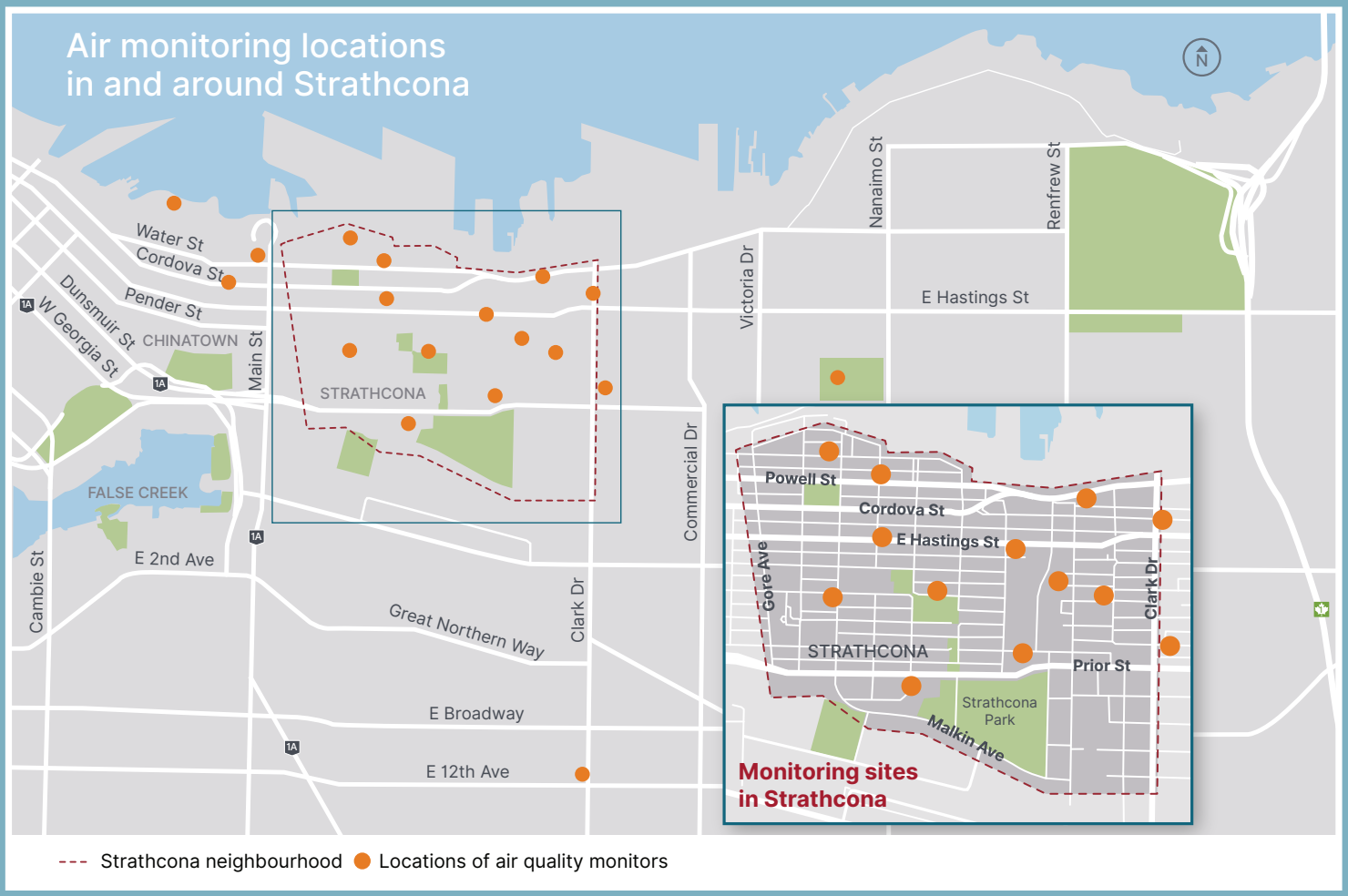
Strathcona Area Air Quality Study: Final study results (2023-2024)

Overview

The Strathcona Area Air Quality Study (SAAQS) was a two-year air monitoring study to better understand air quality in Strathcona and the impacts of port-related emissions in the surrounding neighbourhood. The study was a follow-up to the Strathcona Residents Association's air quality survey conducted in 2021, initiated in response to community concern over nearby port container terminal expansion. Findings from the study will be used to inform potential post-study air quality improvement opportunities.



The study was guided by a steering committee co-chaired by the Strathcona Residents Association and the Vancouver Fraser Port Authority. The steering committee included representatives from the City of Vancouver, Environment and Climate Change Canada, Metro Vancouver, the University of British Columbia, and Vancouver Coastal Health, representing a range of stakeholders and providing air quality and health risk expertise. The port authority funded the study.

Air monitoring began in January 2023 and continued until December 2024, using a network of non-regulatory-grade monitoring devices spread across 18 strategic sites around Strathcona. Collectively, the air quality monitors measured the levels of four different air pollutants—nitrogen dioxide, sulphur dioxide, fine particulate matter, and black carbon. These pollutants are emitted from a range of sources associated with both port operations (e.g., ships, rail, container trucks) and non-port activities (e.g., commercial trucks, passenger vehicles, boilers and heaters).

The study combined technical and community-based knowledge to characterize air quality conditions and build awareness of how air quality varies in the Strathcona neighbourhood.

Study objectives

The SAAQS steering committee defined broad study objectives to:

- **Engage the community and increase awareness and knowledge of local air quality**
- **Monitor, assess, and characterize changes in air quality in Strathcona over the study period**
- **Assess potential contributions from port activities**
- **Identify potential opportunities to improve air quality**

2023-2024 Monitoring results

Summary of SAAQS monitoring data collected from January 1, 2023, to December 31, 2024.

Nitrogen dioxide (NO_2)

- Most Strathcona monitors showed NO_2 levels above both the short-term (1-hour) and long-term (annual) Metro Vancouver objectives, except for the MacLean Park and Clark Drive monitors.
- Strathcona's NO_2 levels were consistently higher than those in other parts of the Metro Vancouver region. The highest NO_2 readings came from the 1000 Block of East Pender Street, which is next to the Burrard Inlet Rail Line. However, more analysis is needed to determine how rail activity and other sources contributed to this location's air quality.
- Monitors near high-volume roads showed clear rush-hour patterns, with NO_2 peaking in the morning and afternoon, especially on weekdays, suggesting commuter traffic as a potential source.
- NO_2 levels were highest in winter and lowest in summer, likely influenced by seasonal heating across homes and buildings (e.g., furnaces, boilers).
- Analysis of three port strikes during the study period suggests that port activity does contribute measurably to NO_2 levels near the port. However, the study was unclear on how far and the extent to which port-related emissions contribute to ambient NO_2 levels across Strathcona, as other emission sources (e.g., passenger vehicles) and weather conditions also play a role.

Fine particulate matter ($PM_{2.5}$)

- The highest $PM_{2.5}$ levels occurred during wildfire smoke events. Although wildfire smoke significantly impacts air quality, the inclusion of these extraordinary events skews the $PM_{2.5}$ results. When these events were excluded, all monitors remained below both the short-term (24-hour) and long-term (annual) Metro Vancouver objectives.

- Strathcona's $PM_{2.5}$ levels were slightly higher than those in other parts of the Metro Vancouver region. The highest $PM_{2.5}$ readings were at MacLean Park (located within a residential area away from port terminals, rail lines and designated commercial truck routes) and 600 Block of East Hastings Street (a busy traffic corridor with little to no port container truck traffic).
- All Strathcona stations showed similar daily, monthly and seasonal patterns.
- $PM_{2.5}$ levels were fairly uniform across Strathcona.

Sulphur dioxide (SO_2)

- Monthly sampling for SO_2 was conducted at three locations within Strathcona, and the resulting concentrations were low and similar over time.
- The annual SO_2 average at all three sites were well below Metro Vancouver objectives.

Black carbon

- Due to monitoring technology and deployment issues, black carbon data were limited and at times intermittent, with data available for eight months out of the two-year study period.
- Black carbon objectives have not yet been established in Canada, or globally.
- Strathcona's short-term (1-hour) black carbon levels were higher than those at other Metro Vancouver stations, though daily average levels were more comparable.
- Black carbon data showed rush-hour patterns, indicating commuter traffic as a potential source.

Conclusion and next steps

- Strathcona residents are exposed to NO_2 levels above the Metro Vancouver objectives.
- Strathcona's NO_2 and black carbon levels are higher than those in other parts of the Metro Vancouver region, with links to both urban (non-port) and port activities.
- Port activity impacts NO_2 levels, especially near port terminals and rail lines, but other non-port emission sources (e.g., commuter traffic, home heating) and weather conditions also play an important role.
- Given the multiple source contributions (port and non-port) and the complex jurisdictions of NO_2 emission sources, a multistakeholder approach is needed to consider emission reduction opportunities.
- The steering committee will use this report to explore potential future opportunities to improve air quality in this neighbourhood.

For more information

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