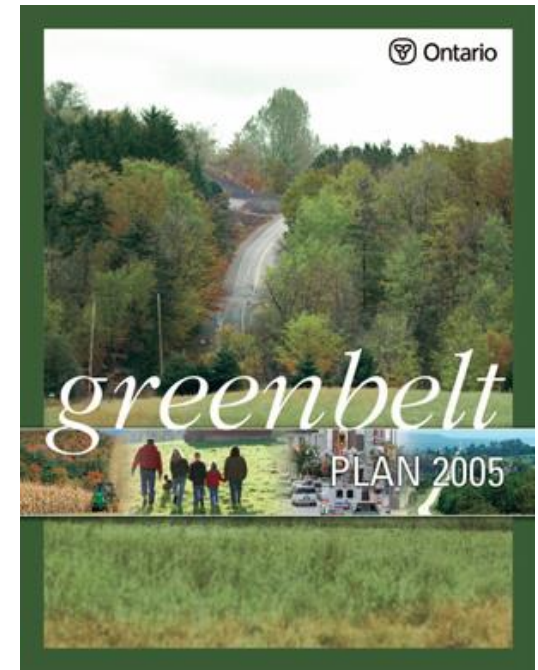
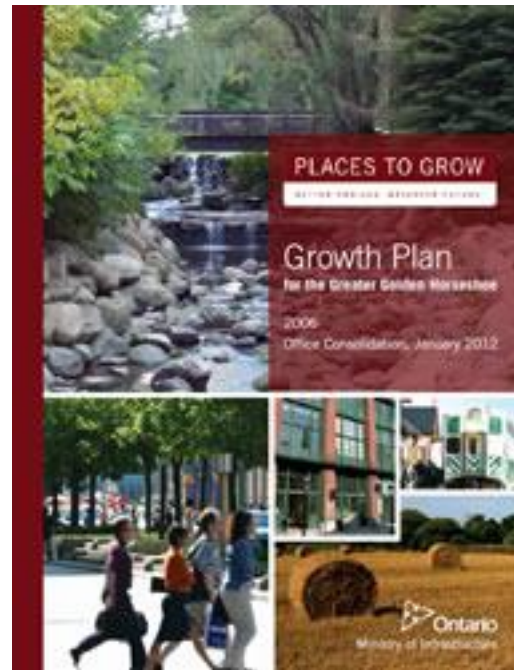
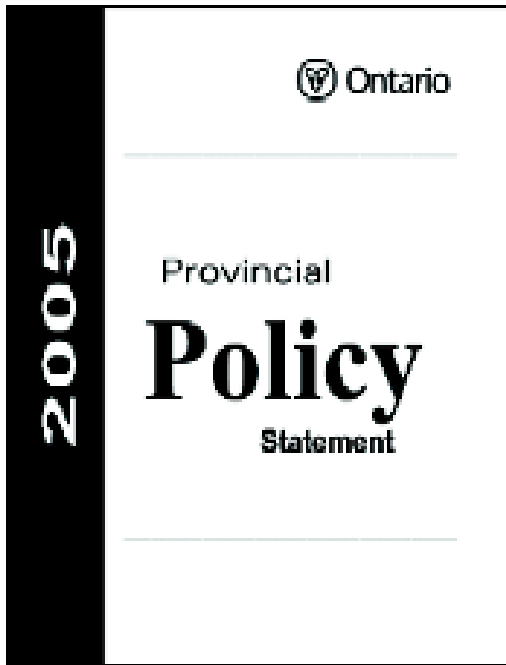


# Presentation Outline

- Policy Direction on Growth and the Environment
- Impact of Growth
  - Water Resources
  - Natural Heritage
  - Air Quality and Climate Change
  - Agriculture
- Are environmental/agricultural factors relevant to allocating growth?

# Provincial Direction



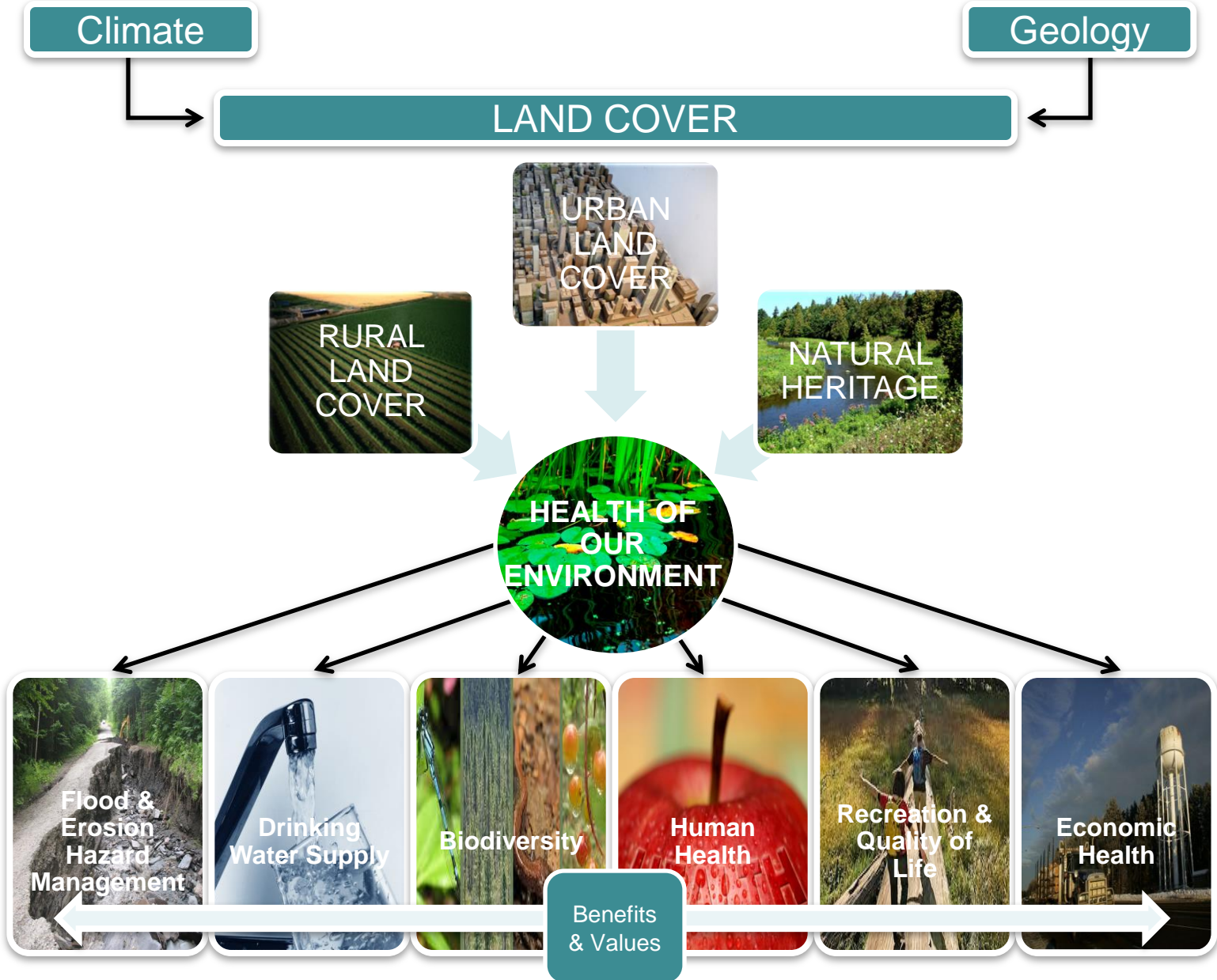
# Regional and Local Policy Framework

- Regional Official Plan
  - Provides regional policy guidance for local plans
  - Recently updated to add sustainability as overarching theme
- Area Municipal Official Plans
  - Establishes local policies for growth and development
  - Implements provincial and regional direction
- Conservation Authority Watershed Plans and Programs
  - Watershed science provides guidance on growth and the environment

# Value/Importance of the Environment

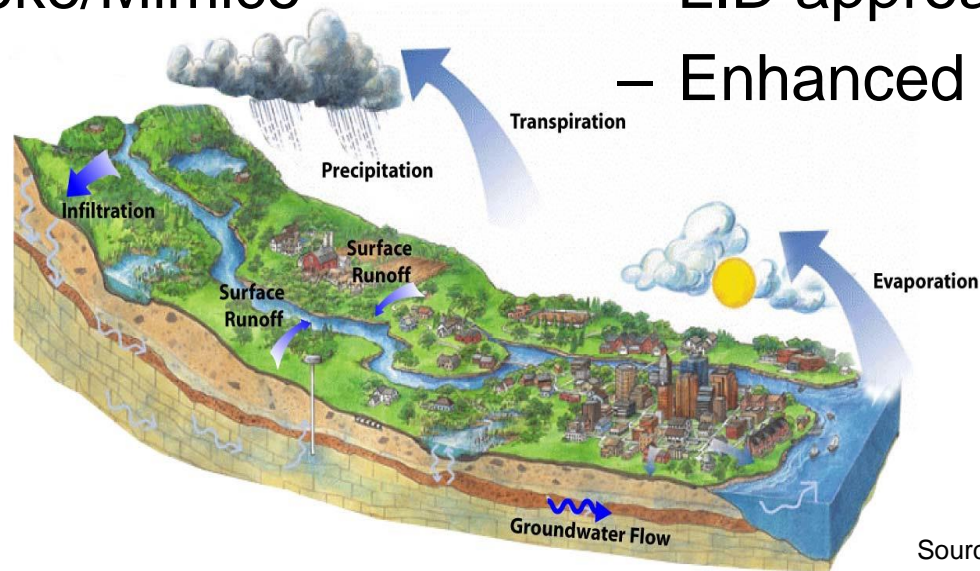
- Value of ecosystem goods and services
  - pollution removal value of urban forest in Peel is over \$8 million annually
  - Peel's forest and wetland cover is valued at \$195 million annually
- Five major watersheds drain to Lake Ontario including the Credit River, Humber River and Etobicoke Creek
- 97% of Peel's population obtains its drinking water from Lake Ontario
- 56% of Caledon's population relies on groundwater
- Provincial Greenbelt, Niagara Escarpment, and Oak Ridges Moraine provide significant landscapes

# ENVIRONMENTAL PATHWAYS RESPONSE



# Watershed Health

- Watershed Studies completed for major watersheds
  - Credit 2007
  - Humber 2008
  - Etobicoke/Mimico 2011
- Modeled build out scenarios for growth
  - Conventional approaches
  - LID approaches
  - Enhanced natural heritage

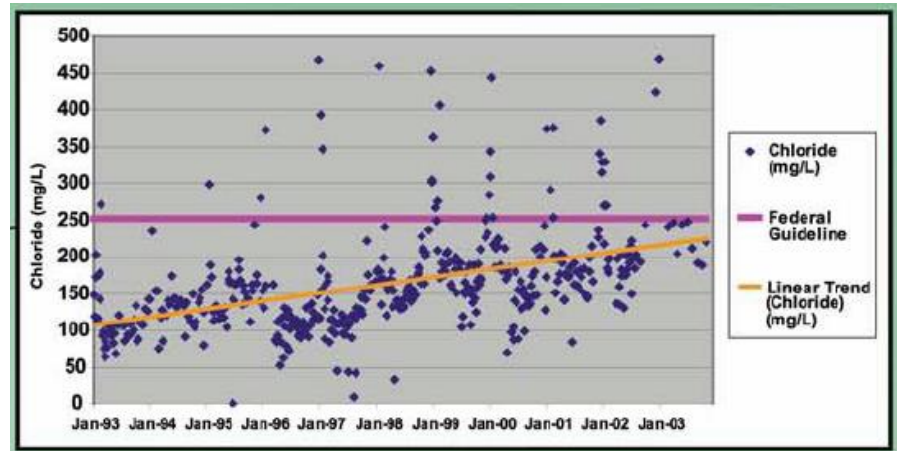


Source: Credit Valley Conservation



# Impact on Water Resources

- Increases flow volume, peak flow, stream erosion, and flooding
- Reduces water quality
- Decreases groundwater recharge



Source: Credit Valley Conservation, Watershed Report Card 2005

# Does Compact Urban Form Protect Water Resources?

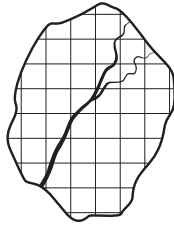
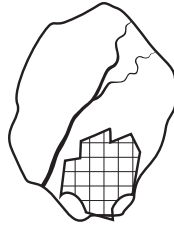
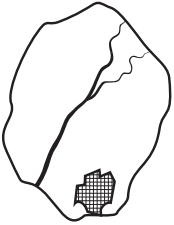
Impervious cover (IC) is important predictor of watershed health

10% Imperviousness

- Watersheds likely to become impaired

25% Imperviousness

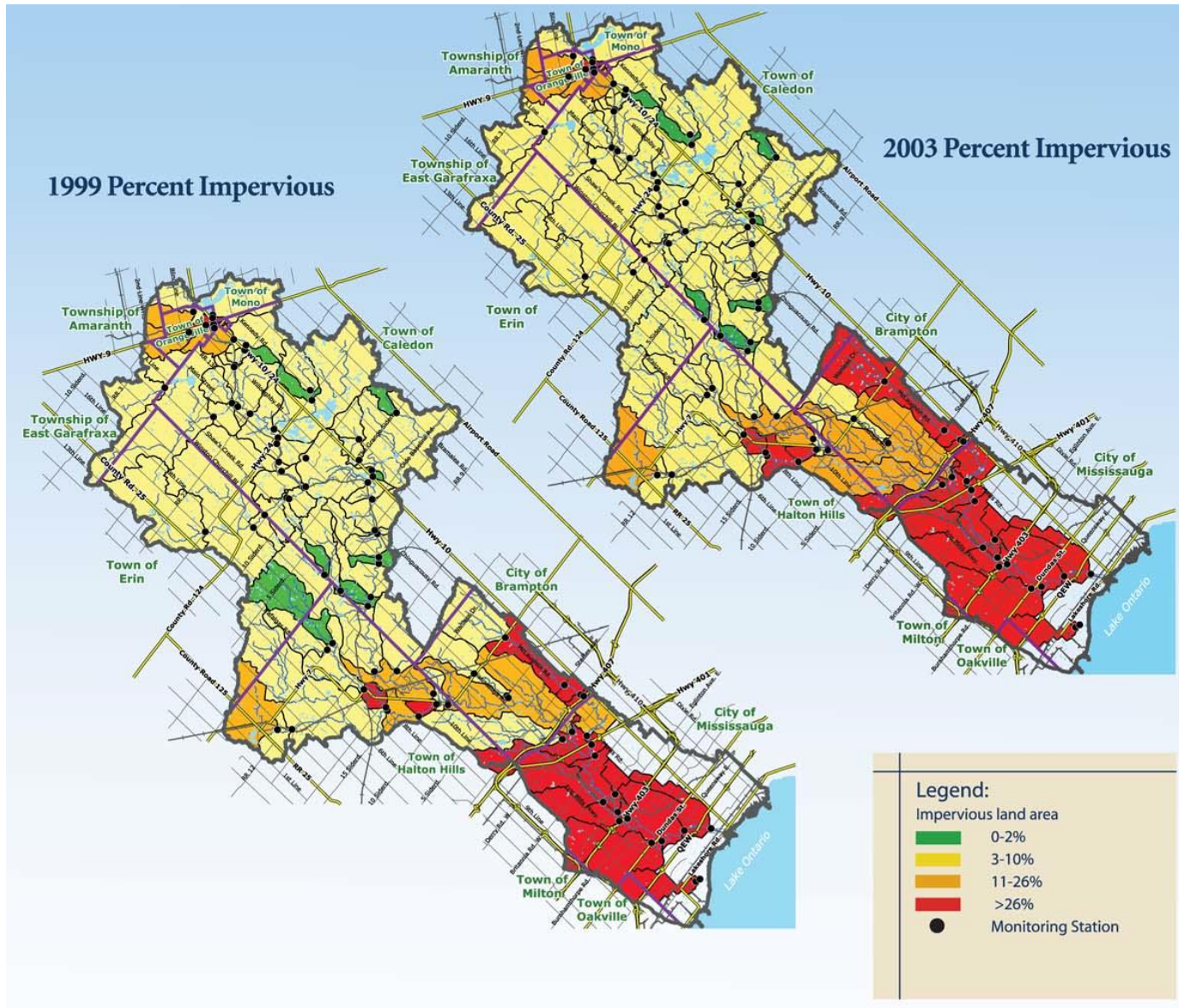
- Watersheds begin to be severely impaired

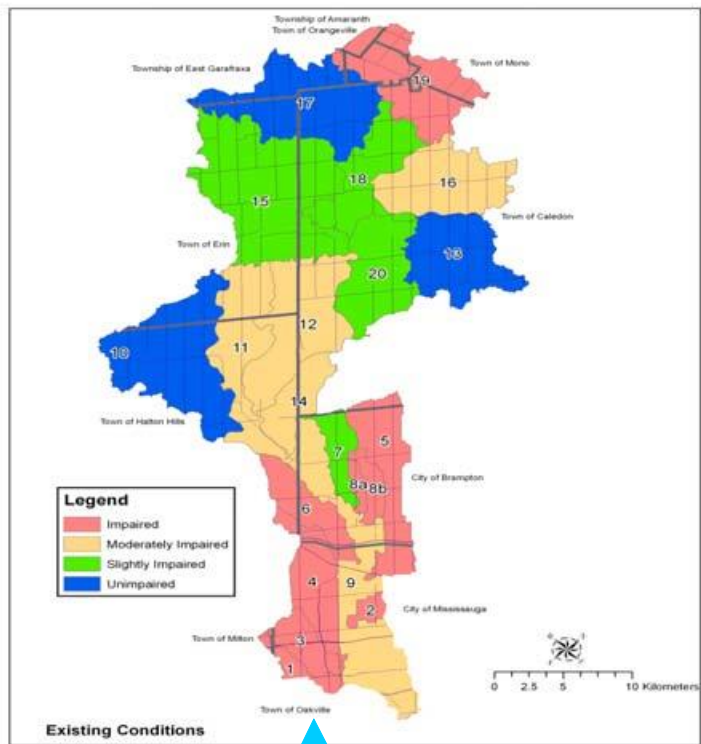
Scenario A	Scenario B	Scenario C
		
<p>10,000 houses built on 10,000 acres produce: 10,000 acres x 1 house x 18,700 ft<sup>3</sup>/yr of runoff =</p> <p><b>187 million ft<sup>3</sup>/yr of stormwater runoff</b></p> <p><b>Site: 20% impervious cover</b></p> <p><b>Watershed: 20% impervious cover</b></p>	<p>10,000 houses built on 2,500 acres produce: 2,500 acres x 4 houses x 6,200 ft<sup>3</sup>/yr of runoff =</p> <p><b>62 million ft<sup>3</sup>/yr of stormwater runoff</b></p> <p><b>Site: 38% impervious cover</b></p> <p><b>Watershed: 9.5% impervious cover</b></p>	<p>10,000 houses built on 1,250 acres produce: 1,250 acres x 8 houses x 4,950 ft<sup>3</sup>/yr of runoff =</p> <p><b>49.5 million ft<sup>3</sup>/yr of stormwater runoff</b></p> <p><b>Site: 65% impervious cover</b></p> <p><b>Watershed: 8.1% impervious cover</b></p>

Source: EPA Protecting Water Resources with High Density Development, 2006



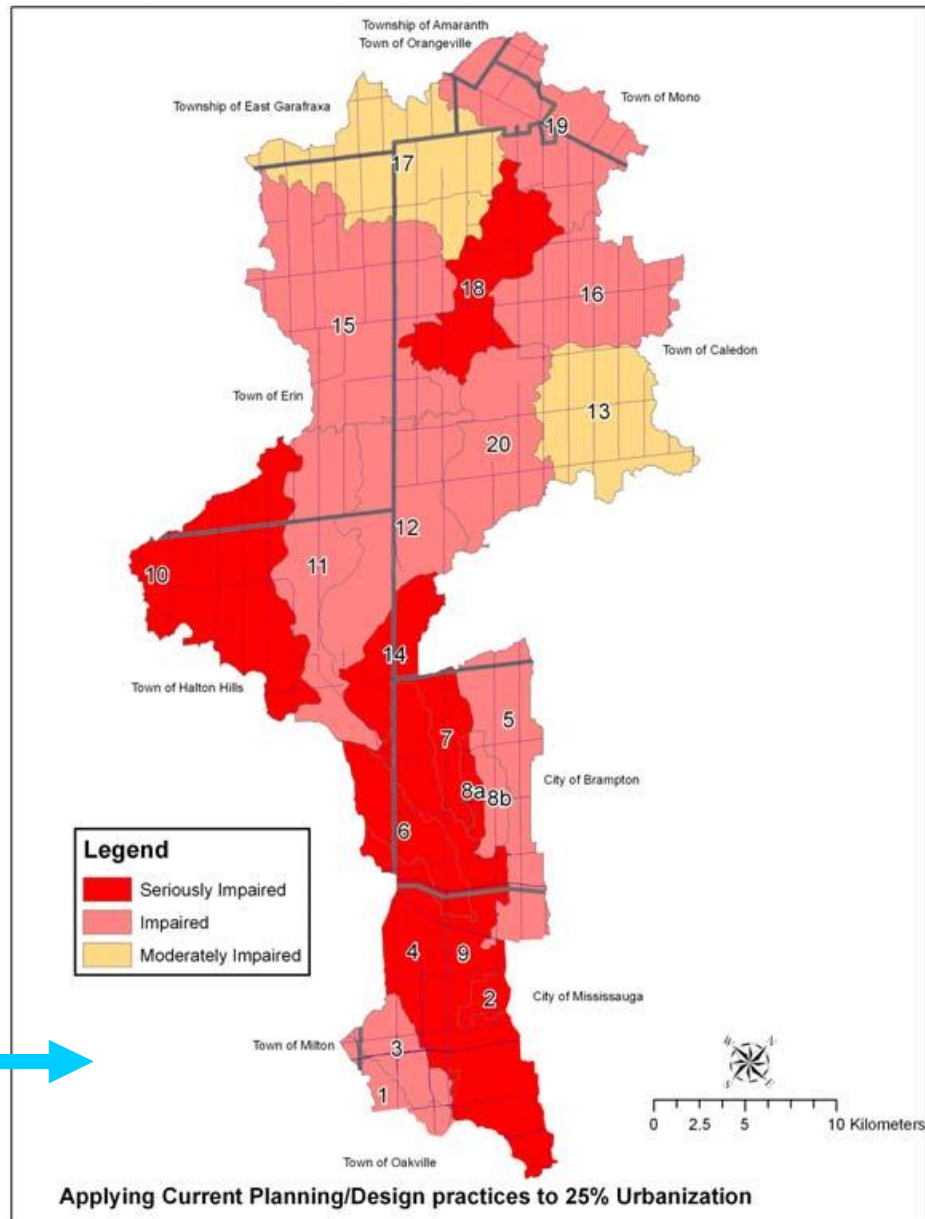
# Changes in Watershed Imperviousness Region of Peel





EXISTING CONDITIONS  
(15% URBANIZATION)

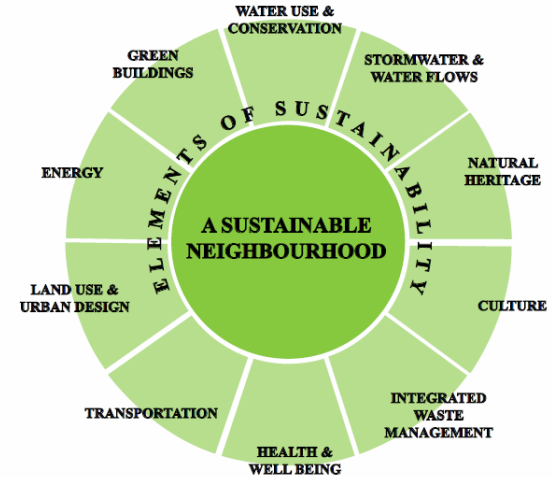
BUSINESS AS USUAL  
MANAGEMENT ALTERNATIVE  
(25% URBANIZATION)



Source: Credit Valley Conservation, Credit River Water Management Strategy Update, 2007

# What do watershed studies tell us about how we should grow?

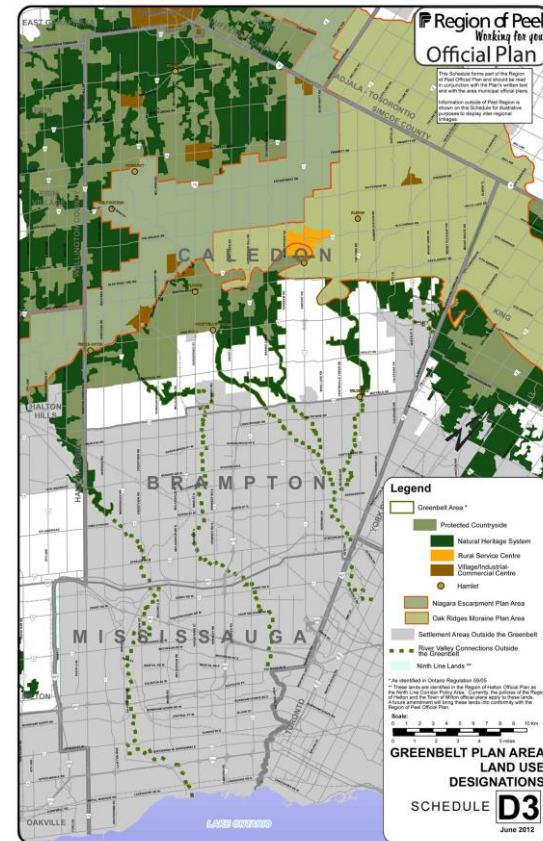
- Adopt “sustainable communities” approach for both greenfield and existing communities
- Enhance natural systems as basis for human and economic health
- Manage water balance through LID and green infrastructure
- Integrate environment, public health, infrastructure cost, risk and liability in decisions on growth and development
- Each \$1 invested in SC measures yields \$1.6 to \$2.4 in return value (a 1.6 to 2.4 benefit to cost ratio)





# Where Should We Be Placing Growth to Protect Water Resources?

- Locate new development strategically in urbanized areas
- Protect and enhance natural areas
- Avoid impacts to sensitive groundwater and surface water
- Mitigate impacts



Adapted from: Moglen, G. & S. Kim. (2007). Limiting Imperviousness: Are threshold-based policies a good idea?. Journal of the American Planning Association, 73 (2): 161-171.

# Natural Heritage

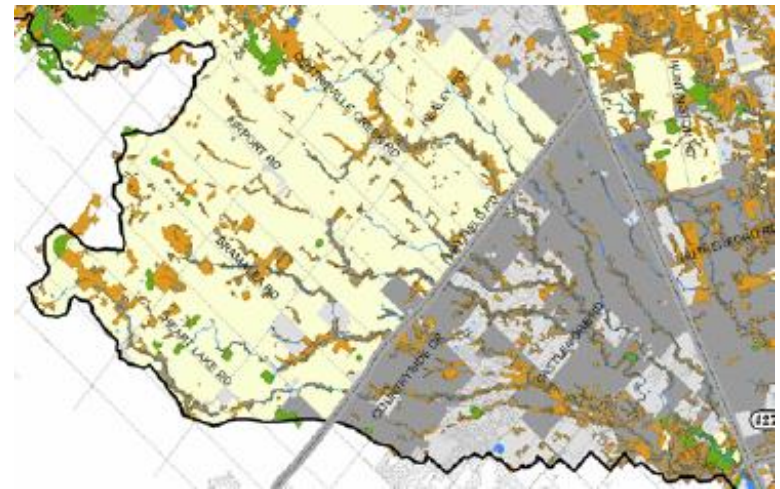
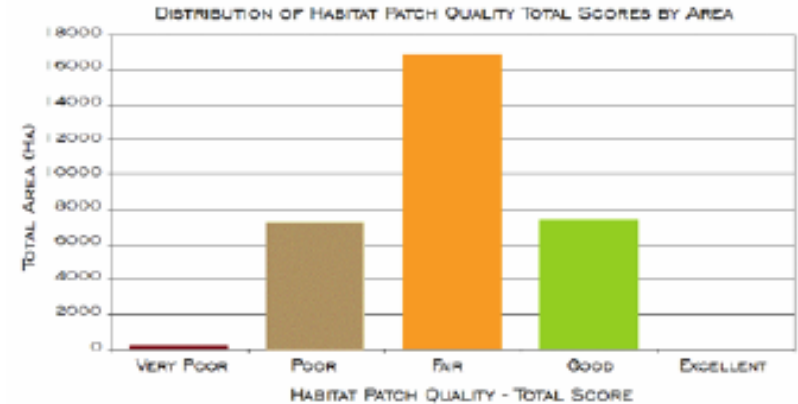


# Impact of Development on Natural Heritage

Urban growth into rural areas:

- Degrades natural heritage system quality
- Increases recreation use pressure, invasive species and predation

Enhanced system needed to maximize biodiversity, improve quality of life, and build resilience to climate change



Source: Toronto & Region Conservation, Humber River Watershed Plan: Pathways to a Healthy Humber, 2008



# Climate Change and Air Quality

## Provincial Emissions and Targets:

- 1990 - 176 Mt of CO<sub>2</sub>eq
- 2008 – 171 Mt of CO<sub>2</sub>eq
- 80% below 1990 levels by 2050

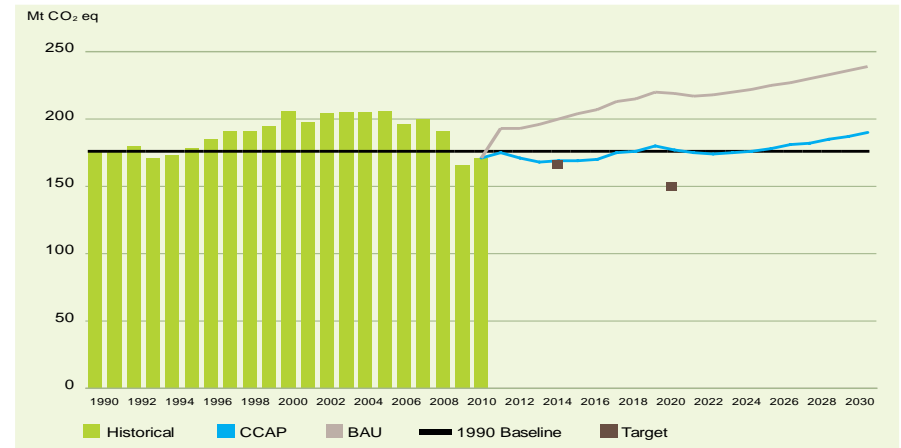
## Peel Emissions and Targets:

- 1990 - 11 Mt of CO<sub>2</sub>eq\*
- 2006 – 14.5 Mt of CO<sub>2</sub>eq\*
- 80% below 1990 levels by 2050\*\*
- Buildings and Transportation are highest emissions sectors

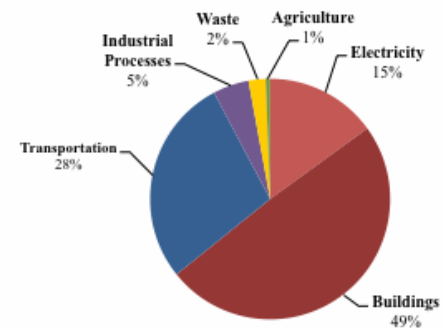
\* preliminary data

\*\* targets being reviewed

## GHG Emissions Forecast for Ontario



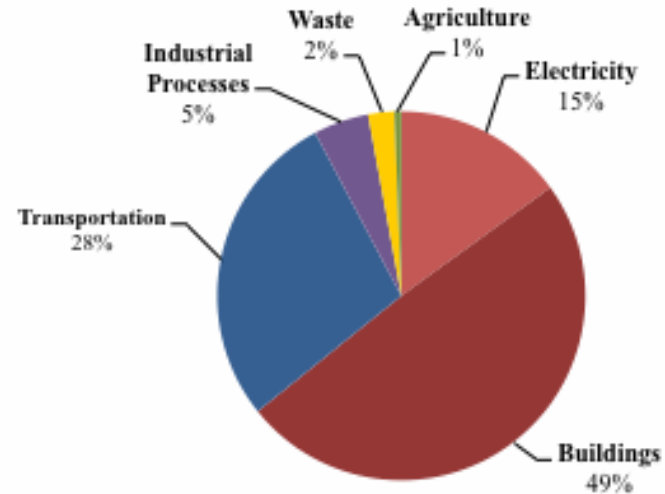
## 2006 GHG Emissions in Peel



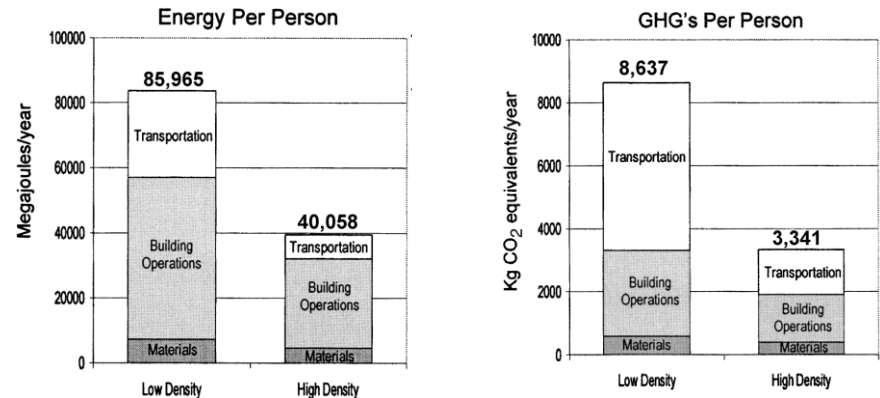
Source: Ontario Ministry of the Environment, Climate Vision: Ontario's Climate Change Progress Report and Peel GHG Emissions Inventory (In progress)

# Impact of Development on Climate Change

- Low density suburban residential is 2.0 to 2.5 times more energy and GHG intensive
- Shifting to higher density development can reduce per capita GHG and air quality emissions
- Growth management policies can reduce transportation emissions from 5 to 12%



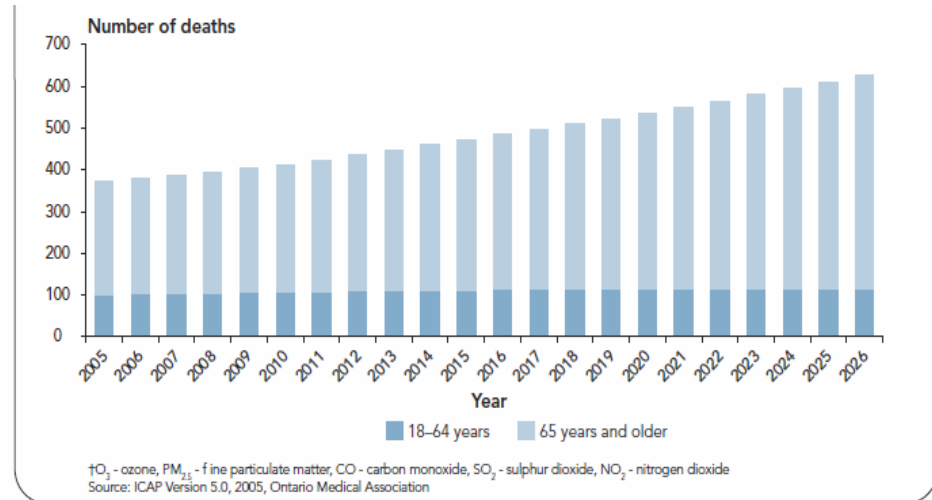
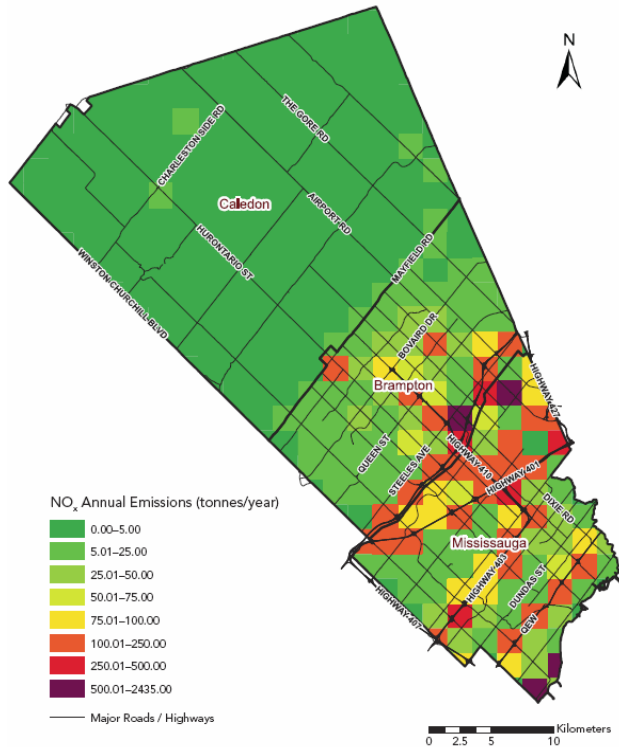
Annual Energy Use and GHG Emissions with High and Low Density Development



Source: Norman, et. al., Comparing High and Low Residential Density: Life Cycle Analysis of Energy Use and Greenhouse Gas Emissions, Journal of Urban Planning and Development, 2006, Peel GHG Emissions Inventory and 2012 MOE Climate Change Progress Report.

# Impact of Development on Air Quality

- Poor air quality in urban areas affects human health



**Estimated Annual Number of Premature Deaths Attributable to O<sub>3</sub>, PM<sub>2.5</sub>, CO, SO<sub>2</sub>, NO<sub>2</sub> by Age Group in Peel, 2005–2026**

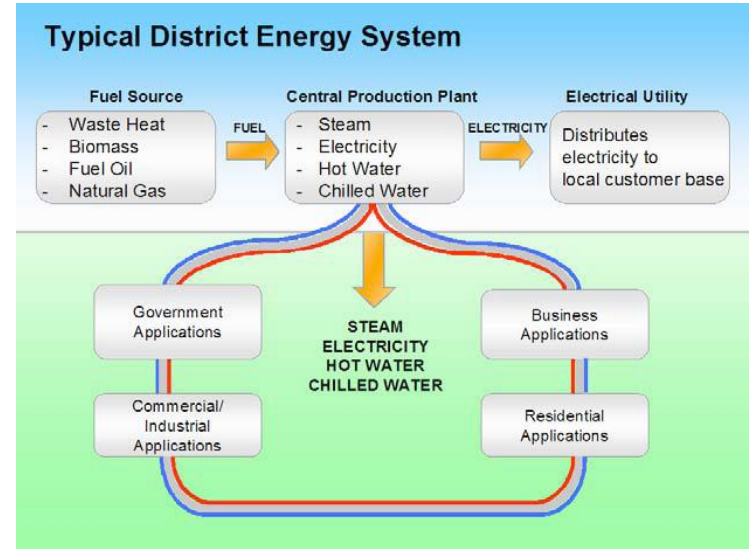
Source: Singh, R. & Ciconne, 2008. A Technical Report: An evaluation of air quality in Peel Region.

**Annual Emissions of Nitrogen Oxides (NO<sub>x</sub>) Peel, 2006**

# Impact of Development on Climate Change and Air Quality

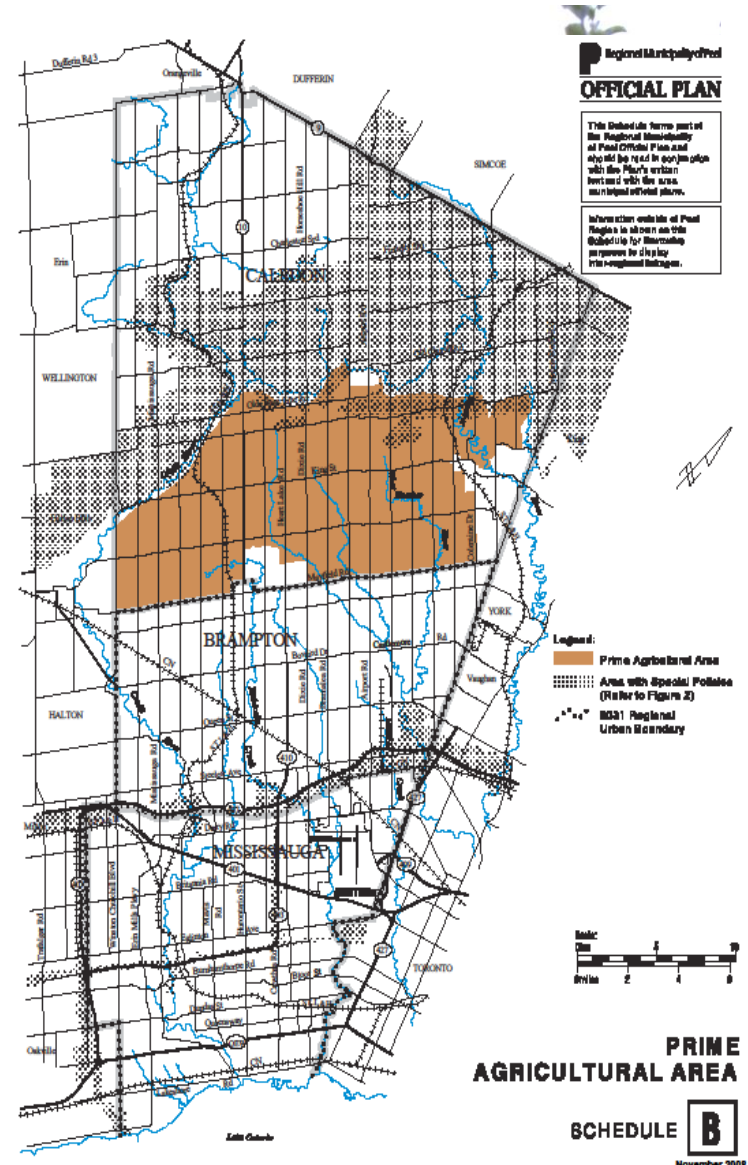
Recommendations to improve energy, air quality and climate change performance of cities:

- Plan transit supportive, mixed use, complete communities
- Shift to higher density closer to core employment
- Increase transit
- Promote street designs that encourage active transportation
- Develop more efficient and clean energy (e.g. energy efficient buildings, district energy)
- Maintain and enhance green space in cities

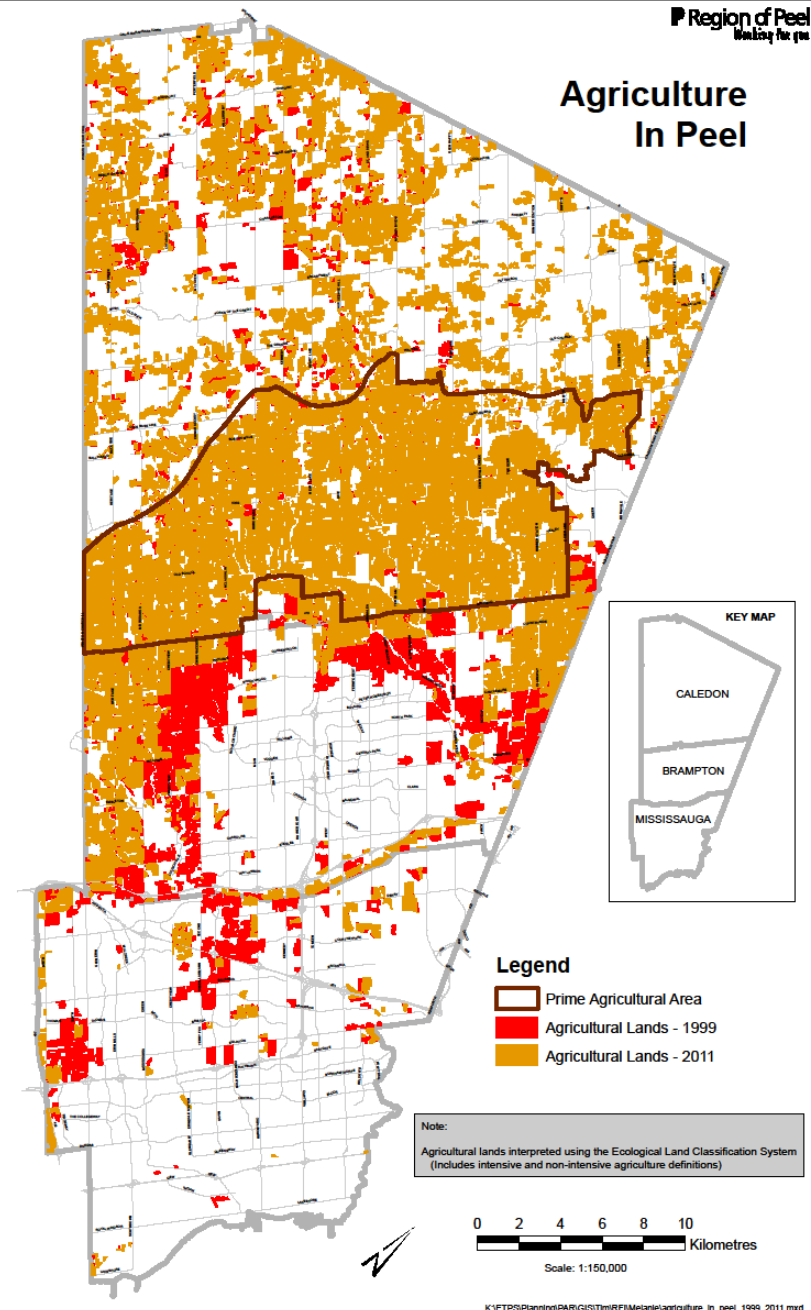




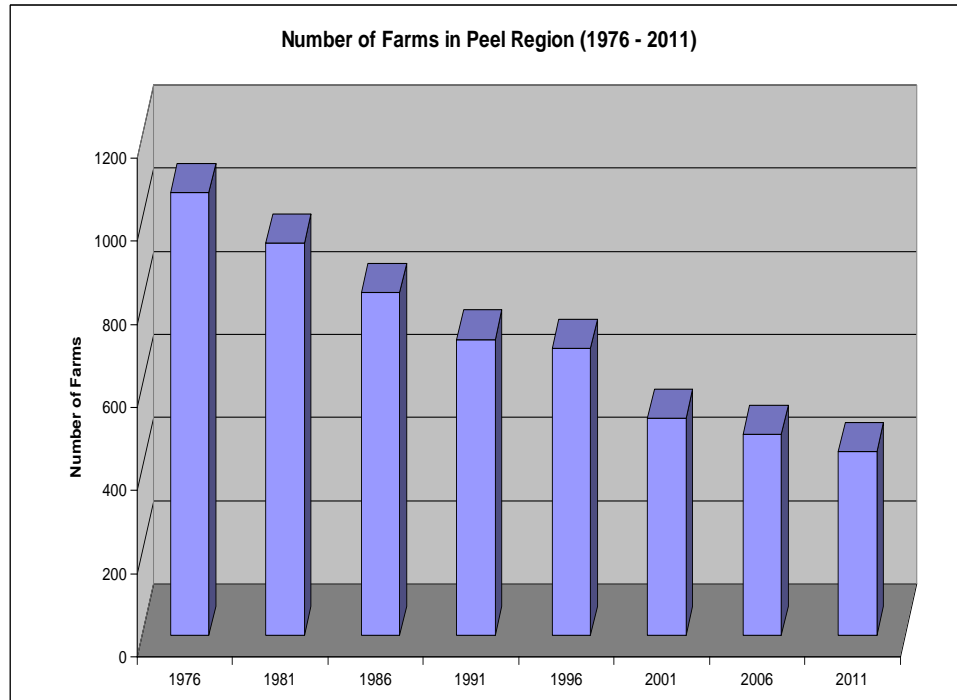
# Agriculture



## Agriculture In Peel



Number of Farms in Peel Region (1976 - 2011)



Source: Census of Agriculture, Statistics Canada

- 17% decline in number of census farms from 2001 – 2011 (59% since 1976)
- Agriculture sector requires both land base and economic viability to be sustainable
- Growth policies can reduce loss of farmland (e.g. through intensification rate)
- Other measures needed to support economic viability (e.g. local food policies and initiatives)



# Criteria to Evaluate Growth Allocations

- What environmental and agricultural information is most relevant to decisions on allocating growth in Peel?
- How much emphasis should be placed on environmental information vs. other factors?
- How much growth should be directed to existing built up areas?
- What other initiatives should Peel undertake to enhance environmental sustainability in response to projected population growth?