Air Quality Study for the Greater Toronto Airports Authority

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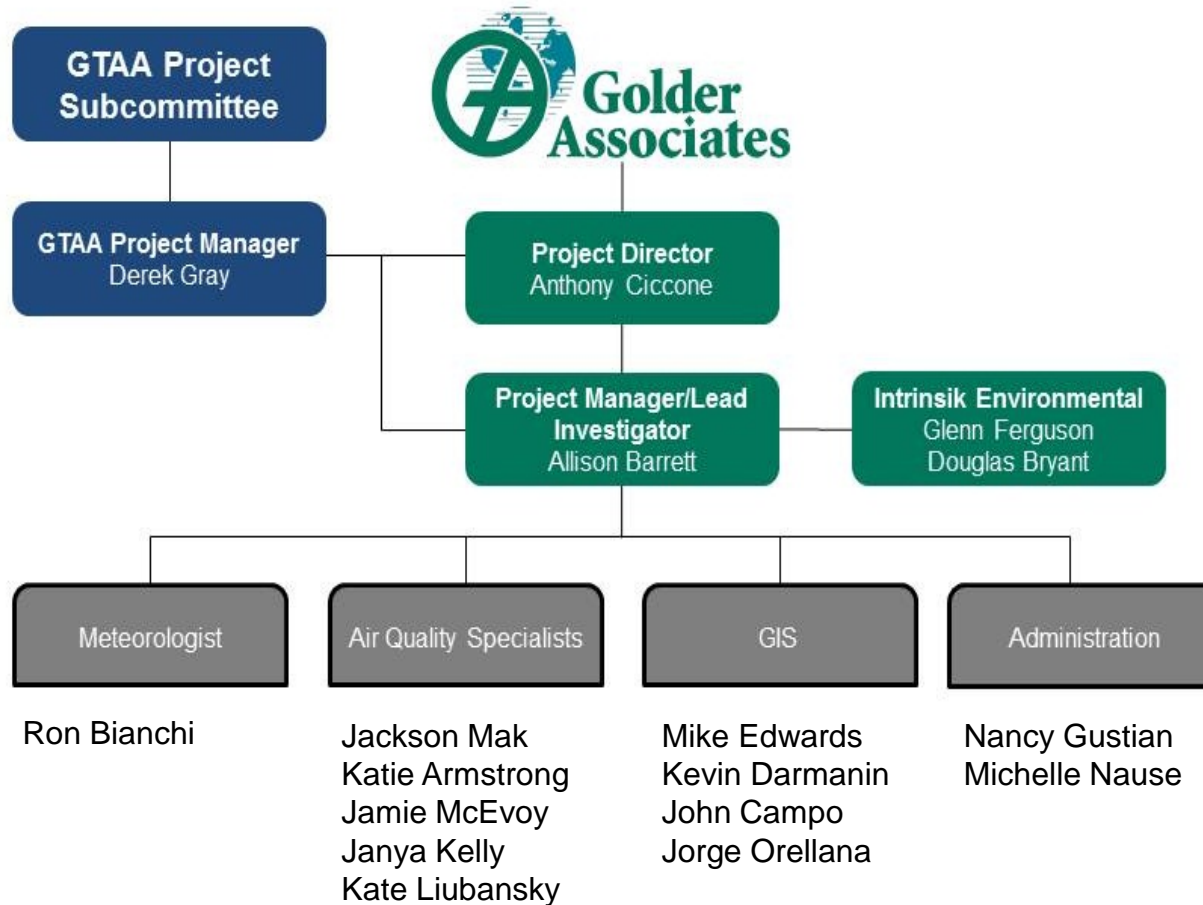
Greater Toronto Airports Authority
3111 Convair Dr.
Toronto AMF

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Meteorologist	**Air Quality Specialists**	**GIS**	**Administration**
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Who we are

- ❑ Golder Associates
  - ▪ Founded in 1961 starting in geotech and expanding to provide full range of environmental services
  - ▪ 3700 staff in the 38 Canadian office, over 9100 worldwide staff in more than 180 offices
  - ▪ Global and Canadian experience
  - ▪ GTA Air Services group consists of 15 air quality specialists and meteorologists
  - ▪ Over 130 years of combined air quality experience in including design of air quality monitoring programs, emissions inventory development, air quality dispersion modelling, policy consultation, GHG assessments, energy and air pollution engineering, and emissions reduction strategies
  - ▪ Modelling capabilities include 3 computer "clusters", two in Canada (Mississauga and Calgary) and one in the United States (Portland)

- ❑ Intrinsik
  - ▪ Experts in human toxicology and evaluation of human health impacts
  - ▪ Specific experience with human health risk assessment of the GTAA (as CANTOX Environmental)

- ❑ Together
  - ▪ Golder and Intrinsik have worked together to provide integrated Air Quality and Human Health Risk Assessment for clients

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Background and Objectives

❑ **Background**

  ▪ Why undertake an air quality study?

❑ **Objectives**

  ▪ **Phase 1** – Airport Emission Inventory

  ▪ **Phase 2** – Local Emission Inventory

  ▪ **Phase 3** – Dispersion Modelling and Results Assessment

  ▪ **Phase 4** – Complete a Human Health Risk Assessment (HHRA) based on the accumulated data.

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General Approach

- Airshed modelling includes
  - Regional model for background and large scale influences
  - Meteorological data
  - Geo-physical data
  - Source data
    - Industrial
    - Commercial / residential
    - Transportation (rail, airways, nautical and roads)
    - Agricultural/biogenics
  - Defining Region of Interest
  - Big Computer
  - Knowing what you are doing!

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Phase 1

- Data Needs:
  - Aircraft counts and fleet make-up
  - GSE types numbers and usage rates
  - Stationary combustion equipment fuel use
  - Taxi and take-off routes for aircraft
  - Ground vehicle counts for parking and public roads
  - Georeferenced site plans/maps

- Golder's Approach:
  - Diurnal or, better-yet, hourly emissions estimates
  - QA of current compared to previous equipment summaries and fuel use
  - Overlay site plans with satellite imagery for review of road, building and other source locations
  - Review of Intrinsik's data needs (24-hour and annual vs. peak hourly)
  - Generate on-road mobile emissions using MOVES rather than default MOBILE6.2

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Phase 2

- ❑ Data Needs:
    - ▪ Emissions inventories for areas with 7.5 km radius of airport property

- ❑ Golder's Approach:
    - ▪ Off-site area within 7.5 km of airport will be divided into grid cells with assistance of GIS
    - ▪ Emissions apportionment to individual grid cells according to facilities, operations or landuse
    - ▪ Point sources will be assessed if stack parameters are known
    - ▪ Individual grid cells modelled as area sources, modelled according to U.E. EPA guidance
    - ▪ Traffic emissions will be estimated using MOVES

Local sources
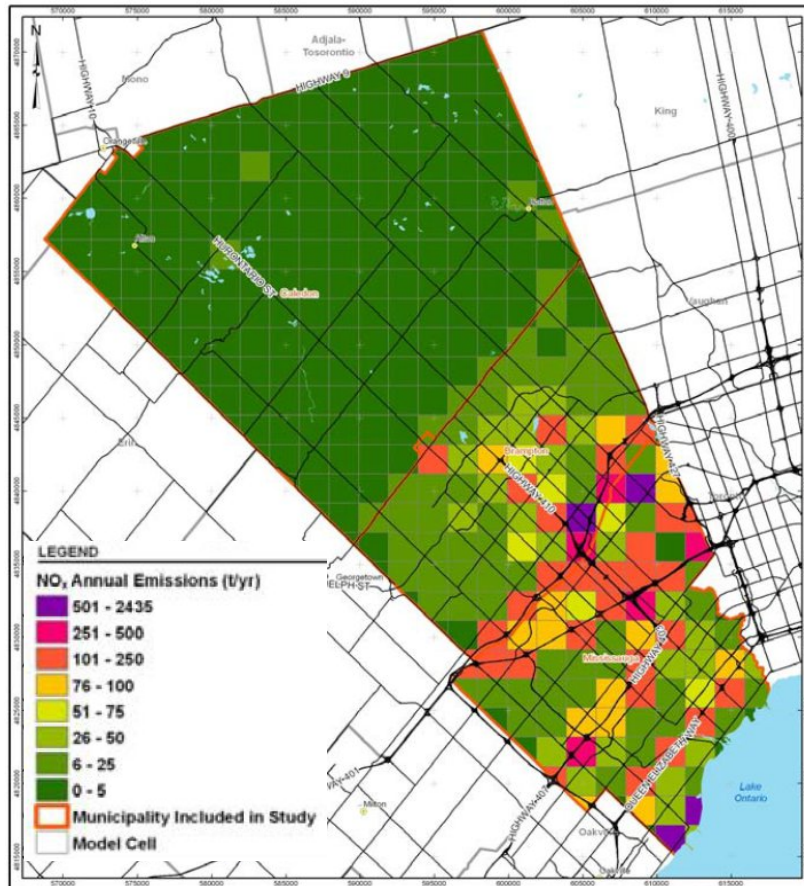
Industrial: NPRI (incl. point sources)

Residential/commercial: StatCan, Union Gas
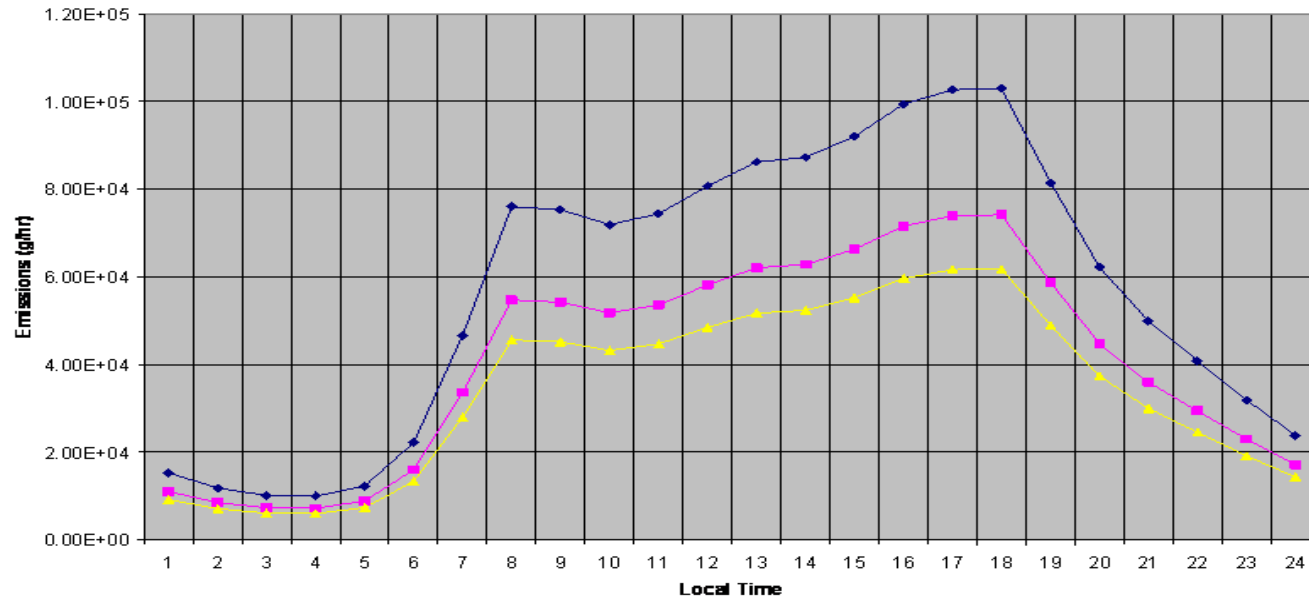
On-Road Mobile: MTO, Peel Region

Non-Road Mobile: Metrolinx, GTAA

Agricultural/biogenic: MPAC, land cover

Phase 2 - Temporal Processing

❑ Emissions in tonnes/year → hourly emissions
  ▪ Applies factors based on source's characteristics
  ▪ Monthly, weekday/weekend and diurnal profiles

Diurnal (24-hr) mobile emissions profile for a major city in Canada
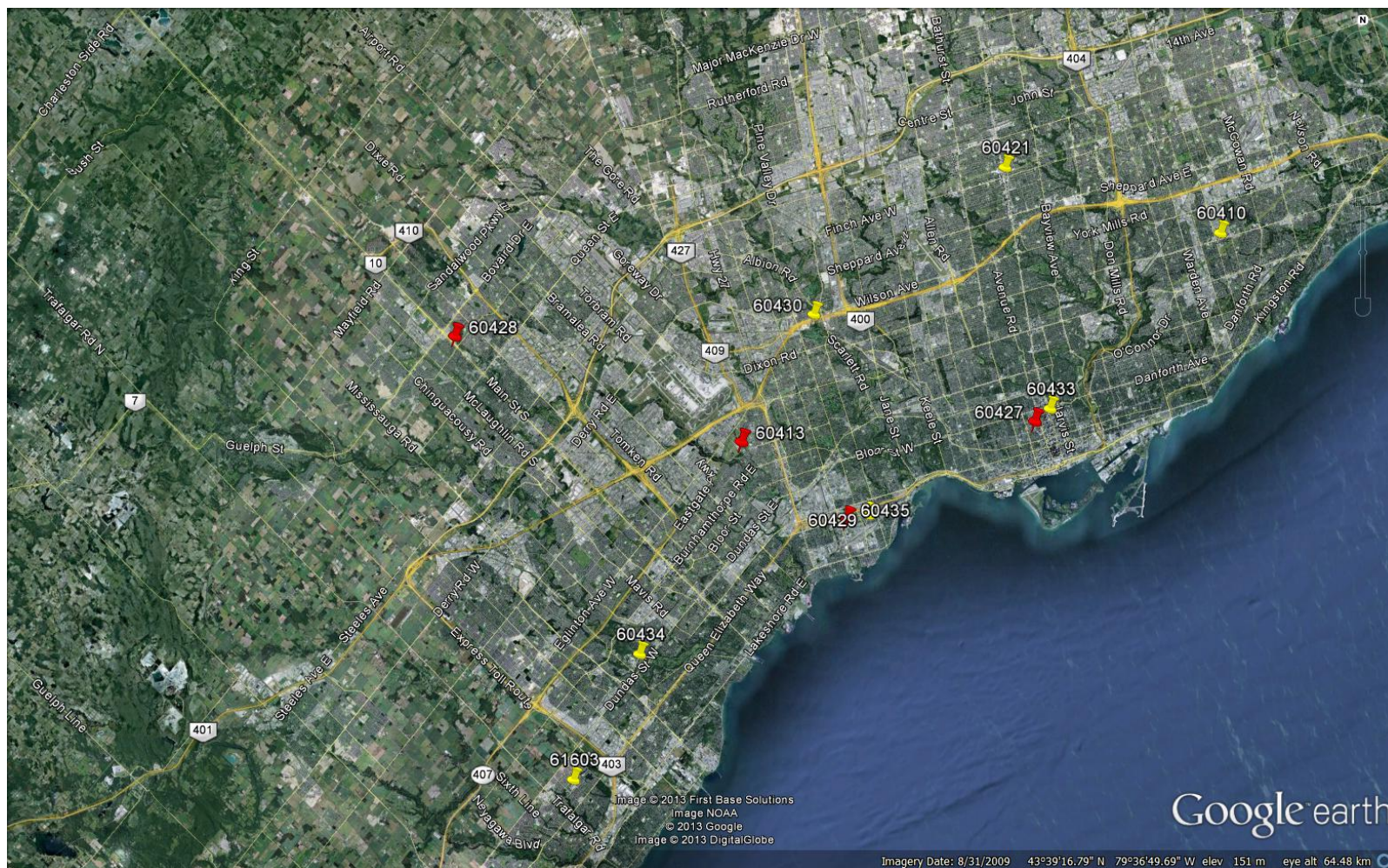
Phase 3

- Data Needs:
  - Previous EDMS input files (if available)
  - Terrain data from MOE
  - Hourly meteorological data
  - Ambient air quality
  - Detailed output specifications to accomplish Phase 4 from Intrinsik

- Golder's Approach:
  - Obtain terrain and hourly meteorological data (using Toronto Pearson station) from MOE
  - Use 5-year meteorological data set
  - Develop a prognostic meteorological data set for 2021 and 2026 modelling (OPTIONAL)
  - Compare results to at least three ambient stations (Centennial Park, Brampton and 125 Resources Rd.)
  - Show change in airport contributions to local air quality with distance from the airport
  - Cumulative and airport-only modelling results (tabular and graphical) for speciated VOCs, CO, NO_X/NO_2, PM, CO_2, CH_4 and SO_2
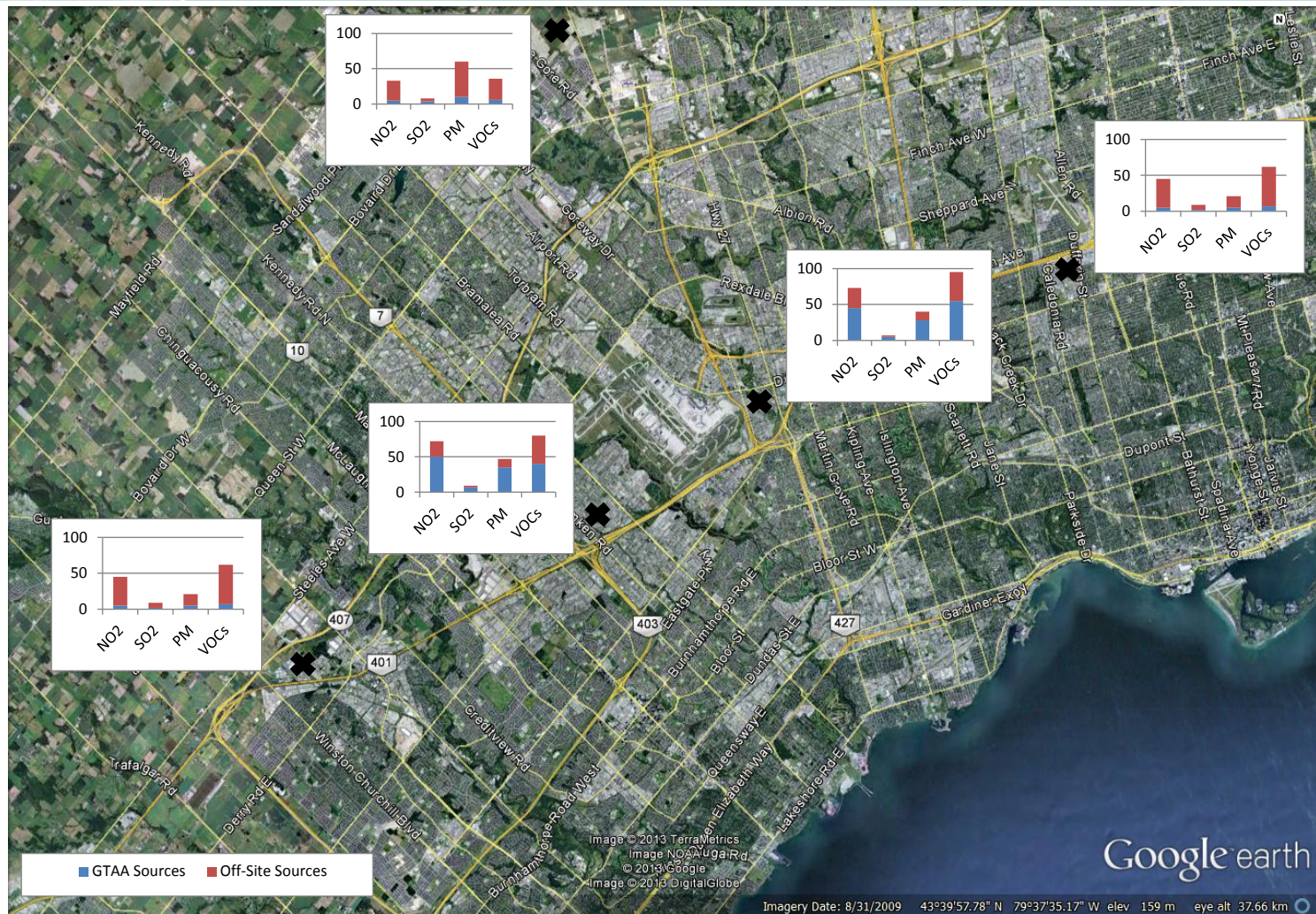 - Summarize existing ambient monitoring and compare to modelling results

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Phase Breakdown and Schedule

Phases	Objectives	Deliverables	Meetings
Phase 1 (Q4 2013)	Develop airport emissions inventories for 2011, 2016, 2021, 2026	• Information request • Presentation to GTAA subcommittee • Modelling Protocol (Optional) • Draft Phase 1 report	• Project kick-off meeting with GTAA PM • Subcommittee scoping meeting • Meeting with Intrinsik
Phase 2 (TBD)	Off-site emissions inventory	• Presentation of emissions inventories to GTAA subcommittee • Draft Phase 2 report	• Meeting with GTAA PM
Phase 3 (TBD)	EDMS and area modelling	• Draft Phase 3 report • Present draft results to GTAA subcommittee • Present draft results to CENAC • Final Phase 1, 2 and 3 reports	• Meeting with GTAA PM
Phase 4 (TBD)	Prepare HHRA based on Phases 1-3	TBD	TBD

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