Executive Summary

The 2018-2020 air zone reporting period is the first to apply the 2020 Canadian Ambient Air Quality Standards (CAAQS) for fine particulate matter and ozone, and the first to include nitrogen dioxide and sulphur dioxide. For this reporting period, the Lower Fraser Valley Air Zone is assigned "orange" management levels for fine particulate matter ($PM_{2.5}$), ozone, and nitrogen dioxide (NO_2), and assigned "yellow" management level for sulphur dioxide (SO_2).

Table 1. Management levels in the Lower Fraser Valley based on the 2018-2020 air zone reporting period**.**

Air Zone	$PM_{2.5}$	Ozone	NO_2	SO_2
Lower Fraser Valley	Orange	Orange	Orange	Yellow

Introduction

This is the eighth annual CAAQS report for the Lower Fraser Valley (LFV) Air Zone in British Columbia (B.C.). Annual air zone reporting is a commitment under the national Air Quality Management System (AQMS). This report describes achievement of the Canadian Ambient Air Quality Standards (CAAQS) for $PM_{2.5}$, ground-level ozone (O_3), nitrogen dioxide (NO_2), and sulphur dioxide (SO_2), their associated management levels and actions to improve air quality.

Air Quality Management System

The AQMS is the comprehensive and collaborative approach of managing air quality by federal, provincial, and territorial governments in Canada. Under the AQMS, the CAAQS are developed to drive actions to protect human health and the environment based on the principles of continuous improvement and keeping clean areas clean. Air zones are defined under the AQMS as areas with similar air quality characteristics, issues, and trends, and serve as the basis for monitoring, reporting, and actions to improve air quality. Under the AQMS, progressively more rigorous actions are expected as air quality approaches or exceeds the CAAQS. The level of action is guided by the Air Zone Management Framework (Table 2).

Table 2. AQMS management levels and objectives for air pollutants based on the 2020 CAAQS.

Management Level	Objectives	$PM_{2.5}$		Ozone	NO_2		SO_2	
		Annual ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	8-hour (ppb)	Annual (ppb)	1-hour (ppb)	Annual (ppb)	1-hour (ppb)
Red	Achieve CAAQS	>8.8	>27	>62	>17.0	>60	>5.0	>70
Orange	Prevent CAAQS Exceedance	>6.4 and ≤8.8	>19 and ≤27	>56 and ≤62	>7.0 and ≤17.0	>31 and ≤60	>3.0 and ≤5.0	>50 and ≤70
Yellow	Prevent Air Quality Deterioration	>4.0 and ≤6.4	>10 and ≤19	>50 and ≤56	>2.0 and ≤7.0	>20 and ≤31	>2.0 and ≤3.0	>30 and ≤50
Green	Keep Clean Areas Clean	≤4.0	≤10	≤50	≤2.0	≤20	≤2.0	≤30

Lower Fraser Valley Air Zone

The LFV Air Zone (Figure 1) is one of seven air zones across B.C. It is located in southwestern B.C., along the coast and along the border of Washington State. Within the LFV Air Zone are the Metro Vancouver Regional District (MVRD) and the Fraser Valley Regional District (FVRD). MVRD represents the largest and most densely populated metropolitan area of B.C. It has the delegated authority under the *Environmental Management Act*[1] to manage air pollution and air quality within its borders. It also has the highest number and density of air quality monitoring stations, with more than 20 stations equipped to monitor at least one CAAQS-defined pollutant.

Figure 1. Map of the lower mainland showing Metro Vancouver (MVRD), the Fraser Valley Regional District (FVRD) and Whatcom County in Washington State, USA. FVRD and MVRD together forms the Lower Fraser Valley Air Zone. Inset shows map of B.C. highlighting the location of the LFV.

[1] See *Environmental Management Act* Part 3 Section 31(1).
https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/03053_03#section31

$PM_{2.5}$

$PM_{2.5}$ refers to solid particles and liquid droplets suspended in air that are smaller than or equal to 2.5 micrometres (µm) in aerodynamic diameter. When inhaled, these particles travel deep into the lungs and the bloodstream and can cause adverse health effects, such as cardiovascular and respiratory diseases. $PM_{2.5}$ is considered a non-threshold pollutant, that is there are associated adverse health effect at any level of exposure.

Daily (24-hour average) concentrations of $PM_{2.5}$ are based on the 24-hour CAAQS. In the LFV, the 24-hour metric values[2] (Figure 2) range from 16 µg/m^3 to 36 µg/m^3. In this reporting period, data from North Vancouver 2nd Narrows are excluded due to nearby major construction affecting measurements. The 24-hour CAAQS of 27 µg/m^3 is exceeded at 12 of the 21 stations. Following the methodology for transboundary flow/exceptional events (TF/EE) adjustments (Appendix I), all adjusted metric values at LFV sites are well below the CAAQS.

Annual metric values [3] in the LFV ranged from 4.9 µg/m^3 to 7.9 µg/m^3. All monitoring sites achieved the national annual CAAQS of 8.8 µg/m^3 even with the influence of wildfire smoke.

Figure 3 and Table 3 shows the wildfire adjusted levels of the 24-hour and annual metrics for $PM_{2.5}$ in the LFV Air Zone throughout various reporting periods. From

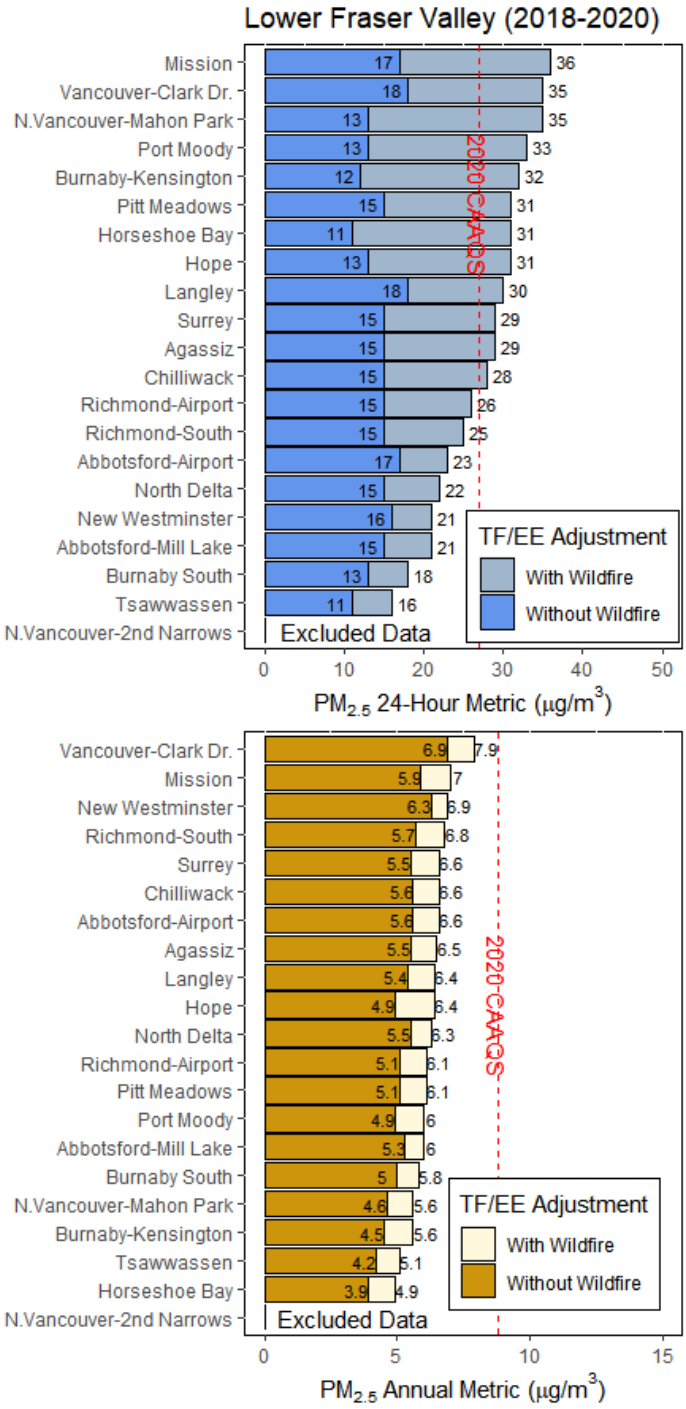


Figure 2. $PM_{2.5}$ metric values in the LFV Air Zone based on 2018-2020 data. Upper plot based on 24-hour CAAQS). Lower plot based on annual CAAQS. The red dashed lines represent the 2020 24-hour CAAQS of 27 µg/m^3 (upper plot) and 2020 annual CAAQS of 8.8 µg/m^3 (lower plot).

[2] $PM_{2.5}$ 24-hour metric is the annual 98th percentile of the 24-hour value, averaged over three years (2018-2020).
[3] $PM_{2.5}$ annual metric is the annual average of 24-hour values, averaged over three years (2018-2020).

2012-2014 to the 2018-2020 reporting periods, almost all locations in the LFV are under "yellow" management levels for $PM_{2.5}$ for both the 24-hour and annual values. However, every reporting period except 2014-2016 has at least one location under "orange" management level. These locations include Abbotsford-Mill Lake (2013-2015), Langley (2013-2015), N. Vancouver (2012-2014), and New Westminster (2017-2019). In more recent reporting periods (2015-2017 to 2018-2020), "orange" management levels are reported from Vancouver-Clark Drive based on the annual metric values and partly on the 24-hour metric values.

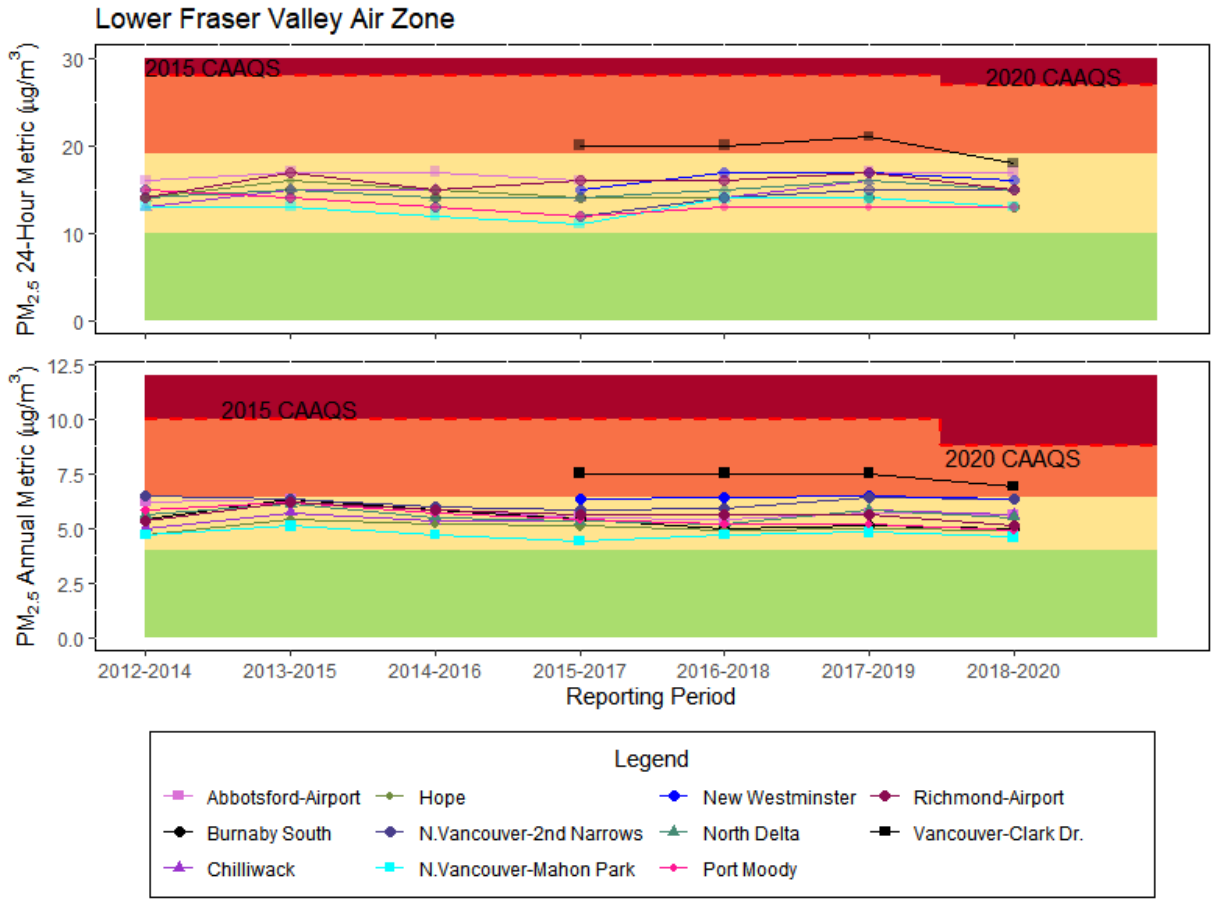


Figure 3. Timeseries of the 24-hour (upper plot) and annual (lower plot) $PM_{2.5}$ metric values at sites with highest levels in the LFV Air Zone after adjusting for wildfire influence. The 2015 CAAQS and 2020 CAAQS are shown by the red dashed lines. The background colours represent the AQMS management levels.

The overall AQMS management level of an entire air zone for $PM_{2.5}$ is based on the location with the highest 24-hour and annual metric values. As a result, the LFV is assigned "orange" management level during the 2018-2020 reporting period based on the measurements from Vancouver-Clark Drive (Table 3). An "orange" management level means that $PM_{2.5}$-related air quality management actions are recommended to prevent exceeding CAAQS. To improve from "orange" to the "yellow" management level, the 24-hour and annual metric values at Vancouver-Clark Drive and all locations should be lower than 19 µg/m^3 and 6.4 µg/m^3, respectively.

Table 3. Summary of $PM_{2.5}$ metric values (shown in box as 24-hour/annual metric values in µg/m^3) and colour-based management levels for the LFV Air Zone and its communities based on applicable 2015 or 2020 CAAQS.

	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	**2018-2020**
LFV Air Zone (CAAQS)	**ORANGE (2015)**	**ORANGE (2015)**	**YELLOW (2015)**	**ORANGE (2015)**	**ORANGE (2015)**	**ORANGE (2015)**	**ORANGE (2020)**
Abbotsford-Airport	16/6.2	17/6.3	17/5.8	16/5.5	16/5.4	17/5.7	17/5.6
Abbotsford-Mill Lake	16/6.1	18/6.9	16/5.8	15/5.7	14/5.5	15/5.6	15/5.3
Agassiz		15/5.9	14/5.6	14/5.4	15/5.4	15/5.5	15/5.5
Burnaby-Kensington		15/6.3	13/5.7	12/5.1	13/4.8	13/4.8	12/4.5
Burnaby South	14/5.4	15/6.3	14/5.8	14/5.4	14/5	14/5.1	13/5
Chilliwack	13/5	15/5.7	15/5.3	14/5.3	14/5.2	16/5.8	15/5.6
Hope	14/4.7	16/5.4	15/5.2	14/5.1	14/4.9	14/5	13/4.9
Horseshoe Bay	11/4.2	11/4.5	10/4.2	10/3.9	11/3.8	12/3.9	11/3.9
Langley	16/5.9	20/6.8	19/6.2	19/6	18/5.6	19/5.8	18/5.4
Mission			14/5.7	14/5.7	16/5.8	18/6.2	17/5.9
N.Vancouver-2nd Narrows	15/6.5	14/6.3	13/6	12/5.8	14/5.9		
N.Vancouver-Mahon Park	13/4.7	13/5.1	12/4.7	11/4.4	14/4.7	14/4.8	13/4.6
New Westminster				15/6.3	17/6.4	17/6.5	16/6.3
North Delta	14/5.6	15/6.1	14/5.5	14/5.3	15/5.2	16/5.8	15/5.5
Pitt Meadows	15/5	17/5.7	15/5.1	15/4.7	15/4.8	15/5.3	15/5.1
Port Moody	15/5.8	14/6.2	13/5.7	12/5.4	13/5.2	13/5.2	13/4.9
Richmond-Airport	14/5.3	17/6.2	15/5.8	16/5.6	16/5.6	17/5.6	15/5.1
Richmond-South	17/6.4	17/6.2	16/5.6	16/5.6	16/5.6	17/6	15/5.7
Surrey	14/5.2	16/5.8	15/5.4	15/5.3	15/5.2	15/5.7	15/5.5
Tsawwassen	13/4.7	14/5.2	11/4.5	13/4.4	13/4.2	14/4.4	11/4.2
Vancouver-Clark Dr.				20/7.5	20/7.5	21/7.5	18/6.9

Management Goals for $PM_{2.5}$ based on the Air Quality Management System

Achieve CAAQS	Prevent CAAQS Exceedance	Prevent Air Quality Deterioration	Keep Clean Areas Clean	Not Available

Metric values at Vancouver-Clark Drive were unchanged through 2015-2017 to 2017-2019 reporting periods, and then decreased during the 2018-2020 reporting period. Reductions in vehicular traffic in

2020 due to the COVID-19 pandemic[4] may help explain reductions in $PM_{2.5}$ levels at Vancouver-Clark Drive and other locations during the 2018-2020 reporting period.

Ozone

Ground-level ozone is a colourless and irritating gaseous pollutant. It forms just above the earth's surface through chemical reactions between "ozone precursor" emissions (including NO_2 and other chemical species). Unlike ozone in the "ozone layer" in the upper atmosphere, ground-level ozone can be harmful to people, animals, and plants.

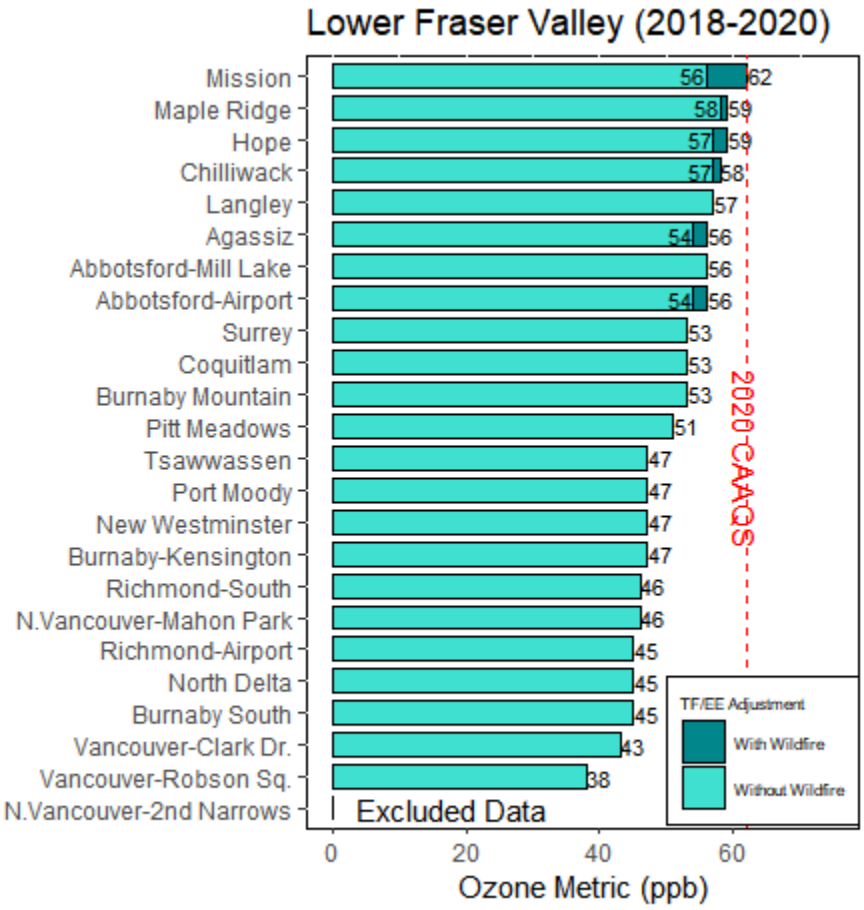


Figure 4. Ozone concentration in the LFV Air Zone based on the annual 4th highest daily 8-hour maximums averaged over 2018-2020. The 2020 CAAQS is shown by the red dashed line (62 ppb).

Figure 4 summarizes the ozone levels based on the 8-hour CAAQS[5] in the LFV Air Zone during the 2018-2020 reporting period. Concentrations ranged from 38 parts per billion (ppb) in downtown Vancouver to 62 ppb in Mission. Data from N. Vancouver-2nd Narrows is excluded due to a major construction affecting measurements. Wildfire smoke can result in elevated ozone readings; this was seen in data from the central and eastern Fraser Valley. To control for these impacts, ozone metric values were adjusted following the methodology for TF/EEs[6] (Appendix I).

Wildfire-adjusted ozone metrics and associated AQMS management levels are presented in Figure 5 and summarized in Table 4. All the CAAQS-reporting stations in the LFV Air Zone achieved CAAQS throughout 2012-2014 to 2018-2020 reporting periods. Most locations in the LFV are within "green" and "yellow" management levels for ozone, but some of the sites, particularly in the central and eastern Fraser Valley, were within "orange" management levels. As a result, the LFV Air Zone had been assigned "orange"

[4] Tian, X., An, C., Chen, Z., & Tian, Z. (2021). Assessing the impact of COVID-19 pandemic on urban transportation and air quality in Canada. Science of the Total Environment, 765, 144270.
[5] Ozone 8-hour metric are based on the 4th highest daily 8-hour maximum, averaged over three years (2018-2020).
[6] See: https://ccme.ca/en/res/guidancedocumentontransboundaryflowsandexceptionalevents_secured.pdf

management level. Under “orange” management level, ozone-related actions are recommended to prevent exceeding CAAQS.

Table 4. Summary of 8-hour ozone metric values (ppb) and recommended ozone management levels for the LFV Air Zone based on applicable 2015 or 2020 CAAQS.

	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	**2018-2020**
LFV Air Zone (CAAQS)	ORANGE (2015)	ORANGE (2015)	ORANGE (2015)	ORANGE (2015)	ORANGE (2015)	ORANGE (2015)	**ORANGE (2020)**
Abbotsford-Airport	50	50	49	53	58	59	54
Abbotsford-Mill Lake	51	52	51	55	60	60	56
Agassiz		63	58	60	60	61	54
Burnaby-Kensington	43	44	43	45	48	49	47
Burnaby Mountain	52	51	50	55	58	57	53
Burnaby South	42	42	40	42	44	45	45
Chilliwack	52	53	52	56	59	61	57
Coquitlam	49	49	49	48	53	54	53
Hope	58	61	60	59	59	59	57
Langley	50	50	50	53	59	59	57
Maple Ridge	51	53	53	58	62	63	58
Mission			54	60	60	61	56
N.Vancouver-2nd Narrows	40	41	40	40	41		
N.Vancouver-Mahon Park	45	46	45	46	47	48	46
New Westminster				47	48	48	47
North Delta	44	44	44	44	45	45	45
Pitt Meadows	48	48	47	51	54	56	51
Port Moody	44	44	44	46	48	49	47
Richmond-Airport	44	45	43	43	43	44	45
Richmond-South	46	47	46	47	47	48	46
Surrey	47	48	47	49	53	54	53
Tsawwassen	47	47	47	49	49	49	47
Vancouver-Clark Dr.			42	42	43	43	43
Vancouver-Robson Sq.	37	37	34	34	36	36	38
Vancouver Kitsilano	46						

Management Goals for Ozone based on the Air Quality Management System

Achieve CAAQS	Prevent CAAQS Exceedance	Prevent Air Quality Deterioration	Keep Clean Areas Clean	Not Available

Ozone levels were increasing at several LFV locations since the 2014-2016 reporting period but decreased in the 2018-2020 period (Figure 5). The impact of the COVID-19 pandemic may have affected emissions and lowered ozone precursor levels.

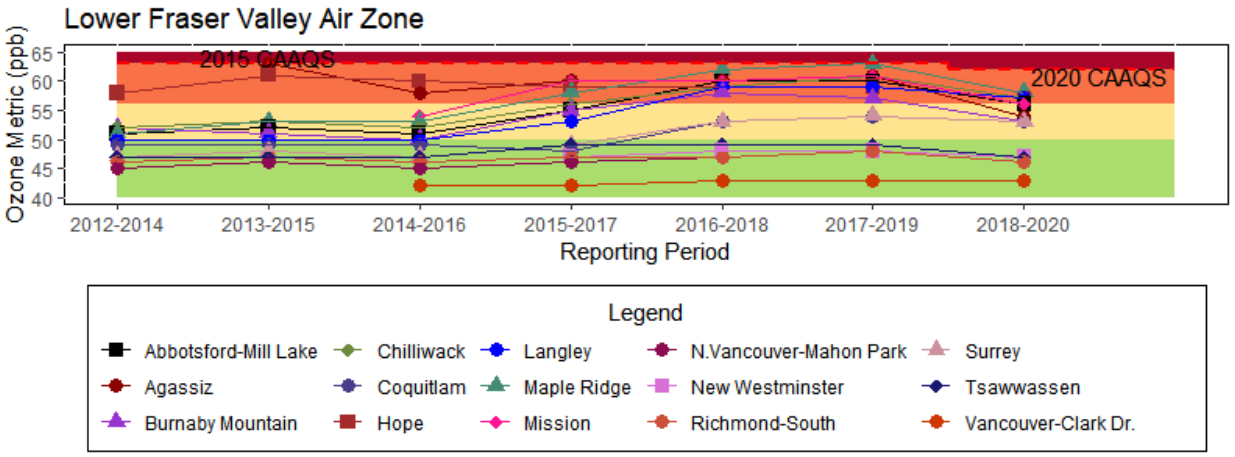


Figure 5. Wildfire-adjusted ozone metrics at LFV locations with highest levels. The 2015 and 2020 CAAQS are shown by the red dashed line. The background colours represent the AQMS management levels.

Nitrogen Dioxide

NO_2 is a gaseous pollutant. A major source of NO_2 is from the combustion of fossil fuels, such as from vehicles, industrial processes, and off-road equipment (construction and lawn and gardening equipment). NO_2 is a major component of ozone precursor species that react to form ground-level ozone and smog.

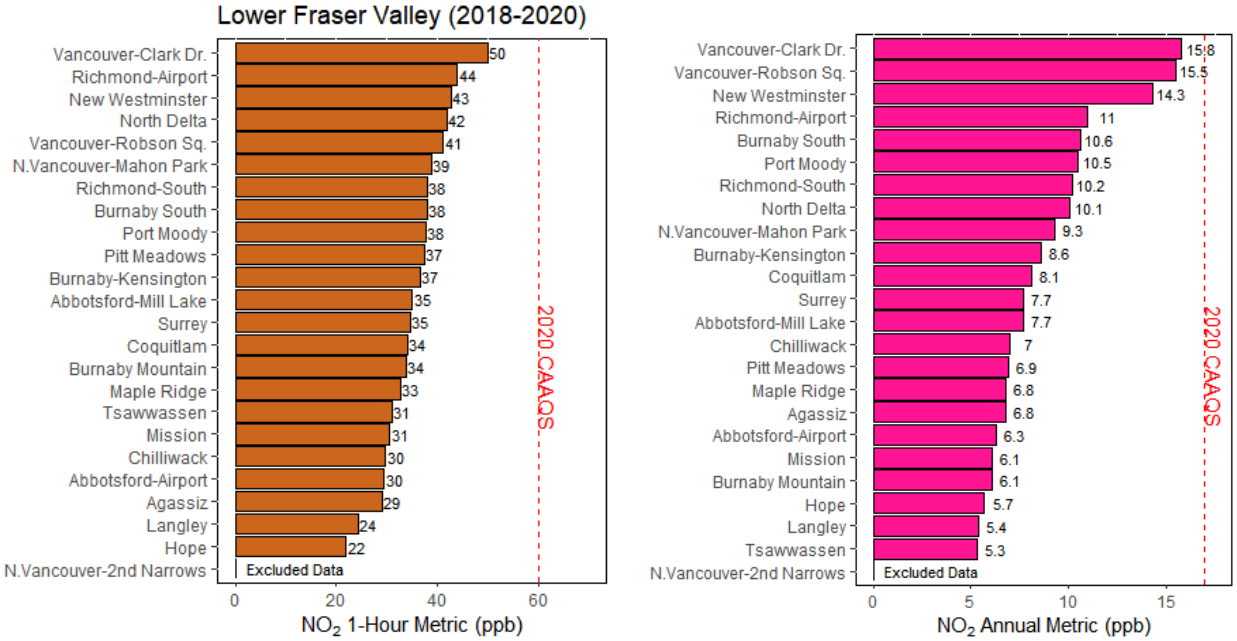


Figure 6. NO_2 concentrations in the LFV Air Zone based on the 1-hour (left) and annual (right) metric values. The 2020 CAAQS for the 1-hour standard (60 ppb) and the annual standard (17 ppb) are shown by the red dashed lines.

Table 5. Summary of NO_2 metric values (shown in box as 1-hour/annual metric values, in ppb) and air zone management levels for the LFV Air Zone based on the 2020 CAAQS.

	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	**2018-2020**
LFV Air Zone (CAAQS)	2020 CAAQS for NO_2 not applicable before 2018-2020 period. Data shown for illustration only.						**ORANGE (2020)**
Abbotsford-Airport	28/6.4	28/7.6	28/6.5	28/7.7	29/7.5	30/7.1	30/6.3
Abbotsford-Mill Lake	35/8.4	35/9.7	34./7.9	34/9.1	35/8.9	36/8.6	35/7.7
Agassiz	-/7.2	30/8	30/7.7	30/7.7	30/8.1	30/7.2	29/6.8
Burnaby-Kensington	40/11.5	39/11.8	40/11	42/12.2	42/11.4	42/10.1	37/8.6
Burnaby Mountain	34/6.8	33/7.8	34/6.6	35/7.4	36/7.4	37/6.9	34/6.1
Burnaby South	42/14	42/13.8	42/12.2	42/13.5	41/12.5	41/12.6	38/10.6
Chilliwack	29.5/7.1	31/8.8	31/7.8	32/8.3	32/8.3	32/7.5	30/7
Coquitlam	35/10.1	35/10.2	35/9.4	34/-	35/9.4	36/9.7	34/8.1
Hope	28/-	28/7.1	27/5.8	25.4/5	22/4.3	22/5.2	22/5.7
Langley	27/6.2	27/6.5	26/5.5	26/6.1	26/5.7	27/6	24/5.4
Maple Ridge	33/7.5	32/8.1	33/7.4	35/8.6	34/7.8	35/8	33/6.8
Mission		-/7.6	30/6.4	31/6.9	31/7	32/6.8	31/6.1
N.Vancouver-2nd Narrows	46/12.8	47/12.6	47/12	48/13.3	49/12.5		
N.Vancouver-Mahon Park	40/12.4	38/12.2	38/10.9	39.4/12.7	41/11.3	42/11.5	39/9.3
New Westminster			-/15.2	45/17.3	45/16.5	46/16	43/14.3
North Delta	44/13.8	44/13.7	43/12.4	45/14.1	46/12.9	46/12.4	42/10.1
Pitt Meadows	35/7.8	36/8.8	35/7.3	37/9.5	37/8.6	40/8.4	37/6.9
Port Moody	38/12.7	37/12.6	37/12	37/13.5	39/11.8	39/11.1	38/10.5
Richmond-Airport	45/14.6	46/14.2	45/14.3	48/15.9	48/14	48/13.7	44/11
Richmond-South	41/12.9	40/11.5	38.8/11.7	40/13	40/11.2	41/11.8	38/10.2
Surrey	37/8.8	36/9.1	34.9/8.2	36/9.3	37/9	37/9.2	35/7.7
Tsawwassen	32/6.9	32/7	33.2/6.3	35/7.1	35/6.6	34/6.7	31/5.3
Vancouver-Clark Dr.			-/20.8	60/22.1	57/19.2	57/17.9	50/15.8
Vancouver-Robson Sq.	42/17.7	40/18.3	41.3/18.5	43/19.1	45/17.3	44/16.1	41/15.5

Management Goals for NO_2 based on the Air Quality Management System

Achieve CAAQS	Prevent CAAQS Exceedance	Prevent Air Quality Deterioration	Keep Clean Areas Clean	Not Available

There are more than 20 stations in the LFV that are equipped to measure NO_2. Readings at the N. Vancouver-2nd Narrows station has been removed in this reporting period due to influence from nearby construction activity. The figure shows LFV Air Zone's 1-hour metric value[7] varies from 22 ppb at Hope to 49.9 ppb at Vancouver-Clark Drive, and annual metric values[8] varies from 5.3 ppb at Tsawwassen to 15.8 ppb at Vancouver-Clark Drive (Table 5). All metric values are below the 2020 1-hour CAAQS of 60 ppb, and 2020 annual CAAQS of 17 ppb.

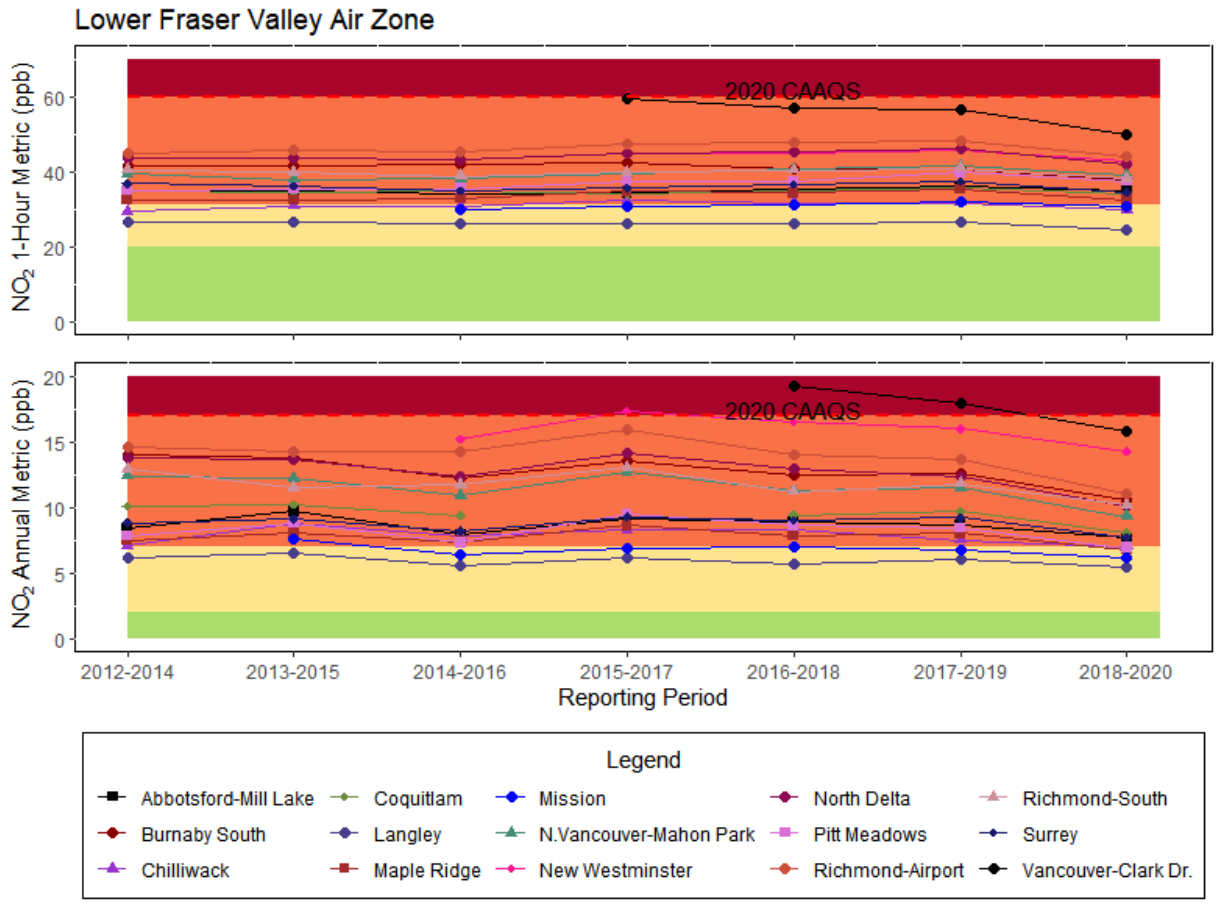


Figure 7. Timeseries of the 1-hour and annual metric values of NO_2 in the LFV Air Zone from stations with highest values. The 2020 CAAQS for NO_2 (red dashed lines) only applies during the 2018-2020 reporting period but presented throughout all reporting periods for comparison. The background colour shows the AQMS management levels.

Table 4 and Figure 7 give summaries of the NO_2 metric values, CAAQS achievement, and management levels through various reporting periods for selected LFV sites with highest observed NO_2 levels. There were no TF/EE data adjustments made to NO_2 metric values because exceedances were not linked to wildfire events. The 2012-2014 to 2018-2020 periods are included to illustrate annual results even

[7] NO_2 1-hour metric values are based on the 98th percentile of daily 1-hour maximum over three consecutive years (2018-2020).
[8] NO_2 annual metric values are based on the average of 1-hour readings over a single calendar year (2020).

though 2020 CAAQS for NO_2 are not implemented before the 2018-2020 reporting period. In the LFV Air Zone, most sites are within the "orange" management level for both NO_2 metric values throughout the reporting periods presented. Only Hope and Langley achieved "yellow" management levels throughout the years, while Vancouver-Clark Drive and Robson Square exceeded the 2020 CAAQS in the previous periods. There is a common decrease at most sites during the 2018-2020 reporting period that may be due to the reductions in vehicular emissions as a result of the COVID-19 pandemic.

Overall, the LFV is assigned an "orange" management level for NO_2. This means actions are recommended to prevent future exceedance of CAAQS.

Sulphur Dioxide

SO_2 is a toxic gas emitted from volcanic eruptions, combustion of sulphur-bearing fossil fuels, and certain industrial processes. SO_2 can also lead to formation of secondary $PM_{2.5}$ and acid rain.

All LFV sites are well below the 2020 CAAQS for SO_2 reporting values of 2.5 ppb to 35.2 ppb for the 1-hour metric[9], and 0.1 ppb to 0.5 ppb for the annual metric (Figure 8)[10]. These are significantly lower than the 2020 CAAQS for SO_2 of 70 ppb for the 1-hour metric, and 5 ppb for the annual metric.

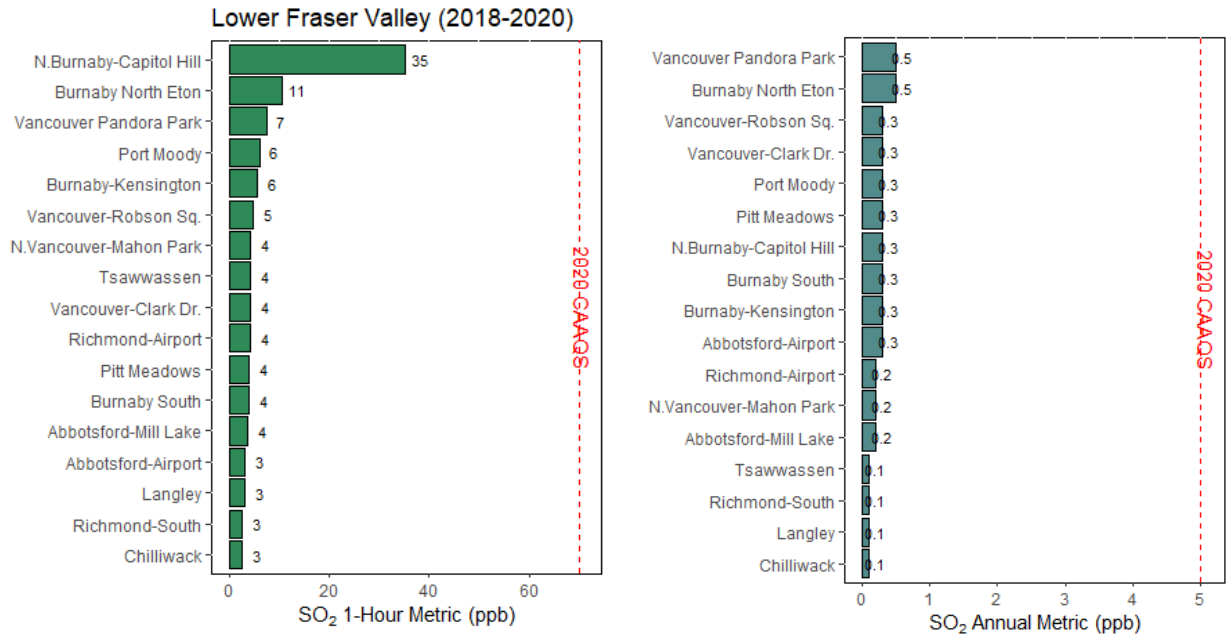


Figure 8. SO_2 concentrations in LFV Air Zone based on the 1-hour (left) and annual (right) metric value. The red dashed lines identify the 2020 CAAQS of 70 ppb for the 1-hour metric value, and 5 ppb for the annual metric value.

[9] SO_2 1-hour metric values are based on the 99th percentile of daily 1-hour maximum over three consecutive years (2018-2020).

[10] SO_2 annual metric values are based on the average of 1-hour readings over a single calendar year (2020).

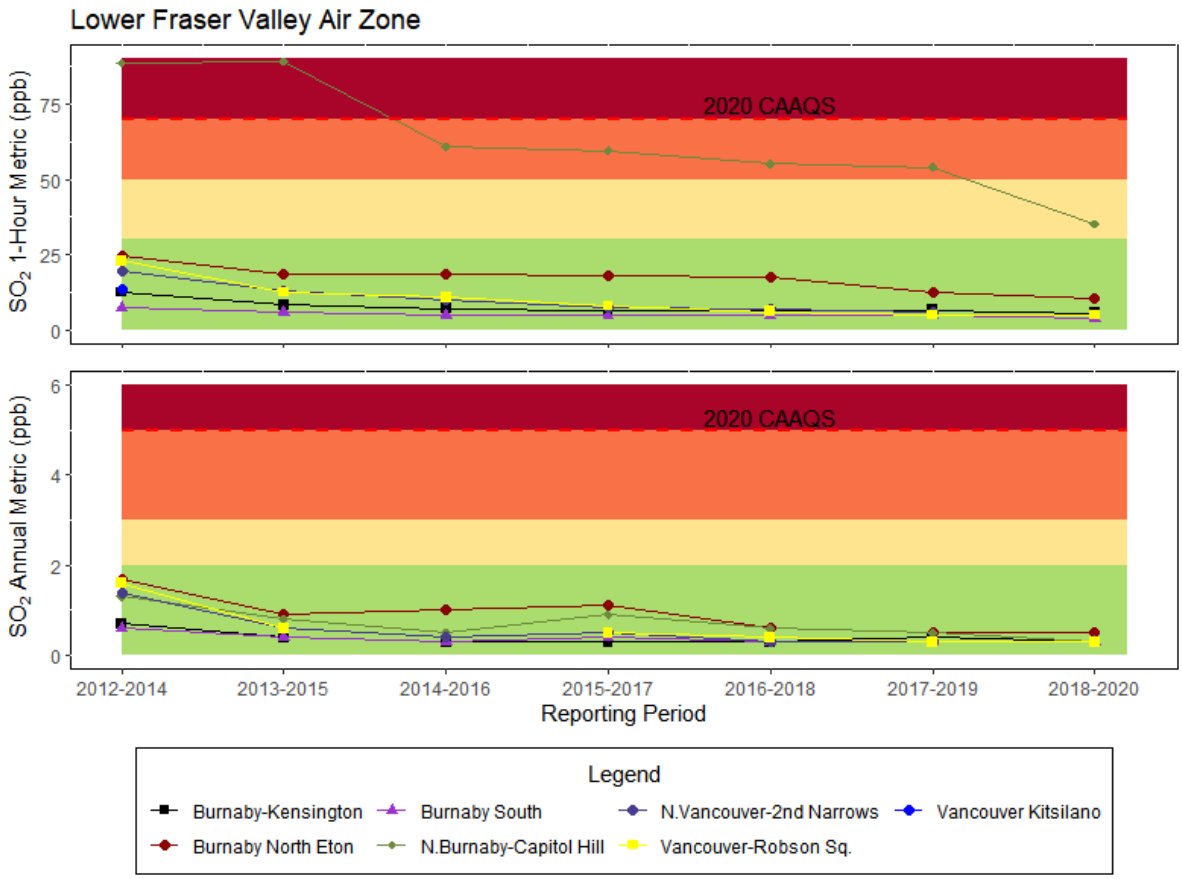


Figure 9. Timeseries of SO_2 1-hour and annual metrics from 2012 to 2020 in LFV Air Zone. CAAQS for SO_2 (red dashed lines) only applies after the 2020 reporting period but presented here for comparison.

Table 6 gives a summary of the management levels for SO_2. The CAAQS for SO_2 are first implemented in this 2018-2020 reporting period. The assignment of management levels on previous periods are not required but are presented in the table for the purposes of comparison. All except one LFV site are assigned "green" management levels for SO_2 for measuring levels below 30 ppb on the 1-hour metric and 2 ppb on the annual metric. The North Burnaby-Capitol Hill station exceeded the 1-hour metric of 60-ppb for the 2020 CAAQS before the 2014-2016 period but has shown continuous reductions and has moved into the "yellow" management level in the 2018-2020 reporting period (Figure 9).The location is in proximity to the Burnaby Refinery, which processes crude oil into transportation fuels and can emit SO_2 during operations[11].

Overall, the LFV is assigned "yellow" management level for SO_2 because of readings at North Burnaby-Capitol Hill. A "yellow" management level for SO_2 means actions are recommended to prevent the deterioration of air quality. To improve into the "green" management level, the 1-hour metric needs to reduce to below 30 ppb at all stations within the Air Zone.

[11] See: https://www.burnabyrefinery.ca/application/files/7016/4011/8140/Parkland_Burnaby_Refinery-Community_Connection_Newsletter-December_2021.pdf

Table 6. Summary of SO_2 metric values (shown in box as 1-hour/annual metrics, in ppb) and Air Zone Management Levels for the LFV Air Zone based on the 2020 CAAQS.

	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	**2018-2020**
LFV Air Zone (CAAQS)	2020 CAAQS for SO_2 not applicable before 2018-2020 period. Data shown for illustration only.						**YELLOW (2020)**
Abbotsford-Airport	4/0.2	4/0.2	4/0.2	4/0.1	4/0.2	3/0.2	3/0.3
Abbotsford-Mill Lake	5/0.2	5/0.3	5/0.2	5/0.2	5/0.2	4/0.1	4/0.2
Burnaby-Kensington	13/0.7	8/0.4	7/0.3	7/0.3	6/0.3	7/0.4	6/0.3
Burnaby North Eton	25/1.7	19/0.9	18/1	18/1.1	18/0.6	13/0.5	11/0.5
Burnaby South	7/0.6	6/0.4	5/0.3	5/0.4	5/0.3	5/0.3	4/0.3
Chilliwack	4/0.1	4/0.2	3/0.1	3/0.1	3/0.1	3/0.1	3/0.1
Langley	5/0.2	5/0.2	5/0.1	4/0.2	4/0.1	4/0.2	3/0.1
N.Vancouver-2nd Narrows	20/1.4	13/0.6	10/0.4	7/0.5	7/0.3		
N.Vancouver-Mahon Park	16/0.8	11/0.3	8/0.3	5/0.4	5/0.3	5/0.2	4/0.2
North Burnaby Capitol Hill	89/1.3	89/0.8	61/0.5	60/0.9	55/0.6	54/0.5	35/0.3
Pitt Meadows	5/0.4	4/0.4	4/0.3	4/0.4	4/0.3	4/0.4	4/0.3
Port Moody	17/0.6	12/0.6	9/0.3	8/0.4	6.5/0.4	6/0.3	6/0.3
Richmond-Airport	6/0.6	5/0.4	4/0.2	4/0.4	4/0.5	4/0.4	4/0.2
Richmond-South	5/0.4	5/0.4	4/0.3	5/0.3	4/0.3	4/0.3	3/0.1
Tsawwassen	7/0.4	6/0.3	5/0.4	6/0.4	6/0.3	5/0.2	4/0.1
Vancouver-Clark Dr.					-/0.6	5/0.4	4/0.3
Vancouver-Robson Sq.	23/1.6	12/0.6	10.7/-	8/0.5	6/0.4	5/0.3	5/0.3
Vancouver Kitsilano	14/-						
Vancouver Pandora Park			-/1	20/1.2	17/0.7	12/0.6	7/0.5

Management Goals for SO_2 based on the Air Quality Management System

Achieve CAAQS	Prevent CAAQS Exceedance	Prevent Air Quality Deterioration	Keep Clean Areas Clean	Not Available

Actions to Protect Air Quality

Through the *Environmental Management Act*, Metro Vancouver provides the service of air pollution control and air quality management within its jurisdictional boundaries. Metro Vancouver established the *Clean Air Plan* in 2021.[12] This plan seeks to reduce emissions of greenhouse gases and health harming air contaminants to achieve climate targets and continuously improve air quality. It includes 136 actions and sectoral targets to reduce emissions of NO_X, $PM_{2.5}$ and diesel particulate matter . If all the actions in the Plan are implemented, it could yield air quality health benefits estimated at up to $1.6 billion. Visit Metro Vancouver's website for more information on the Clean Air Plan.[13]

The FVRD updated its *Air Quality Management Plan* in 2021. The new plan reflects the latest air quality trends, data and research, and provides a roadmap to reduce emissions and improve air quality in the region for the next ten years. The FVRD has also reviewed options for developing alternatives to open burning, on-road and off-road engines, and emissions of ammonia. Visit FVRD's website for more information.[14]

Regional air quality agencies including Metro Vancouver and the FVRD developed a *Regional Ground-Level Ozone Strategy* in 2014.[15] This strategy identifies goals and strategic policy direction to control ozone precursor emissions in the LFV. The strategy is currently being updated.

[12] See: http://www.metrovancouver.org/services/air-quality/AirQualityPublications/Clean-Air-Plan-2021.pdf
[13] Visit: http://www.metrovancouver.org/services/air-quality/about/clean-air-plan
[14] Visit: https://www.fvrd.ca/EN/main/services/AirQualityandClimate.html
[15] See: http://www.metrovancouver.org/services/air-quality/AirQualityPublications/RGLOS2014.pdf

Appendix I – Approach to Identify Wildfire-influenced Data

Summertime air quality in British Columbia is periodically influenced by wildfire smoke – from local fires as well as long-range transport from fires located outside the province. The wildfire season in B.C. typically occurs between May and September, when warm and dry conditions prevail.

Many types of pollutants are emitted from wildfires. These include $PM_{2.5}$ and gases such as nitrogen oxides and volatile organic compounds that can react in the atmosphere to form ground-level ozone and secondary $PM_{2.5}$.

Given that large areas may be affected by smoke, and that smoke may linger for days before being fully dispersed from an airshed, the current analysis has focussed on those periods when wildfire smoke may have contributed to an exceedance of the CAAQS levels for ground-level ozone or $PM_{2.5}$. Criteria used to flag and evaluate wildfire-influenced data included the following:

- 24-hour $PM_{2.5}$ concentrations in excess of the CAAQS level of 27 $\mu g/m^3$ and/or 8-hour daily maximum ozone concentrations in excess of the CAAQS level of 62 ppb between May and September,
- Wildfires of interest identified based on data from the B.C. Wildfire Management Branch,
- Wildfire-related air quality advisories issued by Metro Vancouver during the period of interest,
- NASA satellite images showing smoke impacts over the region, and
- Multiple monitoring sites in the area of concern showing similar air quality characteristics, suggesting a common source.

Wildfire-influenced data were excluded from the calculation of air zone management levels. Excluded data are as summarized in Appendix II.

Appendix II – Wildfire-influenced Data in the Lower Fraser Valley Air Zone (2018-2020)

Ozone and $PM_{2.5}$ data from 2018-2020 for the Lower Fraser Valley Air Zone were evaluated based on the criteria set out in Appendix I for TF/EE influences. Various pieces of evidence were used to support identification of wildfire-influenced periods. These included the following:

- Wildfires of note – either due to size or proximity to populated areas – were identified by the BC Wildfire Service (see: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary).
    - The 2018 wildfire season was a record-breaking year with 1.35 million hectares ha of land area burned from several large fires (see Table II-1)
    - The 2020 wildfire season was severe in the Western United States. Smoke from major fires there impacted air quality in British Columbia.
- Days flagged as potentially wildfire-influenced generally coincided with or were preceded by smoke-related advisories issued by Metro Vancouver (see Table II-2 for ozone and Tables II-3 and II-4 for $PM_{2.5}$).
- While not all ozone events during the summer of 2017 and 2018 were determined to be a direct result of wildfire influence, all $PM_{2.5}$ events coincided with periods of wildfire-smoke-related air quality advisories and as a result were considered to be wildfire-influenced.
- Satellite images during these periods provide additional supporting information on the spatial extent of wildfire smoke over the province, including the Lower Fraser Valley Air Zone, in 2018 and 2020. See Figures II-1 and II-2 for examples.

Wildfire influences on specific ozone events are described further in Appendix III.

Table II-1. Summary of notable wildfires in the LFV Air Zone between 2018-2020.[16][17]

Date Discovered	Size (ha)	Geographic Location	Description
2018-08-08	427	Mount Hicks	Located between Hope and Agassiz adjacent to Hwy 7
2020-08-16	162,000	Santiam	Very large fire in Northwest Oregon formed from the merging of three separate fires
2020-09-07	130,000	Cold Springs	A historic fire event caused by extreme drought conditions throughout the Pacific Northwest

Table II-2. Days on which the 8-hour ozone concentrations exceeded the CAAQS level of 63 ppb (2018-2020) in the LFV Air Zone. Rolling 8-hour average values are based on 1-hour concentrations rounded to the nearest integer.

Location	Date	8-Hr Daily Max Ozone (ppb)	Air Quality Advisory in Effect
Hope Airport	2018-07-27	71.5	None
Mission School Works Yard	2018-07-27	68	None
Hope Airport	2018-07-28	70.9	Ozone advisory
Hope Airport	2018-07-29	72.6	Ozone advisory
Mission School Works Yard	2018-07-29	79.3	Ozone advisory
Hope Airport	2018-07-30	78.0	PM2.5 and Ozone advisory
Mission School Works Yard	2018-07-30	81.5	PM2.5 and Ozone advisory
Hope Airport	2018-08-08	70.5	Ozone advisory in FVRD
Mission School Works Yard	2018-08-08	76.7	Ozone advisory in FVRD
Hope Airport	2018-08-09	65.6	PM and Ozone advisory in FVRD
Mission School Works Yard	2018-08-09	77.1	PM and Ozone advisory in FVRD
Mission School Works Yard	2018-08-21	67.4	PM and Ozone advisory
Hope Airport	2018-08-22	68.8	PM and Ozone advisory
Mission School Works Yard	2018-08-22	76.8	PM and Ozone advisory
Abbotsford A Columbia Street	2020-09-11	62.3	PM advisory
Agassiz Municipal Hall	2020-09-11	66.7	PM advisory
Burnaby Mountain	2020-09-11	67.6	PM advisory
Chilliwack Airport	2020-09-11	68.7	PM advisory
Hope Airport	2020-09-11	67.8	PM advisory
Maple Ridge-Golden Ears	2020-09-11	66.9	PM advisory
Mission School Works Yard	2020-09-11	66.0	PM advisory
Squamish Elementary	2020-09-11	62.8	PM advisory

[16] https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary. Accessed on 29 December 2020.
[17] https://gacc.nifc.gov/sacc/predictive/intelligence/NationalLargeIncidentYTDReport.pdf. Accessed on 29 December 2020.

Table II-3. Wildfire-influenced $PM_{2.5}$ data in LFV during the 2018 wildfire season.

Location	Date	Daily Mean ($\mu g/m^3$)
Hope	2018-08-10	49.4
New Westminster	2018-08-10	31.6
Abbotsford-Airport	2018-08-13	29.3
Abbotsford-Mill Lake	2018-08-13	31
Agassiz	2018-08-13	54.4
Burnaby South	2018-08-13	40.8
Burnaby-Kensington	2018-08-13	44.1
Chilliwack	2018-08-13	52.1
Hope	2018-08-13	63.8
Horseshoe Bay	2018-08-13	41
Mission	2018-08-13	38.1
N. Vancouver-2nd Narrows	2018-08-13	38.3
N. Vancouver-Mahon Park	2018-08-13	40.3
New Westminster	2018-08-13	35.7
North Delta	2018-08-13	33.9
Pitt Meadows	2018-08-13	31.4
Port Moody	2018-08-13	38.6
Richmond South	2018-08-13	32.7
Richmond-Airport	2018-08-13	32.2
Surrey	2018-08-13	37.1
Tsawwassen	2018-08-13	30.3
Vancouver Clark Drive	2018-08-13	38.5
Abbotsford-Airport	2018-08-14	46.9
Abbotsford-Mill Lake	2018-08-14	46.2
Agassiz	2018-08-14	66.1
Burnaby South	2018-08-14	54.7
Burnaby-Kensington	2018-08-14	65.6
Chilliwack	2018-08-14	60.3
Hope	2018-08-14	65.3
Horseshoe Bay	2018-08-14	59.7
Langley	2018-08-14	44.4
Mission	2018-08-14	57.6
N. Vancouver-2nd Narrows	2018-08-14	65.9
N. Vancouver-Mahon Park	2018-08-14	63.8
New Westminster	2018-08-14	57
North Delta	2018-08-14	52.2
Pitt Meadows	2018-08-14	51.1
Port Moody	2018-08-14	69.6
Richmond South	2018-08-14	46.8
Richmond-Airport	2018-08-14	44.9
Surrey	2018-08-14	48.6
Tsawwassen	2018-08-14	34.5
Vancouver Clark Drive	2018-08-14	57.4
Abbotsford-Airport	2018-08-15	36.2
Abbotsford-Mill Lake	2018-08-15	35.3
Agassiz	2018-08-15	57.6
Burnaby South	2018-08-15	32.4
Burnaby-Kensington	2018-08-15	40.8
Chilliwack	2018-08-15	50.3
Hope	2018-08-15	71.2
Horseshoe Bay	2018-08-15	42.2
Langley	2018-08-15	33
Mission	2018-08-15	45
N. Vancouver-2nd Narrows	2018-08-15	46.1
N. Vancouver-Mahon Park	2018-08-15	44
New Westminster	2018-08-15	40.2
North Delta	2018-08-15	36.3
Pitt Meadows	2018-08-15	37.8
Port Moody	2018-08-15	42.1
Surrey	2018-08-15	36.2
Vancouver Clark Drive	2018-08-15	39.4
Hope	2018-08-16	28.5
N. Vancouver-2nd Narrows	2018-08-16	28.9
Hope	2018-08-18	44
Abbotsford-Airport	2018-08-19	30.4
Abbotsford-Mill Lake	2018-08-19	39.3
Agassiz	2018-08-19	89.7
Burnaby-Kensington	2018-08-19	34.5
Chilliwack	2018-08-19	59.1
Hope	2018-08-19	240.8
Horseshoe Bay	2018-08-19	30.9
Mission	2018-08-19	43.9
N. Vancouver-2nd Narrows	2018-08-19	28.2
N. Vancouver-Mahon Park	2018-08-19	36.1
Pitt Meadows	2018-08-19	36.5
Port Moody	2018-08-19	32.4
Richmond South	2018-08-19	31.4
Richmond-Airport	2018-08-19	28.7
Tsawwassen	2018-08-19	28.3
Abbotsford-Airport	2018-08-20	76.9
Abbotsford-Mill Lake	2018-08-20	65.6
Burnaby South	2018-08-20	72.6
Burnaby-Kensington	2018-08-20	87
Chilliwack	2018-08-20	68
Hope	2018-08-20	70.5
Horseshoe Bay	2018-08-20	76
Langley	2018-08-20	59.3
Mission	2018-08-20	51
N. Vancouver-2nd Narrows	2018-08-20	101.6
N. Vancouver-Mahon Park	2018-08-20	94.7
New Westminster	2018-08-20	70.9
North Delta	2018-08-20	78.1
Pitt Meadows	2018-08-20	65.1
Port Moody	2018-08-20	84.6
Richmond South	2018-08-20	96.8
Richmond-Airport	2018-08-20	89.1
Surrey	2018-08-20	60.3
Tsawwassen	2018-08-20	92.4
Vancouver Clark Drive	2018-08-20	80.2
Abbotsford-Airport	2018-08-21	99.9
Abbotsford-Mill Lake	2018-08-21	90.7
Burnaby South	2018-08-21	74.5
Burnaby-Kensington	2018-08-21	59.6
Chilliwack	2018-08-21	78.6

Table II-3 (continued)

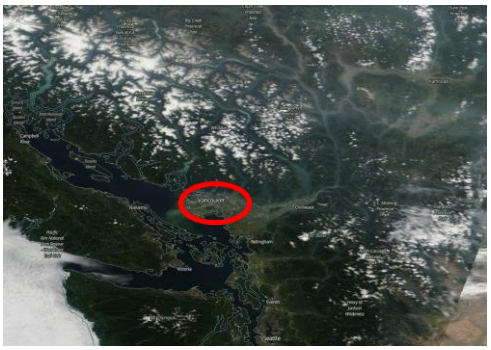
Location	Date	Daily Mean ($\mu g/m^3$)
Hope	2018-08-21	82.1
Horseshoe Bay	2018-08-21	55.4
Langley	2018-08-21	89.7
Mission	2018-08-21	83.7
N. Vancouver-2nd Narrows	2018-08-21	60.2
N. Vancouver-Mahon Park	2018-08-21	61.1
New Westminster	2018-08-21	75.7
North Delta	2018-08-21	91
Pitt Meadows	2018-08-21	69.4
Port Moody	2018-08-21	52.3
Richmond South	2018-08-21	99.3
Richmond-Airport	2018-08-21	91.5
Surrey	2018-08-21	100.8
Tsawwassen	2018-08-21	92.3
Vancouver Clark Drive	2018-08-21	74.8
Abbotsford-Airport	2018-08-22	126.5
Abbotsford-Mill Lake	2018-08-22	118.7
Agassiz	2018-08-22	117.4
Burnaby South	2018-08-22	112
Burnaby-Kensington	2018-08-22	98.9
Chilliwack	2018-08-22	118.7
Hope	2018-08-22	151.5
Horseshoe Bay	2018-08-22	96.2
Langley	2018-08-22	114.1
Mission	2018-08-22	111
N. Vancouver-2nd Narrows	2018-08-22	83.3
N. Vancouver-Mahon Park	2018-08-22	90
New Westminster	2018-08-22	128.1
North Delta	2018-08-22	125.4
Pitt Meadows	2018-08-22	106
Port Moody	2018-08-22	96.1
Richmond South	2018-08-22	123.1
Richmond-Airport	2018-08-22	122.3
Surrey	2018-08-22	126
Tsawwassen	2018-08-22	124.7
Vancouver Clark Drive	2018-08-22	116.7
Abbotsford-Airport	2018-08-23	39.9
Abbotsford-Mill Lake	2018-08-23	46.3
Agassiz	2018-08-23	68.5
Burnaby South	2018-08-23	39.8
Burnaby-Kensington	2018-08-23	43.7
Hope	2018-08-23	82.7
Horseshoe Bay	2018-08-23	52.5
Langley	2018-08-23	33.3
Mission	2018-08-23	50.2
N. Vancouver-2nd Narrows	2018-08-23	50.2
Richmond-Airport	2018-08-23	33.3
Surrey	2018-08-23	34.9
Tsawwassen	2018-08-23	34.3
Vancouver Clark Drive	2018-08-23	48.2
N. Vancouver-Mahon Park	2018-08-23	49.6
New Westminster	2018-08-23	41.7
North Delta	2018-08-23	43.9
Pitt Meadows	2018-08-23	47.2
Port Moody	2018-08-23	49.6
Chilliwack	2018-08-23	59.7
Richmond South	2018-08-23	32.5
Chilliwack	2018-08-25	28.2
Langley	2018-08-25	30.5
Mission	2018-08-25	32.7
New Westminster	2018-08-25	28.6
Surrey	2018-08-25	29.8
Agassiz	2018-09-06	32.5
Hope	2018-09-06	37.1

Table II-4. Wildfire-influenced $PM_{2.5}$ data in LFV during the 2020 wildfire season.

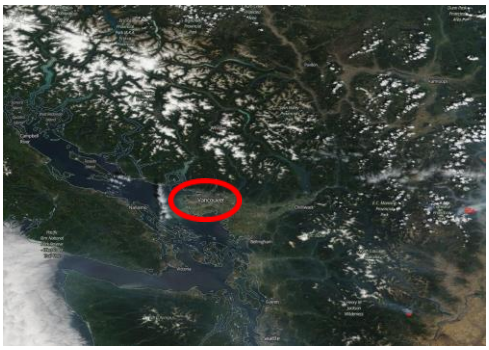
Location	Date	Daily Mean ($\mu g/m^3$)
N. Vancouver Second Narrows	2020-09-08	27.0
Abbotsford A Columbia Street	2020-09-11	78.3
Abbotsford Central	2020-09-11	76.8
Agassiz Municipal Hall	2020-09-11	46.6
Burnaby Kensington Park	2020-09-11	75.1
Burnaby South	2020-09-11	71.5
Chilliwack Airport	2020-09-11	61.6
Langley Central	2020-09-11	80.4
Mission School Works Yard	2020-09-11	77.1
North Delta	2020-09-11	73.5
N. Vancouver Mahon Park	2020-09-11	60.0
N. Vancouver Second Narrows	2020-09-11	59.3
Pitt Meadows Meadowlands School	2020-09-11	71.3
Port Moody Rocky Point Park	2020-09-11	67.0
Surrey East	2020-09-11	84.4
Tsawwassen	2020-09-11	79.1
Vancouver Clark Drive	2020-09-11	69.5
Vancouver International Airport #2	2020-09-11	68.8
Abbotsford A Columbia Street	2020-09-12	119.7
Agassiz Municipal Hall	2020-09-12	106.0
Burnaby Kensington Park	2020-09-12	142.6
Burnaby South	2020-09-12	140.1
Chilliwack Airport	2020-09-12	111.2
Langley Central	2020-09-12	130.1
Mission School Works Yard	2020-09-12	134.6
N. Vancouver Mahon Park	2020-09-12	125.4
N. Vancouver Second Narrows	2020-09-12	129.4
Pitt Meadows Meadowlands School	2020-09-12	118.9
Port Moody Rocky Point Park	2020-09-12	138.2
Surrey East	2020-09-12	144.3
Tsawwassen	2020-09-12	136.3
Vancouver Clark Drive	2020-09-12	146.7
Vancouver International Airport #2	2020-09-12	130.9
Abbotsford A Columbia Street	2020-09-13	134.8
Agassiz Municipal Hall	2020-09-13	111.8
Burnaby Kensington Park	2020-09-13	140.9
Burnaby South	2020-09-13	139.2
Langley Central	2020-09-13	130.3
Mission School Works Yard	2020-09-13	140.1
North Delta	2020-09-13	157.9
N. Vancouver Mahon Park	2020-09-13	143.0
Pitt Meadows Meadowlands School	2020-09-13	126.0
Port Moody Rocky Point Park	2020-09-13	141.9
Surrey East	2020-09-13	140.1
Tsawwassen	2020-09-13	139.7
Vancouver Clark Drive	2020-09-13	147.0
Vancouver International Airport #2	2020-09-13	135.9
Abbotsford A Columbia Street	2020-09-14	172.5
Agassiz Municipal Hall	2020-09-14	137.6
Burnaby Kensington Park	2020-09-14	172.3
Chilliwack Airport	2020-09-14	159.6
Langley Central	2020-09-14	146.9
Mission School Works Yard	2020-09-14	170.9
N. Vancouver Mahon Park	2020-09-14	168.1
Pitt Meadows Meadowlands School	2020-09-14	146.3
Port Moody Rocky Point Park	2020-09-14	172.5
Surrey East	2020-09-14	157.2
Vancouver Clark Drive	2020-09-14	161.0
Vancouver International Airport #2	2020-09-14	144.8
Abbotsford A Columbia Street	2020-09-15	95.8
Abbotsford Central	2020-09-15	93.2
Agassiz Municipal Hall	2020-09-15	89.3
Burnaby Kensington Park	2020-09-15	83.3
Chilliwack Airport	2020-09-15	91.0
Langley Central	2020-09-15	88.9
Mission School Works Yard	2020-09-15	89.1
New Westminster Sapperton Park	2020-09-15	108.2
North Delta	2020-09-15	109.0
N. Vancouver Mahon Park	2020-09-15	80.4
N. Vancouver Second Narrows	2020-09-15	92.5
Pitt Meadows Meadowlands School	2020-09-15	83.9
Port Moody Rocky Point Park	2020-09-15	87.1
Surrey East	2020-09-15	96.7
Tsawwassen	2020-09-15	111.6
Vancouver Clark Drive	2020-09-15	82.4
Vancouver International Airport #2	2020-09-15	95.2
Abbotsford Central	2020-09-16	50.7
Agassiz Municipal Hall	2020-09-16	41.2
Burnaby Kensington Park	2020-09-16	66.0
Burnaby South	2020-09-16	66.4
Chilliwack Airport	2020-09-16	42.8
Langley Central	2020-09-16	52.7
Mission School Works Yard	2020-09-16	52.4
New Westminster Sapperton Park	2020-09-16	61.0
North Delta	2020-09-16	62.2
N. Vancouver Mahon Park	2020-09-16	58.1
N. Vancouver Second Narrows	2020-09-16	62.6
Pitt Meadows Meadowlands School	2020-09-16	54.2
Port Moody Rocky Point Park	2020-09-16	62.4
Surrey East	2020-09-16	57.6
Tsawwassen	2020-09-16	61.2
Vancouver Clark Drive	2020-09-16	53.9
Vancouver International Airport #2	2020-09-16	54.9
Abbotsford A Columbia Street	2020-09-17	54.3
Abbotsford Central	2020-09-17	56.2
Agassiz Municipal Hall	2020-09-17	59.3
Burnaby Kensington Park	2020-09-17	69.5
Burnaby South	2020-09-17	63.4
Chilliwack Airport	2020-09-17	57.6
Langley Central	2020-09-17	50.6

Table II-4 (continued)

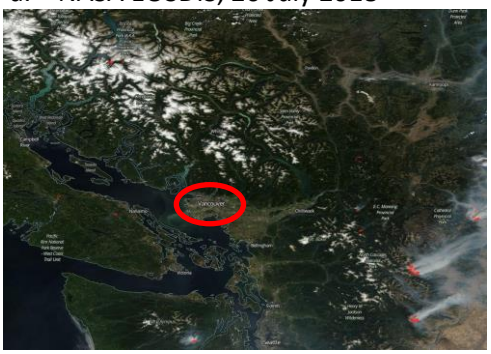
Location	Date	Daily Mean ($\mu g/m^3$)
Mission School Works Yard	2020-09-17	62.1
New Westminster Sapperton Park	2020-09-17	68.2
North Delta	2020-09-17	71.1
North Vancouver Mahon Park	2020-09-17	70.9
North Vancouver Second Narrows	2020-09-17	75.6
Pitt Meadows Meadowlands School	2020-09-17	59.0
Port Moody Rocky Point Park	2020-09-17	63.9
Surrey East	2020-09-17	61.0
Tsawwassen	2020-09-17	55.0
Vancouver Clark Drive	2020-09-17	65.7
Vancouver International Airport #2	2020-09-17	54.2
Abbotsford A Columbia Street	2020-09-18	37.7
Abbotsford Central	2020-09-18	46.0
Agassiz Municipal Hall	2020-09-18	54.8
Burnaby Kensington Park	2020-09-18	51.5
Burnaby South	2020-09-18	39.2
Chilliwack Airport	2020-09-18	51.5
Langley Central	2020-09-18	40.4
Mission School Works Yard	2020-09-18	51.9
New Westminster Sapperton Park	2020-09-18	49.8
North Delta	2020-09-18	42.0
North Vancouver Mahon Park	2020-09-18	59.5
North Vancouver Second Narrows	2020-09-18	65.7
Pitt Meadows Meadowlands School	2020-09-18	48.9
Port Moody Rocky Point Park	2020-09-18	55.8
Surrey East	2020-09-18	42.8
Tsawwassen	2020-09-18	27.3
Vancouver Clark Drive	2020-09-18	47.4
Vancouver International Airport #2	2020-09-18	35.7



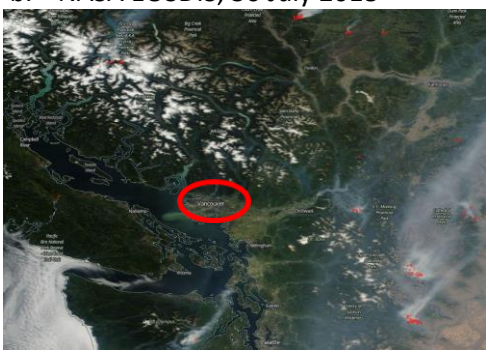
a. NASA EOSDIS, 26 July 2018



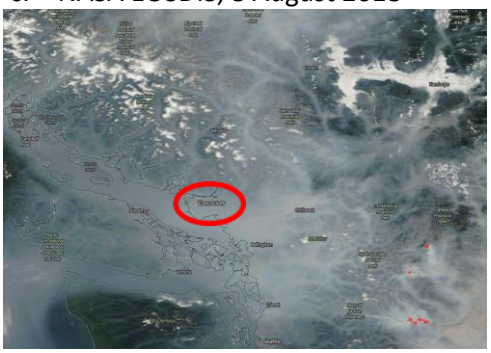
b. NASA EOSDIS, 30 July 2018



c. NASA EOSDIS, 8 August 2018



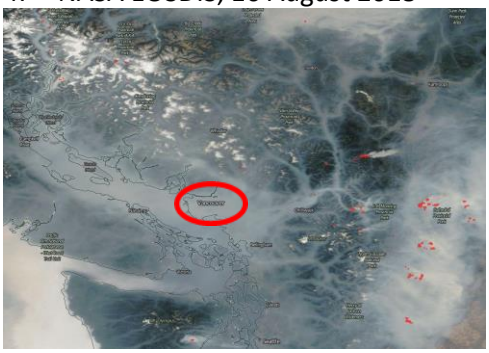
d. NASA EOSDIS, 9 August 2018



e. NASA EOSDIS, 13 August 2018

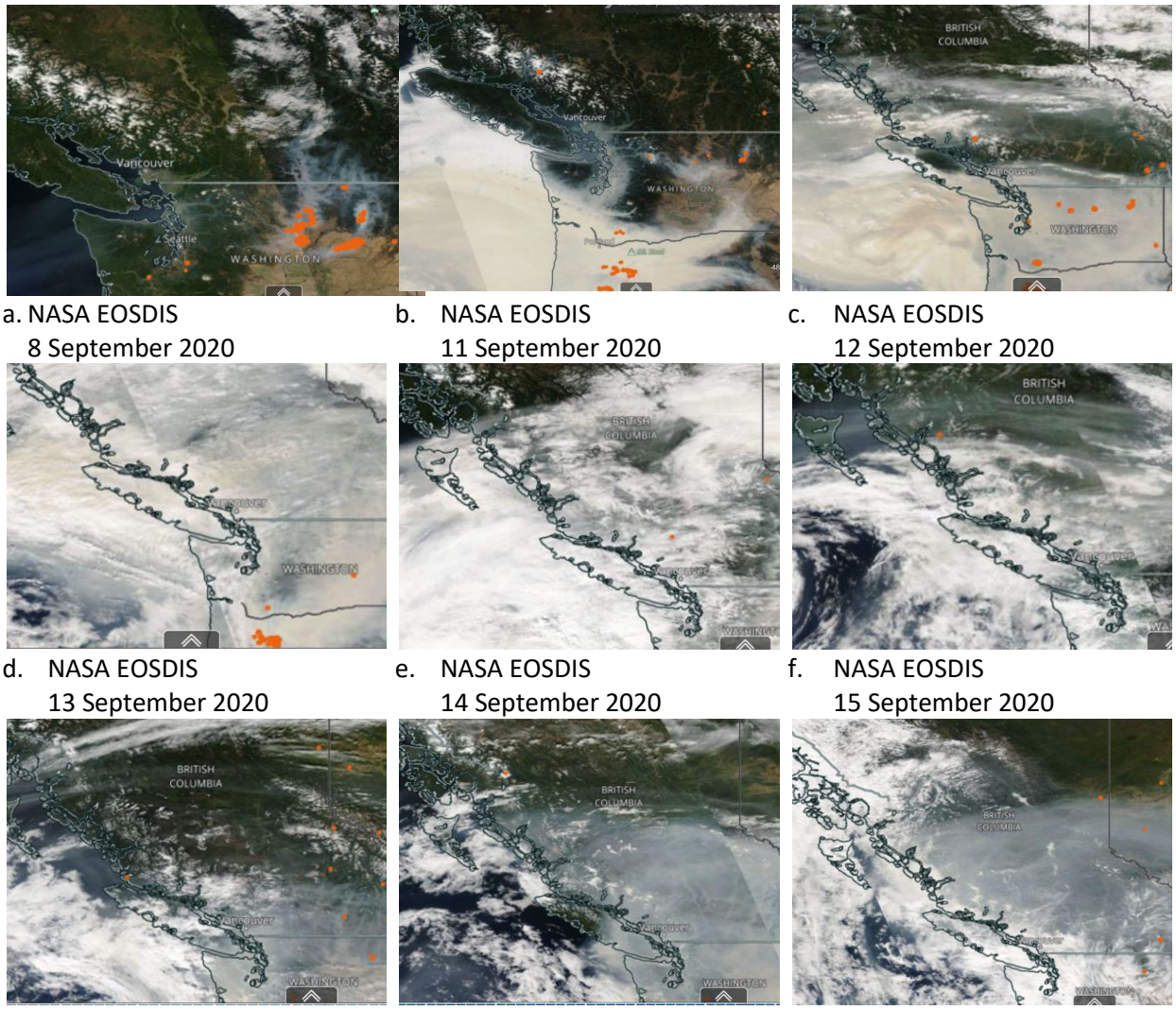
f. NASA EOSDIS, 16 August 2018

g. NASA EOSDIS, 18 August 2018



h. NASA EOSDIS, 22 August 2018

Figure II-1. Corrected reflectance satellite images from NASA's Earth Observing System Data and Information System (EOSDIS) covering July to August 2018. Wildfire smoke appears as grey plumes over the LFV Air Zone. Red dots indicate fires and thermal anomalies. Large red circle identifies Vancouver on map. Source of images: NASA EOSDIS Snapshots at https://worldview.earthdata.nasa.gov/.



a. NASA EOSDIS 8 September 2020
b. NASA EOSDIS 11 September 2020
c. NASA EOSDIS 12 September 2020
d. NASA EOSDIS 13 September 2020
e. NASA EOSDIS 14 September 2020
f. NASA EOSDIS 15 September 2020
g. NASA EOSDIS 16 September 2020
h. NASA EOSDIS 17 September 2020
i. NASA EOSDIS 18 September 2020

Figure II-2. Corrected reflectance satellite images from NASA's Earth Observing System Data and Information System (EOSDIS) covering LFV on September 2020. Wildfire smoke appears as grey plumes. Source of images: NASA EOSDIS Snapshots at https://worldview.earthdata.nasa.gov/.