

WESTRIDGE MARINE TERMINAL ENVIRONMENTAL AIR
ASSESSMENT

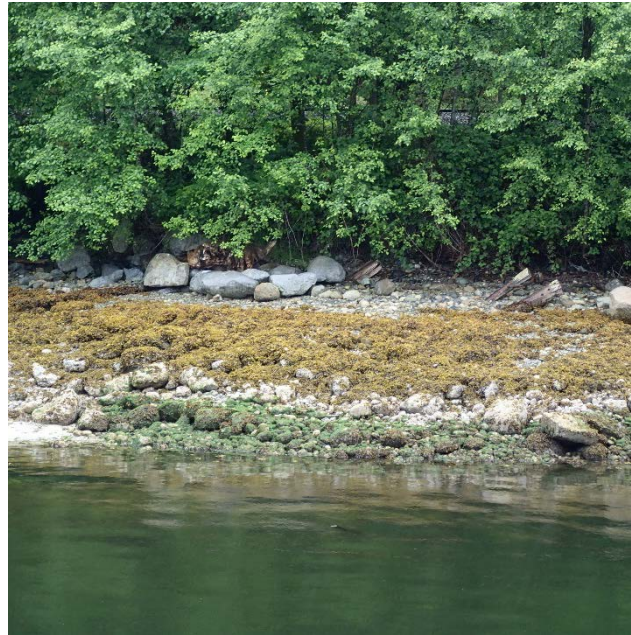
WESTRIDGE MARINE TERMINAL UPGRADE AND EXPANSION PROJECT APPLICATION TO VANCOUVER FRASER PORT AUTHORITY

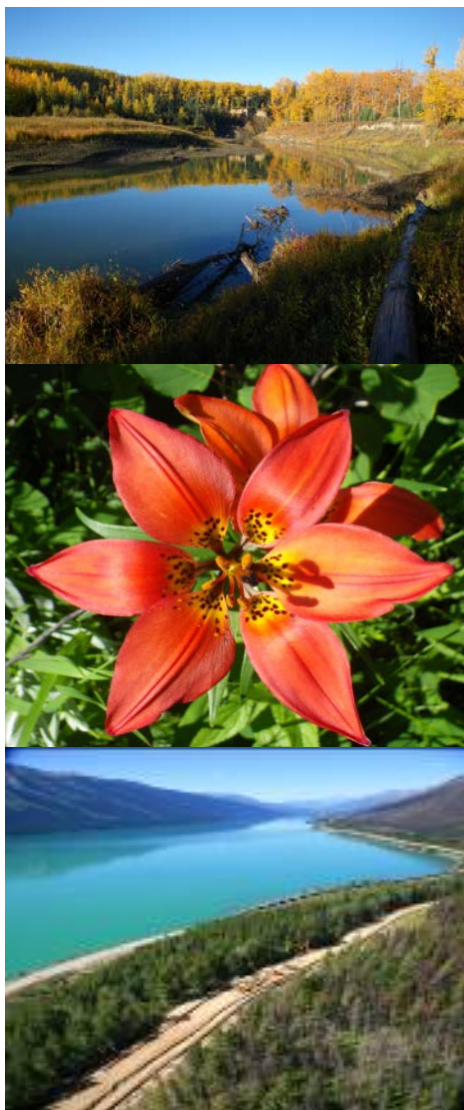


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May 2017





AIR EMISSIONS MANAGEMENT PLAN FOR WESTRIDGE MARINE TERMINAL TRANS MOUNTAIN PIPELINE ULC TRANS MOUNTAIN EXPANSION PROJECT NEB CONDITION 52

April 2017

REV 1

01-13283-TW-WT00-RWD-RPT-0002

Prepared for:



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Trans Mountain Expansion Project

Guide to the Environmental Plans

Environmental Plans
Volume 1 – Temporary Construction Lands and Infrastructure Environmental Protection Plan
Volume 2 – Pipeline Environmental Protection Plan
Volume 3 – Facilities Environmental Protection Plan
Volume 4 – Westridge Marine Terminal Environmental Protection Plan
Volume 5 – Reactivation Environmental Protection Plan
Volume 6 – Environmental Management Plans
Volume 7 – Resource-Specific Mitigation Tables
Volume 8 – Environmental Alignment Sheets
Volume 9 – Burnaby Mountain Tunneling Environmental Protection Plan
Volume 10 – Power Lines Environmental Protection Plans

This plan forms part of Volume 6 and is located:

Volume 6 – Environmental Management Plans
Section 1 – Organizational Structure
Section 2 – Socio–Economic Management
Section 3 – Contaminated Sites and Waste Management
Section 4 – Geological and Groundwater Management
Section 5 – Vegetation Management
Section 6 – Wildlife Management Plans
Section 7 – Wetland Management
Section 8 – Aquatic Resource Management
Section 9 – Reclamation Plans
Section 10 – Facilities Management Plans
Section 11 – Burnaby Mountain Tunneling Management

TABLE OF CONCORDANCE

Condition 52 is applicable to the following legal instrument: OC-064 (CPCN). The table below describes how this Plan addresses the Condition requirements applicable to Project activities.

LEGAL INSTRUMENT CONCORDANCE WITH NEB CONDITION 52: AIR EMISSIONS MANAGEMENT PLAN FOR WESTRIDGE MARINE TERMINAL

NEB Condition 52	OC-064 (CPCN)
Trans Mountain must file with the NEB for approval, at least 4 months prior to commencing construction at the Westridge Marine Terminal, an Air Emissions Management Plan for the Westridge Marine Terminal that includes:	Section 3.1 of this Plan
a) locations of air monitoring sites (on a map or diagram), including the rationale for the locations selected;	Section 3.2 of this Plan
b) confirmation that the new fixed air monitoring stations will be installed and operating at least one year prior to commencing operations at the Westridge Marine Terminal to establish robust local baseline data;	Section 3.3 of this Plan
c) the methods and schedule for ambient monitoring of contaminants of potential concern in air (e.g., particulate matter [including diesel particulate matter and speciation of PM _{2.5}], nitrogen oxides (including NO ₂), sulphur dioxide, hydrogen sulphide, ozone, mercaptans, reduced visibility and volatile organic compounds) following a recognized protocol (e.g. National Air Pollution Surveillance program or U.S. Environmental Protection Agency), and emissions source tracking;	Section 3.3.9 of this Plan
d) representative meteorological data (e.g. wind speed, wind direction, air temperature and relative humidity) for the monitoring period;	Sections 3.3 to 3.7 of this Plan
e) description of monitoring equipment and procedures for monitoring station data recording, assessment, quality assurance and reporting details, including a description of how the real time and non-continuous air quality monitoring data will be made available to the public;	Section 4 of this Plan
f) a particulate matter management plan;	Section 6 of this Plan
g) a description of the public and Aboriginal communication and complaint response processes;	Section 1.3 of this Plan
h) the criteria or thresholds that, if triggered or exceeded, would require implementing additional mitigation measures;	Section 5 of this Plan
i) a description of additional mitigation measures that would be implemented as a result of the monitoring data or ongoing concerns; and	Section 2, Appendix A and Appendix B of this Plan
j) a summary of its consultations with Appropriate Government Authorities, potentially affected Aboriginal groups and affected landowners/tenants. In its summary, Trans Mountain must provide a description and justification for how Trans Mountain has incorporated the results of its consultation, including any recommendations from those consulted, into the plan.	

EXECUTIVE SUMMARY

The Air Emissions Management Plan (AEMP or the Plan) for Westridge Marine Terminal (WMT) was prepared to meet National Energy Board (NEB) Condition 52 regarding the Trans Mountain Expansion Project ("the Project" or "TMEP"). The AEMP has been developed following extensive consultation with Aboriginal groups, Appropriate Government Authorities and landowners/tenants. The AEMP is aligned with information from other plans that have been prepared in support of the Project and together form the Project Environmental Plans.

The objectives of this AEMP are to provide an ambient air quality monitoring plan and to provide mitigation measures for managing particulate matter (PM) emissions to be implemented during construction and operations at the WMT. Trans Mountain has committed to meeting the applicable ambient air quality objectives as they relate to operational emissions from WMT and will continue to evaluate Project effects based on any design changes, as required. The objectives were drawn from several government regulators including Metro Vancouver (MV), British Columbia Ministry of Environment (BC MOE), Alberta Environment and Parks (AEP), Canadian Council of Ministers of the Environment (CCME), and Environment and Climate Change Canada (ECCC). Some of the objectives that Trans Mountain agreed to comply are in alignment with Alberta requirements, in the absence of BC MOE, MV or federal objectives.

The methods and schedules for ambient monitoring are outlined including specific models of continuous analyzers that are proposed for field deployment. The most recent dispersion modelling results are provided for the chemicals of interest as concentration contours. These contours indicate where the maximum predicted concentrations from the Project-related emissions are expected to occur. A wind rose plot is also provided that indicates how frequently a given wind direction occurs. Both the predicted concentrations and wind frequency plot are provided to assist with the objective decision-making needed to site the new ambient air quality monitoring station at WMT. Locations are provided for the proposed continuous monitoring station and two passive samplers. The Alberta Air Monitoring Directive will be adopted to address all proposed instrumentation details, analyses, quality control and quality assurance methods, data validation, audits and reporting commitments. Other relevant guideline documents from MV, BC MOE and ECCC will be considered.

In addition to ambient monitoring, emissions from on-site sources will be tracked, and monitored per the National Pollutant Release Inventory methodology. Both point and storage emission sources will be considered when tracking emissions to air, for example:

- point or stack releases to air from stacks, vents, ducts, pipes or other confined process streams. Releases to air from pollution control equipment such as the Vapour Recovery Units (VRUs) and the Vapour Combustion Unit (VCU) generally fall into this category; and
- storage or handling releases to air from storage tanks or handling of materials such as jet fuel.

In addition to tracking and reporting the chemicals of interest, greenhouse gas emissions will also be monitored and reported if the calculated annual emissions exceed the reporting thresholds for either the National Greenhouse Gas Reporting Program and/or the BC Reporting Regulation.

Trans Mountain plans to publish the readings from the ambient air quality monitoring program during operations in real-time via a web-based reporting platform. This allows viewing of both real-time and historical air quality and meteorological readings that will be collected at WMT.

Trans Mountain also plans to issue reports detailing the results of the monitoring program with an assessment of the readings in terms of compliance with the applicable ambient air quality objectives. These monthly summaries will be issued annually and posted to the web-based reporting platform. The contents of each report may include summary tables of readings, figures such as wind roses, and statistics related to station and instrument operation.

A Particulate Matter Management Program (PMMP) describes mitigation measures to limit emissions of PM from construction and operations at WMT. Details are provided for the construction plan and schedule, sensitive receptors of interest, local climate and weather, proposed controls and dust reduction practices, and administrative controls to monitor, record keep, handle complaints and ensure remedial action is taken. The PMMP is a more detailed plan than that prescribed to control fugitive dust emissions as outlined in Section 4 of the Fugitive Emissions Management Plan (FEMP) for WMT (NEB Condition 53).

Trans Mountain's Odour Complaint Investigation and Response Procedure outlines the ambient air and meteorological measurements and facility activity information that are collected for each odour complaint and retained for trending analyses. During the operation of WMT, these data will be analyzed to identify specific products that may be causing recurring odours. If necessary, further mitigation measures will then be investigated and potentially implemented to reduce the occurrence of odours. Measured elevated levels of odorous compounds will be investigated even when no complaint is filed.

If any measured exceedances of the federal, BC, MV or Alberta Ambient Air Quality Objectives (AAQOs) are noted by future air quality monitoring, the results will be analyzed to determine the source of the exceedance as well as the frequency of exceedance. If the exceedance is determined to be due to emissions from WMT, appropriate mitigation measures will be put in place. Several mitigation measures have been identified that could be implemented in response to any validated ambient monitoring results that exceed the AAQOs. These measures could include changing management or tanker loading practices and the installation of additional emission control equipment.

Trans Mountain's program for addressing Aboriginal or public complaints with respect to point source or storage tank emissions is explained in Section 4.2 Odour Complaint Investigation and Response Procedure of the KMC Environment Manual (see Appendix E).

ACRONYMS

AAAQO	Alberta Ambient Air Quality Objectives
AEMP	Air Emissions Management Plan
AEP	Alberta Environment and Parks
BC AAQO	British Columbia Ambient Air Quality Objectives
BC MOE	British Columbia Ministry of Environment
BC	British Columbia
CAAQS	Canadian Ambient Air Quality Standard
CCME	Canadian Council of Ministers of the Environment
CO	Carbon monoxide
CPCN	Certificate of Public Convenience and Necessity
ECCC	Environment and Climate Change Canada
ESA	Environmental and Socio-economic Assessment
FEMP	Fugitive Emissions Management Plan
FID	Flame ionization detector
FVRD	Fraser Valley Regional District
GC	Gas chromatography
GHG	Greenhouse gas
H ₂ S	Hydrogen sulphide
KMC	Kinder Morgan Canada Inc.
MV	Metro Vancouver
NAPS	National Air Pollution Surveillance Program
NEB	National Energy Board
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPRI	National Pollutant Release Inventory
O ₃	Ozone
PID	Photoionization detector
PM _{2.5}	Particulate matter less than 2.5 µm in diameter
PM	Particulate matter
PMMP	Particulate Matter Management Plan
SO ₂	Sulphur dioxide
TMEP	Trans Mountain Expansion Project
TMPL	Trans Mountain Pipeline
TRS	Total Reduced Sulphur
US EPA	United States Environmental Protection Agency
UV	Ultraviolet
VCU	Vapour Combustion Unit
VFPA	Vancouver Fraser Port Authority
VOC	Volatile Organic Compound
VRU	Vapour Recovery Unit
WMT	Westridge Marine Terminal

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- Appendix E: KMC Environmental Manual. Section 4.2 Odour Complaint Investigation and Response Procedure
- Appendix F: Supplemental Air Quality Technical Report No. 3

1.0 INTRODUCTION

The Air Emissions Management Plan (AEMP or the Plan) for Westridge Marine Terminal (WMT) was prepared to meet the requirements of NEB Condition 52. The Plan was submitted to Appropriate Government Authorities, potentially affected Aboriginal groups, and public stakeholders on November 22, 2016 for a review and feedback period which concluded on February 24, 2017, although additional Appropriate Government Authority and Aboriginal group feedback was considered until March 3, 2017. Trans Mountain incorporated any feedback into the final Plan or has provided rationale for why input has not been included, as summarized in Appendix A.

Since the November 2016 release of the draft Plan, engineering design has continued to progress and there have been changes that are described in detail in TMEP Fall 2016 Project Updates (www.transmountain.com/environmental-plans). All of the design updates have been reviewed, and no revisions to this Plan were required as a result of the design updates.

The following AEMP for the expansion of WMT has been prepared to summarize the recommended location and timing for the installation, operation and reporting from an ambient air quality monitoring station. This Plan also outlines a PM management plan, measures for source emission tracking, and a summary of public consultation. The measures in this Plan consider all relevant information presented throughout the Hearing OH-001-2014 for Trans Mountain Expansion Project (TMEP or the Project).

1.1 Project Description

Trans Mountain Pipeline ULC (Trans Mountain) filed its Facilities Application (the Application) with the NEB in December 2013. In developing its Application, Trans Mountain commenced an engagement and communications program of extensive discussions with landowners, engagement with Aboriginal groups and consultation with affected stakeholders. This program was intended to gather input from these groups into the Application and supporting Environmental and Socio-Economic Assessment (ESA), and to continue to assist Trans Mountain in the design and execution of the Project. Trans Mountain is also working with Appropriate Government Authorities to carry out the necessary reviews, studies and assessments required for the Project.

1.2 Objectives and Measurable Goals

The objectives of this AEMP are to provide an ambient air quality monitoring plan and to provide mitigation measures for managing PM emissions to be implemented during construction and operations at WMT.

Trans Mountain has committed to meeting the most stringent applicable ambient air quality objectives listed in Table 1 for WMT. As detailed in the footnotes under the table, to address the contaminants of interest, these objectives were drawn from several government regulators including Metro Vancouver (MV), British Columbia Ministry of Environment (BC MOE), Alberta Environment and Parks (AEP), Canadian Council of Ministers of the Environment (CCME) and Environment and Climate Change Canada (ECCC). As noted in the footnotes of this table, some of the objectives that Trans Mountain agreed to comply with are in alignment with Alberta requirements, in the absence of BC, MV or federal objectives.

TABLE 1
AMBIENT AIR QUALITY OBJECTIVES (IN μm^3)

Contaminant	Averaging Period	BC MOE	Metro Vancouver	Federal
PM _{2.5}	24-hour	25 ^[1]	25	27 to 28 ^[4]
	Annual	8	8	8.8 to 10 ^[5]
Diesel PM	24-hour	n/a	n/a	n/a
	Annual	n/a	n/a	n/a

Contaminant	Averaging Period	BC MOE	Metro Vancouver	Federal
CO	1-hour	14,300	30,000	15,000
	8-hour	5,500	10,000	6,000
NO ₂	1-hour	n/a	200	400
	1-hour 98 th	188 ^[2]	n/a	n/a
	24-hour	n/a	n/a	200
	Annual	n/a	40	60
SO ₂	1-hour	n/a	196	170 to 183 ^[6]
	1-hour 99 th	200 ^[3]	n/a	n/a
	24-hour	n/a	125	n/a
	Annual	25	30	10.5 to 13.1 ^[7]
Benzene	1-hour	30 ^[8]	n/a	n/a
	Annual	3 ^[8]	n/a	n/a
Ethyl benzene	1-hour	2,000 ^[8]	n/a	n/a
Toluene	1-hour	1,880 ^[8]	n/a	n/a
	24-hour	400 ^[8]	n/a	n/a
Xylenes	1-hour	2,300 ^[8]	n/a	n/a
	24-hour	700 ^[8]	n/a	n/a
TRS	1-hour	7	14 acceptable 7 desirable	n/a
	24-hour	3	n/a	n/a

References: AEP (2016a), BC MOE (2016), CCME (1999, 2015, 2016)

Notes: n/a not available

Highlighted cells indicate the value to be met.

[1] The BC Provincial PM_{2.5} 24-hour objective is based on 98th percentile values.

[2] Based on daily 1-hour maximum, annual 98th percentile of 1 year data.

[3] Based on daily 1-hour maximum, annual 99th percentile of 1 year data.

[4] The Canadian Ambient Air Quality Standard (CAAQS) is 28 µg/m³ in 2015 and 27 µg/m³ in 2020; compliance based on annual 98th percentile value, averaged over three consecutive years.

[5] The CAAQS is 10.0 µg/m³ for 2015 and 8.8 µg/m³ for 2020; compliance based on the average taken over three consecutive years.

[6] The CAAQS is 183 µg/m³ for 2020 and 170 µg/m³ for 2025; compliance based on 3-year average of the annual 99th percentile of the SO₂ daily maximum 1-hour average concentrations.

[7] The CAAQS is 13.1 µg/m³ for 2020 and 10.5 µg/m³ for 2025; compliance based on the arithmetic average over a single year of all 1-hour average SO₂ concentrations.

[8] Alberta Ambient Air Quality Objectives (AAAQO) have been presented for benzene, ethyl benzene, toluene and xylenes as BC does not have objectives for these pollutants.

1.3 Links to Other Trans Mountain Environmental Plans

Information from other management plans prepared for the Project that are related to air emissions management for WMT has been considered in this AEMP. The links between the AEMP and other Trans Mountain Management Plans are provided in Table 2.

TABLE 2
TRANS MOUNTAIN MANAGEMENT PLANS LINKED TO AEMP

Management/Protection Plan	Objectives or Mitigation Topics Contained in Plan Linked to the AEMP
Fugitive Emissions Management Plan for Westridge Marine Terminal (Volume 6)	The purpose of this Plan is to manage fugitive emissions due to construction and operation of WMT.
Air Emissions Management Plan for Edmonton, Sumas and Burnaby Terminals (Volume 6)	The purpose of this Plan is to manage air emissions due to construction and operation of Edmonton, Sumas and Burnaby Terminals.

1.4 Commitment Management

Trans Mountain made a number of commitments regarding the Project during the OH-001-2014 proceedings and engagement activities up to May 2016. Commitments were made to improve and optimize Project planning and mitigation measures. As Trans Mountain has consolidated its commitments into a Commitments Tracking Table in accordance with NEB Condition 6, the table of commitments in each plan has been removed.

The updated Commitments Tracking Table was filed with the NEB and is available on Trans Mountain's web site at www.transmountain.com. Trans Mountain continues to monitor and track compliance with its commitments and will update, post to its website and file with the NEB updated versions of the Commitments Tracking Table according to the timeframes outlined in NEB Condition 6. Commitments with specific relevance to this Plan have been considered and incorporated into this Plan.

1.5 Regulatory Guidance

This Plan was developed in consideration of the current regulatory policies and guidance. Air quality protection is regulated under a variety of legislations, including the provincial Environmental Management Act and Greenhouse Gas Reduction Targets Act. Other non-statutory guidance developed by regulatory authorities includes:

- Canadian Ambient Air Quality Standards (CCME 1999, 2015, 2016);
- Alberta Ambient Air Quality Objectives and Guidelines (AEP 2016a);
- Metro Vancouver Ambient Air Quality Objectives (MV 2016a);
- British Columbia Air Quality Objectives and Standards (BC MOE 2016); and
- North American Emission Control Area requirements (IMO 2017).

2.0 CONSULTATION AND ENGAGEMENT

Consultation and engagement activities related to air emissions from WMT were completed between May 2012 and March 2017 with Appropriate Government Authorities, potentially affected Aboriginal groups and affected landowners/tenants. Opportunities to discuss the air emissions from WMT and identify issues or concerns were provided to public stakeholders through the Trans Mountain website, workshops, meetings and ongoing engagement activities during the reporting period. Appendix A includes a comprehensive record of these engagement activities, stakeholder feedback and Trans Mountain responses.

The draft Plan was released on November 22, 2016, for review and feedback. Feedback was requested by February 24, 2017, although additional Appropriate Government Authority feedback was considered until March 3, 2017. Trans Mountain incorporated any feedback into the final Plan or has provided rationale for why input has not been included, as summarized in Appendix A.

Engineering design changes were issued in the TMEP Fall 2016 Project Update document (www.transmountain.com/environmental-plans) along with a request for feedback. All of the design updates have been reviewed, and no revisions to this Plan were required as a result of the design updates.

3.0 MONITORING

In the absence of detailed guidance on all aspects of siting, operating, calibrating and reporting from ambient air quality and meteorological stations from MV or the BC MOE, Trans Mountain will install, operate, maintain, calibrate and report based on guidance from the Alberta Air Monitoring Directive (AEP 2016b). Other guidance documents will be considered including the following:

- Metro Vancouver Procedure No. AQ02/01/3.00P – Instrument Audits and Primary Calibration (GVRD 2006);
- Air Monitoring and Site Selection and Exposure Criteria (BC MOE 2013);

- QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring (US EPA 2013);
- QA Handbook for Air Pollution Measurement Systems Volume IV Meteorological Measurements (US EPA 2008);
- NAPS Network QA and QC Guidelines (EC 2004) and proposed update in 2017; and
- Ambient Air Monitoring Protocol for PM_{2.5} and Ozone (CCME 2011).

3.1 Proposed Station Locations

Maximum predicted concentration contours for 24-hour and annual PM_{2.5}, 1-hour, 24-hour and annual NO₂, 1-hour, 24-hour and annual SO₂, 1-hour and annual benzene, and 1-hour and 24-hour H₂S at WMT are represented as Figures C1 to C12, respectively, in Appendix C. These contours represent Application Case (Base Case plus Project) results which show Project effects that will assist with identifying suitable locations where the greatest likelihood exists to measure the highest concentrations. Ambient background has not been included in these contours. The reason for this style of presentation is to demonstrate the predicted effects from WMT to assist with siting the ambient air quality monitoring stations. Accounting for the ambient background in these contours would not influence the siting of the station as the background concentrations are expected to be spatially uniform near WMT.

Results are provided for the proposed berth layout scenario as shown in Figure 1. Also shown are the locations of the two proposed vapour recovery unit (VRU) stacks and the vapour combustion unit (VCU) stack on the foreshore. Note that the stack locations have been updated from the original design presented in the hearing (see Appendix F for details). The current ambient air quality monitoring station (SAM - Système Automatisé de Monitoring), which measures VOCs, H₂S, SO₂, wind speed and wind direction, is located in the southwest corner of the WMT, as shown in Figure 1.

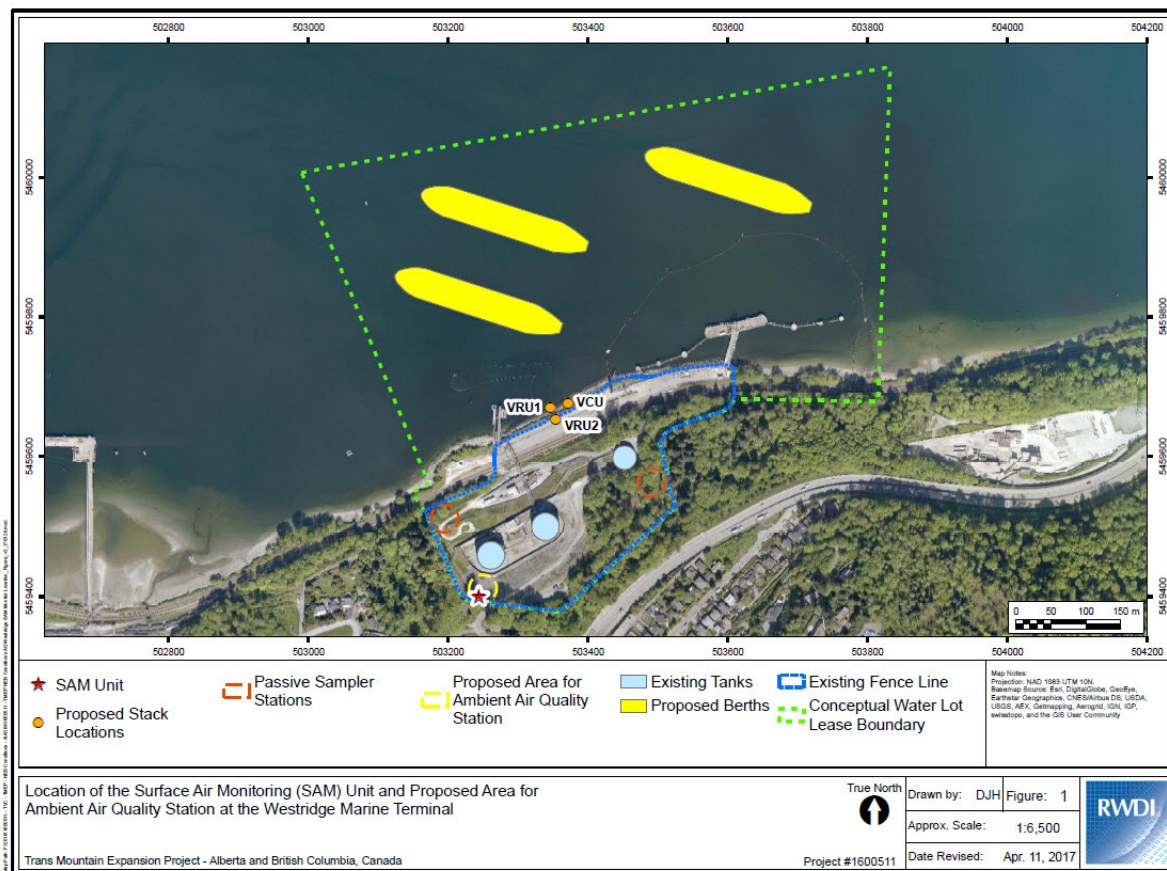


FIGURE 1
LOCATION OF THE EXISTING AMBIENT AIR MONITORING STATION (SAM UNIT) AND PROPOSED LAYOUT OF WESTRIDGE MARINE TERMINAL

These concentration contours are based on the Application Case (Base Case plus Project) modelling results from WMT only. Several updates to the emissions estimates and dispersion modelling were made including updated product types, updated assumptions with respect to product volumes, updated emissions during tanker loading, more stringent process specifications for the VRUs and VCU, and refinements to the approach for estimating NO₂ levels near WMT. As well, the land use for Burnaby Mountain was updated to reflect more recent activities. Appendix D presents a summary of the predicted maximum concentrations from the combined effects of Burnaby Terminal, marine traffic emissions and Westridge Marine Terminal plus ambient background for the Application Case. The predicted concentrations are below the respective criteria. Specific engineering design details and modelled parameters are provided in Appendix F (Supplemental Air Quality Technical Report No. 3).

The following emission sources from WMT were accounted for in the Application Case concentration contours:

- three jet fuel storage tanks;
- two VRUs and one VCU;
- marine Project-related berth combustion emissions from tankers auxiliary engines and boilers at three berths; and
- fugitive emissions from tankers at three berths (assuming 99.5% collection efficiency).

Most of the figures in Appendix C show that the maximum predicted concentrations (which exclude modelled receptors inside the conceptual water lot lease boundary and the landside property boundary) lie to the east-southeast along the WMT property boundary. This can be seen in Figures C1, C3 to C7, C9 and C11 which tend to reflect the 1-hour and 24-hour averaging periods. Higher concentrations were also predicted to occur over land to the southwest of the WMT property boundary. These higher concentrations are aligned with the predominant wind directions at WMT being east-northeasterly through east-southeasterly as shown in FIGURE 11.

Figures C2, C8 and C10 indicate that the maximum predicted concentrations (all annual averaging period) occurred over the water along the west side of the water lot boundary. As noted above, higher concentrations were also predicted to occur over land to the southwest of the WMT property boundary.

Finally, Figure C12 shows that the predicted maximum 24-hour H₂S concentration also occurred over water but on the east side of the water lot boundary near the third berth. All the predicted maximum concentrations were less than their respective ambient air quality objectives, which are shown in the title box on each of the twelve figures.

Therefore, based on the updated Application Case concentration contours, monitoring should occur on the southeast or southwest sides of the WMT to maximize the potential for measuring the highest concentrations due to Project-related emissions for the pollutants of interest. Figure 1 presents the proposed area for the continuous ambient air quality monitoring station as well as two passive sampling stations.

Other considerations for siting the new continuous monitoring station should be based on the following factors: maximizing exposure to pollutants, proximity to the populated areas, accessibility of the monitoring site, reducing air quality impacts from access roads (this factor is more important when considering NO₂ or PM measurements), and access to electrical power for a continuous monitoring station.

Trans Mountain also proposes to install two passive stations for one year during operations to measure SO₂ and NO₂ which will be used to validate the dispersion model predictions (Sonoma 2008). As indicated by the dispersion modelling results in Appendix C and recommended by ECCC in Table A-3, Appendix A, one station will be near the shoreline on the west side and the second station will be on the eastern property line.

All ambient monitoring requirements, will be further refined in consultation with Aboriginal groups, the Appropriate Government Authorities such as MV, BC MOE, ECCC and FVRD, and potentially affected landowners. Trans Mountain will install, operate, maintain, calibrate and report based on guidance from

the Alberta Air Monitoring Directive (AEP 2016b). Other guidance documents such as the National Air Pollution Surveillance Program (NAPS) Quality Assurance and Quality Control Guidelines and methods prepared by NAPS and MV will be considered.

3.2 Installation Schedule

The air quality monitoring station will be installed and operating at least one year prior to commencing TMEP operations at WMT per the requirements of NEB Condition 52. Although there will be some overlap with construction activities for a portion of the initial 12-month period, this will establish baseline conditions to which measurements during Project-related operations can be compared.

Ambient air quality monitoring measurements from the SAM station have also produced continuous measurements since June 2015; therefore, a record of H₂S, SO₂, TVOCs, wind speed and wind direction could be summarized to characterize baseline conditions at WMT.

3.3 Sampling Methods

Most of the sampling will be based on MV standard methods which are generally based on NAPS methods (EC 2004). Where necessary, methods described by Alberta Environment and Parks (AEP 2014) may also be used where NAPS or MV methods are not defined. Methods are described for the collection of continuous air quality readings for a number of common air contaminants, including oxides of nitrogen (NO_x), SO₂, O₃, PM_{2.5}, speciated PM_{2.5}, diesel PM, H₂S, mercaptans and VOCs.

All MV, ECCC and AEP sampling protocols and analyzers are derived from designated United States Environmental Protection Agency (US EPA 2015) Reference or Equivalent Methods for contaminants for which that designation exists. For all other contaminants, analyzers will be chosen based on methods and standards that are acceptable to MV.

Measurements of all contaminants will be conducted on a continuous basis and averaged hourly and daily except speciation of PM_{2.5} which will be sampled once every six days over a 24-hour period according to the NAPS schedule.

3.3.1 Oxides of Nitrogen (NO, NO₂ and NO_x)

The measurement of NO₂ is based on NAPS Method No.: 8.08/2.1/M – Continuous Measurement of Nitrogen Dioxide (NO₂) in Ambient Air by Chemiluminescence. The chemiluminescent method only detects NO, and therefore, NO₂ must be converted to NO. The light intensity caused by the chemiluminescent reaction of NO with excess O₃ is measured which can then be related to NO₂ concentration. Trans Mountain is proposing to use a Thermo Scientific 42i analyzer to measure NO₂. This type of analyzer is currently operated by MV.

3.3.2 Sulphur Dioxide (SO₂)

The measurement of SO₂ is based on NAPS Method No.: 8.09/2.1/M – Continuous Measurement of Sulphur Dioxide (SO₂) in Ambient Air by Ultraviolet (UV) Fluorescence. The fluorescent method is based on the principle that SO₂ molecules will absorb and re-emit ultraviolet light at different wavelengths and the intensity of emission is proportional to the concentration of SO₂. Trans Mountain is proposing to use a Thermo Scientific 43i analyzer to measure SO₂.

3.3.3 Ozone (O₃)

The measurement of O₃ is based on NAPS Method No.: 8.02/2.1/M – Continuous Measurement of Ozone in Ambient Air by Ultraviolet (UV). The UV method is based on the strong absorption of UV light by O₃. Sample air is split into two streams, one with O₃ present and one with O₃ scrubbed. The difference in UV absorption between the two paths is proportional to the concentration of O₃ in the ambient air. Trans Mountain is proposing to use a Thermo Scientific 49i analyzer to measure O₃.

3.3.4 Respirable Particulate Matter (PM_{2.5})

The measurement of PM_{2.5} is based on MV Method No.: AQ02/01/25.00M – DRAFT Measurement of Particulate using Synchronized Hybrid and Ambient Real-time Particulate (SHARP) Monitors (this Method is currently under development). In the absence of the MV method, the methods described by NAPS and

Alberta Environment will be followed. The SHARP monitor's measurement principle is based on using two different types of detectors to achieve continuous measurement of PM_{2.5} concentration. The SHARP method uses a combination of a beta attenuation detector that measures the absorption of beta radiation by the sample deposited on filter tape in conjunction with a nephelometer that measures the light absorption of the sample in air. Trans Mountain is proposing to use a Thermo Scientific 5030i analyzer to measure PM_{2.5}.

Speciation of PM_{2.5} will be conducted by Trans Mountain using a Met One SuperSASS sampler. This type of sampler collects PM_{2.5} samples in canisters on a one in six day frequency. The samples are sent to the NAPS laboratory in Ottawa for speciation analysis. This type of sampler is used by MV and NAPS.

3.3.5 Diesel Particulate Matter (Black Carbon)

The measurement of diesel PM or Black Carbon is based on MV Method No.: AQ02/01/23.00M – DRAFT Method for the Measurement of Black Carbon Concentration in Ambient Air using an Aethalometer (this Method is currently under development by MV). Measurement of Black Carbon using an aethalometer is achieved by collecting airborne particles onto filter tape and measuring the light absorbing properties of the particles. The light absorbing properties are measured at multiple wavelengths to provide information about particle composition. Trans Mountain is proposing to use a Teledyne Advanced Pollution Instrumentation Model 633 aethalometer to measure Black Carbon.

3.3.6 Volatile Organic Compounds (VOCs)

In the absence of MV specifications, the measurement of VOCs, including benzene, toluene, ethylbenzene and xylenes, is based on AEP Performance Specification Standards for VOCs. The method of measurement involves gas chromatography (GC) and either photoionization detection (PID) or flame ionization (FID). The first stage of this method uses GC to separate the sample into their individual constituents while the second step uses a PID with a UV light to ionize the sample constituents with the current generated being proportional to concentration of hydrocarbons in the sample. For the alternative approach in the second stage, hydrocarbons are measured by delivering the sample gas to a detector flame. During combustion, hydrocarbon-based gases are ionized creating a current flow which is proportional to the amount of hydrocarbons in the sample. Trans Mountain is proposing to use a Baseline Mocon Series 9100 GC-PID Gas Chromatograph or SRI Instruments 8610C GC-FID to measure VOCs.

3.3.7 Hydrogen Sulphide (H₂S) including Mercaptans (as Total Reduced Sulphur)

In the absence of a continuous ambient monitor for mercaptans, which as a group includes a number of reduced sulphurs, mercaptans will be measured as total reduced sulphur (TRS). The measurement of TRS (which includes H₂S and mercaptans) is based on AEP Performance Specification Standards for H₂S and TRS. The method of measurement involves using UV pulsed fluorescence (the same method described for SO₂) outfitted with a thermal oxidizer. Trans Mountain is proposing to use a Thermo Scientific Model 450i to measure TRS.

3.3.8 Reduced Visibility

Visibility measurements will be taken using continuous monitors and cameras located at each monitoring station in conjunction with air quality and meteorological measurements. The intended direction and line of sight for the camera will be selected with input from a technical representative from the BC Visibility Coordinating Committee (BCVCC). The data collected will be provided to BCVCC for their visibility degradation assessment using their preferred Visual Air Quality Rating (VAQR). Continuous measurements will be made for the following parameters:

- nitrogen dioxide;
- black carbon (aethalometer);
- scatter light (nephelometer);
- relative humidity;
- ambient temperature; and

- barometric pressure.

All these measurements are discussed elsewhere in Section 3.3 except for the nephelometer which will use an Optech Model NGN-2A.

The VAQR is a perception based index that is used to assess visibility. Some examples of the visual air quality ratings are presented in Figure 2.

3.3.9 Meteorological Sensors

Each air quality station will have supporting meteorological instrumentation to take representative measurements. The parameters of interest that will be measured continuously will include the following:

- air temperature (Rotronics HC253);
- relative humidity (Rotronics HC253);
- wind speed (RM Young 05305);
- wind direction (RM Young 05305);
- atmospheric pressure (CSCC CS-100); and
- precipitation (Ott Pluvio 2).

Siting of meteorological instrumentation and sampling heights above grade will conform to BC MOE (2002) or Alberta Air Monitoring Directive (AEP 2016b) siting requirements.

3.4 Emissions Source Tracking

Emissions from on-site sources will be tracked, and monitored per the National Pollutant Release Inventory (NPRI) methodology (ECCC 2016a). Both point and storage emission sources must be considered when tracking emissions to air, for example:

- point or stack releases to air from stacks, vents, ducts, pipes or other confined process streams. Releases to air from pollution control equipment such as the VRUs and VCU generally fall into this category; and
- storage or handling releases to air from storage tanks or handling of materials such as jet fuel.

Although some of the equipment that discharges the chemicals of interest does not operate continuously, the emissions will be calculated on an annual basis and reported to NPRI if any of the reporting thresholds (based on mass such as tonnes emitted) are triggered.

Fugitive emissions will also be tracked per Section 7 of the FEMP for WMT as listed in NEB Condition 53. Examples of fugitive releases include air emissions that cannot be captured and are unintentional, including fugitive equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines, piping for vapour collection during tanker loading.

In addition to the contaminants of interest that will be tracked and reported for NPRI purposes, greenhouse gas (GHG) emissions will also be tracked and considered for reporting to the National Greenhouse Gas Emissions Reporting Program (ECCC 2016b). The Province of British Columbia requires that any linear facilities in BC that emit 10,000 tonnes or more of CO₂e emissions per year are required to report their greenhouse gas emissions to the BC Reporting Regulation (BC MOE 2011). If any of the Trans Mountain BC linear facilities emit more than 10,000 tonnes of CO₂e per year, Trans Mountain will report the emissions under the BC Reporting Regulation.

3.5 Data Recording and Collection

All data collected from air quality analyzers as well as meteorological instrumentation will be collected using a data acquisition system (DAS). This system will record and store data, convert the raw measurements to engineering units, perform preliminary Quality Assurance/Quality Control (QA/QC) and data validation steps on the measurements and provide a means for producing summary reports from all instrumentation. Any elevated concentration readings that approach the AAQOs would trigger an alarm

message to Trans Mountain indicating that a potential exceedance may occur and operational changes may need to occur.

The instrumentation will be located in a large trailer-type shelter (Figure 3). Within the shelter, all analyzers will be rack mounted (Figure 4) with all inlets, probe siting and manifold design conforming to NAPS and BC MOE standards (EC 2004; BC MOE 2002).



FIGURE 2
VISUAL AIR QUALITY RATINGS



FIGURE 3
EXAMPLE OF AN AIR QUALITY MONITORING SHELTER



FIGURE 4
EXAMPLE OF RACK-TYPE ANALYZER MOUNTING WITHIN A SHELTER

3.6 Audits and Calibrations

All audits and calibrations will be performed according to procedures described by MV Instrument Audits and Primary Calibration - Ambient Air Program Standard Operating Procedures, Procedure No.: AQ02/01/3.00P. Calibrations include the frequency and acceptance criteria for zero/span checks, precision checks, and multipoint verifications/calibrations. Audits will be conducted using MV and NAPS standard procedures for systems and gases. All performance specifications of MV and NAPS will be adhered to.

Data QA/QC and data validation procedures, will follow the Alberta Air Monitoring Directive (AEP 2016b) with consideration of updated NAPS guidance which is currently under review.

3.7 Data Analysis and Reporting

Trans Mountain will issue reports detailing the results of the monitoring program including an assessment of the results relative to the AAQOs and equipment performance. These reports will be issued annually and will be posted to the public web-based reporting platform. Trans Mountain will rely upon real-time measurements (which would also be posted to the web-based reporting platform) to address any air quality issues as they occur. Users of the website would be able to request a summary of readings over a user-specified period up to 30 days.

MV does not have a standard set of reporting protocols for ambient air quality readings; therefore, reporting protocols for an ambient monitoring program will be defined based on other jurisdictions such as Alberta and upon the specific needs or requests from interveners. One approach for reporting is to follow the detailed procedure outlined by AEP Sections 3.1, 5.3 and 6.3 of the Alberta Air Monitoring Directive Chapter 9 (AEP 2016b).

The contents of each report will include monthly summary tables of readings, figures such as wind roses, and operating performance statistics related to station and instrument operation. Figures 5 to 8 provide examples of the types of information that will be provided in the reports.

Operational and Statistical Summary of Half-Hour Averages

Particulate Matter < 2.5µm (PM_{2.5}) - µg/m³

December 2014

Maximum Value: 24 µg/m ³ on Dec 4 03:00										Maximum Daily Average: 8 µg/m ³ on Dec 4										Half-hours in Service: 1488									
Minimum Value: 0 µg/m ³ on Dec 4 20:00										Minimum Daily Average: 1 µg/m ³ on Dec 14										Half-hours of Valid Data: 1478									
Maximum Diurnal Average: 5 µg/m ³ at hour 17										Minimum Diurnal Average: 3 µg/m ³ at hour 4										Half-hours of Invalid Data: 10									
Monthly Average: 4 µg/m ³										Percentiles: P ₁ = 0 P ₅ = 0 Q ₁ = 1 Median = 3 Q ₃ = 5 P ₉₅ = 9 P ₉₉ = 16											Percent Operational Time: 99.3								
Half-Hour Period Beginning At (EST)																													
Day	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	Daily Average	Daily Maximum			
1-Dec	2	2	2	5	3	4	4	5	5	5	4	4	3	3	2	2	3	4	5	6	12	13	10	7	5	13			
2-Dec	2	3	3	3	4	4	5	5	4	5	4	4	3	3	3	3	2	4	6	9	10	12	8	12	5	19			
3-Dec	19	6	6	9	3	1	1	3	3	4	6	2	2	2	2	4	5	7	11	13	6	5	6	5	6	18			
4-Dec	10	6	7	10	1	2	3	4	2	4	4	3	3	4	4	4	3	6	7	11	8	5	4	5	8	24			
5-Dec	6	12	9	5	10	6	7	5	3	5	5	4	3	3	5	4	3	4	7	9	3	6	8	3	6	22			
6-Dec	10	14	6	6	7	6	7	4	4	4	4	3	3	4	2	2	3	7	18	4	3	8	4	5	8	14			
7-Dec	6	5	16	24	8	3	4	16	16	9	6	8	6	p	5	7	7	7	8	7	0	1	2	7	4	12			
8-Dec	5	7	21	13	4	3	11	16	10	7	7	10	p	7	8	7	4	9	9	4	1	3	8	9	8	18			
9-Dec	9	6	6	5	6	5	9	14	22	14	11	10	7	7	5	3	5	7	10	5	4	4	4	4	8	22			
10-Dec	9	6	5	4	9	7	11	18	17	13	9	8	6	5	5	4	6	10	11	4	7	3	4	5	4	14			
11-Dec	4	3	2	3	3	2	3	3	3	2	2	3	1	2	2	3	3	5	6	11	7	8	14	9	4	12			
12-Dec	3	2	2	4	3	4	3	3	3	4	3	3	1	1	1	3	3	10	9	8	8	12	11	7	4	18			
13-Dec	9	11	9	11	8	6	7	8	8	6	0	0	0	0	0	0	0	0	0	0	0	4	2	1	4	12			
14-Dec	10	9	12	10	8	6	8	1	10	0	0	0	0	0	0	0	0	0	0	0	1	3	2	1	5	18			
15-Dec	3	2	4	4	6	3	2	4	5	6	9	9	9	6	5	14	9	9	8	6	1	0	0	0	5	12			
16-Dec	3	2	5	6	4	2	4	4	4	7	10	9	7	5	6	18	11	12	4	5	1	0	0	0	8	18			
17-Dec	0	0	1	2	2	1	2	3	3	4	5	6	5	8	6	5	4	7	4	6	9	12	0	1	4	12			
18-Dec	0	1	1	2	1	1	2	2	4	4	6	4	6	5	5	5	4	9	4	8	11	2	1	2	4	12			
19-Dec	3	2	5	5	6	6	9	7	8	9	12	3	0	0	0	1	4	1	3	2	5	2	3	3	4	12			
20-Dec	3	4	5	6	6	5	8	9	7	9	11	0	0	0	0	4	3	3	2	3	3	2	3	2	3	5			
21-Dec	3	1	3	2	2	3	3	2	4	3	4	2	3	3	3	3	4	3	3	4	5	5	4	5	3	5			
22-Dec	2	3	3	2	2	2	5	4	2	3	2	3	2	4	3	4	4	3	4	4	4	3	2	3	8	15			
23-Dec	5	3	3	6	5	4	6	5	6	7	6	7	2	14	14	7	5	12	12	15	12	11	11	11	8	15			
24-Dec	5	2	2	4	4	6	6	6	6	6	6	2	7	10	7	5	7	13	14	11	10	8	14	15	5	14			
25-Dec	14	12	13	6	5	4	5	8	10	9	7	2	3	2	2	2	2	4	4	3	6	2	1	2	5	14			
26-Dec	11	14	8	5	4	4	6	10	9	6	5	1	4	2	2	2	3	3	3	5	4	5	3	0	1	3			
27-Dec	1	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	2	2	3	0	2	0	0	1	1	3			
28-Dec	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1	3	1	0	0	0	0	0	1	3			
29-Dec	2	0	0	0	1	3	4	1	2	2	2	1	3	2	3	2	0	1	1	1	1	0	0	1	1	6			
30-Dec	1	0	0	0	2	2	2	6	2	5	3	1	1	2	3	2	0	1	1	0	0	0	0	0	1	6			

RWDL

RWDI.

FIGURE 5
EXAMPLE STATISTICAL SUMMARY TABLE FOR PM_{2.5}

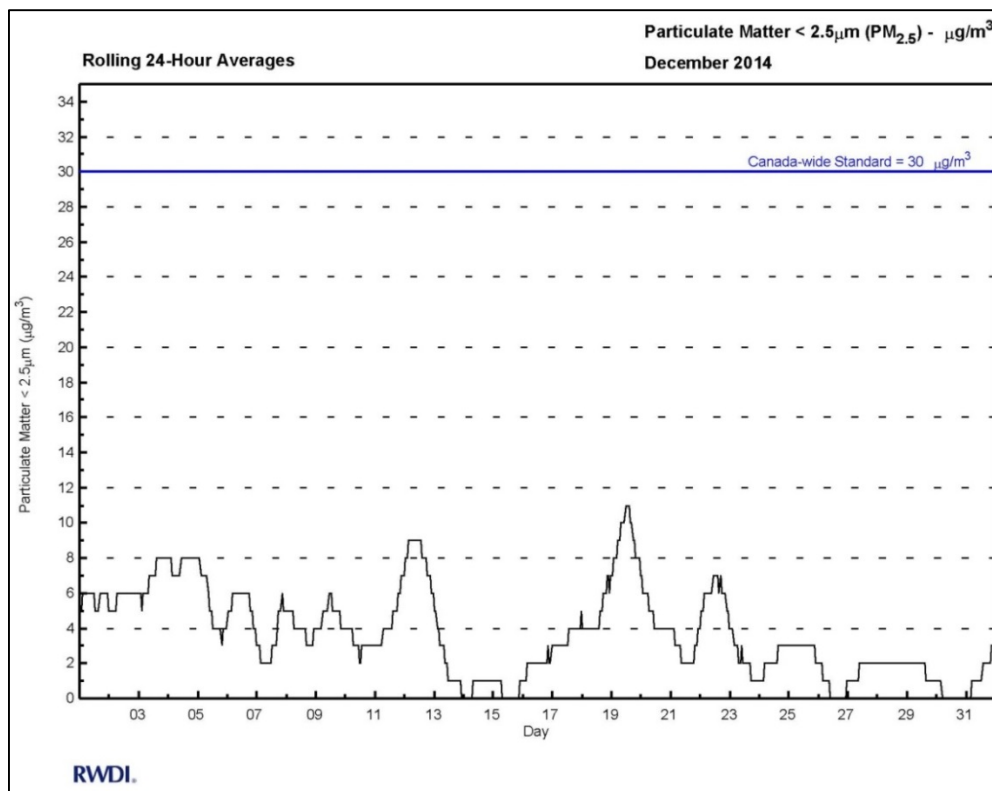


FIGURE 6
EXAMPLE OF ROLING 24-HOUR AVERAGE PM_{2.5} CONCENTRATIONS

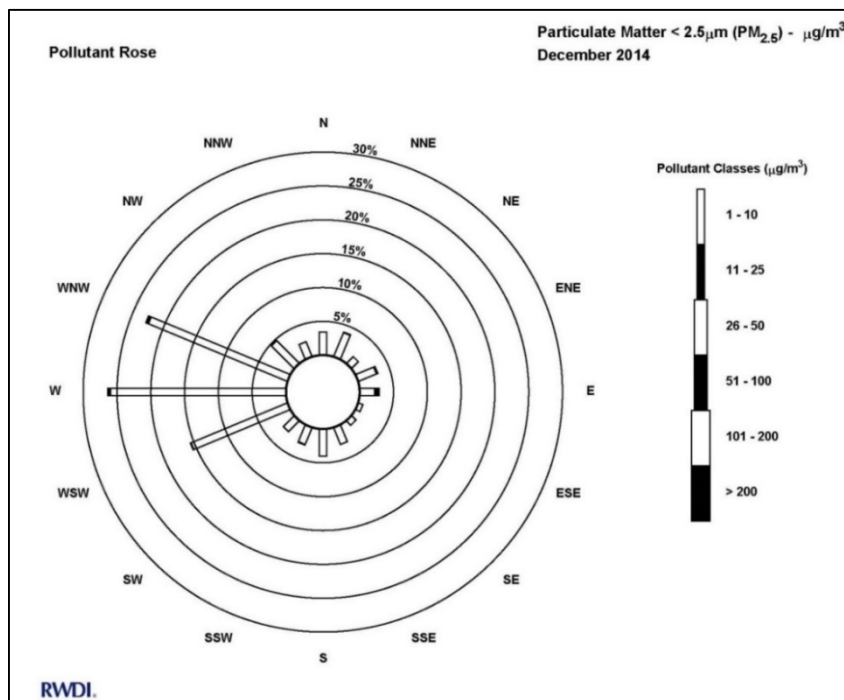


FIGURE 7
EXAMPLE OF JOINT FREQUENCY DISTRIBUTION OF WIND DIRECTION AND PM_{2.5} CONCENTRATION

**Monthly Air Monitoring Summary
Dec-15**

Station #1:
Station #2:

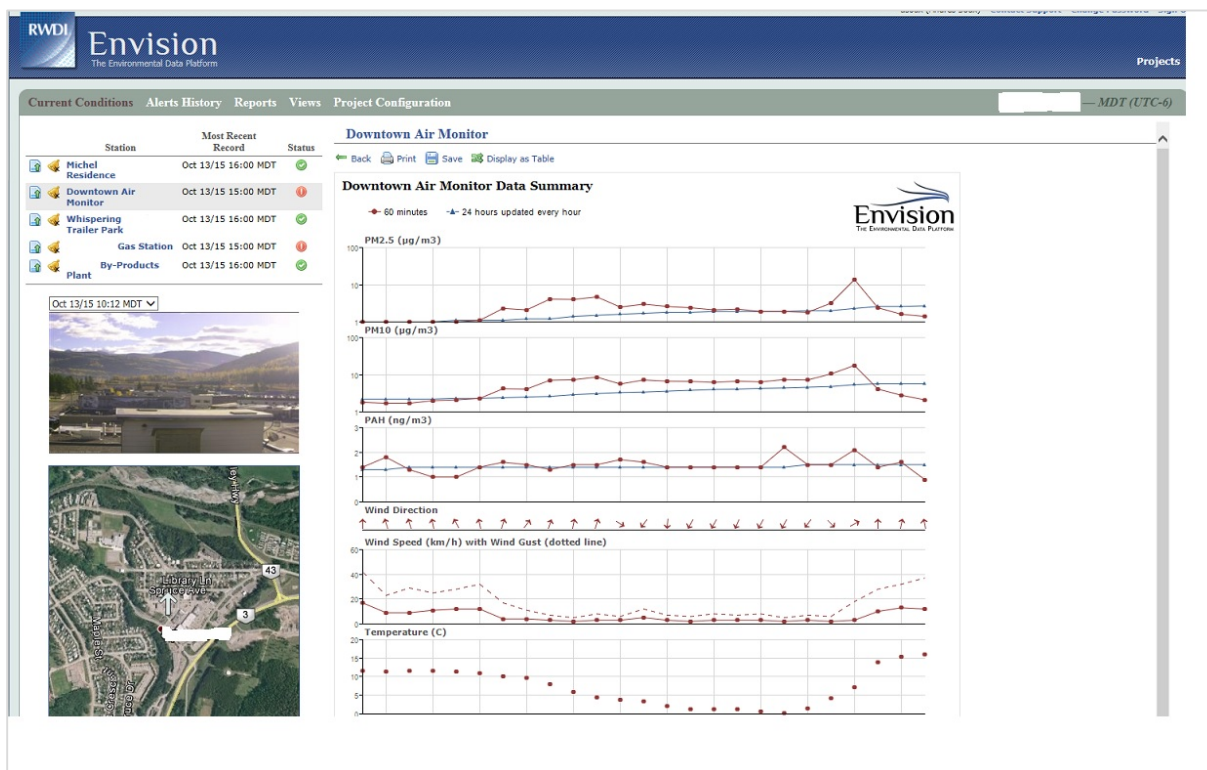
Station Parameter	Station #1 - Frederica	Station #2 - Bailey
	TRS	TRS
Percent Operational Time	99.9%	72.5%
Percent Valid Time	97.6%	70.9%
Maximum Rolling 10-Minute Concentration	11 ppb	2 ppb
Maximum Rolling Half-Hour Concentration	6 ppb	1 ppb
Maximum Rolling 24-Hour Concentration	1 ppb	0 ppb
No. of Readings > 24-Hour Schedule 3 Standard	0	0
No. of Readings > Half-Hour Technical Standard	0	0
No. of Readings > Half-Hour URT	0	0
No. of Readings > 24-Hour URT	0	0

Standards and Thresholds: (Rolling Concentrations)

Schedule 3 Standards: 24-Hour TRS Concentration > 10 ppb
O. Reg. 419/05 P&P Technical Standard: Half-Hour TRS Concentration > 27 ppb.
Half-Hour Upper Risk Threshold (Half-Hour URT): Half-Hour TRS Concentration > 143 ppb
24-Hour Upper Risk Threshold (24-Hour URT): 24-Hour TRS Concentration > 48 ppb

**FIGURE 8
EXAMPLE SUMMARY TABLE FOR TOTAL REDUCED SULPHUR AT TWO STATIONS**

Trans Mountain will publish the readings from the ambient air quality monitoring program in real-time via a web-based reporting platform similar to that shown in Figure 9. This will allow public viewing of both real-time and historical air quality and meteorological readings that are being collected at WMT.



**FIGURE 9
SCREENSHOT DISPLAYING EXAMPLE OF THE INFORMATION TO BE POSTED ON THE PUBLIC WEBSITE**

4.0 PARTICULATE MATTER MANAGEMENT PLAN

4.1 Objectives

The objectives of the Particulate Matter Management Plan (PMMP) are to minimize emissions of PM from construction activities to the air, ensure that construction emissions meet applicable standards, and control construction activities that produce dust and PM from combustion and site disturbance. In addition to identifying activities that create dust emissions, the PMMP provides guidance to understand relevant weather conditions that affect emissions, best management practices, planning measures, monitoring, record keeping, complaint tracking and remedial action. Although there is some redundancy with the Fugitive Emissions Management Plan for WMT (NEB Condition 53) by listing the dust control measures during construction, this PMMP also discusses active management of PM emissions from operations.

With the implementation of the PMMP recommendations, it is expected that construction at WMT will be completed with a manageable level of air quality impacts on the surrounding environment. While adherence to the PMMP will not completely eliminate the potential for complaints related to air quality impacts, it does provide for a corrective action mechanism to deal with such complaints should they arise.

4.2 Regulatory Requirements and Commitments

Air quality protection is regulated under a variety of legislations, including the provincial Environmental Management Act and Greenhouse Gas Reduction Targets Act. Other non-statutory guidance developed by regulatory authorities includes:

- Canadian Ambient Air Quality Standards (CCME 1999, 2015, 2016);
- Alberta Ambient Air Quality Objectives and Guidelines (AEP 2016a);
- Metro Vancouver Ambient Air Quality Objectives (MV 2016a); and
- British Columbia Air Quality Objectives and Standards (BC MOE 2016).

Management of construction-related air emissions relevant to the Project are provided in the Best Management Practices for the Reduction of Air Emissions from Construction and Demolition Activities (Cheminfo et al 2005).

4.3 Construction Plan

The primary scope elements at WMT will be in two areas, the foreshore area and the dock area, and will include activities such as excavating, constructing concrete containments and access road as well as installing equipment (e.g., VRUs, VCU, piping). Some specific details are summarized below for the two areas although these should be considered as preliminary and subject to design change.

Foreshore area:

- excavating unsuitable materials and installing infill materials;
- densification of the portions of existing foreshore and the infill areas;
- constructing secondary containment curb for the VRU process area;
- constructing concrete containment and storm-water collection in process equipment areas;
- constructing an access road system;
- constructing a bulkhead wall;
- installing a receiving trap area, valve manifold, and metering system, complete with a prover;
- installing interconnecting process piping between the manifold area and the dock complex, largely above ground;
- installing two VRU systems, including process vessels, pumps, and vapour and process piping;
- installing one vapour combustion unit (VCU) skid, including a fuel sources and vapour piping;
- installing a nitrogen (purge) system;
- installing interconnection vapour piping between the VRU/VCU area and the dock complex, largely above ground;
- installing one fire-water pump building and one foam building;
- installing a fire-water/foam distribution system;

- installing a new electrical sub-station to the northeast on the other side of the road from the 3rd existing (smaller) jet fuel tank; and
- installing Electrical Service Building and a standby generator building, if required.

Dock area:

- demolishing the existing utility dock;
- installing piles (driven and/or socketed);
- installing cast-in-place and/or pre-cast pile caps;
- installing pre-cast and/or pre-fabricated trestle, and loading platform decking structures;
- installing breasting and mooring dolphins;
- installing gangways, catwalks, and other structural components;
- installing the terminating segments of the incoming pipeline at the berths;
- installing loading arms, and other mechanical components;
- installing interconnection process and vapour piping from the foreshore to the berths (above water);
- installing a fire-water/foam distribution system;
- installing a contained storm-water collection and return system; and
- demolish or decommission or remain in place the existing loading/unloading dock and its associated infrastructure, after the new Berth is in service.

4.4 Construction Schedule

Although subject to change as the design progresses and regulatory approvals are received, work on the new facilities at WMT is expected to take approximately 32 months from August 2017 through March 2020. Marine construction is currently planned to begin in August 2017 (subject to receiving all approvals), to take advantage of the marine least risk window for in-water work. In-water marine construction includes riprap removal on the foreshore, piling foreshore structure as well as trestle, platform and dolphin piling. Pipe, mechanical and electrical construction will progress as the marine and land foundations are completed with Berths 1 and 2 commissioned and entering service in December 2019, and Berth 3 entering service in March 2020.

4.5 Receptors

Air quality impacts related to the proposed construction/demolition activities need to be minimized on both the surrounding natural environment, and on human health which affects the quality of life. WMT is located in the City of Burnaby in a mixed land-use setting surrounded mainly by fjord, forest, residences, parks, and recreational and heritage areas. Sensitive receptors of interest include:

- | | |
|-----------------------|---------------------------|
| ▪ schools; | ▪ long term care centres; |
| ▪ hospitals; | ▪ residences; and |
| ▪ child care centres; | ▪ public parks. |

All of the closest receptors in these categories that are located within approximately 2 km of the existing terminals were reviewed. For residences, individual receptors were selected to represent a group of nearby residences based on proximity to the proposed construction activities. Figure 10 shows the identified receptors and Table 3 shows their approximate distances from WMT.

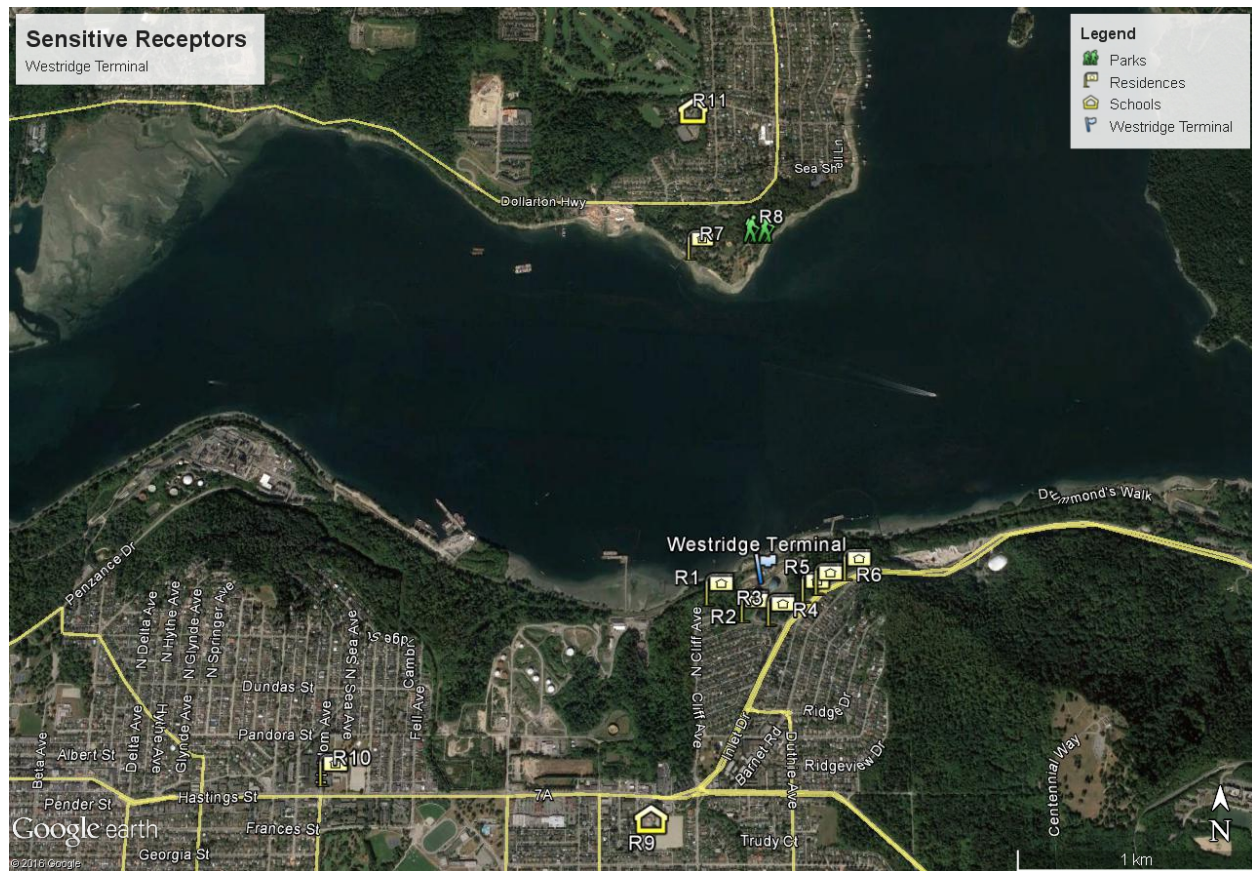


FIGURE 10
EXISTING SENSITIVE RECEPTORS IN THE WESTRIDGE MARINE TERMINAL AREA

TABLE 3
CLOSEST SENSITIVE RECEPTORS TO WESTRIDGE MARINE TERMINAL

Index	Receptor	Category	Approx. Distance to Site (m)
Westridge Marine Terminal			
R1	Nearest Houses to West	Residence	150
R2	Nearest Houses to Southwest	Residence	100
R3	Nearest Houses to South	Residence	150
R4	Nearest Houses to Southeast	Residence	140
R5	Nearest Houses to East Southeast	Residence	200
R6	Nearest Houses to East	Residence	300
R7	Nearest Houses to North	Residence	1200
R8	Cates Park	Park	1400
R9	Westridge Elementary School	School	1200
R10	Ecole Capitol Hill Elementary School	School	2000
R11	Sherwood Park Elementary School	School	2100

4.6 Local Climate and Weather

Climate and weather parameters such as wind speed, wind direction, cloud cover, temperature, humidity, and precipitation can have significant effects on pollutant emissions from construction and demolition activities as well as their subsequent dispersion – particularly for dust.

Dust particles may become entrained by the action of turbulent air currents, such as wind erosion of an exposed surface, by wind speeds over 19 km/h (5 m/s) (US EPA 1995). Below this threshold, dust emissions of this type are expected to be minimal. Wind speed also has a significant effect on the distance to which impacts may be observed, with higher wind speeds leading to longer range impacts. Wind direction plays a critical role in pollution transport downwind of a source of emissions, governing where impacts could potentially occur. Wind direction may also correlate with turbulence at the construction site, as well as downwind of the site, due to upwind surface characteristics. Turbulence affects the dispersion of emissions, where greater turbulence results in greater dilution of an emissions plume, and, as mentioned above, turbulence can affect the degree of entrainment of dust at the source. Figure 11 is a graphical plot (wind rose) of the frequency of wind direction by wind speed for WMT for year 2011. The lobes indicate the direction from which the wind originated so a longer lobe would indicate a more frequent wind direction over the year. The wind rose indicates that the most common wind directions are from the east-southeast through east-northeast (collectively about 39% of the time) which shows a strong alignment with the local terrain features. Westerly winds typically occur about 10.5% of the time. Measureable wind speeds tend to be light to moderate but when stronger winds occur (up to 9 m/s or about 30 km/h) they tend to originate from the west or east-southeast. Calm winds occurred about 8.7% of the time.

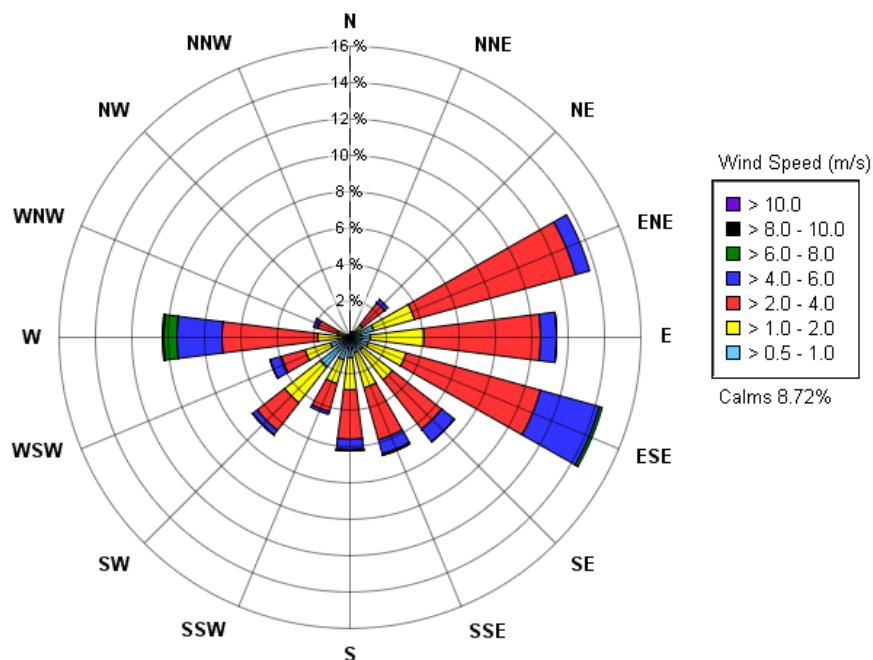


FIGURE 11
CALMET MODEL-PRODUCED WIND ROSE CENTRED ON THE WESTRIDGE MARINE TERMINAL
FOR THE PERIOD JANUARY 1 TO DECEMBER 31, 2011

Cloud cover, temperature, humidity, and precipitation affect the moisture content of outdoor materials such as stripped and exposed soil, aggregates and other fill, and paved and unpaved road surface materials. In large enough quantities, rain can act to flush surfaces, cleaning them of silt and dust, leading to reduced emissions. Snow can also act to suppress emissions by covering silt and dust laden

surfaces. As shown in Figure 12, the wettest months of the year are November through January with some snowfall in December and January. Summer months are likely to be most susceptible to elevated dust emissions in general due to low levels of precipitation, and favorable drying conditions.

Temperature plays an additional role in that water may be rendered a non-practical or unsafe emissions control option near or below freezing. However, climate data indicate that temperatures are generally not expected to be below freezing in winter months and that June through August tend to be the warmest months.

Detailed meteorological data for WMT were provided in Section 4.1.1.4 of Volume 5C-4 (Filing ID [A3S1U1](#)).

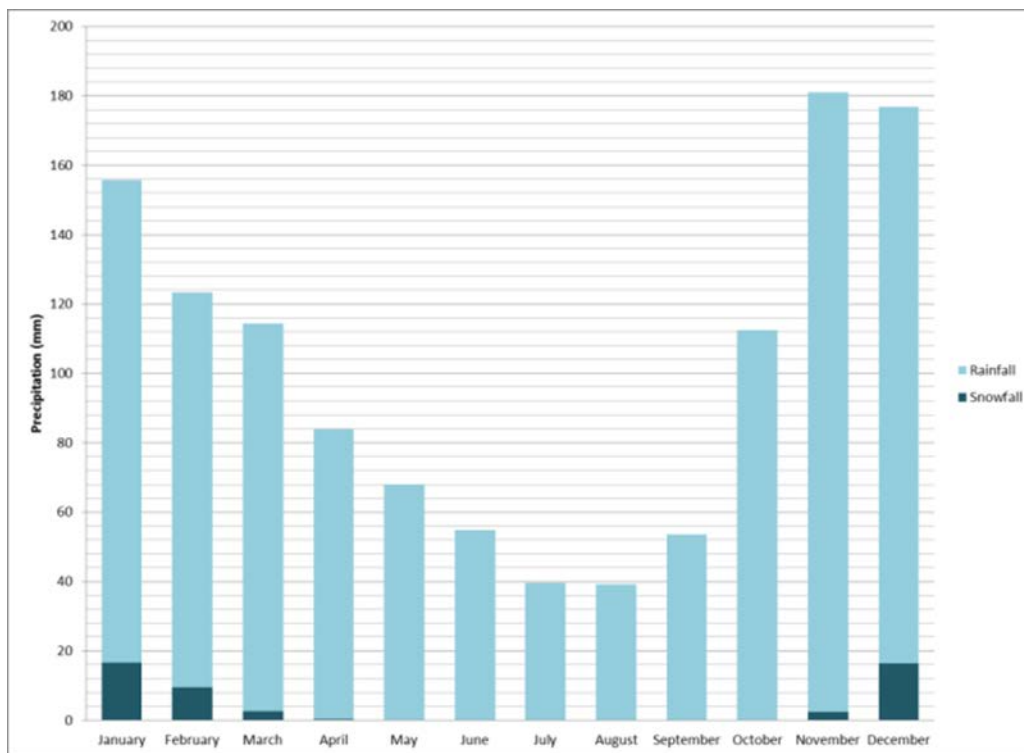


FIGURE 12
PRECIPITATION REGIME FROM VANCOUVER INTERNATIONAL AIRPORT CLIMATE NORMALS, 1971 TO 2000

4.7 Emission Sources

During the construction phase, site preparation, operation of vehicles and equipment, and other construction activities will result in PM emissions of several size fractions. Larger particles (e.g., dustfall) are generally associated with nuisance effects such as surface soiling. Smaller particles (e.g., PM_{2.5}, diesel PM) have the potential to cause human health effects at elevated levels, which supports the NEB decision for their inclusion in their ambient air quality monitoring station at WMT. This PMMP is designed to address all of these PM size fractions. Emissions of PM that may arise from the construction/demolition activities identified in the construction plan can be grouped into two main categories including fugitive dust (particulates) and combustion emissions (such as diesel soot). During tanker loading of crude oil, some PM emissions from operations will occur due to marine traffic and VOC emission control equipment. All of these construction-related fugitive, combustion, and operational emission sources are discussed further in the following sections.

4.7.1 Fugitive Dust

Fugitive dust is expected to be the largest source of emissions from WMT during construction. The potential sources of fugitive dust that were identified can be grouped into six main activities:

- site preparation;
- storage piles and material handling;
- conveyor transferring;
- access/haul roads;
- construction processes; and
- demolition and deconstruction.

Fugitive dust emissions are also discussed in the Fugitive Emissions Management Plan (FEMP) for WMT (NEB Condition 53).

4.7.1.1 Site Preparation

Site preparation activities at WMT include earthworks such as building additional construction accesses, soil stripping and clearing (i.e., tree cutting and grubbing), excavation, rough grading and modifying existing or creating new roads, as well as berm construction and site rehabilitation. These activities are expected to involve excavator, bulldozer and haul truck operations that have the potential to result in significant emissions of fugitive dust. There are various options for reducing potential emissions from these sources; those most applicable have been listed in Section 4.8.1.

4.7.1.2 Storage Piles and Materials Handling

Construction at WMT will result in the need to stock-pile various materials such as cleared brush, stripped soil, excavated earth, other construction waste, as well as aggregates and other construction inputs. Dust particles on the surfaces of these piles may become entrained by the action of turbulent air currents during moderate to high wind speeds. Below this range, dust emissions of this type are expected to be minimal. In addition, handling and transferring of materials to and from piles could potentially result in dust emissions if not adequately controlled. There are a number of emission reduction practices applicable to fugitive dust emissions from storage piles, most of which involve reducing the exposure of storage piles to wind. The practices are listed in Section 4.8.1.

4.7.1.3 Conveyor Transfers

Construction at WMT may involve conveyor transfers of various materials. Dust particles on the surfaces of these conveyor transfers may result in fugitive dust emissions. There are a number of emission reduction practices applicable to fugitive dust emissions from conveyor transfers, the mostly likely that the gravel being conveyed from barge to shore would be wetted before transfer. The practices are listed in Section 4.8.1.

4.7.1.4 Access/Haul Roads

Construction at WMT will require the use of existing paved roads, gravel roads and trails, plus the construction of new temporary and permanent access roads. Dust emissions that result from vehicle and equipment travel on unpaved roads are expected; however, if diligently controlled, these emissions can be rendered minimal.

There may also be paved roads on site or off-site that act as access roads. Paved roads can accumulate mud, dust, and silt “track-out” that may eventually result in fugitive dust emissions. There are well-established dust reduction practices for road surfaces, which are listed in Section 4.8.1.

4.7.1.5 Construction Processes

Construction at WMT will include processes such as cutting, grinding, welding, drilling and sand or grit blasting. The activities could result in fugitive dust emissions if not effectively managed. Applicable emissions reduction techniques for these sources are listed in Section 4.8.1.

4.7.1.6 Demolition and Deconstruction

Prior to or after various phases of construction at WMT parts or all of the existing utility dock and the existing tanker loading berth may or may not be demolished and it may be decommissioned in part or in

whole. Demolition could involve material dropping and handling, as well as processes such as cutting, and drilling, as described above. These activities have the potential to result in significant dust emissions; however, several emission reduction practices are provided in Section 4.8.1.

4.7.2 Combustion Emissions

The preliminary equipment plan for WMT included a variety of heavy equipment such as different sizes of trucks (e.g., for hauling and fuel transport), bulldozers, generators, loaders, graders, compressors, cranes, zoom booms and other equipment. There may also be requirements for portable heaters. Emissions from this construction equipment will use gasoline or diesel fuels so tail-pipe emissions will contain trace amounts of PM.

Many initiatives under the ECCC Federal Agenda on Cleaner Vehicles, Engines and Fuels, such as the off-road compression-ignition (diesel) engine emission regulation, are now in force and apply to most of the newer equipment that would be used for this construction project. These initiatives are expected to significantly reduce emissions from much of the heavy equipment assuming proper operating conditions and maintenance. There are, however, further emission reduction practices available for these sources, as described in Section 4.8.2.

4.7.3 Operational Emissions

During tanker loading, PM emissions are expected to result from operating the VRUs and the standby VCU. The VRUs do not burn any fuel so releases of dust emissions would be trace amounts found in the inert gases being pulled back to shore from the tanker holds. Although used infrequently, the VCU will burn propane fuel which will create some PM in the exhaust gases. Finally, PM emissions are expected to be released from the auxiliary engine exhausts in particular on the tankers at berth and tugs used for maneuvering the tankers from anchorage to berth and vice-versa. These marine vessel combustion emissions reflect combustion products from marine distillate fuel used onboard vessels during cargo loading. Neither the tanker main propulsion engines nor the tanker boiler are used at berth; however, as a dispersion modelling conservatism, it was assumed that these emission sources were operating. Emission reduction practices are described in Section 4.8.3.

4.8 Emission Reduction Practices

Emission reduction practices for construction sites are generally well-understood and there are many best management practices currently in use within the construction industry. With the implementation of the emission reduction practices outlined in this section, it is expected that the TMEP will be completed with a manageable level of air quality impacts on the surrounding environment. While adherence to these emission reduction practices will not completely eliminate the potential for complaints related to air quality impacts, it does provide for a corrective action mechanism to deal with such complaints should they arise.

A summary of the emission reduction practices, which are primarily based on the document Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (Cheminfo 2005), is provided in the following sections. These emission reduction practices will be implemented from the start of construction.

4.8.1 Fugitive Dust

Table 4 summarizes the emission controls that will be employed to reduce fugitive dust emissions from construction, as identified in Section 4.7.1. The procedures and best practices for mitigating fugitive dust and fugitive fuel vapours from construction operations are also provided in Section 4 of the FEMP for WMT (NEB Condition 53).

TABLE 4
PROPOSED CONTROLS FOR FUGITIVE DUST EMISSION SOURCES DURING WMT CONSTRUCTION

Activity	Emission Control
Site Preparation	- Grade the construction site in phases. - Stabilize surfaces of completed earthworks with vegetation. - Compact distributed soil.
Storage Piles and Material Handling	- Schedule deliveries to minimize the length of time soil piles are present. - Use tarps or other acceptable means of retaining soils on stock piles especially during the winter months. - Maintain a suitable moisture content/dust suppression on roads and on surface material for handling. - Avoid creating steep faces on soil piles. - When practical, conduct loading/unloading activities on the downwind side of the pile. - Minimize drop heights and transfer points whenever practical.
Conveyor Transfers	- Where conveyors are used to transfer gravel from a barge into the foreshore, the pile will be wetted prior to unloading. - Where feasible, for fully enclosed transfer points and conveyor belts, ventilation through PM control equipment (i.e., cyclone, baghouse or similar control device) must be provided at all times when the conveyors are in operation. - Where feasible, the distance between material transfer points shall be minimized. - Where feasible, conveyor belts shall be equipped with belt wipers to keep the conveyor belt surfaces clean. - Where feasible, the ground under conveyors and transfer points shall be regularly cleaned to remove any accumulations of fine PM.
Road Surfaces	- Regular wet cleaning of construction sites and access roads to remove construction-caused debris and dust. - Dust suppression on unpaved haul roads and other traffic areas susceptible to dust using water. - Wet cleaning of paved streets/roads where tracking of soil, mud or dust has occurred, as required. - Tire washes and other methods to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads. - Implement vehicle restrictions that limit the speed, weight or number of vehicles on the road.
Construction Processes	- Apply water sprays in conjunction with cutting operations. - Use diamond bladed floor saws with water pumped through the system when cutting roadways, pavements, or blocks. - Whenever practical, conduct cutting, grinding, drilling, sand or grit blasting in enclosures or partial enclosures.
Demolition and Deconstruction	- Whenever practical, apply deconstruction techniques rather than demolition. - Minimize drop height for debris.

In addition to the above reduction practices for reducing fugitive dust emissions, Trans Mountain has also committed to refrain from burning slash (i.e., waste wood, brush) anywhere in the Lower Fraser Valley (Filing ID [A3Y2K7](#)). This will mitigate the emissions of PM and other combustion-related air pollutants resulting from burning slash.

4.8.2 Construction Combustion Emissions

The following practices will be used to reduce combustion emissions from construction equipment:

- use ultra-low sulphur diesel (<15 ppm sulphur content);
- ensure combustion equipment and exhaust systems are properly maintained; and
- reduce or eliminate engine idling.

Construction equipment exhaust systems and emission control systems (where applicable) will be visually inspected daily by the operators. Random site inspections and 500-hour scheduled inspections will also be conducted. Newer equipment will use passive regeneration which constantly monitors and controls the emissions of the engine. Operators will also be trained to minimize equipment idling.

In addition to the reduction practices mentioned above, Trans Mountain has also committed to complying with MV's Non-Road Diesel Engine Emission Regulation Bylaw No. 1161 while operating in MV as well as in the Fraser Valley Regional District (FVRD) (Filing ID [A3Z1T4](#); GVRD 2012). The bylaw requires the

registration of Tier 0 (manufactured prior to 1996) and Tier 1 (manufactured prior to 2003) non-road diesel engines and restricts exhaust opacity and idling times. Adherence to this bylaw will mitigate the combustion-related emissions of NO_x and PM. Trans Mountain has committed to using Tier 2 (manufactured 2004 and later) engines for land-based construction equipment for engines larger than 75 HP.

4.8.3 Operational Emissions

Trans Mountain has incorporated VOC vapour collection technology into their design for WMT, and encourages low emission standard practices during crude oil loading, both of which will reduce PM emissions. The emission reduction practices described below will be used to reduce PM emissions from tanker loading operations.

- Use the two VRUs as the primary VOC vapour removal equipment so no combustion emissions would occur. Trace amounts of PM originating from the inert gases being collected from the tanker holds may be released from the VRU stacks.
- Keep the propane-fired VCU in standby mode most of the time to avoid the release of combustion products including PM that are created during VOC incineration. Planned use of the VCU is less than five percent of the time which reflects a planned minimal usage.
- Tankers not in transit have their main engines turned off while at berth and anchorage, which is a current standard practice. Typically, only one or two auxiliary engines are used at berth to power ships systems and provide comfort heating.
- Continue to require vessels to conform to the fuel quality and operating rules of the Emission Control Area (ECA) to reduce combustion emission products such as SO₂ and PM. The ECA rules have required the use of low sulphur marine distillate fuel since January 1, 2015..
- Westridge operators and Loading Master will continue to bring any observation of unusual or heavy PM emissions from a vessel to the attention of the vessel operator and request for it to be controlled.

4.9 Planning to Reduce Emissions

Beyond the source-specific emission management practices described above, thoughtful planning in the early stages of a construction project can also result in significant emission reductions. Effective planning may also produce co-benefits such as reduced traffic congestion, reduced fuel consumption, accelerated schedule, and improved quality of fabricated components.

Several planning initiatives that may prove beneficial to the Project have been identified and are described in the following sections.

4.9.1 Site Layout

The layout of the construction site should be designed with the minimization of fugitive dust generation and impacts in mind. Construction managers should consider the following:

- do not locate site entrances/exits in areas that are likely to accumulate dust or mud (e.g., low lying areas);
- locate storage piles/stockpiles as far away from sensitive receptors as possible in areas that are protected from wind, if practical;
- locate storage piles/stockpiles close to the location of their end use to minimize on-site travel distances, if practical;
- minimize travel distances to parking and staging areas particularly if these distances occur on unpaved or high silt surfaces; and
- develop a site map showing all unpaved roads, paved roads, stockpiles, material transfer points, material conveyances, parking lots, staging areas and other open areas subject to wind erosion.

4.10 Administration

Where applicable, the construction Contractor will administer the PMMP by implementing the following tasks:

- all control measures shall be in place before construction activities commence;
- formal training on new and existing operating procedures shall be provided to relevant new and existing staff;
- management shall communicate the PMMP to responsible supervisors, who shall ensure personnel are following operating procedures defined in the PMMP;
- the Environmental Manager shall be responsible for ensuring the PMMP is followed;
- management shall ensure the PMMP is reviewed annually; and
- the PMMP shall be kept on file in the most suitable construction trailer.

4.11 Monitoring and Record Keeping

4.11.1 Monitoring

The construction Contractor shall ensure that, if construction/demolition activities are occurring, then the following parameters are monitored continuously, if applicable.

- General Preventative Measures
 - o pre-watering to depth of cuts
 - o pre-watering storage piles
 - o work phased to minimize disturbance
 - o water trucks operating
 - o water trucks filled
- General Mitigative Measures
 - o water applied to dust sources
 - o water runoff, soil instability, or vehicle/equipment mobility problems
- Unpaved Access/Haul Roads
 - o site is free of visible dust
 - o vehicles travelling less than 25 km/h
 - o roads visibly moist
 - o road well-covered with gravel, recycled asphalt, or other suitable material
 - o dust suppressants (approved by the Environmental Inspector) other than water applied to dust sources, if needed
- Loading, Unloading and Storage Piles
 - o visible dust present
- Trackout at Access Points
 - o visible trackout of material on adjacent roads
 - o trackout control device intact and functioning properly
- Weather Forecast Conditions
 - o planning for forecast high wind speed events
 - o number of consecutive days with no precipitation

4.11.2 Record Keeping

- The Contractor shall ensure prior to commencement of construction, a standardized site inspection form has been prepared to document each of the above listed parameters, as well as:
 - o when unpaved roads and regularly travelled portions of the site are re-graded;
 - o when wet or vacuum-sweeper cleans paved surfaces;

- o quantity of water used on-site as a dust suppressant; and
 - o type of chemical dust suppressant applied (if applicable), vendor name, and method, frequency, concentration and quantity of application.
- Trans Mountain shall ensure prior to commencement of construction, a standardized Construction Complaints Process (Process) has been prepared to document information pertaining to complaints received with respect to pollutant emissions as described in the Complaints section of this PMMP.
- The Construction Manager shall ensure that record keeping is being performed at the prescribed frequency.
- Management shall ensure that record-keeping information is stored on-site and information regarding complaints is provided to Trans Mountain for required reporting.
- Management shall ensure that record-keeping information is made available for Trans Mountain reporting and to permitting authorities upon request.
- Management shall ensure that all relevant documentation is retained for at least 3 years after project completion.

4.12 Construction Complaints

A Project Complaints Process (Process) has been developed and aligns with industry best practice as well as meet NEB conditions and commitments made to Intervenor and communities through the regulatory proceedings. Trans Mountain will provide regular complaint reporting updates during all phases of construction.

The Process builds on established Trans Mountain and TMEP communication processes, resources and roles and will be supported by the Project Construction Communications Plan. A separate process is under development for complaints arising from Aboriginal groups.

The goals of the Process are to:

- address stakeholder questions and concerns in a timely manner; and
- meet regulatory requirements.

The goals will be achieved by meeting the following targets:

- provide multiple communication channels to address stakeholder communication needs;
- provide timely detailed information so as to minimize the number of complaints;
- implement construction mitigation measures to minimize the number of complaints;
- promote the complaints communication channels through signage, print, online and social media as well as paid and unpaid media;
- offer email, phone and voicemail access;
- maintain a clear and separate process for all emergency concerns and complaints;
- provide key messages for non-urgent and urgent inquiries or complaints;
- ensure all inquiries and complaints receive timely complaint resolution and responses that are proportional to level of urgency;
- track and report on all inquiries and complaints, including those with immediate resolution;
- report issue resolution, or rationale for non-completion, to Aboriginal groups, landowners/tenants, and Appropriate Government Authorities as required; and
- ensure emergency contact information is available 24/7.

4.12.1 Complaint Management and Handling

Complaints from all sources will be forwarded to a single Trans Mountain intake system. On receipt, complaints will be triaged by the Trans Mountain team undertaking the intake; triage will include determining urgency, type, which appropriate team needs to address, etc. The responsible team will then investigate the complaint, will provide the resolution or indicate where a response is not required. Trans Mountain will respond to the complainant in a timely manner with the required information.

4.12.2 Mitigation to Minimize Complaints

In order to minimize complaints Trans Mountain will:

- provide timely notifications of upcoming Project activities; and
- implement construction and environmental mitigation measures to minimize the number of complaints.

4.12.3 Potential Complaint Sources

Stakeholder complaints may be received from a number of sources including:

- Residents and neighbours
- Elected officials
- Local and regional governments
- Landowners / tenants
- Businesses
- General public including commuters, area users etc.
- Special interest groups
- Others (may include complaints relating to operations)

4.12.4 Process Promotion and Accessibility

The Process and contact information for the complaints line will be promoted through available Trans Mountain communication channels including signage, print, online and social media as well as paid and unpaid media. Local governments and community organizations will be offered tools to promote through associated communication channels (e.g. websites, newsletters, e-blasts). Stakeholders will be able to file complaints by email, phone or mail.

Trans Mountain will also provide complaint contact information to Burnaby Environmental Services Division and the City of Burnaby and request immediate notification if they receive a complaint, to allow for prompt response and follow-up.

4.12.5 Complaint Tracking and Reporting

Trans Mountain will report issue resolution, or rationale for non-completion, to stakeholders, regulators and Appropriate Government Authorities as required. Trans Mountain has developed and will maintain a process/system to track the data described below.

- date and time the complaint was received
- How each complaint was received (e.g., telephone, letter, email) and by whom it was received
- name, address, and phone number of the complainant
- descriptive details of the complaint as reported by the complainant
- location of impact (e.g., place of residence, park)
- cause of complaint and location of source (if known)
- construction or other activities occurring on site at the time of the complaint
- winds at the time of the complaint (e.g., calm, strong, gusty)
- wind direction at the time of the complaint (e.g., from the SE)
- ambient temperature at the time of the complaint
- description of cloud coverage at the time of the complaint (e.g., clear skies, partially cloudy, mostly cloudy, overcast)
- description of precipitation at the time of the complaint (e.g., none, light rain, heavy snow, fog)
- Subsequent dates of all contact or correspondence with each complainant
- Records of any site visits, monitoring, or inspections
- Contact information for all parties involved in each complaint (will not be made public)
- Resolution and date of resolution
- If the complaint was reported to any other entities including Burnaby Environmental Services Division City of Burnaby, Port Metro Vancouver; and date and time it was reported

- If a complaint remains unresolved, a description of any further actions to be taken or an explanation for why no further action is required.

4.12.6 Complaint Response

Trans Mountain will ensure all inquiries and complaints receive timely complaint resolution and responses proportional to level of urgency. track and report on all inquiries and complaints, including those with immediate resolution.

When a complaint is received through the Process, Trans Mountain shall ensure the following steps are taken:

1. Inspect the site and surrounding area to identify possible sources of emissions that lead to the complaint (e.g., visible dust).
2. A complaint form is filled out as per the preceding section.
3. If the available information indicates that construction/demolition activities were not the source of the complaint, the complainant shall be notified of this finding.
4. If it is determined that the complaint was in fact related to the construction/demolition activities, the following response procedures shall be followed, in the order provided below:
 - **Level 1** - Correction of operations as soon as practical. The Construction Manager shall ensure that all elements of the PMMP are being followed. Control measures shall be stepped up or operations curtailed, as required and provided in Section 4.7 to 4.11 of this AEMP.
 - **Level 2** – Review of PMMP. If the Level 1 response does not adequately resolve the source of the complaint (i.e., all measures provided in the PMMP have been implemented), the PMMP shall be reviewed to look for additional control measures to address the source of the complaint.
 - **Level 3** – Operational modifications. If the Level 2 response does not adequately resolve the source of the dust complaint (e.g., if recurring complaint has occurred), the Construction Manager shall commit to making physical changes to the construction site layout to address the source of the complaint, such as additional enclosures, relocation of equipment, or additional paving; or making procedural or scheduling changes to construction/demolition activities to reduce emissions and/or impacts of emissions.

If the available information indicated the construction/demolition activities were identified to be the cause of the complaint, the complainant shall be notified of this finding through the established Process..

4.12.7 Emergencies

All emergency inquiries or complaints will be channeled through established KMC and One-Call communications processes. Trans Mountain will

- maintain a clear and separate process for all emergency concerns and complaints; and
- ensure emergency contact information is available 24/7.

4.13 Summary of the Particulate Matter Management Plan

With the implementation of the PMMP recommendations, it is expected that construction at the terminals will be completed with a manageable level of air quality impacts on the surrounding environment. While adherence to the PMMP will not completely eliminate the potential for complaints related to air quality impacts, it does provide for a corrective action mechanism to deal with such complaints should they arise.

5.0 ADDITIONAL MITIGATION MEASURES

Trans Mountain's Odour Complaint Investigation and Response Procedure outlines the ambient air and meteorological measurements and tank activity information that are collected for each odour complaint

and retained for trending analyses. During the operation of WMT, the data will be analyzed to identify specific products that may be causing recurring odours. If necessary, further mitigation measures will then be investigated and potentially implemented to reduce the occurrence of odours. Measured elevated levels of odorous compounds will be investigated even when no complaint is filed.

If any exceedances of the National, BC, MV or Alberta AAQOs are noted by future air quality monitoring, the results will be analyzed to determine the source of the exceedance as well as the frequency of exceedance. If the exceedance is determined to be due to emissions from WMT, appropriate mitigation measures will be put in place. For any exceedance events, a review of WMT operating conditions will be conducted in addition to meteorological conditions such as wind speed, wind direction, other relevant dispersion parameters, other emission sources such as marine traffic, ambient background concentrations and other factors. Dispersion modelling would be optionally considered.

Mitigation measures that could be implemented, if deemed appropriate, in response to validated ambient monitoring results that exceed the AAQOs, routine leak detection procedures, or confirmed odour concerns raised by Aboriginal groups, Appropriate Government Authorities, residents or land users include:

- repairing leaks as soon as reasonably practical;
- allocating highly odorous vapour streams to VCU;
- adjusting sequence of tanker loadings to reduce peak VOC generation rates;
- temporarily limiting or suspending the loading of highly odorous crude oils; and
- closely monitoring the rate of loading crude oil and adjusting the flow rates accordingly.

6.0 COMMUNICATION PLAN AND COMPLAINT PROCESS

6.1 Aboriginal and Public Communication

Trans Mountain plans to publish the readings from the ambient air quality monitoring program during operations in real-time via a web-based reporting platform. This will allow public viewing of both real-time and historical air quality and meteorological readings that will be collected at WMT.

Trans Mountain also plans to issue reports detailing the results of the monitoring program. These summaries of monthly measurements will be issued annually. The contents of each report may include summary tables of readings, figures such as wind roses, and statistics related to station and instrument operation.

In their commitment to transparency, timeliness, accuracy and proactive communications, KMC has a public notification process in place to provide advance notification to various stakeholders and affected communities about normal operations and maintenance work. Operational and maintenance activities related to potential air emissions that may require notifications include:

- projects/activities that require consultation or information sharing under existing regulations; and
- projects/activities that may have the following impacts:
 - o high visibility to the public;
 - o potential for nuisance odours;
 - o dust due to activities;
 - o work is conducted outside regular business hours with potential for noise, night lights or other disruptions;
 - o work conducted in high profile or environmentally sensitive areas; and
 - o other safety hazards.

KMC employs various outreach methods including emails, letters, signage, advertisements in local newspapers, in-person visits, phone calls, meetings and information sessions. There are also phone lines set up to obtain more information about the project and to report odours or a pipeline emergency.

6.2 Operational Complaints

Trans Mountain's program for addressing public complaints with respect to point source or storage tank emissions during operations is explained in Section 4.2 *Odour Complaint Investigation and Response Procedure* of the KMC *Environment Manual* (Appendix E).

7.0 SUMMARY

The objective of this AEMP is to provide an ambient air quality monitoring plan and to provide mitigation measures for managing PM emissions to be implemented during construction and operations at WMT. Trans Mountain has committed to meeting the applicable ambient air quality objectives as they relate to operational emissions from WMT. These objectives were drawn from several government regulators including MV, BC MOE, AEP, CCME and ECCC.

The methods and schedules for ambient monitoring are outlined including specific models of continuous analyzers that are proposed for field deployment. The most recent dispersion modelling results are provided for the chemicals of interest as concentration contours. These contours indicate where the maximum, predicted concentrations from the Project-related emissions are expected to occur. A wind rose plot is also provided that indicates how frequently a given wind direction occurs. Both the predicted concentrations and wind frequency plot are provided to assist with the objective, decision-making needed to site the new ambient air quality monitoring stations at WMT. The Alberta Air Monitoring Directive will be adopted to address all proposed instrumentation details, analyses, quality control and quality assurance methods, data validation, audits and reporting commitments. Other relevant guideline documents from MV, BC MOE and ECCC will be considered.

Trans Mountain plans to publish the readings from the ambient air quality monitoring program during operations in real-time via a web-based reporting platform. This will allow public viewing of both real-time and historical air quality and meteorological readings that will be collected at WMT.

Trans Mountain also plans to issue reports detailing the results of the monitoring program with an assessment of the readings in terms of compliance with the applicable ambient air quality objectives. These monthly summaries will be issued annually and posted to the web-based reporting platform. The contents of each report may include summary tables of readings, figures such as wind roses, and statistics related to station and instrument operation.

In addition to ambient monitoring, emissions from on-site sources will be tracked, and monitored per the National Pollutant Release Inventory methodology. Both point and storage emission sources will be considered when tracking emissions to air, for example:

- point or stack releases to air from stacks, vents, ducts, pipes or other confined process streams. Releases to air from pollution control equipment such as the VRU's and VCU generally fall into this category; and
- storage or handling releases to air from storage tanks or handling of materials such as jet fuel.

In addition to tracking and reporting the chemicals of interest, greenhouse gas emissions will also be monitored and reported if the calculated annual emissions exceed the reporting thresholds for either the National Greenhouse Gas Reporting Program and/or the BC Reporting Regulation.

A PMMP describes mitigation measures to limit emissions of PM from construction and operations at the WMT. Details are provided for the construction plan and schedule, sensitive receptors of interest, local climate and weather, proposed controls and dust reduction practices, and finally, administrative controls to monitor, record keep, handle complaints and ensure remedial action is taken. The PMMP is a more detailed plan than that prescribed to control fugitive dust emissions as outlined in Section 4 of the FEMP for WMT (NEB Condition 53).

Trans Mountain's Odour Complaint Investigation and Response Procedure outlines the ambient air and meteorological measurements and tank activity information that are collected for each odour complaint

and retained for trending analyses. During the operation of WMT, these data will be analyzed to identify specific products that may be causing recurring odours. If necessary, further mitigation measures will then be investigated and potentially implemented to reduce the occurrence of odours. Measured elevated levels of odorous compounds will be investigated even when no complaint is filed.

If any measured exceedances of the National, BC, MV or Alberta Ambient Air Quality Objectives are noted by future air quality monitoring, the results will be analyzed to determine the source of the exceedance as well as the frequency of exceedance. If the exceedance is determined to be due to emissions from WMT, appropriate mitigation measures will be put in place. Several mitigation measures have been identified that could be implemented in response to any validated ambient monitoring results that exceed the ambient air quality objectives, routine leak detection surveys or confirmed odour concerns raised by Aboriginal groups, Appropriate Government Authorities, residents or land users. These measures include changing management and tanker loading practices and the installation of additional emission control equipment.

Trans Mountain's program for addressing public or Aboriginal complaints with respect to point source or storage tank emissions is explained in Section 4.2 *Odour Complaint Investigation and Response Procedure* of the KMC *Environment Manual* (see Appendix E).

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APPENDIX A

CONSULTATION AND ENGAGEMENT

Consultation and engagement activities related to air quality at Edmonton, Sumas and Burnaby Terminals as well as at the Westridge Marine Terminal were completed with Appropriate Government Authorities, potentially affected Aboriginal groups and affected landowners/tenants. Opportunities to discuss the mitigation measures and identify issues or concerns were also provided to public stakeholders during meetings, workshops and ongoing engagement activities.

Consultation and engagement opportunities began in May 2012 with the Project announcement and are ongoing.

1.0 Consultation and Engagement Overview: Draft Plan Development

Reports on public consultation activities completed between May 2012 and June 30, 2015 were filed with the National Energy Board (NEB) and are available in the Application (Volume 3A: Stakeholder and Volume 3B: Aboriginal; Filing ID [A55987](#)) as well as in Consultation Update No. 1 and Errata, Technical Update No. 1 (Filing ID [A59343](#)) / Consultation Update 2 (Filing IDs [A62087](#) and [A62088](#)), Consultation Update 3 (Filing IDs [A4H1W2](#) through [A4H1W8](#)) and Consultation Update 4 (Filing ID [A72224](#)). These reports include results of consultation conducted to date, identification of issues and concerns as well as Trans Mountain's response and are included below. Where appropriate, Trans Mountain's response has been updated to reflect information developed since the original response was provided during the NEB proceeding for the Project.

Consultation and engagement activities completed between July 1, 2015 and March 2017 have not been filed on the public record with the NEB. Any new issues and concerns identified during this period, as well as Trans Mountain's response, are described below.

2.0 Consultation and Engagement Overview: Draft Plan

The draft Plan was released for review and feedback on November 22, 2016. The comment period closed on February 24, 2017, although additional Appropriate Government Authority feedback was considered up until March 3, 2017. Email or mail notification regarding the Plan was sent to 141 public stakeholders, 17 regulatory authorities, 18 Aboriginal groups and all affected landowners. The notification included a summary description of the Plan, a request for review, the timing of the comment period and contact information. Aboriginal groups were offered the opportunity for an in-person meeting to review the Plan. See Appendix B for a complete list of notified stakeholders.

In addition to direct notification, the online posting of each Plan was promoted through Trans Mountain's weekly e-newsletter, Trans Mountain Today, which provides Project updates, regulatory information, stories and interviews to more than 6,000 subscribers. Each week Trans Mountain Today included a focus on a specific plan, or group of plans, as well as a reminder of all plans available for review.

2016

- September 22 - Wildlife Mitigation and Habitat Restoration Plans
- September 29 - Pipeline Environmental Protection Plans
- October 6 - Air Quality Management Plans
- October 13 - Watercourse and Water Ecosystems Plans
- October 20 - Vegetation Management Plans
- October 27 - Air Quality Plans
- November 3 - Socio-Economic Effects Monitoring Plan
- November 10 - Access Management Plan
- December 22 - General promotion all plans
- December 29 - General promotion all plans

2017

- January 5 - General promotion all plans
- January 12 - General promotion all plans

Trans Mountain is committed to ongoing engagement throughout the life of the Project. The start and end date for the review and comment period for each environmental management plan is defined. These timelines are required to allow time for preparation of the final Plan in order to meet regulatory requirements and NEB submission dates. Although a formal review period may be closed, each plan remains available for review on transmountain.com.

3.0 Consultation and Engagement: Activities and Feedback

Consultation and engagement activities completed with identified stakeholder groups are described below, including: public stakeholders (Section 3.1); Appropriate Government Authorities (Section 3.2); potentially affected Aboriginal groups (Section 3.3); and affected landowner/tenants (Section 3.4).

Feedback on the draft Plan, Trans Mountain's response, and where each issue or concern is addressed in the Plan has been outlined in each section according to stakeholder group.

3.1 Public Consultation

3.1.1 Public Consultation Summary – May 2012 to June 2015

Feedback regarding air quality received during public consultation and engagement activities between May 2012 and June 30, 2015 is summarized in Table A-1.

TABLE A-1
SUMMARY OF PUBLIC CONSULTATION - MAY 2012 TO JUNE 30, 2015

Issue or Concern	Summary Trans Mountain Response	Where Addressed
Risk of carcinogenic effects from products in pipeline	There are no known carcinogenic health related risks related to products within the pipeline. In support of the ESA for the Project, a HHRA was commissioned, the principal aim of which was to identify and understand the potential short- and longterm health risks, including carcinogenic risks, to people exposed to the chemicals that could be released to the environment from the pipeline and associated facilities.	Volume 5B - ESA - Socio-Economic
What are the human health impacts from odours, and pipeline products? Is there a carcinogenic link?	Trans Mountain strives to minimize the impact of our operations on our neighbours by incorporating odour mitigation measures in our day-to-day activities and Project work. In addition, Trans Mountain is taking steps to enhance our early leak detection system and air monitoring/sampling protocol. Trans Mountain is also looking into procuring technology to facilitate automated calls to residents in the area in the event of an emergency and will provide more information on this initiative to local area residents in the coming months. In support of the ESA for the Project, KMC has commissioned a HHRA, the principal aim of which is to identify and understand the potential short-term and long-term health risks, including carcinogenic risks, to people exposed to the chemicals that could be released to the environment from the pipeline and associated facilities.	Volume 5B - ESA - Socio-Economic
Health effects of airborne chemicals	Working openly and co-operatively with all levels of government, Aboriginal communities and stakeholders, Trans Mountain is committed to minimizing effects to the local environment, health, and community. A screening level human health risk assessment was initiated for the Project to assess potential effects of pipeline operations on human health. A human health risk assessment will be submitted to the NEB in Q2 2014. Potential human health effects are discussed in Sections 6.0 and 7.5.8.	Volume 5B Sections 6.0 and 7.5.8 Volume 5D Screening Level Human Health Risk Assessment of Pipeline and Facilities
Health effects from odors at Sumas Terminal	New prevention and community notification measures have been established in response to the release of oil at the Trans Mountain storage facility in Abbotsford. On January 24, 2012, oil from a storage tank at the Sumas Terminal spilled and was fully contained within a bermed area on the property that was lined with an impermeable membrane. The containment worked as designed, and all of the oil was recovered on the same day as the release. It was later determined that damage caused by freezing of the internal roof drain system caused the spill. Odors were reported in the area, which caused concern in the community. As a result, Trans	Volume 5B Sections 6.0 and 7.5.8 Volume 5D Screening Level Human Health Risk Assessment of Pipeline and Facilities

Issue or Concern	Summary Trans Mountain Response	Where Addressed
	Mountain has taken a number of steps to improve air quality monitoring and its process for communicating with local residents. Steps include the following: - Enhanced Odor Complaints and Investigation Process – Taking steps to minimize odors and investigate their cause is a top priority. Odors can be reported to 1-888-876-6711 around the clock. All odor reports will be thoroughly investigated and addressed. As a result of the January incident, additional measures will include notification of the local fire department dispatch. - Air Quality Monitoring and Reporting – An air monitoring station will be installed at the Sumas Terminal by the end of this year and an independent, rapid response service provider will conduct air monitoring sampling and analysis if needed in the event of an incident. In addition to the measures to improve air quality monitoring and notification processes, the drain system – found to be the cause of the incident – has been repaired and tested. Procedures have been put in place to prevent a similar incident. Later this fall, a heating system will be installed on the valves at each of the six tanks at the Sumas Terminal to prevent potential freezing during the winter.	
Concern that residents are dealing with ongoing residual effects of 2012 spill (odors) re: Sumas Terminal Potential increase in odors with increase in tankers and/or tank farms	When crude oil arrives at the Sumas Terminal through the TMPL, it is held temporarily in storage tanks before being shipped to its next destination. Since the crude contains sulphur compounds, often described as having a rotten-egg smell, moving oil into and out of the tanks can cause nuisance odors near the terminal. Petroleum odors can be a nuisance for Trans Mountain's neighbours, and can sometimes also signal a problem with operations. Since safe operations and protection of the environment are always top of mind in this line of work, Trans Mountain investigates and follows up on all odor reports. Continuous air monitoring equipment has been installed at the Sumas Terminal and a new air monitoring program has been implemented for monitoring petroleum vapour concentrations in local neighbourhoods in the event of an incident. Additionally, the drain system – found to be the cause of the spill – has been repaired and tested. Procedures have been put in place to prevent a similar incident. These include: - The installation of a heating system on the external roof drain system valves to prevent potential freezing; and - All drainage valves are now maintained in the closed position when the drainage system is not in use. Finally, changes were made in the control centre process to initiate immediate field response for any observed deviations in tank volume. A tank level monitoring device has been designed to improve the accuracy of tank level changes and minimize false alarms. Trans Mountain strives to minimize the effects of its operations on their neighbors by incorporating odor mitigation measures in its day-to-day activities and project work. In addition, Trans Mountain is taking steps to enhance its early leak detection system and air monitoring/sampling protocol. Trans Mountain is also looking into procuring technology to facilitate automated calls to residents in the area in the event of an emergency and will provide more information on this initiative to local area residents.	Volume 5B Sections 6.0 and 7.5.8 Volume 5D Screening Level Human Health Risk Assessment of Pipeline and Facilities
Concerns about an increase in emissions from the major increase in oil tankers, anchored in Burrard Inlet, awaiting access to the Westridge loading facility. How do the emissions from tankers compares to the emissions from cruise ships?	As part of our Facilities Application a Marine Air Quality and Greenhouse Gas Marine Transportation Technical Report was completed by RWDI Consulting Engineers and Scientists, the complete report can be found http://transmountain.s3.amazonaws.com/application/V8B	Volume 8B - Marine Air Quality and Greenhouse Gas Marine Transportation Technical Report
Stance on upstream/downstream issues, GHGs and climate change	Trans Mountain is assessing the carbon impact of constructing and operating the TMEP and its related facilities. The GHG impacts will be outlined the ESA submitted with the NEB facilities application. For upstream or downstream impacts outside of Trans Mountain's jurisdiction or control, we will also describe how Trans Mountain is acting as a catalyst to influence the industry to help address issues upstream and downstream from the pipeline. Examples include: climate change; oil sands development; shipping practices; emergency spill response; and protecting the ecological integrity of BC and Alberta.	n/a

Issue or Concern	Summary Trans Mountain Response	Where Addressed
Investment in clean technology and research and development to improve tankers	Trans Mountain is assessing the carbon impact of constructing and operating TMEP and its related facilities. The GHG impacts will be outlined the ESA submitted with the NEB facilities application. For upstream or downstream impacts outside of Trans Mountain's jurisdiction or control, we will also describe how Trans Mountain is acting as a catalyst to influence the industry to help address issues upstream and downstream from the pipeline. Examples include: climate change; oil sands development; shipping practices; emergency spill response; and protecting the ecological integrity of BC and Alberta. Transitioning to a clean energy future takes time, financial investment and a shared commitment between government, industry and British Columbians. It requires us to think beyond traditional methods and attitudes and accept that changes are necessary if Canada is to remain a reliable, global energy provider. TMPL has a 60-year history of safe and responsible operations. Trans Mountain is designing a project that will account for our impact on communities, our environment and our economy. A comprehensive assessment of our work will be available in the ESA when Trans Mountain files the Facilities Application to the NEB. The Conference Board of Canada states that over the next five years, more money (\$6.1 billion) will be invested in climate friendly technology in Alberta than all the other Canadian provinces combined. More than \$312 million has been collected for a clean energy technology fund, which will be invested to find better ways to cleanly develop resources. Funds are administered through the Climate Change and Emissions Management Corporation and awarded to Projects within the province. The Alberta government is investing \$25 million into Carbon Management Canada, a national, university-led research network. Climate change and water use are an important issues which Canada's oil industry have addressed through many activities. A lot has changed in the last fifty years and there are some great resources on the CAPP website about climate and water. As well as on the Canadian Energy Pipeline Association website.	n/a
How will Trans Mountain prevent degradation of air quality from increased tanker traffic	All vessels calling PMV are required to comply with international and local regulations on the types of engines (both propulsion and generators) that they are fitted with. Those engines have to meet strict exhaust emission requirements set by the IMO and carry manufacturers' certificates to show that. Regular surveys and checks are conducted by local authorities to verify this and to ensure that the engines are maintained to ensure their continued adherence to those standards. There is an ongoing internationally mandated process underway to improve the type of fuel used by the ships. Vancouver is part of the North American Emissions Control Area (as are Seattle, San Francisco, and Los Angeles) and all ships entering or plying within 200 miles of our coast have to change over to cleaner burning fuel. Mandated further improvement in fuel standards take effect in 2015 and 2020, which period straddles the project's late 2017 coming into operation schedule. In addition, every ocean going commercial vessel is currently required by the IMO to have in place a Shipboard Energy Efficiency Management Plan. From a more practical perspective, given the high cost of fuel, ship operators benefit greatly by taking extra care to ensure that the ship's engines operate efficiently, which plays a very positive overall role in reducing emissions as well. All of the above factors help prevent degradation of air quality in the region from shipping. Trans Mountain, as part of pre-arrival checks shall only accept modern vessels that meet and follow all of the above international requirements to load at Westridge.	Volume 3, Section 4.0 – ESA Volume 8A - Marine Transportation
Environmental impact as well as human health risk of a spill in Vancouver Harbour and other coastal areas.	In support of the ESA for the Project, KMC has commissioned a HHRA, the principal aim of which is to identify and understand the potential short-term and long-term health risks, including carcinogenic risks, to people exposed to the chemicals that could be released to the environment from a marine spill.	Volume 8A, Section 4.0 - ESA
Concerns about the proposed incinerator in the Lower Mainland and tanker traffic causing increased emissions.	This topic has already been addressed in Trans Mountain's response to an Information Request and in its Technical Update No. 4. All vessels calling PMV are required to comply with international and local regulations on the types of engines (propulsion and generators) that they are fitted with. Those engines have to meet strict exhaust emission requirements set by the IMO and carry manufacturers' certificates to show that. Regular surveys and checks are conducted by local authorities to verify this and to ensure that the engines are maintained to ensure their continued adherence to those standards. There is ongoing internationally mandated process underway to improve the type of fuel used by the ships. Vancouver is part of the North American Emissions Control Area (as are Seattle, San Francisco, and Los Angeles) and all ships entering or plying within 200 miles of our coast have to change over to cleaner burning fuel. Mandated further improvement in fuel standards take effect in 2015 and 2020, which period straddles	Response to Metro Vancouver IR No. 1 Part 3 to Technical Update No. 4: An update to the Marine Air Quality and GHG Technical Report for Marine Transportation Part 12 of Technical Update No. 4: responses to Lower Fraser Valley Air Quality Coordinating Committee Informal Information Requests from September 25 and November 13, 2014 Meetings

Issue or Concern	Summary Trans Mountain Response	Where Addressed
	the project's late 2017 coming into operation schedule.	
Dust in the air due to construction is perceived to have potential impacts on recreation and neighborhoods	From the commencement of the staking to the final cleanup, a particular parcel of land could be disrupted for one to two months. This timing can be affected by many variables; however, every effort will be made to minimize impacts to landowners. In areas where there may be a concern regarding the safety of the public, restricted areas will be established. Noise, dust, and other disturbances will be mitigated to avoid the impact on people near the construction.	Volume 5A - ESA - Biophysical Volume 6 – Project Execution
Air Emissions/GHG	The majority of air emissions produced during construction activities will be from fugitive dust. Fugitive dust will result from land clearing, grading, excavation, concrete work, and vehicle traffic on paved and unpaved roads. The amount of dust generated will be a function of construction activities, soil type, moisture content, wind speed, frequency of precipitation, vehicle traffic, vehicle types, and roadway characteristics. Emissions will be greater during dry periods and in areas of fine-textured soils subject to surface activity. The GHG impacts will be outlined in the ESA submitted with the NEB Facilities Application. A carbon management plan will be developed to mitigate (reduce) emissions as much as possible.	Volume 5A - ESA - Biophysical
How are construction emissions being accounted for? What steps will Trans Mountain take to ensure minimal air quality impacts from construction-associated vehicles and equipment? Will Trans Mountain commit to abiding by the Metro Vancouver non- road diesel engine emission regulation when conducting work in the FVRD?	Trans Mountain's policy is to comply with all health, safety, security and environmental laws, rules and regulations, not just because it is legally required but also because we believe it is the responsible way to conduct our business. The majority of air emissions produced during construction activities will be from fugitive dust. Fugitive dust will result from land clearing, grading, excavation, concrete work and vehicle traffic on paved and unpaved roads. The amount of dust generated will be a function of construction activities, soil type, moisture content, wind speed, frequency of precipitation, vehicle traffic, vehicle types and roadway characteristics. Emissions will be greater during dry periods and in areas of fine-textured soils subject to surface activity. A carbon management plan will be developed to mitigate (reduce) emissions as much as possible. The construction emissions and impacts are discussed in Volume 5A, Sections 5.4 and 7.2.4 of the Facilities Application.	Volume 5A, Biophysical - Sections 5.4 and 7.2.4
Air quality measurement and access to air monitoring information (SFU).	This topic has already been addressed in Trans Mountain's response to an Information Request. There is an ambient air quality monitoring station located at Burnaby Terminal monitoring hydrocarbon vapours. In July, it was upgraded with new sensors capable of measuring hydrogen sulphide (H2S) and sulphur dioxide (SO2) levels. Calibration and quality assurance of the data were completed by July 19, 2014. Since installation of the new instrumentation there have been no readings above any provincial regulatory guidelines observed at the fence line or any abnormally high peaks. The volatile organic compound (VOC) sensor has been working since early June and there have been some intermittent peaks of VOC emissions observed, but these were detected in early August. Most of July showed little activity for VOC emissions readings and after July 19, there were no abnormal H2S or SO2 readings. The peak observed on August 10 showed dominant wind direction prevailing from WSW, which would put SFU in the downstream direction of the terminal.	Part 1 Westridge Delivery Line-App Email Response to Sustainable SFU; Page 1-2 https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2451003/2578063/B290-10 - Part 1 Westridge Delivery Line-AppE-Mail Response to Sustainable SFU - A4F5E3.pdf?nodeid=2578727&vemum=-2
Dust in the air due to construction is perceived to have potential effects on recreation and nearby neighborhoods	From the commencement of the surveying and staking of the right-of-way to the final clean up, a particular parcel of land could be disrupted for approximately 3 months. This timing is affected by many variables; however, every effort is made to minimize any effects to landowners. In areas where there may be a concern regarding the safety of the public, restricted areas are established. Noise, dust and other disturbances will be mitigated to avoid the effects on people near the construction. The issue of dust is provided as part of the criteria air contaminants discussion under air emissions in Sections 5.4 and 7.2.4 of Volume 5A. In addition, dust as a sensory disturbance to residents, recreational users and its potential effects on agricultural crops is discussed under human occupancy and resource use in Sections 5.4 and 7.2.4 of Volume 5B. Mitigation measures are outlined in the Pipeline and Facilities EPPs (Volumes 6B and 6C).	Volume 5A Sections 5.4 and 7.2.4 Volume 5B Sections 5.4 and 7.2.4 Volume 5C Air Quality and Greenhouse Gas Technical Report Volume 5D Agricultural Assessment Technical Report Socio-Economic Technical Report Volume 6B Volume 6C

Issue or Concern	Summary Trans Mountain Response	Where Addressed
How will Trans Mountain monitor air quality impacts during construction and expanded operation? Which pollutants will be monitored, by what equipment, and at what locations? How will Trans Mountain rectify any ambient air quality objective exceedances during construction or operation?	Petroleum odours can be a nuisance for our neighbours, and sometimes they can also signal a problem with our operations. Because safe operations and protection of the environment are always top of mind in our line of work, Trans Mountain investigates and follows up on all odour reports. Activities that occur during the construction and operations phases have the potential to affect air quality and GHG; therefore, Project interactions with air quality and GHG during these phases were assessed. The Project will result in the following air emissions: • Criteria air contaminants (CACs), a group of commonly found contaminants typically formed from combustion for which there are ambient air quality criteria, including particulate matter (PM), Carbon Monoxide (CO), nitrogen dioxide (NO₂), and sulphur dioxide (SO₂); • Volatile organic compounds (VOCs), a group of organic compounds with sufficiently high vapour pressures under ambient conditions to evaporate from the liquid form of the compound and enter the surrounding air, and participate in atmospheric photochemical reactions; • Hydrogen sulphide (H₂S) and mercaptans; and • GHGs, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) as well as overall climate change. Trans Mountain has taken a number of steps to improve air quality monitoring and its process for communicating with local residents including an enhanced Odour Complaints and Investigation Process - Taking steps to minimize odours and investigate their cause is a top priority. Steps include the following: - o Enhanced Odour Complaints and Investigation Process – Taking steps to minimize odours and investigate their cause is a top priority. Odors can be reported to 1-888-876-6711 around the clock. All odour reports will be investigated and addressed. As a result of the January incident, additional measures will include notification of the local fire department dispatch. - o Air Quality Monitoring and Reporting – An air monitoring station will be installed at the Sumas Terminal by the end of this year and an independent, rapid response service provider will conduct air monitoring sampling and analysis if needed in the event of an incident.	Volume 5C - Air Quality and Greenhouse Gas Technical Report for the Trans Mountain Pipeline ULC Trans Mountain Expansion Project Volume 5A - Biophysical Section 7.2.
How will the Project assess cumulative effects on a wider scale? (Strategic Environmental Assessment – federal government is more active in assessment of cumulative effects) What environmental protection measures will be taken?	Trans Mountain is committed to determine the significance of the Project's contribution to cumulative effects and to develop technically and economically feasible mitigative measures. The main sources of cumulative ecological effects are: direct habitat loss; indirect habitat loss adjacent to facilities, clearings, and corridors; and increased mortality from altered inter-species relationships (such as: predation and invasive species) and human activities (such as hunting, road kill). The main sources of cumulative social effects are short or long-term changes in population size, particularly from in-migration; associated demand for goods and services; and indirect effects on community quality of life. Trans Mountain will consider any cumulative environmental effects that are likely to result from the Project. • Primary emissions associated with storage tanks of volatile organic compounds (VOCs), benzene, toluene, ethylbenzene and xylene (BTEX) and combustion products like criteria air contaminants (e.g., sulphur dioxide [SO₂], oxides of nitrogen [NO_x], carbon monoxide [CO], particulate matter [such as PM_{2.5}, PM₁₀]); • Secondary smog-related products, like ozone and PM_{2.5} that can form in the atmosphere from Project emissions of NO_x and VOCs; • Hydrogen sulphide (H₂S) and mercaptans emissions which have the potential to cause nuisance odours; and • Fugitive emissions from pump stations.	Volume 5A - ESA - Biophysical
Potential increase in odours with increase in tankers and/or tank farms	Petroleum odours can be a nuisance for our neighbours, and sometimes they can also signal a problem with our operations. Because safe operations and protection of the environment are always top of mind in our line of work, Trans Mountain investigates and follows up on all odour reports. Trans Mountain strives to minimize the impact of our operations on our neighbours by incorporating odour mitigation measures in our day-to-day activities and Project work. In addition, Trans Mountain is taking steps to enhance our early leak detection system and air monitoring/sampling protocol. Trans	Volume 5A - ESA - Biophysical

Issue or Concern	Summary Trans Mountain Response	Where Addressed
	Mountain is also looking into procuring technology to facilitate automated calls to residents in the area in the event of an emergency and will provide more information on this initiative to local area residents in the coming months.	
Potential odours emitted during construction and operation of the proposed pipeline hold the potential to be a nuisance	Petroleum odours can be a nuisance for our neighbours, and sometimes they can also signal a problem with our operations. Because safe operations and protection of the environment are always top of mind in our line of work, Trans Mountain investigates and follows up on all odour reports. Trans Mountain strives to minimize the impact of our operations on our neighbours by incorporating odour mitigation measures in our day-to-day activities and Project work. Trans Mountain is taking steps to enhance our early leak detection system and air monitoring/sampling protocol.	Volume 5A - ESA - Biophysical
Potential odours emitted during construction and operations of the proposed pipeline hold the potential to be a nuisance	Petroleum odours can be a nuisance for Trans Mountain neighbours, and sometimes they can also signal a problem with operations. Trans Mountain investigates all odour reports since safe operations and protection of the environment are key to the business. Trans Mountain strives to minimize the effects of operations on neighbours by incorporating odour mitigation measures in day-to-day activities and Project work. In addition, Trans Mountain continues to take steps to enhance early leak detection system(s) and air monitoring/sampling protocol(s). Trans Mountain is looking into procuring technology to facilitate automated calls to residents in the area in the event of an emergency. A discussion of odours is provided under air emissions in Sections 5.4, 6.0 and 7.5.4. Mitigation measures are outlined in the Facilities EPP (Volume 6C).	Volume 5A Sections 5.4, 6.0 and 7.5.4 Volume 5C Air Quality and Greenhouse Gas Technical Report Volume 6C

3.1.2 New Interests, Issues, Concerns and Response – July 2015 to March 2017

New interests, issues and concerns identified through public consultation and engagement activities between July 2015 and August 2016 are described in Table A-2.

TABLE A-2
NEW INTERESTS, ISSUES, CONCERNS AND COMMON TRANS MOUNTAIN RESPONSES

Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Comments	Where Addressed
- Burnaby Board of Trade - City of Coquitlam - Vancouver Coastal Health - Province of BC	Metro Vancouver SEEMP Workshop	July 15, 2015	Important to track the number of ER visits related to upper respiratory issues as a result of dust from traffic diesel from equipment during construction.	Trans Mountain is not aware of this data being publicly available, and any fluctuations in such data during Project construction in the Greater Vancouver area would not be solely attributable to the Project. Trans Mountain will follow-up with Vancouver Coastal Health (VCH) to inquire about VCH's interest in providing a data set of this information to include as a context indicator of broader trends during the Project's socio-economic effects monitoring program.

3.1.3 Feedback Regarding the Draft Plan

No new issues or concerns regarding the draft Plan were identified by public stakeholders during the comment period.

3.2 Regulatory Consultation

Trans Mountain has initiated consultation and will continue to work with Appropriate Government Authorities to ensure that the measures implemented to avoid, minimize and mitigate Project effects on air quality.

3.2.1 Regulatory Consultation Summary – May 2012 to June 2015

Meetings between Trans Mountain and the members of the Lower Fraser Valley Air Quality Coordinating Committee were held on September 25, 2014 and November 13, 2014.

3.2.2 Feedback Regarding the Draft Plan

A summary of consultation related to the draft Plan is described in Table A-3. The Metro Vancouver and Environment and Climate Change Canada submissions were detailed. Therefore, for ease in presenting the results of the consultation, the Trans Mountain responses and where they are addressed in the Plan, the comments and recommendations have been listed individually.

**TABLE A-3
SUMMARY OF REGULATORY CONSULTATION ACTIVITIES RELATED TO THE
AIR EMISSIONS MANAGEMENT PLAN FOR WESTRIDGE MARINE TERMINAL
(JULY 2015 TO MARCH 2017)**

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
Metro Vancouver	Letter Incoming	March 3, 2017	General comments related to Air Quality Monitoring: - Additional monitoring should not be limited to common air contaminants, as Metro Vancouver's evidence demonstrates that the TMEP will result in elevated concentrations of a number of hazardous pollutants. - Consider the role that Metro Vancouver could take in the operation, maintenance, data handling and reporting associated with the new monitoring (i.e., NEB conditions 52 and 79). Metro Vancouver, in partnership with other air quality monitoring agencies in the Lower Fraser Valley airshed, has already established and operates an air quality monitoring network to assess air quality in this region. - Metro Vancouver's involvement would ensure: high quality data that is consistent with existing regional monitoring in the Lower Fraser Valley; standard operating procedures and accepted methods for auditing stations to ensure integrity of data; availability of air quality data to the public, leading to improved public confidence in the data, especially considering the uncertainty in the modelling results from TMEP. - AEMP's could indicate an agreement in principle of a partnership between the agencies that operate the Lower Fraser Valley air quality monitoring network, for the purpose of integrating TMEP monitoring stations into the network. AEMP's could describe path forward, including developing service models, service agreements, roles and responsibilities, funding, reporting and other specifics. Specifics include but are not limited to: station locations, pollutants and meteorological parameters to be measured, monitoring equipment, instrument exposure, measurement height,	Metro Vancouver has not provided any evidence that emissions from the WMT will exceed any applicable Ambient Air Quality Objectives (AAQOs). The Supplemental Air Quality Technical Report No. 3 provides the most recent results from dispersion modelling and a copy is provided in Appendix F. Trans Mountain has committed to maintain and operate the proposed ambient air quality monitoring stations and use the measured results to inform their compliance with the AAQOs. As noted by ECCC in their comments (provided in this table), the station locations should be sited where the dispersion modelling indicates the greatest likelihood of measuring the contaminants of interest. As suggested by MV in the meeting with the LFVAQCC on February 17, 2017, a partnership with MV would likely involve relocating the Trans Mountain stations to address other air shed goals within the MV network which is not the best methodology for Trans Mountain's Project as this would compromise their ability to comply with their commitment (i.e., to measure Project related air emissions and effects per NEB direction).	Section 3.1 Appendix F

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
			sampling frequency, real time reporting to the public, monthly and annual reporting, QA/QC and data validation procedures.		
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.1, Figure 1 The proposed location of the ambient monitor has the following issues: - NEB condition 52 makes it clear that more than one monitoring station is required through the use of plural words, however only one station is provided. Please provide a description of other monitoring stations, sites and location in order to satisfy NEB condition 52. It was proposed in Metro Vancouver's written argument that new monitoring capabilities include additions to existing Metro Vancouver monitoring stations, as well as new permanent stations, along with consideration of mobile air quality monitoring units.	The dispersion modelling results reported in Table 41 from the Technical Update 3 Report (2017) indicate predicted concentrations to be much less than their respective AAQO for all averaging periods. These results reflect Trans Mountain's design objectives and commitment to comply with the AAQO. These results are consistent with similar evidence that was reported to the NEB in 2014. Trans Mountain concludes that the need for additional continuous and mobile stations without any scientific evidence is not required. However, Trans Mountain has proposed to install two passive sampling stations to measure H ₂ S, SO ₂ and NO ₂ for one year that will be used to verify the dispersion modelling results.	Section 3.1
Metro Vancouver	Letter Incoming	March 3, 2017	- NEB Condition 52 outlines that "representative" meteorological measurements are to be collected, yet the proposed area of meteorological observation is in a vegetated area with tall trees. How will "representative" meteorological measurements be taken in this area? For wind measurements, will the anemometer be sited at a height of 2.5 times the height of any obstacles (trees and buildings)? Based on images from the area, the proposed location appears to be under a set of power lines which presents issues with constructing a monitoring location due to the height of the various instruments. It is requested that a draft site plan of the air monitoring station be provided that includes the dimensions of the meteorological compound including heights of all surrounding obstacles that have the potential of influencing measurements.	Trans Mountain will follow the requirements listed in the Alberta Air Monitoring Directive and will consider guidance from other documents such as the BC MOE (2002) reference document for siting criteria.	
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.1 - More detail needs to be provided about how the NAPS guidelines will be followed.	The Alberta Air Monitoring Directive will be consulted to address all proposed analyses, QA/QC methods, validation, audits and reporting commitments. Other relevant guidance from ECCC and MV including a proposed update to the NAPS QA/QC guidance document will be considered. Reporting guidance of interest within the Alberta Monitoring Directive include Sections 3.1, 5.3 and 6.3.	Section 3.1
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.2 - The installation schedule states that the monitor will be in place at least 1-year prior to operation of the terminal, which matches the requirement in NEB Condition 52. The plan states that there will be overlap in the start of the ambient air quality monitoring with construction at WRT and that the first year of data collected will be a mix of pre-construction and construction related activity. It is important to develop a baseline data set which represents the area prior to any new site activity, construction included. Specifically, the AEMP states, "Although there will be some overlap with construction activities for a portion of the initial 12-month period, this will establish baseline conditions to which measurements during Project-related operations can be compared." This should be revised as baseline air	Current ambient conditions have been well documented. Ambient air quality monitoring measurements using the SAM station have produced continuous measurements since June 2015 so a record (>12 months) of H ₂ S, SO ₂ and TVOCs as well as wind speed and wind direction could be summarised to characterize baseline conditions at WMT. Dispersion modelling results from the Technical Update No. 3 (2016) were provided to the NEB. Both the measurements and modelling results indicated ambient concentrations resulting from existing operations plus	Section 3.2

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
			quality should only include pre-construction activity.	ambient background that would comply with the AAQOs.	
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.3 - There is no discussion of a PM10 monitor but this should be included as part of the monitoring program.	PM ₁₀ monitoring is not required by the NEB Condition.	n/a
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.3.8 - Insufficient detail was available in the submitted plans to verify how visibility measurements will be made. o The AEMP should provide information about how visibility measurements will be conducted and details about how reduced visibility conditions will be assessed.	Trans Mountain will undertake the primary measurements, and provide them to the BCVCC, converted to suitable averaging periods and engineering units. Trans Mountain will contribute to the visibility measurements which would supplement the existing seven station network across the Lower Fraser Valley. As these measurements have been used as part of a long-term airshed management study and are not related to Trans Mountain operations, assessment of the final visibility results will be left to the BCVCC.	Section 3.3.8
Metro Vancouver	Letter Incoming	March 3, 2017	o If assessment of visibility degradation is intended to be based on classification of photographs, a library of the range of visual air quality conditions observed at the site should be compiled prior to the monitoring phase to provide sufficient data on which to base the verification of perceived classifications. Please provide access to the library. In addition, if assessment of visibility degradation is based on visual examination of photographs, a statement outlining the experience or qualifications of the assessor should be provided.	Trans Mountain will undertake the primary measurements, and provide them to the BCVCC, converted to suitable averaging periods and engineering units. Visual examination of the photographs, which will be provided by Trans Mountain, will be left for the BCVCC assessor to review and complete.	Section 3.3.8
Metro Vancouver	Letter Incoming	March 3, 2017	o If assessment of visibility degradation is intended to be determined using the Visual Air Quality Rating (VAQR) developed by the BC Visibility Coordinating Committee (BCVCC), BCVCC representatives (http://www.clearairbc.ca/contact/Pages/default.aspx) can be consulted for the VAQR calculation methodology.	Trans Mountain will undertake the primary measurements and provide them to the BCVCC, converted to suitable averaging periods and engineering units. BCVCC would complete the visibility degradation assessment using their preferred VAQR calculation methodology.	Section 3.3.8
Metro Vancouver	Letter Incoming	March 3, 2017	o The intended direction in which the cameras monitoring visibility will be pointed should be provided.	The intended direction for the camera will be selected with input from a technical representative from the BCVCC.	Section 3.3.8
Metro Vancouver	Letter Incoming	March 3, 2017	o An unobstructed view of landmarks at several distances may be used to inform perception of visibility conditions. Please provide the line of sight for each camera installed, with the distances to landmarks in the line of site included.	The line of sight for the camera will be selected with direction from a technical representative from the BCVCC.	Section 3.3.8
Metro Vancouver	Letter Incoming	March 3, 2017	o To generate a VAQR based on the BCVCC methodology, data from the following monitors are required: Nitrogen dioxide, Aethalometer, Nephelometer, Relative humidity, Atmospheric temperature, and Atmospheric pressure.	The AEMP will be amended to include the nephelometer and atmospheric pressure sensors.	Section 3.3.8
Metro Vancouver	Letter Incoming	March 3, 2017	o Please provide details about the location and types of instruments from which measurements will be used to calculate a VAQR based on the BCVCC methodology.	The location of the proposed air quality monitoring stations was provided in Figure 1 of the AEMP. The types of instruments to be provided in the station related to the visibility were provided in Section 3.3 of the AEMP and will be consistent with the "Measuring Visual Air Quality Fact Sheet" from www.cleanairbc.ca .	Section 3.3.8

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.3.9 - Please provide a description of the meteorological equipment proposed to be installed at the air monitoring station. For each instrument, please include its make and model, description of mounting, measurement height, and sampling rates and averaging periods that will be used.	Descriptions of the proposed meteorological equipment has been added to Section 3.3.9. The Alberta Air Monitoring Directive will be consulted to address description of mounting, measurement height, and sampling rates and averaging periods that will be used for the meteorological equipment to be installed.	Section 3.3
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.3.9 - it is stated that "Siting of meteorological instrumentation will conform to (BC MOE 2013) and/or NAPS (EC 2004) siting requirements" with two references provided. However, the EC 2004 document makes no reference to meteorology and Metro Vancouver along with the Province are not aware of the BC MOE 2013 reference. A copy of the BC MOE 2013 document referred to should be provided, along with an explanation of how the EC 2004 document will be used to inform meteorological measurement.	There was an incorrect reference to the BC MOE document, it should be 2002, not 2013. Also, the EC guidance document for NAPS stations refers only to air quality monitors, not meteorological instrumentation.	Section 3.3.9
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.6 – Please describe how audits will be performed, on which instruments, their frequency and who will perform them?	Audits are typically conducted twice per year per NAPS guidance (2004) and an updated version is expected later in 2017.	Section 3.6
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.6 - No description of data validation and/or quality assurance/quality control methods have been provided nor has the frequency of these checks been provided. Please describe the levels of validation and/or QA/QC that will be performed, frequency of these levels and methods proposed for each level.	QA/QC methods will be conducted per NAPS guidance which is currently under review. An update is expected to be released later in 2017, at which time it will be considered. The Alberta Air Monitoring Directive will be consulted for guidance on data validation methods.	Section 3.6
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.7 indicates that a possible approach for reporting and analysis of data is to follow the detailed procedure outlined in the Alberta Air Monitoring Directive Chapter 9 (AEP 2016b). While this 135 page document is extensive it is not clear which sections of the Directive are proposed to be used. To provide clarity it is requested that a draft monitoring plan be provided that clearly outlines all proposed analyses, QA/QC methods, validation, audits and reporting commitments so that stakeholders can review and comment on specific items as needed.	The Alberta Air Monitoring Directive will be consulted to address all proposed analyses, QA/QC methods, validation, audits and reporting commitments. Other relevant guidance from ECCO and MV including a proposed update to the NAPS QA/QC guidance document will be considered. Reporting guidance of interest within the Alberta Monitoring Directive include Sections 3.1, 5.3 and 6.3.	Section 3.7
Metro Vancouver	Letter Incoming	March 3, 2017	o The AEMP states that monthly air quality monitoring reports will be released annually. These monthly reports should be released on a more frequent basis (monthly or quarterly) in order to ensure ambient air quality objectives are being met and that the ambient air quality monitors are in good working order. The goal of a monthly report is to summarize the data collected over the month and identify any possible air quality issues while communicating the data in a timely manner. These reports should include some discussion of the underlying reasons for various air quality related concerns and the QA'ed data. In addition to monthly reports, an annual report should be created to provide a deeper analysis of the air quality data collected over the course of a calendar year.	Monthly summary reports will not be provided as suggested; rather, Trans Mountain will rely upon real-time measurements (which would be also posted to a public website) to address any air quality issues as they occur. Users of the public web-site would be able to request a summary of readings over a user specified period that could be up to 30 days. The annual report would provide an assessment of all year long measurements.	Section 3.7
Metro Vancouver	Letter Incoming	March 3, 2017	o Monthly ambient air quality reports should be released more often than annually. By releasing the monthly reports at a higher frequency throughout the year, it will ensure that possible air quality issues are dealt with in a timely manner. The reports will also provide quality	Monthly summary reports will not be provided as suggested; rather, Trans Mountain will rely upon real-time measurements (which would be also posted to a public website) to address	Section 3.7

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
			controlled data in a more timely fashion since the real-time website will presumably not show quality controlled data.	any air quality issues as they occur. The annual report would provide an assessment of all year long measurements based on QA'd readings.	
Metro Vancouver	Letter Incoming	March 3, 2017	o Additional information on how the monthly and annual reports will be distributed should be provided. Will stakeholders have the ability to review and comment on monthly or annual reports?	Monthly reports will not be provided as suggested; rather, Trans Mountain will rely upon real-time measurements (which would be also posted to a public website) to address any air quality issues as they occur. Users of the public web-site would be able to request a summary of readings over a user specified period that could be up to 30 days. The annual report would provide an assessment of all year long measurements and would be made available upon request.	Section 3.7
Metro Vancouver	Letter Incoming	March 3, 2017	o There is no detail on the methods that will be applied to assess data completeness or the actual target data completeness level. More detail is required on what will happen if data completeness thresholds are not met and what will be done in the event of monitoring equipment failure.	The Alberta Air Monitoring Directive will be consulted too address all proposed analyses, QA/QC methods, validation, audits and reporting commitments. Other relevant guidance from ECCO and MV including a proposed update to the NAPS QA/QC guidance document will be considered. Reporting guidance of interest within the Alberta Monitoring Directive include Sections 3.1, 5.3 and 6.3.	Section 3.7
Metro Vancouver	Letter Incoming	March 3, 2017	o No mitigation measures have been provided for exceedances of CACs. The application includes predicted exceedances of NO ₂ , SO ₂ , PM _{2.5} and PM ₁₀ . Please provide mitigation measures that will be implemented for all pollutants.	Metro Vancouver incorrectly states that exceedances of the AAQOs for CACs like NO ₂ , SO ₂ , PM _{2.5} and PM ₁₀ are predicted to occur. As noted in air quality assessment reports provided by Trans Mountain to the NEB in Technical Update No. 2 (2014) and Technical Update No. 3 (2017), both documents indicated the ability of WMT to fully comply with the AAQOs for all averaging periods and operating scenarios. The primary source of CAC emissions at WMT is the VCU which will be used infrequently (<5% of the time).	Section 5
Metro Vancouver	Letter Incoming	March 3, 2017	o Please describe how the proposed aethalometer will be used to qualify diesel PM measurements?	Qualifying the aethalometer to measure diesel PM measurements will be achieved based on discussions and direction with a representative from the BCVCC.	Section 3.3
Metro Vancouver	Letter Incoming	March 3, 2017	Section 3.7 (page 15) - Reporting of imagery to assess visibility is mentioned but reporting of the VAQR is not. Please provide information about the intended methods used to report visibility annually as well as on a real-time web-based platform.	Trans Mountain will undertake the primary measurements and provide them to the BCVCC, converted to suitable averaging periods and engineering units. BCVCC would complete the visibility degradation assessment using their preferred VAQR calculation methodology.	Section 3.3.8
Metro Vancouver	Letter Incoming	March 3, 2017	Section 4.5 – Some sensitive receptors within 2-3 km of the facility are missing from this analysis. In particular, the Westridge Elementary school is only 1 km from the facility. Capitol Hill and Sherwood Park (North Van) Elementary are both within 2 km of the facility. An explanation should be provided as to why these sensitive receptors were not included in the modelling, including the criteria used to exclude certain sensitive receptors in the modelling.	The sensitive receptors mentioned were included in the modelling. The area shown in the figure was not large enough to show these receptors; therefore the table and figure have been updated to include Westridge Elementary School, Capitol Hill and Sherwood Park (North Van) Elementary Schools are provided.	Section 4.5

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
Metro Vancouver	Letter Incoming	March 3, 2017	Section 4.8 - When will each of the emission reduction practices be implemented?	The emission reduction practices will be implemented from the start of construction.	Section 4.8
Metro Vancouver	Letter Incoming	March 3, 2017	Section 4.12.3 - The Particulate Matter Management Plan complaint section is lacking detail on time frames for addressing complaints. For example, it states that if it is determined that the construction/demolition activity is not the source of the air quality complaint, that the complainant will be notified of this finding. No time period for follow up with a complainant is given. With fugitive dust related emission complaints, it is important that the complaint is addressed as soon as possible because they tend to be transient in nature.	A detailed Project Complaints Process (Process) is under development and will align with industry best practice as well as meet NEB conditions and commitments made to Intervenor and communities through the regulatory proceedings. Additional details have been provided in Section 4.12.	Section 4.12
Metro Vancouver	Letter Incoming	March 3, 2017	o Better triggers should be set to clearly indicate when a situation is escalated from Level 1 to 2 to 3. As it stands, the AEMP is vague on when more corrective actions will be applied. What is the measure for "success"? What is the measure that will be used to apply further mitigation measures?	Additional text has been added to Section 4.12.3 to better describe the escalation process between levels 1, 2 and 3 and how more corrective actions will be applied.	Section 4.12.3
Metro Vancouver	Letter Incoming	March 3, 2017	o A listing of complaints and complaint resolutions should be included in the monthly and annual reports as a method of tracking performance.	The annual report will provide a listing of any complaints received by Trans Mountain and the resolution of the complaint.	Section 6.2
Metro Vancouver	Letter Incoming	March 3, 2017	Section 5 states that even if no complaint is made, elevated odour levels that have been measured will be investigated. How will odour be measured? There is no mention of continuous odour monitoring in the previous sections. What would constitute "elevated odour"? Similar comments made about the PMMP apply to this as well, including how complaints will be addressed, the escalation of mitigation, etc. Will Trans Mountain staff be trained on odour measurement techniques? In particular, there is a risk that in using on-site staff to determine if there is an odour, that staff may be desensitized to the odours and therefore may not recognize elevated odour concentrations.	Odorous compounds such as H ₂ S, TRS (H ₂ S plus mercaptans) and VOCs will be continuously monitored at the proposed ambient air quality monitoring station. KMC's odour complaint procedure is provided in Appendix E of the AEMP.	Section 6 and Appendix E
Metro Vancouver	Letter Incoming	March 3, 2017	Section 5 - Part of Condition 52 is to provide criteria or thresholds that if triggered would require implementation of mitigation measures. While the AEMP states that the odour plan and the relevant provincial/federal air quality objectives will be used as trigger points, the AEMP also says it will first determine if they are the source of the exceedance. There are no details provided on how it will be determined if the terminal is the source of the odour/exceedance. A clear methodology should be outlined to ensure that in all cases of exceedances, the same method of determination is applied.	Additional clarifying text has been added to Section 5.	Section 5
Metro Vancouver	Letter Incoming	March 3, 2017	Appendix B - Based on Figure B1, the proposed location of the monitor does not reside in either the area of the overall PM _{2.5} maximum or in the secondary area. More justification must be provided for the current proposed location of the monitor.	Based on the Application Case concentration contours and based on comments from ECCC (provided in this table), monitoring should occur on the southeast or southwest sides of the WMT to maximize the potential for measuring the highest concentrations due to Project-related emissions for the pollutants of interest.	Section 3.1
Metro Vancouver	Letter Incoming	March 3, 2017	Appendix C - Dispersion modelling for NO _x should show the 100% conversion in addition to the ARM.	The NO _x results with 100% conversion are provided in Table D-1 of Appendix D.	Appendix D
Metro	Letter	March 3,	Dispersion Modelling report (Condition 79 and 52	MCHEM=6 has been used for all Trans	Appendix B of Filling

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
Vancouver	Incoming	2017	Addenda): MCHEM is set to 6 (updated RIVAD + ISOROPPIA) which does not appear to have been used previously. No details are given in the report as to how this is parameterized in the model and what pollutants this applies to. A discussion of how this chemical transformation scheme impacts the predicted concentrations should be provided in the modelling report.	Mountain air dispersion modelling to date, and was requested by BC Ministry of Environment which is documented in the Detailed Model Plan - BC Portion of Study Area, Final (v5) Tran Mountain Expansion Project (Appendix B of Filling ID A3S1U3).	ID A3S1U3
Metro Vancouver	Letter Incoming	March 3, 2017	Dispersion Modelling report (Condition 79 and 52 Addenda): The modeled precipitation values are much higher than the observed values. With higher than observed precipitation, there is the possibility that more pollutants are scavenged from the atmosphere and therefore lowering the predicted concentrations. This coupled with the implementation of a chemical transformation scheme could lead to much different predictions.	MCHEM=6 (for SO ₂ and NO _x) has been used for all Trans Mountain air dispersion modelling to date, and was requested by BC Ministry of Environment which is documented in the Detailed Model Plan - BC Portion of Study Area, Final (v5) Tran Mountain Expansion Project (Appendix B of Filling ID A3S1U3).	Appendix B of Filling ID A3S1U3
Metro Vancouver	Letter Incoming	March 3, 2017	Dispersion Modelling report (Condition 79 and 52 Addenda): Trans Mountain in its application to the NEB has filed different model predictions of air quality which have made use of varying assumptions, emission rates and emission control efficiency.	Engineering design has evolved since the original Environmental and Socio-Economic Assessment in 2013. Several updates to the emissions estimates, stack parameters and dispersion modelling were made including updated product types, updated assumptions with respect to product volumes, updated emissions during tanker loading, more stringent process specifications for the VRUs and VCU, and refinements to the approach for estimating NO ₂ levels near WMT. See Appendix F for details on the engineering and modelling updates.	n/a
Metro Vancouver	Letter Incoming	March 3, 2017	Dispersion Modelling report (Condition 79 and 52 Addenda): Trans Mountain filed results that showed predicted exceedances of Metro Vancouver's air quality objectives for SO ₂ , NO ₂ , PM _{2.5} and PM ₁₀ and Alberta's air quality objective for benzene. Metro Vancouver asserts that confirmation ambient air quality measurements are needed in areas where the application shows predicted exceedances. o Trans Mountain has filed air quality model results that predict exceedances of applicable air quality objectives and standards for multiple pollutants in large, populated areas of Burnaby. Trans Mountain subsequently filed updates to these model predictions showing markedly lower concentrations, but the modelling is based on emission rates and vapour collection efficiency for the vapour combustion unit which have not been substantiated to Metro Vancouver's satisfaction. In the absence of substantiation of these input numbers, Metro Vancouver maintains that this renders the air quality model results to be both unreliable and uncertain. Metro Vancouver believes confirmation ambient air quality measurements are needed in these areas to assure the public. Metro Vancouver requests that additional monitors be added including PM _{2.5} and NO _x measurements at Metro Vancouver's station at Burnaby-Capitol Hill (T23) and PM _{2.5} and PM ₁₀ measurements at Metro Vancouver's station at-Burnaby Mountain (T14).	There are no predicted exceedances based on updated modelling. Trans Mountain proposes to install one ambient air quality monitoring station as well as two passive sampling stations to measure H ₂ S, SO ₂ and NO ₂ for one year that will be used to verify the dispersion modelling. The VOC control equipment has been designed to comply with all applicable AAQOs and the equipment provider has committed to meet the emission rates and vapour collection and removal efficiencies. Additional monitors at these Metro Vancouver stations (T14 and T23) are not required. There is no evidence to support Metro Vancouver's assertions.	Section 3.1
Metro	Letter	March 3,	o Environment and Climate Change Canada provided	Trans Mountain has attempted to	n/a

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
Vancouver	Incoming	2017	written evidence that a monitoring site was needed at, or adjacent to, the Tsleil-Waututh Nation reserve. They stated that "Section 5(1)(c) of the Canadian Environmental Assessment Act (2012) requires that the environmental effects on aboriginal peoples be taken into account."	actively engage First Nations, including Tsleil-Waututh Nation, in the consultation process but were ultimately unsuccessful in achieving this engagement.	
Metro Vancouver	Letter Incoming	March 3, 2017	Dispersion Modelling report (Condition 79 and 52 Addenda): The proposed single location of an air quality monitoring station at Westridge is not at a location where the maximum predicted 1-hour, 24-hour or annual concentrations have been predicted nor is it at a location that represents residential exposure. Higher concentrations have been predicted at residential locations surrounding the terminal. Based on the isopleth plots provided of the Westridge Terminal only, the residents on the north side of Barnet Road in the 7300 block appear to be located where some of the highest 1-hour concentrations have been predicted for NO₂, SO₂, benzene and H₂S and the residents of the north side of North Cliff Crescent appear to be located where some of the highest annual concentrations have been predicted for PM_{2.5}, NO₂, and SO₂. The health authorities (Fraser Health) has indicated that both chronic and acute exposure is important from a public health perspective and that monitoring in both of these locations is needed.	Trans Mountain has committed to maintain and operate the proposed ambient air quality monitoring stations and use the measured results to inform their compliance with the Ambient Air Quality Objectives (AAQOs). As noted by ECCC, the station locations should be sited where the dispersion modelling indicates the greatest likelihood of measuring the contaminants of interest. As suggested by MV in the meeting with the LFVAQCC on February 17, 2017, a partnership with MV would likely involve relocating the Trans Mountain stations to address other air shed goals within the MV network which is not the best methodology for the Trans Mountain Project as this would compromise their ability to comply with their commitment (i.e., to measure Project related air emissions and effects per NEB direction). As stated in the response to ECCC comments provided in this table, two passive sampler stations, each measuring H₂S, NO₂ and SO₂, will be installed for a one year period to verify the dispersion modelling results. The three proposed ambient stations at WMT will address all the predicted impact areas.	Section 3.1
Metro Vancouver	Letter Incoming	March 3, 2017	Dispersion Modelling report (Condition 79 and 52 Addenda): On October 20, 2010 the Canadian Council of Ministers of the Environment (CCME) agreed to move forward with a new collaborative Air Quality Management System (AQMS) to better protect human health and the environment. The AQMS contains several key elements, including Canadian Ambient Air Quality Standards (CAAQS), air zone management, a system of regional airshed coordination, base-level industrial emission requirements (BLIERs) for industry, and collaborative action to address mobile source emissions. The Air Zone Management Framework (AZMF) provides guidance on how provinces and territories can implement air zone management in order to help achieve the CAAQS, drive continuous improvement and keep clean areas clean. Metro Vancouver has been involved in a working group to develop a new federal Canadian Ambient Air Quality Standard (CAAQS) for NO₂. In the working group Metro Vancouver has reviewed the final draft document that is proposed to be taken to the Canadian Council of Ministers of the Environment (CCME) for approval and adoption. The federal NO₂ CAAQS metrics once adopted will be the driver for air quality management across the country	Trans Mountain has committed to meeting the AAQOs. Measurements from the proposed ambient air quality monitoring will be reviewed regularly to ensure that the objectives are being met and that would include any changes to the NO₂ AAQO.	Section 1.2 and Section 3.5

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
			under the AQMS. Under the AQMS a management framework similar to what exists for PM2.5 and O3 is proposed for NO2 exceedances of the federal NO2 CAAQS. The numerical value of the federal NO2 CAAQS metrics is yet to be finalized, however it is expected that they will be more stringent than Metro Vancouver's current NO2 1-hour and annual objectives.		
Environment and Climate Change Canada	Letter Incoming	February 27, 2017	Information Source/Reference: AEMP Section 3.1 Proposed Station Location Context/Rationale: From ECCC's perspective, the air quality monitoring components of the Air Emissions Management Plan generally appear to meet the requirements of NEB condition 52. However ECCC has a suggestion concerning the siting of the air quality monitoring station or stations. Section 3.1 addresses the location for the proposed air quality monitoring station. The commentary on page 7 expresses the intent to "maximize the potential for measuring the highest concentrations due to project-related emissions for the pollutants of interest." The section also lists a number of other siting factors including proximity to populated areas, accessibility of the monitoring site and reducing air quality impacts from access roads. ECCC observes that peak concentrations of NO2 (1-hour), PM2.5 (24-hour) and SO2 (1-hour) due to Westridge Marine Terminal emissions appear to be along the southeast or eastern boundaries of the property, with secondary peak lobes along the western boundary near the shoreline. The suggested location of the air quality monitoring station (Figure 1) is along the western boundary about 200m from the shore. The discussion in section 3.1 (page 7) also mentions potentially locating the monitoring station on the southwest side of the WMT. Locating the station in this area would not appear to follow the siting objectives listed on page 7 of the AEMP since it may not maximize the potential for measuring the highest concentrations due to project-related emissions. Comment/Recommendation: ECCC supports the principle that the air quality monitoring station or stations should be positioned "to maximize the potential for measuring the highest concentrations due to project related emissions for the pollutants of interest." ECCC also acknowledges that there are other practical siting considerations such as a reliable electric power source and accessibility throughout the year, which are included in Section 4.4 (Site Selection) of the CCME Ambient Air Monitoring Protocol for PM2.5 and Ozone for the CWS (2011). ECCC suggests that the Proponent locate an air quality monitoring station near one of the concentration peaks for the pollutants of interest: along the east to southeast WMT boundary or along the western fenceline boundary near the shoreline. ECCC is interested to participate in the forthcoming	Trans Mountain agrees that the air quality monitoring stations should be located to "maximize the potential for measuring the highest concentrations due to Project related emissions" which is predicted to occur along the east to southeast WMT boundary or along the western property boundary near the shoreline. Subject to access and siting requirements, the three proposed station locations are shown in Figure 1.	Section 3.1

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
			consultation with government authorities and others concerning the location and operation of the Westridge Marine Terminal air quality monitoring station.		
Environment and Climate Change Canada	Letter Incoming	February 27, 2017	Information Source/Reference: AEMP Section 4.8.2 Construction Combustion Emissions Context/Rationale: The Proponent indicates that they comply with Metro Vancouver's bylaw for off-road diesel emissions (No. 1161) and indicates that the bylaw states: "If approved emission reduction measures are applied to the Tier 0 and Tier 1 engines, registration fees may be reduced or waived. The bylaw also restricts exhaust opacity and idling times. Adherence to this bylaw will mitigate the combustion-related emissions of NOX and PM" This commitment does not actually indicate the degree to which the Proponent intends to mitigate emissions from Tier 0 and Tier 1 emissions. Comment/Recommendation: Metro Vancouver's bylaw for off-road emissions does not actually require the Proponent to apply new emission controls to the oldest, highest emitting engines (Tier 0 and Tier 1). ECCC requests that the Proponent indicate the quantity of Tier 0 and Tier 1 engines expected to be used on site, and the degree to which they plan to apply approved mitigation measures to Tier 0 and Tier 1 engines, or simply pay the full registration fees.	Trans Mountain will not deploy any heavy equipment with Tier 0 or Tier 1 diesel engines. Only Tier 2 or higher heavy diesel equipment will be deployed for land-based construction activities.	Section 4.8.2
Environment and Climate Change Canada	Letter Incoming	February 27, 2017	Information Source/Reference: AEMP Section 4.8.2 Construction Combustion Emissions Context/Rationale: Two of the three reduction practices laid out in this section are vague, specifically: • "ensure combustion equipment and exhaust systems are properly maintained; and • reduce or eliminate engine idling." Comment/Recommendation: ECCC requests that the proponent provide specific details of their plan to reduce or eliminate engine idling, such as employee training or automatic engine shutoff timers. ECCC requests that the proponent provide specific details of their plan to ensure combustion and equipment exhaust systems are properly maintained, including a commit to not remove or bypass any manufacturer installed after treatment devices.	Construction equipment exhaust systems and emission control systems (where applicable) will be visually inspected daily by the operators. Random site inspections and 500-hour scheduled inspections will also be conducted. Newer equipment will use "passive regeneration" which constantly monitors and controls the emissions of the engine. Operators will also be trained to minimize equipment idling.	Section 4.8.2
Environment and Climate Change Canada	Letter Incoming	February 27, 2017	Information Source/Reference: N/A Context/Rationale: The proponent has not proposed any measures to mitigate emissions associated with this project other than particulate matter (PM) from the land-side.	The NO _x emissions are expected to be low because neither the tanker main propulsion engines nor the tanker boiler are used at berth or anchor (Section 4.7.3). These actions are taken in part to minimize fuel consumption and reduce CAC emissions per the ships efficiency	n/a

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
			ECCC previously provided the following comment on this project: "EC's analysis indicates that the marine-source of emissions of NOx and fugitive VOCs could be substantially underestimated [by the Proponent] and therefore lacks confidence in the Proponent's maximum modeled concentrations, some of which are close to the applicable Ambient Air Quality Objectives, such as for NO2....Given the uncertainties related to prediction of marine-source combustion emissions, EC recommends the Proponent develop an Air Quality Monitoring, Reporting, and Mitigation Plan in conjunction with the Lower Fraser Valley Air Quality Coordinating Committee. EC further recommends that the Plan include monitoring of emissions to provide data necessary to verify the Project emissions." Comment/Recommendation: Throughout the EA process, ECCC has expressed concerns regarding the proponent's estimates of how much NOx (and fugitive VOCs) would be emitted from marine vessels associated with this project. While the current draft of the AEMP includes emission monitoring for all criteria air contaminant (CAC) emissions at Westridge (including from marine vessels), its proposed emission management measures only apply to particulate matter (PM) emissions from the land-side. The result of this is that, while marine emissions will be monitored, there is currently no plan to mitigate emissions from Westridge-associated marine sources. ECCC recommends the management plan be broadened to include measures to mitigate other pollutants of concern (i.e. not only land-side PM emissions), notably marine-source NOx.	management plan. Section 4.8.3 states that typically, only one or two auxiliary engines are used at berth to power ships systems and provide comfort heating. Therefore, Trans Mountain does not own or operate tankers tug boats or barges but actively encourages marine operators to further reduce emissions of NOx, CO, VOCs and other contaminants of interest. Trans Mountain would bring to the attention of any ship captains if black smoke is seen and would enforce the requirement to not blowdown soot from economizers at Westridge.	
Environment and Climate Change Canada	Letter Incoming	February 27, 2017	Information Source/Reference: Proponent Commitment #370 Context/Rationale: The proponent has not engaged with stakeholders, specifically the Lower Fraser Valley Air Quality Committee, to develop an Air Quality Monitoring, Reporting and Mitigation Plan. ECCC previously provided the following comment on this project: "Given the uncertainties related to prediction of marine-source combustion emissions, EC recommends the Proponent develop an Air Quality Monitoring, Reporting, and Mitigation Plan in conjunction with the LFVAQCC. EC further recommends that the Plan include monitoring of emissions to provide data necessary to verify the Project emissions." Proponent Commitment 370 – "Trans Mountain will work with various provincial and federal agencies with responsibilities related to air emissions from the Project components." Comment/Recommendation: ECCC requests the Proponent consult and work with	Trans Mountain will continue consultation with ECCC and LFVAQCC regarding air quality monitoring.	n/a

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
			ECCC and the other LFVAQCC members, to develop air emissions monitoring, verification, and management requirements for the AEMP.		
Environment and Climate Change Canada	Letter Incoming	February 27, 2017	Information Source/Reference: AEMP Section 1.6 Regulatory Guidance Context/Rationale: Given the boundaries for the project, the North American Emission Control Area (ECA) should be taken into account as project operations are with the ECA zone. Comment/Recommendation: Section 1.6 of the AEMP should include the North American Emission Control Area (ECA) requirements.	Agreed. Added NA ECA guidance to the AEMP.	Section 1.6
Environment and Climate Change Canada	Letter Incoming	February 27, 2017	Information Source/Reference: AEMP Appendix C Table C1: Maximum Predicted Concentrations for Burnaby Terminal + Westridge Marine Terminal + Marine (BWM), Application Case (in $\mu\text{g}/\text{m}^3$) Context/Rationale: ECCC is capable of estimating emissions associated with marine activity of the type that would be driven by this project. While ECCC is able to replicate the Proponent's emissions estimates for tanker boilers, provided in Table 38 of Section 6.1.2.2 of the AEMP Addendum, it is unable to replicate the Proponent's auxiliary engine and tug emissions. ECCC estimates the auxiliary engine emissions will be twice as high and that the tug emissions are too low by an order of magnitude or more (depending on what assumptions the Proponent made regarding tug activity). If the emissions in Table 38 are used in the dispersion modelling, the implication is that the max modeled CAC concentrations will be too low. Further, anchorage emissions are estimated (using the Proponent's estimate for anchorage times) to add another 40 to 50% of emissions the Westridge marine terminal area. So the uncertainty as to the Proponent's estimates of marine-source emissions, and the resulting maximum modelled concentrations, remains. Comment/Recommendation: Regarding Table C1, Appendix C of the AEMP: ECCC requests clarification: - On whether the emissions in Table 38 in the AEMP Addendum were used in the modelling to generate the results in Table C1, Appendix C, where the max modelled concentration for NO_2 for the application case plus background was $182 \mu\text{g}/\text{m}^3$ ($\text{AAQO} = 188 \mu\text{g}/\text{m}^3$), - On how the emission rates in Table 38 were obtained (load factor, emission factors, activity hours, etc). ECCC recommends the marine emissions inputs to the model be verified and that emissions from anchorages N,L,K, ~1000 m from Westridge, be included in the assessment of emissions and dispersion modelling included in the AEMP.	The emissions shown in Table 38 were used to generate the results in Table C1 of Appendix C (now Table D-1 of Appendix D). Footnotes were added to Addendum (now Appendix F) Table 38 to clarify assumptions.	Appendix D Appendix F Table 38
Environment and Climate Change	Letter Incoming	February 27, 2017	Information Source/Reference: AEMP Section 3.5 Data Recording and Collection	The amount of time spent by Westridge-related tankers in the Burrard inlet, either at berth or anchorage is not solely	n/a

Invited Stakeholder Group/ Agency Name	Method of Contact	Date of Consultation Activity	Feedback/Stakeholder Response	Trans Mountain Response	Where Addressed in the Plan
Canada			Context/Rationale: The proponent has proposed no measures to mitigate emissions associated with CAC emissions from marine vessels; nor have they established any process for implementing additional measures if monitored emissions are shown to increase. The maximum modelled concentration for NO₂ for Westridge is close to the air quality limit of 188 µg/m³. This concentration is an estimate based on an emissions estimate that ECCC assessed as being too low, and contains a high level of uncertainty. In their revised CMAQ modelling, the Proponent assumed all tankers will be NO_x Tier III compliant when the project is operational. However, the NO_x Tier III regulation applies to vessels 2016 and newer. Current fleet age data indicates that the average age of crude oil tankers in 2020 will be 9 years old. In other words, not NO_x Tier compliant. Thus the actual max concentration of NO₂ could be higher than predicted by the revised CMAQ model and the dispersion modelling, possibly exceeding the AAQO. The current AEMP states in Section 3.5 that "Any elevated concentration readings that approach the AAQOs would trigger an alarm message indicating that a potential exceedance may occur and operational changes may need to occur" but does not include any specific NO_x-reducing measures or mitigation. Comment/Recommendation: Regarding Section 3.5 of the AEMP: ECCC recommends the Air Emissions Management Plan (AEMP) provide a plan to mitigate and manage other CACs, in particular NO_x and NO₂ from marine vessels, rather than only managing particulate emissions. ECCC recommends the AEMP also include criteria that would require additional mitigation measures for NO_x and NO₂, and a description of additional mitigation measures that would be implemented if the monitoring data identified exceedance of the threshold of NO_x or NO₂, such as working with the Port and taking other measures to reduce the amount of time that Westridge-associated tankers spend in the Burrard Inlet, either at berth or at anchorages.	dictated by Trans Mountain. Other marine traffic, tidal conditions and weather are some of the factors that affect tanker traffic movements. Ultimately decisions made the Vancouver Fraser Port Authority will dictate movement of not only Westridge-related tankers but also other large vessels. Trans Mountain strives to promote efficient terminal usage and minimize anchorage time.	

3.3 Aboriginal Engagement

Since April 2012, Trans Mountain has engaged with Aboriginal groups who might have an interest in the Project or have Aboriginal interests potentially affected by the Project, based on the proximity of their community and their assertion of traditional and cultural use of the land along the pipeline corridor to maintain a traditional lifestyle. The objectives of Aboriginal engagement are to:

- have an open, transparent and inclusive process that seeks to exchange information in a respectful manner;
- address concerns shared by those who might have an interest in the Project or have Aboriginal interests potentially affected by the Project;
- incorporate feedback into Project planning and execution; and
- provide opportunities to maximize Project benefits to Aboriginal communities and Aboriginal groups.

A comprehensive Aboriginal engagement process is led by experienced engagement advisors in Alberta and BC, specialized in the areas of Aboriginal relations, law, economic development, education, training, employment and procurement. Trans Mountain's engagement process for the Project is flexible, allowing each community and group to engage in meaningful dialogue in the manner they choose and in a way to meet their objectives and values.

Each community has the opportunity to engage with Trans Mountain, depending on Project interests and potential effects. The following opportunities to engage have been provided:

- Project announcement;
- initial contact with Aboriginal community or Aboriginal group;
- meetings with Chief and Council and meetings with staff;
- host community information session(s);
- conduct TLU studies and socio-economic interviews;
- identify interests and concerns; and
- identify mitigation options.

Issues and concerns specific to the AEMP for Westridge Marine Terminal raised during Aboriginal engagement between early 2012 to March 2017 are summarized in Table A-4.

TABLE A-4
SUMMARY OF ABORIGINAL CONCERNS REGARDING THE
AIR EMISSIONS MANAGEMENT PLAN FOR WESTRIDGE MARINE TERMINAL

Issue or Concern		Summary Trans Mountain Response	Where Addressed
Summary	Aboriginal Community		

Issue or Concern		Summary Trans Mountain Response	Where Addressed
Summary	Aboriginal Community		
Concerned for the assessment methodology used for the potential Project impacts on air quality.	Lower Nicola Indian Band	Responded to Lower Nicola Indian Band's concerns related to the Project ESA's assessment of potential impacts to air quality through Lower Nicola Indian Band Information Request No. 2.16 which responded to air quality modelling methodology in the ESA air quality assessment. Additionally, a number of Conditions require Trans Mountain to file reports that will monitor Project-related impacts to air quality, including NEB Condition 52, which requires filing of an Air Emissions Management Plan for the Westridge Marine Terminal, and NEB Condition 79, which requires filing of Air Emissions Management Plans for the Edmonton, Sumas, and Burnaby Terminals. Trans Mountain will consult with Aboriginal groups in advance of its filings in compliance with NEB Conditions 52 and 79. Trans Mountain will include rationale for the inclusion of information received from Aboriginal groups in its filing and will issue a response letter to Aboriginal groups with the same information at the time of filing, as per the Condition.	Lower Nicola Indian Band Information Request No. 2.16
Tsawwassen First Nation has commented that NEB Condition 52 is not specific regarding jurisdiction and fiscal resources for consultation related to the Air Emissions Management Plan for the Westridge Marine Terminal. As such, they have requested that the NEB amend NEB Condition 52 so that it requires Trans Mountain to also satisfy the requirements of provincial and municipal/regional parties with jurisdiction over this matter.	Tsawwassen First Nation	Trans Mountain will consult with Aboriginal groups in advance of its filings in compliance with NEB Condition 52, which addresses this issue. Trans Mountain will include rationale for the inclusion of information received from Aboriginal groups in its filing and will issue a response letter to Aboriginal groups with the same information at the time of filing as per the Condition. Trans Mountain has committed to meeting the most stringent applicable ambient air quality objectives.	Air Emissions Management Plan for Westridge Marine Terminal Section 1.3 Objectives were drawn from several government regulators including Metro Vancouver (MV), British Columbia Ministry of Environment (BC MOE), Alberta Environment and Parks (AEP), Canadian Council of Ministers of the Environment (CCME) and Environment and Climate Change some of the objectives that Trans Mountain agreed to comply with are taken from Alberta, in the absence of BC, MV or National objectives.

Trans Mountain continues its liaison with Indigenous and Northern Affairs Canada, the Government of Canada's Major Projects Management Office, the BC Ministry of Aboriginal Relations and Reconciliation, and the Alberta Ministry of Aboriginal Affairs to provide updates regarding Trans Mountain's engagement activities with Aboriginal groups.

Identifying Aboriginal Groups for Consultation

Trans Mountain used the First Nations Consultative Area Database Public Map Service to identify the Aboriginal groups with traditional territories encountered by the Westridge Marine Terminal. Listed below are the Aboriginal groups identified for consultation. Throughout regular engagement with TMPEP, any Aboriginal groups were added to the list if they identified air quality as a concern.

- Aitchelitz First Nation (Stó:lō)

- Cowichan Tribes
- Halalt First Nation (CNA)
- Kwikwetlem First Nation
- Lake Cowichan First Nation
- Leq'a:mel First Nation (Stó:lō)
- Lyackson First Nation
- Musqueam Indian Band
- Penelakut First Nation
- Popkum First Nation (Stó:lō)
- Skawahlook First Nation (Stó:lō)
- Skowkale First Nation (Stó:lō)
- Squamish Nation
- Stu'zuminus First Nation (Chemainus)
- Tsleil-Waututh Nation
- Tsawwassen First Nation
- Tzeachten First Nation (Stó:lō)
- Yakwekwioose Band (Stó:lō)

Consultation Activities

A letter was sent to the Aboriginal groups listed above with a copy of the draft Plan in November 2016. Where appropriate and upon request, a follow up meeting was arranged to discuss this Plan in more detail and address any concerns. No feedback specific to this Plan was received.

Trans Mountain has summarized the feedback received through Trans Mountain's engagement on this Plan in Table A-4 and the summary includes how Trans Mountain responded to and addressed the concern or issue. It should be noted that although the engagement process also provided for opportunity for general discussion about Project construction and associated Aboriginal issues and opportunities, only feedback/issues directly related to the topic are provided in this Plan. Other issues and topics raised have been captured in the corresponding mitigation plan as appropriate.

This final Plan will be shared with the Aboriginal groups at the same time as the Plan is filed with the NEB in 2017.

3.4 Landowners/Tenants

Trans Mountain has implemented a comprehensive landowner engagement process for the TMEP to:

- ensure landowners are informed of the Project and how it may affect them;
- enable landowners to gain an understanding of their rights under the *NEB Act*, and the regulatory process and their opportunities for comment within the NEB regulatory process; and
- have a number of opportunities to discuss the Project, identify my concerns or questions they may have with the project, and have those questions and concerns addressed by Trans Mountain.

In addition to these opportunities for engagement, Trans Mountain is required to provide formal notifications of landowners under Sections 87 and 34 of the *NEB Act*, and Trans Mountain has or will, at the appropriate time, provide such notices.

Individual landowners and tenants have different preferences with respect to communications, and Trans Mountain tailors its communications as requested. Land representatives working for Trans Mountain

have been in discussions with landowners for over three years and issues or concerns raised with land agents have been documented in the Project landowner database, addressed within site specific construction plans and documented within the land rights agreements. Trans Mountain has filed reports with the NEB providing details on the landowner engagement program and results to date. In accordance with NEB Condition 99, records of engagement and consultation with landowners and tenants will be filed with the NEB at least two months prior to commencing construction and every six months thereafter until five years after commencing Project operations.

Trans Mountain's landowner/tenant consultation strategy includes the activities described below.

1. Prior to Project approval - obtain landowner permission for survey, provide information on the project and landowner rights, provide copies of land agreement documents to the landowners for their review and consideration, dialogue with each landowner to answer questions and address concerns raised by landowners, provide Project updates, and disseminate any other information necessary to satisfy landowner requests and regulatory requirements. After addressing outstanding questions and issues, obtain land agreements from landowners voluntarily. Land agreements have and will address specific landowner concerns regarding construction and reclamation activity.
2. After obtaining a CPCN from the NEB, Trans Mountain will provide Section 34 notices indicating the detailed route for the pipeline and the specific lands affected by the Project, and complete any additional regulatory procedures required prior to commencement of construction, including providing reasonable notice through land agents of commencement date and activities. Trans Mountain land representatives will continue to maintain contact with landowners through construction to answer questions and address any issues that may arise. Following construction, maintain communication with landowners to discuss reclamation activities and timing. Upon completion of reclamation, Trans Mountain will transition the Project land program to operations.

Respecting this report, Trans Mountain notified landowners by letter in September 2016 that NEB Condition plans were being released for consultation and feedback. The landowner notification letter requested that landowners review the reports available on the TMEP website, or alternatively contact their assigned land representative or Trans Mountain directly if they wished to receive hard copies of the reports to review. No responses or requests for copies of the reports were received by Trans Mountain and no concerns or questions about the reports were expressed by landowners.

APPENDIX B

TABLE B-1

RECORD OF NOTIFICATION

Regulator/Stakeholder Group	Contact Name (if applicable)	Date	Method of Contact
Landowners	N/A	September 11, 2016	Letter
Aboriginal Groups (please refer to Appendix E)	N/A	September 26, 2016	Letter
Vancouver Fraser Port Authority	Tim Blair	September 20, 2016	Email
Jasper National Park of Canada	Mayabe Dia	September 20, 2016	Email
Alberta Environment and Parks	Corinee Kristensen	September 20, 2016	Email
Ministry of Transportation and Infrastructure	Lisa Gow	September 20, 2016	Email
BC Parks	Ken Morrison	September 20, 2016	Email
BC Oil and Gas Commission	Brian Murphy	September 20, 2016	Email
Ministry of Natural Gas Development	Linda Beltrano	September 20, 2016	Email
Forests, Lands and Natural Resource Operations	Andrea Mah	December 22, 2016	Email
Forests, Lands and Natural Resource Operations	Susan Fitton	September 20, 2016	Email
FVAQC	Roger Quan	October 21,, 2016	Email
ECCC	Phil Wong	October 21, 2016	Email
ECCC	Rachel Mayberry	October 28,, 2016	Email
ECCC	Coral Deshield	December 21,, 2016	Email
ECCC	Phil Wong	December 21, 2016	Email
Vancouver Fraser Port Authority	Patrick Coates	September 20, 2016	Email
Department of Fisheries and Oceans	Sandra Hollick-Kenyon	December 3, 2016	Email
Department of Fisheries and Oceans	Alston Bonamis	December 3, 2016	Email
City of Edmonton	N/A	November 29, 2016	Letter
City of Spruce Grove	N/A	November 29, 2016	Letter
Municipality of Jasper	N/A	November 29, 2016	Letter
Parkland County	N/A	November 29, 2016	Letter
Strathcona County	N/A	November 29, 2016	Letter
Town of Edson	N/A	November 29, 2016	Letter
Town of Hinton	N/A	November 29, 2016	Letter
Town of Stony Plain	N/A	November 29, 2016	Letter
Village of Wabamun	N/A	November 29, 2016	Letter
Yellowhead County	N/A	November 29, 2016	Letter
City of Kamloops	N/A	November 29, 2016	Letter
City of Kamloops RCMP Detachment	N/A	November 29, 2016	Letter

Regulator/Stakeholder Group	Contact Name (if applicable)	Date	Method of Contact
City of Merritt	N/A	November 29, 2016	Letter
City of Merritt RCMP Detachment	N/A	November 29, 2016	Letter
Clearwater Chamber of Commerce	N/A	November 29, 2016	Letter
District of Clearwater	N/A	November 29, 2016	Letter
District of Clearwater RCMP Detachment	N/A	November 29, 2016	Letter
Interior Health	N/A	November 29, 2016	Letter
Merritt Chamber of Commerce	N/A	November 29, 2016	Letter
Northern Health	N/A	November 29, 2016	Letter
Regional District of Fraser Fort George	N/A	November 29, 2016	Letter
Thompson Nicola Regional District	N/A	November 29, 2016	Letter
Town of Blue River	N/A	November 29, 2016	Letter
Venture Kamloops	N/A	November 29, 2016	Letter
Village of Valemount	N/A	November 29, 2016	Letter
Village of Valemount RCMP Detachment	N/A	November 29, 2016	Letter
Nicola Stock Breeder's Association - on behalf of the BC Cattlemen's Association	N/A	November 29, 2016	Letter
Grassland's Conservation Council	N/A	November 29, 2016	Letter
Thompson Rivers University	N/A	November 29, 2016	Letter
Southern Interior Weed Management Committee	N/A	November 29, 2016	Letter
Fraser Basin Council	N/A	November 29, 2016	Letter
Northwest Invasive Plant Council (NWIPC)		November 29, 2016	
Grassland's Conservation Council	N/A	November 29, 2016	Letter
Abbotsford Chamber of Commerce	N/A	November 29, 2016	Letter
Abbotsford Police Department	N/A	November 29, 2016	Letter
ASCA	N/A	November 29, 2016	Letter
BC Invasive Species	N/A	November 29, 2016	Letter
BC Ministry of Children and Family Development	N/A	November 29, 2016	Letter
BC Ministry of Social Development	N/A	November 29, 2016	Letter
BC Nature	N/A	November 29, 2016	Letter
BC Wildlife Federation	N/A	November 29, 2016	Letter
Burnaby Board of Trade	N/A	November 29, 2016	Letter
Burnaby RCMP Detachment	N/A	November 29, 2016	Letter
Chilliwack Chamber of Commerce	N/A	November 29, 2016	Letter
Chilliwack Economic	N/A	November 29, 2016	Letter

Regulator/Stakeholder Group	Contact Name (if applicable)	Date	Method of Contact
Partners			
City of Abbotsford	N/A	November 29, 2016	Letter
City of Burnaby	N/A	November 29, 2016	Letter
City of Chilliwack	N/A	November 29, 2016	Letter
City of Coquitlam	N/A	November 29, 2016	Letter
City of New Westminster	N/A	November 29, 2016	Letter
City of Port Coquitlam	N/A	November 29, 2016	Letter
City of Port Moody	N/A	November 29, 2016	Letter
City of Surrey	N/A	November 29, 2016	Letter
Coquitlam RCMP Detachment	N/A	November 29, 2016	Letter
Corporation of Delta	N/A	November 29, 2016	Letter
District of Hope	N/A	November 29, 2016	Letter
Eagle Creek	N/A	November 29, 2016	Letter
Fraser Valley Invasive Plant Council	N/A	November 29, 2016	Letter
Fraser Valley Regional District	N/A	November 29, 2016	Letter
Glen Valley Watershed Society	N/A	November 29, 2016	Letter
Hope Chamber of Commerce	N/A	November 29, 2016	Letter
Hope Community Policing Office	N/A	November 29, 2016	Letter
Langley Chamber of Commerce	N/A	November 29, 2016	Letter
LEPS	N/A	November 29, 2016	Letter
LFVAQCC	N/A	November 29, 2016	Letter
Metro Vancouver	N/A	November 29, 2016	Letter
Newton RCMP Detachment	N/A	November 29, 2016	Letter
RCMP Division 'E'	N/A	November 29, 2016	Letter
Sapperton Fish and Game	N/A	November 29, 2016	Letter
Stoney Creek	N/A	November 29, 2016	Letter
Surrey Board of Trade	N/A	November 29, 2016	Letter
Surry Environmental Partners	N/A	November 29, 2016	Letter
Surrey RCMP Detachment	N/A	November 29, 2016	Letter
Township of Langley	N/A	November 29, 2016	Letter
Township of Langley RCMP Detachment	N/A	November 29, 2016	Letter
TriCities Chamber of Commerce	N/A	November 29, 2016	Letter
Upper Fraser Valley Regional Detachment	N/A	November 29, 2016	Letter
Village of Anmore	N/A	November 29, 2016	Letter
Village of Belcarra	N/A	November 29, 2016	Letter
Yorkson	N/A	November 29, 2016	Letter
ACGI Shipping	N/A	November 29, 2016	Letter
Barnett Marine Park	N/A	November 29, 2016	Letter
BC Ambulance	N/A	November 29, 2016	Letter
BC Chamber of Shipping	N/A	November 29, 2016	Letter

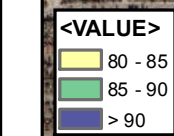
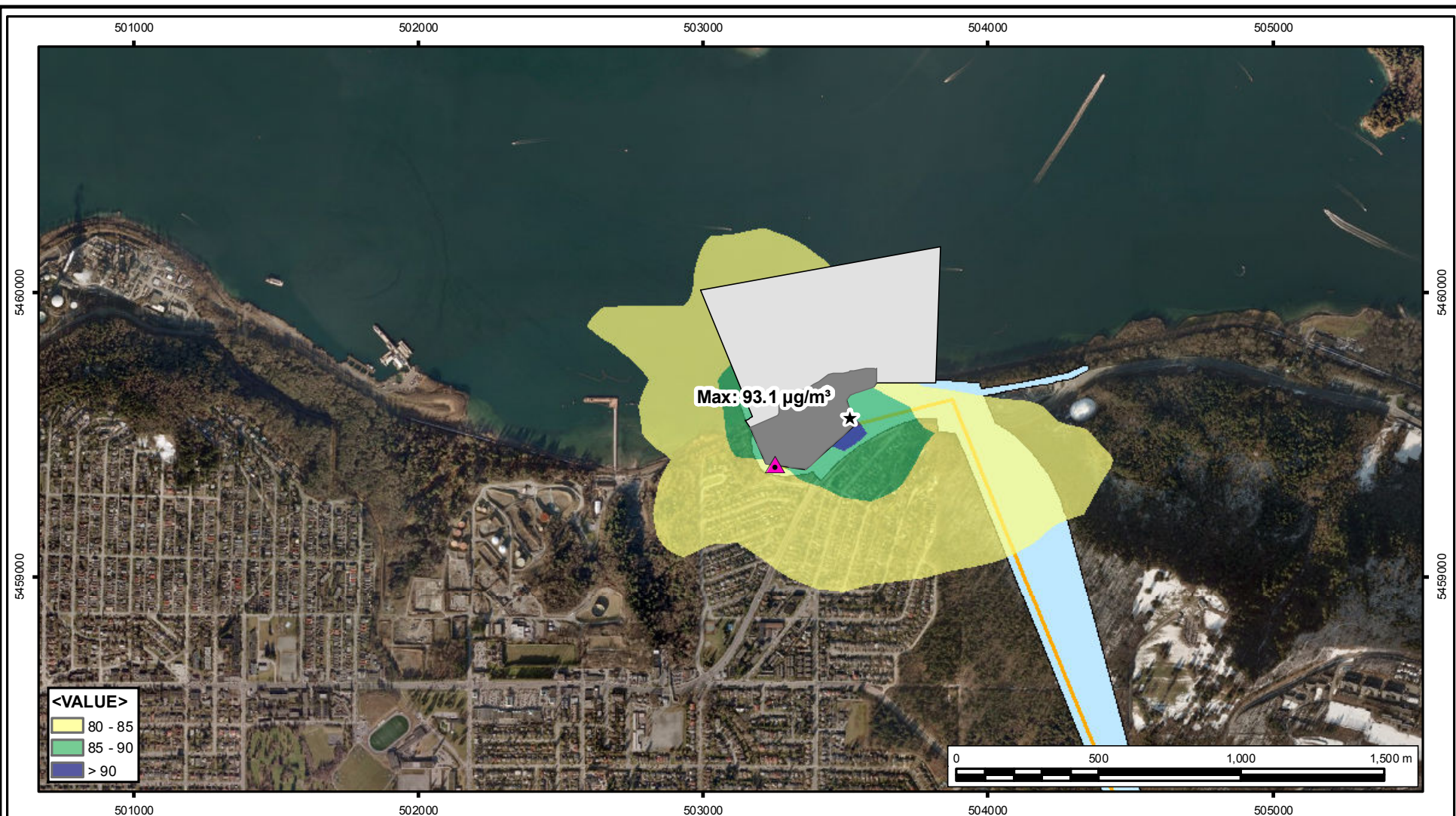
Regulator/Stakeholder Group	Contact Name (if applicable)	Date	Method of Contact
BC Coast Pilots (BCCP)	N/A	November 29, 2016	Letter
BROKE (Burnaby Residents Opposed to Kinder Morgan Expansion)	N/A	November 29, 2016	Letter
Canadian Pacific (CP) Rail	N/A	November 29, 2016	Letter
Canexus- Ero- Newalta- Univar Community Advisory Panel (CAP)	N/A	November 29, 2016	Letter
Canexus Chemicals	N/A	November 29, 2016	Letter
Chevron	N/A	November 29, 2016	Letter
CN Rail	N/A	November 29, 2016	Letter
Council of Marine Carriers	N/A	November 29, 2016	Letter
District of North Vancouver	N/A	November 29, 2016	Letter
Empire Shipping	N/A	November 29, 2016	Letter
Erco Worldwide	N/A	November 29, 2016	Letter
First Nation Emergency Services Society (FNESS)	N/A	November 29, 2016	Letter
First Nation Health Authority	N/A	November 29, 2016	Letter
Fraser Health Authority	N/A	November 29, 2016	Letter
Inchcape Shipping	N/A	November 29, 2016	Letter
Island Tug and Barge	N/A	November 29, 2016	Letter
Kask Brothers	N/A	November 29, 2016	Letter
Ledcor Resources and Transportation Limited Partnership	N/A	November 29, 2016	Letter
Mason Agency (Shipping Service)	N/A	November 29, 2016	Letter
MLA- Burnaby Lougheed	N/A	November 29, 2016	Letter
MLA- Burnaby North	N/A	November 29, 2016	Letter
MLA- Coquitlam – Burke Mountain	N/A	November 29, 2016	Letter
MLA- North Vancouver Lonsdale	N/A	November 29, 2016	Letter
MLA- North Vancouver Seymour	N/A	November 29, 2016	Letter
MLA- Port Moody- Coquitlam	N/A	November 29, 2016	Letter
MP- Delta	N/A	November 29, 2016	Letter
MP- North Burnaby Seymour	N/A	November 29, 2016	Letter
MP- North Vancouver	N/A	November 29, 2016	Letter
MP- Vancouver Centre	N/A	November 29, 2016	Letter
MP- Vancouver East	N/A	November 29, 2016	Letter
MP- Vancouver Quadra	N/A	November 29, 2016	Letter
MP- West Vancouver – Sunshine Coast – Sea to Sky Country	N/A	November 29, 2016	Letter
North Shore NOPE	N/A	November 29, 2016	Letter
North Vancouver Chamber of Commerce	N/A	November 29, 2016	Letter
Pacific Coast Terminal	N/A	November 29, 2016	Letter
Pacific Pilotage Authority	N/A	November 29, 2016	Letter

Regulator/Stakeholder Group	Contact Name (if applicable)	Date	Method of Contact
Pacific Wildlife Foundation	N/A	November 29, 2016	Letter
Peter Kiewit Infrastructure Co.	N/A	November 29, 2016	Letter
Seaspan	N/A	November 29, 2016	Letter
Shell Terminal	N/A	November 29, 2016	Letter
Simon Fraser University	N/A	November 29, 2016	Letter
SMIT Marine	N/A	November 29, 2016	Letter
Suncor Terminal	N/A	November 29, 2016	Letter
UBC Stellar Sea Lion (Marine Mammal) Research Centre	N/A	November 29, 2016	Letter
Vancouver Aquarium	N/A	November 29, 2016	Letter
Vancouver Board of Trade	N/A	November 29, 2016	Letter
Vancouver Coastal Health Authority	N/A	November 29, 2016	Letter
Vancouver Pile and Dredge	N/A	November 29, 2016	Letter
West Vancouver Chamber of Commerce	N/A	November 29, 2016	Letter
Westward Shipping	N/A	November 29, 2016	Letter
Wild Bird Trust	N/A	November 29, 2016	Letter
Metro Vancouver Regional District	Ali Ergudenler	November 29, 2016	Email
Metro Vancouver Regional District	Roger Quan	November 29, 2016	Email

Appendix C

Westridge Marine Terminal Application Case (Project Only) Concentration Contour Plots

Map Path: C:\Users\jgibson\Documents\160201\160201_160201_AQMap_WebMap_Terminal_R_AQMap_Corridor_Plot_v1_20151211.mxd



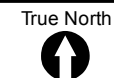
- Existing Automated Monitoring System (SAM) Unit
- Conceptual Water Lot Lease Boundary
- Existing Trans Mountain Pipeline
- Trans Mountain Expansion Proposed Pipeline Corridor
- Terminal Boundary

Map Notes:
Projection: NAD 1983 UTM 10N
Routing: BaseLine TMPL provided by KMC, May 2012; Study Corridor V9 provided by UPL, March 19, 2014; Facilities: Provided by KMC, 2012;
Transportation: BC Forests, The National Topographic Data Base, 2012, Lands and Natural Resource Operations, 2012, ESRI, 2005 & BC Crown Registry and Geographic Base Branch, 2010; Geopolitical Boundaries: BC FLNRO, 2007, ESRI, 2005, ESRI, 2013 & Natural Resources Canada, 2012; First Nation Lands: Government of Canada, 2013 & IHS Inc., 2011; Basemap Imagery: First Base Solutions - Vancouver 2008; Transportation Data: ESRI 2010.

Predicted Maximum 1-hour NO₂ Concentration for the Westridge Marine Terminal Only (in µg/m³)

Application Case Excluding Ambient Background
Trans Mountain Expansion Project - Alberta and British Columbia, Canada

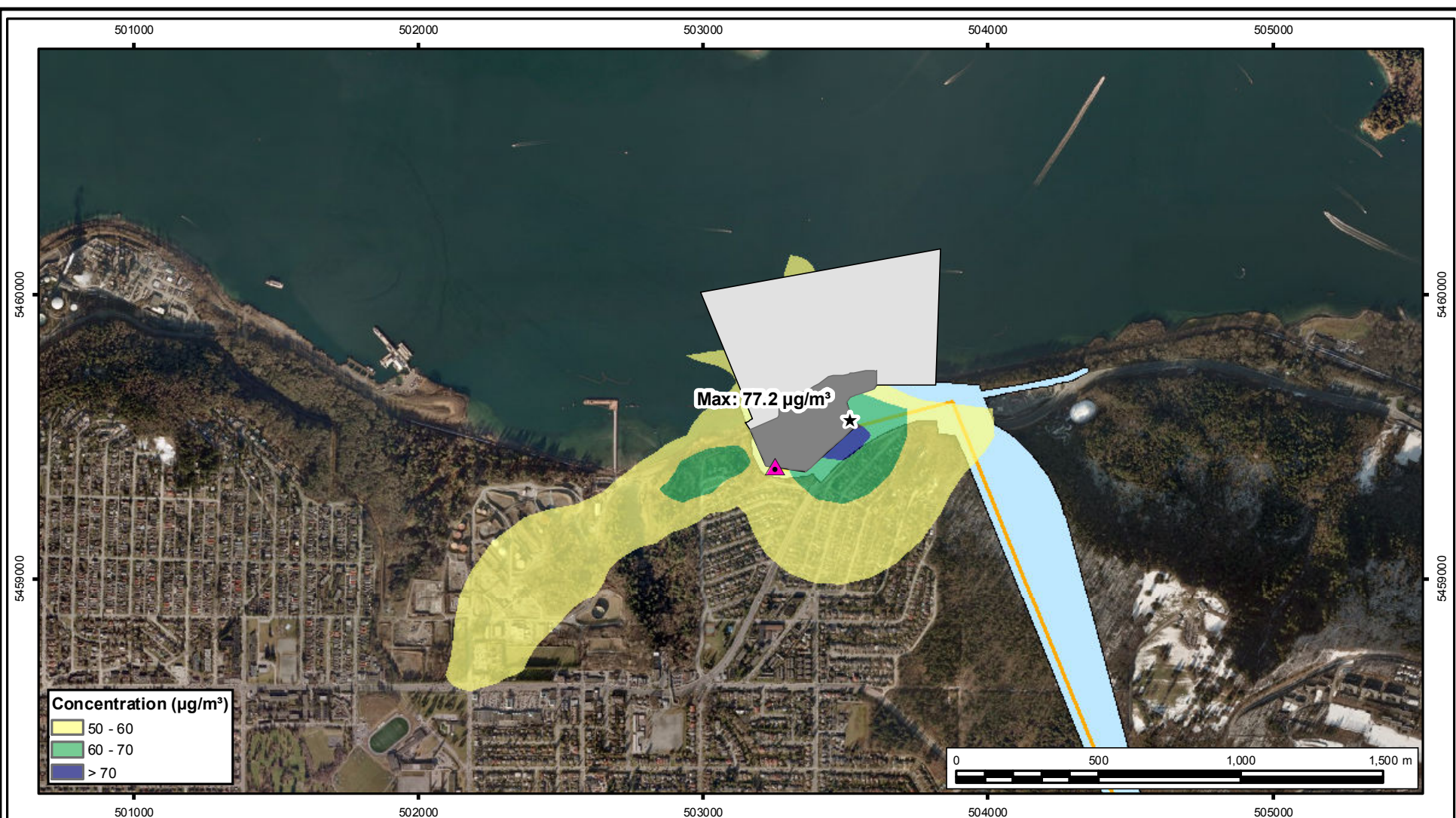
BC Interim AQO = 188 µg/m³
(based on 98th percentile of daily 1-hour maximum)



Project #1602001

Drawn by: DJH	Figure: C3
Approx. Scale: 1:20,000	
Date Revised: Nov. 2, 2016	





- Existing Automated Monitoring System (SAM) Unit
- Conceptual Water Lot Lease Boundary
- Existing Trans Mountain Pipeline
- Trans Mountain Expansion Proposed Pipeline Corridor
- Terminal Boundary

Map Notes:
 Projection: NAD 1983 UTM 10N
 Routing: BaseLine TMPL provided by KMC, May 2012; Study Corridor V9 provided by UPL, March 19, 2014; Facilities: Provided by KMC, 2012;
 Transportation: BC Forests, The National Topographic Data Base, 2012;
 Lands and Natural Resource Operations, 2012; ESRI, 2005 & BC Crown Registry and Geographic Base Branch, 2010; Geopolitical Boundaries: BC FLNRO, 2007; ESRI, 2005, ESRI, 2013 & Natural Resources Canada, 2012;
 First Nation Lands: Government of Canada, 2013 & IHS Inc., 2011; Basemap Imagery: First Base Solutions - Vancouver 2008; Transportation Data: ESRI 2010.

Predicted Maximum 24-hour NO_2 Concentration for the Westridge Marine Terminal Only (in $\mu\text{g}/\text{m}^3$)

National Ambient Air Quality Objective = 200 $\mu\text{g}/\text{m}^3$

Application Case Excluding Ambient Background
 Trans Mountain Expansion Project - Alberta and British Columbia, Canada

True North



Drawn by: DJH Figure: C4

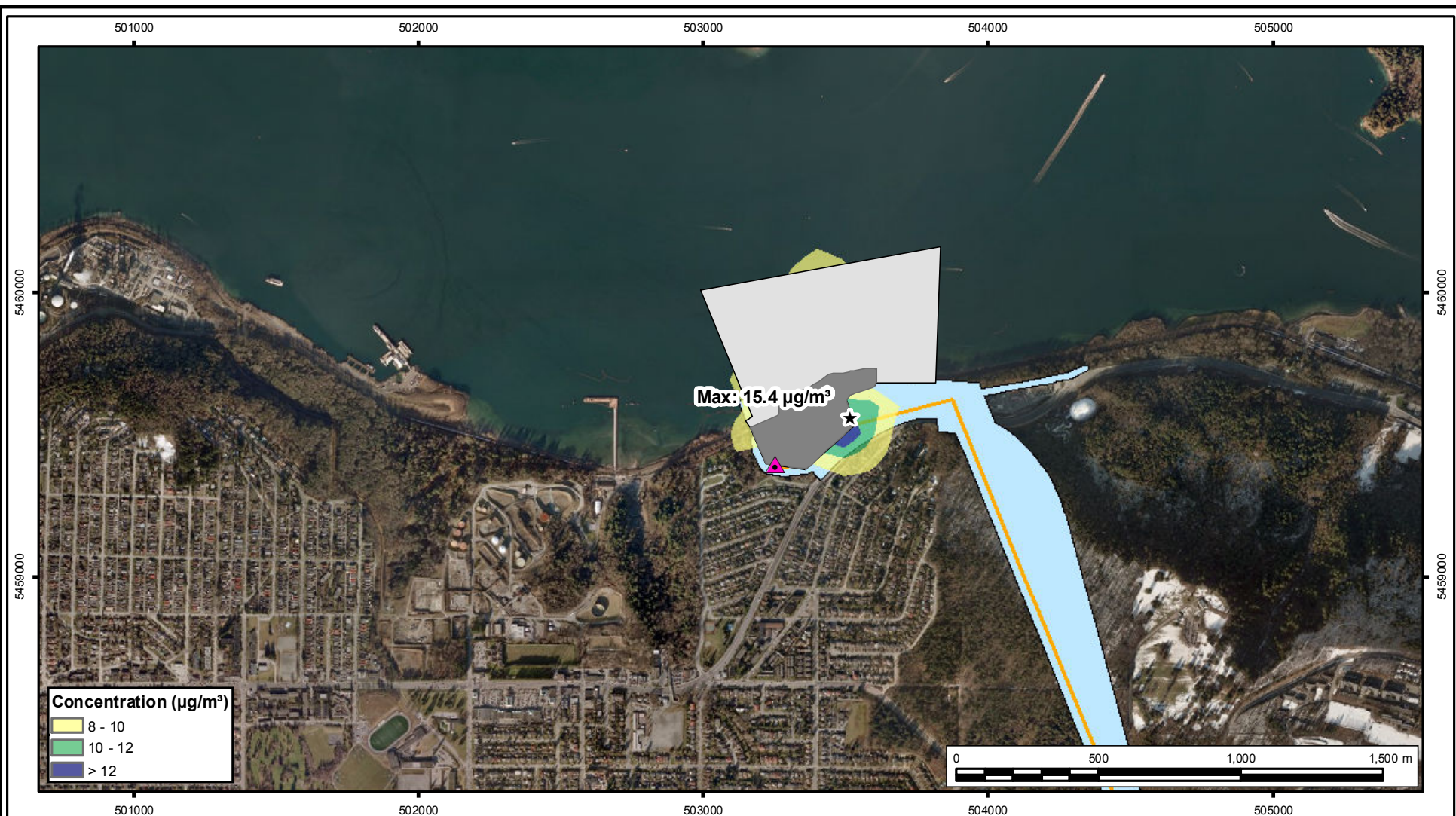
Approx. Scale: 1:20,000

Date Revised: Nov. 2, 2016

Project #1602001



Map Path: C:\Users\jgordon\Documents\160201\160201_160201_AQ_Rep_Westridge_Terminal_R_AirMap_Corridor_Plot_v1_20151211.mxd



- Existing Automated Monitoring System (SAM) Unit
- Conceptual Water Lot Lease Boundary
- Existing Trans Mountain Pipeline
- Trans Mountain Expansion Proposed Pipeline Corridor
- Terminal Boundary

Map Notes:
Projection: NAD 1983 UTM 10N
Routing: BaseLine TMPL provided by KMC, May 2012; Study Corridor V9 provided by UPL, March 19, 2014; Facilities: Provided by KMC, 2012;
Transportation: BC Forests, The National Topographic Data Base, 2012; Lands and Natural Resource Operations, 2012; ESRI, 2005 & BC Crown Registry and Geographic Base Branch, 2010; Geopolitical Boundaries: BC FLNRO, 2007; ESRI, 2005, ESRI, 2013 & Natural Resources Canada, 2012; First Nation Lands: Government of Canada, 2013 & IHS Inc., 2011; Basemap Imagery: First Base Solutions - Vancouver 2008; Transportation Data: ESRI 2010.

Predicted Maximum 1-hour SO_2 Concentration for the Westridge Marine Terminal Only (in $\mu\text{g}/\text{m}^3$)

Application Case Excluding Ambient Background
Trans Mountain Expansion Project - Alberta and British Columbia, Canada

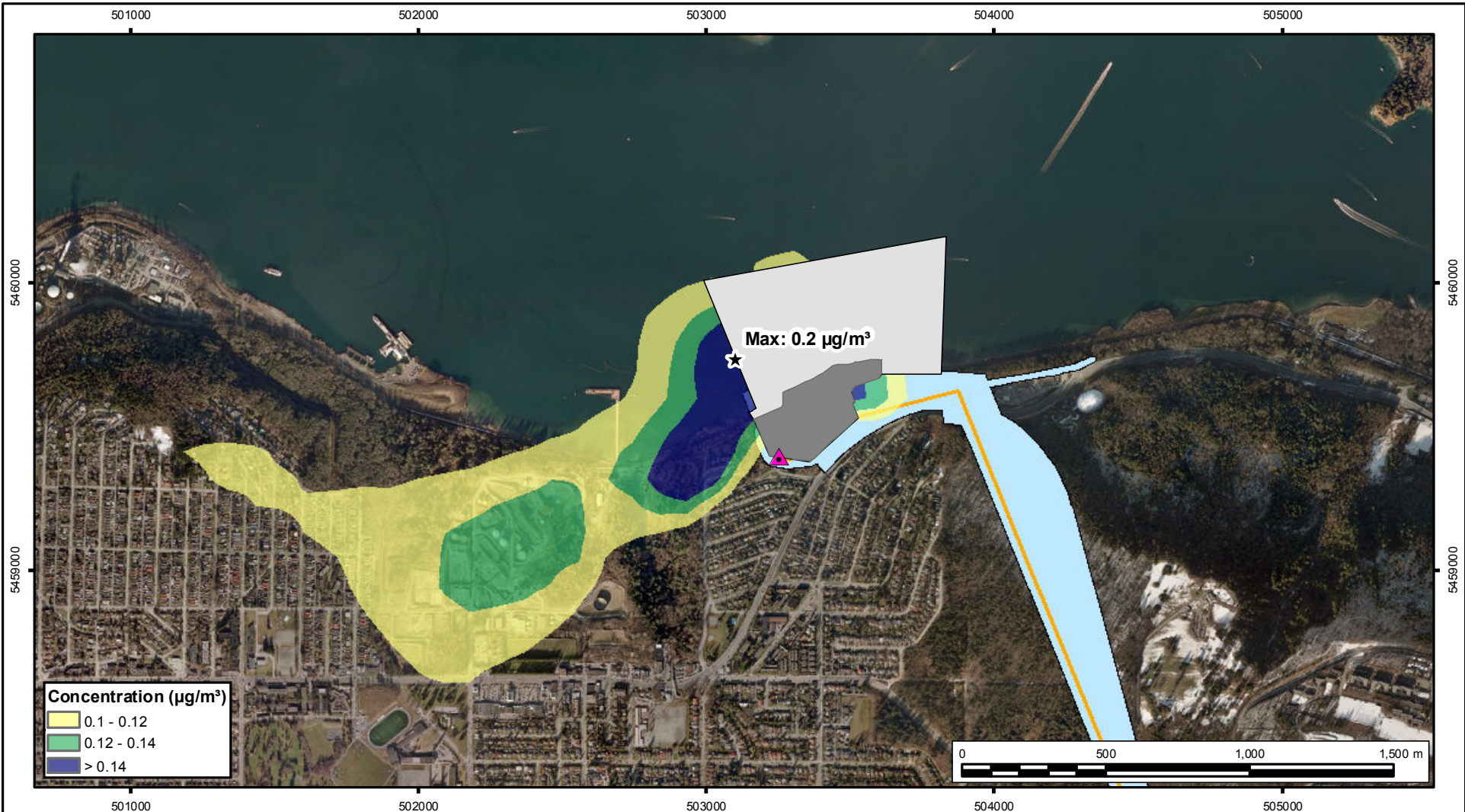
Canadian Ambient Air Quality Standard = 183 $\mu\text{g}/\text{m}^3$ in 2020 and 170 $\mu\text{g}/\text{m}^3$ in 2025 (based on 3-year average of the annual 99th percentile of daily 1-hour maximum)



Project #1602001

Drawn by: DJH Figure: C6
Approx. Scale: 1:20,000
Date Revised: Nov. 2, 2016





 Existing Automated Monitoring System (SAM) Unit

Trans Mountain Expansion
Proposed Pipeline Corridor

 Conceptual Water Lot Lease Boundary

Map Notes:

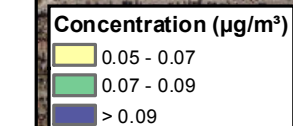
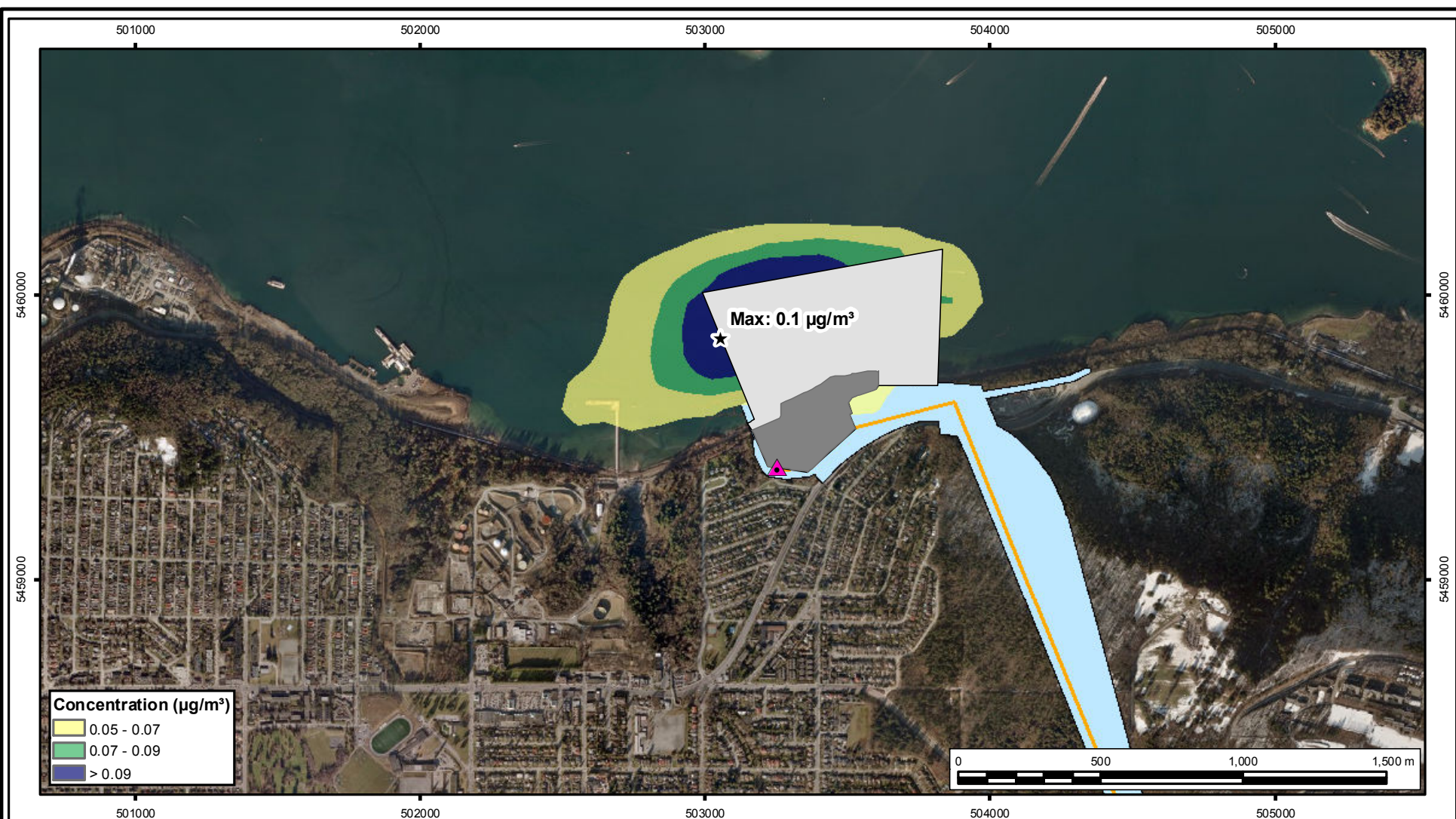
- Projection: NAD 1983 UTM 10N.
- Routing: Baseline TEMPL provided by KMC. May 2012: Study Corridor V9 provided by UPI, March 19, 2014; Facilities: Provided by KMC, 2012;
- Transportation: BC Forests, The National Topographic Data Base, 2012.
- Lands and Natural Resource Operations, 2012. ESRI, 2005 & BC Crown Registry and Geographic Base Branch, 2010. Geopolitical Boundaries: BC FLNRA, 2007; ESRI, 2005; ESRI, 2013 & Natural Resources Canada, 2012;
- First Nation Lands: Government of Canada, 2013 & IHS Inc., 2011; Basemap Imagery: First Base Solutions - Vancouver 2008; Transportation Data: ESRI 2010.

Predicted Maximum Annual SO₂ Concentration for the Westridge Marine Terminal Only (in µg/m³)

Canadian Ambient Air Quality Standard = 13.1 $\mu\text{g}/\text{m}^3$ in 2020 and 10.5 $\mu\text{g}/\text{m}^3$ in 2025

Project #1602001





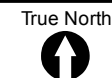
- Existing Automated Monitoring System (SAM) Unit
- Conceptual Water Lot Lease Boundary
- Existing Trans Mountain Pipeline
- Trans Mountain Expansion Proposed Pipeline Corridor
- Terminal Boundary

Map Notes:
 Projection: NAD 1983 UTM 10N.
 Routing: BaseLine TMPL provided by KMC, May 2012; Study Corridor V9 provided by UPL, March 19, 2014; Facilities: Provided by KMC, 2012;
 Transportation: BC Forests, The National Topographic Data Base, 2012, Lands and Natural Resource Operations, 2012, ESRI, 2005 & BC Crown Registry and Geographic Base Branch, 2010; Geopolitical Boundaries: BC FLNRO, 2007, ESRI, 2005, ESRI, 2013 & Natural Resources Canada, 2012;
 First Nation Lands: Government of Canada, 2013 & IHS Inc., 2011; Basemap Imagery: First Base Solutions - Vancouver 2008; Transportation Data: ESRI 2010.

Predicted Maximum Annual Benzene Concentration for the Westridge Marine Terminal Only (in $\mu\text{g}/\text{m}^3$)

Alberta Ambient Air Quality Objective = $3 \mu\text{g}/\text{m}^3$

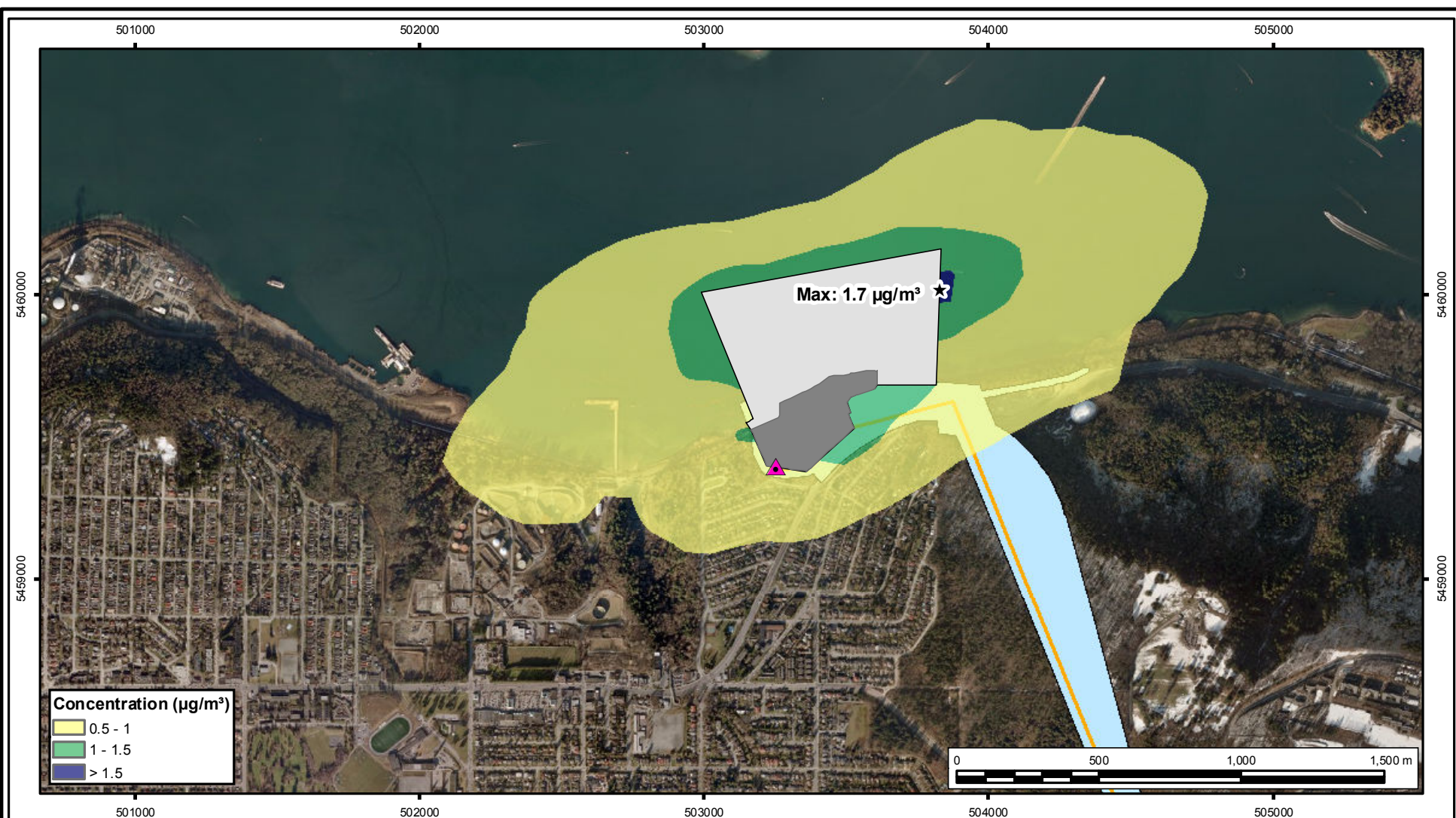
Application Case Excluding Ambient Background
 Trans Mountain Expansion Project - Alberta and British Columbia, Canada



Project #1602001

Drawn by: DJH	Figure: C10
Approx. Scale: 1:20,000	
Date Revised: Nov. 2, 2016	





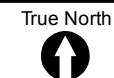
- Existing Automated Monitoring System (SAM) Unit
- Conceptual Water Lot Lease Boundary
- Existing Trans Mountain Pipeline
- Trans Mountain Expansion Proposed Pipeline Corridor
- Terminal Boundary

Map Notes:
 Projection: NAD 1983 UTM 10N.
 Routing: Baseline TMPL provided by KMC, May 2012; Study Corridor V9 provided by UPL, March 19, 2014; Facilities: Provided by KMC, 2012;
 Transportation: BC Forests, The National Topographic Data Base, 2012, Lands and Natural Resource Operations, 2012, ESRI, 2005 & BC Crown Registry and Geographic Base Branch, 2010; Geopolitical Boundaries: BC FLNRO, 2007, ESRI, 2005, ESRI, 2013 & Natural Resources Canada, 2012;
 First Nation Lands: Government of Canada, 2013 & IHS Inc., 2011; Basemap Imagery: First Base Solutions - Vancouver 2008; Transportation Data: ESRI 2010.

Predicted Maximum 24-hour H_2S Concentration for the Westridge Marine Terminal Only (in $\mu\text{g}/\text{m}^3$)

Application Case Excluding Ambient Background
 Trans Mountain Expansion Project - Alberta and British Columbia, Canada

24-hr H_2S Alberta Ambient Air Quality Objective = $4 \mu\text{g}/\text{m}^3$
 24-hr TRS BC Level A Objective = $3 \mu\text{g}/\text{m}^3$



Drawn by: DJH Figure: C12

Approx. Scale: 1:20,000

Date Revised: Nov. 2, 2016

Project #1602001



Appendix D

Summary of Application Case Dispersion Model Results

Table D-1: Maximum Predicted Concentrations for Burnaby Terminal + Westridge Marine Terminal + Marine (BWM), Application Case (in µg/m³)

Pollutant	Averaging Period	Ambient Background	Burnaby App Case Without Ambient Background	Westridge App Case Without Ambient Background	BWM App Case Without Ambient Background	BWM App Case With Ambient Background	Ambient Air Quality Objective
PM _{2.5}	24-Hour	12.5	No CAC emissions at Burnaby	2.3	2.8	15.2	25 ^[1]
	Annual	3.3		0.1	0.4	3.7	8
CO	1-Hour	605.0		348.2	359.0	964.0	14,300
	8-Hour	542.6		164.9	169.2	711.8	5,500
NO _x	1-Hour	110.5		930.1	1711.3	1821.8	n/a
	24-Hour	88.7		246.6	273.9	362.7	n/a
	Annual	26.7		11.0	16.6	43.4	n/a
NO ₂ (using 100% conversion)	1-Hour	56.3		930.1	1711.3	1767.6	188 ^[2]
	24-Hour	43.6		246.6	273.9	317.5	200
	Annual	19.5		11.0	16.6	36.1	40
NO ₂ using Ambient Ratio Method (ARM)	1-Hour	NO _x background is added to the results before applying ARM		93.1	171.1	182.1	188 ^[2]
	24-Hour			77.2	79.8	87.0	200
	Annual			7.0	10.7	27.8	40
SO ₂	1-Hour	26.3		15.4	51.2	77.5	170 to 183 ^[3]
	24-Hour	17.4		4.1	5.0	22.4	125
	Annual	2.7		0.2	0.6	3.3	10.5 to 13.1 ^[4]
Benzene	1-hour	5.1	3.0	5.5	6.7	11.8	30 ^[5]
	Annual	0.6	0.0	0.1	0.2	0.7	3 ^[5]
Ethyl benzene	1-hour	2.7	0.8	27.1	27.2	29.9	2,000 ^[5]
Toluene	1-hour	14.3	10.8	61.6	62.1	76.4	1,880 ^[5]
	24-hour	5.7	1.8	16.2	16.2	21.9	400 ^[5]
Xylene	1-hour	13.1	3.7	50.4	50.7	63.8	2,300 ^[5]
	24-hour	5.2	0.6	13.4	13.4	18.6	700 ^[5]
H ₂ S	1-hour	0.0	2.1	5.2	6.1	6.1	14 ^[5]
	24-hour	0.2	0.5	1.7	2.8	3.0	4 ^[5]
Mercaptans	10-minute	n/a	0.5	3.2	3.2	3.2	13 ^[6]

References: AEP (2016a), BC MOE (2016), CCME (1999, 2015, 2016), MV (2016), OMOE (2012)

Notes: n/a not available

[1] The BC Provincial PM_{2.5} 24-hour objective is based on 98th percentile values.

[2] Based on daily 1-hour maximum, annual 98th percentile of 1 year measurements.

[3] The CAAQS is 183 µg/m³ for 2020 and 170 µg/m³ for 2025; compliance based on 3-year average of the annual 99th percentile of the SO₂ daily maximum 1-hour average concentrations.

[4] The CAAQS is 13.1 µg/m³ for 2020 and 10.5 µg/m³ for 2025; compliance based on the arithmetic average over a single year of all 1-hour average SO₂ concentrations.

[5] Alberta Ambient Air Quality Objectives (AAAQO) have been presented for benzene, ethyl benzene, toluene and xylenes as BC does not have objectives for these pollutants.

[6] The 10-minute Ontario Ambient Air Quality Criteria has been presented for comparison.

APPENDIX E
KMC ENVIRONMENTAL MANUAL. SECTION 4.2 ODOUR COMPLAINT
INVESTIGATION AND RESPONSE PROCEDURE

1210 ENVIRONMENT MANUAL
Environmental Complaints**4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE**

Revision: 1

Effective: October 26, 2016

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4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

1.0 INTRODUCTION

1.1 Purpose

- 1.1.1 This document outlines the requirements associated with receiving, responding to, investigating, and closing out odour complaints.

1.2 Authorization

- 1.2.1 KMC personnel who have been qualified by successfully completing the *Environmental Complaints (Core B)* Skill Packet of the KMC KEEP Canada training program or have been approved by Kinder Morgan Canada based on equivalent training or experience are authorized to perform this procedure.

1.3 Applicability

- 1.3.1 This procedure applies to the following (checked) systems:

- | | |
|--|---|
| ☒ Trans Mountain | ☒ Jet Fuel |
| ☒ Puget Sound | ☒ North 40 Terminal |

1.4 Responsibilities

1.4.1 Regional Director

- Review and sign Section E of the *Environmental Complaint Report Form*

1.4.2 District Supervisor

- Ensure that personnel performing work in relation to this procedure are properly qualified
- Review and sign Section E of the *Environmental Complaint Report Form*
- Provide recommendations as appropriate

1.4.3 Control Centre Operator

- Receive odour complaint and respond as required following Control Centre General Procedure 2.2.9 *Environmental Complaint Notification*
- Complete sections A – C of the *Environmental Complaint Report Form*

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

- Contact on call local responding field technician to initiate onsite investigation
- Initiate an Odour Complaint Emergency Response Line (ERL) process in the event that there are two or more odour complaints in the same geographical area within a 24 hour rolling time period
- Initiate emergency response procedures as needed

1.4.4 EHS Advisor

- Review and sign Section E of the *Environmental Complaint Report Form*
- Provide recommendations as appropriate

1.4.5 Environmental Specialist (Air)

- Review available air monitoring data to assist in attributing the odour complaint to Kinder Morgan activities. Refer to *3.1.2. Ambient Fenceline Monitoring Data Access Procedure*
- Assign the *Environmental Complaint Report Form* an identification number, and complete section D of the form
- Update the Odour Complaints Master List, located:

[E:\DEPT\EHS\Environment\General\Environmental Complaints\OdrCom](#)

1.4.6 Responding Field Technician

- Complete an onsite investigation of the odour complaint
- Perform sampling procedures as required for the location
- Complete the required sections of an *Odour Complaint Investigation Form* and submit as directed
- Report the investigation results to Control Centre
- Contact external emergency personnel as needed
- Contact the complainant to relay investigative findings if requested in Section B of the *Environmental Complaint Report Form*

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

2.0 PROCEDURE SPECIFIC INFORMATION AND REQUIREMENTS

2.1 Background

2.1.1 Timely investigation of odour complaints is important in maintaining public (stakeholder) confidence, identifying operational problems, and fulfilling commitments made to external regulatory bodies.

2.1.2 Odour complaint investigations from Burnaby, Westridge, and Sumas include air sampling using a Jerome H₂S Analyzer.

2.2 Receipt of Odour Complaints

2.2.1 The Control Centre is the initial point of contact for all odour complaints. This ensures that the complaint is properly documented and investigated.

2.2.2 Other KMC personnel receiving an odour complaint must direct the complainant to the Control Centre. Always provide the Control Centre contact number.

2.3 Documentation

2.3.1  The *Environmental Complaint Report Form* is initiated by the CCO, who completes sections A through C. The EHS Advisor, District Supervisor, Regional Director, and Environmental Specialist then complete the balance of the form.

2.3.2  The *Odour Complaint Investigation Form* is completed by the Responding Field Technician during onsite investigation of the odour complaint.

3.0 REQUIRED EQUIPMENT AND SUPPLIES

3.1 Equipment Required

3.1.1 At a minimum Responding Field Technicians must have:

- A personal gas detector (ITX gas detector)
- A communication device (radio or cell) in the event an ERL needs to be initiated.

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

3.1.2 Additional equipment required by Responding Field Technicians at Burnaby, Westridge, and Sumas:

- Jerome H₂S Analyzer
- Calibration accessories

4.0 HAZARDS AND CONTROL MEASURES

4.1 Health and Safety Hazards and Controls

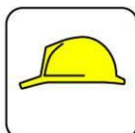
Hazard		Control Measure
4.1.1	Safety hazards at worksite	Check the work area for hazards that may cause personal injury. Correct any hazardous situations before work begins.  Additional information and guidance regarding hazard recognition and control can be found in the KMC Health and Safety Standards Manual, Section 401 Hazard Identification/Assessment & Control Program. Use PPE as required. See section 4.1.3 below for details.
4.1.2	Exposure to toxic or explosive atmospheres	Gas monitoring may be required due to the nature of the work.  Refer to the KMC Health and Safety Standards Manual, part 516 Gas Detection.

4.1.3 Personal Protective Equipment

4.1.3.1 Use approved PPE as required. At a minimum this should include:



Fire Retardant
Outerwear



CSA/ANSI
Approved
Hard Hat



Steel-Toed
Safety
Footwear



Eye
Protection



Work
Gloves
(available to be
worn as required)



Hearing
Protection
(available to be
worn as required)

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

4.1.3.2 Additional PPE may be required depending on the hazards anticipated.



Refer to the Safe Work Practice in KMC Health and Safety Standards Manual, Sections [527 Personal Protective Equipment](#) and [703 Respiratory Protective Equipment](#) for additional information and guidance.

4.2 Integrity Hazards and Controls

None identified

4.3 Operational Hazards and Controls

None identified

4.4 Environmental Hazards and Controls

None identified

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

5.0 PROCEDURE

5.1 Receipt of Odour Complaint

All Personnel (except Control Centre Operators):

This procedure is followed by all personnel (other than Control Centre Operators) who receive an odour complaint.

5.1.1 Direct the complainant to contact the Control Centre Emergency Line. Always provide the telephone number: **1-888-876-6711**.

Control Centre Operators:

5.1.1.1 The following procedure is applicable to the Control Centre Operators receiving an odour complaint.

5.1.2 Initiate an *Environmental Complaint Report* following Control Centre General Procedure [2.2.9 Environmental Complaint Notification](#).

5.1.3 If there are two or more odour complaints received in the same geographical area, within a 24 hour rolling time period the Control Centre Operators will initiate an Odour Complaint ERL.

5.2 Odour Complaint Field Investigation

These steps are carried out by the Responding Field Technician, after receiving complaint information from the Control Centre.

WARNING



Refer to section 6.0 Abnormal Operating Conditions if toxic or explosive gas is detected or a pipeline release is identified or suspected.

5.2.1 Conduct an on-site field investigation to verify whether odours are present.

5.2.2 Record details of the weather conditions, operating conditions and odour observations in section A of the *Odour Complaint Investigation Form*.

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

5.2.3 (Burnaby, Westridge, and Sumas only) Perform air sampling.

5.2.3.1 Conduct at least one 15 minute air sampling event using a Jerome H₂S Analyzer.



Refer to Environment Manual section [4.2.1 Jerome H₂S Analyzer Operation and Maintenance](#) for additional information.

5.2.3.2 Record the results in section B of the *Odour Complaint Investigation Form*.

5.2.3.3 Compare measurements to AEGL-1, AEGL-2, and STEL criteria provided in Section B of the *Odour Complaint Investigation Form*.

5.2.3.4 If exceedances are noted, take a second sample and contact the Control Centre with details.

5.2.4 Make a drawing of the site/area where the odour was reported in section C of the *Odour Complaint Investigation Form*.

5.2.4.1 Take photographs of the area as appropriate to support the sketch.

5.2.5 Contact the Control Centre immediately following the investigation to discuss results and observations, and record the details of this conversation in section D of the *Odour Complaint Investigation Form*.

5.2.5.1 In consultation with the CCO, determine if the odour is likely to be attributable to KMC, and if so, the likely cause of the odour (i.e. routine operations or possible spill/release).

5.2.6 Sign and forward the *Odour Complaint Investigation Form* as directed (see email information in section D of the form).

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

5.3 Response Procedures

5.3.1 Response to Odours due to KMC Release

5.3.1.1 Immediately contact the Control Centre with details.

- The Control Centre will initiate applicable emergency response procedures including ERL/ERL+.
- The Environment Department will review available air sampling and meteorological data and initiate the [*Emergency Response – Air Monitoring Plan*](#).

5.3.1.2 Do not directly respond to complainant if response has been requested, contact KMC external relations to develop appropriate messaging and relay response.

5.3.2 Response to Odours due to KMC Routine Operations

5.3.2.1 Respond to the complainant with investigative findings.

5.3.3 Response to KMC AEGL-1, AEGL-2, or STEL 8 Hour Exceedence

5.3.3.1 Contact the Control Centre with details.

- The Control Centre will initiate applicable emergency response procedures including ERL/ERL+.
- The Environment Department will review available air sampling and meteorological data and initiate the [*Emergency Response – Air Monitoring Plan*](#).

5.3.3.2 If the odour is likely to be attributable to KMC, respond to the complainant.

- The Environment Department will continue with the [*Emergency Response – Air Monitoring Plan*](#), and coordinate odour control and abatement with field personnel.

5.3.3.3 If the odour is NOT likely to be attributable to KMC, contact local emergency response agencies (i.e. fire department) and respond to the complainant.

- The Environment Department will discontinue with the Emergency Response - Air Management Plan.

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

5.3.4 Response to Odours Not Due to KMC

5.3.4.1 Respond to the complainant with investigative findings.

5.4 Closure and Corrective Actions

This section of the procedure does not directly involve the Responding Field Technician, except to provide additional details in the completion of the *Environmental Complaint Report Form*.

5.4.1 The EHS Advisor and District Supervisor complete section E of the form including recommendations and corrective actions.

- The EHS Advisor and District Supervisor will notify the Regional Director when this is complete.

5.4.2 The Regional Director ensures that follow-up actions are completed and signs section E of the form.

- The Regional Director will notify the Environmental Specialist (Air) when this is complete.

The Environmental Specialist (Air) assigns the ECR # to the complaint and completes section D of the form. The Environmental Specialist (Air) then updates the Odour Complaints Master List located:

<E:\DEPT\EHS\Environment\General\Environmental Complaints\OdrCom>

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

6.0 ABNORMAL OPERATING CONDITIONS (AOC)

6.1 Abnormal Operating Conditions



A list of the recognition of and response to non task-specific abnormal operating conditions that may be encountered when performing this procedure is found in General Operating Procedure [3.2 Recognizing and Responding to Abnormal Operating Conditions](#).

6.2 Task-Specific Abnormal Operating Conditions

6.2.1 Hazardous Levels of Toxic or Combustible Gas

RECOGNIZE: Portable gas detector alarm is triggered.

REACT: Immediately move to a safe location and notify the Control Centre. Follow established procedures for Incident Safe Approach, including securing the area to prevent unauthorized entry. Discontinue the investigation until it is safe to re-enter the area.

6.2.2 Pipeline Release Identified or Suspected

RECOGNIZE: Portable gas detector alarm is triggered or other visible indications of a spill or release.

REACT: Immediately move to a safe location and notify the Control Centre. Follow established procedures for Incident Safe Approach, including securing the area to prevent unauthorized entry. Discontinue the investigation until it is safe to re-enter the area.

4.2 ODOUR COMPLAINT INVESTIGATION AND RESPONSE PROCEDURE

7.0 REFERENCES

7.1 *KMC Health and Safety Standards Manual*

- 401 Hazard Identification/Assessment & Control Program
- 502 Action Levels
- 527 Personal Protective Equipment
- 703 Respiratory Protective Equipment

7.2 KMC Environment Manual

- *4.2.1 Jerome H₂S Analyzer Operation and Maintenance*
- *4.1.1 Environmental Complaint Report Form*
- *4.2.2 Odour Complaint Investigation Form*
- *3.1.2 Ambient Fenceline Monitoring Data Access Procedure*
- *Emergency Response – Air Monitoring Plan (KMC ERP)*
- Odour Complaints Master List

Located online in the folder E:\DEPT\EHS\Environment\General\Environmental Complaints\OdrCom

7.3 Control Centre General Procedures

- *2.2.9 Environmental Complaint Notification*

7.4 General Operations Procedures

- *3.2 Recognizing and Responding to Abnormal Operating Conditions*