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AIR QUALITY REPORT

2023

Prince Edward Island 2023 Air Quality Report Covering the Years 2021-2023

PEI Department of Environment, Energy and Climate Action

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INTRODUCTION

Air Quality Monitoring in PEI

This report provides the status of the air quality in Prince Edward Island for the years 2021-2023. The Department of Environment, Energy and Climate Action shares responsibilities regarding air quality and the monitoring of air quality with the federal government. This shared responsibility is attained through a partnership with Environment and Climate Change Canada where the provinces, territories and federal government are signatories to the *Memorandum of Understanding Respecting the National Air Pollution Surveillance Program*.

Through the National Air Pollution Surveillance (NAPS) Program[11], PEI operates an ambient air monitoring network consisting of three stations - Wellington, Southampton and Charlottetown. The stations monitor ambient air parameters such as particulate matter ($PM_{2.5}$), ground level ozone (O_3), sulfur dioxide (SO_2), and nitrous oxides (NO_X) as part of the NAPS program. The data from the NAPS program is available through Environment and Climate Change Canada's data portal[22]. Summary and real-time data is also available on the PEI Air Monitoring Data Hub.

Figure 1: PEI Air Quality Monitoring Station (Southampton)

Figure 2: Map of PEI Air Quality Monitoring Stations

Mercury (Hg) in ambient air and precipitation monitoring data are also monitored at the Southampton station by the province but are not part of NAPS. Raw data for mercury and precipitation monitoring can be found at the province's Open Data Portal and the PEI Air Monitoring Data Hub:

[1] https://www.canada.ca/en/environment-climate-change/services/air-pollution/monitoring-networks-data/national-air-pollution-program.html

[2] https://open.canada.ca/data/en/dataset/1b36a356-defd-4813-acea-47bc3abd859b

- Mercury in ambient air data:
  - https://data.princeedwardisland.ca/datasets/5c821d592f954770bb55aa0be32fbf08_0/explore
  - https://data.princeedwardisland.ca/datasets/310728450bc34c039ba270644556ce74_0/explore
  - https://air.princeedwardisland.ca/
- Precipitation sampling data:
  - https://data.princeedwardisland.ca/datasets/4414f9e626554a0db2aa802701a564b5_0/explore
  - https://air.princeedwardisland.ca

Airsheds and Air Zones

Airsheds and air zones are geographic areas used to manage air quality. There are six airsheds in Canada, with most of them including portions of multiple provinces/territories. PEI is in the Southern Atlantic Airshed (Figure 3).

Air zones are smaller areas within airsheds, with most provinces having several air zones within their boundaries. PEI has only one air zone that covers the entire province. Both airsheds and air zones are used to coordinate efforts to manage and report on regional air quality, and to reduce transboundary air pollution flows. Transboundary air pollution flows are those that enter one province or territory from other provinces or territories or flows that enter Canada from the United States.

Figure 3: Airsheds and air zones in Canada. Airsheds are delineated by the thick black lines. Air zones are smaller areas within the airsheds. PEI has one airsheds[3]

[3] https://ccme.ca/en/air-quality-report

An air zone generally exhibits similar air quality issues and trends throughout its area. The Air Zone Management Framework (AZMF)[4] has been developed to ensure proactive measures are taken to protect air quality using the principles of continuous improvement and keeping clean areas clean. Provinces and territories manage air zones within their boundaries with the goal of bringing about improvements in air quality and preventing standards from being exceeded.

Air Quality Management System (AQMS)

The Air Quality Management System (AQMS) was endorsed by the Canadian Council of Ministers of the Environment in October 2012 to improve air quality across Canada and protect human health and the environment. The system provides a framework for collaborative action across Canada using a consistent approach to air quality management. The AQMS was developed by federal, provincial and territorial governments, in conjunction with a variety of stakeholders, over several years. The system consists of several interrelated parts, as depicted in Figure 4.[5]

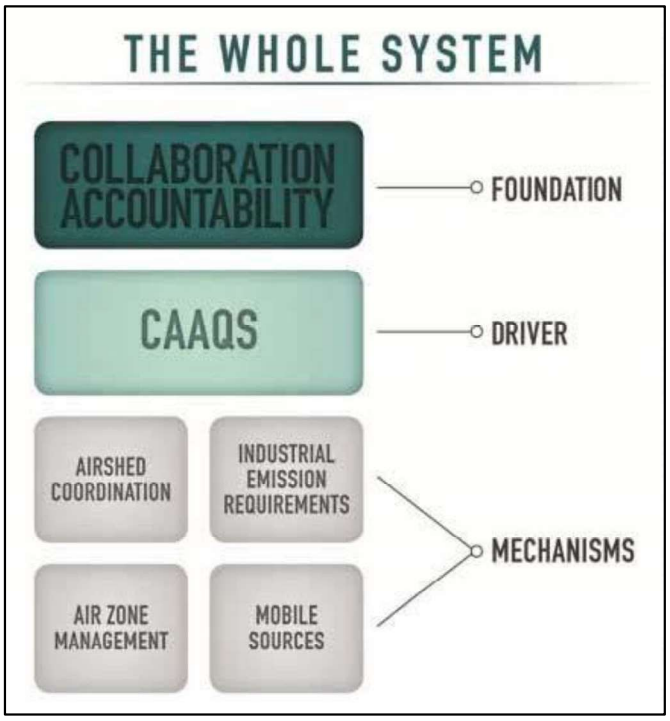


Figure 4: The Air Quality Management System

The driver for this system is the Canadian Ambient Air Quality Standards (CAAQS)[6]. Standards have been developed for fine particulate matter ($PM_{2.5}$) and ground-level ozone (O_3). Nitrogen dioxide (NO_2) and Sulphur dioxide (SO_2) standards were added for the 2020 reporting year.

[4] https://ccme.ca/en/air-quality-report
[5] Image source and additional information regarding the AQMS is available at: https://ccme.ca/en/air-quality-report
[6] https://ccme.ca/en/air-quality-report

The goal is to ensure the CAAQS are not exceeded while managing emissions using the mechanisms listed in the figure above (Airshed Coordination, Industrial Emission Requirements, Air Zone Management and Mobile Sources).

In addition to standards, there are colour coded management levels that signify the relative amount of air pollutants in the air during the reporting time period. The management levels range from green to red, and each category has its own objectives. For example, an area that falls within the red level will prompt a province to institute air management actions to achieve air zone CAAQS. The *Guidance Document on Air Zone Management*[7] is available as a reference tool for jurisdictions and the public, providing details of the Air Zone Management Framework under the AQMS.

It is important to note the difference between the Canadian Ambient Air Quality **Standards** and **management levels** under the Air Zone Management Framework. The standards are hard values for a parameter that the province either meets or doesn't. The management levels fit a provincial calculated value into a coloured range, with each range having management techniques that the jurisdiction should introduce. Table 1 provides an example of the difference between a standard and a management level.

Table 1: Standards versus Management Levels using example data

	Example provincial monitoring value for 0_3 (ppb)	**Air Quality Standard and Management Levels for 0_3 (ppb)**	**Explanation**	**Example Result**
Air Quality Standard	52	62	*If data value is below standard, the standard is achieved. If value is over standard, the standard is not achieved.*	*Standard achieved*
Management Levels	52	>62 >56 and ≤ 62 >50 and ≤ 56 ≤ 50	*Data value is placed into one of the management levels and assigned that colour (green/yellow/orange/red).*	Data value (52) is assigned a *yellow management level.*

Health and Environmental Effects

Although we may not consider air pollution as a major health issue, Health Canada estimates that 15,300 premature deaths per year in Canada can be linked to air pollution from fine particulate matter, nitrogen dioxide and ozone. In addition, the total Canadian economic cost of all health impacts attributable to air pollution is estimated to be $120 billion per year.[8]

[7] https://ccme.ca/en/res/guidancedocumentonairzonemanagement_secured.pdf
[8] https://www.canada.ca/en/health-canada/services/publications/healthy-living/health-impacts-air-pollution-2021.html

Table 2 below provides a summary of health and environmental effects of fine particulate matter, ozone, sulfur dioxide and nitrogen dioxide.

Table 2: Summary of O3, PM2.5, SO2 and NO2 health and environmental effects (information from Government of Canada website)

Air Pollutant	Description	Health/Environmental Effects
Ground Level Ozone (O_3)[9]	Ground-level ozone is a colorless and highly irritating gas that forms just above the earth's surface. Ozone occurs naturally in the upper atmosphere where it filters ultraviolet radiation, but at ground level, O_3 is an important ingredient of smog. It is called a "secondary" pollutant because it is produced when two primary pollutants react in sunlight and stagnant air (often hot, sunny weather). These two primary pollutants are nitrogen oxides (NO_x) and volatile organic compounds (VOCs). NO_x and VOCs come from natural sources as well as human activities. About 95 per cent of NO_x from human activity come from the burning of coal, gasoline and oil in motor vehicles, homes, industries and power plants. VOCs from human activity come mainly from gasoline combustion and marketing, upstream oil and gas production, residential wood combustion, and from the evaporation of liquid fuels and solvents. Significant quantities of VOCs also originate from natural (biogenic) sources such as coniferous forests.	Ozone is known to have significant effects on human health, mainly in the form of breathing issues. Ozone can also significantly impact vegetation and decrease the productivity of some crops, damage synthetic materials, cause cracks in rubber and speed the deterioration of some paints and coatings.
Particulate Matter ($PM_{2.5}$)[10]	Particulate matter (PM) consists of airborne particles in solid or liquid form (e.g. dust, smoke, sand, pollen, mist, and fly ash). PM may be classified as primary or secondary, depending on the compounds and processes involved during its formation. Primary PM is emitted at the emissions source in particle form, for example, the smokestack of an electrical power plant or a recently tilled field subject to wind erosion. Secondary PM formation results from a series of chemical and physical reactions involving different precursor gases, such as Sulphur oxides and nitrogen oxides, and ammonia reacting to form sulphate, nitrate and ammonium particulate matter. This report deals with $PM_{2.5}$, airborne particulate matter with a mass median diameter less than 2.5 µm. Air pollutants at this size are small enough to float in air and can be transported over long distances.	Numerous studies have linked PM to aggravated cardiac and respiratory diseases such as asthma, bronchitis and emphysema and to various forms of heart disease. PM can also have adverse effects on vegetation and structures and contributes to visibility deterioration and regional haze.

[9] https://www.canada.ca/en/environment-climate-change/services/air-pollution/pollutants/common-contaminants/ground-level-ozone.html

[10] https://www.canada.ca/en/environment-climate-change/services/air-pollution/pollutants/common-contaminants/particulate-matter.html

Air Pollutant	Description	Health/Environmental Effects
Sulfur Dioxide (SO_2)[11]	Sulphur dioxide (SO_2), belongs to a family of Sulphur oxide gases (SOx). It is formed from the Sulphur contained in raw materials such as coal, oil and metal-containing ores during combustion and refining processes. SO_2 dissolves in water vapour in the air to form acids and interacts with other gases and particles in the air to form particles known as sulphates.	Both SO_2 in its untransformed state, and the acid and sulphate transformation products of SO_2, can have adverse effects on human health or the environment. SO_2 itself can cause adverse effects on respiratory systems of humans and animals, and damage to vegetation. When dissolved by water vapour to form acids it can again have adverse effects on the respiratory systems of humans and animals, and it can cause damage to vegetation, buildings and materials, and contribute to acidification of aquatic and terrestrial ecosystems. When transformed into sulphate particles that are subsequently deposited on aquatic and terrestrial ecosystems, acidification can result, and when sulphate is combined with other compounds in the atmosphere, such as ammonia, it becomes an important contributor to the secondary formation of respirable particulate matter ($PM_{2.5}$).
Nitrogen Dioxide (NO_2)[12]	Nitrogen oxides include the gases nitrogen oxide (NO) and nitrogen dioxide (NO_2). NO_x is formed primarily from the liberation of nitrogen contained in fuel and nitrogen contained in combustion air during combustion processes. NO emitted during combustion quickly oxidizes to NO_2 in the atmosphere. NO_2 dissolves in water vapour in the air to form acids and interacts with other gases and particles in the air to form particles known as nitrates and other products that may be harmful to people and their environment.	Both NO_2 in its untransformed state, and the acid and nitrate transformation products of NO_2 , can have adverse effects on human health or the environment. NO_2 itself can cause adverse effects on respiratory systems of humans and animals, and damage to vegetation. When dissolved by water vapour, the acids formed can have adverse effects on the respiratory systems of humans and animals. Nitric acid (HNO_3) can cause damage to vegetation, buildings and materials, and contribute to acidification of aquatic and terrestrial ecosystems. When NO_2 is transformed into nitrate particles that are subsequently deposited on aquatic and terrestrial ecosystems, acidification can result. When nitrate is combined with other compounds in the atmosphere, such as ammonia, it becomes an important contributor to the secondary formation of respirable $PM_{2.5}$. NO_2 is one of the two primary contributing pollutants, along with volatile organic compounds (VOCs), to the formation of ground-level ozone. As mentioned previously, both ozone and $PM_{2.5}$ are known to have harmful effects on human health and the environment.

[11] https://www.canada.ca/en/environment-climate-change/services/air-pollution/pollutants/common-contaminants/sulphur-oxides.html

[12] https://www.canada.ca/en/environment-climate-change/services/air-pollution/pollutants/common-contaminants/nitrogen-oxides.html

PEI RESULTS

Canadian Ambient Air Quality Standards (CAAQS)

Starting in the 2020 reporting period, two additional parameters were reported for the CAAQS. In addition to ground level ozone and $PM_{2.5}$, the new parameters of nitrogen dioxide and sulfur dioxide were reported. Also beginning in 2020, the standards for $PM_{2.5}$ and ozone were more stringent than previous years. As shown in Table 3 below, Ozone has one standard, while nitrogen dioxide, Sulphur dioxide and $PM_{2.5}$ have 2 standards each of varying time periods.

Table 3: Canadian Ambient Air Quality Standards[13]

Pollutant	Averaging Time	Numerical Value			Statistical Form
		2020	2025	2030	
Fine Particulate Matter ($PM_{2.5}$)	24 – hour	27 µg/m^3	-	23 µg/m^3	The 3-year average of the 98th percentile of the 24-hour average concentrations.
	Annual	8.8 µg/m^3	-	8.0 µg/m^3	The 3-year average of the annual average of all 1-hour concentrations.
Ozone (O_3)	8-hour	62 ppb	60 ppb	-	The 3-year average of the annual 4th highest of the daily maximum 8-hour average ozone concentrations.
Sulphur Dioxide (SO_2)	1-hour	70 ppb	65 ppb	-	The 3-year average of the annual 99th percentile of the SO_2 daily maximum 1-hour average concentrations.
	Annual	5.0 ppb	4.0 ppb	-	The average over a single calendar year of all 1-hour average SO_2 concentrations.
Nitrogen Dioxide (NO_2)	1-hour	60 ppb	42 ppb	-	The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations.
	Annual	17.0 ppb	12.0 ppb	-	The average over a single calendar year of all 1-hour average concentrations.

The protocols for comparing monitoring data to the CAAQS are detailed in various guidance documents[14]. The protocols detail criteria for determining the values for comparison, including data completeness requirements.

- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone.*
- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Ozone.*
- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Sulfur Dioxide; and*
- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Nitrogen Dioxide.*

[13] Image source: https://ccme.ca/en/air-quality-report

[14] https://ccme.ca/en/resources#

$PM_{2.5}$ 24-hour Standard Calculations for PEI

To calculate the 24-hour standard for PEI, the following steps were taken:

1. The daily 24-hour average $PM_{2.5}$ concentrations for 2021, 2022, and 2023 were determined for each of the three monitoring stations.
2. The 98th percentile value of the daily 24hr $PM_{2.5}$ for the given year was calculated for each year and site.
3. The values for the three years were averaged for each site.
4. The highest of the averages from the three stations was used as the value for the Air Zone and to determine CAAQS achievement. Results are shown in Table 4 below.

Table 4: 2023 PM2.5 24-hour Standard Results for PEI

2023 $PM_{2.5}$ 24-hour Standard Results				
Station/Year	**2021**	**2022**	**2023**	**Average**
Wellington	**10.5**	**9.3**	**13.1**	**11**
Charlottetown	**10.3**	**9.0**	**12.3**	**10.5**
Southampton	**9.5**	**8.3**	**11.5**	**9.7**

Units – µg/m^3
Green values meet data completeness criteria

Of the three stations, the average for the full three years can be calculated for all three sites. When there are multiple stations used to determine CAAQS values within an air zone, priority is given to stations that have 3 full years of data completeness compared to a station with 2 years of data completeness, even if the station with 2 years has a higher value. Of the remaining stations, the one with the higher value is selected. The higher value for the 2023 reporting year is from the Wellington station; therefore, the Wellington value is used for the CAAQS reported value. The PEI $PM_{2.5}$ 24-hour standard for 2023 is **11 µg/m^3**. Additional information regarding data completeness criteria is found in Appendix 1.

The value of 11 µg/m^3 is below the CAAQS of 27 µg/m^3, therefore PEI achieved the $PM_{2.5}$ 24-hour standard for 2023.

$PM_{2.5}$ Annual Standard Calculations for PEI

To calculate the annual standard, the following steps were taken:

1. The daily 24-hour average $PM_{2.5}$ concentrations over 2021, 2022, and 2023 were determined for each day for the three monitoring stations.
2. The annual averages of the daily 24hr $PM_{2.5}$ for the given year were calculated for each year and site.
3. The values for the three years were average for each site.
4. The highest of the averages from the three stations was used as the value for the Air Zone and to determine CAAQS achievement. Results are shown in Table 5 below.

Table 5: 2023 PM2.5 Annual Standard Results for PEI

2023 $PM_{2.5}$ Annual Standard Results				
Station/Year	**2021**	**2022**	**2023**	**Average**
Wellington	**4.5**	**4.4**	**4.4**	**4.4**
Charlottetown	**4.8**	**4.3**	**4.2**	**4.4**
Southampton	**4.3**	**4.2**	**4.2**	**4.2**

Units – µg/m³
Green values meet data completeness criteria

The average value across all three stations can be calculated over the three-year period. Since the average values for Charlottetown and Wellington are equal, that shared value is used for reporting purposes. The PEI 2023 annual standard is **4.4 µg/m³.** For further details on data completeness requirements, refer to Appendix 1.

The value of 4.4 µg/m³ is below the CAAQS of 8.8 µg/m³, therefore PEI achieved the $PM_{2.5}$ annual standard for 2023.

Ozone Standard Calculations for PEI

To calculate the ozone standard, the following steps were taken:

1. The 8-hour average ozone concentration was calculated for each hour of the day, for each of the three sites.
2. The maximum 8-hour average ozone concentration was calculated for each day.
3. The annual 4th highest maximum daily 8-hour ozone concentration was determined for each year and each station. Results are shown in Table 6 below.

Table 6: 2023 Ozone Standard Results for PEI

2023 Ozone Standard Results				
Station/Year	2021	2022	2023	Average
Wellington	54.1	49.5	47.6	**50.4**
Charlottetown	55.1	46.8	53.3	**51.7**
Southampton	53.5	47.1	46.5	**49***

Units – ppb *(parts per billion)*
Green values meet data completeness criteria
Red values do not meet data completeness criteria
* Based on incomplete data (average on 2-years of data)

Of the three stations, the average for the three years can only be calculated for Charlottetown and Wellington. When there are multiple stations used to determine CAAQS values within an air zone, priority is given to stations that have 3 full years of data completeness, compared to a station with 2 years of data completeness, even if the station with 2 years has a higher value. Charlottetown had the highest average ozone standard value at 51.7 ppb; therefore, the PEI 2023 ozone standard value is **51.7 ppb**.

The value of 51.7 ppb is below the CAAQS ozone standard of 62 ppb; therefore, PEI achieved the ozone standard for 2023.

Nitrogen Dioxide 1-hour Standard Calculations for PEI

To calculate the 1-hour NO_2 standard for PEI, the following steps were taken:

1. The maximum 1-hour value for each day was determined and ranked in descending order.
2. The 98th percentile value for the given year was calculated for each year.
3. The values for the three years were averaged.
4. The above procedure is completed for each of the 3 stations.
5. The highest of the averages from the three stations was used as the value for the Air Zone and to determine CAAQS achievement. Results are shown in Table 7 below.

Table 7: 2023 NO2 1-hour Standard Results for PEI

2023 NO_2 1-hour Standard Results				
Station/Year	2021	2022	2023	Average
Wellington	5.7	7.9	6.6	**6.7**
Charlottetown	28.7	23.5	19.5	**23.9**
Southampton	4.0	5.2	5.2	**14.4**

Units – ppb
Green values meet data completeness criteria

All stations had valid results for all three years. The Charlottetown average result was highest, so it is used for the CAAQS reported value. Therefore, the PEI 2023 annual standard for NO_2 is **23.9 ppb**. Additional information regarding data completeness criteria is found in Appendix 1.

The value of 23.9 ppb is below the CAAQS of 60 ppb; therefore, PEI achieved the NO_2 1-hour standard for 2023.

Nitrogen Dioxide Annual Standard Calculations for PEI

To calculate the annual NO_2 standard for PEI, the following steps were taken:

1. All 1-hour NO_2 values for the year were compiled and averaged for the current year.
2. The above procedure was completed for each station.
3. The highest average value from the stations was used for the Air Zone and to determine CAAQS achievement. Results are shown in Table 8 below.

Table 8: 2023 NO2 Annual Standard Results for PEI

2023 NO_2 Annual Standard Results	
Station/Year	**2023**
Wellington	**0.5**
Charlottetown	**1.5**
Southampton	**0.5**

Units – ppb
Green values meet data completeness criteria

All three stations met the data completeness criteria. To choose the NO_2 annual standard value for PEI in this case, the highest of the three averages is selected. Charlottetown had the highest average NO_2 standard value at 1.5 ppb, therefore the PEI 2023 NO_2 annual standard value is **1.5 ppb**. Additional information regarding data completeness criteria is found in Appendix 1.

The value of 1.5 ppb is below the CAAQS of 17.0 ppb; therefore, PEI achieved the NO_2 Annual standard for 2023.

Sulfur Dioxide 1-hour Standard Calculations for PEI

To calculate the 1-hour SO_2 standard for PEI, the following steps were taken:

1. The maximum 1-hour value for each day was determined and ranked in descending order.
2. The 99th percentile value for the given year was calculated for each year.
3. The values for the three years were averaged.
4. The average from the station was used for the Air Zone and to determine CAAQS achievement. Results are shown in Table 9 below.

Table 9: 2023 SO2 1-hour Standard Results for PEI

2023 SO_2 1-hour Standard Results				
Station/Year	**2021**	**2022**	**2023**	**Average**
Charlottetown	**1.5**	**1.4**	**1.0**	**1.3**

Units – ppb
Green values meet data completeness criteria

As only one station records SO_2 values on PEI, it is used for the CAAQS reported standard value. Therefore, the PEI 2023 SO_2 1-hour standard is **1.3 ppb**. Additional information regarding data completeness criteria is found in Appendix 1.

The value of 1.3 ppb is below the CAAQS of 70 ppb; therefore, PEI achieved the SO_2 1-hour standard for 2023.

Sulfur Dioxide Annual Standard Calculations for PEI

To calculate the annual SO_2 standard for PEI, the following steps were taken:

1. All 1-hour SO_2 values for the year were compiled and averaged for the current year.
2. The average value from the station was used for the Air Zone and to determine CAAQS achievement. Results are shown in Table 10 below.

Table 10: 2023 SO2 1-hour Standard Results for PEI

2023 SO_2 Annual Standard Results	
Station/Year	**2023**
Charlottetown	**0.2**

Units – ppb
Green values meet data completeness criteria

As only one station records SO_2 values on PEI, it is used for the CAAQS reported standard value. Therefore, the PEI 2023 SO_2 annual standard is **0.2 ppb**. Additional information regarding data completeness criteria is found in Appendix 1.

The value of 0.2 ppb is below the CAAQS of 5 ppb; therefore, PEI achieved the SO_2 Annual standard for 2023.

CAAQS Summary Values for PEI

Table 11 below is a summary of the $PM_{2.5}$, nitrogen dioxide, sulfur dioxide and ozone values (calculated above) for PEI compared to the CAAQS. The table lists the CAAQS value for each of the parameters, with the respective PEI values for 2023 compared to them. If the PEI value is lower than the CAAQS, the respective standard is achieved. All seven standards are achieved for the 2023 reporting year.

Table 11: Achievement of Canadian Ambient Air Quality Standards for 2023

Parameter	Standard (CAAQS)	PEI 2023 Value	Achieved/Not Achieved
$PM_{2.5}$ 24-hour standard	27 µg/m^3	11 µg/m^3	**ACHIEVED**
$PM_{2.5}$ Annual Standard	8.8 µg/m^3	4.4 µg/m^3	**ACHIEVED**
Ozone Standard	62 ppb	51.7 ppb	**ACHIEVED**
NO_2 1-hour standard	60 ppb	23.9 ppb	**ACHIEVED**
NO_2 Annual Standard	17.0 ppb	1.5 ppb	**ACHIEVED**
SO_2 1-hour standard	70 ppb	1.3 ppb	**ACHIEVED**
SO_2 Annual Standard	4.0 ppb	0.2 ppb	**ACHIEVED**

Management Levels and Final Air Zone Results for PEI

Under the Air Zone Management Framework (AZMF), progressively more rigorous actions are to be implemented in an air zone as air quality approaches or exceeds the CAAQS. Seven Management Levels, covering $PM_{2.5}$, ground-level ozone, SO_2 and NO_2 concentrations, provide general guidance on the nature of the management, monitoring and reporting actions to be implemented in air zones, see Tables 12 and 13.

Table 12: Air Zone Management Framework (Ozone and PM2.5)[15]

Air quality management levels	Management Levels for the Ozone CAAQS (ppb)		Management Levels for the Annual $PM_{2.5}$ CAAQS ($\mu g/m^3$)		Management Levels for the 24- hour $PM_{2.5}$ CAAQS ($\mu g/m^3$)		Management Objective (if value is in this coloured category)
	2020	2025	2015	2020	2020	2030	
Red	>62	>60	>10.0	>8.8	>27	>23	To Achieve Air Zone CAAQS through Advanced Air Management Actions
Orange	57 to 62	57 to 60	6.5 to 10.0	6.5 to 8.8	20 to 27	17 to 23	To Improve Air Quality through Active Air Management and Prevent a CAAQS Exceedance
Yellow	51 to 56		4.1 to 6.4		11 to 19		To Improve Air Quality using Early and Ongoing Actions for Continuous Improvement
Green	≤ 50		≤ 4.0		≤ 10		To Maintain Good Air Quality through Proactive Air Management Measures to Keep Clean Areas Clean

[15] Adapted from - https://ccme.ca/en/air-quality-report

Table 13: Air Zone Management Framework (NO2 and SO2)[16]

Air quality manage-ment levels	Management Levels for the 1- hour Nitrogen Dioxide CAAQS (ppb)		Management Levels for the Annual Nitrogen Dioxide CAAQS (ppb)		Management Levels for the 1- hour Sulphur Dioxide CAAQS (ppb)		Management Levels for the Annual Sulphur Dioxide CAAQS (ppb)		Management Objective (if value is in this coloured category)
	2020	2025	2020	2025	2020	2025	2020	2025	
Red	>60	>42	>17.0	>12.0	>70	>65	>5.0	>4.0	To Achieve Air Zone CAAQS through Advanced Air Management Actions
Orange	32 to 60	32 to 42	7.1 to 17.0	7.1 to 12.0	51 to 70	51 to 65	3.1 to 5.0	3.1 to 4.0	To Improve Air Quality through Active Air Management and Prevent a CAAQS Exceedance
Yellow	21 to 31		2.1 to 7.0		31 to 50		2.1 to 3.0		To Improve Air Quality using Early and Ongoing Actions for Continuous Improvement
Green	≤ 20		≤ 2.0		≤ 30		≤ 2.0		To Maintain Good Air Quality through Proactive Air Management Measures to Keep Clean Areas Clean

The values calculated earlier in the report (summarized in Table 11) were all used to determine the management level of each parameter according to the AZMF (Tables 12 and 13 above). The parameter levels were compared to each other to determine the final management level for the PEI Air Zone. The highest level of the seven parameters is used as the final management level for the Air Zone. Table 14 summarizes these results.

[16] Adapted from - https://ccme.ca/en/air-quality-report

Table 14: 2023 PEI Air Zone Results

Parameter	2023 PEI Value	Management Level
$PM_{2.5}$ 24-hour standard	11 µg/m^3	YELLOW
$PM_{2.5}$ Annual Standard	4.4 µg/m^3	YELLOW
Ozone Standard	51.7 ppb	YELLOW
NO_2 1-hour standard	23.9 ppb	YELLOW
NO_2 Annual Standard	1.5 ppb	GREEN
SO_2 1-hour standard	1.3 ppb	GREEN
SO_2 Annual Standard	0.2 ppb	GREEN

Past PEI Management Levels

Table 15 below provides a historical look at the various annual CAAQS values and resulting management levels from 2013 to 2023.

Table 15: Historical air quality annual values and management levels for PEI

Parameter	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
Ozone (ppb)	55	53	51	54	52	51	50	49	50	51	51
$PM_{2.5}$ 24-hour (µg/m^3)	12*	10*	9*	9	9*	9*	7*	8	13	11	11
$PM_{2.5}$ Annual (µg/m^3)	5.2*	4.1*	3.6*	4.5	4.9*	4.4*	3.2*	3.6	6.4	5.2	4.4
NO_2 1-hour (ppb)								27	28	26	23.9
NO_2 Annual (ppb)								1.6	1.7	1.5	1.5
SO_2 1-hour (ppb)								11	8	5	1.3
SO_2 Annual (ppb)								0.2	0.1	0.2	0.2

** - value based on 2 years of data (instead of 3)*
Note: Although data for NO_2 and SO_2 was collected in previous years, they were not used for CAAQS calculations until the 2020 reporting year, and therefore not displayed in the table.

Past Air Quality Reports can be accessed online at:
https://air.princeedwardisland.ca/pages/air-quality-reports

2021-2023 Management Level Discussion

Air quality management levels for PEI have historically been classified as either yellow or green (see Table 15 above). In 2019, several parameters reached the green level for the first time. Since then, multiple parameters have returned to the yellow level. As outlined in the Air Zone Management Framework, jurisdictions with parameters in the yellow level are expected to implement actions aimed at preventing further deterioration in air quality.

In 2020 and 2021, there was a noticeable increase in the PM2.5 24-hour levels, but since then, those levels have stabilized and remained steady this year. The PM2.5 annual average has improved, dropping from 5.2 to 4.4 µg/m³.

These results are largely influenced by data from the Charlottetown monitoring station, which typically shows higher readings due to its urban setting. In contrast, the Wellington and Southampton stations, located in rural areas, tend to report lower values. This is the third year Charlottetown data has been included in calculations, and all three years fall within the yellow management level category.

It's expected that urban areas like Charlottetown—with more vehicles and emission sources—will have higher PM2.5 levels than rural areas, so these results are not unexpected.

In 2020, for the first time, all stations in the monitoring network met the data completeness criteria, allowing for a full dataset to be used in calculating the Canadian Ambient Air Quality Standards (CAAQS). However, in 2023, not all parameters met the completeness requirement, marking the first time since 2020 that a full dataset was unavailable.

The following will discuss each parameter in more detail for the 2023 reporting period.

Ozone Results

A value of 50 ppb or less is required to be in the green management level for ozone. Historically, PEI ozone values for the 3 sites hover around 50 ppb: very close to the divide between green and yellow. In 2023 the ozone value went up slightly to 51.7 ppb, pushing the parameter into the yellow management level category for the second year in a row.

For the first time in several years, the Southampton station did not meet the data completeness[17] criteria. As a result, only two of the three monitoring stations were used to determine the ozone value for 2023.

$PM_{2.5}$ 24-hour and $PM_{2.5}$ Annual Results

A value of 10 µg/m^3 or lower for the $PM_{2.5}$ 24-hour parameter is required to be in the green management level. PEI values had been 10 or below for each of the years since 2013[18]. In 2023, the value remained unchanged from 2022 at 11 µg/m^3, keeping it within the yellow management level category. While we saw increases at all three stations Charlottetown data continues to drive this management level.

For the $PM_{2.5}$ Annual parameter, a value of 4 µg/m^3 and below results in a green management level category while a value between 4.1 and 6.4 results in a yellow management level. The $PM_{2.5}$ Annual values for PEI have bounced between yellow and green, however it should be noted that historically the $PM_{2.5}$ Annual parameter has had data completeness issues, with the Charlottetown data not included in the management level determination. For the third year in a row, the Charlottetown station data met the data completeness criteria and was used to calculate the average. The value was 4.4 µg/m^3, down from 5.2 µg/m^3 in 2022, but still within the yellow management level category.

For 2023, both the annual and 24-hour values fell into the yellow management level and were based on 3 years of data, with the Charlottetown station being the driver.

To improve the accuracy of air quality data, a correction has been introduced for $PM_{2.5}$ measurements

[17] See Appendix A for data completeness criteria
[18] See table 15

collected using Teledyne API T640 instruments. These instruments were found to consistently report slightly higher $PM_{2.5}$ levels compared to standard reference methods.

To address this, Teledyne API—working with the U.S. Environmental Protection Agency (EPA) and Environment and Climate Change Canada (ECCC)—developed a correction factor. This adjustment brings T640 readings in line with the Federal Reference Method (FRM) used by both the EPA and Canada's National Air Pollution Surveillance (NAPS) program.

All NAPS partners, including provinces and territories, have agreed to apply this correction. In Prince Edward Island, the adjustment applies to $PM_{2.5}$ data collected on or after January 1, 2023.

SO_2 1-hour and Annual Results

Sulfur dioxide is a parameter that is only recorded at the Charlottetown air monitoring station, being monitored at the station since 2011. The 2023 report marks the fourth time that SO_2 has been reported as part of the air monitoring report and used to calculate the final management level. Unlike $PM_{2.5}$, the annual metric value uses only the current year of data. In contrast, the 1-hour metric for SO_2 is an average for the last 3 years.

For 2023 both the 1-hour and annual metric value fell within the green management levels (30 ppb or less and 2.0 ppb or less respectively). In fact, PEI's values were quite a bit under the management threshold at 1.3 ppb and 0.2 ppb. Although reporting has only been required since 2020, Table 16 below shows the historical annual values for reference. Following a drastic decrease in 2020 the annual values continue to gradually decline from 1.4 ppb in 2022 to 1.3 in 2023.

A review of the data from the last several years shows that SO_2 peak values started to significantly decline around May 2020. This coincides with the completion of a demolition and restoration project on the adjacent property. A nursing home on the adjacent property was demolished beginning in the fall of 2019, ending with site restoration into the summer of 2020. Since the completion of the project, there have been far fewer peaks in the SO_2 data, resulting in lower annual 99th percentile values. At this point it is uncertain why there are fewer peaks in the SO_2 data since the removal of the building. Note that this building was heated with district heating lines and did not have any onsite combustion. We will continue to monitor the data moving forward for any changes.

Table 16: SO2 Annual metric and 99th percentile values

Parameter (ppb)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Annual Metric	**1.0**	**0.9**	**0.6**	**0.5**	**0.7**	**0.6**	**0.3**	**0.2**	**0.3**	**0.2**	**0.1**	**0.2**	**0.2**
Annual 99th Percentile*	**13.7**	**20.3**	**14.0**	**14.1**	**16.0**	**20.1**	**14.0**	**8.1**	**11.3**	**12.3**	**1.5**	**1.4**	**1.3**

* - the annual 99th percentile value is used to calculate the 1-hour metric (average of 3 years of data)

Data meets data completeness criteria for the year

Data DOES NOT meet data completeness criteria for the year

NO_2 1-hour and Annual Results

Nitrogen dioxide is a parameter that has been recorded at all three stations since 2011. Similar to SO_2,

2023 marks the fourth time that NO_2 has been reported as part of the air monitoring report and used to calculate the final management level. The annual metric value uses only the current year of data, while the 1-hour metric is an average of the last 3 years.

For 2023 the annual metric value of 1.5 ppb fell within the green management level (2.0 ppb or less), while the 1-hour value of 23.9 ppb fell within the yellow management level (21 to 31 ppb).

As displayed in Table 17 below, it was the Charlottetown station that drove the 1-hour NO_2 management level to yellow with higher annual 98th percentile values (reminder: the 1-hour management level is calculated by averaging three years of data, and the highest station value for the period in question is used to determine the final management level for the parameter). A quick evaluation of the Charlottetown data in Table 17 shows that averaging any of the Charlottetown 3-year periods for the 1-hour NO_2 management level would continue to yield a value over the green management level threshold of 20 ppb. Given current trends, it is likely that the 1-hour ozone metric will continue to fall within the yellow management level in the near term.

Table 17: NO2 annual metric and 98th percentile values

Parameter (ppb)	Location	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Annual Metric	Wellington	0.3	1.1	0.8	0.6	0.5	0.5	0.6	0.5	0.5	0.6	0.5
Annual 98th Percentile*	Wellington	6.3	6.0	7.0	5.1	4.8	6.5	7.1	6.3	5.7	7	6.6
Annual Metric	Charlottetown	2.6	2.0	1.9	1.9	1.8	1.8	2.3	1.6	1.7	1.5	1.5
Annual 98th Percentile*	Charlottetown	32.5	20.5	21.8	25.0	27.5	25.7	29.6	25.6	28.7	26	19.5
Annual Metric	Southampton	0.3	0.2	0.2	0.2	0.3	0.5	0.4	0.5	0.4	0.6	0.5
Annual 98th Percentile*	Southampton	4.3	3.4	4.4	3.8	4.1	4.2	4.0	5.2	4.0	5	5.2

* - the annual 98th percentile value is used to calculate the 1-hour metric (average of 3 years of data) Data meets data completeness criteria for the year
Data DOES NOT meet data completeness criteria for the year

Management Level for 2023

As mentioned previously, the management level for several parameters in PEI have historically been yellow, except for 2019. The 2023 reporting year saw a continuation of the yellow management levels for multiple parameters (both $PM_{2.5}$ metrics, O_3 and the NO_2 1-hour standard). For parameters with a yellow management level, the objective is "To Improve Air Quality using Early and Ongoing Actions for Continuous Improvement."

The following section will discuss some of the actions PEI is taking that are expected to improve air quality. The actions do show promise for improving air quality on PEI, as many of them focus on reducing the use of fossil fuels, moving more towards renewable energy sources. These efforts should result in a reduction of the various air parameters over time within the province.

PEI MANAGEMENT ACTIONS

The quality of the air in PEI is influenced by two sources; the emissions we generate within the province and those that come to us from provinces to the west and from the northeastern United States. Although we can make efforts at home to improve air quality, we don't have control over what happens elsewhere. However, as the AQMS is a national effort, improvement efforts in other provinces are continually occurring. As well, the Canada-United States Air Quality Agreement, signed in 1991 to address transboundary air pollution leading to acid rain, has led to benefits for Atlantic Canada. In 2000, the Ozone Annex was added to address ground-level ozone, a major component of smog.

At a provincial level, government has initiated several management actions that improve air quality. There is a strong relationship between climate change mitigation actions and improvements in air quality. For example, many actions taken to reduce greenhouse gas emissions also improve air quality. Governments across Canada, including PEI, are working to better link air quality and climate change programming to serve both purposes. Many of the actions listed below will be climate change focused, but they can also improve air quality as well.

The initiatives outlined in the 2023 Air Quality Report are the same as those in the 2022 report. This is because the 2023 report reflects the actions that were already in place at the time it was published. The initiatives are active and ongoing, having actions that span over several years.

Provincial Incentives and Rebates

The province is providing various incentives to residents and businesses to lessen the amount of energy used and to encourage sustainable transportation. All these incentives help reduce the use of fossil fuels, resulting in reductions in air pollutants.

Energy Efficiency Rebates

Homeowners

- Free heat pumps for low-income Islanders
- Free home insulation program
- Free hot water electrification program
- Point of sale heat pump rebates
- Energy audits
- Home insulation rebates for the installation of insulation, air sealing improvements as well as ENERGY STAR® windows and doors
- Energy efficient equipment rebates for the installation of ENERGY STAR® certified heating equipment including water saving devices, biomass heating devices, and other energy saving products
- Free weatherization for low-income homeowners
- Solar electric rebates
- Financing for the purchase of energy efficient equipment, insulation, and solar
- Incentives for building energy efficient new homes

Businesses, non-profits, and industrial/agricultural facilities

- Business Energy Rebate Program
- Community energy solutions for energy efficiency upgrades to businesses and organizations
- Rebates on energy-efficient lighting and equipment
- Rebates on solar electric installation

Electric Vehicle Incentives

- New and used Battery Electric Vehicles (BEV): $5,000, plus a free type 2 charger
- New and used Plug-in Hybrid Electric Vehicles (PHEV): $2,500, plus a free type 2 charger
- Can be combined with federal incentive and leasing is also eligible for the program

Bicycle and E-bike Rebates

- $100 rebate on bicycles
- $500 rebate on e-bikes

Active Transportation and Transit[19]

- Rural transit system expanded
- Transit fees temporarily reduced and new rural transit routes added during summer months
- Active Transportation Fund - a $25 million investment over five years that supports priority active transportation infrastructure throughout the province

2040 Net Zero Framework

In February 2022 the province released the *2040 Net Zero Framework, "*Accelerating *our transition to a clean, sustainable economy".* The document provides the framework to achieve the goals and targets required to be Canada's first Net Zero Province. The priorities included within this framework will be supported by the development and implementation of a series of five-year action plans that will include interim emission reduction targets and reporting of progress made to-date.

The framework focuses on six pillars:

- Transform the way people and goods move
- Transition to efficient and cleaner buildings
- Shape agriculture for PEI's transition to net zero
- Remove carbon through forestry, technologies and emerging opportunities
- Create a clean industry and waste advantage
- Inspire transformational change through leadership and engagement

It is expected that many of the initiatives generated from the framework will result in reductions to air pollution, and result in an improvement in air quality on Prince Edward Island.

[19] These items stem from the Active Transportation Strategy discussed later in the document.

The framework can be downloaded at:
https://www.princeedwardisland.ca/sites/default/files/publications/2040_net_zero_framework.pdf

Building Resilience: Climate Adaptation Plan

In October 2022 the "Building Resilience: Climate Adaptation Plan" was released by the Department of Environment, Energy and Climate Action. While most of the plan revolves around actions related to adapting to climate change, there are several that have the potential to improve air quality in the province.

Action 24 – Enhancement of Trees and Forests – In this action the province will:

- Ensure a diversity of trees and vegetation planted in areas to enhance natural systems and provide additional resiliency.
- Increase wind-firming exercises in treed areas with pruning.
- Develop guidelines for landowners and municipalities on recommended types and varieties of trees and vegetation based on location and topography.
- Provide further training and support to municipalities and re departments for FireSmart to increase response capacity for forest fires; and
- Support municipalities, utilities, and land conservation partners to complete forest and tree assessments and restoration projects.

This action can improve air quality through the addition of treed areas in the province, while also increasing the resilience of forests already in existence. Any action that improves forests could improve air quality through the absorbing and storing of greenhouses gases.

Several other actions in the plan will have an indirect effect on air quality through knowledge and capacity building:

- **Action 25** - Research, Monitor, and Model Local Climate Conditions and Impacts.
- **Action 26** - Provide Expertise and Resources to Departments for Climate Adaptation.
- **Action 27** - Create Curriculum Materials on Climate Impacts for K-12; and
- **Action 28** - Public Awareness of Climate Impacts and Personal Adaptation Actions.

The plan is available for download at: https://www.princeedwardisland.ca/en/publication/building-resilience-climate-adaptation-plan

Forestry Programs

The forestry programs administered by the Forests, Fish and Wildlife Division within the Department were responsible for the planting of over 1 million trees within the province in 2021. As mentioned previously, trees do have a positive effect on air quality. The following lists the various forestry programs in place for the province:

- Carbon Capture Tree Planting Program:
  - https://www.princeedwardisland.ca/en/service/carbon-capture-tree-planting-program
- Hedgerow Program:
  - https://www.princeedwardisland.ca/en/information/environment-energy-and-climate-action/hedgerowbuffer-zone-planting-program
- Greening Spaces Program:
  - https://www.princeedwardisland.ca/en/information/environment-energy-and-climate-action/greening-spaces-program
- Forest Enhancement Program:
  - https://www.princeedwardisland.ca/en/service/forest-enhancement-program-fep-forestry-services-for-private-forest-land-owners

Sustainable Transportation Action Plan

As part of the Climate Change Action Plan (action item #11) and the PEI Provincial Energy Strategy 2016/17, the province developed a Sustainable Transportation Action Plan. The action plan is meant to provide Islanders with sustainable, affordable, safe and convenient transportation options. It also strives to help Islanders consider the impacts of their transportation choices and provide opportunities for change. Transportation is a main source of air pollution and in PEI 41% of greenhouse gas emissions are from the transportation sector. Reducing the amount, we drive, and the type of vehicles we drive will lead to fewer emissions and less air pollution.

Almost every one of the 27 action items in the Sustainable Transportation Action Plan can lead to reductions in air pollution and are relevant to air quality on PEI. Instead of listing all the action items, a brief explanation of each section of the plan is described below:

Urban and Rural Transit: these actions involve promoting the use of public transit, instead of using personal vehicles. Actions include increasing the number of routes, education, increasing the affordability and convenience, increasing efficiencies, and removing financial barriers.

Vehicles and Transportation: included actions focus on transitioning to electric and low emission vehicles, promoting fuel efficiencies and reducing driving. These can be done through education, incentives for lower emission vehicles, improving efficiencies for the transport truck sector, improving fleet management and increasing carpooling opportunities.

Active Transportation: active transportation can include any form of self-propelled movement, such as biking, walking, skateboarding or rollerblading. Increasing the use of active transportation means we are driving vehicles less. Actions include expanding active transportation infrastructure, education and ensuring that active transportation plans are created for municipalities and new developments.

Community Design and Infrastructure includes promoting a healthy built environment and building the right infrastructure in the right places. Our built environments are the places we build to work, live and play. A healthy built environment considers neighborhood design, transportation networks, natural areas, housing and food systems. Where and how we build our homes, facilities and businesses can allow people better access to different modes of transportation, such as walking and biking. Our communities can be improved by locating housing closer to goods and services.

The action plan is available at: https://www.princeedwardisland.ca/en/publication/sustainable-transportation-action-plan

PEI Provincial Energy Strategy 2016/17

In 2017 The Government of Prince Edward Island developed a 10-year strategy to reduce energy use, establish cleaner and locally produced energy sources and moderate future energy price increases. The goal of the strategy is to develop a stronger, more sustainable and energy independent province. It focuses on three vital areas: efficiency, conservation and renewables. The action items below will have the added benefit of having a positive impact on PEI air quality.

Action Item: *Implement a comprehensive set of energy efficiency programs that enable customers to reduce their energy use in a cost-effective manner. Standard programs include deep energy retrofits for building shells, residential new construction, appliance recycling, and encouraging sales (through rebates) of the most efficient appliances and lighting. These programs must be supplemented with public outreach and education initiatives for all forms of energy in order to succeed.*

Action Item: *Implement a comprehensive set of energy efficiency programs that enable commercial, institutional, and industrial customers to reduce their energy use in a cost-effective manner. Standard programs include small business programs, encouraging sales of the most efficient appliances and lighting, and custom options for large customers*.

Action Item: *Pending outcomes of the above opportunities and an agreement with New Brunswick Power, develop two additional wind farms: 30 MW in 2019 and 40 MW in 2025.*

Each of the action items above either advances energy efficiency across the province or reduces the use of fossil fuels. Reducing the use of fossil fuels, or greenhouse gases, helps to improve air quality in the province. The strategy is available at: https://www.princeedwardisland.ca/en/information/environment-energy-and-climate-action/energy-strategy-20162017

Although the quality of the air in our province is generally considered good, there is still work to be done to ensure that continual improvements are made. Many of the actions listed above will help ensure Islanders continue to have good air quality in the future.

APPENDIX 1 – Data Completeness Criteria and Historical Values

Data Completeness Criteria

The flowing table details the requirements for data completeness for the calculation of the CAAQS values. The contents of the table were extracted from the following documents:

- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone*
- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Ozone*
- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Sulfur Dioxide*
- *Guidance Document on the Achievement Determination Canadian Ambient Air Quality Standards for Nitrogen Oxide*

Table 18: Data Completeness Criteria

Standard	Data Requirements

$PM_{2.5}$ 24hr Standard	• a daily 24hr-$PM_{2.5}$ is to be considered valid if at least 75% (18 hours) of the 1-hour concentrations are available on the given day
	• For any given year, the annual 98P will be considered valid if the following two criteria are satisfied:
	  ○ at least 75% valid daily-24hr-$PM_{2.5}$ in the year
	  ○ at least 60% valid daily-24hr-$PM_{2.5}$ in each calendar quarter
	• A $PM_{2.5}$ 24-hour metric value will be calculated and considered valid if an annual 98P value is available for at least two of the required three years

$PM_{2.5}$ Annual Standard	• a daily 24hr-$PM_{2.5}$ is to be considered valid if at least 75% (18 hours) of the 1-hour concentrations are available on the given day
	• For any given year, the annual average $PM_{2.5}$ concentration will be considered valid if the following two criteria are satisfied:
	  ○ at least 75% valid daily-24hr-$PM_{2.5}$ in the year
	  ○ at least 60% valid daily-24hr-$PM_{2.5}$ in each calendar quarter
	• A $PM_{2.5}$ annual metric value will be calculated and considered valid if annual averages are available for at least two of the required three years

Ozone Standard	• A rolling 8-hour average will be calculated and considered valid if there are at least six 1-hour • For any given day, the daily 8hr-O_3-max will be considered valid if there are at least 75% (18) valid 8-hour rolling averages in the day • For any given year, the annual 4th highest daily 8hr-O_3-max will be considered valid if there are at least 75% valid daily 8hr-O_3-max in the combined 2nd and 3rd quarters (April 1 to September 30) • For a given CAAQS reporting station, the ozone metric value will be calculated and considered valid if the annual 4th highest daily 8hr-O_3-max are available in at least two of the required three years

Standard	Data Requirements
NO_2 Annual Standard	• at least 75% of the NO_2 1- hour values are available in the year; and • at least 60% of the NO_2 1- hour values are available in each calendar quarter
NO_2 1-Hour Standard	• At least 18 of the 24 (75%) NO_2 1-hour values are available in the day. • The NO_2 Dmax 1-hour value must be available for at least: ○ 75% of the days in a year; and ○ 60% of the days in each calendar quarter; and • Two of the possible three annual 98th percentile values are available
SO_2 Annual Standard	• at least 75% of the SO_2 1- hour values are available in the year; and • at least 60% of the SO_2 1- hour values are available in each calendar quarter
SO_2 1-Hour Standard	• At least 18 of the 24 (75%) SO_2 1-hour values are available in the day. • The SO_2 Dmax 1-hour value must be available for at least: ○ 75% of the days in a year; and ○ 60% of the days in each calendar quarter; and • Two of the possible three annual 99th percentile values are available

Historical Data Completeness

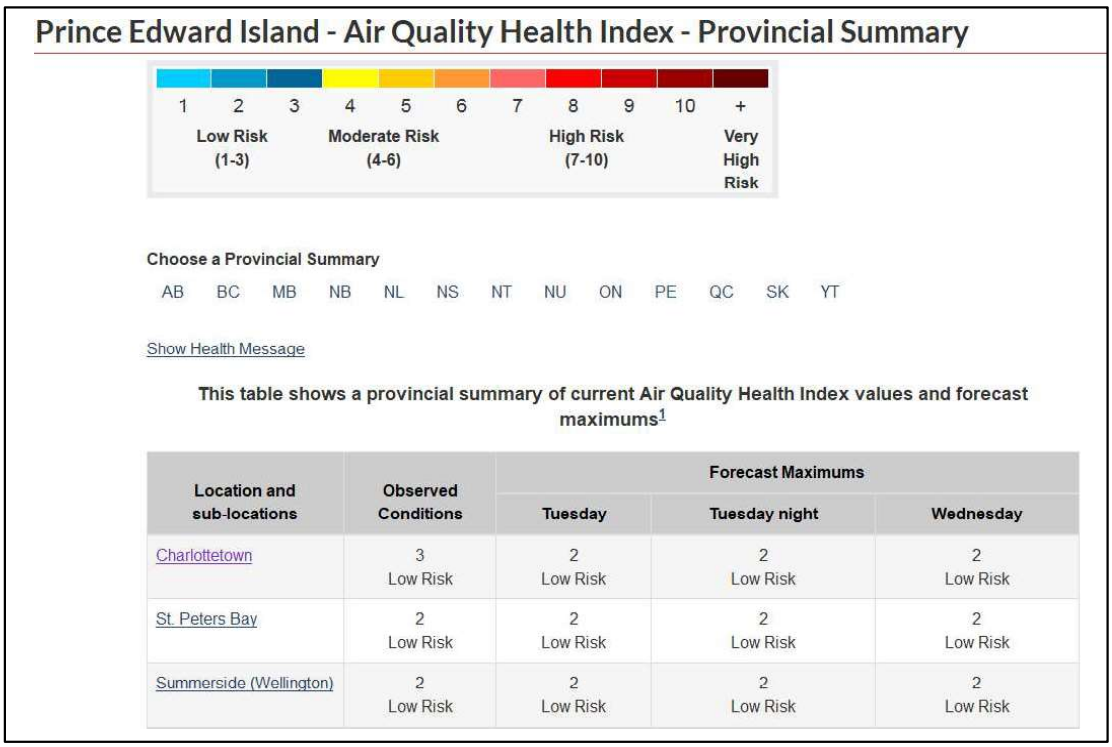
Table 19 displays annual data completeness for the various stations and parameters.

Table 19: Historical Data Completeness at PEI Stations (annual percentage)

Station/Parameter	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Charlottetown $PM_{2.5}$	No	No	Yes	No	No	No	94.2	98.4	98.4	92.6	96.7
Charlottetown O_3	No	Yes	Yes	Yes	Yes	Yes	98.4	98.4	99.5	94.0	97.3
Charlottetown NO_2	No	Yes	Yes	Yes	Yes	Yes	92.3	98.1	98.4	95.9	98.4
Charlottetown SO_2	No	Yes	Yes	Yes	Yes	Yes	97.0	98.6	98.4	95.6	97.5
Southampton $PM_{2.5}$	No	Yes	Yes	Yes	Yes	Yes	93.2	97.0	99.5	87.9	95.1
Southampton O_3	Yes	Yes	Yes	Yes	Yes	Yes	92.9	97.3	99.5	95.6	80.5
Southampton NO_2	Yes	Yes	Yes	No	Yes	No	90.1	98.6	99.2	96.4	99.4
Wellington $PM_{2.5}$	No	No	No	No	No	No	51.8	98.6	99.7	98.9	96.7
Wellington O_3	Yes	Yes	Yes	Yes	Yes	Yes	86.9	98.9	99.5	96.2	98.9
Wellington NO_2	Yes	Yes	Yes	No	Yes	Yes	94.2	98.1	100.0	98.9	99.6

APPENDIX 2 – Air Quality Health Index

The Air Quality Health Index (AQHI) is a public information tool that helps Canadians protect their health on a daily basis from the negative effects of air pollution. This tool was developed by Health Canada and Environment and Climate Change Canada, in collaboration with the provinces and key health and environment stakeholders. It measures the air quality in relation to your health on a scale from 1 to 10 (Figure 5) and provides related health messages. The higher the number, the greater the health risk associated with the air quality. The AQHI is calculated based on the relative risks of a combination of common air pollutants that are known to harm human health. These pollutants are ground-level ozone, particulate matter and nitrogen dioxide.



Prince Edward Island - Air Quality Health Index - Provincial Summary

1 2 3 4 5 6 7 8 9 10 +

Low Risk (1-3) | Moderate Risk (4-6) | High Risk (7-10) | Very High Risk

Choose a Provincial Summary

AB BC MB NB NL NS NT NU ON PE QC SK YT

Show Health Message

This table shows a provincial summary of current Air Quality Health Index values and forecast maximums[1]

Location and sub-locations	Observed Conditions	Forecast Maximums		
		Tuesday	Tuesday night	Wednesday
Charlottetown	3 Low Risk	2 Low Risk	2 Low Risk	2 Low Risk
St. Peters Bay	2 Low Risk	2 Low Risk	2 Low Risk	2 Low Risk
Summerside (Wellington)	2 Low Risk	2 Low Risk	2 Low Risk	2 Low Risk

Figure 5: Air Quality Health Index (https://weather.gc.ca/airquality/pages/provincial_summary/pe_e.html)

The AQHI has been available in Prince Edward Island since May 1, 2009, for each of the three areas in which the Department has a monitoring site: Charlottetown, St. Peters Bay (Southampton) and Summerside (Wellington). Real time data is continuously provided to Environment and Climate Change Canada, who then calculate and provide the Index to the public continuously on their weather forecast website. Most of the time, the AQHI across the province is 2. It will often dip to 1 or occasionally rise to 3. In unusual circumstances, such as a forest fire in a neighbouring province, it may increase beyond 3.