

April 20th, 2021

Town of Caledon General Committee Meeting,
6311 Old Church Road,
Caledon East, L7C 1J6.

Re: Resilient Caledon Community Climate Action Plan

Mayor of Caledon and Councillors.

I am here today to address significant omissions in the Proposed Resilient Caledon Community Climate Action Plan. As a resident who is surrounded by pit applications, concerned about future impacts to wells and drinking water, the Climate Emergency that Council declared in January 2020, and the lack of oversight in the Province on preserving the Credit River, the Action Plan does not address the communities needs to be “Resilient” nor does it mention aggregate. The Community Climate Action Plan is timely as the Covid-19 pandemic has highlighted the critical need for food security from local sources during crisis periods, and as one of the key factors in the subsequent economic recovery. Ontario has some of the best agricultural land in Canada, much of which is not protected by current land-use planning policies.

Under Land Acknowledgments per the Caledon Climate Action Plan, it is stated that Caledon:

“recognize and respect the historic connection of First Peoples to this place, and their ancestors’ stewardship of it for thousands of years before us. We recognize the contributions of Métis, Inuit, and other Indigenous peoples in shaping and strengthening our communities, as well as our province and country as a whole. We are grateful for the opportunity to live and work on this land and give our respect to its first inhabitants. We would like to express our commitment to making the promise and challenge of Truth and Reconciliation real, and to undertaking meaningful collaboration to do so.”

Therefore:

- 1. I formally request that every aggregate license issued in the Town of Caledon undergo consultation and written permission from the Mississaugas of the Credit First Nation.**
- 2. That the Town require cumulative, social and health impact studies before approving zoning or licenses to represent Public Interests as is done in Waterloo Region where social and cumulative impact studies are a requirement.**
- 3. That the Official Plan audit and omit Aggregate Resource Areas that are harmful to the Credit River.**
- 4. That the Town of Caledon Climate Action Plan and the Official Plan Review include cancelling approvals for extraction below the water table.**

5. That Caledon review their Climate Action Plan to address fully the impacts of Aggregate Extraction in Caledon and adopt more stringent requirements for aggregate licensing like other regions in the Province.

Was there any communication or consultation with Indigenous groups in creating the Climate Action Plan? Has there been any consultation from Indigenous groups on any of the development proposals in the Town of Caledon? Should that not be addressed given that it is globally acknowledged that environmental stewardship can only be achieved through the 7th Generation Principle?

Changes to the Aggregate Resources Act have made it a requirement of gravel companies to consult appropriately when seeking licences. The Town of Caledon has not consulted with Indigenous groups on infrastructure developments before or since declaring a Climate Emergency. *“The duty to consult and to accommodate is part of the fundamental law of Canada, imposed by s.35 (1) the Constitution. It overrides federal as well as provincial law and affects private rights in the property, including land on which pits and quarries operate or on which they are intended to be operated”*

While the proposed expansion of the Greenbelt as outlined in the Initial Study Area of the Paris Galt Moraine and Urban River Valleys is a valuable groundwater system that must be protected, the Oak Ridges Moraine is under threat today. The moraines continue to be under pressure for aggregate development (including below-water-table extraction), water takings, growth, as well as the impacts of a changing and variable climate.

Council approved quarries will serve as unlimited extensions to adjacent properties and massive expansions into mega quarry sites. There is no end in sight for this community unless the Town begins to plan for a sensible, sustainable approach that does not degrade wetlands, rivers, streams, heritage villages, rural roads, quality of life and water security for the taxpayers of Caledon who are environmentally conscientious and expect their representatives to advocate for them.

Yesterday there were many recommendations to the Province, made by a multitude of environmental groups, on the Greenbelt expansion. The demand for more oversight of the Greenbelt, our watersheds, and Moraines was clear:

- That the Greenbelt boundaries be significantly expanded to include more of Ontario’s agricultural land
- That below-water-table aggregate extraction be prohibited in the Greenbelt (refer to Bill 71, Paris Galt Moraine Conservation Act, 2019)
- That there be broader moraine protection across the province (per The Oak Ridges Moraine Conservation Act) in addition to the Greenbelt Plan

Jennifer Le Forestier, Caledon, ON., L7K 0E6

- That the Moffat Moraine (part of the Paris Galt, and Moffat Moraines ANSI) be included in the Initial Study Area and mapping
- That policy leadership is required to analyze the extent to which the cumulative effect of aggregate extraction negatively impacts groundwater recharge in the moraine areas.
- That the Province assess the cumulative impacts of water-taking and/or permitting in the Greenbelt Plan Study Areas and across the province.
- That the out-wash gravel deposits adjacent to the moraine, that store and transmit groundwater recharged in the moraine to river valleys, and the river valleys that contain the high-baseflow streams fed by discharge from the moraine, be included in the mapped area.

The Greenbelt expansion does not address the degradation of natural heritage systems and it is up to this Region to implement stronger municipal policies.

Recently licence approval was granted at LPAT for aggregate extraction under the water table for 50+ years in an ecologically rich area in Belfountain, Ontario (Erin Pit) part of a UNESCO World biosphere. The Proponent plans to extract material at a combined annual rate of 1.8 million tonnes per year.

The Town had no conditions in approving the Zone Amendment despite a proposal to dump 7.2 million litres of effluent in the same area of the West Credit River. Only one Councillor negotiated on behalf of residents requesting well-monitoring when the Zoning Amendment was approved. The Town of Caledon then left the community to settle at LPAT at the cost of \$35,000 dollars for one day's tribunal, only to have minimum requirements met to secure the integrity of their wells.

<https://www.caledonenterprise.com/news-story/9852560-james-dick-erin-pit-expansion-one-step-closer-as-caledon-council-votes-to-shelve-objection/>

A licence for another 321 hectares of land is being sought in Cataract by St. Mary's and the license application is one year away. Studies have shown that quarries impact private wells. The fly-rock from CBM will impact the entire community and their house valuations. CBM has stated at public meetings that they intend to pump into the Credit. They have been drilling and residents have already noticed that ponds have disappeared on the Cataract trail.

The proponent states at public meetings that the area is "protected in the Official Plan, however the OP is being reviewed. If the Town of Caledon wished to reach GHG emission targets by 2030 than it would be wise to withdraw the land north of Cataract as "protected" and consider that a Climate Action Plan does not include extracting and blasting in a community's backfield.

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Furthermore, a letter was recently sent March 21st from our MP Kyle Seebach to Minister Wilkinson. He is concerned about the impacts of the Olympia Pit to wells downstream as there are 3 tributaries of the Credit River that are being impacted. I have included that letter as part of my delegation.

What has been done by the Town of Caledon? How have you responded? How long has the Town been aware of this situation?

A ruling on March 29th found that Gravel pits in southern Wellington County owe millions in back-dated property taxes after an Ontario court ruled, that they were assessed too low by the Municipal Property Assessment Corp. (MPAC). An interim decision from the Tribunals Ontario Assessment Review Board dated March 29th. ruled six aggregate operations in Puslinch and Erin need to be reassessed for the 2017 to 2020 taxation years.

Has the Town of Caledon assessed back-taxes on any pits? Will you in the future?

<https://www.guelphtoday.com/wellington-county/tribunal-ruling-means-wellington-county-pit-operators-owe-millions-in-back-taxes-3635192?fbclid=IwAR3Ow8T2NBGcEp9woGFQUytilbTwcGFxH8OPzkqxqdBmMLkGsEJhA8IF7NY>

The Blueland pits POPA 13-02 is seeking a license with no fixed end date that means that by 2050 the Town of Caledon will not reach its climate targets if nothing is changed. The application proposed a licensed area of 26 hectares, with 20.75 proposed for extraction. The pit would produce a maximum tonnage limit of 750,000 tonnes.

https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/17736-Heart-Lake/2.-Draft-Official-Plan-Amendment.pdf?fbclid=IwAR3Wxyw2YqvjLkS7gzNViiX7rk48No_6IAzXAZsGKADLdxxDEigq75iQ2zA

<https://www.caledonenterprise.com/news-story/9216130-a-caledon-aggregate-pit-deep-enough-to-completely-bury-a-10-storey-building-says-pitsense-advocacy-group/>

The Town of Caledon must start seeking a balance between the health and welfare of citizens now and in the future and the demands of an industry that is contributing \$362,000 dollars a year in Tax Levy Funding.

Recent investigative studies show that the contributions of the moraine to groundwater recharge and discharge extend well beyond the physical landform and influence water-flow, temperatures, quality and associated terrestrial and aquatic habitats in the water system.

Both urban development and rural land-use practices such as below-water-table aggregate extraction continue to be a risk to the integrity of the hydrological and ecological functions of the moraine. The cumulative impacts of both aggregate extraction and water taking must be considered in relation to growth and development.

Development of a Paris Galt Moraine Conservation Plan in addition to the Greenbelt Plan would address and protect the features and functions of a more defined moraine Study Area. They must prohibit below-water-table extraction in clear, straightforward language such as:

- Aggregate extraction is not permitted in natural core areas (as in the Oak Ridges Moraine Conservation Plan).

Both public and private lands must be included to provide protection, avoid fragmentation, and act as corridors for wildlife. Ontario's Greenbelt should be expanded to include more agricultural land. In addition to the Greenbelt Plan, the moraines require a broader province wide Conservation Plan with more restrictive aggregate policies that include no below water table extraction.

Identifying "food belts" in various regions of the province and by branding goods produced there will encourage Ontarians to buy local, provide for Ontario's economy, and promote tourism comparable to the evolution of the Niagara Region's vineyards.

Ontario Nature has stated that the following water resource areas should be protected:

- All moraines, given their vital role in providing clean drinking water and mitigating floods.
- Private lands within urban river valleys, since it is primarily private lands, not public lands, that are threatened with urbanization and development.
- Coldwater streams, wetlands, and headwaters of river systems, which improve water quality, provide critical habitat for fish and other wildlife, and afford many further benefits such as flood control, carbon storage, groundwater recharge, and recreational opportunities.
- Former glacial Lake Algonquin and Iroquois Shorelines and Plain which feature significant groundwater discharge zones and are the headwaters of many Coldwater streams.

Several studies have suggested that enough aggregate supply is available currently to fuel economic growth for at least 50 years. Rather than continue to prioritize extraction of new sources of aggregate, it would be in the Province's best interest to create incentives to maximize re-use and re-processing of aggregate materials under safe and appropriate industrial conditions. A recent study completed by The National Farmers' Union, McMaster University, and Gravel Watch Ontario revealed that 83% of aggregate extraction occurs on prime agricultural lands. Given that agricultural lands are the economic driver in Ontario, they must be protected and prioritized from invasive industrial development such as mining, pits, and quarries. The National Farmers' Union – Ontario states that the "interim use" for aggregate extraction" as considered by the aggregate industry, undermines

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Ontario's food sustainability, and arguably permanently alters agricultural land. This finite, non-renewable resource must be permanently protected.

Aggregate extraction below the water-table results in a permanent water surface when extraction is finished. This situation results in direct exposure of the groundwater system to contamination from airborne sources and spills, as well as removes the possibility of rehabilitation of the site to resumed agricultural use. Prior to the late 1980's (Section 3.16 of the Ministry of Agriculture and Food Guidelines Policy) mineral extraction on Class 1 to 3 agricultural lands was not permitted unless agricultural rehabilitation of the site was carried out. In conjunction with the growing the Greenbelt consultation, below water-table aggregate extraction should be prohibited in the Greenbelt and full rehabilitation of all extraction sites to agricultural use be required.

From field to fork, the agri-food sector contributes \$47.3billion to Ontario's economy and supports over 860,000 jobs.

Therefore, I urge this Council to review their Climate Action Plan to fully address the impacts of Aggregate Extraction in Caledon and enact more stringent requirements for aggregate licensing. I also wish to have a recorded vote on the motions I have put forward.

Thank you

Links and Further References:

The **Seventh Generation** Principle is based on an ancient Haudenosaunee (Iroquois)* philosophy that the decisions we make today should result in a sustainable world **seven generations** into the future. May 30, 2020

Review of the State of Knowledge for the Waterloo and Paris/Galt Moraines. February 2009. Prepared for: Land and Water Policy Branch Ministry of the Environment. Prepared by Blackport Hydrogeology Inc., Blackport and Associates Ltd., AquaResource Inc.

Ontario Ministry of Agriculture and Food: Revision to Food Land Guidelines Policy Regarding Mineral Aggregate Extraction (416/965).

<https://www.northdumfries.ca/en/doing-business/resources/Documents/1662-Alps-Rd/Planning-Justification-Report.pdf>

<https://pub-caledon.escribemeetings.com/filestream.ashx?DocumentId=11838>

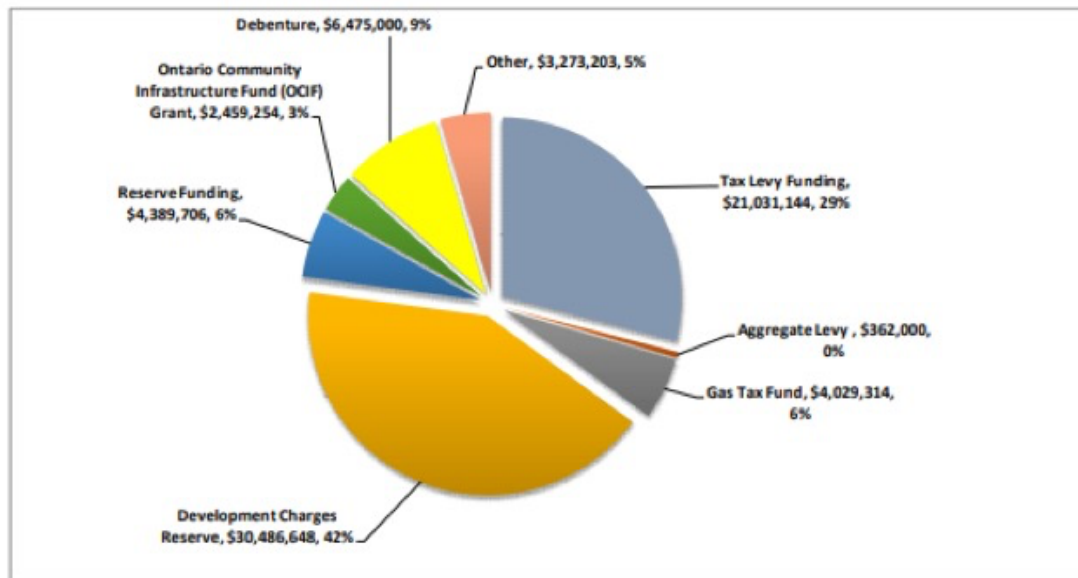
https://ofa.on.ca/newsroom/mzos-jeopardize-long-term-productivity-and-sustainability-of-ontarios-farmland/?fbclid=IwAR2kB5g4fY60wE8Ozcct5zd_nWq4UPqInU4hul8rR0ZHCQq-yWDmKNiTQI

https://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwia-tX9-lrwAhUKQ60KHa-DBrkQFjAAegQIAxAD&url=https%3A%2F%2Fguelph.ca%2Fwp-content%2Fuploads%2FMoraines_Report_May2009.pdf&usg=AOvVaw3o5HBrhW4680uluBBaQHGs

Overview of Budget Processes and Policies

The proposed 2021 Capital budget totals \$72,506,269 and is funded from the following sources:

Tax Levy Funding	Aggregate Levy	Gas Tax Fund	Development Charges Reserve	Reserve Funding	Ontario Community Infrastructure Fund (OCIF) Grant	Debenture	Other	Total
\$21,031,144	\$362,000	\$4,029,314	\$30,486,648	\$4,389,706	\$2,459,254	\$6,475,000	\$3,273,203	\$72,506,269





HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

Kyle Seeback

Member of Parliament
Dufferin-Caledon

COPY

March 23, 2021

Honourable Jonathan Wilkinson, P.C., M.P.
Minister of Environment & Climate Change
House of Commons
Ottawa, ON
K1A 0A6

Re: Olympia Pit – Caledon, ON

Dear Minister Wilkinson,

I'm writing you today on behalf of my constituent, _____ I recently had a telephone conversation with _____ regarding his concerns for the risks to the three Credit River headwater tributaries adjacent to the Olympia Pit, located in my riding of Dufferin-Caledon.

The Olympia Pit has been an ongoing concern for many Caledon residents for some time now because of the considerable excavating and deep trench filling with large amounts of imported soil at the site. Residents have raised health concerns about the imported soil being contaminated, as well as putting the Credit River in jeopardy along with all well owners downstream of the pit. For more information, please visit

<https://stonecoldtruth2011.wordpress.com/2019/08/09/what-would-you-do-scroll-down/> and <https://www.youtube.com/watch?v=zopIZAGFLk>

The concerns _____ raised on behalf of residents are very serious and must be addressed to ensure their health and safety aren't in jeopardy and that the environment isn't being compromised because of this pit's large-scale dumping activities. I'm asking you to investigate these concerns. I'm also asking you to respond to _____ directly and that you copy me on your response to _____

Thank you for your time and attention to this matter.

Sincerely,

Kyle Seeback, M.P.
Dufferin-Caledon

c.c.

Room 209, Justice Building, Ottawa, ON K1A 0A6
Tel.: 613-995-7813 Fax: 613-992-9789

Ottawa

Constituency

229 Broadway, Unit 2, Orangeville, ON L9W 1K4
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Ontario Inspection Report under the Aggregate Resource Act

Site Description

Date of Inspection:	March 20, 2019	Licence/Permit Number:	625402
Licensee/Permittee Name:	Olympia Sand and Gravel Ltd.		
Site Name:			
Address:	111 Creditstone Road , Concord	E-Mail Address:	lpevato@olympia-group.ca; anoveva@erm-group.ca
Lot(s):	Pt 27 & 28	Conc.(s):	2 WHS
Local Municipality:	CALEDON	Township:	CALEDON
County/Region:	PEEL R	Mining Claim #:	
Licence/Permit Area (ha):	111.6	UTM# (NAD 83):	
Inspection Category:	Complaint	Extraction Area (ha):	81.6
Operation Type:	Pit	Authority Type:	Class A Licence
Above Water:	Yes	Operating Status:	Operating

Critical Inspection Items

Inspection Results: ✓ Compliance X Non Compliance n/a Not applicable n/i Not Inspected

A. General

1. ✓ Identification Sign 2. ✓ Gates 3. ✓ Entrance/Exit:

B. Operational

1. ✓ Berms	2. n/i Setbacks	3. X Stockpile Location
4. n/i Face Heights	5. n/i Trees within 5m	6. n/i Extraction Depth
7. X Buildings	8. n/i Stripping	9. n/i Progressive Rehab
10. X Inert Fill	11. n/i Undercutting	12. n/i GPS Corners
13. X Boundary Demarcation		

C. Equipment

1. n/i Asphalt Plant	2. n/i Concrete Plant	3. n/i Portable Crusher
4. n/i Permanent Crusher	5. n/i Wash Plant	6. n/i Screening Plant

D. Environmental

1. n/a Pumping	2. n/a Discharging (ECA)	3. n/a Ditching
4. n/a Permit to take Water	5. n/a ECA 2	6. ✓ Scrap
7. ✓ Dust	8. X Fuel Storage	9. n/i ESA
10. n/a PSW	11. n/i Woodlands	12. n/i ANSI

E. Recycling

1. n/a Asphalt (RAP)	2. n/a Concrete	3. n/a Glass
4. n/a Bricks	5. n/a Slag	6. n/a Asphalt Shingles

F. Monitoring Reports

1. n/i Water Monitoring	2. n/i Noise Monitoring	3. n/i Blast Monitoring
4. n/i AMP		

G. Other / Notes

This inspection occurred as a result of a complaint that was received regarding importation of fill and excess waste accumulation on site (tires, pipes, and other waste). The neighbours were concerned about excavation of aggregate beneath the berms contrary to the site plan, the quality of the fill being imported to the site and the possibility of groundwater contamination. The neighbours were also concerned with the increase in truck traffic and the perceived road hazards associated with the trucks. The undersigned inspector met with representatives of the licensee on Wednesday, March 20, 2019. Specifically the following people were in attendance: Larry Pavato, President; Anna Noveva; and, Mark VanVoorst, P.Eng and Qualified Professional working for Van Voorst Engineering Ltd contracted by the licensee to oversee the importation of fill and compliance with the Off-Site Fill Acceptance Protocol dated March 11, 2014 (an appendix to the site plan and herein referred to as “the Fill Protocol”). At the time of the inspection the entrance fencing and gate were not in place and the sign was on the ground. These are not considered to be compliance items requiring remedial action as a new fence and gate were being installed that day. The sign was to be reinstated once the fence and gate were erected. It is understood that by the time this report was written the perimeter fencing, gate and sign was in compliance again and no longer required discussion. The following items were identified as compliance items that required remedial action: **BOUNDARY DEMARCATION (FENCING)** – At the time of the inspection there was still perimeter fencing to be erected in accordance with the site plan. All perimeter fencing shall be erected. **INERT FILL/BERMS** – The site plan requires that all berms be constructed prior to extraction. As was identified during licencing, there is not enough on site overburden and topsoil to construct all of the perimeter berms intended to act as noise and visual barriers off-site. As a result, inert fill was planned to be imported under the Fill Protocol. It appears as though the majority of material used to construct the berms has been off-site fill which ensures a smaller disturbed area on the licence. Generally, the less area that is disturbed on a licence would ensure dust impacts to neighbours would be decreased. **AR. 2.00.02 – Variations to Operational Standards**, states, **5.7 EROSION CONTROL ON BERMS AND STOCKPILES** Establishing vegetation to control erosion on topsoil and overburden stockpiles and berms is important not only to eliminate damage of adjacent lands from sedimentation but also to preserve the quality and quantity of the soil. Variations of this operational standard would not normally be considered. Additionally, the Aggregate Resource of Ontario Provincial Standards (AROPS) – Operational Standards for Licensees 5.7 requires that berms be vegetated as soon as possible once constructed. At the time of the inspection Berm A, Berm B and Berm F were either completed or almost completed. Hydroseeding is expected to take place in early May with a seed mix that meets the requirements of the site plan. While not specifically identified in the Remedial Action section below, it is the understanding of the undersigned inspector that once vegetation is well established on the newly constructed berms that the required tree planting will occur within 1 year. Berm C, Berm D, Berm E, Berm G, Berm H, Berm I and Berm J are expected to continue to be constructed over the next 18-24 months. In accordance with the above referenced operational standard 5.7 all berms shall be seeded and vegetated forthwith once construction has been completed. **THE FILL PROTOCOL** – First, it should be noted that the Fill Protocol should be amended as there are errors in Section 2 which defines schedule 2 and in the definition of “Table 1 Standards” in Section 1. Currently, the Table 1 Standards means the standards set out under the column entitled “All Other Types of Property Uses” in Table 1 of the “Soil, Groundwater and Sediment Standards for Use under Part XV1 of the Environmental Protection Act” published by the MOE and dated April 15, 2011, as may be amended or replaced pursuant to the provisions of the EPA. The problem is that there is no column with that title. Because the after use for this licence as stated on the rehabilitation page of the site plan is agricultural uses the definition should be changed to mean the standards

set out under the column entitled “Agricultural or Other Property Use” in Table 1 of the “Soil, Groundwater and Sediment Standards for Use under Part XV1 of the Environmental Protection Act” published by the MECP and dated April 15, 2011, as may be amended or replaced pursuant to the provisions of the EPA. Based on the report discussing the quality control samples taken by Van Voorst Engineering Ltd on January 29, 2019 it is apparent the licensee believed the appropriate column would be “Residential/Parkland/Institutional/Commercial/Community Property Use”. This would not make sense with the planned after use of the site. Section 2 of the Fill Protocol defines acceptable fill. In that definition asphalt is considered acceptable fill. It should be noted that asphalt is recyclable and should be used as a product whenever there is an opportunity. It should also be noted that asphalt can leach into soil and cause contamination that would exceed Table 1 standards for Agricultural or Other Property Use. There have also been cases in Ontario of crushed concrete material contaminating surface water bodies. These materials should be removed from the definition of acceptable fill. Only inert material (which may include stone, rock, brick or concrete) that meets the Table 1 standards should be considered acceptable fill. It is recommended that the Fill Protocol be reviewed and amended in accordance with Section 9. Section 5.1 of the Fill Protocol requires that quality control audit samples be taken every 10,000 cubic metres. As discussed during the inspection the licensee’s current practice is to only sample every 10,000 cubic metres regardless of the source site. It was recommended by the undersigned inspector that, in order to show due diligence, the licensee should be randomly collecting quality control audit samples somewhere between every 7,000-10,000 cubic metres from each source site. If the source site is not anticipated to ship 10,000 cubic metres then a random quality control sample should be taken from the deliveries originating at that source site. A change to the plan would not be required to implement this recommendation as the current wording allows for required flexibility. The representatives that were present at the meeting agreed to these recommendations verbally and in a subsequent email.

SOURCE SITE REPORTS - As part of the inspection 2 of the 8 source site reports required to be submitted to the licensee prior to approval to ship fill in accordance with section 3.3 of the Fill Protocol were reviewed by the undersigned inspector as a random sample. The first report was from a source site referred to as “The Well”. The letter signed by a Qualified Professional states that all parameters for source site samples met the Table 1 standards for Residential/Parkland/Institutional/Commercial/Community Property Use however some of the sample results state that the samples were not taken at the same address as the source site. Additionally, there was no report that discussed the source site investigations, what other samples were taken on the site, the exact location of the samples that were taken, any other source of possible contamination in the area, etc. The report only consisted of a letter and soil sample results. This report did not meet all the requirements of the report required by Section 3.3 of the Fill Protocol. The second report reviewed was for a source site referred to as “The Grange Side Road”. While the report appeared complete and met the requirements of Section 3.3 of the Fill Protocol the sample results at this location were only compared to Table 2 residential standards and not Table 1 standards at all. As a result, neither of the source site reports seem to comply with section 3.3 of the Fill Protocol.

REVIEWING PROFESSIONAL – It was discussed during the inspection that Mark Van Voorst, a Qualified Professional (QP) as defined by O. Reg 153 of the Environmental Protection Act, was just recently hired and that moving forward he will be reviewing the source site reports for completeness and compliance with the Fill Protocol prior to issuing approval documents to the generators of the fill to import fill onto this site. The QP must review the source site reports for all prior approvals to ensure that the quality of the fill being imported to the site meets Table 1 Standards for Agricultural or Other Property Use and reconsider whether the source site fill should be

accepted on the licence. A report of his review shall be submitted to the undersigned inspector or Ben Keen, Aggregate Technical Specialist for review. Moving forward, any deficient source site report that does not meet the standard as stated in the Fill Protocol shall be considered non-compliance of the site plan and a contravention of Section 15 of the Aggregate Resources Act.

STOCKPILE LOCATION – An MNRF Aggregate Technical Specialist gave permission, contrary to the note in the site plan, for extraction of aggregate in the location of the operational road required to access Area 1. As Area 1 is currently being used to stage imported fill, the stockpiles of sorted aggregate product are being stored in Area 7 and in what appears to be the location where berm C and/or Berm D are to be located. Anna Noveva provided direction that the stockpiles of product will be moved within the next two months and that Area 7 will be restored with the construction of the berms. No further extraction on the licence is permitted until all the berms are constructed. Based on the estimated timeline of 18 months to complete the berms, extraction of aggregate is not expected to begin on this licence until the fall of 2020 or the spring of 2021.

FUEL STORAGE – The site plan requires that the fuel tank be on an impervious pad and located in Area 1. The fuel tank is currently safely installed to the standards of the Technical Standards and Safety Authority and the Ministry of Labour in a temporary location. The fuel tank is intended to be moved by the licensee within the next month now that the road has been extracted to the appropriate elevation. If the fuel tank is not moved a site plan amendment must be submitted for consideration by the MNRF. In the meantime a remedial action date to have the fuel tank moved is provided below.

BUILDINGS – A transport trailer and a recreational vehicle trailer are located on the site in a temporary storage location for equipment. These are considered buildings and must be removed from the site. The shipping containers intended to form part of the construction of the noise barrier in Area 1 for the crushing operations do not need to be removed from the site but should be moved to Area 1 as soon as possible.

Remedial Action for Non-Compliance Items

Item	Section (Aggregate Resource Act / Provincial Standards)	Remedial Action Required	Remedial Action Date
Boundary Demarcation	ARA Section 15, AROPS 5.1 , Site Plan	All perimeter fencing shall be erected.	May 3, 2019
Inert Fill/Berms	ARA Section 15, AROPS 5.7	The constructed berms that have been fully constructed shall be vegetated.	June 30, 2019
Inert Fill - QP Review of Source Sites	ARA Section 15, Site Plan, Off-Site Fill Acceptance Protocol	A report summarizing the findings of the QP source site review and actions to be taken shall be submitted to the undersigned inspector or Ben Keen, Aggregate Technical Specialist.	June 30, 2019

Stockpile Location	ARA Section 15, Site Plan	All stockpiles of aggregate product shall be removed from the site or moved to Area 1 in accordance with the requirements of the site plan.	September 15, 2019
Fuel Storage	ARA Section 15, Site Plan	The impermeable pad shall be constructed and the fuel storage tank moved to the location indicated on the Site Plan.	June 30, 2019
Buildings	ARA Section 15, Site Plan	The recreational vehicle trailer and the transport trailer shall be removed from the site.	May 3, 2019

Inspection Results

Satisfactory (Site in Compliance): No
Remedial Action Required by Licensee/Permittee: Yes

Delivery/Attachments/Referral

Delivered By: Mail: ☐ EMail: ☒ Personal: ☐
Discussed/Accompanied by:
Referred To: Ministry of the Environment and Climate Change: ☐
Ministry of Labour: ☐
Fisheries and Oceans Canada: ☐
Ministry of Northern Development and Mines: ☐
Other:
Reason for referral:

Aggregate Inspector Information

Badge #: 000 **Name:** Emily Moore **Phone:** 905-713-7396 **Fax:** 905-713-7361
Address: 50 Bloomington Road, Aurora, Ontario L4G 0L8
E-Mail: emily.c.moore@ontario.ca **MNR District:** Aurora

To: Mayor and Council
From: Ontario Stone, Sand & Gravel Association
Re: Gravel Facts in Ontario
Date: January 18, 2020

The Ontario Stone, Sand & Gravel Association (OSSGA) represents the producers and suppliers of aggregate resources – stone, sand and gravel – in Ontario.

An important part of our mandate is to correct misinformation about the industry that often finds its way into the media and the community at large. ‘NIMBY’ groups present themselves as watchdogs of industry, but all too often offer observations and recommendations which meet their own agendas – and most important, do not reflect the broader community and business interests. That said, OSSGA understands that the issues around the location and operation of pits and quarries raises questions with your constituents. We want to be here to help you answer those questions, and to stop the misinformation.

As an example, a recent NIMBY report stated that aggregate poses a threat to Ontario’s important agriculture resources. The reality is that loss of agriculture because of aggregate is not accurate. Of the 4.9 million ha of prime agricultural land in southern Ontario, only 0.7% contains a licensed aggregate operation. And much of that land is returned to an agricultural use after extraction. In addition, aggregate is an essential part of the agri-food system – necessary for farm structures, farming road construction, soil amendments, bedding, drainage, etc.

The same report suggested that because some aggregate companies are operated by multi-nationals, aggregate does not contribute significantly to local economies. The reality is that the aggregate industry in Ontario, like many industries, consists of a small number of large multinational companies, large Canadian firms, and more than 200 medium and small sized operations that range in size from 20 sites to a single sand or gravel pit. Regardless of ownership, all sites hire local workers and supply the product that generates **hundreds of thousands of jobs** in the construction industry in Ontario.

There are also comments circulating regarding haul routes, road repair and the aggregate levy that require correcting. In Ontario, the aggregate industry is the only industry to pay a levy. Currently, that levy is 20.8 ¢ per tonne which equates to more than \$20 million for all of Ontario. The majority of these funds are distributed to local municipalities for infrastructure spending.



In most municipalities, haul routes are located on Regional Roads – which have been built for the purpose of hauling goods. In Ontario, there are more than 200,000 trucks on the roads every day. Only 3% of these trucks are aggregate trucks. The rest carry the 90% of goods that are delivered by truck in this province. Aggregate producers want to be good neighbours and have worked with the Top Aggregate Producing Municipalities of Ontario (TAPMO) to help increase the levy. In addition, producers often work with municipalities on haul road repairs and emergency response services. In many cases in Township's throughout Ontario where entrances are located on Township roads, the producers paid to upgrade the roads to accommodate heavy trucks at their own expense.

These are just some examples of misinformation. OSSGA offers many resources to help understand the aggregate industry.

Our [videos](#) are a great place to start to learn about the industry. You will discover how we all use aggregate – every day – including the individuals critical of the industry! How, in order to build the communities and meet the growth demands of tomorrow, we must look for new supplies of high-quality aggregate today. You'll learn about the environmental due diligence that producers undertake to ensure the industry is safe, clean and responsible. And you'll see for yourself the amazing rehabilitation efforts that have resulted in some of Ontario's most beautiful landscapes – as well as innovative new land uses and agricultural projects.

If you're looking for more, check out our [GravelFacts.ca/resources](https://www.gravelfacts.ca/resources) page for brochures on topics including water management, dust-mitigation, blasting and more information on rehabilitation.

Finally, our new brochure – [The Life Cycle of a Pit or Quarry](#) – walks you through the operation of a pit or quarry from site planning through to rehabilitation. The smartest, most environmentally responsible consideration when mining for stone, sand or gravel is to ensure that the gravel pit is located as close to market as possible.

OSSGA would be delighted to answer any questions about the aggregate industry in Ontario. Please do not hesitate to reach out to OSSGA's Executive Director, Norm Cheesman at 647-727-8774 or by email at ncheesman@ossiga.com.

Our industry wants to work in partnership with communities, to bring the aggregate that we all use every single day of our lives - to where it is needed in the most environmentally and economically way possible.

We won't see you in person at ROMA but hope to see some of you at OSSGA's virtual booth!

Suggested Amendments to Aggregate Policies in The Updated Town of Caledon Official Plan (Review 2041)

As noted in Introduction Section 1.1 of the current Official Plan (Geographic Context of Caledon), [https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/Official Plan Master Copy.pdf](https://www.caledon.ca/en/town-services/resources/Documents/business-planning-development/Official%20Plan%20Master%20Copy.pdf).

Caledon plays a vital stewardship role relative to a number of significant geographic, geological and cultural landforms in both a local as well as a broader regional context. Large parts of the Oak Ridges Moraine which serves a vital groundwater recharge function for much of the Greater Toronto Area and beyond, the Peel Plain which consists primarily of high capability agricultural lands, and parts of the Niagara Escarpment which has been designated a World Biosphere Reserve by the United Nations, are contained in the Municipality. Two major river systems, the Credit and the Humber, and their many tributaries traverse the landscape. These and other geographic features form the basis on which the socio-economic fabric of the Town of Caledon has evolved. They are also the focal point of environmental conservation, protection and management of resources for both the Town of Caledon and areas beyond the municipal boundaries. Caledon's extensive protected natural heritage systems perform a vital role within the Region of Peel and the Greater Toronto Area with respect to climate change mitigation and adaptation, acting as a major carbon sink and moderating extremes in rainfall events and temperatures. [underscoring added]

The Official Plan speaks to the importance of preserving its historical *Settlement Areas* (Historical Background 1.2):

The Caledon area has been inhabited for thousands of years, initially by First Nations who followed the wildlife they hunted for survival and then by settlers who began to arrive after the land was surveyed in 1818-1819. Most of the first settlers farmed the land. Subsequently, many of the settlement areas were established to service the agricultural population. Proximity to water power as well as to railways, the growth of Toronto, and improved road connections were all factors in the growth and subsequent decline of some of these settlements in Caledon. These historical settlements form the basis of the settlement areas which exist within the Town of Caledon today, and represent a heritage resource unique in the region, worthy of protection. [underscoring added]

Section 1.3 sets out the Purpose and Scope of the Official Plan, and, in part, states:

1.3.1 This Official Plan is a statement of principles, goals, objectives and policies intended to guide future land use, physical development and change, and the effects on the social, economic, and natural environment within the Town of Caledon. [underscoring added]

1.3.5 The policies of the Plan are designed to promote public input and involvement in the future of the Town and to maintain and enhance the quality of life for the residents of Caledon. [underscoring added]

As for the current Aggregate policies, detailed in Section 5.11 (Mineral Resources) of the Town of Caledon Official Plan, there are no policies that address *separation distances between conflicting land uses, avoidance of sterilization of adjacent lands* (protecting third-party property rights, and present and future land use planning options) and *appropriate setback requirements on new* blasting quarries to *protect the environment and the health, safety and welfare of the citizens of Caledon.*

Protection of the *environment and the health, safety and welfare* of the public is mandated by the Objectives of the Official Plan, and provided for under the Municipal Act (Health, Safety and Nuisances).

Revision of the Town of Caledon's Mineral Resources policies are to take into account the stated Objectives of the Official Plan (Sections 1.3.1 and 1.3.5), as part of the 2041 Official Plan Review, and to ensure preservation of Caledon's historic Settlement Areas (e.g., Cataract, Belfountain, Alton, Campbell's Cross, Claude, Melville, Mono Road, Terra Cotta and Wildfield) and unique and sensitive environmental landscape (e.g., Oak Ridges Moraine, Credit and Humber Rivers, and the Niagara Escarpment, part of which is designated a World Biosphere Reserve by UNESCO). In this respect, incorporating into Caledon's updated Official Plan (2041 Review) Aggregate policies similar to those extracted from the Township of Algonquin Highlands 2019 Official Plan, would

- provide clear direction as to where new blasting quarries could possibly locate within the Town of Caledon, while still protecting the *environment* and protecting and maintaining the *health, safety and welfare of its citizens and the general public* during the entire period a blasting quarry is expected to remain operational;
- save the Town of Caledon (i.e., taxpayers) and ratepayer groups from expending substantial resources (time and money) on fighting blasting quarry applications in inappropriate locations within the Town of Caledon; and
- virtually eliminate future citizen complaints and lawsuits that operational blasting quarries inevitably generate (i.e., flyrock, noise, fumes, odour, dust, ground vibration, subsidence, sinkholes, airblast, soil contamination, personal or real property damage, injury or death of humans, pets or wildlife, well-water quality or quantity, etc.); and
- preserve the Town of Caledon's tax base by avoiding the deleterious effects that blasting quarries have on the value of nearby residential properties (e.g., Settlement Areas),¹ and ensure that homeowner equity is not eroded or that a community is not stigmatized, so as to render homes unmarketable or unmortgageable.^{2 3}

¹ In a large scale peer reviewed study of the impact of blasting rock quarries on residential property values, the first of its kind, Malikov, et al. (2018) documented a sample of 5,500 house sales that took place in Delaware County during 2009-2011 (roughly two years), and conclude that the impact on the value of houses within one mile of a blasting quarry is 23% (low-priced houses) to 51% (high-priced houses \$552,500 avg at 95%th quantile), Emil Malikov, Yiguo Sun and Diane Hite, "(Under)Mining Local Residential Property Values: A Semiparametric Spatial Quantile Autoregression," *Journal of Applied Econometrics* (June 22, 2018): 82-109. <https://onlinelibrary.wiley.com/doi/epdf/10.1002/jae.2655>.

² According to Toffey, the initial introduction and addition of disamenities has a cumulative effect of stigmatizing and destabilizing a community, and causes house prices to decline. Extracts taken from Untitled Document, <https://halifaxvermont.com/wp-content/uploads/2013/11/Bartenhagen-N.-property-values-07-28-2015.pdf>.

³ "The public record contains an abundance of information from landowners who feel that they will have difficulty in selling their properties if the mine [blasting quarry] is in operation, and that it will deprive them the ability to sell or develop additional residences on land already owned," Within a half-mile (805 metres) are 105 residential parcels and within one mile 91,609 metres) are 291 residential parcels. September 1, 2015, hearing of the Town of Nassau, which denied Troy Sand & Gravel a permit to operate a blasting quarry. At this same hearing, Professor Hite's study *The Impact of Hard Rock and Gravel Mines on House Prices in Upstate New York* "concludes that mine operations are a disamenity that would have a negative impact on property values ranging from 7.5% to 36% discount....She concludes (page 12) that "These discounts are statistically significant at the 99+ level; such a high degree of significance leads us to conclude that, without a doubt, the [blasting] quarry that Troy Sand & Gravel Co., Inc., proposes to develop and operate in the Town of Nassau, Rensselaer County, New York, will have a deleterious financial effect on existing homeowners."

4.3.8 Mineral Aggregate Resources (Township of Algonquin Highlands Official Plan 2019
<https://www.algonquinhighlands.ca/deptdocs/Official%20Plan%20OFFICE%20CONSOLIDATION%2001-Jan-2019.PDF>)

- 4.3.8.1 Known mineral aggregate resources and licensed/permitted pits and quarries are identified on Schedule....
- 4.3.8.2 Mineral aggregate resources represent a limited non-renewable resource in the Township. The importance of these resources is recognized.
- 4.3.8.3 Local and regional needs for mineral aggregate should be met with minimal disturbance to the social and natural environment to ensure a balanced approach to extraction is employed.
- 4.3.8.4 Mineral aggregate operations are governed by the Aggregate Resource Act administered by the Province.
- 4.3.8.5 Existing licensed/permitted pit and quarry operations and significant mineral aggregate resources shall be protected.
- 4.3.8.6 The implementing Zoning By-law shall place all existing licensed mineral aggregate operations in separate zones that allow quarry and pit operations, and a zone that allows only pit operations. The implementing Zoning By-law will contain setbacks for extraction operations from adjoining properties zoned for sensitive land uses, municipal roads and property boundaries.
- 4.3.8.7 The expansion of an existing licensed pit or quarry may be permitted subject to a Zoning By-law Amendment, if the area of the proposed expansion extends beyond the area zoned for extractive industrial.
- 4.3.8.8 The creation of a new pit or quarry, within an area identified as containing aggregate resources on Scheduled "D", may be established by Zoning Bylaw Amendment. If the proposed pit or quarry is outside of the areas identified as containing aggregate resources, an Official Plan Amendment shall be required.
- 4.3.8.9 In addition to the requirements under the Aggregate Resources Act, Council shall require the following information prior to considering an amendment to the Official Plan or Zoning By-law:
 - A Site Development Plan showing topography, natural features, significant wildlife and vegetation, existing contours, the extent of the development and adjacent land uses;
 - A sketch indicating existing uses within 1,000 metres of the proposed operation;
 - A description of the location, height, dimensions, and use of all buildings or structures to be erected on the property including existing grades, final grades, setbacks, stockpile locations and drainage patterns; and,
 - A Site Development Plan indicating the proposed rehabilitation of the property and the intended future use of the lands.
- 4.3.8.10 A new Aggregate Quarry requiring an Amendment to this Plan shall be limited to areas:
 - Farther than 1,000 metres from a residential or sensitive land use;
 - Farther than 1,000 metres from a boundary of a Settlement Area; and
 - Farther than 1,000 metres from the Waterfront designation.
- 4.3.8.11 All extraction operations should be undertaken in a manner that minimizes impacts on the physical environment and adjacent land uses, after issues of public health, public safety and environmental impact have been addressed.
- 4.3.8.12 The Township, in consultation with Ministry of Natural Resources, may permit other land uses or developments in areas with aggregate resources as shown on Schedule... or within 1,000 metres of a licensed pit or quarry, without amendment to this Plan provided that:

- *extraction of the aggregate is not feasible;*
- *the proposed land use or development serves a greater long-term interest of the general public than aggregate extraction;*
- *the proposed land use or development would not significantly preclude or hinder future extraction; and,*
- *issues of public health, public safety, compatibility and environmental impact are addressed.*



Discussion Paper



Air Quality

TABLE OF CONTENTS

Section 1: Introduction	4
1.1 Emerging Trends.....	5
1.2 Discussion Paper Scope	6
Section 2: Air Pollution: Effects and Sources	7
2.1 Air Pollution	7
2.1.1 Ground Level Ozone (O ₃)	7
2.1.2 Particulate Matter (PM ₁₀ and PM _{2.5}).....	8
2.1.3 Carbon Monoxide (CO).....	8
2.1.4 Sulphur Dioxide (SO ₂)	8
2.1.5 Nitrogen Dioxides (NO ₂)	8
2.1.6 Volatile Organic Compounds (VOCs).....	8
2.1.7 Other Pollutants.....	8
2.2 Air Quality and Climate Change	9
2.3 Air Quality Monitoring and Indices	10
2.3.1 Air Quality Index	12
2.3.2 Air Quality Health Index.....	12
2.4 What are the Effects of Poor Air Quality?.....	13
2.4.1 Human Health.....	13
2.4.2 Economic Impacts	14
2.4.3 Natural Heritage impacts	15
2.5 What are Some of the Sources of Poor Air Quality?	16
2.5.1 Community Design	16
2.5.2 Transportation	17
2.5.3 Built Form and Energy Use.....	18
2.5.4 Urban Heat Island Effect.....	18
2.5.5 Industrial	18
2.5.6 Open Sources.....	19
2.5.7 Transboundary Pollution.....	19
3.0 Air Quality in Peel Region	21
4.0 Guiding Policy.....	29
4.1 Federal Initiatives	29
4.1.1 Clean Air Act.....	29
4.1.2 Canada US Air Quality Agreement	30
4.1.3 National Emissions Inventory for Air Pollutants	30
4.1.4 Regulatory and Monitoring Initiatives.....	30
4.2 Provincial initiatives.....	31
4.2.1 Ontario Regulation 419/05 (2005)	31
4.2.2 Ontario Regulation 194/05 (2005)	32
4.2.3 Drive Clean Program (1998).....	32
4.2.4 Ontario's Smog Strategy (1997)	32
4.2.5 Ontario's Action Plan on Climate Change (2007)	32
4.2.6 Clarkson Airshed Study	32
4.2.7 Growth Management Policies	33
4.3 Peel Region initiatives.....	35
4.3.1 Strategic Plan (2007).....	35
4.3.2 State of the Atmosphere Report (2002).....	35
4.3.4 Regional Official Plan	35
4.3.5 Clean Air Strategy	36
4.3.6 Issues	37
4.3.7 Actions and Accomplishments.....	37
4.4 City of Mississauga	39
4.4.1 Issues	39
4.4.2 Actions and Accomplishments.....	40
4.5 City of Brampton	41
4.5.1 Issues	41

4.5.2 Actions and Accomplishments	42
4.6 Town of Caledon	43
4.6.1 Issues	44
4.6.2 Actions and Accomplishments	44
5.0 Best Practices	46
5.1 City of Toronto	46
5.2 Metro Vancouver Regional District	49
5.3 Greater London Authority, UK	52
5.4 Region of Halton	56
5.5 City of Hamilton	58
6.0 Discussion	65
6.1 Key Variations in policy approaches	65
6.1.1 Greenhouse gas reduction targets	65
6.1.2 Compact urban form	65
6.1.3. Mixed land uses	66
6.1.4 Transportation sector	66
6.1.5 Stationary and point source emissions	68
6.1.6 Community Greening and Forest Cover	68
6.1.7 Cumulative Impacts	69
6.1.8 Monitoring and Modelling – Capturing Variations in Local Air Quality	69
6.2 Examination of Possible Tools and Initiatives	70
6.2.1 Air Quality Management Plans	70
6.2.2 Development Guidelines	70
6.2.3 Promotion of Green Development	71
6.2.4 Anti-Idling by-law	74
6.2.5 Building Community Awareness	74
7.0 Recommendations	75
7.1 Recommendations: Policy Direction	76
References	83
APPENDIX A: London Planning Guidelines	
APPENDIX B: Excerpts from Toronto Green Development Guide	

SECTION 1: INTRODUCTION

The Region of Peel is currently undertaking a review of its Official Plan and is using this occasion as an opportunity to bring its policies in line with provincial direction toward promoting improved air quality at the regional and local level. Peel Region Official Plan Review (PROPR) is a conformity exercise that responds to requirements of section 26 of the Planning Act which requires municipalities to review their official plans every five years to ensure consistency with policy and legislative changes enacted by the Provincial government. Most recently, these changes include the Provincial Policy Statement (2005), Places to Grow Provincial Growth Plan (Bill 136, The Places to Grow Act), Greenbelt Plan (Bill 135 Greenbelt Act) and Bill 51 (to facilitate the implementation of the *Planning and Conservation Land Statute Law Amendment Act, 2006* and provide direction on a range of matters including giving notice of planning applications and public participation in the planning process).

The Region of Peel has identified improved air quality as a priority issue for the health and well being of its citizens and air quality is one of fifteen areas of focus of the PROPR. Below are the other 14 focus areas:

- Sustainability
- Managing growth
- Employment lands
- Energy
- Integrated waste management
- Transportation
- Agriculture
- Greenbelt conformity
- Natural heritage
- Regional housing strategy
- Water resources
- Monitoring
- Consultation, communications and engagement
- Planning tools and updates

Air quality issues and impacts have far-reaching effects to human health, the environment and the economy. As a result, prospective policies to address air quality issues are likely to overlap with various other PROPR focus areas, particularly the sustainability, energy and transportation focus areas.

As part of understanding the conditions and issues pertaining to air quality in the Region of Peel, this report provides the following information:

- An overview of air quality pollutants, sources and impacts;
- A summary of key policy directions that inform approaches to improving air quality at a local level and initiatives ongoing in the Region and its municipalities: Mississauga, Brampton and Caledon as identified during interviews with staff;
- An assessment of the current air quality situation in Peel Region;
- A review of best practices; and
- Recommendations for Official Plan policy.

1.1 EMERGING TRENDS

The Region of Peel is experiencing tremendous population growth, particularly in the municipalities of Mississauga and Brampton, with a projected population of 1.6 million for the year 2031¹. Combined with global issues such as escalating energy costs and the growing awareness of the health and environmental costs of climate change, the need to consider local contributions to these macro issues is becoming increasingly essential for local regions and municipalities. Peel Region's review of its official plan is an excellent starting point for considering air quality issues and is set against a backdrop of a number of emerging issues affecting municipalities across the Province²:

- Increasing number of smog days and greenhouse gas emissions;
- Increasing automobile dependency and traffic congestion;
- Impact of urban form on population health (i.e. suburban sprawl and separation of land uses);
- Recent provincial initiatives to mitigate impacts emissions;
- Increasing emphasis on health effects, health care costs and lost productivity costs due to air pollution;
- An aging population who represent a vulnerable population to smog and climate change impacts;
- Increasing number of initiatives, programs and technological innovations for combating poor quality and climate change. For example, green building standards (i.e. LEED³), green procurement strategies, hybrid vehicles, solar panels, etc.; and
- Broader availability of energy saving products in the marketplace.

¹ Region of Peel Public Health. 2008. Health and Urban Form. Presentation at the alPHa Conference by Gayle Bursey, Director of Chronic Disease and Injury Prevention.

² These emerging issues were summarized from the discussion of emerging trends in Peel Region's 2006 Clean Air Strategy and Service Strategy Business Plan.

³ Leadership in Energy and Environmental Design

1.2 DISCUSSION PAPER SCOPE

The discourse on air pollution and air emissions can be contemplated into kinds – emissions that have impact at a global scale and those with more local consequences. Global air emissions are primarily associated with greenhouse gas emissions (GhGs) and climate change while those with more localized impact include criteria air contaminants (CACs). The CACs are comprised of ground level ozone, particulate matter with diameters of 2.5 microns and 10 microns, carbon monoxide, nitrogen oxides, sulphur oxides, volatile organic compounds, many of which are precursors to smog and acid rain. These CACs are most clearly linked with adverse health effects and are more closely examined in Section 2.

The primary focus of this Discussion Paper is on local air quality. Despite this concentration, an important factor to any consideration of prospective regional policies for air quality is that while climate change and air quality have somewhat differing impacts, they both primarily originate from the same major cause (i.e. the burning of fossil fuels). Strategies to improve air quality are also valuable in mitigating effects of climate change as both issues require changes to land use, minimizing use of fossil fuels and shifting towards alternative energy sources to address smog and greenhouse gases.

SECTION 2: AIR POLLUTION: EFFECTS AND SOURCES

2.1 AIR POLLUTION

Outdoor air contaminants are derived from both natural and human sources. Natural sources include smoke from forest fires, dust blown by the wind, bacteria, fungi and chemicals released by plants and animals. Conversely, air pollution involves mainly human activities including pollutants released as a result of motor vehicle use, industrial processes, and the burning of fossil fuels⁴. The six most common air pollutants measured in Canada include ground level ozone, particulate matter, carbon monoxide, sulphur dioxide, nitrogen oxides and volatile organic compounds and are termed criteria air contaminants.

Table 1. Common Air Pollutants

Abbreviation	Air Pollutant
O ₃	Ground level ozone
PM _{2.5} and PM ₁₀	Particulate Matter
CO	Carbon Monoxide
SO ₂	Sulphur Dioxide
NO _x	Nitrogen Oxides
VOCs	Volatile Organic Compounds

These substances form the precursors to smog and are responsible for poor air quality the majority of the time in Peel Region.

Smog literally means a combination of 'smoke' and 'fog' and generally refers to the visible haze that drifts over many highly urbanized areas and is made up of ground level ozone and particulate matter. Derived mainly from motor vehicles and industrial pollution, smog typically peaks in late afternoon and early evening and is generally worse during periods of warmer and sunnier weather. Although more typically seen in larger cities, smog can be present in almost any climate and in rural areas. The Windsor-Quebec corridor of which Peel Region is a part, experiences the most smog episodes in Ontario.

2.1.1 Ground Level Ozone (O₃)

Ozone is a colourless, odourless gas which is formed when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) react in the presence of sunlight and stagnant air. Ozone occurs naturally in the stratosphere and is also formed at ground level. Ozone in the stratosphere is beneficial as it forms a protective layer around the earth, shielding it from harmful ultra-violet radiation. However, the ozone formed at ground level is harmful to human health and the environment.

Ground-level ozone is a primary component of smog along with particulate matter and generally occurs during hot summer days or downwind of pollutant sources and heavily populated areas.

⁴ Health Canada. Site accessed May 6, 2008. www.hc-sc.gc.ca/ewh-semt/air/index_e.html

2.1.2 Particulate Matter (PM₁₀ and PM_{2.5})

Particulate matter is made up of tiny particles of sulphates, nitrates, organic compounds, metals and soil dust. They are generated as wind-blown dust from roads, construction sites and agricultural areas, ash from forest fires, and emissions from vehicles and industry⁵. PM₁₀ and PM_{2.5} are described as particles smaller than 10 and 2.5 microns in diameter respectively. PM_{2.5} can be emitted directly or formed in the atmosphere when NO and SO₂ react with ammonia and VOCs. Significant amounts of PM_{2.5} and its precursors are carried into Ontario from the U.S. During periods of widespread elevated levels of PM_{2.5}, it is estimated that more than 50 per cent of the pollutants in Ontario come from the U.S. Particulates are also an important component of smog.

2.1.3 Carbon Monoxide (CO)

Carbon monoxide is a colourless, odourless and tasteless gas which is poisonous at high concentrations. The largest source of CO in Ontario is the transportation sector which accounts for 68 per cent of all emissions.

2.1.4 Sulphur Dioxide (SO₂)

Sulphur dioxide is a colourless gas with an odour similar to a burnt match. The gas can oxidize to form sulphuric acid aerosols and is a precursor to sulphates, a main component of fine particulate matter. The main source of SO₂ in Ontario is from industrial processes such as smelters and utilities.

2.1.5 Nitrogen Dioxides (NO₂)

Nitrogen dioxide is a reddish brown gas with a pungent and irritating odour. All combustion processes produce oxides of nitrogen (NO_x) of which NO₂ is a component. NO_x is formed when fossil fuels are burnt in the presence of air - as with fuels burnt to produce power in vehicles, heating from natural gas, and products in several industrial processes. These components account for 94 per cent of NO_x emissions in Canada. This family of gases can be transported long distances and plays a key role in smog formation.

2.1.6 Volatile Organic Compounds (VOCs)

Volatile organic compounds are carbon containing chemicals that evaporate easily at room temperature. VOCs are present in our atmosphere at low levels and some VOCs can react with other substances in the presence of sunlight to form ground-level ozone or fine particulate matter. VOCs are generally found in higher concentrations indoors. VOCs originate from man made and natural sources, although man-made sources are the main contributors to air quality issues. The main sources of VOC emissions are motor vehicles and the production and use of solvents. Other sources include vegetation, forest fires and animals.

2.1.7 Other Pollutants

Other pollutants including persistent organic compounds (POPs) such as pesticides and PCBs, heavy metals such as mercury and lead, and toxics such as benzene, also affect the environment and human health. After their release into the environment, they travel in multiple cycles of evaporation and condensation. POPs and heavy metals can travel distances through the air, are capable of entering our water and food supply, and bioaccumulating in body tissue thereby contributing to human health problems.

⁵ City of Toronto, (2000). Clean, Green and Healthy: A Sustainable Plan for Toronto.

2.2 AIR QUALITY AND CLIMATE CHANGE

Air pollution occurs on all scales in the atmosphere from local to regional to global. Urban air pollution can be transported to the regional scale and then to hemispheric or global scale depending on the lifetime of gas or particles in the atmosphere. Air pollution, climate change, acid rain and stratospheric ozone depletion are part of a family of air-related issues. Local air pollution such as smog and acid rain affect the lowest part of the atmosphere – the air we breathe. Air pollutants from motor vehicles, industry (e.g. electricity, pulp and paper) and the burning of fossil fuels (e.g. coal, oil and gas) compromise the quality of the air near the source of pollution and affect local and regional air quality.

Climate change is the long term shift in the average weather over a much larger area. Anthropogenic (man made) emissions have contributed to changing the chemical composition of the global atmosphere. The greenhouse gas effect regulates the earth's temperature and without it, the earth would not be warm enough for human survival. Sunlight that enters the atmosphere is absorbed by the Earth's land, water and biosphere and then reflected back as infrared. Some of this infrared energy is radiated into space but much of it is trapped by greenhouse gases (GhGs) which maintain the earth's temperature. An increase in GhG emissions since the industrial revolution - largely the result of fossil fuel use, intensive agriculture and permanent forest loss - has resulted in higher than normal concentrations of GhGs in the atmosphere which has intensified the natural greenhouse effect, thus causing changes in the earth's climate.

Greenhouse gases include water vapour, carbon dioxide, methane, nitrous oxide, halogenated fluorocarbons, ozone, perfluorinated carbons and hydrofluorocarbons. Carbon dioxide is produced primarily through the burning of fossil fuels and is the largest contributor to climate change. Methane is produced naturally when vegetation is burned, digested or rotted without the presence of oxygen. Large amounts of methane are also released by cattle farming, landfills, rice farming and the production of oil and gas. Nitrous oxide, released by chemical fertilizers and the burning of fossil fuels has the global warming potential 310 times that of carbon dioxide. Hydrofluorocarbons and perfluorocarbons are generated through a variety of industrial processes⁶.

Local communities are directly and indirectly impacted by the effects of climate change. Climate change has a destabilizing effect on weather patterns. Variability in climate will increase the occurrence and intensity of extreme weather events resulting in an increase in the: number of hot days (above 32 degrees Celsius), annual average precipitation, number of droughts, amount of ice cover resulting in lower lake levels, number of pests, and extreme weather events. From a public health perspective, warmer weather increases vector-borne disease carriers such as mosquitoes and augments lake temperature thereby increasing opportunities for pathogens and the degradation of source drinking water. It can also amplify existing health conditions such as asthma and allergies. Impacts to the natural environment include effects on crops, livestock, soils, weeds and insects. A longer growing season may increase yields if soil conditions are maintained but drought conditions may have the reverse effect.

Climate change was identified as a major global issue at the United Nations Framework Convention on Climate change held in Rio de Janeiro in 1992. Since then, the establishment of the Kyoto Protocol in 1997 (which Canada ratified in 2003) has brought to light the extent that climate change has impacted the global environment. Canada pledged to reduce its GhG

⁶ Statistics Canada 2007; David Suzuki Foundation, 2007 as cited in Peel Region Background Paper on Air Quality, 2007.

emissions by 6 per cent below 1990 levels by 2012. Since then, Phase 2 of the Kyoto agreement was initiated in 2007 as a two-year negotiation process for post-2012 and will include negotiating emission targets amongst other components. The Ontario government has identified the following short, medium and long term targets for reducing greenhouse gases:

- 6 per cent per cent below 1990 levels by 2014
- 15 per cent below 1990 levels by 2020
- 80 per cent below 1990 levels by 2050

2.3 AIR QUALITY MONITORING AND INDICES

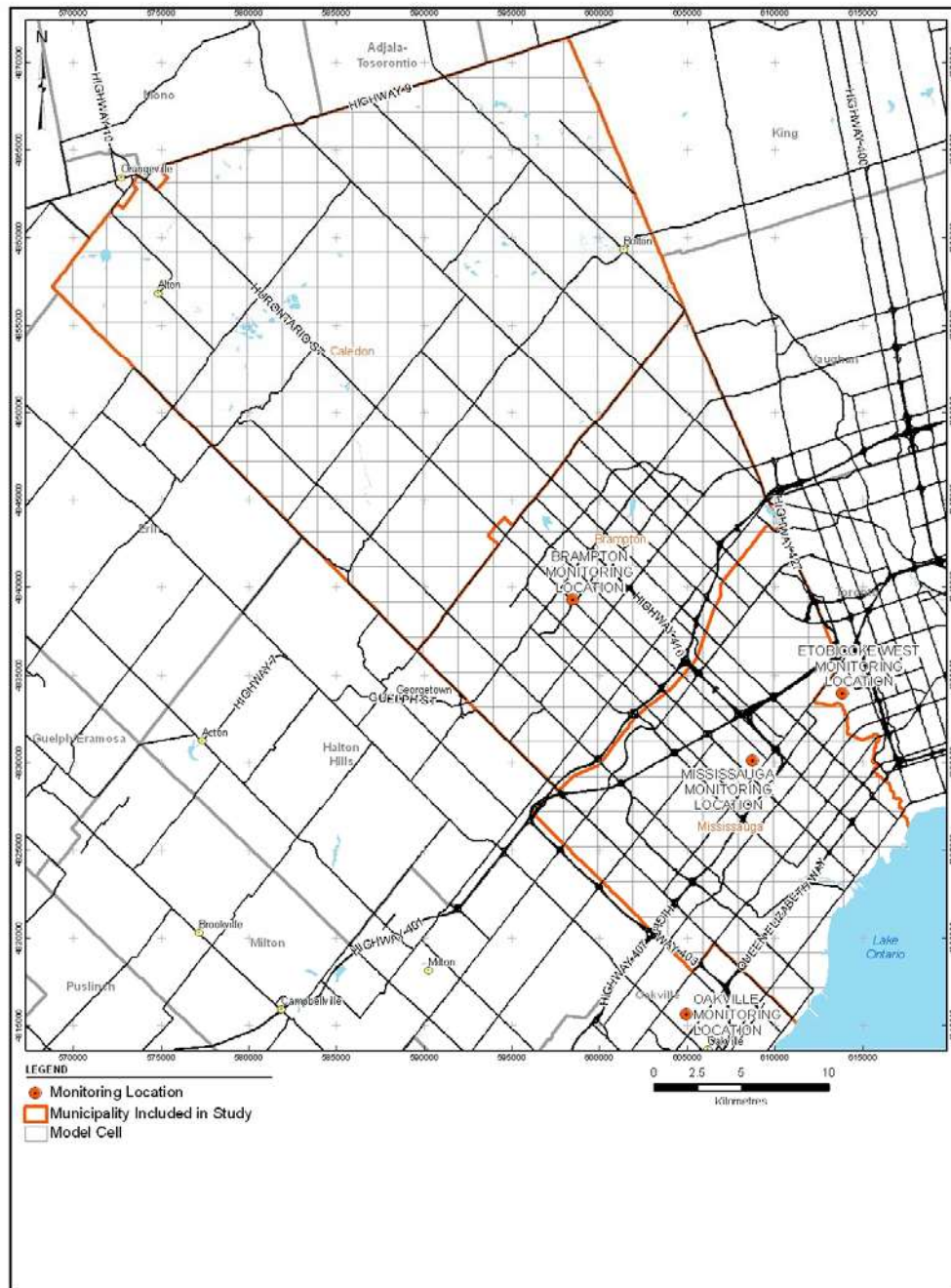
The Ontario Ministry of the Environment operates a network of 38 monitoring stations across Ontario, 11 of which are in the Greater Toronto Area. There are four stations that are within or immediately adjacent to Peel Region:

- Station #35003 (Elmcrest Rd./Centennial Park), Etobicoke West;
- Station #46109 (3359 Mississauga Road), Mississauga;
- Station #46089 (525 Main St. N./ Peel Manor), Brampton and
- Station #44017 (8th Line/Halton Reservoir), Oakville.

The monitoring locations within or close to Peel Region are shown in **Figure 1**. The Etobicoke West station is the longest operating station close to Peel Region since 1969. The Mississauga station was established in 1977 near the intersection of Queensway West and Horntail Street. In May 2004, the station closed due to construction and was relocated to the Frank McKechnie Community Centre at 310 Bristol Road East (Station #46109 replaced station #46110 as the Mississauga site in 2004). It has since moved to the University of Toronto campus in Mississauga⁷. The Brampton monitoring station was established in 2000 at Peel Manor, 525 Main Street North. The Oakville station (Station #46017) is near the intersection of the 8th Line/Halton Reservoir.

⁷ The station was moved to 3359 Mississauga Road in November 2007.

Figure 1. Monitoring Locations In and Around Peel Region



2.3.1 Air Quality Index

The air monitoring network data are used by the Ministry of the Environment to calculate the air quality index (AQI). The AQI is derived by measuring the ambient concentrations of six major pollutants: O₃, PM_{2.5}, CO, SO₂, NO₂, and total reduced sulphur. It serves mainly as an informational and advisory tool, particularly to issue smog advisories to the public.

The AQI is connected to a scale ranging from 0 to over 100. The lower the AQI number, the better the air quality. Each hour the concentration of the six pollutants is measured and the pollutant with the highest number at the given hour becomes the AQI. An AQI value below 15 is categorized as very good, between 16 and 31 as good, between 32 and 49 as moderate, between 50 to 99 as poor and 100 or more as very poor.

A smog watch is issued when there is at least a 50 per cent probability that the AQI will reach or exceed 50 in the next three days. A smog advisory is issued when there is a high probability that the AQI will reach or exceed 50 in the next 24 hours.

The current AQI is not based on human health risk. In 2001, Toronto Public Health released the report "Condition Critical: Fixing our Smog Warning System". The report indicated that 90 per cent of the premature mortality associated with poor air quality occurred on days when the AQI suggested that the air quality was "good". Dr. Sheela Basur, Toronto's former Medical Officer of Health, called for an improved health-based air quality index to be developed. At the 2002 Smog Summit, the Government of Canada committed to developing a national health-based air quality index.

2.3.2 Air Quality Health Index

The Air Quality Health Index (AQHI) is a scale that measures the health risk associated with the integration of three indicator pollutants: ozone, PM_{2.5}, PM₁₀ and NO₂. The formula reflects cumulative health impacts from these multiple pollutants, as opposed to the air quality index which indicates the highest single reading among multiple pollutants.

The AQHI allows local, regional and transboundary pollutant emissions to be reflected in the readings ranging from 1 to 10+ indicating the quality of the air along with health information and customized messages for vulnerable groups to assist them with how to respond to compromised air quality, i.e. avoiding exercise during certain parts of the day. An index reading of 1 to 3 is categorized as a low health risk, 4 to 6 as moderate, 7 to 10 as high and 10+ as a very high health risk.

2.4 WHAT ARE THE EFFECTS OF POOR AIR QUALITY?

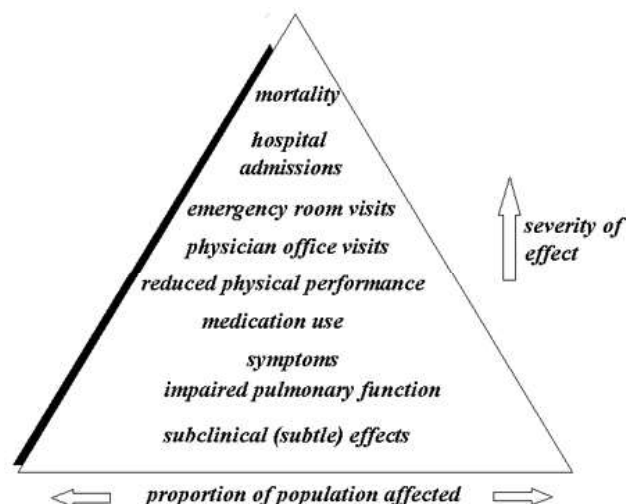
The emission of air pollutants has impacts to human health, the economy and the natural environment.

2.4.1 Human Health

The adverse effects that air pollutants have on human health include compromises to respiratory, immune and circulatory systems resulting in increases to respiratory diseases such as asthma and bronchitis along with lung cancer, heart attack and strokes. Certain groups of people – including children, the elderly, seniors, people with allergies and asthma, heart or lung conditions, and individuals who exercise outside - face a greater risk and are considered to be vulnerable populations. Additionally, research has found that there is no “safe” level for exposure to smog⁸.

The health effects of air pollution can be described as a pyramid. Relatively rare, but more serious health outcomes such as premature deaths and hospitalizations are at the peak of the pyramid, while more common health outcomes such as asthma symptom days and respiratory infections appear towards the bottom of the pyramid.

Figure 2. Pyramid of Health Effects Due to Air Pollution, Health Canada (2006)



A summary of criteria air contaminants and their associated health effects includes the following:

- Ground-Level Ozone – reduction in lung function in healthy people during periods of exercise, generally accompanied by tightness in the chest, pain and difficulty breathing, coughing and wheezing;
- Particulate matter – Finer particles, i.e. PM_{2.5}, pose the greatest threat to human health because they can travel deepest into the lungs. Particulates can irritate eyes, throat, nose and cause coughing, breathing difficulties, reduced lung function, inflammation and increased use of asthma medication;

⁸ Province of Ontario. 2004. Clean Air Action Plan: Protecting Environmental and Human Health in Ontario.

- CO – when inhaled, CO reduces the body's ability to transport oxygen. With low-level, short term exposure to CO, decreased athletic performance is seen along with aggravated cardiac symptoms. There is evidence of an association with premature death;
- SO₂ – can cause breathing problems in people with asthma, but at relatively high levels of exposure;
- VOCs – some VOCs are carcinogenic such as formaldehyde and benzene; and
- NO_x – at elevated levels, can impair lung function, irritate the respiratory system and at very high levels make breathing difficult.

In 2008, the Canadian Medical Association released data estimating the provincial health and economic damages associated with exposure to poor air quality. Data for Ontario revealed that exposure to air pollution was predicted to result in approximately 1,178 acute premature deaths, 4,597 hospital admissions, and 39,575 emergency room visits in 2008. If nothing was done to improve Ontario's air quality, the number of premature deaths was estimated to hit 2,222 by the year 2031 as the population ages. The combined healthcare and lost productivity costs in 2008 were estimated to reach approximately \$3.5 million dollars and are estimated to be over \$6 million dollars by 2031.

Canadian Medical Association. 2008. No Breathing Room: National Illness Costs of Air Pollution

2.4.2 Economic Impacts

Air pollution has both direct economic impacts as well as indirect impacts as a result of issues stemming from human health and the natural environment. Addressing air pollution can improve economic sectors such as agriculture, tourism, fishing and forestry as well as have spin-off effects in the developing 'green' sector to combat air pollution. For example, in the agriculture industry, poor air quality can result in lower yields and changes in the structural properties of crops. Climate change can cause longer growing seasons and unpredictable weather can lead to droughts⁹.

Economic damages associated with air pollution-related illnesses were assessed by the Ontario Medical Association¹⁰ and considered for four major categories:

Lost productivity - includes time lost to treatment and recovery by both patients and caregivers was estimated to be \$374 million and expected to increase to \$466 million by 2026 for Ontario.

Health care costs – includes the costs of institutional care plus medication. 2005 health care costs resulting from air pollution-related illnesses were estimated at \$507 million and are expected to increase to \$702 million by 2026.

Pain and suffering – economic implications related to pain and suffering respond to the amount that people are willing to pay to avoid illness causing pain and suffering. In 2005, economic losses associated with pain and suffering from air pollution-related illness are estimated in the order of \$537 million for the Province and is expected to increase to more than \$718 million by 2026.

⁹ State of the Environment, page 41.

¹⁰ Ontario Medical Association, (2005), The Illness Costs of Air Pollution: 2005-2026 Health and Economic Damage Estimates.

Loss of life – premature death is valued as the willingness of people to pay to reduce this risk and for Ontario, 2005 estimates are approximately \$6.4 billion and is expected to increase to \$11 billion by 2026.

The improvement in productivity in Canadian industry along with a decrease in health care costs has impacts to the overall economy and general quality of life for citizens.

2.4.3 Environmental Impacts

Air pollutants affect a wide variety of ecosystem functions and affects soil and water quality, vegetation and wildlife.

Effects on soil and water quality – pollutants such as acid rain can alter the quality of the soil which then in turn affects plant growth and water quality. An increase in soil acidity causes important minerals and nutrients to be leached from the soil. It also increases the movement of heavy metals and POPs through the soil and into water bodies, which have major negative impacts to fish and other wildlife. Lakes affected by a change in pH are typically clear as vegetation and aquatic organism growth is stunted. Other aquatic ecosystems such as coastal waterways and estuaries experience excessive plant and algae growth (“eutrophication”) which when decomposed, can deplete oxygen resources needed by other organisms for development¹¹.

Vegetation – plant development is primarily affected by ground-level ozone. O₃ entering through plant leaves can alter photosynthesis and other physiological processes thereby reducing plant growth. Acid rain can also damage plant root systems and leaves. Sulphur dioxide has negative effects on biological processes.

Wildlife – air pollutants can have negative impacts on the quality of wildlife habitat and food supply. Acid rain can alter the quality of the soil and water, rendering them inhabitable for some species. This impacts larger animals along the food chain who depend on creatures in these habitats as a food source.

Heavy metals and POPs enter the food chain and once consumed by animals, are stored in their tissues. As these animals are consumed by other species, the stored pollutants collect and increase in concentration in the predator’s tissue which is termed bioaccumulation. For example, the effects of this process can be seen in the accumulation of mercury in certain larger fish species and can have impacts to human health if too much is consumed.

Additionally, smog in the atmosphere negatively impacts the human experience of the natural environment as it reduces the visibility of the surrounding landscape.

¹¹ Environment Canada. Clean Air Online. Site accessed August 2008. http://www.ec.gc.ca/cleanair-airpur/Soil_and_Water-WS789667A5-1_En.htm

2.5 WHAT ARE SOME OF THE SOURCES OF POOR AIR QUALITY?

Pollutant sources are many and varied and are greatly influenced by human consumption patterns. While motor vehicles, energy generation, and industry are the largest contributors to poor air quality, the design of Peel Region communities also is an important contributor to the reliance on the automobile.

2.5.1 Community Design

Urban form or the shape of our communities, can have a significant effect on air quality. Urban sprawl is characterized by low density, separated land uses, and poor connectivity, particularly between the different land uses. This is the dominant form of development found in Peel Region.

Urban Sprawl is described as being

...a population that is widely dispersed in low-density development; rigidly separated homes, shops, and workplaces; a network of roads marked by huge blocks and poor access; and a lack of well-defined, thriving centres, such as downtowns and town centres. Most of the other features usually associated with sprawl – the lack of transportation choices, relative uniformity of housing options or the difficulty of walking – are a result of these conditions¹².

These characteristics contribute to an increased reliance on the private automobile – cars are driven for longer distances in sprawling communities and residents are less likely to walk or take transit to work - resulting in increased levels of air pollution.

Key issues in Peel Region related to sprawl were identified in a 2005 report by the Federation of Canadian Municipalities:

- Peak hour gridlock resulting in unnecessarily long commutes;
- Increase in vehicle use and decline in public transportation use resulting in increases in poor air quality days;
- Increased infrastructure costs due to low-density suburban development;
- The loss of downtown and city-centre vitality;
- The loss of prime agricultural land and encroachment of natural areas such as the Oak Ridges Moraine; and
- The continuing development of neighbourhoods that do not promote active lifestyles¹³.

Density

Density refers to the quantity of people, households and/or employment distributed over a unit area of land and is a widely recognized indicator of sprawl. Suburban subdivision design has in the past been dominated by single family homes on larger lots and large blocks with limited sidewalk access and circuitous street design. At low densities, introducing viable transit options is difficult rendering most households primarily reliant on private vehicles for transport.

¹² Smart Growth America. 2002. Measuring Sprawl and its Impacts.
<http://www.smartgrowthamerica.org/sprawlindex/sprawlindex.html>

¹³ Federation of Canadian Municipalities. 2005. Quality of Life in Canadian Communities.

Urban development in Peel adds the equivalent of a town the size of Orangeville (or about 25,000 people) to Peel's population every year. That is equivalent to approximately 68 people per day, through natural increase, immigration and migration. In order to accommodate the increased population, increased density in the form of redevelopment, intensification, infill, and development of underutilized or vacant lands as opposed to developing greenfield (lands with no development) would be a more efficient use of land and help achieve higher densities. Higher densities would in turn lead to a decreased reliance on the private automobile and reduce levels of air pollution.

However, density in itself is not the sole gauge of sprawl and should be considered along with neighbourhood mix of homes, jobs and services; the strength and vibrancy of town centres; and the accessibility of the street network.

Mixed Land Use

The strict segregation of different land uses is another factor of urban sprawl. Sprawling communities are typified by residential subdivisions that are separated from other land uses such as jobs, shopping, schools, and civic centres. The distance separating these uses and the lack of opportunity to combine trips requires that virtually every household trip necessitate a car for travel.

Town Centres

Centres and sub-centres, which are the focus of activity for a community, consist of a concentration of businesses, services, institutions and residential uses that foster a sense of place and support multi-purpose trips. In sprawling communities, centres are typically absent from the landscape, and subdivisions are built adjacent to one another, connected by arterial roads lined with commercial strip development.

Street Network

The network of roads within a neighbourhood can be based on short or long blocks, with either a grid-like pattern, or curvilinear road patterns punctuated by cul de sacs where the circulation of vehicles is a prime generator of form. Sprawling communities are characteristically built on large 'super-blocks' that are poorly connected to main roads, with dead ends (cul de sacs) and a concentration of traffic on a few routes. Travelling via walking, cycling or transit is hampered by the poor accessibility and lack of direct, connected block faces integrated with main routes.

2.5.2 Transportation

Across Canada, transportation-related air pollution is responsible for approximately one quarter of all greenhouse gas emissions. In Ontario, it is the most significant source of NO_x and CO emissions.

Transportation in Peel Region during peak hour is dominated by the automobile. Results from the Transportation Tomorrow survey (2006) show that out of 595,000 trips, the dominant mode of transportation by residents in Peel during the peak morning period of 6 a.m. to 9 a.m. is the automobile (driver) at 63 per cent, followed by the automobile (passenger) at 15 per cent of the trips. Walking and cycling sits at 8 per cent of the trips by Peel residents. Moreover, truck traffic accounts for about 6 per cent of all vehicle trips in the Region and the annual percentage growth

is higher than the growth in population, employment and passenger trips¹⁴. Actions taken to reduce traffic can not only improve air quality, but also contribute to improved health. Adverse health impacts of sprawling communities are becoming increasingly documented – obesity, asthma and other chronic illnesses – and are being connected to built environments that offer little opportunity for active transportation and promote time spent in vehicles which may reduce physical activity¹⁵. This is especially important when one considers that an estimated 45 per cent of adults are overweight or obese and an estimated 27 per cent of youth are either overweight or obese in Peel¹⁶. Additionally, a number of traffic corridor studies have shown that there is a relationship between location adjacent major transportation corridors and health issues – hospitalizations for asthma and deaths related to strokes are higher among residents who live in close proximity to busy highways as compared with those who live further away¹⁷.

2.5.3 Built Form and Energy Use

Poor air quality is closely linked to energy use. Burning fossil fuels for heating and cooling and the generation of electricity is a significant source of air pollution. Coal-fired generating stations are responsible for a large share of NO_x, SO_x and greenhouse gases and although they are being phased out across the Province, other sources of fuel being contemplated to expand the strained electricity generating sector also have inherent air pollutants¹⁸.

It is estimated that building construction accounts for 25 per cent of Canada's overall GhG emissions through new construction and the consumption of fossil fuels for heating, electrical consumption and air conditioning. This has implications for the building code as well as opportunities for local influence on greener alternatives to new building construction and building retrofits. Research also shows that freestanding or detached homes consume 85 to 99 per cent more energy than a house of equal size that share a common wall,¹⁹ lending support for more denser forms of development than the 'single family home'.

2.5.4 Urban Heat Island Effect

The urban heat island effect is the increase in temperature of cities as compared with more rural areas due to urban land development that diminishes vegetation, increases the amount of paved dark surfaces (i.e. buildings, parking lots) that absorb more heat from the sun, and waste heat generated by energy usage. This leads to increased energy demand for air conditioning and increased levels of air pollution. The large amounts of paving, concrete and rooftops also result in run-off pollutants from pet and wildlife waste, nutrients from fertilizers and sediment to be carried across the surfaces with rainwater and end up in our surface water.

2.5.5 Industrial

Major industrial operations include base metal smelting, petroleum exploration and development, steel manufacturing, and electricity generation among others. The industrial sector accounts for

¹⁴ Data Management Group. 2006. Transportation Tomorrow Survey, as reported in Peel Region Background Paper on Air Quality.

¹⁵ Frank, Lawrence D. et. al. 2006. Many Pathways from Land Use to Health, American Planning Association.

¹⁶ Region of Peel. 2005. State of the Region's Health: Focus on Overweight, Obesity, and Health-Related Consequences in Adults.

¹⁷ Halton Region Health Department. 2007. Air Quality, Human Health and the Environment: Protecting Air Quality Through the Land Use Planning Process.

¹⁸ For example, natural gas emits CO, NO_x, VOCs, particulate matter and methane; nuclear energy involve issues surrounding long term storage, dust during uranium mining rather than air emissions, and cogeneration (combined heat and power facilities that more efficiently utilize natural gas to generate both heat and electric power) also emits NO_x, CO, VOCs and particulate matter. (Region of Peel, 2007, Electricity Supply Mix, Air Quality and Health, Report to the General Committee).

¹⁹ Campoli, Julie and Maclean, Alex S. 2007. Visualizing Density. Lincoln Institute of Land Policy, Cambridge, Massachusetts.

nearly 60 per cent of SO₂ emissions in the Province. Across nearly all industrial sectors there is a common need for mechanical or thermal energy. In Canada, combustion systems used in industrial facilities account for approximately one-third of all energy consumed and are responsible for about 20 per cent of smog and 25 per cent of greenhouse gas emissions. These systems include boilers, heaters and gas turbines that produce thermal and mechanical energy.

In Canada, the principal means of tracking industrial emissions is through the National Pollutant Release Inventory (NPRI) which is legislated under the Canadian Environmental Protection Act. Facilities (industrial, commercial and institutional) are required to report annual emissions if they exceed pollutant specific thresholds. For Ontario, Ontario's Regulation 127/01 - Airborne Contaminant Discharge Monitoring and Reporting Regulation, requires that Ontario-based facilities to also report emissions. The two reporting schemes have been harmonized such that both report the same level of releases.

Industrial areas in the Peel Region include the Highway 410 area north of Highway 401 in Brampton, Clarkson area in Mississauga, industrial areas adjacent Pearson International Airport and the airport itself which includes aircraft movements, ground and service traffic, heating plants and construction.

2.5.6 Open Sources

Open sources such as landfill sites, where methane gas is produced naturally as waste decomposes, are another contributor to greenhouse gas emissions. There are a total of 20 closed sites in Peel Region²⁰ that the Region monitors including Centre Street, Professor's Lake, Britannia, North Sheridan and Newman along with a number of closed sites in Caledon (Albion, Bolton, Chinguacousy and Palgrave). Gas reduction measures that transform the gas into less harmful emissions are in place in the Region. Other programs to mitigate methane release include waste diversion through recycling, composting and yard waste collection along with relatively recent methods for methane capture for energy production.

Aggregate operations produce dust as a result of blasting, machinery and trucks that contribute to particulate matter in local emissions and are a particular concern in Caledon. Agricultural operations are also sources of air contaminants in the form of soil, fertilizers, pesticides, biosolids, tillage and harvesting operations and fuel combustion.

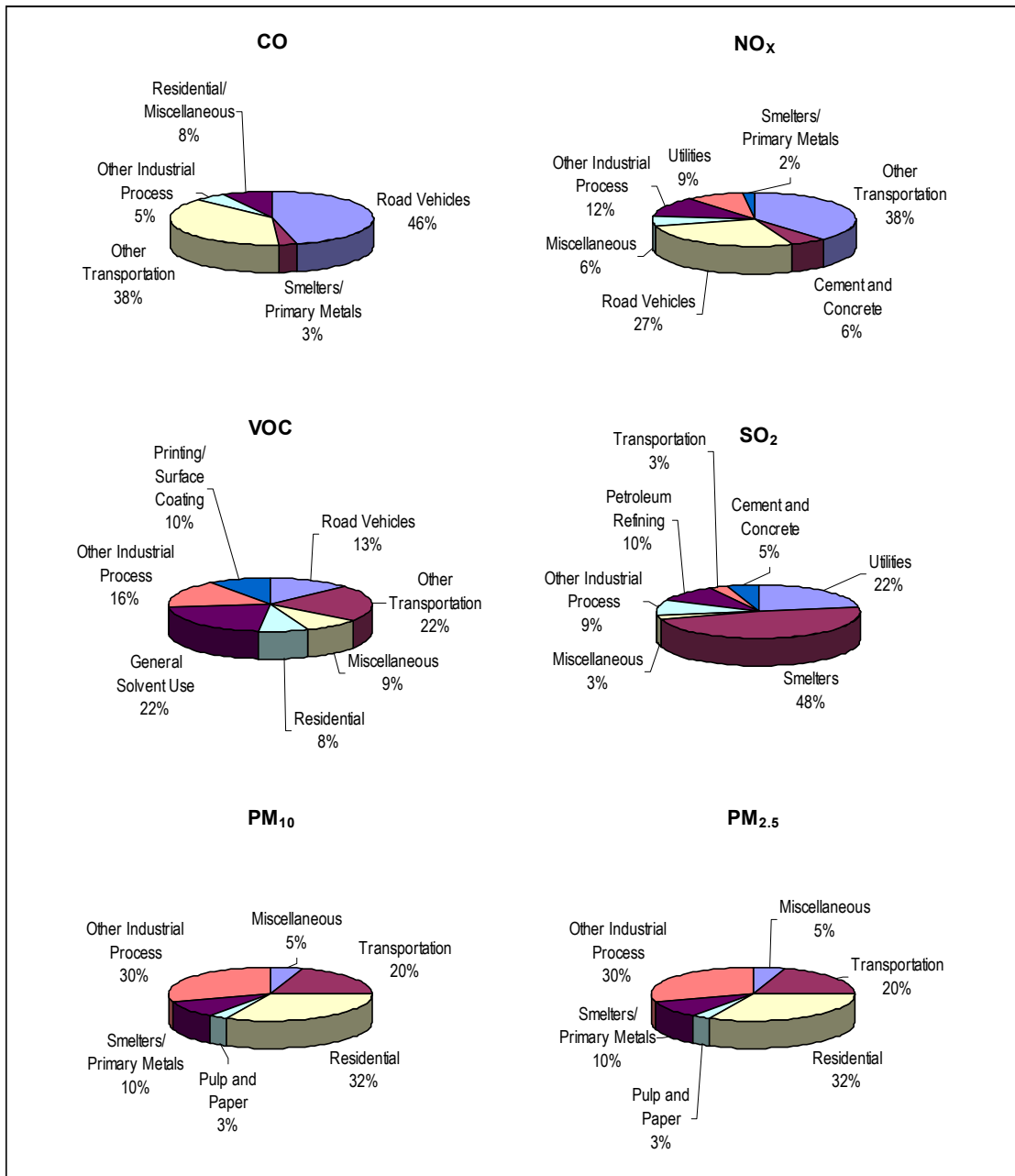
2.5.7 Transboundary Pollution

Some pollutants travel great distances and affect other communities which is known as transboundary pollution. For example, prevailing southwesterly winds transport air pollutants originating in the Ohio Valley through the Windsor-Quebec City corridor. Approximately half of the air pollution in Peel Region emanates from the U.S. Conversely, Peel's emissions affect neighbouring communities downwind.

Figure 3 shows the sources of emissions by sector in Ontario.

²⁰ Peel Region. 2002. State of the Atmosphere Report.

Figure 3. Emission Sources by Sector in Ontario



Source: Ontario Ministry of the Environment as cited in Report on Evaluation of Air Quality in Peel Region, 2007, Golder and Associates Ltd.

3.0 AIR QUALITY IN PEEL REGION

Currently, Ministry of Environment (MOE) operates two ambient air monitoring stations in Mississauga and Brampton, respectively. In addition, there are two other MOE air quality stations located in Oakville and Etobicoke which also provide some additional insight into Peel Region's air quality. These stations measure a number of pollutants including nitrogen dioxide, nitric oxide and sulphur dioxide as well as ozone and fine particulate matter. Both ozone and particulate matter are major components of smog and continue to exceed the ambient air quality criteria. In Peel Region about 50 per cent of the smog forming air pollution is transported from sources in the U.S. during the smog season.

The Province of Ontario has legislated Ambient Air Quality Criteria (AAQC) as a guide for good air quality for residents of Ontario as shown below. Monitoring data are compared to these levels for criteria air contaminants.

Table 3. Ontario Air Quality Criteria

Air Pollutant	Time Period	AAQC (ppb) ²¹	AAQC (µg/m ³) ²²
CO	1 hour	30,000	36,200
	8 hour	13,000	15,700
NO _x (a)	1 hour	200	400
	24 hour	100	200
SO ₂	1 hour	250	690
	24 hour	100	275
	Ann	20	55
PM ₁₀	24 hour	-	50
PM _{2.5} (b)	24 hour	-	30
Ozone	1 hour	80	-
	8 hour (b)	65	-

(a) Reported as NO₂

(b) Canada Wide Standard

In general, air quality around Brampton is relatively better than air quality in Mississauga which is similar to air quality in Oakville. Air quality in Peel Region is better than air quality in downtown Toronto and Hamilton but ozone and fine particulates are of a concern as they continue to be at or above the Canada Wide Standards. There are no ambient air monitoring stations in north Peel Region but based on limited data, the air quality should be similar to Brampton²³.

Approximately 50 per cent of smog events (i.e., high levels of ozone and fine particulate matter) in the Region of Peel are due to transboundary sources primarily from the U.S. mid-west. This suggests that the remaining 50 per cent are due to local sources and conditions. In addition, these local sources and conditions contribute highly to non-smog days and have an effect on air quality.

²¹ Parts per billion

²² Micrograms per cubic metre

²³ Ontario Ministry of the Environment. 2006. Town of Caledon Regional Airshed Characterization Study Report. The findings of the study indicated that inferred measurements from monitoring sites in Brampton and/or Newmarket adequately represent the air quality in Bolton and Caledon.

Golder carried out the analysis of the air quality monitoring at the two Peel Region locations, namely Brampton and Mississauga between 2001 and 2006. The summary Tables are presented below.

Table 3. Hourly Maximum, 98th Percentile and Annual Average O₃ Concentrations

Year	Maximum (ppb)		98 th Percentile (ppb)		Average (ppb)	
	Brampton	Mississauga	Brampton	Mississauga	Brampton	Mississauga
2001	106	121	69	72	25	22
2002	107	111	68	70	26	23
2003	111	110	65	66	25	25
2004	84	78	59	49	25	21
2005	101	102	67	63	27	23
2006	92	90	64	57	26	22

Table 4. 24-h Maximum, 24-h 98th percentile and Annual Average PM_{2.5} concentrations

Year	Maximum (µg/m ³)		98 th Percentile (µg/m ³)		Average (µg/m ³)	
	Brampton	Mississauga	Brampton	Mississauga	Brampton	Mississauga
2003	43	45	30	28	8	8
2004	39	40	33	33	8	8
2005	48	47	33	34	9	9
2006	33	34	22	25	7	8

Table 5. 1-h Maximum, 1-h 98th percentile and Annual Average NO₂ concentrations

Year	Maximum (ppb)		98 th Percentile (ppb)		Average (ppb)	
	Brampton	Mississauga	Brampton	Mississauga	Brampton	Mississauga
2001	73.0	73.0	51.0	48.0	19.1	20.1
2002	66.0	95.0	45.0	43.0	16.3	19.5
2003	82.0	71.0	53.0	47.0	17.6	23.0
2004	87.0	ND	49.0	ND	16.2	ND
2005	89.0	ND	52.0	ND	16.9	ND
2006	75.0	ND	47.0	ND	15.0	ND

Table 6. 24-h Maximum, 98th Percentile and Annual Average NO₂ Concentrations

Year	Maximum (ppb)		98 th Percentile (ppb)		Average (ppb)	
	Brampton	Mississauga	Brampton	Mississauga	Brampton	Mississauga
2001	52.6	47.5	41.3	37.9	19.1	20.1
2002	45.3	47.5	38.4	36.1	16.3	19.5
2003	58.1	42.8	45.0	42.2	17.6	23.0
2004	53.1	ND	39.3	ND	16.2	ND
2005	53.9	ND	43.8	ND	16.9	ND
2006	41.5	ND	36.4	ND	15.0	ND

Table 7. Hourly Maximum, 98th percentile and Annual Average SO₂ concentrations

Year	Maximum (ppb)		98th Percentile (ppb)		Average (ppb)	
	Brampton	Mississauga	Brampton	Mississauga	Brampton	Mississauga
2001	45.0	ND	13.0	ND	2.7	ND
2002	52.0	ND	11.6	ND	2.7	ND
2003	82.0	103.0	12.0	13.0	2.3	2.5
2004	40.0	95.0	9.0	10.0	1.7	1.7
2005	69.0	66.0	10.0	10.0	1.9	2.6
2006	23.0	20.0	7.0	9.0	1.4	2.7

Table 8. 24-h Maximum, 98th percentile and Annual Average SO₂ Concentrations

Year	Maximum (ppb)		98 th Percentile (ppb)		Average (ppb)	
	Brampton	Mississauga	Brampton	Mississauga	Brampton	Mississauga
2001	15.5	ND	9.0	ND	2.7	ND
2002	15.3	ND	8.7	ND	2.7	ND
2003	17.4	15.6	8.7	9.2	2.3	2.5
2004	13.8	16.3	6.6	7.5	1.7	1.7
2005	10.0	9.0	7.2	7.5	1.9	2.6
2006	7.5	8.0	5.2	7.3	1.4	2.7

ND = Data Not Available

Except for one year (2004) the maximum hourly O₃ has exceeded the Ontario AAQC. The hourly maximum O₃ concentrations over the six year period were typically higher at the Mississauga station but during the last three years, the levels between both stations were about the same. The 24-hour maximum PM_{2.5} concentrations over four year period (2003 to 2006) were 48 and 47 µg/m³ for Brampton and Mississauga, respectively. The provincial AAQC for NO₂ and SO₂ were not exceeded at any of Peel Region air monitoring sites.

The air quality in Peel Region is affected by local regional, national and international sources. The emissions generated in Peel Region also affect areas located downwind of Peel Region. A preliminary emission inventory, developed by Golder compared traffic, residential, industrial and airport emissions are shown below.

Table 9. Estimated Emissions in Peel Region from Major Industrial, Residential, Traffic and Airport Sources in 2005

Pollutants	<i>Annual Emissions</i>								
	Industrial		Residential		Traffic		Airport(a)		Total
	t/a	% of total	t/a	% of total	t/a	% of total	t/a	% of total	t/a
CO	6,386	18.7%	4,089	12.0%	17,609	51.5%	6,100	17.8%	34,184
NO _x	5,392	31.1%	965	5.6%	8,739	50.5%	2,226	12.9%	17,322
PM ₁₀	812	17.7%	113	2.5%	3,630	79.2%	30	0.7%	4,585

(a) Based on 2000 emission inventory

Figure 4. CO Annual Emissions from Industrial, Residential, Traffic and Airport in Peel Region

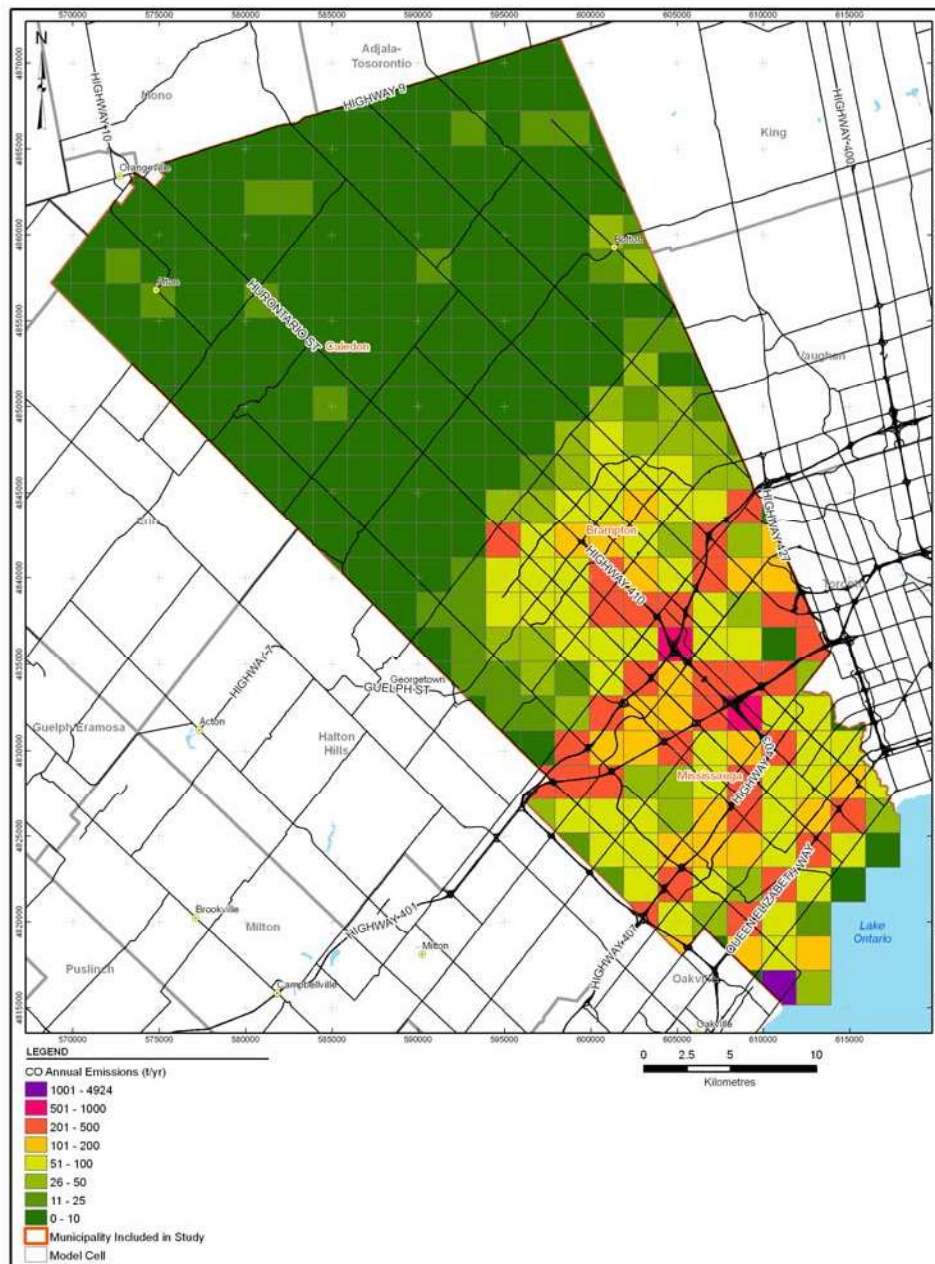


Figure 5. NO_x Annual Emissions from Industrial, Residential, Traffic and Airport in Peel Region

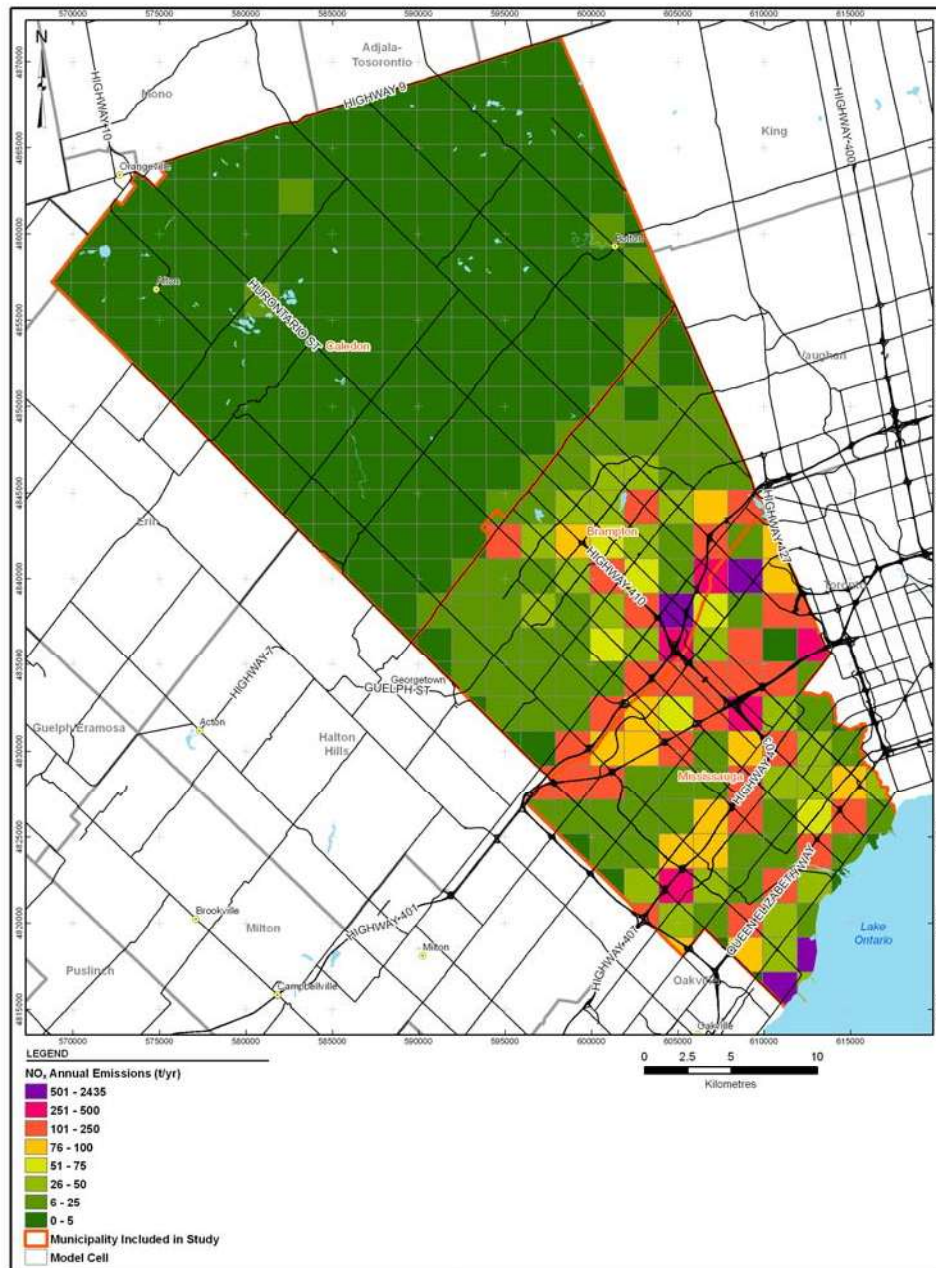
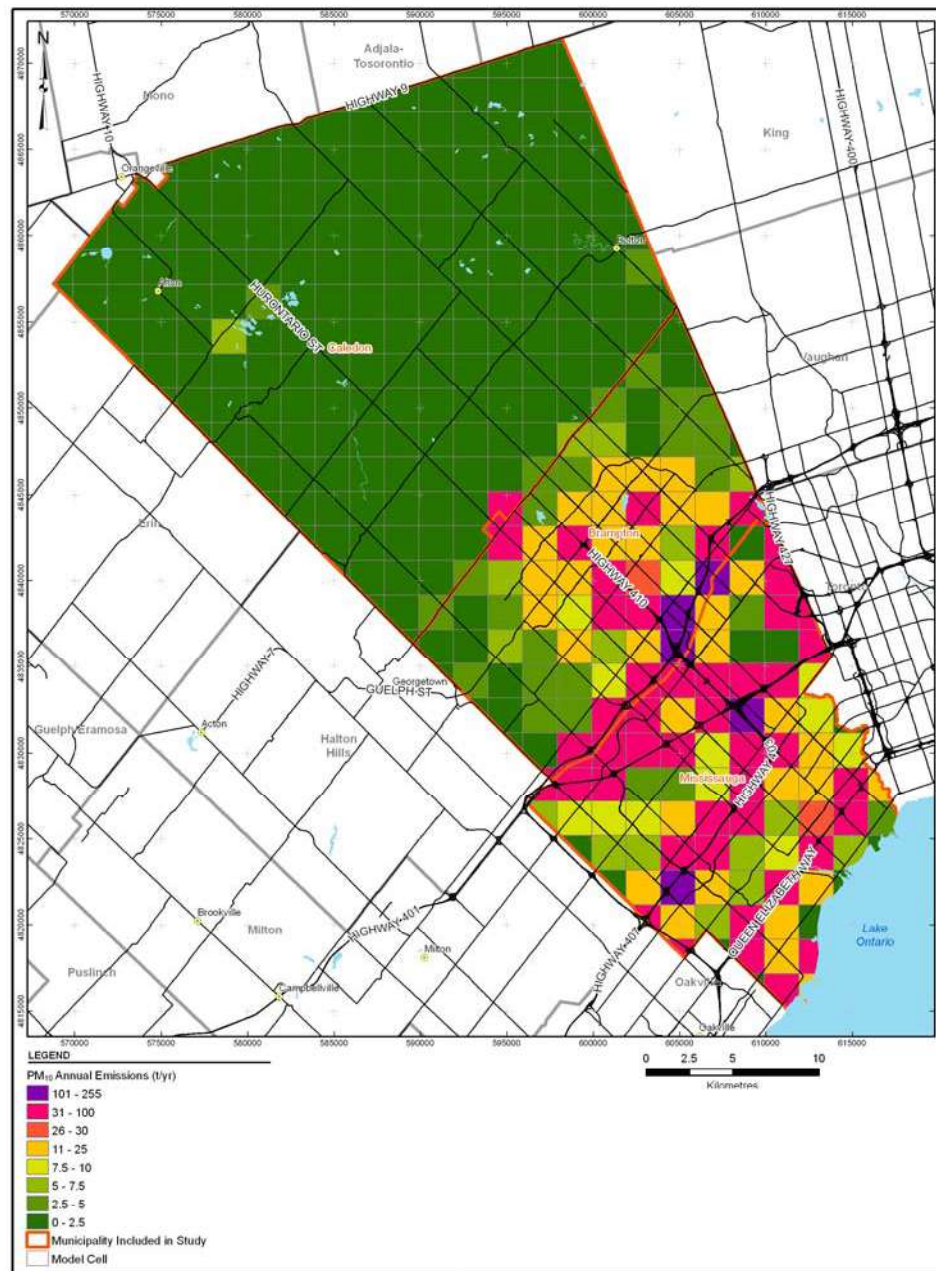


Figure 6. PM₁₀ Annual Emissions from Industrial, Residential, Traffic and Airport in Peel Region



These emissions were estimated from the air quality modelling work carried out by Golder for the Halton Region and should not be used in air quality modelling or in decision making processes. It is provided as a first cut at potential emissions in Peel Region. Emissions loading of these species into Peel Region are dominated by traffic activity followed by the industry. An accurate emission inventory for Peel Region is a critical step for planning purposes.

Geographically, Peel Region is not a taxed airshed²⁴ except for some taxed pockets in the southern part where most of the population reside. It is expected that air quality concentrations will be several times higher near roadways, especially during peak traffic hours. As establishing a large network of monitoring stations over Peel Region will be extremely expensive, the use of a high resolution emission inventory and along with an urban air quality modelling system will be a cost efficient method to examine air quality in Peel Region. In addition, air quality modelling can be used to evaluate various approaches or options in transportation planning and residential/industrial growth.

As population in the Region increases, one will expect that traffic emissions will also increase even with improved automobile emission standards. Industrial emissions will also grow but not at the same rate as population-based emissions since industry is regulated by the MOE to meet prescribed air quality standards.

Given the sparse air quality monitoring data in Peel Region, it is recommended that Peel Region consider air quality modelling in evaluating sustainable approaches to growth. Regional scale modelling has been completed in Toronto and Halton with good success in replicating general air quality.

²⁴ A taxed airshed is an airshed which has higher ambient air concentrations than other surrounding airsheds.

4.0 GUIDING POLICY

In Canada, air quality management is a shared responsibility of the federal, provincial and territorial governments. With the exception of Montreal and the Greater Vancouver Regional District who have delegated authorities from their respective provincial governments, municipalities don't have direct authority over air issues. However because regional and local municipalities have direct influence over the daily activities of its residents, many municipalities have initiated programs and plans to address air quality issues.

Air quality initiatives by senior government levels are summarized in this section followed by Peel Region plans and those developed by Peel's municipalities.

4.1 FEDERAL INITIATIVES

The federal government is involved with developing standards that govern vehicles and fuels, developing transborder agreements governing air emissions, monitoring air quality, improving public awareness and funding programs to assist with reducing emissions from the transportation sector²⁵.

Federal initiatives and policies aimed at improving air quality are summarized below.

4.1.1 Clean Air Act

The Government of Canada recognizes that actions that contribute to smog and acid rain also influence climate change. As a result, the federal government has taken an integrated approach to addressing air pollutants and greenhouse gases. It recognizes that steps are necessary for federal regulation of air pollutants and greenhouse gases. The three key components of the Act are:

- Create a "clean air" part to the current Canadian Environmental Protection Act which will authorize the government to regulate indoor and outdoor air pollutants and greenhouse gases. This enables the two leading ministries on air quality - Environment Canada and Health Canada – to establish national air quality objectives and monitoring of these objectives. It also allows the government to regulate the blending of fuels, an important step towards meeting the 5 per cent renewable fuel content for motor fuels by 2010.
- Amend the Motor Vehicle Consumption Standards Act to increase the government's authority to regulate fuel efficiency and establishing mandatory fuel consumption standards.
- Expand authority under the Energy Efficiencies Act to permit the government to set energy efficiency standards and labeling requirements for a wider range of consumer and commercial products.

The following actions are aimed at reducing emissions from industrial sectors, motor vehicles, consumer and commercial products and indoor air:

Industry - develop a regulatory framework for key industrial sectors and set targets for air pollutants based on fixed caps and for greenhouse gases based on emissions intensities

²⁵ RWDI. (2005). Development of Policy Papers for Phase Two of the Transportation Master Plan for the City of Hamilton: Air Quality Policy Paper.

in order to meet the long term goal (year 2050) of a reduction in GhG emissions by 45-60 per cent from 2003 levels. Future consultation with the National Roundtable on the Environment will establish a specific target along with scenarios on how the target could be achieved. By 2010, the government plans to have final emissions regulations and the necessary tools to monitor and enforce compliance for all sectors.

Vehicles – final regulations to further reduce emissions from motorcycles and off-road diesel engines along with new regulations for marine spark ignition engines and other off-road vehicles.

Consumer and commercial products – regulations to reduce emissions from VOCs in various household products and establish performance requirements for various products.

Indoor air – a new guideline for radon will be established that will form the basis for a future national radon strategy.

4.1.2 Canada U.S. Air Quality Agreement

The Canada-United States Air Quality Agreement was signed by Canada and the United States in Ottawa, Ontario on March 13, 1991 to address transboundary air pollution leading to acid rain. Both countries agreed to reduce emissions of sulphur dioxide and nitrogen oxides which are the major precursors to acid rain²⁶. In 2000, the Agreement was updated to address transboundary air pollution leading to high levels of ground level ozone. The Ozone Annex commits both countries to reduce precursor pollutants to ground level ozone (NO_x and VOCs) to within the Canada Wide Standard for ozone and for the U.S., the National Ambient Air Quality Standards for ozone.

4.1.3 National Emissions Inventory for Air Pollutants

The emissions of various air pollutants that contribute to poor air quality are tracked by Environment Canada through its national emissions inventory for air pollutants and includes criteria air contaminants, persistent organic pollutants, and heavy metals. The national emissions inventory is compiled annually and provides emission summaries at the national, provincial, and territorial levels for different years and time periods. Input included in the inventory consist of data compiled from the National Pollutant Release Inventory (NPRI), along with non-industrial source emissions, emissions from the transportation industry, residential fuel combustion, landfill sites, incineration, forest fires and others. The NPRI is a database of pollutants released from industrial and institutional facilities, included in the inventory are the contaminants that contribute to smog. Reporting under the NPRI is a mandatory requirement legislated under the Canadian Environmental Protection Act, for those facilities that fall within the requirements as outlined by Environment Canada.

4.1.4 Regulatory and Monitoring Initiatives

The Federal government has established a number of regulations and standards for air pollution control:

²⁶ Environment Canada, <http://www.ec.gc.ca/cleanair-airpur/default.asp?lang=En&n=83930AC3-1>, Site accessed May 2008.

- Canada Wide Standards (CWS) are targets for certain air pollutants that are aimed at reducing health and environmental risks within a specific timeframe. The two air pollutants with CWS are:
Ozone – 65 ppb (over 8 hours)
PM_{2.5} – 30 µg/m³ (24 hours)
- Sulphur in gasoline regulations (SOR 99-236) – beginning in 2005, all gasoline in Canada must have a low sulphur content, i.e. average sulphur content must be less than 30 ppm.
- Alternative Fuels Act (1995) was enacted to accelerate the use of alternative fuels by mandating that 75 per cent of the federal government's fleet run on alternative fuels where it is economically feasible and operational. The 2005-06 report identified that during the fiscal year, the federal government has fully complied with the requirements of the Alternative Fuels Act with respect to vehicle acquisitions. With regard to the use of [alternative fuels], limitations on their availability resulted in their limited use in many situations.²⁷

4.2 PROVINCIAL INITIATIVES

In addition to establishing air quality standards as outlined in the previous section, the Province of Ontario is responsible for funding, provincial infrastructure, vehicle registration and licensing and emissions testing and monitoring. The Province also plays a primary role in establishing land use policies to curb urban sprawl.

The Ministry of the Environment (MOE) is responsible for monitoring air quality in the Province of Ontario. A large part of the ministry's regulatory and enforcement activities focus on local air concerns affecting Ontario's communities. For example, the MOE sets air standards for a large number of air toxics, and deals with individual industrial emitters on a facility-by-facility basis. Ontario has introduced new or updated standards for over seventy harmful pollutants. The Province also has a plan in place to significantly reduce emissions of smog-causing pollutants from large industries by the year 2015. The Drive Clean program also ensures that all cars on the road in Ontario pass strict emission controls.

4.2.1 Ontario Regulation 419/05 (2005)

This regulation is the cornerstone of the ministry's efforts to protect local air quality. The regulation imposes air standard concentration limits for contaminants that are assessed using air dispersion models and/or ambient monitoring on a facility-by-facility basis. More stringent standards are planned to be phased in over time. Reporting by the industrial sector is completed through an Emission Summary and Dispersion Modelling (ESDM) Report which compiles all of the air emissions from the specific facility and compares the results with Ministry standards²⁸. A limitation with the regulation is that it does not fully address the cumulative impacts of multiple sources within an airshed as the certification process is primarily based on the point of impingement i.e. by each facility²⁹.

²⁷ Treasury Board of Canada Secretariat. Report on the Application of the Alternative Fuels Act Fiscal year 2005-2006. Site accessible at: http://www.tbs-sct.gc.ca/report/other/2006/afa02-eng.asp#_Toc147130523

²⁸ Ministry of the Environment, <http://www.ene.gov.on.ca/en/air/ministry/index.php>

²⁹ Region of Peel. 2007. Follow on Motion Regarding the Adverse Health Effects of Ambient Air Pollution.

4.2.2 Ontario Regulation 194/05 (2005)

This regulation establishes limits on emissions (sets 'caps') of two key smog-causing pollutants for the industrial sector – nitrogen oxides (NO_x) and sulphur dioxide (SO₂). It is expected that regulation 194/05 will cut emissions of NO_x by 21 per cent and SO₂ by 46 per cent by the year 2015.

4.2.3 Drive Clean Program (1998)

Drive Clean is Ontario's mandatory vehicle emissions inspection and maintenance program that is reducing vehicle emissions of smog-causing pollutants by requiring vehicles to undergo an emissions test (beginning when they are five years old) to identify emissions problems and have them repaired.

4.2.4 Ontario's Smog Strategy (1997)

The province's strategy for reducing smog sets a goal of emission reductions by 2015 of 45 per cent of the total nitrogen oxides (NO_x) and volatile organic compounds (VOCs) emitted in the province in 1990. This has encouraged local municipalities to develop smog response plans that address corporate activity during smog days.

4.2.5 Ontario's Action Plan on Climate Change (2007)

The Go Green plan is a five point action plan premised on short, medium and long term targets for reducing greenhouse gas emissions in the province. The greenhouse gas reduction targets include:

- 6 per cent below 1990 levels by 2014
- 15 per cent below 1990 levels by 2020
- 80 per cent below 1990 levels by 2050

Steps toward achieving these targets include the phasing out of coal-fired power plants³⁰, extensive transit investment, creation of a 'green jobs' program, and a move toward renewable energy sources. It is expected that the Places to Grow Plan, Greenbelt Act and the closure of coal-fired plants will achieve almost half of the target. The remaining 50 per cent will come from transit investment (which will account for 15 per cent), new policies that will focus on home energy audits, retrofits and working with municipalities to reduce their greenhouse gases (15 per cent) with the remaining portion being achieved through research and innovation through the Next Generation of Jobs Fund and research funds.

4.2.6 Clarkson Airshed Study

The Clarkson Airshed Study (CAS) was initiated to address concerns by the MOE, the public and other stakeholders about air quality, in particular levels of PM_{2.5} in the CAS area. This study consists of the following components:

- identifying major sources of specific target pollutants;
- conducting an ambient air monitoring program in and around the airshed to determine whether or not air quality in the area is "taxed" or is at risk;
- determining contributions and impacts from the major sources of the emissions, through air dispersion modeling; and

³⁰ The closure of the Lakeview facility is likely to have an effect on air quality in Peel Region but the level of change has not been quantified due to lack of ambient air monitoring stations or air quality modelling in the area.

- looking at abatement options that may take area industries “beyond compliance” as a means of improving airshed quality.

Data was collected from six monitoring stations between summer of 2003 and spring 2005. Findings indicate that at times, especially during smog events, concentrations of respirable particulates (PM_{2.5}) can be elevated and contribute to the airshed being taxed or compromised with respect to air quality. It is reported that industrial emissions may contribute up to 25 per cent of the PM_{2.5} concentrations in the CAS area. Vehicular traffic along major roadways was also reported as a contributor to PM_{2.5}, nitric oxide and nitrogen dioxide within the study area.

The CAS ambient air-monitoring program operated between June 1, 2003 and March 31, 2005. The CAS boundaries consisted of the Queen Elizabeth Way to the north; Winston Churchill Boulevard to the west; Southdown Road to the east; and Lake Ontario to the south³¹.

The recently released Part III of the study determined the relative contribution of various sources to the contaminant concentrations at the six Provincial monitoring stations established for the study. Results showed that the vehicular sector was the most significant contributor (accounting for 50-70 per cent of NO_x, PM₁₀ and PM_{2.5}); the industrial sector was second (accounting for 25-30 per cent). For volatile organic compounds, the miscellaneous sector accounted for 40 per cent of the measured values. Transboundary sources contributed 15-60 per cent. The Lakeview Generating Station and the Petro Can Oakville Refinery located on either side of the Clarkson study area (both of which have now closed), were found to contribute only <.1 – 6 per cent of the contaminants measured in the study area. Additionally, a summary of matrices showed the predicted and measured data of 10 individual industrial sources of which half were identified as key contributors: St. Lawrence Cement, Petro Canada, Ford, Universal Drum and Stackpole.

4.2.7 Growth Management Policies

A number of Provincial policy changes have recently come into effect that will provide additional guidance with regards to official plan policies pertaining to air quality and urban form. These policies are summarized below.

Provincial Policy Statement (2005)

The Provincial Policy Statement (PPS) establishes the policy foundation for regulating the development and use of land in Ontario. Key directions include wisely managing change to promote efficient development and land use patterns. Managing land use is based on accommodating an appropriate range and mix of uses, intensification and redevelopment of land, efficient use of infrastructure and services that protect the diversity of natural connections, and providing housing forms that promote densities which use land, resources and infrastructure efficiently. Section 1.8 provides guidance for energy and air quality that promotes a compact form of development premised on nodes and corridors, use of public transit, land use mix to reduce the length and number of vehicle trips, and design which maximizes use of alternative energy sources. Providing opportunities for energy generation facilities where feasible to promote increased energy supply and alternative energy systems and renewable sources are to be permitted in all settlement areas, rural areas and prime agricultural areas.

³¹ For example, the CAS study (Clarkson Airshed Study, 2006 Part II) observed high PM_{2.5} concentrations when wind was blowing from the QEW. Receptors located at 100m, 200m and 300m away from the QEW showed NO reductions by 40 to 45 per cent, 65 to 70 per cent and 75 to 80 per cent respectively. In general, monitors near QEW observed higher concentrations of pollutants in comparison to monitors located near industrial or residential sites.

The PPS was issued under Section 3 of the Planning Act and it is intended to provide policy direction for land use matters, which are of Provincial interest. Planning Authorities are to be consistent with the Policy Statement when exercising any authority.

Places to Grow Provincial Growth Plan (2006)

The Province of Ontario has released *Places to Grow, Growth Plan for the Greater Golden Horseshoe* that affects all municipalities within the Greater Golden Horseshoe (GGH). Established under the Places to Grow Act, the objectives of this plan are to effectively manage growth and develop stronger communities. Urban sprawl is recognized as a contributor to the degradation of air quality, natural environment and water resources and efficient public transport is acknowledged as being difficult to introduce into sprawling communities.

Integral to the Growth Plan is the emphasis on intensification and re-urbanization of urban growth centres, intensification corridors, major transit station sites, brownfields, and greyfields within existing built-up areas to create mixed-use, compact forms of development that are transit-supportive. A minimum of 40 per cent of all residential development will occur within built up boundaries of each upper- and single-tier municipality.

Within the Region of Peel, Downtown Brampton and Mississauga City Centre are identified as urban growth centres on Schedule 4 and are anticipated to be focal areas for investment, major transit infrastructure, major employment centres and population growth with a gross density target of 200 residents and jobs per hectare. For places such as the Town of Caledon, the majority of future development will occur on greenfield areas where development will generally be planned to achieve a density of not less than 50 residents and jobs per hectare. These intensification targets are measured over Peel Region, therefore coordination amongst the municipalities and Region will be essential.

A Culture of Conservation (section 4.2.4) also directs municipalities to develop official plan policies that support the following objectives: water and energy conservation, air quality protection including reduction in emissions from municipal and residential sources, integrated waste management, and cultural heritage conservation.

Greenbelt Plan (2005)

The Greenbelt Plan was prepared under the Greenbelt Act and provides permanent protection to natural heritage systems and agricultural areas encompassed within the Oak Ridges Moraine plan and the Niagara Escarpment Plan. The Greenbelt Plan mainly affects land within the Town of Caledon and lands in northwest Brampton.

4.3 PEEL REGION INITIATIVES

The Region of Peel is one of the fastest growing jurisdictions in the Greater Toronto Area (GTA) and the largest Region in the 905 area. Peel Region consists of the Cities of Mississauga and Brampton and the Town of Caledon and has jurisdiction over health and welfare services, police, water supply, sanitary sewers and waste collection and disposal, and portions of the road system.

This section focuses on initiative undertaken by Peel Region; in addition, there are a number of voluntary initiatives that are being undertaken by industry, NGOs and the private sector. A number of policy documents which guide growth and development in the Region are described below.

4.3.1 Strategic Plan (2007)

The Council-endorsed Strategic Plan provides a vision and mission statement along with goals and strategic actions to deliver high quality programs and services to Peel residents to the year 2010. Under Goal 2 (Deliver services that meet the diverse and evolving needs of the community), the Plan directs the Region to:

Develop a corporate strategy to respond to climate change and implement strategies to improve air quality.

In response, the Region has established a *Clean Air Strategy*, which directs and coordinates implementation measures directly related to improving air quality for Peel Region as a corporation.

4.3.2 State of the Atmosphere Report (2002)

Developed in 2002 by an interdepartmental steering committee comprised of staff from the Region of Peel's Planning, Health, Public Works, Social Services and Housing departments, the State of the Atmosphere Report depicts the condition of Peel's air quality, air pollution, ozone and effects of climate change in the Region.

4.3.3 Regional Official Plan

The existing Regional Official Plan and Regional Official Plan Amendment (ROPA) 16 provides some direction with regards to air quality with policies mainly aimed at transportation measures such as:

- 5.6.8.1.1 Objective: Improve air quality and reduce greenhouse gas emissions produced by vehicles using Peel's transportation system.
- 5.6.8.1.2 Minimize the transportation infrastructure's impact on the natural environment.
- 5.6.8.2.1 Work with area, neighbouring GTA and Hamilton municipalities, the Province and stakeholder groups to minimize traffic congestion, air pollution and noise pollution from automobiles.
- 5.6.8.2.2 Work with area municipalities, school boards, transit providers and non-profit organizations, to educate the public, through new initiatives, on the relationship of vehicles and air pollution.
- 5.6.5.2.7 Encourage the intensification of residential and non-residential development at nodes and along corridors to support a higher level of transit service and other sustainable modes.

- 5.6.8.2.1 Work with area, neighbouring GTA and Hamilton municipalities, the Province and stakeholder groups to minimize traffic congestion, air pollution and noise pollution from automobiles.
- 5.6.8.2.2 Work with area municipalities, school boards, transit providers and non-profit organizations, to educate the public, through new initiatives, on the relationship of vehicles and air pollution.
- 5.6.8.2.4 Encourage efficient fuel use and conservation by promoting Transportation Demand Management programs, linked trips, the use of Intelligent Transportation Systems and public transit.
- 5.6.9.2.1 Encourage area municipalities to promote land uses and site design in the Region which foster the use of alternative modes of transportation, including transit, vanpooling, carpooling, and active transportation (such as walking and bicycling), as well as infrastructure to encourage teleworking.
- 5.6.9.2.5 Work with all levels of the public and private sector to promote a safe and sustainable transportation system that offers travelers a variety of mobility choices and increases the efficiency of the existing transportation system.

A 2002 Regional Official Plan Strategic Update initiated some policies aimed at leveraging changes to the transportation network as a way to advance air quality improvements. ROPA 16 recognizes the growing auto dependency, road congestion, travel delays, expansion of goods movement, concerns about air quality, health, climate change and the need to provide transportation options. It proposes a policy response that promotes the use of intelligent transportation systems, protecting the environment when considering network improvements, minimizing congestion, air and noise pollution from vehicles, public education, and a general improvement to air quality and reduction in greenhouse gases produced by vehicles utilizing Peel's road network.

The current review of the Regional Official Plan will focus on the four pillars of sustainability: environmental, social, economic and cultural.

4.3.4 Clean Air Strategy

Created by an inter-departmental steering committee, Peel Region has undertaken a corporate service strategy business plan that addresses the following objectives:

- Develop a corporate understanding of and build corporate awareness and support for air quality;
- Establish the Region as a corporate leader in air quality improvement and greenhouse gas reduction;
- Establish a process to manage the Region's air quality improvement activities;
- Reduce corporate emissions as part of the Region's commitment to the Partners for Climate Change Protection Program; and
- Reduce the morbidity and premature mortality associated with poor air quality in the regional airshed.

4.3.5 Issues

Issues identified through conversations with Peel staff include the following:

- poor air quality impacts on public health and the natural environment and its relationship to climate change, greenhouse gas emissions and smog;
- extent of transboundary air pollutants in Peel;
- land use patterns and transportation that promote poor air quality;
- lack of energy efficiencies in building standards and relationship to poor air quality;
- impacts of localized sources of pollution such as Pearson Airport, Southdown, industrial areas adjacent Pearson, and cogeneration facilities;
- aging population – what are the implications for land use planning and transportation?;
- ethnic/cultural perspectives on air quality;
- incompatible land uses, i.e. new residential sited too close to major roadways;
- bio-accumulation of air toxins;
- general statements in the Regional Official Plan but there is a disconnect with what happens on the ground; and
- lack of monitoring of cumulative effects.

4.3.6 Actions and Accomplishments

Peel Region is a part of a number of key initiatives and partnerships aimed at mitigating the effects of air pollution and climate change, a summary of which is summarized in the table below. A few of the key initiatives include Partners in Climate Protection, the Smart Commute Program and the Smog Response Plan.

- *Partners in Climate Protection* - is a network of over 130 municipalities who are committed to mitigating the effects of climate change. Supported by the International Council for Local Environmental Initiatives (ICLEI) and in Canada by the Federation of Canadian Municipalities (FCM), the partnership provides an opportunity for information sharing and for developing action plans against climate change based on a five step process: creating a greenhouse gas emissions inventory, setting GhG emission reduction targets, developing and implementing a local action plan, monitoring and reporting on results.
- *Regional Air Quality Working Group* – Interdepartmental working group consisting of Peel staff, and the municipalities of Mississauga, Brampton and Caledon on issues related to air quality.
- *Smart Commute Peel* - This regional program encourages regional employees to use alternative forms of transportation. This also includes alternative work arrangements such as flex hours, telecommuting and a compressed work week.
- *Smog Response Plan* - The Smog Response Plan focuses on the actions that the Region as a corporation could employ to reduce the corporation's impact on air quality during days when the Province issues smog advisories.
- *Greater Toronto Area Clean Air Council* – This intergovernmental group promotes the reduction of air pollution emissions and increases awareness of regional air quality issues in the Greater Toronto Area.

The Region of Peel has undertaken the following initiatives:

Land Use, Parks and Transportation Planning Initiatives
• Urban Forest Canopy Study (finalizing terms of reference, coordinated by TRCA)³² • Participation in air quality modelling project with GTA Clean Air Council • Urban heat island effects (NRCAN) on going through summer 2008 • Monitoring Environmental Bill of Rights (EBR) site and Canadian Gazette to comment on provincial and federal policy • Developing criteria for evaluating development proposals from a health perspective • Britannia Landfill Gas Utilization project – converts landfill gas to energy • Greater Toronto & Hamilton Area Smart Commute Initiative including support of the two local transportation management associations • Greenland Securement Project has been created to assist conservation authorities and other conservation organizations in Peel Region in implementing greenlands securement strategies and to support the policies of the Peel Region Official Plan that aim to protect, preserve and enhance the Regional Greenlands System.
Corporate Programs
• Smart Commute - employee trip reduction program for Region of Peel employees • Clean Air Strategy • Smog Response Strategy (reduce corporate air emissions during periods of poor air quality) • Corporate Greenhouse Gas Emission Inventory • Anti-idling Policy for Fleet Vehicles and Equipment • Corporate energy plan, building retrofits, green energy purchasing, biodiesel fleet, hybrid vehicle use for regional fleet • Investigate the development of a climate change plan as part of the 2009 budget
Public Outreach/Awareness and Affiliations
• Safe and active route to school initiative • Water Smart Program- incentives and information to reduce water consumption by 10 per cent by 2015 • Seasonal and bi-weekly collection of yard waste (decreases number of trucks on road by 35 per cent), refrigerant extraction and organics recycling program, blue box recycling program • Peel Public Health chairs the Regional Air Quality Working Group • Member of GTA Clean Air Council (annual Smog Summits and signatory on GTA Inter-Governmental Declaration on Clean Air) • Member of Partners for Climate Protection • Become a partner in the Toronto City Summit Alliance's Greening Greater Toronto and investigate the development of a climate change plan for the Region of Peel in cooperation with the Conservation Authorities and area municipalities as part of the 2009 budget³³ • State of the Region's Health Report on Asthma
Examples of Other Programs
• Kids on the Move (Centre for Sustainable Transportation) • Pearson Air Quality Study and Emission Reduction Program (Greater Toronto Airport Authority) • Eco-business zone – Partners in Project Green (Toronto Region Conservation Authority and Greater Toronto Airports Authority)

³² This focus of this study is to examine the form and structure of Peel's urban forests and develop a model Urban Forest Strategy.

³³ Region of Peel, Greening Greater Toronto, August 2008 (Commissioner of Environment, Transportation and Planning Services).

4.4 CITY OF MISSISSAUGA

The City of Mississauga is the largest of the three municipalities in Peel Region and includes over half of the Region's population. Considered as one of the Province's urban growth centres, Mississauga City Centre is a mix of commercial and high-density residential uses, cultural facilities and over 3.7 million square feet of office space.

The municipality recognizes that development in its greenfields is nearing its limits and that intensification will become focused on brownfields and greyfields within its built boundaries. Mississauga Plan is the City's current Official Plan and the City is in the beginning stages of its conformity exercise to meet the policy directions of the Provincial Policy Statement and the Provincial Growth Plan. A recently completed official plan amendment (no. 25) focused primarily on housekeeping issues and policies that support the recent approval of the comprehensive zoning by-law. Policies with regards to air quality fall within the pollution prevention and reduction subsection (3.15.4.3), compatibility between land uses (3.15.4.4), along with section 2.7 on the environment which promotes energy conservation and reduction of air pollution through support of alternative modes of transportation.

The City is undertaking a number of studies of which the Southdown District Policies Review is pertinent to this review because of its location within the Clarkson Airshed Study area. The Southdown employment district is approximately 700 hectares and one of the last remaining areas in Mississauga that contains traditional industrial uses. The Southdown District Policies were adopted by Council on July 2, 2008 and the implementing zoning will be brought forward in the fall of 2008. The vision for the Southdown employment area resulting from the district policies review is to continue to provide a place of employment and in the long term embrace a mix of manufacturing, research and development and offices. The vision also encourages an improved public realm and land uses, addresses the interface with residential uses and recognizes this area as an important gateway into the City of Mississauga. Another key element of the vision is the importance of the Lake Ontario waterfront both for business operations and recreation. A high quality environment is advocated with improved urban design and connections from within the Southdown area, surrounding communities and the City.

4.4.1 Issues

Issues identified through conversations with City of Mississauga staff include the following:

- There are few nodes with strong cultural identity. The city centre is dominated by a large mall; other major nodes in the city are malls and 'old towns';
- Efficient public transit options are challenging. The lack of a grid backbone in the city's network of streets makes it difficult for efficient transit delivery between nodes. There are few secondary roads for bus links and therefore transit is focused on arterial roads. Bus Rapid Transit (BRT) is limited because of issues with grade and right-of-ways;
- Abundance of free parking is at odds with making transit economical;
- Metrolink regional transportation is key for inter-jurisdictional boundary issues, i.e. currently cannot transport a bike across municipal boundaries on transit;
- Gas Fired power generating facilities: Site approved in Southdown (945 MW) - not built to date; Greenfield South (280 MW) - proposed; and the Greater Toronto Airport Authority plant (90 MW) - built and operational;
- Other major emission sources include the Queen Elizabeth Highway, and Highways 403, 401, 407, and 427 along with Pearson International Airport;

- Ministry of the Environment does not consider cumulative impacts of pollutants;
- Economic impacts of smog days;
- The Clarkson Airshed Study does not categorize polluters into types of land uses;
- Removal/reduction in natural areas due to road widenings and developments i.e. widening of Highway 401 (near 410/403 interchange) will likely require removal of some natural areas; and
- Removal/reduction of natural areas as a result of invasives.

4.4.2 Actions and Accomplishments

The City of Mississauga has commenced the following initiatives:

Land Use, Parks and Transportation Planning
• Commuter-focused cycling master plan (underway)
• Transportation master plan (underway)
• Transit strategy
• Road classification review
• Urban forestry inventory
• Review of drive-throughs
• Natural areas survey/strategy (2007 update)
• Green development strategy (start-up planned for Fall 2008)
• Tree by-law
• Bus rapid transit project (underway)
• Hurontario higher order transit study (underway)
• Parking strategy study (Phase 1 is City Centre)
• Mississauga Plan (Official Plan) review and Growth Management Strategy
Corporate Initiatives
• Mississauga Clean Air Strategy
• Smog Alert Response Plan, i.e. cease parks maintenance, re-fuelling activities after sundown, curtail use of gasoline powered equipment
• Various energy savings initiatives for building technology, i.e. solar panels on Hershey Centre, part of energy management program operated by Facilities and Property Management, use of LED traffic signals
• City of Mississauga Clean Air Strategy
• Smart Commute for employees (trip reduction program)
• Mississauga Civic Centre uses Bullfrog power
• Naturalization of City parks
• Greenfleet project – use of hybrids and right-sizing vehicles to applications
• Corporate Security Bike Patrol program replacing some vehicle patrols
• Biodiesel used in transit buses
• Bike racks for all transit buses (in process)
Public Outreach/Awareness and Affiliations
• Member of Peel Region Air Quality Working Group
• Member of GTA Clean Air Council (annual smog summits and signatory on GTA Inter-Governmental Declaration on Clean Air) and Partners for Climate Protection
• Member of Peel Region Active Transportation Working Committee
• Member of Smart Commute Metrolinx Technical Committee
• Partners in Car Free Day Event and Challenge
• Anti-idling campaign

4.5 CITY OF BRAMPTON

The City of Brampton is one of the fastest growing municipalities in Canada and is accountable for the majority of recent growth in Peel Region. The City has recently completed its Official Plan review in 2006 (approved by City Council in October 2006 and Peel Region in January 2008), which is based on a population target of 725,000 residents and 310,000 workers by the year 2031. The recent Official Plan review was focused on addressing issues such as redefining the retail hierarchy and updating the office strategy, natural heritage policies/mapping, urban design, and cultural heritage policies. Further work is currently being undertaken to bring the Official Plan into conformity with the Places to Grow Growth Plan. The foundation of the new Brampton Official Plan is a sustainable city concept that balances social, economic and environmental values of the community.

The Official Plan integrates transportation and land use planning by prioritizing complete and compact development. The Plan is premised on a framework that consists of a Central Area (historic Downtown and adjoining Queen Street corridor) with transit supportive nodes, intensification corridors, employment precincts, and interconnected open space systems. Policies pertaining to air quality are identified in section 4.5.15.2 Air Quality and Energy which emphasizes consolidating growth around nodes, corridors and existing infrastructure along with prioritizing transit and creating complete communities, taking an ecosystem approach to planning, incorporating live-work opportunities and green design standards. Additionally, a Transportation and Transit Master Plan (TTMP) update will be undertaken shortly and it is expected that air quality impact will be examined at a broad, strategic level but will not entail monitoring.

4.5.1 Issues

Issues identified through a meeting with City of Brampton staff on May 2, 2008 include the following:

- Newer type of development such as Transit-Oriented Development (TOD) needs to be a joint undertaking by the developers and the City balancing various regional demands for roads with local priorities;
- Decisions on road geometry are heavily guided by high-volume traffic modelling. More attention should be given to the eventual urbanization of the specific corridors and the shift to public transit and increasing pedestrian needs associated with it. As well, more opportunities should be provided for streetscape amenities along arterial roads including boulevard trees and median landscaping to make walking more attractive;
- The City's arterial road infrastructure needs to be improved to support cycling as the emerging alternative transportation mode;
- The City's pathway paving standards need to be improved to better promote Low Impact Development (LID) and conservation of natural areas;
- Applying for Federal funding is onerous, i.e. Green Municipal Funds; consideration should be given to re-orienting the program to a results-based credit approach using a common measure (credit per tonne of quantified CO₂ reduced) funding requirements so that funding is received post-implementation; and
- Staff education and awareness needs to be improved pertaining to sustainable travel options.

4.5.2 Actions and Accomplishments

The City of Brampton has undertaken or commenced the following initiatives:

Land Use, Parks and Transportation Planning	
•	Leader in restoring tree canopy – extensive buffers along roads; tree planting in new residential areas
•	Collaboration with Conservation Authorities in developing new low impact development standards for pathways in natural areas to minimize the use of hard surfaces and lighting
•	Aggressive approach to re-foresting the city, i.e. 5000 trees per year in new developments and 500 boulevard trees per year are replaced by the City in established areas
•	Partner with TRCA and other municipalities on the Urban Forest Effects Model Study (UFOR) to publicize the environmental benefits of urban canopy and establish targets for forest cover in the City
•	Valley re-planting (24,000 native trees and 200,000 shrubs in 10 years)
•	AcceleRide (BRT) with transit priority measures
•	Drive-throughs is not permitted in the Downtown area; and a study is underway to provide design guidelines for gas stations and drive-throughs
•	Bicycle rack program for buses and storage units at terminals
•	Parking exemption in some areas in Downtown and OP policies to allow lower parking requirements to encourage use of alternative transportation modes
•	Woodlot By-law – woodlots sized at a minimum of 0.5 hectares are protected
•	Tree Protection Bylaw for trees on private property
•	Road classification review
•	Pathway Master Plan
•	New TOD community (Mount Pleasant) planned for NW Brampton
•	Committee to consider alternative design standards (ADS)
•	Incineration and Waste Processing Transfer and Disposal Study
•	Environmental Master Plan
Corporate Initiatives	
•	Greenfleet – bio-diesel used in all diesel powered municipal fleet and transit vehicles and equipment, municipal sweepers are PM ₁₀ compliant; eco-technology in vehicles (e.g. use less salt); using new technology to transition the fleet to hybrids, alternative fuels and right sizing to application; use of bio-degradable cleansers in fleet operations
•	Comprehensive anti-idling campaign for all municipal vehicles and equipment
•	Environmental working group to identify current and future energy efficiency and CO2 reduction programs and initiatives
•	Smog Alert Response Plan, i.e. cease parks maintenance, re-fuelling activities after sundown, curtail use of gasoline powered equipment
•	Various energy savings initiatives for building technology i.e. use of LED traffic signals, energy efficient lighting in all buildings
•	Smart Commute
Public Outreach/Awareness and Affiliations	
•	Member of Peel Region Air Quality Working Group
•	Member of GTA Clean Air Council (annual smog summits and signatory on GTA Inter-Governmental Declaration on Clean Air) and Partners for Climate Protection

4.6 TOWN OF CALEDON

The Town of Caledon is the most northerly of the Region of Peel's three municipalities and comprises over half of the Region's total land area. Caledon is a geographically diverse municipality that includes a number of natural and cultural landforms including the Oak Ridges Moraine, portions of the Niagara Escarpment and the agriculturally rich lands of the Peel Plain, which constitute the majority of land within the municipality. These environmentally significant lands are identified as within the bounds of either the Niagara Escarpment Plan, Oak Ridges Moraine Conservation Plan or considered protected countryside. Land not covered within these boundaries – the “white belt” - is identified as being developable to a certain density level in the Provincial Growth Plan. As a result, the Town must balance the priorities of each of these areas to achieve conformity while reflecting the Town's objectives when considering its Official Plan policies.

The existing Official Plan was premised on a progressive view of growth management, environmental protection, Village planning and aggregate resources. The focus of the Official Plan has been to direct growth in already serviced areas to reduce expansion into the countryside where only partial servicing exists. Although the municipality does not yet contain transit routes, roads and residential densities are being planned to support future transit options. Policies with regards to air quality are focused mainly around aggregate resource extraction. The Town is currently undertaking a conformity exercise to bring its Official Plan in line with the recent Provincial policy changes and is scheduled for completion in June 2009.

The eight key topic areas are listed below with the topic of air quality included under the blanket term of sustainability:

- growth forecasts/density intensification targets
- employment
- transportation and servicing
- agriculture and rural policies
- sustainability
- water resources/watershed planning
- natural heritage system
- significant woodlands/significant wildlife habitat study

COOL Caledon was formally established by means of a Council resolution in 2002 to address recommendations from a Caledon Environmental Advisory Committee Climate Change Report. Former Mayor Carol Seglins chaired the committee which consisted of municipal staff, Councillors and local residents. The Committee recommended the Town's participation in the Partners for Climate Protection Program.

4.6.1 Issues

The major issues in Caledon are reflective of its wealth of natural resources and its rural location.

- Aggregate extraction;
- The amount of through traffic in the municipality;
- Current lack of transit - Caledon's growth forecasting exercise has identified limited potential for intensifying growth to built up areas of the municipality which affects the possibilities for transit service. New community planning including Mayfield West is targeting 50 persons and jobs per hectare and reflect a more explicit mix of land uses, live/work opportunities and higher densities. Other community plans with a similar direction include Cheltenham Village and Bolton/Albion South.
- Residents raised concerns over the effects of aggregate activity and commuter traffic in the Town. In 2006, at the request of the Town, the Province undertook a regional airshed characterization study to measure the concentration of key air quality contaminants in Bolton and Caledon to determine if there was a need to establish a new monitoring station in north Peel Region. Findings showed that aggregate activity and increased traffic volumes were not significant based on the pollutants measured and that no new station was required in the area³⁴.

The Region conducts surface and ground water and methane gas monitoring programs to assess potential hazards to human health i.e. methane gas can deplete ozone and contributes to poor air quality³⁵.

4.6.2 Actions and Accomplishments

The Town has taken a proactive approach to environmental stewardship and has established an Office of Environmental Progress within the Planning Department along with an environmental strategy endorsed by Council in 2005 – the Environmental Progress Action Plan – that is premised on seven priority areas: air quality, climate change, energy, a Green economy, environmental awareness, sustainable planning, and community capacity. A 2007 Action Report provides a progress update on achievements towards the seven priority goal areas. The focus of the strategy is on corporate operations and summarized below are some key initiatives that reflect actions on air quality, climate change and energy.

³⁴ Ontario Ministry of the Environment. 2006. Town of Caledon Regional Airshed Characterization Study Report.

³⁵ Region of Peel 2002. State of the Environment Report, page. 42.

The Town of Caledon has undertaken the following initiatives:

Land Use, Parks and Transportation Planning
• Participation in air quality modelling project with GTA Clean Air Council • Prioritizing emissions reduction options (with GTA Clean Air Council) • Participation in annual GTA Smog Summit • Council endorsed GhG reduction targets; 2003 greenhouse gas inventory; and ongoing GhG reduction plan • Formed committee to explore feasibility of wind power • Energy Star for New Home is the minimum standard for all new Mayfield West residential construction • Tree Seedling Program for landowners who are interested in reforesting their properties • Road salt management policy • Trail development master plan (includes both in urban and suburban areas)
Corporate Initiatives
• All Public Works diesel powered vehicles now use, at a minimum, B10 diesel fuel and turf mowers use B20 bio-diesel blend. Public Works is also testing bio lubricants. • Idle-free zones at all Town-owned facilities • Drive Smart and anti-idling policy for Town fleet • Purchase of 2 hybrid vehicles • Energy awareness campaigns for staff and energy savings measures in Town Hall and Fire Halls, use of Bullfrog Power for Town Hall; energy efficient lighting in Caledon Centre for Recreation and Wellness; co-generation installation to be completed in the winter of 2009; upgraded insulation levels and efficient lighting in new Caledon East arena; and an energy audit was completed on the Town Hall in June 2008 and four additional audits on the Town's largest energy consuming facilities will occur in the fall. • Creation of a smog response plan • Town is a member of the Smart Commute Brampton-Caledon program and promoted the Carpool Zone and Emergency Ride Home program to all staff • Environmental purchasing policy
Public Outreach/Awareness and Affiliations
• GhG reduction targets and inventory completed through COOL Caledon. Ongoing GhG reduction plan and inventory update • Bylaws enacted: Woodlands Conservation, Fill, Healthy Horticultural Landscapes • Participation in GTA anti-idling campaign in 2005 • Provide assistance/information as needed to businesses on conservation and sustainable practices • New Green Development Program (Provides development charge discounts for new commercial and industrial buildings which certify to LEED or incorporate one of five pre-qualified technologies) • Member of Peel Region Air Quality Working Group • Member of GTA Clean Air Council (annual Smog Summits and signatory on GTA Inter-Governmental Declaration on Clean Air) and Partners for Climate Protection

5.0 BEST PRACTICES

A number of municipalities were reviewed to identify best practices with regards to policy approaches to addressing local air quality and climate change.

5.1 CITY OF TORONTO

Overview of Air Quality Policies in Toronto Official Plan (1997)

The City of Toronto Official Plan embraces sustainability as a central concept and is premised on nodes and corridors approach to growth management. Rather than devoting specific chapters to individual topics, the Official Plan recognizes the interrelationship amongst various components and is divided into broad categories of:

- Shaping the city (growth management and integration of land use and transportation as informed by Places to Grow)
- Building a successful city (built form, public realm, housing, community services and facilities, natural environment, and economic health)
- Land use designations
- Implementation (height and density incentives, holding bylaws, site plan control, etc.)
- Secondary plans which define in more detail, land use for various neighbourhoods in the City, are contained separately in stand alone documents.

Air quality is addressed in two key sections of Toronto's Official Plan (consolidated August 2007) as outlined below, however, any targets are positioned in the air quality and climate change plan as the Official Plan does not contain any specific numbers or targets including density aside from overall population and employment targets.

- Growth management – growth directed to centres, avenues, employment districts and the downtown...to improve air quality, energy efficiency and reduce greenhouse gas emissions.
 - Reduce auto dependency and improve air quality.
- Natural Environment – protecting and improving health of natural ecosystem based on minimizing air, water and soil pollution.
- Managing air quality is addressed through the introduction of a future air quality strategy to promote public health and well being.

Change is in the Air: Climate Change, Clean Air and Sustainable Energy Plan, Phase 1 (June 2007)

The City's Environmental Plan³⁶ recommended that a strategy to improve air quality be developed. Specifically, the Environmental Plan stated that the City should integrate and coordinate its efforts to improve air quality through the development of a comprehensive Air Quality Strategy for the City that will:

- assess the progress of and integrate current air quality initiatives;
- set priorities for City action;
- set targets where they do not now exist;

³⁶ Clean, Green and Healthy: A Plan for an Environmentally Sustainable Toronto (2000) was developed by the Environmental Task Force and sets the direction on many key areas and builds on the environmental protection and enhancement efforts being carried out by the City, agencies and other organizations.

- consider air emissions and their impacts;
- identify areas where the City can be involved (such as promoting the City's own corporate smog reduction program within the Toronto business community, zero-emission City fleets and promoting employer trip reduction programs) and how it can best apply its resources to maximum effect; and
- facilitate monitoring and reporting to the public.

Initially, an air quality strategy was considered for the City but the approach was modified to include air quality issues with climate change. The two subjects were integrated mainly because although there are some distinct measures required for each, the behavioural changes that the City wishes to encourage, i.e. leave the car at home, result in a similar effect whether you are considering air quality or climate change. The Plan is monitored by the Toronto Environment Office.

A synopsis of the recently completed plan is summarized below:

- Directed by Parks and Environment Committee and endorsed by Council in July 2007;
- Crafted to meet and exceed Kyoto Protocol GhG reduction target;
- Includes measures for city operations and residents and businesses;
- Builds upon existing programs and policies;
- Developed through public consultation which included a framework for public review and engagement which identified potential actions under four categories: natural gas, gasoline, diesel, electricity, solid waste, comprehensive actions;
- Also includes identifying beginning work on an Adaptation Strategy;
- Integrates climate change and air quality issues into one plan because fossil fuels are responsible for the majority of both GhG and smog causing pollutants; and, generally, measures to reduce GhG emissions will also reduce emissions of air pollutants;
- Includes proposed programs aimed at neighbourhood action, green business, renewable energy, sustainable transportation, tree canopy, building partnerships, public awareness;
- Live Green Toronto program aimed at supporting community initiatives to improve energy efficiency, renewable energy, local food production, tree planting, etc.;
- Renewal of concrete high-rise buildings;
- "one-window" source of environmental information;
- Standard to regulate green roofs and goal of 10 per cent of industrial, commercial and institutional roof space to be more environmentally friendly;
- Business plan for a model green industry business park;
- Establish working groups for enviro-business (develop a comprehensive environmental efficiency and improvement program) and enviro-food (local food production);
- Focus on renewable energy: pilot program for solar hot water heating, renewable energy by-law, options for expanding deep lake water cooling capacity by 20 per cent;
- Sustainable transportation implementation strategy; and
- Double the tree canopy from 17 per cent to 34 per cent.

The Plan includes a number of targets that are summarized below:

- 20 per cent reduction for locally generated smog causing pollutants from 2004 level by 2012.
- GhG reduction targets are as follows based on 1990 levels:
 - 6 per cent by 2012 (Kyoto target)
 - 30 per cent by 2020
 - 80 per cent by 2050.
- Double the tree canopy from 17 per cent to 34 per cent by 2050.
- 70 per cent diversion solid waste from landfills

Achievements to Date

Recent accomplishments include the following:

- The Toronto Environmental Office and the Toronto Atmospheric Fund have completed an inventory for GhG and smog emissions;
- Recently completed Climate Adaptation Strategy (April 2008);
- Green Fleet program Phase 1: 23 per cent reduction in GhGs from City's 4,000 vehicles);
- City's Energy Retrofit Program undertaken \$30M worth of retrofits in City facilities;
- Better Buildings Partnership - \$80M in energy retrofits in buildings;
- Enwave's deep lake water cooling system;
- Toronto's Green Development Standard;
- Installation of wind, solar, hydrogen, tri-generation facilities at Exhibition Place; and
- Green roofs.

City Council's commitment to implementing the Plan is indicated by its \$1billion allocation over the next five years in its capital budget for programs to implement the Plan. Key investment areas include³⁷:

- \$67 million for the Better Building Partnership and the Sustainable Energy Funds, which are low interest revolving loan funds that support energy conservation and renewable energy;
- \$136 million for energy retrofits to and installation of renewable energy systems on City owned buildings;
- \$24 million for tree planting, in addition to the \$40 million a year operating budget for the City's Forestry Unit;
- \$36 million to accelerate implementation of the City's Bike Plan;
- \$20 million for the Live Green Toronto program which provides support for neighbourhood and community groups in taking action on climate change;
- \$10 million for continued conversion of traffic signals to LED lights;
- \$7 million for the Clean Roads to Clean Air street sweeping initiative;
- \$186 million for water efficiency and improved energy efficiency in Toronto water operations that will achieve an annual avoidance of an estimated 14,000 tonnes of greenhouse gas emissions;
- \$21 million for methane gas capture and control at closed and operating landfills;

³⁷ Ahead of the Storm: Preparing Toronto for Climate Change, 2008, Toronto Environment Office, City of Toronto.

- \$67 million to build anaerobic digestion facilities that will capture biogas from collected Green Bin organic materials and generate enough electricity to power an estimated 1,700 homes;
- \$380 million to improve rapid transit services, such as: new light rapid transit lines, rapid transit routes for buses and an improved signalling system that will increase the capacity of the Yonge subway line;
- \$400 million for the purchase of electric-hybrid buses; and
- \$10 million plus for a range of initiatives including the Green Fleet Transition, the Eco-Roofs and Greenroofs Incentive programs, and support.

Lessons Highlighted

- In practice, issues have arisen in terms of implementation. For example, the policy for locally purchased food for the city's institutions has proven difficult to implement due to cost implications for institutions. Community design approaches that have included narrowing pavement widths have been met with resistance by the City's emergency services due to lack of space for equipment. Zoning by-law changes were required to permit solar panels as-of-right. The Forestry division is slowing integrating change amongst other divisions to encourage better methods for street tree planting. The City's recently completed Green Development Standards has yet to filter to all building managers and landlords. It will take some time for the key messages to filter to all frontline staff.
- Next steps will include taking a closer look at by-laws and operating policies to identify gaps with the Plan, considering low emission vehicles for all taxis, and updating the city's tree canopy inventory.
- In terms of implementation, the 'low hanging fruit' would include energy retrofits of buildings and encouraging greater efficiency in new construction. The public demand is there and it has a financial payback.
- Phase Two of the Plan will consider how each action in the plan is contributing towards achieving the targets. The challenges are to determine how much of the targets will be achieved by actions outside the Plan (e.g. provincial and federal government regulation changes).

5.2 METRO VANCOUVER REGIONAL DISTRICT

The Livable Region Strategic Plan (LRSP) is Greater Vancouver's regional growth strategy and was adopted by all member municipalities in 1996. The plan encompasses an area of more than 300,000 hectares in the Lower Mainland and includes 22 municipalities and one electoral district. The plan's primary task is to help maintain regional livability and protect the environment in the face of anticipated growth. In 2001, the population of the Vancouver region reached two million and, at current growth rates, is expected to reach 2.7 million by 2021. The region is currently developing a new growth strategy to the year 2040 to update the LRSP. Draft strategies include concentrating growth in centres and priority development areas, developing complete communities, and integrating land use and transportation decisions.

The Metro Vancouver Sustainability Framework has been completed and provides the principles and framework for all other management plans, i.e. air quality, drinking water, solid waste, liquid

waste, growth management, housing, parks and greenway, ecological health. It directs that these plans must contain goals, strategies, actions and performance measures.

Metro Vancouver is in a unique situation in that it has delegated authority from the Province of British Columbia and the municipalities to manage air quality over the region. As part of its duties, Metro Vancouver monitors air quality, controls the industrial, commercial and some residential sources of air pollution, creates long-term plans and inventories emissions. Programs are aimed at addressing air quality and climate change problems simultaneously and fall under a region-wide plan called the Air Quality Management Plan.

Cars and light-duty trucks account for two-thirds of vehicle-related air pollution in the Lower Fraser Valley Airshed. Metro Vancouver tracks the output of the most common air pollutants through emission inventories.

Metro Vancouver's Regional Growth Strategy (April 2008, Draft document)

The Regional Growth Strategy is currently under development and is premised on three fundamental principles of sustainability:

- Have regard for local and global consequences
- Recognize and reflect the interconnectedness and interdependence of systems
- Be collaborative and adaptive.

It provides the land use framework for planning related to utilities, housing, air quality, and transportation. With a focus on concentrated growth in nodes, the Regional Growth Strategy assists with cost effectiveness of related management plans, including the Air Quality Management Plan described below. Specifically,

The Regional Growth Strategy is intended to make a major contribution to the achievement of air quality and greenhouse gas emission targets by directing urban development into a pattern that reduces the demand for energy consumption, through the energy savings in building form and reduced vehicle travel³⁸.

Air Quality Management Plan (adopted October 2005)

Metro Vancouver was the first regional district in Canada to develop and adopt an Air Quality Management Plan (AQMP). A key goal of the original plan - to reduce harmful emissions from vehicle, industrial and commercial sources by 38 per cent of 1985 levels by 2000 - was achieved and exceeded by 2000. More recently, a new AQMP was developed and is more strategic in nature, providing a vision, goals, strategies, new health-based ambient air quality objectives and actions that will guide air quality management in the region over the next decade. The Plan aims to minimize the risk to human health from air pollution, improve visibility and reduce Greater Vancouver's contribution to global climate change. Its five principles are based on:

- Pollution prevention
- Continuous improvement
- Achieving co-benefits
- Shared responsibility
- Innovative approaches

³⁸ Metro Vancouver. 2008. Metro Vancouver's Growth Strategy: Actions for a Sustainable Region. (Incomplete Draft dated April 2008). www.metrovancouver.org.

The Plan is comprised of three principle strategies/goals along with 33 actions to implement these strategies. The most recent Plan does not include hard targets because a full cost accounting was not completed for this Plan and therefore the Region could not ascertain how much of the emissions could be reduced³⁹.

Performance Measures

Goal A: Minimize risk to public health from air pollution

- Reduce regional ambient inhalable particulate matter (PM₁₀), fine particulate matter (PM_{2.5}) and ground-level ozone.
- Reduce emissions of PM₁₀, PM_{2.5} and precursors to PM₁₀, PM_{2.5} and ozone formation
- Improve local air quality

Goal B: Improve visibility

- Reduce regional ambient PM_{2.5} levels
- Reduce emissions of PM_{2.5} and its precursors

Goal C: Minimize Greater Vancouver's contribution to global climate change

- Reduce regional GhG emissions

Monitoring

- Metro Vancouver has developed an emission inventory which is updated every five years that identifies progress made to date along with emissions results. The 2010 review will evaluate how effective the Plan has been and whether changes to the Plan should focus on updating it or totally changing the Plan;
- AQMP report every two years and a comprehensive plan review every five years;
- Are in the process of preparing a progress report, but it is unlikely that there will be a lot of figures to report as they are only two years into the plan; and
- Regional GhG Management Plan and the Corporate GhG Management Plan are both underway. Several municipalities in Metro Vancouver already have GhG management plans (but defer to the regional Air Quality plan).

Lessons Highlighted

- The Plan combines air quality and GhG emission policies to ensure that actions identified to mitigate these issues do not negatively impact one another. There are co-benefits that can be achieved and should be emphasized.
- Most successful program has been the Air Care program – vehicle inspection and maintenance program that was most effective early on and was the main reason they achieved the 38 per cent target in 2000. Also, the public education seemed to work well but measuring results is difficult, i.e. the message got out but it was difficult to measure if it had a major impact on changing behaviour.
- Slower to roll out was the diesel retrofit program. The Region attempted to provide funding for private and public companies to retrofit fleets but there were legal barriers to implementing the program. The Local Government Act does not allow the Region to provide funds to companies and therefore the \$200,000, three-year program was not implemented.
- In general, programs take longer to implement than expected and actions are proceeding slowly mainly due to lack of staff.

³⁹ Personal communication – Laurie Bates-Frymel, Air Quality Planner, Metro Vancouver. July 2008.

- Important regional partners include: the BC Ministry of the Environment, which has jurisdiction over the Fraser Valley and Sea to Sky highways, Fraser Valley Regional District for planning authority, and Environment Canada, which is heavily involved with work in the Geogin Basin and Puget Sound.

5.3 GREATER LONDON AUTHORITY, UK

The Greater London Authority and the Air Quality Policies in the London Plan

The Greater London Authority (GLA) is responsible for the strategic administration of Greater London. It shares local government powers with the councils of 32 London boroughs and the City of London Corporation. The Mayor of London is responsible for producing a spatial development strategy for Greater London, referred to as the London Plan (completed in 2004).⁴⁰ It sets forth broad policies on strategic matters of importance to Greater London as a whole, to which the policies of London boroughs must have regard.

The London Plan includes improving air quality under a section in *Cross-cutting policies, London's metabolism: using and managing natural resources*. Its general approach is to direct the Mayor of London and the boroughs to implement the Mayor's Air Quality Strategy (2002) by:

- Improving integration between land use and transportation policy and reducing the need to travel (especially by car);
- Promoting sustainable design and construction;
- Setting out criteria concerning different pollutants against which plans and policies can be evaluated;
- Taking air quality into account at the planning application stage for new developments; and
- Promoting cleaner fuels, and supporting the development of the necessary refueling infrastructure.

The same section also directs the boroughs to consider the National Air Quality Strategy in the formation of their Urban Development Plans, with particular attention paid to Air Quality Reviews and Assessments and Air Quality Management Areas that have been designated within their boundaries. Also, it requires the appropriate bodies to assess the feasibility of establishing Low Emission Zones.

Other sections of the London Plan have implications for air quality including policies on climate change, energy use and transportation (reference is made to the Mayor's Climate Change Strategy and Energy Strategy). The London Plan also promotes design that fosters higher density development within the existing boundaries of the city and reduces the need to travel and facilitates access to sustainable transportation.

Mayor's Air Quality Strategy (2002)

The Mayor's Air Quality Strategy (2002) is required to include policies and proposals implementing the UK's National Air Quality Strategy and leading to the achievement of national

⁴⁰ Due to a change of leadership at the Mayoral level at the GLA in Spring 2008, approaches to air quality are being reassessed.

air quality objectives for Greater London. Beyond these statutory requirements, the strategy also includes other proposals and policies the Mayor considers appropriate.

The Air Quality Strategy is a substantial document, comprising more than 400 pages. Its policies and proposals are prefaced by an explanation of the statutory context for the strategy and an assessment of the current air quality situation. Although far removed from the era of the notorious “London Fog”, the air quality in London is still much worse than other parts of UK. While industrial sources of air pollution have been greatly improved, with a growing population, emissions from road vehicles are the primary polluter in Greater London.

The London Atmospheric Emission Inventory provides the technical base for the Air Quality Strategy. It is based on emissions estimates from all quantifiable sources and provides a consistent basis for local air quality modelling. The inventory is updated annually and allows an understanding of the scale of emissions from different sources.

Policies and proposals are organized by category and by agency responsible. The categories include:

- Road transport – including reducing traffic, improving public transport, cleaner road vehicles, proposals by vehicle type and traffic management;
- Other modes of transport – air travel and airports, rail, shipping and the underground;
- Industrial sources;
- Construction and fires; and
- Energy and heating.

The concluding section of the Air Quality Strategy addresses implementation, financing, and monitoring. The section includes a summary of all proposals listed in the strategy with timescales, impacts and responsible organizations.

The work plan and budgets for all of the Mayor’s strategies are laid out on a yearly basis. Progress reports are produced annually for the strategies. Air quality is also addressed in a State of the Environment Report, produced every four years. The London Atmospheric Inventory is annually updated and is used to measure progress on targets, particularly national objectives on NO₂ and PM₁₀.

Highlights from the Air Quality Strategy:

- Through the Mayor’s Transport Strategy, to facilitate the shift to modes of transportation other than the automobile, most notably improving bus services to improve reliability, reduce journey times, increase frequencies and provide new service, and reduce fares for public transport;
- The Congestion Charge to reduce traffic volumes in central London by charging all vehicles entering central London a fee;
- Through the London Plan (Spatial Development Strategy), the Mayor will in general, support high trip generating development only at locations with both high levels of public transport accessibility and capacity;
- Promoting the replacement or retrofitting of polluting vehicles, supporting refueling infrastructure;

- Reducing the emissions from the City and borough fleets;
- Anti-idling measures;
- Low Emissions Zones that prohibit the most polluting vehicles from specified areas;
- BAA/Heathrow Airport Air Quality Strategy;
- Encouraging the use of appropriate methods for assessing the environmental performance of buildings, both commercial and large residential blocks;
- Energy assessments of major developments;
- Supplementary Planning Guidance on Sustainable Design and Construction;
- Air Quality Assessments of development proposals;
- Laying out the borough's responsibilities for Air Quality Reviews, Management Areas and Action Plans; and
- Green procurement for the GLA and local authorities.

Other Initiatives and Key Drivers

Air Quality Assessments for Planning Applications – Association of London Government (ALG)
Guidance to provide technical advice to developers, their consultants and local authorities on how to deal with planning applications that could have an impact on air quality.

UK and EU policies

European Union policies established the framework for UK national policies and the development of the UK Air Quality Strategy adopted in 1997, which lays out objectives on levels of nine air pollutants. Air quality objectives will be met through actions at the European and UK level, as well as at the local level through Local Air Quality Management (LAQM). The national strategy requires local authorities to review and assess air quality and work towards objectives to be achieved between 2003 and 2010. Where these objectives will not be met, local authorities must designate an Air Quality Management Area and develop an Air Quality Strategy and Action Plan to address the issue in the long term.

Statutory Requirements

The *GLA Act 1999* created the GLA and the office of the Mayor of London. Included in the act was the statutory requirement to develop eight strategies, one of which addresses air quality. The other strategies include spatial development (the London Plan discussed above), energy, transport, economic development, culture, biodiversity, ambient noise and municipal waste management. The Air Quality Strategy acknowledges that it overlaps with other strategies and the collective pursuit is a balancing act between different policies.

Local Air Quality Sources

London air quality is the worst in the UK and on par with cities of its size around Europe, such as Paris and Milan. The primary sources of air pollution are emissions related to transportation, most notably road traffic.

Achievements to Date

- By setting the strategic approach to air quality at the Greater London level, the London Plan and the Air Quality Strategy have shaped the air quality approach at the borough level as well. In effect, air quality has been put on the agenda as a consideration in the policy-making and planning process. Local Development Frameworks created by the boroughs, similar to an Official Plan in the Canadian context, make air quality a consideration in the evaluation of development proposals. Similarly, although the development approval process occurs at the borough level, most large-scale developments are referred to the Mayor of London for consideration. Air quality is one of the issues against which these developments are evaluated;
- Several high profile initiatives have been effective in improving air quality. The Congestion Charge for Central London is a well-known measure to reduce traffic in the city core during peak times. The GLA has also initiated a Low Emission Zone that bars the heaviest polluting vehicles in certain classes (lorries over 3.5 tonnes, buses and coaches) from operating in Greater London. The GLA has set emissions standards for the city's black cabs and taken measures to improve its own fleet of vehicles, including buses; and
- The GLA has led the way in developing best practice guidance for mitigating the air quality impacts of demolition and construction activities. This effort was conducted in cooperation with the boroughs and an accreditation scheme initiated to help developers find suitable emissions abatement equipment to limit the air quality impact of their activities.

Lessons Highlighted

The GLA is a pertinent example for the Region of Peel because, although the specific division of powers and responsibilities differs, both are upper tier local governments. Several lessons emerge:

- The Air Quality Strategy (2002) is a comprehensive document which approaches the air quality issue very broadly and sets out many different policy directions. The informant to this case study felt that what the document gained for its comprehensiveness, it lost in its ability to clearly prioritize the policy directions it lays out. Given limited resources prioritization is an important outcome of any strategy development process. It was also felt that air quality policies must reflect the longer view and set targets in that context;
- One of the great successes of the GLA's approach to air quality is its integration with strategies on related topics, such as climate change, energy, and transportation. The benefits of this approach are twofold. First, it avoids unwanted side effects that make progress on one agenda while setting back another. Second, it allows for added benefits with very little extra effort, given that one solution carefully tailored can resolve more than one issue;
- The Region, like the GLA, can make air quality a priority issue in policy making and planning in both its own policies and in guiding the activities of lower tier authorities. It is at this level that the strategic approach is best taken since, even though air quality has local causes and effects, a unity of effort is essential for any significant improvement. The Region can also provide the linkages between local efforts to improve air quality with the larger picture at the GTA and provincial levels;

- The approach to air quality must be integrated with other strategic policy objectives in the areas of climate change, energy, transportation, etc. Often these policy objectives are best advanced in unison. When they clash, it is important to evaluate which should be prioritized. An example of this from the GLA is rise in the use of diesel fueled vehicles which decreases greenhouse gases that lead to climate change, but increases particulate levels that are a measure of air quality; and
- Good decision-making in the area of air quality is dependent on good information. The London Atmospheric Emission Inventory provides the base for approaching the air quality issue both at the local and Greater London level. The Region of Peel should consider how it can best meet its information needs as concerns air quality.

5.4 REGION OF HALTON

The Region of Halton is in the midst of its growth management exercise aimed at creating a more sustainable and healthy region under the Sustainable Halton initiative. In June of this year, various growth concepts were released for public review that illustrated where prospective homes and jobs could be located in the future to accommodate the projected population of 780,000 and 390,000 jobs by 2031.

Halton Region is undertaking air quality modelling to estimate the contribution of different emission sources to air levels in various parts of the region. Air modelling can also predict how changes in policy or new emission sources will impact existing air pollutant emissions and can estimate the cumulative impacts of all emission sources on air quality in the community. The Region has also set up a stationary air monitoring station in Milton as part of its airshed monitoring to capture air pollutants in north Halton, supplementing the provincial monitoring stations in the southern portion of the Region.

Region of Halton Official Plan (2006)

Halton Region's Official Plan includes air quality policies in Section IV Healthy Communities that outline a series of objectives that are aimed at reducing greenhouse gas emissions, meeting Kyoto Protocol targets, reducing greenhouse gas emissions and other air pollutants generated by corporate activity, promoting walking and cycling, compact urban form, and promoting tree planting.

Key policies include:

- Developing a Halton response plan to the Kyoto Protocol on Halton measures and best management practices to reduce greenhouse gas emissions and increase carbon sinks across the Region;
- Establishing five-year targets for, and monitor regularly the performance of, the reduction in greenhouse gas emissions and other air pollutants generated by Region's own corporate activities and functions;
- promoting cycling, walking and public transit over other modes of transport;
- Requiring all new development to consider 400 metre walking distance to transit stops, cycling paths, pedestrian walkways;
- Considering tree planting during the reconstruction of arterial roads to improve air quality and reduce visual impact to adjacent land uses; and

- Establishing a Regional transportation management association to provide alternatives to commuting by single occupancy vehicles.

Halton Region's Strategic Plan

The Region of Halton's Strategic Plan 2007-2010 establishes two themes that support improved air quality:

- Control and manage growth for sustainable communities
- Protect and enhance our natural environment

Specifically, the first goal under *protect and enhance our natural environment* is to

- Develop a plan and implement activities to protect and enhance Halton's air quality.

Other goals address issues of growth management, improving transit, reducing vehicle use, ecosystem approach to natural heritage protection, demonstrating corporate leadership in waste management, environmental protection and energy efficiency and developing pilot projects for "eco-friendly" communities in the Region.

Clean Air Plan (2006)

The Clean Air Plan was previously known as the Region's smog response plan but a shift towards a longer term perspective in addressing smog was endorsed due to the increased number of smog advisories issued in 2005. The focal point of the plan is to increase public awareness about air pollution and promote actions that address the issues, particularly on smog advisory days. Two main components are aimed at the main target audiences – employers/employees and community members so that both can be stand alone documents. The section directed at employers/employees are suggested strategies such as "encourage car pooling" along with employee awareness programs that provide a long list of options that can improve air quality. The other section is aimed at increasing community awareness of how individual decisions have larger community impact.

Air Quality Management Strategy (2004)

Halton Region has included air quality as part of its Transportation Management Plan primarily to address air quality issues in a comprehensive way and considering the entire roadway system rather than on a project specific basis. Aside from an overview section that summarizes issues, federal and provincial policy initiatives, and air quality for Ontario and the Region, the Strategy presents the Region's current efforts at addressing the issues, assesses the transportation sector's contribution to pollution levels and recommends options for reducing emissions as a result of transportation. Conclusions were at a strategic level of analysis as no new ambient measurements were collected as part of the work.

To reduce impacts from the transportation sector, a host of recommendations was provided ranging from the promotion of TDM measures to tree planting and are identified below:

- Promote TDM measures;
- Increase fuel efficiency in regional fleet management;
- Implement street sweeping and flushing near construction and industrial activities to minimize dirt track out and subsequent suspension in the atmosphere;
- Maintain posted driving speeds to minimize tailpipe emissions, where possible;
- Promote on-street and off-street bicycle and walking trail networks, especially where public transit services are spatially or temporarily inadequate;

- Develop design and roadway maintenance guidelines that reduce air pollution, such as wider paved shoulders and appropriate street and shoulder flushing to reduce dust emissions;
- Increase tree planting across the Region as an effective means of removing airborne contaminants;
- Develop a Corporate model, to lead by example, in the reduction of vehicle travel/emissions, reducing air quality impacts from transportation sources; and
- Develop an education campaign to promote air quality.

Lessons Highlighted

- Emission inventories prepared by the Province provide some information on the contribution of pollutant emissions to overall regional air quality, they do not indicate how these pollutants are dispersed once they are released in the air, and therefore do not provide information on how they impact the local community.
- Utilization of portable air monitors can provide emission data for micro environments along roadways and measure air pollution at different points in the community. A shortcoming of the device is that it cannot identify the sources that contribute to the emissions, nor can they estimate the impact of new development, industries or policies on emission concentrations.
- Air quality modeling provides a sophisticated approach to establishing accurate emissions data which includes the height, speed and frequency of emission releases and can estimate the concentration of pollutants throughout the community. Modelling tools can examine sources separately and therefore can identify the concentration of pollutants from various sources in different parts of the region. Modelling tools can also be used for forecasting estimated impact of changes to policy and new emission sources.

5.5 CITY OF HAMILTON

The new City of Hamilton was formed in 2001 through the amalgamation of the former City and the six constituent municipalities under the Hamilton-Wentworth Regional Municipality. The City first initiated work on air quality in the 1990s through its work on the Hamilton Air Quality Initiative (HAQI) and Clean Air Hamilton. Since then, Clean Air Hamilton, a multi-stakeholder group dedicated to improving clean air in Hamilton was assembled to conduct research, provide policy advice, and encourage emission reductions in the City.

The City is currently undergoing work on a new official plan and growth management in an integrated process known as “Building A Strong Foundation” that implements the long term Vision 2020 plan for a sustainable community. Vision 2020 has three goals for climate change:

- 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
- To reduce greenhouse gas emissions (20 percent of 1994 levels in municipal operations and six percent of 1994 levels city-wide)

Hamilton’s ongoing growth management exercise – GRIDS (Growth Related Integrated Development Plan) - aims to establish realistic levels of intensification, to develop more compact communities around transit supportive nodes, and reduce auto emissions along with other

initiatives such as the Transportation Master Plan, Green Fleet, and Energy Management Plan. The GRIDS process has established a nodes and corridors approach that responds to the provincial Growth Plan. The Official Plan process will consolidate the policies from the seven former municipalities and is expected for completion in 2009

Hamilton Air Quality and Climate Change Corporate Strategic Plan (2006)

The City of Hamilton has developed various programs and policies aimed at improving air quality and addressing climate change. The Hamilton Air Quality and Climate Change Corporate Strategic Plan aims to coalesce this work to set a corporate example of leadership in addressing air quality and climate change and will be rolled out in two phases. Phase I involves identifying strategic directions and the roles and responsibilities of City Departments which is encompassed in the 2006 plan; Phase II has recently been adopted and identifies corporate targets for GhG reductions which include a 10 per cent reduction of 2005⁴¹ levels by 2012 and a 20 per cent reduction by 2020.

The corporate climate change plan reports on the City's actions, policies and programs that address five action categories along with identifying City Departments who play a lead and supporting role in delivering these initiatives.

I. Research that informs policies and strategies

Involves staying informed of new information and research on air quality and climate change through partnerships with organizations such as Clean Air Hamilton and developing appropriate corporate responses. Also includes managing risk involved with impacts of climate change. Planning and Economic Development department will lead the work with support from Public Health and Public Works on subjects such as health effects, fleet greening, waste management and reduction operations and energy management.

II. Response, engagement and communication

Again led by Planning and Economic Development, this action involves promoting City responses to air quality and climate change along with responding to external development proposals, regulatory proposals, internal policy and the concerns of the community.

III. Adaptation to smog and climate change

Adaptation strategies to smog and climate change include the smog response plan, corporate response and community response with leadership shared by Public Health (smog response, public awareness) and Public Works (city infrastructure, greenspace, water quality and supply).

IV. Reducing emissions, key pollutants and greenhouse gases

Lead by Public Works, this category of actions includes fleet greening, transportation demand management, city operations, energy management, land use and transportation planning, idling control and waste management and reduction.

V. Delivering air quality and climate change programs

The final category of actions is aimed at the longer term and includes creating internal collaboration and monitoring and evaluation.

⁴¹ 2005 was used as the base year because of lack of comprehensive data collected in the 1990s.

The corporate response includes both mitigation and adaptation strategies. Mitigation is addressed in action IV and refers to actions that avoid or delay occurrence of climate change. Adaptation actions aim to reduce the impact of air pollutants and climate change on the community and is addressed in category III.

As part of this Plan, an inter-departmental working group will be formed to coordinate actions to address air quality and climate change.

Local Air Quality Sources

Data shows that local air pollutant levels are similar to or slightly higher than other cities in southern Ontario. The transportation sector is the leading source of NO_x emissions within the City. The industrial sector the primary source of particulate matter as well as VOCs, SO₂, and CO.

Achievements to Date

- Hamilton Air Quality Initiative (HAQI) was established in 1997 (changed to Clean Air Hamilton in 1998)
- Smog Alert Response Plan in place since 1999 to curtail emissions from municipal operations
- Anti-idling policy since 2004 for its fleet
- Partnerships with local environmental organizations such as Environment Hamilton (a grassroots organization which receives funding from the City) and Green Venture (a city delivery agent for City programs i.e. Commuter Challenge and rain barrels)
- Corporate fleet of 40 hybrid light-duty vehicles, participation in the Repair Our Air Fleet Challenge sponsored by Natural Resources Canada promotes anti-idling and fuel management.
- Smart Commute, along with other GTA communities, a TDM response to reducing auto demand particularly at peak periods, through ride matching services, van pool, car sharing and ride matching services.
- Commuter Challenge – week long competition where Canadian cities compete to reduce pollution by using sustainable modes of transport.
- Energy management practices – goal to reduce all City facilities' energy consumption by 10-15 per cent.
- Member of the Federation of Canadian Communities 20 per cent club since 1996, a forum for information sharing amongst municipalities, which was evolved into Partners for Climate Protection in 1999.
- Partial inventories of GhG emissions for baseline years of 1994 and 1998
- Had established a regional Climate Change Action Plan in 1997, prior to amalgamation and the City of Hamilton had completed a Greenhouse Gas Reduction Program in 1999
- Establishing the staff position of air quality coordinator. The main role is to be the main point of contact for the community, City staff and stakeholder organizations (such as Clean Air Hamilton) for issues pertaining to air quality.
- City has purchased regenerative street sweepers to assist with fugitive dust abatement
- Corporate Green Procurement Policy
- Solid Waste Management Master Plan approved in 2001 with a goal of 65 per cent diversion from landfill.

Lessons Highlighted

- Partnerships with local organizations to share research roles, data collection, program implementation such as Environment Hamilton, Green Venture and Clean Air Hamilton.
- Coordinate initiatives for air quality and climate change as there are mutual benefits and lead by example i.e. Corporate leadership.
- Addressing climate change involves not only mitigating the effects of air pollutants and GhGs, it also needs to address adaptation to climate change. Hamilton will work with ARC (Alliance for Resilient Cities, convened by the Toronto Clean Air Partnership) to conduct a vulnerability scan of municipal operations and prepare a corporate Climate Change Adaptation Strategy.
- Having said that, adaptation seems more difficult to grasp than mitigation. This may be due to the fact that mitigation efforts are more 'hands on' as compared with adaptation, which requires longer term thinking. Measures which can be more quickly implemented are public awareness program focusing on energy management, water conservation (e.g. rain barrel program), waste diversion and waste 'refusal' (i.e. do you even need to buy that?) and active transportation.
- Air Quality coordinator staff position – A key point of contact and reference for other city departments, grassroots organizations and Hamilton residents. The role could be expanded to include coordinating the research for climate change along with administrative support to a future advisory committee on climate change, similar to the support role to Clean Air Hamilton. This position is based out of the Planning department and duties includes: providing support and coordination to Clean Air Hamilton and other community organizations, contract management for Green Venture, community outreach, preparing an annual report on air quality, organizing Upwind/Downwind conference and responding to other City divisions regarding air quality actions.
- Changing staff perspectives regarding their role and contribution toward improving air quality and reducing climate change will take time, i.e. How does this pertain to what I do on a daily basis?
- Next steps include preparing an inventory of corporate GhG emissions which will be undertaken by the Corporate Air Quality and Climate Change Working Group. Additionally, secondary plans and design guidelines are being updated to prevent sprawl, adjust land use patterns and increase density.
- In establishing the corporate target, two types of goals were incorporated – a visionary goal which influences people into action, and a measured goal based on previous measurements and inventory of emissions. In establishing the corporate GhG emissions reduction target, the corporate energy targets were factored in and pushed slightly higher. The next step is the completion of a GhG inventory, followed by a gap analysis to determine how far off the City is in achieving the target, and identifying actions on how to achieve them.

Table 10. Summary Table of Best Practices

Official Plan policies related to air Quality	Comprehensive Air Quality Plans	Lead	Key components of Approach	Lessons Learned and Next Steps
Toronto	<i>Growth Management</i> – direct growth to centres, avenues, DT, employment districts <i>Natural Environment</i> - Minimize air pollution to improve health of natural ecosystem * Air quality management to be addressed in separate strategy	Toronto Environment Office	Includes measures for city operations and residents and businesses Targets: 20 per cent reduction for locally generated smog causing pollutants from 2004 level by 2012. GhG reduction targets are as follows based on 1990 levels: • 6 per cent by 2012 (Kyoto target) • 30 per cent by 2020 • 80 per cent by 2050 Double the tree canopy from 17 per cent to 34 per cent by 2050. 70 per cent diversion solid waste from landfills	Integration of air quality and climate change in one plan – though there are some distinct measures, focus for behaviour and processes are similar. Inter-departmental barriers e.g. food purchasing policy, narrow road widths, street tree growth, green development standards. Phase 2: closer look at actions as they relate to the source – gaps. Future target – low emission standards for taxis.
Metro Vancouver	Livable Region Strategic Plan: Refers to Air Quality Management Plan Sustainability Framework (AQ, energy, drinking water, solid waste, liquid	Air Quality Management Plan	AQMP does not have hard targets. Following targets in the Sustainability Framework: AQ: Reduce diesel particulates by 75 per cent by 2025 – corporate sources	Combines air quality and GhG policies to ensure that actions don't negatively impact one another.

waste, GM, parks, ecological health)		Energy: net contributor of energy		
		GhG: carbon neutral by 2012; reduce GhGs by 15 per cent by 2015 and 33 per cent by 2020 Waste: 70 per cent diversion by 2015; liquid waste to energy increase by 10 per cent by 2012		
London	General policy directs the Mayor of London and the boroughs to implement the Mayor's Air Quality Strategy	Air Quality Strategy	Greater London Authority	• Congestion charges • Low emission zone • Emission standards for cabs, own fleet • Best practice guide-demolition and construction • Air Quality Assessments for Planning Applications – Association of London Government Strategic approach is best taken since, even though air quality has local causes and effects, a unity of effort is essential for any significant improvement. Integration with strategies on related topics, such as climate change, energy, and transportation. When they clash, it is important to evaluate which should be prioritized, i.e. diesel fueled vehicles reduce GhG but increase particulate matter.
Halton Region	Healthy Communities – Air and Ambience section - reduce GhG, support Kyoto protocol, tree	No comprehensive document. Air Quality	Environmental Health	Review best practices for incorporating walkability, energy efficiency and

planting, compact urban form, promote alternative modes transport	Management strategy (Transportation – TMP) Clean Air Plan (Health) –formerly smog response	incompatible land uses into OP. Consider carrots and sticks to enforce walkability and GBS in community design.
Hamilton	Air Quality and Climate Change Corporate Strategic Plan	10 per cent reduction in GhG emissions from 2005 levels by 2012 20 per cent by 2020 Air Quality Coordinator (Planning Dept) Lead by example Air quality/climate change coordinator.

6.0 DISCUSSION

6.1 KEY VARIATIONS IN POLICY APPROACHES

The findings from the best practices review illustrate various approaches to addressing air quality issues from a policy perspective and are discussed in the section below.

Official Plan policies in most 'best practice' cases, were aimed at promoting land use practices that reduce emissions and encourage compact, healthy communities. In many cases, policies relating to air quality fell under various sections of official plans – growth management, natural resources, transportation – reflecting the cross-cutting nature of air quality issues. The summary below is intended to highlight the key issues and provide discussion on the approaches from case studies⁴².

6.1.1 Greenhouse gas reduction targets

The establishment of targets to reduce GhG emissions has been addressed in Toronto and Hamilton, the differences being in the application and time span of the target. Toronto's target applies to the Toronto urban area and includes short, medium and long term targets for GhG reduction and a short term target for locally generated smog causing pollutants. In Hamilton, the GhG reduction targets are aimed at corporate initiatives and include short and medium term targets. In both cases, the targets are not referenced in the Official Plan but are identified in a separate document (Climate Change, Clean Air and Sustainable Energy Action Plan in Toronto, and the Corporate Air Quality and Climate Change Plan in Hamilton). Although the Region of Halton has not identified air quality or GhG targets, it has taken a more strategic approach in its official plan by including a policy aimed at identifying the need for five-year targets and performance monitoring of greenhouse gas emissions and other air pollutants generated by the Region's corporate activities.

Identifying targets in a strategic plan for air quality/climate change raises the question of measuring the effects of various initiatives at reducing local air pollution and GhG emissions towards reaching the targets. An additional issue relates to establishing clear lines of accountability for reducing GhG emissions. An alternative towards establishing hard targets is to monitor key pollutant levels throughout the region - such as particulate matter and ozone - which is the approach that Metro Vancouver is taking in its Air Quality Management Plan, until it can conduct full cost accounting as part of the process⁴³.

6.1.2 Compact urban form

Creating denser, mixed-use nodes – both in new community planning, within existing centres, and along existing corridors - that help to reduce car trip lengths by locating the majority of homes, jobs, shops, institutions and services in close proximity will be an important ingredient to improving air quality and reducing greenhouse gas emissions. Intensification, through infilling of vacant and under-utilized sites in built up areas, brownfields, greyfields, arterial commercial strip development, together with better planned suburbs to engender the tenets of a "complete community" can create a broader range of transportation options.

⁴² The focus of the policies is on settlement areas, transportation and industrial facilities since these are the major local sources of air pollution. While aggregate operations and agricultural practices contribute somewhat to air quality concerns, these are less significant than other sources, and for this reason are not emphasized in this discussion.

⁴³ Personal communication, Laurie Bates-Frymel

Increasing neighbourhood development density reduces the distance that people need to drive, increases the viability of alternative modes of transportation such as walking and biking, makes public transit a more convenient choice, and provides cost savings to the commuter. Official plan policies relating to the design of communities and intensification of existing areas are mainly premised on establishing compact urban form at transit-supportive densities in a system of nodes and corridors. These policies are generally located in the growth management section of the official plan. The Halton Region Official Plan includes an Air and Ambience section that includes a more specific policy requiring a 400 metre walking distance be established for all new urban development in relationship to transit services and pathways. Specifically, this policy states:

143(5) Require all new urban development to consider in its design the provision of pedestrian walkways, cycling paths and access to public transit services, or transit stops where they are likely to be located, within a walking distance of 400 metres.

While this approach has merit, it is the type of policy that is best grouped with other transportation and land use sections of the Official Plan.

6.1.3. Mixed land uses

The separation of land uses, particularly uses related to residential, retail, and office employment has resulted in communities that rely heavily on the automobile to access basic needs for daily living. This has been of post war subdivision design, but can also be observed along arterial roads that are burdened with one-storey 'strip commercial' land uses.

Incorporating different land uses (e.g. recreation, housing, employment, shopping) within a neighbourhood is important to reduce the number and distance of vehicle trips. Studies show that the decision to walk or bike is influenced by having access to pedestrian and bike friendly areas, well connected streets, small blocks, mixed land uses and access to retail. Planning communities that encourages people to get out of their cars and onto the sidewalks may be a key means of addressing the issue of obesity, improving air quality and promoting public health⁴⁴. For example, a study completed on increasing the walkability of communities in the Seattle region yielded the following results: with a 5 per cent increase in the walkability of residential neighbourhoods, residents did 32 more minutes of physically active travel per day, had 0.23 per cent decrease in body mass index, had 6.5 per cent fewer vehicles miles travelled per person; and 5.6 per cent fewer grams of NO_x emitted and 5.5 per cent fewer VOCs emitted per person⁴⁵.

The case studies all supported the mixing of land uses in key areas, typically in centres and corridors and is a recommended approach for achieving a better live-work relationship. Toronto's Official Plan identifies the Downtown, Centres and certain portions of Avenues as key places where jobs, housing and services will be concentrated and will be focal points for transit services. In Halton Region, the objectives of "Urban Areas" include nodes and strategically located mixed use corridors.

6.1.4 Transportation sector

Technological changes to reduce vehicle emissions has been an important step towards reducing pollution from the transportation sector yet these strides gained have been offset by an increased number of vehicles on the road as a result of poorly planned communities and considerably longer distances travelled per vehicle. Emphasizing growth within existing boundaries will help to

⁴⁴ Frank, Lawrence D. et. al. 2006. Many Pathways from Land Use to Health, American Planning Association.

⁴⁵ Ibid.

avoid scattered development and improve transit choice thereby providing greater accessibility, creating more vibrant urban spaces, and maximizing use of infrastructure across Peel Region. Encouraging alternative modes of transport besides the private automobile – including public transit, car/van pooling, HOV lanes, cycling lanes, interconnected link of pedestrian pathways – reduces vehicle-miles travelled and gasoline consumption.

Transportation-related policies in the best practices review acknowledge the significant contribution of the transportation sector in the generation of GhG and smog. The policies aim to reduce air emissions through sustainable transportation choices. Responses to transportation-related emissions address the importance of both reducing vehicles from roads and emissions from these vehicles. Prioritizing transit, expanding cycling infrastructure and trails, encouraging compact development, transferring goods movement from trucks to rail, and encouraging transportation demand management measures were the focal points of these policies. Consideration of a separation distance from major roads to sensitive land uses to address the issue of increased air pollution around major roadways is under investigation in both Halton and Hamilton.

Indicators related to urban form could also be considered in future related research that assess the extent to which communities are being designed to be compact, mixed use developments that support multiple modes of transport. A good deal of research is currently exploring ways to measure sprawl; the following could provide a starting point for future work on monitoring the design of communities⁴⁶:

<u>Density</u>	<u>Land Use Mix</u>	<u>Centres</u>	<u>Street Network/Connectivity</u>	<u>Transportation</u>	<u>Air Quality</u>
Gross population density per sq. km.	% of residents with businesses or institutions within a ½ block of homes	Variation of population density by census tract	Average block length Median perimeter of blocks (<i>smaller the perimeter, the greater the connectivity</i>)	Daily vehicle miles travelled per capita	# of Smog advisory days
Median lot size of single family dwelling units	% of residents with satisfactory shopping within 1 mile	% of population living within 3 miles of the central business district	Average block size in square miles	% of commuters taking transit to work	
	% of residents with a public elementary school within 1 mile		Percentage of small blocks	% of commuters walking/cycling to work	
	Balance of jobs to residents		# of street intersections divided by sum of # intersections + # cul-de-sacs (<i>higher the ratio, the greater the connectivity</i>)	Average commute times	
	Land area of commercial, industrial, public land uses in neighbourhood divided by # housing units (<i>higher the ratio, greater the mix</i>)			All residential development to be within a 400-500 metres of a transit stop	

⁴⁶ The measures provided have been assembled from various sources in the sprawl literature, primarily from Smart Growth America in its *Measuring Sprawl and Its Impact* report and Song, Yan. 2004. *Measuring Urban Form*. They are meant to provide an example of some factors that could be contemplated in future work on how to create more compact, sustainable communities, and are by no means meant to be an exhaustive list.

6.1.5 Stationary and point source emissions

Area sources such as heating systems for residences and offices are small individual point source emissions that together, have an impact on air quality. Minimizing energy utilized during construction of new buildings, selection of low energy materials for retro-fits, and minimizing energy used for operations are some factors for consideration in addressing the burning of fossil fuels in the construction of new homes, offices and facilities and operation of existing buildings. Other considerations for built form include using lighter coloured material for roads, parking lots and roofs along with the contemplation of green roofs assists to offset negative impacts.

Large *point sources* such as heavy industry, the Airport or the former Lakeview Generating Station have a greater impact to local air quality. These issues are separate but related, and involve responses related to energy conservation as well as land use designations associated with employment uses.

- In Halton Region, Official Plan policies in the “Energy” section encourage local municipalities to adopt energy conservation policies. In Toronto, the Official Plan policies encourage development that reduces GhG emissions and support ‘green building designs and construction practices’ in the section on the Natural Environment.

This represents a reasonable approach that could be considered by Peel Region and will likely be addressed through the ‘energy’ portion of the PROPR review. In addition to a policy response, a key implementation tool that been adopted in Vancouver, Toronto and in the Town of Caledon, are green building standards which are further elaborated in section 6.2.3.

- In case study municipalities in the GTA, a policy response to industrial and office uses has been to cluster businesses and other generators of economic activity including industrial facilities into areas designated specifically as Employment Lands. This approach was intended to reserve these areas for employment uses against competition from other land uses. They also provided a separation between heavier polluting industry and residential uses. Employment Areas generally include a broad range of businesses consisting of offices, light and heavy industrial uses.

Given the present direction in planning towards mixed use nodes and corridors, Peel region and its municipalities could consider shifting low emitting businesses – particularly offices - into mixed use areas and setting aside Employment Areas for medium to heavier industrial uses which would provide a focus to clustering higher polluting industrial facilities and providing a separation from residential areas. This will also assist with achieving a better balance with home and work relationships by locating offices in areas of good transit accessibility, something not readily available in many Employment Areas.

An innovative example of employment lands that support a more sustainable model of development is the proposed Project Green eco-business zone surrounding Pearson Airport that includes approximately 12,000 businesses, the majority of which are small-to medium-sized.

6.1.6 Community Greening and Forest Cover

Forest cover including woodlots and tree plantings along roadsides act as carbon sinks to remove carbon dioxide from the air, are important for maintaining comfortable temperatures in urban

environments (i.e. they mitigate the urban heat island effect) through shading and sheltering, provide a natural filtration of pollutants and have the co-benefit of providing habitat and being places that are strongly valued by residents.

Increased tree planting (afforestation) and strategies for improving health of street trees, i.e. practices to extend the life of trees, should be incorporated into operations and maintenance.

The importance of preserving and expanding green spaces and natural areas in municipalities to reduce air pollution and greenhouse gas emissions is generally captured in official plan policies addressed in 'greening' policies such as achieving a 'targetted' tree canopy, enhancing streetscapes, parks and open spaces through naturalization, plantings and protecting existing natural areas. Halton Region has established a requirement for all development proposals to the degree possible, preserve existing trees, plant additional trees, in accordance with good forestry management practices.

6.1.7 Cumulative Impacts

One of the major criticisms of the current approach to Provincial regulation is the lack of consideration for the cumulative impact that various smaller sources have on regional air quality. For example, individual industries may report emissions well under provincial guidelines, but if these facilities are located in close proximity, there is no measure to indicate the cumulative effects of the emissions through the regular provincial monitoring stations.

From the case study review, it appears that only the London air quality plan includes an approach to addressing cumulative impacts. It has been addressed through a separate document "Air Quality and Planning Guidance" (more fully described in section 6.2.2) which requires an air quality assessment as part of a development application if the proposed development is likely to cause a deterioration in local air quality, if the development is located in an area of poor air quality or if there will be significant impacts during the construction period. As part of an air quality assessment, cumulative impacts of other developments in the area are to be considered. This approach could be examined as a possible longer term action for Peel municipalities in partnership with the Region.

6.1.8 Monitoring and Modelling – Capturing Variations in Local Air Quality

Given the nature of source emissions and wind patterns, air quality is not uniform across Peel Region and it is therefore useful to identify localized air quality, trends and potential problem areas across the region. Air monitoring by the Province through its monitoring stations provides input into assessing regional air quality, including Pearson Airport, but does not provide localized information in other locations such as adjacent major roadways or power generating facilities. Additionally, air monitoring does not identify the sources that contribute to the emissions.

Air quality modelling can provide estimates of air pollutants in various parts of a community and can provide an analysis of how different sources contribute to the concentration of pollutants across the region. Modelling can also be used to assess the possible changes to concentrations of pollutants as a result of proposed development and shifts in policy.

Halton Region has initiated an air monitoring program which includes a monitoring station in Milton along with portable air monitors to measure air pollution at different micro-environments in the region and to validate airshed modelling. Halton is also undertaking air quality modelling to assess the contribution of different sources in its airshed and to assess the impacts of various policy options. This is an approach that appears to have merit and could be replicated in Peel.

6.2 EXAMINATION OF POSSIBLE TOOLS AND INITIATIVES

Air quality policies in an official plan provide a starting point for addressing the issues of air pollution and GhG emissions. Implementation of these policies requires a range of tools to achieve results towards improving local air quality and reducing GhG emissions. Peel Region has already undertaken or is in the midst of planning to implement a broad range of tools that address air quality issues and greenhouse gas reduction both through corporate activities and the corporate Clean Air Strategy. The following discussion highlights some of the more innovative approaches that may be useful in augmenting Peel's 'toolkit'.

6.2.1 Air Quality Management Plans

A number of case study municipalities have developed separate air quality management plans (AQMPs) or strategies to provide more detail on policies and strategies for reducing air pollution. In most instances, these local air quality strategies were combined with climate change objectives. In some cases, the plans were directed solely at corporate initiatives as a way to 'lead by example' while others were aimed at the broader community. A co-benefit of these types of plans or strategies is that they have the opportunity to raise public awareness of air quality and climate issues and therefore impact individual decisions about transportation choices, green building and other decisions that will affect air quality. Additionally, because air quality is not uniform across the Region, an AQMP could target areas that are more burdened with emissions. For example, the London Air Quality Strategy identifies a number of objectives to be met by local boroughs. In the instance where the prescribed objectives cannot be met, boroughs must designate an Air Quality Management Area and produce an action plan that establishes measures to be taken to address the air quality issues.

Working towards the creation of an air quality management plan for the Region is a longer term strategy that provides for a comprehensive approach to addressing air quality and climate change issues through strategies and actions. It can also educate Peel residents and the private sector by discussing opportunities to optimize their contributions to overall air quality issues, encourage them to adopt more environmentally-friendly lifestyles through improvements for their homes, businesses and employees through programs, building partnerships with local organizations and sharing information.

6.2.2 Development Guidelines

London Council's Air Quality and Planning Guidance⁴⁷ provides technical guidance to the development community and local authorities on how to deal with planning applications that could have an impact on air quality. The following sections are derived from the document to provide a description of key points in its understanding.

The three main ways in which a development may have significant impact to air quality are if the development:

- Is likely to cause a deterioration in local air quality, i.e. once completed it will increase pollutant concentrations;
- Is located in an area of poor air quality, i.e. it will expose future occupiers to unacceptable pollutant concentrations; and
- Demolition and construction phase will have significant impact on the local environment i.e. through fugitive dust and exhaust emissions.

⁴⁷ The London Air Pollution Planning and the Local Environment (APPLE) Working Group. 2007. Air Quality and Planning Guidance.

Key considerations by the local authority when determining if an air quality assessment should be advised of a new development include the following:

- Locality of development – including relevant exposure;
- Length of time and scale of demolition/construction phases;
- Likely increase in traffic levels from existing base (either through servicing or parking requirements);
- New industrial development, e.g. boiler plant/energy production, etc;
- Size of development – residential/commercial floor space or number of units;
- Street canyons and stationary or queuing traffic;
- Increase in HDV movements (e.g. more than 20 per day) such as for lorry parks, depots, bus stations;
- New rail, road building and signalling, bridge, tunnel, port or airport developments; and
- Waste handling activities.

Both site suitability and impact of development are two important factors that influence the assessment of a proposed development. In terms of site suitability, if development is proposed for an area that already exceeds air quality limits, it should be recognized that additional development could have detrimental impacts upon its residents. The impact of the development on the environment also needs to be detailed. An air quality assessment should clearly identify the likely change in pollutant concentrations arising from the proposed development both during construction and operational phases and must consider the difference in air quality as a result of the proposed development. Where practicable, these assessments should account for cumulative air quality impacts of other developments in the local authority area and neighbouring boroughs.

The guidelines indicate that there is no one definitive method for conducting a detailed air quality impact assessment for developments, but the method must be appropriate to the development. In some cases, screening may be completed, in others, more detailed dispersion modelling may be needed. In the case of dispersion modelling, the guidelines advise that proposed modelling techniques be coordinated with local air quality officers to ensure its appropriateness to the site. Key points for dispersion modelling include:

- Assess current air quality in the locality;
- Estimate emissions of local air pollutants from the development;
- Predict statistics relevant to air quality objectives without the development in place relative to the year of opening and the baseline scenario;
- Predict statistics relevant to the air quality objectives with the development in place in the same years; and
- Cumulative impact of developments should be considered.

This tool requires substantive collaboration between the Region and municipalities and would be an initiative to be considered by Peel and its municipalities in the longer term, but is an excellent example of an approach that addresses the issue of cumulative impacts.

6.2.3 Promotion of Green Development

Green development reduces the impact of development on the local environment and its contribution to global climate change. Green building strategies aim to reduce the impacts to energy, water, wastewater, stormwater, material conservation, and indoor air quality through sustainable practices used in the construction of new development and retrofit of existing buildings.

The Canada Green Building Council has established LEED_{TM} (Leadership in Energy and Environmental Design) certification for construction in Canada that responds to Canadian climate issues, construction practices and regulations. LEED_{TM} is a market based program that certifies high performance green buildings and communities. Certification is based on a points system with four possible levels of certification: certified, silver, gold and platinum. LEED_{TM} for Neighbourhood Development integrates the principles of new urbanism, smart growth and green buildings to facilitate community design that mitigates urban sprawl and creates more sustainable communities. Many communities across the globe have used certification programs such as LEED_{TM} or have adapted LEED_{TM} to fit local circumstances such as Toronto's Green Development Standard.

Building retrofits such as solar panels and roof gardens contribute towards reducing stormwater run off, increasing energy efficiency, and improving thermal comfort can also be considered for existing structures.

While encouraging and implementing a green development standard such as LEED_{TM} is typically the jurisdiction of local municipalities, two approaches to local green buildings are discussed below for information purposes as this approach is important not only to reducing demand for energy, water and waste reduction, but also for raising awareness in the public and within the development community.

City of Vancouver

The City of Vancouver is currently developing a Green Building Strategy and has approved LEED_{TM} standards for civic buildings – LEED_{TM} Gold as a goal for civic buildings greater than 500 square metres and LEED_{TM} Silver as a minimum goal for the Southeast False Creek/Olympic Village development.

Beyond civic buildings, the general approach is to develop a mandatory standard that parallels LEED_{TM} priorities in some instances and diverges from it to reflect local environmental and economic conditions⁴⁸. The overall approach is to raise the playing field for the entire city rather than provide incentives for green development. There is a provincial building code which the City has the authority to strengthen to achieve various objectives.

Staff in Vancouver will continue to work with developers to negotiate rezoning applications to go above and beyond the new baseline. Currently, nearly all rezonings of major projects are negotiated to meet a level of LEED_{TM} Silver or better with an additional 30 per cent in energy efficiency. This has never been formally adopted in policy (i.e. it represents ad hoc policy). The City has its own charter which gives it a high level of authority and considerable power to attain public benefits, such as park space, social housing and daycare, either through its discretionary zones or through a rezoning.

City of Toronto Green Development Standards

In Toronto, the recently developed Green Development Standard⁴⁹ provides an integrated set of targets, that are adapted from LEED_{TM} but which reflect local priorities to encourage the private sector to use more sustainable building practices and to guide the development of city-owned properties. The standards are appropriate for consideration

⁴⁸ City of Vancouver Policy Report to the Standing Committee on Planning and Environment. April 20, 2007. Progress Report on Vancouver Green Building Strategy.

⁴⁹ City of Toronto. 2007. Toronto Green Development Standard. http://www.toronto.ca/planning/pdf/gds_standardjan07_03.pdf

by local municipalities as part of their development approval process. The existing baseline to which the green standard meets or exceeds, is the recently updated Ontario Building Code which has revised requirements to improve energy efficiencies.

The standard is focused on mid- to high-rise residences, commercial, industrial and institutional development. The air quality component of the standard incorporates the following features:

- Materials - A minimum of 10 per cent of material to be locally supplied and preferred target of 20 per cent.
- Parking – studies are currently underway to establish parking standards in the downtown; shared use of parking for mixed use developments, dedicated priority parking for carpool/ridesharing and ultra low emission vehicles.
- Cycling – provide 0.75 bike parking spaces per unit for buildings with more than 10 units and 1 parking space for every 1250 square metres of non-residential floor space (6 space minimum); provide bicycle storage and shower/change facilities for workplaces.
- Public Transit Accessibility – where feasible, integrate transit facilities directly into the development or locate a major entrance within 200 metres of a transit stop.
- Pedestrian infrastructure – the City already has existing guidelines which include urban design guidelines and a draft streetscape manual. Green Development Standard criteria range from providing direct integration with existing pedestrian routes, shading, lighting, signage and avoiding conflicts between pedestrian and vehicular routes amongst other criteria.
- Construction Activity – identify method for minimizing air emissions, dust, VOCs.
- Ozone protection – eliminate CFC-based refrigerants and halons in fire suppression
- Urban Heat Island – the City currently has a Green Roof Strategy which includes performance criteria. The Green Development Standard provides criteria for roofs and for at-grade cover. Roof options include ‘minimum’, ‘preferred’ and ‘excellent’ criteria based on building type/size.
- Energy Efficiency – targets for ‘minimum’, ‘preferred’ and ‘excellent’ criteria; 70 per cent of appliances to be Energy Star compliant; target of on-site renewable energy where feasible.
- Daylighting/Building Orientation – orient buildings to take advantage of passive solar for heating and cooling and daylighting.
- The final two categories address indoor air quality and systems commissioning.

A questionnaire has been prepared for developers to review as part of the application process.

Town of Caledon Green Development Program

The Town of Caledon has recently developed a Green Development Program that issues discounts on development charges based on the inclusion of green technologies into building construction. The development charge discounts are a percentage of non-residential development charges and apply to commercial and industrial buildings as follows

- 5 per cent for any inclusion or any combination of inclusions of green technologies⁵⁰

⁵⁰ See the Town of Caledon's Green Development Brochure for examples of green technologies at http://www.town.caledon.on.ca/content/greendevlopment/Caledon_Green_Development_Brochure.pdf

- 20 per cent for LEED certified
- 22.5 per cent for LEED Silver
- 25 per cent for LEED Gold
- 27 per cent for LEED Platinum

6.2.4 Anti-Idling by-law

The City of Toronto has implemented an idling control by-law that limits idling to no more than three minutes in a given 60 minute period. The by-law allows transit vehicles to idle when picking up or discharging passengers and also allows limited idling when transit vehicles are waiting for passengers. As well, the by-law provides for idling during extreme outdoor temperatures to ensure heating or cooling inside a vehicle.

The City's intention is to achieve compliance with the by-law through voluntary measures. If these measures are not successful, the by-law provides for a fine of up to a maximum of \$5,000 for infractions of the by-law⁵¹.

The City of Hamilton also approved a similar bylaw in 2007.

6.2.5 Building Community Awareness

The current Peel Region corporate Clean Air Plan is an excellent start toward raising the profile of corporate activities aimed at smog reduction and GhG mitigation (i.e. leading by example). However, improvements by Peel Region as a corporation can only address air quality objectives to a certain extent. Increasing the awareness of Peel Region residents and the private sector about how their actions can impact air quality is an important step to establishing broad-based support for regional and local initiatives that mitigate smog and GhG impacts. It will be essential to continue promoting initiatives and programs that aim to reduce local impact to air quality through measures that include a broad spectrum of the population.

Public education programs build awareness about energy conservation, waste management and water conservation measures and are initiatives that can be implemented relatively quickly and without extensive costs associated with them. For example, the City of Hamilton's rain barrel program (Catch the Rain Pilot Project) which was implemented in 2007 by Green Venture, offered residents three types of rain barrels at a reduced rate⁵². The purpose of the pilot program was to gauge conservation efforts and determine benefits of an ongoing rain barrel rebate program⁵³.

⁵¹ City of Toronto. 1998. Idling Control By-law. <http://www.toronto.ca/legdocs/bylaws/1998/law0673.htm>

⁵² Peel Region subsidizes the sale of rain barrels and backyard composters to residents (personal communication, K. Hogan, 2008).

⁵³ <http://www.myhamilton.ca/myhamilton/CityandGovernment/NewsandPublications/NewsReleases/2007News/July/07-20-07ka.htm>

7.0 RECOMMENDATIONS

Improving air quality across the Region requires a variety of responses that reach across many departments and requires cooperation from local municipalities. Transportation, growth management, land use and community design, energy, natural resources and greening strategies, building design, water and wastewater services, solid waste management, and community awareness among other areas, are all important key components to designing a comprehensive approach to mitigating poor air quality. In addition, air quality issues are related to climate change. While climate change and air quality have somewhat differing impacts, they both primarily originate by the same major cause, i.e. the burning of fossil fuels.

The review of the Regional Official Plan offers an opportunity to provide a strong policy base for mitigating air quality issues in Peel Region. The Region's main role with its Official Plan is to provide a broad policy direction on strategic issues, allowing its municipalities to structure their communities around local features and characteristics, as long as the intent of the Regional vision is maintained.

The intent of Regional Official Plan policies should be to make a significant contribution to achieving improvements in air quality and reducing greenhouse gas emissions by directing development to reduce energy consumption through less vehicle travel, improved transport choices and energy savings in the built form. Key strategic areas for the Official Plan that will support air quality improvements include a broad range of topic areas identified below:

- Promote a compact Region
- Reduce reliance on the private automobile
- Enable transit-oriented development
- Extend active transportation infrastructure
- Design for walkable communities
- Prioritize cycling, walking and other non-auto modes of transport
- Maintain and enhance natural areas and green areas
- Provide for job opportunities close to home/flex work
- Support options for clean energy
- Promote green development – buildings, neighbourhoods and industrial areas
- Preserve areas for industrial needs
- Preserve agricultural lands and aggregate uses
- Encourage water conservation
- Encourage green procurement policy
- Monitor and forecast air quality in the Region

Official Plans primarily address land use policy, which represents an important lever for influencing urban form, a significant factor contributing to poor air quality in Peel Region. Prospective air quality objectives and policies need to be grounded in an overall vision for the Region which was established at the Sustainability Workshop in Spring 2008.

The draft vision for air quality composed at the workshop is identified as:

1. Breathable clean air for everyone
2. Better land use relationships (more compact development) to reduce auto dependency
3. Optimise resources and minimize waste and pollution (do more with less).

7.1 RECOMMENDATIONS: POLICY DIRECTION

Based on the results of the vision developed during the sustainability workshop, the proposed overall strategic Official Plan goal for addressing air quality in the Region is to create an environment that delivers breathable, clean air for everyone, optimizes resources, minimizes waste and pollution by doing more with less and delivers compact land use relationships so that residents and workers have the option of not having to use automobiles to attend to their daily activities.

It is recommended that the following objectives and policies should be considered by Peel Region for incorporation in its new Official Plan.

It is the objective of the Region to work with Federal and Provincial governments, other Regions within the GTA, local municipalities and citizens to reduce air pollution and greenhouse gases to improve the health and well being of Peel Region residents and workers by:

- Preparing an air quality management plan for the Region;
- Advocating for stronger emission standards for vehicles, industries and energy producing facilities;
- Monitoring air quality on a regular basis;
- Reviewing all corporate operations to ensure that these minimize air pollution and GhG emissions;
- Promoting compact urban form in attractive communities that provide alternatives to the use of the private automobile;
- Developing a sustainable transportation system that emphasizes transit, walking and cycling;
- Protecting and expanding the tree canopy and natural heritage features across the Region; and
- Developing programs to retrofit existing buildings in order to reduce energy consumption and air pollution.

In support of the objective to establish an air quality management plan and to regularly monitor air quality, it is the policy of the Region to:

- Work with citizens and the private sector to raise awareness about local air quality issues and climate change and to identify specific programs that can be undertaken in partnership with the Region;
- Conduct air quality modeling to accurately identify local air emissions in Peel Region;
- Establish targets for greenhouse gas emissions and air pollutants; and
- Monitor progress towards improving air quality through corporate initiatives as defined in the Region's Clean Air Strategy.

In support of the objective to promote compact urban form in attractive communities, it is the policy of the Region to:

- Promote infill and residential intensification of existing urban areas;
- Promote the design of communities in new Secondary Plan areas and re-design in existing neighbourhoods so that transit stops are within walking distance for the vast majority of residents in urban centres;
- Encourage office uses to locate in mixed use areas that are well-served by transit including Urban Growth Centres, Major Transit Station Areas, and other transit nodes and corridors;
- Promote an urban structure based on a pattern of 'priority areas' or urban mixed use centres and corridors to increase the possibilities of working and living in close proximity;
- Support pedestrian friendly streetscapes; and
- Work with local municipalities to develop tools to reduce the impact on air quality of development applications.

In support of this objective to develop a transportation system that minimizes air pollution, it is the policy of the Region to:

- Work with local municipalities to give priority to transit use on Regional and local streets;
- Support alternative modes of travel including walking and cycling;
- Improve cycling infrastructure and walking trails, both on and off road;
- Promote transportation demand management measures to encourage more sustainable modes of transport; and
- Provide regional highways that prioritize both people and goods movement and result in a network that is safe, economic and efficient.

In support of this objective to protect and expand natural areas and the urban tree canopy, it is the policy of the Region to:

- Preserve and expand areas of significant ecological value in the Region's Greenland system;
- Develop a Regional Urban Forest Strategy in partnership with area municipalities and the conservation authorities;
- Encourage the area municipalities to develop Urban Forest Strategies in partnership with the Region and the conservation authorities; and
- Promote tree planting and other naturalized and drought tolerant landscaping initiatives along Regional roads and regional properties.

In support of this objective to balance the need for economic generators in the form of industry facilities with sensitive land uses:

- Encourage the separation of residential uses from employment areas containing industrial uses that may have air quality impacts; and
- Preserve employment lands for heavy industrial uses and facilities.

Table 11. Summary Table of Recommendations

Topic Area/Objective	Policy	Rationale	Tools
Collaboration <i>It is the objective of the Region to work with Federal and Provincial governments, other Regions within the GTA, local municipalities and citizens to reduce air pollution and greenhouse gases to improve the health and well being of Peel Region residents and workers by:</i>	• Preparing an air quality management plan for the Region; • Advocating for stronger emission standards for vehicles, industries and energy producing facilities; • Monitoring air quality on a regular basis; • Reviewing all corporate operations to ensure that these minimize air pollution and GhG emissions; • Promoting compact urban form in attractive communities that provide alternatives to the use of the private automobile; • Developing a sustainable transportation system that emphasizes transit, walking and cycling; • Protecting and expanding the tree canopy and natural heritage features across the Region; and • Developing programs to retrofit existing buildings in order to reduce energy consumption and air pollution.	The impacts of air pollution and climate change are not constrained by boundaries and therefore a need exists for a broad-based, collaborative effort amongst municipalities, residents, organizations, and various government levels to address the causes through appropriate, implementable actions.	Air Quality Management Plan- Establish a Regional Implementation Committee Anti-idling bylaw
Air Modelling and Targets <i>In support of the</i>	• Work with citizens and the private sector to raise awareness about local air quality issues and climate change	Modelling air emissions can provide estimates of air pollutants in various parts of a community and provide an analysis of	Air emission model tied to a baseline of emissions, from an

Topic Area/Objective	Policy	Rationale	Tools
<i>objective to establish an air quality management plan and to regularly monitor air quality, it is the policy of the Region to:</i>	and to identify specific programs that can be undertaken in partnership with the Region; • Conduct air quality modeling to accurately identify local air emissions in Peel Region; • Establish targets for greenhouse gas emissions and air pollutants; and • Monitor progress towards improving air quality through corporate initiatives as defined in the Region's Clean Air Strategy.	how different sources contribute to the concentration of pollutants across the Region. It can also be used to assess the possible changes to concentrations of pollutants as a result of proposed development and shifts in policy.	emission inventory Community awareness programs Portable Air Monitors (like Halton)
Compact Urban Form <i>In support of the objective to promote compact urban form in attractive communities, it is the policy of the Region to:</i>	• Promote infill and residential intensification of existing urban areas; • Promote the design of communities in new Secondary Plan areas and re-design in existing neighbourhoods so that transit stops are within walking distance for the vast majority of residents in urban centres; • Encourage office uses to locate in mixed use areas that are well-served by transit including Urban Growth Centres, Major Transit Station Areas, and other transit nodes and corridors; • Promote an urban structure based on a pattern of 'priority areas' or urban mixed use centres and corridors to increase	Creating denser, mixed-use nodes – both in new community planning, within existing centres, and along existing corridors - that help to reduce car trip lengths by locating the majority of homes, jobs, shops, institutions and services in close proximity will be an important ingredient to improving air quality and reducing greenhouse gas emissions. Increasing neighbourhood development density reduces the distance that people need to drive, increases the viability of alternative modes of transportation such as walking and biking, makes public transit a more convenient choice, and provides cost savings to the commuter.	Official Plan policies that support intensification, through infilling of vacant and underutilized sites in built up areas, brownfields, greyfields, arterial commercial strip development, together with better planned suburbs to engender the tenets of a "complete community" can create a broader range of transportation options.

Topic Area/Objective	Policy	Rationale	Tools
	the possibilities of working and living in close proximity; • Support pedestrian friendly streetscapes; and • Work with local municipalities to develop tools to reduce the impact on air quality of development applications.		
Transportation <i>In support of this objective to develop a transportation system that minimizes air pollution, it is the policy of the Region to:</i>	• Work with local municipalities to give priority to transit use on Regional and local streets; • Support alternative modes of travel including walking and cycling; • Improve cycling infrastructure and walking trails, both on and off road; • Promote transportation demand management measures to encourage more sustainable modes of transport; and • Provide regional highways that prioritize both people and goods movement and result in a network that is safe, economic and efficient.	Emphasizing growth within existing boundaries will help to avoid scattered development and improve transit choice thereby providing greater accessibility, creating more vibrant urban spaces, and maximizing use of infrastructure across Peel Region.	Official Plan policies that encourage alternative modes of transport besides the private automobile – including public transit, car/van pooling, HOV lanes, cycling lanes, interconnected link of pedestrian pathways – reduces vehicle-miles travelled and gasoline consumption. Pay for Use Parking Strategy HOV Strategy Support active transportation

Topic Area/Objective	Policy	Rationale	Tools
			infrastructure Car sharing
Community Greening <i>In support of this objective to protect and expand natural areas and the urban tree canopy, it is the policy of the Region to:</i>	• Preserve and expand areas of significant ecological value in the Region's Greenland system; • Develop a Regional Urban Forest Strategy in partnership with area municipalities and the conservation authorities; • Encourage the area municipalities to develop Urban Forest Strategies in partnership with the Region and the conservation authorities; and • Promote tree planting and other naturalized and drought tolerant landscaping initiatives along Regional roads and regional properties.	Forest cover including woodlots and tree plantings along roadsides act as carbon sinks to remove carbon dioxide from the air, are important for maintaining comfortable temperatures in urban environments (i.e. they mitigate the urban heat island effect) through shading and sheltering, provide a natural filtration of pollutants and have the co-benefit of providing habitat and being places that are strongly valued by residents.	Regional Urban Tree Canopy Study Urban Forest Strategy Tree planting and naturalization programs Natural Heritage Strategy Tree management plans Tree by-laws
Industrial Facilities <i>In support of this objective to balance the need for economic generators in the form of industrial facilities with sensitive land uses:</i>	• Encourage the separation of residential uses from employment areas containing industrial uses that may have air quality impacts; and • Preserve employment lands for heavy industrial uses and facilities.	Given the present direction in planning towards mixed use nodes and corridors, Peel region and its municipalities could consider shifting low emitting businesses – particularly offices - into mixed use areas and setting aside Employment Areas for medium to heavier industrial uses which would provide a focus to	

<i>Topic Area/Objective</i>	<i>Policy</i>	<i>Rationale</i>	<i>Tools</i>
		clustering higher polluting industrial facilities and providing a separation from residential areas. This will also assist with achieving a better balance with home and work relationships by locating offices in areas of good transit accessibility, something not readily available in many Employment Areas.	

REFERENCES

- Campoli, Julie and Maclean, Alex S. 2007. *Visualizing Density*. Lincoln Institute of Land Policy, Cambridge, Massachusetts.
- Canadian Medical Association. 2008. *No Breathing Room: National Illness Costs of Air Pollution*.
- City of Toronto. 1998. Idling Control Bylaw.
<http://www.toronto.ca/legdocs/bylaws/1998/law0673.htm>
- City of Toronto. 2000. *Clean, Green and Healthy: A Plan for an Environmentally Sustainable Toronto*.
- City of Toronto. 2007. Green Development Standards.
- City of Toronto. 2008. *Ahead of the Storm: Preparing Toronto for Climate Change*. Toronto Environment Office.
- City of Vancouver. 2007. Progress Report on Vancouver Green Building Strategy.
- Data Management Group. 2006. *Transportation Tomorrow Survey*.
- Environment Canada. *Clean Air Online*. Site accessed August 2008.
http://www.ec.gc.ca/cleanair-airpur/Soil_and_Water-WS789667A5-1_En.htm
- Federation of Canadian Municipalities (FCM). 2004. *Quality of Life in Canadian Communities: Growth, the Economy and the Urban Environment. Theme Report #3*.
- Frank, L.D., Sallis, J.F., Conway, T., Chapman, J., Saelens, B. Bachman, W. 2006. *Many Pathways from Land Use to Health: Associations Between Neighbourhood Walkability and Active Transportation, Body Mass Index, and Air Quality*. Journal of the American Planning Association.
- London Air Pollution Planning and Local Environment Working Group. 2007. Air Quality and Planning Guidance.
- Lwebuga-Mukasa, J. S., Ayirookuzhi, S. J., and A. Hyland. 2003. *Traffic volumes and respiratory health care utilization among residents in close proximity to the Peace Bridge before and after September 11, 2001*, Journal of Asthma. Vol. 40: 855-864.
- Metro Vancouver. 2008. *Metro Vancouver's Growth Strategy: Actions for a Sustainable Region*. (Incomplete Draft dated April 2008). www.metrovancouver.org.
- Ontario Medical Association. 2005. *Illness Costs of Air Pollution*.
- Ontario Ministry of the Environment. 2006. *Town of Caledon Regional Airshed Characterization Study Report*.
- Oyana, Tonny, Rivers, Patrick. 2005. *Geographic Variations of Childhood Asthma Hospitalization and Outpatient Visits and Proximity to Ambient Pollution Sources at a U.S.-Canada Border Crossing*, International Journal of Health Geographics. Accessed online at: <http://www.ij-healthgeographics.com/content/4/1/14>.
- Province of Ontario. 2004. *Clean Air Action Plan: Protecting Environmental and Human Health in Ontario*.
- Province of Ontario, 2005. Greenbelt Plan.

Province of Ontario. 2006. Clarkson Airshed Study. Part II: The Ambient Air Monitoring Program.

Province of Ontario, 2008. Clarkson Airshed Study, Part III: The Air Quality Dispersion Monitoring Source Contribution Assessment

Province of Ontario. 2006. Places to Grow: Growth Plan for the Greater Golden Horseshoe. Ministry of Public Infrastructure and Renewal.

Province of Ontario. 2005. Provincial Policy Statement, Ministry of Municipal Affairs and Housing.

Region of Halton. 2004. Appendix L: Air Quality Management Strategy to the Halton Region Transportation Master Plan.

ibid. 2007. *Air Quality, Human Health and the Built Environment: Protecting Air Quality Through the Land Use Planning Process*.

ibid. 2007. Health *Department's Proposed Air Quality Program*, Report No. MO-35-07.

Region of Peel. 2002. *State of the Environment Report*.

ibid. 2005. Official Plan Strategic Update: Regional Official Plan Amendment 16.

ibid. 2005. Official Plan (office consolidation).

ibid. 2005. *State of the Region's Health: Focus on Overweight, Obesity, and Health-Related Consequences in Adults*.

ibid. 2006. Clean Air Strategy: Service Strategy Business Plan.

ibid. 2007. *Follow on Motion Regarding the Adverse Health Effects of Ambient Air Pollution*. Report to the General Committee.

ibid. 2007, *Electricity Supply Mix, Air Quality and Health*, Report to the General Committee.

ibid. 2007. *Peel Region Official Plan Review: Background Paper on Air Quality*.

ibid. 2008. Greening Greater Toronto. Commissioner of Environment, Transportation and Planning Services.

RWDI. 2005. Development of Policy Papers for Phase Two of the Transportation Master Plan for the City of Hamilton: Air Quality Policy Paper.

Smart Growth America. 2002. *Measuring Sprawl and its Impacts*. Site accessed June 2008, <http://www.smartgrowthamerica.org/sprawindex/sprawindex.html>

Song, Yan and Knaap, Gerrit-Jan. 2004. *Measuring Urban Form: Is Portland Winning the War on Sprawl?* Journal of American Planning Association.

Treasury Board of Canada Secretariat. Report on the Application of the Alternative Fuels Act – Fiscal year 2005 – 2006. Site accessed at: http://www.tbs-sct.gc.ca/report/other/2006/afa02-eng.asp#_Toc147130523

APPENDIX A: LONDON AIR QUALITY AND PLANNING GUIDANCE



Air Quality and Planning Guidance

Revised version- January 2007

**Written by:
The London Air Pollution Planning and the Local Environment
(APPLE) working group**

London Councils Air Quality and Planning Guidance

1. Introduction

1.1 Purpose of the guidance

This guidance is aimed at developers, their consultants and local authorities. It revises previous guidance issued in 2001 and provides technical advice on how to deal with planning applications that could have an impact on air quality. If developers and local authorities follow the procedures in this guidance, it will help ensure consistency in the approach to dealing with air quality and planning in London. This revised guidance was endorsed by the London Councils Transport and Environment Committee (TEC) on 17th October 2007.

The recent Government draft Air Quality Expert Group (AQEG) *Air Quality and Climate Change* report recognises the potential for both local and global air quality improvements. Local authorities will be looking towards reductions in both and developers should take this into account throughout the design, construction and operational phases of a development, bearing in mind any potential trade-offs between global and local air quality improvements.

1.2 Background

Clean air is vital to human health. High levels of fine particulate (PM₁₀) air pollution in 2005 were estimated to have caused 1,031 accelerated deaths and 1,088 respiratory hospital admissions in London¹.

The Government adopted the UK Air Quality Strategy (AQS) in 1997, to deal with local air quality and its impact on health. This was revised as the AQS for England, Wales, Scotland and Northern Ireland in 2000, which set requirements for local authorities to undertake a process of Local Air Quality Management (LAQM). As part of this process, local authorities must review and assess air quality and work towards objectives to be achieved between 2003 and 2010. Where the prescribed air quality objectives are unlikely to be met, local authorities must designate Air Quality Management Areas (AQMAs) and produce an Air Quality Action Plan setting out measures they intend to take to work towards objectives. Under the requirements of the Greater London Authority Act 1999, the Mayor of London produced an Air Quality Strategy in 2002 setting out how the National Strategy will be implemented in London as a whole. London borough Action Plans need to have regard to this strategy.

By 2006, all but one borough has declared AQMA(s) for nitrogen dioxide (NO₂) and/or PM₁₀. The major cause of air pollution in London is road traffic, although around Heathrow Airport, emissions from aircraft and associated site traffic are an additional problem. Other notable contributions come from industrial plant and premises, domestic energy production, and construction activity. It should be remembered that background pollutant concentrations in London and the South East are heavily influenced by weather systems that also affect northern Europe.

A consultation on the review of the National AQS was issued in April 2006. The Government is proposing an 'exposure reduction' approach in line with the proposed EU Thematic Strategy. This approach supplements air quality objectives (which are focused at hot-spots) to achieve a general reduction in pollution concentrations in urban areas across the whole

¹ The Mayor's Air Quality Strategy: Progress report to March 2005.

country. Any changes in the National AQS will be reflected in future borough Review and Assessment, and policy work.

A key principle of LAQM is for local authorities to integrate air quality considerations with other policy areas, such as planning. The recent Planning Policy Statement 23 (PPS23) on Planning and Pollution Control clearly states that air quality can be a material planning consideration. Indeed, PPS23 goes on to state that the planning system should not just seek to maintain the 'environmental status quo', rather "*planning should become a more strategic, proactive force for economic, social and environmental well-being*"². It goes on to say "*The planning system plays a key role in protecting and improving the natural environment, public health and safety, and amenity*"³. It is therefore important for all local authorities to think about how they can best bring air quality considerations into the planning process at the earliest possible stage and it is no longer satisfactory to simply demonstrate that a development is no worse than the existing or previous land use on a particular site.

Where developments take place in an AQMA, mitigation measures should be considered as standard practice, particularly in cases where the development is new and does not replace an existing use. This is especially important where the development has provision for a large number of parking spaces, significantly increasing the number of trips, and/or heating plant.

This guidance takes into account new planning policies, including PPS23, and aims to help reduce exposure to air pollution across the whole of London. This approach should bring health benefits to everyone - not just those living in localised areas (i.e., hotspots) where the objectives are exceeded. This is particularly important for PM₁₀, as this pollutant has a significant impact on health and has no safe threshold. In order to reduce overall exposure, background pollution will need to be reduced, so it makes sense that every development that has the potential to emit pollution should require mitigation or offsetting to help achieve an overall reduction in London's air pollution.

This technical guidance has been produced by the APPLE (Air Pollution Planning and the Local Environment) working group. The document updates and replaces the ALG⁴ Planning Technical Guidance issued on 20th March 2001 and Circular TEC 01/03.

² PPS23 Planning and Pollution Control, ODPM 2004, para. 3.

³ *ibid*, para. 9.

⁴ London Councils was formerly known as the Association of London Government (ALG). Its new name, effective from 1 October 2006, was chosen to reflect more accurately its membership.

2. Air quality assessments for planning applications

2.1 Introduction

Where air quality impact assessments are required as part of a planning application, guidance is often sought by the applicant as how best to undertake these to the satisfaction of the local authority. This document sets out situations when an assessment may be required and suggests methods for undertaking such an assessment within the London area. It is based on situations unique to London and on the experience of London local authorities.

Once an air quality assessment has been completed, the local authority will make a judgement on whether the proposed development is likely to significantly affect air quality or if it is located in an area of poor air quality. If a development is determined to result in a deterioration of air quality, the local authority will often work with the developer to offset this impact by securing mitigation measures that will allow the development to progress. Similarly, if a development is of sensitive use and located in an area of poor air quality, the local authority will work with the developer to ensure all measures are taken to secure acceptable air quality for new receptors.

London local authorities have typically used similar assessment methods to each other to fulfil the requirements of the detailed Review and Assessment process that led to the AQMA designation. For consistency, air quality impact assessments for developments within London should, where possible, follow similar methodologies. Applicants intending to undertake an air quality assessment should always seek the latest information available on air quality and pollutants of concern from the appropriate borough(s). Guidance on the use of air quality assessment applications is available in the Department for the Environmental, Food and Rural Affairs (Defra) *Technical Guidance Note LAQM.TG(03)*.

Appendix 3: Air Quality Assessment Toolkit, provides details of the information that is likely to be agreed with a local authority Air Quality Officer prior to an Air Quality Assessment being undertaken. It is hoped that this checklist will cut out 'consultation fatigue' between developers, or their agents, and local authority officers.

2.2 Developments that require an air quality assessment

The overall outcome of an air quality assessment is to determine whether the development will have a significant impact on air quality or whether the existing air quality environment is unacceptable for the proposed development.

The three main ways a development may have a significant impact are:

1. If the development is likely to cause a deterioration in local air quality (i.e., once completed it will increase pollutant concentrations)
2. If the development is located in an area of poor air quality (i.e., it will expose future occupiers to unacceptable pollutant concentrations)
3. If the demolition/construction phase will have a significant impact on the local environment (e.g., through fugitive dust and exhaust emissions). [Note the proposed London-wide Best Practice Guidance entitled *The Control of Dust and Emissions from Construction and demolition* should help reduce emissions from this stage of a development.

The Environmental Impact Assessment (EIA) process is likely to require a detailed study of the effects of a development on air quality, particularly where a development is to take place in the urban environment or in an AQMA. In such cases, the approach set out in this guidance note should be followed. Most proposals for commercial or industrial installations

that have the potential to emit pollution (e.g., 'Part A' installations) will also normally require an air quality assessment under the EIA regulations⁵. Small industries, such as 'Part B' installations, may still require an assessment as part of a permit application under the Pollution Prevention and Control (PPC) regime⁶, as too would waste handling activities⁷, and the same assessment can often be used to help determine the impact of the development in terms of air quality for a planning application. If for whatever reason planning permission is being sought in the absence of an assessment having been carried out for a permit application or similar, then local authorities should require one to be submitted.

There are likely to be many other situations where developments that do not require a full EIA will nevertheless warrant an air quality assessment as part of the planning application. Developers should always check with the local authority to determine whether an air quality assessment is required before submitting a planning application.

Where it is clear from the initial specification of the development that it is likely that the development will have a minimal impact on air quality, but an air quality assessment may still be required (e.g., within an AQMA), developers may wish to consider identifying air quality mitigation measures from the start as part of the development, instead of undertaking a full air quality assessment. This course of action is at the discretion of the local authority Air Quality Officer, and so it is important that communication between developers, or their consultants, and the local authority takes place at an early stage of the decision making process. This does not apply to applications where an EIA under the town and country planning regulatory regime is required.

When considering issues of relevant exposure it is advisable to refer to the ongoing borough Review and Assessment, carried out as part of the Local Air Quality Management duties, specified by the Environment Act 1995. Also, wherever possible, air quality assessments should be carried out so as to allow comparison with a borough Review and Assessment.

Key Points:

Local authorities will consider the following issues when determining whether an air quality assessment should normally be undertaken:

- Locality of development – including relevant exposure;
- Length of time and scale of demolition/construction phase;
- Likely increase in traffic levels from existing base (either through servicing or parking requirements);
- New industrial development (e.g., boiler plant/energy production/permitted installations/authorised processes);
- Size of development - residential/commercial floor space or number of units;
- Street canyons and stationary or queuing traffic;
- Increase in HDV movements (e.g., more than 20 per day), such as for lorry parks, depots, bus stations;
- New rail, road building and signalling, bridge, tunnel, port or airport developments;
- Waste handling activities.

***Note:** This list is not exhaustive and other factors may determine that, in the local authority's opinion, an air quality assessment is required.*

⁵ The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, SI 293/1999.

⁶ The Pollution Prevention and Control (England and Wales) Regulations 2000, SI 1973/2000.

⁷ Waste Management Licensing (England and Wales) Regulations 1994 (as amended).

2.3 General principles of air quality assessments

There are two primary factors that impact upon the AQ assessment of a proposed development:

- **Site suitability:** it should be recognised that a development in an area that is already exceeding AQ limits could have a detrimental impact upon its residents;
- **Impact of development:** the impact of the development on the environment needs to be detailed. An air quality impact assessment should clearly indicate the likely change in pollutant concentrations (relevant to the air quality objectives⁸) arising from the proposed development– during both the construction and operational phases. The assessment must consider the **difference** in air quality as a result of the proposed development.

There is no single, definitive method for carrying out a detailed air quality impact assessment, but the method must be appropriate for the development. For some developments screening models may be acceptable, provided they can be demonstrated to work and are suitable for the urban environment. Where a detailed dispersion modelling is required, developers should consult the local authority's air quality officer about the proposed modelling technique, to ensure it is appropriate for the air quality assessment.

Consistency is important in all air quality assessments and this guidance note is particularly concerned with air quality assessments where dispersion models are to be used. The scope for inconsistency is greater due to the range of different possible model inputs in such situations.

Where practicable, air quality assessments should take into account the cumulative air quality impacts of other developments, both within the authority and neighbouring boroughs. These should include both committed developments (i.e., those proposals that have been granted planning permission at the time the assessment is undertaken), as well as other proposals which planning officers consider are likely to proceed. This will ensure that a realistic scenario of air quality in the AQMA is presented for both the 'baseline' and 'with development' predictions of the air quality impact of the development.

The granting of outline planning permission should follow the precautionary principle. In the case of high-risk developments a full EIA is likely to be required, therefore the information provided should be the same as that of a full planning application. However, where a development is seen as a lower risk, outline planning permission may be granted. Local authorities should ensure that suitable planning conditions are attached to the outline planning permission requiring further consideration to be given to environmental issues at a later stage, before detailed permissions is granted. This issue is dealt with in further detail in Annex 1 of PPS23: Pollution Control, Air and Water Quality.

⁸ The Air Quality (England) (Amendment) Regulations 2002, SI 3043/2002.

Key Points:

An air quality assessment must demonstrate how a development would affect pollution concentrations in relation to health based statutory and proposed air quality standards and objectives.

This would normally involve dispersion modelling to:

- Assess the current air quality situation in the locality;
- Estimate emissions of local air pollutants from the development;
- Predict statistics relevant to the air quality objectives *without* the development in place relative to the year of opening and air quality objectives (EU Limits year 2010 or relevant EU limit years)- the baseline scenario;
- Predict statistics relevant to the air quality objectives *with* the development in place in the same years;
- The cumulative impact of developments should be considered.

Modelled baseline scenarios should also be checked against the local authority's predicted baseline scenarios, to ensure that they broadly agree. If not, the predicted pollutant concentrations, without development, might show an exceedance of air quality objectives where a local authority's Review and Assessment did not, or vice-versa; full explanations should be given for differences in modelling approached and assumptions. The factor of greatest importance would be the *difference* in air quality associated with the proposed development compared to the baseline.

2.4 Choosing a dispersion model

Dispersion models should be used in almost all cases for large developments, or those developments proposed in areas where air quality is approaching or exceeding the relevant standards or objectives. Defra guidance *LAQM.TG (03)*⁹ suggests models that can be used for air quality assessments– it could be beneficial to confirm the selection of the model with the local authority. The model should be capable of taking into account all relevant emission sources within London, for example; line (major road) and area (minor road, domestic heating, individual boilers, commercial etc.) sources. The application should also be able to include point sources (i.e., chimney stacks) from nearby industrial sources. Where relevant the model should be able to determine the effect of height on air pollutant concentrations, if relevant for the planning application under consideration.

2.5 Model input data

The assessment should provide a transparent account of the modelling undertaken, all assumptions made and input data used. The local authority may request an audit of the assessment, in which case the developer must provide any extra appropriate data requested.

2.5.1 Emissions data

The Greater London Authority (GLA) has responsibility to compile an atmospheric emissions inventory for London. This inventory is annually updated using best available data and is used as the basis for all London local authorities' air quality Review and Assessment reports.

The most recent version of the London Atmospheric Emissions Inventory (LAEI) should be used for an air quality assessment within London, unless significantly better data are

⁹ LAQM Technical Guidance. LAQM.TG (03), Defra 2003.

available. Developers can obtain this inventory directly from the GLA Air Quality Team¹⁰. Road traffic emission factors are incorporated into the LAEI but can also be obtained from the Emission Factor Toolkit (v2e)¹¹. Comparison should be made with monitoring data from Defra's Automatic Urban and Rural Network or the London Air Quality Network where appropriate¹².

If other emission data is needed for specific situations, such as more recent emission factors on idling, slow speeds or cold starts, they should be shown to be consistent with those used in this inventory; further information can be sort sought from the GLA or local authority.

Except for situations where a distant major source has a significant effect on pollution levels in the area of interest, only major roads and stacks in the vicinity of the development need be included explicitly. The study should take into account the proposed model output area, which may include nearby sensitive receptors and other local hot spots of concern to the local authority.

Background air pollution can be accounted for by using urban background data from a nearby monitoring station where the data is sufficiently relevant to the study area. However, care should be taken to avoid double counting emissions if the urban background concentrations are used.

Distant major sources within London should be included within aggregated grid sources and must be included when using rural background data. Where a model is unable to include all emissions sources across London in this manner, it should be demonstrated that the omission of these sources does not affect the model results. Minor roads in the immediate vicinity, which are congested or show large increases in traffic and which have been included in the transport assessment, should also be modelled.

Further information on emissions and atmospheric emissions inventories, can be found in the Defra's technical guidance document *LAQM.TG (03)*.

2.5.2 Time-varying emissions

Traffic flows and speeds, and hence emissions, vary throughout the day; if appropriate emissions from vehicles should vary within the model, by time of day and by day of week. Where possible, time-varying traffic movements should be based on local information, for instance a local network of automatic traffic counters (ATCs). This information is most applicable for assessments looking at short-term objectives.

The additional density of emissions that occurs during traffic congestion needs to be properly addressed in the assessment. This is particularly important where that proposed development is likely to result in increased congestion or increased queue length. For industrial processes, these should be modelled to vary in time as would be expected by the authorisation or permit.

2.5.3 Supplementary traffic data

Where a transport assessment (TA) has been prepared for a proposed development, modelled or predicted development traffic flows in the TA should generally be used as the

¹⁰ GLA Air Quality contact: 020 7983 4492.

¹¹ Emission Factor Toolkit (v2e) currently available from http://www.casellastanger.com/modelling_helpdesk/subjects/emission_factors_toolkit.asp

¹² The Mayor's AQ Strategy. September 2002.

basis for the calculation of 'with development' emissions and subsequent model runs. **Before an air quality assessment based on a TA is undertaken, the TA should be approved by the local authority's traffic planners, in consultation with their air quality officers.** If this does not happen, developers risk undertaking an air quality assessment on the basis of traffic proposals that may subsequently change, risking the assessment becoming obsolete. Through liaising with traffic engineers and dispersion model users, it is usually possible to obtain traffic data in a suitable format to perform an emissions calculation.

Where the proposed development is likely to result in additional congested traffic conditions, the TA will need to provide sufficient information to quantify the times when queuing around junctions is likely to occur. Particular care should be taken in selecting appropriate traffic speeds.

2.5.4 Weather data

The format required will depend on the model to be used, and should be checked with the supplier of the dispersion model.

Key Points:

- Weather data should be taken from an appropriate and representative site with a full dataset;
- At least one year of hourly-sequential data should be used;
- In adopting a precautionary approach, it is currently recommended that suitable 'worst-case' MET year be used, as well as a 'typical' MET year.

2.5.5 Model specific data

Depending on the model used and the area in question, there are many parameters that should be agreed prior to modelling being undertaken.

Key Points:

These might include:

- Site surface roughness length (typically 1m to 2m in London);
- Minimum Monin-Obukhov length (certain models only);
- The number and dimensions of any street canyons (streets where pollutant dispersal is adversely affected by surrounding buildings);
- Release height of aggregated sources (grid or volume sources).

2.5.6 Background pollution data

Pollution can be carried into London or into the modelled area from non-local sources. If this is smaller than the whole of the London area, it must be taken into account. Validated and ratified monitoring data should be taken from an appropriate background site or from the National Air Quality Archive¹³, background emissions data can also be gathered from the National Atmospheric Emissions Inventory database¹⁴, in most cases the same year as the

¹³ <http://www.airquality.co.uk/archive/laqm/laqm.php>

¹⁴ <http://www.airquality.co.uk/archive/laqm/laqm.php>

weather data will be used; however, there may be occasions when data from different years may be appropriate. The developer should agree in advance with the local authority's Air Quality Officer which background data should be used.

2.6 Pollutant-specific concerns

If a development is expected to alter traffic flows, PM_{10} and NO_2 would normally be modelled, since widespread exceedences of these pollutants are predicted across much of London, and motor vehicles are a significant source of each. If the development is itself a significant emitter, pollutants relevant to the type of development need to be taken into account (for instance, SO_2 and NO_2 should be considered for an oil-burning process or benzene from a petrol station or refinery).

The results for local air pollutants should be compared against air quality objectives. Any likely exceedences or worsening of air quality as a result of the development must be highlighted.

Local Concerns

2.6.1 Nitrogen dioxide (NO_2)

NO_2 is derived from NO_x (oxides of nitrogen) via a series of complex chemical reactions. An empirical method or a chemistry scheme may be used to derive NO_2 from NO_x .

Key Points:

- All inputs relevant to the chosen chemistry scheme or a $NO_x:NO_2$ conversion scheme should be used (see LAQM.TG(03)) and detailed in the report;
- The model's NO_x outputs should be shown. A full table of outputs should be shown in the appendix, identifying road contributions, adjusted road contributions and total concentrations. The details of the verification process should also be included.

2.6.2 Fine particles (PM_{10})

The objective for PM_{10} is based on a gravimetric measurement. Any PM_{10} modelling study should present results as a *gravimetric equivalent*. Projection of PM_{10} for future years should follow the Defra guidance LAQM.TG (03).

Key Issues:

- PM_{10} should be calculated as a gravimetric equivalent;
- Secondary and coarse PM_{10} components should be included.

2.6.3 Sulphur Dioxide (SO_2)

The objective for SO_2 that is likely to be hardest to meet is the 15-minute objective.

Key Points:

- The assessment should demonstrate that the modelling methodology provides a reasonable assessment against the 15-minute and 1 hour objectives.

2.6.4 Other pollutants

There are other local air pollutants (including those not in the Air Quality Regulations) that may also be relevant to specific developments. The developer should check with the local authority to determine whether they need to consider the implications of other pollutants or take into account any new air quality objectives. Other pollutants could include:

- Carbon monoxide (CO)
- PAH (poly aromatic hydrocarbons)
- PM_{2.5}
- Heavy metals
- Benzene
- Industrial pollutants eg dioxins, halides
- Ozone (O₃)

Global concerns

2.6.5 Climate Change Emissions

Although these pollutants are not included in the Air Quality Regulations for Local Air Quality Management, they are of global importance for their contribution to climate change. Many policies that reduce traffic flow will tend to bring about reductions in both carbon dioxide (CO₂) and local air pollutants. However, although these pollutants are closely linked, it cannot be assumed that this will be the case for all measures¹⁵. Therefore, it is important to consider total CO₂ emissions alongside an air quality assessment (both local and remote emissions).

The integration of climate change policies with the planning process is a progressive move, and it is recognised that local authorities are at different stages of incorporating climate change policies into their general practices. The development of Local Implementation Plans, setting out how London borough's are going to implement the Mayor's Transport Strategy, should take into account Air Quality Action Plans, and will facilitate this process; typically incorporating developments which lead to an increase in traffic generation.

2.6.6 Estimating Climate Change Emissions

A planning application should give details, in its air quality assessment, where the design, construction and operation of the development has accounted for reductions in Climate Change emissions. Any potential 'trade-off' issues between local air quality and climate change emissions should be acknowledged within the assessment.

CO₂ emissions from sources such as traffic and buildings can be estimated from the London Atmospheric Emission Inventory. Such data may be useful to a borough when considering off-setting the impact of development.

¹⁵ AQEG. Air quality and climate change: A UK perspective (draft)

2.7 Model output area

The output results should cover the area likely to be affected by the proposed development. For a development that affects traffic movements, the output should cover the area where traffic movement is significantly affected, i.e., as a minimum all the roads included in the transport assessment.

The results produced would normally be in the form of a detailed contour plot of predicted pollutant concentrations and scale of air quality change. A map showing predicted concentrations with the development in place and a map of the *difference* in concentration with and without the development should both be produced. Ideally, the grid spacing for any contour plots should not be more than 5 metres, to ensure robust definition.

In certain cases it may be acceptable for the assessment to predict concentrations at a number of carefully selected receptors. The developer should agree the output area, location and number of receptors in advance with the local authority. All receptors should be presented on an appropriately scaled Ordnance Survey map.

In the case of tall buildings, developers may need to consider the vertical as well as the horizontal dispersion of pollutants in terms of model outputs. Developers should consider the surrounding environment of the development - any high level point sources, such as chimney stacks or ventilation outlets, should be identified to ensure that the proposed development does not encroach upon the plume dispersion. This is vital with the increase in high-rise developments within London. Developers should therefore take into account any research, emerging studies or guidance on this matter¹⁶. The Building Research Establishment (BRE) has produced reports concerning the dispersion of pollutants over a building envelope.

Authorities may require source apportionment data in order to evaluate mitigation and off-set strategies.

Key Points:

- The area affected by the development should be adequately covered by the model output;
- The output should be on an Ordnance Survey map or similar and in a table;
- Maps of the difference with and without the development should be provided where possible;
- Locations and height of receptors should be clearly indicated (on the map);
- The assessment should consider whether the development will create new areas of exposure or increase existing exposure;
- The difference in concentration should be given in $\mu\text{g}/\text{m}^3$;
- The cumulative impact of multiple developments within a localised area should be considered.

2.8 Model Verification

Because of the number of uncertainties associated with dispersion modelling, the performance of the model being used in relation to measured pollution concentrations in a similar environment should be demonstrated. For air quality assessments in London, it should be demonstrated as a minimum that the model can adequately predict pollution concentrations in a similar urban environment, preferably within the borough where the development is proposed, since model performance may vary from location to location.

¹⁶ Also see DAPPLE research project <http://www.dapple.org.uk/>

Where the model is used to predict statistics relevant to the air quality objectives (such as percentiles), the evidence of model performance should also address this. Evidence of this should either be incorporated into the report, or submitted with it.

Wherever possible, it is preferable to verify the model against measured pollution concentrations using the same input parameters as for the air quality assessment. Within London, there are many continuous monitoring sites that may be used to validate a modelling exercise. Sites within London are normally associated with the Automatic Urban and Rural Network (AURN)¹⁷ or the London Air Quality Network (LAQN)¹⁸, but the local authority may collect its own data from a nearby air pollution monitoring station; this can also be used for any necessary validation work. For a more complete description of the approach to the verification of a model please see *LAQM.TG(03)*.

Key Points:

- Evidence of model performance must be provided (e.g., with the release of the version of the model used) or where possible from a new site-specific validation exercise;
- The accuracy in terms of margin of error or uncertainty of the results must be stated explicitly;
- Any scaling factor applied to model outputs (e.g., to adjust results according to observed data) must be clearly stated;
- The model's effectiveness at predicting statistics relevant to the air quality objectives must be demonstrated.

2.9 Determining significant impacts on air quality

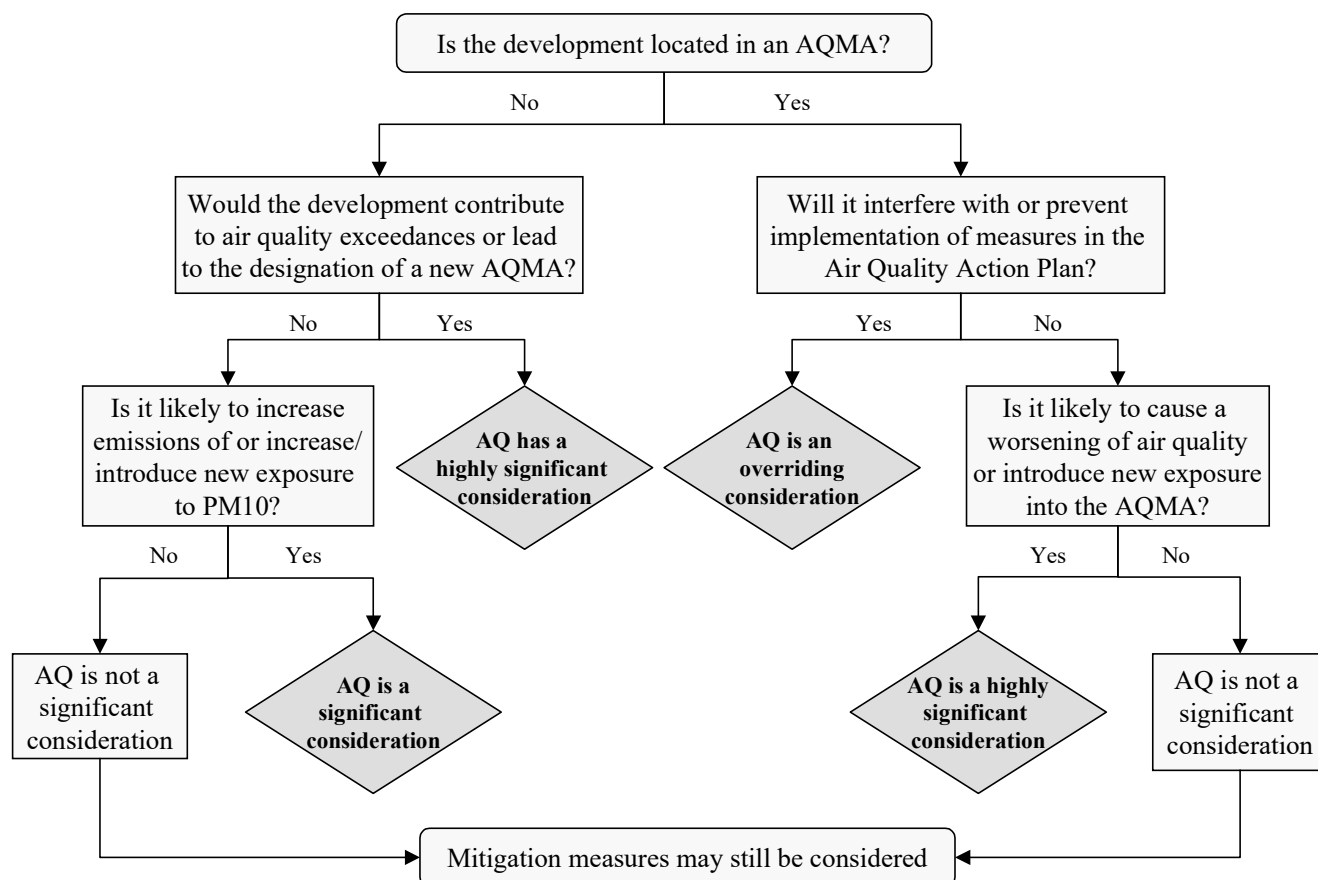
One of the key concerns with regard to assessing the air quality impact of a development in London is its impact on human health. It is important that an air quality assessment evaluates modelled air quality in terms of changes in pollution concentrations where there is relevant public exposure. The current Air Quality Regulations are concerned with areas that exceed air quality objectives but this may be revised to favour overall exposure reduction. This guidance follows this approach, where any development that may lead to additional air pollution problems, even if it is outside an AQMA, could be significant. Local Authority Air Quality Officers will make a judgement on the likely impact of each development, based on the results of the air quality assessment and their professional experience. The local authority may also consider the impact of the development on air quality in neighbouring authorities.

The following diagram should assist in determining whether the application is significant in terms of air quality. In line with PPS23, air quality can be a material consideration in the planning process. **Only zero-emission developments are unlikely to have any impact on local or global air quality** and therefore mitigation should be a consideration for **all** developments. Please refer to **Section 3** on Mitigation.

¹⁷ <http://www.airquality.co.uk>

¹⁸ <http://www.londonair.org.uk>

Determining significant impacts on air quality



Note: Where **significant** is used, it will be based on the professional judgement of the Local Authority officer.

In determining both the significance of exposure to air pollution and the levels of mitigation required, consideration should be given to the following Air Pollution Exposure Criteria (APEC) table:

	Applicable Range Nitrogen Dioxide Annual Mean	Applicable Range PM10	Recommendation
APEC – A	> 5% below national objective	Annual Mean: > 5% below national objective 24 hr: > 1-day less than national objective	No air quality grounds for refusal; however mitigation of any emissions should be considered.
APEC – B	Between 5% below or above national objective	Annual Mean: Between 5% above or below national objective 24 hr: Between 1-day above or below national objective.	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g., Maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
APEC – C	> 5% above national objective	Annual Mean: > 5% above national objective 24 hr: > 1-day more than national objective.	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

Note: Applicable ranges assume downward pollutant trend has been established.

2.10 Reporting the Assessment

In summary, the following information should be provided as a minimum when reporting an air quality assessment:

- **A description of the methodology used**
- **Evidence of model performance or validation results**
- **Details of any extra emissions calculations**
- **Input data- sources included, input parameters specific to the model and site, meteorology etc**
- **Years modelled**
- **Assessment against relevant air quality objectives**
- **Model output data, on maps where appropriate**
- **Discussion of results**
- **Determination of significance**
- **Conclusions**

2.11 Audit trail

The assessment should provide a transparent account of the modelling undertaken and all assumptions made. Should an audit of the assessment be required, the local authority may request extra data.

3. Mitigation of air quality impacts

This guidance has been designed to help local authorities to identify those developments that are likely to have significant air quality impacts. The local authority will make recommendations based on the assessment result in the flow chart, but it is not the case that all those where air quality is an overriding or highly significant consideration is necessarily refused. Instead, local authorities should work with developers to explore mechanisms to ensure that a development has a beneficial impact on the environment. In terms of air quality, this may be through careful design of the development or by securing mitigation or off-setting measures through planning obligations or conditions that will allow the development to go ahead.

3.1 Construction phase

Emissions and dust from the demolition and construction phase of a development can have a significant impact on local air quality, especially from large developments where this phase can take many years. The APPLE working group has produced draft Best Practice Guidance entitled: *The Control of Dust and Emissions from Construction and Demolition* that looks at best practical means to control dust and emissions from construction sites. This guidance is due to be adopted in partnership between London Councils and the Mayor of London in 2006, and boroughs will be able to use this in the planning process to help minimise the impact from fugitive dust emissions and vehicle exhausts.

3.2 Design of the development

The design of the development will have a bearing on the overall impact that it will have on the environment. The Mayor's London Plan identifies that suitable design and construction constraints have to be placed on developments to ensure the protection of the local air quality, and every effort should be taken to achieve an integrated approach to air quality and emission reductions through improved energy efficiency and energy use¹⁹.

Careful consideration should be given to the site characteristics of the development, as particular elements of a scheme may be more sensitive to air pollution than others, for example a children's play space should be located away from roads with high levels of air pollution. The appropriate design, layout, orientation and construction can avoid increasing exposure whilst minimising energy demand and energy loss. Further details of design approaches can be found in the Mayor of London's Sustainable Design and Construction Supplementary Planning Guidance (SPG).

The local authority should consider issues such as ventilation provision and location of opening windows and doors to improve indoor air quality. In the case of tall buildings, mixed use can help make development acceptable by, for example, placing residential use on higher storeys away from sources of air pollution (and noise) at ground level, allowing for balconies and open-able windows, while lower floors can accommodate commercial uses where mechanical ventilation and windows that cannot be opened are more acceptable. The use of outside space is also important, and roof gardens and roof terraces have been encouraged by the Mayor²⁰. However, exposure levels should still be considered; with the location of the roof terrace (height of open space), and adjacent roof exhausts and intake vents, all being factors that can impact upon the exposure levels at these open spaces.

¹⁹ The London Plan: Spatial Development Strategy for Greater London. February 2004. pg162.

²⁰ Living Roofs: Promoting green roofs, roof terraces and roof gardens across London. GLA. June 2005.

3.3 Building emissions

The Mayor of London's SPG on Sustainable Design and Construction highlights the impacts that buildings can have on the local and global environment. An estimated 20% of NO_x in London is emitted directly from buildings. In addition, buildings contribute an estimated 24% of the total CO₂ emissions directly contributing to climate change. Together with the Mayor's London Plan, the SPG presents a number of requirements that developers should meet, where possible, including the following:

3.3.1 Energy efficiency

Part L of the Building Regulations identifies the legal minimum a development needs to meet in terms of energy efficiency in the UK. However, in London developers should look to meet more stringent demands that have been set by the Mayor in the London Plan, with the overarching aim of reducing CO₂ emissions, improving energy efficiency and increasing the proportion of energy generated from renewable sources. Many of these options will have direct synergies with the improvement of local air quality.

A development may increase local pollutant concentrations whilst making a positive impact in other areas. For example, a CHP plant serving 1000 dwellings will give rise to increased pollutant concentrations from a single point source. However, there are potential trade-offs with the removal of 1000 less efficient, individual boilers. Methods to reduce the impacts of large-scale CHP need to be planned into a development at an early stage. These include:

- using a fuel suitable for the location (gas produces lower emissions than oil or wood);
- correctly calculating the height of boiler flues;
- incorporating technologies that reduce emissions, such as low NO_x burners and fan dilution;
- ensuring the energy from the installation is fully utilised.

Consideration of the net balance of emissions may be more appropriate in such a case rather than just considering local pollutant emissions in isolation.

3.3.2 Renewable energy

The Mayor's London Plan requires 10%²¹ of energy demand in new development to be generated by renewables on site. A large number of boroughs have set a 10% proportion of energy to be supplied from renewable sources, and some boroughs are seeking even higher renewable energy contributions. There are a number of different energy options and technologies available, and developers should select the most favorable technology to bring about the greatest reduction in CO₂ emissions. Details and guidance of available techniques and their suitability can be found in the Mayor's Energy Strategy and London Renewable's publication: *Integrating renewable energy into new developments: Toolkit for planners, developers and consultants*²².

3.3.3 Supply of energy

Developers should consider supplying energy schemes such as tri-generation combined heat and power (CHP), or district heating from the outset. These are more efficient at reducing

²¹ At the time of writing, the Mayor's *Draft further alterations to the London Plan*, published on 29th September 2006, have increased this target to 20%- however, this is still only as yet a draft target.

²² http://www.london.gov.uk/mayor/environment/energy/docs/renewables_toolkit.pdf

emissions than installing gas central heating or condensing boilers in each dwelling, and can lead to reduced emissions of local air pollutants and CO₂.

Developers need to consider how dwellings will remain cool once they are occupied. Air conditioning can put additional strains on energy consumption and should be considered as a last resort. Air conditioning can be designed out by the use of well designed passive ventilation, sensible building orientation and using materials with a high thermal mass. Renewable energy sources should always be used in association with any air conditioning installation.

3.4 Planning Conditions

In Annex 1 of PPS23, it is stated that there may be some cases where it is appropriate to use planning conditions to control aspects of a development that are not covered by a pollution permit. Examples include controlling transport modes, hours of operation and reducing air pollutants and dust from certain phases of the development, such as construction. A planning condition has to be necessary and relevant to the development to be valid. Further advice can be found in Government Circular 11/95.

3.5 Planning obligations

Annex 1 of PPS23 also describes how section 106 agreements can be used to require developers to provide assistance or support to enable local authorities to implement any actions in pursuit of their Air Quality Action Plan. Typically, measures will focus on ways to reduce the need to travel or encourage more sustainable travel, but it may often be appropriate for developers to fund measures elsewhere within the AQMA as a way to off-set any predicted increases in pollutant emissions. The following are examples of measures that London local authorities have successfully secured in the past through section 106 agreements. Further advice can be found in Government Circular 05/2005.

3.5.1 Travel Plans

All new developments should make provisions to encourage cycling and walking and wherever possible, seek submission of Travel Plans that encourage staff and visitors to use more sustainable modes of transport rather than rely on car use. Car parking should be discouraged within AQMAs, particularly for developments located near to public transport. Measures in a Travel Plan need to produce quantifiable emission benefits and ideally an element of monitoring should be included in the agreement.²³

The Trip Rate Assessment Valid for London (TRAVL) database is a useful tool to assist in estimating the effect of proposed changes in land use on transport patterns. In addition, TRAVL also contains a Travel Plan monitoring and assessment function, enabling the effectiveness of individual travel plans to be compared over time and with other sites²⁴

Examples of individual measures within a Travel Plan include:

- Secure cycle parking and changing facilities;
- Safe pedestrian routes;
- Facilities for public transport, such as bus stops and lay-bys;

²³ Further information can be obtained from <http://www.travl.org.uk>

- Management and use of parking spaces, so that priority is given to certain categories of people, e.g., disabled people, people with children, visitors, or cars with more than one occupant, electric or low emission vehicles;
- The removal of parking spaces after a specified period, or when access to the site is improved (e.g., new public transport routes, cycle lanes);
- Car free housing developments;
- The provision of information on public transport, walking and cycling access to the site;
- Details on deliveries to the site, covering specification of vehicles and hours of operation, and specifications for lorry parking and turning spaces; and junction and road layouts;
- Employment of a travel plan co-ordinator for the site with responsibility for monitoring;
- Setting targets on the proportion of employee trips to be made by public transport and other alternative modes of transport;
- Setting up or participating in City Car Clubs for residents or employers.

3.5.2 Use of clean/alternatively fuelled vehicles

Promoting the provision of refuelling for alternative fuels such as liquid petroleum gas, liquefied/compressed natural gas or biogas at local fuel stations, encouraging suitable locations for new refuelling facilities, or installing electric vehicle charging points in car parks, can all encourage people to use cleaner-fuelled vehicles. Site operators or occupiers can be required to use clean fuel fleets or restrictions can be placed on them to use specific classes and types of vehicles. They can also be required to monitor the maintenance and carry out emissions testing of the fleet.

3.5.3 Low Emission Schemes and Strategies

All reasonable means to minimise emissions from a scheme should be adopted. Measures may include using opportunities to regulate vehicle emissions, either in relation to European Emission Standards or CO₂ emissions, in line with Vehicle Excise Duty Bandings. Consideration should be given to both incentives and disincentives to influence vehicle emissions in both commercial and residential usage. A more holistic approach would consider all types of emissions from a development and there may be opportunities to off-set vehicle emissions with energy emissions and vice versa.

3.5.4 Air quality monitoring

Section 106 agreements can be secured to require the operator or occupier to monitor emissions or concentrations of pollutants at off site locations. London local authorities have also secured section 106 agreements to require developers to contribute to their borough wide air quality monitoring programmes. In these cases, capital funding may be sought for the purchase, installation, operation or maintenance of new equipment.

3.5.5 Other

A local authority can ask for appropriate funds through the section 106 process for any reasonable measure that can help them improve air quality. This means there will be other opportunities to improve air quality that are not highlighted above.

Appendix 1: The Planning Context

Guidance relevant to local planning authority's air quality responsibilities is set out in the following planning policy guidance:

National and London Planning Guidance

Planning Obligations Circular 05/05

This replaces Circular 1/97 and provides revised guidance to local authorities on the use of planning obligations under section 106 of the Town and Country Planning Act 1990 as substituted by the Planning and Compensation Act 91.

Planning Conditions Circular 11/95

This circular sets out guidance on the use of planning conditions for situations that can enhance the quality of the development. Conditions need to be fair, reasonable and practical and meet the tests set out in this document.

PPS23: Planning and Pollution Control (2004)

This document has recently been revised to include requirements under the Environment Act 1995 and states that pollution issues must be taken into account as appropriate planning decisions. In terms of air quality, Annex 1 paragraphs 1.48-1.50 set out how planning conditions or obligations can be used to address the impact of the proposed development on air quality. Appendix 1G gives examples of cases where air quality may be important in planning.

PPG6: Town Centres and Retails Developments (1996), PPG12 Development Plans (2000) and PPG13 Transport (1999)

PPG 6 and PPG12 deal with air quality indirectly by promoting sustainable forms of development i.e., development in locations such as town centres that are well served by public transport in order to reduce traffic generation and emissions. Draft revised PPG13 emphasises the importance of local air quality as an "important consideration in the integration of planning and transport" (paragraph 9). It also states the importance of well-designed traffic management as a measure to reduce local air pollution.

Mayor of London- The London Plan: Spatial Development Strategy for Greater London (2004) and Air Quality Strategy (2002)

The Mayor of London is responsible for strategic planning in London, and his London Plan replaces strategic guidance RPG3. Borough's development plans must conform to the plan. Policy 4A.6 on Improving Air Quality sets out that the Mayor and boroughs should implement the Mayor's Air Quality Strategy to achieve reductions in pollution emissions in the new developments. For example:

- Improving the integration of land use and transport policy by reducing the need for car travel;
- Setting out criteria for different pollutants, against which plans and policies can be assessed;
- Ensuring that air quality is taken into account as a material consideration at the planning application stage.

Policy Guidance LAQM.PG(03), Defra (Department for Environment, Food and Rural Affairs)

This guidance has a chapter on Air Quality and Land Use Planning that states "Any air quality consideration is capable of being a material planning consideration, in so far as it affects land use". The guidance also states "All planning applications should be supported by such information as is necessary to allow a full consideration of the impact of the proposal on the air quality of the area".

NSCA guidance Development Control: Planning for Air Quality

This national guidance was published in 2004 to provide a framework for air quality considerations that need to be taken into account in the development control process. The guidance provides a new approach to addressing air quality impacts compared to previous documents, such as the ALG Planning Technical Guidance issued in 2001.

Local Planning Policy

In London, the major cause of air pollution is road traffic. Although many measures to solve this problem are outside the scope of planning, such as stricter controls on vehicle emissions, there is much local planning authorities can do. The planning policy response should concentrate on policies to reduce the need to travel and policies to encourage the use of public transport, walking and cycling. There should be close co-operation between Planners, Traffic engineers and Environmental Health Officers to integrate land use and transport policies to achieve air quality improvements.

Unitary Development Plans (UDP), Local Implementation Plans (LIP) and Local Development Frameworks

Relevant policies in these documents need to integrate reducing travel with reference to local air quality management. Examples of such policies include introducing low emission or clear zones that limit vehicles entering areas unless they comply with specified emissions limits.

Air Quality Policies

A specific policy on Air Quality Management Areas could be included in the local authorities' development plans. Policies on air quality should make clear that any development being proposed that is potentially polluting e.g., will significantly increase the number of vehicle trips, involve polluting industrial activities, energy generation projects etc. will need a detailed air quality assessment.

Restrictive Parking Policies

Policies that impose restrictive parking standards in areas where development is likely to impact on air quality and lead to exceedences within the AQMA, particularly promoting car free or car 'capped' housing developments could be adopted. Converting existing off-street car parking spaces and car parks to other uses should also be encouraged.

Supplementary Planning Guidance and Planning briefs

For each Air Quality Management Area, Supplementary Planning Guidance notes could be adopted requiring any specific local matters relevant to the development of land. Any planning brief produced for development of land in an Air Quality Management Area should address in detail issues of air quality and how the development will be designed to minimise air pollution from the development. Many Local authorities will have specific AQ SPGs or Sustainable Design and Construction SPGs, which will be relevant to this document.

Appendix 2: References

- Development Control: Planning for Air Quality (Guidance from NSCA on dealing with air quality concerns within the development control process) NSCA 2004
- Use of conditions in planning permission. Circular 11/95. ODPM. 1995
- **LAQM.PG (03)** Policy Guidance (code PB7516), Defra 2003
- **LAQM.TG (03)** Technical Guidance (code PB7514), Defra 2003
- Mayor of London. Air Quality Strategy: Cleaning London's Air. 2002
- Mayor of London. London Plan: Spatial Development Strategy for Greater London. 2004
- **PPG4** *Industrial and Commercial Development and Small Firms* (ISBN 0 11 752723 8), DOE 1992
- **PPG6** *Town Centres and Retail Developments* (ISBN 0 11 753294 0), DOE 1996
- **PPG12** *Development Plans* (ISBN 1 85112 349 0), DETR 1999
- **PPG13** *Transport* (March 2001)
- Planning Obligations Circular 05/2005, ODPM 2005
- **PPS23** *Planning and Pollution Control* (ISBN 0117539317), ODPM 2004

Appendix 3: Air Quality Assessment Toolkit

Throughout this Guidance the importance of communication between Local Authority officers and Developments, or their consultants has been shown. It is hoped that this Toolkit will clearly indicate what information is required to satisfactorily complete an AQ Assessment and what information needs to be agreed prior to the assessment taking place.

Stage 1: *What information should initially be provided to the local authority in order to determine if there is a need for an Air Quality Assessment.*

Locality of development	Definition of spatial scope, including identification of all relevant exposure. Is the site located in and Air Quality Management Area, or will it impact upon an Air Quality Management Area?
Traffic Assessment	Local Authority Traffic Planners/Engineers should advise, in consultation with Air Quality officers, what is required for the traffic impact assessment?
Nature of development	The number of units proposed or commercial floor space.
Parking spaces	The number of parking spaces that are proposed.
Energy usage	The planned source of energy and number of appliances; CHP, individual boilers etc.
Committed developments	Agreement with local planning authority, regarding further developments that should be taken into account.
Road Access	Will there be any alteration to the access roads, or road layouts as result of the development.

Stage 2: If after the information supplied above indicates that an AQ Assessment is required the following information will have to be agreed prior to the AQ assessment taking place.

<i>What models are to be used?</i>	Identify what screening and assessment model is to be used, need to be informed the model was selected and why it's appropriate.
<i>Emissions</i>	Identify appropriate emissions inventory, if not LAEI an explanation of reasons will have to be provided.
<i>Traffic Speeds</i>	What traffic scenarios are to be used for the assessment, identify any changes to traffic flow as a result of the development.
<i>Traffic Congestion</i>	As above, local data can be gathered from local authority traffic assessments
<i>Weather Data</i>	Suitable nearest site should be used for Met data, a worst case scenario and typical Met year should be provided.
<i>Background Source Data</i>	Suitable data should be selected in consultation with the local authority.
<i>Pollutants to be modelled</i>	What pollutants are required to be modelled, taking into account the end use and local environment.
<i>Agreement on model output</i>	Single receptors and/or Gridded output? Grid size?
<i>How will the model be verified</i>	Comparison against recent locally collected data.
<i>Assessment of construction and demolition dust</i>	Identification of risk. Proposed mitigation.

**APPENDIX B: EXCERPT FROM TORONTO GREEN
DEVELOPMENT STANDARD**

(AIR QUALITY)

Toronto GREEN Development Standard

for Mid- to High-Rise Residences, Commercial, Industrial and Institutional Development

	Development Feature	Existing City Standards, Guidelines or Targets	The Toronto Green Standard 2007*	Relationship to Other Standards	Possible Strategies to Implement
Air Quality O.P., Environmental Plan, Climate Change and Air Quality Strategy	Local Materials Avoid long-distance shipping of building materials	None	► <u>Minimum</u>: 10% (based on value) of materials to be harvested, manufactured and supplied within 800 km of project. <u>Preferred</u>: 20% of materials to be harvested, manufactured and supplied within 800 km of project.	- LEED Materials and Resources (MR) Credits 5.1 and 5.2 satisfy minimum and preferred targets - Green Globes Resources E.2 addresses minimum & preferred targets	Identify materials and suppliers that can help to achieve this goal.
	Automobile Infrastructure Discourage single-occupancy automobile use	Zoning Bylaw: Studies are currently underway to determine minimum and in some cases maximum parking standards for downtown office and residential buildings. Standards for shared parking to be incorporated into the zoning by-law.	► Provide the minimum number of parking spaces allowed under the Zoning By-law. - Mixed use developments should include shared use of parking among uses that have different peaking characteristics. - Dedicated priority parking spaces for carpool ride sharing. - Dedicated priority parking spaces for ultra low emission vehicles.	- LEED Sustainable Sites (SS) Credit 4.4 satisfies minimum target - LEED SS 4.3, 4.4 address enhanced targets - Targets addressed by Green Globes Energy C.5 and Canadian Institute of Transportation Engineers (CITE): Promoting Sustainable Transportation Through Site Design Guidelines	Carpool parking spaces, shared parking with adjacent properties.
	Cycling Infrastructure Encourage cycling as a clean air alternative	Zoning Bylaw (former City only): provide 0.75 bicycle spaces per unit for buildings with more than 10 units and 1 parking space for every 1250 m² of non-residential floor space (6 spaces minimum). [under review].	► Provide at least 0.75 bicycle spaces per unit for buildings with more than 10 units and 1 parking space for every 1250 m² of non-residential floor space (6 spaces minimum) - Provide bicycle storage for long term parking, - Provide shower and change facilities for workplaces.	- LEED SS 4.2 satisfies minimum and enhanced targets. - Enhanced targets addressed by Green Globes Energy C.5 and CITE Guidelines	Bicycle racks, secure storage, shower and change facilities
	Public Transit Accessibility Encourage public transit as a clean air alternative	O.P. policies encourage transit-oriented development	Where feasible, integrate transit facilities directly into the development or locate major entrance within 200 metres of a transit stop.	- Not addressed by LEED - Addressed by CITE Guidelines	Integrated design, transit shuttle.

* The symbol "►" identifies the core, minimum requirements of the Toronto Green Standard.



Toronto GREEN Development Standard

for Mid- to High-Rise Residences, Commercial, Industrial and Institutional Development

	Development Feature	Existing City Standards, Guidelines or Targets	The Toronto Green Standard 2007*	Relationship to Other Standards	Possible Strategies to Implement
Air Quality O.P., Environmental Plan, Climate Change and Air Quality Strategy	Pedestrian Infrastructure Encourage walking as a clean air alternative	• O.P. policies promote a beautiful, comfortable and safe public realm with accessible streets, parks and open spaces. • Urban Design Guidelines: Provide guidelines for orienting buildings and improving the public realm. • Draft Toronto Streetscape Manual • Toronto Accessibility Design Guidelines	• ► Provide opportunities for shade, reduced ultra-violet exposure and protection from inclement weather • ► Provide direct integration with existing pedestrian routes • ► Provide appropriate grading and surface treatment, in accordance with the Toronto Accessibility Design Guidelines and the Draft Toronto Streetscape Manual as applicable • Provide clear and sufficient signage • Provide sufficient and appropriate lighting • Avoid conflicts between pedestrian and vehicular routes • Avoid conflicts between pedestrian routes and air exhaust and intake systems.	• CITE Guidelines partially address minimum and enhanced targets • Not addressed by LEED or Green Globes	• Pedestrian-scaled building design, landscaping, lighting and signage.
	Construction Activity Minimize air pollution from construction and demolition	• City Building Permit Construction and Demolition, Article 363 By-law 598-2005: requires identification of method for handling air and dust emissions, recognizing on-site resources, in compliance with sections 6 and 11 of regulation 346 made under the EPA.	• ► For construction and demolition, identify method for minimizing air emissions and dust. • For construction and demolition, identify method for minimizing Volatile Organic Compound (VOC) emissions.	• LEED SS Prerequisite 1 satisfies minimum target	• Air and Dust Emissions Control Plan
	Ozone Protection Minimize contributions to ozone depletion from HVAC&R Equipment	• Toronto Atmospheric Fund: Zero use of CFC-based refrigerants and zero use of halons in fire suppression.	• ► Eliminate use of CFC-based refrigerants and Halons in fire suppression	• Satisfied by LEED EA Prerequisite 3 • Satisfied by Green Globes Emissions, Effluents and Other Impacts F.2	• Install HVAC equipment that uses no CFC refrigerants



Toronto GREEN Development Standard

for Mid- to High-Rise Residences, Commercial, Industrial and Institutional Development

	Development Feature	Existing City Standards, Guidelines or Targets	The Toronto Green Standard 2007*	Relationship to Other Standards	Possible Strategies to Implement
Air Quality O.P., Environmental Plan, Climate Change and Air Quality Strategy	Urban Heat Island Reduction: Roof Reduce ambient surface temperatures	- Green Roof Strategy, adopted by City Council in 2006. Green Roof Performance Criteria: 6 inch depth, 50% coverage, non-monoculture.	► <u>Minimum:</u> Do one of the following: Public Buildings: install a green roof with 50% minimum coverage. The remainder of the available roof (not covered by green roof, other environmental technologies or mechanical equipment) must be covered with light coloured materials* OR Commercial Properties with a Gross Floor Area (GFA) > 10,000 m² and Residential Properties with a GFA > 20,000 m²: Install a green roof with 50% minimum coverage. The remainder of the available roof must be covered with light coloured materials* OR For all other development, install a green roof with 50% minimum coverage OR Install light coloured roofing materials* for 75% of the roof OR Install a combination of both for 75% of the roof. ► Design the green roof to meet the City's performance criteria (6 inch depth, non-monoculture) <u>Preferred:</u> Install a green roof with at least 50% coverage of the roof. The rest of available roof space must be covered with light coloured materials* <u>Excellent:</u> Install a green roof with at least 75% coverage of the roof. The rest of available roof space must be covered with light coloured materials.* <i>*Light coloured materials must have an Surface Reflectivity Index greater than 78 and emissivity greater than 0.9 according to ASTM Standard 408</i>	- Addressed by LEED SS 7.2 - Addressed by Green Globes Site B.2	Green roofs, energy star light-coloured reflective roofing.



Toronto GREEN Development Standard

for Mid- to High-Rise Residences, Commercial, Industrial and Institutional Development

	Development Feature	Existing City Standards, Guidelines or Targets	The Toronto Green Standard 2007*	Relationship to Other Standards	Possible Strategies to Implement
Air Quality O.P., Environmental Plan, Climate Change and Air Quality Strategy	Urban Heat Island Reduction: At Grade Reduce ambient surface temperatures		► Do one of the following: Provide cover, including trees, that shades at least 30% of hardscape, including surface parking areas, walkways and other hard surfaces OR Use light coloured materials* for 50% of hardscape, including surface parking areas, walkways and other hard surfaces OR Use a combination of shading and light coloured materials* for 50% of hardscape, including surface parking areas, walkways and other hard surfaces * <i>Light coloured materials must have a reflectance of 0.3</i>	- Addressed by LEED SS 7.1 - Addressed by Green Globes Site B.2	Soft landscaping, natural shading, light-coloured materials
	Indoor Temperature Ensure a comfortable indoor climate	Compliance to ASHRAE 55-2004 Thermal Comfort standards for City-owned and leased buildings.	► Comply to ASHRAE 55-2004 Thermal Comfort standards.	- Satisfied by LEED Indoor Environmental Quality (EQ) Credit 7.1 - Satisfied by Green Globes Indoor Environment G.4	Design envelope and HVAC system to maintain specified comfort ranges
	Indoor Ventilation and Filtration Ensure clean and fresh indoor air	- Compliance to ASHRAE 62-2004 Ventilation standard for City-owned and leased buildings. - Smoke Free Bylaw	► <u>Minimum</u>: Comply to ASHRAE 62-2004 Ventilation standards ► <u>Preferred</u>: Achieve outdoor ventilation rates 30% above minimum required by ASHRAE 62.1-2004.	- Minimum satisfied by LEED EQ Prerequisite 1 and Green Globes G.1 - Preferred satisfied by LEED for Existing Buildings IEQ Credit 2	Design according to ASHRAE specifications, Bio-walls
	Indoor Low-Emitting Materials Minimize sources of air contaminants	None.	► Control fungus, mould and bacteria. ► Ensure that at least 45% of materials are low-emitting, including adhesives and sealants, paints and coatings, carpet systems, composite wood and agrifiber products: ► <u>Preferred</u>: 75% low-emitting ► <u>Excellent</u>: 90% low-emitting	- Addressed by LEED EQ Credit 4.1 – 4.4 but additional fungus, mold and bacteria control required - Addressed by Green Globes Indoor Environment G.2	Specify low-VOC materials in construction documents, provide manufacturer literature identifying emissions





