



AIR QUALITY MANAGEMENT PLAN 2021



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LIST OF ACRONYMS

AQ	Air Quality
AQHI	Air Quality Health Index
BC MOECCS	BC Ministry of Environment and Climate Change Strategy
BVOC	Biogenic Volatile Organic Compounds
CAAQS	Canada-wide Ambient Air Quality Standards
CAC	Criteria Air Contaminants
CH₄	Methane
CO	Carbon Monoxide
CO₂	Carbon Dioxide
CO₂eq	Carbon Dioxide equivalent
COPD	Chronic Obstructive Pulmonary Disease
DPM	Diesel Particulate Matter
ECCC	Environment and Climate Change Canada
EV	Electric Vehicles
GHG	Greenhouse Gases
H₂S	Hydrogen Sulfide
FVRD	Fraser Valley Regional District
LFV	Lower Fraser Valley
MV	Metro Vancouver
NH₃	Ammonia
N₂O	Dinitrogen Monoxide or Nitrous Oxide
NO₂	Nitrogen Dioxide
NO	Nitrogen Monoxide or Nitric Oxide
NO_x	Nitrogen Oxides
O₃	Ozone
PM	Particulate Matter
PM_{2.5}	Fine Particulate Matter (with particle diameter ≤ 2.5µm)
PM₁₀	Coarse or Inhalable Particulate Matter (with particle diameter ≤ 10µm)
ppb	Parts Per Billion
ppm	Parts Per Million
SO₂	Sulfur Dioxide
SO_x	Sulfur Oxides
TAP	Toxic Air Pollutants
TRS	Total Reduced Sulfur
TSP	Total Suspended Particulates
US EPA	US Environmental Protection Agency
VAQR	Visual Air Quality Rating
VI	Ventilation Index
VOC	Volatile Organic Compounds
ZEV	Zero-Emission Vehicles



INTRODUCTION

“Air pollution causes 1 in 9 deaths. It is the most important environmental health risk of our time.”

United Nations Environment Program

Clean air is something we often take for granted. Poor air quality affects our health, our economy, and our recreational and aesthetic enjoyment of the outdoors. In the Lower Fraser Valley, episodes of poor air quality still occur. Multiple health advisories can be issued each year. Our scenic mountains and beautiful landscapes are often hidden from view due to pollution and haze. While there have been improvements in air quality observed over the last few decades, ongoing effort is needed to maintain this progress, particularly as population and economic growth continues and new emission sources emerge.

Due to internal and external sources of pollution, and a landscape that tends to funnel and concentrate pollutants within the region, air quality has remained a significant priority for the Fraser Valley Regional District (FVRD) for the past 25 years. The FVRD produced its first Air Quality Management Plan (AQMP) in 1998. Since then, new comprehensive air quality data have become available, as has new research on air pollution effects, suggesting the need for a revised AQMP.

The new FVRD Air Quality Management Plan represents the FVRD’s ongoing commitment to the continual

improvement of air quality within the sensitive airshed of the Lower Fraser Valley. This new AQMP, which is based on updated air quality data and trends, provides a roadmap to reduce emissions and improve air quality of the region for the next ten years. The FVRD can not do this alone however, and a coordinated effort will be needed by all levels of government, neighbouring jurisdictions, industry associations, scientific experts, user and community groups, and residents, in order to achieve the vision and goals contained within this report. Implementation depends on all of us to work together and to make a collective effort that benefits us all.

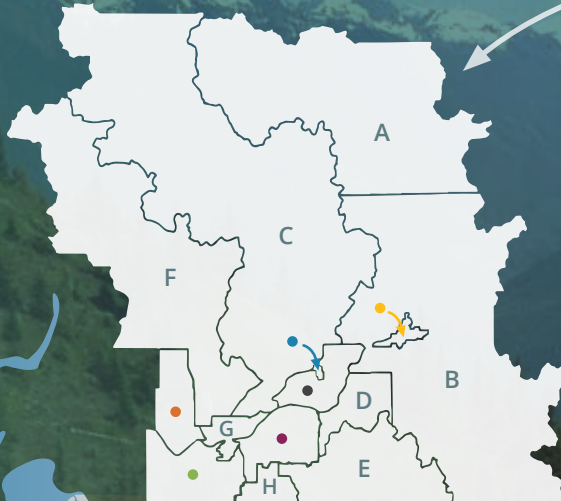
This report is intended to be a living document and will receive updates and amendments as new data, technologies, ideas, funding opportunities, or policy directions emerge over time. Much can change within a ten-year period, and remaining adaptable and flexible will allow the plan to stay relevant over the next decade. By following the roadmap outlined within this AQMP, residents and visitors will continue to enjoy clean air, beautiful vistas, and healthy living in this beautiful region.

Fraser Valley Regional District

WHERE ARE WE?

The FVRD is located in southwestern British Columbia - also considered part of the 'Pacific Northwest'.

British Columbia



The FVRD incorporates 8 Electoral Areas and these 6 Municipalities:

- Abbotsford
- Mission
- Chilliwack
- Kent
- Harrison Hot Springs
- Hope

WHO ARE WE?



330,000
Residents



23 Board
Members



6 Municipalities



8 Electoral
Areas

WHAT DO WE DO?



We deliver over
100 separate services
to the residents of our district

What is the Fraser Valley Regional District?

The Fraser Valley Regional District (FVRD) is a federation of six municipalities (Abbotsford, Chilliwack, Harrison Hot Springs, Hope, Kent, and Mission) and eight Electoral Areas (A through H). It is located in southwest British Columbia directly adjacent to Metro Vancouver to the east and to the US border to the south.

The region has a population of approximately 330,000 residents, making it the third most populous regional district in BC. Approximately 94% of our population lives within our member municipality boundaries, while the remaining 6% live in our electoral areas. The FVRD is governed by a 23 member board made up of appointed local municipal mayors, councillors, and electoral area directors. The FVRD provides over 100 separate

services to residents within the region, including sewer and water, fire protection, street lighting, solid waste management, regional parks, emergency services, animal control, community planning, and air quality.

The FVRD is one of the fastest growing regional districts in British Columbia. Over 60% population increase from 2016 levels or an additional 190,000 residents are anticipated in the region by 2051. Future residential, industrial, and commercial development will continue to provide opportunities for the local communities. Population growth is also placing stress on the local environment and sustainability, a significant concern that needs to be addressed moving forward.



Lower Fraser Valley Airshed



WHAT IS AN AIRSHED?

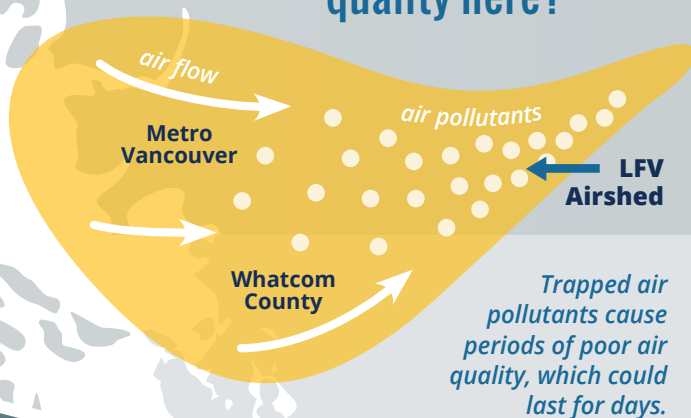
An airshed is a region sharing common airflow patterns hindered by local features, such as mountains and weather, and often exposed to similar levels of air pollution.

THE LFV AIRSHED

- » is funnel-shaped and confined between the mountains
- » has complex meteorology with frequent temperature inversions
- » is characterized by restricted airflow and limited vertical air mixing



What happens to air quality here?



AIRSHED MANAGEMENT is

- » cooperative and coordinated amongst multiple levels of government
- » complex and dynamic
- » a long-term undertaking based on continuous improvement

What is the Lower Fraser Valley Airshed?

The FVRD comprises the eastern portion of the Lower Fraser Valley (LFV) airshed. This airshed is situated between the Cascades and the Coast Mountains and includes both the southwestern portion of British Columbia and the northwestern portion of Washington State. It is shared by three regions: the FVRD, Metro Vancouver, and Whatcom County.

The LFV is shaped like a funnel, with the wide end facing the Pacific Ocean and narrowing as it continues inland towards the Fraser Valley, bound by mountains that confine and channel the air. On a hot summer day, onshore sea-breezes (westerlies) can push air pollutants towards the eastern, narrower portion of the airshed.

The result is often an accumulation of pollutants from densely populated and industrialized areas of Metro Vancouver and Whatcom County in Washington State, combining with pollutants emitted locally, creating air quality health and visibility concerns within the FVRD. The airshed is considered 'sensitive' due to this tendency to re-circulate and concentrate air pollutants, resulting in increased health risks for its residents.

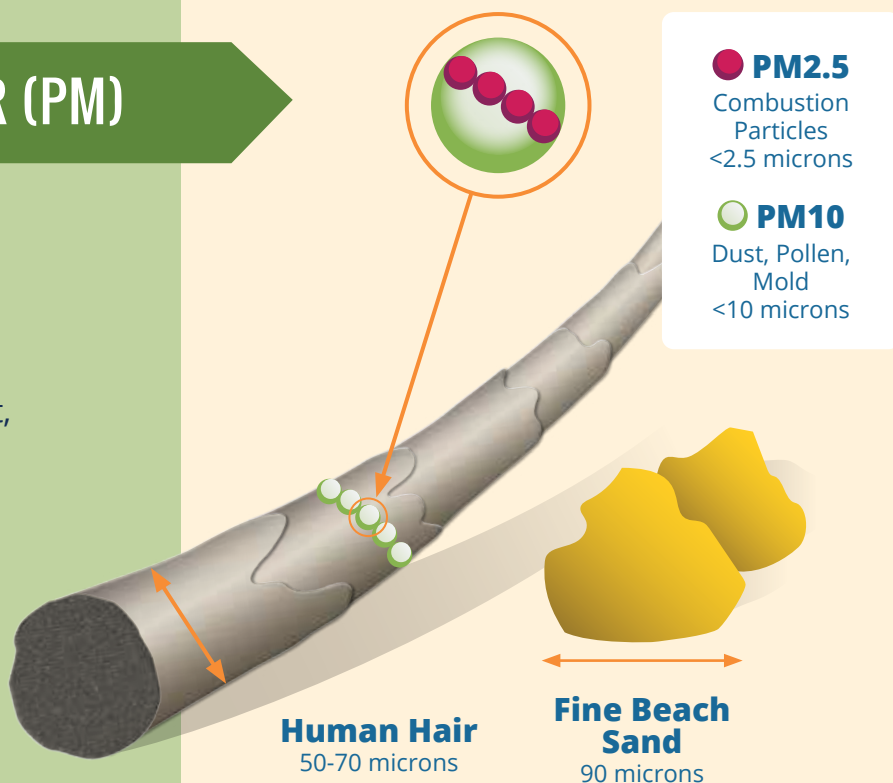
The FVRD boundaries extend beyond the LFV airshed, including up into the Fraser Canyon. While focus is most often placed on the LFV airshed, the breadth and application of efforts to improve air quality described within the AQMP extend throughout the FVRD.



Air Quality and Particulate Matter

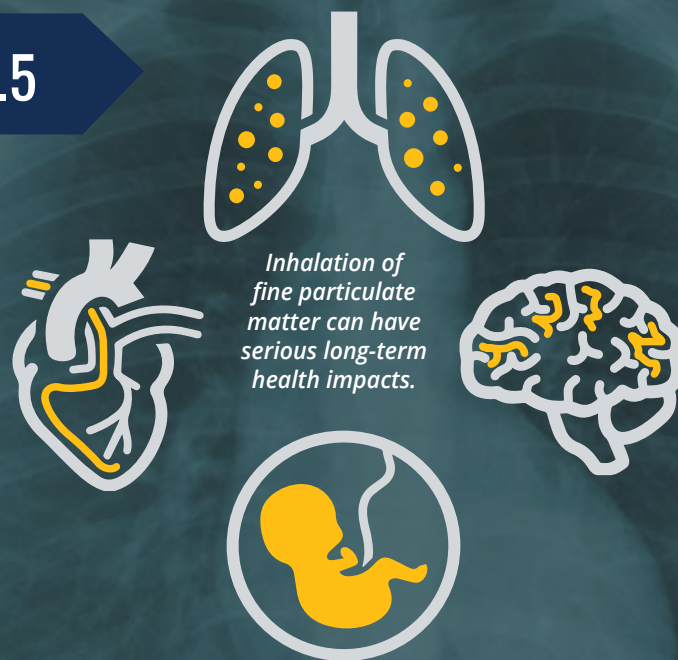
PARTICULATE MATTER (PM)

- » Is a mix of tiny solid or liquid particles of various shapes and sizes
- » Can be made up of organic matter, black carbon, sea salt, sulfates and nitrates, metal oxides, or crustal minerals
- » Can be emitted directly (primary PM) or formed from other air pollutants (secondary PM)



FINE PARTICULATE MATTER - PM2.5

- » Penetrates deep into the lungs and bloodstream causing inflammation
- » Causes asthma, and heart and lung disease
- » Contributes to growth disorders and congenital anomalies in children
- » Increases the risk of dementia and cognitive decline in older adults



WHY IS AIR QUALITY IMPORTANT?

“You know it as Mt. Cheam but our name for it is Lhilheqey... she was supposed to be watching over the river and watching over the people and watching over the salmon and yet she’s way up there and all the smog that’s impairing her vision to watch over people.”

Sonny McHalsie, Stó:lō Nation [1]

Poor air quality affects human health, economic development, agricultural production, local ecosystems, and our overall quality of life. As such, air quality is recognized as one of the most important environmental issues in the FVRD.

Health

Poor air quality can cause adverse health effects on people of all ages, from pre-birth development deficiencies to premature mortality [2,3]. Air pollution represents a measurable health risk commonly characterized by the large scale population exposure and strong impacts on vulnerable groups, including children, seniors, and people with pre-existing conditions [4,5]. Air quality is ubiquitously recognized by the public health professionals as one of the major modifiable risk factors in disease prevention and management [6]. In the LFV, long-term exposure to

traffic-related air contaminants has been linked to the adverse cardiovascular outcomes in nearby residents [7]. Regional episodes of poor air quality often see increases in hospital admissions and dispensation of asthma medications, with asthma and Chronic Obstructive Pulmonary Disease (COPD) rates in the FVRD municipalities reported above BC average (Appendix A). Studies also reveal close association between Toxic Air Pollutants and a greater risk of cancer, with the recent focus on diesel soot from engine exhaust as a primary driver for lung cancer in the region [8]. Air toxins may also contribute to leukemia and other types of cancers.

Ground-level ozone (O₃), nitrogen dioxide (NO₂), and fine particulate matter (PM_{2.5}), including diesel particulate matter (DPM), are of particular concern, contributing to a broad range of illnesses [3]. Regulatory standards and objectives for these contaminants do not imply that ‘safe levels’ are found below these thresholds, but in fact these contaminants are considered harmful at any level of exposure. Ozone is a powerful oxidant that can cause inflammation to lung tissue and permanent damage or loss of lung function after repeated long-term exposure. NO₂ is a highly reactive and hazardous gas which also acts as a precursor for the O₃ formation. PM_{2.5} penetrates deep into the respiratory tract causing irritation and inflammation to the tissues. Due to their small sizes, fine particulates are falsely recognized and attacked by the immune system as biological invaders,

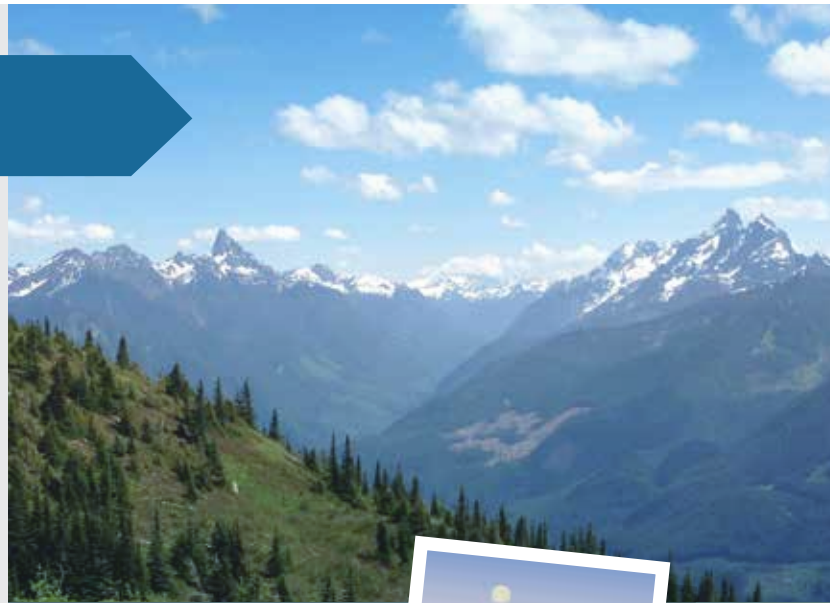
TOXIC AIR POLLUTANTS (TAP)

Also sometimes referred to as hazardous air pollutants, are substances that cause or may cause cancer or other serious health effects.

Visual Air Quality

VISUAL AIR QUALITY (VAQ)

- » Describes the effect of air pollution on how the surrounding scenery looks to the naked eye
- » Depends on the concentration of air pollutants and atmospheric conditions
- » Improves through emissions reductions



HAZE AND PM2.5

- » When VAQ is poor, we usually see haze
- » Haze is caused by PM2.5 in the air which scatters visible light
- » Different kinds of particles create different colours of haze



To measure VAQ we use
VISUAL AIR QUALITY RATING



e.g., viruses and bacteria. However, the particulates cannot be killed by the immune system, and the inflammation is sustained [9,10].

Other air contaminants, such as sulfur oxides (SO_x) or carbon monoxide (CO), are also associated with significant risks for respiratory and cardiovascular health [11,12]. Their direct effect might be less pronounced in the LFV due to decreasing trends and improved regional air quality. However, those air pollutants even at the low levels may act as precursors and contribute to the formation of either secondary PM_{2.5} or O₃.

Air quality in the Lower Fraser Valley might be perceived as generally 'good' when compared with many other places in the world, but substantial health benefits can still be achieved by reducing and preventing air emissions and by making continual improvements in air quality.

Visual Air Quality

In the LFV, air pollution often appears as white or brown haze that obscures views of mountains and scenic vistas within the region. Visual Air Quality (VAQ) or 'visibility' is the term that describes the effect of air pollution and weather conditions on the views of distant landscapes [13,14]. Recent research has shown that PM_{2.5} of mixed chemical composition (nitrates, sulfates, and organic matter) is the greatest contributor to local haze [15]. The direct effect of PM_{2.5} on visibility is however hard to quantify. Currently, VAQ monitoring in the LFV is performed using automated cameras taking a photograph of the same site every half-hour and instrumentation that measures particles in the air such as a nephelometer or aethalometer. Airshed partners use an observation-based scale from 'Poor' to 'Excellent' to report VAQ on a daily basis [16].

Visual Air Quality is important for many residents and for those that spend time in the Fraser Valley. It affects the ability of local First Nations to see the local mountains and to maintain cultural traditions and meet their spiritual needs [1]. Businesses, like real estate, recreation and tourism, also stand to benefit from better VAQ. To improve VAQ, the emissions of PM and other pollutants that contribute to the formation of PM, have to be reduced, so that residents and visitors can enjoy unobstructed views of natural landscapes.

Economy

Economic effects of air pollution are felt by a broad range of institutions, industries, and businesses. Sectors directly impacted by air quality include public health, agriculture, forestry, real estate, tourism and recreation, to name just a few.

Health impacts attributed to poor air quality result in substantial costs to the health care system each year. Health Canada estimates the number of annual mortalities in Canada due to air pollution to be 14,600 deaths per year, and this number keeps increasing [3]. The total economic cost of all health impacts attributable to air pollution across Canada has been estimated at C\$114 billion per year (in 2015 currency). For the Lower Fraser Valley, the 2014 report by Environment Canada and the United States Environmental Protection Agency highlights that a 10% decrease from a 5-year average baseline (1999-2003) in ambient air quality could generate annual health benefits of C\$328 million by 2020 [7]. The report also identifies losses in revenue from tourism, recreation, and real estate associated with reduced visibility. For example, a single poor visibility event in the Fraser Valley during the peak tourist season could result in losses as high as C\$1.3 million in regional tourism revenue.

For agricultural and forestry operations, air pollution can result in reduced crop and timber yields and related economic activities [7]. This effect has been well documented elsewhere in Canada and globally, but local studies are lacking [17,18]. Ozone exposure in particular may generate visible foliar damage, reduce plant and tree growth and productivity, and increase their vulnerability to drought, pests, and diseases. Ozone pollution, in combination with rising temperatures, poses a major threat (up to 30% yield decline) to crop production [19].

Ecosystems

Air pollution can negatively impact ecosystem health. Atmospheric nitrogen and sulfur oxides (NO_x and SO_x) are strong acidifying compounds. When deposited on vegetation, they can damage plant tissue, reduce crop yields, and cause loss of sensitive species. Research conducted in Canada found that acid deposition on soils and water could cause significant changes in soil and surface water chemistry and reduce nutrient

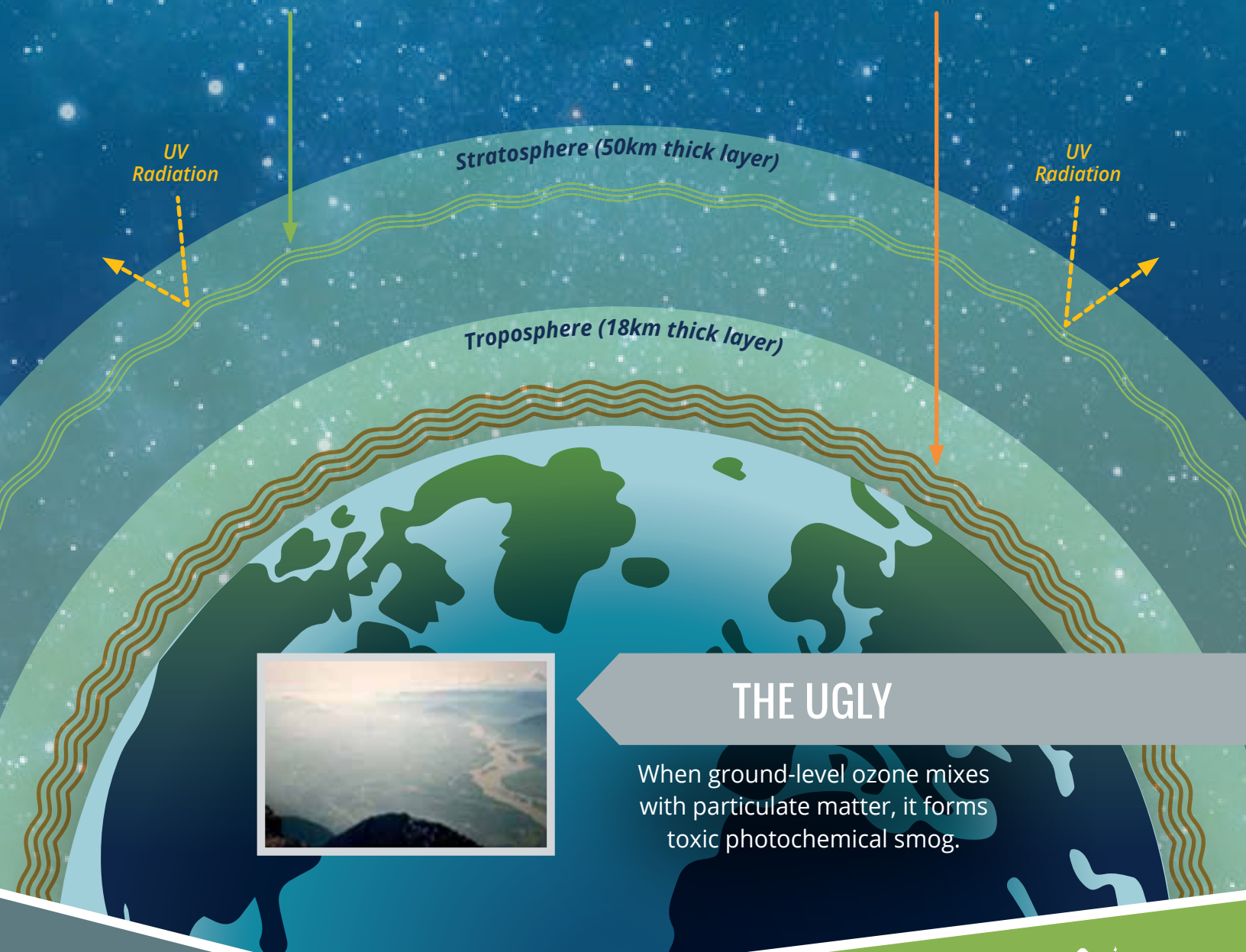
Ozone: the Good, the Bad, and the Ugly

GOOD OZONE

The stratospheric or upper atmosphere ozone layer protects the Earth from harmful UV radiation from space.

BAD OZONE

Ground-level ozone forms just above the earth's surface and damages human health and the environment.



THE UGLY

When ground-level ozone mixes with particulate matter, it forms toxic photochemical smog.

uptake by the roots [20]. There are indications that acid deposition is growing in coastal BC, although scientific information is still scarce [21].

Atmospheric deposition of those nutrients also contributes to eutrophication of aquatic ecosystems, overgrowth of algae, and degradation of water quality [22]. Locally, atmospheric deposition has been identified as the largest single source of nitrogen loading to Cultus Lake, cumulatively responsible for 63% of total nitrogen entering this waterbody [23].

Air pollution can lead to the overall decline in habitat and food supply availability for ecosystem wildlife. High concentrations of ground-level ozone can damage vegetation, while the long-term exposure may result in decreased plant health [24, 25]. Visible foliar damage from ozone has been documented in BC forests [26]. In addition, particulate matter deposited on plant surfaces can inhibit the normal respiration and block photosynthesis within the leaf [27], decreasing plant health and making vegetation less resilient to environmental stresses such as changes in soil chemistry, climate change, or invasive species.

Studies of air pollution effect on domestic, livestock, and companion animals are scarce; however, the research that has been done indicates that animals are often exposed to the same risks as humans and may express similar health problems [28]. Amongst wildlife, birds are strongly affected by air quality and the known response includes respiratory distress, direct mortality, and loss of population [29,30]. Local studies are not available at the time of this publication.

Odours

Odours associated with air quality are caused by one or more volatilized chemical compounds that are generally found in low quantities but detectable by the human nose and is commonly considered offensive to people, even at concentrations below instrumental detection limits. Some odorous compounds are merely a source of nuisance, while others can negatively affect health [31]. Odours are often unavoidable consequences of certain commercial and business activities, such as wastewater treatment, livestock and manure management, mushroom composting, and various industrial operations potentially impacting

nearby residents and communities. Understanding the sources of odours, having monitoring tools available, establishing communications between those impacted by the odours and the authorities responsible, and implementing best management practices and control methods, are critical components that help to reduce and avoid odours that can cause deteriorating health and quality of life for residents.

Climate Change

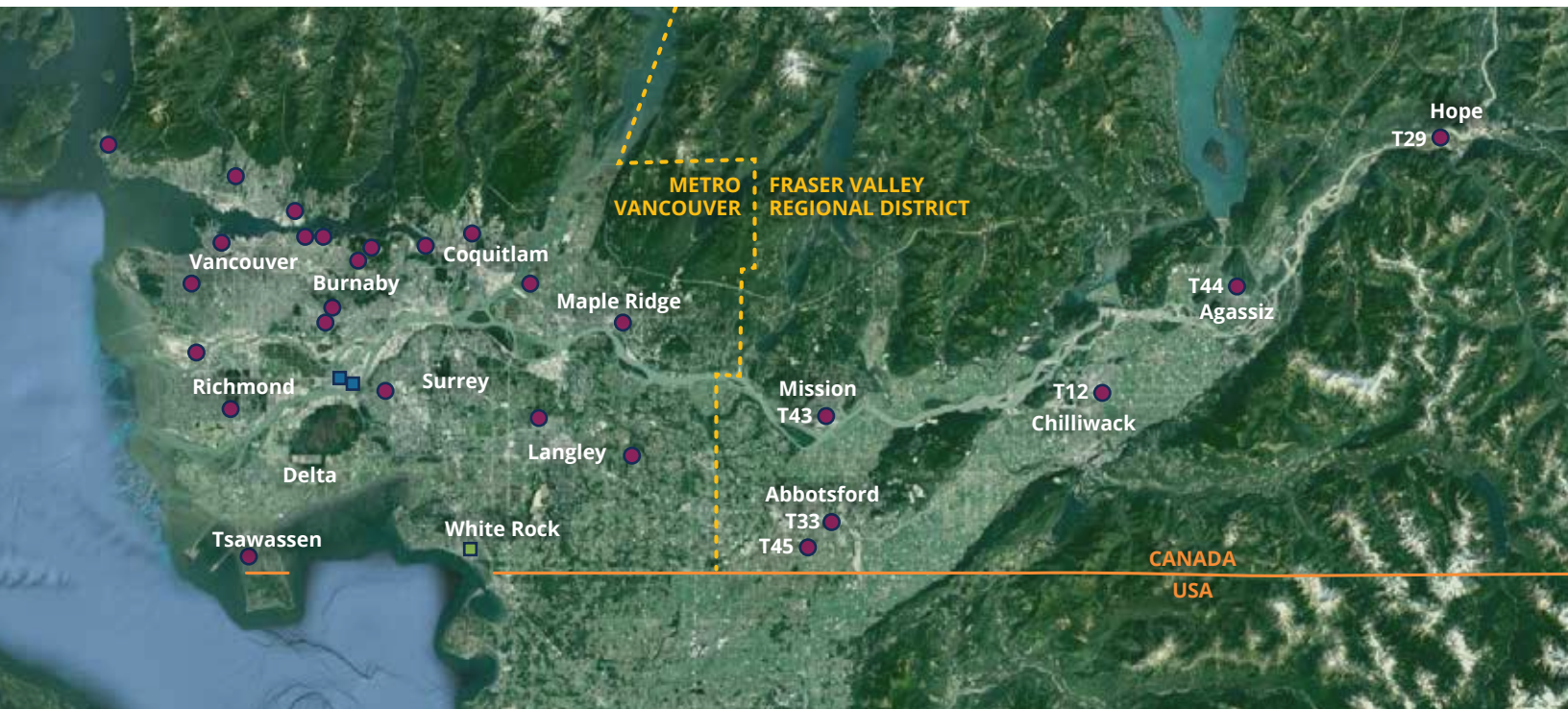
Air pollution and climate change are directly linked. Greenhouse gases (GHG) and air contaminants often come from the same sources and through the same activities. On-road transportation, off-road machinery, residential and commercial heating, and livestock farming are amongst the largest emitters of both GHGs and air pollutants in the FVRD. Certain pollutants themselves, such as ground-level ozone or particulate matter, act as short-lived GHGs adding to the greenhouse effect and climate change.




The consequences of climate change are already being felt within the Fraser Valley. The recent trends are towards more extreme weather patterns with drier and hotter summers and warmer and wetter winters. With that comes a greater risk of natural disasters. The region is increasingly experiencing intense precipitation, storms and flooding, as well as forest wildfires, impacting the economy and the environment. While the effects are observed locally, they can be derived from climate change impacts occurring elsewhere, such as wildfire smoke blowing into the region from the USA or from floodwaters on the Fraser River coming from rapid warming and snowmelt happening elsewhere within the Fraser River Basin.



GHG emissions in the FVRD are forecast to continue to slowly increase until at least 2035 (see the emission trends on pp. 30-31 and in Appendix B). To reverse this trend, consistent mitigation actions are needed across the region. While this AQMP is not a climate plan per se, by addressing causes of air pollution that also contribute to climate change, the actions identified in this plan have the co-benefits of addressing both air pollution and GHG emissions. It is recognized however that additional GHG planning and management remains an important component of regional sustainability that still needs to be undertaken.

FACT SHEET

Air Quality Monitoring Network in the Lower Mainland



-  Continuous air quality monitoring station
-  Non-continuous air quality monitoring station
-  Meteorological monitoring station only

-  Border between regional districts
-  Border between Canada and the USA



AIR QUALITY IN THE FVRD

“Understanding the source, location and types of emissions in an area is valuable and allows communities to develop targeted actions that can improve air quality in a region.”

BC Ministry of Environment and Climate Change Strategy

Monitoring Air Quality

The LFV Air Quality Monitoring Network is an integrated system of monitoring stations that measure air contaminant concentrations in ambient air throughout the region. These stations cover the Canadian part of the LFV airshed from Horseshoe Bay to Hope. The FVRD hosts the six eastern-most stations: Abbotsford (2 stations), Mission, Chilliwack, Agassiz, and Hope. All of these stations also collect meteorological data.

Automated air quality sensors take a reading of each parameter multiple times per hour, generating high-frequency, real-time continuous data. Non-continuous air testing is also conducted periodically for certain contaminants when continuous monitoring is not available. After averaging over certain time periods (hourly, 8-hour, 24-hour, or annual), the data is reported through online web resources¹.

Real-time continuous data from the Network also serve as a basis for air quality advisories, Air Quality Health Index (AQHI) calculations, and help to inform numerous reports and assessments.

Trends and Pollutants of Concern

Since the late 1990s, consistent measures on reducing air pollution have resulted in significant air quality improvements in the LFV airshed, including within the FVRD. As the region faces growing populations and industrial usages, maintaining this progress becomes more difficult and collaborative efforts on air quality protection becomes even more critical.

While the improving trends in some air pollutants (e.g., SO₂, NO₂, CO) is encouraging and standards and objectives are being met, several concerns remain, in particular for PM_{2.5} and O₃ levels (see the ambient concentrations on pp. 26-27).

AIR QUALITY HEALTH INDEX (AQHI)

Air Quality Health Index is a scale (1-10+) designed to help understand what the quality of the air around us means to our health. It is a tool developed by health and environmental professionals based on three air pollutants levels (PM_{2.5}, O₃ and NO₂) and is used to communicate the health risk posed by air pollution.

¹ <http://airmap.ca>; <https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-quality/current-air-quality-data>. Note: Real-time reported data is considered preliminary as it has not passed through the quality assurance/quality control (QA/QC) prior to reporting out to the public.

Wildfire Smoke

Wildfire seasons are getting longer and more extreme.

Wildfires generate toxic smoke which affects people both outdoors and indoors. Smoke exposure is associated with many respiratory and cardiac symptoms and an increased risk of mortality.

WHAT'S IN THAT SMOKE?

- » Particulate matter PM2.5 and PM10
- » Gases such as CO, CO₂ and NOx
- » Toxic volatiles, such as formaldehyde and acrolein

WHO IS AT RISK?



Children and pregnant women



Seniors



People with asthma, lung and heart disease

SMOKE EXPOSURE REDUCTION

- » Minimize outdoor activity to keep your respiration rate low, and drink plenty of water
- » Check the local Air Quality and Health Index (AQHI) for health-specific messaging in smoky conditions
- » Work with your doctor to create a plan for smoky periods if you or your family member has lung disease
- » Use a high quality portable air cleaner with HEPA filtration for indoor air
- » Look for alternatives to open burning, such as chipping
- » Seek out places in your community where you can find fresh air (like a mall or library)

The main source of PM_{2.5} in the FVRD is smoke from wood and biomass burning, originating either from inside the airshed or from outside. Episodes of elevated PM_{2.5} can occur during all seasons. Burning for residential heating, yard waste disposal and land clearing generate abundant smoke in colder months, with wildfire smoke becoming a growing source for high levels PM_{2.5} in hot and dry summer conditions. It is not uncommon for smoke from massive wildfires in other regions of the world to travel into the LFV and trigger air quality related health advisories for multiple days.

Ground-level ozone O₃ is not emitted directly but forms in the atmosphere from other air pollutants called pre-cursors (NOx and VOC) in the presence of sunlight. Both local sources of these pre-cursors, as well as pre-cursors originating elsewhere and carried into the airshed, contribute to ozone formation in the LFV. Summertime high-peak episodes of ground-level ozone had been common in past decades, but their frequency has decreased over time. While peak episodes may be subsiding, the background level of ozone appears to be rising. This concerning trend in non-peak averages, believed to be due to medium and long range transport of pollutants from out of the region, leads to more hours of elevated ozone concentrations during the day [32] (see the ambient concentrations for O₃, page 27).

The release of ammonia (NH₃), another important air contaminant, has been increasing in the LFV since 2010, attributed mostly to livestock and manure management. While it does not represent an immediate threat to human health at the ambient levels, it contributes to the formation of PM_{2.5} and participates in atmospheric deposition and excessive nutrient loading for local ecosystems.

Regional trends show that without further actions taken reductions in air emissions observed in the FVRD since 1995 will level off or slowly increase after 2025 (see the emission trends on pp. 28 -29 and in Appendix B). Caused by population growth, steady increases are also projected for the principal greenhouse gases of carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).

SMOKE

In September 2020, smoke from US wildfires in Washington, Oregon and California traveled to Canada and caused some of the worst air quality on record in BC. An air quality advisory was in effect for over a week while smoke continued to persist in the region.

View from Hillkeep Regional Park



July 17, 2017 - Smoke



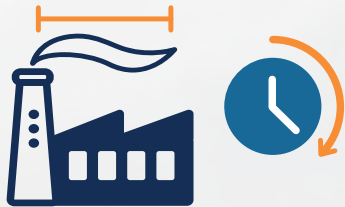
September 7, 2017 - Ozone



September 14, 2017 - Clear

Emissions vs Concentrations

AIR EMISSIONS



Are the **TOTAL amounts** of pollutants released from a specific source within a specific time

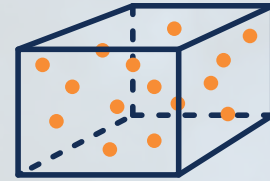


Describe a **CHANGE** in atmospheric composition over a given time **PERIOD**



Are mostly **CALCULATED**

AMBIENT CONCENTRATIONS



Are **AVERAGE amounts** of pollutants per air volume, regardless of a source



Describe a **STATE** of atmospheric composition at a given **MOMENT** in time



Are typically **MEASURED**

Air Emission Sources

Air emissions within the LFV originate from a multitude of sources, both natural and anthropogenic (see the emissions sources on page 33 and in Appendix B). Natural sources of air pollution include forest fires, volcanoes, and volatile organic compound (VOC) emissions from vegetation. Anthropogenic emissions are caused by human activities and come from point, area, and mobile sources.

Degraded air quality is a result of the cumulative effect of all these emissions occurring within the confined airshed. Due to high complexity and diversity of emission sources, it is not always possible to directly measure emissions from all the different source types, so they are estimated from other data. A regional emission inventory is a database of estimated emissions from sources located in a certain geographic region or jurisdiction within a specific time period. Emission inventories are developed for policy making and to monitor progress towards emission reduction targets. The emission inventories use forecast projections based on variables such as changes in population, economy, kilometres traveled, fuel consumed and future growth

representing “business as usual” scenarios. In addition to the forecast, emissions are also reported back to 1995, in five-year increments to give an indication of trends in emissions over time, and allow for comparison of emissions in previous years to the current year.

Metro Vancouver, in partnership with the FVRD, updates the LFV Emission Inventory every 5 years. The 2015 Emission Inventory¹ is the most recent inventory, with a 2020 update not yet available. New emission trend data will be reflected in future revisions of this AQMP should it be warranted.

The main sources of emissions can be broadly characterized as originating from one of the following five categories:

1. On-Road Transportation
2. Non-Road Equipment and Engines
3. Intentional Indoor and Outdoor Wood Burning
4. Commercial, Industrial, and Agricultural Operations
5. Natural Sources

SOURCE TYPES

Point sources are stationary, fixed sources from which air pollutants can be released into the atmosphere continuously or instantaneously, for example, factory or power plant smokestacks.

Area sources release pollutants to the atmosphere from larger areas, for example, agricultural fields or forest wildfires.

Mobile sources generally refer to the emissions from sources that can move around, for example, road transportation, non-road machinery, railways marine vessels or aviation.

¹ <http://www.metrovancouver.org/services/air-quality/AirQualityPublications/2015LowerFraserValleyAirEmissionsInventory.pdf>

These categories and the emissions they are responsible for based on the 2015 LFV emission inventory are summarized in the following table.

Category	Main Sources	Pollutants of Concern ¹	Significance in FVRD
1. On-Road Transportation	Light-, medium- and heavy-duty gasoline & diesel vehicles (e.g., cars, trucks, buses)	CO, NO _x , SO _x , VOCs, PM _{2.5} (including diesel PM), TAPs, GHGs	Accounts for: 37% of NO _x emissions 43% of total GHG emissions
2. Non-Road Equipment and Engines	Construction equipment Agriculture machinery Lawn and garden equip. Rec. vehicles & watercraft Aircraft Rail yard and locomotives Marine vessels	CO, NO _x , SO _x , VOCs, PM _{2.5} (including diesel PM), TAPs, GHGs	Accounts for: 58% of NO _x emissions 21% of total GHG emissions
3. Intentional Indoor or Outdoor Wood Burning	Land clearing burning Prescribed forest burning Residential yard waste burning Woodstoves and fireplaces Commercial boilers & heaters	PM ₁₀ , PM _{2.5} , CO, VOCs, TAPs	Accounts for: 27% of PM _{2.5} emissions
4. Commercial, Industrial, and Agricultural Operations	Composting Facilities Soil tillage Agricultural debris burning Fuel distribution stations Forest harvesting Aggregate extraction Construction and excavation Waste landfills and incinerators Livestock and poultry farms Pulp mills & wood processing Miscellaneous facilities	PM _{2.5} , PM ₁₀ , NH ₃ , VOCs, NO _x , TAPs, GHGs, odours	Accounts for: 49% of PM _{2.5} emissions 35% of GHG emissions 99% of NH ₃ emissions
5. Natural Sources	Wildfires Radon Sources Vegetation foliage (natural emissions)	CO, Ground-level ozone, BVOC, PM ₁₀ , PM _{2.5} , TAPs, Radon	Accounts for: 73% total VOC emissions

¹ Acronyms and formulas used within the table include the following:

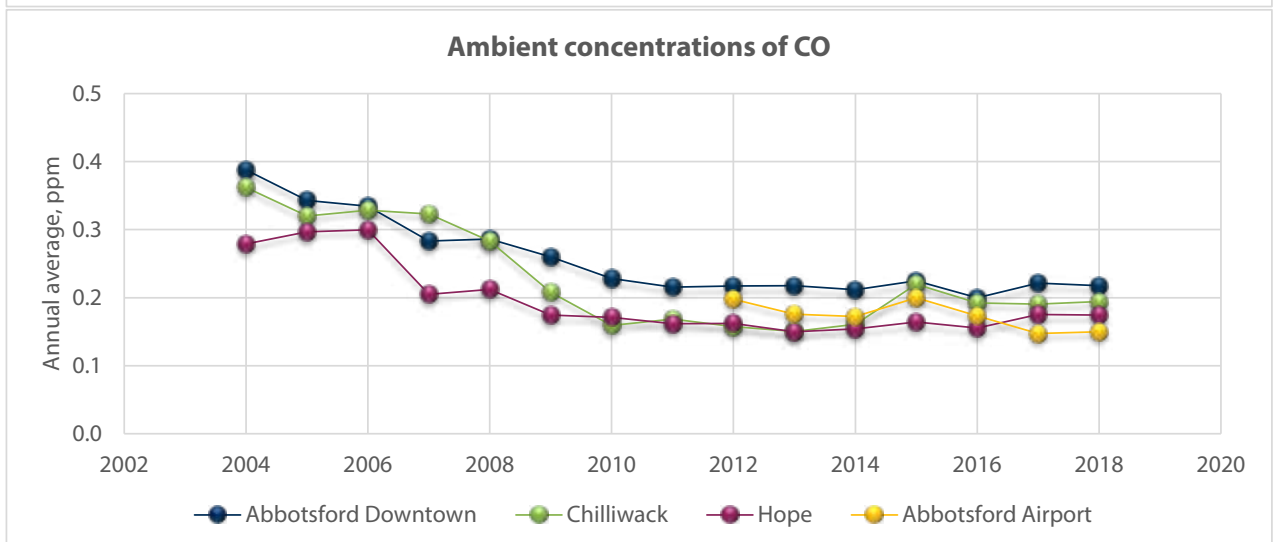
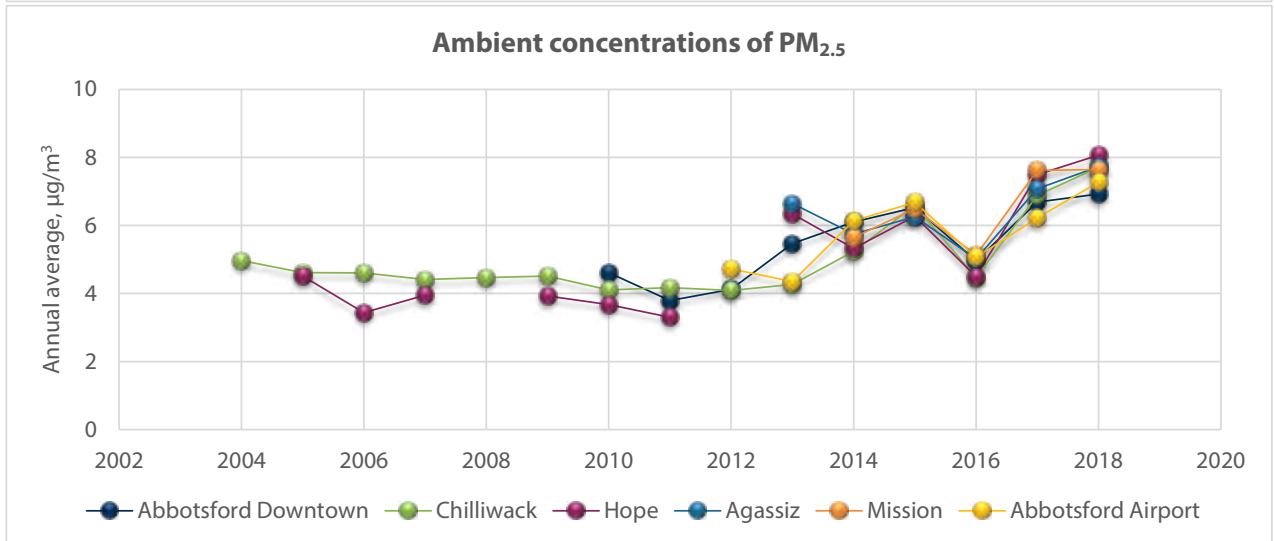
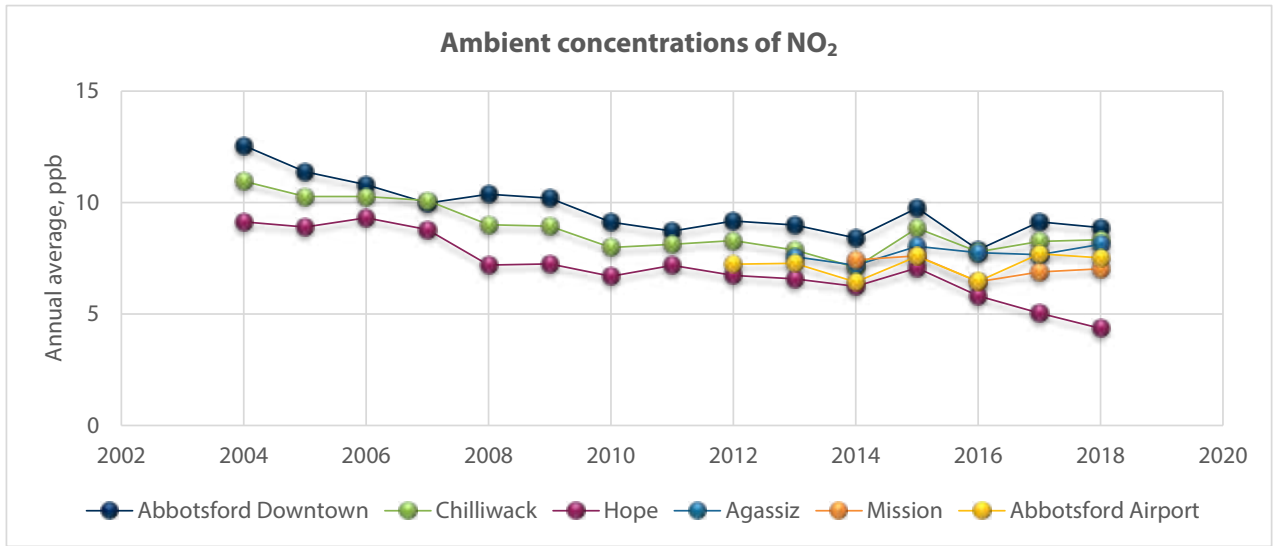
- » CO = Carbon Monoxide
- » NO_x = Nitrogen Oxides
- » SO_x = Sulfur Oxides
- » PM_{2.5} = Fine Particulate Matter
- » PM₁₀ = Inhalable Particulate Matter
- » VOCs = Volatile Organic Compounds
- » BVOC = Biogenic Volatile Organic Compounds
- » TAPs = Toxic Air Pollutants
- » GHGs = Greenhouse Gases
- » NH₃ = Ammonia

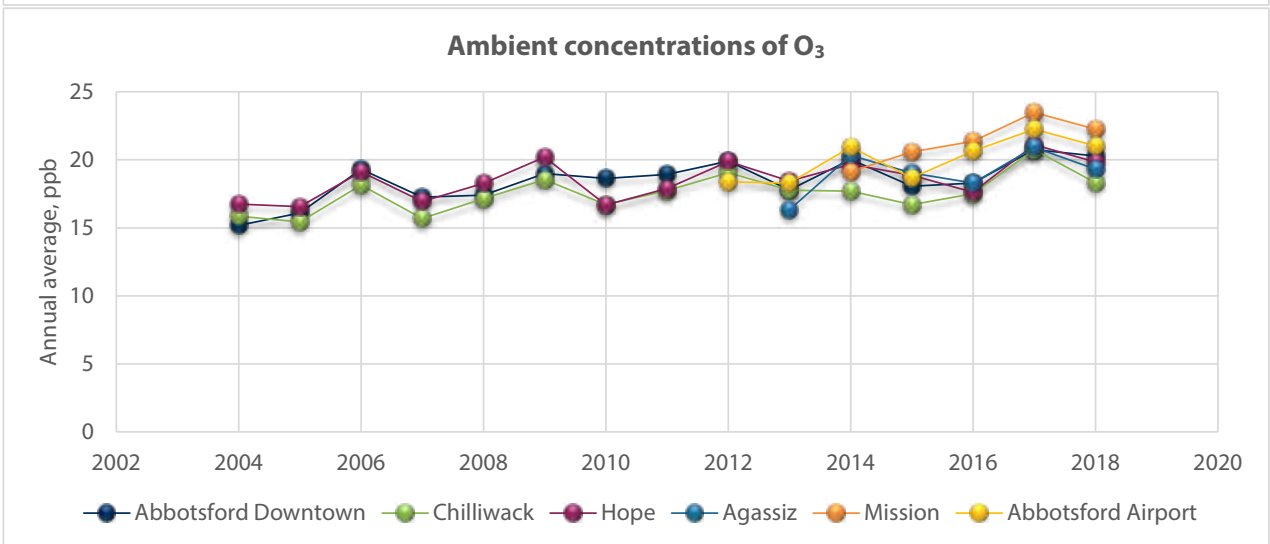
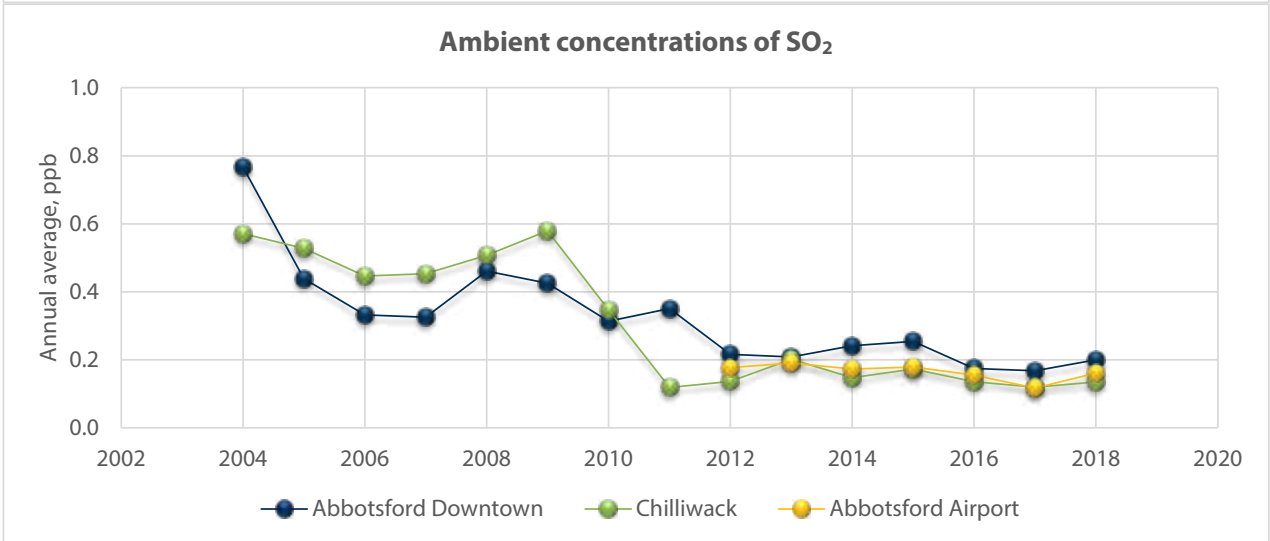
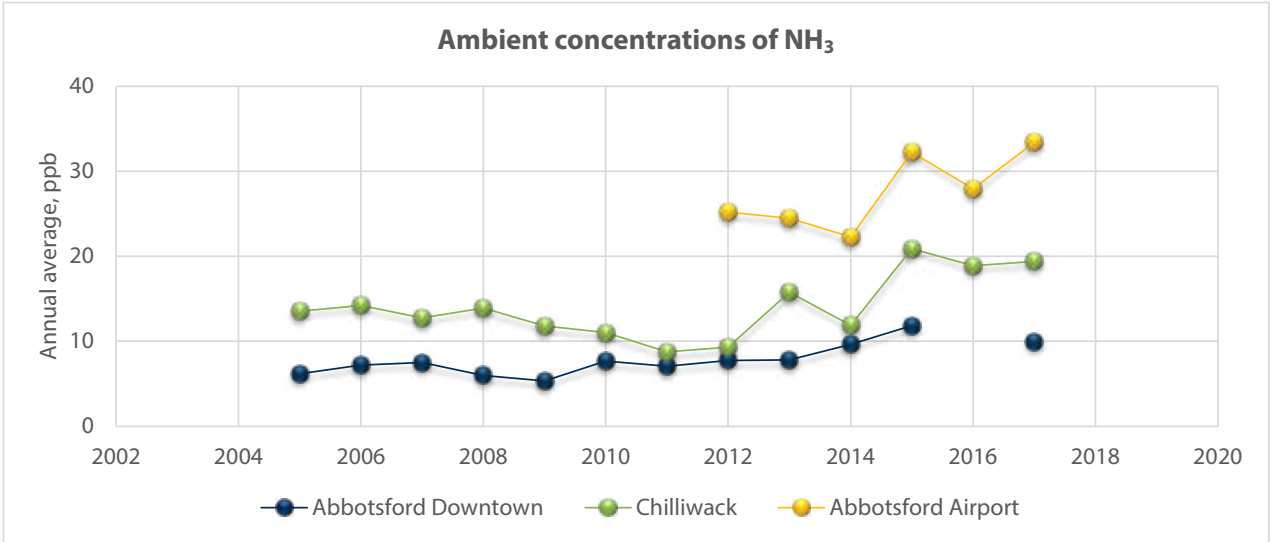
These categories of emission sources are used later in the report to present the various actions identified as part of the AQMP.



Ambient Concentrations of Air Contaminants in the FVRD (2004-2018)

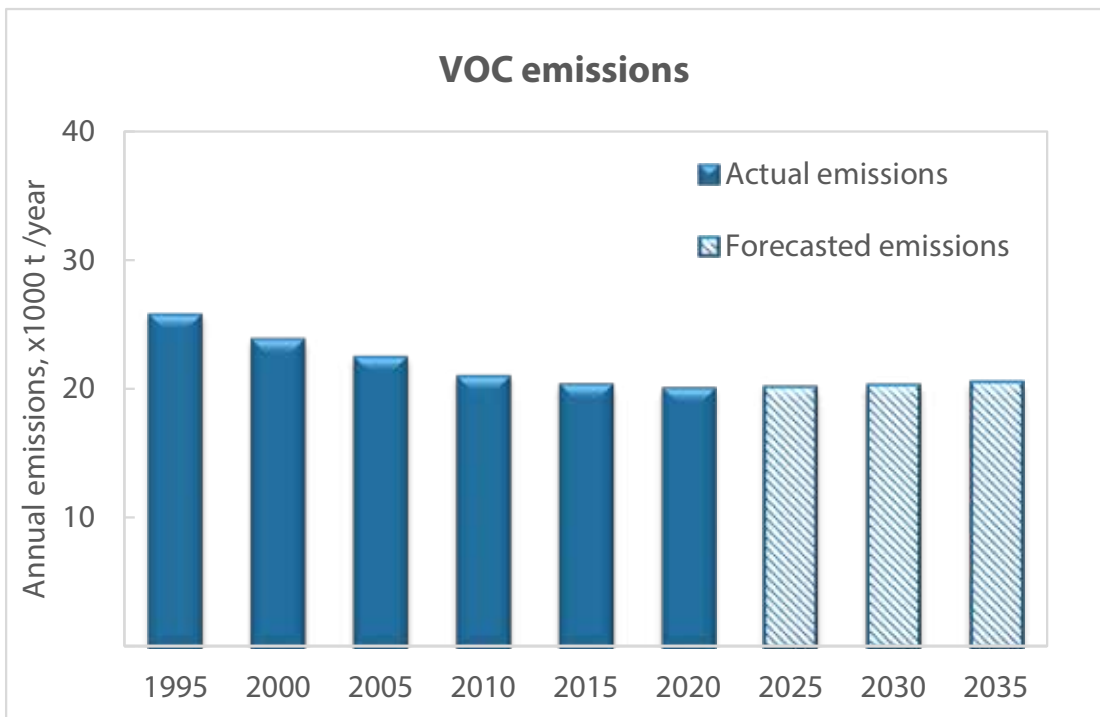
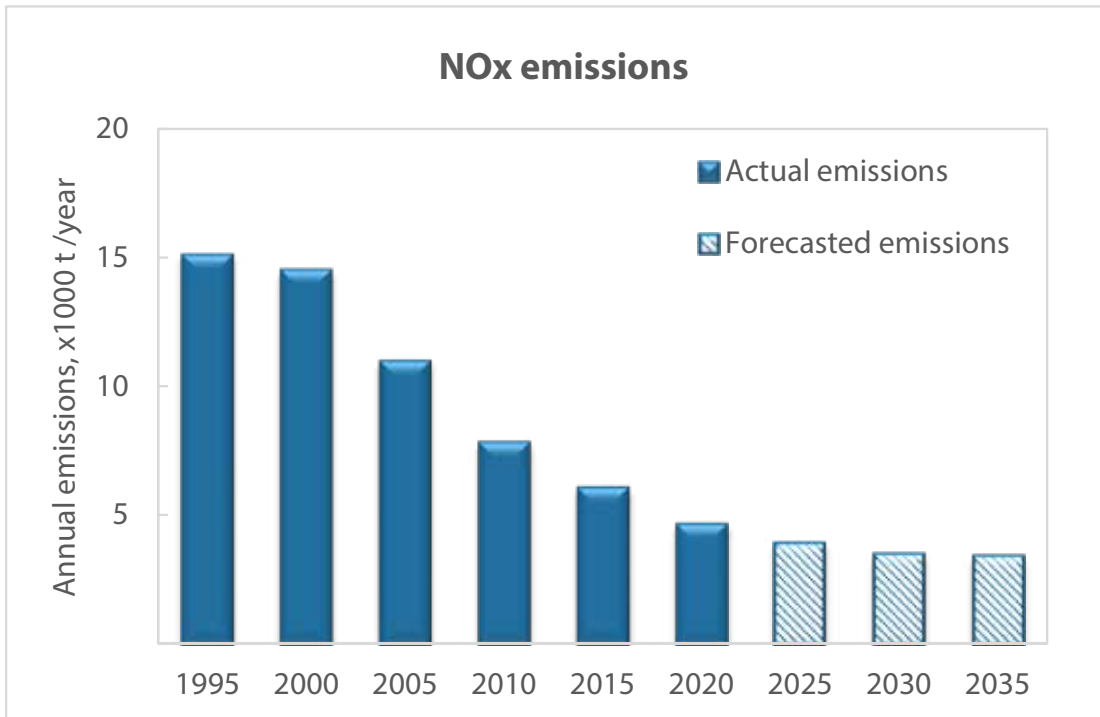
These graphs demonstrate annual average levels of air contaminants measured at FVRD air quality monitoring stations. Some compounds (CO, NO₂, SO₂) show downward trends, whereas others (O₃, PM_{2.5}, NH₃) have shown an increase.

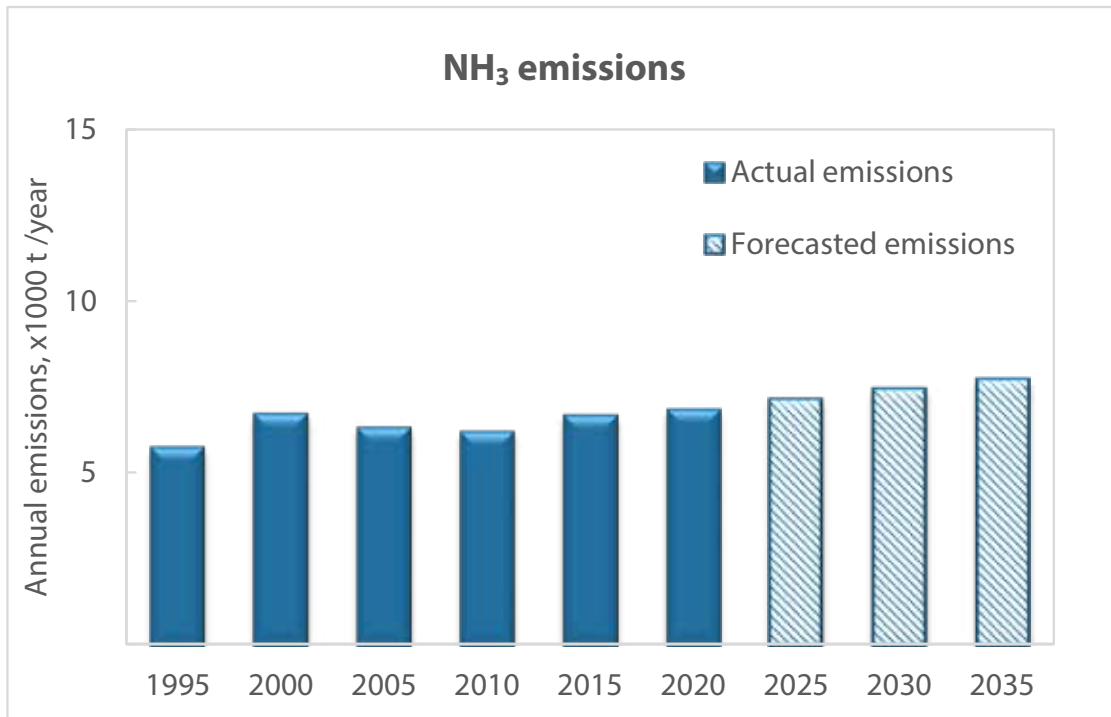
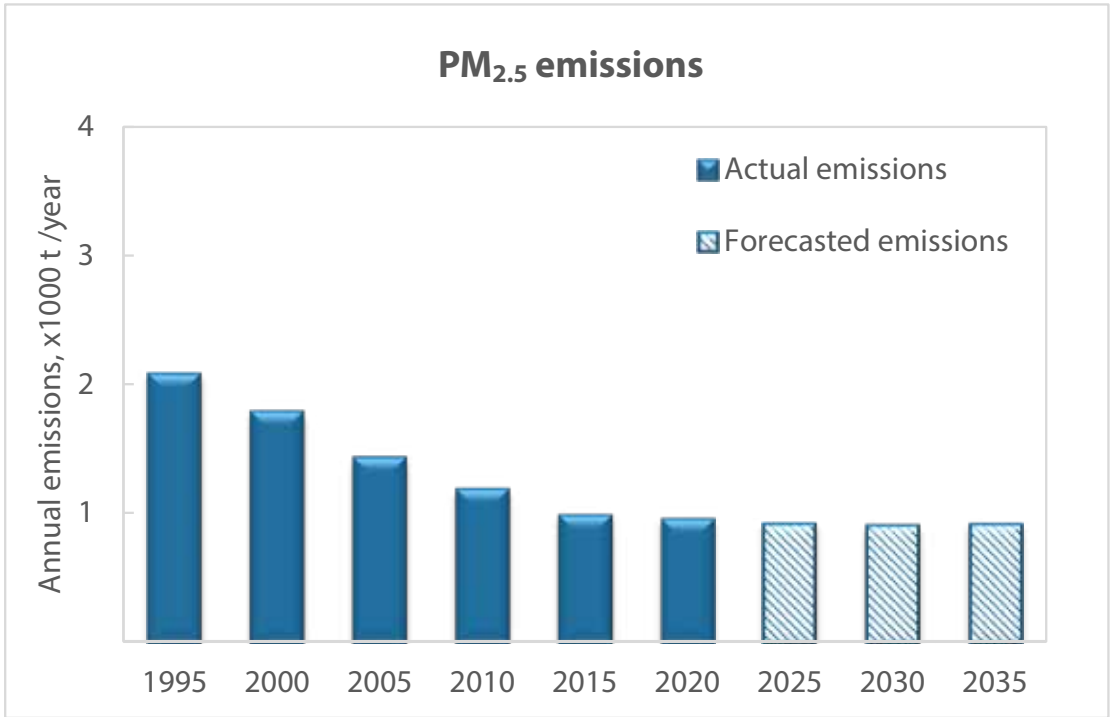




Air Contaminant Emission Trends and Forecasts in the FVRD (1995-2035)

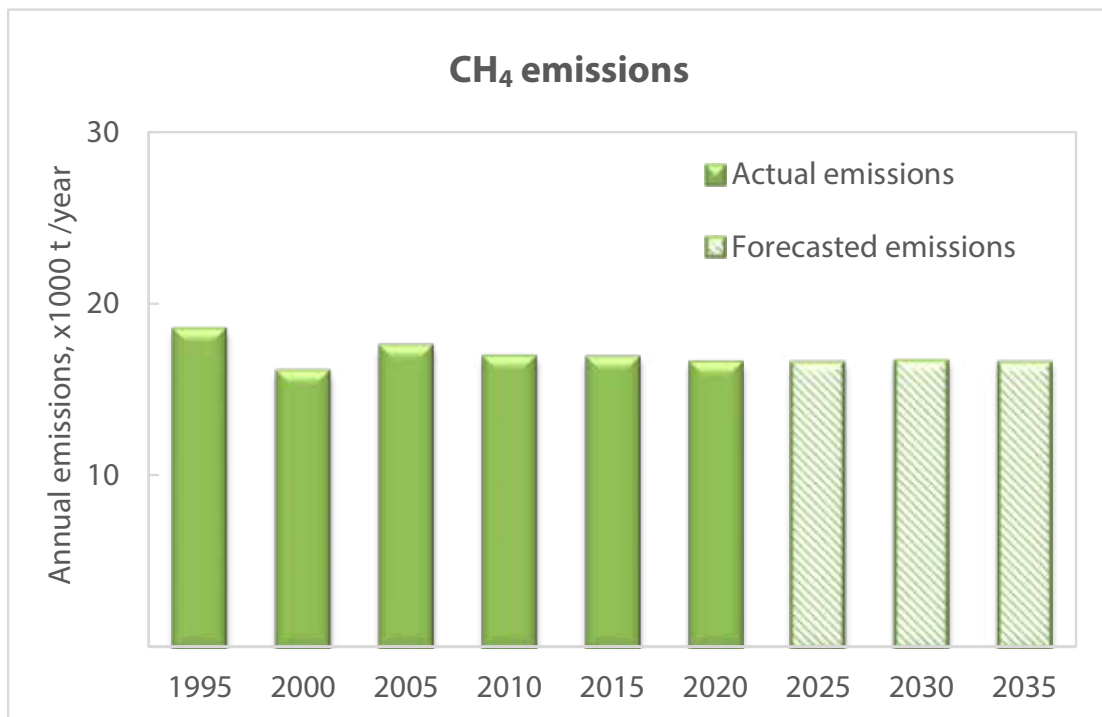
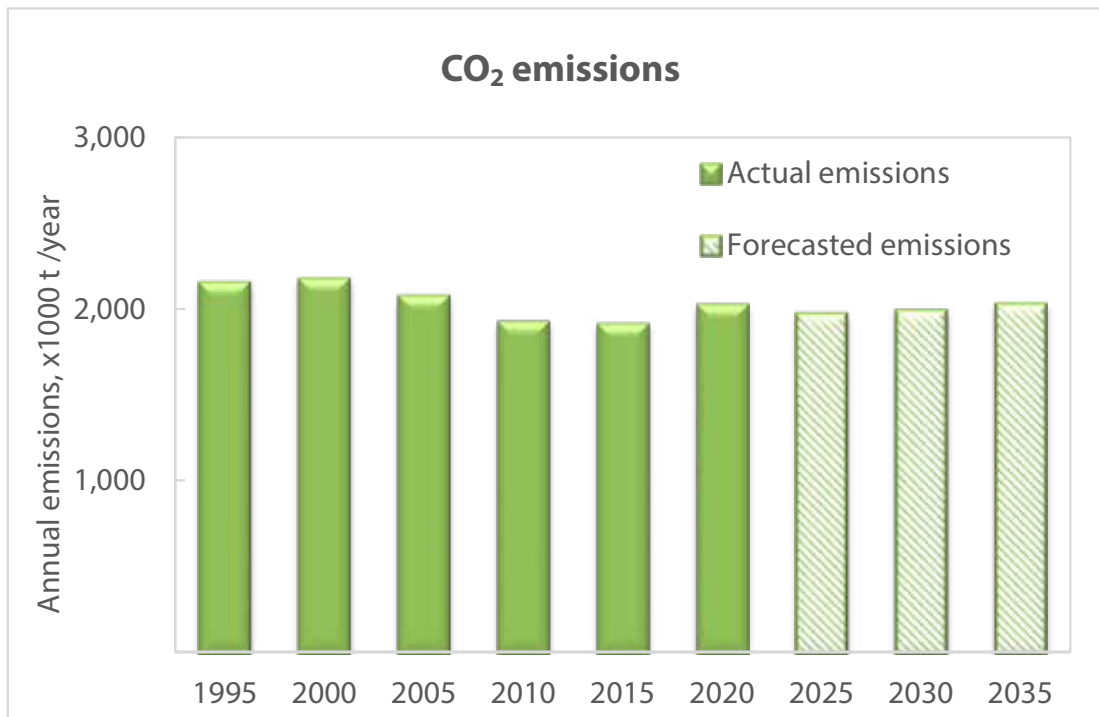
These graphs show emission trends and forecasts calculated for air contaminants of concern in the FVRD (also shown for the full range of compounds in Appendix B). Most emissions have been steadily decreasing, however the reductions are forecasted to level off or reverse after 2025. Ammonia (NH₃) emissions appear to be the exception, which have been on the rise since 1995.

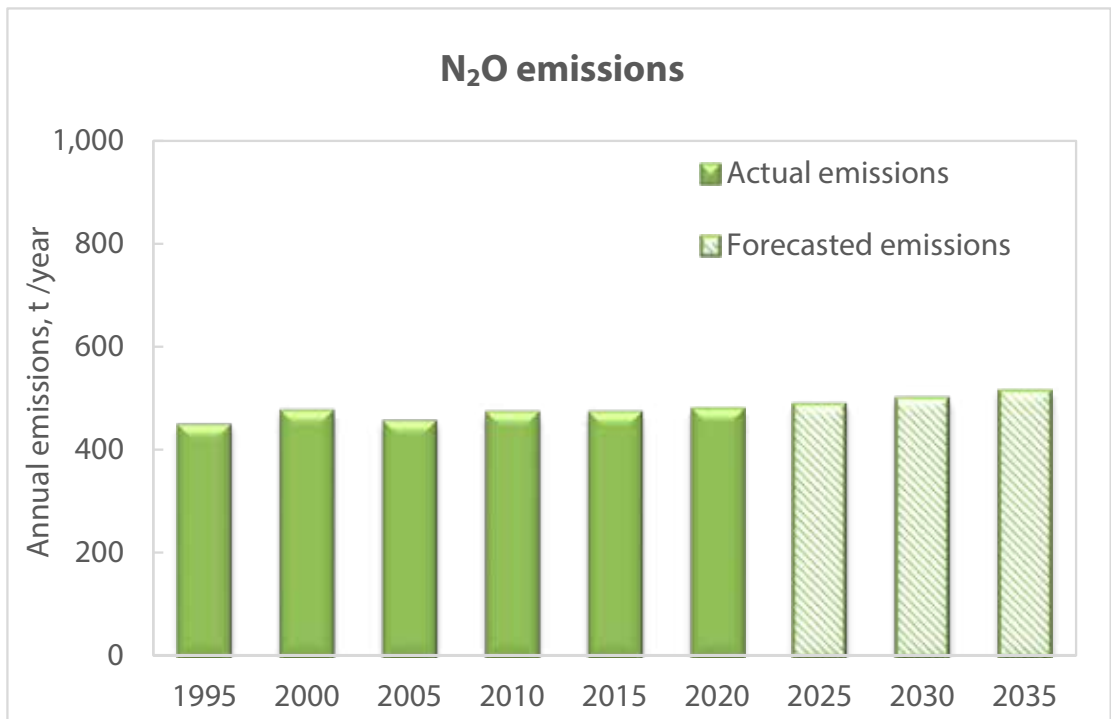




The GHG Emission Trends and Forecasts in the FVRD (1995-2035)

These graphs demonstrate emission trends and forecasts calculated for the major greenhouse gases in the FVRD. No substantial change has been observed since 1995 and the emissions are forecasted to increase slightly by 2035.





FACT SHEET

Smog



Fog & Smog Juan de Fuca Strait

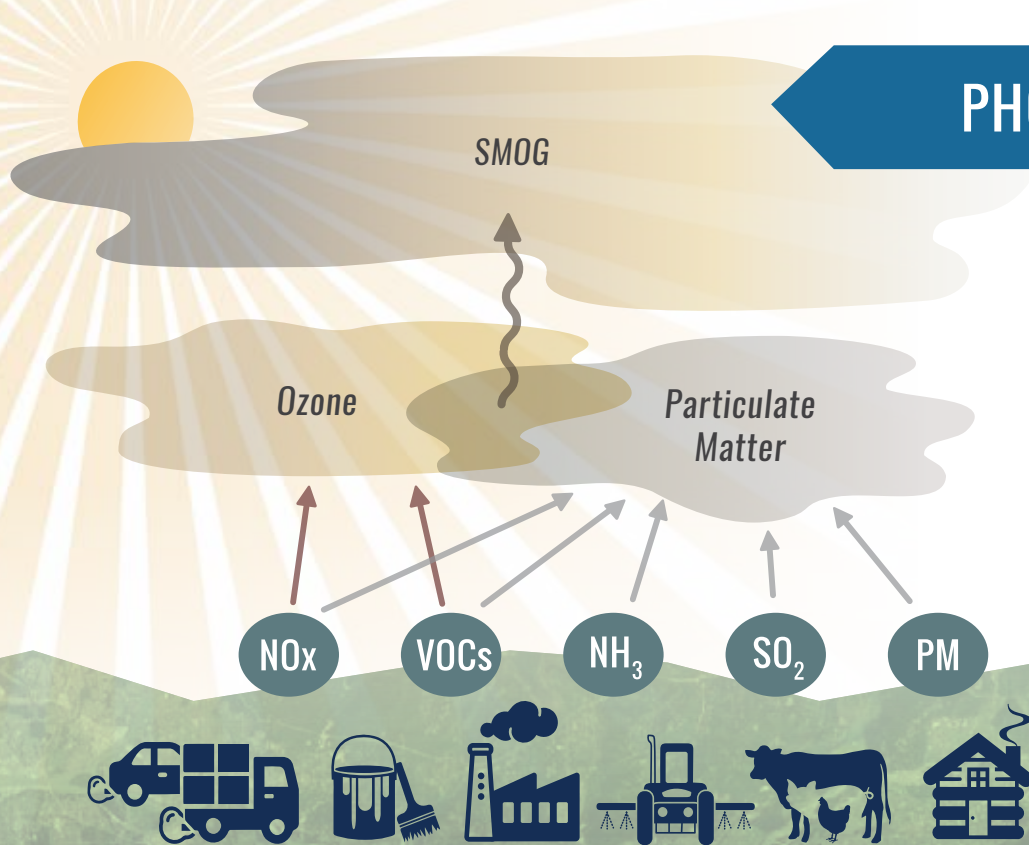
WHAT IS SMOG?

- » A historic name combined from the words “smoke” and “fog”
- » Visible air pollution composed of nitrogen oxides, sulfur oxides, ozone, and PM emissions
- » Derived from coal burning, vehicular exhaust, industry, fires, and atmospheric reactions between those emissions



- » Harmful to human health, especially for people with pre-existing lung and heart conditions, seniors, and young children
- » Increases the likelihood of premature death from a respiratory disease

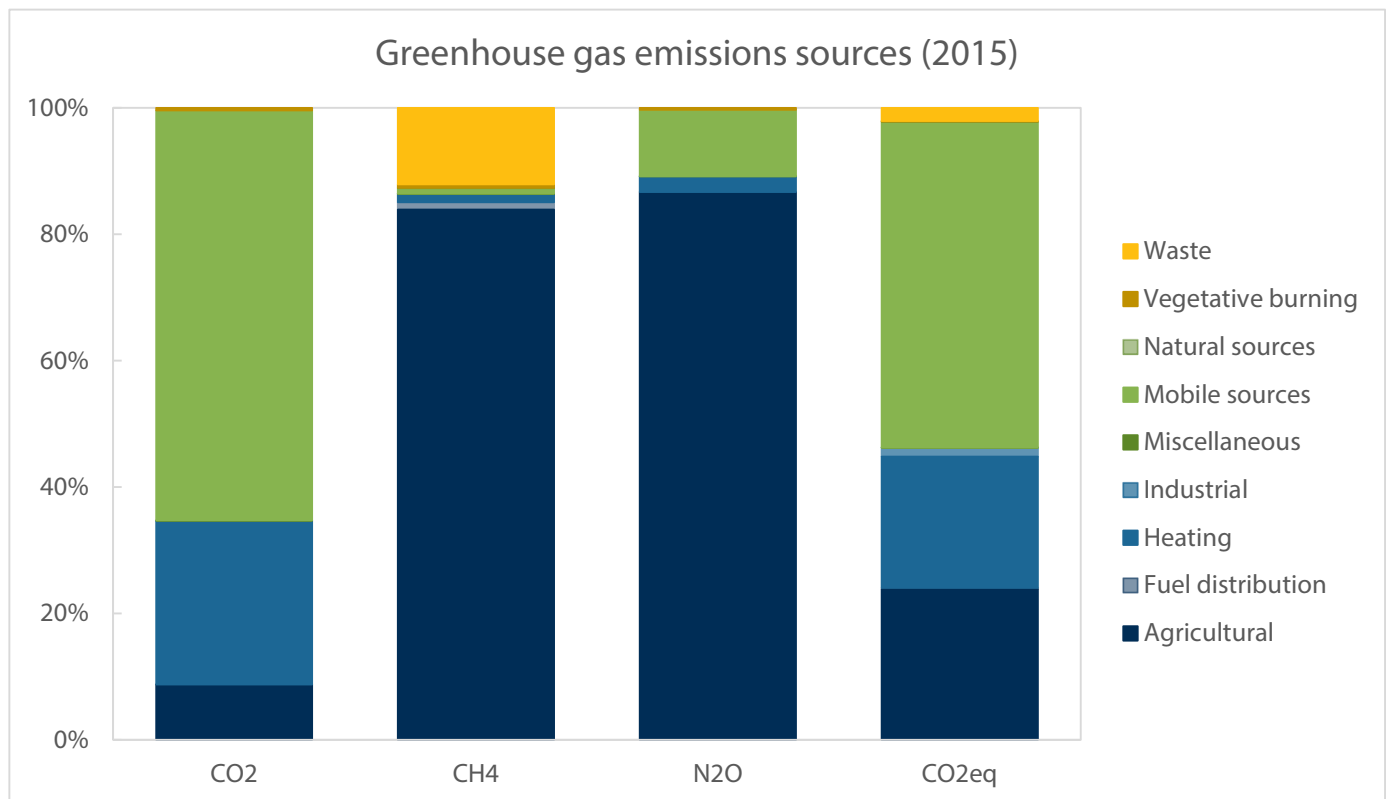
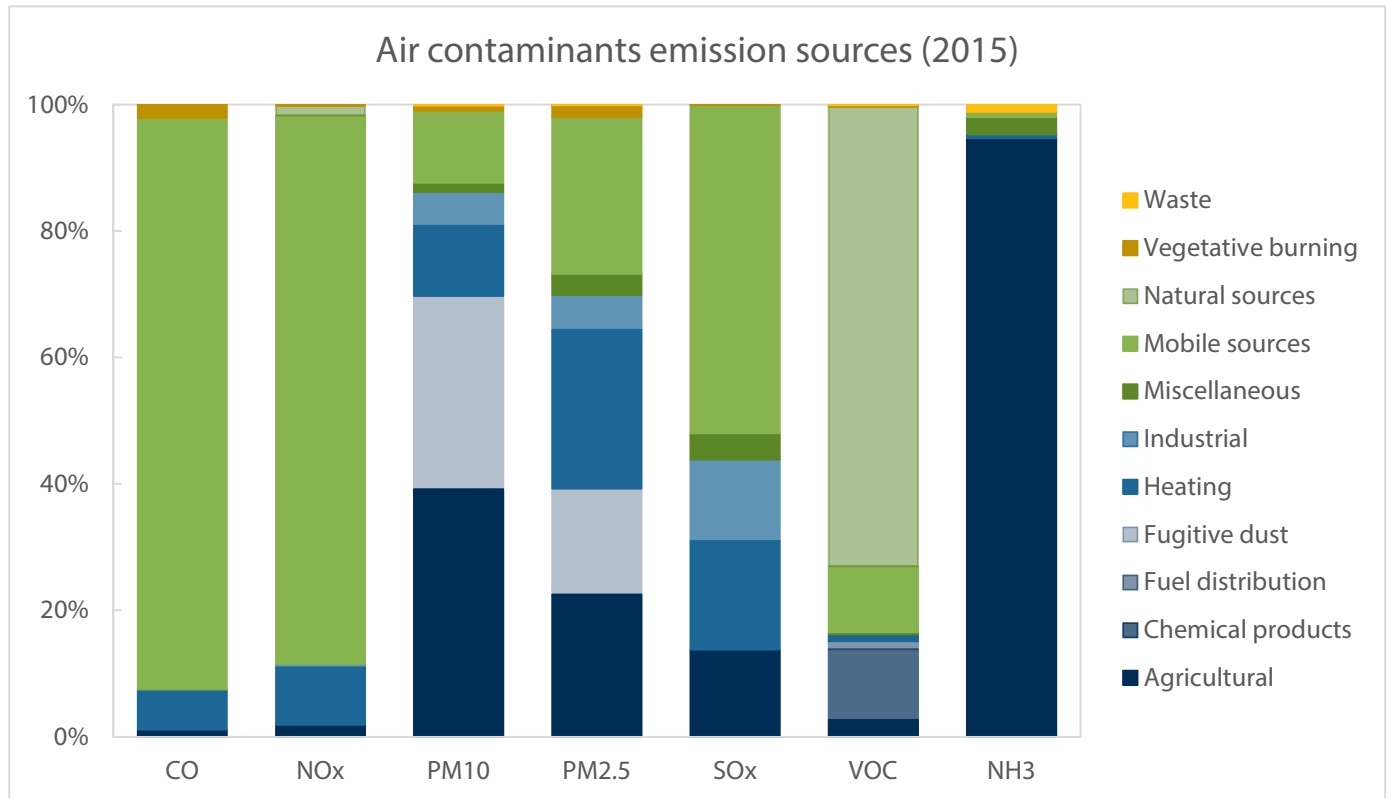
PHOTOCHEMICAL SMOG



- » Forms from ozone and PM2.5 in the presence of sunlight
- » More frequent in the summer and hot temperatures
- » Aggravated by temperature inversions which decrease air dispersion and lead to smog formation

Emission Sources of Air Contaminants and GHGs in the FVRD

The graphs show input of main sources into overall emissions of air contaminants and GHGs as percentage contribution for each individual compound. The numerical values (tonnes/year) are available in Appendix B.





AIR QUALITY PLANNING AND MANAGEMENT

“Air pollution does not recognize borders. Improving air quality demands sustained and coordinated government action at all levels.”

World Health Organization

Airshed Authority

The primary authority for air quality regulation in British Columbia outside of Metro Vancouver lies with the BC Ministry of the Environment and Climate Change Strategy under the Environmental Management Act. This legislation establishes air quality standards and guidelines for regulating point sources of emissions throughout BC. The provincial government builds its air quality policies and actions upon programs already in place at the national level. The federal government also plays a pivotal role in addressing air quality issues, and is involved in monitoring, providing public health information, and controlling emissions in many federally-regulated industries or sectors such as motor vehicles and fuels, railways, and marine vessels.

The FVRD received air quality planning authority by a Provincial Order in Council in 1992. Although air emissions regulatory authority remains with the Province, the FVRD has numerous ways to influence air quality in the region. These tools, which are described in more detail below, allow the FVRD to play an important role in reducing regional air pollution and its associated risks for public health.

Tools

In order to be effective and efficient, the FVRD uses numerous tools available within the air quality management toolbox. These tools include reliance on partnerships, air quality monitoring and comparing data with standards, supporting educational initiatives, conducting and assisting with scientific research, developing policies and programs, advocating to senior governments, leading by example, and pursuing co-benefits.

1. Partnerships and Collaboration

Air pollution cannot be stopped by geographic boundaries. It can travel long distances and affect large dispersed population groups. Management of airshed air quality is a complex, non-trivial undertaking that can only be successful with coordinated, long-term effort involving all levels of government, health authorities, science experts, and environmental advocates.

Many regional agencies and organizations share a common mission for continuous improvements in air quality in the LFV that can only be realized by working together. To coordinate that effort, air quality experts

and regulators from relevant agencies in the LFV (e.g., FVRD, BC Ministry of Environment and Climate Change Strategy, Environment and Climate Change Canada, Metro Vancouver, and others) work in cooperation on a network of regional committees and working groups (Appendix C). Such cooperation includes but is not limited to ambient air quality monitoring, compilation of periodic emission inventories, provision of air quality data to the public, initiatives and incentives on emission reduction, and public outreach and education. As an active member of the LFV air quality management network, the FVRD regularly contributes to continuous improvement of local air quality, both individually and in collaboration with airshed partners.

2. Measuring and Monitoring Air Quality

Information on ambient levels of air contaminants is gathered to assess health exposure, evaluate the performance of programs and actions aimed at reducing emissions, and provide support for the development of new initiatives. To obtain this information, the FVRD participates in ambient air quality monitoring activities and collaborates with Metro Vancouver on operation, maintenance, optimization, and expansion of the LFV Air Quality Monitoring Station Network.

3. Air Quality Standards and Objectives

Air quality standards and objectives are established by the regulatory authorities to help protect human health and the environment, assess current or historical air quality status, and guide decision-making for all levels of government. For many air pollutants, there are no “safe” levels and exposure can affect peoples’ health even at low concentrations. Air quality objectives should not be viewed as limits to “pollute up to” but as targets for guiding decision-making and policies.

CRITERIA AIR CONTAMINANTS (CACs)

CACs are the most common air pollutants for which standards and objectives are set to protect public health and to guide airshed planning activities. In Canada, they include fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and ground-level ozone (O₃).

Air quality standards and objectives for contaminant concentrations in ambient air have been established at the national, provincial, and regional levels (Appendix D).

The Canadian Ambient Air Quality Standards (CAAQS) have been developed as federal standards for certain Criteria Air Contaminants. CAAQS are an important part of the national Air Quality Management System (AQMS) in Canada. The purpose of the AQMS is to protect human health and the environment from detrimental effects of air pollution. It does so through maintaining the ambient air quality standards, such as CAAQS, limiting industrial and transportation emissions, supporting actions to improve air quality, and encouraging collaboration between jurisdictions on air quality initiatives. Appendix E provides a summary of key air contaminants, their sources, and their impact on human health and the environment.

LOVE OUR AIR

In 2017, the FVRD launched a well-received school program called “Love Our Air”. This program consists of custom workshops designed for Grades 5 and 10 classrooms. The teacher resource package focuses on development of students’ respect for the FVRD’s sensitive airshed and understanding how to reduce pollution through everyday actions.

4. Education and Awareness

Environmental education helps build an understanding of air quality and how to make informed and responsible decisions at both the individual and community level. Knowledge and awareness of air quality sources, of exposure risks, and of personal choices that can be taken are critical for ongoing air stewardship.

5. Research and Studies

Scientific knowledge is essential for creating guidance or policies on complicated environmental topics such as air quality and climate change. Effective dialogue between science and policy helps policymakers, industry, and the public to make decisions that protect our health, our ecosystems, and our air.

The FVRD engages in research to identify emerging air quality issues or trends and to better understand sources and impacts of air quality. Conducted either independently or in collaboration with other partners, these studies help to address the broad range of factors contributing to air quality. Examples of recent studies administered by the FVRD include reviews of air emissions from on-road and off-road engines, smoke from open burning, and emissions of ammonia. Those studies provided important insight and background information essential for decision making.

WOOD STOVE EXCHANGE PROGRAM

The Provincial Wood Stove Exchange Program changes out old, smoky wood stoves for cleaner heating options including heat pumps, gas or pellet stoves and cleaner-burning wood stoves. The FVRD has been administering the Program in the region since 2009.

6. Policies and Programs

Environmental policies and programs are practical measures for preventing or reducing the harmful effects of air pollution on environment and public health. These policies or programs can take many forms, including the provision of incentives, developing alternatives that are more sustainable, filling gaps in existing processes, or encouraging the use of regulatory measures, all of which have the desired affect of encouraging behavioural change that benefits the health of the airshed. Developed either on their own or with other governments, these policies or programs can be useful to facilitate positive relations with regional counterparts, stakeholders, businesses, and communities.

7. Advocating for the Region

Advocating to higher levels of government for addressing issues that are beyond the authority or capacity of local government is a valuable tool for protecting regional air quality. It can include raising concerns and awareness about current regulations, lobbying for legislation that is more robust, or supporting best industry standards.

8. Integration with Other Planning Processes

To be successful, air quality policies need to be fully integrated into the existing network of federal, provincial, regional, municipal and electoral area plans and strategies. An AQMP cannot be effective in isolation. Many local governments within the FVRD already have robust air quality policies within their Official Community Plans (Appendix F). Incorporating linkages between air quality actions and the current policy framework assists with implementation and helps to ensure success.

9. Leading by Example

The FVRD is committed to demonstrate and promote responsible behaviour aimed at reducing air emissions, using sustainable energy sources, and minimizing environmental footprints from day-to-day operations. By undertaking actions at their own corporate level, the FVRD and their member municipalities are proudly leading by example.

10. Pursuit of Co-Benefits

The focus of the FVRD's air quality management is on improving air quality, but helping to address sources of pollution can have multiple co-benefits beyond the health of the air. Reducing greenhouse gases emissions from fossil fuels and the accompanying climate impacts is the most obvious co-benefit. Other areas where positive impacts could be expected might include resource and energy efficiency, economic development, ecosystem sustainability, and biodiversity.

ZERO EMISSIONS

The FVRD has been actively promoting low or zero emission initiatives by adding several electric vehicles to its fleet, installing new chargers in the FVRD parking lots, organizing Bike-to-Work and Walk-to-Work campaigns, and reducing corporate energy consumption.



VISION AND GOALS

“People are at the centre of everything we do.”

Fraser Valley Regional District

“Healthy air and clear vistas that support a vibrant region”

Many plans use a simple linear framework where each goal is followed by a series of actions designed to help achieve that particular goal. Such a linear model does not fully reflect the dynamic complexity of air quality though, a cross-jurisdictional issue affected by diverse emission sources, convoluted pollutant behaviour, and intricate atmospheric chemistry.

Intrinsic in the complex and interactive nature of air quality and airshed management, the Actions identified within this AQMP may contribute to various Goals at the same time. It is not a simple 1:1 relationship. The strong focus is therefore on pursuit of co-benefits and alignment with collective airshed responsibility without duplication of efforts. Actions are categorized based on the primary emission source they target as

identified within the emission inventory data; however, since sources often overlap across categories, this categorization is flexible and unrestrictive. The conceptual diagram demonstrates the AQMP structure with Actions as the basis of the plan contributing to all four Goals, which support the overarching Vision for regional air quality.

The Vision is the AQMP’s overarching objective and long-term aspiration for the region with respect to air quality. To realize this Vision, four Goals have been identified. Goals are specific desired outcomes representing steps towards achievement of the Vision, continuously helping to test our abilities, skills, and perseverance in reaching it.

VISION



GOALS

The Goals of this AQMP address four primary concerns in the airshed related to air quality: health, visibility, odour, and climate change.

Goal 1: To improve community and ecosystem health impacted by exposure to air contaminants

This Goal will be reached through emission reductions of criteria and toxic air contaminants harmful for humans and the environment. The focus is on key sources of fine particulate matter (PM_{2.5}) and ground-level ozone and its precursors, such as nitrogen oxides (NOx), in the LFV.

Goal 2: To attain a consistently excellent visibility rating that allows visitors and residents to fully enjoy the region's scenic beauty

This Goal will be reached through emission reductions of air pollutants contributing to poor visual air quality (visibility), which has negative effects on various economic and cultural aspects and quality of life in the LFV.

Goal 3: To effectively prevent or mitigate nuisance odour conditions

This Goal will be reached through emission reductions of air pollutants contributing to noxious odours, which can have negative impacts on residents and visitors of the FVRD.

Goal 4: To achieve continual reductions in emissions which contribute to climate change

While climate change is not the focus of this AQMP, achievement of this goal is attainable by focussing on air quality actions that have this as a co-benefit (e.g., reduced fossil fuel use benefits both climate and air quality) and avoiding non-benefits (e.g., direct biomass burning reduces greenhouse gas emissions but increases air pollution).



ACTIONS

“Taking action to reduce air pollution will help improve human health, reach air quality targets, preserve the environment and enhance our economic advantage.”

BC Ministry of Environment and Climate Change Strategy

Actions outlined in the document are meant to serve as a roadmap only. Additional needs or opportunities will no doubt emerge over the course of implementing this AQMP, and this list is not intended to be exhaustive or to prevent moving forward with new actions that arise that remain consistent with the Vision and Goals of the AQMP. New initiatives will be brought forward to the FVRD Board for their consideration to determine if they align with the organization’s capacity and policy directions prior to commencement. The following actions should provide a foundation for the FVRD’s Air Quality Program to follow to continue addressing air quality matters within the LFV for the next decade.

Actions are categorized based on the main sources of emissions: on-road transportation; non-road equipment and engines; intentional indoor and outdoor wood burning; commercial, industrial, and agricultural operations; and natural sources.

On-Road Transportation

Light-duty automobile emissions

1. The FVRD will continue to improve public awareness and knowledge of zero-emission vehicles (ZEV) including plug-in hybrid, battery electric and hydrogen fuel cell vehicles by:

- a. Providing information and education materials on purchasing, driving, charging, and long-term benefits and cost savings of ZEVs to organizations, businesses, and residents;
- b. Collaborating with regional campaigns and organizers (e.g., Emotive BC), where feasible, to showcase and promote ZEVs at community events.
2. The FVRD will advocate for maintaining, expanding, and accelerating government programs and financial incentives for replacing old polluting vehicles with ZEVs.
3. The FVRD will support¹ or help develop public, residential, and commercial ZEV charging infrastructure by:
 - a. Maintaining existing and installing new public charging stations in the FVRD, using available grants and financial support;
 - b. Helping to evaluate need and identify locations for new public charging stations within the region for travelers (e.g., rest areas, campgrounds, tourist destinations), daily commuters (e.g., park-and-ride/carpool lots, transit hubs), and residents (e.g., schools, hospitals, parks);

¹ Throughout the AQMP, support might entail a broad range of activities depending on resources available, from written endorsements to financial investments.

- c. Supporting local municipalities, neighbouring jurisdictions, BC Hydro, and the Province in their efforts to build and operate new charging stations (e.g., providing host locations);
 - d. Supporting development of government guidelines and/or sample bylaws that would assist with the installation of ZEV charging infrastructure in new developments (multifamily, mixed use, employment center developments, and new homes) where appropriate and as permitted under the BC Building Code;
 - e. Assisting homeowners with identifying potential funding sources and incentives for home EV charger installation.
4. The FVRD will consider adopting a ZEV policy for the FVRD corporate fleet by:
 - a. Continuing to replace old corporate fleet vehicles with ZEVs, or cleaner alternatives with lower emission and carbon outputs;
 - b. Developing a corporate driving policy for FVRD staff prioritizing use of ZEVs, when appropriate;
 - c. Continuing to provide education for staff on the use of ZEVs and on fuel-efficient driving behaviours.
 5. The FVRD will promote optimizations of local fleets and improve driving behaviour by:
 - a. Supporting regional fleet management programs that reduce emissions from private and public vehicle fleets by maintaining appropriate fleet size and composition;
 - b. Promoting driver education programs that increase fuel efficiency and reduce emissions;
 - c. Supporting the installation of low-emission re-fueling infrastructure within the region;
 - d. Supporting efforts to reduce emissions associated with vehicle idling and non-exhaust vehicle emissions caused by brake and tire wear;
 - e. Advocating to the Province of BC to prevent tampering of emission control devices from vehicles, particularly when the tampering results in higher emissions of harmful diesel engine exhaust (e.g., "coal rolling").
 6. The FVRD will encourage transit ridership and cleaner transit vehicles within the region via improving and expanding transit service and through the use of promotion and marketing campaigns.
 7. The FVRD will consider the promotion of car-pooling and ride-sharing within the region by:
 - a. Supporting infrastructure upgrades and expansions for safe and affordable park-and-ride and park-and-carpool parking options;
 - b. Facilitating information exchange for drivers and riders to schedule rides and routes;
 - c. Promoting car-sharing co-ops to reduce residents' need for owning a car.
 8. The FVRD will promote active transportation, such as biking and walking by:
 - a. Actively participating in community events such as Bike to Work Week, Walk to Work Day, etc.;
 - b. Supporting the development of pedestrian-friendly and bike-friendly communities and infrastructure (sidewalks, crosswalks, overpasses, road signage, trails, bike route and trail maps, etc.).
 9. The FVRD will collaborate with the Provincial Government, municipalities, and health and transportation authorities to address air quality health concerns associated with siting residential developments near heavy traffic areas.

Heavy-duty On-road Transportation

10. The FVRD will encourage and support initiatives on developing electrification infrastructure for truck stops within the Fraser Valley to reduce idling of commercial trucks.
11. The FVRD will encourage and support the Province of BC and regional partners to develop a heavy-duty diesel vehicle retirement program that replaces or retrofits old polluting vehicles with cleaner models.
12. The FVRD will advocate for a new, thorough vehicle emission inspection program for heavy-duty vehicles.
13. The FVRD will promote and advocate for the use of cleaner alternative fuels (e.g., natural gas, propane, renewable fuels) for heavy-duty vehicles by:

- a. Providing in-kind assistance for municipal, public, and private fleet managers in their efforts to replace heavy-duty diesel vehicles with cleaner alternative fuel vehicles;
- b. Supporting the establishment of programs or infrastructure that increases the availability of increased access to sources of clean re-fueling technology or stations.

Non-Road Equipment and Engines

Non-road machinery

- 14. The FVRD will advocate to the Province to address spill-over emissions from old diesel engines being relocated to the Fraser Valley as a result of non-road diesel engine programs administered by other agencies (Metro Vancouver’s Non-Road Diesel Engine Emission Regulation, Vancouver Fraser Port Authority’s Non-Road Diesel Emissions program).
- 15. The FVRD will encourage and promote opportunities for residents and businesses to replace or retrofit older diesel and gasoline equipment with newer low-emission models by:
 - a. Investigating the feasibility of providing an incentive program to encourage residents to replace older lawn and garden equipment;
 - b. Advocating to the Province of BC and agricultural agencies to pilot a ‘SCRAP-IT’ type of financial incentive program for replacing old diesel and gasoline-fueled agricultural equipment.
- 16. The FVRD will support and promote the development and use of Best Management Practices (BMPs) for construction and agricultural non-road diesel and gasoline equipment that would reduce emissions of harmful emissions (e.g., avoiding unnecessary idling, preventative engine maintenance, prevention of fuel spills, using electric grid power when available, using alternative fuels where feasible, etc.).
- 17. The FVRD will recommend that adequate air quality provisions are considered in new industrial proposals associated with non-road equipment or engine use within the region and referred to the FVRD for input.



Rail, Airplanes, and Boat Emissions

- 18. The FVRD will advocate to Transport Canada and the Railway Association of Canada for emission monitoring and enforcement of new railway emission regulations to reduce emissions from diesel locomotives and railyard support machinery.
- 19. The FVRD will consider a study of river traffic (both industrial and pleasure craft) used on regional waterways to understand its impact on air quality and, if warranted, investigate potential options to reduce emissions or exposure of nearby users or residents to resulting emissions.
- 20. The FVRD will provide in-kind assistance, where feasible, to municipal and local airport staff to help in their efforts to reduce emissions associated with airport ground support machinery.



Intentional Indoor and Outdoor Wood Burning

Residential woodstoves and fireplaces

21. The FVRD will continue to administer and promote the BC Wood Stove Exchange Program that provides financial incentives to support the upgrade of older wood burning appliances with newer, emission-certified woodstoves or fireplaces.
22. The FVRD will continue to promote education and awareness for reducing emissions from the operation of residential wood burning appliances.
23. The FVRD will encourage and promote new energy-efficient residential developments that are less reliant on woodstoves for heating.

Commercial boilers and heaters

24. The FVRD will continue to advocate for more stringent emission standards for commercial boilers and heaters and for improved compliance with provincial and regional regulations and policies.
25. The FVRD will promote and encourage the use of cleaner or retrofitted greenhouse boilers that optimize efficiencies and reduce emissions.

Residential and agricultural debris burning

26. The FVRD will explore potential alternatives to residential and agricultural open burning that could be introduced on a voluntary basis.
27. The FVRD will work with municipalities and electoral areas to achieve regulatory consistency within the region for residential and agricultural debris burning.
28. The FVRD will provide education and awareness on BMPs for open burning.
29. The FVRD will investigate the potential effect of smoke from land clearing burning for development purposes on nearby communities through modeling and monitoring studies.
30. The FVRD will work with municipal and electoral area planning and firefighting staff on developing more effective and consistent use of “burning windows” across the region.
31. The FVRD will investigate the feasibility of prohibiting or discouraging land clearing burning for development purposes if warranted by research data and supported by member municipalities and electoral areas.

Commercial, Industrial, and Agricultural Emissions

Sources of dust and wind erosion of soils

32. The FVRD will support and advocate for the development and implementation of industry-specific soil stabilization and dust control BMPs, such as wind barriers, cover crops, reduced tillage, and sprinkler/irrigation systems.

33. The FVRD will support and advocate for the implementation of provincial, regional, and municipal regulations and other tools (e.g., Mines Permits by the BC Ministry of Energy and Mines) related to dust emissions or dust suppression requirements.

Sources of gaseous ammonia

34. The FVRD will promote applicable research and information exchange within regional air quality and agriculture networks, government agencies, and research institutions, in order to gain further knowledge of ammonia emissions.

35. The FVRD will optimize and advance the ambient ammonia monitoring network and air pollution data collection, through:

- a. Continuously expanding and improving the stationary ammonia monitoring network within the region in collaboration with Metro Vancouver, BC Ministry of Environment and Climate Change Strategy, and Environment and Climate Change Canada.
- b. Exploring short-term mobile air pollution monitoring of ambient ammonia for near-farm communities to better understand localized ammonia emissions and exposure risks.

36. The FVRD will encourage and promote the use of new technologies and practices that clean ammonia from ventilation air, such as gas-phase bio-filtration at livestock or poultry facilities.

Sources of greenhouse gases

37. The FVRD will support and encourage best agricultural practices to reduce GHG emissions from seasonal farm operations and manure management e.g. by advocating to improve funding for the Environmental Farm Plan Project or similar initiatives.

38. The FVRD will support and promote the use of anaerobic digesters in manure management where permitted to prevent emissions of methane (CH₄) to the atmosphere.

Municipal solid waste

39. The FVRD will continue to advocate against the incineration of municipal solid waste from within

the LFV airshed and for strong emission control requirements and transparency.

40. The FVRD will support reduction of air pollutants, odorous compounds and GHG emissions from landfills.

41. The FVRD will increase awareness and implementation of the FVRD's Source Separation Bylaw, which, through diversion of organic waste, will reduce methane emissions from regional landfills.

New industrial developments

42. The FVRD will work to protect the airshed from new industrial developments potentially contributing to air pollution by working with regulatory agencies (BC Ministry of Environment and Climate Change Strategy, USA Northwest Clean Air Agency, USA Puget Sound Clean Air Agency, Metro Vancouver, local municipalities) to collect information on air discharges, permits, modeling and monitoring data.

43. The FVRD will encourage and provide in-kind assistance for local businesses to develop, adopt, and implement pollution prevention plans to reduce air pollution from their operations.

Sources of odour emissions

44. The FVRD will encourage local businesses to increase the use of new technologies and employ BMPs to manage nuisance impacts of odour, such as bio-filtration systems, activated carbon systems, forced or fan-driven ventilation, sealed or covered storage of odorous materials, and maintaining good housekeeping and spill cleanup procedures.

45. The FVRD will support, when appropriate, the development of mutual understandings and communications between businesses and neighbouring residential communities to deal effectively with odour-related issues.

46. The FVRD will advocate to the Province of BC, the Government of Canada, and health authorities to develop a publicly-accessible system for receiving and responding to odour complaints, and establishing guidelines for odour impact assessment.

47. The FVRD will consider a study to better understand odour issues in the FVRD, including best practices available and the level of regulatory response needed to address those issues.

48. The FVRD will advocate for and participate in the development of a regional policy framework to address noxious odours from commercial cannabis growing.

General emissions

49. The FVRD will continue to explore ways to reduce commercial, industrial, and agricultural emissions through partnerships with the provincial government, industry, and academic institutions (e.g. UFV Agriculture Centre of Excellence).

50. The FVRD will support further studies of reduced air quality economic impact on commercial, industrial, and agricultural operations.

Natural Sources

Smoke from forest wildfires

51. The FVRD will continue to provide updated and timely air quality information when wildfire smoke air quality advisories are in effect for the region, including updates and associated messaging on the Air Quality Health Index (AQHI).

Radon Sources

52. The FVRD will promote residential indoor radon awareness, testing and mitigation, in collaboration with health authorities and regional partners.

Biogenic VOC Sources

53. The FVRD will coordinate with regional partners to develop an updated emission inventory of local biogenic sources of volatile organic compounds.

54. The FVRD will support and promote planting of low biogenic volatile organic compound (BVOC)-emitting tree species in the region that would include:

- a. Coordinating with the FVRD municipalities to develop and support a low-BVOC species guidance document in the municipal tree planting programs.
- b. Advocating to the Province of BC to include BVOC emission rates as a selection criterion in a Tree Species Selection Tool.

55. The FVRD will participate and contribute to regional studies of potential impacts of BVOC emissions from commercial cannabis cultivation and processing.

General/Other

All Sources

56. The FVRD will continue to study and monitor air quality throughout the region in collaboration with provincial and regional partners.

57. The FVRD will investigate the need for additional air quality monitoring within the region and expand the monitoring network as required, including short-time mobile monitoring campaigns, to obtain pollutant and source-specific information about air quality emissions of concern.

58. The FVRD will investigate and employ new evolving technologies for air quality testing, such as small and portable sensors, to amend and complement its existing air quality monitoring network.

59. The FVRD will continue working in partnership with other agencies and health authorities as part of an air quality advisory network that creates and delivers consistent and timely health messaging to the public about poor air quality conditions.

60. The FVRD will continue conducting emission assessments and forecast studies for all sources of emissions to enhance understanding of the impacts that local emission sources have on populated areas and of emission sources that might require further controls.

61. The FVRD will continue to support or deliver air quality education programs developed by the FVRD for schools in the Fraser Valley.

62. The FVRD will provide information and awareness to local communities about air quality issues at the individual or community level by utilizing multiple methods of communication (e.g., public forums, regional events, internet and mass media resources, education and extension centers, signage at parks and scenic viewpoints, etc.).

63. The FVRD will advocate for the Province to ensure that they are able to review and address all air emission complaints and compliance issues received in a timely manner.

64. The FVRD will continue to assist regional stakeholders with air quality knowledge and data upon request.
65. The FVRD will continue to participate in the BC Visibility Coordinating Committee (BCVCC) on managing visual air quality through activities such as:
 - a. Developing visual air quality goals, metrics, indices, and rating tools;
 - b. Helping to maintain a visual air quality monitoring network at the FVRD air quality monitoring stations to collect and analyze visibility data;
 - c. Raising public awareness of air quality impacts on visibility through communications, outreach, published materials, interpretive signage, and community workshops.
66. The FVRD will work with regional stakeholders directly affected by poor visual quality, such as health, tourism, and real estate sectors, to receive feedback, to better understand the regional impact of haze and poor visibility days, and form partnerships to collectively improve visual air quality.
67. The FVRD will identify further opportunities for information exchange and collaboration with local First Nation communities on air quality.
68. The FVRD will continue supporting stewardship group such as the Fraser Valley Watersheds Coalition to replant degraded habitat sites with native trees and shrubs and restoring healthy ecosystems that help mitigate the impacts of climate change.

It is anticipated this list of actions will expand as new regulations or technology emerges and as we continue to discuss projects and ideas with airshed stakeholders. Our hope is that through the implementation of this AQMP, we will be able to discover initiatives proposed or being undertaken by others that also align with the vision and goals of this plan. Supporting those projects and helping to coordinate and develop synergies between actions underway within the airshed will allow the greatest chance for success in collective stewardship of our shared airshed.





PLAN IMPLEMENTATION

“Canadians can take action in their everyday lives to improve air quality. These actions can range from selecting your means of transportation; to actions at home or at the office; to modifying your purchasing habits.”

Canadian Council of Ministers of the Environment

The actions previously described outline a collective, long-term response to achieve the goals and vision outlined in this Air Quality Management Plan. Whereas the Plan’s overarching strategy focuses on a clear target of lowering emissions at the source or reducing exposure to air pollution, there are a multitude of ways for how to get there. Addressing a significant, large scale issue as complex as air quality is best tackled by using various approaches, which is why the actions described encompass the full range of tools available.

Actions are prioritized based on several criteria, including its ability to achieve more than one goal, the level of effort or investment required, and the anticipated air quality benefit that it could result in. These prioritization categories are described more fully below. This prioritization is not intended to be rigid or restraining and does not imply that some of the actions are not worth undertaking. Instead, it aims at finding the most effective and efficient way for the FVRD to implement this AQMP.

Prioritizing Actions

Three criteria were selected for evaluation of Action Priority: Versatility, Effort, and Return.

1. Versatility (max score 4)

Individual Actions can contribute to multiple Goals. Versatility is estimated as a total number of AQMP Goals each Action would help achieve. Actions contributing to multiple Goals were given higher scores.

2. Effort (max score 3)

The level of effort required to implement the Actions might include cost, labour, equipment inventory, or other assets. While this is an estimation only, it is intended as a measure of investment needed to fulfil the individual action. Actions associated with lower investment requirements were given a higher score.

3. Return (max score 3)

The cross-jurisdictional nature of air quality management and uncertain cause-effect relationships makes quantification of practical returns from individual Actions challenging. Rather than attempt to quantify the specific impacts any particular action has on emissions, this category attempts to rate how the intended outcome of the action potentially relates to

the ability to achieve at least one of the Goals of the AQMP. While an Action that directly reduces emissions or exposure levels would certainly score highly, those Actions that have indirect air quality benefits can score high as well. For example, providing education about the airshed or collecting and analyzing air quality data may not directly reduce emissions or exposure, but they do offer a critical function needed in being able to influence personal behaviours and to make informed decision that can help reduce emissions or exposures. Consequently, these actions can also receive higher scores for this criteria.

Total Score (max score 10) = Versatility + Effort + Return

Each individual Action under the AQMP has been evaluated on the three criteria above. Based on the total score, each Action was assigned a Priority score as either Low, Medium, or High.

Total Score	Priority
3-6	Low
7-8	Medium
9-10	High

The example below demonstrates how the Priority score has been evaluated for individual Actions. This Action was evaluated on each of three criteria and its cumulative Total Score was calculated as a sum of all three scores:

Example of Action Priority Score Calculation

“Action 11. The FVRD will encourage and support the Province of BC and regional Partners to develop a heavy-duty diesel vehicle retirement program that replaces or retrofits old polluting vehicles with cleaner models.”

Action Score	Priority Criteria			
	Versatility (1-4)	Effort (1-3)	Return (1-3)	Total (max 10)
4		2	3	9
What does it mean?	Action 11 contributes to 4 out of 4 goals	Action 11 requires a moderate level of effort or cost to the FVRD	Action 11 will have high benefits if implemented	Impact level for Action 11 is high

The total Priority scores calculations for each Action are provided in Appendix G.

Timeframe

This AQMP is designed to provide guidance and a framework to help manage air quality in the LFV region for the next 10 years. Some Actions under the AQMP will be transformed into concrete tasks and activities within shorter periods of time, whereas others, equally important but more high-level or exploratory, might take longer to implement. Certain Actions may also require multiple tasks, initiatives or projects and will need to be implemented in phases. Actions that are either Ongoing or have been rated as High Priority will be initiated first.

Actions were assigned one of the following timeframe measures:

- » Short-term: action will be implemented within 1-3 years.
- » Medium-term: action will be implemented within 4-6 years.
- » Long-term: while some exploratory or feasibility measures may be undertaken sooner, long-term actions are expected to begin in the second half of the AQMP's timeframe.
- » Ongoing: actions are ongoing and anticipated to continue.

Timeframes associated with each Action are provided in Appendix G. A summary table of Action Priorities and Timeframes is shown on pp. 54-55.



Actions Priority Evaluation and Timeframes

##	Actions (short description) ¹	Goal				Priority (H/M/L)	Timeframe
		1: Health	2: Visibility	3: Odour	4: Climate		
1	Increase EV awareness	✓	✓		✓	H	Ongoing
2	Advocate for EV incentives	✓	✓		✓	H	Short
3	Support expansion of EV infrastructure	✓	✓		✓	H	Ongoing
4	Implement EV upgrades for the FVRD fleet	✓	✓		✓	L	Ongoing
5	Promote improved driving behavior	✓	✓		✓	M	Short-Medium
6	Increase transit ridership	✓	✓		✓	M	Ongoing
7	Promote carpooling and ridesharing	✓	✓		✓	L	Medium-Long
8	Promote active transportation	✓	✓		✓	M	Ongoing
9	Support studying AQ exposure in high traffic zones	✓	✓		✓	M	Medium-Long
10	Support truck stop electrification	✓	✓	✓	✓	M	Long
11	Support incentives to replace old diesel vehicles	✓	✓	✓	✓	H	Short-Medium
12	Advocate for inspections for heavy-duty vehicles	✓	✓	✓	✓	H	Short-Medium
13	Promote use of cleaner alternative fuels	✓	✓		✓	M	Long
14	Advocate to address influx of old non-road engines	✓	✓	✓	✓	H	Short
15	Support incentives to replace old non-road engines	✓	✓	✓	✓	H	Short-Medium
16	Support emissions BMPs for non-road equipment	✓	✓	✓	✓	H	Short-Medium
17	Assist in AQ provisions in new industrial proposals	✓	✓	✓	✓	M	Ongoing
18	Advocate for railway emission regulations	✓	✓		✓	L	Long
19	Study emissions from river traffic	✓	✓		✓	L	Long
20	Help lower emissions from airport ground support	✓	✓		✓	L	Long
21	Administer the BC Wood Stove Exchange program	✓	✓	✓	✓	M	Ongoing
22	Promote education for improved wood burning	✓	✓	✓	✓	M	Ongoing
23	Promote alternatives to woodstoves for new developments	✓	✓	✓		L	Medium-Long
24	Support tougher standards for commercial boilers	✓	✓		✓	M	Long
25	Promote use of cleaner greenhouse boilers	✓	✓		✓	M	Long
26	Explore alternatives to open burning	✓	✓	✓		M	Short-Medium
27	Support consistency for debris burning	✓	✓	✓		L	Short-Medium
28	Provide education on open burning BMPs	✓	✓	✓		M	Short-term
29	Study effect of smoke from land clearing burning	✓	✓	✓		M	Short
30	Work towards consistent “burning windows”	✓	✓	✓		M	Short-Medium
31	Investigate options to prevent land clearing burning for development purposes	✓	✓	✓		M	Medium
32	Support development of dust control BMPs	✓	✓			L	Medium-Long
33	Support regulatory tools for dust suppression	✓	✓			L	Long
34	Promote information exchange on NH3 emissions	✓	✓	✓		M	Ongoing
35	Optimize the ambient NH3 monitoring network	✓	✓	✓		M	Medium

¹ Calculations for Actions priority evaluation and timeframes table are available in Appendix G

##	Actions (short description) ¹	Goal				Priority (H/M/L)	Timeframe
		1: Health	2: Visibility	3: Odour	4: Climate		
36	Promote new technologies for cleaning NH ₃	✓	✓	✓		M	Medium-Long
37	Support BMPs to reduce GHGs from farm facilities	✓		✓	✓	M	Medium-Long
38	Support use of anaerobic digesters	✓		✓	✓	M	Short-Medium
39	Continue to advocate against waste incinerators	✓	✓	✓	✓	H	Ongoing
40	Support reduction of all emissions from landfills	✓		✓	✓	H	Ongoing
41	Prevent organics solid waste from landfills	✓		✓	✓	M	Ongoing
42	Review impacts of industrial developments on AQ	✓	✓	✓	✓	H	Ongoing
43	Assist businesses in emissions reduction efforts	✓	✓	✓	✓	M	Ongoing
44	Encourage use of new technologies to reduce odours	✓		✓		M	Medium-Long
45	Support cooperation of producers and residents	✓		✓		L	Long
46	Advocate for provincial odour complaint guidelines	✓		✓		L	Medium-Long
47	Study to better understand odours in the region	✓		✓		L	Medium
48	Advocate for monitoring odours from cannabis	✓	✓	✓	✓	M	Medium
49	Explore further reductions of agricultural and industrial emissions	✓	✓	✓	✓	H	Short-Medium
50	Monitor economic impact of reduced air quality	✓	✓	✓	✓	H	Short-Medium
51	Provide AQ updates during smoke advisories	✓	✓	✓	✓	H	Ongoing
52	Promote radon awareness	✓				L	Ongoing
53	Update BVOC emissions inventory	✓	✓			L	Long
54	Support low BVOC tree planting	✓	✓			L	Long
55	Study cannabis BVOC emissions	✓	✓	✓	✓	M	Long
56	Continue AQ monitoring	✓	✓	✓	✓	M	Ongoing
57	Explore need for additional AQ monitoring	✓	✓	✓	✓	H	Short
58	Explore use of small and portable AQ sensors	✓	✓	✓		H	Short
59	Collaborate to deliver consistent health messages	✓	✓	✓		H	Ongoing
60	Continue emission assessments and forecast studies	✓	✓		✓	M	Ongoing
61	Support or deliver AQ school education programs	✓	✓		✓	H	Ongoing
62	Communicate information on AQ issues	✓	✓		✓	M	Ongoing
63	Advocate for better addressing AQ complaints	✓	✓	✓		M	Medium-Long
64	Provide AQ expertise and data to stakeholders	✓	✓		✓	M	Ongoing
65	Collaborate on management of visual AQ	✓	✓			M	Ongoing
66	Work with stakeholders on visual AQ impacts	✓	✓			L	Medium-Long
67	Collaborate with First Nations on AQ issues	✓	✓		✓	M	Ongoing
68	Support replanting degraded habitat	✓	✓		✓	L	Ongoing

Monitoring Progress

To evaluate the effectiveness of the AQMP in making progress towards the Plan’s goals, a number of Performance Indicators have been selected. Emission data will continue to be collected and analysed which provides a tangible measure of progress, but it can often take years before trends in air quality to be detected. Other measures, which may be more indirect but are also valuable, will also be used to demonstrate the implementation success of this Plan. Performance Indicators for this AQMP and their targets for are shown in the table below.

Table 1. Performance Indicators and Targets

##	Performance Indicator	Desired outcomes	Target
1	Number of hospital visits related to asthma, lung disease, and COPD	Reduction in health exposure to poor AQ in the FVRD	Continuous improvement
2	Mortality due to poor AQ		Continuous improvement
3	Morbidity due to poor AQ		Continuous improvement
4	Number of days under AQ Advisories		0 days/year under AQ Advisories
5	Number of days with 8-hr O ₃ objective exceedances	Reductions in critical air contaminants	0 days/year with 8-hr O ₃ exceedances
6	Number of days with 24-hr PM _{2.5} objective exceedances		0 days/year with 24-hr PM _{2.5} exceedances
7	Annual NH ₃ emissions		Continuous improvement
8	Number of days with VAQR ¹ = Excellent	Improved visual air quality	Increase in days/year with VAQR=Excellent ²
9	Number of days with VAQR = Poor		0 days/year with VAQR=Poor
10	GHG emissions	Reduction in GHG emissions	50% by 2050, relative to 2007 levels ³

These statistics, many of which are provided by health authorities and airshed partners, will be used by FVRD staff for the purposes of measuring progress of the AQMP in periodic reporting and updates and for identifying where further actions or efforts may be needed.

1 Visual Air Quality Rating

2 Consistent with BCVCC “Goals and Metrics Strategy”

3 Consistent with the FVRD Regional Growth Strategy “Fraser Valley Future 2051”, November 2020 (draft). GHG targets will be amended to align with the BC levels in the final FVRD Regional Growth Strategy document.

Performance Indicators are intended to reflect general improvements in air quality, which might take years to achieve. It is important however to also monitor shorter-term progress of the AQMP in order to make adjustments to the plan if necessary. Interim benchmarks represent direct and quantifiable results of Actions under the AQMP which are expected to lead to eventual benefits in air quality conditions. A number of initial interim benchmarks have been proposed to facilitate such monitoring, including the following:

- » Number of public outreach activities offered related to air quality awareness (e.g., school workshops, public forums or presentations, etc.)
- » Usage of EVs within the region
- » Number of public EV charging stations available
- » Number of private EV charging stations available
- » Woodstove exchange applications processed
- » Ridership on public transit
- » Active transportation infrastructure provided
- » Expansion of the AQ monitoring network.

Additional interim benchmark measures will likely emerge as the Plan implementation proceeds.

Progress Reporting and Updates

Actions and Priorities are not static and are expected to evolve over time as new information, new technology, new partnerships, new priorities, and new ideas, policies, or new concerns emerge. For this reason, the Plan is considered as a living document, receiving regular updates, with the input of stakeholders, in order to be flexible enough to accommodate potential changes or opportunities in a timely and effective manner. In addition, financial priorities of the FVRD and its member municipalities will be taken into account prior to undertaking new actions, and direction from the Board will be pursued prior to investing in new air quality actions to ensure alignment with current policy directions and available resources.

Using the Performance Indicators or benchmarks previously identified, AQMP implementation will be tracked for the duration of the Plan. A mid-term (5 yr.) review will determine whether or not any changes or corrections are necessary for successful plan implementation during the remaining time. Final reporting at the end of the full term (10 yr.) will analyze the plan's success in achieving the Goals and will provide recommendations, based on the newest data made available, for further actions or areas of focus to be considered.



Regional Transit

9202

12 COMMUTER

Bay St

CONCLUSION

“Everything that we do, our health, our identity and our survival depends on the long-term health of the environment - all of which are vulnerable to the effects of air pollution.”

Environment and Climate Change Canada

Air quality remains of foundational importance within the Lower Fraser Valley to the Fraser Valley Regional District and to many of the residents within the region. The Lower Fraser Valley Airshed is considered to be sensitive to air pollution because it has the tendency to trap and concentrate pollutants in the eastern portion of the airshed where the FVRD is located, causing health concerns, smog and reduced visibility, and economic and ecological impacts. Key parameters of concern include particulate matter, ground-level ozone, nitrogen oxides, volatile organic compounds, ammonia, greenhouse gases and others.

While much has been done at all levels of government to reduce emissions over the past several decades within the airshed, and progress has been made with several parameters, some pollutants continue to show increased concentrations. More is needed to reverse these trends, and more is needed to ensure that the progress made with other pollutants continues.

With the exception of wildfire smoke events that can blanket the region for weeks and can come from a large area, most of this pollution comes from thousands of small emissions sources, such as vehicles, equipment, businesses, or homes. Some of these sources originate from within the FVRD, but others come from elsewhere

within the airshed or even outside of the airshed, creating particular challenges with respect to air quality management. It necessitates a multi-faceted approach and a reliance on cooperation and collaboration, as well as a need to stay up-to-date with the newest scientific air quality data through monitoring and research.

The FVRD Air Quality Management Plan 2021 provides an update of air quality trends and emission sources that impact the FVRD and the eastern Lower Fraser Valley Airshed, and presents a roadmap for the FVRD to follow for the next decade. Air quality affects us all, and by working together, we can achieve the vision of “Healthy air and clear vistas that support a vibrant region”.

Based on the strong partnerships already formed between the FVRD and other agencies in the management of the shared airshed, based on the updated data and the comprehensive set of actions outlined within this AQMP, and based on the energy and enthusiasm shown by students within the region who have participated in the FVRD’s air quality in the classroom program so far, there is reason to be optimistic, for now and for the future.

We are excited about the opportunities that lie ahead and the progress we will achieve together.

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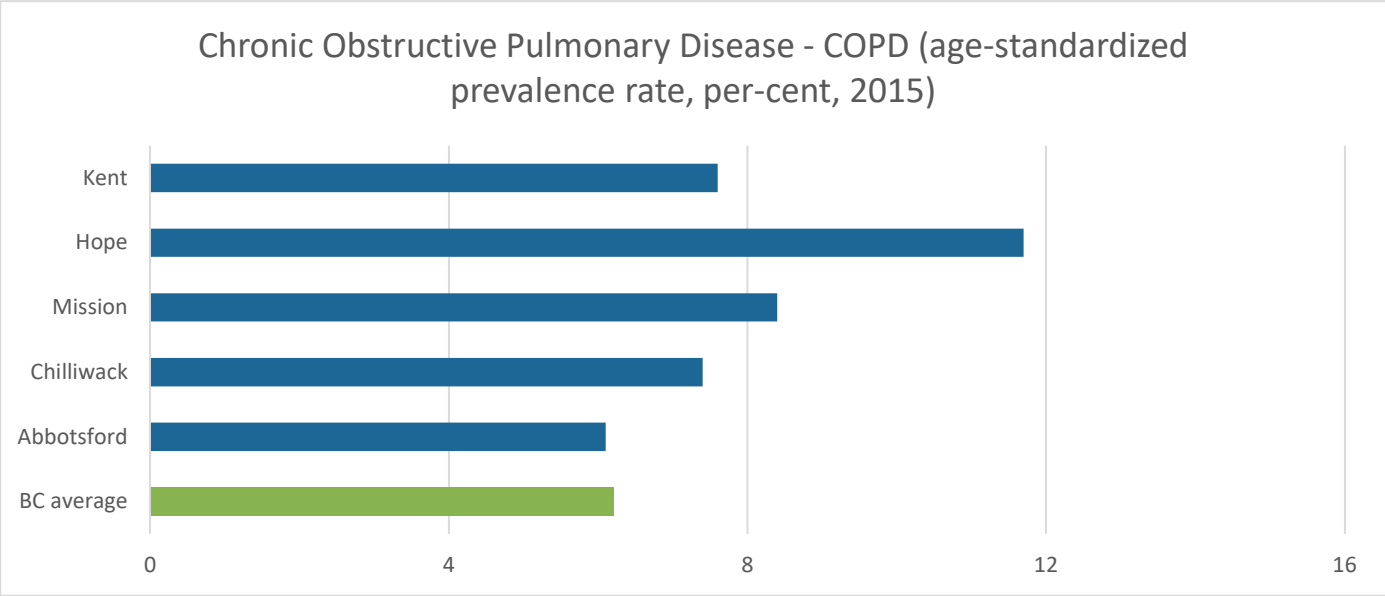
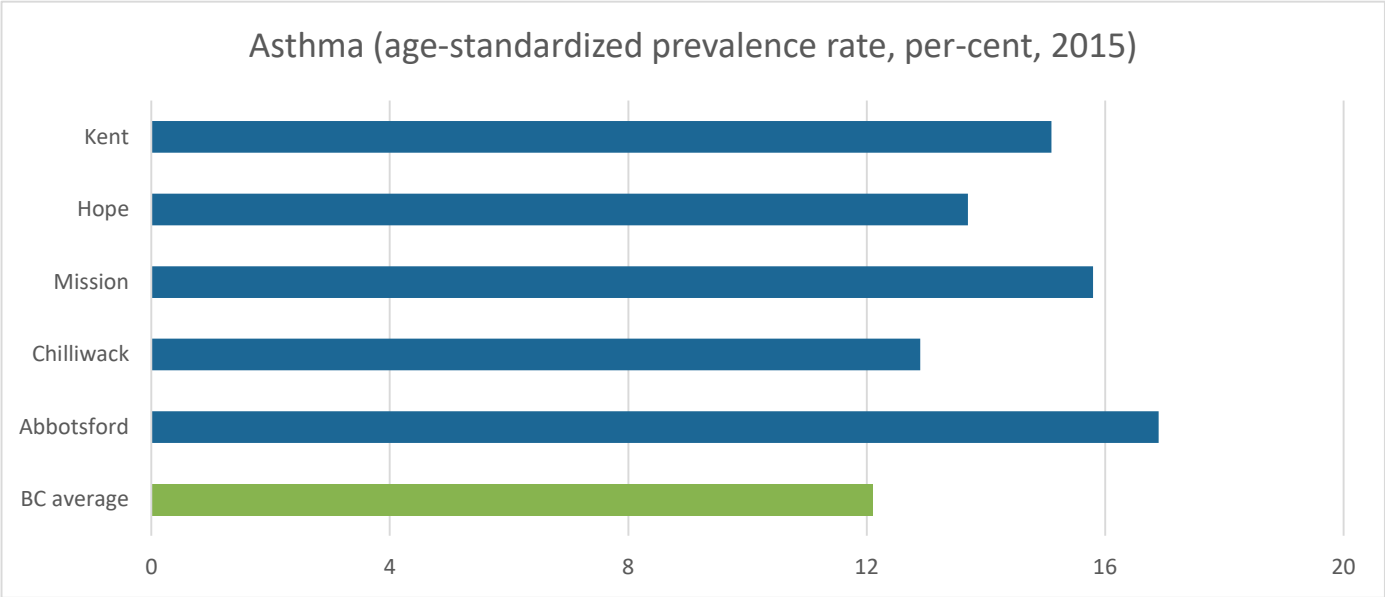


APPENDICES

- APPENDIX A: Lung Disease Prevalence in the FVRD
- APPENDIX B: Air Quality Trends and Emission Data for the FVRD
- APPENDIX C: List of Air Quality Committees and Working Groups
- APPENDIX D: Ambient Air Quality Objectives in Canada, BC, and the Lower Fraser Valley
- APPENDIX E: Criteria Air Contaminants and their Sources and Effects
- APPENDIX F: Linkages to the Existing Local Plans and Policies
- APPENDIX G: Action Evaluation Matrix

APPENDIX A

Lung Disease Prevalence in the FVRD



APPENDIX B

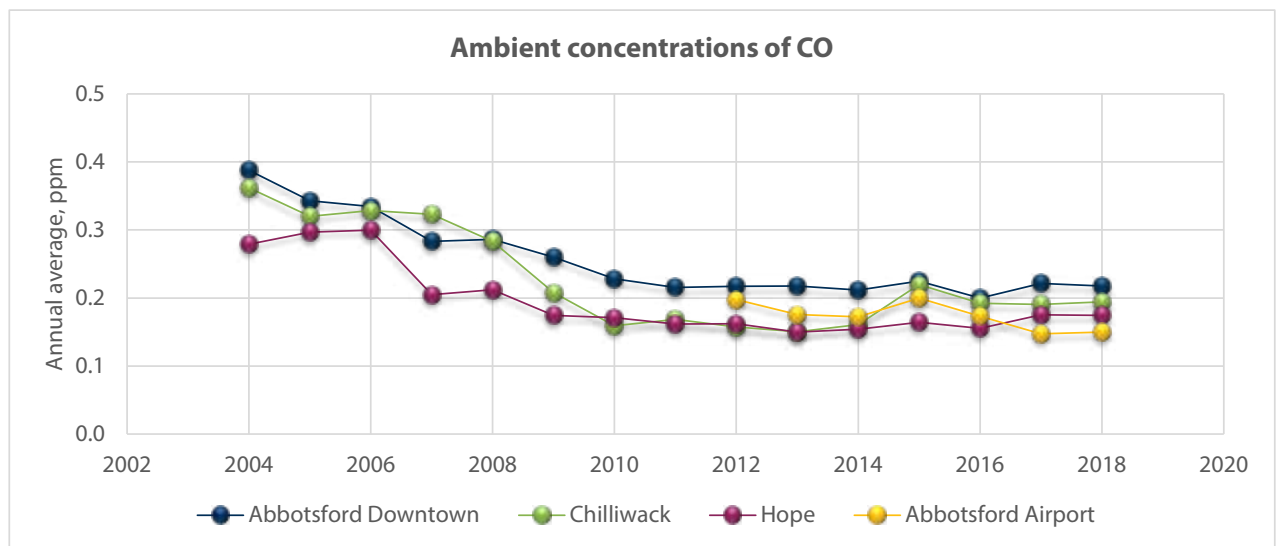
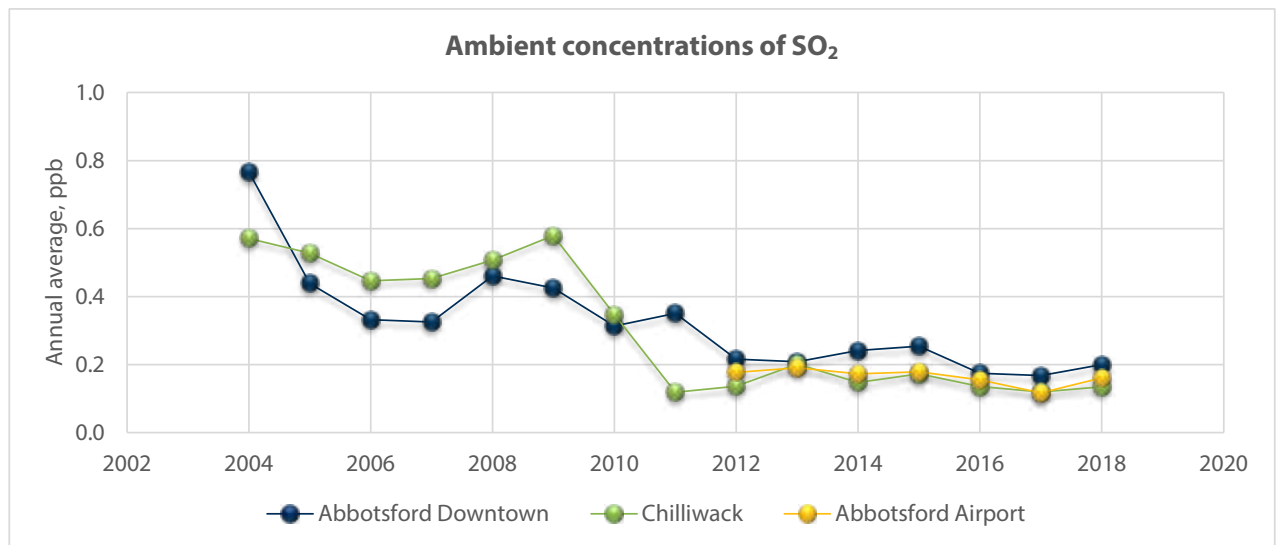
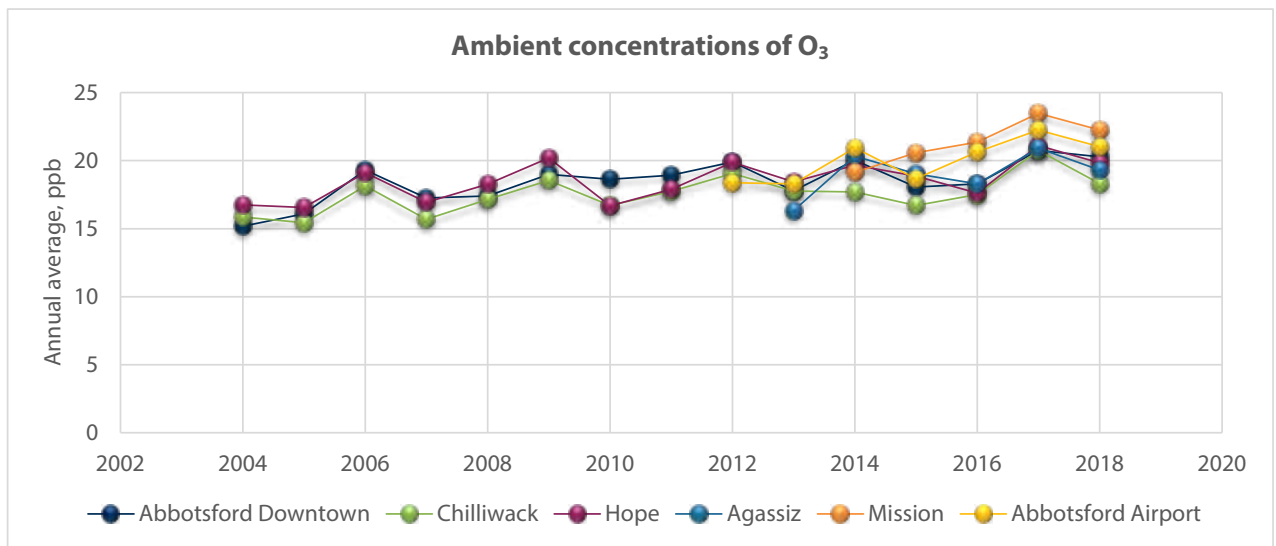
Air Quality Trends and Emissions Data for the FVRD

Air Contaminant Emissions (tonnes/year)

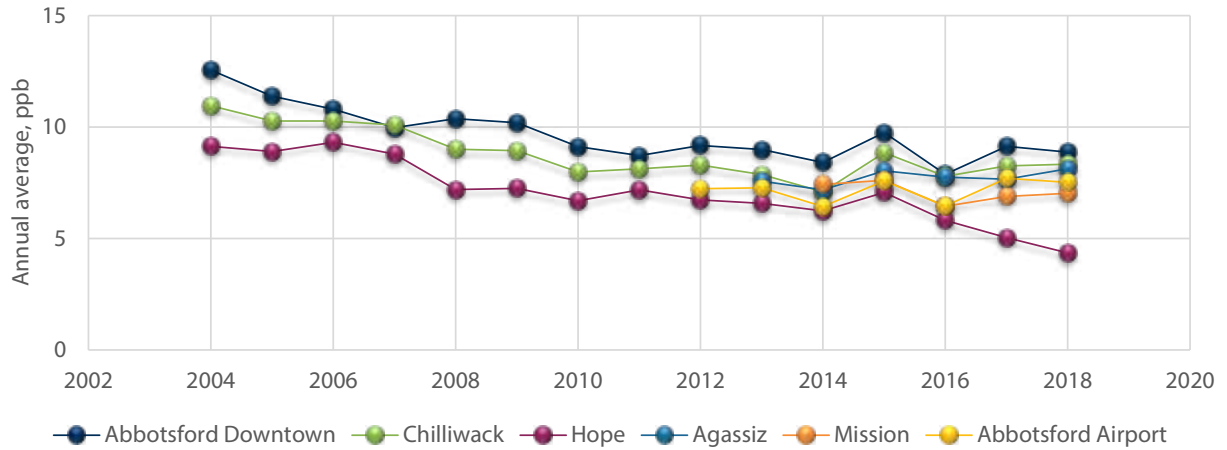
	CO	NOx	PM ₁₀	PM _{2.5}	SOx	VOC	NH ₃
Agricultural	292.79	116.49	1007.52	254.11	9.72	540.73	6304.04
Chemical products	0.00	0.00	0.00	0.00	0.00	2279.93	5.66
Fuel distribution	0.00	0.00	0.00	0.00	0.00	257.87	0.00
Fugitive dust	0.00	0.00	786.54	189.14	0.00	0.00	0.00
Heating	1554.98	563.56	284.51	283.40	12.10	172.02	40.77
Industrial	86.23	34.05	138.03	62.43	9.09	60.04	0.35
Miscellaneous	24.22	2.27	38.28	37.92	2.92	61.21	181.40
Mobile sources	23422.60	5386.33	292.07	280.11	36.60	2124.52	50.65
Natural sources	0.00	94.74	0.00	0.00	0.00	14813.82	0.00
Vegetative burning	529.08	10.55	21.09	21.09	0.03	49.21	3.32
Waste	0.00	0.00	3.98	1.05	0.00	21.88	76.14

Greenhouse Gas Emissions (tonnes/year)

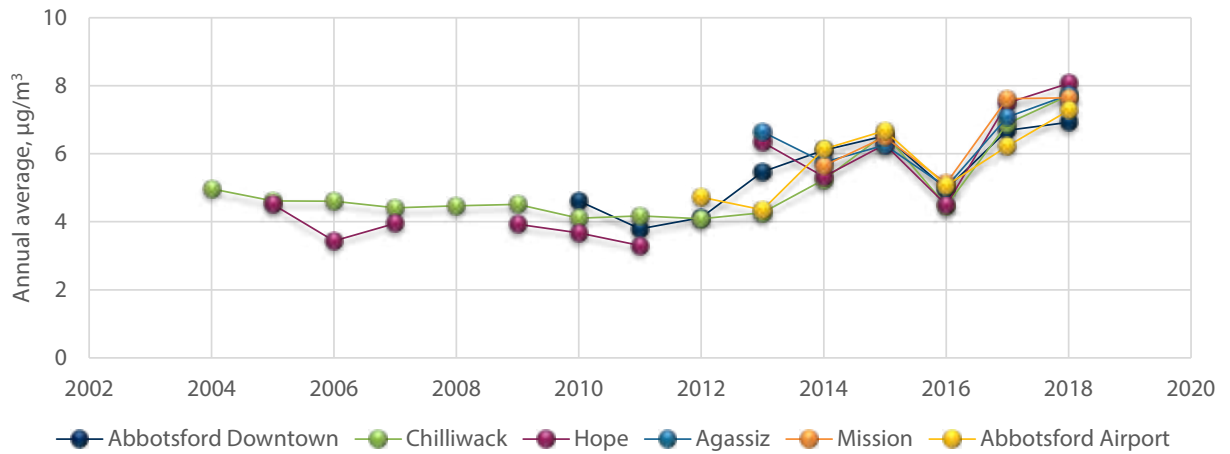
	CO ₂	CH ₄	N ₂ O	CO _{2eq}
Agricultural	177203.62	14137.99	410.34	584029.55
Fuel distribution	5.05	191.48	0.00	4791.99
Heating	523147.90	227.79	11.67	508759.48
Industrial	509.79	0.86	0.01	34154.12
Miscellaneous	1099.19	7.47	0.17	399.21
Mobile sources	1310050.11	143.33	49.78	1262714.30
Natural sources	0.00	10.48	0.00	262.09
Vegetative burning	8541.81	94.91	1.45	2805.45
Waste	0.00	2034.82	0.00	50870.46



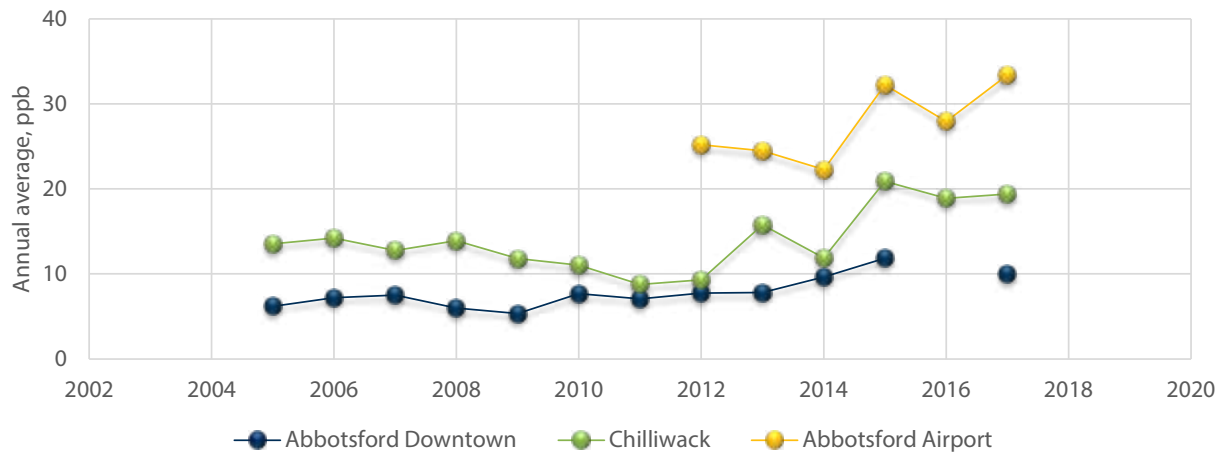
Ambient concentrations of NO₂

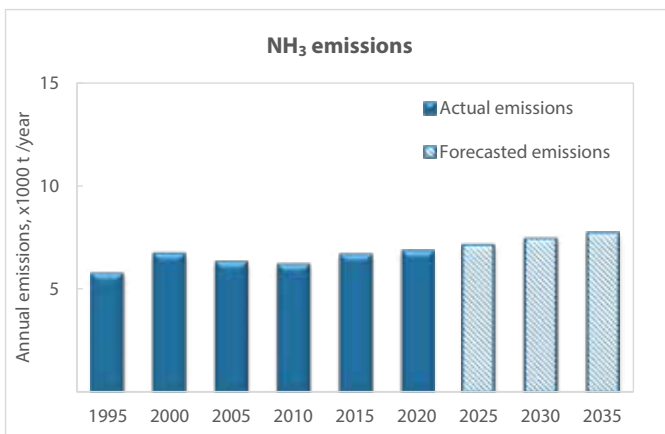
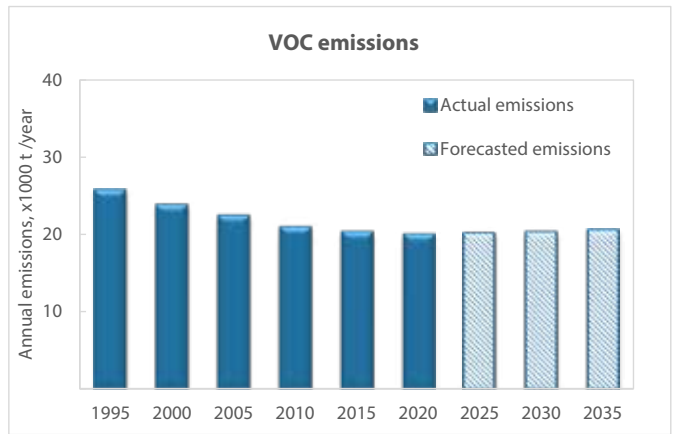
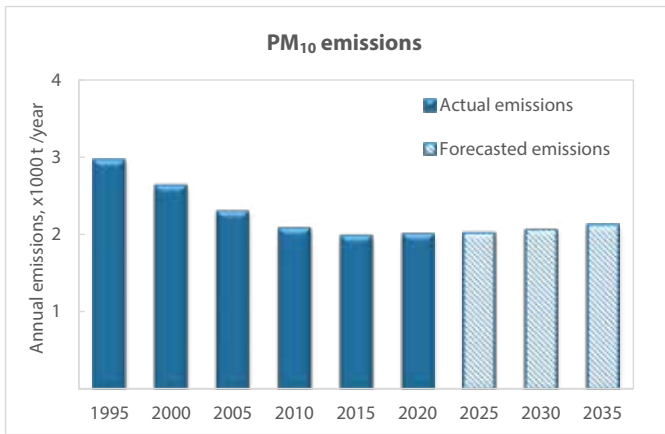
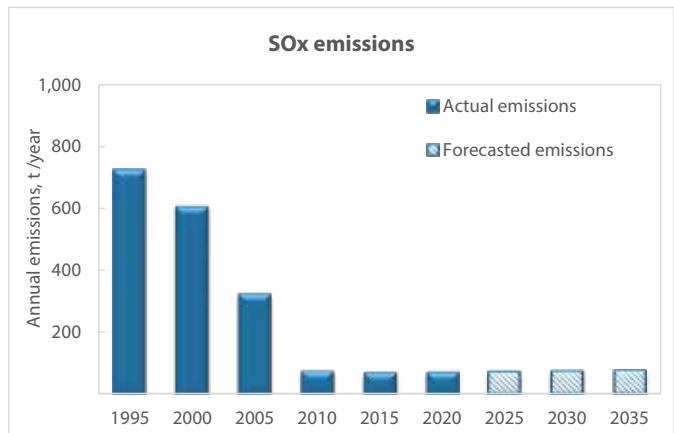
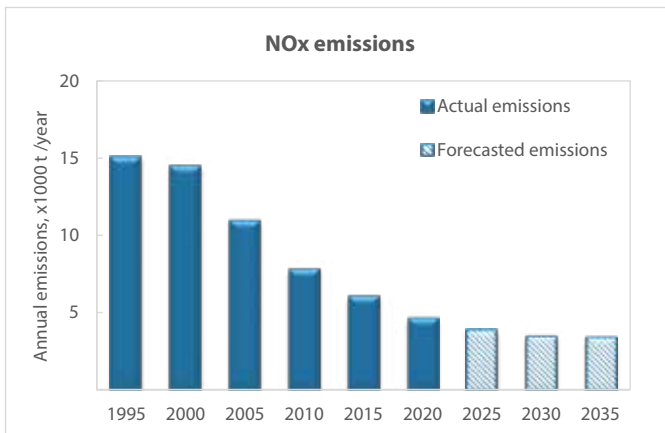
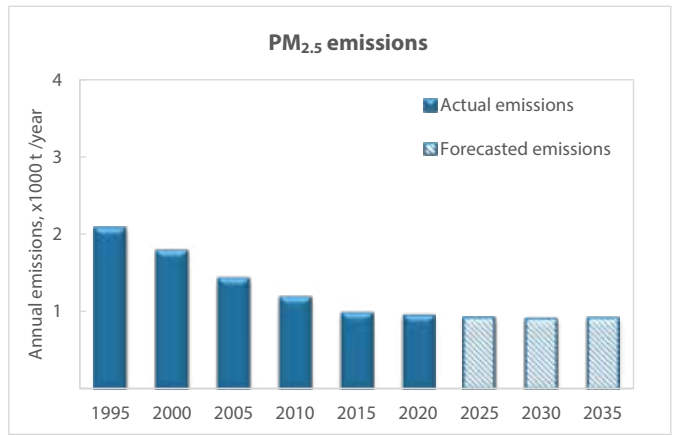
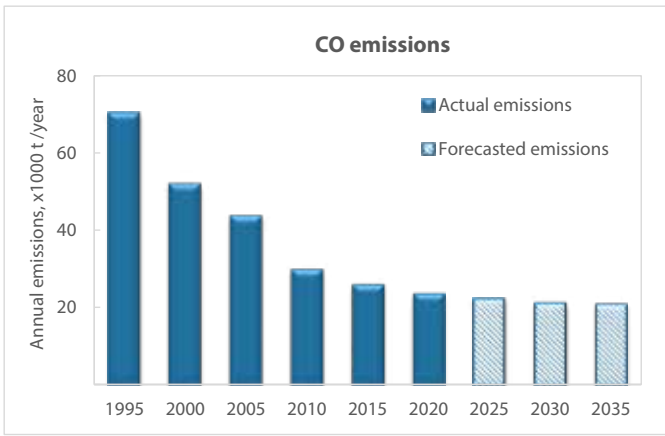


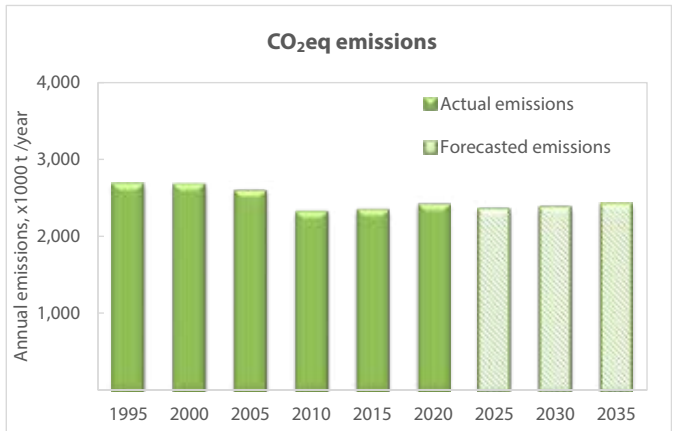
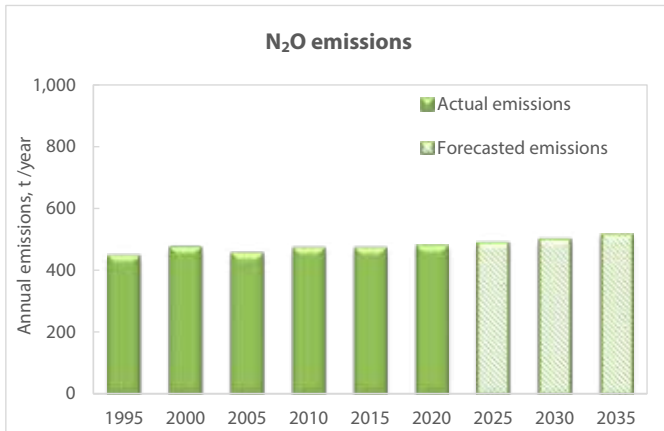
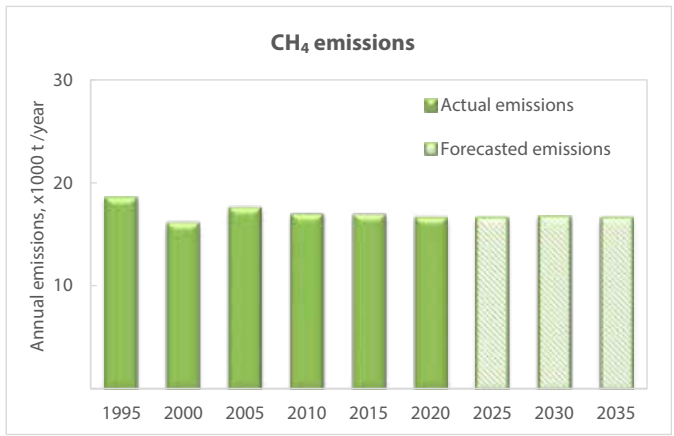
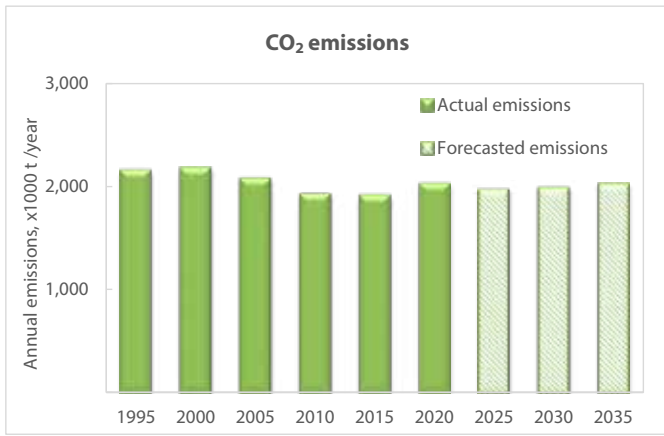
Ambient concentrations of PM_{2.5}



Ambient concentrations of NH₃







APPENDIX C

List of Air Quality Committees and Working Groups in the LFV

Committee	Region/Country	Goals and Objectives	Activity Status	FVRD Involvement
Agricultural Nutrient and Air Working Group (ANAWG) - a joint industry-government working group	LFV	Provides a forum for exchange of information on agricultural nutrient management and air quality, as well as to review projects and research being done.	Dormant since 2018	Member
Air Quality & Health Steering Committee (AQ&HC) - a multi-agency regional committee	LFV	Promotes understanding of the effects of air pollution on health, environment, and economy through research, education, and public awareness campaigns. Aims to develop tools and inform policies that will reduce the impact of air pollution on human health, ecosystems, and visibility.	Active, meets semi-annually	Member
BC Air Quality Meteorologists (AQ Met) - a provincial air quality experts group	BC	Discusses provincial air quality issues and organizes training sessions and workshops.	Active, meets monthly by tele-conference	Member
BC Visibility Coordinating Committee (BCVCC)	LFV	Studies and communicates the impact of air pollutants on visual air quality in the LFV	Dormant since 2019	Member
eMotive (Electric Vehicle Experience) Campaign	LFV	Develops and implements electric vehicle communications strategy. Raises awareness and promotes electric vehicles in the LFV.	Active, meets monthly by tele-conference	Member
Georgia Basin/Puget Sound International Airshed Strategy Group (IAS)	LFV and WA (USA)	Works collaboratively to address present and future cross-border air quality issues and to resolve pressing international air quality issues in the region in a timely manner.	Active, meets semi-annually	Member
IAS Subcommittee - Residential Wood Smoke Workgroup	LFV and WA (USA)	Exchanges information on wood burning appliances regulations and studies across the USA and Canada.	Active, meets semi-annually	Member

Committee	Region/ Country	Goals and Objectives	Activity Status	FVRD Involvement
Lower Fraser Valley Air Quality Coordinating Committee (LFV AQCC)	LFV	Works toward coordinated policies and programs for air quality management in the LFV. Guides intergovernmental actions to address the issues, encourage efforts to understand and manage air quality and foster the stewardship. Facilitates cooperation and information exchange between agencies responsible for air quality management in the LFV airshed.	Active, meets quarterly	Member, Co-chair
Regional Ground Level Ozone Strategy Steering Committee (RGLOSSC)	LFV	Develops and implements the regional Ground Level ozone Strategy in the LFV	Active	Chair
Mobile Source Emissions Forum (MSEF, formerly Air Care Steering Committee)	LFV	Oversees the inspection and maintenance program for light-duty vehicles in the LFV	Dormant since 2015	Member
Regional Clean Air Communications Team (RCACT)	LFV	Focuses on air quality communications	Dormant since 2018	Member
Regional Engineers Advisory Committee (REAC Climate Protection Subcommittee, Metro Vancouver)	MV	Discusses climate change and greenhouse emissions reductions	Active, meets monthly	Adjunct member

APPENDIX D

Ambient Air Quality Objectives in Canada, BC, and the LFV

Canadian Ambient Air Quality Standards¹

Pollutant	Averaging Time	Numerical Value			Statistical Form
		2015	2020	2025	
Fine Particulate Matter (PM _{2.5})	24-hour	28 µg/m ³	27 µg/m ³		The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
	Annual	10.0 µg/m ³	8.8 µg/m ³		The 3-year average of the annual average of all 1-hour concentrations
Ozone (O ₃)	8-hour	63 ppb	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

¹ Adopted from the Canadian Council of Ministers of the Environment website. More details available at <http://airquality-qualitedelair.ccme.ca/en/>

Ambient Air Quality Objectives in British Columbia¹

Contaminant	Avg. Period	Air Quality Objective		Source	Date Adopted by Source
		µg/m ₃	ppb		
Formaldehyde (HCHO)	1 hour	60	50	Provincial AQO	1995
Nitrogen Dioxide (NO ₂)	1-hour	188	100	Interim Provincial AQO	2014
	Annual	60	32		
Ozone (O ₃)	1-hour	160	82	NAAQO	1989
	8 hour	123	63	CAAQS	2013
Particulate Matter <2.5 µm (PM _{2.5})	24 hour	25	-	Provincial AQO	2009
		28	-	CAAQS	2013
	Annual	8	-	Provincial AQO	2009
		10	-	CAAQS	2013
Particulate Matter <10 µm (PM ₁₀)	24 hour	50	-	Provincial AQO	1995
Sulphur Dioxide (SO ₂)	1-hour	196	75	Interim Provincial AQO	2016
	1-hour	183	70	CAAQS	2016
	Annual	13	5	CAAQS	2016
Total Suspended Particulate (TSP)	24- hour	120	-	NAAQO	1974
	Annual	60	-	NAAQO	1974

AQO – Air Quality Objectives

NAAQO – National Ambient Air Quality Objectives

CAAQS – Canadian Ambient Air Quality Objectives

¹ Adopted from the BC Air Quality website. More details available at <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/aqotable.pdf>

Metro Vancouver's Current Ambient Air Quality Objectives¹

Air Contaminant	Averaging Time	Ambient Air Quality Objective Levels	
		µg/m ₃	parts per billion
Carbon monoxide (CO)	1-hour	14,900	13,000
	8-hour	5,700	5,000
Nitrogen dioxide (NO ₂)	1-hour	113	60
	Annual	32	17
Sulphur dioxide (SO ₂)	1-hour	183	70
	Annual	13	5
Ozone (O ₃)	1-hour	161	82
	8-hour	122	62
Fine particulate matter (PM _{2.5})	24-hour	25	-
	Annual	8 (6)	-
Inhalable particulate matter (PM ₁₀)	24-hour	50	-
	Annual	20	-
Total reduced sulphur (TRS)	1-hour (acceptable)	14	10
	1-hour (desirable)	7	5

¹ Adopted from the Metro Vancouver website (January 2020). More details available at <http://www.metrovancouver.org/services/air-quality/AirQualityPublications/CurrentAmbientAirQualityObjectives.pdf>

Air Zone Management Framework for Ground-level Ozone and PM_{2.5}¹

Management Level	O ₃ (ppb)		PM _{2.5} -Annual (µg/m ⁵)		PM _{2.5} - 24h (µg/m ³)	
	2015	2020	2015	2020	2015	2020
Red	Actions for Achieving Air Zone CAAQS					
Threshold (CAAQS)	63	62	10	8.8	28	27
Orange	Actions for Preventing CAAQS Exceedance					
Threshold	56		6.4		19	
Yellow	Actions for Preventing Air Quality Deterioration					
Threshold	50		4		10	
Green	Actions for Keeping Clean Areas Clean					

“Red” - Communities are expected to work towards a goal of achieving the CAAQS through advanced air zone management actions. The CAAQS define the upper threshold separating the “red” and “orange” management levels.

“Orange” - Communities are expected to improve air quality through active management.

“Yellow” – Communities are expected to utilize early intervention and ongoing actions to continuously improve air quality.

“Green” zones are expected to keep clean areas clean and to proactively manage air quality.

¹ Adopted from the Report on Air Zone Management Response for British Columbia, September 2017

APPENDIX E

Criteria Air Contaminants and their Sources and Effects

Air Contaminant	What is it?	Where does it come from?	What does it do for health and environment?
Particulate Matter (PM)			
Coarse or inhalable Particulate Matter (PM ₁₀)	Solid or liquid airborne particles smaller than 10 micrometers (µm) in diameter (1/10 of a human hair thickness)	Motor vehicles Wood burning stoves and fireplaces Wildfires Open burning and incineration of waste Dust from construction, roads, and agriculture	Health: Penetrates the deeper part of human lungs, such bronchi (PM ₁₀) and alveoli (PM _{2.5}) causing irritation and inflammation to airways. Causes negative health effects, such as lung cancer, respiratory and cardiopulmonary diseases, adverse pregnancy outcomes, birth defects, and dementia. Increases mortality and a number of hospital visits. Has no safe levels for human exposure
Fine Particulate Matter (PM _{2.5})	Solid or liquid airborne particles smaller than 2.5 micrometers (µm) in diameter (1/40 of a human hair thickness)	Industrial sources Windblown dust from open lands Atmospheric chemical reaction between other pollutants	Environment: Contributes to haze and smog; reduces visibility Clogs stomatal openings of plants, leading to slower growth or mortality in some plant species
Ozone (O₃)			
Ground-level ozone (O ₃)	Light-blue gas with a pungent smell Highly reactive and hazardous substance Powerful oxidizing agent Major component of toxic photochemical smog	Photochemical (sun-driven) atmospheric reaction between nitrogen oxides (NOx) and volatile organic compound (VOC)	Health: Aggravates chronic lung diseases and causes permanent lung damage, particularly for children and the elderly. Increases risk of premature death Has no safe levels for human exposure Environment: Damages sensitive vegetation and decreases productivity of some crops Damages synthetic materials and rubber Deteriorates dyes, paints, and coatings

Air Contaminant	What is it?	Where does it come from?	What does it do for health and environment?
Nitrogen Oxides (NOx)			
Nitrogen dioxide (NO ₂)	Reddish-brown gas with pungent and irritating smell Highly reactive and hazardous substance	Motor vehicles Industrial stack emissions Boilers and heaters Heating/cooling of buildings	Causes airway irritation and inflammation in healthy people Increases respiratory symptoms in people with asthma Main component of ground-level ozone formation cycle Major component of acid rain
Nitric oxide (NO)	Colorless gas, a free radical Highly reactive and hazardous substance	Motor vehicles Industrial sources	Rapidly oxidizes to hazardous NO ₂ in presence of air
Volatile Organic Compounds (VOC)			
Volatile organic compounds (VOC)	Organic substances which easily evaporate or sublime from their liquid or solid form	Motor vehicles Various hydrocarbons in fossil fuels Chemical products, such as solvents, paints and coatings	Participate in ground-level ozone formation cycle Vary from highly toxic to those with no known health effects Might cause eye and respiratory irritation, headaches, dizziness, visual disorders, and memory impairment
Biogenic volatile organic compounds (BVOC)	VOCs produced by plants	Certain plant/tree species	
Greenhouse gases (GHG)			
Carbon dioxide (CO ₂)	Atmospheric gases that absorb and re-emit thermal energy and cause the greenhouse effect on Earth	Motor vehicles (all)	Contribute to global warming and climate change
Methane (CH ₄)		Deforestation and land use changes (CO ₂)	
Nitrous oxide (N ₂ O)		Livestock and manure management (CH ₄ , N ₂ O)	

Air Contaminant	What is it?	Where does it come from?	What does it do for health and environment?
Other Criteria Air Contaminants			
Ammonia (NH ₃)	Colourless gas with a pungent and irritating smell Extremely hazardous and toxic in high concentrations	Livestock and manure management Sewage treatment	Causes airway irritation and inflammation in healthy people Contributes to formation of secondary PM
Sulfur oxides (SO _x)	Colorless gas with a pungent and irritating smell Extremely hazardous and toxic in high concentrations	Motor vehicles Marine vessels Coal burning Industrial sources	Causes airway irritation and inflammation in healthy people Increases respiratory symptoms in people with asthma Increases risk of premature death Contributes to formation of secondary PM _{2.5} Major component of acid rain
Carbon monoxide (CO)	Colorless, odorless, and tasteless gas Extremely hazardous and toxic in high concentrations	Motor vehicles Gas burning stoves and fireplaces (if improperly vented) Coal burning Industrial sources	Causes significant damage to the heart and central nervous system May result in seizure, coma, and fatality May have severe adverse effects on the fetus of a pregnant woman

APPENDIX F

Linkages to the Existing FVRD Plans and Policies

Plan or Policy	Air Quality Content
FVRD Regional Growth Strategy (2020, working draft)	<p>Strategy 5.1: Monitor, study, protect and improve air quality.</p> <p>Strategy 6.1: Create a region-wide network of affordable and convenient transportation options that safely and efficiently facilitates the movement of people and goods.</p> <p>Strategy 6.2: Promote active and alternative forms of transportation that prioritize pedestrians and cyclists.</p> <p>Strategy 8.1: Promote energy efficiency and the reduction of greenhouse gas emissions.</p> <p>Strategy 8.2: Reduce the region's impact on climate change and develop capacity to adapt to and mitigate climate change.</p>
FVRD Solid Waste Management Plan Update (2016-2026) ¹	<p>The FVRD is not supportive of incineration as a method of 'recovery' for reasons that include its emissions of harmful air emissions and its production of greenhouse gases.</p> <p>The FVRD supports organic diversion from landfills to reduce production of methane and other volatile organic compounds.</p> <p>Strategy 7.3.4: Reduce operations-related GHG emissions.</p>
Strategic Review of Transit in the Fraser Valley (2010) ²	Includes a 20-year vision for transit in the Fraser Valley involving significant increases in local services, new regional services between communities, and new inter-regional services, and outlines numerous transit-related strategies to achieve this Vision.
FVRD Climate Change Adaptation Strategy (2015) ³	As part of the BC Agriculture & Food Climate Action Initiative, this strategy identified priority actions for the agricultural sector to adapt to impacts from climate change. It also included a detailed analysis of climate projections for the Fraser Valley through the 2050s. The report discusses the anticipated impacts of climate change on the region some of which (e.g., increased opportunities for production of ground level ozone in the atmosphere, increased dust, etc.) affect air quality.
FVRD Greenhouse Gas Reduction Strategy (2009)	<p>Stantec prepared a baseline inventory of corporate greenhouse gas emissions that result from FVRD operations and identified a number of corporate actions that could be taken to reduce energy consumption.</p> <p>The total energy consumption for the FVRD operations in 2008 was estimated at 563 tonnes of CO₂e, primarily emanating from recreational facilities and the fleet. Although not part of the strategy, the report estimates community emissions for the FVRD as 67,685 tonnes of CO₂e.</p>

1 Available: <http://www.fvrd.ca/assets/Services/Documents/Garbage/SWMP.pdf>

2 Available: <http://www.fvrd.ca/assets/Government/Documents/Transit%20Strategic%20Review.pdf>

3 Available: <http://www.fvrd.ca/assets/Government/Documents/RegionalStrategies-FraserValley.pdf>

Plan or Policy	Air Quality Content
City of Abbotsford Official Community Plan (2016)	<p>Sets city-wide GHG Reduction Targets for 2025 (20%) and 2040 (40%; per capita, below 2007 levels) and establishes policies pertaining to alternative forms of transportation and improved air quality, including:</p> <p>Policy 3.2: “Develop ambitious but realistic city wide and neighbourhood specific mode targets that emphasize walking, biking, and transit use year-round, reflecting a multi-modal city. A suggested starting target is 25% of all trips being made without a vehicle in the life of this Plan, an increase from 7% today.”</p> <p>Policy 5.6: “Protect viewsapes to natural features such as Mt. Baker, north shore, and Fraser Valley mountains, and minimize the visual impact of development on the hillside from the lowlands.”</p> <p>Policy 5.12: “Promote strategies that reduce local air pollution, including measures to protect the Fraser Valley airshed from additional point pollution sources such as energy plants.”</p>
City of Abbotsford Green Energy Plan (2013)	<p>This plan outlines strategies that can be taken to support and promote green house gas and energy use reduction in the City of Abbotsford. Carbon emissions related to the energy used in buildings (29% of community emissions), transportation (69% of community emissions) and solid waste decomposition (2% of community emissions). Activities in Abbotsford generate 6%-9% of the emissions of carbon monoxide (CO), nitrogen oxide (NOx) and particulate matter (PM 2.5) in the Lower Fraser Valley.</p>
Chilliwack’s Integrated Air Quality, Energy and Greenhouse Gas Community Action Plan (2011)	<p>Stantec prepared an action plan for to help address community and corporate air quality and greenhouse gas emissions for the City of Chilliwack.</p> <p>Based on 2007 levels, 45% of GHG emissions within the City were from on-road transportation. Buildings (29%), agriculture (17%), and solid waste (9%) were responsible for the remainder.</p> <p>Around 3-6% of all emissions in the Lower Fraser Valley originate from within Chilliwack, with key parameters of concern including ammonia, particulate matter, and nitrogen oxides and volatile organic compounds (which react with sunlight to produce ozone). This plan will be updated in 2020</p>
District of Mission OCP (2017)	<p>The District is striving to achieve the greenhouse gas emissions reduction targets adopted in the 2008 OCP - 20% below 2007 levels by December 31, 2020 and by 80% below 2007 levels by December 31, 2050.</p> <p>The District’s Policies to achieve these goals include:</p> <p>4.2.3-4.2.8. Promote sustainable and active transportation, establishing an idling reduction policy, and developing infrastructure for electric vehicles.</p> <p>4.2.9-4.2.27 Programs and incentives for home energy retrofits, sustainable development practices, building alternative energy systems, promote energy efficiency for commercial and residential buildings, reduce commercial fleet vehicle emissions</p> <p>4.2.30 Reduce methane gas generation from the landfill</p> <p>6.5.1-6.5.12 Improve transit service and amenities</p>

Plan or Policy	Air Quality Content
District of Kent OCP (2014)	<p>According to the Community Energy and Emissions Inventory for Kent (2010), on-road transportation accounts for approximately 54% of emissions in Kent. Buildings account for 36% of emissions and solid waste for 10%. The district already has air quality initiatives such as no-idling policy for municipal fleet vehicles and the operation of a new air quality monitoring station.</p> <p>Further GHG and Energy Reduction Policies include the following:</p> <p>Reduce District GHG's by 10% of 2006 levels by 2025; this target is in line with the District's unique small town and rural characteristics.</p> <p>Raise awareness respecting climate change and GHG emission reduction initiatives through leadership and community sustainability programs incorporate climate change, its potential impact, and mitigation measures when reviewing new development applications and undertaking long-term planning projects and initiatives.</p> <p>Continue to pursue opportunities to reduce GHG emissions in District operations including the use of fuel-efficient municipal vehicles.</p> <p>Continue to support improvements to alternative and active transportation amenities.</p> <p>Explore options for encouraging and developing infrastructure for "electric plug-in-vehicles".</p> <p>Support provincial efforts and work with other agencies, stakeholders, and the community to achieve emission reduction targets and energy conservation goals.</p>
District of Hope OCP (2018)	<p>Objective 6.6 To improve air quality.</p> <p>Policy 6.6.1 Discourage vehicle idling within the District.</p> <p>Policy 6.6.2 Collaborate with the FVRD, other Fraser Valley municipalities, and major employers to address issues that affect air quality.</p> <p>Policy 6.6.3 Encourage large employers and government agencies with air quality monitoring data to share this information publicly.</p> <p>Policy 6.6.4 Continue to support the wood stove exchange program.</p> <p>In 2014, Hope set its community target of reducing GHG emissions to 23% per capita below 2009 levels by the year 2030.</p> <p>Develop a sustainability checklist for buildings to improve energy efficiency in new and existing developments.</p> <p>Policy 15.1.2 Encourage active transportation through infrastructure development and education.</p> <p>Policy 15.1.3 Work with BC Transit to provide local public transit options that are affordable and convenient.</p> <p>Policy 15.1.4 Promote energy demand-side management programs</p> <p>Policy 15.1.5 Incorporate energy efficient standards into purchase agreements, enforced through a Section 219 covenant, when selling District lands for development.</p> <p>Policy 15.1.6 Investigate the implementation of LED street lighting, solar pathway lighting and lighting retrofits in municipal buildings, where appropriate.</p>
Harrison Hot Springs OCP (2018)	<p>Goal 5: Protect and maintain air and water quality and biodiversity. The strategy to achieve this goal involves upgrading wastewater management systems, managing stormwater drainage and runoff, limiting campfires and protecting important natural habitats and ecosystem functions.</p>

Plan or Policy	Air Quality Content
Area A Official Community Plan (1994)	It is the Regional Board's policy that: 10.3.1 The Regional board will encourage the ongoing monitoring and analysis of ambient air quality and air contaminant discharges in the Plan area.
Area D Official Community Plan (Draft)	7.6.4 Residents are encouraged to avoid the burning of wood wastes and debris, which results in reduced air quality and emissions of fine particulates that may pose a health hazard, and instead employ alternatives such as composting or mulching. 7.6.5 The Regional District will work with Provincial ministries and other appropriate organizations to combat the illegal burning of household garbage and other prohibited materials.
Area E and H Official Community Plans (2011)	6.1.4 The farming community is strongly encouraged to follow best management practices associated with the spreading of manure on fields and the burning of wastes to minimize air quality impacts, particularly fine particulates in the air. Farms are encouraged to review the Ministry of Agriculture's Beneficial Management Practices for crop types grown in Columbia Valley. 8.4.5 Residents are encouraged to avoid the burning of garbage and wastes which results in reduced air quality and emissions of fine particulates which may pose a health hazard.
Area F Official Community Plan (2010)	The Plan states that support from the FVRD board for any new transportation/utility corridor proposals will be contingent on the proposals meeting the air quality policies outlined in the AQMP
Area G Official Community Plan (2009)	The Plan states that support from the FVRD board for any new transportation/utility corridor proposals will be contingent on the proposals meeting the air quality policies outlined in the AQMP
Hemlock Valley OCP (Draft)	Sets a community-wide plan to reduce GHG and other air pollutants originating from the Hemlock Valley Community. This Plan strives to protect sensitive ecosystems with high biodiversity values through legal and policy tools including the following; 4.7.7 Encourage residents to avoid the burning of garbage and waste which results in reduced air quality and hazardous fine particulate matter emissions. 6.3.3 Take actions to reduce particulates and other emissions from transportation, industry, building heating and other sources. 6.3.4 Continue to study and monitor air quality throughout the Hemlock Valley and expand the monitoring network as needed. 6.3.5 Support land use development, initiatives, and programs across all sectors that reduce Greenhouse Gas Emissions, protect air quality, and promote energy efficiency and conservation. 6.3.6 Update and implement the regional Air Quality Management Plan. 6.3.7 Educate Hemlock Valley residents on the causes and impacts of degraded air quality, and what they can do to improve air quality.

APPENDIX G

Action Evaluation Matrix

##	Actions (full description)	Versatility				Effort/ Cost (1=high effort; 3=low effort)	Impact (1=low impact; 3=high impact)	Priority Score (max 10)	Priority (High/ Medium/ Low)	Action Timeframe (Short- term, Mid-term, Long- term, or Ongoing)
		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
1	The FVRD will continue to improve public awareness and knowledge of zero-emission vehicles (ZEV) including plug-in hybrid, battery electric and hydrogen fuel cell vehicles by:	1	1		1	3	9	H	O	
	a Providing information and education materials on purchasing, driving, charging, and long-term benefits and cost savings of ZEVs to organizations, businesses, and residents;	1	1		1	3	9			
	b Collaborating with regional campaigns and organizers (e.g., Emotive BC), where feasible, to showcase and promote ZEVs at community events	1	1		1	3	9			
2	The FVRD will advocate for maintaining, expanding, and accelerating government programs and financial incentives for replacing old polluting vehicles with ZEVs	1	1		1	3	9	H	S	
3	The FVRD will support or help develop public, residential, and commercial ZEV charging infrastructure by:	1	1		1	3	9	H	S	
	a Maintaining existing and installing new public charging stations in the FVRD, using available grants and financial support;	1	1		1	3	9			

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
	<p>b Evaluating need and identifying locations for new public charging stations within the region for travelers (e.g., rest areas, campgrounds, tourist destinations), daily commuters (e.g., park-and-ride/carpool lots, transit hubs), and residents (e.g., schools, hospitals, parks);</p> <p>c Supporting local municipalities, neighbouring jurisdictions, BC Hydro, and the Province in their efforts to build and operate new charging stations (e.g., providing host locations);</p> <p>d Supporting development of government guidelines and/or sample bylaws that would assist with the installation of ZEV charging infrastructure in new developments (multifamily, mixed use, employment center developments, and new homes) where appropriate and as permitted under the BC Building Code;</p> <p>e Assisting homeowners with identifying potential funding sources and incentives for home EV charger installation</p>	1	1		1	2	3	8		
		1	1		1	3	3	9		
		1	1		1	3	3	9		
		1	1		1	3	2	8		
4	The FVRD will consider adopting a ZEV policy for the FVRD corporate fleet by:	1	1		1	2	1	6	L	O
	a Continuing to replace old corporate fleet vehicles with ZEVs, or cleaner alternatives with lower emission and carbon outputs;	1	1		1	1	1	5		
	b Developing a corporate driving policy for FVRD staff prioritizing use of ZEVs, when appropriate;	1	1		1	3	1	7		
	c Continuing to provide education for staff on the use of ZEVs and on fuel-efficient driving behaviours									
5	The FVRD will promote optimizations of local fleets and improve driving behaviour by:	1	1		1	3	1	7	M	M

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
	a Supporting regional fleet management programs that reduce emissions from private and public vehicle fleets by maintaining appropriate fleet size and composition;	1	1		1	2	8			
	b Promoting driver education programs that increase fuel efficiency and reduce emissions;	1	1		1	1	7			
	c Supporting the installation of low-emission re-fueling infrastructure within the region;									
	d Supporting efforts to reduce emissions associated with vehicle idling;	1	1		1	1	7			
	e Advocating to the Province of BC to prevent tampering of emission control devices from vehicles, particularly when the tampering results in higher emissions of harmful diesel engine exhaust (e.g., "coal rolling")	1	1	1		1	7			
6	The FVRD will encourage transit ridership within the region via improving and expanding transit service, promotion and marketing campaigns, and providing incentives for using transit	1	1		1	2	7	M	S	
7	The FVRD will consider the promotion of car-pooling and ride-sharing within the region by:	1	1		1	1	6	L	S	
	a Supporting infrastructure upgrades and expansions for safe and affordable park-and-ride and park-and-carpool parking options;	1	1		1	1	6			
	b Facilitating information exchange for drivers and riders to schedule rides and routes;	1	1		1	1	6			
	c Promoting car-sharing co-ops to reduce residents' need for owning a car									
8	The FVRD will promote active transportation, such as biking and walking by:	1	1		1	1	7	M	O	

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
	a Actively participating in community events such as Bike to Work Week, Walk to Work Day, etc.;	1	1		3	1	7			
	b Supporting the development of pedestrian-friendly and bike-friendly communities and infrastructure (sidewalks, crosswalks, overpasses, road signage, trails, etc.)	1	1		2	1	6			
9	The FVRD will collaborate with the Provincial Government, municipalities, and health and transportation authorities to increase awareness about air quality health concerns associated with siting residential developments near heavy traffic areas	1	1		2	2	7	M	L	
10	The FVRD will encourage and support initiatives on developing electrification infrastructure for truck stops within the Fraser Valley to reduce idling of commercial trucks	1	1	1	2	2	8	M	L	
11	The FVRD will encourage and support the Province of BC and regional partners to develop a heavy-duty diesel vehicle retirement program that replaces or retrofits old polluting vehicles with cleaner models	1	1	1	3	3	10	H	M	
12	The FVRD will advocate for a new, thorough, vehicle emission inspection program for heavy-duty vehicles	1	1	1	3	3	10	H	M	
13	The FVRD will promote and advocate for the use of cleaner alternative fuels (e.g., natural gas, propane, renewable fuels) for heavy-duty vehicles by:	1	1		3	2	7	M	L	
	a Providing in-kind assistance for municipal, public, and private fleet managers in their efforts to replace heavy-duty diesel vehicles with cleaner alternative fuel vehicles;	1	1		2	1	6			
	b Supporting the establishment of programs or infrastructure that increases the availability of increased access to sources of clean re-fueling technology or stations	1	1		3	2	8			

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
14	The FVRD will advocate to the Province to address spill-over emissions from old diesel engines being relocated to the Fraser Valley as a result of non-road diesel engine programs administered by other agencies (Metro Vancouver's Non-Road Diesel Engine Emission Regulation, Vancouver Fraser Port Authority's Non-Road Diesel Emissions program)	1	1	1	1	2	3	9	H	S
15	The FVRD will encourage and promote opportunities for residents and businesses to replace or retrofit older diesel and gasoline equipment with newer low-emission models by:	1	1	1	1	3	2	9	H	M
	a Investigating the feasibility of providing an incentive program to encourage residents to replace older lawn and garden equipment;	1	1	1	1	2	2	8		
	b Advocating to the Province of BC and agricultural agencies to pilot a 'SCRAP-IT' type of financial incentive program for replacing old diesel and gasoline-fueled agricultural equipment	1	1	1	1	3	2	9		
16	The FVRD will support and promote the development and use of Best Management Practices (BMPs) for construction and agricultural non-road diesel and gasoline equipment that would reduce emissions of harmful emissions (e.g., avoiding unnecessary idling, preventative engine maintenance, prevention of fuel spills, using electric grid power when available, using alternative fuels where feasible, etc.)	1	1	1	1	3	2	9	H	M
17	The FVRD will ensure that adequate air quality provisions are considered in new industrial proposals associated with non-road equipment use within the region and referred to the FVRD for the feedback	1	1	1	1	3	1	8	M	L

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
18	The FVRD will advocate to Transport Canada and the Railway Association of Canada for emission monitoring and enforcement of new railway emission regulations to reduce emissions from diesel locomotives and rail yard support machinery.	1	1		2	1	6	L	L	
19	The FVRD will consider a study of river traffic (both industrial and pleasure craft) used on regional waterways to understand its impact on air quality and, if warranted, investigate potential options to reduce emissions or exposure of nearby users or residents to resulting emissions	1	1		2	1	6	L	L	
20	The FVRD will provide in-kind assistance, where feasible, to municipal and local airport staff to help in their efforts to reduce emissions associated with airport ground support machinery	1	1		2	1	6	L	M	
21	The FVRD will continue to administer and promote the BC Wood Stove Exchange Program that provides financial incentives that support the upgrade of older wood burning appliances with newer, emission-certified woodstoves or fireplaces	1	1	1	3	2	8	M	O	
22	The FVRD will continue to promote education and awareness for reducing emissions from the operation of residential wood burning appliances	1	1	1	3	2	8	M	O	
23	The FVRD will encourage and promote new energy-efficient residential developments that are less reliant on woodstoves for heating	1	1	1	2	1	6	L	M	
24	The FVRD will continue to advocate for more stringent emission standards for commercial boilers and heaters and for improved compliance with provincial and regional regulations and policies	1	1		3	2	8	M	L	

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
25	The FVRD will promote and encourage use of cleaner or retrofitted greenhouse boilers that optimize efficiencies and reduce emissions	1	1	1	3	2	8	M	M	
26	The FVRD will explore potential alternatives to residential and agricultural open burning that could be introduced on a voluntary basis	1	1	1	1	3	7	M	S	
27	The FVRD will work with municipalities and electoral areas to support regulatory consistency within the region for residential and agricultural debris burning	1	1	1	1	2	6	L	S	
28	The FVRD will provide education and awareness on best management practices for open burning	1	1	1	3	2	8	M	S	
29	The FVRD will investigate the potential effect of smoke from land clearing burning for development purposes on nearby communities through modeling and monitoring studies	1	1	1	2	3	8	M	S	
30	The FVRD will work with municipal and electoral area planning and firefighting staff on developing more effective and consistent use of "burning windows" across the region	1	1	1	2	3	8	M	S	
31	The FVRD will investigate options to land clearing burning for development purposes, as warranted by research data and supported by member municipalities and electoral areas	1	1	1	2	2	7	M	S	
32	The FVRD will support and advocate for the development and implementation of industry-specific soil stabilization and dust control BMPs, such as wind barriers, cover crops, reduced tillage, and sprinkler/irrigation systems	1	1		2	2	6	L	M	
33	The FVRD will support and advocate for the implementation of provincial, regional, and municipal regulations and other tools (e.g., Mines Permits by the BC Ministry of Energy and Mines) related to dust emissions or dust suppression requirements	1	1		3	1	6	L	M	

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
34	The FVRD will promote applicable research and information exchange within regional air quality and agriculture networks, government agencies, and research institutions, in order to gain further knowledge of ammonia emissions	1	1	1		2	2	7	M	M
35	The FVRD will optimize and advance the ambient ammonia monitoring network and air pollution data collection, through: a Continuously expanding and improving the stationary ammonia monitoring network within the region in collaboration with Metro Vancouver, BC Ministry of Environment and Climate Change Strategy, and Environment and Climate Change Canada b Exploring short-term mobile air pollution monitoring of ambient ammonia for near-farm communities to better understand localized ammonia emissions and exposure risks	1	1	1		2	2	7	M	S
36	The FVRD will encourage and promote the use of new technologies and practices that clean ammonia from ventilation air, such as gas-phase bio-filtration at livestock or poultry facilities	1	1	1		3	2	8	M	M
37	The FVRD will support and encourage best agricultural practices to reduce GHG emissions from seasonal farm operations and manure management	1		1	1	3	1	7	M	M
38	The FVRD will support and promote the use of anaerobic digesters in manure management where permitted to prevent emissions of methane (CH4) to the atmosphere	1		1	1	3	2	8	M	M
39	The FVRD will continue to advocate against the incineration of municipal solid waste from within the LFV airshed and for strong emission control requirements and transparency	1	1	1	1	3	3	10	H	O

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
40	The FVRD will support reduction of air pollutants, odorous compounds and GHG emissions from landfills	1		1	1	3	9	H	O	
41	The FVRD will increase awareness and enforcement of the FVRD's Source Separation Bylaw, which, through diversion of organic waste, will reduce methane emissions from regional landfills	1		1		2	8	M	O	
42	The FVRD will work to protect the airshed from new industrial developments potentially contributing to air pollution by working with regulatory agencies (BC Ministry of Environment and Climate Change Strategy, USA Northwest Clean Air Agency, USA Puget Sound Clean Air Agency, Metro Vancouver, local municipalities) to collect information on air discharges, permits, modeling and monitoring data	1	1	1	1	3	9	H	O	
43	The FVRD will encourage and provide in-kind assistance for local businesses to develop, adopt, and implement pollution prevention plans to reduce air pollution from their operations	1	1	1	1	2	8	M	M	
44	The FVRD will encourage local businesses to increase the use of new technologies and employ BMPs to manage nuisance impacts of odour, such as bio-filtration systems, activated carbon systems, forced or fan-driven ventilation, sealed or covered storage of odorous materials, and maintaining good housekeeping and spill cleanup procedures	1		1		3	8	M	M	
45	The FVRD will support, when appropriate, the development of mutual understandings and communications between businesses and neighbouring residential communities to deal effectively with odour-related issues	1		1		2	6	L	L	

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
46	The FVRD will advocate to the Province of BC, the Government of Canada, and health authorities to develop a publicly-accessible system for receiving and responding to odour complaints, and establishing guidelines for odour impact assessment	1		1		3	1	6	L	S
47	The FVRD will consider a study to better understand odour issues in the FVRD, including best practices available and the level of regulatory response needed to address those issues	1		1		2	2	6	L	S
48	The FVRD will advocate for and participate in the development of a regional policy framework to address noxious odours from commercial cannabis growing	1	1	1	1	2	2	8	M	M
49	The FVRD will continue to explore ways to reduce commercial, industrial, and agricultural emissions through partnerships with the provincial government, industry, and academic institutions (e.g., UFV Agriculture Centre of Excellence)	1	1	1	1	3	3	10	H	O
50	The FVRD will support further studies of reduced air quality economic impact on commercial, industrial, and agricultural operations	1	1	1	1	2	3	9	H	O
51	The FVRD will continue to provide updated and timely air quality information when wildfire smoke air quality advisories are in effect for the region, including updates and associated messaging on the Air Quality Health Index (AQHI)	1	1		1	3	3	9	H	O
52	The FVRD will promote residential indoor radon awareness, testing and mitigation, in collaboration with health authorities and regional partners	1				2	2	5	L	O
53	The FVRD will coordinate with regional partners to develop an updated emission inventory of local biogenic sources of volatile organic compounds	1	1			3	1	6	L	M

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
54	The FVRD will support and promote responsible planting of low biogenic volatile organic compound (BVOC) emitting tree species in the region that would include: a Coordinating with the FVRD municipalities to develop and support a low-BVOC species guidance document in the municipal tree planting programs b Advocating to the Province of BC to include BVOC emission rates as a selection criterion in a Tree Species Selection Tool	1	1		3	1	6	L	M	
55	The FVRD will participate and contribute to regional studies of potential impacts of BVOC emissions from commercial cannabis cultivation and processing	1	1	1	2	2	8	M	M	
56	The FVRD will continue to study and monitor air quality throughout the region in collaboration with provincial and regional partners	1	1	1	1	3	8	M	O	
57	The FVRD will investigate the need for additional air quality monitoring within the region and expand the monitoring network as required, including short-time mobile monitoring campaigns to obtain pollutant and source-specific information about air quality emissions of concern	1	1	1	3	3	10	H	S	
58	The FVRD will investigate and employ new evolving technologies for air quality testing, such as small and portable sensors, to amend and complement its existing air quality monitoring network	1	1	1	3	3	9	H	S	
59	The FVRD will continue working in partnership with other agencies and health authorities as part of an air quality advisory network that creates and delivers consistent and timely health messaging to the public about poor air quality conditions	1	1	1	3	3	9	H	O	

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		Goal 1: Health	Goal 2: Visibility	Goal 3: Odour	Goal 4: Climate					
60	The FVRD will continue conducting emission assessments and forecast studies for all sources of emissions to enhance understanding of the impacts that local emission sources have on populated areas and of emission sources that might require further controls	1	1		1	3	7	M	O	
61	The FVRD will continue to support or deliver air quality education programs developed by the FVRD for schools in the Fraser Valley	1	1		1	3	9	H	O	
62	The FVRD will provide information and awareness to local communities about air quality issues at the individual or community level by utilizing multiple methods of communication (e.g., public forums, regional events, internet and mass media resources, education and extension centers, signage at parks and scenic viewpoints, etc.)	1	1		1	2	7	M	S	
63	The FVRD will advocate for the Province to ensure that they are able to review and address all air emission complaints and compliance issues received in a timely manner	1	1	1		3	8	M	M	
64	The FVRD will continue to assist regional stakeholders with air quality knowledge and data upon request	1	1		1	3	8	M	O	
65	The FVRD will continue to participate in the BC Visibility Coordinating Committee (BCVCC) on managing visual air quality through activities such as:	1	1			3	7	M	O	
	a Developing visual air quality goals, metrics, indices, and rating tools;	1	1			3	7			
	b Helping to maintain a visual air quality monitoring network at the FVRD air quality monitoring stations to collect and analyze visibility data;	1	1			2	6			
	c Raising public awareness of air quality impacts on visibility through communications, outreach, published materials, interpretive signage, and community workshops	1	1			3	7			

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66	The FVRD will work with regional stakeholders directly affected by poor visual quality, such as health, tourism, and real estate sectors, to receive feedback, to better understand the regional impact of haze and poor visibility days, and form partnerships to collectively improve visual air quality	1	1			3	1	6	L	M
67	The FVRD will identify further opportunities for information exchange and collaboration with local First Nation communities on air quality	1	1		1	2	2	7	M	S
68	The FVRD will continue supporting stewardship group such as the Fraser Valley Watersheds Coalition to replant degraded habitat sites with native trees and shrubs and restoring healthy ecosystems that help mitigate the impacts of climate change	1	1		1	2	1	6	L	O



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