr>
<tr>
<td></td>
<td>▪ Operations</td>
</tr>
<tr>
<td></td>
<td>▪ Energy Management</td>
</tr>
<tr>
<td>Stakeholders Clean Air Hamilton &amp; Climate Change Advisory Committee</td>
<td>▪ Data Collection &amp; Policy Analysis</td>
</tr>
</tbody>
</table>
### II. Response, Engagement & Communication

#### Planning & Economic Development

**Lead Department:**
- Responding to community concerns
- Responding to external development proposals
- Responding to regulatory proposals
- Responding to internal policy input requests
- Communicating and promoting actions

**Supporting Departments**

**Public Works**
- Responding to regulatory proposals
- Responding to external development proposals
- Responding to internal policy input requests

**Public Health**
- Responding to regulatory proposals
- Responding to internal policy input requests

**All Departments**
- Responding to community concerns
- Responding to internal policy input requests
- Communicating and promoting actions

### III. Adaptation to Smog & Climate Change

**Public Health (Smog Response)**

- Smog Alert (Smog Response Plan)
- Corporate Response
- Community Response
  - Avoid Exposure

**Supporting Departments**

**All Departments**
- Implement actions laid out in Corporate Smog Response Plan

**Public Works (Climate Change Adaptation)**

- Extreme Weather Events
- Water Quality & Supply
- Built Environment
- Tree Planting & Preservation

**Supporting Departments**

**Public Health**
- Cold/heat alerts, disease vectors

**Emergency Services**
- Emergency Response
<table>
<thead>
<tr>
<th>Lead Department</th>
<th>Roles &amp; Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td></td>
</tr>
<tr>
<td>Reducing Emissions, Key Pollutants &amp; Green House Gases</td>
<td>Fleet Greening, Transportation Demand Management, Energy Management, Land Use &amp; Transportation Planning, City Operations, Waste Management &amp; Reduction, Idling Control</td>
</tr>
<tr>
<td>Supporting Departments</td>
<td>Planning &amp; Economic Development, Corporate Services</td>
</tr>
<tr>
<td>Supporting Departments</td>
<td>Land Use &amp; Transportation Planning, Compact Urban Form, Preservation of Green Space, Urban Design</td>
</tr>
<tr>
<td>Supporting Departments</td>
<td>Purchasing &amp; Procurement</td>
</tr>
<tr>
<td>Lead Department</td>
<td>Roles &amp; Responsibilities</td>
</tr>
<tr>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Program Delivery</td>
<td>Identifying Responsibility of the Plan, Creating Internal Collaboration Reporting &amp; Structure for the Plan, Monitoring &amp; Evaluation of the Plan</td>
</tr>
<tr>
<td>Supporting Departments</td>
<td>All Departments, Interdepartmental Working Group</td>
</tr>
<tr>
<td>Supporting Departments</td>
<td>Ensuring Regulatory Compliance, Internal Collaboration, Identifying Alternative Service Delivery Opportunities, Monitoring &amp; Evaluation of Programs &amp; Plan</td>
</tr>
<tr>
<td>Supporting Departments</td>
<td>Stakeholders, Climate Change Advisory Committee &amp; Clean Air Hamilton</td>
</tr>
<tr>
<td>Supporting Departments</td>
<td>Implementation</td>
</tr>
</tbody>
</table>
An Inter-Departmental Air Quality and Climate Change Work Group would be formed that would co-ordinate and be responsible for the actions of the corporation to address air quality and climate change and serve as a clearing house to disseminate information on corporate actions and priorities regarding air quality and climate change. Representatives of the group would be from the Departments (Planning & Economic Development, Public Works, Public Health) within the Corporation who can engage and promote actions to reduce air pollutants and greenhouse gases and adapt to climate change within City operations, policies and programs. The Inter-Departmental Air Quality and Climate Change Working group would support the Corporate Leads.

**Partnerships**

The Corporate Air Quality and Climate Change Strategic Plan is not an isolated plan or effort. It is dependent upon and supports activities undertaken by community partners outside of the Corporation. Such partners include international and non-governmental organizations, the federal and provincial government, the Federation of Canadian Municipalities, the Association of Ontario Municipalities, the Ontario Medical Association, the Ontario Professional Planners Institute, the Canadian Climate Impact and Adaptation Research Network, other municipalities, community groups such as Clean Air Hamilton, Green Venture, Environment Hamilton, the Hamilton Community Foundation, local industries and academics. The activities that each of these partners have or will undertake with regards to air quality and climate change also influence and shape the delivery of the City’s action strategies on Air Quality and Climate Change.

**Figure 3: Partnerships in Air Quality and Climate Change within and beyond Hamilton**

Local actions on clean air and climate change and successful cooperation among community members, industry and all levels of government are essential for reducing air pollutants and greenhouse gases.
Research helps an organization identify and focus its role in issues, assess what actions it can undertake directly through its operations and services and influence others to take action that support its priorities.

The purpose of research in the Corporate Air Quality and Climate Change Strategic Plan is to review new information and monitor trends on the impacts of air quality and climate change, and to develop, and assess corporate policies and programs that need to respond. Greater knowledge within the organization on issues of air quality and climate change is always required, as well as ensuring that the knowledge developed or identified by parts of the organization is shared amongst Departments.

The transfer of knowledge amongst Departments will keep air quality and climate change activities both relevant and current based on the available research on the topics of air quality, climate change, public health and climate impacts.

The Government of Canada reports that Canadians can expect to see many changes to personal and community risks as a result of climate change.\textsuperscript{13} Risk management is necessary in informing the actions that the City can undertake to address air quality and climate change impacts. Research in these areas helps in the development of “effective plans that identify, reduce and manage risks”; a goal of Hamilton's Vision 2020 Strategy.

Risk management is the process of assessing risk and then developing strategies to manage that risk. Risk management helps organizations avoid “nasty surprises” while allowing for adaptability in responses to the impacts of a changing climate. Information gathered through research and partnerships can inform decisions that respond to risk. Risks associated with air quality or climate change should not be addressed in isolation. They need to be integrated in a more holistic risk management strategy while recognizing the dynamic nature of climate-related risks.

The Corporation does not often undertake original research into air quality and climate change due to resources and mandate, however partnerships with governments, academics and organizations such as Clean Air Hamilton assist in the obtaining of factual knowledge on air quality and climate change issues.

\textsuperscript{13} Natural Resources Canada: \textit{Climate Change, Impacts & Adaptation: A Canadian Perspective}, 2005.
Air Quality

Clean Air Hamilton works to improve air quality by initiating research on local air quality issues and providing policy advice to government. Since 1992, Clean Air Hamilton has hosted a biennial conference on issues of air quality, health and planning known as the Upwind Downwind Conference. This conference provides a forum for improved understanding of air quality issues and human health impacts related to issues of urban cities and transportation. The conference highlights the roles that industry, community groups and governments can play in achieving air quality improvements. The conference generates many ideas and is an excellent opportunity for Hamilton and other communities to share practical solutions to air quality problems.

The City also joined the Greater Toronto Area (GTA) Clean Air Council in 2005 to participate in a dialogue on air quality with other municipalities in southern Ontario. The Greater Toronto Area Clean Air Council is an intergovernmental working group that promotes the reduction of air pollution emissions and increased awareness of Regional air quality issues through the collective efforts of all levels of government.

Climate Change

Research into climate change and its potential impacts on Hamilton requires on-going information gathering and dissemination to enhance learning by the Corporation and the community, understand the types of actions that can be undertaken to reduce emissions and adapt to smog and climate change.

Engagement and research on climate change is now a primarily a partnership with other levels of government, organizations, municipalities, local industries, academics and community groups. A proposed first step in formalizing these partnerships is the undertaking of a round table community forum which may lead to the formation of an equivalent advisory organization to Clean Air Hamilton, focussed on climate change issues.

The forum could raise awareness of climate change in Hamilton, create dialogue amongst groups, assist in the creation of a Climate Change Advisory Committee for the City.

By taking advantage of the research undertaken by other organizations, and consulting people and groups within the City of Hamilton, a more focussed and coherent set of air quality and climate change policies and strategies can be developed by the Corporation and the City’s community partners. Keeping informed of continued research and program activities will help the City maintain its policies and strategies and keep them relevant to the issues and impacts of air quality and climate change.
Departmental Roles & Responsibilities:

Within the Planning and Economic Development Department resides the “Air Quality Co-ordinator” for the City of Hamilton and Clean Air Hamilton. The Planning and Economic Development Department, through the role of the Air Quality Co-ordinator, can co-ordinate the gathering of research from partners on overall issues of air quality and climate change. The City’s Air Quality Co-ordinator already serves the role of supporting Clean Air Hamilton in their research on air quality and health and responds to external enquiries and proposals that impact local air quality. The role of the Co-ordinator could be expanded to gather research on climate change with the support of a Climate Change Advisory Committee, similar to Clean Air Hamilton.

However, specific research topics that fall under the current mandate and/or activities or functions of other Departments - such as public health, waste management, and infrastructure will remain the responsibility of those Departments.

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<table>
<thead>
<tr>
<th>Lead Department</th>
<th>Roles &amp; Responsibilities</th>
</tr>
</thead>
</table>
| Planning & Economic Development | Air Quality & Climate Change:  
  - Data Collection, Information Gathering, Analysis & Modeling  
  - Policy Analysis  
  - Risk Management  |
| Supporting Departments |  |
| Public Health |  
  - Health effects & impacts  
  - Disease Vectors  |
| Public Works |  
  - Risk management  
  - Infrastructure  
  - Fleet Greening  
  - Waste Management & Reduction  
  - Operations  
  - Energy Management  |
| Stakeholders |  |
| Clean Air Hamilton & Climate Change Advisory Committee |  
  - Data Collection & Policy Analysis  |
II  Response, Engagement & Communications

The Corporation provides many services to the citizens of Hamilton that involve information services such as responding to enquiries on plans, policies, programs, projects and disseminating community education materials and programs.

The Corporate Air Quality and Climate Change Strategic Plan will need to respond to enquiries and proposals from a variety of interests (e.g. public, internal Departments, different levels of government, international activities, industry, stakeholders, etc.). These differing interests influence how actions undertaken by the Corporation address air quality and climate change.

Activities undertaken by the Corporation on air quality and climate change will need to:

1) Respond to the community and to internal staff or Department concerns regarding air quality and climate change issues that impact the economy, health and environment of Hamilton.

The City Air Quality Co-ordinator responds to public and internal policy requests regarding issues of air quality and co-ordinates with City Departments on requests regarding specific City programs and air quality. This function will continue to serve in the City to address Hamilton’s air quality needs. However engagement of climate change awareness and responses by and within the Corporation is required.

With respect to the Corporate Air Quality and Climate Change Strategic Plan, the Air Quality Co-ordinator can assist in the co-ordination of efforts and information regarding air quality and climate change to other internal Departments through a proposed internal working group and a Climate Change Advisory Committee.

Public Health responds to concerns of the health of the citizens of Hamilton and engages citizens in healthy lifestyle, health protection and health promotion through education and the delivery of public health programs. Public Health will continue in this role under the Corporate Air Quality and Climate Change Strategic Plan, but would expand it role to respond and deliver Smog Advisories. Cold alerts and information on health impacts of climate change and air quality such as disease vectors would remain unchanged.

The Public Works Department responds to enquires regarding public operations and services such as transit, road services, water and wastewater treatment; water distribution; stormwater and drainage; solid waste collection and disposal; recycling; street access and street lighting; traffic control; road/water/sewer infrastructure; environmental approvals; Park's operation and maintenance; and forestry including street tree planting. The Public Works Department would continue to respond to enquiries regarding public operations and services under the Corporate Air Quality and Climate Change Strategic Plan.

Corporate Services runs the Customer Contact Centre that serves as a portal to public enquiries and information on municipal services. City Clerks processes official correspondence to and from City Council and can also serve as a general information office to the public on a wide range of enquiries. Air quality and climate change
information and/or corporate contact information should be made available to these venues for the public.

2) Respond to external policies (e.g. federal, provincial, other municipalities) and regulations that will influence the Corporation’s operations and to ensure local compliance.

The Canadian Environmental Protection Act, the Canadian Environmental Assessment Act, the Canada-United States Air Quality Agreement, the Provincial Environmental Protection Act, The Provincial Policy Statement, Ontario’s Anti-Smog Action Plan, the Memorandum of Understanding for Cooperation on Addressing Climate Change, Ontario Conserves are all examples of some of the current policies or regulations that the Corporation needs to consider in its operations and services that relate to air quality and climate change issues. The City needs to effectively engage other organizations and government in future policies and regulations that affect its air quality and climate change objectives and actions.

3) Respond to external project development and planning proposals that may impact the local airshed and climate of Hamilton. A consideration of air quality and climate change impacts resulting in changes in infrastructure and operations, leading to adaptation, is advised under the decision-making and approvals context.

4) Communicate and promote the actions that the Corporation is undertaking to address air quality and climate change.

The promotion and communication on the activities that the Corporation and City undertake to address the impacts of air quality and climate change is important to educate the community on City initiatives, but also to create dialogue and encourage partners in developing similar programs within their communities. Under the Corporate Air Quality and Climate Change Strategic Plan, individual Departments will be responsible for promoting their own respective programs and policies and educating the public. However, in the implementation of a City Wide Air Quality and Climate Change Action Plan, an annual progress report could be developed similar to the City’s Waste Reduction and Vision 2020 Indicators Reports. This type of reporting should be considered in the Phase II of the Plan.
**Departmental Roles & Responsibilities:**

The Planning and Economic Development Department, through the role of the Air Quality Co-ordinator, can lead the responses to enquiries from the public, as well as promote City actions, with regards to air quality and climate change in Hamilton by continuing to be a point of City contact. The Air Quality Co-ordinator, where required, will co-ordinate with and assist City Departments in responses where specific action enquiries such as tree planting requests, energy programs and transportation are made.

Individual Departments will still be responsible for responding to enquiries and/or proposals on specific programs that may impact on air quality or climate change that fall under their mandate and/or activities or functions. They will also be responsible for the promotion and marketing of their individual actions.

Individual Departments are responsible for complying with relevant legislation which influences their mandates and actions, and the Air Quality Co-ordinator, within the Planning and Economic Development Department, can disseminate emerging legislation and policies with regards to overall air quality and climate change to Departments.

<table>
<thead>
<tr>
<th>Lead Department</th>
<th>Roles &amp; Responsibilities</th>
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</table>
| Planning & Economic Development | ▪ Responding to community concerns  
                          ▪ Responding to external development proposals  
                          ▪ Responding to regulatory proposals  
                          ▪ Responding to internal policy input requests  
                          ▪ Communicating and promoting actions |
| Supporting Departments | |
| Public Works | ▪ Responding to regulatory proposals  
                          ▪ Responding to external development proposals  
                          ▪ Responding to internal policy input requests |
| Public Health | ▪ Responding to regulatory proposals  
                          ▪ Responding to internal policy input requests |
| All Departments | ▪ Responding to community concerns  
                          ▪ Responding to internal policy input requests  
                          ▪ Communicating and promoting actions |

The next two categories of the Corporate Air Quality and Climate Change Strategic Plan emphasizes the role that the City can undertake in educating and motivating action by citizens and employees on improving air quality and retarding climate change.
III Adaptation to Smog & Climate Change

Adaptation is not mitigation. Mitigation involves actions meant to avoid or delay the occurrence of climate change. Mitigation is addressed under category IV Reducing Emissions, Key Pollutants and Greenhouse Gases.

Adaptation covers all actions aimed at addressing the impacts of air pollutants and climate change. Adaptation can involve taking actions to modify existing facilities, structures, services, and operations to minimize the impacts and disruptions caused by air pollutants and climate change.

According to the International Panel on Climate Change (2001) adaptation is a necessary part of climate change mitigation. The corporate reality is not if, but when and how much adaptation should be made. Adaptation has the potential to reduce adverse impacts and to enhance beneficial impacts. Adaptation actions could incur costs and may not prevent all damages, however variability, and rates of change are all key features in addressing adaptation to climate change, not simply changes in average climate conditions.

At the municipal level, efforts to manage climate-related risks have not kept pace with the challenges. Canadian communities are vulnerable to hazards associated with climate variability and change, and without appropriate adaptation responses, their vulnerabilities to risk will surely increase.  

Adaptation includes technical adaptation (e.g. alternative sources of energy, or new technology that reduces greenhouse gas emissions); environmental adaptation (e.g. responding to the changing structure of natural systems such as water, air, forests, and land); and social adaptation (e.g. changes in the use of transportation, land use, and personal behaviour).

Adaptation to climate change and air quality must be considered in light of all other corporate risks to better adapt to changing variables.

Smog Response

The Corporate Smog Response Plan is an example adapting to the recurrence of smog during the summer season. A network of City Departments engages Ministry of the Environment Smog Alerts within the Corporation and to our external citizens. Departments include Planning & Economic Development, Public Health Services, and the City Manager. Corporate Departments such as Public Works, Planning and Economic Development, Community Services, Emergency Services, and Human Resources respond by ensuring appropriate program modification actions, outlined in the departmental smog response, are undertaken to reduce activities that release further smog precursors or aggravate health effects on employees and citizens.

14 Canadian Climate Change Impacts & Adaptation Research Network (accessed online at http://www.c-ciarn.ca/)
Although the Corporate Smog Response Plan is more responsive to the Ministry of Environment issued smog alerts in the summer, ultimately the corporate response and departmental operating procedures should be undertaken throughout the year. Smog is no longer a summer phenomenon. Recent Smog Advisories (October 2004 and December 2005) for Hamilton are evidence that a broader and more frequent process of adaptation is required from the corporation.

Smog - Departmental Roles & Responsibilities:

Public Health is the lead Department on adaptation activities to Smog. The mandate of Public Health is to protect the health of local citizens. Public health already educates and engages citizens in Hamilton on health related issues of water quality, disease and food safety. Air pollution is considered a threat to public health by health organizations (OPHA, OMA etc.) and the Ministry of Environment.

Hamilton’s Public Health would be able to deliver a smog response program that would advise and engage changes in behaviour by citizens on an on-going basis. The Planning and Economic Development, Corporate Services and Public Works Departments would support Public Health in the implementation of adaptation responses to smog as the communication network is already established and actions are undertaken in city operations to reduce activities during smog days under the Corporate Smog Response Plan. Public Health could also improve smog advisories by linking smog advisories to hot weather and thereby combining advice and education to the public regarding health issues of air quality and heat safety.

City Departments with a role in adapting to smog include:

- Public Health (Lead Department)
- Planning and Economic Development (Support)
- Public Works (Support)
- Corporate Services (Support)

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<tr>
<th>Lead Department</th>
<th>Roles &amp; Responsibilities</th>
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| **Public Health** (Smog Response) | - Smog Alert (Smog Response Plan)  
- Corporate Response  
- Community Response  
  - Avoid Exposure |
| **Supporting Departments** | |
| **All Departments** | - Implement actions laid out in Corporate Smog Response Plan |
Climate Change Adaptation

Adapting to climate change needs to understand the potential impacts and effects of climate variability and the risks. All corporate actions need to incorporate an element of preparation and risk protection of citizens that the Corporation cannot directly control but can still prepare for. Potential areas of corporate policy and program attention for climate change include: extreme weather events, disease vectors, water quality and supply, the built environment, and tree planting and preservation.

Extreme Weather Events

The International Panel on Climate Change has projected that climate change will increase the number and intensity of extreme weather events that give rise to heat waves, droughts, floods, extreme snowfalls, run off and soil erosion.

Increasing temperatures will lead to changes in wind patterns, the amount and type of local precipitation, and the types and frequency of severe weather events that may be expected to occur. Such climate change has far-reaching and/or locally unpredictable environmental, social and economic consequences.\(^\text{15}\)

The Government of Canada (2005) reports that Canadians can expect to see many changes to climate-related risks in their lifetimes. These include:

- More severe weather events, including thunderstorms, heavy rains, hail, and tornadoes.
- Increased landslide/avalanche activity
- Increased magnitude flooding of inland infrastructure
- Changing levels of water tables resulting in flooding, erosion, droughts and storm surges

Recent events such as the BC forest fires (2003), the Prairie drought (2004), and the Eastern Ontario/Quebec ice storm (1998) have demonstrated unusual weather related impacts that show how vulnerable Canadian communities are to the wide-ranging social and economic impacts of weather extremes and variability.

Hamilton will not be exempt from the effects of climate change. The City’s 2004 Environmental Scan points out that “research indicates that future weather patterns in Southern Ontario will fluctuate to an increasing degree. Adverse weather conditions will become more intense and less predictable.” For example Hamilton experienced a tornado in 2005 that tore off roofs, toppled trees in areas of Hamilton and knocked Lawfield Middle School off its foundations. Hamilton has approached the Ontario Disaster Relief Assistance Program in the past with regards to the tornado and other sources of widespread flooding.

The Ontario Emergency Management Act (EMA), amended in 2003 outlines the responsibilities of local/municipal and provincial government in the mitigation and management of emergency situations. It requires all Ontario municipalities to develop comprehensive, risk-based emergency management programs based on planned emergency prevention, preparedness, response and recovery.

The City of Hamilton Emergency Management Program has been developed and managed since the 1990’s. The Program may present an opportunity to further address risks of weather related events resulting from climate change.

Bitter cold and severe winter storms cause more than 100 deaths in Canada every year. Similarly heat waves can have a substantial impact on human health by exasperating the risk of heart attack or worsen medical conditions such as diabetes. Extreme heat can result in other ailments related to excessive heat exposure - dehydration, heatstroke, heat cramps, and heat exhaustion – in healthy populations. During a 5-day heat wave in Chicago in 1995, the number of deaths increased by 85%. The very young and elderly are the most vulnerable to heat waves because they have a more limited capacity to regulate their body temperatures through prolonged extreme heat. At greater risk are those who lack access to air conditioners, pools or cool recreational facilities needed for relief from excessive heat. Heat waves are expected to increase with climate change.

The City of Hamilton Public Health Services issues extreme cold or smog alerts and works with community agencies to develop actions to protect the vulnerable from extreme weather conditions. The actions for extreme cold alerts include transporting and sheltering of people who are at particular risk. Safety strategies can include general health related information and developing an inventory of residential premises whose occupants may be at high risk in the event of extreme heat, so that relevant responses can be developed that are tailored to the population at risk. It has been suggested that heat safety programs be strengthened through coordination with public air quality advisories. Public Health is piloting an approach to combine heat safety messages with public smog advisories in Hamilton.

To adapt to the potential impacts of extreme weather, further public health programs will need to be established to reduce the health impacts and risks to the public associated with climate change.

Disease Vectors

Studies have suggested that global warming and extreme weather affects the breeding and range of disease vectors such as mosquitoes and rodents responsible for malaria, yellow fever, hantavirus, Lyme disease, Rocky Mountain spotted fever, dengue fever, encephalitis, and West Nile virus.

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18 Pollution Probe, Towards an Adaptation Action Plan: Climate Change and Health in the Toronto-Niagara Region, 2002
Lyme disease, the most widespread vector-borne disease, is currently increasing in North America as winters warm and ticks proliferate. Ragweed pollen growth, stimulated by increasing levels of carbon dioxide, may be contributing to the rising incidence of asthma.\(^{19}\) In combination with poor air quality, climate change can aggravate and combine health impacts. For example, allergists are now beginning to see the combined impacts of smog and pollen referring to the double mixture as “smollen”.\(^{20}\)

<table>
<thead>
<tr>
<th>West Nile Virus is a virus found in wild birds and carried by mosquitoes. When an infected mosquito bites a bird, the bird can become infected and can pass the virus on to other mosquitoes. When an infected mosquito bites a human, the virus can cause mild-to-severe symptoms, including West Nile fever or encephalitis.</th>
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The City adopted a West Nile Virus Plan in 2004, and the City’s Public Health Services runs the West Nile Virus program. Actions include educating the public on West Nile Virus, tracking dead bird reports within City limits and enforcement of the standing water by-law.

To adapt to the potential increase in disease vectors, further public health programs may need to be established to reduce the health impacts.

**Water Quality & Supply**

Lowered lake and river levels predicted by many climate models could have negative impacts on shipping, water intake infrastructure, rural groundwater supply, hydropower generation and shoreline property and lead to degraded water quality as well as ecosystem disruption.

Increased moisture deficits and frequent localized droughts may lead farmers and other individuals dependent on water resources to consider supplementary irrigation and new water sourcing leading to competition over allocations.

Hamilton’s storm water management programs are pivotal to preserving water supplies and improving source water quality. Increased precipitation will challenge the design capacity of water collection systems, and multiply the probability of flooding. Excess runoff from overwhelmed sewer systems could permit the release of contaminants into local water sources. In 2002, heavy rainfall in Walkerton washed harmful bacteria from manure into a municipal well, causing seven deaths and serious illness to others.\(^{21}\)

The City is undertaking a Stormwater Master Plan to provide strategies for servicing and management guidance for the City’s stormwater system (including storm trunk sewers) for the next 30 years, and a strategy to protect, enhance and restore the environmental resources within Hamilton’s 15 watersheds as land use changes occur. A study of the historical analysis of meteorologic records will be undertaken in order to define the

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\(^{19}\) Centre for Health and the Global Environment, Harvard Medical School, *Climate Change Futures: Health, Ecological and Economic Dimensions*, 2005


impact on infrastructure (capacity and susceptibility to flooding) and the environment (water quality, fisheries, erosion, baseflows etc.). The City also has formed SERG (Storm event response group) committee which is exploring the causes of stormwater infrastructure failure, infrastructure response to changes in rainfall patterns and will make recommendations for solutions.

The City is also undertaking a City-wide Water and Wastewater Master Plan to develop policies and strategies for its water and wastewater servicing over the next 30 years. This includes the lake based water distribution system and sanitary sewer systems. One of the policies behind the Plan is for the City to maintain sufficient reserve capacity in its water and wastewater infrastructure and facilities to provide operational flexibility and meet potential changes in servicing conditions (such as power failures, growth rates and fluctuating demands). 22

Since 2002, the City’s Public Works Department has undertaken a Water Metering Program to reduce municipal water use by households & businesses. The City has also initiated a Groundwater Resources and Wellhead Protection Partnership Study as an initiative to help protect groundwater resources within the City. The objectives of the study are to ensure a continued safe drinking water supply to Hamilton residents who depend on municipal groundwater supply wells, specifically those in the communities of Freeland, Carlisle, Lynden, and Greensville where the City operates local water systems.

The Wastewater Investment Needs and Strategies (WINS) is dedicated to long-range planning and implementation of appropriate wastewater infrastructure upgrades. The City initiated the WINS program to address the technical, social and financial needs of wastewater infrastructure over a 30 year period. The challenges for this program include Hamilton's aging infrastructure, anticipated growth, and most importantly water quality targets established by the Hamilton Harbour Remedial Action Plan (RAP) and by the Ministry of Environment.

**Built Environment**

Building designers, operators and managers need to consider climate change in building and construction. Buildings and their construction account for 25% of Canada’s overall greenhouse gases emitted through the processing of new construction, combustion of fossil fuels to meet water and space-heating requirements and electrical consumption in lighting and air conditioning.

The other aspect is for the building to adapt to a changing climate. In other words, the impacts of land use patterns and building/construction on air quality and climate change, and the impact of air pollutants and climate change on buildings. Climate change will have major effects on the development of future building standards and environmental regulations.

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Vulnerability is further augmented by Canada’s aging and deteriorating infrastructure; in many cases, the minimum standards that were used to design capacity in urban infrastructures are no longer appropriate for a changing climate. A 1995 survey by the Federation of Canadian Municipalities and McGill University indicated that Canadian urban infrastructure is dangerously outdated and requires upgrades that could cost up to $44 billion.\(^{23}\)

Climate change may lead to potential increases in the amounts of precipitation as well as the frequency of extreme weather events, including storms. Thus it is also likely that there will be an increased rate of weathering on the built environment. Damage to buildings from weather can be caused by: storm damage; rain penetration; poor durability of construction materials; flood damage; coastal erosion and foundation movement.

To respond to these anticipated changes, new buildings should compensate for changing weather in their design, materials and construction processes. For example, using new technologies like green buildings and encouraging LEED Certification (Leadership in Energy and Environmental Design) which indicates the level of sustainable design concepts incorporated into the site and building design. Old buildings may be adapted or retrofitted to be able to withstand harsh weather effects.\(^{24}\) City Council has directed an investigation of LEED certification for new City facilities.\(^{25}\)

Heat Island Reduction (HIR) strategies (i.e. shade trees, reflective roofs, less reflective pavements and urban reforestation) can reduce cooling energy use in buildings, lower the ambient air temperature and improve local air quality

Building service retrofits such as solar panel and roof garden installations increase energy efficiency, improve thermal comfort, and saves peak demand electricity which generates savings on heating and electricity bills. They also contribute to reduced stormwater runoff and improved air and water quality. Similarly strategically placed trees, shading windows and walls of a building, reduce the amount of direct heat gain. Trees act as filters, trapping dust particles and absorbing gaseous pollutants.

The City has been participating in the coordination and preparation of the National Guide to Sustainable Infrastructure known as InfraGuide with the Federation of Canadian Municipalities and the National Research Council. The Guide provides a road map to the best available solutions for addressing municipal infrastructure issues and is meant to be a focal point for a Canada-wide network of practitioners, researchers and municipal governments focused on infrastructure operations and maintenance. The City of Hamilton was the 2005 recipient of the InfraGuide National Award of Excellence that recognizes leadership and innovation in municipal infrastructure management that embrace InfraGuide’s Principles and Guidelines for Sustainability.

\(^{24}\) Canadian Climate Change Impacts & Adaptation Research Network (accessed online at [http://www.c-ciarn.ca/](http://www.c-ciarn.ca/))
\(^{25}\) City of Hamilton Committee of the Whole, *Committee of the Whole Report 06-007*, May 2006.
Hazard Land Management

Changes in climate plays a key role in triggering landslides through extreme rainfalls, disruption of freeze-thaw cycles and faster melting of snowfall resulting in less stable slopes and areas. Hamilton experienced unusually high volumes of rainfall over a short period of time in July and August 2005. The force of water on August 2005, drove 1088 tonnes of shale and debris down the escarpment at the Chedoke golf course.

Changes in precipitation patterns and extreme weather events also lead to an increase in flood frequency. Increased frequency and magnitude of flooding will increase the hazard to structures, buildings and humans. The effects of climate change may amplify the existing impact of human activity on rivers. The most significant mitigation for this is to be able to accurately forecast flood situations.

In Ontario, Conservation Authorities were established to manage issues related to the flood plain. Flood forecasting is the responsibility of the local Conservation Authority in partnership with the Ministry of Natural Resources. Municipal governments and other agencies act to minimize the impacts of flooding on communities through land use planning, building design and construction.

Tree Planting & Preservation

Since 1998, the Hamilton Tree Planting Program has enabled Hamilton citizens to plant a total of over 2100 native species trees to improve local air quality. The City, in partnership with Clean Air Hamilton and Green Venture, offered homeowners subsidies for native trees to be planted on their properties. Encouraging tree planting within a community serves many purposes: trees act as carbon sinks that can off-set the release of greenhouse gases by other sources; they provide shade that can mitigate the “urban heat island effect”; they offer shade that can protect people from the damaging effects of the sun’s ultra-violet light; they can provide cool retreats for people during heat waves; and they may remove many pollutants from the atmosphere.

The Forestry Management Plan for City Owned Trees guides the delivery of forestry services to obtain maximum community benefit. In 2002, there were an estimated 300,000 street trees in urban areas and 120,000 park and open space trees on City property. The urban forest includes public owned trees located on residential boulevards, parks, natural areas, institutional/City owned sites, waterfronts and trees from other public use areas. The Plan ensures there is a minimum level of service for all municipally owned trees, and the total number of trees in the City increases with plantings.

The Trees Across Hamilton program was initiated in an effort to undertake community based naturalized tree plantings in each Ward across the City. The 2005 pilot program was carried out over six weekends with volunteers, Ward Councillors, and staff participating in the tree planting events. In total, 3,000 tree whips and 2,000 seedlings were planted in thirteen different locations.
Climate Change - Departmental Roles & Responsibilities:

The Public Works Department is the corporate lead on adaptation to climate change. The Public Works Department is responsible for city infrastructure, greenspaces and water quality and supplies. City operations and services that would need to adapt to a changing climate and prepare for the impact of air quality and climate change such as extreme weather. The Public Works Department already undertakes a number of activities to reduce or mitigate air pollutants and greenhouse gases from city operations and services (see Action Category IV). Addressing adaptation, as the corporate lead, would expand some of the activities already undertaken by the Department and link them to the reduction activities they currently undertake.

Public Health would continue to be responsible for engagement and education on disease vectors and cold alerts as these are threats to the public health of citizens and the programs are currently developed. Public Health could increase public health programs to address climate change and air quality.

Emergency Response and Planning remains the responsibility of Emergency Services. The City’s Emergency Management Program may present an opportunity to address the risks of weather related events resulting from climate change and should be explored.

The responsibility of land use and built environment resides both within the Planning and Economic Development and the Public Works Departments. A working relationship between both Departments has been established in the area of land use and transportation planning, of which infrastructure is a component. Since this relationship linkage of policy with the implementation of services and city operations is established, the co-operative relationship should continue in respecting each Departments mandate and function under the Corporate Air Quality and Climate Change Strategic Plan.

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<tr>
<th>Lead Department</th>
<th>Roles &amp; Responsibilities</th>
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</table>
| Public Works (Climate Change Adaptation) | - Extreme Weather Events  
- Water Quality & Supply  
- Built Environment  
- Tree Planting & Preservation |
| Supporting Departments |  
| Public Health | - Cold/heat alerts, disease vectors |
| Emergency Services | - Emergency Response |
IV Reducing Emissions, Key Pollutants & Greenhouse Gases

Reduction, or mitigation, is directed at reducing atmospheric concentrations of air pollutants and greenhouse gases resulting from municipal operations and services (i.e. areas of direct control or influence by the Corporation).

Reduction strategies should:

- Define actions to reduce greenhouse gas emissions and improve air quality in corporate operations, and
- Encourage actions by staff, citizens and industries to reduce their personal emissions to improve air quality and retard climate change.

Public Works is the main City Department responsible for the operations of most facilities of the municipality. Key operations include:

- transportation management
- buildings and infrastructure management
- energy management and conservation; and
- waste management and reduction.

These operational areas are or can be directed by policies and actions to reduce or mitigate air pollutants and climate change.

The Planning and Economic Development Department has a role to play in the reduction of air pollutants and greenhouse gases through the structure and design of the built urban environment. Land use planning to encourage a more compact mixed use of land that protects greenspaces, and mitigates the impacts of climate change is essential to achieve emission reductions over the long term.

Fleet Greening

Municipal fleets can be responsible for a significant portion of corporate air pollutants and greenhouse gases emitted in the course of municipal operations.

In 2004, the Corporation directed the implementation of a Central Fleet Strategic Plan. This Plan included a Green Fleet Transition Plan to provide an affordable way to use new vehicle and fuel technology. The Green Fleet Implementation Plan (2005) was developed for the Central Fleet, which manages vehicles used by the Public Works Department, the Planning and Development Department, and several other City agencies (the Corporate Fleet) to implement affordable and sustainable vehicle technology. Actions within the Plan include:

- Light duty vehicles replaced with hybrid gas-electric vehicles where practical, as they become due for replacement;
- The City’s bulk fuel supply include 10% biodiesel content; and,
- An Anti-idling policy for City vehicles.
The Corporation’s fleet of hybrid light-duty vehicles is one of the largest in Canada with 40 hybrid vehicles now in service to demonstrate that a market exists for more fuel-efficient vehicles and is committed to their production by placing firm orders for fuel-efficient hybrid vehicles.

The City also participates in and promotes The Repair Our Air Fleet Challenge. A program funded by Natural Resources Canada with the purpose of reducing greenhouse gas emissions through the promotion of efficient fuel management practices and the reduction of vehicle idling.

The City is currently engaged in a project initiated by the federal government to develop heavy-duty vehicles with hybrid diesel-electric or hybrid diesel-hydraulic launch systems. It is expected that this project will produce hybrid versions of a garbage packer and a tree service aerial truck as well as a courier truck.

**Transportation Demand Management**

The City of Hamilton in cooperation with a number of other municipalities in the Greater Toronto Area is proposing to establish a Greater Toronto Demand Management Program called Smart Commute. The project examines establishing a network of transportation management associations throughout Hamilton and the Greater Toronto Area. These associations will focus on reducing auto demand, particularly for peak-periods work trips, through initiatives such as a ride matching service, education/training, establishing a van pool program and car sharing program.

The Commuter Challenge is a week-long, friendly competition where Canadian cities compete to reduce air pollution by using active and sustainable modes of transportation. Hamilton has undertaken the Commuter Challenge for six years. The City of Hamilton's Commuter Challenge began in the year 2000 when 41 companies and over 700 individuals made the commitment to eco-commute. In 2005, 28 organizations registered for the challenge and participation included 1,915 Hamiltonians.

The City also offers eligible employees a discounted bus pass. The Employee Commuter Pass program is available to full time employees who do not have an employer paid parking and is available through a flexible payroll deduction. The program is consistent with the objectives of the Downtown Transportation Plan and encourages the use of transit.

**Energy Management**

The City of Hamilton has assumed responsibility for the usage of energy from the energy grid. An energy management program has been in place since 2004 to help reduce the amount of energy all City buildings require to operate. The focus is on providing energy efficient solutions that upgrade facilities while reducing operating costs, improving indoor air quality, addressing code compliance and reducing environmental emissions. This program reduces energy consumption, which in turn reduces the amount of greenhouse emissions the City is responsible for producing. The goal is to reduce all City facilities' energy consumption by 10-15%. The City has engaged in an energy management feasibility study of 22 City operated facilities ( Arenas, Recreation Centres, Libraries, Fire stations, Public Works Operation centers Social Housing, and
Municipal centres). The City is now undertaking the implementation phase of an energy retrofitting project.26

The City has Corporate Computer Equipment Shutdown guidelines for the daily routine for shutting down corporate computer systems and related devices such as printers. The guidelines ensure best practices will result in reduction of energy consumption for the Corporation, reduce wear and time loss on corporate computer systems.

The City has begun to explore the future impacts of energy availability on Hamilton through the examination of the Peak Oil concept.

**Peak Oil describes the situation where future world oil production reaches a peak and then rapidly declines resulting in higher energy costs.**

The City understands that a strategy for responding to peak oil must recognize two policy response areas: the Corporation strives to minimize its own costs. Secondly the City seeks to sustain the economic, social, and environmental welfare of Hamilton’s residents and businesses in the event of serious energy supply constraints.

In 2006, the City created an Office of Energy Initiatives position within the Public Works Department to formalize and centralize responsibility for energy management in the City by focusing on how and where the City of Hamilton is spending money on energy and to look for ways to save and reduce energy consumption.

The Office of Energy Initiatives may, amongst other functions:

- Develop and implement billing verification strategies;
- Develop purchasing strategies and practices for commodities (natural gas, electricity and eventually fuel (diesel, unleaded, and biodiesel);
- Establish consumption reduction targets and guidelines for the use of renewable energy sources in City Projects (subject to Council approval);
- Develop and project manage energy retrofit projects (i.e. recent approval for retrofit of 22 City buildings); and
- Raise awareness in the Corporation with respect to energy use.

**Land Use & Transportation Planning**

Canadian cities have been characterized by urban sprawl associated with low density land use and increasing greenspace reserves within developing suburban areas, and segregated land use patterns that separate home, work, shopping and recreational facilities. Urban sprawl leads to increased motorized travel distances than would be unnecessary in more compact, mixed use land developments.

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Low-density development patterns promote the use of the personal vehicle for more functions due to greater distances and difficulty in combining trip purposes. This can discourage more healthy forms of transportation such as walking and bicycling. In most situations, public transit requires high-density and more compact land use to be cost-effective. A decrease in public transit ridership and the decrease in use of active forms of transportation increase the demand for road travel and its associated infrastructure. This demand for automobile usage leads to increased traffic congestion, thereby increasing travel time, minimizing fuel efficiency and increasing vehicular emissions of air pollutants and greenhouse gases.

**Ontario Provincial Policy Statement (2005):**

The Ontario Provincial Policy Statement provides policy direction on matters of provincial interest related to land use planning and development. Air quality & climate change effects of planning decisions are two of the many factors that need to be evaluated in the decision-making planning process. Section 1.1.3.2 (a) (3) of the Statement makes specific mention of the importance of minimizing impacts to air quality, climate change and promoting energy efficiency.

The City of Hamilton is actively engaged in planning to create a more compact urban form, direct new development and density to support transit, and reduce auto emissions through the 30-year Growth-Related Integrated Development Strategy (GRIDS), Transportation Master Plan, Green Fleet Implementation Plan and Energy Management Program.

Commencing in 2003, the City developed the Growth Related Integrated Development Strategy (GRIDS) to identify and assess options for a broad land use structure, and associated infrastructure, enhance the economic development strategy and assess fiscal implications for the growth of the City. GRIDS is focussed on the urban areas of Hamilton. A parallel process for the rural areas is being undertaken as part of the Official Plan review. The objective of GRIDS has been to achieve a balance amongst social, economic and environmental considerations. One of the key inputs into GRIDS is the Transportation Master Plan which has undertaken policy research into the greenhouse gas emissions resulting from transportation options.

The GRIDS process aims to meet a higher, yet realistic level of intensification, focus urban growth around transit infrastructure, provide improved support to future transit initiatives, develop new areas as compact communities, and protects local natural features and greenspace. It addressed the Provincial growth management and planning initiatives of the Places to Grow plan, the Greenbelt Plan, and the Provincial Policy Statement.

The preferred growth option for Hamilton has been identified as a “Nodes and Corridors” approach. Corridors are mixed uses areas that serve a main street function that do/will provide locations for the retailing of goods and services, community and recreational uses. The nodes reflect existing areas of live, work and play activities and residential intensification opportunities will be directed/facilitated to occur within the defined nodes to support public transit and the objectives of the growth management strategy. During the GRIDS process, conceptual neighbourhood plans were developed to demonstrate how more compact, mixed use communities could be developed based on citizen’s suggestions of development that encourages
a greater mix of uses and social diversity while providing for transit and “walkable” (i.e. pedestrian and bike linkages) communities.27

GRIDS will serve as the point of departure for a number of plans. The overall growth management strategy will be implemented through a wide range of mechanisms including, but not limited to, the Official Plan, Water and Wastewater Master Plan, Stormwater Master Plan, Transportation Master Plan, Development Charges By-law and other financial programs, Social Development Strategy, and the Economic Development Strategy.

The City has undertaken an Environmental Remediation and Site Enhancement (ERASE) Community Improvement Plan which contains a comprehensive set of programs to promote the rehabilitation and redevelopment of brownfield properties within the 3,400 acres of old industrial area. “Brownfields” are generally abandoned, idled or underused industrial or commercial properties in built-up urban areas where expansion or redevelopment is complicated by real or perceived environmental contamination, building deterioration/obsolescence, and/or inadequate infrastructure. The objective of ERASE is to bring these properties back into economic use while reducing the environmental impacts of the property. Brownfield development can reduce the amount of greenfield land being consumed, thereby reducing urban sprawl and its associated negative environmental impacts including air and water pollution and the loss of agricultural land.

The Downtown Transportation Master Plan and Secondary Plan, represent an integrated land use and transportation planning exercise which views the future Downtown Hamilton as an overall system as opposed to separate components.

The Transportation Plan aims to support a mix of land uses and built form, and ensure development can be supported by the transportation system and parking controls; supports short-term business oriented parking, discourages long-term parking and provide public parking in strategically located structures or lot. In the long term, its objectives is to reduce the number of off-street parking lots and replace them with buildings, parkettes and landscaping; divert through-traffic around the downtown core and implement traffic-calming measures where appropriate, and give priority to pedestrian safety over vehicles that will create an attractive pedestrian environment with improved air quality.

Urban greenspaces can provide a range of benefits including mitigating air and water pollution, providing opportunities for recreation, fostering cohesive neighborhoods, attracting businesses, and stabilizing property values. Investing in open space can serve as an anchor for revitalizing neighborhoods and building healthy communities.

Linking to the Downtown Transportation Master Plan and the Downtown Secondary Plan is the Streetscape Master Plan which seeks to enhance the quality of existing downtown corridors through extensive street tree planting, new trail connections and for enhancements to existing open spaces, parks, schools, and cultural landscapes. The Plan aims to “create a green construct

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of connected open spaces as a renewed setting in urban environments and continued economic growth and reinvestment in the core city”

Developing recreational opportunities and trails that support alternative transportation such as bicycles and walking encourage individuals to reduce their auto dependency and adopt a healthier lifestyle while reducing transportation sources of air pollutants and greenhouse gases.

| Pedestrians and cyclists account for a high proportion of the trips generated within downtown Hamilton. Multi-use trails provide viable and valuable alternatives to automobile usage throughout the City. |

The Hamilton Trails Master Plan seeks to prescribe a comprehensive multi-purpose off-road recreational trail system to connect natural areas, cultural features, major land use destinations and link with on-road commuter corridors within the City of Hamilton. Through the Plan, transportation options and recreational activities are encouraged while linkages amongst greenspaces are increased within Hamilton.

**City Operations**

**Street sweeping**

Fugitive dust emissions are often referred to as road dust, and can be detected visually when traffic or wind disturbs dust, soil or silt on the ground, causing it to become airborne. The fugitive dust emissions disperse into the air and impacts downwind air quality.

The composition of road dust varies depending upon adjacent land uses, local emission sources and traffic loads. It can consist of inhalable particulate matter (PM$_{10}$ & PM$_{2.5}$) from vehicle exhaust, tire wear and pavement wear, and it can consist of material tracked off industrial sites, blown off construction sites, and/or settled from low level emission sources such as scrap-yards.

In Hamilton, local road dust impacts occur routinely in industrial areas during business hours when truck traffic is the heaviest. The combination of truck track-out of soil and dust onto roads and heavy traffic causes large quantities of dust to be stirred up.

Fugitive dust control is an important responsibility of industrial, bulk storage and aggregate industry. On-site management of soil and dust at the site level has a direct influence on the availability of both for dispersion into the air and tracking onto the roadways. Dust control on properties can prevent dust and soil from becoming airborne, from being tracked-out, or from being created or transported in the first place and unpaved properties creates a “dust bowl” effect, increasing impacts of road dust. The City is engaged with partners and the Ministry of the Environment on a fugitive dust abatement strategy.
Street sweeping of roadways can reduce or increase the impacts of dust along roadways. The effectiveness of equipment, the technology used, and the frequency of sweeping have a direct influence on the availability of soil and dust available for dispersion into the air from traffic.

The City has purchased regenerative street sweepers to replace aging vehicles in the fleet. The regenerative air technology is more effective at controlling fine particulate matter than either mechanical or vacuum-assisted machines. In 2005, in partnership with the City of Toronto, street sweeping vehicles were subject to performance testing in the ability to reduce air pollutants (particulate matter) in their street sweeping operations prior to purchasing. The City has purchased six, with two more to come, regenerative air street sweepers that passed the performance testing in reducing particulate matter and keeping operations costs down.

**Purchasing**

Municipalities can spend millions of dollars each year in the purchasing goods and services. Some of the most immediate and significant ways in which municipalities can improve air quality and retard climate change is through their purchasing decisions.

Examples of actions include:

- Giving preference to energy efficient products with an **ENERGY STAR®** label
- Giving preference to products that are re-useable, durable and contain recycled content
- Looking for products and services with Environment Canada’s **EcoLogo™**
- Giving preference to products that reduce or eliminate air pollutants. For example, purchasing products made of recycled material, cleaner fuels and vehicles in municipal fleets.

Through the Green Fleet Implementation Plan (2005), the City has begun to purchase alternative technology and fuels for the use in fleet vehicles such as low emission and hybrid vehicles and renewable fuels.

The responsibility of developing green aspects into the specifications of the products or service to be procured is undertaken by the respective Department requesting the goods or services to be delivered. Under a Corporate Green Procurement Policy, the incorporation of green aspects into the products and service procured would be assured, with associated cost savings, and could reduce the air quality, climate change and other environmental impacts (energy, resources, waste, etc.) that may result from the making or use of products and services. The City’s Corporate Services Department that assists Departments in purchasing of goods and services, working with respective Departments, could examine the benefits and practicality of a corporate green procurement policy for the Corporation.
Waste Management and Reduction

Landfilling is the most common waste disposal method and, in many cases, the one that produces the most greenhouse gas emissions when there is no landfill gas capture system in place. The anaerobic decomposition of waste in landfills produces methane, a greenhouse gas 21 times more potent than carbon dioxide.\(^{28}\)

Incineration, a less common disposal method, results in emissions of both carbon dioxide and nitrous oxide. Combusted waste can displace the burning of fossil fuels by producing electricity or heat for nearby buildings or industry.

In addition, the transportation of waste to disposal sites produces greenhouse gases from the combustion of the fuel used in the equipment. Finally, the disposal of materials indicates that new products are being produced as replacements. This production often requires greater use of fossil fuels to obtain raw materials and manufacture the items.

Recycling can have a large impact on reducing greenhouse gases, because it replaces some of the raw materials and energy used in the manufacturing process. Using recycled material not only reduces emissions used to produce these products, but also the energy required for manufacturing. For materials that require intensive processing, such as steel, plastic and aluminium, recycling can reduce emissions by about two tonnes of carbon dioxide equivalent per tonne of product. Paper recycling also increases carbon storage because it leaves more trees growing in the forest.

Composting is an option available only for food scraps and yard waste. Because it involves aerobic decomposition, composting does not generate methane emissions, and only releases a small amount of carbon dioxide.

Hamilton’s long term plan, the Solid Waste Management Master Plan (SWMMP), was approved by City Council in December 2001 and the target of 65% diversion from landfill was set at that time. Amongst the recommendations of the Plan are the adoption of a three-stream waste collection system (recyclables, organics and residuals), and centralized waste composting facility and community recycling and reuse centres. An Energy from Waste (EFW) facility was identified in the recommendations as potentially forming part of the City of Hamilton’s waste management system.

The approved Plan became more critical with the closing of Hamilton’s Solid Waste Reduction Unit (SWARU). The closing of SWARU incinerator in 2002 benefited local air quality with regards to air toxics, but was also identified as increasing the greenhouse gas emissions associated with City Operations.\(^{29}\) However, the closing of SWARU also redirected waste to the Glanbrook landfill and reducing the life span of the landfill.

The City has undertaken a number of waste management initiatives that support the SWMMP and divert and reduce the amount of waste to landfills, thereby reducing the amount of

\(^{28}\) United States Environmental Protection Agency (2006) *Global Warming*

greenhouse gases generated from waste. These programs include the organic waste Green Cart program, the Blue Box recycling program, the creation of community recycling centres and household special waste. Hamilton has also built a central composting facility, located on former industrial land, which will process the organic materials diverted through the City’s Green Cart program.

The Niagara-Hamilton WastePlan is a joint initiative of the Regional Municipality of Niagara and City of Hamilton to work together to find a way to manage solid waste remaining after 65% diversion from the two communities.

The process recognizes that diversion programs help reduce the amounts of waste going into each community’s landfills in the short term, but for the long term, the option of disposal may greatly reduce the amount of waste that is sent to landfill and needs to be considered (e.g. thermal technologies, mechanical and biological processes, etc.).

The WastePlan is being carried out under the Provincial Environmental Assessment Process and is a multi-year study that involves extensive community consultation. Each preferred option undergoes an extensive assessment of impacts to the economy, community and the environment in categories such as air quality and climate change.

As part of the Hamilton-Niagara WastePlan, it is proposed that solid waste be managed primarily through waste diversion, but thermal processing will be used to manage the majority of the post-diversion residual waste and to recover energy from the combustible portion of the residual waste stream.

**Idling Control**

Idling any vehicle pollutes the air, contributes to climate change, wastes natural resources for little benefit to the vehicle operator, harms passengers (by polluting the air inside the vehicle) and wastes money. Anti-idling aims to reduce air pollution and climate change by controlling emissions of carbon dioxide & nitrogen oxides.

Unnecessary idling results in Canadians wasting over 3.2 million litres of fuel a day. This costs about $1.9 million and produces over 7.6 million kilograms of greenhouse gases, based on 10 minutes of idling per day. A freight-hauling truck averages 6 hours of idling a day for 43 weeks of the year. This means that a single truck emits about 21, 000 pounds of carbon dioxide, 390 pounds of carbon monoxide and 225 pounds of nitrogen oxides per year.

The City of Hamilton does not have a City-wide anti-idling by-law. However, the Corporation has implemented a policy with regards to internal fleets as a component of the Green Fleet Implementation Plan. Signs have been placed in areas of Hamilton to remind drivers to turn their engines off if they are waiting for a long period of time.

The City through partnership with Clean Air Hamilton and Green Venture is developing an idling awareness campaign for the community. The campaign will aim to encourage behavioural change among those who live and work in Hamilton through education and awareness.
**Departmental Roles & Responsibilities:**

The City’s Public Works Department will be the corporate lead on reducing emissions, key pollutants and greenhouse gases by the corporation. Municipal operations and services (i.e. areas of direct control or influence by the Corporation) falls under the mandate of the Public Works Department, and the Department has already undertaken a number of initiatives to reduce emissions in their services.

In the area of land-use and transportation planning, the Departments of Planning and Economic Development and Public Works have established a working relationship that integrates land use and transportation policy with the implementation of services and city operations. This relationship will continue with both Departments taking responsibility for individual activities that falls under the respective mandate and function of the Department under the Corporate Air Quality and Climate Change Strategic Plan.

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V  Program Delivery

Implementation

The City delivers a variety of policies and programs that address air quality and the reduction of greenhouse gases. However, a strategy to bring the current policies and programs together and translate into a corporate effort to address both air quality and climate change in the form of a strategic plan is required.

Identify Responsibility

This report of the long-term Plan identifies roles and responsibilities of City Departments by recognizing corporate leads and supporting Departments in an air quality and climate change network, respecting those Departments mandate and functions. The Corporate Air Quality and Climate Change Strategic Plan encourages Department to undertake further actions and expand programs to address air quality and climate change in the delivery of their services and operations in the City of Hamilton.

Ensure Regulatory Compliance

The Corporate Air Quality and Climate Change Strategic Plan, and actions within, seek to ensure that corporate operations are in compliance with external regulations and that corporate air quality and climate change activities are monitored and evaluated, based on current available information.

As outlined under Action Category II of the Plan, individual Departments are responsible for ensuring their service and operations are compliant with relevant legislation. A proposed Inter-Departmental Air Quality and Climate Change Working Group, with the assistance of the Air Quality Co-ordinator, will ensure that emerging legislation and policies with respect to overall air quality and climate change decisions is distributed within the Corporation.

Create an Internal Collaboration & Reporting Structure

Phase II will outline specific implementation details and actions of the long-term Plan. However, to implement a Corporate Air Quality and Climate Change Strategic Plan for the City of Hamilton, new or redirected resources and collaboration amongst Departments and divisions is needed. Collaboration and partnerships within the City has been demonstrated in the development of the City’s Vision 2020 Strategy, GRIDS, Transportation Master Plan, and the Corporation’s Triple Bottom Line Reporting.

However the formation of an Inter-Departmental Air Quality and Climate Change Working Group and Climate Change Advisory Committee could formalize the partnerships within the Corporation and aid in the establishment of roles.
Inter-Departmental Air Quality and Climate Change Working Group

An Inter-Departmental Air Quality and Climate Change Work Group would co-ordinate and have responsibility for the actions of the corporation to address air quality and climate change and serve as a clearing house to disseminate information on corporate actions and priorities regarding air quality and climate change.

Representatives of the group would be from the Departments within the Corporation who can engage and promote actions to reduce air pollutants and greenhouse gases and adapt to climate change within City operations, policies and programs. Representation on the group would be from the identified Corporate Lead Departments of the Plan’s action categories (Planning & Economic Development, Public Works, Public Health).

The working group could undertake an inventory of current efforts including reductions of air pollutants and greenhouse gases, identify programs and areas where gaps exist in the strategic plan, and working with the Climate Change Advisory Committee recommend actions to be taken corporately to address air quality and climate change.

The Inter-Departmental Air Quality and Climate Change Working Group would report to the Climate Change Advisory Committee on measures and progress to reduce and adapt to climate change and consult with Clean Air Hamilton on projects pertaining to air quality improvements.

Clean Air Hamilton

Clean Air Hamilton would continue to advise the City on matters of air quality and work with government partners, community stakeholders and the private sector in developing strategies to improve air quality in Hamilton. Clean Air Hamilton would continue its research on air quality and encourage behavioural changes in individuals living and working in Hamilton.

The Inter-Departmental Air Quality and Climate Change Working group would consult with Clean Air Hamilton on projects pertaining to air quality improvements.

Climate Change Advisory Committee

The Climate Change Advisory Committee would advise the City on matters of climate change and work with government partners, community stakeholders and the private sector in developing strategies to address climate change in Hamilton.

Representatives of the group would be from the City, industry, community/citizens, government, academic, health professionals and similar partners who can engage and promote actions to reduce greenhouse gases and adapt to climate change within the City of Hamilton. This group would have links to the community on climate change actions for the City, and build partnerships to undertake joint programs/actions on air quality and climate change. The Climate Change Advisory Committee would consult and work with Clean Air Hamilton on projects relating to air quality improvements.

The Climate Change Advisory Committee would report to Council annually on the progress of reducing greenhouse gases in the City.
Identify Alternative Service Delivery Opportunities

Alternative service delivery can be defined as an organizational option or response to the challenge of improving the capacity of governments to manage change, promote innovation and meet their infrastructure and service-delivery obligations more efficiently and effectively. Collaborative partnerships are an approach that municipalities can undertake as alternative service delivery.

Individual City Departments may need to explore alternative service delivery models for services and operations where resources to undertake action on improving air quality and reducing greenhouse gases are lacking.

Monitoring & Evaluation

Specific reporting details and progress indicators and measurements of the City’s progress on improving air quality and climate change will be developed in consultation with stakeholders under the direction of the Climate Change Advisory Committee. This will be addressed further under Phase II of the long-term Plan.

Departmental Roles & Responsibilities:

The City’s Public Works Department will be the corporate lead, supported by the Inter-Departmental Air Quality and Climate Change Working Group, on implementation of the Corporate Air Quality and Climate Change Strategic Plan. The delivery of direct municipal programs and services is a function of the Public Works Department. The lead department would administer the Inter-Departmental Air Quality and Climate Change Working Group.

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**Supporting Departments**

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Recommendations

The following recommendations are initial steps the Corporation could undertake to build on Departmental activities to date, integrate these activities, and work in partnership with the community to address both air quality and climate change within the City of Hamilton.

A) Adopt the idea that the Corporation of the City of Hamilton requires a comprehensive long-term strategic plan to address air quality and climate change concerns based on current actions and to address the present and future needs of the citizens of Hamilton.

B) Host a Hamilton Climate Change Roundtable and invite the community to voice their interest, help identify community resources, and develop partnerships. Engage citizens on climate change and activities to reduce greenhouse gases at the community level. This roundtable forum could lead to the development of a Climate Change Advisory Committee for the City of Hamilton.

C) Create an Inter-Departmental Air Quality and Climate Change Working Group with representatives of Departments within the Corporation who would engage and can promote activities to reduce air pollutants and greenhouse gases and adapt to climate change within City operations, policies and programs. This internal corporate group’s work would feed into the Climate Change Advisory Committee to build partnerships to undertake joint programs/actions with the community on air quality and climate change.

D) Undertake a City inventory of air pollutants and greenhouse gas emissions. Previous attempts at an inventory used pre-amalgamation data and the results are irrelevant to the current operations of the Corporation. In 1999, the City completed an analysis of the Corporate greenhouse gas emissions associated with the Region of Hamilton-Wentworth and the City of Hamilton for 1994 and 1998. The analysis showed greenhouse gas emissions from Corporate operations were reduced by 3.8% between those four years. However, with changes in Corporate structure and operations since amalgamation, comparisons with the 1998 data are difficult, if not impossible.

E) Continue to support programs and partnerships that educate and initiate action to improve the local air quality and reduce greenhouse gases within the Corporation and in the City of Hamilton.
Conclusion

The City has undertaken air quality and climate change initiatives since the early 1990s. Air Quality had been addressed through partnerships with HAQIC and now through Clean Air Hamilton.

Prior to amalgamation in 2001, two programs addressing climate change existed, the Region’s Climate Protection Action Plan and the City’s Greenhouse Gas Reduction Program. However, these programs were not yet combined after amalgamation. The Corporation maintained its network of sustainability and air quality programs which contribute to the mitigation and adaptation to climate change.

The City of Hamilton’s Departments currently deliver a variety of policies and programs that address both air quality and climate change. However, a clear, coherent strategy to bring the current policies and programs together and that translate into a corporate effort to address both air quality and climate change in the form of a strategic plan is needed.

Where local air quality is a concern, greenhouse gas reduction strategies can be developed in concert with clean air initiatives and can result in actions that reduce both air pollutants and greenhouse gases, reduce costs and save corporate resources.

The Corporate Air Quality and Climate Change Strategic Plan Phase I builds on the current network of air quality and climate change policies and programs and attempts to combine and expand them into a strategic plan to address both air quality and climate change issues in a focussed approach.

The Corporate Air Quality and Climate Change Strategic Plan Phase I establishes lead departments within the Corporation that would work with the Inter-Departmental Air Quality and Climate Change Working Group in the delivery of the five action categories of the Plan with the support of Departments in the delivery of program areas to address air quality and climate change.

The Corporate Air Quality and Climate Change Strategic Plan Phase II will focus on the long-term implementation details of the Plan and new strategic actions of the corporation.

Ultimately, the long-term strategic Plan will help guide the City’s future policies and operations in such a way to ensure the City’s actions are consistent with the goals of improving air quality and mitigating the effects of climate change and greenhouse gas emissions in areas the City can influence.

The Corporate plan should not be seen as an isolated action but is dependent upon and supports activities undertaken by partners outside of the Corporation. Through partnerships and community engagement the corporate plan can be a component to build upon and create a City-Wide Hamilton Action Plan on Air Quality and Climate Change that engages the citizens of Hamilton.
References and Sources of Information:

Canadian Climate Impacts and Adaptation Research Network (C-CIARN) (2006)  
http://www.c-ciarn-ontario.ca/english/science.html

Canadian Climate Impacts and Adaptation Research Network (C-CIARN) (2006)  
*Adapting to Climate change. An Introduction for Canadian Municipalities.* 32 pgs.

Centre for Health and the Global Environment, Harvard Medical School (2005)  
*Climate Change Futures Health, Ecological and Economic Dimensions.* 142 pgs.


City of Hamilton (2004) *Vision 2020 Corporate Action Inventory*  


City of Ottawa (2004) *Air Quality and Climate Change Plan.*  
http://ottawa.ca/city_services/planningzoning/2020/air/


The Clean Air Partnership (2006) *Adapting to Climate Change in Toronto.*  
http://www.cleanairpartnership.org/climate_change.php

The Clean Air Partnership (2006) *A Scan of Climate Change Impacts on Toronto.* 50 pgs.


http://www.ec.gc.ca/cleanair-airpur/

http://kn.fcm.ca/


APPENDIX A:

The Corporate Air Quality and Climate Change Strategic Plan – Framework

The following chart outlines and visualizes the structure to the Corporate Air Quality and Climate Change Strategic Plan. This chart is a framework model of the Plan and should be consulted when reading this report.
### APPENDIX C to Report PED06336
Departmental Roles & Responsibilities

<table>
<thead>
<tr>
<th>Lead Department</th>
<th>Roles &amp; Responsibilities</th>
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<tbody>
<tr>
<td><strong>I</strong> Research That Informs Policies &amp; Strategies</td>
<td><strong>Planning &amp; Economic Development</strong>&lt;br&gt;<strong>Supporting Departments</strong>&lt;br&gt;- Air Quality &amp; Climate Change:&lt;br&gt;  - Data Collection, Information Gathering, Analysis &amp; Modeling&lt;br&gt;  - Policy Analysis&lt;br&gt;  - Risk Management&lt;br&gt;- Public Health&lt;br&gt;  - Health effects &amp; impacts&lt;br&gt;  - Disease Vectors&lt;br&gt;- Public Works&lt;br&gt;  - Risk management&lt;br&gt;  - Infrastructure&lt;br&gt;  - Fleet Greening&lt;br&gt;  - Waste Management &amp; Reduction&lt;br&gt;  - Operations&lt;br&gt;  - Energy Management&lt;br&gt;- Stakeholders&lt;br&gt;  - Clean Air Hamilton &amp; Climate Change Advisory Committee&lt;br&gt;  - Data Collection &amp; Policy Analysis</td>
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<td><strong>II</strong> Response, Engagement &amp; Communication</td>
<td><strong>Planning &amp; Economic Development</strong>&lt;br&gt;<strong>Supporting Departments</strong>&lt;br&gt;- Public Health&lt;br&gt;  - Responding to community concerns&lt;br&gt;  - Responding to external development proposals&lt;br&gt;  - Responding to regulatory proposals&lt;br&gt;  - Responding to internal policy input requests&lt;br&gt;  - Communicating and promoting actions&lt;br&gt;- Public Works&lt;br&gt;  - Responding to regulatory proposals&lt;br&gt;  - Responding to external development proposals&lt;br&gt;  - Responding to internal policy input requests&lt;br&gt;- All Departments&lt;br&gt;  - Responding to community concerns&lt;br&gt;  - Responding to internal policy input requests&lt;br&gt;  - Communicating and promoting actions</td>
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<td><strong>III</strong> Adaptation to Smog &amp; Climate Change</td>
<td><strong>Public Health (Smog Response)</strong>&lt;br&gt;<strong>Supporting Departments</strong>&lt;br&gt;- Smog Alert (Smog Response Plan)&lt;br&gt;- Corporate Response&lt;br&gt;- Community Response&lt;br&gt;  - Avoid Exposure&lt;br&gt;- Public Works (Climate Change Adaptation)&lt;br&gt;<strong>Supporting Departments</strong>&lt;br&gt;- Extreme Weather Events&lt;br&gt;  - Water Quality &amp; Supply&lt;br&gt;  - Built Environment&lt;br&gt;  - Tree Planting &amp; Preservation&lt;br&gt;- Emergency Services&lt;br&gt;  - Cold/heat alerts, disease vectors&lt;br&gt;- All Departments&lt;br&gt;  - Emergency Response</td>
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<td><strong>IV</strong> Reducing Emissions, Key Pollutants &amp; Green House Gases</td>
<td><strong>Public Works</strong>&lt;br&gt;<strong>Supporting Departments</strong>&lt;br&gt;- Fleet Greening&lt;br&gt;  - Transportation Demand Management&lt;br&gt;  - Energy Management&lt;br&gt;  - Land Use &amp; Transportation Planning&lt;br&gt;  - City Operations&lt;br&gt;  - Waste Management &amp; Reduction&lt;br&gt;  - Idling Control&lt;br&gt;- Planning &amp; Economic Development&lt;br&gt;  - Land Use &amp; Transportation Planning&lt;br&gt;  - Compact Urban Form&lt;br&gt;  - Preservation of Green Space&lt;br&gt;  - Urban Design&lt;br&gt;- Corporate Services&lt;br&gt;  - Purchasing &amp; Procurement&lt;br&gt;- All Departments&lt;br&gt;  - Identifying Responsibility of the Plan&lt;br&gt;  - Creating Internal Collaboration Reporting &amp; Structure for the Plan&lt;br&gt;  - Monitoring &amp; Evaluation of the Plan&lt;br&gt;- Stakeholders&lt;br&gt;  - Climate Change Advisory Committee &amp; Clean Air Hamilton&lt;br&gt;  - Implementation</td>
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<td><strong>V</strong> Program Delivery</td>
<td><strong>Public Works</strong>&lt;br&gt;<strong>Supporting Departments</strong>&lt;br&gt;- All Departments&lt;br&gt;  - Interdepartmental Working Group&lt;br&gt;  - Ensuring Regulatory Compliance&lt;br&gt;  - Internal Collaboration&lt;br&gt;  - Identifying Alternative Service Delivery Opportunities&lt;br&gt;  - Monitoring &amp; Evaluation of Programs &amp; Plan&lt;br&gt;- Stakeholders&lt;br&gt;  - Climate Change Advisory Committee &amp; Clean Air Hamilton&lt;br&gt;  - Implementation</td>
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