SITE C CLEAN ENERGY PROJECT

VOLUME 2 APPENDIX L

TECHNICAL DATA REPORT:
AIR QUALITY

FINAL REPORT

Prepared for:

BC Hydro Power and Authority
333 Dunsmuir Street
Vancouver, BC
V6B 5R3

Prepared by:

RWDI AIR Inc.
830 – 999 West Broadway
Vancouver, BC
V5Z 1K5
Tel: (604) 730-5688 Fax: (604) 730-2915

November 2012

06-113

Last update November 30, 2012

RWDI®

CONSULTING ENGINEERS
& SCIENTISTS

SITE C CLEAN ENERGY PROJECT

TECHNICAL DATA REPORT:
AIR QUALITY

FINAL REPORT

Prepared for BC Hydro Power and Authority

Prepared by RWDI AIR Inc.

November 2012

Lead Author: Jeff Lundgren, M.Sc., Technical Director

Section Contributors: David Chadder, Hon. B.Sc., QEP, Principal/Senior Consultant
Nancy Chan, B.A.Sc., P.Eng., Senior Engineer
Kathy Preston, Ph.D., P.Eng., Project Director
Christian Reuten, Ph.D., ACM, Senior Scientist
Andres Soux, M.Sc., Senior Scientist
Brian Sulley, B.A.Sc., P.Eng., Senior Specialist
Marco Wong, M.A.Sc., EIT, Intermediate Engineer

EXECUTIVE SUMMARY

The Site C Clean Energy Project (the Project) is a proposed third dam and hydroelectric generating station on the Peace River in northeast BC. The Project, consisting of an earthfill dam approximately 1,050 metres in length, would provide up to 1,100 megawatts of capacity, and produce about 5,100 gigawatt-hours of electricity each year.

Construction and operation of the Project have the potential to change local and regional air quality. The Project components that are expected to be sources of emissions during construction include the dam, generating station and spillways, quarried and excavated construction materials, road and rail access and transmission line. Construction vehicles and equipment would be sources of combustion and fugitive dust emissions. Clearing and burning vegetation and debris would also result in combustion and fugitive dust emissions, as would the extraction of construction materials from quarries during construction.

During operations, there is potential for the Site C reservoir to influence the local air quality during dry periods of the year when the reservoir water level is lower than normal. Dry reservoir bottoms have been known to be sources of fugitive dust emissions when coupled with a wind speed high enough to entrain the sediments into the air. However, wind erosion is not expected to pose a major air quality issue for the Project given the reservoir configuration and steep reservoir banks, and the small reservoir operating range. Other potential emission sources during operation are combustion emissions from maintenance vehicles and vessels. Emissions during operations would be much lower than during construction.

The objectives of the Air Quality technical study were to:

- Characterize the existing baseline air quality in terms of observed ambient air quality and emissions
- Estimate emissions due to Project construction and operations
- Predict changes to ambient air quality in the dam site area due to Project construction
- Discuss potential changes to ambient air quality during Project operations

The information presented in this technical data report was used to evaluate the potential effects of the Project on human health (See EIS Volume 4 Section 33 Human Health).

Study Areas

Two areas were used for the air quality technical study: a technical study area and a dispersion modelling study area. The technical study area is a 138 km by 102 km area that encompasses all Project components, including the West Pine Quarry, as well as the City of Fort St. John and the District of Taylor. All Project emissions are expected to occur within the technical study area. The dispersion modelling study area measures 26 km by 27 km, and includes a minimum 5 km buffer around the dam site area, Wuthrich Quarry, Area E, and extends north to the community of Charlie Lake and east to the District of Taylor. The dispersion modelling study area was defined to consider ambient concentrations of air contaminants due to Project emissions at the Site C dam site due to its location close to Fort St. John.

Subsets of the technical study area were defined around the construction material sources (Wuthrich Quarry, West Pine Quarry, 85th Avenue Industrial Lands, Portage Mountain Quarry and Del Rio Pit) and Hudson's Hope Shoreline Protection to further characterize baseline settings and Project emissions in these areas. These subsets are 12 km by 12 km squares, specified with a minimum 5 km buffer around each Project component.

Methods

The focus of the air quality technical study for the Project are criteria air contaminants (i.e., air contaminants for which there are either ambient air quality objectives or Canada-wide standards). These include particulate matter, nitrogen dioxide, sulphur dioxide, and carbon monoxide. Ambient air quality objectives and Canada-wide standards are criteria established by environmental and health authorities to provide guidance for environmental protection decisions. These criteria are based on scientific studies that consider the influence of the contaminant on such receptors as humans, wildlife, vegetation, as well as aesthetic qualities such as visibility.

Baseline emissions for the two study areas were obtained from the BC Ministry of Environment and from Environment Canada's National Pollutant Release Inventory.

Baseline ambient air quality conditions in the technical study area were determined based on a review of available monitoring data. Particulate matter, nitrogen dioxide, sulphur dioxide, and ozone data from Fort St. John North Peace Cultural Centre, Taylor Townsite, and Taylor South Hill stations, were obtained from the BC Ministry of Environment and used in the baseline study. As well, dustfall monitoring data from existing and closed mines within the vicinity of the Project activity zone were obtained from public reports on the Environmental Assessment Office website. Additional air quality monitoring data from Beaverlodge and Grand Prairie were downloaded from the Clean Air Strategic Alliance data warehouse to establish baseline carbon monoxide concentrations and to provide additional reference points for nitrogen dioxide and ozone. Furthermore, two ambient air quality monitoring stations were installed at Attachie Flat and Old Fort as part of field studies to collect additional particulate matter data.

Representative background concentrations for the dispersion modelling study area were calculated following the Guidelines for Air Quality Dispersion Modelling in British Columbia.

To evaluate the potential change to local air quality, Project emissions during construction and operation were estimated and compared to baseline emissions. Project construction emissions were estimated for every year of the expected eight-year construction period. The scope of the emission inventory included the following emission sources, where applicable: clearing activities; prescribed burning and incineration of clearing debris; extraction, processing, movement and placement of construction and waste materials; drilling; explosives detonation and blasting; material handling and transfers; concrete batch plant operations; material processing; stockpile wind erosion; grading and scraping; fugitive emissions of road dust on paved and unpavedroads; mobile vehicle exhaust; diesel-fuelled equipment and generators; boats; aircraft and asphalt production.

Project operation emissions were estimated for regular maintenance activities at the Site C dam site. Emissions sources during Project operation include: road dust re-entrainment from paved roads; and fossil fuel combustion from mobile vehicles, diesel equipment and boats. Project emissions were estimated using emission factors from a number of sources including: the United States Environmental Protection Agency (US EPA) AP-42 Compilation of Air Pollutant Emission Factors and US EPA emission models. Other sources of emission information include Environment Canada's *Criteria Air Contaminants Emission Inventory 2002 Guidebook*, the Air and Waste Management Association's *Air Pollution Engineering Manual*, the Western Regional Air Partnership's *Fugitive Dust Handbook*, and the Chamber of Shipping's *Ocean-Going Vessels Emissions Inventory Report*.

Concentrations of criteria air contaminants and dustfall deposition rates were predicted using dispersion modelling for the construction year with the highest estimated emissions. Dispersion modelling was conducted using the CALMET/CALPUFF modelling system using the full three-dimensional CALMET mode. Meteorological, terrain and land cover characterization data are required for dispersion modelling. Meteorological data were obtained from the BC Ministry of Environment station at Taylor Townsite and the Environment Canada station at Fort St. John Airport. Additional meteorological data were obtained from six meteorological stations installed between Taylor and Hudson's Hope as part of field studies. Terrain elevations and land cover characterization information were obtained from GeoBase.

In the technical study area, area sources and point sources are the largest contributors to baseline particulate matter emissions; area sources emit most of the fine particulate matter while point sources emit the most coarse sizes of particulate matter. Mobile sources, primarily off-road equipment, are the largest contributors to baseline emissions of the other criteria air contaminants. In the dispersion modelling study area, area sources, primarily related to agricultural activities, represent the largest contributors to baseline particulate matter emissions, while point sources represent a smaller contributor compared to the technical study area. Similar to the technical study area, mobile sources, primarily off-road equipment, are the largest contributors to baseline emissions of the other criteria air contaminants.

Findings

Construction of the Site C dam, generating station and spillways would contribute most of the coarse sized particulate matter for the technical study area. This would largely be due to dust entrainment from the use of unpaved roads. Burning and incineration from clearing activities are estimated to contribute most of the emissions of fine particulate matter and carbon monoxide. For oxides of nitrogen and sulphur oxides, the largest source of emissions would be asphalt production from road infrastructure. Estimated particulate matter emissions were greatest in Year 1, 2, 3 or 5 of the eight-year construction period depending on the size fraction. Estimated emissions of carbon monoxide were greatest in Year 1, and estimated emissions of oxides of nitrogen and sulphur oxides were greatest in Year 4. Total Project construction emissions for the year with greatest emissions are estimated to increase existing overall emissions in the technical study area by 5 to 83%, depending on the contaminant.

The largest contributor of coarse particulate matter during the operations phase of the Project would be road dust re-entrainment from the use of paved roads, while diesel equipment would be the largest contributor of fine particulate matter and carbon monoxide. Boats would account for most of the emissions of oxides of nitrogen and sulphur oxides.

The highest ambient air concentrations for all contaminants and the highest dustfall deposition rates were predicted to occur in the vicinity of Wuthrich Quarry. Dispersion modelling results suggest that all relevant ambient air quality objectives and Canada-wide standards for particulate matter may be exceeded with or without the addition of background. Exceedances were predicted from the Project, not including background, only at one sensitive receptor, the North Camp Site located within the dam site area; no exceedances were predicted at residences, other private buildings, schools, child care, health care, or senior care facilities. When background concentrations were included, exceedances of PM_{10} were also predicted at one residence located within, and a few non-residential buildings adjacent to, the proposed dam site area. When background concentrations were included, exceedances of $PM_{2.5}$ were also predicted at the proposed South Camp Site located within the dam site area and at a few non-residential buildings in the vicinity of the Site C dam site. The provincial objective for dustfall may be exceeded with the addition of background within the dam site area, but exceedances were not predicted to occur at any sensitive receptors. Maximum predicted concentrations of nitrogen dioxide, sulphur dioxide and carbon monoxide were well below relevant ambient air quality objectives.

Abbreviations and Acronyms

°C .... degree Celsius
µm .... Micrometer
µg/m^3 .... Micrograms per cubic meter
ANFO .... Ammonium nitrate with fuel oil
ASTER GDEM .... Advanced Spaceborne Thermal Emission and Reflection Radiometer Global Digital Elevation Model
AWMA .... Air & Waste Management Association
BC .... British Columbia
BCMOE .... British Columbia Ministry of Environment
CACs .... Criteria Air Contaminants
CEIDARS .... California Emission Inventory and Reporting System
cm/s .... centimetres per second
CO .... Carbon monoxide
EAC .... Environmental Assessment Certificate
EDMS .... Emissions and Dispersion Modelling System
FSJ .... Fort St John
g .... grams
g/kWh .... Gram of pollutant per kilowatt-hour of engine power
g/y .... Gram per year
GWh .... Gigawatt hours
h .... hour
kg .... kilogram
km .... kilometres
km/h .... Kilometres per hour
kPa .... kiloPascal
m .... metre
m^2 .... metres squared
m^3 .... metres cubed

mg/dm^2-d	Milligrams per decimeter squared per day
m/s	metres per second
MOVES	Motor Vehicle Emission Simulator
MW	Megawatt
NCEP	National Centers for Environmental Protection
NO	Nitrogen monoxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPRI	National Pollutant Release Inventory
O_3	Ozone
OSB	Oriented Strand Board
PM_{10}	Particulate matter with particle size of less than 10 µm
$PM_{2.5}$	Particulate matter with particle size of less than 2.5 µm
ppm	Parts per million
ROW	Right-of-Way
SO_2	Sulphur dioxide
SO_x	Sulphur oxides
STC1	Attachie Flat Upper Terrace Station
STC2	Attachie Flat Lower Terrace Station
STC3	Attachie Plateau Station
STC4	Bear Flat Station
STC5	Hudson’s Hope Station
STC6	Farrell Creek Station
STC7	Site C Dam Station
STC8	Old Fort Station
TSP	Total Suspended Particulate
TT	Taylor Townsite Station
US EPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator

VKT .... Vehicle Kilometres Travelled
W.. Average weight of vehicles travelling the road
WRAP .... Western Regional Air Partnership
WRF... Weather Research and Forecasting

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

1 INTRODUCTION

The Site C Clean Energy Project (the Project) is a proposed third dam and hydroelectric generating station on the Peace River in northeast BC. The project is described in Volume 1, Section 4 of the EIS.

The purpose of this technical report is to describe baseline ambient air quality and potential changes to air quality resulting from construction and operation of the Project. The specific objectives of the Air Quality technical study were to:

- Characterize the existing baseline air quality in terms of measured ambient air quality and emissions of CACs
- Estimate emissions due to Site C construction and operation
- Predict changes to ambient air quality in the dam site area due to Site C construction
- Discuss potential changes to ambient air quality during Site C operation

The information presented in this technical data report was used to evaluate the potential effects of the Project on human health (See EIS Volume 4 Section 33 Human Health).

Objectives and Scope

Construction and operations of the Site C Clean Energy Project have the potential to change local and regional air quality.

The Project components that are expected to be sources of emissions during construction include the dam, generating station and spillways, quarried and excavated construction materials, road and rail access and transmission line. Construction vehicles and equipment would be sources of criteria air contaminants (CACs) from fossil fuel combustion and fugitive dust. Clearing and burning vegetation and debris during construction would also result in emissions of CACs and fugitive dust as would extraction of construction materials from source areas. The greatest change to air quality due to Project construction is anticipated to occur near the proposed dam although there would also be emissions of CACs and fugitive dust from several construction material source areas.

During operations, there is potential for the Site C reservoir to influence the local air quality during dry periods of the year when the reservoir water level is lower than normal. Dry reservoir bottoms have been known to be sources of fugitive dust emissions when coupled with a wind speed high enough to entrain the sediments into the air. However, wind erosion from the exposed bottom of the proposed reservoir is estimated to be a small contributor to air emissions for the Project given the reservoir configuration and steep reservoir banks, and the small reservoir operating range. Other potential emission sources during operation are combustion emissions from maintenance vehicles and vessels. Emissions during operations would be much lower than during construction.

The report is organized as follows:

1. The first section outlines ambient air quality guidelines and standards
2. The second sections details the methods used for emissions estimation and dispersion modelling.
3. The third section describes baseline meteorology, air quality and emissions in the study area
4. The fourth section provides an inventory of Project specific emissions sources for Construction and Operation.
5. The fifth section presents results of dispersion modelling

1.1 Contaminants and Ambient Air Quality Criteria

This study focuses on criteria air contaminants (CACs i.e., contaminants for which there are either ambient air quality objectives or Canada-wide standards), including particulate matter (PM), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and carbon monoxide (CO).

Ambient air quality criteria are developed by environment and health authorities. These criteria are based on scientific studies that consider the influence of the contaminant on such receptors as humans, wildlife, vegetation, as well as aesthetic qualities such as visibility. British Columbia ambient air quality objectives and Canada-wide standards for CACs (i.e., contaminants analyzed in this study) are listed in Table 1.1.1. These criteria were used to provide context for baseline ambient air quality and for predicted changes in ambient concentrations due to Project construction in the dam site area.

There are provincial ambient air quality objectives for all CACs except NO_2 and ozone. For the purposes of this study, federal ambient air quality objectives were used in place of provincial objectives for NO_2. Provincial ambient air quality objectives are divided into three categories designated as Level A, B, and C with Level A being the most stringent. These levels correspond roughly to federal levels as defined below:

- Level A is equivalent to the federal maximum desirable objective, which is a long-term goal for air quality and provides a basis for an anti-degradation policy for unpolluted areas, and for continuing development of control technology.
- Level B is equivalent to the federal maximum acceptable objective, which is intended to provide adequate protection against effects on soil, water, vegetation, materials, visibility, personal comfort and well-being.
- Level C is equivalent to the federal maximum tolerable objective, which denotes time-based concentrations of air contaminants beyond which, due to a diminishing margin of safety, appropriate action is required without delay to protect the health of the general public.

Canada-wide standards have been developed for $PM_{2.5}$ and ozone. Canada-wide standards are established by the Canadian Council of Ministers of the Environment as a step towards the long-term goal of minimizing risks to human health and the environment. They represent a balance between the desire to achieve the best health and environmental protection possible in the relative near-term and the feasibility and costs of reducing the pollutant emissions that contribute to elevated ambient concentrations. (CCME 2006).

Table 1.1.1 British Columbia ambient air quality objectives and Canada-wide standards for criteria air contaminants

Contaminant	Averaging Period	Objectives/Standards (μg/m^3)			
		British Columbia			Canada-wide Standard
		Level A	Level B	Level C	
Total Suspended Particulate	24-hour	150	200	260	—
	Annual	60	70	75	
Particulate Matter less than 10 μm (PM_{10})	24-hour	50			—
	Annual	—			—
Particulate Matter less than 2.5 μm ($PM_{2.5}$)	24-hour	25[a]			27 to 30[b]
	Annual	8[c]			8.8 to 10[d]
Dustfall[e]	24-Hour	1.75 mg/dm^2-d residential, 2.9 mg/dm^2-d non-residential			—
Nitrogen Dioxide[f]	1-hour	—	400	1,000	—
	24-hour	—	200	300	
	Annual	60	100	—	
Sulphur Dioxide	1-hour	450	900	900-1,300	—
	24-hour	160	260	360	
	Annual	25	50	80	
Carbon Monoxide	1-hour	14,300	28,000	35,000	—
	8-hour	5,500	11,000	14,300	
Ozone	8-hour	—			65 ppb[g]

NOTES:

Source: BCMOE 2009b, CCME 2006

[a] Compliance based on annual 98th percentile value

[b] Current objective of 30 μg/m^3 is proposed to change to 28 μg/m^3 in 2015 and 27 μg/m^3 in 2020; compliance based on annual 98th percentile value, averaged over three consecutive years

[c] BC also has a planning goal for annual $PM_{2.5}$ of 6 μg/m^3

[d] There is currently no annual Canada-wide standards for annual $PM_{2.5}$ but there is a proposed objective of 10.0 μ/m^3 for 2015 and 8.8 μg/m^3 for 2020

[e] 24-hour average based on 30-day sample

[f] BC does not have ambient air quality objectives for NO_2 and, therefore, the federal maximum acceptable (Level A), desirable (Level B) and tolerable (Level C) objectives are presented

[g] Compliance based on 4th highest annual value, averaged over three consecutive years

Particulate matter is often defined in terms of size fractions. Dustfall refers to the amount of particulate matter of all size classes that settles onto the ground or other collection surfaces in a given amount of time. It is a measure of the amount of particulate present in the ambient air that is deposited on the ground. Particles less than 40 μm in diameter typically remain suspended in the air for some time, and are referred to as total suspended particulate (TSP). Suspended particulate matter less than 10 µm in diameter is termed PM_{10} and particulate matter less than 2.5 µm in diameter is termed $PM_{2.5}$. Exposure to particulate matter aggravates a number of respiratory illnesses (BCLA 2005). Smaller particles are generally thought to be of greater concern to human health than larger particles (Wichers Stanek et al. 2010).

Oxides of nitrogen (NO_x), comprised of nitric oxide (NO) and nitrogen dioxide (NO_2), are produced when fossil fuels are burned at high temperatures. Nitrogen dioxide can combine with other air contaminants to form fine particulates, which can reduce visibility. It can be further oxidized to form nitric acid, a component of acid rain. Nitrogen dioxide also plays a major role in the secondary formation of ozone. In humans, NO_2 acts as an irritant affecting the mucous membranes of the eyes, nose, throat, and respiratory tract. Continued exposure to NO_2 can irritate the lungs and lower resistance to respiratory infection, especially for people with pre-existing asthma and bronchitis (BCLA 2005).

Sulphur oxides (SO_x) are produced mostly in the form of SO_2 by the combustion of fossil fuels containing sulphur. Sulphur dioxide reacts in the atmosphere to form sulphuric acid, a major contributor to acid rain, and particulate sulphates, which can reduce visibility. Sulphur dioxide is irritating to the lungs at elevated levels and is frequently described as smelling of burning sulphur (e.g., a struck match).

Carbon monoxide (CO) is produced by incomplete combustion of fossil fuels. It is the most widely distributed and commonly occurring air contaminant and derives primarily from motor vehicle emissions. Space heating and commercial and industrial operations are also contributors. Short-term health issues related to exposure to elevated levels of CO include headache, dizziness, light-headedness and fainting.

Ozone is formed through a complex sequence of reactions of precursors in sunlight. Ozone is a strong oxidizer and can irritate the eyes, nose and throat and decrease athletic performance at high levels.

2 METHODS

2.1 Study Area Boundaries

Two study areas were used for air quality: (a) a technical study area that encompassed all project components and (b) a dispersion modelling study area that focused on the dam site area. Due to its proximity to the City of Fort St. John, the dispersion modelling study area was defined to conduct additional analyses of predicting ambient concentrations due to estimated Project emissions.

2.1.1 Technical Study Area

The air quality technical study area is illustrated in Figure 2.1.1. The 138 km by 102 km technical study area boundaries encompass the Project activity zone with a minimum of five-kilometre buffer, including West Pine Quarry, as well as the City of Fort St. John and the District of Taylor. This represents the area within which all Project emissions are expected to occur. Emissions from all Project components during construction and operations were estimated for the technical study area.

Subareas within the technical study area were defined around the construction materials source areas (Wuthrich Quarry, West Pine Quarry, 85th Avenue Industrial Lands, Portage Mountain Quarry and Del Rio Pit) and Hudson's Hope Shoreline Protection to further characterize baseline settings and Project emissions in these areas. These subareas are 12 km by 12 km squares, specified to include a minimum five-kilometre buffer around each Project component.

2.1.2 Dispersion Modelling Study Area

Dispersion modelling was conducted for the Site C dam and generating station site due to the site's proximity to the City of Fort St. John. The dispersion modelling study area illustrated in Figure 2.1.1, is a 26 km by 27 km rectangle specified to include a minimum five-kilometre buffer around the proposed dam site area, Wuthrich Quarry and Area E. The dispersion modelling study area was extended north to include the community of Charlie Lake and east to include the District of Taylor.

2.2 Review of Existing Data Sources

Baseline air quality conditions were determined from emission inventories and ambient air quality data. Existing meteorological, terrain and land cover characterization data were used as inputs to the dispersion model.

2.2.1 Emissions Data Sources

Emission estimates of PM, NO_x, SO_x, and CO were obtained from the BC Ministry of Environment (BCMOE 2012a) for area and mobile sources. Emissions from point sources were determined from Environment Canada's National Pollutant Release Inventory (Environment Canada 2012). Existing emissions were determined for the technical study area, the dispersion modelling study area and for 12 km by 12 km areas around the construction material sources (Wuthrich Quarry, West Pine Quarry, 85th Avenue Industrial Lands, Portage Mountain Quarry and Del Rio Pit) and Hudson's Hope Shoreline Protection.

2.2.2 Ambient Air Quality Data Sources

The BCMOE operates a network of ambient air quality monitoring stations in the province (BCMOE 2012b). The closest ambient air quality monitoring stations to the dispersion modelling study area, shown in Figure 2.2.1, are the Fort St. John North Peace Cultural Centre, Taylor Townsite, Taylor South Hill, Pine River Gas Plant, and Pine River Hasler.

The ambient air quality monitoring stations at Fort St. John and Taylor provide information for PM_{10}, $PM_{2.5}$, NO_2, SO_2 and ozone, as shown in Table 2.2.1. The two Pine River stations are furthest from the Project and the Peace River Valley and they measure only SO_2. Since SO_2 is measured by the two Taylor stations, data from the two Pine River stations are not representative of the Project study area and were not included in the baseline study.

The BCMOE ambient air quality monitoring database has no record of monitoring data for either TSP or dustfall in or near the dispersion modelling study area. Dustfall monitoring data collected near mine sites and reported to the BCMOE as conditions of the mine site air quality permits were obtained from the Environmental Assessment Office and analyzed for the baseline study. Existing mine sites in the vicinity of the Project area for which dustfall data were available are the Brule, Dillon and Willow Creek coal mines. Closed mines in the Project area are the Quintette and Bullmoose mines, which ceased operations in 2000 and 2003, respectively.

To characterize baseline air quality in the technical study area, additional data from Beaverlodge and Grand Prairie, located roughly 130 to 180 km southeast of the Project, were downloaded from the Clean Air Strategic Alliance Data Warehouse (2012) to provide information on background carbon monoxide concentrations and additional reference points for nitrogen dioxide and ozone. Furthermore, field studies were conducted to collect additional PM data as discussed in Section 2.3.

Table 2.2.1 lists the stations, time periods, and pollutants included in the baseline characterization. Note that while some of the stations listed are located outside the technical study area, it was prudent to include all data to ensure that all CACs are covered in the baseline study, and to ensure that the limited data from within the technical study area are reasonable and representative of general baseline conditions.

Table 2.2.1 Baseline ambient air quality monitoring data

Station	Pollutant	Time Period
Fort St. John North Peace Cultural Centre	$PM_{2.5}$	March 2001 to April 2003
	PM_{10}	March 2001 to January 2012
Taylor Townsite	NO_2	January 2000 to January 2002
	SO_2	January 2000 to January 2012
	O_3	January 2000 to January 2002
Taylor South Hill	SO_2	January 2000 to January 2012
Beaverlodge	NO_2	January 2000 to January 2012
Grand Prairie	NO_2	February 2004 to January 2012
	CO	February 2004 to January 2012
	O_3	February 2004 to January 2012
Quintette and Bullmoose mines	Dustfall	1993 to 1996, 1998 to 2000
Dillon Mine	Dustfall	February to April 2005, June to July 2005
Willow Creek Mine	Dustfall	January 2005 to September 2009

Baseline air quality was characterized by analyzing time series plots and box plots of the data as described below. In addition, representative background concentrations for the dispersion modelling study area were calculated. Since the main purpose of the time series is to highlight inter-annual trends and intra-annual variability, the hourly data were smoothed by calculating thirty-day running medians centred on each hour. This removed extreme spikes and diurnal variability and thereby improved the vertical scale. Box plots are a simplified representation of the frequency distribution of data. These were chosen to present key percentiles that are well spread on the vertical axis: 2^{nd}, 25^{th}, 50^{th} (median), 75^{th}, and 98^{th} percentiles. The narrow outer box spans the 2^{nd} and 98^{th} percentiles, the smaller, wider box spans the 25^{th} and 75^{th} percentiles, and the line transecting the smaller box indicates the 50^{th} percentile or the median. When higher percentiles are selected, the lower percentiles tend to be squeezed close to 0 and visually become very difficult to compare. Box plots were generated for 1-hour and 24-hour averages since most contaminants have objectives for these averaging periods (8-hour averages for carbon monoxide). Background concentrations were calculated following the *Guidelines for Air Quality Dispersion Modelling in British Columbia* (BCMOE 2008).

2.2.3 Meteorological, Terrain and Land Cover Characterization Data Sources

Meteorological, terrain and land cover characterization data are required for dispersion modelling. Meteorological data were obtained from the BCMOE station at Taylor Townsite station and the Environment Canada station at Fort St. John Airport. Additional meteorological data were collected from field studies as discussed in Section 2.3. Terrain elevations and land cover characterization information were obtained from GeoBase as discussed in Section 2.5.1.5 and Section 3.2.2 (http://www.geobase.ca).

2.3 Field Surveys

Two ambient air quality stations were installed to collect baseline particulate matter measurements and provide ongoing monitoring during all phases of the Project. Since there are ambient air quality objectives in British Columbia for both PM_{10} and $PM_{2.5,}$ and there is a Canada-wide standard for $PM_{2.5}$, the two new stations were equipped to measure both PM_{10} and $PM_{2.5}$.

The Attachie Flat station (STC1) was installed in January 2011 and the Old Fort station (STC8) was installed in February 2011. Each station is equipped with two Thermo Scientific 5030 SHARP instruments to continuously measure $PM_{2.5}$ and PM_{10}. The locations of these stations are shown in Figure 2.2.1. The coordinates of the stations and measurement periods are presented in Table 2.3.1. Data from January to March 2011 at the Attachie Flat station were invalid due to instrument malfunctions and were therefore excluded from the analysis for baseline characterization.

Table 2.3.1 Project ambient air quality monitoring station details

Station	Location UTM NAD 83 (m)	Type	Measurement Period
Station 1 – Attachie Flat Upper Terrace	597983 Easting 6232938 Northing	Air Quality	January 15, 2011 to present
Station 8 – Old Fort	634890 Easting 6230532 Northing	Air Quality	March 1, 2011 to present

A meteorological monitoring network was installed between October 2010 and January 2011 to observe the baseline microclimate of the Peace River Valley (Volume 2 Appendix K). The network comprises six meteorological stations located between Taylor and Hudson's Hope and includes: three stations in Attachie Flat at different elevations (Lower Terrace, Upper Terrace and Plateau) and three stations located on the upper terrace along the Peace River (Hudson's Hope, Bear Flat and on a terrace overlooking the proposed Site C dam site). A wind station installed in Farrell Creek in March 2009 is also contained within the network and continues to collect wind speed and wind direction records. The locations of these stations are illustrated in Figure 2.3.1. The coordinates of each station and the measurement period are presented in Table 2.3.2. The data were used for the microclimate technical study (Volume 2 Appendix K Microclimate Technical Data Report) and for the dispersion modelling as outlined in Section 2.5.1.4.

Table 2.3.2 Project climate station details

Station	Location UTM NAD 83 (m)	Type	Measurement Period
STC1 – Attachie Flat Upper Terrace	597983 Easting 6232938 Northing	Climate	January 15, 2011 to present
STC2 – Attachie Flat Lower Terrace	597721 Easting 6231898 Northing	Climate	January 13, 2011 to present
STC3 – Attachie Plateau	595065 Easting 6233032 Northing	Climate	November 4, 2010 to present
STC4 – Bear Flat	610669 Easting 6238135 Northing	Climate	December 1, 2010 to present
STC5 – Hudson's Hope	570577 Easting 6213303 Northing	Climate	December 12, 2010 to present
STC6 – Farrell Creek	580779 Easting 6220238 Northing	Wind	April 1, 2009 to present
STC7 – Site C Dam	629517 Easting 6230875 Northing	Climate	November 27, 2010 to present

Standard data checks were performed regularly on all field data collected. Data were checked for missing data and anomalies in order to ensure any instrument malfunctions were detected and corrected as soon as possible.

2.4 Emission Estimation

Project emissions were estimated for every year of the expected eight-year construction period. The emission inventory was subdivided by project components (i.e., Site C dam site construction, construction material source areas, transmission line, and roads) and by study area. Emissions associated with construction of Hudson's Hope Shoreline Protection are included in the roads component. Emissions associated with clearing activities were not included in the subtotals for each project component as clearing activities would occur at more than one construction area. More details on the emissions from clearing activities are presented in Section 4.1.11. The scope of the emission inventory included the following emission sources, where applicable:

- Clearing activities
- Prescribed burning and incineration of clearing debris
- Extraction, processing, movement and placement of construction and waste materials

- Drilling
- Explosives detonation and blasting
- Material handling and transfers
- Concrete batch plant operations
- Material processing
- Stockpile wind erosion
- Grading and scraping
- Fugitive emissions of road dust on paved and unpaved roads
- Mobile vehicle exhaust
- Diesel-fuelled equipment and generators
- Boats
- Aircraft
- Asphalt production

Project emissions were estimated using emission factors obtained primarily from the United States Environmental Protection Agency (US EPA) AP-42 *Compilation of Air Pollutant Emission Factors* (www.epa.gov/ttnchie1/ap42/). The following subsections explain the methodology used to estimate emissions. Detailed information on emission estimates is provided in Appendix A.

2.4.1 Prescribed Burning and Incineration

Clearing of wood and other vegetation would be required for construction of the Project. A portion of waste wood may be disposed of through prescribed burning and incineration of wood slash at various locations within the Project activity zone.

Emission factors for TSP, PM_{10}, $PM_{2.5}$ and CO from prescribed burning of logging slash debris were obtained from Section 13.1 *Wildfires and Prescribed Burning* of AP-42 (US EPA 1996). Emissions factors for NO_x from prescribed burning of forest residues were obtained from Section 2.5 on Open Burning of AP-42 (US EPA 1992). Emission factors for SO_x were obtained from *Criteria Air Contaminants Emissions Inventory 2002 Guidebook* (Environment Canada 2006) for prescribed burning. Emissions from prescribed burning were calculated as follows:

$$E_{TSP} = 6.0\, kg/tonne_{woodresidue}$$

$$E_{PM10} = 4.0\, kg/tonne_{woodresidue}$$

$$E_{PM2.5} = 4.0\, kg/tonne_{woodresidue}$$

$$E_{NOx} = 2.0\, kg/tonne_{woodresidue}$$

$$E_{SOx} = 0.037\, kg/tonne_{woodresidue}$$

$$E_{CO} = 37\, kg/tonne_{woodresidue}$$

Emission factors for incineration were obtained from *Criteria Air Contaminants Emissions Inventory 2002 Guidebook* (Environment Canada 2006). Emissions from wood waste incineration were calculated as follows:

$$E_{TSP} = 2.9010\, kg/tonne_{woodresidue}$$

$$E_{PM10} = 1.5956\, kg/tonne_{woodresidue}$$

$$E_{PM2.5} = 1.1604\, kg/tonne_{woodresidue}$$

$$E_{NOx} = 0.50\, kg/tonne_{woodresidue}$$

$$E_{SOx} = 0.050\, kg/tonne_{woodresidue}$$

$$E_{CO} = 65\, kg/tonne_{woodresidue}$$

2.4.2 Bulldozing

Emission factors for TSP, PM_{10} and $PM_{2.5}$ from bulldozing of overburden were obtained from Section 11.9 *Western Surface Coal Mining* of AP-42 (US EPA 1998). Emissions were calculated as follows:

$$E_{TSP} = \frac{2.6(s)^{1.2}}{M^{1.3}}\, kg/hour \cdot unit$$

$$E_{PM10} = 0.75 \times \frac{0.45(s)^{1.5}}{M^{1.4}}\, kg/hour \cdot unit$$

$$E_{PM2.5} = 0.105 \times E_{TSP} = \frac{0.273(s)^{1.2}}{M^{1.3}}\, kg/hour \cdot unit$$

where:

s = material silt content (%)

M = material moisture content (%)

2.4.3 Drilling

The emission factor for TSP from drilling operations was obtained from Section 11.9 *Western Surface Coal Mining* of AP-42 (US EPA 1998). Emission factors for PM_{10} and $PM_{2.5}$ are not provided for drilling activities; therefore, the aerodynamic particle size multipliers for aggregate handling contained in Section 13.2.4 *Aggregate Handling and Storage Piles* of AP-42 (US EPA 2006a), reproduced in Table 2.4.1, were used to convert TSP emissions to emissions of the smaller PM size fractions.

Table 2.4.1 $PM_{2.5}$ and PM_{10} size fraction multipliers

	Aerodynamic Particle Size Multiplier		
Size Fraction	Less than 2.5 microns	Less than 10 microns	Less than 30 microns
Multiplier as a ratio of total dustfall	0.053	0.35	0.74
Multiplier as a ratio of TSP	0.072	0.47	1.0

NOTES:
Source: US EPA, 2006

Emissions of TSP, PM_{10} and $PM_{2.5}$ were calculated as follows:

$$E_{TSP} = 0.59\, kg/hole$$

$$E_{PM10} = 0.47 \times E_{TSP} = 0.28\, kg/hole$$

$$E_{PM2.5} = 0.072 \times E_{TSP} = 0.042\, kg/hole$$

2.4.4 Explosives Detonation

Explosives would be used for blasting at quarries and the Site C dam site. For Wuthrich Quarry, West Pine Quarry, and Site C dam site earthworks, emissions factors for CO, NO_x and SO_x from detonation of ammonium nitrate with fuel oil (ANFO) were obtained from Section 13.3 *Explosives Detonation* of AP-42 (US EPA 1980). Emissions were calculated as follows:

$$E_{NOx} = 8.0\, kg/tonne_{ANFO}$$

$$E_{SOx} = 1.0\, kg/tonne_{ANFO}$$

$$E_{CO} = 34\, kg/tonne_{ANFO}$$

Dynamite used for tunnelling would be gelatin. Emission factors for CO, NO_x and SO_x were obtained from Section 13.3 of AP-42 (US EPA 1980) for detonation of gelatin dynamite used for tunnelling activities. Emissions were calculated as follows:

$$E_{NOx} = 26\, kg/tonne_{Dynamite(Gelatin)}$$

$$E_{SOx} = 1.0\, kg/tonne_{Dynamite(Gelatin)}$$

$$E_{CO} = 52\, kg/tonne_{Dynamite(Gelatin)}$$

Tunnel blasting would occur according to the Project schedule in Volume 1, Section 4.3; annual mass of dynamite used for tunnelling construction was scaled based on the Project schedule.

2.4.5 Blasting

Emission factors for TSP, PM_{10} and $PM_{2.5}$ from blasting activities were obtained from Section 11.9 *Western Surface Coal Mining* of AP-42 (US EPA 1998). Emissions were calculated as follows:

$$E_{TSP} = 0.00022(A)^{1.5}\ kg/blast$$

$$E_{PM10} = 0.52 \times E_{TSP} = 0.52 \times 0.00022(A)^{1.5}\ kg/blast$$

$$E_{PM2.5} = 0.03 \times E_{TSP} = 0.03 \times 0.00022(A)^{1.5}\ kg/blast$$

where:

A = horizontal area of blast (square metres, m²)

These emission estimates apply to blasting activities at quarries and the Site C dam.

2.4.6 Material Handling

Material handling activities that would occur during road and dam construction include: loading and unloading of granular material using shovels, front-end loaders and haul trucks; and stockpiling of gravel, silt and till.

Emission factors for $PM_{2.5}$, PM_{10} and TSP from material handling activities were obtained from Section 13.2.4 *Aggregate Handling and Storage Piles* of AP-42 (US EPA 2006a). Emissions were calculated as follows:

$$E_{TSP} = 0.74 \times (0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ kg/tonne_{handled}$$

$$E_{PM10} = 0.35 \times (0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ kg/tonne_{handled}$$

$$E_{PM2.5} = 0.053 \times (0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ kg/tonne_{handled}$$

where:

U = mean wind speed (metres per second, m/s)

M = material moisture content (%)

Since emission estimates for material handling are dependent on the wind speed, hourly wind speeds derived from the CALMET meteorological model (see Section 2.5.1) were used in the calculations to provide a more realistic estimate of emissions than relying on emissions based on maximum or average wind speeds. As a result, a variable emission file providing hourly wind-derived emissions was used in the dispersion modelling. The wind speeds were derived from the results of the CALMET model to ensure consistency between wind speed assumptions used for the emission estimates and dispersion calculations.

The mass of annual material handled at each location was estimated using the annual volume of material and an assumed density. As till is composed of various fractions of clay and gravel, the density of till material was assumed to be the average of wet and dry sand and clay (1,610 kg/m^3), and the density of material from the dam site area was assumed to be the average of all gravel types (1,782 kg/m^3) (SI Metric 2011) to represent an average till density.

A control factor of 90% was applied for the processing of washed aggregate (AWMA 2000). Although this control factor is used for controlling of fugitive dust through wet suppression with chemicals, given the nature of washed aggregate where most of the silt is removed by washing, applying a higher control efficiency would be more appropriate; however, the control factor of 90% is more conservative and is most analogous to the washing of aggregate. A review of documents from the San Diego and the San Joaquin Valley Air Pollution Control District (2012); County of San Diego Air Pollution Control District (1998) indicates that emissions from washed aggregates are essentially zero. Therefore, the assumption of 90% control for the handling of washed aggregate provides a conservative estimate.

2.4.7 Conveyor Transfers

Emissions factors for TSP and PM_{10} from conveyor transfers of granular material were obtained from Section 11.19.2 *Crushed Stone Processing and Pulverized Mineral Processing* of AP-42 (US EPA 2004a). Emissions were calculated for conveyor transfers with no controls as follows:

$$E_{PM2.5} = 0.072 \times E_{TSP} = 0.00011\,kg/tonne_{transferred}$$

$$E_{PM10} = 0.00055\,kg/tonne_{transferred}$$

$$E_{TSP} = 0.0015\,kg/tonne_{transferred}$$

The controlled emission factors obtained from Section 11.19.2 Crushed Stone Processing and Pulverized Mineral Processing of AP-42 (US EPA 2004a) were used to estimate emissions from conveyor transfers to reflect the moisture content of the material being handled. Emissions were calculated for conveyor transfers of wet material with moisture content greater than two percent as follows:

$$E_{PM2.5} = 0.0000065\, kg/tonne_{transferred}$$

$$E_{PM10} = 0.000023\, kg/tonne_{transferred}$$

$$E_{TSP} = 0.000070\, kg/tonne_{transferred}$$

2.4.8 Concrete Batch Plant Operations

Emissions factors for TSP and PM_{10} for concrete batch plant operations were obtained from Section 11.12 *Concrete Batching* of AP-42 (US EPA 2006b). Emission factors for processes at the concrete batch plants used to estimate particulate emissions are presented in Table 2.4.2. Emissions factors for $PM_{2.5}$ were estimated by applying the particle size multiplier in Table 2.4.1 to the PM_{10} emission factor.

Baghouses, which are used to control particulate matter emissions by filtration, would be installed at the conventional concrete batch plant and roller-compacted concrete batch plant. A control factor of 99% was applied to processes where a baghouse would be used (AWMA 2000). A control factor of 90% was applied for the processing of wet or washed aggregate (AWMA 2000), as noted in Section 2.4.6.

Table 2.4.2 Emission factors of concrete batch plant operations

	TSP	PM_{10}	$PM_{2.5}$	Units
Aggregate transfer	0.0035	0.0017	0.00026	$kg/tonne_{aggregate}$
Sand transfer	0.0011	0.00051	0.000077	$kg/tonne_{sand}$
Pneumatic cement unloading to elevated silo (controlled)	0.0005	0.00017	0.000026	$kg/tonne_{cement}$
Weigh hopper loading	0.0026	0.0013	0.00020	$kg/tonne_{aggregate\ \&\ sand}$
Mixer loading (central mix) (controlled)	0.0092	0.0028	0.00042	$kg/tonne_{cement}$

NOTES:
Source: Section 11.12 AP-42 (US EPA 2006b).

2.4.9 Material Processing

The processing activities include a coarse screen (grizzly screen) at the construction material source areas and the crushing of material at the Site C dam site and for road construction. Quarried material is passed through a grizzly screen at each construction material source area before being hauled to site. In the dam site area, aggregate is passed through scalping screens at the breaker station before continuing to the rotary breaker. Material used for road construction would be sorted and larger stones would be passed through a crusher.

Emission factors for TSP and PM_{10} from these processing activities were obtained from Section 11.19.2 *Crushed Stone Processing and Pulverized Mineral Processing* of AP-42 (US EPA 2004). The emission factor for TSP from the primary crusher was obtained from the *AWMA Air Pollution Engineering Manual* (AWMA 2000). The particle size multipliers for $PM_{2.5}$ and PM_{10} given in Table 2.4.1 were applied to the TSP emission factor, as necessary. Emissions were calculated using the factors in Table 2.4.3. A control factor of 99% was applied to crushing activities where a baghouse would be used (AWMA 2000). A control factor of 90% was applied for the processing of wet or washed aggregate (AWMA 2000) at grizzly screens.

Table 2.4.3 Emission factors of material processing operations

	TSP	PM_{10}	$PM_{2.5}$	Units
Grizzly Screen	0.0125	0.0043	0.00065	$kg/tonne_{aggregate}$
Grizzly Screen (controlled)	0.0011	0.00038	0.000025	$kg/tonne_{aggregate}$
Scalping Screen	0.0125	0.0043	0.00065	$kg/tonne_{aggregate}$
Crushing	0.0027	0.0012	0.00018	$kg/tonne_{aggregate}$

2.4.10 Stockpile Wind Erosion

During periods of high winds, wind-blown dust can be a source of PM emissions. Meteorological conditions, frequency and extent of pile disturbances, silt content, and moisture levels are the most important factors in determining the magnitude of wind-blown dust from stockpiles.

The size of riprap stockpiled on site would be sufficiently large and the silt content sufficiently low that winds experienced at the Site C dam site would not be strong enough to pick up and entrain dust particles from the stockpiles. Washed aggregate would have negligible silt content that would result in fugitive dust emissions. Stockpiles of fine aggregates, till and sand have the potential for wind erosion and, therefore, emissions were calculated for these sources.

Short-term (hourly) emissions of TSP, PM_{10} and $PM_{2.5}$ due to wind erosion from stockpiles were estimated using the methodology published by the *Western Regional Air Partnership* (WRAP 2006). The method considers the frequency of wind speeds greater than 5.4 metres per second:

$$E_{TSP} = 0.00019 \times \left(\frac{s}{1.5}\right) \times \left(\frac{f}{15}\right) kg/day/m^2$$

where:

s = silt content of material (weight percent)

f = percentage of time the unobstructed wind speed is greater than 5.4 metres per second at the mean pile height

Emissions of $PM_{2.5}$ and PM_{10} are based on the PM_{10}/TSP ratio of 0.5 and $PM_{2.5}/PM_{10}$ ratio of 0.15 for windblown dust from active storage piles:

$$E_{PM10} = 0.5 \times E_{TSP} = 0.00010 \times \left(\frac{s}{1.5}\right) \times \left(\frac{f}{15}\right) kg/day/m^2$$

$$E_{PM2.5} = 0.15 \times E_{PM10} = 0.000014 \times \left(\frac{s}{1.5}\right) \times \left(\frac{f}{15}\right) kg/day/m^2$$

Wind speeds were obtained from CALMET for locations of stockpiles inside the dispersion modelling study area. The percentage of time the unobstructed wind speed was predicted to be greater than 5.4 metres per second ranged between 2.9 and 10.8 percent.

For stockpiles where moisture content and silt content were not known, a moisture content of 2.1% and silt content of 3.9% were used, based on stone quarrying and processing industry averages listed in Section 13.2.4 of AP-42 (US EPA 2006a).

A control efficiency of 90% was applied to aggregate stockpiles that are sprayed (WRAP 2006) and a control efficiency of 100% was applied to aggregate stockpiles that are washed (San Joaquin Valley Air Pollution Control District 2012; County of San Diego Air Pollution Control District 1998).

Annual emissions of TSP, PM_{10} and $PM_{2.5}$ due to wind erosion from stockpiles were also estimated using the WRAP methodology (WRAP 2006). The method considers the occurrence of precipitation as well as the frequency of wind speeds greater than 5.4 metres per second:

$$E_{TSP} = 0.00019 \times \left(\frac{S}{1.5}\right) \times \left(365 \times \frac{(365 - p)}{235}\right)\left(\frac{f}{15}\right) kg/year/m^2$$

$$E_{PM10} = 0.5 \times E_{TSP} = 0.00010 \times \left(\frac{S}{1.5}\right) \times \left(365 \times \frac{(365 - p)}{235}\right)\left(\frac{f}{15}\right) kg/year/m^2$$

$$E_{PM2.5} = 0.15 \times E_{PM10} = 0.000014 \times \left(\frac{S}{1.5}\right) \times \left(365 \times \frac{(365 - p)}{235}\right)\left(\frac{f}{15}\right) kg/year/m^2$$

where:

p = number of days per year with at least 0.0254 centimetres of precipitation

s = silt content of material (weight percent)

f = percentage of time the unobstructed wind speed is greater than 5.4 metres per second at the mean pile height

Using climate normal precipitation data for Fort St. John Airport, an average of 121 days per year receive greater than 0.0254 centimetres of precipitation.

2.4.11 Grading and Scraping

Grading and scraping activities are expected to occur at construction material source areas, road construction, transmission line, clearing and the Site C dam site. Emission factors for TSP, PM_{10} and $PM_{2.5}$ were obtained from Section 11.9 *Western Surface Coal Mining* of AP-42 (US EPA 1998). Emissions from grading were calculated as follows:

$$E_{TSP} = 0.0034 \times S^{2.5}\ kg/vehicle\ kilometre\ travelled$$

$$E_{PM10} = 0.6 \times 0.0056 \times S^{2.0}\ kg/vehicle\ kilometre\ travelled$$

$$E_{PM2.5} = 0.031 \times E_{TSP} = 0.0001054 \times S^{2.5}\ kg/vehicle\ kilometre\ travelled$$

where:

S = mean vehicle speed (in km/h)

These equations were developed for grading activities at western surface coal mines; however, AP-42 Section 13.2.3 *Heavy Construction Operations* recommends the use of these emission factors for heavy construction operations (US EPA 1995).

The annual vehicle kilometres travelled were estimated based on the annual operating hours of the graders and a mean vehicle speed. Values used fall within the normal range of values found both in the literature and in measurements conducted by RWDI for other facilities. For Site C dam site construction and construction material source areas, grader operating hours were calculated from material processing rates and the annual volume or mass of material handled. Grader operating hours for clearing, transmission line and road infrastructure were provided by the Site C engineering team. The AP-42 geometric mean vehicle speed of 11.4 km/h was assumed for calculation of PM emissions associated with grading.

Emissions due to scraping were calculated as follows:

$$E_{TSP} = 0.029\ kg/tonne_{aggregate}$$

Emission factors for PM_{10} and $PM_{2.5}$ are not provided for scraping activities; therefore, the aerodynamic particle size multipliers for aggregate handling contained in Table 2.4.1 were used to convert TSP emissions to emissions of the smaller PM size fractions. Emissions of PM_{10} and $PM_{2.5}$ were, therefore, calculated as follows:

$$E_{PM10} = 0.473 \times E_{TSP} = 0.014 kg/tonne_{aggregate}$$

$$E_{PM2.5} = 0.072 \times E_{TSP} = 0.0021 kg/tonne_{aggregate}$$

The emission factors do not include a term for the moisture content of the material being graded or scraped. A review of the background documents for Section 11.9 of AP-42 (US EPA 1998) reveals that the emission factors were developed using a series of tests from a single coal mine in Central North Dakota. Soil moisture data were not recorded as part of the testing and, therefore, moisture was not included in the derivation of the equation.

Measurements collected at the dam site area and construction material source areas indicate that the natural moisture content of the overburden material is between 8% and 18%. At this level, it can be expected that particulate emissions from grading and scraping would be low.

In order to quantify a reduction in emissions relative to the factors provided in Section 11.9 of AP-42 (US EPA, 1998), the information provided in both Section 13.2.2 of AP-42 *Unpaved Roads* (US EPA 2006) and Section 13.2.4 of AP-42 *Aggregate Handling and Storage Piles* (US EPA, 2006) were reviewed. These documents provide two methods for estimating the control efficiency due to increased moisture levels. Both methods indicate that a control efficiency of 80% would be conservative for natural moisture content values higher than five percent. At a natural moisture content value of 18%, emissions would be controlled by over 95%. Thus, as a conservative estimate, a value of 80% was used for both grading and scraping where the natural moisture content is greater than 5%.

2.4.12 Unpaved Roads

Haul trucks operate on unpaved roads on site, resulting in the re-suspension of road dust particles. The magnitude of road dust emissions is dependent on vehicle weight and the surface material silt content. Although not explicitly stated in the equation, road surface moisture (whether via precipitation or dust control activities) also affects the magnitude of the emissions. Heavy vehicles and high surface material silt content would increase the magnitude of emissions, while surface moisture content would decrease the magnitude of emissions. Emissions of $PM_{2.5}$, PM_{10} and TSP from vehicle traffic on unpaved roads were calculated following the method described in Section 13.2.2 *Unpaved Roads* of AP-42 (US EPA 2006c). This method estimates particulate emissions from re-suspended road surface materials; the equation does not include emissions from vehicle exhaust, brake wear and tire wear.

$$E = k\left(\frac{s}{12}\right)^{a}\left(\frac{1.1W}{3}\right)^{b}$$

where:

E = emission factor in kilograms (kg) per vehicle-kilometres-travelled

k, a, b = empirical constants (Table 2.4.4)

s = surface material silt content (%)

W = mean vehicle weight (tonnes)

Table 2.4.4 Unpaved roads, empirical constants for emissions

	TSP	PM_{10}	$PM_{2.5}$
k	1.4	0.42	0.042
a	0.70	0.90	0.90
b	0.45	0.45	0.45

NOTES:
Source: Modified from US EPA 2006c.

In calculating W (the average weight of vehicles travelling the road), an average vehicle weight was calculated for each road segment. Emissions were estimated by road segment and then summed.

On unpaved roads at construction material source areas, the dam site area and along the reservoir, trucks would be fully loaded during trips to the construction sites and stockpiles, and empty during return trips. The AP-42 default silt content of 8.3 per cent was used for the haul road surface material.

To reduce re-suspension of road dust particles on unpaved roads, water trucks would apply water to the haul roads as needed during the spring and summer. An average control efficiency of 75% was assumed for year-round road dust control. The use of 75 per cent control efficiency reflects an increase in the moisture content of the haul road surface to roughly twice that of the natural moisture level, as a result of watering activities and natural precipitation (US EPA 2006c).

All roads inside the dam site area and construction material source areas would be unpaved. For vehicles used during clearing activities and vehicles that travel both at the Site C dam site and the transmission line, half the vehicle distance travelled was estimated to be on unpaved roads. All other vehicles on the transmission line and all road infrastructure construction vehicles and vehicles-in-transit were assumed to travel only on paved roads.

Estimates of vehicle trip distances and total annual hours of operation are summarized in Table 2.4.5. Trip distance estimates were used in estimating unpaved and paved roads emissions as well as motor vehicle combustion emissions. Service vehicles at the Site C dam site and generating equipment installation vehicles were assumed to travel one round-trip per day for six days each week each year.

Table 2.4.5 Worker transport vehicle activity at construction material source areas and the Site C dam site

	Trip Distance (km)	Annual Hours of Operation
Construction material source area vehicle	0.50	3,160
Offsite service vehicle	5.0	2,000
Onsite service vehicle	3.0	2,000
Shuttle buses	10.0	2,000

NOTES:
The above table is applicable to both paved and unpaved roads and is referred to both in the current section and Section 2.4.14.

2.4.13 Paved Roads

Emissions of TSP, PM_{10} and $PM_{2.5}$ from vehicle traffic on paved roads were calculated using the methods of Section 13.2.1 *Paved Roads* of AP-42 (US EPA 2011). The paved road emission factor equation reflects new studies that were undertaken by the US EPA and accounts for only particulate emissions from re-suspended road surface materials; the equation does not include emissions from vehicle exhaust, brake wear and tire wear.

$$E = k(sL)^{0.91}(W)^{1.02}$$

E = particulate emission factor (g/vehicle kilometres travelled VKT)

k = particle size multiplier (Table 2.4.6)

W = average weight of all vehicle travelling the road (tonnes)

sL = silt loading (g/m^2)

Table 2.4.6 Paved roads, particle size multipliers

	TSP	PM_{10}	$PM_{2.5}$
k	3.23	0.62	0.15

NOTES:
Source: US EPA 2011.

The baseline silt loading value for low volume roads (0.6 g/m^2) from Section 13.2.1 *Paved Roads* of AP-42 (US EPA 2011) was used for all paved road calculations. Although some roads are not considered low volume, the silt loading of low volume roads would provide the most conservative estimate, as silt loading on higher volume roads tends to be lower.

2.4.14 Motor Vehicle Combustion

Tailpipe exhaust emissions from highway motor vehicles were estimated for Project-related traffic. This includes vehicles used for transport crews, equipment and supplies for construction, as well as vehicles used for site inspections, waste removal, road watering, and maintenance.

The standard approach for estimating vehicular emissions is to use computer simulation techniques that are based on extensive previous testing of a wide range of vehicles. The Motor Vehicle Emission Simulator (MOVES) model and MOBILE6.2 are two such models that have been developed for this purpose by the US EPA. Implementation of MOVES in Canada and the US began in March 2, 2010, and use of the model will be mandatory in the US for transportation conformity analysis after March 2, 2013. MOBILE6.2 will be gradually phased out during this time. For this reason, and because it is an improved model, MOVES was used to estimate vehicle emissions for the Project. MOVES is the most current and most advanced emissions estimation tool available for motor vehicle exhausts, and is now the regulatory model provided by the US EPA.

Climate information inputs required by MOVES include annual average barometric pressure, maximum and minimum annual average ambient temperature and humidity. Pressure, humidity and temperature data were obtained from 1971 to 2000 climate normals, the most recent 30-year period for which Environment Canada has published them, for the closest station to the proposed Site C dam site, which is Fort St. John Airport. Vehicle age distribution data for BC were compiled by Stewart Brown Associates (2005). Information inputs are summarized in Table 2.4.7.

Table 2.4.7 MOVES input parameter data sources

Input Parameter*	Value Used	Notes
Ambient temperature	Min. -2.9°C Max. 6.9°C	Source: Environment Canada 2012b
Relative Humidity	At 6am: 76.2% At 3pm: 54.6%	Source: Environment Canada 2012b
Barometric Pressure	93.1 kPa	Source: Environment Canada 2012b

NOTES:
*Values are annual average.

Conditions that affect emission factors in MOVES include time of day, month, vehicle source type, and vehicle speed. The MOVES model was executed for four scenarios (morning, midday, evening and overnight) for January and July for each construction year. Vehicles were classified and matched to a MOVES vehicle source type, such as passenger truck or single-unit, short-haul truck. Mean vehicle speeds were assumed to be equal to the posted speed limit. As a conservative assumption, the maximum emission factor of each vehicle source type for the four times of day was used to estimate mobile emissions. The model does not provide emission factors for TSP and, therefore, TSP was assumed to be equal to PM_{10} because particulate emissions from engine exhaust are expected to be less than 10 microns in size.

Vehicle trip distances and total annual hours of operation are summarized in Table 2.4.5. Service vehicles at the Site C dam site and generating equipment installation vehicles were assumed to travel one round-trip per day for six days each week each year.

2.4.15 Diesel-Fuelled Equipment

Exhaust emissions were calculated for diesel-fuelled non-road equipment such as bulldozers, graders, excavators, loaders and generators. Emissions of TSP, PM_{10}, $PM_{2.5}$, NO_x and CO were calculated based on the methodology used in the US EPA NONROAD model (US EPA 2004b). Emissions of SO_x were estimated based on a 15 parts per million (ppm) sulphur content in non-road diesel per Canada's *Sulphur in Diesel Fuel Regulation* implemented in 2010 (Environment Canada 2012c).

Emissions were calculated based on the equipment horsepower, load factor, model year and hours of operation. Where information on equipment horsepower was unavailable, data from typical equipment based on type, size and load were obtained from Caterpillar Inc. or from other manufacturers for equipment not manufactured by Caterpillar Inc. Load factors were obtained from the US EPA NONROAD model (US EPA 2004b). Equipment not classified in NONROAD was assumed to have a load factor of 0.59, which represents the highest load factor used for other equipment categories in the NONROAD model. Equipment would be purchased new for the Project. As a conservative approach, after consultation with the engineering team as to an appropriate vehicle age, the model year was estimated to be 2010. Hours of operation were estimated from an hourly handling rate and annual quantity of material handled.

2.4.16 Diesel Generators

Exhaust emissions for diesel generators were estimated following the same methodology for diesel-fuelled non-road equipment (see Section 2.4.15). Horsepower ratings were not available for diesel generators used for light towers; they were estimated based on equipment specifications from Magnum Power Products LLC (2012) for models MLT 4080 and MLT 4150, which were specified to have fuel consumptions similar to those expected for Project light tower generators. Horsepower ratings for all other diesel generators were estimated based on provided kilowatt ratings assuming a generating efficiency of 80%. The resulting horsepower ratings and associated fuel consumptions are detailed in Table 2.4.8.

Table 2.4.8 Diesel generator horsepower ratings and fuel consumption rates

Generator	Horsepower Rating	Fuel Consumption (L/h)
Light tower – Wuthrich Quarry	16	3.2
Light tower – West Pine Quarry	16	3.2
Light tower – tunneling	16	3.2
Light tower – RCC and CVC aggregate production	16	3.2
Light tower – CVC placing	16	3.2
Light tower – Portage Mountain Quarry	16	3.2
Generator 1 – RCC and CVC aggregate production	34	6.9
Generator 1 – RCC batching	34	6.9
Generator 1 – CVC batching	34	6.9
Generator – tunneling	50	10.8
Generator 2 – RCC and CVC aggregate production	101	21.5
Generator – Wuthrich Quarry	168	21.5
Generator – West Pine Quarry	168	21.5
Generator 2 – RCC batching	168	21.5
Generator 2 – CVC batching	168	21.5

2.4.17 Boats

Exhaust emissions were estimated for boats that would be used to transport crews during clearing activities. Emissions factors for boats were obtained from the 2005 to 2006 BC *Ocean-Going Vessel Emissions Inventory Report* (Chamber of Shipping 2007) using the following equation:

$$E = P(EF)(LF)(T)$$

where:

E = emissions in grams per year (g/y)

EF = emission factor in grams of pollutant per kilowatt-hour of engine power (g/kWh) shown in Table 2.4.9.

LF = load factor of boat

T = duration in hours (h) in particular mode of activity per year

Table 2.4.9 Power-based emission factors for main engine(s) in underway mode

Engine Type	Slow			Medium			Fast		
Fuel Type	HFO	MDO	MGO	HFO	MDO	MGO	HFO	MDO	MGO
PM_{10}	0.98	0.46	0.26	1.05	0.48	0.26	1.05	0.48	0.26
$PM_{2.5}$	0.88	0.41	0.23	0.95	0.43	0.24	0.95	0.43	0.24
NO_X	18.10	17.00	17.00	14.00	13.20	13.20	12.70	12.00	12.00
SO_X	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
CO	1.40	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10

NOTES:
HFO – heavy fuel oil
MDO – marine diesel oil
MGO – marine gas oil
Source: The Chamber of Shipping, 2007

As a conservative assumption, the load factor was assumed to be one (100 percent) for all boats. Emissions of SO_x were estimated based on 15 ppm sulphur content in marine diesel, which is consistent with amendments to Canada's *Sulphur in Diesel Fuel Regulation* (Environment Canada 2012b) that came into effect in 2007. The duration in a particular mode of activity for each vessel was estimated from an average speed of eight knots, number of trips per year and the distance per trip.

Emissions of TSP were calculated from PM_{10} emissions based on Particulate Matter Speciation Profiles developed by California Emission Inventory and Reporting System (CEIDARS 2009) for diesel fuel combustion.

2.4.18 Aircraft

Helicopter emissions were estimated using the Federal Aviation Administration Emissions and Dispersion Modelling System (EDMS). This model is the industry standard for estimating aircraft emissions. EDMS was developed in the mid-1980s as a complex source microcomputer model to determine the change in air quality due to proposed airport development projects. By choosing the closest airport to the Project (Fort St. John Airport), EDMS determines the location in terms of latitude and longitude as well as the weather information. EDMS uses the landing and take-off cycles of the corresponding helicopters and estimates the total CO, NO_X and SO_X emissions. Emissions of TSP are not available in the EDMS but can be estimated from a SO_X-to-TSP ratio of 2.8 provided by Environment Canada (2006). Emissions of PM_{10} and $PM_{2.5}$ were estimated using the Particulate Matter Speciation Profiles by CEIDARS (2009) for aircraft powered by jet fuel.

Assumptions were made on the helicopter type as there are limited models in the EDMS database. Helicopters to be used for the Project were matched with similar units in the EDMS database based on the helicopter type and engine horsepower. Emissions were not estimated for helicopters used for emergencies because they are not scheduled Project construction activities.

2.4.19 Asphalt Production

Emissions from asphalt production include particulate matter from the combustion of waste oil in the boiler, the waste oil-fired dryer, and load-out and storage silo filling of asphalt. Emission factors for the load-out were obtained from Section 11.1 *Hot Mix Asphalt Plants* of AP-42 (US EPA 2004c). Emissions from asphalt load-out were calculated as follows:

$$E_{TSP} = 0.000091 + (0.00071)(-V)e^{((0.025)((1.8T+492)-20)} \; kg/tonne_{handled}$$

$$E_{CO} = (0.0028)(-V)e^{((0.025)(1.8T+492)-20)} \; kg/tonne_{handled}$$

where:

E = Asphalt load-out emission factor (kg/tonne of asphalt handled)

V = Asphalt Volatility (assumed to be 0.5 from Section 11.1 of AP-42)

T = Hot mix asphalt temperature (^{o}C)

Emissions from asphalt silo filling were calculated as follows:

$$E_{TSP} = 0.00017 + (0.00053)(-V)e^{((0.025)((1.8T+492)-20)} \; kg/tonne_{handled}$$

$$E_{CO} = (0.0024)(-V)e^{((0.025)(1.8T+492)-20)} \; kg/tonne_{handled}$$

where:

E = Asphalt silo filling emission factor (kg/tonne of asphalt handled)

V = Asphalt Volatility (assumed to be 0.5 from Section 11.1 of AP-42)

T = Hot mix asphalt temperature (^{o}C)

As a conservative assumption, emissions of PM_{10} and $PM_{2.5}$ were assumed to be equal to TSP for asphalt load-out and silo filling.

The emission factors for the combustion of waste oil in boilers were obtained from Section 1.11 *Waste Oil Combustion* of AP-42 (US EPA 1996). Emissions were calculated as follows:

$$E_{TSP} = 7.7(A) \; kg/m^3_{WasteOil}$$

$$E_{PM10} = 6.1(A) \; kg/m^3_{WasteOil}$$

$$E_{PM2.5} = E_{PM10} = 6.1(A) \; kg/m^3_{WasteOil}$$

$$E_{NOx} = 2.3\, kg/m^3_{WasteOil}$$

$$E_{SOx} = 18(S)\, kg/m^3_{WasteOil}$$

$$E_{CO} = 0.60\, kg/m^3_{WasteOil}$$

where:

E = Combustion emission factor (kg/m^3 of waste oil)

A = Ash content in waste oil (assumed to be 0.65% from Section 1.11 of AP-42)

S = Sulphur content in waste oil (assumed to be 0.50% from Section 1.11 of AP-42)

The heating value of waste oil was assumed to be 140,000 BTU/gal or 11 kWh/l of waste oil (AGSolutions LLC 2012). Emission factors for the waste oil-fired dryer, which operates with a fabric filter, were obtained from Section 11.1 *Hot Mix Asphalt Plants* of AP-42 (US EPA 2004c). Emissions from the dryer were calculated as follows:

$$E_{TSP} = 0.017\, kg/tonne_{Asphalt}$$

$$E_{PM10} = 0.012\, kg/tonne_{Asphalt}$$

$$E_{PM2.5} = 0.0081\, kg/tonne_{Asphalt}$$

$$E_{NOx} = 0.028\, kg/tonne_{Asphalt}$$

$$E_{SOx} = 0.029\, kg/tonne_{Asphalt}$$

$$E_{CO} = 0.065\, kg/tonne_{Asphalt}$$

where:

E = Combustion emission factor (kg/m^3 of waste oil)

The $PM_{2.5}$ emission factor for the waste oil-fired dryer was estimated using the ratio between PM_{10} and $PM_{2.5}$ described in Section 11.1-4 of AP-42.

2.4.20 Clearing Activities

Clearing of vegetation would occur for all Project components. As part of clearing activities, burning and incineration of waste vegetation would generate the most emissions for each component. Emissions from other clearing activities, i.e., excluding burning and incineration, are expected to be a small percentage of the total emissions for each Project component and, therefore, are not expected to change the total emissions at the dam site area and the dispersion modelling study area.

2.5 Dispersion Modelling

Ambient concentrations of CACs and dustfall deposition rates were predicted for the dispersion modelling study area. Dispersion modelling was conducted for a conservative construction year based on predicted quantity of emissions and proximity of sources to residences. Predicted concentrations of CACs and dustfall deposition rates were compared to British Columbia ambient air quality objectives and Canada-wide standards, which are listed in Table 1.1.1.

The dispersion modelling methodology is based on the *Guidelines for Air Quality Dispersion Modelling in BC* (BCMOE 2008). A conceptual model plan for the dispersion modelling study area was submitted to and agreed upon by the BCMOE (see Appendix B).

Terrain in the Peace River Valley is complex, resulting in complex wind flow patterns. Therefore, a refined dispersion model, capable of simulating complex wind flow patterns was selected: the CALPUFF model in full three-dimensional CALMET mode (Earth Tech 2000a, 2000b). This model, developed by the Atmospheric Studies Group, is accepted for use by the BCMOE and US EPA, among other jurisdictions. CALMET is a meteorological pre-processor that develops hourly three-dimensional meteorological fields of wind and temperature used to drive pollutant transport within CALPUFF. CALPUFF is a multi-layer, multi-species, non-steady-state puff dispersion model. It simulates the influences of time- and space-varying meteorological conditions on pollutant transport, transformation and deposition.

All estimated emissions were included in the modelling except road dust and burning vegetation due to clearing activities.

Fugitive road dust emissions were not modelled for several reasons. The standard emission factors for fugitive road dust are understood to be overly conservative, particularly for unpaved roads. The Desert Research Institute found that about 75% of the total emissions estimated using these equations are released within two metres of the ground, and are likely to be re-deposited on the ground within a few hundred metres of their release and therefore are not considered transportable. This is compounded by the fact that regulatory dispersion models do not tend to account for the almost immediate deposition of much of the material. This is particularly true of the CALPUFF model, which does not have a proper line-source algorithm for modelling roads. Analyses of ambient samples have also shown that road dust makes up a smaller amount of particulate matter in the air than suggested by the AP-42 equations (Desert Research Institute 2000). The estimation methodology has an inherent assumption that there is an infinite source of road material to be emitted. Furthermore, these equations were developed based on a regression analysis of numerous monitoring tests for free-flowing traffic at constant speeds on relatively level roads. The use of these equations for stop-and-go traffic or for roads with characteristics beyond the range observed in the monitoring tests leads to increased uncertainty. For these reasons, road dust emissions are not always included in dispersion modelling projects in British Columbia.

Burning of vegetation would occur at variable, unknown locations depending on need and meteorology and, therefore, cannot reasonably be included in the dispersion model. Burning would be conducted in accordance with applicable BC regulatory requirements developed in consideration of human health receptors. As well, BC Hydro has developed a draft smoke management plan for the Site C project which provides best management practices (Silvicon 2012). Emissions from other clearing activities would be minimal, as discussed in Section 2.4.20, and could not reasonably be quantified by location as required for inclusion in the dispersion modelling.

2.5.1 CALMET

CALMET is the meteorological pre-processor for the CALPUFF model. Dispersion modelling was applied using the full 3-D CALMET mode because it has the ability to assimilate multiple meteorological stations and to simulate the changes in mixing height and boundary layer mechanics that result from the variable land cover characterization and terrain in the air quality dispersion modelling study area. This modelling approach also allows full use of the meteorological data collected for the Project as well as the prognostic model output from the microclimate technical study. The following is a summary of CALMET model inputs. More detailed information is provided in Appendix C.

2.5.1.1 Model Period

CALMET was run for a one-year period from January 17, 2011 to January 16, 2012. This represents the period during which meteorological data from the Site C climate network were collected.

2.5.1.2 Model Domain

The CALMET model domain was chosen to be a 40 km by 40 km area, encompassing the 26 km by 27 km dispersion modelling study area and allowing for several kilometres of buffer on all sides to avoid edge effects influencing dispersion at the boundaries of the study area. Horizontal domain resolution was set at 500 m. In the vertical direction, 10 layers were chosen, with the top of the layers set as 20, 40, 80, 160, 300, 600, 1000, 1500, 2200 and 3300 m above ground level.

2.5.1.3 Prognostic Meteorology

CALMET was initialized for the one-year model period using the Weather Research and Forecasting model, which was executed as part of the microclimate technical study. The Weather Research and Forecasting model run included inputs of North American Regional Reanalysis meteorological data from the United States Geological Survey (National Centers for Environmental Protection [NCEP] 2011) and high-resolution terrain data from the Advanced Spaceborne Thermal Emission and Reflection Radiometer Global Digital Elevation Model (ASTER GDEM 2011). Further information on the WRF modelling can be found in Volume 2 Appendix K Microclimate Technical Data Report.

2.5.1.4 Surface Meteorology

Surface meteorological data collected from the Site C climate network operated by BC Hydro were used in the CALMET model, supplemented by data from two additional stations located in the model domain. Farrell Creek (STC 6) was excluded from the CALMET model as it is located over 30 km west of the model domain and measures only wind speed and wind direction which would affect only a small area in the immediate vicinity of the station in the CALMET solution. A total of eight surface stations were used in the CALMET model including:

- Attachie Flat Upper Terrace station (STC1) operated by BC Hydro
- Attachie Flat Lower Terrace station (STC2) operated by BC Hydro
- Attachie Plateau station (STC3) operated by BC Hydro
- Bear Flat station (STC4) operated by BC Hydro
- Hudson's Hope station (STC5) operated by BC Hydro
- Site C Dam station (STC7) operated by BC Hydro
- Fort St. John Airport station operated by Environment Canada
- Taylor Townsite station operated by BCMOE

The locations of the surface climate and meteorological stations are shown in Figure 2.3.1.

2.5.1.5 Terrain Elevation and Land Cover Characterization

The terrain elevation and land cover characterization information used as input into the CALMET model were obtained from GeoBase (http://www.geobase.ca) and are discussed in Section 3.2. Terrain elevations from GeoBase represent 1:50,000 scale Canadian Digital Elevation Data.

Land cover characterization data from GeoBase represent the vectorized result of raster thematic data originating from classified ortho-images from Agriculture and Agri-Food Canada, Canada Center for Remote Sensing, and Canadian Forest Service.

2.5.1.6 Geophysical Parameters

The CALMET model requires gridded geophysical parameters including surface roughness length, albedo, Bowen ratio, soil heat flux, vegetation leaf area index, and anthropogenic heat flux. To more accurately represent the seasonally dependent geophysical parameters in the CALMET model, five seasons were specified:

- Season 1: Mid-summer with lush vegetation (July)
- Season 2: Autumn with cropland that has not yet been harvested (August to September)
- Season 3: Winter with freezing temperatures, no snow on ground (October)
- Season 4: Winter with sub-freezing temperatures, snow cover on ground (November to March)
- Season 5: Transitional spring with partially green short annuals (April to June)

All geophysical parameters were defined by land cover characterization type and seasonal category based on CALMET defaults in combination with recommendations from recent studies (Earth Tech 2000a; Zhang et al. 2002, 2003). A full listing of the geophysical parameters is included in Appendix C.

2.5.1.7 Model Options and User Switches

In general, the diagnostic model options were chosen in accordance with the *Guidelines for Air Quality Dispersion Modelling in BC* (BCMOE 2008) and other CALMET studies performed with similar meteorological data. Features of note include:

- The model was initialized using WRF prognostic meteorological model output at 1-km resolution
- Surface observations were extrapolated upward. This was done using the option to invoke Monin-Obukhov similarity theory and to more accurately represent winds at lower levels in areas of complex terrain

A list of the CALMET model options used is provided in Appendix C.

2.5.2 CALPUFF

The CALMET output (a year of hourly three-dimensional meteorological fields) was used as input to the CALPUFF dispersion model to predict the maximum expected CAC concentrations and dustfall deposition rates resulting from estimated Project construction emissions. To understand the contribution of various source types and to limit file size, emissions sources were grouped into 19 model runs as summarized in Table 2.5.1. Results from each model run were then summed to determine the total contribution from all sources.

Table 2.5.1 Description of CALPUFF model runs

Emission Source	Location	CALPUFF Source Type (Point, Area or Volume)	Nature of Emissions (Constant or Variable)
Bulldozing	All	Area	Constant
Drilling	Wuthrich and dam site area	Volume	Constant
Explosives detonation	Wuthrich and dam site area	Volume	Constant
Blasting	Wuthrich and dam site area	Volume	Constant
Material handling	Dam site area (north)	Volume	Variable
	Dam site area (south)	Volume	Variable
	85th Ave. Industrial Lands	Volume	Variable
Conveyor transfers, concrete batching, and screening (grizzly)	All	Area	Constant
Crushing	Dam site area	Volume	Constant
Stockpile wind erosion	Dam site area and 85th Ave. Industrial Lands	Area	Constant
Grading	All	Area	Constant
Scraping	All	Area	Constant
Mobile vehicles	Wuthrich, Area E, and 85th Ave. Industrial Lands	Area	Constant
	Dam site area	Volume	Constant
	Area E to dam site area	Volume	Constant
	Wuthrich to dam site area	Volume	Constant
	Fort St. John to dam site area	Volume	Constant
Generators	All	Point	Constant
Other diesel equipment	All	Area	Constant

2.5.2.1 Model Domain

The CALPUFF model domain within which CAC concentrations and dustfall deposition rates are predicted is the 26 km by 27 km dispersion modelling study area described in Section 2.1.2. The Universal Transverse Mercator (UTM) coordinates of the domain vertices are given in Table 2.5.2. Puff transport and dispersion is computed within the CALPUFF model for the entire CALMET model domain (see Section 2.5.1.2). Model predictions are reported at discrete receptor locations within the dispersion modelling study area.

Table 2.5.2 UTM Coordinates of CALPUFF model domain

Domain Vertex	UTM Easting (km)	UTM Northing (km)
Southwest	621.900	6,218.700
Northwest	621.900	6,245.700
Southeast	647.900	6,218.700
Northeast	647.900	6,245.700

NOTES:
All coordinates are for North American datum 83 grid zone 12.

2.5.2.2 Receptor Locations

In the CALPUFF model, a discrete set of receptor points are specified at which pollutant concentrations are predicted. A Cartesian nested grid of receptors was defined within the model domain, as per *Guidelines for Air Quality Dispersion Modelling in British Columbia* (BCMOE 2008). Receptor spacing for the Cartesian grid is as follows:

- 20-m spacing along the construction boundaries for Area E, Wuthrich, 85th Ave. Industrial Lands, and the dam site area.
- 50-m spacing up to 500 m from the construction boundaries
- 250-m spacing up to 2 km from the construction boundaries
- 500-m spacing up to 4 km from the construction boundaries
- 1,000-m spacing in the remainder of the 26 km by 27 km model domain

To ensure maximum concentrations near populated areas were captured, a fine receptor grid with 100 metre spacing was defined over Fort St. John and Taylor. In addition, a number of special receptors were defined at the worker camps, schools, child care facilities, health care facilities, senior care facilities and private buildings. Some nearby private buildings were ground-truthed to determine whether or not they were inhabited residences. Lists of these special receptors are provided in Appendix D. Receptor locations are shown in Figure 2.5.1. Note that several of the identified residences and non-residences are located within the proposed dam site area where construction activities are expected to occur, and therefore, these receptors are located within or very close to modelled emission sources. Model predictions at these receptors may be unrealistic.

Terrain elevations for all receptors required as input to the CALPUFF model were extracted from 1:50,000 scale Canadian Digital Elevation Data obtained from GeoBase, as used in CALMET.

Within the construction boundary of the dam site area, a separate receptor grid with 250 metre spacing was defined to predict pollutant concentrations for the purposes of the terrestrial wildlife assessment.

2.5.2.3 Technical Dispersion Options

All technical options relating to the CALPUFF dispersion model were set according to the Guidelines for Air Quality Dispersion Modelling in BC (BCMOE 2008) or to model defaults. These include parameters and options such as the calculation of plume dispersion coefficients, the plume path coefficients used for terrain adjustments, exponents for the wind speed profile, and wind speed categories. A list of the technical options is shown in

Table 2.5.3.

Table 2.5.3 CALPUFF model switch settings

Parameter	Default	Project	Comments
MGAUSS	1	1	Gaussian distribution used in near field
MCTADJ	3	3	Partial plume path terrain adjustment
MCTSG	0	0	Sub-grid scale complex terrain not modelled
MSLUG	0	0	Near-field puffs not modelled as elongated
MTRANS	1	1	Transitional plume rise modelled
MTIP	1	1	Stack tip downwash used
MBDW	1	2	Not used since building downwash not modelled
MSHEAR	0	0	Vertical wind shear not modelled
MSPLIT	0	0	Puffs are not split
MCHEM	1	0	Chemical transformation not modelled
MAQCHEM	0	0	Aqueous phase transformation not modelled
MWET	1	1	Wet removal modelled for all sources
MDRY	1	1	Dry deposition modelled for all sources
MDISP	3	2	Near-field dispersion coefficients internally calculated from sigma-v, sigma-w using micrometeorological variables as recommended by guidelines
MTURBVW	3	3	Not used since MDISP = 2
MDISP2	3	2	Not used since MDISP = 2
MROUGH	0	0	PG sigma-y, sigma-z not adjusted for roughness
MPARTL	1	1	No partial plume penetration of elevated inversion
MTINV	0	0	Strength of temperature inversion computed from default gradients

Parameter	Default	Project	Comments
MPDF	0	1	PDF used for dispersion under convective conditions as recommended for MDISP = 2
MSGTIBL	0	0	Sub-grid TIBL module not used for shoreline
MBCON	0	0	Boundary concentration conditions not modelled
MFOG	0	0	Do not configure for FOG model output
MREG	1	0	Do not test options specified to see if they conform to United States Environmental Protection Agency regulatory values

2.5.2.4 Point Source Parameters

Emissions from diesel generators were modelled as point sources. Stack parameters including stack height, stack diameter, exit velocity, and exit temperature, as summarized in Table 2.5.4 were estimated based on manufacturer specifications for similar equipment.

Table 2.5.4 Point source stack parameters for diesel generators

Parameter	Value
Stack height	1.0 m
Stack diameter	0.04 m
Exit velocity	30 m/s
Exit temperature	437 °C

2.5.2.5 Volume Source Parameters

Emissions from drilling, blasting (including explosives detonation), material handling, and crushing were modelled as volume sources. Locations of these volume sources were determined from maps provided by BC Hydro showing proposed locations of various activities. Vehicle exhaust emissions that occur along defined roads were also specified as series of volume sources located 16 m apart. Volume source emission parameters specified as input to CALPUFF are shown in Table 2.5.5. Release heights were estimated based on manufacturer specifications of typical equipment used for each activity. Initial plume sigmas were chosen to reflect the size of dust clouds or exhaust plumes expected from each activity.

Table 2.5.5 Volume source emission parameters

Source Type	Release Height (m)	Initial Horizontal Plume Sigma (m)	Initial Vertical Plume Sigma (m)
Drilling	2.0	2.0	2.0
Blasting (including explosives detonation)	0.0	2.0	2.0
Material handling	4.0 or 4.8	0.7	0.5 or 2.4
Crushing	8.0	2.0	2.0
Mobile vehicles	2.0	1.0	1.0

Emissions from material handling vary with time, depending on wind speed. Time-varying emissions were estimated for each hour of the model period and incorporated through use of the option for an external VOLEMARB.DAT file for arbitrarily varying volume emissions.

2.5.2.6 Area Source Parameters

Emissions from bulldozing, conveyor transfers, concrete batching, screening, grading, scraping, and diesel equipment (except generators) were modelled as area sources. These sources refer to activities and processes that occur over a large area rather than at a defined location. Similarly, mobile vehicle emissions at Wuthrich, Area E and 85th Ave. Industrial Lands were modelled as area sources as road locations have not yet been specified within these areas. Source parameters, summarized in Table 2.5.6, reflect the height and thickness of dust or exhaust plumes expected from each activity.

Table 2.5.6 Area source emission parameters

Source Type	Source Height (m)	Initial Vertical Plume Sigma (m)
Bulldozing	0.0	2.0
Conveyor transfers	3.0	2.0
Concrete batching	3.0	2.0
Screening	3.0	2.0
Grading	0.0	2.0
Scraping	0.0	2.0
Diesel equipment	0.75	0.75
Mobile vehicles	2.0	1.0

2.5.2.7 Wet and Dry Deposition

Calculation of wet and dry deposition of particulate matter was enabled for all sources to predict dustfall deposition in the model domain and to estimate the concentrations of suspended particulate matter with more accuracy. Due to the lack of information on geophysical parameters, dry deposition could not be modelled accurately using the full resistance model which calculates spatially and temporally varying particle deposition rates based on geophysical parameters and meteorological conditions. Instead, dry deposition was modelled using a bulk deposition velocity of 1.67 cm/s for TSP and PM_{10}, and a bulk deposition velocity of 0.167 mm/s for $PM_{2.5}$ (Tombach and Brewer 2005). Wet deposition was modelled using prognostic WRF precipitation output to determine precipitation in CALMET and scavenging coefficients of 1.0×10^{-4} s^{-1} in liquid rain and 3.0×10^{-5} s^{-1} in frozen precipitation. These represent the default CALPUFF values for PM_{10} and were assumed to be representative of TSP and $PM_{2.5}$ due to the lack of size-specific information.

2.5.2.8 Operation Schedule

All construction activities would be conducted in 10-hour shifts, with one or two shifts per day depending on the activity, six days per week. Some activities (e.g., construction material excavation, earthfill works at the dam site area, aggregate production and concrete batching) would also be limited to the summer season, with work being conducted only between April and October or between May and September. For activities that occur year-round, hours of activity were incorporated directly into dispersion modelling as inputs to CALPUFF using the option for diurnal variation. For generators that are required two shifts per day and are unlikely to be turned off during the two-hour shift turnaround periods, months of activity were incorporated into the modelling using the option for monthly variation. Since the options for monthly and diurnal variations cannot be invoked together for a single source in CALPUFF, sources for which both hourly and monthly variation occur were incorporated through the use of an external VOLEMARB.DAT or BAEMARB.DAT file for arbitrarily variable emissions, except in the case of vehicle emissions. For vehicle emissions, the specification of volume sources along the length of roads results in too many sources to feasibly be defined in external VOLEMARB.DAT files and, therefore, the option for diurnal and seasonal variation was invoked, allowing hours of activity to be specified according to the shift schedule, and allowing emissions to be turned off during the winter season, defined in CALPUFF as December to February. The six days per week schedule was incorporated by scaling all monthly and annual model results by a factor of 0.86 (i.e., 6 days out of 7), with the exception of stockpiles which are subject to wind erosion at all times, even during periods of inactivity.

2.5.3 Model Output Interpretation

Maximum TSP dry and wet deposition rates (i.e., dustfall) as well as maximum ground-level concentrations of CACs were predicted for each model run at each receptor. Post-processing techniques were employed to determine required results for comparison with ambient air quality objectives.

2.5.3.1 Summing of Model Results

The CALSUM post-processing software was used to sum the predicted dry and wet deposition rates and ground-level concentrations at each receptor from each of the 19 model runs to obtain the total predicted deposition rates and concentrations from all emission sources. Since the CALPUFF model simulates and predicts dry and wet deposition separately, the POSTUTIL post-processing software was used to determine the total deposition rates. The CALPOST post-processing software was then used to extract required results from the resulting binary files.

2.5.3.2 NO_x to NO_2 Chemistry

Emissions of NO_x from the Project are comprised of NO and NO_2. The primary emission is in the form of NO with reactions in the atmosphere resulting in the conversion of NO to NO_2. The ambient air quality objectives are based on NO_2, not NO_x nor NO. Dispersion models such as CALPUFF predict NO_x concentrations.

The reaction between NO and O_3 is one of the most important means of converting NO to NO_2, especially in non-urban areas:

$$NO + O_3 \Rightarrow NO_2 + O_2$$

According to the *Guidelines for Air Quality Dispersion Modelling in BC* (BCMOE 2008), the first and most conservative method of estimating NO_2 is to assume 100% conversion of NO_x into NO_2. If a more accurate estimate is desired, the ozone-limiting method or the ambient ratio method may be used. In this report, NO_2 concentrations were estimated using the ozone-limiting method:

$$NO_2 = 0.1*NO_x + \text{lesser of } (O_3 \text{ or } 0.9\ NO_x)$$

Ozone concentrations used for this conversion were derived from ambient monitoring data at the Taylor Townsite station. As per the *Guidelines for Air Quality Dispersion Modelling in British Columbia* (BCMOE 2008), background ozone concentrations used for NO_x to NO_2 conversion were based on the maximum of one-hour and 24-hour average observations. Annual average background ozone concentrations were based on the average of all observations. The data are discussed in Section 3.3.6, and resulting background concentrations are shown in Table 3.3.5.

2.5.3.3 SO_x to SO_2 Conversion

Emissions of SO_x include all sulphur oxides, the primary form of which is SO_2. Ambient air quality objectives are based on SO_2, not SO_x. A 100% conversion was conservatively applied to ambient SO_x concentrations predicted by dispersion modelling to estimate maximum ambient SO_2 concentrations.

2.5.3.4 Determination of Background

The Guidelines for Air Quality Dispersion Modelling in British Columbia (BCMOE 2008) require that representative background concentrations be added to concentrations predicted by dispersion modelling to account for other emission sources in the study area.

As per the Guidelines for Air Quality Dispersion Modelling in British Columbia (BCMOE 2008), the 98th to 100th percentile of historical monitoring data is to be added to maximum predicted concentrations. This methodology is very conservative as it assumes that the maximum predicted concentration and the background concentration would occur at the same time even though, by definition, concentrations equal to or greater than the 98th percentile occur only 2% of the time and the maximum predicted concentration, by definition, would occur once during the modelled period.

For this study, short-term (1-hour to 24-hour) average background concentrations were based on the 98th percentile of representative ambient air quality observations. Annual average background concentrations were based on the average of all representative ambient air quality observations, except for the annual average background TSP concentration, which was calculated as the geometric mean of all observations as per the statistic on which the air quality objective is based. Due to the limited amount of 30-day average dustfall data, the average of all dustfall monitor results were used as background.

2.6 Study Limitations

A number of limitations are inherent in the air quality study. These include limitations in emissions estimation and limitations in dispersion modelling.

Emissions have been estimated based on Project-specific activity data where available, and default activity data from US EPA where Project-specific information are not available. Default activity data are based on the average of conditions observed at a limited number of project sites, mainly in the Unites States, which may not be representative of the Project. The use of published emission factors is associated with inherent limitations in that such factors are based on averages of available data, which may not be sufficient to extrapolate for Project-specific activity parameters (e.g., vehicle speed, material silt content, etc.) outside the observed range of these parameters. Furthermore, these published emission factors are typically representative of long-term averages and the use of such emission factors for estimating short-term emission rates for dispersion modelling are associated with uncertainties.

By definition, air quality dispersion models can only approximate atmospheric processes. Many assumptions and simplifications are required to describe real phenomena in mathematical equations. Model uncertainties can result from:

- Simplifications and accuracy limitations related to source data

- Extrapolation of meteorological data from selected locations to a larger region
- Simplifications of model physics to replicate the random nature of atmospheric dispersion processes

Models are reasonable and reliable in estimating the maximum concentrations occurring on an average basis. That is, the maximum predicted concentration that may occur at some time somewhere within the model domain, as opposed to the exact concentration at a point at a given time, is usually within the ±10% to ±40% range (US EPA 2003) of the observed maximum concentration. Typically, a model is viewed as replicating dispersion processes if it can predict within a factor of two, and if it can replicate the temporal and meteorological variations associated with monitoring data. Model predictions at a specific site and for a specific hour, however, may correlate poorly with the associated observations due to the above-indicated uncertainties. For example, an uncertainty of 5 to 10 degrees in the measured wind direction can result in concentration errors of 20% to 70% for an individual event (US EPA 2003).

3 RESULTS OF BASELINE INVESTIGATIONS

The technical and dispersion modelling study areas are characterized by mostly low population densities in rural settings. Forestry, agriculture, oil and gas, mining and power generation are the main industries and emission sources in the region. In addition, off-road transportation contributes between 15 and 50 percent to pollutant emissions in the two study areas. Fort St. John is the largest population centre. Within population centres, emissions from vehicle traffic and residential wood heating are important factors to local air quality as are emissions from vehicle traffic along major roads, in particular Highway 97 (i.e., Alaska Highway).

The following subsection provides more detailed information on emissions in the technical study area and dispersion modelling study area. Subsection 3.2 covers aspects of the regional meteorology pertaining to the transport and dispersion of pollutant emissions. Ambient air quality measurements are discussed in Subsection 3.3.

3.1 Baseline Emissions of Criteria Air Contaminants

Baseline emissions of $PM_{2.5}$, PM_{10}, NO_x, SO_x, and CO are considered in this section. In addition, TSP is included in the discussion, since total particulate matter reveals additional information on the emission characteristics of a source category. Total oxides of nitrogen and sulphur (NO_x and SO_x) are specified rather than the individual CACs for which there are ambient air quality objectives (NO_2 and SO_2) because these oxides are photochemically active in the atmosphere and the ratios of various oxides in ambient air are not equal to the ratios at which they are emitted at the source. This is particularly true for NO_x and NO_2 and, therefore, conversion from NO_x to NO_2 is not estimated until after dispersion modelling is conducted as discussed in Subsection 2.5.3.2. Since SO_2 is more photochemically stable, it is standard practice to assume that 100 percent of SO_x is converted to SO_2; however, emissions are typically presented as SO_x not SO_2.

The tables in the following subsections show emissions divided into three source categories: industrial, area and mobile sources. The area and mobile source categories are further divided by source type such as agriculture, residential wood heating, aircraft, and heavy-duty diesel vehicles. Data for area and mobile source were provided by BCMOE for the most recent inventory year, 2000 (BCMOE 2000). A total of 43 industrial facilities were identified from Environment Canada's National Pollutant Release Inventory (NPRI) in the technical study area for the year 2010, 16 of which are located in the dispersion modelling study area. A detailed list of emissions from each industrial facility is provided in Appendix E.

3.1.1 Baseline Emissions in the Technical Study Area

3.1.1.1 Total Suspended Particulate

More than half of TSP emissions are from point sources (Table 3.1.1). The primary source of industrial TSP emissions is the Willow Creek mine. Agriculture and off-road vehicles are the main contributors to TSP emissions from the area and mobile source categories, respectively, contributing roughly one fifth of total TSP emissions each.

Table 3.1.1 Air emissions inventory for the technical study area

Category/Sector	Pollutant Emissions (tonnes/year)					
	TSP	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**CO**
Point sources						
Subtotal Point sources	**6,600**	**2,860**	**391**	**6,360**	**13,900**	**15,400**
Area Sources						
Agriculture	2,510	1,240	347	1,370	39.5	1,260
Residential Wood Heating	205	194	193	22.3	3.19	1,180
Forest Fires	478	366	329	48.8	1.22	2,490
Prescribed Burning	9.88	6.59	6.16	1.18	0.03	59.0
Other Area Sources	294	226	220	60.7	10.5	1,250
Subtotal Area Sources	**3,500**	**2,030**	**1,100**	**1,500**	**54.4**	**6,240**
Mobile Sources						
Aircraft	9.04	8.92	8.70	43.3	2.10	310
Heavy-Duty Diesel Vehicles	34.9	34.9	30.6	927	17.1	210
Heavy-Duty Gasoline Vehicles	0.38	0.37	0.26	19.7	0.44	115

Category/Sector	Pollutant Emissions (tonnes/year)					
	TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO
Light-Duty Diesel Vehicles	4.64	4.63	4.02	33.3	8.24	27.7
Light-Duty Gasoline Trucks	4.86	4.75	2.76	236	8.24	4,850
Light-Duty Gasoline Vehicles	3.65	3.58	1.85	246	6.40	4,280
Boats	4.81	4.81	4.43	12.3	0.42	270
Railways	29.4	29.4	27.1	1,240	15.2	236
Other Mobile Sources	2,970	1,590	678	3,140	7,560	6,230
Subtotal Mobile Sources	**3,060**	**1,680**	**758**	**5,900**	**7,620**	**16,500**
Total	**13,200**	**6,570**	**2,250**	**13,800**	**21,600**	**38,100**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).

3.1.1.2 Particulate Matter Less than 10 Microns in Diameter

Point sources contribute more than 40% of total PM_{10} emissions in the technical study area. The Willow Creek mine is the dominant contributor to PM_{10} emissions from point sources, emitting 40% of total PM_{10} emissions in the technical study area. The area and mobile source categories contribute about one third and one quarter of all PM_{10} emissions in the study area, respectively.

3.1.1.3 Particulate Matter Less than 2.5 Microns in Diameter

Area sources and mobile sources contribute about one half and one third of $PM_{2.5}$ emissions, respectively, while point sources contribute roughly one sixth of $PM_{2.5}$ emissions in the technical study area. The dominant industrial $PM_{2.5}$ source is the Willow Creek mine, which emits 14% of total area-wide $PM_{2.5}$. Of the area sources, agriculture represents 15% of total $PM_{2.5}$ emissions in the technical study area and residential wood heating represents 9%. Almost 90% of all mobile source emissions are attributed to off-road vehicle emissions (other mobile sources). Fifteen percent of total area-wide $PM_{2.5}$ emissions are from forest fires.

3.1.1.4 Oxides of Nitrogen

Nitrogen oxide emissions are dominated by the industrial and mobile source categories, each emitting more than 40% of total NO_x in the technical study area. Emissions from point sources are more evenly distributed among the facilities than in the case of particulate matter. The two largest NO_x point sources are Compressor Station 1 at Taylor and Pine River Gas Plant. Half of total mobile source emissions of NO_x are from off-road vehicles. The other two source types with substantial contributions to the mobile source category are railways and heavy-duty diesel vehicles. Area sources, primarily associated with the agricultural sector, emit 11% of NO_x emissions in the technical study area.

3.1.1.5 Sulphur Oxides

The majority of SO_x emitted in the technical study is derived from two industrial facilities: the Pine River Gas Plant (46% of total SO_x emissions) and the McMahon Gas Plant (16%). Emissions of SO_x from area sources are less than 1%. Also, on-road mobile sources, boats, and railways in the technical study area operate on low or non-sulphur containing fuels and emit less than 1% of total SO_x. Other mobile sources, i.e., off-road vehicles, emit about one third of total SO_x in the technical study area.

3.1.1.6 Carbon Monoxide

The industrial and mobile source categories each emit roughly 40% of CO emissions in the technical study area. Almost 30% of all CO emissions are from Chetwynd Forest Industries' lumber mill while all other industrial facilities emit 2% or less, each. Mobile sources emit 43% of total CO emissions in the technical study area and are mostly attributed to off-road vehicles (16%), light-duty gasoline trucks (13%), and light-duty gasoline vehicles (11%). Forest fires contribute about 7% of total CO emissions, whereas agriculture, residential wood heating, and other area sources emit about 3% each.

3.1.1.7 Summary

In the technical study area, point sources contribute 17% to $PM_{2.5}$ and between 40% and 64% to the other five CACs. Area sources contribute 49% to $PM_{2.5}$ and between 11% and 31% to the other CACs except SO_x, to which they contribute less than 1%. Mobile sources contribute between 23% and 43% to all six CACs.

Of the three source categories, area sources emit the most $PM_{2.5}$ but point sources emit the most PM_{10} and TSP. Agriculture is an important source of particulate matter emissions, contributing from 15% of $PM_{2.5}$ to 19% of TSP emissions. Off-road vehicles emit almost all of the $PM_{2.5}$, PM_{10} and TSP from mobile sources.

The main sources of NO_x, SO_x and CO emissions are point sources and mobile sources. This is particularly true for SO_x, for which the area source category emits less than 1% of total emissions. Area sources emit 11% of NO_x (mainly agriculture) and 16% contribution of CO.

3.1.2 Baseline Emissions in the Dispersion Modelling Study Area

Within the dispersion modelling study area, which is a subset of the larger technical study area, no air pollutant emissions were attributed to forest fires or prescribed burning in the BCMOE 2000 emission inventory (Table 3.1.2).

Table 3.1.2 Air emissions inventory for the dispersion modelling study area

Category/Sector	Pollutant Emissions (tonnes per year)					
	TSP	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**CO**
Point sources						
Subtotal Point sources	**289**	**192**	**42.0**	**2,950**	**3,730**	**1,740**
Area Sources						
Agriculture	355	176	49.2	194	5.60	178
Residential Wood Heating	141	134	133	15.4	2.20	815
Forest Fires	0	0	0	0	0	0
Prescribed Burning	0	0	0	0	0	0
Other Area Sources	116	87.2	84.4	31.3	6.33	478
Subtotal Area Sources	**612**	**397**	**267**	**241**	**14.1**	**1,470**
Mobile Sources						
Aircraft	9.04	8.92	8.70	43.3	2.10	310
Heavy-Duty Diesel Vehicles	5.02	5.01	4.40	133	2.46	30.2
Heavy-Duty Gasoline Vehicles	0.05	0.05	0.04	2.84	0.06	16.5
Light-Duty Diesel Vehicles	0.80	0.80	0.69	5.72	1.31	4.77
Light-Duty Gasoline Trucks	0.77	0.76	0.44	37.5	1.31	771
Light-Duty Gasoline Vehicles	0.65	0.64	0.33	43.9	1.14	764
Boats	0	0	0	0	0	0
Railways	5.68	5.68	5.23	239	2.94	45.6
Other Mobile Sources	489	281	151	1,060	3,510	2,570
Subtotal Mobile Sources	**511**	**303**	**171**	**1,570**	**3,520**	**4,510**
Total	**1,410**	**892**	**480**	**4,760**	**7,260**	**7,720**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).

3.1.2.1 Total Suspended Particulate

Point sources emit 21% of all TSP in the dispersion modelling study area. The largest sources are the Canfor Taylor Pulp, Peace Valley OSB, and Canadian Forest Products' sawmill in Fort St. John. Area sources emit 43% of total TSP emissions in the dispersion modelling study area with about 25% from agriculture, 10% from residential wood heating, and 8% from other area sources.

3.1.2.2 Particulate Matter Less than 10 Microns in Diameter

Point sources emit 22% of the coarse particulate matter size fraction (PM_{10}). The Canfor Taylor Pulp and the Peace Valley OSB facilities are the main PM_{10} sources with contributions of 14% and 5%, respectively. The area source category contributes almost half of all PM_{10} emissions with 20% from agriculture, 15% from residential wood heating, and 10% from other area sources. Off-road mobile sources emit 32% of total PM_{10} emissions in the dispersion modelling study area.

3.1.2.3 Particulate Matter Less than 2.5 Microns in Diameter

More than half of all $PM_{2.5}$ emissions in the dispersion modelling study area are emitted by area sources. The spatial percentage of residential areas is larger in the dispersion modelling study area than in the technical study area. Consequently, residential wood heating has a larger share of area-wide $PM_{2.5}$ emissions in the dispersion modelling study area (28%) than in the technical study area (9%). Agriculture contributed 10% and other area sources 18% to total $PM_{2.5}$ emissions in the dispersion modelling study area. Similar to the technical study area, mobile sources emitted about one third of all $PM_{2.5}$ in the dispersion modelling study area, with almost 90% of that share emitted by off-road vehicles. Industrial facilities emitted 9% of total $PM_{2.5}$, half of which was emitted by the Canfor Peace Valley Oriented Strand Board (OSB) facility.

3.1.2.4 Oxides of Nitrogen

Nitrogen oxide emissions are dominated by the industrial and mobile source categories, which emit 62% and 33% of total NO_x in the dispersion modelling study area, respectively. Almost one half of the industrial emissions are emitted by the Spectra Energy Transmission Compressor Station 1 at Taylor. Two thirds of total mobile source emissions of NO_x are from off-road vehicles. The other two sectors with substantial contributions to the mobile source category are railways (5%) and heavy-duty diesel vehicles (3%).

3.1.2.5 Sulphur Oxides

In the dispersion modelling study area, 51% of SO_x is emitted by point sources and 48% is emitted by mobile sources. The dominant industrial source of SO_x emissions is the Spectra McMahon Gas Plant. Off-road vehicles are the main source of SO_x emissions from mobile sources.

3.1.2.6 Carbon Monoxide

Almost 60% of CO emissions in the dispersion modelling study area is emitted by the mobile source category, with over half of this attributed to off-road vehicles, and 10% each to light-duty gasoline trucks and light-duty gasoline vehicles. Industrial and area sources each emit about 20% of total CO emissions. Almost half of all industrial CO emissions are from Spectra Energy Transmission's Compressor Station 1 at Taylor and about one quarter from the Peace Valley OSB facility. Residential wood heating represents 11% of total CO emissions.

3.1.2.7 Summary

In the dispersion modelling study area, industrial source contributions to NO_x and SO_x are 62% and 51%, respectively. The contribution of point sources to other CACs is less than 23%. Area sources contribute between 43% and 56% to all particulate matter emissions, 19% to total CO, 5% to total NO_x, and less than 1% to total SO_x. Mobile sources contribute between 33% and 58% to all six CACs.

The contribution of point sources to particulate matter emissions is less in the dispersion modelling study area than in the technical study area. Area and mobile sources contribute most to all size fractions of particulate matter. Similar to the technical study area, agriculture is an important area source of particulate matter emissions in the dispersion modelling study area, contributing from 10% of $PM_{2.5}$ to and 25% of TSP emissions. Residential wood heating contributes a larger fraction of particulate matter emissions in the dispersion modelling study area than in the technical study area, contributing from 10% of TSP to 28% of $PM_{2.5}$ emissions.

Point sources dominate NO_x emissions in the dispersion modelling study area followed by mobile sources. The industrial and mobile source categories emit roughly 50% each to total SO_x emissions in the dispersion modelling study area. The majority of the CO emissions are emitted by mobile sources, particularly off-road sources.

3.1.3 Baseline Emissions in the Vicinity of Construction Material Sources and Hudson's Hope Shoreline Protection

This section summarizes baseline emissions in additional Project component areas within the air quality technical study area (see Figure 2.1.1). Air emissions were determined for 12 km by 12 km areas centred on the Project components. The breakup into source categories is the same as in Table 3.1.1 and Table 3.1.2 above. Where point sources were listed in NPRI, emissions of the individual facilities are shown. In addition, total emissions without forest fires are shown, because for small areas, the random occurrence of forest fires in the baseline year can lead to substantially higher baseline emissions that are not representative for years in which no forest fires occur.

3.1.3.1 Wuthrich Quarry

There are four main sources of particulate matter emissions in the area surrounding Wuthrich Quarry (Table 3.1.3): other mobile sources (off-road), agriculture, residential wood burning, and other area sources. The major NO_x emission sources are other mobile sources, some of the point sources, and agriculture. The only two substantial source sectors for SO_x are other mobile sources and one of the industrial facilities. Main contributors to CO emissions are mobile sources (most notably off-road), residential wood heating, and other area sources.

Table 3.1.3 Air emissions inventory for 12 km by 12 km area centred on Wuthrich Quarry

Category/Sector		Pollutant Emissions (tonnes per year)					
		TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO
Point sources							
NPRI ID	**Facility**						
7717	Spectra Energy Transmission, Booster Station 19 - Cabin Lake	0.56	0.56	0.56	47.5	NS	24.2
7963	Spectra Energy Transmission, BS 9. Nig Creek	NS	NS	NS	NS	NS	NS
7965	Spectra Energy Transmission, Booster Station 11 – Rigel	NS	NS	NS	33.3	NS	52.1
16406	Devon Canada Corporation, West Eagle 02-01	1.71	1.71	1.71	125	NS	NS
19733	Suncor Energy Inc., Suncor Kobes Battery (B-24-A/94-B-9)	NS	NS	NS	133	247	NS
19953	AltaGas Ltd. - Blair Creek Comp Stn d-058-F	NS	NS	NS	41.0	NS	27.0
Subtotal Point sources		**2.27**	**2.27**	**2.27**	**380**	**247**	**103**
Area Sources							
Agriculture		181	89.8	25.1	99.0	2.86	91.0
Residential Wood Heating		124	117	117	13.5	1.93	717
Forest Fires		0.31	0.24	0.21	0.03	0	1.61
Prescribed Burning		0	0	0	0	0	0
Other Area Sources		83.0	62.1	59.9	24.9	5.17	337
Subtotal Area Sources		**389**	**270**	**203**	**137**	**9.96**	**1,150**
Mobile Sources							
Aircraft		7.70	7.60	7.41	36.9	1.79	264
Heavy-Duty Diesel Vehicles		2.23	2.23	1.96	59.3	1.09	13.5
Heavy-Duty Gasoline Vehicles		0.02	0.02	0.02	1.26	0.03	7.36
Light-Duty Diesel Vehicles		0.37	0.37	0.32	2.66	0.60	2.22
Light-Duty Gasoline Trucks		0.35	0.34	0.20	17.1	0.60	352
Light-Duty Gasoline Vehicles		0.31	0.30	0.15	20.6	0.54	358
Marine Vessels		0	0	0	0	0	0
Railways		1.47	1.47	1.35	61.7	0.76	11.8
Other Mobile Sources		277	165	97.2	394	530	1,990
Subtotal Mobile Sources		**290**	**177**	**109**	**593**	**535**	**2,990**
Total		**681**	**449**	**313**	**1,110**	**792**	**4,240**

Category/Sector	Pollutant Emissions (tonnes per year)					
	TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO
Total without Forest Fires	**681**	**449**	**313**	**1,110**	**792**	**4,240**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).
Emissions of TSP (in tonnes per year) less than PM_{10} reported in NPRI were set equal to PM_{10} emissions.
-NS”: not specified; NPRI reporting thresholds in tonnes/year are 0.3 ($PM_{2.5}$), 0.5 (PM_{10}), and 20 (all other pollutants).

3.1.3.2 85th Avenue Industrial Lands

Because the 12 km by 12 km areas centred on Wuthrich Quarry and 85th Avenue Industrial Lands partially overlap, the air emission inventories for the two areas have similar compositions. The four main emission sources of particulate matter in the area surrounding 85th Avenue Industrial Lands are other mobile sources (off-road), agriculture, residential wood burning, and other area sources (Table 3.1.4). The major NO_x emission sources are other mobile sources, some of the point sources, and agriculture. One industrial facility is the dominant source of SO_x; other mobile sources contribute only 15.6 tonnes per year (about 5% of the total), unlike in the area around Wuthrich Quarry (530 tonnes per year). Main contributors to CO emissions are mobile sources (most notably off-road), residential wood heating, other area sources, and one industrial facility.

Table 3.1.4 Air emissions inventory for 12 km by 12 km area centred on 85th Avenue Industrial Lands

Category/Sector		Pollutant Emissions (tonnes per year)					
		TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO
Point sources							
NPRI ID	**Facility**						
5124	Spectra Energy Midstream Corporation, Highway Gas Plant	0.65	0.65	0.65	101	29.6	39.8
5169	Canadian Forest Products Ltd., Fort St. John	65.7	8.16	3.57	37.9	NS	102
7717	Spectra Energy Transmission, Booster Station 19 - Cabin Lake	0.56	0.56	0.56	47.5	NS	24.2
7963	Spectra Energy Transmission, BS 9. Nig Creek	NS	NS	NS	NS	NS	NS
7965	Spectra Energy Transmission, Booster Station 11 - Rigel	NS	NS	NS	33.3	NS	52.1
19733	Suncor Energy Inc., Suncor Kobes Battery (B-24-A/94-B-9)	NS	NS	NS	133	247	NS
20104	Canfor Pulp Limited Partnership, Peace Valley OSB	81.8	43.3	21.3	84.7	NS	467
Subtotal Point sources		**149**	**52.7**	**26.1**	**26.1**	**277**	**685**
Area Sources							
Agriculture		145	72.0	20.1	79.4	2.29	72.9

Category/Sector	Pollutant Emissions (tonnes per year)					
	TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO
Residential Wood Heating	156	147	147	16.9	2.42	897
Forest Fires	0	0	0	0	0	0
Prescribed Burning	0	0	0	0	0	0
Other Area Sources	116	86.7	83.7	32.8	6.83	475
Subtotal Area Sources	**417**	**306**	**251**	**129**	**11.5**	**1,440**
Mobile Sources						
Aircraft	8.64	8.52	8.31	41.4	2.01	296
Heavy-Duty Diesel Vehicles	2.37	2.37	2.08	63.1	1.16	14.3
Heavy-Duty Gasoline Vehicles	0.03	0.03	0.02	1.34	0.03	7.83
Light-Duty Diesel Vehicles	0.42	0.42	0.36	3.01	0.66	2.50
Light-Duty Gasoline Trucks	0.39	0.38	0.22	18.9	0.66	388
Light-Duty Gasoline Vehicles	0.35	0.34	0.18	23.5	0.61	409
Marine Vessels	0	0	0	0	0	0
Railways	1.44	1.44	1.33	60.6	0.75	11.6
Other Mobile Sources	279	175	120	337	15.6	2,560
Subtotal Mobile Sources	**293**	**189**	**132**	**549**	**21.0**	**3,690**
Total	**858**	**547**	**409**	**1,120**	**310**	**5,820**
Total without Forest Fires	**858**	**547**	**409**	**1,120**	**310**	**5,820**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).
Emissions of TSP (in tonnes per year) less than PM_{10} reported in NPRI were set equal to PM_{10} emissions.
“NS”: not specified; NPRI reporting thresholds in tonnes/year are 0.3 ($PM_{2.5}$), 0.5 (PM_{10}), and 20 (all other pollutants).

3.1.3.3 West Pine Quarry

Table 3.1.5 displays the air emissions inventory for the 12 km by 12 km area centred on West Pine Quarry. For all pollutants, emissions are only a few percent of those in the areas around Wuthrich Quarry and 85th Avenue Industrial Lands. None of the individual source sectors shows similarly high emissions as in the latter two areas. No industrial facilities have registered air emissions in the NPRI, and no forest fires were recorded within the area during the inventory year.

Table 3.1.5 Air emissions inventory for 12 km by 12 km area centred on West Pine Quarry

Category/Sector	Pollutant Emissions (tonnes per year)					
	TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO
Point sources						
Subtotal Point sources	**0**	**0**	**0**	**0**	**0**	**0**
Area Sources						
Agriculture	0	0	0	0	0	0
Residential Wood Heating	0.23	0.22	0.22	0	0	1.31
Forest Fires	0	0	0	0	0	0
Prescribed Burning	0	0	0	0	0	0
Other Area Sources	1.03	0.75	0.72	0.18	0.03	4.21
Subtotal Area Sources	**1.26**	**0.97**	**0.94**	**0.20**	**0.03**	**5.52**
Mobile Sources						
Aircraft	0	0	0	0	0	0
Heavy-Duty Diesel Vehicles	0.92	0.92	0.81	24.4	0.45	5.53
Heavy-Duty Gasoline Vehicles	0.01	0.01	0.01	0.52	0.01	3.03
Light-Duty Diesel Vehicles	0.10	0.10	0.08	0.70	0.19	0.58
Light-Duty Gasoline Trucks	0.11	0.11	0.06	5.52	0.19	114
Light-Duty Gasoline Vehicles	0.07	0.07	0.04	4.84	0.13	84.4
Marine Vessels	0	0	0	0	0	0
Railways	2.05	2.05	1.89	86.2	1.06	16.5
Other Mobile Sources	1.14	0.86	0.83	1.32	0.07	14.4
Subtotal Mobile Sources	**4.40**	**4.12**	**3.72**	**124**	**2.10**	**238**
Total	**5.66**	**5.09**	**4.66**	**124**	**2.13**	**244**
Total without Forest Fires	**5.66**	**5.09**	**4.66**	**124**	**2.13**	**244**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).

3.1.3.4 Portage Mountain Quarry

During the inventory year, forest fires were recorded in the area around Portage Mountain (Table 3.1.6). Particulate matter and CO emissions in the area were dominated by forest-fire emissions. Totals without forest fires are similarly low as emissions around West Pine Quarry.

Table 3.1.6 Air emissions inventory for 12 km by 12 km area centred on Portage Mountain

Category/Sector	Pollutant Emissions (tonnes per year)					
	TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO
Point sources						
Subtotal Point sources	**0**	**0**	**0**	**0**	**0**	**0**
Area Sources						
Agriculture	3.74	1.85	0.52	2.04	0.06	1.88
Residential Wood Heating	0.37	0.35	0.35	0	0.01	2.14
Forest Fires	72.2	55.3	49.7	7.37	0.18	376
Prescribed Burning	0	0	0	0	0	0
Other Area Sources	0.70	0.53	0.52	0.13	0.02	3.01
Subtotal Area Sources	**77.0**	**58.0**	**51.1**	**9.58**	**0.27**	**383**
Mobile Sources						
Aircraft	0	0	0	0	0	0
Heavy-Duty Diesel Vehicles	0.15	0.15	0.13	4.00	0.07	0.91
Heavy-Duty Gasoline Vehicles	0	0	0	0.09	0	0.50
Light-Duty Diesel Vehicles	0.03	0.03	0.03	0.23	0.05	0.19
Light-Duty Gasoline Trucks	0.03	0.03	0.02	1.36	0.05	27.9
Light-Duty Gasoline Vehicles	0.03	0.03	0.01	1.87	0.05	32.6
Marine Vessels	0.20	0.20	0.18	0.50	0.02	11.1
Railways	0	0	0	0	0	0
Other Mobile Sources	4.41	2.36	1.01	2.71	0.10	10.1
Subtotal Mobile Sources	**4.85**	**2.80**	**1.38**	**10.8**	**0.34**	**83.3**
Total	**81.9**	**60.8**	**52.5**	**20.3**	**0.61**	**466**
Total without Forest Fires	**9.66**	**5.53**	**2.77**	**13.0**	**0.43**	**90.3**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).

3.1.3.5 Del Rio Pit

Some forest fires were recorded in the emissions inventory for the 12 km by 12 km area centred on Del Rio Pit, but their contributions to particulate emissions are less than ten tonnes per year (Table 3.1.7). Agriculture and other mobile sources are the main contributor to emissions of all pollutants. Overall, emissions in the area around Del Rio Pit are roughly one order of magnitude lower than emissions around Wuthrich Quarry and 85th Avenue Industrial Lands.

Table 3.1.7 Air emissions inventory for 12 km by 12 km area centred on Del Rio Pit

Category/Sector	Pollutant Emissions (tonnes per year)					
	TSP	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**CO**
Point sources						
Subtotal Point sources	**0**	**0**	**0**	**0**	**0**	**0**
Area Sources						
Agriculture	42.8	21.2	5.92	23.4	0.67	21.5
Residential Wood Heating	0.27	0.25	0.25	0	0	1.54
Forest Fires	7.22	5.53	4.97	0.74	0.02	37.6
Prescribed Burning	0	0	0	0	0	0
Other Area Sources	1.02	0.97	0.97	0.18	0.01	5.17
Subtotal Area Sources	**51.3**	**27.9**	**12.1**	**24.3**	**0.70**	**65.8**
Mobile Sources						
Aircraft	0	0	0	0	0	0
Heavy-Duty Diesel Vehicles	0.03	0.03	0.03	0.76	0.01	0.17
Heavy-Duty Gasoline Vehicles	0	0	0	0.02	0	0.09
Light-Duty Diesel Vehicles	0.01	0.01	0.01	0.04	0.01	0.04
Light-Duty Gasoline Trucks	0	0.01	0.01	0.26	0.01	5.33
Light-Duty Gasoline Vehicles	0	0.01	0.01	0.36	0.01	6.22
Marine Vessels	0	0	0	0	0	0
Railways	0	0	0	0	0	0
Other Mobile Sources	43.0	21.4	6.07	23.6	0.69	23.9
Subtotal Mobile Sources	**43.1**	**21.4**	**6.11**	**25.0**	**0.73**	**35.8**
Total	**94.4**	**49.4**	**18.2**	**49.3**	**1.43**	**102**
Total without Forest Fires	**87.2**	**43.8**	**13.3**	**48.6**	**1.41**	**64.0**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).

3.1.3.6 Hudson's Hope Shoreline Protection

Total emissions in the area centered on Hudson's Hope Shoreline Protection (shown in Table 3.1.8) are similar to those around Del Rio Pit, with the exception of CO. Light-duty gasoline vehicles and trucks contributed several hundred tonnes of CO more in the Hudson's Hope Shoreline Protection area than at the Del Rio Pit area. Agriculture, residential wood heating, other area sources, and other mobile sources are the main emission sources for Hudson's Hope Shoreline Protection.

Table 3.1.8 Air emissions inventory for 12 km by 12 km area centred on Hudson's Hope Shoreline Protection

Category/Sector	Pollutant Emissions (tonnes per year)					
	TSP	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**CO**
Point sources						
Subtotal Point sources	**0**	**0**	**0**	**0**	**0**	**0**
Area Sources						
Agriculture	38.1	18.9	5.27	20.8	0.60	19.1
Residential Wood Heating	8.49	8.02	8.01	0.92	0.13	48.9
Forest Fires	0	0	0	0	0	0
Prescribed Burning	0	0	0	0	0	0
Other Area Sources	5.68	4.42	4.32	1.08	0.19	24.9
Subtotal Area Sources	**52.3**	**31.3**	**17.6**	**22.8**	**0.92**	**92.9**
Mobile Sources						
Aircraft	0	0	0	0	0	0
Heavy-Duty Diesel Vehicles	1.54	1.53	1.35	40.8	0.75	9.25
Heavy-Duty Gasoline Vehicles	0.02	0.02	0.01	0.87	0.02	5.06
Light-Duty Diesel Vehicles	0.19	0.19	0.17	1.37	0.35	1.14
Light-Duty Gasoline Trucks	0.21	0.20	0.12	10.0	0.35	206
Light-Duty Gasoline Vehicles	0.15	0.15	0.08	10.0	0.26	174
Marine Vessels	0	0	0	0	0	0
Railways	0	0	0	0	0	0
Other Mobile Sources	43.4	22.9	9.22	26.0	0.91	84.5
Subtotal Mobile Sources	**45.5**	**25.0**	**11.0**	**89.1**	**2.64**	**480**
Total	**97.8**	**56.3**	**28.6**	**112**	**3.56**	**573**
Total without Forest Fires	**97.8**	**56.3**	**28.6**	**112**	**3.56**	**573**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (point sources) and BCMOE 2000 (all other sources).

3.2 Meteorology

Regional meteorological conditions determine how Project emissions (presented in Section 4.1) are transported and dispersed, resulting in predicted concentrations that are discussed in Section 5. This section characterizes the meteorology within the dispersion modelling study area. The two main characteristics that are discussed are winds, which determine the horizontal and vertical transport of pollutants, and the mixing height, which determines the total volume into which pollutants are dispersed. Winds and mixing heights, in turn, are modified by topography and surface characteristics, which are discussed first.

3.2.1 Topography

The topography in the dispersion modelling study area varies over a range of a few hundred metres (Figure 3.2.1). Steeper terrain, with elevation changes on the order of about a hundred metres over a distance of 1 km, is mostly limited to the river valleys. Based on this topography, complex-terrain flows can be expected occasionally at some of the meteorological stations.

Three main flow regimes with distinct flow characteristics are typical for complex terrain and their general characteristics are well studied and understood (e.g., Whiteman 2000). In the first flow regime, during the day, under mostly sunny (fair weather) conditions with weak large-scale winds, the atmosphere is unstable. Wind flow is primarily driven by local horizontal temperature differences and convective turbulence. The general tendency under these conditions is up-slope flows. Westerly up-valley flows might occur within the river valleys. The weak, large-scale winds usually add to these local winds. The atmosphere is well-mixed under convective conditions, and the mixing layer can reach heights of up to 2,000 m. This convective boundary layer is well isolated from the free atmosphere above by a capping inversion, and vertical dispersion beyond the convective boundary layer is minimal.

In the second flow regime, under overcast windy conditions, the atmospheric stability is neutral. Large-scale winds typically dominate, but might be channelled along the main valley and some of the smaller tributary valleys. Large-scale winds couple strongly with the surface, where roughness elements generate turbulence that disperses pollutants into a mixing layer that can reach heights of more than 1,000 m.

The third flow regime occurs when the atmosphere is stably stratified, typically at night under fair weather conditions or in the winter over snow cover. Wind flow is primarily driven by local horizontal temperature differences leading to downslope and down-valley flows. Surface winds under stable conditions tend to be decoupled from larger-scale winds aloft. Vertical mixing is strongly suppressed and mixing heights do not exceed a few hundred metres.

These three flow regimes are a high-level categorization of local and regional flows. Special cases and complex local features also exist and can further complicate the flow. Of particular importance are surface characteristics, which are described in the next subsection.

3.2.2 Surface Characteristics

Surface characteristics are important for horizontal and vertical transport and dispersion of pollutants. Figure 3.2.2 shows land cover characterization and surface roughness length within the dispersion modelling study area. Land cover characterization is responsible for horizontal differences in local heat input to the atmosphere through surface moisture, reflectivity, conductivity, and heat capacity. These horizontal heterogeneities can modify winds locally. Land cover characterization is also an underlying factor for surface roughness length, which determines the generation of mechanically generated turbulence. Surface roughness length is expressed as a characteristic length of individual roughness elements that disturb the flow. The value chosen for a particular land-use type depends on the mean and variability of the heights and shapes of individual roughness elements, their distance from each other, and geometrical arrangement relative to the mean wind. In addition, surface roughness length is a function of season because vegetation changes over the course of a year and snow cover tends to alter surface roughness length.

The southwestern part of the dispersion modelling study area is dominated by forest; water and barren land are found along the Pine River, which runs through the dispersion modelling study area. Surface roughness length is typically greatest for forested land (0.5 to 1.3 m) and lowest for water surfaces (0.001 to 0.002 m). The northwestern part of the dispersion modelling study area shows a mixture of forest, agriculture, water (Charlie Lake), and built-up area (Community of Charlie Lake to the southwest of the lake). Surface roughness length is 0.01 to 0.20 m for agricultural land and 0.50 to 0.54 m for built-up areas. The remainder of the dispersion modelling study area is dominated by agricultural land with the exception of the urban areas of Fort St. John and Taylor, stretches of forest along the Peace River in the centre and the Beatton River in the northeast, and the water surface of Cecil Lake in the northeast.

3.2.3 Modelled Flow Regimes

Results of the CALMET model, presented in greater detail in Appendix C, were used to investigate the expected flow and dispersion characteristics within the dispersion modelling study area.

Examples of modelled wind fields at 10 m for the three flow regimes are displayed in Figure C.5. In general, these CALMET-derived wind fields agree with expected flows. During unstable conditions (Figure C.5, left), upslope flows cause convergence over the elevated terrain in the northwestern and southern parts of the dispersion modelling study area and divergence in the river valleys. The westerly large-scale winds seem to dominate up-valley flows. Only in the central southern part of the study area, the narrowing of the valley from the southeast towards the northwest appears to enhance the along-valley temperature gradient enough to cause an up-valley flow against the westerly large-scale winds. As the day progresses, the convective boundary layer grows deeper than the topography in the dispersion modelling study area and the wind fields are less affected by local topography (see the diurnal variation on a typical summer day in Figure C.7).

Under neutral conditions (Figure C.5, centre), the model predicts a fairly uniform wind field across the model domain. No channelling is apparent, with the exception of some northerly steering of winds in the southeast over Taylor. The valleys might be too narrow and shallow for the model to predict any channeling at the grid resolution for which the model was applied. In addition, in reality the river valleys are mostly parallel or perpendicular to the prevailing southwesterly wind, so that generally little channelling is expected to actually occur.

Finally, the example for stable conditions (Figure C.5, right) shows downslope flows leading to divergence over elevated terrain and convergence over the valley bottoms.

3.2.4 Modelled Mixing Heights

Mixing height is a measure of the depth of the layer into which air pollutants are mixed vertically and is determined by a combination of atmospheric stability and surface characteristics. Figure C.7 in Appendix C shows mixing heights for the same three examples of the unstable, neutral, and stable stability classes as in Figure C.6.

Mixing height in an unstable atmosphere is dominated by surface characteristics with respect to incoming radiation. In this example at 10:00 AM local time on July 7 (Figure C.6, left), the surface has not received much heating yet, and CALMET-predicted mixing heights range from roughly 250 m to 700 m. Lowest mixing heights are predicted over water because of its high heat capacity and the conversion of incoming solar radiation into evaporation. In the northwest, a combination of upslope flows, high surface roughness length, and built-up areas (low moisture, conductivity, and heat capacity) promotes mixing heights of more than 600 m. Under unstable conditions, in particular early in the development of the convective boundary layer, high ambient pollutant concentrations might be observed near elevated emission sources, because the strong vertical mixing tends to disperse pollutants quickly towards the ground.

In the example for neutral conditions (Figure C.6, centre), mixing heights vary between 900 m and 2,200 m. The potential for vertical mixing and dispersion of pollutants is large. In this particular example of southwesterly large-scale winds (see Figure C.5, centre), mixing heights are highest over and downwind of areas with high surface roughness length, in particular over the southwest and the northwest of the dispersion modelling domain. By contrast, mixing heights are several hundred metres lower over the smoother agricultural areas in the east and over Charlie Lake (northwest) and Cecil Lake (northeast). Because of the quick and deep vertical mixing, high ambient pollutant concentrations are less common under neutral conditions than under unstable or stable conditions.

In the stable case (Figure C.6, right), mixing heights are mostly homogeneous and very low at about 50 m. Mixing heights of up to 100 m are found mostly in small areas of convergent flows over the valleys of Peace River and Beatton River in the eastern parts of the dispersion modelling study area. Pollutants emitted under these conditions tend to be trapped in a very shallow layer near the ground, which can often lead to high ambient concentrations near the source or where larger-scale winds impinge on higher terrain downwind of the source.

3.2.5 Observed Winds

Fort St. John Airport is located at an elevation of 650 to 700 metres (Figure 3.2.1). Elevation varies less than 100 m within about two kilometres of the airport. Topography exceeding the airport's elevation by more than 100 metres is more than ten kilometres away, mostly to the west and northwest. Therefore, Fort St. John Airport provides a good representation of larger-scale regional flows. Figure C.2 in Appendix C shows that most frequent wind directions are from south-southwest to west-southwest (about 45 to 50% of the time), followed by winds from the north and north-northwest (15%) and the east and east-southeast (10%).

Taylor is located about 200 m lower than Fort St. John Airport near the valley bottom in a bowl with a diameter of roughly 4 km. The station at Taylor Townsite is likely partially protected from stronger winds aloft and occasionally under the influence of winds channelled along the river valley. The wind rose in Figure C.3 shows about twice as many calms and substantially fewer strong winds than Figure C.2 for Fort St. John Airport. The most frequent wind directions at Taylor Townsite are also from south-southwest to west-southwest (about 30 to 35% of the time), but this station rarely measures northerly winds.

Field station STC7 at the proposed Site C Dam site is located on the upper edge of the river valley, roughly 50 m lower than Fort St. John Airport station. Based on this location, STC7 is expected to be subject to larger-scale wind flows and occasional channelling of winds along the valley axis roughly from northwest to southeast. The wind rose in Figure C.1 shows the expected general flow characteristics. Calms occur about 15% of the time. The frequency of stronger winds is intermediate between Fort St. John Airport and Taylor Townsite. The frequencies of winds at STC7 from southwesterly and northerly directions are similar to Fort St. John Airport (Figure C.2). Winds from westerly to northwesterly directions are more frequent at STC7 than Fort St. John Airport, which might be caused by channelling of winds along the axis of the Peace River valley at STC7.

Because of the high frequency of southwesterly winds at all three measurement locations, the urban areas of Fort St. John (to the west of the airport) would be more frequently downwind of emissions from the proposed Site C Dam site than the urban areas of Taylor.

3.3 Ambient Air Quality

Ambient air quality measurements of $PM_{2.5}$, PM_{10}, dustfall, NO_2, SO_2, CO, and O_3 were analysed using the methodology presented in Section 2.2 to evaluate baseline conditions in the technical study area. In addition, representative background concentrations were determined so they could be added to ambient concentrations predicted using a dispersion model as per the *Guidelines for Air Quality Dispersion Modelling in BC* (BCMOE 2008).

3.3.1 Particulate Matter Concentrations

The time series plot for PM_{10} observations at Fort St. John is illustrated in Figure 3.3.1. Particulate concentrations at Fort St. John tend to follow a seasonal trend, with the highest concentrations in the spring and summer. The data collection periods for both $PM_{2.5}$ and PM_{10} at Attachie Flat Upper Terrace and Old Fort are roughly one year from 2011 to 2012, and for $PM_{2.5}$ at Fort St. John roughly two years from 2001 to 2003; therefore, time series plots are not shown.

Box plots for 24-hour average $PM_{2.5}$ concentrations are illustrated in Figure 3.3.2, Box plots are a simplified representation of the frequency distribution of data. The horizontal bars were chosen to present key percentiles that are well spread on the vertical axis from bottom to top: 2nd, 25th, 50th (median), 75th, and 98th percentiles. The narrow outer box spans the 2nd and 98th percentiles, the smaller, wider box spans the 25th and 75th percentiles, and the line transecting the smaller box indicates the 50th percentile or the median. Median concentrations of $PM_{2.5}$ observed at Attachie Flat Upper Terrace were similar to those observed at Old Fort, but the 98th percentile observed concentrations were considerably higher at Attachie Flat, possibly due to episodes of wind-blown dust.

Box plots for 24-hour average PM_{10} are illustrated in Figure 3.3.3. For all percentiles except the 2nd percentile, higher PM_{10} concentrations were observed at Fort St. John and Attachie Flat Upper Terrace than at Old Fort. Particulate matter observations at Fort St. John are likely dominated by residential emission sources. The Attachie Flat Upper Terrace monitoring station is located in a large field, which may result in higher PM_{10} observations during dry weather conditions in the summer due to wind-blown dust.

For both PM_{10} and $PM_{2.5}$, the 98th percentile observed concentrations are less than the relevant air quality objectives, and the median observed concentrations are less than half the relevant air quality objectives. These distributions are consistent with what one would expect for a rural area, with some influence from urban sources at Fort St. John (Cheng et al. 2000).

In addition to the wind-blown dust episodes, there was an extended downtime at the Attachie Flat Upper Terrace station from September 28, 2011 through December 21, 2011. The data completeness over the collection period is, therefore, less than the 75% recommended by the BCMOE (2008). Furthermore, since PM observations at Fort St. John are likely dominated by residential emission sources that are not considered representative of the Project area, background $PM_{2.5}$ and PM_{10} concentrations are based on observations at Old Fort.

As discussed in Section 2.2, there are no TSP monitoring data available that may be representative of baseline conditions in the Project area. Therefore, background PM_{10} concentrations based on observations at Old Fort were used to represent background TSP concentrations. While background TSP concentrations are likely to be higher than background PM_{10} concentrations by definition, the calculation of background PM_{10} based on the 98th percentile is likely to be sufficiently conservative such that background TSP concentrations would not be underestimated.

3.3.2 Dustfall Deposition

Historical dustfall measurements were collected by the BCMOE near the Quintette and Bullmoose mines, located about 35 to 45 km south of the technical study area, from the late 1980s to 2000. Data are available for the years 1993 to 2000, excluding 1997. However, data were incomplete for most of the years, with 1995, 1998 and 1999 being the most complete years. The data are from locations outside the technical study area, but are close enough to provide context for historical dustfall from industrial activity in the region. These dustfall data cover periods when the Bullmoose and Quintette mines were in operation and mining activities would likely have had an influence on the measurements, although several stations in the Tumbler Ridge area were located sufficiently distant from mine operations to have had minimal contribution from mining activities. Dustfall measurements from these stations are summarized in Table 3.3.1. A number of high dustfall readings were observed at Tumbler Ridge Centre, the flatbed airstrip and 350 Man Camp in 1995. Data records indicate that there may have been foreign matter in the sample canister, leading to unduly influenced results (Western Coal Corporation 2005). Apart from these, most measurements in the Tumbler Ridge area were well below the 1.75 mg/dm^2-d objective for residential areas, with few exceedances observed.

Table 3.3.1 Dustfall measurements near Quintette and Bullmoose mines

Station	Dustfall (mg/dm²-d)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993												
Tumbler Ridge West	0.55	0.92	0.14	0.92	0.58	—	—	—	—	—	—	—
Provincial Highway Control	0.21	0.30	0.30	0.10	0.23	—	—	—	—	—	—	—
1994												
Tumbler Ridge West	0.45	0.62	0.62	0.28	—	—	—	—	—	—	—	—
Provincial Highway Control	0.25	0.26	0.23	0.26	—	—	—	—	—	—	—	—
Upper West Bullmoose Valley	0.41	0.64	0.18	0.64	—	—	—	—	—	—	—	—
1995												
Tumbler Ridge West	0.33	0.40	0.40	0.71	1.44	0.65	1.02	0.63	**1.78**	0.66	0.30	0.25
Provincial Highway Control	0.19	0.25	0.25	0.35	0.47	1.98	0.41	0.44	0.12	—	—	0.15
Upper West Bullmoose Valley	0.18	—	—	—	0.35	—	0.36	0.56	0.37	0.22	0.59	0.35
Tumbler Ridge Centre	0.28	0.33	0.65	1.50	1.18	0.57	**3.70**	1.70	**3.40**	**2.30**	1.20	1.00
Near Flatbed Airstrip	0.26	0.50	**6.98**	**6.98**	**2.47**	1.46	**2.20**	1.60	0.50	**2.20**	**2.40**	0.92
Near 350 Man Camp	0.47	0.64	0.38	**2.09**	1.25	**10.95**	**4.60**	**2.80**	**9.50**	0.60	**1.90**	1.41
1996												
Tumbler Ridge West	—	—	—	0.94	—	—	—	—	—	—	—	—
Provincial Highway Control	—	—	—	0.21	—	—	—	—	—	—	—	—
Upper West Bullmoose Valley	—	—	—	0.10	—	—	—	—	—	—	—	—
1997												
All Stations	—	—	—	—	—	—	—	—	—	—	—	—
1998												
Tumbler Ridge Centre	**2.41**	0.66	1.04	0.61	0.00	0.22	0.28	0.05	0.11	0.23	0.05	0.19
Near Flatbed Airstrip	0.94	0.48	0.33	0.34	0.00	0.61	0.77	0.06	0.05	1.34	0.31	0.08

Station	Dustfall (mg/dm^2-d)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Near 350 Man Camp	1.27	0.51	0.57	0.47	0.00	0.33	0.53	0.11	0.20	0.37	0.13	0.41
1999												
Tumbler Ridge Centre	0.10	0.09	0.32	0.49	0.33	0.31	—	—	—	0.49	0.00	0.13
Near Flatbed Airstrip	0.06	0.05	0.04	0.13	0.25	0.15	—	—	—	0.61	0.02	0.05
Near 350 Man Camp	1.60	0.18	0.07	0.22	0.74	0.39	—	—	—	0.77	0.17	0.37
2000												
Tumbler Ridge Centre	0.21	0.15	0.66	—	—	—	—	—	—	—	—	—
Near Flatbed Airstrip	0.10	0.07	0.04	—	—	—	—	—	—	—	—	—
Near 350 Man Camp	0.48	0.14	0.28	—	—	—	—	—	—	—	—	—

NOTES:
Source: Modified from Western Coal Corporation 2005 (formerly known as Western Canadian Coal).
Exceedances of the provincial objective for residential areas (1.75 mg/dm^2-d) are shown in **bold**.

Five months of dustfall measurements near the Dillon mine, located about 10 km south of the technical study area, are available for February, March, April, June, and July of 2005, and are shown in Table 3.3.2. Four exceedances of the provincial objective for non-residential areas of 2.9 mg/dm^2-d were observed and were attributed to the fact that the monitors were located in close proximity of mining operations. During this time, Dillon Mine undertook several improvements in coal handling that resulted in a decrease of fugitive dust emissions and dustfall levels in June and July.

Though the results are from outside the technical study area they demonstrate the level of dustfall that may result from point sources and show that concentration may be reduced through management practice.

Table 3.3.2 Dustfall measurements near Dillon mine

	Dustfall (mg/dm^2-d)					
Station	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**
2005						
A1	0.17	0.89	—	—	2.45	2.00
A2[(a)]	**15.60**	**72.30**	—	—	—	—
A3[(a)]	**4.24**	2.68	2.65	—	—	—
A4	**3.04**	—	2.58	—	1.08	0.31
A5	—	—	—	—	1.46	<0.10[(b)]
A6	—	—	—	—	0.65	1.24

NOTES:
Source: Modified from Western Coal Corporation 2005 (formerly known as Western Canadian Coal).
Exceedances of the provincial objective for non-residential areas (2.9 mg/dm^2-d) are shown in bold.
A1 was located near streambed, 690 m south of crushing and screening operations.
A2 was located 280 m northeast of crushing and screening operations.
A3 was located near drainage ditch 120 m east of mine pit.
A4 was located near tributary 1.1 km northeast of mine pit.
A5 was located along stream, 360 m southeast of crushing and screening operations.
A6 was located near creek 760 m northeast of mine pit.
[a] Monitors A2 and A3 were disabled and replaced by monitors A5 and A6, respectively.
[b] Detection limit is 0.10 mg/dm^2-d.

Dustfall was measured at several locations near the Willow Creek Mine, located within the technical study area. Of these sites, the only one located at a residence and, therefore, subject to the lower provincial objective of 1.75 mg/dm^2-d is D9; the rest are subject to the provincial objective of 2.9 mg/dm^2-d. Dustfall measurements at the Willow Creek mine were made both during mining operations (Table 3.3.3) and during non-operational care and maintenance (Table 3.3.4) when limited mining activities occurred. The majority of measurements were well below the relevant provincial objective. Occasional elevated levels of dustfall were attributed to road dust emissions along nearby access roads during dry weather conditions and infrequent high traffic volume from logging activity.

Table 3.3.3 Dustfall measurements near Willow Creek mine during mining operations

Station	Dustfall (mg/dm^2-d)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005												
D1	0.61	0.16	0.60	0.27	0.67	0.14	0.26		0.22	0.25	0.41	0.37
D2	0.69	0.97	0.63	0.29	0.81	2.16	0.29		0.27	0.36	0.27	**7.03**
D3	0.18	0.34	0.30	0.84	0.39	1.27	0.35		**6.65**	0.28	0.31	1.53
D4	**4.49**	**15.50**	**6.95**	**7.50**	**6.25**	1.68	**6.32**		0.19	**6.23**	2.50	0.60
D5	0.73	**3.28**	**3.58**	**3.09**	1.85	**3.80**	2.18		0.65	1.06	0.58	0.35
D6	0.15	0.31	0.31	0.48	0.98	0.14	0.53		0.30	0.46	0.44	0.28
D7	0.06	0.23	0.20	0.45	0.25	0.43	0.31		0.36	0.36	0.25	0.13
D8	0.08	0.21	0.14	0.15	0.55	0.16	0.18		0.16	0.25	0.27	0.18
D9	0.09	0.06	0.04	0.14	0.20	0.06	0.17		0.08	0.19	0.06	**2.47**
2006												
D1	0.11	0.06	0.15	0.12	0.22	1.32	1.48	0.06	0.05	<0.01	0.14	NA
D2	0.44	0.11	0.21	0.43	0.26	0.40	0.52	0.15	0.04	0.02	0.22	NA
D3	0.36	0.16	0.35	1.23	**21.10**	0.89	0.80	0.66	0.28	0.14	0.16	0.28
D4	1.68	1.33	**2.95**	**13.40**	0.54	2.82	**3.54**	—	**2.91**	1.43	0.27	<0.01
D5	0.58	0.43	1.16	1.62	0.62	1.32	0.85	1.16	0.94	0.39	0.20	0.22
D6	0.19	0.15	0.72	1.02	0.42	0.78	0.50	1.18	0.44	1.01	0.11	0.05
D7	0.23	0.08	0.31	0.67	0.28	0.29	0.65	0.66	0.56	0.31	0.15	NA
D8	0.19	0.07	0.26	0.73	0.18	0.24	0.38	0.29	0.13	0.37	0.28	0.15
D9	0.05	0.06	0.14	0.39	0.19	0.34	0.16	0.26	0.27	0.10	0.20	NA
D10	0.44	0.18	0.35	0.58	0.44	0.07	0.09	—	0.15	0.33	0.09	0.19
D11	0.80	0.88	0.86	**3.00**	2.06	0.29	0.69	1.05	0.78	0.70	0.40	NA
D12	—	0.12	0.17	0.50	0.31	0.51	0.15	**13.60**	0.38	—	0.12	NA

Station	Dustfall (mg/dm²-d)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
D13	—	0.18	0.23	2.22	0.38	1.13	0.22	0.43	0.07	—	0.18	NA
2007												
All Stations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2008												
D1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.26	0.11	0.26	N/A
D2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25	0.23	0.16	N/A
D3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.17	0.35	0.19	N/A
D4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.51	2.80	0.25	N/A
D5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.71	1.03	0.14	N/A
D6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.63	1.34	0.29	N/A
D7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.20	1.40	0.20	N/A
D8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.80	0.57	0.17	N/A
D10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	—	—	—	N/A

NOTES:
Source: Modified from Western Coal Corporation 2010.
D1 and D2 were located at a temporary coal loading site.
D3 was located at the Canadian National Railway bridge.
D4 was located at the plant site.
D5 and D6 were located near the forest service road.
D7 and D8 were located near the highway.
D9 was located at nearest non-mine owned residence.
D10 was located at coal reject dump.
For July and August in 2005, a two month sample was taken.
Exceedances of the provincial air quality objective (2.9 mg/dm²-d at D9, 1.75 mg/dm²-d at remaining stations) are shown in bold.
N/A denotes ―not applicable”.

Table 3.3.4 Dustfall measurements near Willow Creek during non-operational care and maintenance

Station	Dustfall (mg/dm^2-d)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2007												
D4	0.34	—	0.04	—	—	0.43	1.52	0.24	0.41	0.40	0.21	0.23
D5	0.06	0.07	0.09	0.46	0.46	2.07	0.41	0.40	0.69	0.38	<0.10	<0.20
D6	0.08	0.05	0.12	0.19	0.19	0.74	0.59	0.66	1.13	0.31	0.25	<0.20
D8	0.07	0.04	0.06	0.11	0.11	0.39	0.25	0.16	0.27	0.29	0.18	0.24
D10	0.13	0.01	0.10	1.38	1.38	0.81	1.20	1.72	**2.95**	0.58	0.30	<0.20
2008												
D4	<0.10	<0.10	0.11	0.29	1.28	**8.46**	**4.13**	**4.83**	N/A	N/A	N/A	0.34
D5	<0.10	<0.10	0.12	0.26	1.59	0.70	1.62	1.17	N/A	N/A	N/A	0.19
D6	<0.10	<0.10	0.21	0.31	0.48	0.72	1.73	1.49	N/A	N/A	N/A	0.15
D8	<0.10	0.18	0.43	0.39	0.23	0.21	0.78	0.46	N/A	N/A	N/A	0.38
D10	<0.10	<0.10	0.13	0.63	0.61	1.40	**4.91**	—	N/A	N/A	N/A	—
2009												
D4	0.28	—	0.53	0.14	0.41	1.84	**5.12**	1.55	0.48	—	—	—
D5	0.24	0.54	0.24	0.14	0.38	0.47	0.38	1.45	1.08	—	—	—
D6	0.14	0.37	0.28	0.17	0.45	**6.02**	**7.53**	1.51	1.99	—	—	—
D8	0.46	0.92	0.76	0.38	0.60	0.64	2.09	1.10	0.57	—	—	—
D10	—	0.43	0.23	0.17	0.42	0.88	0.62	1.73	0.79	—	—	—

NOTES:
Source: Modified from Western Coal Corporation 2010.
D4 was located at the plant site.
D5 were D6 are located near the forest service road.
D8 was located near the highway.
D10 was located at coal reject dump.
Exceedances of the provincial air quality objective (2.9 mg/dm^2-d at D9, 1.75 mg/dm^2-d at remaining stations) are shown in bold.
N/A denotes not applicable.

Overall, dustfall measurements near mine sites have been less than the relevant provincial objectives, except during dust episodes from nearby activities. Due to the location and quality of available dustfall data, the dustfall measurements made near Willow Creek Mine during the non-operational care and maintenance period between 2007 and 2009 are expected to be most representative of background dustfall levels in the dispersion modelling study area.

3.3.3 Nitrogen Dioxide

The time series plots for NO_2 observations at Beaverlodge and Grand Prairie are illustrated in Figure 3.3.4 and Figure 3.3.5, respectively. These two stations are the closest stations with NO_2 measurements spanning substantially more than two years. Although located outside the technical study area, they provide context for typical NO_2 background concentrations and seasonal cycles in the region. A time series plot for NO_2 observations at Taylor Townsite is not shown due to the short data period of only two years ended in 2002. The time series for the 2006 to 2012 period at Beaverlodge are smoother than for the 2000 to 2005 period, indicating an improvement in monitor accuracy. Ambient concentrations of NO_2 tend to be highest in the winter season when there is less daylight for the photolysis of NO_2.

Box plots for 1-hour and 24-hour average NO_2 concentrations are illustrated in Figure 3.3.6 and Figure 3.3.7, respectively. Concentrations are highest in Grand Prairie which is likely a reflection of the size of the town and the presence of nearby oil and gas activity. The 98th percentile observed concentrations at Grand Prairie are less than one-half the federal maximum acceptable objective for the corresponding averaging period, while the 98th percentile concentrations observed at Beaverlodge and Taylor Townsite are approximately one-quarter of the 24-hour objective or less.

Measurements at all three monitoring stations appear to be representative of NO_2 conditions in small towns with some oil and gas activity and therefore may not be representative of baseline NO_2 conditions in the dispersion modelling study area. As per recommendations from the BCMOE (Fudge 2012, pers. comm.), the background NO_2 concentration in the dispersion modelling study area was set to zero for all averaging periods. This is justified, because there are no known sources of NO_2 or its precursors within a surrounding region on the order of 100 km that would be expected to cause measurable concentrations of NO_2. In addition, chemical and physical removal processes eliminate NO_2 from air masses that are transported from outside this region.

3.3.4 Sulphur Dioxide

Time series plots of SO_2 observations at Taylor Townsite and Taylor South Hill stations are illustrated in Figure 3.3.8 and Figure 3.3.9, respectively. The time series for the 2008 to 2012 period are smoother than for the 2000 to 2007 period, indicating an improvement in monitor accuracy. Ambient SO_2 concentrations at both stations are very low, and within the measurement accuracy of the monitor during the 2000 to 2007 period before monitor accuracy was improved.

Box plots of 1-hour and 24-hour average SO_2 concentrations are illustrated in Figure 3.3.10 and Figure 3.3.11, respectively. For both stations, the 2nd to 75th percentile concentrations are very low, less than 10 $\mu g/m^3$, while the 98th percentile concentrations are less than 20% of the provincial Level A objective for the corresponding averaging period. The SO_2

concentrations measured at both Taylor Townsite and Taylor South Hill stations are representative of rural conditions with some oil and gas activity. As per recommendations from the BCMOE, the background SO_2 concentration in the dispersion modelling study area was set to zero (Fudge 2012, pers. comm.). This is justified, because there are no known sources of SO_2 within a surrounding region on the order of 100 km that would be expected to cause measurable concentrations of SO_2. In addition, chemical and physical removal processes eliminate SO_2 from air masses that are transported from outside this region.

3.3.5 Carbon Monoxide

The time series plot of CO observations at the Grand Prairie station is shown in Figure 3.3.12. This station is the closest station with CO measurements spanning substantially more than two years. Although located outside the technical study area, the Grand Prairie station provides context for typical CO background concentrations and seasonal cycles in the region. Ambient CO concentrations have decreased over time and tend to peak in the winter, possibly due to higher heating emissions and oil and gas activity during this time. Box plots of the one-hour and eight-hour averaging periods are shown in Figure 3.3.13 and Figure 3.3.14, respectively. In the five-year period from January 2007 to December 2011, ambient CO concentrations have been relatively low, with a 98th percentile one-hour CO concentration of 775 μg/m^3, which is only 5% of the provincial Level A objective. The range of CO concentrations observed at the Grand Prairie station is typical for rural areas with some industry or rural influence, similar to, for example Fort McMurray or Lethbridge (http://environment.alberta.ca/01644.html).

The BC modelling guideline (BCMOE 2008) recommends the use of the 98th percentiles provided in the previous paragraph to establish CO background concentrations for one-hour and eight-hour averages. As per recommendations from the BCMOE, the background CO concentration in the dispersion modelling study area was set to 200 ppb or 229 μg/m^3 for one-hour averages (Fudge 2012, pers. comm.), which is similar to the median one-hour and eight-hour concentrations observed at Grand Prairie (Figures 3.3.13 and 3.3.14). The use of these lower values rather than the 98th percentiles is based on the influence of nearby point sources to CO concentrations at the Grand Prairie air quality monitor.

3.3.6 Ozone

Hourly ozone concentrations were measured for a two-year period from January 2000 to January 2002 at the Taylor Townsite station. For comparison, hourly ozone measurements from the Grand Prairie monitoring station for the eight-year period from February 2004 to January 2012 were also reviewed. This station is the closest station with ozone measurements spanning substantially more than two years. Although located outside the technical study area, the Grand Prairie monitoring station provides context for typical ozone background concentrations and seasonal cycles in the region. Eight-hour running averages were calculated, as shown in Figure 3.3.15 and Figure 3.3.16, and compared to the numerical value of the Canada-Wide Standard (65 ppb). Ozone concentrations at Taylor Townsite and Grande Prairie are similar, with eight-hour average concentrations reaching approximately 50 µg/m^3 in the summer. No excursions above the numerical value of the Canada-Wide Standard were observed, with the eight-hour running average reaching 65 ppb only on one occasion at Grand Prairie.

Ozone measurements from the Taylor Townsite station are most representative of the dispersion modelling study area due to the station's location inside the study area.

3.3.7 Representative Background Concentrations

As discussed above, background PM_{10} and $PM_{2.5}$ concentrations were based on observations at the Old Fort station between March 2011 and January 2012. Background PM_{10} concentrations were used to also represent background TSP concentrations. Background dustfall levels were determined based on measurements made near the Willow Creek mine during the non-operation care and maintenance period between 2007 and 2009. Background ozone concentrations were based on observations at Taylor Townsite station between January 2000 and January 2002. Background concentrations for NO_2, SO_2 and CO were selected with guidance from the BCMOE (Fudge 2012, pers. comm.) The representative background concentrations selected for this Project are summarized in Table 3.3.5.

Table 3.3.5 Representative background concentrations (in µg/m^3)

Pollutant	Averaging Period	Background Value
TSP	24-Hour	26
	Annual	5.4
PM_{10}	24-Hour	26
$PM_{2.5}$	24-Hour	15
	Annual	5.0
Dustfall[(a)]	24-Hour	0.8 mg/dm^2-d
NO_2	1-Hour	0.0
	24-Hour	
	Annual	
SO_2	1-Hour	0.0
	24-Hour	
	Annual	
CO	1-Hour	229
	8-Hour[(b)]	160
Ozone	1-Hour	64 ppb
	24-Hour	19 ppb
	Annual	19 ppb

NOTES:
[a] 24-Hour average based on a 30-day sample.
[b] The eight-hour average concentration is calculated by applying a scaling factor of 0.7 (BCMOE 2008) to the specified one-hour average concentration.

4 RESULTS OF EMISSION ESTIMATION

Estimated emissions due to Project construction are presented in Section 4.1. Section 4.2 presents estimates of Project emissions during operation and maintenance.

4.1 Construction

Emission estimates of CACs for every year of Project construction activities are presented by Project component and study area. Emissions associated with clearing activities, including burning and incineration, are not included in the subtotals for each project component; they are presented in a standalone subsection. Summary tables by contaminant and year are presented in this section. Detailed emission estimates organized by emission source and contaminant are provided in Appendix F.

4.1.1 Site C Dam Construction

Construction at the Site C dam site is anticipated to commence in Year 1 and scheduled for completion in Year 8.

Emissions estimated for dam construction are presented in Table 4.1.1. The largest source of TSP, PM_{10} and $PM_{2.5}$ emissions during dam construction was estimated to be entrainment of road dust on unpaved roads (95.5%, 94.4% and 83.1% of total emissions of those particulate matter size fractions, respectively). Large haul trucks in combination with the number of trips contribute to large emissions estimates. The second largest source of TSP and PM_{10} was estimated to be bulldozing (1.70% and 1.44%, respectively). The second largest source of $PM_{2.5}$ emissions was estimated to be diesel-fuelled heavy equipment (7.17%).

Greatest annual particulate matter emissions were estimated to occur in Year 5. The largest sources of TSP, PM_{10} and $PM_{2.5}$ in Year 5 were estimated to be unpaved roads (95.2%, 94.0% and 82.5%, respectively), bulldozing (1.86%, 1.66% and 5.94%, respectively), grading (1.26%, 1.28% and 1.19%, respectively) and diesel-fuelled heavy equipment (0.253%, 0.878% and 7.45%, respectively).

The largest source of NO_x and CO emissions during dam construction was estimated to be diesel-fuelled equipment (93.0% and 57.1%, respectively). The second largest source of NO_X and CO was estimated to be vehicles (4.80% and 33.6%, respectively). Other sources of NO_X and CO emissions include explosives and diesel generators.

Table 4.1.1 Site C dam construction emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
TSP	5,747	6,903	9,273	8,766	9,886	9,647	7,916	2,017
PM_{10}	1,646	1,985	2,670	2,527	2,848	2,780	2,271	576
$PM_{2.5}$	185	232	314	289	325	310	250	61.4
NO_X	148	230	336	281	299	279	196	37.0
SO_X	0.738	1.29	0.963	0.696	1.09	1.10	0.439	0.0806
CO	116	179	202	187	215	209	141	31.3

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Greatest annual NO_x emissions were estimated to occur in Year 3. The largest source of NO_x estimated for Year 3 was diesel-fuelled heavy equipment (96.4% of total emissions). The greatest annual CO emissions were estimated to occur in Year 5. The largest source of CO estimated for Year 5 was diesel-fuelled heavy equipment (58.6% of total emissions).

The largest source of SO_x emissions during dam construction was estimated to be from explosives (49.6% of total emissions). Other sources in the dam site area that generate SO_x include diesel-fuelled heavy equipment (40.7% of total emissions), vehicles (9.64% of total emissions) and diesel generators (0.227% of total emissions). Total annual SO_x emission estimates were greatest in Year 2. The largest source of SO_x emissions estimated for Year 2 was explosives (69.6% of total emissions).

Emissions from vehicles in transit are tabulated separately as they would travel on public roads that are outside the dam construction boundaries. These vehicles include worker transportation and haul trucks from construction material source areas such as Wuthrich and West Pine quarries. Emissions estimated for vehicles in transit, which include tailpipe emissions and road dust from paved roads, are presented in Table 4.1.2.

Table 4.1.2 Vehicles in transit emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
TSP	100	93.4	93.7	299	120	113	375	57.5
PM_{10}	19.6	18.3	18.3	57.7	23.3	22.3	73.4	11.3
$PM_{2.5}$	5.02	4.71	4.70	14.2	5.88	5.79	18.9	2.95
NO_X	5.85	5.86	5.08	4.68	4.29	9.14	32.5	3.20
SO_X	0.0381	0.0381	0.0372	0.0373	0.0366	0.0455	0.0930	0.0334
CO	27.6	27.8	23.3	22.4	21.2	21.1	24.5	16.7

NOTE:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

The largest source of TSP, PM_{10} and $PM_{2.5}$ for vehicles in transit was estimated to be paved roads (100%, 98.0% and 93.1% of total emissions, respectively). All emissions of NO_x, SO_x and CO would be from fuel combustion in vehicles. Emissions from vehicles in transit were estimated to be greatest in Year 7 for particulate matter, NO_x and SO_x. Emissions of CO from vehicles in transit were estimated to be greatest in Year 1 and Year 2.

Modelling of all dam site area construction is based on Year 3 for which particulate matter and NO_x emissions are the highest. Although SO_x emissions are slightly higher in Year 2 and CO emissions are slightly higher in Years 5 and 6, modelling was based on Year 3 for all pollutants. It is expected that the most substantial pollutant emitted during Project construction is particulate matter, as a result of the numerous sources of fugitive dust.

The modelled year for vehicles in transit is dependent on activity. Vehicles in transit from Wuthrich Quarry are based on Year 2 (see Section 4.1.2). Vehicles in transit from Area E are based on Year 7 (see Section 4.1.7). Vehicles in transit to/from Fort St. John and Taylor represent worker transportation and service vehicles for which vehicle travel is expected to be relatively constant throughout the duration of dam site area construction. As a result, modelling for these vehicles is based on Year 1 when emission standards are the least stringent and estimated emissions are greatest. Vehicles in transit to/from West Pine quarry, Hudson’s Hope and Chetwynd were not included in dispersion modelling since the fraction of road associated with these routes that lies within the dispersion modelling study area is small.

Modelled emissions from dam site area construction and vehicles in transit are presented in Table 4.1.3. Modelled emissions exclude emissions from road dust, prescribed burning and incineration.

Table 4.1.3 Modelled emissions from dam site area construction and vehicles in transit (in tonnes)

Pollutant	TSP	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO
Dam site area construction	573	197	66	334	0.7	193
Vehicles in transit	0.2	0.2	0.2	1.3	0.08	4.5

4.1.2 Construction Material Sources – Wuthrich Quarry

Wuthrich Quarry is scheduled to provide temporary riprap and bedding material for the Project from Year 1 to Year 3, and in Year 8. Emissions from road construction for Wuthrich are covered in Section 4.1.9. The quarry is outside the dam site area construction boundaries and would require haul trucks for material transport to the dam site area.

Estimates of CAC emissions at Wuthrich quarry are presented in Table 4.1.4. The largest source of TSP, PM_{10} and $PM_{2.5}$ was estimated to be unpaved roads (84.1%, 81.3% and

54.5% of total emissions, respectively). Other large sources of particulate matter emissions include bulldozing, drilling, blasting, and diesel-fuelled heavy equipment.

Total annual particulate matter emission estimates are greatest in Year 2. The greatest emissions of TSP, PM_{10} and $PM_{2.5}$ estimated for Year 2 were from unpaved roads (84.1%, 81.5% and 54.4% of total emissions, respectively), bulldozing (8.1.6%, 4.70% and 19.5% of total emissions, respectively) and drilling (3.44%, 5.54% and 5.60% of total emissions, respectively).

The largest source of estimated NO_x emissions is diesel-fuelled equipment (83.7% of total emissions). The largest source of estimated SO_x and CO emissions is explosives (91.1% and 53.5% of total emissions, respectively). The greatest emissions of NO_x, SO_x and CO are expected to occur in Year 2. The largest emission source of NO_x in Year 2 was estimated to be from diesel-fuelled heavy equipment (83.8% of total emissions). The greatest emissions of SO_x and CO estimated for Year 2 were from explosives (90.9% and 53.5% of total emissions, respectively).

Table 4.1.4 Wuthrich quarry emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 8
TSP	89.7	97.9	65.7	5.13
PM_{10}	26.3	28.7	19.2	1.66
$PM_{2.5}$	3.90	4.30	2.87	0.206
NO_X	6.60	7.23	4.86	0.316
SO_X	0.121	0.132	0.0887	0.00579
CO	6.91	7.63	5.10	0.328

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Modelling of Wuthrich Quarry was based on Year 2 as this represents the year in which the most material is expected to be extracted, resulting in the highest emissions. Modelled emissions at Wuthrich Quarry are presented in Table 4.1.5.

Table 4.1.5 Modelled emissions from Wuthrich Quarry (in tonnes)

Project Component	TSP	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO
Wuthrich Quarry	16	5.3	2.0	7.2	0.1	7.6

4.1.3 Construction Material Sources – 85th Avenue Industrial Lands

Impervious till material is planned to be sourced from 85th Avenue Industrial Lands to construct the core of the earthfill dam, the approach channel lining and the upper part of the upstream cofferdam. Material would be produced and transported to the Site C dam site using a combination of conveyors and haul trucks from Year 3 to Year 7. Emissions from road construction for 85th Avenue Industrial Lands are covered in Section 4.1.9.

Estimated CAC emissions from 85th Avenue Industrial Lands are presented in Table 4.1.6. The largest source of TSP, PM_{10} and $PM_{2.5}$ was estimated to be unpaved roads (87.5%, 85.3% and 63.6% of total emissions, respectively). Grading, scraping and bulldozing were also estimated to be large sources of particulate matter emissions. Estimates of TSP, PM_{10} and $PM_{2.5}$ emissions were greatest in Year 5. The largest source of estimate emissions of TSP, PM_{10} and $PM_{2.5}$ in Year 5 was unpaved roads (87.2%, 85.6% and 63.7% of total emissions, respectively).

The largest source of estimated emissions of NO_x, SO_x and CO was from diesel-fuelled heavy equipment (98.6%, 97.8% and 97.5% of total emissions, respectively). Activities in Year 5 were estimated to produce the most emissions of NO_x, SO_x and CO. The largest source of NO_x, SO_x and CO emissions estimated for Year 5 was diesel-fuelled heavy equipment (99.9%, 98.7% and 97.9% of total emissions, respectively).

Table 4.1.6 85th Avenue industrial lands emissions (in tonnes)

Pollutant	Year 3	Year 4	Year 5	Year 6	Year 7
TSP	84.6	113	243	216	229
PM_{10}	24.6	32.8	70.6	62.9	66.8
$PM_{2.5}$	3.27	4.38	9.48	8.45	9.01
NO_X	2.72	3.63	7.83	7.14	7.59
SO_X	0.00519	0.00691	0.0149	0.0136	0.0144
CO	1.44	1.96	4.33	3.90	4.20

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Modelling of emissions at 85th Avenue Industrial Lands, presented in Table 4.1.7, was based on Year 5, corresponding to the year when emissions are expected to be greatest.

Table 4.1.7 Modelled emissions from 85th Avenue Industrial Lands (in tonnes)

Project Component	TSP	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO
85th Avenue Industrial Lands	30	10	3.4	7.8	0.01	4.3

4.1.4 Construction Material Sources – West Pine Quarry

West Pine Quarry is scheduled to provide permanent riprap and bedding material for the upstream face of the dam from Year 1 to Year 7. Material would be hauled to the dam site area using haul trucks. Emissions from road construction for West Pine Quarry are covered in Section 4.1.9.

Emissions estimated for activities at West Pine quarry are presented in Table 4.1.8. The largest sources of TSP and PM_{10} at West Pine quarry were estimated to be bulldozing (6.27% and 3.54% of total emissions, respectively), drilling (4.73% and 7.47% of total emissions, respectively) and unpaved roads (84.2% and 80.4% of total emissions, respectively). The largest sources of $PM_{2.5}$ at West Pine quarry were estimated to be diesel-fuelled heavy equipment (16% of total emissions), bulldozing (15% of total emissions) and unpaved roads (55% of total emissions). Other sources of particulate matter emissions include blasting, grading, scraping, material processing and diesel generators.

Estimated total annual particulate matter emissions are greatest in Year 7. The largest source of TSP, PM_{10} and $PM_{2.5}$ in Year 7 was predicted to be from unpaved roads (84.7%, 81.1% and 55.0% of total emissions, respectively).

Diesel-fuelled heavy equipment were estimated to generate the most emissions of NO_x at West Pine quarry (79.8% of total emissions), while explosives were estimated to generate the most emissions of SO_x and CO (93.3% and 61.5% of total emissions, respectively). Similar to particulate matter, activities at West Pine were estimated to produce the most emissions of NO_x, SO_x and CO in Year 7.

Table 4.1.8 West Pine quarry emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
TSP	25.1	22.0	27.7	164	40.5	36.2	215
PM_{10}	7.55	6.63	8.32	48.8	12.1	10.8	64.0
$PM_{2.5}$	1.04	0.910	1.16	7.14	1.73	1.54	9.43
NO_X	1.89	1.65	2.09	12.7	3.10	2.76	16.8
SO_X	0.0442	0.0385	0.0490	0.297	0.0725	0.0645	0.390
CO	2.23	1.94	2.47	15.4	3.70	3.29	20.3

NOTES:

All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding. The emissions from West Pine Quarry are outside the dispersion modelling study area and thus were not modelled.

4.1.5 Construction Material Sources – Portage Mountain

Portage Mountain Quarry is scheduled to supply equal amounts riprap and material for road construction and Hudson's Hope Shoreline Protection in Year 2 and Year 3. Material would be transported using haul trucks to the location of use.

Emissions estimated for activities at Portage Mountain are presented in Table 4.1.9. The largest sources of TSP and PM_{10} at Portage were estimated to be paved roads (43.2% and 28.8% of total emissions, respectively), drilling (20.0% and 32.9% of total emissions, respectively) and bulldozing (22.2% and 13.0% of total emissions, respectively). The largest emission sources of $PM_{2.5}$ were estimated to be bulldozing (29.0% of total emissions), paved roads (24.9% of total emissions) and diesel-fuelled heavy equipment (18.4% of total emissions). Although the scheduled production of riprap in Year 2 and Year 3 at Portage Mountain Quarry are equal, emissions of particulate matter estimated were higher in Year 3 due to the aging and wearing of diesel-fuelled heavy equipment.

Emission sources of NO_x, SO_x and CO at Portage Mountain include explosives, diesel-fuelled equipment, diesel generators, and vehicles. The largest source of NO_x was estimated to be diesel-fuelled heavy equipment (70.1% of total emissions) and the largest source of SO_x and CO was explosives (96.1% and 73.1% of total emissions, respectively). As with emissions of particulate matter, total annual emissions of NO_x, SO_x and CO were estimated to be greater in Year 3 than Year 2.

Table 4.1.9 Portage Mountain Quarry emissions (in tonnes)

Pollutant	Year 2	Year 3
TSP	102	102
PM_{10}	29.5	29.5
$PM_{2.5}$	8.22	8.28
NO_X	18.9	18.9
SO_X	0.637	0.637
CO	28.4	28.4

NOTES:

All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding. The emissions from Portage Mountain Quarry are outside the dispersion modelling study area and thus were not modelled.

4.1.6 Construction Material Sources – Del Rio Pit

Del Rio Pit is scheduled to supply material for road construction for Jackfish Lake Road extension in Year 1. Material would be transported using haul trucks to the location of use.

Emissions estimated for activities at Del Rio Pit are presented in Table 4.1.10. The largest sources of TSP, PM_{10} and $PM_{2.5}$ were estimated to be grading (58.9% of total emissions), material handling (46.5% of total emissions) and diesel-fuelled heavy equipment (42.1% of total emissions), respectively. Diesel-fuelled equipment was estimated to be the only source of NO_x, SO_x and CO emissions at Del Rio Pit.

Table 4.1.10 Del Rio Pit emissions (in tonnes)

Pollutant	Year 1
TSP	4.43
PM_{10}	1.70
$PM_{2.5}$	0.347
NO_X	1.43
SO_X	0.00270
CO	0.763

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding. The emissions from Del Rio Pit are outside the dispersion modelling study area and thus were not modelled.

4.1.7 Construction Material Sources - Area E

Area E is a potential source of 1,000,000 m^3 of granular material in Year 7 if Zone 3 at the dam site area does not have sufficient material. Material would be transported using haul trucks to the dam site area. Emissions from Area E are not tabulated with total Project emissions to avoid double counting emissions associated with producing 1,000,000 m^3 of granular material which would be shifted from Zone 3 at the dam site area to Area E.

Emissions estimated for activities at Area E are presented in

Table 4.1.11. The largest sources of TSP, PM_{10} and $PM_{2.5}$ were estimated to be unpaved roads (91.7%, 89.5% and 80.3% of total emissions, respectively). Diesel-fuelled equipment was estimated to be the largest source of NO_x, SO_x and CO emissions at Area E (73.6%, 70.1% and 82.4% of total emissions, respectively). Modelling of emissions from Area E, not including unpaved roads, are presented in Table 4.1.12**.**

Table 4.1.11 Area E emissions (in tonnes)

Pollutant	Year 7
TSP	335
PM_{10}	97.8
$PM_{2.5}$	10.9
NO_X	6.44
SO_X	0.0121
CO	3.01

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Table 4.1.12 Modelled emissions from Area E (in tonnes)

Project Component	TSP	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO
Area E	25	9.7	2.0	6.1	0.01	2.9

4.1.8 Hudson's Hope Shoreline Protection

Hudson's Hope Shoreline Protection is scheduled for construction in Year 4 and Year 5. Material would be supplied from Portage Mountain and transported using haul trucks.

Emissions estimated for activities at Hudson's Hope Shoreline Protection are presented in Table 4.1.13. The largest source of TSP at Hudson's Hope Shoreline Protection was estimated to be grading (66.9% of total emissions) and the largest emission source of PM_{10} and $PM_{2.5}$ was estimated to be diesel-fuelled heavy equipment (62.8% and 93.9% of total emissions, respectively). Total annual fine particulate matter emission estimates for Year 5 were slightly greater than emissions estimates for Year 4 due to the reduction in efficiency from aging and wearing of diesel-fuelled heavy equipment. Emission estimates were otherwise equal in Years 4 and 5 because of the equal amount of material handled at Hudson's Hope Shoreline Protection in both years.

The only emission source of NO_x, SO_x and CO at Hudson's Hope Shoreline Protection is expected to be diesel-fuelled heavy equipment. Total annual emissions of NO_x, SO_x and CO were estimated to be equal in Year 4 and Year 5.

Table 4.1.13 Hudson's Hope Shoreline Protection emissions (in tonnes)

Pollutant	Year 4	Year 5
TSP	4.82	4.82
PM_{10}	2.53	2.54
$PM_{2.5}$	1.64	1.65
NO_X	23.0	23.0
SO_X	0.0314	0.0314
CO	8.23	8.25

NOTES:

All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding. The emissions from Hudson's Hope Shoreline Protection are outside the dispersion modelling study area and thus were not modelled.

4.1.9 Road Infrastructure

Changes to permanent road infrastructure and temporary access roads are scheduled to occur from Year 1 to Year 5. Road infrastructure construction includes the dam site area, material source areas, transmission line, reservoir access roads and the re-alignment of several segments of Highway 29.

Emissions of CACs from road infrastructure work are presented in Table 4.1.14. The largest source of TSP emissions during road infrastructure work was estimated to be entrainment of road dust on paved roads (60.0% of total emissions) and the largest source of PM_{10} and $PM_{2.5}$ emissions was estimated to be asphalt production (65.8% and 83.6% of total emissions, respectively). Other sources of particulate matter are expected to include material handling, wind erosion from stockpiles, diesel-fuelled equipment and grading. Emissions of particulate matter were estimated to be greatest in Year 4.

The largest source of NO_x, SO_x and CO emissions was estimated to be asphalt production (88.0%, 100% and 96.9% of total emissions, respectively), followed by emissions from diesel-fuelled heavy equipment (11.4%, 0.0167% and 1.89% of total emissions, respectively). Emissions of NO_x, SO_x and CO were estimated to be greatest in Year 4.

Table 4.1.14 Road infrastructure emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5
TSP	738	1,003	498	1,156	977
PM_{10}	156	264	260	526	487
$PM_{2.5}$	42.6	107	161	316	306
NO_X	126	240	520	1,083	1,057
SO_X	0.174	235	547	1,014	1,014
CO	62.6	558	1,232	2,330	2,316

NOTES:

All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

4.1.10 Transmission Line

Construction of the transmission line is scheduled to occur from Year 1 to Year 4. Activities along the right-of-way include site clearing and preparation, construction of access roads, tower foundation and anchor installation, concrete production and placement, and tower assembly. Emissions were estimated for the construction activities associated with the transmission line and transmission towers.

Emissions estimated for the construction of the transmission line are presented in Table 4.1.15. The largest source of TSP, PM_{10} and $PM_{2.5}$ emissions from transmission line construction was estimated to be entrainment of road dust on paved roads (96.7%, 91.0% and 81.7% of total emissions, respectively). The large number of trips of pickup trucks and long travel distances of flatbeds and tractor trucks may contribute to larger emissions. Other sources of particulate emissions include grading, vehicles, diesel-fuelled equipment and aircraft. Total annual emission estimates of TSP, PM_{10} and $PM_{2.5}$ are greatest in Year 4.

Diesel-fuelled heavy equipment was estimated to account for 64.5% of NO_x emissions. Other sources of NO_x emissions include vehicles and aircrafts. Total annual NO_x emission estimates were greatest in Year 4.

The largest source of estimated SO_x emissions was aircraft (56.2% of total emissions). The second largest source of estimated SO_x was vehicles. Annual SO_x emissions were estimated to be greatest in Year 4.

The largest source of CO during transmission line construction was estimated to be vehicles (84.6% of total emissions). Diesel-fuelled heavy equipment and aircraft also contribute to CO emissions. Total annual CO emissions predicted were greatest in Year 4.

Table 4.1.15 Transmission line emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4
TSP	0.930	4.76	21.8	27.0
PM_{10}	0.179	1.03	4.49	5.37
$PM_{2.5}$	0.0436	0.294	1.24	1.41
NO_X	0.00888	0.851	2.69	1.80
SO_X	0.000655	0.00371	0.0239	0.0208
CO	0.0637	1.97	6.71	4.82

NOTES:

All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

4.1.11 Clearing

Clearing of vegetation is scheduled to occur from Year 1 to Year 3. Boats used to remove debris from the reservoir would continue to be used beyond Year 3.

The largest sources of CAC emissions were estimated to be burning and incineration of waste vegetation. Burning and incineration emission estimates are presented in Table 4.1.16. Total annual CAC emissions estimated from burning and incineration were greatest in Year 1.

Table 4.1.16 Burning and incineration emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3
TSP	1,881	1,564	508
PM_{10}	1,231	1,025	333
$PM_{2.5}$	1,202	1,001	325
NO_X	596	496	161
SO_X	13.8	11.4	3.69
CO	14,772	12,213	3,956

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Emissions estimated for clearing activities excluding burning and incineration are presented in Table 4.1.17. Unpaved roads were estimated to be the largest source of TSP, PM_{10} and $PM_{2.5}$ emissions (90.3%, 89.8% and 64.6% of total emissions, respectively) when burning and incineration are not considered. Other sources of particulate matter emissions include diesel-fuelled heavy equipment grading, paved roads, aircrafts, vehicles and boats. Estimates of annual $PM_{2.5}$, PM_{10} and TSP emissions were greatest in Year 1.

The largest source of NO_x and CO emissions was estimated to be diesel-fuelled heavy equipment (62.6 and 48.2% of total emissions, respectively). Other sources of NO_x, and CO emissions include aircraft, vehicles and boats. The largest source of SO_x emissions was estimated to be aircraft (98.8% of total emissions). Other sources of SO_x include diesel-fuelled heavy equipment, vehicles and boats. The estimated total annual emissions of NO_x, SO_x and CO are greatest in Year 1.

Table 4.1.17 Emissions due to clearing activities (excluding burning and incineration) (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
TSP	430	370	130	0.053	0.053	0.053	0.053	0.053
PM_{10}	120	110	36	0.053	0.053	0.053	0.053	0.053
$PM_{2.5}$	17	14	5.4	0.047	0.047	0.047	0.047	0.047
NO_X	31	27	13	2.8	2.8	2.8	2.8	2.8
SO_X	3.7	3.1	2.6	0.0010	0.0010	0.0010	0.0010	0.0010
CO	21	19	6.3	0.18	0.18	0.18	0.18	0.18

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Emissions estimated from clearing activities, excluding burning, from Year 1 to Year 3 were less than emissions from other dam construction activities in the same years. Emissions of particulate matter from clearing activities in Year 1, the year with the most emissions predicted, are less than ten percent of particulate matter emissions at the Site C dam site in Year 1. Although estimated emissions of NO_x, SO_x and CO from clearing activities in Year 1 were more than ten percent of emissions from Site C dam construction of the same year, total emissions estimated in Year 1 were less than Site C dam construction emissions in Year 3 as presented in Table 4.1.18.

Table 4.1.18 Clearing activities and Site C dam construction emissions (in tonnes)

Pollutant	Site C dam construction plus clearing	Site C dam construction
	Year 1	Year 3
TSP	6,172	9,273
PM_{10}	1,768	2,670
$PM_{2.5}$	202	314
NO_X	179	336
SO_X	4.47	0.963
CO	137	202

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

4.1.12 Summary of Project Emissions in the Study Areas

4.1.12.1 Technical Study Area

Total annual emissions of CACs from the Project, excluding burning and incineration, are presented in Table 4.1.19. Estimated emissions of all contaminants were greatest in Year 5.

Table 4.1.19 Total annual Project emissions (excluding burning and incineration in Years 1 to 3) (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Baseline
									2000
TSP	7,131	8,597	10,293	10,529	11,270	10,012	8,736	2,080	13,200
PM_{10}	1,979	2,439	3,071	3,200	3,444	2,876	2,476	589	6,570
$PM_{2.5}$	254	372	502	634	650	326	287	64.6	2,250
NO_X	321	532	906	1,413	1,397	301	256	43.3	13,800
SO_X	4.85	240	552	1,015	1,015	1.23	0.938	0.121	21,600
CO	237	823	1508	2,571	2,568	238	190	48.5	38,100

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Total annual emissions of CACs from the Project, including burning and incineration, are presented in Table 4.1.20. Estimated emissions of TSP were greatest in Year 5, estimated emissions of PM_{10} were greatest in Year 2, $PM_{2.5}$ and CO are greatest in Year 1 and estimated emissions of NO_x and SO_x are greatest in Year 4.

Table 4.1.20 Total annual Project emissions (including burning and incineration in Years 1 to 3) (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Baseline 2000
TSP	9,012	10,161	10,801	10,529	11,270	10,012	8,736	2,080	13,200
PM_{10}	3,210	3,463	3,403	3,200	3,444	2,876	2,476	589	6,570
$PM_{2.5}$	1,456	1,373	827	634	650	326	287	64.6	2,250
NO_X	916	1,028	1,067	1,413	1397	301	256	43.3	13,800
SO_X	18.6	251	555	1,015	1,015	1.23	0.938	0.121	21,600
CO	15,009	13,036	5,463	2,571	2,568	238	190	48.5	38,100

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

Existing emissions in the technical study area were mainly due to other mobile sources, which include diesel-fuelled heavy equipment. The largest source of Project-related mobile emissions is diesel-fuelled heavy equipment.

Table 4.1.21 Total annual Project mobile emissions (in tonnes)

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Baseline 2000
TSP	26.1	27.1	33.2	37.0	36.1	25.9	22.9	4.62	3,060
PM_{10}	26.1	27.1	33.2	37.0	36.1	25.9	22.9	4.62	1,680
$PM_{2.5}$	25.0	25.9	31.8	35.5	34.6	24.5	21.4	4.29	758
NO_X	311	292	375	446	430	294	257	43.2	5,900
SO_X	4.21	3.62	3.26	0.793	0.757	0.578	0.536	0.116	7,620
CO	211	237	242	282	274	215	179	48.3	16,500

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

4.1.12.2 Dispersion Modelling Study Area

Annual emissions estimated for the dispersion modelling study area are presented in Table 4.1.22. Emissions of particulate matter and CO were greatest in Year 3. Emissions estimated for NO_x were greatest in Year 3 and emissions estimated for SO_x were greatest in Year 2.

Table 4.1.22 Total annual Project emissions (in tonnes) in the dispersion modelling study area

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Baseline 2000
TSP	5,862	7,024	9,438	8,901	10,150	9,884	8,167	2,041	1,410
PM_{10}	1,677	2,018	2,717	2,564	2,923	2,847	2,342	581	892
$PM_{2.5}$	190	238	321	295	336	320	260	62.5	480
NO_X	156	239	345	286	308	287	205	38.1	4,760
SO_X	0.869	1.43	1.07	0.713	1.11	1.13	0.464	0.0954	7,260
CO	131	195	216	196	225	219	151	36.3	7,720

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

4.2 Operation

4.2.1 On-going Emissions from Regular Operation

Most of the activities during Site C dam operation are at the generating station. (Note that maintenance activities are included as part of Site C dam operation) Emissions estimated for operation activities at the Site C dam site are presented in Table 4.2.1. The largest source of TSP and PM_{10} is paved roads (88.8% and 60.4%, respectively) and diesel-fuelled heavy equipment is the largest source of $PM_{2.5}$ (51.5% of total emissions) and CO (44.4% of total emissions). Boats account for 64.3% of NO_x emissions and 91.5% of SO_x emissions. Emissions from the switch yard and microwave station account for less than one percent of total emissions from operation activities.

Table 4.2.1 Emissions from operation and maintenance activities (in tonnes)

Activity	TSP	PM_{10}	$PM_{2.5}$	NO_X	SO_X	CO
Paved Roads	0.406	0.0779	0.0189	-	-	-
Vehicles	0.00184	0.00184	0.00120	0.0161	0.000143	0.116
Diesel Equipment	0.0357	0.0357	0.0346	0.263	0.000504	0.139
Diesel Generators	0.00276	0.00276	0.00268	0.0853	0.000101	0.0160
Boats	0.0111	0.0109	0.00970	0.649	0.00801	0.0420
Total	0.457	0.129	0.0671	1.01	0.00875	0.313

NOTES:
All numbers less than 100 are rounded to three significant figures. Totals may not match numbers in Appendices due to rounding.

4.2.2 Potential Wind Erosion of Exposed Shorelines

The potential for fugitive dust emissions from shoreline exposures in the proposed reservoir was investigated by Nickling Environmental Ltd., and described in their Project

Memorandum dated August 14, 2012 (Nickling 2012). The potential for fugitive dust emissions was evaluated based on experience at the Williston Reservoir, which included six years of measuring both dust emissions at the source and regional ambient concentrations of $PM_{2.5}$ and PM_{10}; experience at other locations in North America; and a review of data provided in the literature.

In comparison to Williston, the potential dust emissions from the proposed Site C Reservoir could be as much as 10 to 100 times less than at Williston. This is due partly to the much smaller size of exposed area resulting from drawdown of the Site C reservoir compared to the Williston reservoir. At the Site C reservoir, approximately 189 ha would be exposed during drawdown, in addition to bank cuts and exposed sediments deposited in the near shore as a result of wave action. At Williston, up to 20,000 ha of beach and silt rich cliffs are exposed during drawdown, with over 5,000 ha designated as major dust sources.

While the relative size of the exposed area due to drawdown is the primary driver of potential wind fugitive dust emissions, the Site C reservoir also tends to have coarser grained sediments than at Williston, further reducing the potential for erosion. Furthermore, much of the exposed area in the Site C reservoir would be bedrock, as opposed to beach at Williston. This would further reduce the potential for erosion and emissions of fugitive dust at the Site C dam site.

The Nickling report therefore concludes that it is unlikely that dust emissions would be a large contributor to emissions from the proposed Site C Reservoir. This is attributed to the:

- small annual drawdown and the associated small area of exposed beach
- the relatively coarse texture of a large proportion of the sediments
- amount of bedrock exposure at the beaches that would reduce sediment input

5 RESULTS OF DISPERSION MODELLING

Dispersion modelling using CALPUFF was conducted to predict concentrations of CACs within the dispersion modelling study area using the methodology described in Section 2.5.2 and emission inputs as described in Section 4.1. The results of the dispersion modelling in the dispersion modelling study area are discussed in the following sections by CAC. Results at individual receptors can be found in Appendix G.

5.1 Particulate Matter

This section describes predictions of particulate matter concentrations and dustfall deposition rates in the dispersion modelling study area. As discussed in Section 1.1, there are ambient air quality objectives for dustfall and three size classes of PM concentration, namely TSP, PM_{10} and $PM_{2.5}$.

5.1.1 TSP

The maximum predicted concentrations of TSP at various receptors in the dispersion modelling study area are presented in Table 5.1.1. Without background, the BC level C ambient air quality objective for the 24-hour averaging period would be exceeded outside the dam site area. Inside the dam site area the BC level A objective would be exceeded. For the annual averaging period exceedances of the BC level C objectives[1] are predicted to occur only outside the dam site area. Exceedances of the BC level A 24-hour objective are predicted at one sensitive receptor location (North Camp Site), which is within the dam site area (see Figure 5.1.1). The maximum concentration predicted outside the dam site area occurs adjacent to the Wuthrich quarry but there are no known sensitive receptors in this area.

When the ambient background value is included with the predicted concentration, for the 24-hour averaging period outside the dam site area, exceedances of the BC level C objective would occur. Inside the dam site area at the North Camp Site, the exceedance would become higher than the BC level B objective. For the annual averaging period, with background included, exceedances of the BC level C objective would occur outside the dam site area close to Wuthrich quarry. Figure 5.1.1 shows the maximum predicted concentration isopleths for 24-hour TSP and Figure 5.1.2 shows the maximum predicted concentration isopleths for annual TSP. The highest values predicted outside the dam site area for both averaging periods occur near Wuthrich quarry.

The frequency of exceedance of the Level A 24-hour TSP objective for each receptor type is indicated in Table 5.1.2. Figure 5.1.3 shows the spatial distribution of exceedance frequency of the Level A 24-hour TSP objective over the dispersion modelling study area. As with the maximum concentration isopleths, the highest frequency of exceedance of 56% was predicted outside the dam site area in the vicinity of the Wuthrich quarry.

[1] Note that an exceedance of a standard or objective at a higher concentration also means that the lower or more stringent objective has also been exceeded. For example, an exceedance of the Level C objective by definition also means that Level A and Level B objectives have been exceeded.

Table 5.1.1 Maximum predicted concentrations of TSP at various receptors in the dispersion modelling study area

Averaging period	24-hour		Annual	
BC Level A Objective*	150 µg/m3		60 µg/m3	
Receptor Type	Without background (µg/m3)	With background (µg/m3)	Without background (µg/m3)	With background (µg/m3)
Outside Dam site area	**618**	**644**	**131**	**136**
Fort St. John	19	45	3.1	8.5
Taylor	5.9	32	1.0	6.4
Residence (Ground-truthed)	83	109	12	17
Non-Residence (Ground-truthed)	89	115	32	37
Unknown Building	6.0	32	0.9	6.3
North Camp Site	**184**	**210**	39	45
South Camp Site	48	74	11	16
School	9.3	35	1.3	6.7
Child Care	8.9	35	1.4	6.8
Health Care	9.0	35	0.7	6.1
Senior Care	7.1	33	0.9	6.3

NOTES:

Bold values indicate predicted concentrations which exceed the corresponding ambient air quality objective.

*Only the Level A objective is shown as it is the most stringent

Table 5.1.2 Frequency of exceedance of Canada-wide Standards and BC objectives for receptor types in the dispersion modelling study area with background

	TSP[a]	PM_{10}	$PM_{2.5}$ [b]	Dustfall[c]
Receptor Type	**Exceedance (%)**	**Exceedance (%)**	**Exceedance (%)**	**Exceedance (%)**
Outside Dam site area	56.0	76.9	80.1	33.3
Fort St. John	0.0	0.0	0.0	0.0
Taylor	0.0	0.0	0.0	0.0
Residence (Ground-truthed)	0.0	0.3	0.0	0.0
Non-Residence (Ground-truthed)	0.0	14.0	20.0	0.0
Unknown Building	0.0	0.0	0.0	0.0
North Camp Site	1.4	21.4	38.7	0.0
South Camp Site	0.0	0.0	1.3	0.0
School	0.0	0.0	0.0	0.0
Child Care	0.0	0.0	0.0	0.0
Health Care	0.0	0.0	0.0	0.0
Senior Care	0.0	0.0	0.0	0.0

NOTE:

a – comparison is made to BC Level A objective for TSP

b – relative to BC objective of 25 $\mu g/m^3$

c – refers to non-residential provincial objective of 2.9 $mg/m^2/day$

5.1.2 PM_{10}

The maximum predicted 24-hour concentrations of PM_{10} are presented in Table 5.1.3. Without background, the provincial ambient air quality objective would be exceeded within and outside the dam site area for the 24-hour averaging period. Exceedances were predicted at one sensitive receptor location (North Camp Site), which is within the dam site area (see Figure 5.1.4). The maximum concentration predicted outside the dam site area occurs adjacent to the Wuthrich quarry but there are no known sensitive receptors in this area.

When background is included, in addition to the locations with predicted exceedances already mentioned, an exceedance was also predicted at one residence located within the dam site area. In addition to the sensitive receptor locations indicated, exceedances were also predicted at non-residential buildings in the vicinity of the Site C dam site. Figure 5.1.4 shows the maximum predicted concentration isopleths for 24-hour PM_{10}. The highest values predicted outside the dam site area occur near Wuthrich quarry.

The frequency of predicted exceedances for each receptor type is indicated in Table 5.1.2. Figure 5.1.5 shows the spatial distribution of predicted exceedance frequency over the dispersion modelling study area. The one residence within the dam site area where an exceedance was predicted only has one instance of exceedance. The maximum frequency of exceedance predicted outside the dam site area was 76.9% and occurred in the vicinity of the Wuthrich quarry.

Table 5.1.3 Maximum predicted concentrations of PM_{10} at various receptors in the dispersion modelling study area

Averaging period	24-hour	
BC Objective	**50 μg/m³**	
Receptor Type	**Without background (μg/m³)**	**With background (μg/m³)**
Outside Dam site area	**251**	**278**
Fort St. John	5.8	32
Taylor	2.2	28
Residence (Ground-truthed)	25	**51**
Non-Residence (Ground-truthed)	41	**67**
Unknown Building	2.1	28
North Camp Site	**64**	**90**
South Camp Site	20	47
School	3.1	29
Child Care	3.0	29
Health Care	3.0	29
Senior Care	2.3	29

NOTES:
Bold values indicate predicted concentrations which exceed the corresponding ambient air quality objective.

5.1.3 $PM_{2.5}$

The maximum predicted concentrations of $PM_{2.5}$ are presented in Table 5.1.4. For the 24-hour averaging period, compliance with both the provincial objective and the Canada-wide Standard for $PM_{2.5}$ is based on the 98^{th} percentile concentration. Without background, maximum predicted concentrations exceeded both the provincial objective of 25 μg/m³ and Canada-wide Standard of 30 μg/m³ within and outside the dam site area for the 24-hour averaging period. Exceedances of the annual provincial objective of 8 μg/m³ were also predicted. Without background, exceedances were predicted at one sensitive receptor location (North Camp Site), which is within the dam site area (see Figure 5.1.6). The maximum concentration predicted outside the dam site area occurs adjacent to the Wuthrich quarry. When background is included, in addition to the locations with exceedances already mentioned, exceedances of the provincial 24-hour objective are also predicted at the South Camp Site. In addition to the sensitive receptor locations indicated, exceedances were also predicted at non-residential buildings in the vicinity of the Site C dam site. Figure 5.1.6 shows the 98th percentile predicted concentration isopleths for 24-hour $PM_{2.5}$ and Figure 5.1.7 shows the maximum predicted concentration isopleths for annual $PM_{2.5}$. The highest values outside the dam site area were predicted near Wuthrich quarry.

The frequency of predicted exceedances of the 24-hour objective for each receptor type is indicated in Table 5.1.2. Figure 5.1.8 shows the spatial distribution of predicted exceedance frequency over the dispersion modelling study area. The maximum frequency of exceedance predicted outside the dam site area was 80.1% and occurred in the vicinity of the Wuthrich quarry.

Table 5.1.4 Maximum predicted concentrations of $PM_{2.5}$ at various receptors in the dispersion modelling study area. Values in red exceed BC objective.

Averaging period	**24-hour[a]**		**Annual**	
Canada-wide Standard//BC Ambient Objective	**30 µg/m3 / 25 µg/m3**		**8 µg/m3**	
Receptor Type	**Without background (µg/m3)**	**With background (µg/m3)**	**Without background (µg/m3)**	**With background (µg/m3)**
Outside dam site area	**69**	**84**	**20**	**25**
Fort St. John	3.5	18	0.8	5.8
Taylor	1.0	16	0.2	5.2
Residence (ground-truthed)	9.1	24	2.3	7.3
Non-Residence (ground-truthed)	22	**37**	5.9	**11**
Unknown building	1.3	16	0.3	5.3
North Camp Site	**30**	**45**	**8.4**	**13**
South Camp Site	11	**26**	2.6	7.6
School	1.5	16	0.3	5.3
Child Care	1.6	17	0.3	5.3
Health Care	1.2	16	0.2	5.2
Senior Care	1.2	16	0.2	5.2

NOTES:
a - based on annual 98th percentile value
Bold values indicate predicted concentrations which exceed the corresponding ambient air quality objective.

5.1.4 Dustfall

The maximum predicted deposition rates of dustfall for the 30-day averaging period are presented in Table 5.1.5. There are two provincial objectives presented. The lower (1.75 mg/m^2/day) is the objective for residential locations while the higher (2.9 mg/m^2/day) is for non-residential locations. Without background, the non-residential provincial ambient air quality objective is not exceeded outside the dam site area. The maximum concentration predicted outside the dam site area occurs adjacent to the Wuthrich quarry (see Figure 5.1.9), but this local maximum does not cause any sensitive receptor site exceedances. When background is included, exceedances were predicted to occur outside the dam site area. No exceedances were predicted at sensitive receptors within or outside the dam site area.

The frequency of predicted exceedances of the non-residential objective for each receptor type is indicated in Table 5.1.2. Figure 5.1.10 shows the spatial distribution of predicted exceedances of the non-residential objective over the dispersion modelling study area. The maximum frequency of exceedance predicted outside the dam site area was 33.3% or about 4 months of the year and occurred in the vicinity of the Wuthrich quarry.

Table 5.1.5 Maximum predicted deposition rate of dustfall at various receptors in the dispersion modelling study area

Averaging period	30-day	
BC Ambient Objective	**1.75 mg/m^2/day (residential) or 2.9 mg/m^2/day (non-residential)**	
Receptor Type	**Without background (µg/m^3)**	**With background (µg/m^3)**
Outside Dam site area	2.5	**3.3**
Fort St. John	0.08	0.9
Taylor	0.03	0.8
Residence (Ground-truthed)	0.4	1.2
Non-Residence (Ground-truthed)	0.6	1.4
Unknown Building	0.03	0.8
North Camp Site	0.8	1.6
South Camp Site	0.2	1.0
School	0.04	0.8
Child Care	0.04	0.8
Health Care	0.03	0.8
Senior Care	0.03	0.8

NOTES:
Bold values indicate predicted concentrations which exceed the non-residential (2.9 mg/m2/day) ambient air quality objective.

5.2 Nitrogen Dioxide, Sulphur Dioxide and Carbon Monoxide

The maximum predicted concentrations of NO_2 and NO_x are presented in Table 5.2.1, SO_2 are presented in Table 5.2.2 and CO is presented in Table 5.2.3. There is no difference in concentrations of NO_2 and SO_2 if background is added, as the background value is 0 µg/m^3 (see Section 3.3.3 and Section 3.3.4). For CO maximum concentrations with and without background are included in Table 5.2.3. There are no exceedances predicted anywhere within the dispersion modelling study area for any of the averaging periods for which an ambient objective is defined for NO_2, SO_2 and CO (see Figures 5.2.1, 5.2.2 and 5.2.3, respectively, for maximum predicted concentrations). The maximum concentrations predicted outside the dam site area for NO_2, SO_2 and CO are all found near Wuthrich quarry.

Table 5.2.1 Maximum predicted concentrations of NO_2 and NO_x at various receptors in the dispersion modelling study area

Averaging period	**1-hour**		**24-hour**		**Annual**	
Most Stringent* Ambient Objectives for NO_2	**400 µg/m^3**		**200 µg/m^3**		**60 µg/m^3**	
Receptor Type	**With background (µg/m^3)**		**With background (µg/m^3)**		**With background (µg/m^3)**	
	NO_2	**NO_x**	**NO_2**	**NO_x**	**NO_2**	**NO_x**
Outside dam site area	306	1,794	78	400	45	73
Fort St. John	145	181	27	27	3.3	3.3
Taylor	63	63	8.0	8.0	1.0	1.0
Residence (ground-truthed)	170	436	44	61	8.2	8.2
Non-Residence (ground-truthed)	182	561	49	115	24	24
Unknown building	81	81	10	11	1.4	1.4
North Camp Site	194	676	54	165	26	26
South Camp Site	165	388	45	70	13	13
School	106	106	12	12	1.3	1.3
Child Care	109	109	13	13	1.4	1.4
Health Care	87	87	10	10	0.9	0.9
Senior Care	73	73	10	9.5	1.0	1.0

NOTES:

* Most stringent Canada Wide Standard for each averaging period as shown in Table 1.1.1.

Table 5.2.2 Maximum predicted concentrations of SO_2 at various receptors in the dispersion modelling study area

Averaging period	1-hour	24-hour	Annual
BC Level A Objective	450 µg/m^3	160 µg/m^3	25 µg/m^3
Receptor Type	With background (µg/m^3)	With background (µg/m^3)	With background (µg/m^3)
Outside dam site area	75	21	1.6
Fort St. John	1.6	0.1	0.01
Taylor	0.2	0.05	0.003
Residence (ground-truthed)	3.3	0.4	0.03
Non-Residence (ground-truthed)	4.5	0.5	0.06
Unknown building	0.5	0.06	0.004
North Camp Site	14	1.5	0.1
South Camp Site	1.1	0.2	0.03
School	0.7	0.1	0.005
Child Care	0.7	0.1	0.005
Health Care	0.5	0.05	0.003
Senior Care	0.3	0.04	0.004

Table 5.2.3 Maximum modelled concentrations of CO at various receptors in the dispersion modelling study area

Averaging period	1-hour		8-hour	
BC Level A Objective	14,300 µg/m^3		5,500 µg/m^3	
Receptor Type	Without background (µg/m^3)	With background (µg/m^3)	Without background (µg/m^3)	With background (µg/m^3)
Outside dam site area	2,733	2,962	1,918	2078
Fort St. John	96	325	31	191
Taylor	29	258	10	170
Residence (ground-truthed)	193	422	79	240
Non-Residence (ground-truthed)	342	571	120	280
Unknown building	45	274	13	173
North Camp Site	554	783	165	326
South Camp Site	192	421	80	241
School	48	277	16	177
Child Care	49	278	18	178
Health Care	39	268	13	174
Senior Care	32	261	10	171

6 CLOSURE

RWDI AIR Inc. has prepared this report for the sole benefit of BC Hydro for the purpose of documenting baseline conditions in anticipation of an environmental assessment under the British Columbia *Environmental Assessment Act* and the *Canadian Environmental Assessment Act*. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of RWDI AIR Inc. and BC Hydro. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties.

The information provided in this report was compiled from existing documents and data provided by BC Hydro and by field data compiled by RWDI AIR Inc. This report represents the best professional judgment of the authors at the time of its preparation. RWDI AIR Inc. reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to re-evaluate the conclusions provided herein.

BC Hydro has the right to reproduce, use and rely upon this report for proper purposes in planning, operating and maintaining the electrical generation, transmission and distribution system in the Province of British Columbia, including, without limitation, the right to deliver this report to regulatory authorities in support of or in response to regulatory inquiries and proceedings, including environmental assessment.

Respectfully submitted by:

RWDI AIR Inc.

Lead Author:
Jeff Lundgren, M.Sc.
Technical Director

Reviewer:
David Chadder, Hon. B.Sc., QEP
Principal/Senior Consultant

Reviewer:
Christian Reuten, Ph.D., ACM
Senior Scientist

Reviewer:
Brian Sulley, B.A.Sc., P.Eng.
Senior Specialist

7 REFERENCES

Agriculture and Agri-Food Canada. Canada Center for Remote Sensing.

AGSolutions LLC, 2012. Online: http://www.wasteoilboiler.net/page/page/waste_oil_burning_facts.htm (Accessed July 2012).

ASTER GDEM, 2011. Ministry of Economy, Trade, and Industry (METI) of Japan and the United States National Aeronautics and Space Administration (NASA) (http://www.ersdac.or.jp/GDEM/E/3.htm)

Air & Waste Management Association. 2000. Air Pollution Engineering Manual, Second Edition. 886 pp. ISBN: 0-471-33333-6.

British Columbia Lung Association. 2005. State of the Air in British Columbia: 2005. Vancouver, BC. 16 pp.

British Columbia Ministry of Water, Land and Air Protection Water, Air and Climate Change Branch. 2004. 2000 British Columbia Emissions Inventory of Criteria Air Contaminants: Methods and Calculations. (Revised June 2005) Victoria, BC.

British Columbia Ministry of Environment (BCMOE). 2000. Emission Inventory.

BCMOE.2008. Guidelines for Air Quality Dispersion Modelling in British Columbia. Environmental Protection Division. Environmental Quality Branch, Air Protection Section. Victoria, BC. 152 pp.

BCMOE 2009b. Air Quality Objectives and Standards. 2 pp.

BCMOE 2012a. Data provided by Warren McCormick in July 2012.

BCMOE 2012b. BC Air Data Archive Website. Online: http://envistaweb.env.gov.bc.ca/ (Accessed June 2012).

Canadian Council of Ministers of the Environment. 2006. Canada-wide Standards for Particulate Matter and Ozone. Five Year Report: 2000-2005.

Canadian Digital Elevation Data, 2011. *Geobase.* Online: http://www.geobase.ca (Accessed July 2012)

Clean Air Strategic Alliance Data Warehouse 2012. Online: http://www.casadata.org/ (Accessed June 2012).

California Environmental Protection Agency Air Resources Board 2009. CEIDARS database.

Cheng, L., H.S. Sandhu, R.P. Angle, K.M. McDonald, and R.H. Myrick. 2000. Rural particulate matter in Alberta, Canada. *Atmospheric Environment* 34, 3365-3372.

The Chamber of Shipping. 2007. BC Ocean-Going Vessel Emissions Inventory Report.

County of San Diego Air Pollution Control District. 1998. http://www.sdapcd.org/toxics/emissions/trpts/trpts1.pdf

Desert Research Institute. 2000. Reconciling Urban Fugitive Dust Emissions Inventory and Ambient Source Contribution Estimates: Summary of Current Knowledge and Needed Research. 240 pp.

Earth Tech. 2000a. A User's Guide for the CALMET Meteorological Model (Version 5). 332 pp.

Earth Tech. 2000b. A User's Guide for the CALPUFF Dispersion Model (Version 5). 521 pp.

Environment Canada. 2006. Criteria Air Contaminants Emissions Inventory 2002 Guidebook.

Environment Canada. 2012. Environment Canada's National Pollutant Release Inventory.

Environment Canada. 2012b. Canadian Climate Normals or Average 1971-2000. Online: _http://climate.weatheroffice.gc.ca/climate_normals/index_e.html (Accessed May 2012)

Environment Canada. 2012c. Sulphur in Diesel Fuel Regulation. Online: http://www.ec.gc.ca/energie-energy/default.asp?lang=En&n=7A8F92ED-1 (Accessed May 2012)

National Centre for Environmental Protection. 2011. North American Regional Reanalysis meteorological data.

National Pollutant Release Inventory. 2010. Online: http://www.ec.gc.ca/inrp-npri/ (Accessed July 2012).

POSTEL Thematic Centre Land Cover Database. 2011. POSTEL. Online: http://postel.mediasfrance.org/ (Accessed July 2012)

RWDI AIR Inc. (RWDI). 2012. Site C Clean Energy Project – Technical Data Report: Microclimate. Document Number 06-110

San Joaquin Valley Air Pollution Control District. 2012. http://www.valleyair.org/busind/draft-policies/DraftAggregatepolicy_Rev6.pdf

SI Metric. 2011. Online: http://www.simetric.co.uk/si_materials.htm (Accessed January 2012)

Tombach, Ivar and Pat Brewer. 2005. BART Modeling Protocol for VISTAS.

US EPA, 1980. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.3: Explosives Detonation. 5 pp.

US EPA, 1992. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 2.5: Open Burning. 19 pp.

US EPA. 1995. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.2.3: Heavy Construction Operations. 7 pp.

US EPA. 1996. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 1.11: Waste Oil Combustion. 9 pp.

US EPA. 1998. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 11.9: Western Surface Coal Mining. 14 pp.

US EPA. 2004a. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 11.19.2: Crushed Stone Processing and Pulverized Mineral Processing. 17 pp.

US EPA. 2003. Appendix W to Part 51 – Guideline on Air Quality Models. July 2003 Edition.

US EPA 2004b. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition. 135 pp.

US EPA. 2004c. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 11.1: Hot Mix Asphalt Plants. 63 pp.

US EPA. 2006a. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.2.4: Aggregate Handling and Storage Piles. 6 pp.

US EPA. 2006b. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 11.12: Concrete Batching. 14 pp.

US EPA. 2006c. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.2.2: Unpaved Roads. 20 pp.

US EPA. 2011. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.2.1: Paved Roads. 15 pp.

Western Coal Corporation. 2005. Application for an Environmental Assessment Certificate for the Brule Mine Project. Section 11: Air Quality. 113 pp.

Western Coal Corporation. 2010. Technical Assessment Report: 2010 Application for Amendment to Willow Creek Mine, Air Permit PA-17043. 99 pp.

Whiteman, C. David, 2000: Mountain Meteorology. Fundamentals and Applications. Oxford University Press, N. Y., USA, 355 pp.

Wichers Stanek et al. 2010. A Review of the Current State of Science for Health Effects of Particulate Matter. EM, Air and Waste Management Association.

Western Regional Air Partnership. 2006. Fugitive Dust Handbook.

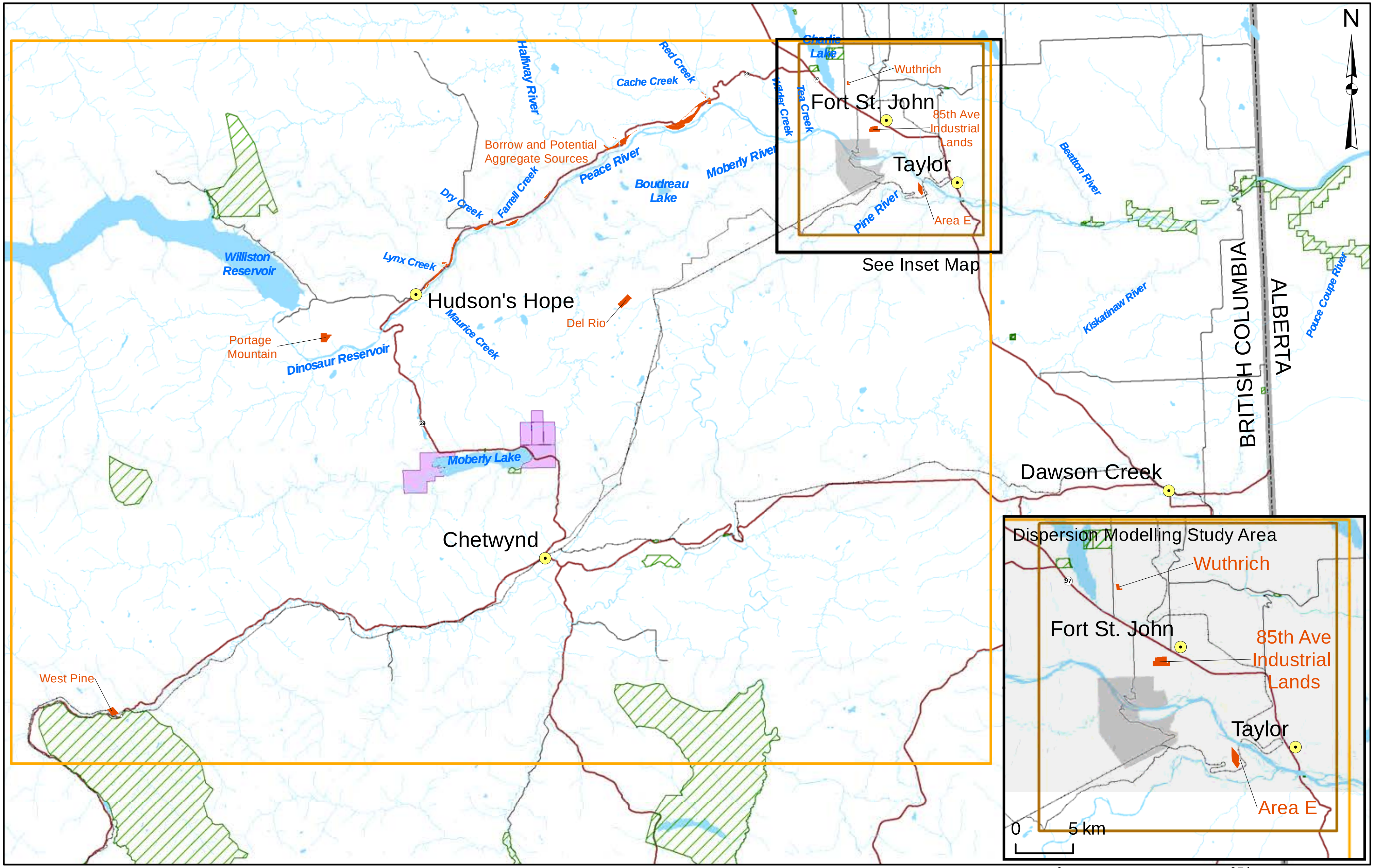
Zhang et al. 2002. Modelling gaseous dry deposition in AURAMS: a unified regional air quality modelling system. Atmospheric Environment Vol. 36. pp 537-560.

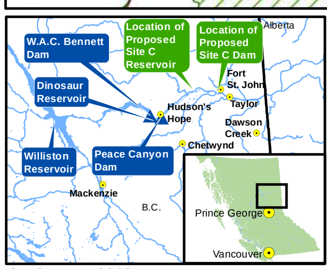
Zhang et al. 2003. A revised parameterization for gaseous dry deposition in air-quality models. Atmospheric Chemistry and Physics. Vol. 3. pp 2067-2082.

Source	Format
Personal Communications	Dennis Fudge. BCMOE. 2012. Personal communication.
Personal Communications	W.G. Nickling. Nickling Environmental Ltd. 2012. Personal communication.

8 FIGURES

Please see the following pages.





Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Air Quality Technical Study Area
- Dispersion Modelling Study Area
- Dam Site Area
- Offsite Construction Material Sources
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Indian Reserve
- Provincial/Territory Boundary
- City/District Municipality
- Existing Road
- Existing Highway
- Existing Railway

1:725,000

0 — 25 km

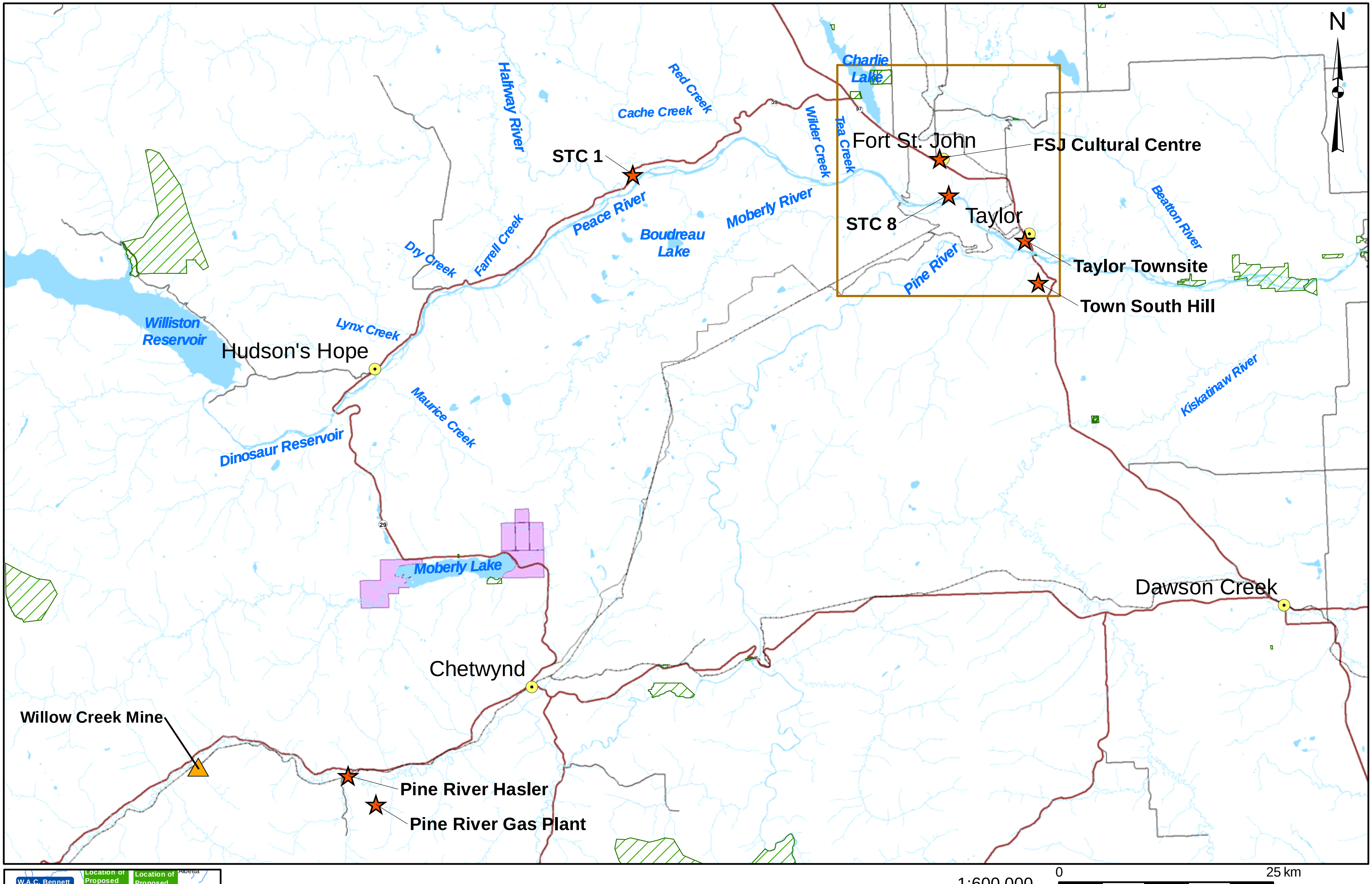
SITE C CLEAN ENERGY PROJECT

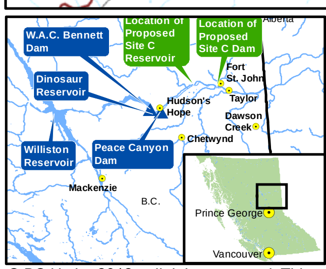
BC hydro

Figure 2.1.1
Air quality technical and dispersion modelling study areas

DATE	Dec. 3, 2012	1016-C14-A6288-1	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





Legend

- Air Quality Monitoring Station
- Willow Creek Mine
- Dispersion Modelling Study Area
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Indian Reserve
- City/District Municipality
- Existing Road
- Existing Highway
- Existing Railway

Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

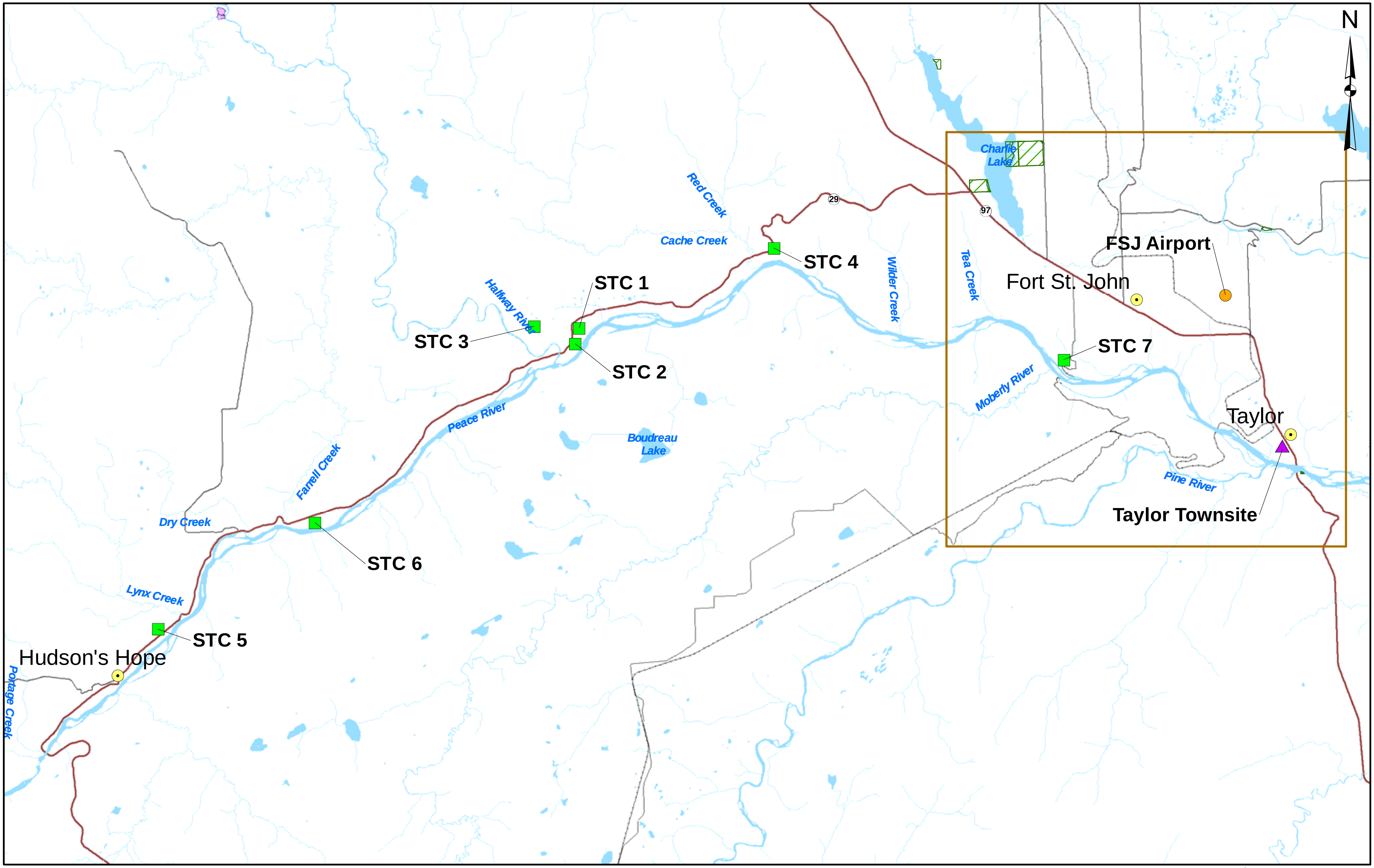
BC hydro

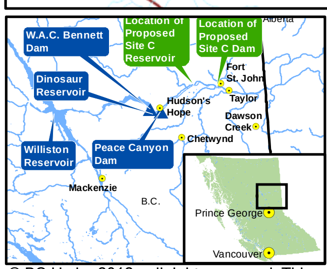
SITE C CLEAN ENERGY PROJECT

Figure 2.2.1
Locations of the ambient air quality monitoring stations within the technical study area

DATE	Dec. 6, 2012	1016-C14-A6288-2	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





Map Notes:
1. Datum: NAD83
2. Projection: UTM Zone 10N
3. Base Data: Province of B.C.

Legend

- Site C Climate Station
- Environment Canada Climate Station
- BC Ministry of Environment Meteorological Station
- Dispersion Modelling Study Area
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Indian Reserves
- City/District Municipality
- Existing Road
- Existing Highway
- Existing Railway

1:335,000

0 10 km

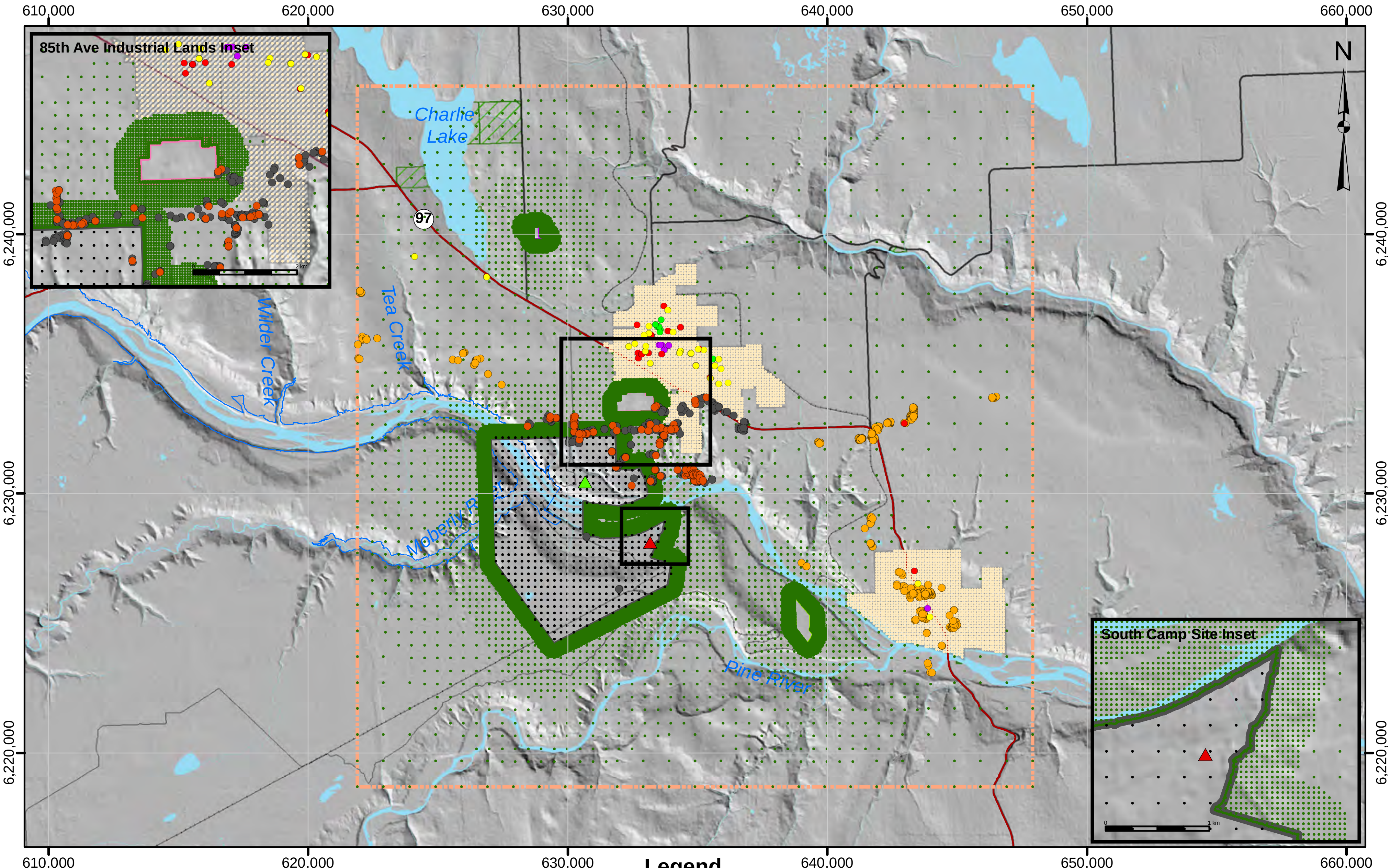
BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 2.3.1
Locations of climate and meteorological stations within the technical study area

DATE	Nov. 26, 2012	1016-C14-A6288-3	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

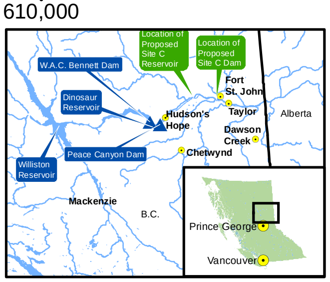


Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Grid Receptors inside Project Areas
- Grid Spacing Following MOE Guidelines
- 100m Grid Spacing over Fort St John and Taylor
- Existing Road
- Existing Highway
- Existing Railway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

1:200,000

0 4 km



Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

SITE C CLEAN ENERGY PROJECT

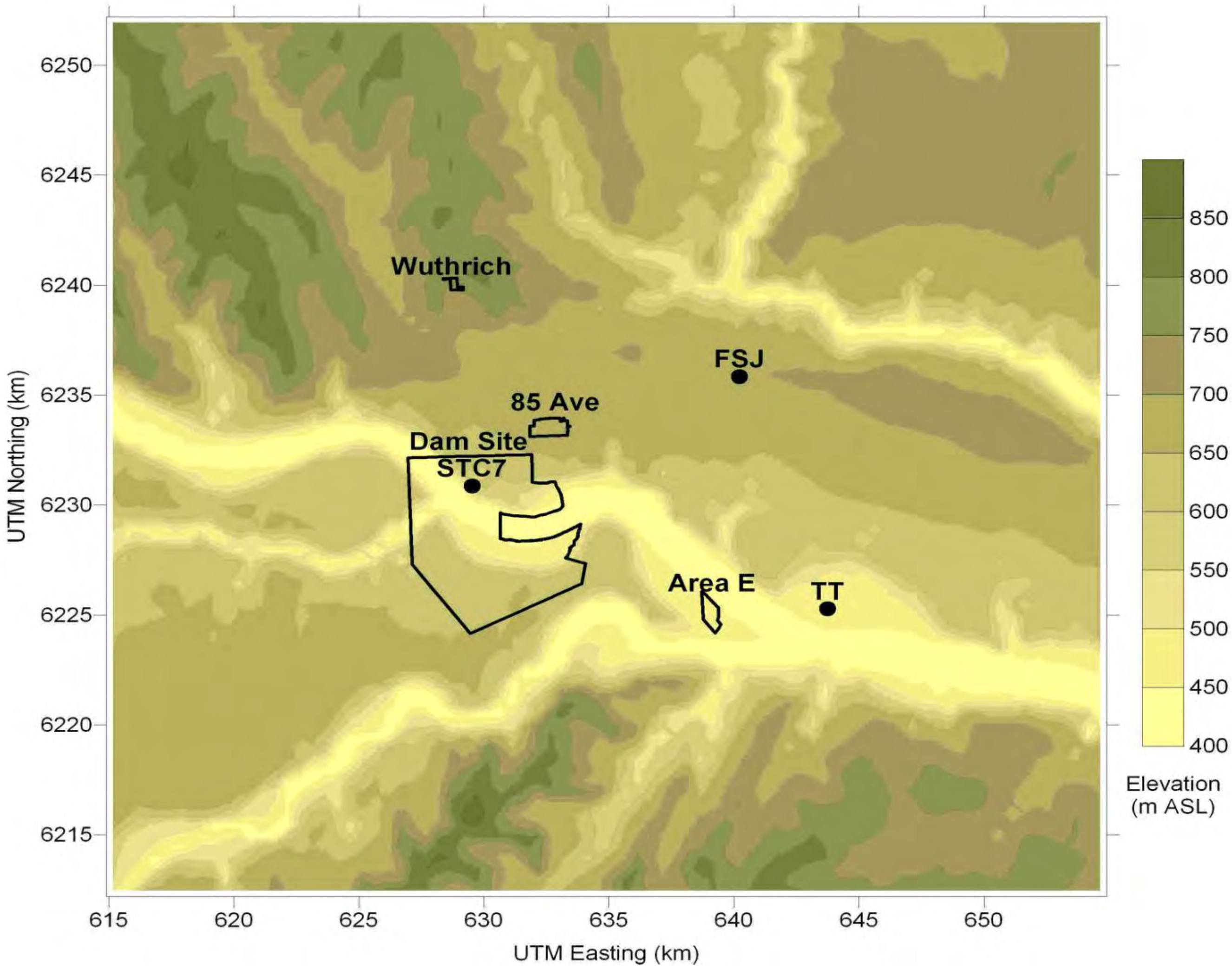
BC hydro

RWDI

Figure 2.5.1
Dispersion modelling study area receptor grid

DATE	Dec. 10, 2012	1016-C14-A5533	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification



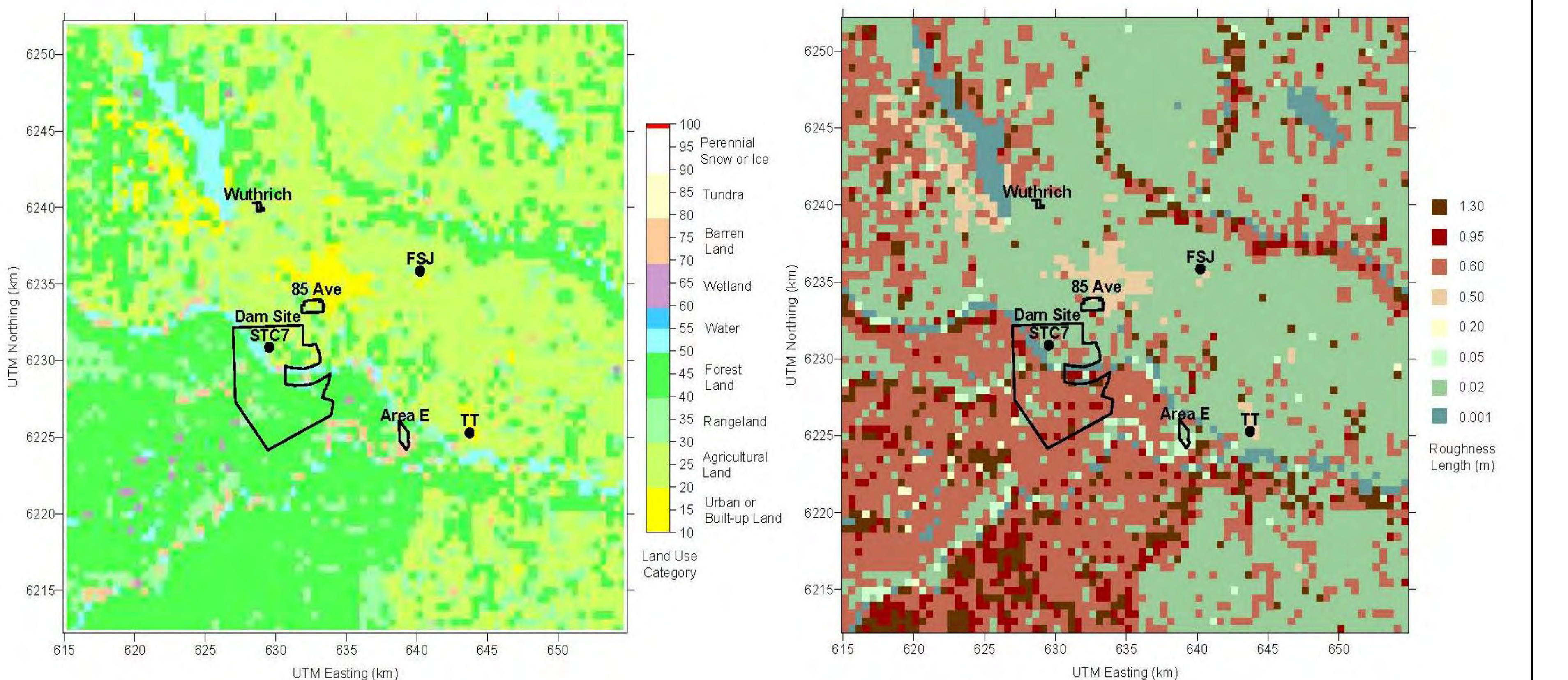
NOTES:
1. PROJECT COMPONENTS ARE DAM SITE AREA, WUTHRICH QUARRY, 85th AVE INDUSTRIAL LANDS. AND AREA E.

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.2.1 - Topography in dispersion modelling study area and meteorological stations including Site C Dam (STC7), Fort St. John Airport (FSJ), and Taylor Townsite (TT)

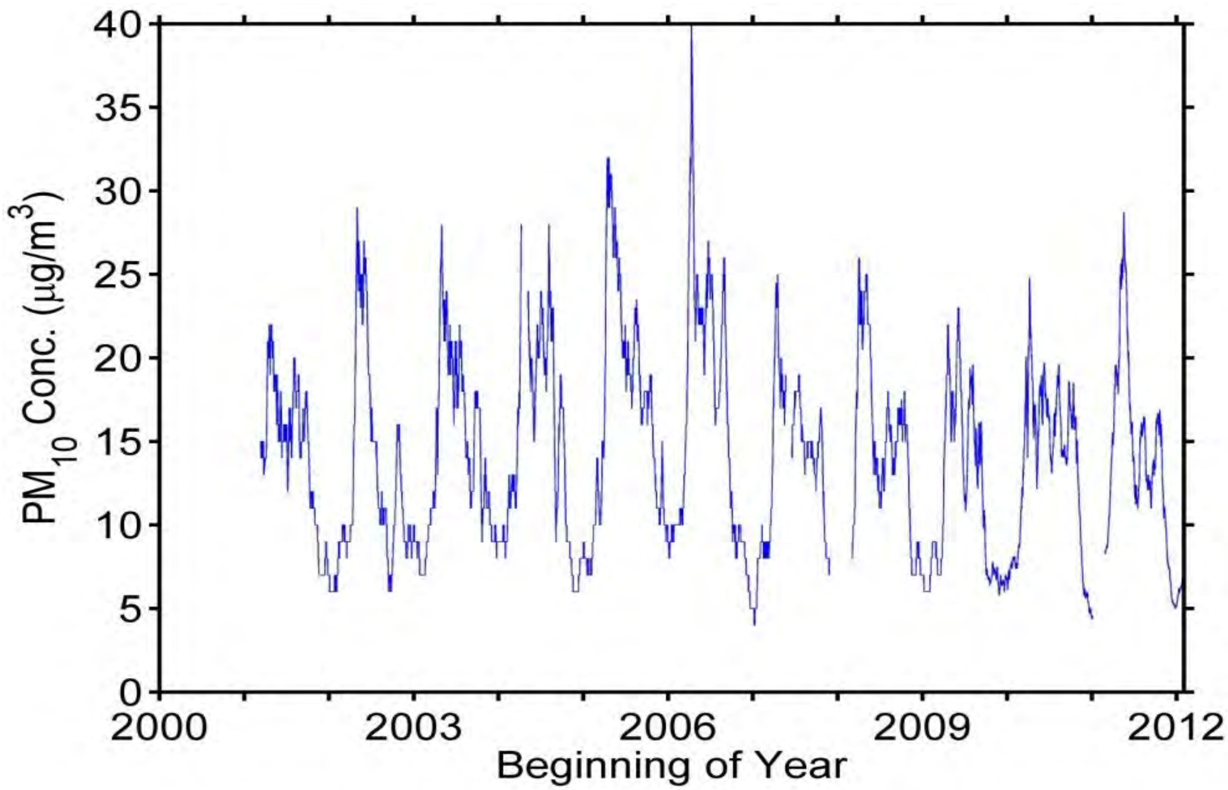


Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

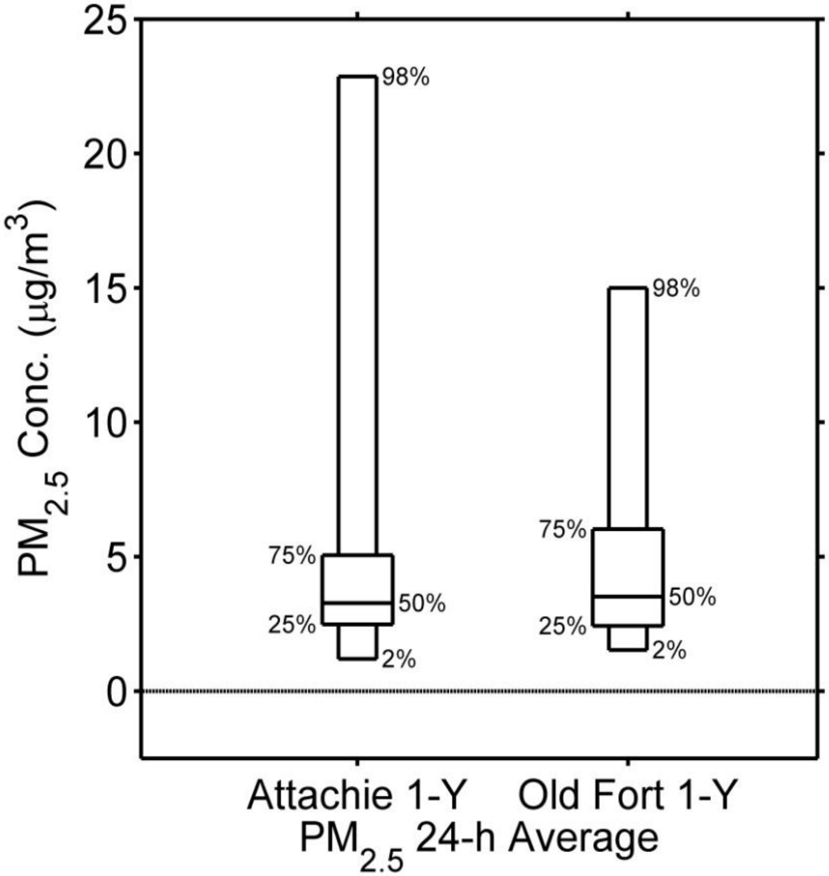
Figure 3.2.2 - Land cover characterization and surface roughness length in winter without snow cover in dispersion modelling study area



BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.1 - Time series of 30-day median PM_{10} concentrations at Fort St. John Airport for the period 2000 to 2012

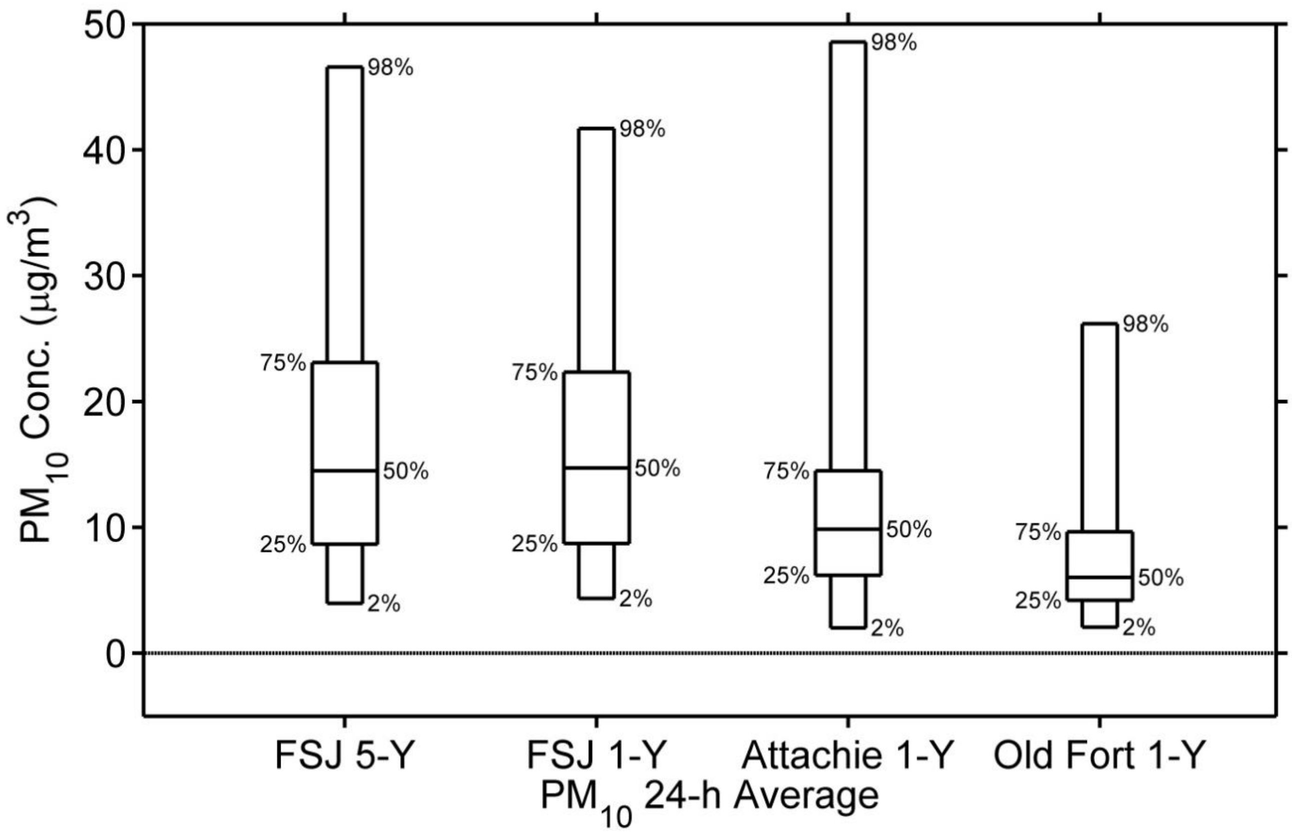


NOTES:
1. 1-Y DENOTES THE PERIOD MARCH 2011 TO JANUARY 2012. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.2 - Box plot of 24-hour average $PM_{2.5}$ concentrations at Attachie Flat Upper Terrace and Old Fort stations



NOTES:

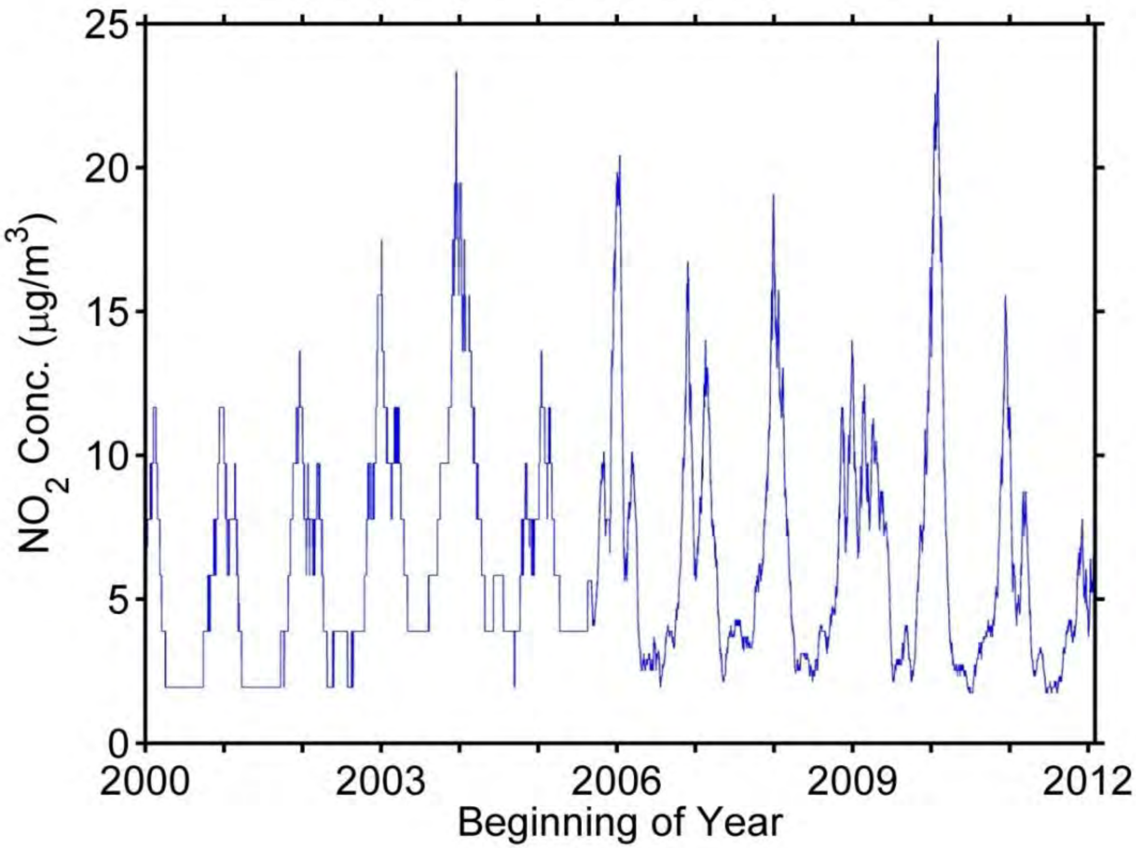
1. 5-Y DENOTES THE PERIOD FROM JANUARY 2007 TO DECEMBER 2011 AND 1-Y THE PERIOD FROM MARCH 2011 TO JANUARY 2012. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

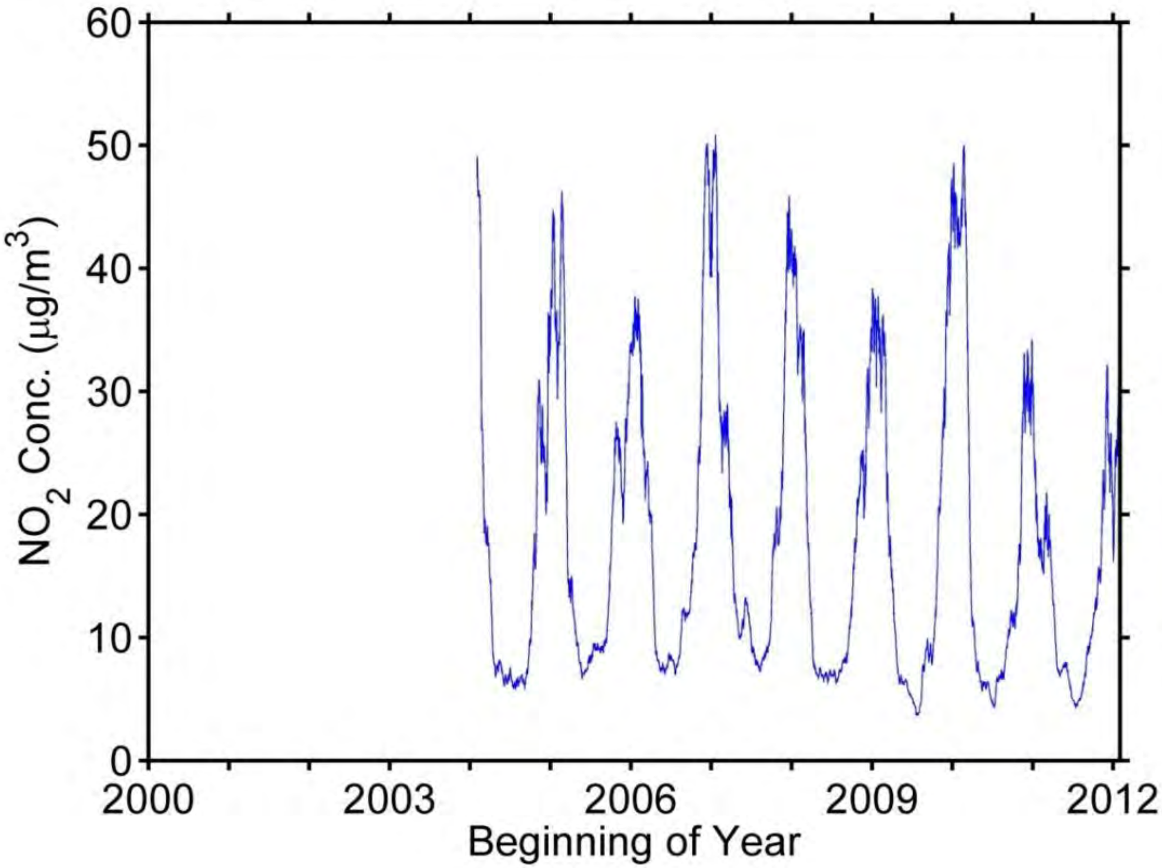
Figure 3.3.3 - Box plot of 24-hour average PM_{10} concentrations at Fort St. John, Attachie Flat Upper Terrace and Old Fort stations



BC hydro

SITE C CLEAN ENERGY PROJECT

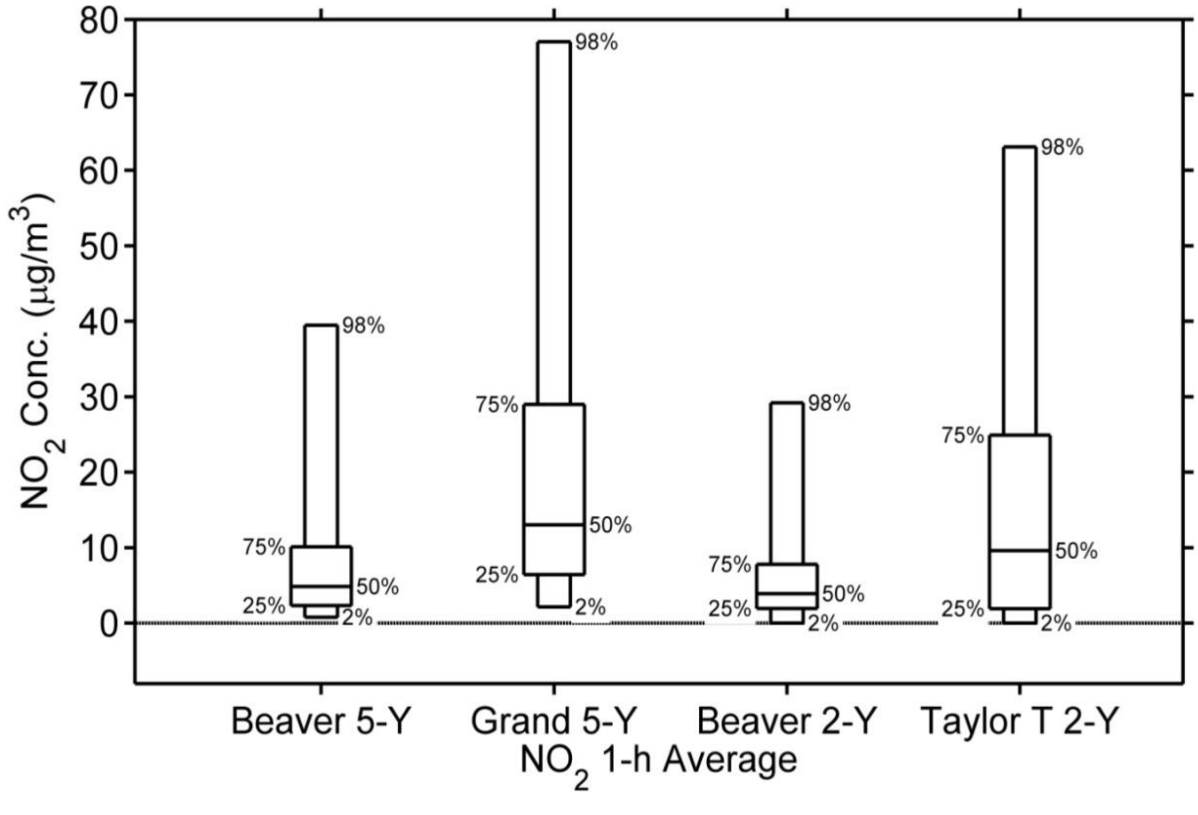
Figure 3.3.4 - Time series of 30-day median NO_2 concentrations at Beaverlodge for the period 2000 to 2012



BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.5 - Time series of 30-day median NO_2 concentrations at Grand Prairie station for period 2000 to 2012



NOTES:

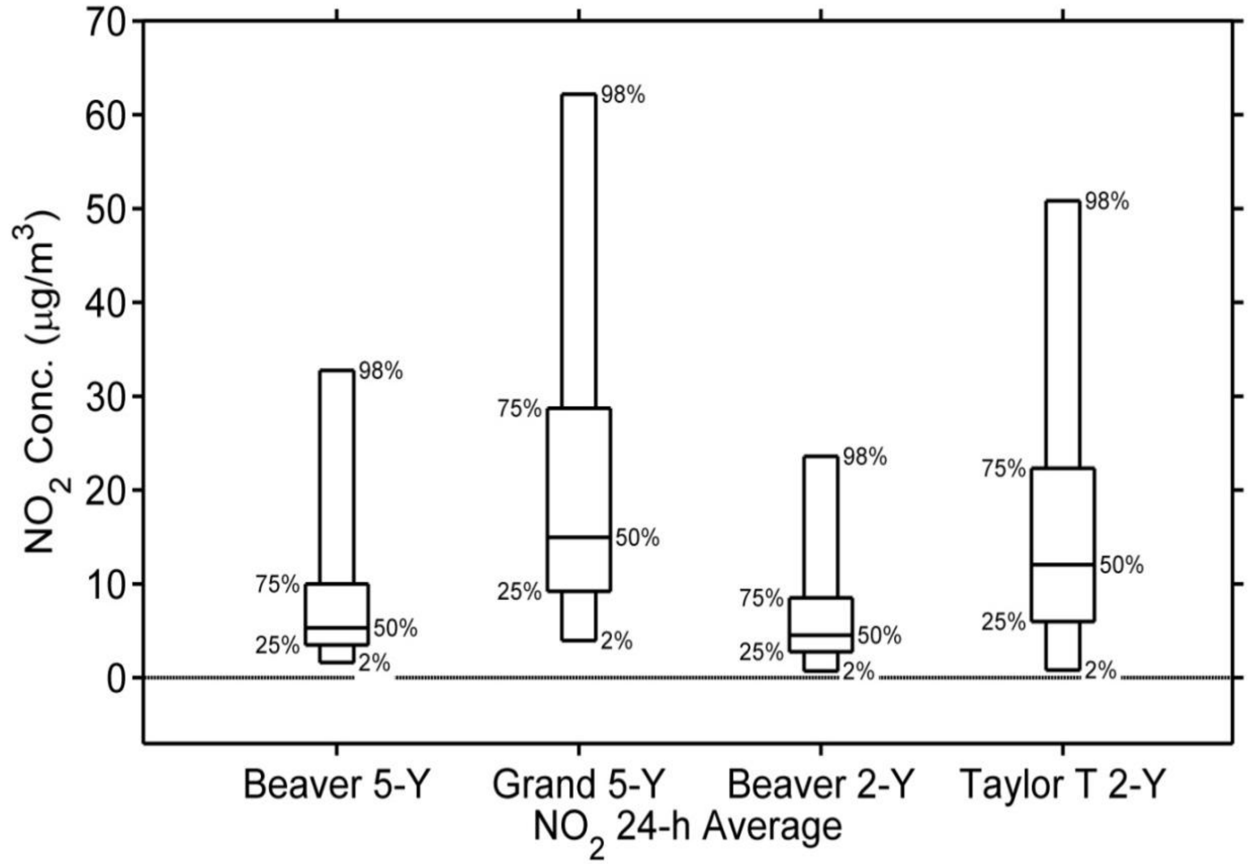
1. 5-Y DENOTES THE PERIOD FROM JANUARY 2007 TO DECEMBER 2011 AND 2-Y THE PERIOD FROM JANUARY 2000 TO DECEMBER 2001. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.6 - Box plot for 1-hour average NO_2 concentrations for the Beaverlodge, Grand Prairie and Taylor Townsite stations

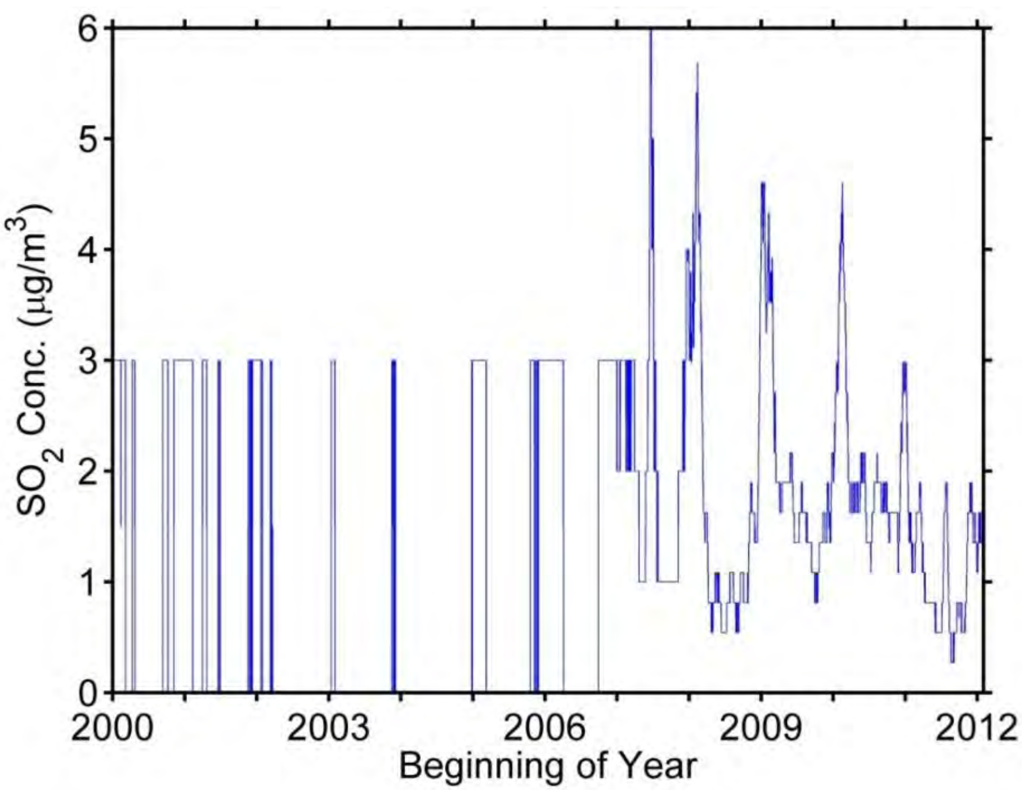


NOTES:
1. 5-Y DENOTES THE PERIOD FROM JANUARY 2007 TO DECEMBER 2011 AND 2-Y THE PERIOD FROM JANUARY 2000 TO DECEMBER 2001. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.7 - Box plot for 24-hour average NO_2 concentrations for the Beaverlodge, Grand Prairie and Taylor Townsite stations

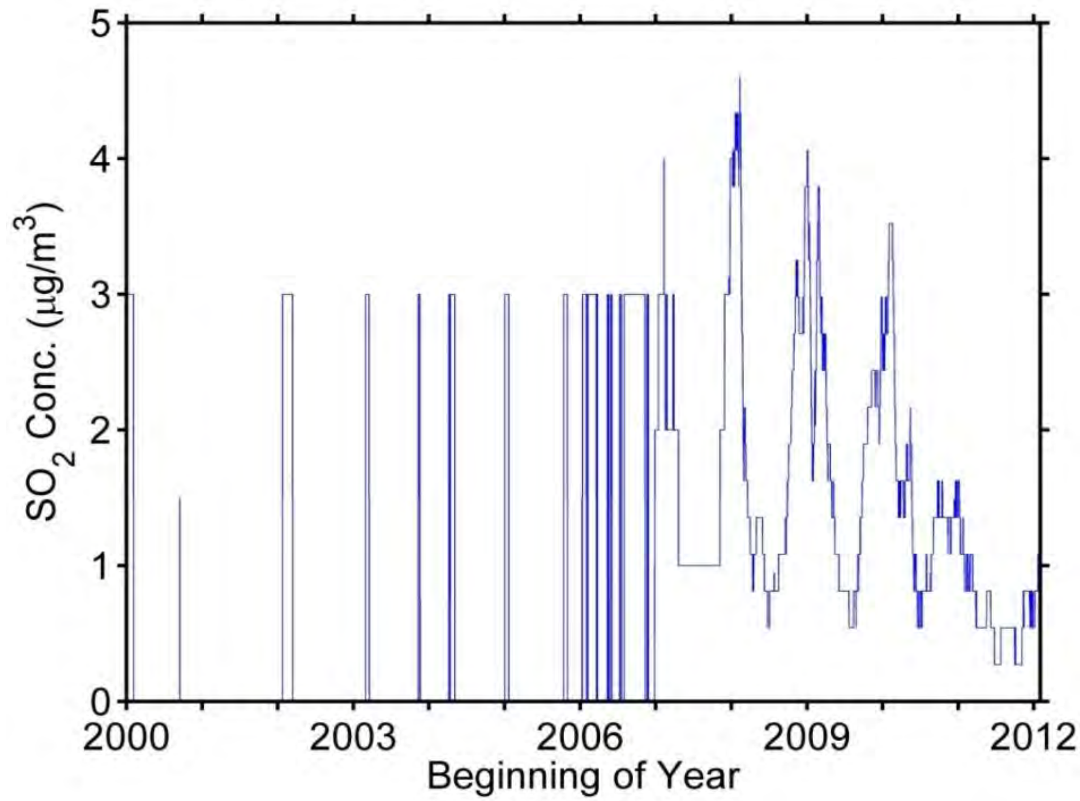


Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.8 - Time series of 30-day median SO_2 concentrations at Taylor Townsite station for the period 2000 to 2012

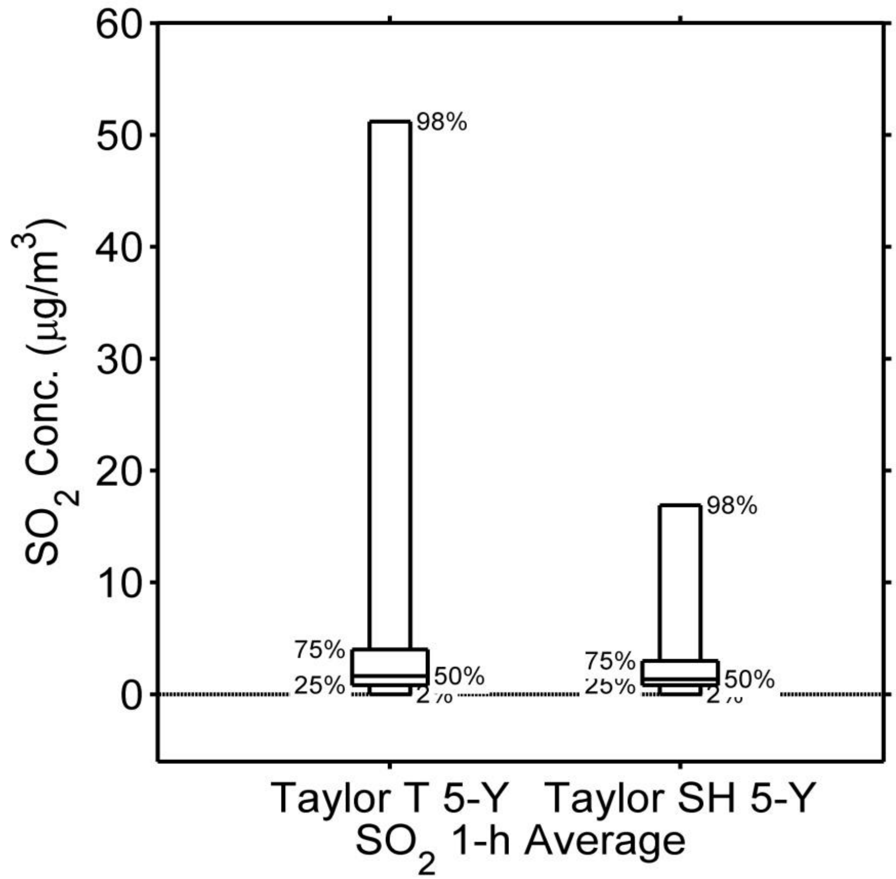


BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.9 - Time series 30-day median SO_2 concentrations at Taylor South Hill station for period 2000 to 2012

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification



NOTES:

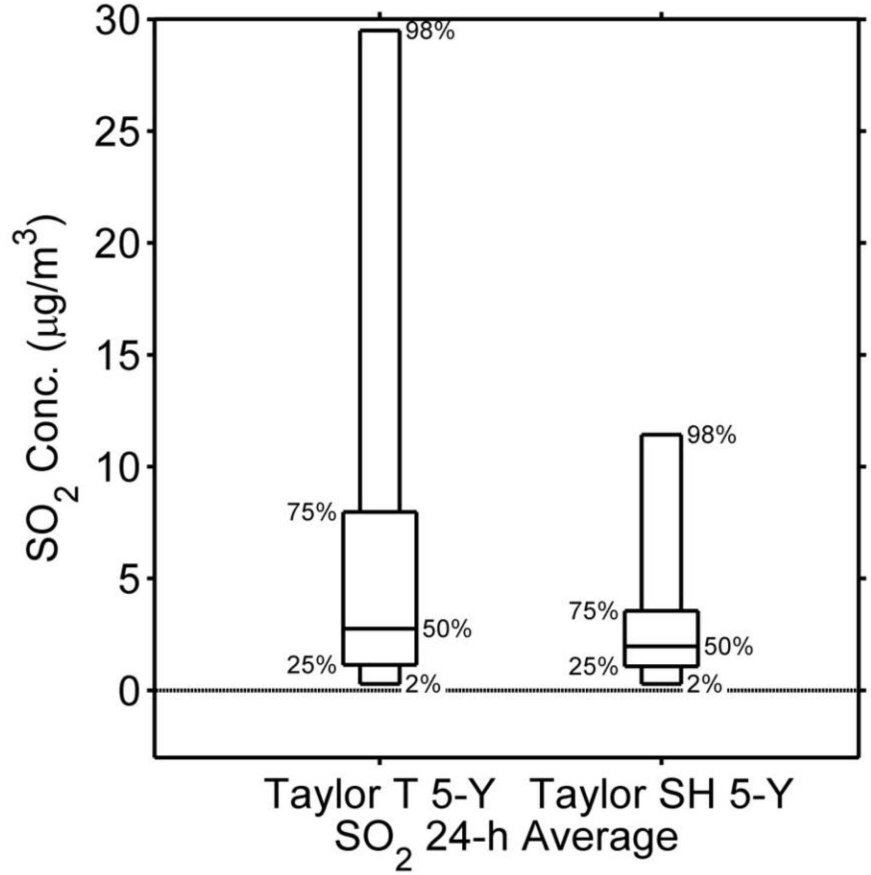
1. 5-Y DENOTES THE PERIOD FROM JANUARY 2007 TO DECEMBER 2011. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.10 - Box plot for 1-hour average SO_2 concentrations for Taylor Townsite and Taylor South Hill stations

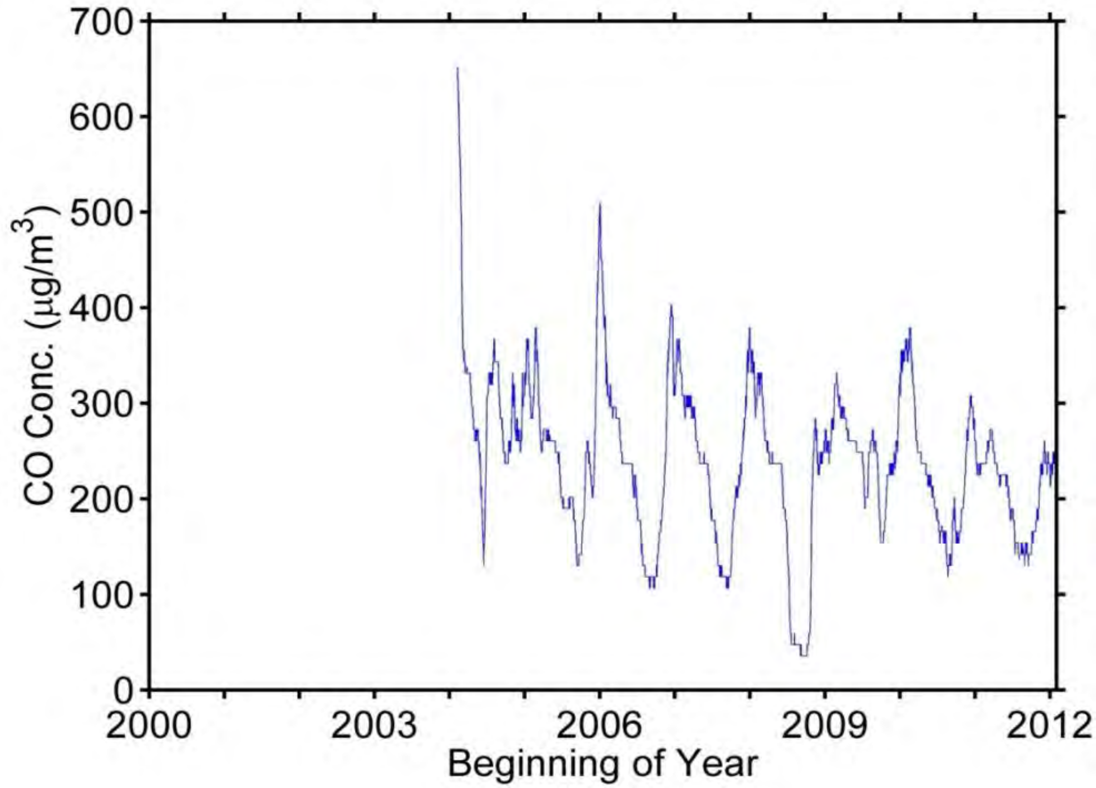


NOTES:
1. 5-Y DENOTES THE PERIOD FROM JANUARY 2007 TO DECEMBER 2011. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.11 - Box plot of 24-hour average SO_2 concentrations at Taylor Townsite and Taylor South Hill stations

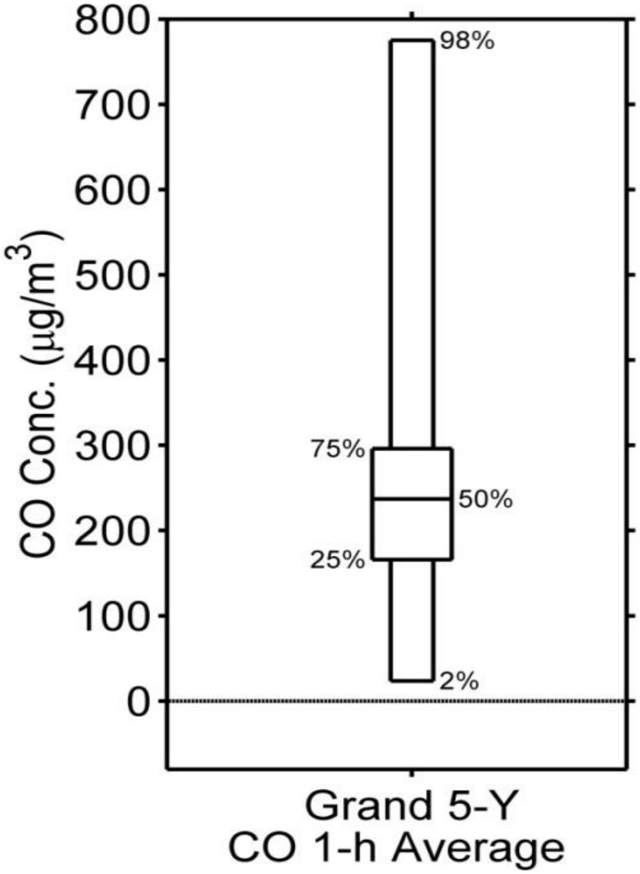


Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.12 - Time series of 30-day median CO concentrations at the Grand Prairie station for the period 2004 to 2012



NOTES:

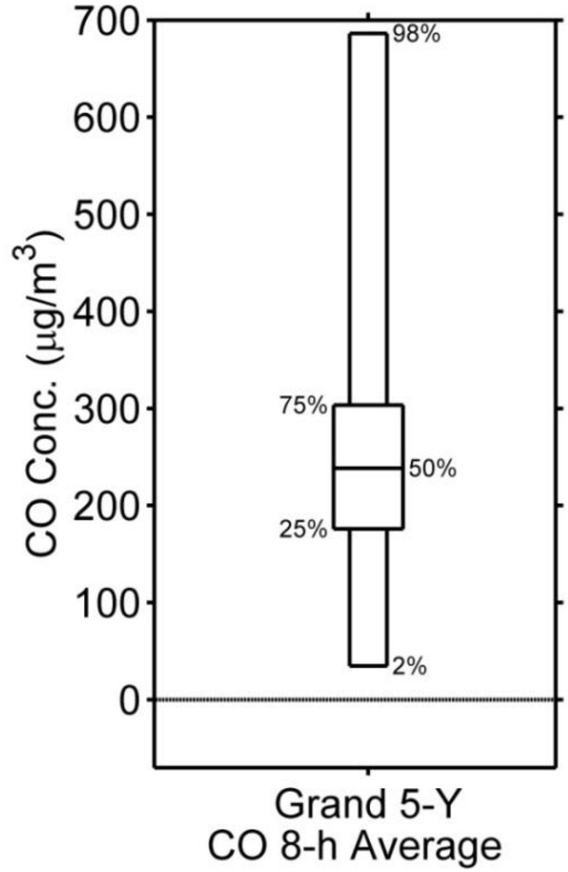
1. 5-Y REPRESENT 5-YEAR PERIOD FROM JANUARY 2007 TO DECEMBER 2011. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.13 - Box plot for 1-hour average CO concentrations for the Grand Prairie station



NOTES:

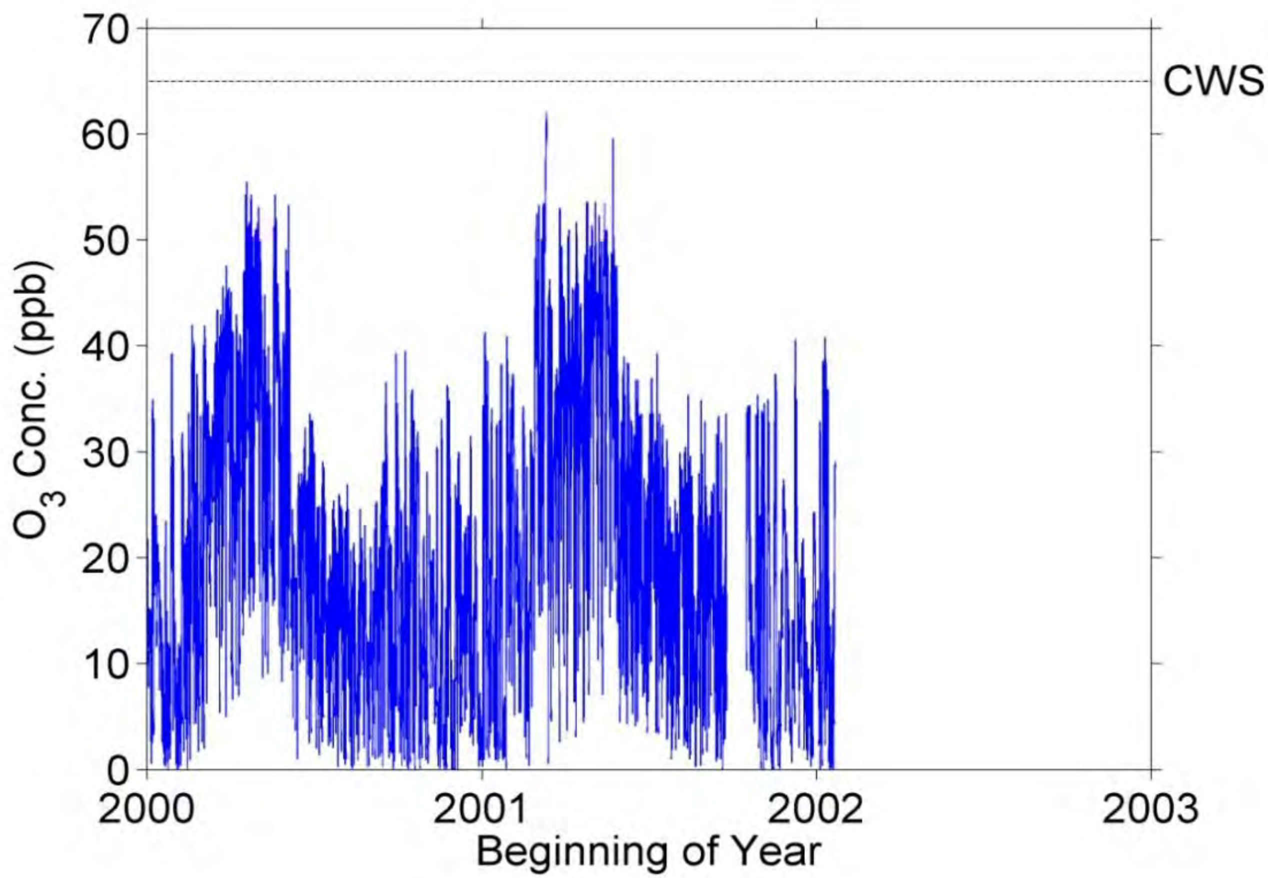
1. 5-Y REPRESENT 5-YEAR PERIOD FROM JANUARY 2007 TO DECEMBER 2011. BOX LIMITS REPRESENT PERCENTILES AS LABELLED.

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

BC hydro

SITE C CLEAN ENERGY PROJECT

Figure 3.3.14 - Box plot for 8-hour average CO concentrations for the Grand Prairie station

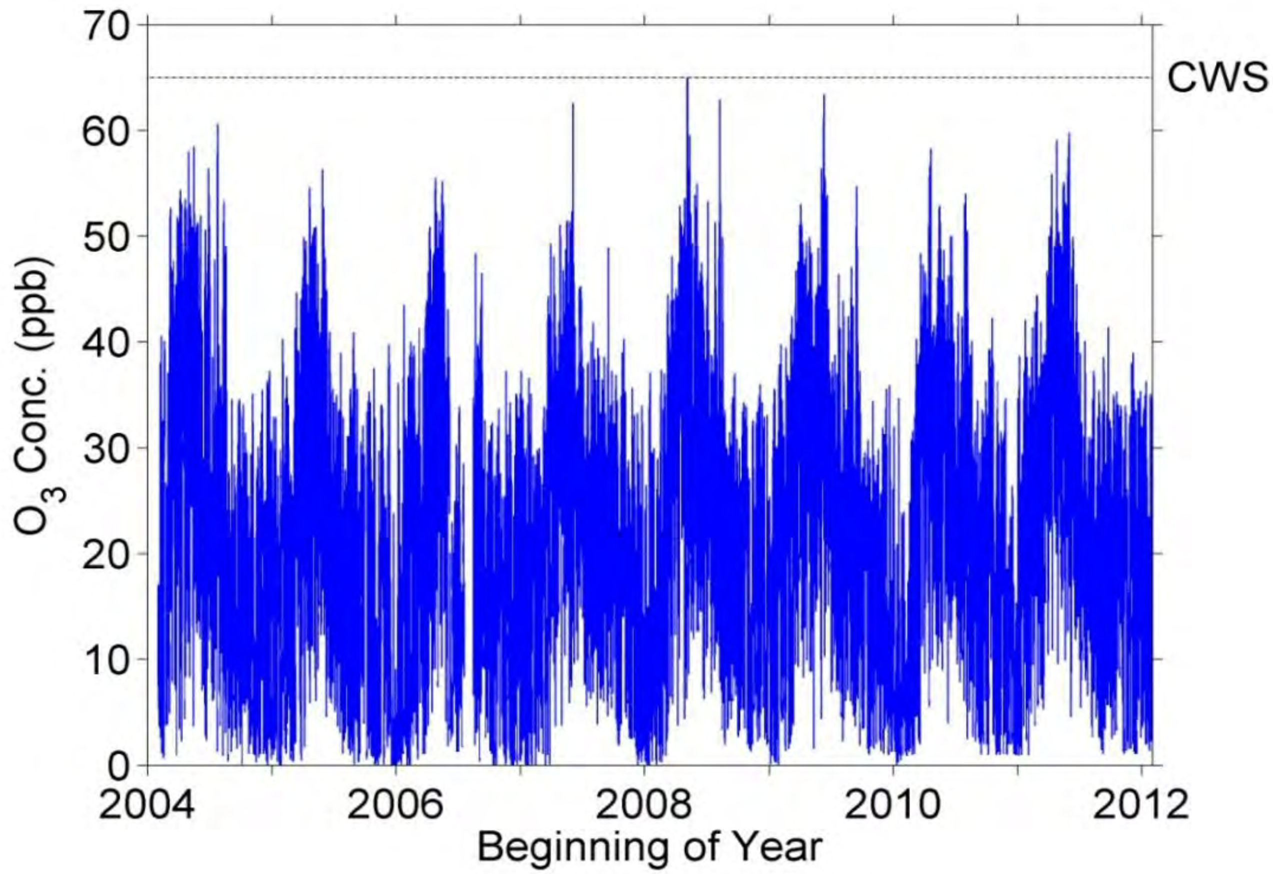


NOTES:
1. CWS DENOTES CANADA-WIDE STANDARD (65 ppb).

BC hydro

SITE C CLEAN ENERGY PROJECT

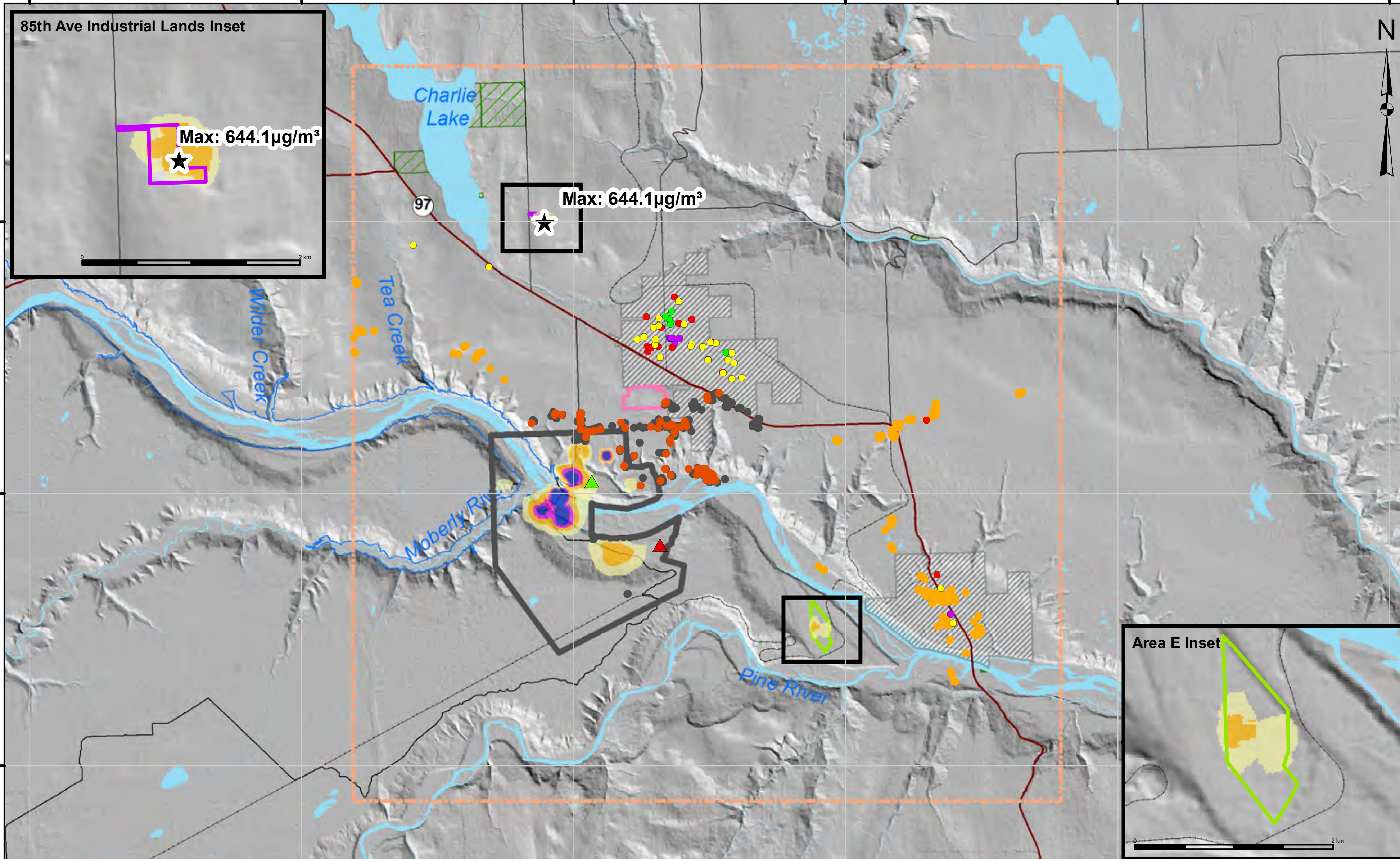
Figure 3.3.15 - 8-hour average ozone concentrations at Taylor Townsite station for the period from January 2000 to January 2002

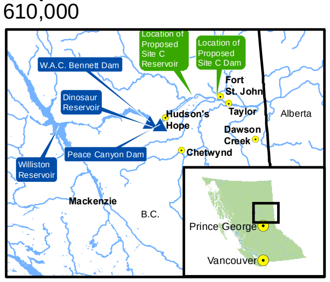


NOTES:
1. CWS DENOTES CANADA-WIDE STANDARD (65 ppb).

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

Figure 3.3.16 - 8-hour average ozone concentrations at Grand Prairie station for the period from February 2004 to January 2012





*** 24-hr TSP BC AQ Objective:**
Level A = 150 µg/m³.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Concentration (µg/m³)*
- > 900
- 600 to 900
- 300 to 600
- 150 to 300

1:200,000

0 4 km

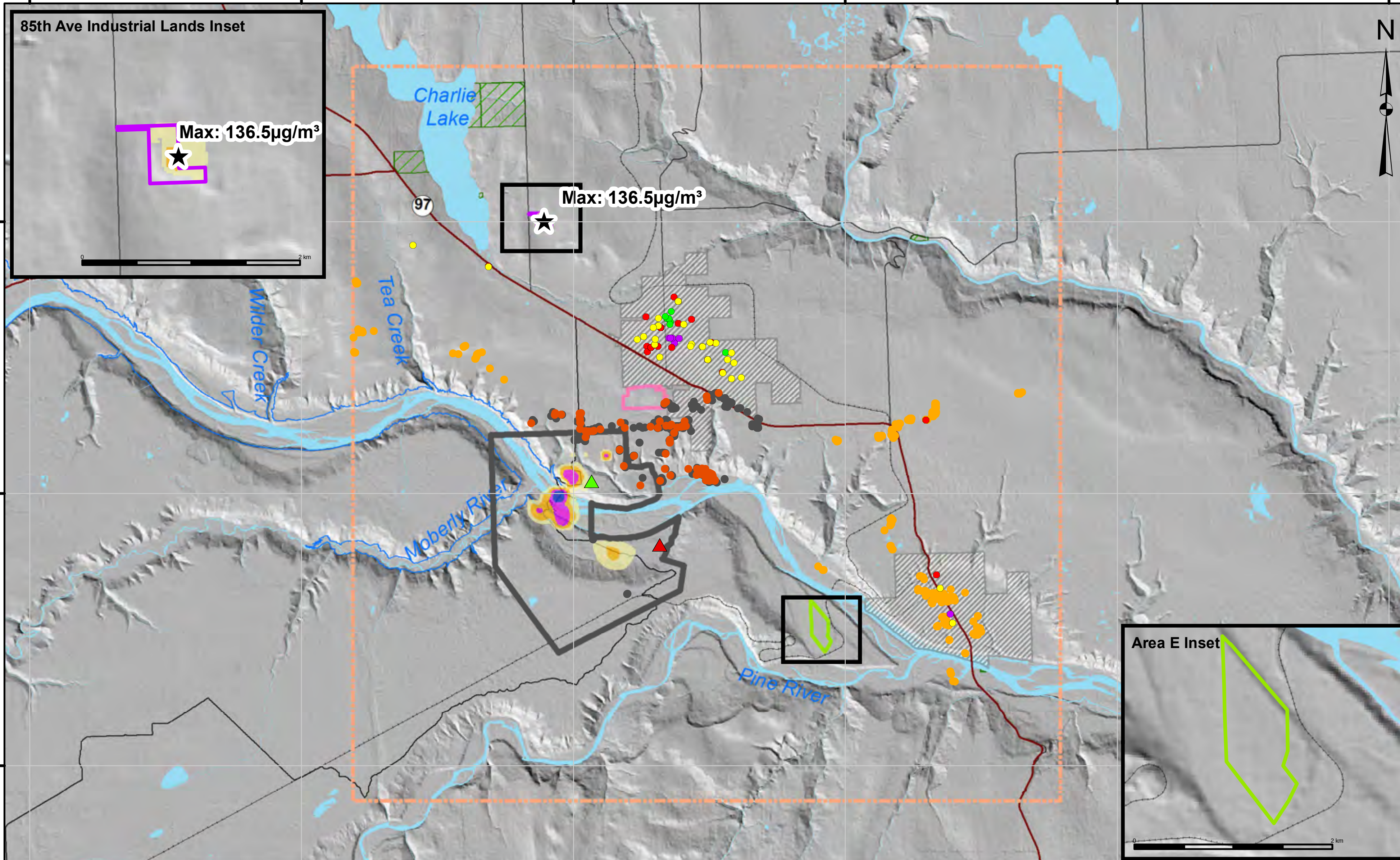
BChydro RWDI

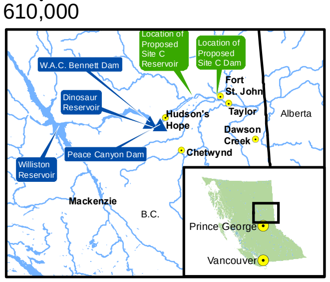
SITE C CLEAN ENERGY PROJECT

Figure 5.1.1
Maximum predicted 24-hour total suspended particulate concentrations with background

DATE	Dec. 10, 2012	1016-C14-A5534-1	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





* Annual TSP BC Level A Objective = 60 µg/m³.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Concentration (µg/m³)*
- > 480
- 240 to 480
- 120 to 240
- 60 to 120

1:200,000

0 4 km

BChydro

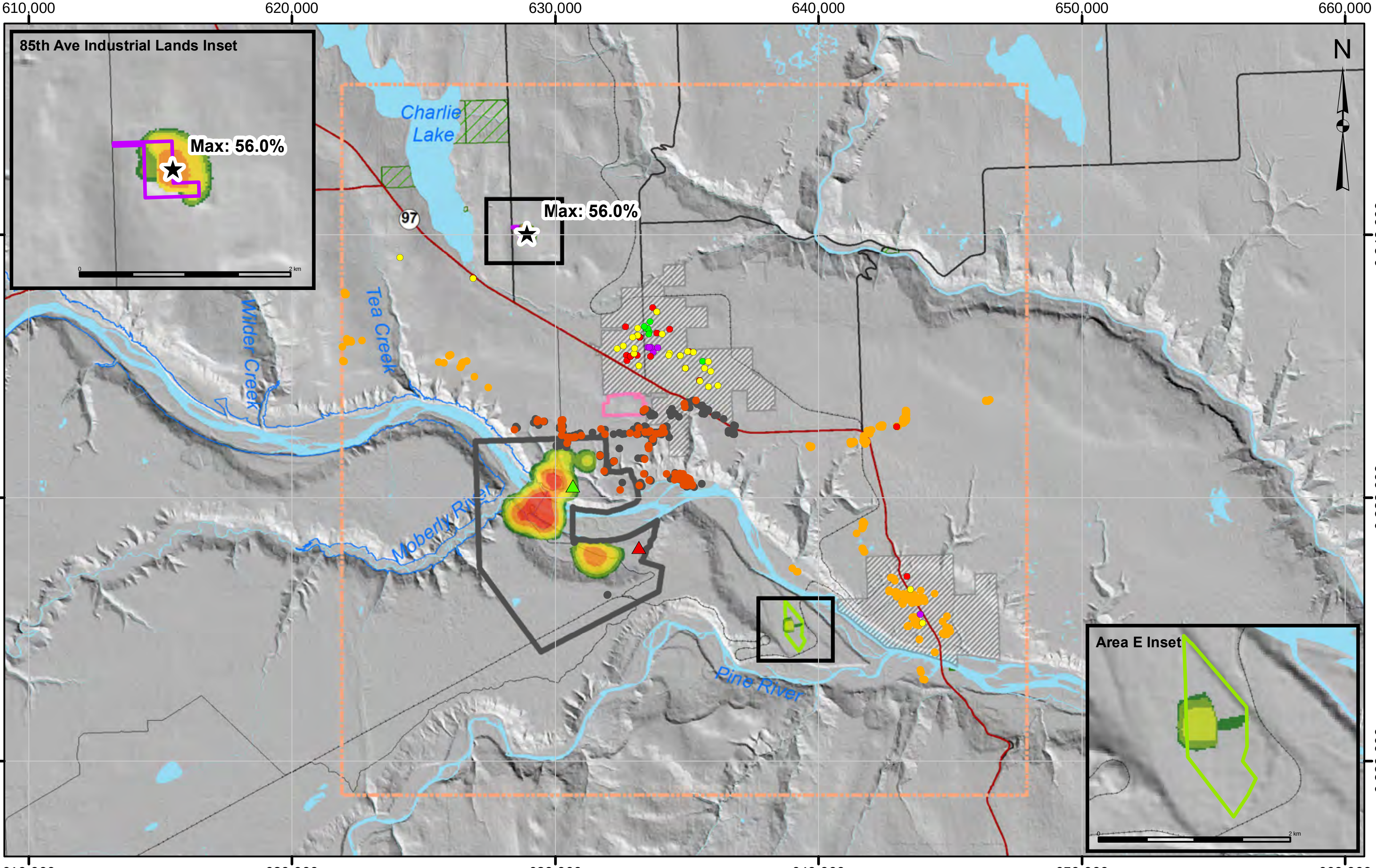
RWDI

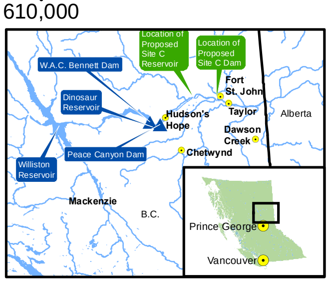
SITE C CLEAN ENERGY PROJECT

Figure 5.1.2
Maximum predicted annual total suspended particulate concentrations with background

DATE	Dec. 10, 2012	1016-C14-A5534-2	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





Frequency of predicted 24-hour Total Suspended Particulate concentrations greater than 150 µg/m³ for the Dam Site with background.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Frequency (%)
- > 50%
- 25 to 50%
- 10 to 25%
- 5 to 10%
- 2 to 5%
- 1 to 2%

1:200,000

0 — 4 km

SITE C CLEAN ENERGY PROJECT

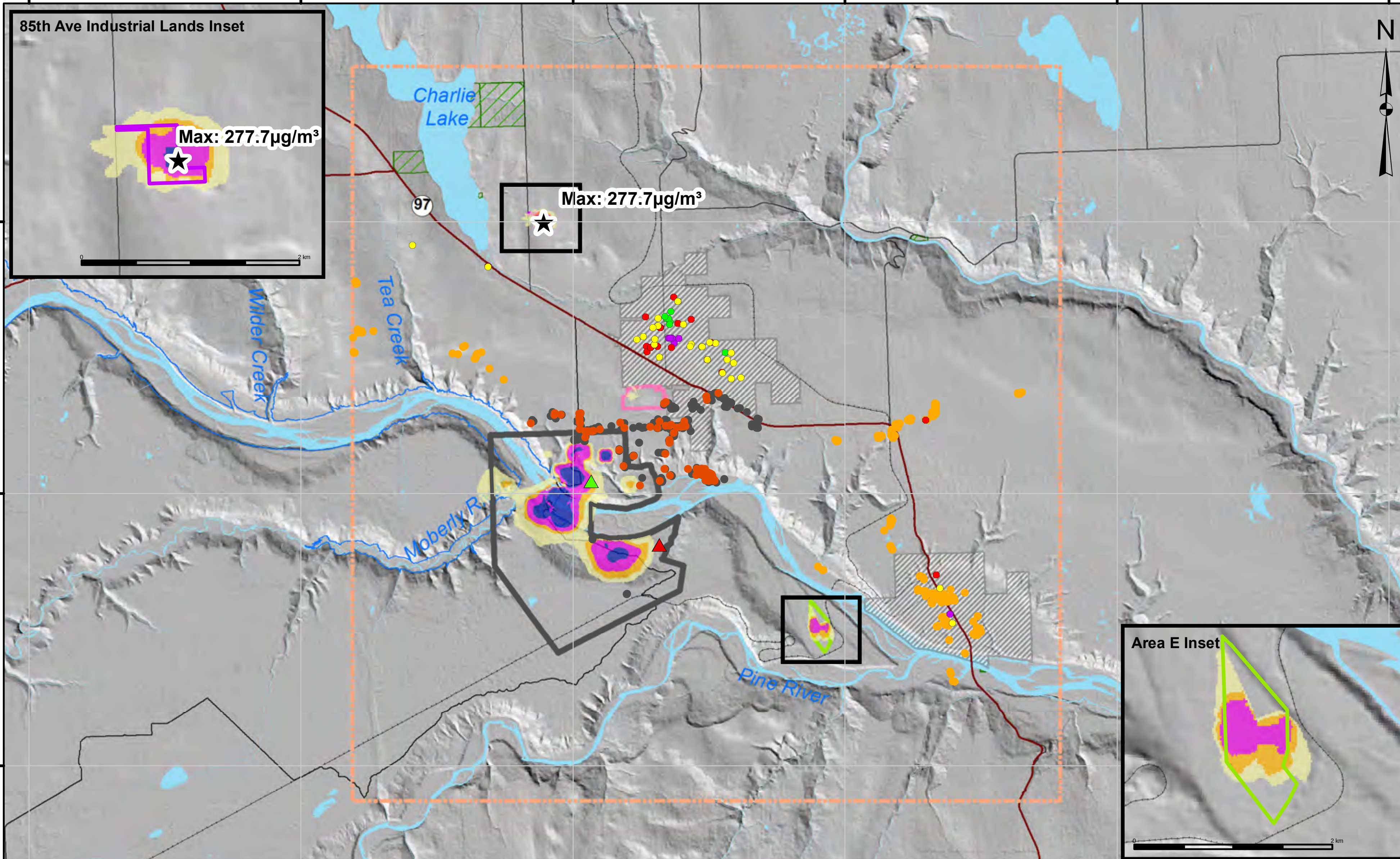
BC hydro

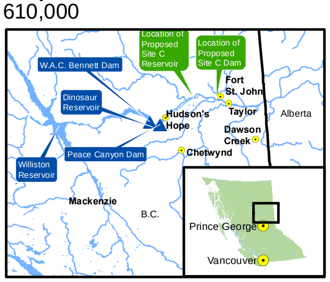
RWDI

Figure 5.1.3
Frequency of exceedance - predicted 24-hour total suspended particulate concentrations with background

DATE	Dec. 10, 2012	1016-C14-A5534-3	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





* 24-hr PM_{10} BC AQ Objective = 50 µg/m³.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Concentration (µg/m³)*
- > 200
- 100 to 200
- 75 to 100
- 50 to 75

1:200,000

0 4 km

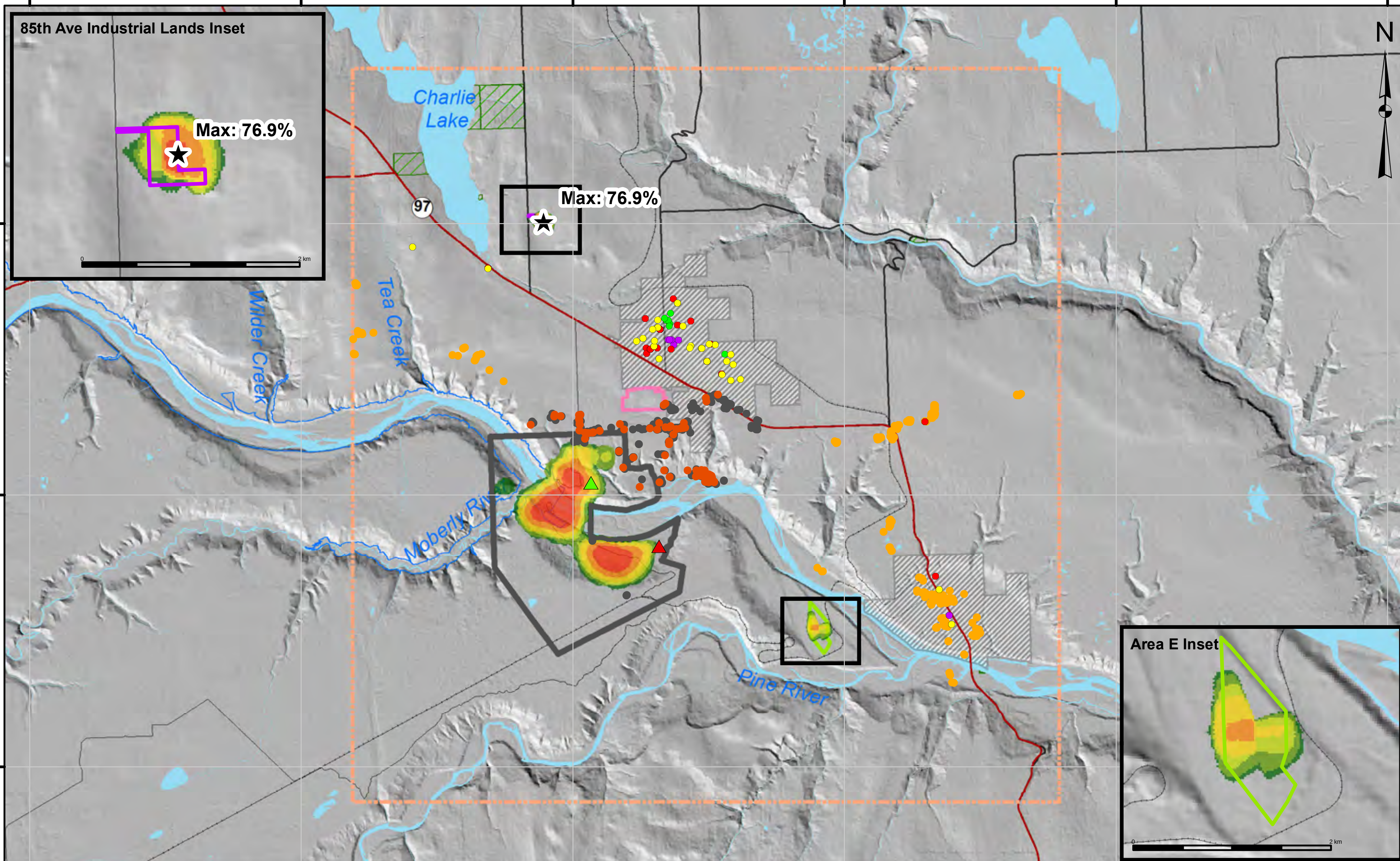
SITE C CLEAN ENERGY PROJECT

BC hydro RWDI

Figure 5.1.4
Maximum predicted 24-hour PM_{10} concentrations with background

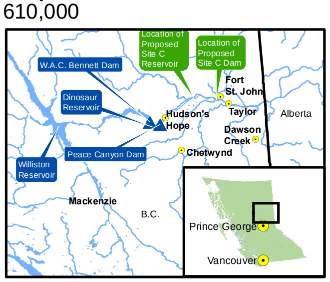
DATE	Dec. 10, 2012	1016-C14-A5535-1	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification



1:200,000

0 4 km



Frequency of predicted 24-hour PM_{10} concentrations greater than 50 µg/m³ with background.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Frequency (%)
- > 50%
- 25 to 50%
- 10 to 25%
- 5 to 10%
- 2 to 5%
- 1 to 2%

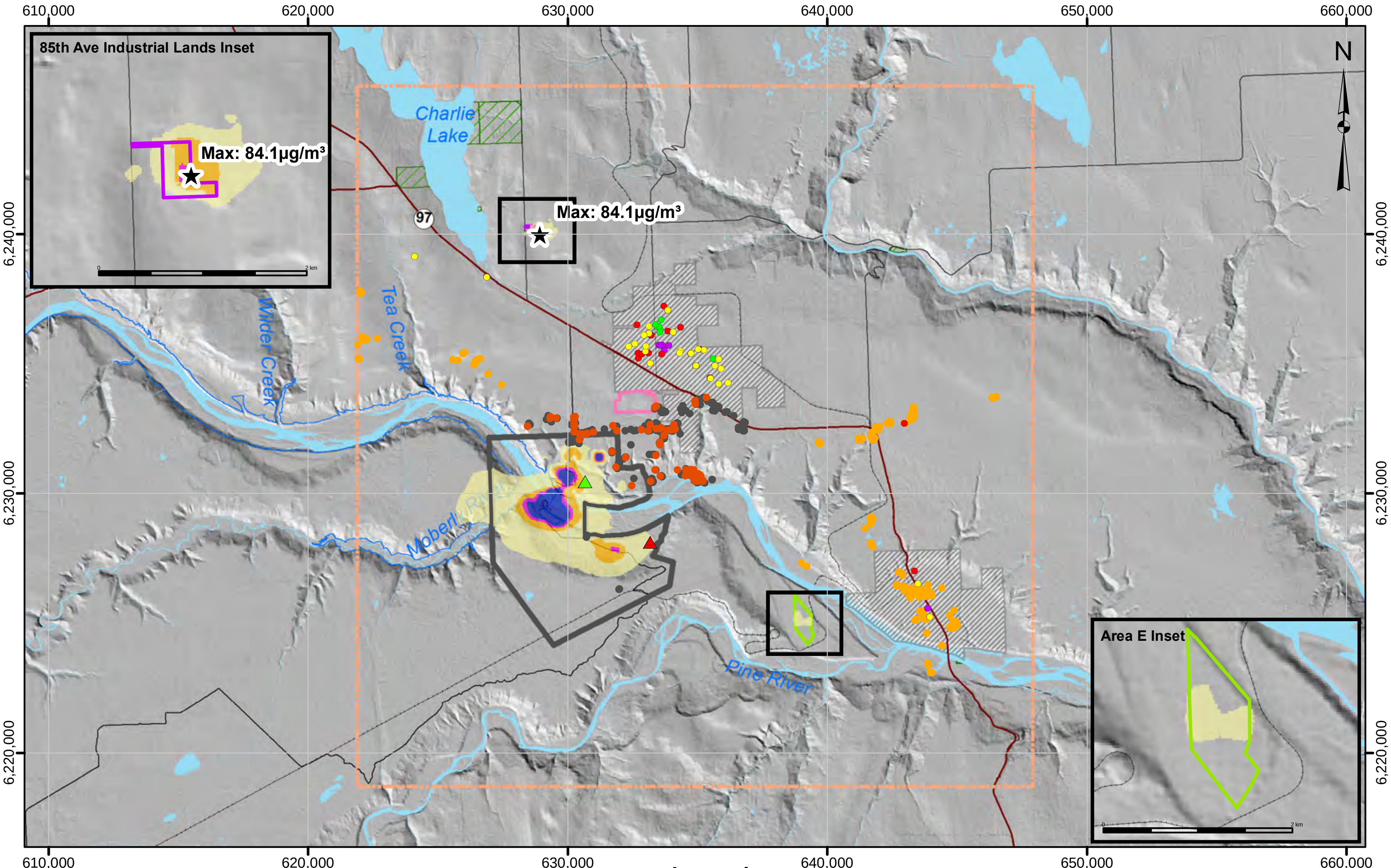
SITE C CLEAN ENERGY PROJECT

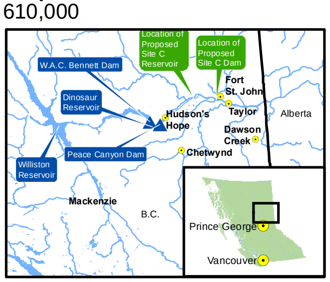
BC hydro RWDI

Figure 5.1.5
Frequency of exceedance - predicted 24-hour PM_{10} with background

DATE	Dec. 10, 2012	1016-C14-A5535-2	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





* 24-hr $PM_{2.5}$ BC AQ Objective = 25 µg/m³.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Concentration (µg/m³)*
- > 100
- 75 to 100
- 50 to 75
- 25 to 50

1:200,000

0 4 km

BChydro RWDI

SITE C CLEAN ENERGY PROJECT

Figure 5.1.6
Ninety-eighth percentile predicted 24-hour $PM_{2.5}$ concentrations with background

DATE	Dec. 10, 2012	1016-C14-A5536-1	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

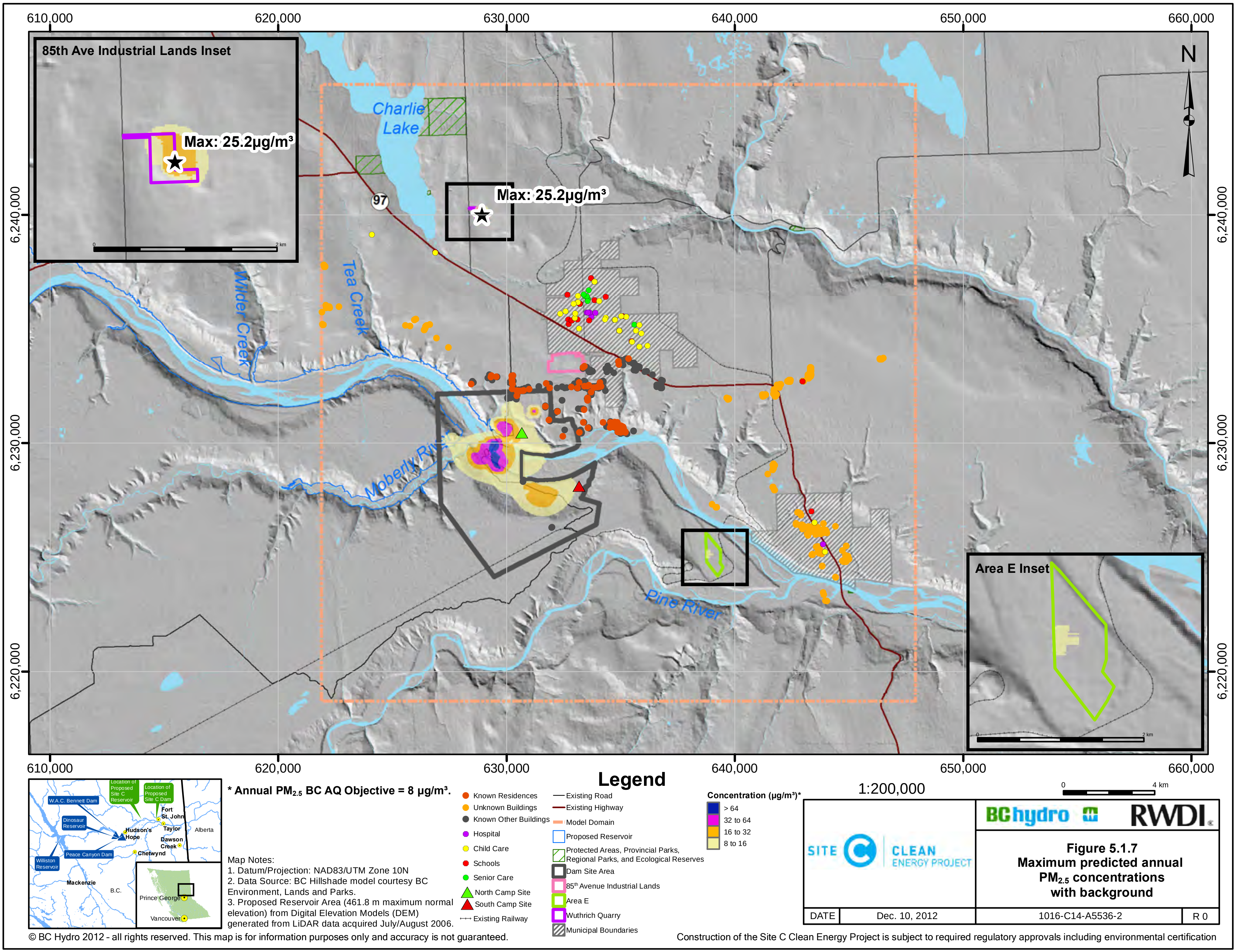
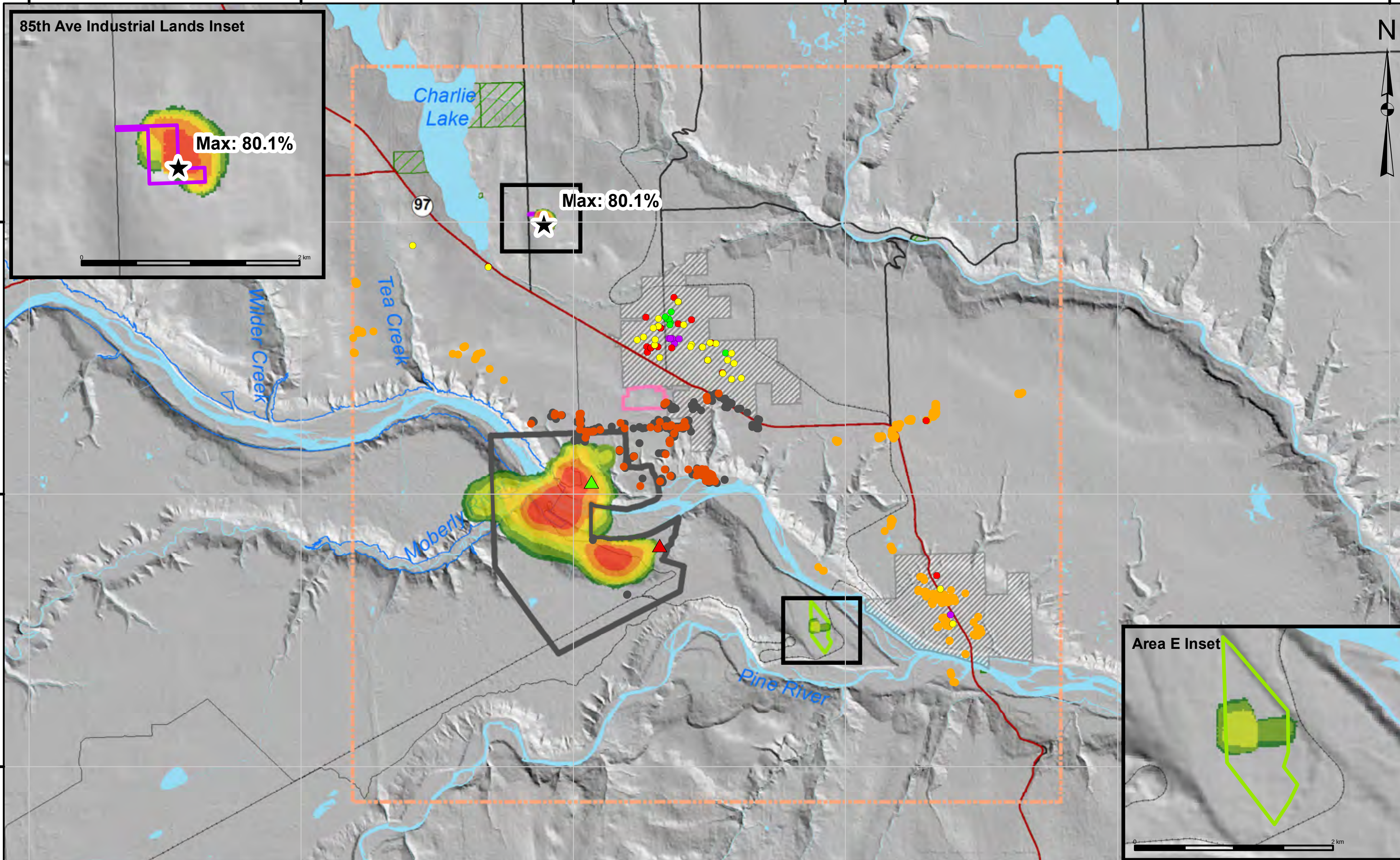
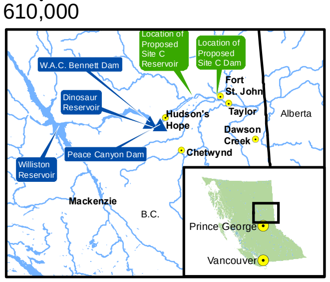


Figure 5.1.7
Maximum predicted annual $PM_{2.5}$ concentrations with background





Frequency of predicted 98th percentile 24-Hour $PM_{2.5}$ concentrations greater than 25 µg/m³ with background.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Frequency (%)
- > 50%
- 25 to 50%
- 10 to 25%
- 5 to 10%
- 2 to 5%
- 1 to 2%

1:200,000

0 4 km

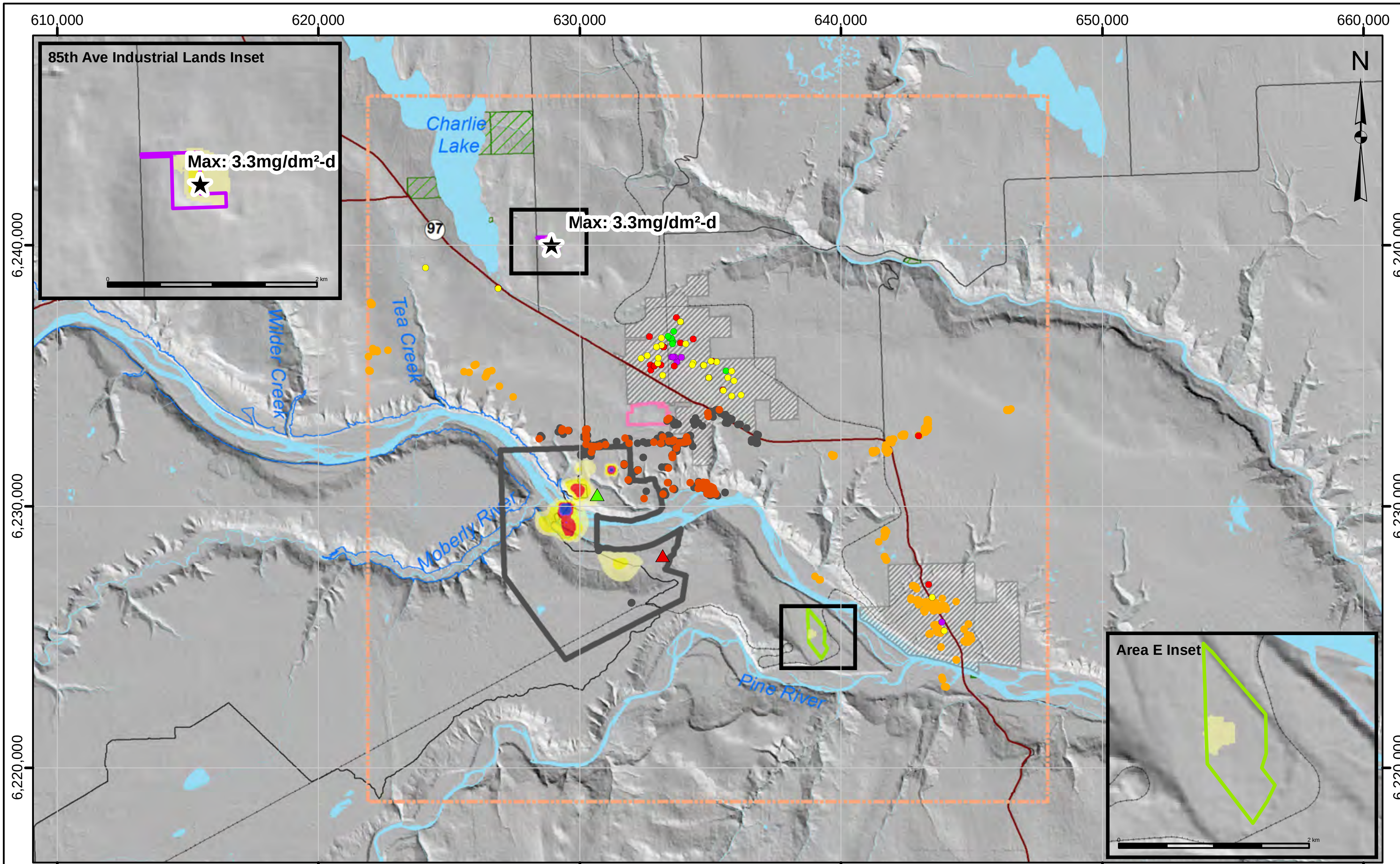
SITE C CLEAN ENERGY PROJECT

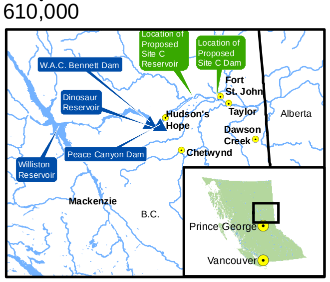
BChydro RWDI

Figure 5.1.8
Frequency of exceedance - Ninety-eigth percentile predicted 24-hour $PM_{2.5}$ concentrations with background

DATE	Dec. 10, 2012	1016-C14-A5536-3	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





*** BC Dustfall Objectives: 1.75 mg/dm²-d for residential areas and 2.9 mg/dm²-d for non-residential areas.**

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Deposition (mg/dm²-d)*
- > 11.6
- 8.7 to 11.6
- 5.8 to 8.7
- 2.9 to 5.8
- 1.75 to 2.9

1:200,000

0 4 km

SITE C CLEAN ENERGY PROJECT

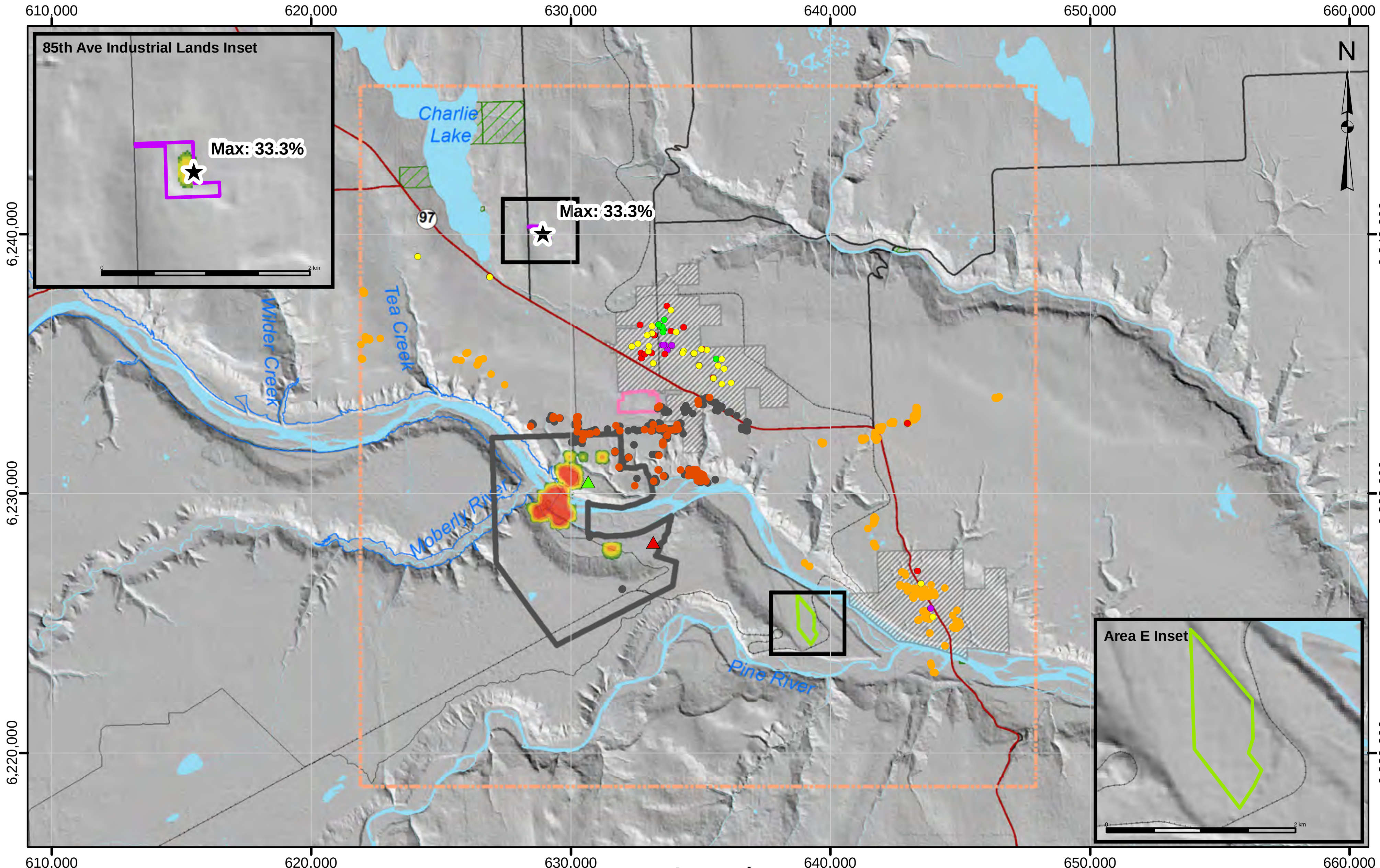
BC hydro

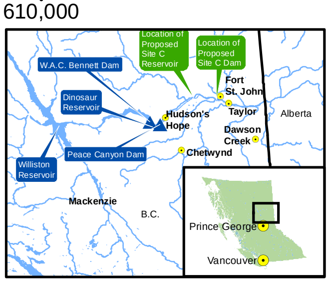
RWDI

Figure 5.1.9
Maximum predicted 30-day dustfall deposition rate with background

DATE	Dec. 10, 2012	1016-C14-A5537-1	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





Frequency of predicted 30-day dustfall deposition greater than 2.9 mg/dm²/d with background.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Frequency (%)
- > 50%
- 25 to 50%
- 10 to 25%
- 5 to 10%
- 2 to 5%
- 1 to 2%

1:200,000

0 4 km

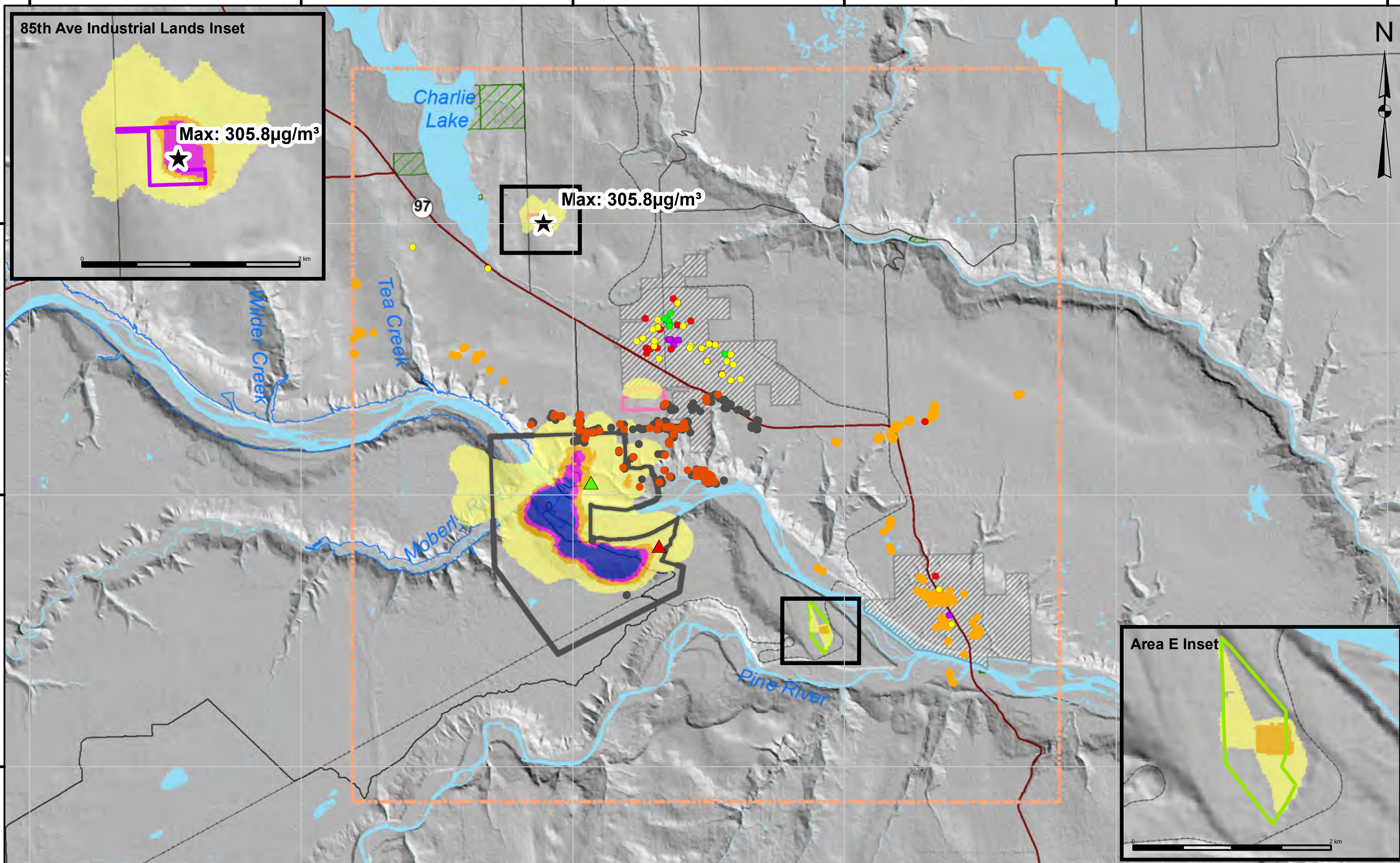
BChydro RWDI

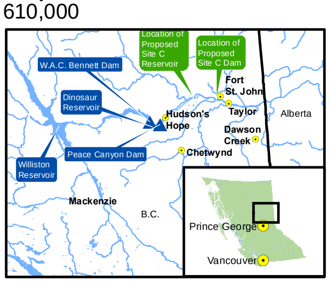
SITE C CLEAN ENERGY PROJECT

Figure 5.1.10
Frequency of exceedance (non-residential) - predicted 30-day dustfall deposition rate with background

DATE	Dec. 10, 2012	1016-C14-A5537-2	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





* 1-hr NO_2 Government of Canada AQ Objective: Maximum Acceptable Level = 400 μg/m³.

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Concentration (μg/m³)*
- > 300
- 250 to 300
- 200 to 250
- 150 to 200

1:200,000

0 4 km

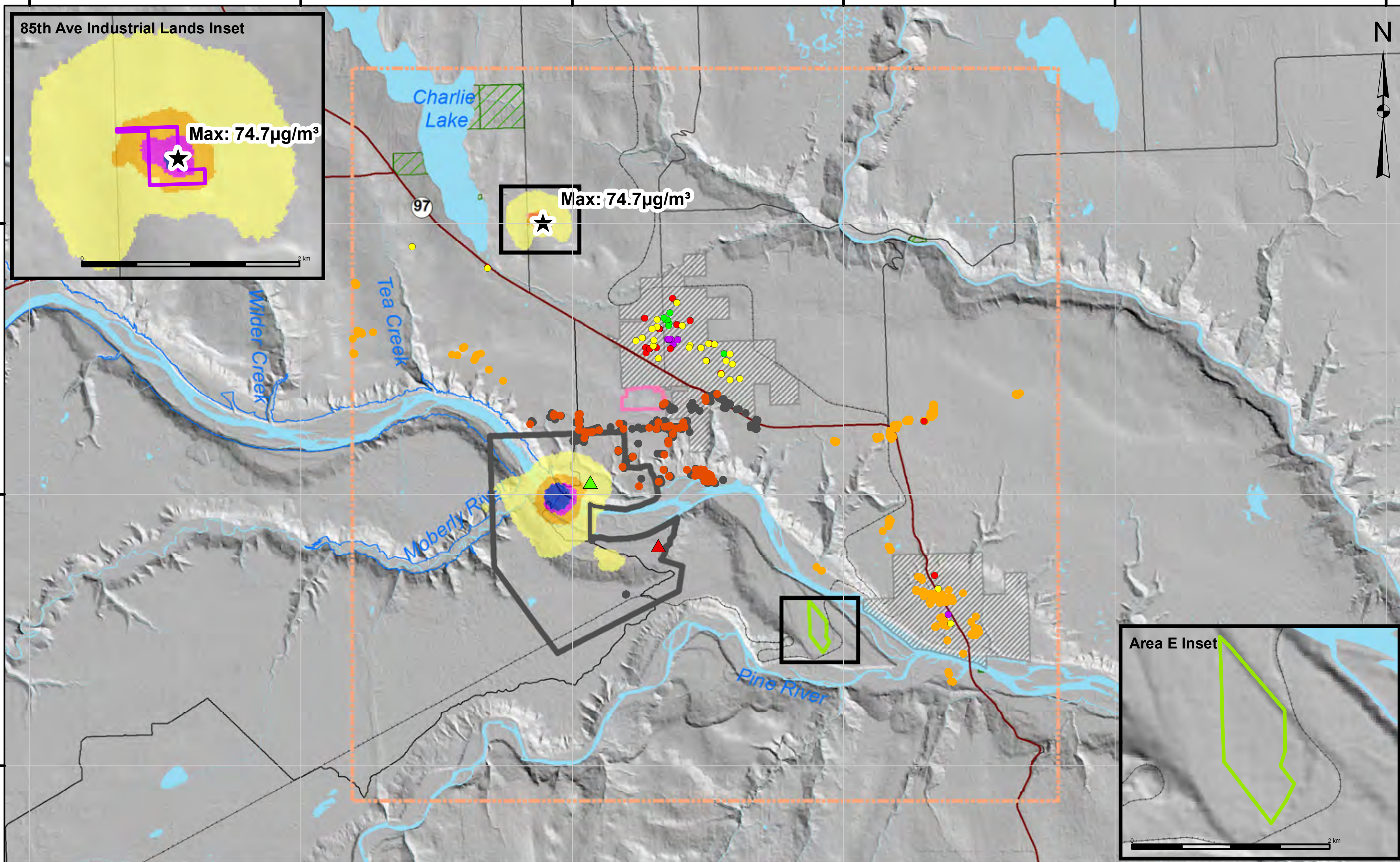
BC hydro RWDI

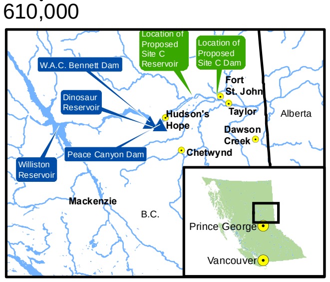
SITE C CLEAN ENERGY PROJECT

Figure 5.2.1
Maximum predicted 1-hour NO_2 concentrations with background

DATE	Dec. 10, 2012	1016-C14-A5538	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification





*** 1-hr SO_2 BC AQ Objective Level A = 450 µg/m³.**

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Concentration (µg/m³)*
- > 60
- 30 to 60
- 15 to 30
- 5 to 15

1:200,000

0 4 km

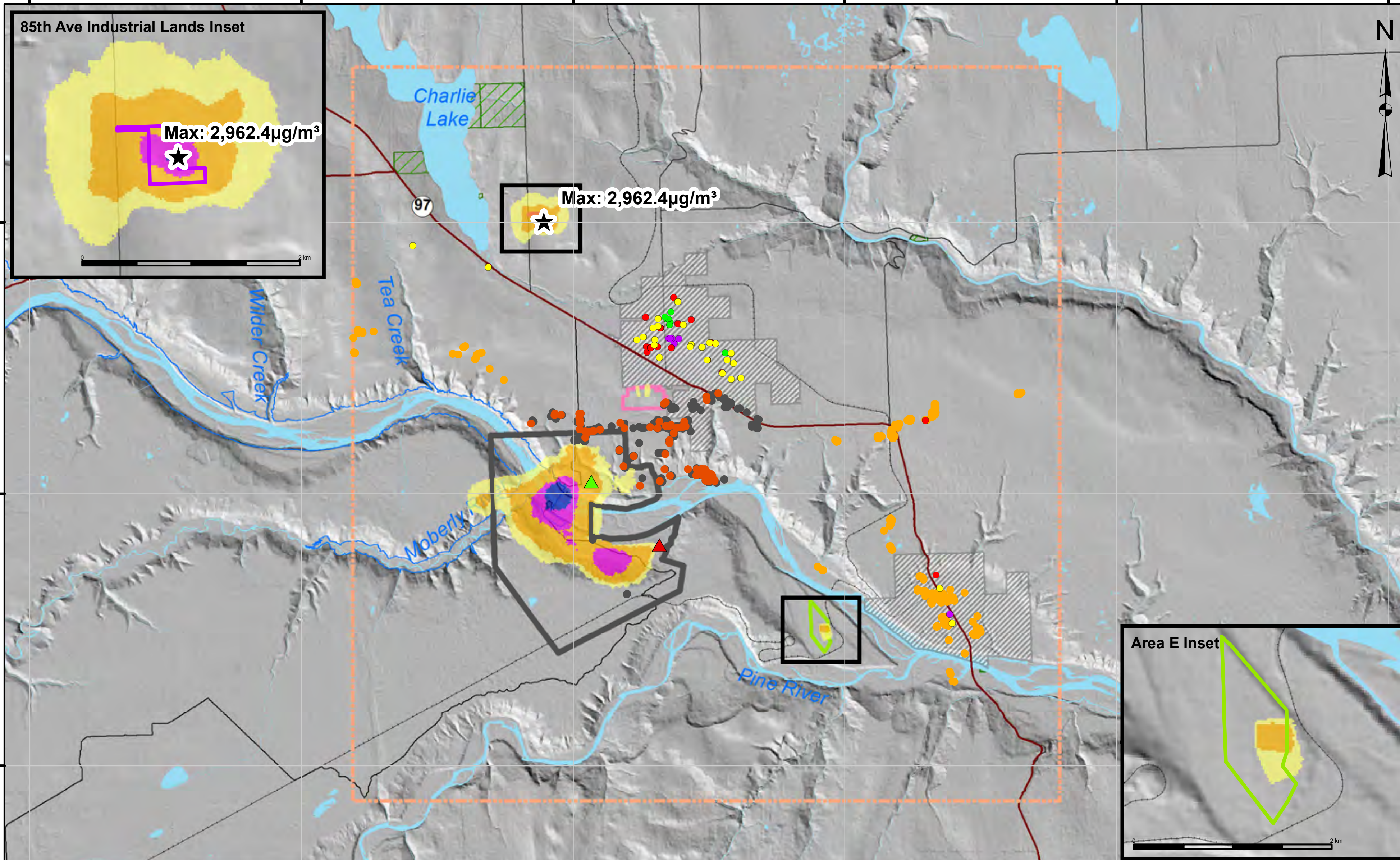
SITE C CLEAN ENERGY PROJECT

BChydro RWDI

Figure 5.2.2
Maximum predicted 1-hour SO_2 concentrations with background

DATE	Dec. 10, 2012	1016-C14-A5539	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification



Legend

- Known Residences
- Unknown Buildings
- Known Other Buildings
- Hospital
- Child Care
- Schools
- Senior Care
- North Camp Site
- South Camp Site
- Existing Railway
- Existing Road
- Existing Highway
- Model Domain
- Proposed Reservoir
- Protected Areas, Provincial Parks, Regional Parks, and Ecological Reserves
- Dam Site Area
- 85th Avenue Industrial Lands
- Area E
- Wuthrich Quarry
- Municipal Boundaries

Concentration (µg/m³)*

- > 2,500
- 1,250 to 2,500
- 625 to 1,250
- 500 to 625

*** 1-hr CO BC Level A Objective = 14,300 µg/m³.**

Map Notes:
1. Datum/Projection: NAD83/UTM Zone 10N
2. Data Source: BC Hillshade model courtesy BC Environment, Lands and Parks.
3. Proposed Reservoir Area (461.8 m maximum normal elevation) from Digital Elevation Models (DEM) generated from LiDAR data acquired July/August 2006.

1:200,000

0 4 km

W.A.C. Bennett Dam, Dinosaur Reservoir, Location of Proposed Site C Reservoir, Location of Proposed Site C Dam, Fort St. John, Hudson's Hope, Taylor, Alberta, Dawson Creek, Chetwynd, Peace Canyon Dam, Williston Reservoir, Mackenzie, B.C., Prince George, Vancouver

SITE C CLEAN ENERGY PROJECT

BC hydro RWDI

Figure 5.2.3
Maximum predicted 1-hour CO concentrations with background value

DATE	Dec. 10, 2012	1016-C14-A5540	R 0

Construction of the Site C Clean Energy Project is subject to required regulatory approvals including environmental certification

APPENDIX A

Emission Inventory Methods

A.1 Introduction

This appendix provides details on specific model inputs used in the emission inventory and dispersion modelling that are not provided in the main text of the Air Quality Technical Data Report. Model inputs are organized by the following emission sources:

- Prescribed burning and incineration
- Bulldozing
- Drilling
- Explosives detonation
- Blasting
- Material handling
- Conveyor transfers
- Concrete batch plant operations
- Material processing
- Stockpile wind erosion
- Grading and scraping
- Paved and unpaved roads
- Mobile vehicles
- Diesel-fuelled equipment
- Diesel generators
- Boats
- Aircraft
- Asphalt production

A.2 Prescribed Burning and Incineration

Information provided:

- Mass of waste/debris per burn
- Annual number of burn-days
- Annual mass of waste/debris incinerated

Assumptions were not required to estimate emissions from prescribed burning and incineration.

A.3 Bulldozing

Information provided:

- Annual volume of material (m^3)
- Bulldozer hours per 1,000 m^3 of material
- Silt content and moisture content
- Construction schedule and shifts at each location

The number of bulldozers required for each activity was estimated by rounding up the total bulldozing-hours divided by the scheduled working-hours per year. For example, if one location requires 2,500 bulldozing-hours and the scheduled working-hours per year at the same location were 1,200 hours, three bulldozers were used in the calculation.

A.4 Drilling

Information provided:

- Maximum number of drilled holes per hour
- Maximum number of drilled holes per day
- Annual number of drilled holes

Assumptions were not required to estimate emissions from drilling.

A.5 Explosives Detonation

Information provided:

- Annual amount of explosive required (kg)
- Type of explosive used

Explosives detonation for dam site tunnel construction would occur from mid-May in Year 2 to mid-May in Year 3. Dispersion modelling, however, includes blasting emissions year-round based on estimated emissions in Year 3 in order to capture meteorological conditions in the winter.

Emissions per blast were estimated by dividing total annual emissions by the annual number of blasts (see Section A.6). Emissions per blast were assumed to occur within one hour for the purposes of dispersion modelling.

A.6 Blasting

Information provided:

- Amount of explosive required (kg)
- Number of blasts per day

- Estimated area per blast (m^2)
- Construction schedule and shifts at each location

The annual number of blasts was estimated by multiplying the number of blasts per day by the number of scheduled work days at each location.

A.7 Material Handling

Information provided:

- Annual mass or volume of material (m^3)
- Silt content and moisture content
- Equipment hours per 1,000 m^3 of material

Material load, unload and placing would be separate handling activities. Till from 85th Avenue Industrial Lands would be loaded onto a conveyor and till from Area C would be loaded onto a haul truck. Till was would be unloaded and placed at the dam site.

Material densities used to estimate mass of material handled from volume of material handled was obtained from SI Metric (2012) and are presented in Table A.1. The density of gravel was estimated from the average of loose and dry gravel, natural gravel with sand, wet gravel and dry gravel. The density of till or silt was estimated from the average of wet sand, dry sand, wet clay and dry clay.

Table A.1 Material densities (in kg/m^3)

Material	Density
Concrete	2403
Gravel	1782
Limestone	1554
Riprap	1602
Shale	1586
Till or Silt	1610

A control factor of 90% was applied for the processing of washed aggregate (AWMA 2000). Although this control factor is used for the controlling of fugitive dust through wet suppression with chemicals, given the nature of washed aggregate where most of the silt is removed by washing, applying a higher control efficiency would be more appropriate; however, the control factor of 90% is more conservative and is most analogous to the washing of aggregate. A review of documents from the County of San Diego Air Pollution Control District (1998) and the San Joaquin Valley Air Pollution Control District (2012) indicates that emissions from washed aggregates are essentially zero. Therefore, the assumption of 90% control for the handling of washed aggregate provides a conservative estimate.

A.8 Conveyor Transfers

Information provided:

- Annual mass or volume of material (m^3)
- Equipment hours per 1,000 m^3 of material
- Construction schedule and shifts at each location

The densities presented in Table A.1 were used to estimate mass of material conveyed for the purposes of conveyor transfer emissions estimation.

The conveyor used for transporting till from 85th Avenue Industrial Lands would be covered at the conveyor transfer points. All other conveyors would not be covered.

A.9 Concrete Batch Plant Operations

Information provided:

- Annual mass or volume of material (m^3)
- Equipment hours per 1,000 m^3 of material
- Construction schedule and shifts at each location
- Concrete batch plant flow diagram

The densities presented in Table A.1 were used to estimate mass of material processed for the purposes of concrete batch plant operations emissions estimation.

The conventional concrete and roller-compact concrete batch plants each have a feed of aggregate (89%), cement (9.3%) and fly ash (2.1%). Material would be stored in silos each equipped with a baghouse. A control factor of 99% was applied to processes where a baghouse would be used (AWMA 2000). A control factor of 90% was applied for the processing of wet or washed aggregate (AWMA 2000).

A.10 Material Processing

Information provided:

- Annual mass or volume of material (m^3)
- Silt content and moisture content
- Equipment hours per 1,000 m^3 of material
- Borrow pit process flow diagram
- 85th Avenue Industrial Lands conveyor configuration

The densities presented in Table A.1 were used to estimate mass of material processed for the purposes of material processing emissions estimation.

Processing at construction material source areas would contain a grizzly and a conveyor. Material would be loaded onto the grizzly, and then the screened material would be conveyed onto a temporary stockpile. The stockpile would be consumed following its creation by loading the material onto haul trucks. The process flow and corresponding transfer points were based on the list of equipment provided for roller compact concrete (RCC) and conventional concrete (CVC) aggregate production.

A control factor of 99% was applied to crushing activities where a baghouse would be used (AWMA 2000). A control factor of 90% was applied for the processing of wet or washed aggregate (AWMA 2000) at grizzly screens. There were no controls assumed for scalping screens.

A.11 Stockpile Wind Erosion

Information provided:

- Maximum surface area of stockpile (m^3)
- Height of stockpile (m)
- Silt content and moisture content
- Material and aggregate size
- Type of dust control

Stockpiles would be conical. For stockpiles where moisture content and silt content were not known, a moisture content of 2.1% and silt content of 3.9% was used, based on stone quarrying and processing industry averages listed in Section 13.2.4 of AP-42 (US EPA 2006).

A control efficiency of 90% was applied to aggregate stockpiles that are sprayed (WRAP 2006) and a control efficiency of 100% was applied to aggregate stockpiles that are washed (San Joaquin Valley Air Pollution Control District 2012; County of San Diego Air Pollution Control District 1998).

A.12 Grading and Scraping

Information provided:

- Annual volume of material (m^3) (dam construction only)
- Grader and scraper hours per 1,000 m^3 of material (dam construction only)
- Annual grader and scraper operating hours (clearing, transmission line and road infrastructure only)
- Silt content and moisture content
- Construction schedule and shifts at each location

For activities or locations where a scraper or grader is listed, all material would be scraped and/or graded. For rock excavation, the ripping and non-ripping fractions were identified as separate activities.

The densities presented in Table A.1 were used to estimate the mass of material handled for the purposes of grading and scraping emissions estimation. The AP-42 geometric mean vehicle speed of 11.4 km/h was used for the calculation of PM emissions associated with grading (US EPA 1998).

The number of graders required for each activity was estimated by rounding up the total grading-hours divided by the scheduled working-hours per year. For example, if one location requires 2,500 grading-hours and the scheduled working-hours per year at the same location were 1,200 hours, three graders were used for the calculation.

In order to quantify a reduction in emissions relative to the factors provided in Section 11.9 of AP-42 (US EPA 1998), the information provided in both Section 13.2.2 of AP-42 Unpaved Roads (US EPA 2006b) and Section 13.2.4 of AP-42 Aggregate Handling and Storage Piles (US EPA 2006) were reviewed. These documents provide two methods for estimating the control efficiency due to increased moisture levels. Both methods indicate that a control efficiency of 80% would be conservative for natural moisture content values higher than 5%. At a natural moisture content value of 18%, emissions would be controlled by over 95%. Thus, as a conservative estimate, a value of 80% was used for both grading and scraping where the natural moisture content is greater than 5%.

A.13 Paved and Unpaved Roads

Information provided:

- Onsite speed limit (km/h)
- Construction schedule and shifts at each location
- Annual volume of material (m^3) (dam construction only)
- Equipment and vehicle hours per 1,000 m^3 of material (dam construction only)
- Vehicle hours (generating equipment installation only)
- Annual number of units (generating equipment installation and service vehicles only)
- Vehicle empty and loaded weight (kg/each) (service vehicles only)
- Traffic management plan (truck hauls and worker transport vehicles only)
- Annual number of trips (clearing and transmission line only)
- Average one-way trip distance (km) (transmission line and service vehicles only)

Trip distances were estimated for clearing, truck haul and worker transport vehicles based on available route descriptions. For dam construction vehicles operating at 85th Avenue Industrial Lands, Area E, Wuthrich Quarry and West Pine Quarry, the average one-way trip distance would be 0.5 km, representing a short direct route from the location at which trucks are loaded to a local road outside the construction boundary. Within the dam site, a configuration of roads would be based on topography and site layout. Trip distances for construction vehicles operating within the dam site were then estimated using this road configuration based on the start and end points identified for each activity.

The total distance travelled per vehicle was estimated in one of two ways: (1) based on the annual number of trips and the average trip distance, or (2) based on the annual hours of operation and the onsite or posted speed limit. In cases where only the annual number of units was provided (i.e. service vehicles), the annual number of trips was estimated by assuming all units made one round trip per working shift.

The onsite speed limit was given as 25 km/h at the dam site and construction material source areas, and 30 km/h at transmission line. Onsite speed limit for clearing and road infrastructure was given as be 25 km/h. The speed limit on highways would be 80 km/h, and the speed limit on other public roads would be 50 km/h.

Vehicle empty and loaded weights were estimated based on manufacturer specifications for representative vehicles. For vehicles where the model or size was not known, they were assumed to be similar to units used at the dam site to obtain an average vehicle weight.

A silt content of 8.3% was assumed for all unpaved roads based on the average silt content of haul roads to and from pits for stone quarry and processing, obtained from Section 13.2.2 *Unpaved Roads* of AP-42 (US EPA 2006b). The baseline silt loading value for low volume roads (0.6 g/m^2) from Section 13.2.1 *Paved Roads* of AP-42 (US EPA 2011) was used for all paved road calculations. Although some roads are not considered low volume, the silt loading of low volume roads would provide the most conservative estimate, as silt loadings on higher volume roads tend to be lower.

Vehicles that travel between construction areas were separated into a vehicles-in-transit category, where emissions tabulated were separate from travel within the dam site or construction material source areas.

All roads inside the dam site and construction material source areas would be unpaved. For vehicles used during clearing activities and vehicles that travel both at Site C and the transmission line, half the vehicle distance travelled was assumed to be on unpaved roads. All other vehicles on the transmission line and all road infrastructure construction vehicles and vehicles-in-transit would travel only on paved roads.

Haul truck trips from the Wuthrich and West Pine construction material source areas were obtained from the traffic management plan for the worst case year; the haul truck trips for all other years were scaled based on the material processed.

The average one-way trip distance was assumed to be three kilometres for onsite service vehicles and five kilometres for offsite service vehicles. Shuttle bus trips between Fort St. John Airport and the dam site cover a one-way trip distance of ten kilometres, plus the distance from the dam site construction boundary to the core trench area along roads within the assumed road configuration.

To reduce re-suspension of road dust particles on unpaved roads, water trucks would apply water to the haul roads as needed during the spring and summer. An average control efficiency of 75% was used for year-round road dust control. The use of 75 per cent control efficiency reflects an increase in the moisture content of the haul road surface to roughly twice that of the natural moisture level, as a result of watering activities and natural precipitation (US EPA 2006b).

A.14 Motor Vehicle Combustion

Information provided:

- Onsite speed limit (km/h)
- Construction schedule and shifts at each location
- Annual volume of material (m^3) (dam construction only)
- Equipment and vehicle hours per 1,000 m^3 of material (dam construction only)
- Vehicle hours (generating equipment installation only)
- Annual number of units (generating equipment installation and service vehicles only)
- Vehicle empty and loaded weight (kg/each) (service vehicles only)
- Traffic management plan (truck hauls and worker transport vehicles only)
- Annual number of trips (clearing and transmission line only)
- Average one-way trip distance (km) (transmission line only)

The total distance travelled per vehicle was estimated in one of two ways: (1) based on the annual number of trips and the average trip distance, or (2) based on the annual hours of operation and the onsite or posted speed limit. In cases where only the annual number of units was provided (i.e. service vehicles), the annual number of trips was estimated by assuming all units made one round trip per working shift.

Emission factors generated by the MOVES model are dependent on vehicle speeds. For vehicles that travel between two incremental speeds preset in the MOVES model, emission factors based on the faster of the two speeds were used (US EPA 2012).

Meteorological data for January and July were obtained from climate normals provided by Environment Canada (2012). The MOVES model was executed using meteorological data for each month, with the greater emission factor generated for January and July used to estimate emissions. Road types selected for the MOVES model include rural restricted access and urban unrestricted access. Speed categories ranged from 0 to 115 km/h. Fuel types selected include gasoline and diesel. All vehicle types were selected except for motor home and motorcycle.

Vehicles that travel between construction areas were separated into a vehicles-in-transit category, where emissions tabulated were separate from travel within the dam site or construction material source areas. Haul truck trips from the Wuthrich and West Pine construction material source areas were obtained from the traffic management plan for the worst case year; the haul truck trips for all other years were scaled based on the material processed.

The average one-way trip distance was assumed to be three kilometres for onsite service vehicles and five kilometres for offsite service vehicles. Shuttle bus trips between Fort St. John Airport and the dam site would cover a one-way trip distance of ten kilometres, plus the distance from the dam site construction boundary to the core trench area along roads within the assumed road configuration.

A.15 Diesel-fuelled equipment

Information provided:

- Construction schedule and shifts at each location
- Annual volume of material (m^3) (dam construction only)
- Equipment type and equipment hours per 1,000 m^3 of material (dam construction only)
- Annual operating hours per unit (except dam construction)
- Equipment horsepower (hp)
- Equipment model year

Where information on equipment horsepower was unavailable, data from typical equipment based on type, size and load were obtained from Caterpillar Inc. or from other manufacturers for equipment not manufactured by Caterpillar Inc.

For road construction, cranes were assumed to be 375 horsepower, compactors were assumed to be 401 horsepower, road reclaimers were assumed to be 540 horsepower, and pavers were assumed to be 173.5 horsepower. The 988H loader was assumed to be used for loading of asphalt for road construction. Equipment such as wheel saw and planers would have a small contribution to emissions due to their size and duration of use; therefore they were not included in the emissions estimates.

The number of equipment required for each activity was estimated by rounding up the total equipment-hours divided by the scheduled working-hours per year. For example, if one location requires 2,500 equipment-hours and the scheduled working-hours per year at the same location were 1,200 hours, there would be three units.

Emissions of PM, NO_X and CO were calculated based on the methodology used in the US EPA NONROAD model (US EPA 2004). Emissions of SO_X were estimated based on a 15 parts per million (ppm) sulphur content in non-road diesel implemented in 2010.

A.16 Diesel Generators

Information provided:

- Annual operating hours
- Fuel consumption
- Electric power rating in kW (not available for light tower generators)

Horsepower ratings were estimated based on the provided electric power ratings, where available, assuming an 80% generating efficiency. Where electric power ratings were not available (i.e. light tower generators), horsepower ratings were estimated from manufacturer specifications from Magnum Products LLC. Specifically, models MLT 4080 and MLT 4150 were references as the manufacturer specified fuel consumptions were similar to those provided for light tower generators.

A.17 Boats

Information provided:

- Vessel model and engine type
- Number of units
- Number of trips per year
- Average distance per trip (km)

As a conservative assumption, the load factor was assumed to be one (100 percent) for all boats. Emissions of SO_X were estimated based on 15 ppm sulphur content in marine diesel, which is consistent with amendments to Canada's Sulphur in Diesel Fuel Regulation that came into effect in 2007 (Environment Canada 2012b).

Boat travel speed was assumed to be 15 km/h, which corresponds to slow vessels as defined in the *2005 to 2006 BC Ocean-Going Vessel Emissions Inventory Report* (Chamber of Shipping 2007). Power-based emission factors for main engines in underway mode were used.

A.18 Aircraft

Information provided:

- Aircraft model
- Aircraft horsepower (hp) (transmission line only)
- Aircraft fuel type
- Number flying days
- Number of aircraft (transmission line only)
- Number of trips per year (clearing only)
- Average distance per trip (km) (clearing only)

Emissions of TSP are not available in the EDMS (FAA 2007) but can be estimated from a SO_X-to-TSP ratio of 2.8 provided by Criteria Air Contaminants Emissions Inventory 2002 Guidebook (Environment Canada 2006). Emissions of PM_{10} and $PM_{2.5}$ were estimated using the Particulate Matter Speciation Profiles by CEIDARS (2009) for aircraft powered by jet fuel.

Assumptions were made on the helicopter type as there are limited models in the EDMS database. Helicopters to be used for the Project were matched with similar units in the EDMS database based on the helicopter type and engine horsepower. The H500E (300hp) was assumed to be similar to Hughes 500D (317hp), the A35t Twin (420hp) was assumed to be similar to Boelkow BO-105 (420hp), and the Bell 205 was replaced by Bell UH-1 Iroquois in EDMS because Bell UH-1 Iroquois was the military equivalent. Emissions were not estimated for helicopters used for emergencies because they are not scheduled Project construction activities.

A.19 Asphalt Production

Information provided:

- Asphalt plant type and fuel type
- Mass of asphalt produced (tonnes)
- Boiler power rating (MMBtu/h)
- Hot mix asphalt mix temperature (^{o}F)
- Operating hour

The asphalt volatility was assumed to be 0.50 and the ash content was assumed to be 0.65 from Section 11.1 Hot Mix Asphalt Plants of AP-42 (US EPA 2004b). The heating value of waste oil was assumed to be 140,000 BTU/gal or 11 kWh/L (AGSolutions LLC 2012). Emission factors for batch mix hot mix asphalt plants with a fabric filter (baghouse) were used.

The asphalt plants would have a silo and a load-out. As a conservative assumption, emissions of PM_{10} and $PM_{2.5}$ were assumed to be equal to TSP for asphalt load-out and silo filling as there are only emission factors for TSP.

A.20 References

AGSolutions LLC, 2012. Online: http://www.wasteoilboiler.net/page/page/waste_oil_burning_facts.htm (Accessed July 2012).

Air & Waste Management Association (AWMA). 2000. Air Pollution Engineering Manual, Second Edition. 886 pp. ISBN: 0-471-33333-6.

CEIDARS. 2009. California Emission Inventory and Reporting System.

The Chamber of Shipping. 2007. BC Ocean-Going Vessel Emissions Inventory Report

County of San Diego Air Pollution Control District. 1998. http://www.sdapcd.org/toxics/emissions/trpts/trpts1.pdf

Environment Canada. 2006. Criteria Air Contaminants Emissions Inventory 2002 Guidebook.

Environment Canada. 2012. Canadian Climate Normals or Average 1971-2000. Online: http://climate.weatheroffice.gc.ca/climate_normals/index_e.html (Accessed May 2012)

Environment Canada. 2012b. Sulphur in Diesel Fuel Regulation. Online: http://www.ec.gc.ca/energie-energy/default.asp?lang=En&n=7A8F92ED-1 (Accessed May 2012)

Federal Aviation Administration. Office of Environment and Energy. 2007. Emissions and Dispersion Modeling System (EDMS) User's Manual. Prepared by CSSI Inc.

San Joaquin Valley Air Pollution Control District. 2012. http://www.valleyair.org/busind/draft-policies/DraftAggregatepolicy_Rev6.pdf

SI Metric. 2012. Online: http://www.simetric.co.uk/si_materials.htm (Accessed July 2012)

United States Environmental Protection Agency (US EPA). 1998. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 11.9: Western Surface Coal Mining. 14 pp.

US EPA 2004. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition. EPA 420-P-04-009. 135 pp.

US EPA. 2004b. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 11.1: Hot Mix Asphalt Plants. 63 pp.

US EPA. 2006. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.2.4: Aggregate Handling and Storage Piles. 6 pp.

US EPA. 2006b. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.2.2: Unpaved Roads. 20 pp.

US EPA. 2011. AP-42, Fifth Edition Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. Section 13.2.1: Paved Roads. 15 pp.

US EPA. 2012. Motor Vehicle Emission Simulator (MOVES) – User Guide for MOVES2010b.

WRAP. 2006. Western Regional Air Partnership Fugitive Dust Handbook.

APPENDIX B

Conceptual Model Plan

RWDI
CONSULTING ENGINEERS & SCIENTISTS

Tel: 604.730.5688
Fax: 604.730.2915

RWDI AIR Inc.
830 – 999 West Broadway
Vancouver, B.C., Canada
V5Z 1K5
Email: solutions@rwdi.com

July 13, 2012

BC Ministry of Environment
Environmental Protection Division
Environmental Quality Section
#325 – 1011 Fourth Ave.
Prince George, BC V2L 3H9

RWDI AIR Project: 0920007A

Attention: Dennis Fudge
Email: Dennis.Fudge@gov.bc.ca

Subject: Site C Clean Energy Project - Conceptual Model Plan

Dear Mr. Fudge,

The Site C Clean Energy Project is a proposed third dam and hydroelectric generating station on the Peace River in northeast BC, southwest of Fort St. John. It would provide up to 1,100 MW of capacity and produce about 5,100 GWh of clean and renewable electricity each year. The main permanent components of the project include the dam, generating station and associated structures; an 83-km reservoir that would be, on average, two to three times the width of the current river; a transmission line connecting Site C to Peace Canyon; and realignment of four segments of Highway 29, including four new bridges. The main temporary components of the Project include access roads, worker housing, offices, staging areas, several cofferdams, and material borrow areas and quarries.

Most of the air emissions associated with the Project are expected to occur during construction, which is expected to take seven years. Based on a request from Health Canada, we are proposing to estimate and model construction emissions. The focus of the modelling will be on at the dam site since it is the component located closest to a populated area and will likely be the largest source of emissions. Enclosed is our Conceptual Model Plan for the air quality assessment of Site C Clean Energy Project.

If you have any questions or comments regarding the information contained in this Conceptual Model Plan, please do not hesitate to contact me at 604-730-5688 ext. 2480.

Yours sincerely,

Laura Dailyde, P.Eng.
Project Manager

Date: July 13, 2012

Facility Name, Company and Location (Lat., Long.):

Site C Clean Energy Project, BC Hydro (56° 11’ 46.00” N, 120° 54’ 48.00” W)

Air Quality Consultant and Contact Name:

Laura Dailyde, RWDI AIR Inc. (604) 730-5688 x2480
Kathy Preston, RWDI AIR Inc. (604) 730-5688 x3223

Ministry Contact (Air Quality Assessment):

Dennis Fudge

Assessment Type: ***Answer 2 or 3.***

3

Anticipated sources to be modelled and corresponding contaminants:

Modelling will be performed on the dispersion modelling study area (DMSA) surrounding the dam site during construction only. Fugitive dust will be emitted by the various dam construction activities including blasting, concrete batch plant operations, material handling, material processing, crushing, and stockpiling. In addition, fugitive dust from ancillary activities that occur within the DMSA such as transmission line right-of-way construction, road and bridge construction, vegetation clearing, and construction material source area operations will be included in the modelling. Criteria air contaminants (CACs) will be emitted by boilers, heaters, generators, vehicles, and equipment operating during dam construction and ancillary activities in the DMSA. We propose to model sulphur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), total suspended particulates (TSP), particulate matter less than or equal to 10 microns in diameter (PM_{10}), particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and dustfall.

Source	Source Type (Point, Line, Area, Volume)	Contaminant(s) SO_2, CO, NO_2, TSP, PM_{10}, $PM_{2.5}$, Dustfall
Dam Construction		
Blasting	Volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Concrete batch plant operations	Area or volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Material handling	Volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Material processing	Area or volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Construction Material Source Areas	Area or volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Aggregate stockpiles	Area	TSP, PM_{10}, $PM_{2.5}$, dustfall
Crushers	Point	TSP, PM_{10}, $PM_{2.5}$, dustfall
Transmission line right-of-way	Area or volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Vegetation clearing	Area or volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Road & Bridge Construction	Area or volume	TSP, PM_{10}, $PM_{2.5}$, dustfall
Boilers/heaters	Point or Area	SO_2, NO_2, CO, TSP, PM_{10}, $PM_{2.5}$
Generators	Point	SO_2, NO_2, CO, TSP, PM_{10}, $PM_{2.5}$
Vehicles and equipment	Area	SO_2, NO_2, CO, TSP, PM_{10}, $PM_{2.5}$

Table B.1 - Conceptual Model Plan (cont'd)

Anticipated model domain and receptors (preliminary domain dimension, receptor grid/locations, sensitive receptors) – attach map

> Emissions of CACs will be estimated for a 138 km by 102 km air quality technical study area (see Figure 1) that encompasses all project components. Dispersion modelling will be conducted for a smaller area around the dam site, Fort St. John and Taylor. The proposed dispersion modelling study area (DMSA) is a 26 km by 27 km rectangle specified to include a minimum five-kilometre buffer around the dam construction boundaries (see inset of Figure 1 and Figure 2). The boundaries were extended north to include the Wuthrich Quarry and the community of Charlie Lake, and east to include Area E and Taylor.
>
> The receptor grid for the DMSA will be developed in accordance with the *Guidelines for Air Quality Dispersion Modelling in BC*. In addition, a 100-m fine grid will be applied over Fort St. John, Charlie Lake, and Taylor. Hospitals, schools, child-care centres, senior centres, worker camps and residences located within the dam site construction area will be identified on figures and maximum predicted concentrations at these locations will be presented in tables.

Terrain characteristics within domain: flat terrain or complex terrain (i.e., will complex flow need to be considered?)

> Terrain in the DMSA is dominated by the Peace River Valley. Local winds within the study area could be quite variable and therefore CALMET modelling is proposed.

Dominant land cover: forested, urban, industrial, rock, water, grassland:

- Land use in the DMSA is illustrated in Figure 3. There is a mix of agricultural (cropland and rangeland, about 50%), forested (about 40%), urban, and water.

Existing air quality situation (pristine, industrial, urban):

> Existing air quality in the DMSA is affected by the following sources:
>
> - Oil and gas– gas plants, compressor stations and flares
> - Mines – coal mines
> - Wood processing- sawmills
> - Forestry area– slash burning
> - Residential wood smoke
> - Agricultural activities

Table B.1 - Conceptual Model Plan (cont'd)

Potential air quality data sources

Two air quality stations were installed to collect baseline data. STC 1 – Attachie Flat Upper Terrace is located outside the proposed DMSA and STC 8 – Old Fort is located south of Fort St. John (see Figure 4). Both stations contain two Thermo Scientific SHARP 5030 monitors collocated to measure PM_{10} and $PM_{2.5}$. Data collection began on January 23, 2011 at Station 1 and on February 25, 2011 at Station 8. Representative PM_{10} and $PM_{2.5}$ background concentrations will be determined using data from the two stations.

The nearest stations to the project that record NO_2 and SO_2 are operated by BC MOE at Taylor Townsite and Taylor South. Following guidance from the MOE (D. Fudge pers. comm.) it was decided that these stations do not provide good background values due to their proximity to industrial installations. Therefore, background NO_2 and SO_2 will not be considered. . The nearest station that records CO is in Grand Prairie and is operated by Alberta Environment. Following guidance from the MOE (D. Fudge pers. comm.) it was decided that this station would not be representative of the DMSA and that a background hourly value of 200 ppb should be used for CO. Pine River Hasler and Pine River Gas Plant collect only H_2S and SO_2. These data will not be used because the Project is not expected to be a source of H_2S emissions and the Taylor stations are located within the DMSA and are therefore considered to be more representative of the DMSA.

Dustfall data in the air quality technical study area will be obtained from recent applications for environmental assessment certificates available on the Environmental Assessment Office website.

Potential meteorological data sources (site specific or offsite measured surface/upper-air, mesoscale model data):

We propose to run CALMET initialized with output from a mesoscale model.

- Mesoscale model data:
  The Weather Research and Forecasting (WRF) model was used to assess microclimate for the Project and therefore will also be used for the air quality assessment. It will be executed using inputs of North American Regional Reanalysis (NARR) meteorological data from January 2011 to January 2012 and terrain data from United States Geological Survey (USGS). CALWRF will be applied to WRF model outputs to extract upper air meteorology for CALMET.
- Surface stations:
  Seven meteorological stations were installed for the Project (see Figure 5) to assess the potential effects of the reservoir on the microclimate. One of these stations (STC 7) is located within the DMSA. The Fort St. John Airport meteorological station is also located within the DMSA. The Taylor Townsite station also records meteorology and will be used as it is located in the DMSA. The next closest station is STC 4, which we propose including to resolve meteorology west of Site C. It is proposed to use data from the other stations only to fill data gaps. In summary, we propose using surface-station data from the following stations in CALMET:
  - STC 4 – Bear Flat, BC (BC Hydro)
  - STC 7 – Site C Dam, BC (BC Hydro)
  - Fort St. John Airport, BC (Environment Canada)
  - Taylor Townsite, BC (BC MOE)

Wind roses for STC 4, STC 7,Fort St. John Airport and Taylor Townsite for the period of January 16, 2011 to January 15, 2012 are presented in Figures 6 to 9, respectively.

Identify possible model(s) to be applied:

The CALPUFF model will be applied with CALMET in full 3-D mode. WRF model outputs of upper air meteorology will be used to initialize CALMET through processing with CALWRF. CALPUFF has been selected since it allows for estimation of dustfall deposition, and can accommodate all source types, including variable emission sources such as stockpiles. A desirable feature of CALMET/CALPUFF modelling system is that when applied in the full 3-D CALMET mode, it has the ability to assimilate multiple meteorological stations and to simulate the changes in mixing height and boundary layer mechanics that result from the variable land use and terrain in the study region. This modelling system also allows us to make full use of the meteorological data collected for the Project as well as the WRF model output.

Identify any potential modelling requirements due to Canada/U.S. trans-boundary issues:

None

Anticipated ministry review completion date of conceptual model plan:

July 13, 2012

Ministry Acceptance of Plan:____________________________ Date:____________________

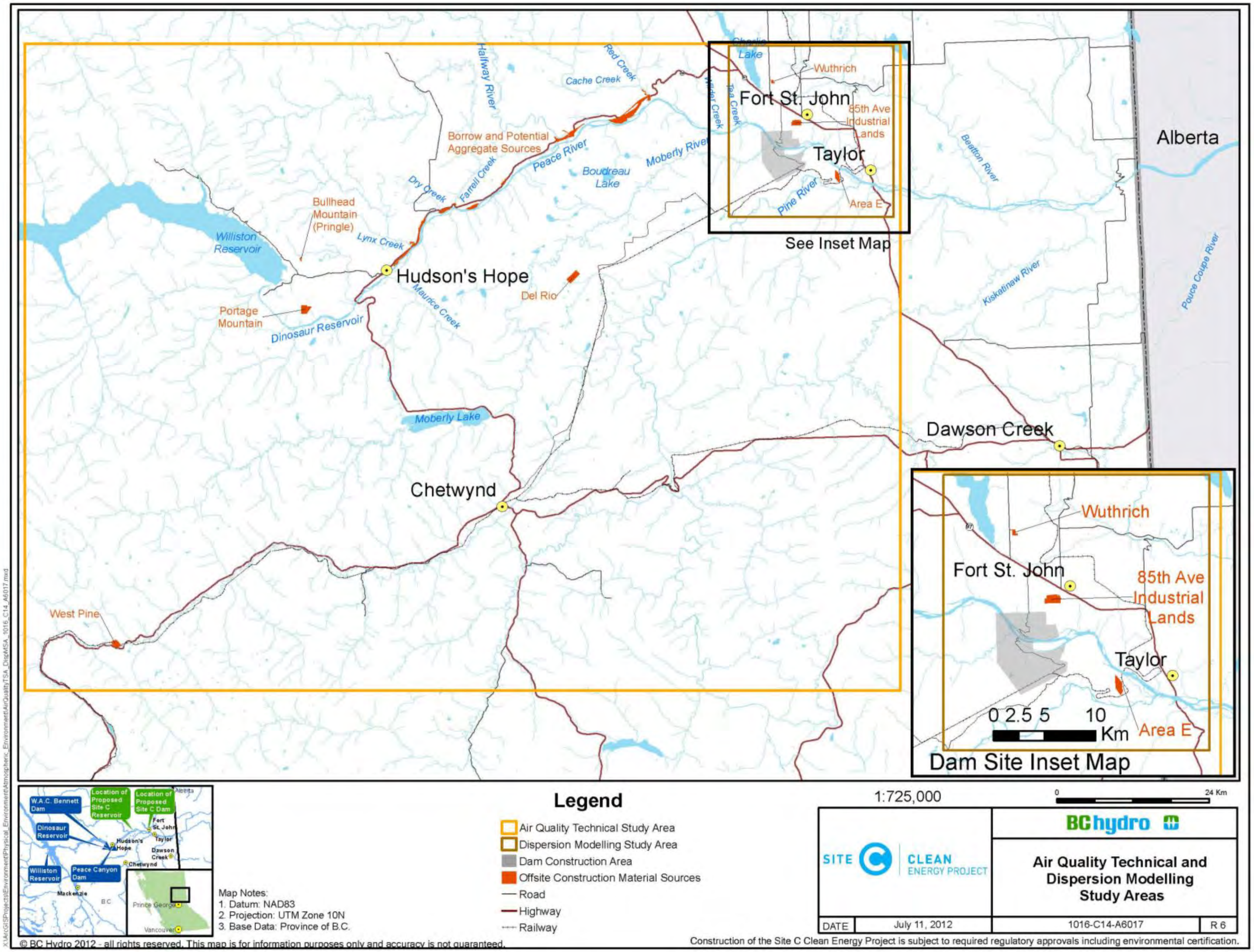


Figure 1 Map of air quality technical study area and dispersion modelling study area (inset map)

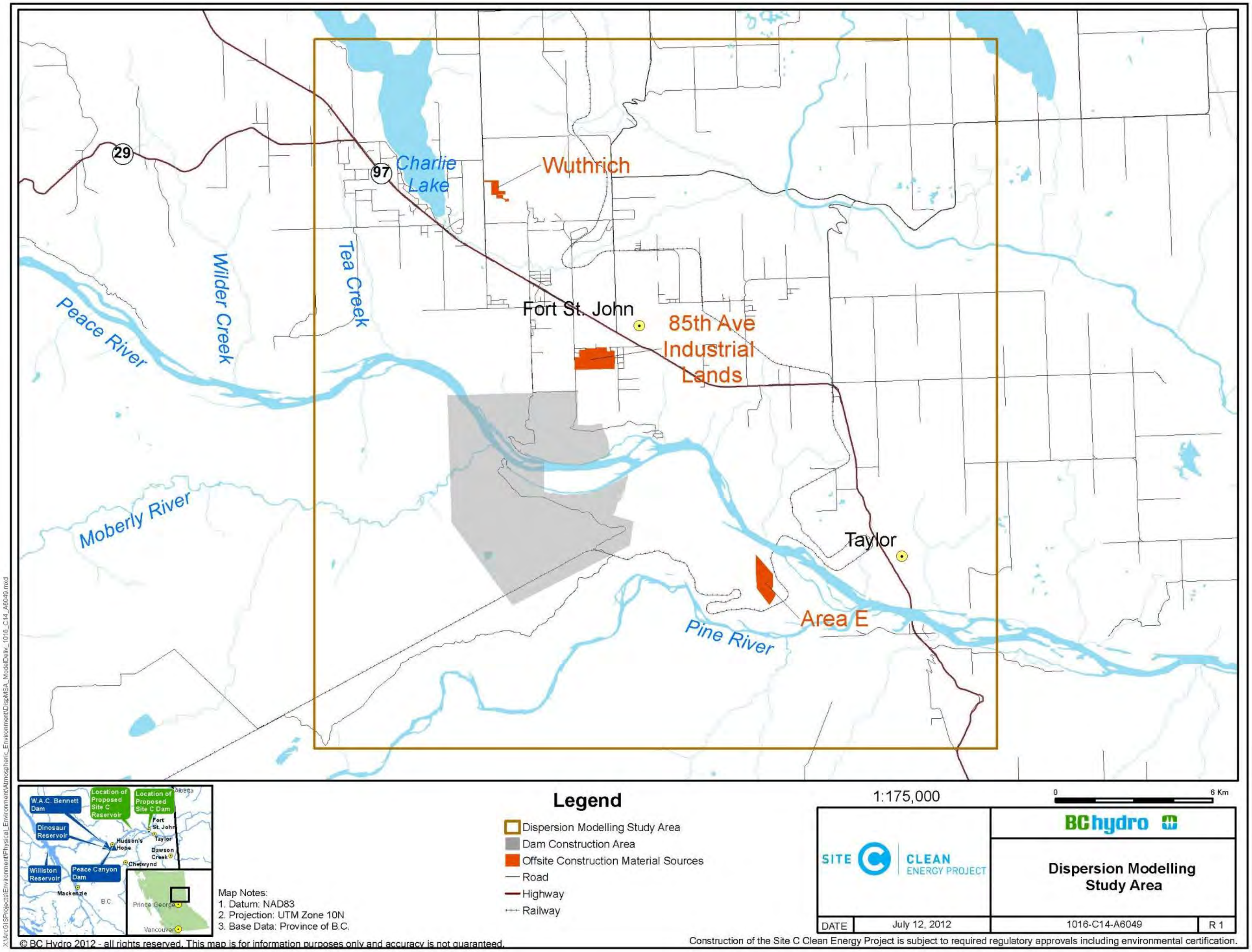


Figure 2 Map of dispersion modelling study area

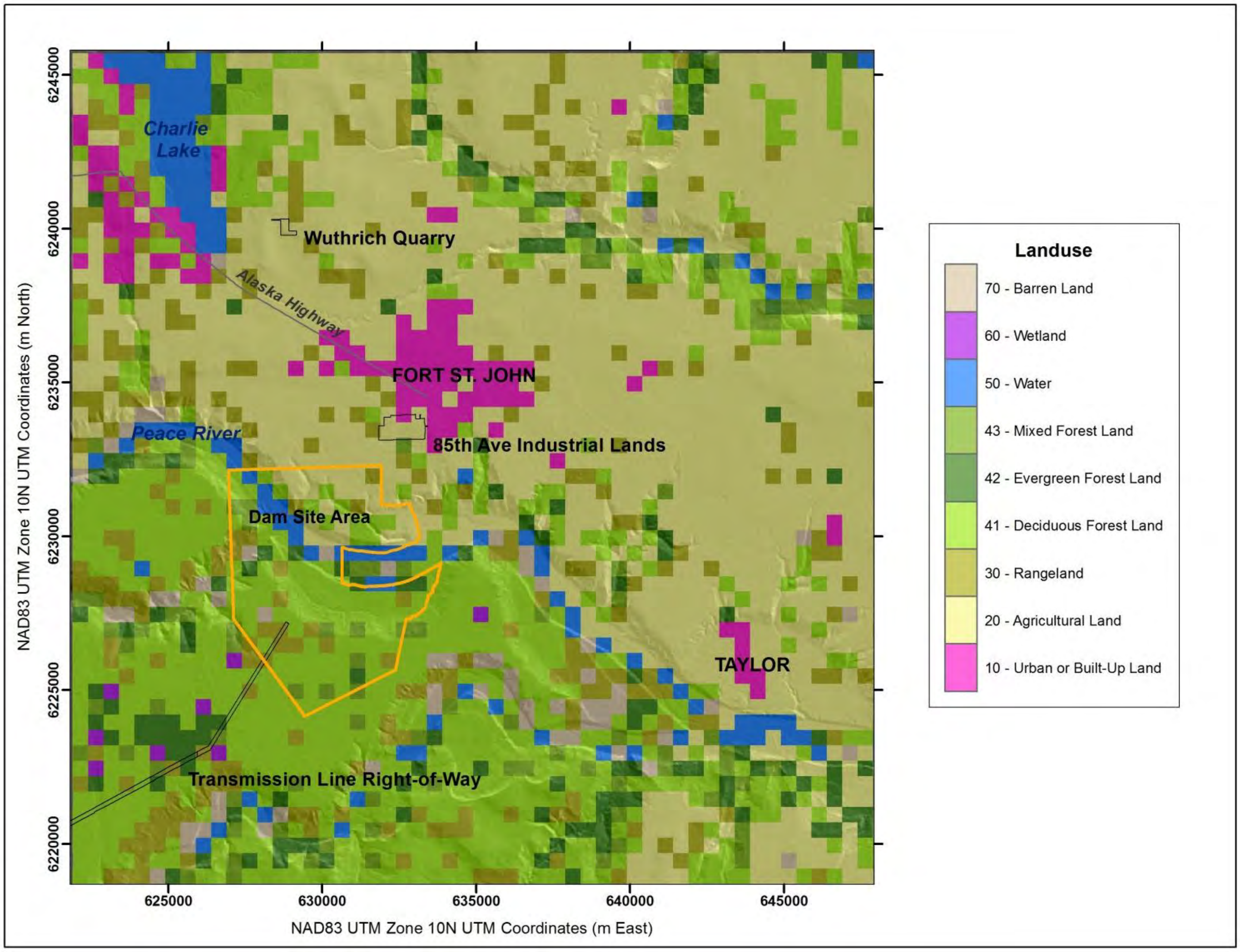


Figure 3 Land use within the dispersion modelling study area

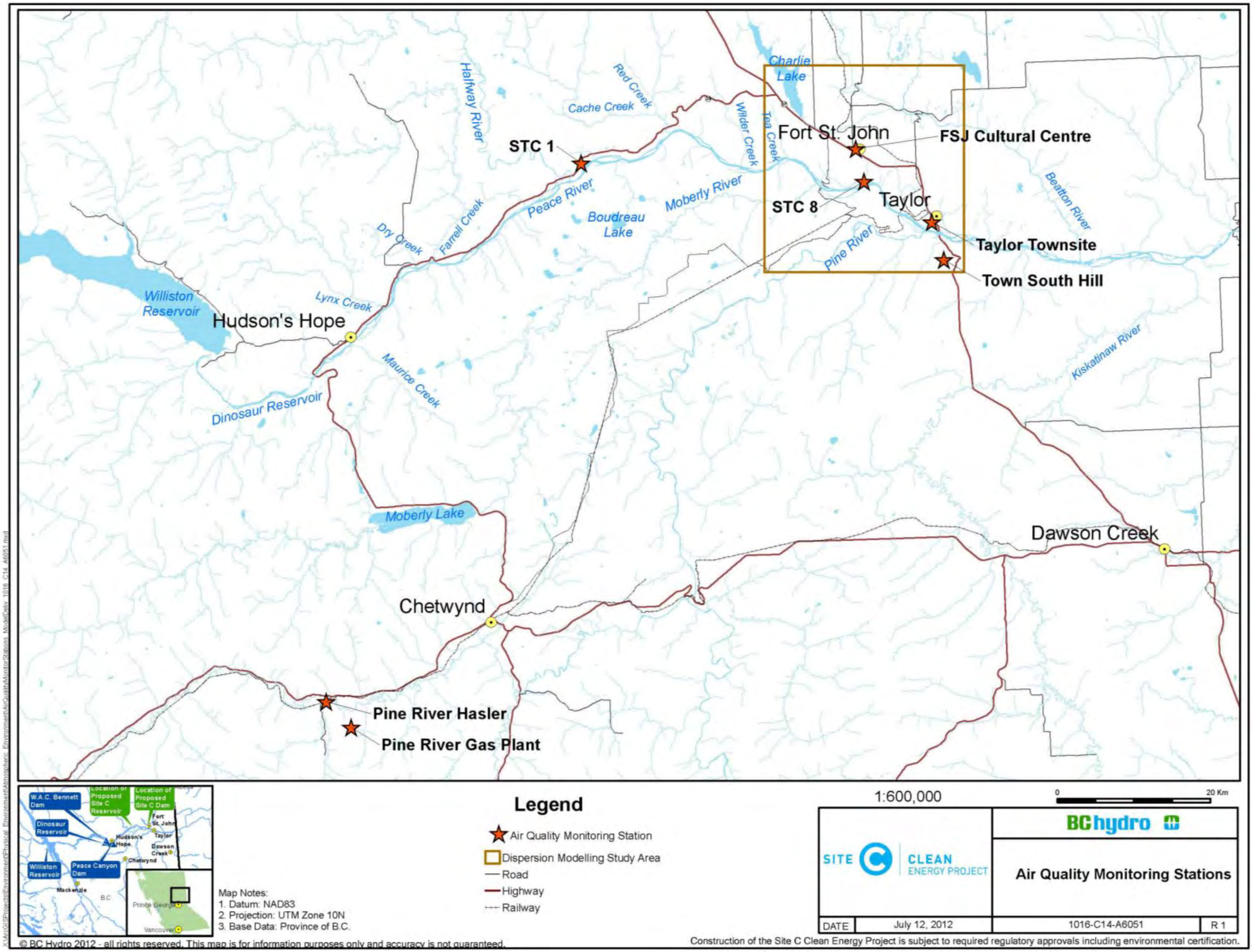


Figure 4 Location of the ambient air quality stations within the air quality technical study area

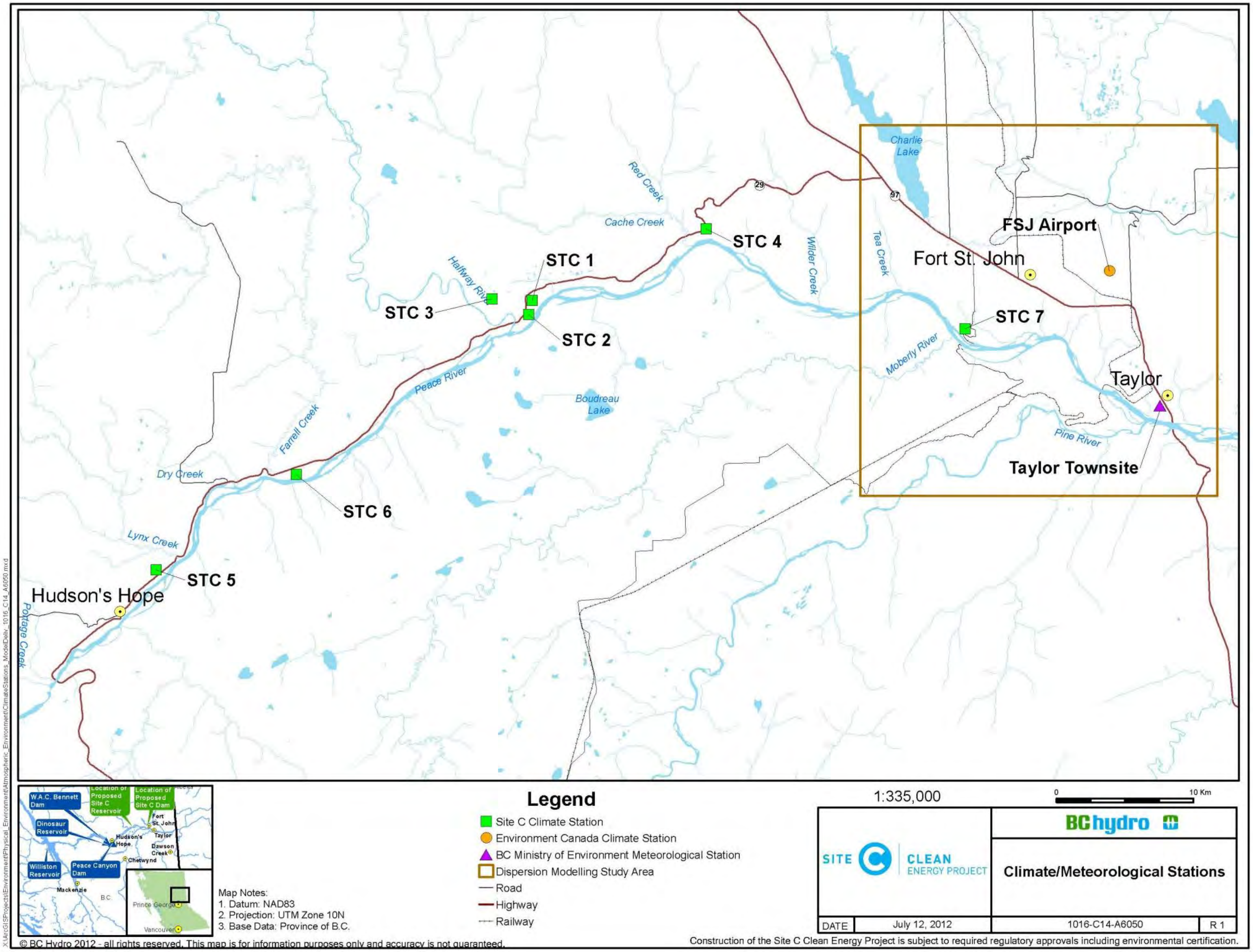


Figure 5 Map of BC Hydro microclimate stations near the Project

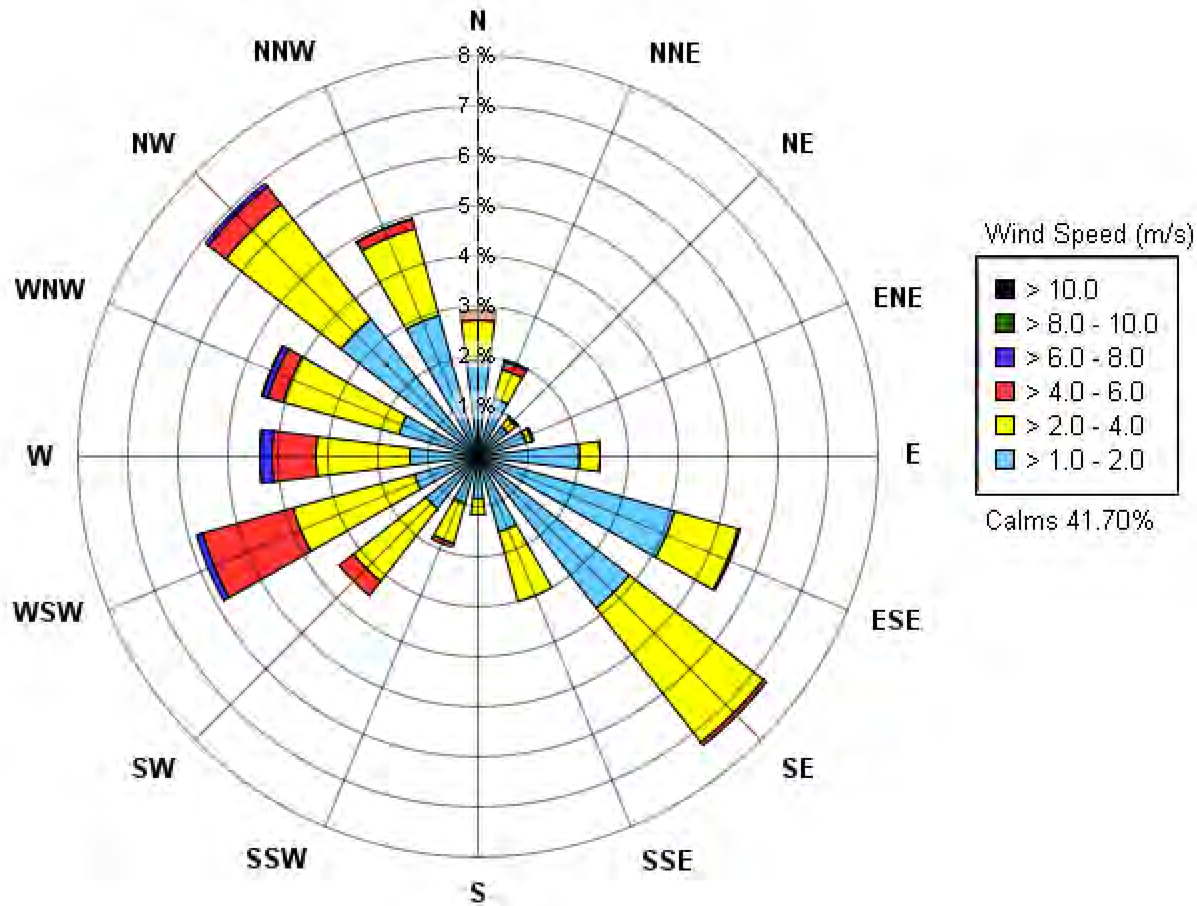


Figure 6 **Wind Rose of STC 4 – Bear Flat from January 17, 2011 to January 16, 2012**

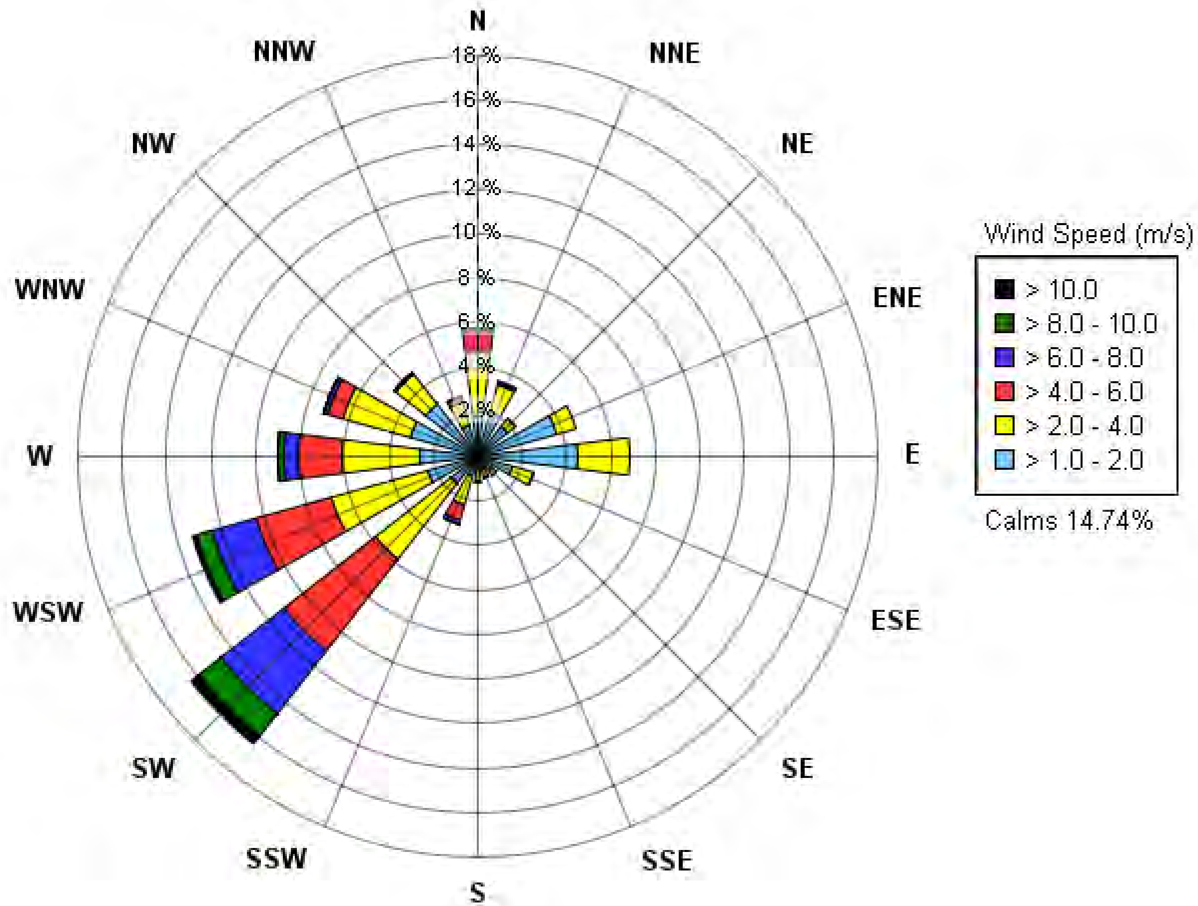


Figure 7 Wind Rose of STC 7 – Site C Dam from January 17, 2011 to January 16, 2012

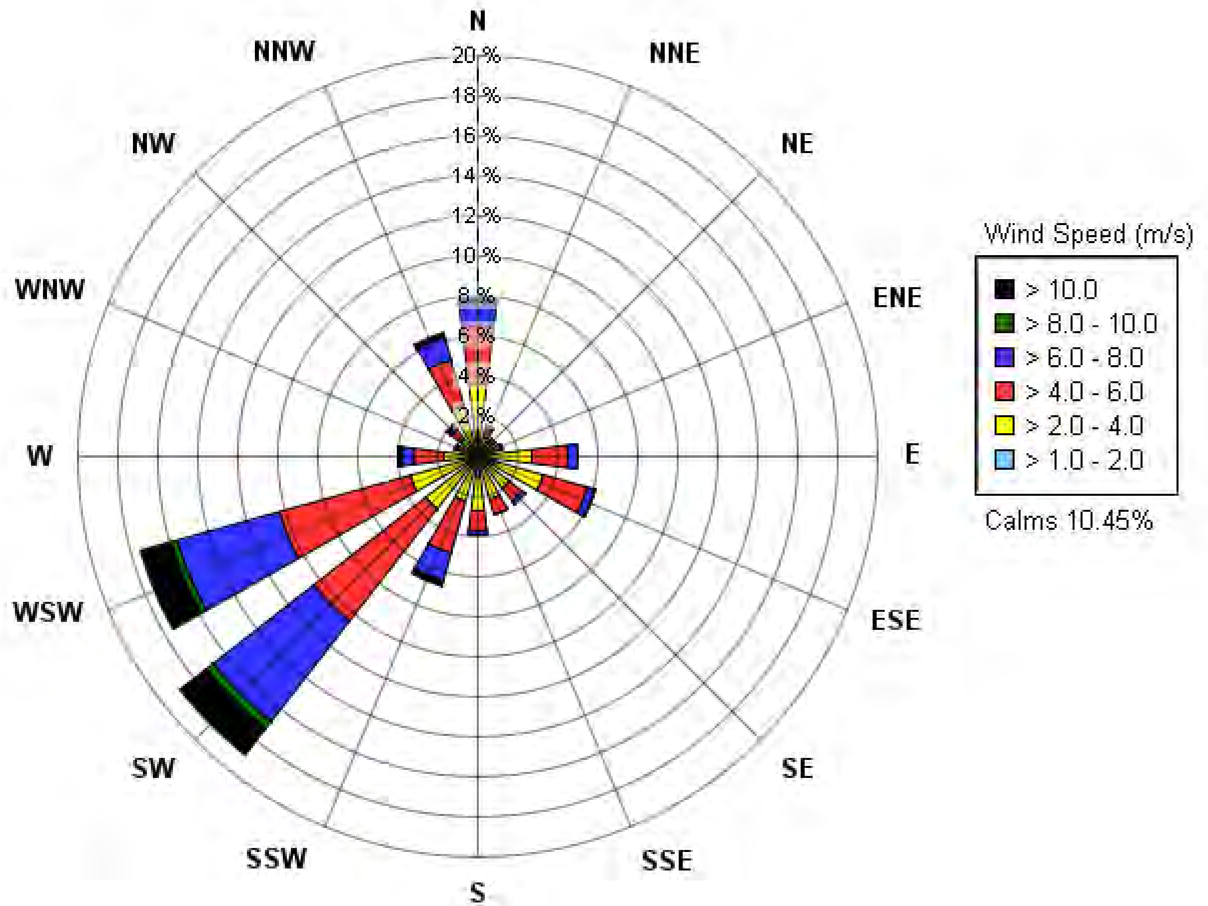


Figure 8 **Wind Rose of Fort St. John Airport from January 17, 2011 to January 16, 2012**

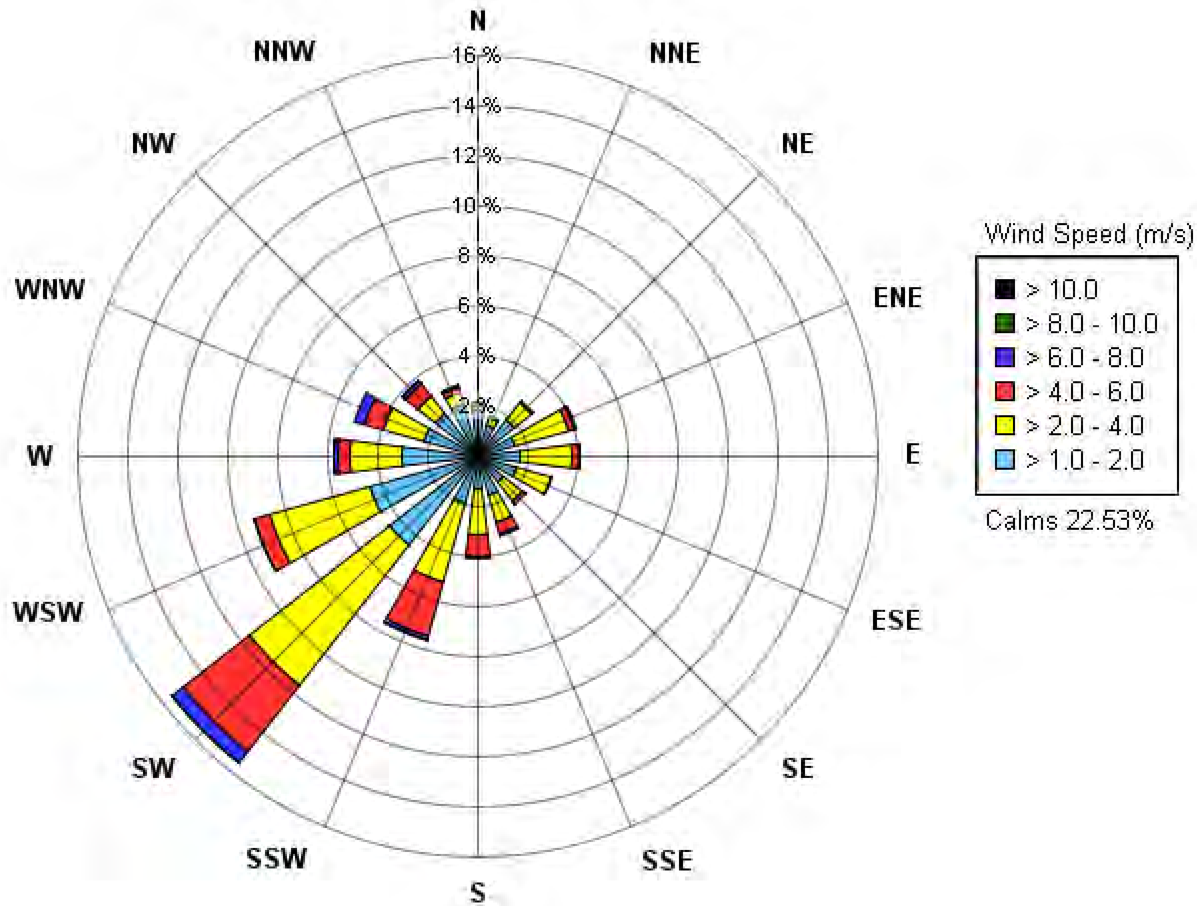


Figure 9 Wind Rose of Taylor Townsite from January 17, 2011 to January 16, 2012

Laura Manuel - RE: Site C Air Model Plan

From: "Fudge, Dennis ENV:EX" <Dennis.Fudge@gov.bc.ca>
To: "'Strang, Al'" <Al.Strang@bchydro.com>
Date: 9/18/2012 12:42 PM
Subject: RE: Site C Air Model Plan
CC: "'Laura Dailyde'" <laura.dailyde@rwdi.com>

I agree with the modelling plan. I am assuming the output would be the same as that specified in the modelling guidelines, which is usually the standard output the RWDI provides. I will point out the importance of good quality assured data to be used in the modelling. Please take all measures to ensure all the meteorological data is valid, including the ministry's data.

Dennis Fudge
Air Pollution Meteorologist
Ministry of Environment
250-565-4210

If you woke up breathing, congratulations! You have another chance!

From: Strang, Al [mailto:Al.Strang@bchydro.com]
Sent: Friday, September 14, 2012 8:13 AM
To: Fudge, Dennis ENV:EX
Cc: Laura Dailyde
Subject: Site C Air Model Plan

Hi Dennis,

As we discussed on Wednesday, here is the revised plan for the Site C air dispersion model.

The revisions incorporate your comments from our discussion on July 6.

We would appreciate receiving your approval of the plan by e-mail by September 28 so that we can include it with our report.

If you have any questions please contact me or Laura Dailyde at RWDI.

Thanks very much Dennis.

Al

Al Strang, P. Eng.

Environment and Social Issues Manager
Site C Clean Energy Project

BC Hydro
Four Bentall Centre
1100-1055 Dunsmuir Street
PO BOX 49260
Vancouver, BC V7X 1V5
(Couriers and visitors, please go to the 6th floor reception desk)

Office: 604 699 7282
Mobile: 604 313 2342

Email: al.strang@bchydro.com

bchydro.com/sitec

APPENDIX C

CALMET

C.1 Introduction

This Appendix provides details on CALMET inputs (Section C.2) that are not provided in the main text of the Air Quality Technical Data Report. Some CALMET output is shown and briefly discussed in Section C.3 to demonstrate that CALMET produces meteorological input to CALPUFF that qualitatively agrees with expected meteorological conditions.

C.2 CALMET Inputs

This section presents the input parameters needed to run CALMET. These are divided into two broad categories: geophysical parameters, which specify surface properties as a function of season and land-use type, and model switch settings, which specify how CALMET will process the input.

C.2.1 Geophysical Parameters

The following tables are based on five seasons, which were identified from the climate normals at Fort St. John Airport and are described in the main text of the Air Quality Technical Data Report. Surface roughness, albedo, and Bowen ratio are mostly based on recommended values from the United States Environmental Protection Agency for the conterminous United States with some modifications to account for the high latitude of the dispersion modelling study area. Soil heat flux values are CALMET default values with one exception as noted. Finally, leaf area index is based on generic values for land-use type, which have been used previously for Canada (Zhang et al. 2002, 2003).

Anthropogenic heat flux was assumed negligible throughout the entire model domain. No gridded population data were available and heat flux was determined to be minimal in the largest urban area of Fort St. John.

Table C.1 Seasonal values of surface roughness length by land cover characterization category (in m)

Land cover characterization Category	Season 1 (Summer)	Season 2 (Autumn)	Season 3 (Winter 1)	Season 4 (Winter 2)	Season 5 (Spring)
Urban	0.54	0.54	0.50	0.50	0.52
Agricultural	0.20	0.20	0.02	0.01	0.03
Rangeland	0.15	0.15	0.02	0.01	0.03
Deciduous Forest	1.30	1.30	0.60	0.50	1.00
Coniferous Forest	1.30	1.30	1.30	1.30	1.30
Mixed Forest	1.30	1.30	0.95	0.90	1.15
Water	0.001	0.001	0.001	0.002[(a)]	0.001
Wetland[(b)]	0.20	0.20	0.20	0.10	0.20
Barren Land	0.05	0.05	0.05	0.05	0.05

NOTES:
Source: Modified from US EPA (2008)
[a] Value borrowed from "Perennial Snow or Ice".
[b] Values based on emergent herbaceous wetlands.

Table C.2 Seasonal values of albedo by land cover characterization category

Land cover characterization Category	Season 1 (Summer)	Season 2 (Autumn)	Season 3 (Winter 1)	Season 4 (Winter 2)	Season 5 (Spring)
Urban	0.16	0.16	0.18	0.45	0.16
Agricultural	0.20	0.20	0.18	0.60	0.14
Rangeland	0.20	0.20	0.18	0.60	0.14
Deciduous Forest	0.16	0.16	0.17	0.50	0.16
Coniferous Forest	0.12	0.12	0.12	0.35	0.12
Mixed Forest	0.14	0.14	0.14	0.42	0.14
Water	0.10	0.10	0.10	0.70[(a)]	0.10
Wetland[(b)]	0.14	0.14	0.14	0.30	0.14
Barren Land	0.20	0.20	0.20	0.60	0.20

NOTES:
Source: Modified from US EPA (2008)
[a] Value borrowed from "Perennial Snow or Ice".
[b] Values based on emergent herbaceous wetlands.

Table C.3 Seasonal values of Bowen ratio by land cover characterization category

Land cover characterization Category	Season 1 (Summer)	Season 2 (Autumn)	Season 3 (Winter 1)	Season 4 (Winter 2)	Season 5 (Spring)
Urban	0.80	1.00	1.00	0.50	0.80
Agricultural	0.50	0.70	0.70	0.50	0.30
Rangeland	0.50	0.70	0.70	0.50	0.30
Deciduous Forest	0.30	1.00	1.00	0.50	0.70
Coniferous Forest	0.30	0.80	0.80	0.50	0.70
Mixed Forest	0.30	0.90	0.90	0.50	0.70
Water	0.10	0.10	0.10	0.50(a)	0.10
Wetland(b)	0.10	0.10	0.10	0.50	0.10
Barren Land	1.50	1.50	1.50	0.50	1.50

NOTES:
Source: Modified from US EPA (2008)
[a] Value borrowed from “Perennial Snow or Ice”.
[b] Values based on emergent herbaceous wetlands.

Table C.4 Seasonal values of soil heat flux by land cover characterization category (in Watts per square metre)

Land cover characterization Category	Season 1 (Summer)	Season 2 (Autumn)	Season 3 (Winter 1)	Season 4 (Winter 2)	Season 5 (Spring)
Urban	0.25	0.25	0.25	0.15(a)	0.25
Agricultural	0.15	0.15	0.15	0.15	0.15
Rangeland	0.15	0.15	0.15	0.15	0.15
Deciduous Forest	0.15	0.15	0.15	0.15	0.15
Coniferous Forest	0.15	0.15	0.15	0.15	0.15
Mixed Forest	0.15	0.15	0.15	0.15	0.15
Water	1.00	1.00	1.00	1.00	1.00
Wetland	0.25	0.25	0.25	0.25	0.25
Barren Land	0.15	0.15	0.15	0.15	0.15

NOTES:
Source: CALMET defaults
[a] Value borrowed from “Perennial Snow or Ice”.

Table C.5 Seasonal values of leaf area index by land cover characterization category

Land cover characterization Category	Season 1 (Summer)	Season 2 (Autumn)	Season 3 (Winter 1)	Season 4 (Winter 2)	Season 5 (Spring)
Urban	0.30	0.20	0.10	0.00	0.20
Agricultural	2.00	1.50	1.00	0.00	1.00
Rangeland	1.00	1.00	1.00	1.00	1.00
Deciduous Forest	3.40	1.90	0.10	0.00	0.80
Coniferous Forest	5.00	5.00	5.00	5.00	5.00
Mixed Forest	4.50	3.50	2.30	2.30	3.30
Water	0.00	0.00	0.00	0.00	0.00
Wetland[(a)]	0.20	0.20	0.10	0.00	0.10
Barren Land	0.00	0.00	0.05	0.05	0.00

NOTES:
Source: Modified from Zhang et al. (2002, 2003)
[a] Values based on wetlands with plants

C.2.2 Model Switch Settings

Table C.6 CALMET model switch settings

Parameter	Default	Project	Comments
IWFCOD	1	1	Diagnostic wind module used
IFRADJ	1	1	Froude number adjustment effects computed
IKINE	0	0	Kinematic effects not computed
IOBR	0	0	No adjustment to vertical velocity profile at top of model domain
ISLOPE	1	1	Slope flow effects computed
IEXTRP	-4	-4	Similarity Theory used except layer 1 data at upper air stations ignored
ICALM	0	0	Frequency of calms are realistic for Peace River Valley
BIAS	0, 0, 0, 0, 0, 0, 0, 0, 0, 0	0, 0, 0, 0, 0, 0, 0, 0, 0, 0	Not used since no upper air station data
RMIN2	4	-1	Used to ensure extrapolation of all surface stations for IEXTRP = -4
IPROG	0	14	Used WRF prognostic model output for initial guess field
LVARY	F	T	Closest station used if no stations are within RMAX
RMAX1	NA	10	Local effects minimized to ensure smoothness over model domain
RMAX2	NA	100	Upper air stations not used
RMAX3	NA	50	Over-water stations not used
RMIN	0.1	0.1	Small value used as recommended
TERRAD	NA	2	Peace River Valley identified as main terrain feature of influence
R1	NA	2	Local effects minimized to Peace River Valley
R2	NA	10	Limited to 5 times R1 due to variability of terrain and land cover characterization
RPROG	NA	0	Not used since IPROG = 0
DIVLIM	5×10^{-6}	5×10^{-6}	Not used since IKINE = 0
NITER	50	50	Not used since IKINE = 0
NSMTH	2, 4, 4, 4, 4, 4, 4, 4, 4, 4	2, 4, 4, 4, 4, 4, 4, 4, 4, 4	Default number of passes in the smoothing procedure
NINTR2	99	99	All stations can be used
CRITFN	1	1	Default critical Froude number used
ALPHA	0.1	0.1	Not used since IKINE = 0
FEXTR2	0	0	Not used since IEXTRP = -4
NBAR	0	0	Barriers not used
XBAR, YBAR, XEBAR, YEBAR	0, 0, 0, 0	0, 0, 0, 0	Not used since NBAR = 0

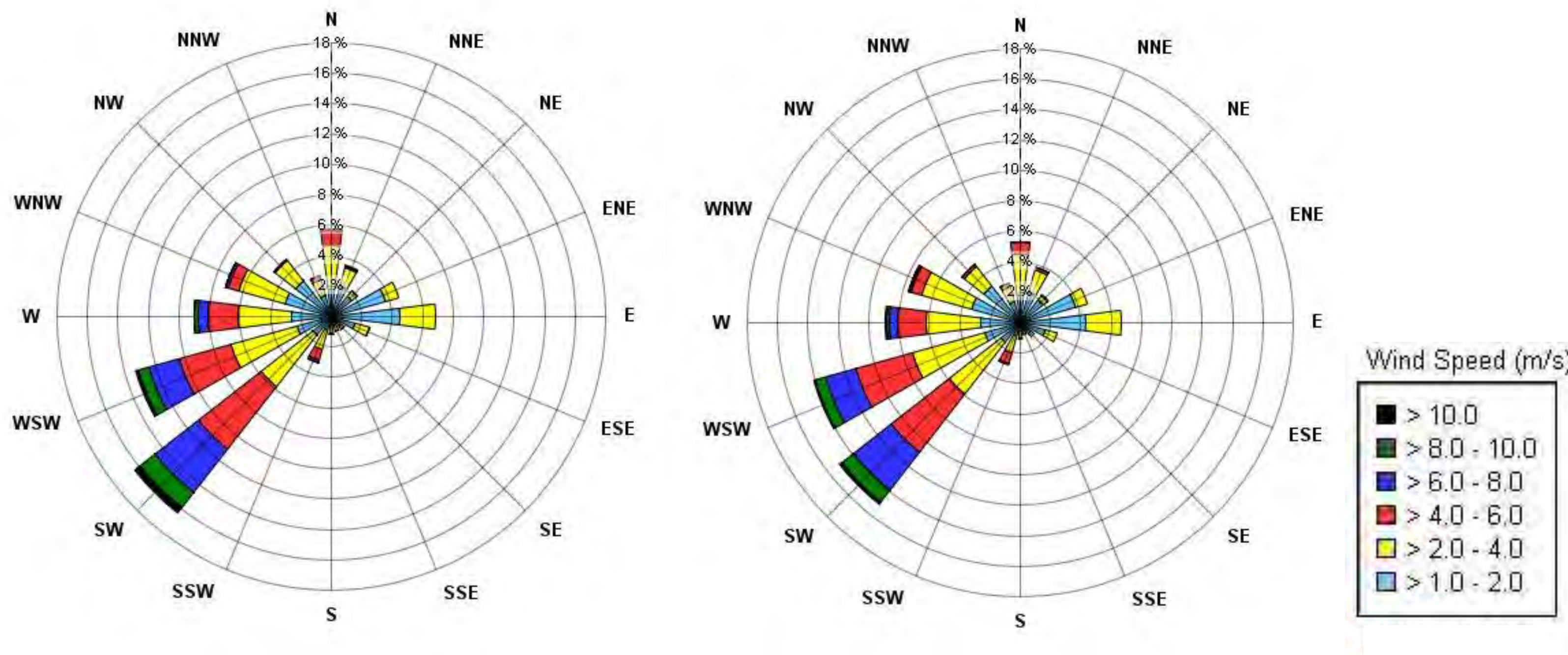
Parameter	Default	Project	Comments
IDIOPT1	0	0	Surface temperatures computed internally
ISURFT	NA	1	Diagnostic module surface temperatures based on Attachie Flat Upper Terrace Station
IDIOPT2	0	0	Lapse rate computed internally
IUPT	NA	1	Upper air stations not used
ZUPT	200	200	Lapse rate computed for default depth
IDIOPT3	0	0	Domain-averaged wind components computed internally
IUPWND	-1	-1	Upper air stations not used
ZUPWND	1, 1000	1, 1000	Default used

C.3 Results

The CALMET model was assessed by reviewing various model outputs and, where possible, comparing to observations. These outputs include: surface wind roses for three monitoring locations within the dispersion modelling study area (Site C Dam [STC 7], Fort St. John Airport, and Taylor Townsite), CALMET-derived stabilities and mixing heights, and domain wind vector plots under various stability and flow regimes.

C.3.1 Surface Winds

The combined frequency distribution of wind speed and direction as observed and as modelled by CALMET at the Site C Dam (STC 7), Fort St. John Airport, and Taylor Townsite stations are shown as wind roses in Figure C.1 to Figure C.3 respectively. Observed and modelled surface wind roses are similar at all three locations. The predominant wind directions at all three locations are southwest and west-southwest.



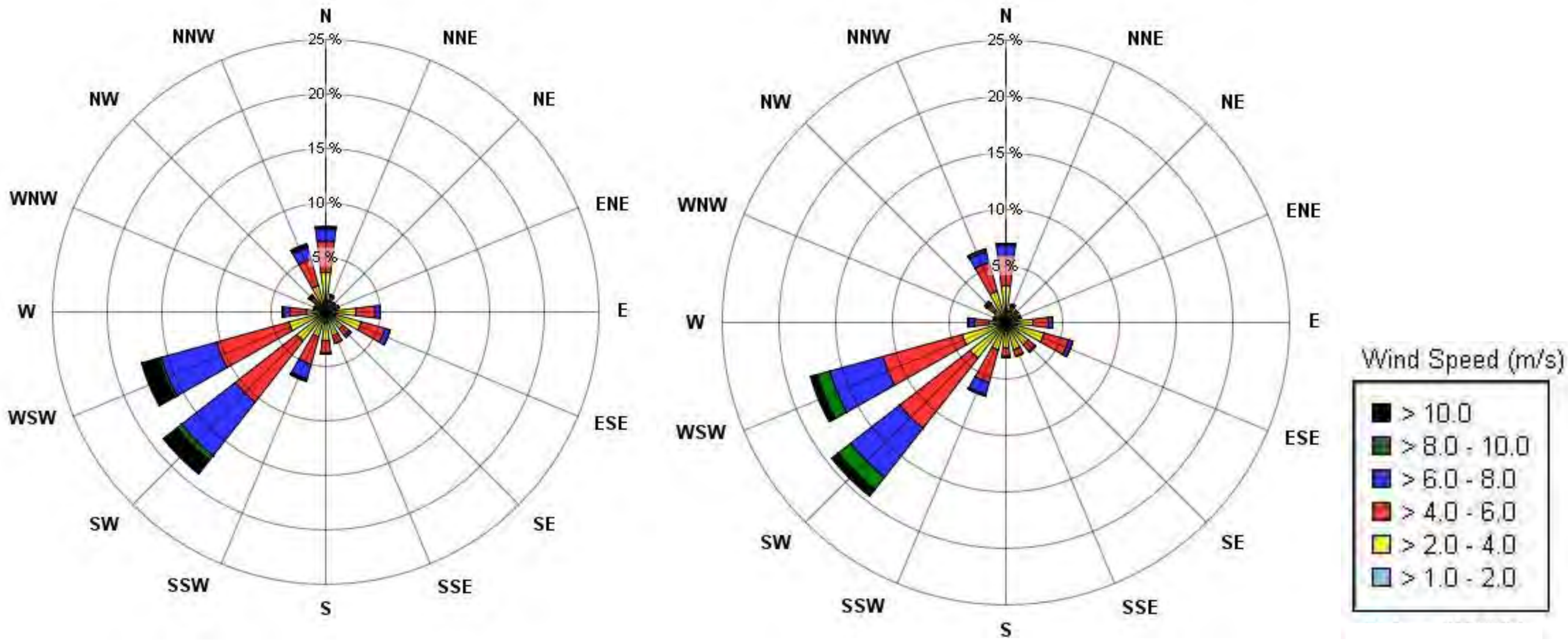
Calms: 14.74%

Observed

Calms: 15.38%

Modelled (CALMET)

Figure C.1 Observed and modelled wind roses at Site C Dam Station (STC7)



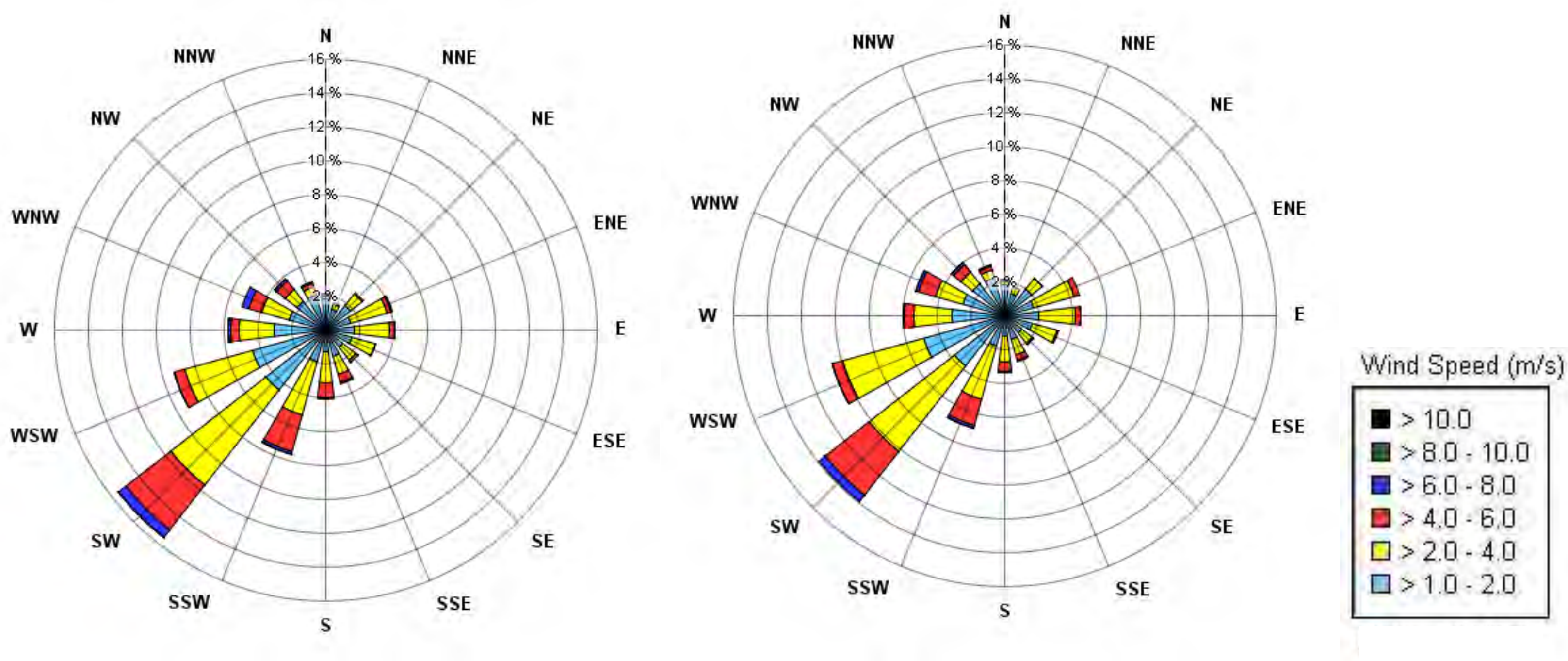
Calms: 10.45%

Observed

Calms: 10.65%

Modelled (CALMET)

Figure C.2 Observed and modelled wind roses at Fort St. John Airport



Calms: 22.53%

Observed

Calms: 22.75%

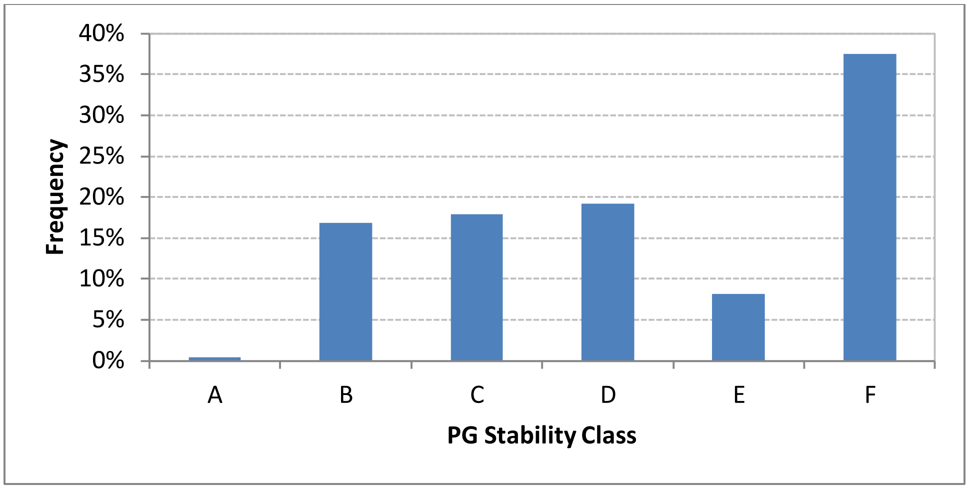
Modelled (CALMET)

Figure C.3 Observed and modelled wind roses at Taylor Townsite Station

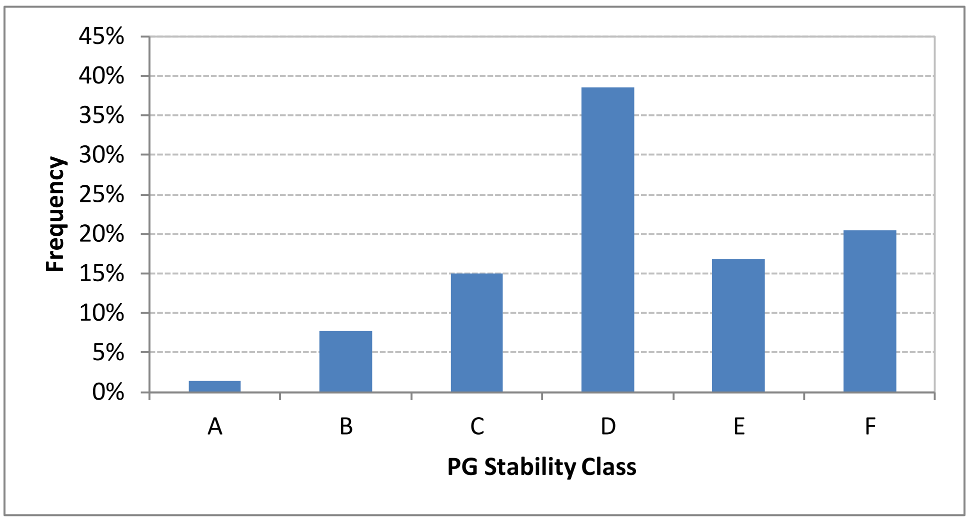
C.3.2 Pasquill-Gifford Stability Class

In CALMET, the Pasquill-Gifford stability scheme is used to classify atmospheric stratification in the boundary layer over land. These classes range from unstable (Classes A, B and C), through neutral (Class D) to stable (Classes E and F). Normally, unstable conditions are associated with daytime, ground-level heating, which results in thermal turbulence activity in the boundary layer. Stable conditions are primarily associated with night-time cooling, which results in the suppression of the turbulence levels and temperature inversion at lower levels. Neutral conditions are mostly associated with high wind speeds or overcast sky conditions.

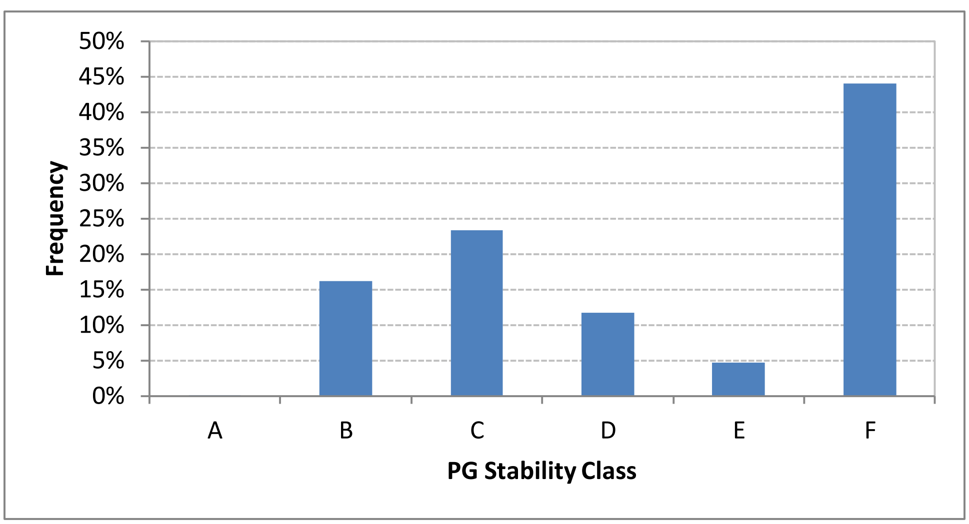
The frequency distributions of CALMET-derived Pasquill-Gifford stability classes for STC7, Fort St. John and Taylor Townsite stations are shown in Figure C.4. For STC7 and Taylor Townsite, the most frequent stability class is Class F or very stable. This is a direct result of the large percentages of low (<3 m/s) wind speeds seen in the wind roses shown above. Though Class F is most commonly associated with clear skies, it can also occur for overcast conditions if the wind speed is less than 1.8 m/s. The most frequent stability class at Fort St. John is Class D or neutral, which is associated with the higher wind speeds observed at this location.



Site C Dam (STC 7)



Fort St. John Airport

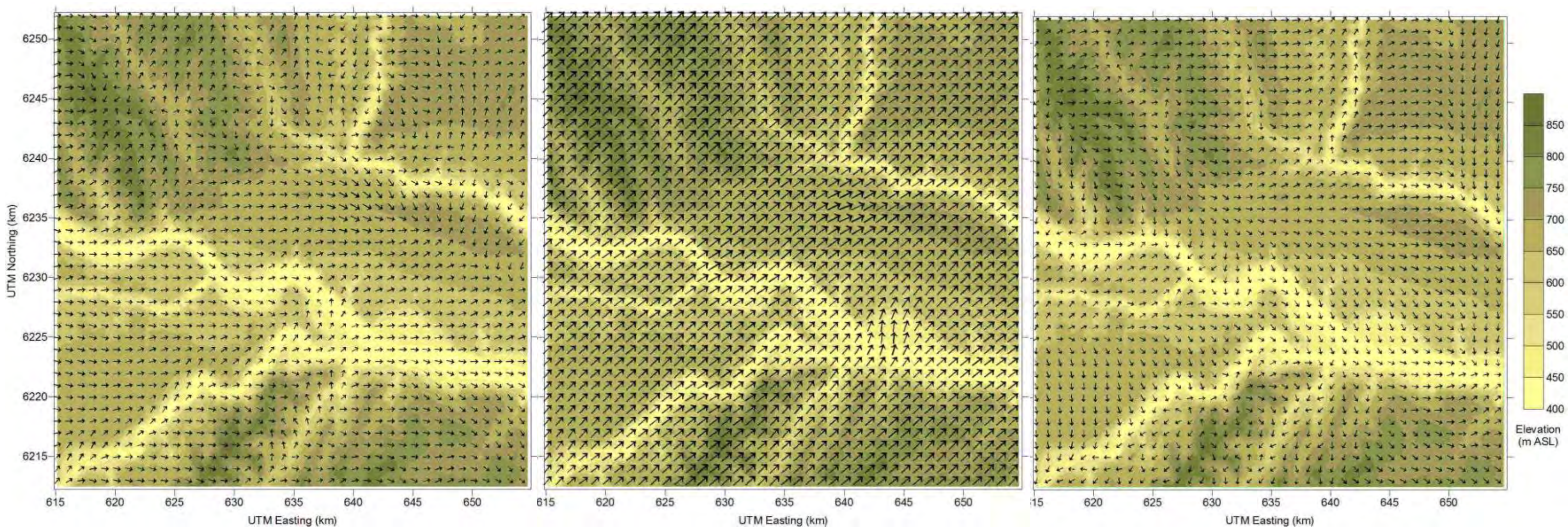


Taylor Townsite

Figure C.4 Frequency of modelled Pasquill-Gifford stability classes

C.3.3 Modelled Wind Fields

A common approach used to evaluate a meteorological model's ability to replicate wind flow patterns is through the use of wind field plots. Wind fields plots representing unstable, neutral, and stable conditions are illustrated in Figure C.5 to provide an overview of how CALMET performed under different conditions. In general, CALMET-derived wind fields follow the expected terrain flows under various stability and flow regimes, flowing up slope during unstable, daytime conditions and down slope during stable, night-time conditions. Under neutral conditions, the characteristic high wind speeds result in less noticeable terrain effects and wind fields are fairly uniform across the model domain.



Unstable | Neutral | Stable

July 7, 2011 10:00 | September 27, 2011 15:00 | October 12, 2011 02:00

Arrow lengths show relative wind speed from 0 to 10.5 m/s.

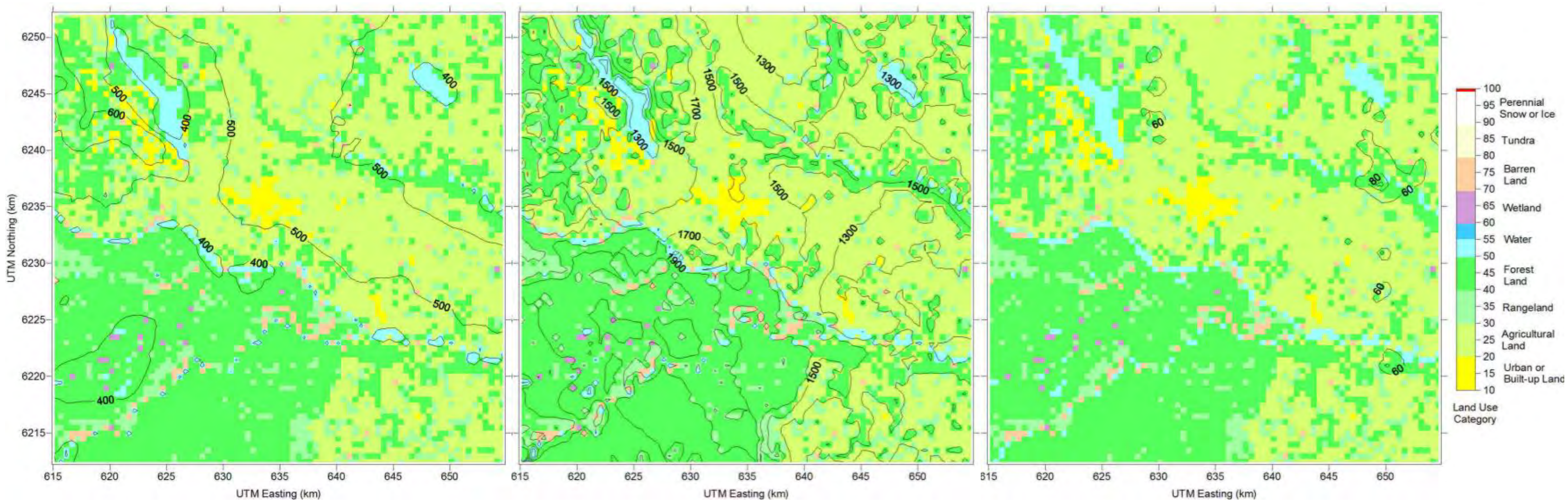
Figure C.5 Modelled wind fields at 10 m above ground level during unstable, neutral, and stable conditions

C.3.4 Mixing Heights

Mixing heights are estimated in CALMET through methods that are based on either surface heat flux (thermal turbulence) and vertical temperature profiles, or friction velocities (mechanical turbulence). Table C.7 shows the average modelled mixing heights by Pasquill-Gifford stability class. Overall, the highest mixing heights are associated with unstable conditions (Classes A, B and C), while the lowest mixing heights are associated with stable conditions (Classes E and F). Figure C.6 shows the spatial distribution of mixing heights under unstable, neutral, and stable conditions. The mixing height increases with distance from water more quickly in areas where surface roughness is greater (i.e., where surface elements are larger). Diurnal variations in mixing heights are shown in Figure C.7 for a typical summer day (July 25, 2011) and a typical winter day (January 18, 2011). Mixing heights tend to increase during the day and decrease during the night, although daytime mixing heights may be suppressed during stable winter conditions due to weak solar insolation, high reflectivity of snow covered surfaces, low wind speeds and synoptic subsidence.

Table C.7 Average modelled mixing height by Pasquill-Gifford Stability Class (in m)

Station	A	B	C	D	E	F
STC7	640	628	412	668	325	106
FSJ	812	696	499	448	184	70
Taylor	725	641	424	351	307	95



Unstable

July 7, 2011 10:00

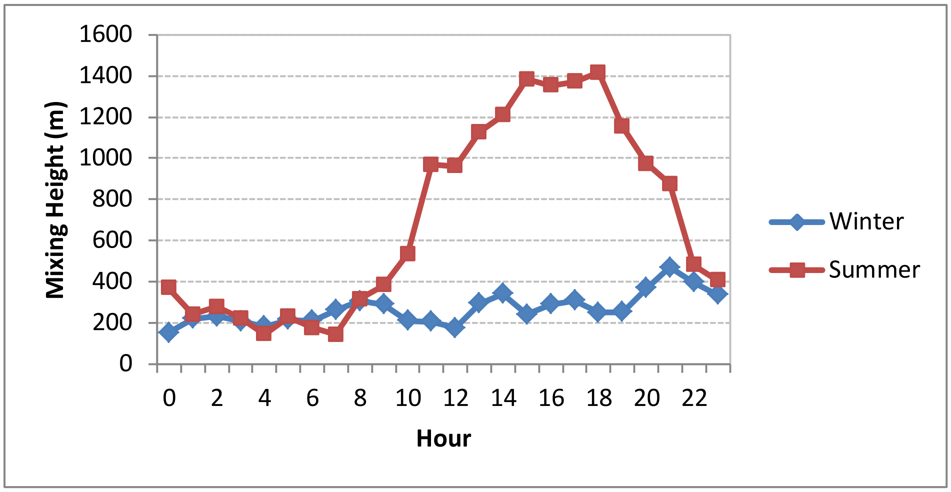
Neutral

September 27, 2011 15:00

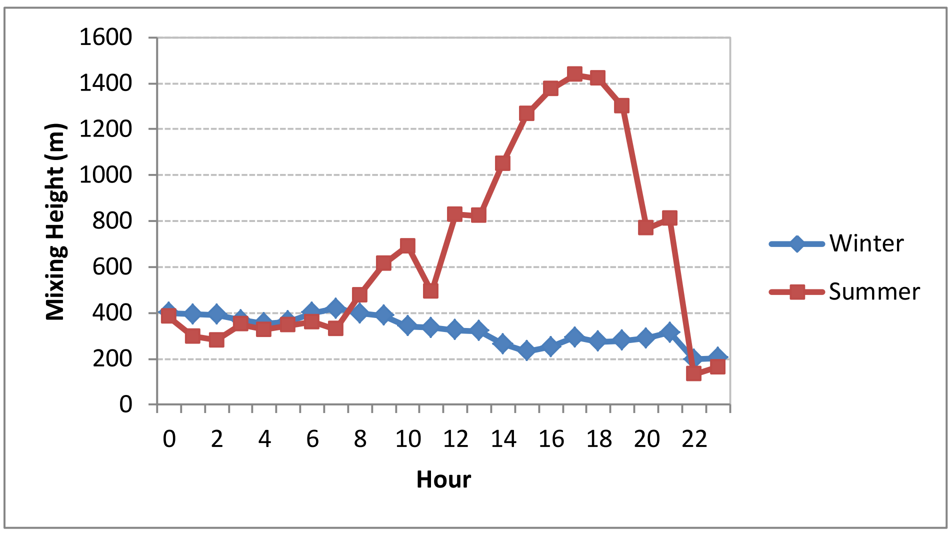
Stable

October 12, 2011 02:00

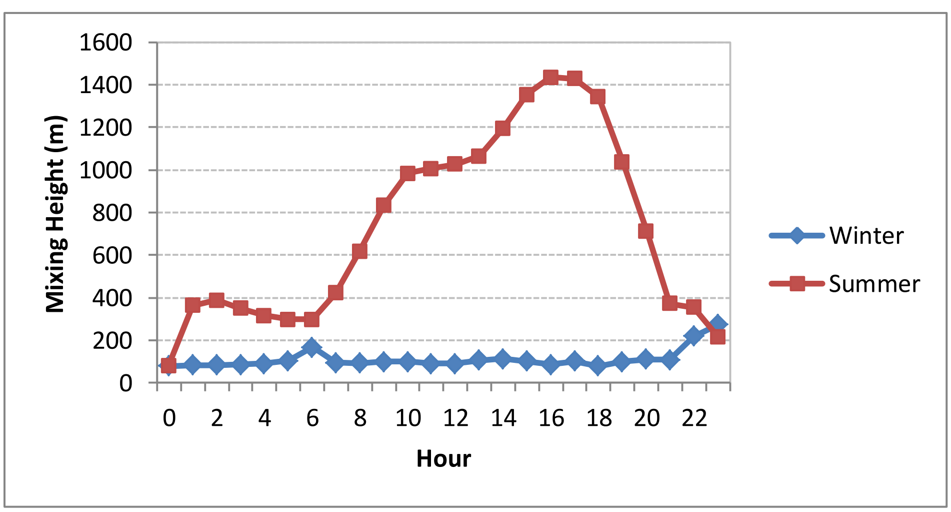
Figure C.6 Modelled mixing heights (contour lines, labels in metres) overlaid on top of land cover characterization during unstable, neutral, and stable atmospheric conditions. Contour intervals are 100 m (unstable), 200 m (neutral), and 20 m (stable).



Site C Dam (STC 7)



Fort St. John Airport

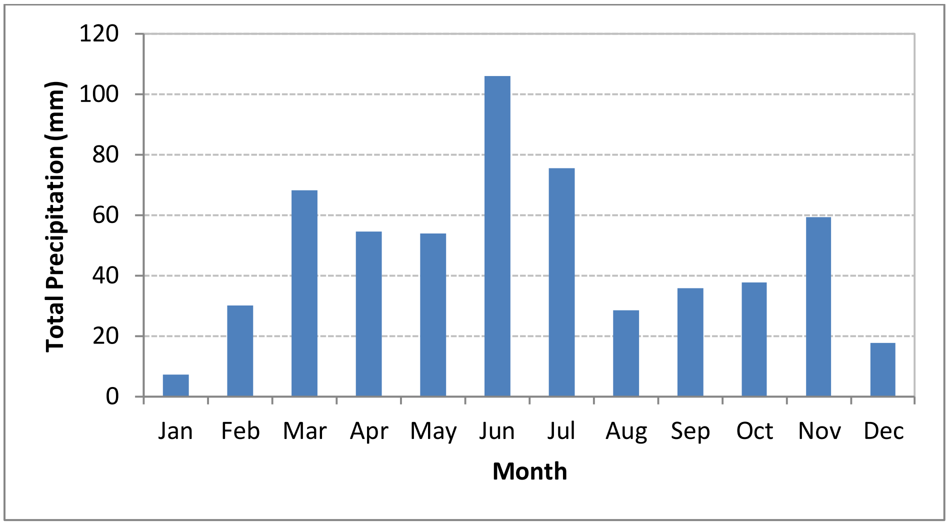


Taylor Townsite

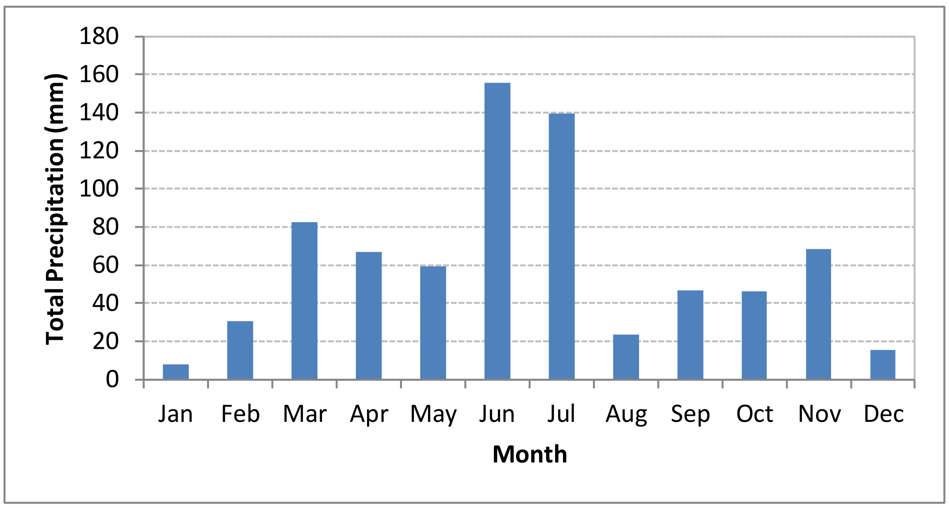
Figure C.7 Diurnal variation of modelled mixing heights

C.3.5 Precipitation

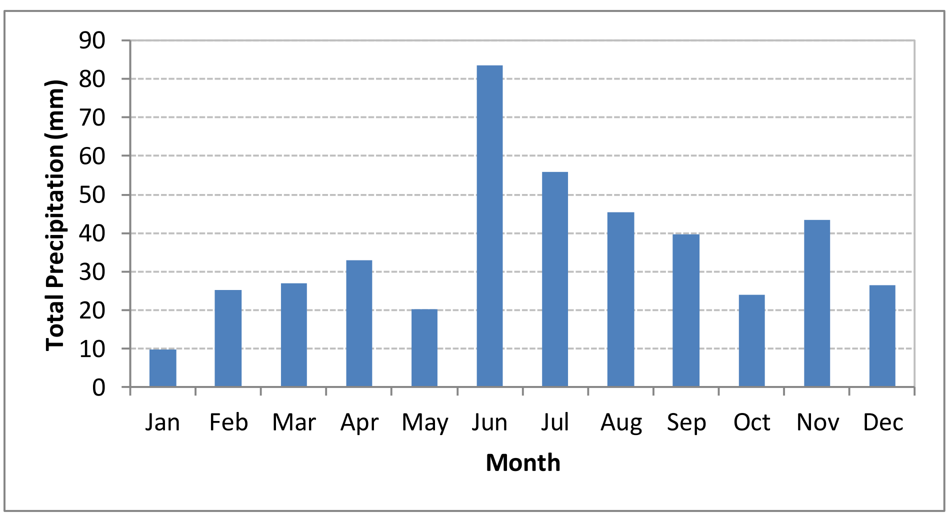
CALMET-derived monthly precipitation patterns at Site C Dam (STC 7), Fort St. John Airport and Taylor Townsite stations are illustrated in Figure C.8. The greatest amount of precipitation is expected to occur in the summer months from June to July. CALMET-derived precipitation patterns at Fort St. John Airport are compared to observed precipitation for the same period and to 30-year climate normals (1971 to 2000) in Figure C.9. While the amount of precipitation may differ, the overall monthly precipitation patterns predicted by the CALMET model are representative of actual conditions.



Site C Dam (STC 7)



Fort St. John Airport



Taylor Townsite

Figure C.8 Monthly distribution of modelled precipitation

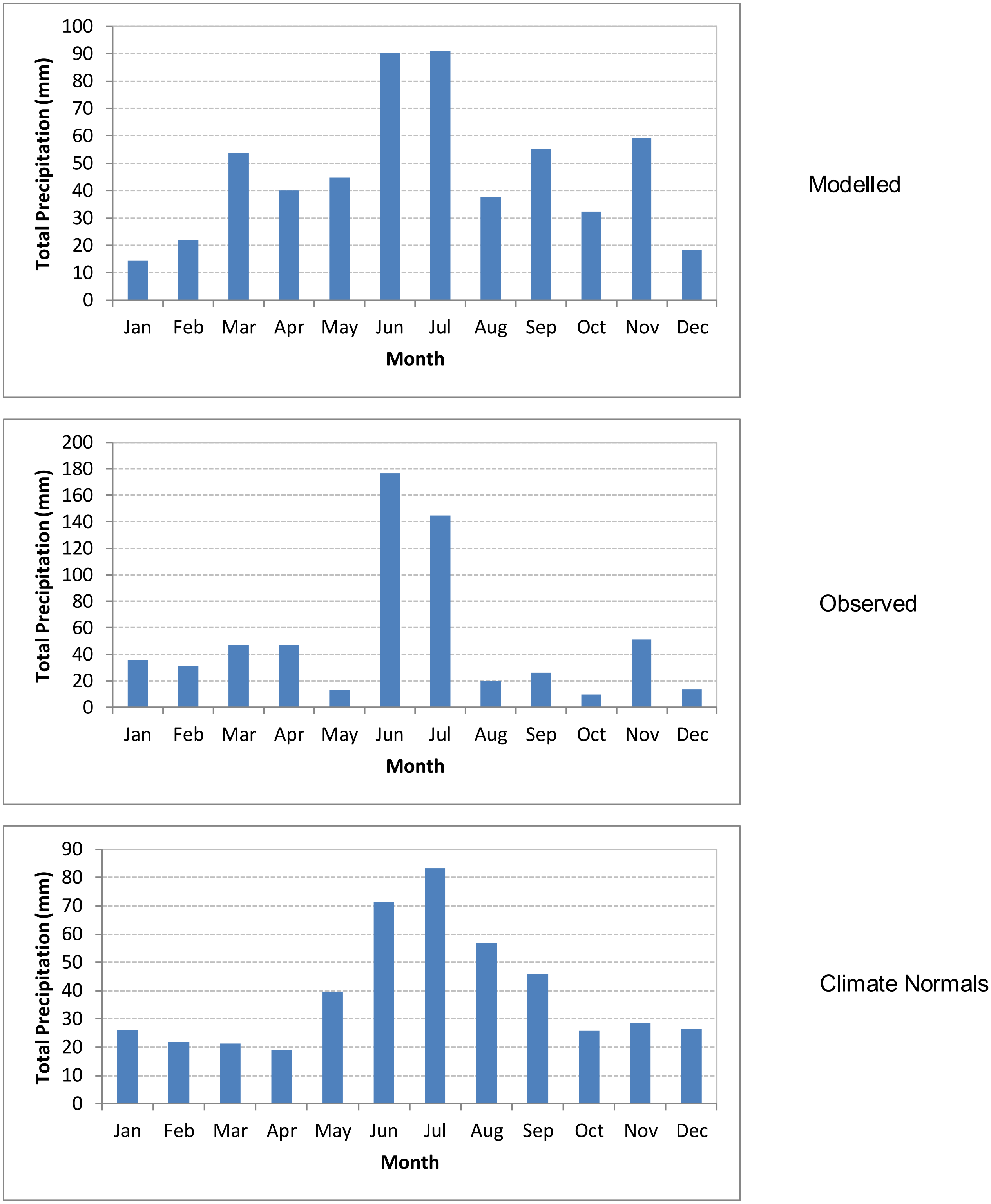


Figure C.9 Comparison of modelled precipitation with observations and climate normal at Fort St. John Airport

C.4 References

Zhang, L., Moran, M.D., Makar, P.A., Brook, J.R., and Gong, S. 2002: *Modelling gaseous dry deposition in AURAMS: a unified regional air-quality modelling system*. Atmospheric Environment 36: 537-560.

Zhang, L., Brook, J.R., and Vet, R. 2003: *A revised parameterization of gaseous dry deposition in air-quality models*. Atmospheric Chemistry and Physics 3: 2067-2082.

United States Environmental Protection Agency, 2008: *AERSURFACE User's Guide*, EPA-454/B-08-001.

APPENDIX D

List of Sensitive Receptors

Table D.1 Special receptors at worker camps (in km)

Receptor ID	UTM Easting	UTM Northing
North camp site	630.439	6230.605
South camp site	633.206	6228.230

Table D.2 Special receptors at ground-truthed residences (in km)

Receptor ID	UTM Easting	UTM Northing
Residence 1	630.981	6232.372
Residence 2	630.756	6232.335
Residence 3	630.717	6232.314
Residence 4	630.581	6232.296
Residence 5	630.552	6232.296
Residence 6	630.247	6232.403
Residence 7	634.997	6230.486
Residence 8	634.862	6230.523
Residence 9	635.041	6230.506
Residence 10	635.124	6230.508
Residence 11	634.535	6230.703
Residence 12	634.579	6230.785
Residence 13	634.743	6230.833
Residence 14	634.840	6230.765
Residence 15	634.898	6230.703
Residence 16	634.982	6230.627
Residence 17	635.045	6230.755
Residence 18	635.042	6230.725
Residence 19	635.072	6230.654
Residence 20	635.123	6230.659
Residence 21	635.138	6230.587
Residence 22	630.252	6232.596
Residence 23	633.547	6231.980
Residence 24	633.549	6232.516
Residence 25	633.590	6232.546
Residence 26	633.545	6231.881
Residence 27	633.547	6231.893
Residence 28	634.090	6232.671
Residence 29	634.047	6232.473
Residence 30	634.132	6232.501
Residence 31	633.822	6232.438
Residence 32	633.703	6232.241
Residence 33	633.970	6232.454
Residence 34	632.469	6230.313

Receptor ID	UTM Easting	UTM Northing
Residence 35	632.227	6231.391
Residence 36	630.438	6232.091
Residence 37	631.858	6231.027
Residence 38	631.693	6231.612
Residence 39	633.385	6231.479
Residence 40	634.217	6230.914
Residence 41	635.205	6230.478
Residence 42	634.888	6230.495
Residence 43	631.729	6232.627
Residence 44	631.892	6232.432
Residence 45	632.827	6232.458
Residence 46	633.108	6232.423
Residence 47	633.417	6232.513
Residence 48	630.233	6232.814
Residence 49	630.237	6232.750
Residence 50	630.223	6232.954
Residence 51	630.236	6232.907
Residence 52	633.410	6233.370
Residence 53	633.348	6233.331
Residence 54	634.909	6233.462
Residence 55	634.900	6233.602
Residence 56	635.348	6233.713
Residence 57	629.555	6232.927
Residence 58	629.316	6232.906
Residence 59	629.323	6232.964
Residence 60	630.449	6232.305
Residence 61	635.088	6230.518
Residence 62	634.706	6230.715
Residence 63	634.632	6230.798
Residence 64	634.537	6230.925
Residence 65	634.738	6230.939
Residence 66	634.844	6230.924
Residence 67	634.799	6230.766
Residence 68	634.815	6230.761
Residence 69	634.889	6230.773
Residence 70	634.915	6230.769
Residence 71	634.844	6230.703
Residence 72	634.828	6230.713
Residence 73	634.951	6230.718
Residence 74	634.947	6230.768
Residence 75	635.008	6230.765

Receptor ID	UTM Easting	UTM Northing
Residence 76	634.993	6230.715
Residence 77	635.076	6230.717
Residence 78	635.096	6230.718
Residence 79	635.089	6230.604
Residence 80	630.237	6232.630
Residence 81	628.453	6232.604
Residence 82	633.190	6230.482
Residence 83	633.355	6230.925
Residence 84	633.569	6230.686
Residence 85	635.202	6230.516
Residence 86	633.165	6232.660
Residence 87	630.279	6232.963

Table D.3 Special receptors at ground-truthed non-residences (in km)

Receptor ID	UTM Easting	UTM Northing
Non-residence 1	630.709	6228.334
Non-residence 2	630.724	6228.349
Non-residence 3	631.896	6230.979
Non-residence 4	630.996	6232.371
Non-residence 5	630.784	6232.310
Non-residence 6	630.699	6232.333
Non-residence 7	630.658	6232.313
Non-residence 8	630.599	6232.308
Non-residence 9	630.325	6232.338
Non-residence 10	630.351	6232.358
Non-residence 11	630.361	6232.357
Non-residence 12	630.319	6232.360
Non-residence 13	630.328	6232.360
Non-residence 14	630.302	6232.348
Non-residence 15	630.246	6232.343
Non-residence 16	630.255	6232.364
Non-residence 17	630.255	6232.349
Non-residence 18	630.896	6232.415
Non-residence 19	630.888	6232.417
Non-residence 20	630.895	6232.422
Non-residence 21	630.528	6232.328
Non-residence 22	630.527	6232.347
Non-residence 23	630.499	6232.316
Non-residence 24	630.473	6232.305
Non-residence 25	630.447	6232.321
Non-residence 26	630.301	6232.359

Receptor ID	UTM Easting	UTM Northing
Non-residence 27	630.282	6232.385
Non-residence 28	630.933	6232.456
Non-residence 29	630.771	6232.361
Non-residence 30	635.021	6230.444
Non-residence 31	635.133	6230.463
Non-residence 32	634.933	6230.465
Non-residence 33	634.669	6230.722
Non-residence 34	634.373	6230.747
Non-residence 35	634.381	6230.741
Non-residence 36	634.454	6230.786
Non-residence 37	634.721	6230.824
Non-residence 38	634.904	6230.735
Non-residence 39	634.976	6230.724
Non-residence 40	634.975	6230.734
Non-residence 41	635.079	6230.582
Non-residence 42	634.982	6230.433
Non-residence 43	634.986	6230.434
Non-residence 44	634.990	6230.433
Non-residence 45	635.064	6230.733
Non-residence 46	635.559	6230.553
Non-residence 47	630.266	6232.703
Non-residence 48	630.244	6232.580
Non-residence 49	630.299	6232.482
Non-residence 50	633.556	6232.393
Non-residence 51	633.672	6232.107
Non-residence 52	633.541	6231.953
Non-residence 53	633.535	6231.964
Non-residence 54	631.988	6226.324
Non-residence 55	633.707	6232.186
Non-residence 56	634.245	6232.454
Non-residence 57	634.231	6232.707
Non-residence 58	634.232	6232.711
Non-residence 59	633.703	6232.491
Non-residence 60	633.718	6232.487
Non-residence 61	634.013	6232.543
Non-residence 62	634.065	6232.496
Non-residence 63	636.582	6232.572
Non-residence 64	634.044	6232.415
Non-residence 65	636.569	6232.484
Non-residence 66	634.109	6232.491
Non-residence 67	636.664	6232.507

Receptor ID	UTM Easting	UTM Northing
Non-residence 68	634.117	6232.506
Non-residence 69	634.130	6232.514
Non-residence 70	636.698	6232.511
Non-residence 71	636.681	6232.499
Non-residence 72	636.727	6232.539
Non-residence 73	636.788	6232.473
Non-residence 74	633.847	6232.489
Non-residence 75	633.760	6232.438
Non-residence 76	634.147	6232.482
Non-residence 77	633.694	6232.129
Non-residence 78	633.664	6232.127
Non-residence 79	633.683	6232.132
Non-residence 80	633.703	6232.133
Non-residence 81	633.712	6232.132
Non-residence 82	633.695	6232.140
Non-residence 83	634.318	6232.305
Non-residence 84	633.676	6232.153
Non-residence 85	633.702	6232.170
Non-residence 86	636.793	6232.437
Non-residence 87	636.794	6232.426
Non-residence 88	636.747	6232.422
Non-residence 89	636.776	6232.519
Non-residence 90	633.791	6232.477
Non-residence 91	633.665	6232.282
Non-residence 92	633.664	6232.298
Non-residence 93	633.685	6232.296
Non-residence 94	633.676	6232.289
Non-residence 95	633.706	6232.222
Non-residence 96	633.703	6232.200
Non-residence 97	633.730	6232.221
Non-residence 98	633.806	6232.494
Non-residence 99	633.805	6232.498
Non-residence 100	636.768	6232.602
Non-residence 101	633.805	6232.503
Non-residence 102	633.908	6232.447
Non-residence 103	633.911	6232.490
Non-residence 104	632.547	6230.574
Non-residence 105	631.982	6231.163
Non-residence 106	631.982	6231.127
Non-residence 107	631.960	6231.110
Non-residence 108	632.131	6231.351

Receptor ID	UTM Easting	UTM Northing
Non-residence 109	632.237	6231.408
Non-residence 110	630.192	6232.050
Non-residence 111	630.176	6232.008
Non-residence 112	630.031	6232.003
Non-residence 113	630.039	6231.965
Non-residence 114	630.433	6232.124
Non-residence 115	630.415	6232.072
Non-residence 116	630.397	6232.048
Non-residence 117	630.429	6232.027
Non-residence 118	630.394	6231.969
Non-residence 119	630.393	6231.980
Non-residence 120	630.419	6231.972
Non-residence 121	630.431	6231.946
Non-residence 122	630.345	6232.115
Non-residence 123	630.273	6232.059
Non-residence 124	630.296	6232.052
Non-residence 125	630.300	6232.083
Non-residence 126	630.256	6232.077
Non-residence 127	630.239	6232.054
Non-residence 128	628.501	6232.716
Non-residence 129	631.705	6231.574
Non-residence 130	633.145	6231.522
Non-residence 131	633.295	6231.506
Non-residence 132	633.349	6231.512
Non-residence 133	633.275	6231.506
Non-residence 134	633.386	6231.498
Non-residence 135	633.269	6230.441
Non-residence 136	633.237	6230.581
Non-residence 137	633.292	6230.470
Non-residence 138	633.261	6230.472
Non-residence 139	633.225	6230.449
Non-residence 140	633.391	6230.914
Non-residence 141	633.630	6230.661
Non-residence 142	633.628	6230.657
Non-residence 143	631.766	6232.355
Non-residence 144	631.411	6232.490
Non-residence 145	631.403	6232.484
Non-residence 146	631.876	6232.603
Non-residence 147	632.203	6232.437
Non-residence 148	632.427	6232.483
Non-residence 149	632.632	6232.445

Receptor ID	UTM Easting	UTM Northing
Non-residence 150	632.430	6231.891
Non-residence 151	632.963	6232.611
Non-residence 152	632.828	6232.481
Non-residence 153	633.145	6232.700
Non-residence 154	633.134	6232.689
Non-residence 155	633.442	6232.703
Non-residence 156	633.084	6232.423
Non-residence 157	633.105	6232.405
Non-residence 158	633.046	6232.480
Non-residence 159	633.419	6232.447
Non-residence 160	633.452	6232.453
Non-residence 161	633.424	6232.451
Non-residence 162	633.127	6232.758
Non-residence 163	630.249	6232.842
Non-residence 164	630.298	6232.738
Non-residence 165	630.247	6232.782
Non-residence 166	634.386	6233.116
Non-residence 167	634.207	6232.732
Non-residence 168	635.335	6233.676
Non-residence 169	635.310	6233.690
Non-residence 170	636.056	6233.139
Non-residence 171	635.660	6233.183
Non-residence 172	635.581	6233.534
Non-residence 173	635.575	6233.206
Non-residence 174	635.529	6233.502
Non-residence 175	635.633	6233.267
Non-residence 176	635.687	6233.405
Non-residence 177	635.751	6233.348
Non-residence 178	635.820	6233.359
Non-residence 179	630.258	6232.922
Non-residence 180	634.541	6233.203
Non-residence 181	633.385	6233.309
Non-residence 182	633.348	6233.268
Non-residence 183	633.503	6233.342
Non-residence 184	633.633	6233.221
Non-residence 185	634.933	6233.444
Non-residence 186	635.804	6233.334
Non-residence 187	633.576	6233.209
Non-residence 188	635.793	6233.323
Non-residence 189	635.790	6233.311
Non-residence 190	633.658	6233.135

Receptor ID	UTM Easting	UTM Northing
Non-residence 191	635.803	6233.303
Non-residence 192	633.656	6233.119
Non-residence 193	635.749	6233.372
Non-residence 194	634.690	6233.086
Non-residence 195	635.608	6233.285
Non-residence 196	636.833	6232.745
Non-residence 197	633.745	6233.168
Non-residence 198	636.822	6232.743
Non-residence 199	633.760	6233.162
Non-residence 200	636.790	6232.734
Non-residence 201	636.777	6232.764
Non-residence 202	633.639	6233.221
Non-residence 203	633.658	6233.220
Non-residence 204	633.619	6233.125
Non-residence 205	634.432	6233.402
Non-residence 206	634.423	6233.360
Non-residence 207	634.340	6233.269
Non-residence 208	634.914	6233.603
Non-residence 209	634.903	6233.556
Non-residence 210	635.007	6233.494
Non-residence 211	635.007	6233.556
Non-residence 212	635.030	6233.644
Non-residence 213	635.234	6233.722
Non-residence 214	635.199	6233.691
Non-residence 215	636.133	6233.165
Non-residence 216	629.360	6232.774
Non-residence 217	629.356	6232.783
Non-residence 218	629.578	6232.895
Non-residence 219	629.226	6232.883
Non-residence 220	629.334	6232.855
Non-residence 221	629.324	6232.873
Non-residence 222	629.292	6232.864
Non-residence 223	629.279	6232.862
Non-residence 224	629.331	6232.925
Non-residence 225	629.345	6232.916
Non-residence 226	629.348	6232.935
Non-residence 227	633.401	6232.733
Non-residence 228	630.655	6232.303
Non-residence 229	630.407	6232.300
Non-residence 230	630.452	6232.324
Non-residence 231	630.360	6232.328

Receptor ID	UTM Easting	UTM Northing
Non-residence 232	630.809	6232.413
Non-residence 233	630.679	6232.377
Non-residence 234	635.280	6230.416
Non-residence 235	634.753	6230.706
Non-residence 236	634.459	6230.807
Non-residence 237	634.485	6230.766
Non-residence 238	634.674	6230.781
Non-residence 239	634.719	6230.837
Non-residence 240	634.543	6230.948
Non-residence 241	634.915	6230.724
Non-residence 242	634.915	6230.654
Non-residence 243	635.018	6230.724
Non-residence 244	635.096	6230.655
Non-residence 245	635.128	6230.627
Non-residence 246	635.559	6230.527
Non-residence 247	630.258	6232.565
Non-residence 248	631.977	6226.320
Non-residence 249	633.954	6232.464
Non-residence 250	634.021	6232.502
Non-residence 251	636.675	6232.516
Non-residence 252	636.764	6232.524
Non-residence 253	633.791	6232.481
Non-residence 254	633.682	6232.260
Non-residence 255	633.808	6232.445
Non-residence 256	633.820	6232.470
Non-residence 257	631.968	6231.106
Non-residence 258	632.215	6231.407
Non-residence 259	630.179	6231.985
Non-residence 260	630.455	6232.103
Non-residence 261	630.434	6231.940
Non-residence 262	630.116	6232.674
Non-residence 263	628.548	6232.661
Non-residence 264	631.692	6231.654
Non-residence 265	633.277	6231.494
Non-residence 266	633.164	6230.500
Non-residence 267	633.210	6230.535
Non-residence 268	633.276	6230.498
Non-residence 269	633.220	6230.512
Non-residence 270	633.590	6230.696
Non-residence 271	634.866	6230.491
Non-residence 272	631.883	6232.606

Receptor ID	UTM Easting	UTM Northing
Non-residence 273	632.540	6232.426
Non-residence 274	632.425	6231.891
Non-residence 275	633.140	6232.682
Non-residence 276	633.196	6232.449
Non-residence 277	630.243	6232.781
Non-residence 278	630.280	6232.975
Non-residence 279	635.385	6233.556
Non-residence 280	635.106	6233.424
Non-residence 281	635.812	6233.348
Non-residence 282	635.182	6233.689
Non-residence 283	636.388	6232.996
Non-residence 284	629.248	6233.007
Non-residence 285	629.176	6232.862
Non-residence 286	629.578	6232.917
Non-residence 287	629.256	6232.919

Table D.4 Special receptors at unknown private buildings (in km)

Receptor ID	UTM Easting	UTM Northing
Unknown Building 1	644.950	6225.018
Unknown Building 2	644.872	6225.507
Unknown Building 3	644.880	6225.504
Unknown Building 4	644.952	6225.002
Unknown Building 5	644.955	6224.971
Unknown Building 6	644.947	6224.943
Unknown Building 7	644.947	6224.925
Unknown Building 8	644.963	6224.933
Unknown Building 9	644.882	6225.060
Unknown Building 10	643.566	6225.463
Unknown Building 11	643.559	6225.463
Unknown Building 12	643.374	6225.135
Unknown Building 13	643.404	6225.133
Unknown Building 14	643.403	6225.138
Unknown Building 15	643.969	6223.120
Unknown Building 16	643.834	6224.638
Unknown Building 17	643.831	6224.618
Unknown Building 18	644.950	6225.063
Unknown Building 19	644.943	6225.062
Unknown Building 20	644.951	6225.052
Unknown Building 21	644.953	6225.057
Unknown Building 22	644.933	6225.059
Unknown Building 23	644.990	6224.918
Unknown Building 24	644.990	6224.939
Unknown Building 25	644.873	6225.014
Unknown Building 26	644.713	6224.856
Unknown Building 27	644.760	6224.826
Unknown Building 28	644.816	6224.832
Unknown Building 29	644.815	6224.853
Unknown Building 30	644.843	6224.892
Unknown Building 31	644.871	6224.825
Unknown Building 32	644.906	6224.940
Unknown Building 33	644.867	6224.969
Unknown Building 34	643.667	6225.359
Unknown Building 35	643.773	6225.267
Unknown Building 36	643.797	6225.227
Unknown Building 37	643.806	6225.168
Unknown Building 38	643.808	6225.162
Unknown Building 39	643.766	6225.177
Unknown Building 40	643.683	6225.204

Receptor ID	UTM Easting	UTM Northing
Unknown Building 41	643.681	6225.221
Unknown Building 42	643.634	6225.271
Unknown Building 43	643.633	6225.252
Unknown Building 44	643.894	6223.384
Unknown Building 45	643.856	6223.461
Unknown Building 46	644.033	6223.096
Unknown Building 47	644.849	6225.100
Unknown Building 48	644.708	6225.309
Unknown Building 49	644.412	6224.131
Unknown Building 50	644.406	6224.149
Unknown Building 51	643.639	6225.491
Unknown Building 52	643.623	6225.483
Unknown Building 53	643.691	6225.415
Unknown Building 54	643.709	6225.375
Unknown Building 55	643.700	6225.363
Unknown Building 56	643.664	6225.368
Unknown Building 57	642.358	6232.697
Unknown Building 58	642.370	6232.697
Unknown Building 59	641.707	6232.306
Unknown Building 60	641.716	6232.294
Unknown Building 61	639.639	6231.988
Unknown Building 62	639.669	6231.968
Unknown Building 63	641.692	6232.162
Unknown Building 64	639.724	6231.971
Unknown Building 65	641.692	6232.158
Unknown Building 66	642.008	6232.583
Unknown Building 67	639.730	6231.945
Unknown Building 68	641.731	6232.165
Unknown Building 69	641.983	6232.575
Unknown Building 70	639.694	6231.927
Unknown Building 71	641.719	6232.146
Unknown Building 72	641.977	6232.585
Unknown Building 73	641.745	6232.141
Unknown Building 74	641.764	6232.131
Unknown Building 75	641.939	6232.450
Unknown Building 76	641.800	6232.154
Unknown Building 77	641.817	6232.160
Unknown Building 78	641.827	6232.134
Unknown Building 79	641.220	6232.063
Unknown Building 80	641.784	6232.059
Unknown Building 81	641.219	6232.071

Receptor ID	UTM Easting	UTM Northing
Unknown Building 82	641.751	6232.050
Unknown Building 83	641.219	6232.085
Unknown Building 84	641.208	6232.134
Unknown Building 85	641.842	6232.556
Unknown Building 86	641.200	6232.134
Unknown Building 87	641.242	6232.144
Unknown Building 88	641.273	6232.106
Unknown Building 89	641.267	6232.081
Unknown Building 90	641.350	6232.123
Unknown Building 91	641.913	6232.471
Unknown Building 92	641.360	6232.149
Unknown Building 93	641.339	6232.148
Unknown Building 94	641.334	6232.133
Unknown Building 95	641.329	6232.136
Unknown Building 96	641.319	6232.130
Unknown Building 97	641.716	6232.361
Unknown Building 98	641.726	6232.330
Unknown Building 99	642.420	6232.706
Unknown Building 100	641.719	6232.315
Unknown Building 101	642.414	6232.697
Unknown Building 102	641.708	6232.314
Unknown Building 103	641.729	6229.020
Unknown Building 104	641.715	6229.015
Unknown Building 105	641.684	6229.037
Unknown Building 106	641.664	6229.052
Unknown Building 107	641.684	6229.050
Unknown Building 108	641.698	6229.109
Unknown Building 109	641.689	6228.896
Unknown Building 110	641.669	6228.915
Unknown Building 111	641.657	6228.840
Unknown Building 112	641.665	6228.834
Unknown Building 113	644.398	6226.367
Unknown Building 114	643.881	6226.485
Unknown Building 115	644.029	6226.070
Unknown Building 116	644.017	6226.086
Unknown Building 117	642.838	6226.416
Unknown Building 118	642.945	6226.433
Unknown Building 119	642.936	6226.428
Unknown Building 120	642.888	6226.854
Unknown Building 121	642.854	6226.949
Unknown Building 122	643.847	6226.177

Receptor ID	UTM Easting	UTM Northing
Unknown Building 123	643.840	6226.157
Unknown Building 124	643.865	6226.164
Unknown Building 125	643.882	6226.134
Unknown Building 126	643.897	6226.107
Unknown Building 127	643.902	6226.101
Unknown Building 128	643.599	6226.038
Unknown Building 129	643.616	6226.337
Unknown Building 130	643.663	6226.211
Unknown Building 131	643.697	6226.185
Unknown Building 132	643.719	6226.149
Unknown Building 133	643.736	6226.142
Unknown Building 134	643.744	6226.087
Unknown Building 135	643.748	6226.078
Unknown Building 136	643.753	6226.063
Unknown Building 137	641.735	6229.039
Unknown Building 138	643.909	6226.161
Unknown Building 139	643.834	6226.210
Unknown Building 140	643.384	6226.373
Unknown Building 141	643.418	6226.364
Unknown Building 142	642.743	6226.973
Unknown Building 143	642.768	6226.982
Unknown Building 144	642.672	6226.501
Unknown Building 145	642.676	6226.447
Unknown Building 146	643.764	6226.139
Unknown Building 147	643.755	6226.147
Unknown Building 148	643.768	6226.152
Unknown Building 149	643.779	6226.166
Unknown Building 150	643.757	6226.160
Unknown Building 151	643.771	6226.180
Unknown Building 152	643.753	6226.187
Unknown Building 153	643.720	6226.203
Unknown Building 154	643.744	6226.210
Unknown Building 155	643.832	6226.175
Unknown Building 156	643.172	6226.037
Unknown Building 157	643.203	6225.978
Unknown Building 158	643.484	6226.166
Unknown Building 159	643.367	6226.160
Unknown Building 160	643.528	6226.061
Unknown Building 161	643.545	6226.046
Unknown Building 162	643.536	6226.004
Unknown Building 163	643.472	6226.157

Receptor ID	UTM Easting	UTM Northing
Unknown Building 164	643.587	6226.050
Unknown Building 165	643.185	6226.306
Unknown Building 166	643.027	6226.363
Unknown Building 167	641.436	6228.659
Unknown Building 168	642.961	6226.254
Unknown Building 169	644.004	6226.153
Unknown Building 170	643.970	6226.198
Unknown Building 171	643.973	6226.201
Unknown Building 172	643.968	6226.204
Unknown Building 173	643.956	6226.214
Unknown Building 174	641.724	6227.960
Unknown Building 175	641.741	6227.953
Unknown Building 176	641.677	6228.058
Unknown Building 177	641.672	6228.099
Unknown Building 178	641.666	6228.095
Unknown Building 179	643.902	6226.128
Unknown Building 180	643.908	6226.118
Unknown Building 181	643.914	6226.110
Unknown Building 182	643.882	6226.168
Unknown Building 183	643.875	6226.180
Unknown Building 184	639.183	6227.195
Unknown Building 185	639.162	6227.197
Unknown Building 186	638.997	6227.336
Unknown Building 187	639.202	6227.203
Unknown Building 188	643.875	6226.185
Unknown Building 189	643.868	6226.221
Unknown Building 190	643.761	6226.051
Unknown Building 191	643.782	6226.058
Unknown Building 192	643.814	6226.081
Unknown Building 193	643.801	6226.090
Unknown Building 194	643.797	6226.103
Unknown Building 195	643.794	6226.117
Unknown Building 196	643.793	6226.138
Unknown Building 197	643.767	6226.128
Unknown Building 198	643.268	6226.302
Unknown Building 199	643.292	6226.276
Unknown Building 200	643.216	6226.347
Unknown Building 201	643.224	6226.078
Unknown Building 202	643.256	6226.097
Unknown Building 203	643.288	6226.117
Unknown Building 204	643.339	6226.147

Receptor ID	UTM Easting	UTM Northing
Unknown Building 205	643.303	6226.155
Unknown Building 206	622.081	6236.050
Unknown Building 207	622.088	6235.938
Unknown Building 208	622.090	6235.975
Unknown Building 209	621.912	6235.742
Unknown Building 210	622.223	6235.981
Unknown Building 211	622.240	6235.939
Unknown Building 212	643.342	6232.985
Unknown Building 213	642.375	6232.724
Unknown Building 214	642.401	6232.723
Unknown Building 215	643.329	6233.006
Unknown Building 216	642.416	6232.748
Unknown Building 217	643.334	6233.011
Unknown Building 218	642.409	6232.755
Unknown Building 219	643.338	6233.028
Unknown Building 220	642.398	6232.749
Unknown Building 221	643.335	6233.152
Unknown Building 222	642.392	6232.749
Unknown Building 223	643.308	6233.164
Unknown Building 224	642.368	6232.771
Unknown Building 225	643.304	6233.215
Unknown Building 226	642.409	6232.760
Unknown Building 227	643.336	6233.207
Unknown Building 228	643.314	6233.263
Unknown Building 229	626.029	6235.450
Unknown Building 230	643.303	6233.282
Unknown Building 231	643.334	6233.306
Unknown Building 232	643.313	6233.331
Unknown Building 233	643.300	6233.326
Unknown Building 234	643.203	6233.002
Unknown Building 235	643.196	6232.991
Unknown Building 236	643.246	6232.984
Unknown Building 237	643.191	6232.960
Unknown Building 238	643.239	6232.950
Unknown Building 239	643.231	6232.911
Unknown Building 240	646.432	6233.677
Unknown Building 241	646.501	6233.734
Unknown Building 242	626.927	6234.611
Unknown Building 243	643.244	6232.893
Unknown Building 244	643.200	6232.869
Unknown Building 245	646.378	6233.687

Receptor ID	UTM Easting	UTM Northing
Unknown Building 246	643.189	6232.851
Unknown Building 247	646.378	6233.691
Unknown Building 248	643.204	6232.854
Unknown Building 249	646.354	6233.688
Unknown Building 250	643.219	6232.853
Unknown Building 251	646.357	6233.709
Unknown Building 252	643.238	6232.844
Unknown Building 253	643.016	6232.721
Unknown Building 254	643.326	6232.944
Unknown Building 255	643.315	6232.981
Unknown Building 256	642.409	6232.764
Unknown Building 257	642.409	6232.768
Unknown Building 258	642.434	6232.773
Unknown Building 259	642.331	6232.741
Unknown Building 260	642.316	6232.728
Unknown Building 261	642.298	6232.715
Unknown Building 262	642.963	6232.725
Unknown Building 263	621.923	6235.219
Unknown Building 264	621.936	6235.188
Unknown Building 265	621.979	6235.185
Unknown Building 266	625.563	6235.174
Unknown Building 267	625.767	6235.142
Unknown Building 268	627.442	6234.203
Unknown Building 269	626.401	6234.964
Unknown Building 270	626.381	6234.964
Unknown Building 271	626.452	6235.114
Unknown Building 272	626.453	6235.109
Unknown Building 273	626.630	6235.208
Unknown Building 274	626.467	6235.141
Unknown Building 275	626.461	6235.127
Unknown Building 276	626.495	6235.173
Unknown Building 277	626.425	6235.038
Unknown Building 278	621.996	6237.816
Unknown Building 279	622.012	6237.737
Unknown Building 280	622.051	6237.728
Unknown Building 281	622.041	6237.751
Unknown Building 282	622.038	6237.770
Unknown Building 283	622.001	6237.816
Unknown Building 284	622.656	6235.987
Unknown Building 285	625.996	6235.432
Unknown Building 286	625.963	6235.416

Receptor ID	UTM Easting	UTM Northing
Unknown Building 287	625.953	6235.405

Table D.5 Special receptors at schools (in km)

Receptor ID	UTM Easting	UTM Northing
Aboriginal Education Center	633.609	6,235.391
Alwin Holland	633.853	6,236.278
Baldonnel Elementary	642.961	6,232.724
Bert Ambrose Elementary	633.698	6,237.244
Bert Bowes Middle School	632.695	6,235.420
Board Office	633.204	6,236.129
Charlie Lake Elementary	626.866	6,238.375
CM Finch Elementary	632.665	6,236.509
Dr. Kearney Middle School	634.341	6,236.419
Duncan Cran Elementary	635.468	6,234.477
Ecole Central Elementary	633.100	6,235.426
Facilities & Transportation	632.721	6,235.227
Key Learning Centre	632.856	6,235.390
North Peace Secondary	634.926	6,234.932
Energetic Learning Campus	634.926	6,234.932
Northern BC Distance Education	632.856	6,235.390
Open Learning	632.856	6,235.390
Robert Ogilvie Elementary	635.074	6,235.572
Student Support Services	633.204	6,236.129
Taylor Elementary	643.346	6,227.033
Technology Services	633.204	6,236.129
Upper Halfway Elementary	633.204	6,236.129
Wonowon Elementary	633.204	6,236.129

Table D.6 Special receptors at child care facilities (in km)

Receptor ID	UTM Easting	UTM Northing
Chunkey Monkey Daycare	634.736	6,235.411
Oscare Daycare/Oscare Tots	632.978	6,235.501
The Zoo Daycare	634.054	6,236.232
Little Kritters Daycare	624.101	6,239.158
ABC & 123 Family Daycare	635.818	6,234.246
Baby Bear Daycare	634.940	6,234.929
Rascals	626.867	6,238.356
Building Blocks Daycare	632.341	6,235.672
Kidz Club	635.485	6,234.438
Northern Lights College Daycare	632.978	6,235.501
Little Bear Family Daycare	634.746	6,235.411
Little Peanuts Family Daycare	636.173	6,234.279
Little Pigs Family Daycare	633.130	6,236.459
Nanny Norma’s Daycare	633.845	6,237.086
Pitter Patter Day Care	635.907	6,234.821
Puddle Jumpers	633.845	6,237.086
Seeds to Sow	634.341	6,235.509
The Playground Family Daycare	635.666	6,234.938
The Wiggles and Giggles Daycare	632.583	6,235.781
TJ’s Playhouse	634.310	6,235.425
Tot’s and Tikes Family Daycare	633.117	6,236.197
The Stepping Stones Centre	635.815	6,235.192
Aboriginal Head Start	633.003	6,235.697
Child Development Centre	632.929	6,236.112
Keeginaw Pre-School	633.173	6,235.032
Totem Pre-School	635.236	6,235.541
Rise and Shine Clubhouse	635.020	6,235.584
Barney and Friends Family Daycare	643.482	6,226.539
Hudson's Hope Playschool	643.946	6,225.250

Table D.7 Special receptors at health care and senior care facilities (in km)

Category	Receptor ID	UTM Easting	UTM Northing
Hospital	Fort St. John Hospital and Health Care	633.715	6,235.551
Hospital	Fort St. John Medical Clinic	633.889	6,235.722
Hospital	Fort St John Pharmacy and Wellness Centre	633.623	6,235.735
Hospital	The Taylor Medical Clinic	643.866	6,225.592
Hospital	ABC Medical Clinic	633.516	6,235.725
Hospital	North Peace Medical Clinic	633.554	6,235.725
Senior Care	Heritage Manor III	633.568	6,236.327
Senior Care	Peace Lutheran Apt #1,	633.439	6,236.439
Senior Care	Peace Lutheran Apt #2,	633.517	6,236.442
Senior Care	The Sunset Home	633.588	6,236.708
Senior Care	North Peace Care Centre	633.381	6,236.534
Senior Care	Abbeyfield Houses of Fort St. John	635.602	6,235.204
Senior Care	New Senior Housing	633.553	6,236.243

APPENDIX E

Baseline Emissions

Table E.1 Existing emissions in the technical study area including individual industrial sources (in tonnes/year),

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
1257	Canadian Forest Products Ltd., Canfor Taylor Pulp	NS	124	125	49.0	NS	36.5
4305	Spectra Energy Transmission, McMahon Gas Plant	2.02	2.02	2.02	193	3,450	89.4
4306	Spectra Energy Transmission, Pine River Gas Plant	10.4	10.4	10.4	872	9,930	229
5124	Spectra Energy Midstream Corporation, Highway Gas Plant	0.65	0.65	0.65	101	29.6	39.8
5141	Tembec, Tembec	NS	1.34	37.9	114	NS	467
5158	West Fraser Mills Ltd., Chetwynd Forest Industries, a Division of West Fraser Mills	6.65	19.1	144	101	NS	10,800
5169	Canadian Forest Products Ltd., Fort St. John	3.57	8.16	65.7	37.9	NS	102
7717	Spectra Energy Transmission, Booster Station 19 - Cabin Lake	0.56	0.56	0.56	47.5	NS	24.2
7720	Spectra Energy Transmission, Station 1 - Taylor	2.19	2.19	2.19	1,410	NS	726
7721	Spectra Energy Transmission, CS No.2, Willow Flats	0.99	0.99	0.99	170	NS	42.7
7909	Canadian Forest Products Limited	1.31	9.86	36.4	NS	NS	NS
7959	Spectra Energy Transmission, McMahon Cogen Plant	9.11	9.11	9.11	320	NS	144
7963	Spectra Energy Transmission, BS 9. Nig Creek	NS	NS	NS	NS	NS	NS
7965	Spectra Energy Transmission, Booster Station 11 - Rigel	NS	NS	NS	33.3	NS	52.1
15713	ConocoPhillips Canada Resources Corp. - Brassey Comp Station D-013-F	0.96	0.96	0.96	259	NS	370
16406	Devon Canada Corporation, West Eagle 02-01	1.71	1.71	1.71	125	NS	NS
16409	Devon Canada Corporation - Attachie 07-20	0.33	0.33	0.33	NS	NS	NS
17461	Pengrowth Corporation - Tupper #4587 (b-61-J, 93-P-8)	NS	NS	NS	70.7	NS	NS

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
17885	TAQA North Ltd., Monias (11-13)	0.46	0.46	0.46	264	NS	NS
18238	Shell Canada Upstream, Sunset Battery 2-17	NS	NS	NS	NS	109	NS
18497	Canadian Natural Resources Limited, CNSL Monias 06-14-82-21	NS	NS	NS	67.0	NS	NS
18498	Canadian Natural Resources Limited, CNSL Monias 11-13-83-21	0.34	0.34	0.34	117	NS	NS
18718	Devon Canada Corporation, Cecil 06-14	0.62	0.62	0.62	90.3	NS	NS
18741	Devon Canada Corporation, Monias 14-14	0.50	0.50	0.50	200	NS	36.0
19733	Suncor Energy Inc., Suncor Kobes Battery (B-24-A/94-B-9)	NS	NS	NS	133	247	NS
19845	ARC Resources, Septimus Well 02-35-BCBT11202	0.95	0.95	0.95	NS	NS	NS
19953	AltaGas Ltd. - Blair Creek Comp Stn d-058-F	NS	NS	NS	41.0	NS	27.0
20104	Canfor Pulp Limited Partnership, Peace Valley OSB	21.3	43.3	81.8	84.7	NS	467
20175	Western Coal Corp, Willow Creek Mine	314	2,610	6,070	206	70.3	768
20201	Shell Canada Upstream, Brassey Gas Processing and Production IF-a	0.70	0.70	0.70	227	NS	158
20202	Shell Canada Upstream, Groundbirch Gas Processing and Production IF-a	5.45	5.45	5.45	371	NS	419
20208	Shell Canada Upstream, Sundown Gas Processing and Production IF-a	0.46	0.46	0.46	97.1	NS	67.6
20210	Shell Canada Upstream, Sunset Gas Processing and Production IF-a	2.18	2.18	2.18	92.7	75.7	67.1
20211	Tourmaline Oil Corp, Sunrise 1-18-80-17 W6	NS	NS	NS	23.3	NS	NS
20212	Tourmaline Oil Corp, Sunrise 3-18-80-17 W6	0.49	0.49	0.49	35.4	NS	31.7
20214	Alliance Pipeline Ltd., Taylor Compressor Station	NS	NS	NS	44.9	NS	NS
20216	Apache Canada Ltd., d-84-J/93-P-7	NS	NS	NS	52.9	NS	NS
21225	Suncor Energy - Commotion a-23-D/93-P-12	NS	NS	NS	90.5	NS	86.1

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
22080	Canadian Natural Resources Limited, CNSL Monias 14-9-82-21	NS	NS	NS	NS	NS	32.5
23471	Aux Sable Canada LP, Septimus Sweet Gas Plant 12-27	0.95	0.95	0.95	67.9	NS	33.6
23493	Devon Canada Corporation - ANDERSON CECIL 15-24-84-18 #1	NS	NS	NS	88.6	NS	NS
23836	Canadian Natural Resources Limited, CNSL Septimus 08-22-81-19	0.32	0.32	0.32	NS	NS	NS
24059	Talisman Energy, Talisman Farrell Creek B-88-I/94B-1	1.47	1.47	1.47	60.0	NS	88.6
Sub-total Industrial Sources		**391**	**2,860**	**6,600**	**6,360**	**13,900**	**15,400**
Area Sources							
Agriculture		347	1,240	2,510	1,370	39.5	1,260
Residential Wood Heating		193	194	205	22.3	3.19	1,180
Forest Fires		329	366	478	48.8	1.22	2,490
Prescribed Burning		6.16	6.59	9.88	1.18	0.03	59.0
Other Area Sources		220	226	294	60.7	10.5	1,250
Sub-total Area Sources		**1,100**	**2,030**	**3,500**	**1,500**	**54.4**	**6,240**
Mobile Sources							
Aircraft		8.70	8.92	9.04	43.3	2.10	310
Heavy-Duty Diesel Vehicles		30.6	34.9	34.9	927	17.1	210
Heavy-Duty Gasoline Vehicles		0.26	0.37	0.38	19.7	0.44	115
Light-Duty Diesel Vehicles		4.02	4.63	4.64	33.3	8.24	27.7
Light-Duty Gasoline Trucks		2.76	4.75	4.86	236	8.24	4,850
Light-Duty Gasoline Vehicles		1.85	3.58	3.65	246	6.40	4,280
Marine Vessels		4.43	4.81	4.81	12.3	0.42	270
Railways		27.1	29.4	29.4	1,240	15.2	236
Other Mobile Sources		678	1,590	2,970	3,140	7,560	6,230
Sub-total Mobile Sources		**758**	**1,680**	**3,060**	**5,900**	**7,620**	**16,500**
Total		**2,250**	**6,570**	**13,200**	**13,800**	**21,600**	**38,100**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (industrial sources) and BCMOE 2000 (all other sources).
Emissions of TSP (in tonnes per year) less than PM_{10} reported in NPRI were set equal to PM_{10} emissions.
“NS”: not specified; NPRI reporting thresholds in tonnes/year are 0.3 ($PM_{2.5}$), 0.5 (PM_{10}), and 20 (all other pollutants).

Table E.2 Existing emissions in the technical study area including individual industrial sources (in percent of total),

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
1257	Canadian Forest Products Ltd., Canfor Taylor Pulp	NS	1.89	0.95	0.36	NS	0.10
4305	Spectra Energy Transmission, McMahon Gas Plant	0.09	0.03	0.02	1.40	16.0	0.23
4306	Spectra Energy Transmission, Pine River Gas Plant	0.46	0.16	0.08	6.32	46.0	0.60
5124	Spectra Energy Midstream Corporation, Highway Gas Plant	0.03	0.01	0.00	0.73	0.14	0.10
5141	Tembec, Tembec	NS	0.02	0.29	0.83	NS	1.23
5158	West Fraser Mills Ltd., Chetwynd Forest Industries, a Division of West Fraser Mills	0.30	0.29	1.09	0.73	NS	28.3
5169	Canadian Forest Products Ltd., Fort St. John	0.16	0.12	0.50	0.27	NS	0.27
7717	Spectra Energy Transmission, Booster Station 19 - Cabin Lake	0.02	0.01	0.00	0.34	NS	0.06
7720	Spectra Energy Transmission, Station 1 - Taylor	0.10	0.03	0.02	10.2	NS	1.91
7721	Spectra Energy Transmission, CS No.2, Willow Flats	0.04	0.02	0.01	1.23	NS	0.11
7909	Canadian Forest Products Limited	0.06	0.15	0.28	NS	NS	NS
7959	Spectra Energy Transmission, McMahon Cogen Plant	0.40	0.14	0.07	2.32	NS	0.38
7963	Spectra Energy Transmission, BS 9. Nig Creek	NS	NS	NS	NS	NS	NS
7965	Spectra Energy Transmission, Booster Station 11 - Rigel	NS	NS	NS	0.24	NS	0.14
15713	ConocoPhillips Canada Resources Corp. - Brassey Comp Station D-013-F	0.04	0.01	0.01	1.88	NS	0.97
16406	Devon Canada Corporation, West Eagle 02-01	0.08	0.03	0.01	0.91	NS	NS
16409	Devon Canada Corporation - Attachie 07-20	0.01	0.01	0.00	NS	NS	NS
17461	Pengrowth Corporation - Tupper #4587 (b-61-J, 93-P-8)	NS	NS	NS	0.51	NS	NS

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
17885	TAQA North Ltd., Monias (11-13)	0.02	0.01	0.00	1.91	NS	NS
18238	Shell Canada Upstream, Sunset Battery 2-17	NS	NS	NS	NS	0.50	NS
18497	Canadian Natural Resources Limited, CNSL Monias 06-14-82-21	NS	NS	NS	0.49	NS	NS
18498	Canadian Natural Resources Limited, CNSL Monias 11-13-83-21	0.02	0.01	0.00	0.85	NS	NS
18718	Devon Canada Corporation, Cecil 06-14	0.03	0.01	0.00	0.65	NS	NS
18741	Devon Canada Corporation, Monias 14-14	0.02	0.01	0.00	1.45	NS	0.09
19733	Suncor Energy Inc., Suncor Kobes Battery (B-24-A/94-B-9)	NS	NS	NS	0.96	1.14	NS
19845	ARC Resources, Septimus Well 02-35-BCBT11202	0.04	0.01	0.01	NS	NS	NS
19953	AltaGas Ltd. - Blair Creek Comp Stn d-058-F	NS	NS	NS	0.30	NS	0.07
20104	Canfor Pulp Limited Partnership, Peace Valley OSB	0.95	0.66	0.62	0.61	NS	1.23
20175	Western Coal Corp, Willow Creek Mine	14.0	39.7	46.0	1.49	0.33	2.02
20201	Shell Canada Upstream, Brassey Gas Processing and Production IF-a	0.03	0.01	0.01	1.64	NS	0.41
20202	Shell Canada Upstream, Groundbirch Gas Processing and Production IF-a	0.24	0.08	0.04	2.69	NS	1.10
20208	Shell Canada Upstream, Sundown Gas Processing and Production IF-a	0.02	0.01	0.00	0.70	NS	0.18
20210	Shell Canada Upstream, Sunset Gas Processing and Production IF-a	0.10	0.03	0.02	0.67	0.35	0.18
20211	Tourmaline Oil Corp, Sunrise 1-18-80-17 W6	NS	NS	NS	0.17	NS	NS
20212	Tourmaline Oil Corp, Sunrise 3-18-80-17 W6	0.02	0.01	0.00	0.26	NS	0.08
20214	Alliance Pipeline Ltd., Taylor Compressor Station	NS	NS	NS	0.33	NS	NS
20216	Apache Canada Ltd., d-84-J/93-P-7	NS	NS	NS	0.38	NS	NS
21225	Suncor Energy - Commotion a-23-D/93-P-12	NS	NS	NS	0.66	NS	0.23

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
22080	Canadian Natural Resources Limited, CNSL Monias 14-9-82-21	NS	NS	NS	NS	NS	0.09
23471	Aux Sable Canada LP, Septimus Sweet Gas Plant 12-27	0.04	0.01	0.01	0.49	NS	0.09
23493	Devon Canada Corporation - ANDERSON CECIL 15-24-84-18 #1	NS	NS	NS	0.64	NS	NS
23836	Canadian Natural Resources Limited, CNSL Septimus 08-22-81-19	0.01	0.00	0.00	NS	NS	NS
24059	Talisman Energy, Talisman Farrell Creek B-88-I/94B-1	0.07	0.02	0.01	0.43	NS	0.23
Sub-total Industrial Sources		**17.4**	**43.5**	**50.0**	**46.1**	**64.4**	**40.4**
Area Sources							
Agriculture		15.4	18.9	19.0	9.93	0.18	3.31
Residential Wood Heating		8.58	2.95	1.55	0.16	0.01	3.10
Forest Fires		14.6	5.57	3.62	0.35	0.01	6.54
Prescribed Burning		0.27	0.10	0.07	0.01	0.00	0.15
Other Area Sources		9.78	3.44	2.23	0.44	0.05	3.28
Sub-total Area Sources		**48.7**	**30.9**	**26.5**	**10.9**	**0.25**	**16.4**
Mobile Sources							
Aircraft		0.39	0.14	0.07	0.31	0.01	0.81
Heavy-Duty Diesel Vehicles		1.36	0.53	0.26	6.72	0.08	0.55
Heavy-Duty Gasoline Vehicles		0.01	0.01	0.00	0.14	0.00	0.30
Light-Duty Diesel Vehicles		0.18	0.07	0.04	0.24	0.04	0.07
Light-Duty Gasoline Trucks		0.12	0.07	0.04	1.71	0.04	12.7
Light-Duty Gasoline Vehicles		0.08	0.05	0.03	1.78	0.03	11.2
Marine Vessels		0.20	0.07	0.04	0.09	0.00	0.71
Railways		1.20	0.45	0.22	8.99	0.07	0.62
Other Mobile Sources		30.1	24.2	22.5	22.8	35.0	16.4
Sub-total Mobile Sources		**33.7**	**25.6**	**23.2**	**42.7**	**35.3**	**43.4**
Total		**100**	**100**	**100**	**100**	**100**	**100**

NOTES:

All numbers were rounded to three significant figures but no more than two decimal places.

Sources: National Pollutant Release Inventory 2010 (industrial sources) and BCMOE 2000 (all other sources).

Emissions of TSP (in tonnes per year) less than PM_{10} reported in NPRI were set equal to PM_{10} emissions before percentages were calculated for this table.

"NS": not specified; NPRI reporting thresholds in tonnes/year are 0.3 ($PM_{2.5}$), 0.5 (PM_{10}), and 20 (all other pollutants).

Table E.3 Existing emissions in the dispersion modelling study area including individual industrial sources (in tonnes/year),

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
1257	Canadian Forest Products Ltd., Canfor Taylor Pulp	NS	124	125	49.0	NS	36.5
4305	Spectra Energy Transmission, McMahon Gas Plant	2.02	2.02	2.02	193	3,450	89.4
5124	Spectra Energy Midstream Corporation, Highway Gas Plant	0.65	0.65	0.65	101	29.6	39.8
5169	Canadian Forest Products Ltd., Fort St. John	3.57	8.16	65.7	37.9	NS	102
7717	Spectra Energy Transmission, Booster Station 19 - Cabin Lake	0.56	0.56	0.56	47.5	NS	24.2
7720	Spectra Energy Transmission, Station 1 - Taylor	2.19	2.19	2.19	1,410	NS	726
7959	Spectra Energy Transmission, McMahon Cogen Plant	9.11	9.11	9.11	320	NS	144
7963	Spectra Energy Transmission, BS 9. Nig Creek	NS	NS	NS	NS	NS	NS
7965	Spectra Energy Transmission, Booster Station 11 - Rigel	NS	NS	NS	33.3	NS	52.1
16406	Devon Canada Corporation, West Eagle 02-01	1.71	1.71	1.71	125	NS	NS
18718	Devon Canada Corporation, Cecil 06-14	0.62	0.62	0.62	90.3	NS	NS
18741	Devon Canada Corporation, Monias 14-14	0.50	0.50	0.50	200	NS	36.0
19733	Suncor Energy Inc., Suncor Kobes Battery (B-24-A/94-B-9)	NS	NS	NS	133	247	NS
19953	AltaGas Ltd. - Blair Creek Comp Stn d-058-F	NS	NS	NS	41.0	NS	27.0
20104	Canfor Pulp Limited Partnership, Peace Valley OSB	21.3	43.3	81.8	84.7	NS	467
23493	Devon Canada Corporation - ANDERSON CECIL 15-24-84-18 #1	NS	NS	NS	88.6	NS	NS
Sub-total Industrial Sources		**42.0**	**193**	**290**	**2,950**	**3,730**	**1,740**
Area Sources							
Agriculture		49.2	176	355	194	5.60	178
Residential Wood Heating		133	134	141	15.4	2.20	815
Forest Fires		0	0	0	0	0	0
Prescribed Burning		0	0	0	0	0	0
Other Area Sources		84.4	87.2	116	31.3	6.33	478
Sub-total Area Sources		**267**	**397**	**612**	**241**	**14.1**	**1,470**

Category/Sector	Pollutant Emissions					
	$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Mobile Sources						
Aircraft	8.70	8.92	9.04	43.3	2.10	310
Heavy-Duty Diesel Vehicles	4.40	5.01	5.02	133	2.46	30.2
Heavy-Duty Gasoline Vehicles	0.04	0.05	0.05	2.84	0.06	16.5
Light-Duty Diesel Vehicles	0.69	0.80	0.80	5.72	1.31	4.77
Light-Duty Gasoline Trucks	0.44	0.76	0.77	37.5	1.31	771
Light-Duty Gasoline Vehicles	0.33	0.64	0.65	43.9	1.14	764
Marine Vessels	0	0	0	0	0	0
Railways	5.23	5.68	5.68	239	2.94	45.6
Other Mobile Sources	151	281	489	1,060	3,510	2,570
Sub-total Mobile Sources	**171**	**303**	**511**	**1,570**	**3,520**	**4,510**
Total	**480**	**893**	**1,410**	**4,760**	**7,260**	**7,720**

NOTES:
All numbers were rounded to three significant figures but no more than two decimal places.
Sources: National Pollutant Release Inventory 2010 (industrial sources) and BCMOE 2000 (all other sources).
Emissions of TSP (in tonnes per year) less than PM_{10} reported in NPRI were set equal to PM_{10} emissions.
"NS": not specified; NPRI reporting thresholds in tonnes/year are 0.3 ($PM_{2.5}$), 0.5 (PM_{10}), and 20 (all other pollutants).

Table E.4 Existing emissions in the dispersion modelling study area (including individual industrial sources (in percent of total).

Category/Sector		Pollutant Emissions					
		$PM_{2.5}$	PM_{10}	TSP	NO_x	SO_x	CO
Industrial Sources							
NPRI ID	**Facility**						
1257	Canadian Forest Products Ltd., Canfor Taylor Pulp	NS	13.9	8.87	1.03	NS	0.47
4305	Spectra Energy Transmission, McMahon Gas Plant	0.42	0.23	0.14	4.05	47.5	1.16
5124	Spectra Energy Midstream Corporation, Highway Gas Plant	0.13	0.07	0.05	2.12	0.41	0.52
5169	Canadian Forest Products Ltd., Fort St. John	0.74	0.91	4.66	0.80	NS	1.32
7717	Spectra Energy Transmission, Booster Station 19 - Cabin Lake	0.12	0.06	0.04	1.00	NS	0.31
7720	Spectra Energy Transmission, Station 1 - Taylor	0.46	0.25	0.16	29.6	NS	9.40
7959	Spectra Energy Transmission, McMahon Cogen Plant	1.90	1.02	0.65	6.72	NS	1.87
7963	Spectra Energy Transmission, BS 9. Nig Creek	NS	NS	NS	NS	NS	NS
7965	Spectra Energy Transmission, Booster Station 11 - Rigel	NS	NS	NS	0.70	NS	0.67
16406	Devon Canada Corporation, West Eagle 02-01	0.36	0.19	0.12	2.63	NS	NS
18718	Devon Canada Corporation, Cecil 06-14	0.13	0.07	0.04	1.90	NS	NS
18741	Devon Canada Corporation, Monias 14-14	0.10	0.06	0.04	4.20	NS	0.47
19733	Suncor Energy Inc., Suncor Kobes Battery (B-24-A/94-B-9)	NS	NS	NS	2.79	3.40	NS
19953	AltaGas Ltd. - Blair Creek Comp Stn d-058-F	NS	NS	NS	0.86	NS	0.35
20104	Canfor Pulp Limited Partnership, Peace Valley OSB	4.44	4.85	5.80	1.78	NS	6.05
23493	Devon Canada Corporation - ANDERSON CECIL 15-24-84-18 #1	NS	NS	NS	1.86	NS	NS
Sub-total Industrial Sources		**8.80**	**21.6**	**20.6**	**62.1**	**51.3**	**22.6**
Area Sources							
Agriculture		10.3	19.7	25.2	4.08	0.08	2.31
Residential Wood Heating		27.7	15.0	10.0	0.32	0.03	10.6
Forest Fires		0	0	0	0	0	0
Prescribed Burning		0	0	0	0	0	0
Other Area Sources		17.6	9.76	8.23	0.66	0.09	6.19
Sub-total Area Sources		**55.5**	**44.5**	**43.4**	**5.06**	**0.19**	**19.1**
Mobile Sources							
Aircraft		1.81	1.00	0.64	0.91	0.03	4.02

Category/Sector	Pollutant Emissions					
	$PM_{2.5}$	**PM_{10}**	**TSP**	**NO_x**	**SO_x**	**CO**
Heavy-Duty Diesel Vehicles	0.92	0.56	0.36	2.79	0.03	0.39
Heavy-Duty Gasoline Vehicles	0.01	0.01	0.00	0.06	0.00	0.21
Light-Duty Diesel Vehicles	0.14	0.09	0.06	0.12	0.02	0.06
Light-Duty Gasoline Trucks	0.09	0.09	0.05	0.79	0.02	9.99
Light-Duty Gasoline Vehicles	0.07	0.07	0.05	0.92	0.02	9.90
Marine Vessels	0	0	0	0	0	0
Railways	1.09	0.64	0.40	5.02	0.04	0.59
Other Mobile Sources	31.5	31.5	34.7	22.3	48.3	33.3
Subtotal Mobile Sources	**35.6**	**33.9**	**36.2**	**32.9**	**48.5**	**58.4**
Total	**100**	**100**	**100**	**100**	**100**	**100**

NOTES:

All numbers were rounded to three significant figures but no more than two decimal places.

Sources: National Pollutant Release Inventory 2010 (industrial sources) and BCMOE 2000 (all other sources).

Emissions of TSP (in tonnes per year) less than PM_{10} reported in NPRI were set equal to PM_{10} emissions before percentages were calculated for this table.

“NS”: not specified; NPRI reporting thresholds in tonnes/year are 0.3 ($PM_{2.5}$), 0.5 (PM_{10}), and 20 (all other pollutants).

REFERENCES

British Columbia Ministry of Environment (BCMOE). 2000. Emission Inventory.

National Pollutant Release Inventory. 2010. Online: http://www.ec.gc.ca/inrp-npri/ (Accessed July 2012).

APPENDIX F

Project Emissions

Table F.1 Project emissions of TSP from dam construction (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	111	173	224	148	184	118	66.5	0.251
Drilling	16.9	44.1	22.6	10.8	31.1	32.9	2.66	-
Explosives	-	-	-	-	-	-	-	-
Blasting	0.770	2.31	2.31	1.54	1.54	1.54	1.54	-
Material Handling	2.51	3.75	4.62	4.03	2.34	1.72	2.74	0.0230
Material Processing	0.742	15.8	29.6	32.9	9.99	12.1	8.72	-
Crushing	0.00317	0.0657	0.121	0.137	0.0317	0.0431	0.0273	-
Stockpile Wind Erosion	-	21.5	48.0	48.0	48.0	43.9	48.0	-
Grading	61.0	117	167	114	125	75.0	49.6	-
Scraping	13.3	24.1	45.6	37.3	30.7	16.5	3.93	-
Unpaved Roads	5,524	6,464	8,690	8,334	9,416	9,310	7,704	2,002
Paved Roads	5.37	19.2	10.5	10.5	10.5	10.5	10.5	10.5
Vehicles	0.673	1.03	1.10	1.38	1.49	2.30	2.34	0.542
Diesel Equipment	11.0	17.9	27.0	23.6	25.0	21.9	15.6	3.62
Diesel Generators	0.124	0.146	0.138	0.201	0.124	0.168	0.107	-
Total	5,747	6,904	9,273	8,766	9,886	9,647	7,916	2,017

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.2 Project emissions of PM_{10} from dam construction (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	28.2	38.7	50.5	36.5	47.3	33.4	14.0	0.0423
Drilling	8.01	20.9	10.7	5.11	14.7	15.5	1.26	-
Explosives	-	-	-	-	-	-	-	-
Blasting	0.400	1.20	1.20	0.801	0.801	0.801	0.801	-
Material Handling	1.19	1.77	2.18	1.91	1.11	0.815	1.29	0.0109
Material Processing	0.235	5.00	9.42	10.4	3.23	3.89	2.82	-
Crushing	0.00141	0.0292	0.0536	0.0608	0.0141	0.0192	0.0121	-
Stockpile Wind Erosion	-	10.8	24.0	24.0	24.0	21.9	24.0	-
Grading	17.9	34.1	48.9	33.2	36.5	21.9	14.5	-
Scraping	6.27	11.4	21.5	17.6	14.5	7.83	1.86	-
Unpaved Roads	1,571	1,838	2,471	2,370	2,678	2,647	2,191	569
Paved Roads	1.03	3.68	2.01	2.01	2.01	2.01	2.01	2.01
Vehicles	0.673	1.03	1.10	1.38	1.49	2.30	2.34	0.542
Diesel Equipment	11.0	17.9	27.0	23.6	25.0	21.9	15.6	3.62
Diesel Generators	0.124	0.146	0.138	0.201	0.124	0.168	0.107	-
Total	1,646	1,985	2,670	2,527	2,849	2,779	2,272	575

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.3 Project emissions of $PM_{2.5}$ from dam construction (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	11.6	18.1	23.6	15.6	19.3	12.4	6.98	0.0264
Drilling	1.21	3.16	1.62	0.773	2.23	2.35	0.190	-
Explosives	-	-	-	-	-	-	-	-
Blasting	0.0231	0.0693	0.0693	0.0462	0.0462	0.0462	0.0462	-
Material Handling	0.180	0.268	0.331	0.289	0.168	0.123	0.196	0.00165
Material Processing	0.0326	0.685	1.28	1.42	0.402	0.498	0.347	-
Crushing	0.000212	0.00438	0.00804	0.00912	0.00212	0.00287	0.00182	-
Stockpile Wind Erosion	-	1.62	3.60	3.60	3.60	3.29	3.60	-
Grading	1.89	3.62	5.18	3.52	3.87	2.32	1.54	-
Scraping	0.949	1.73	3.26	2.67	2.20	1.19	0.281	-
Unpaved Roads	157	184	247	237	268	265	219	56.9
Paved Roads	0.249	0.890	0.486	0.486	0.486	0.486	0.486	0.486
Vehicles	0.482	0.740	0.787	0.981	1.04	1.67	1.72	0.404
Diesel Equipment	10.7	17.4	26.2	22.9	24.2	21.2	15.1	3.52
Diesel Generators	0.120	0.142	0.134	0.195	0.121	0.163	0.104	-
Total	184	232	314	289	326	311	250	61.3

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.4 Project emissions of NO_X from dam construction (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	7.29	9.21	3.21	1.54	4.43	4.68	0.379	-
Blasting	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Crushing	-	-	-	-	-	-	-	-
Stockpile Wind Erosion	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	5.65	8.05	7.96	9.27	9.87	19.1	20.5	6.45
Diesel Equipment	134	212	324	269	284	254	174	30.5
Diesel Generators	1.00	1.25	1.18	1.79	1.20	1.61	1.03	-
Total	148	231	336	282	300	279	196	37.0

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.5 Project emissions of SO_X from dam construction (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	0.489	0.898	0.402	0.193	0.554	0.585	0.0474	-
Blasting	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Crushing	-	-	-	-	-	-	-	-
Stockpile Wind Erosion	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.0408	0.0612	0.0675	0.0853	0.095	0.125	0.118	0.0242
Diesel Equipment	0.206	0.328	0.491	0.415	0.439	0.389	0.272	0.0564
Diesel Generators	0.00159	0.00198	0.00212	0.00303	0.00180	0.00241	0.00154	-
Total	0.737	1.29	0.963	0.696	1.09	1.10	0.439	0.0806

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.6 Project emissions of CO from dam construction (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	20.0	32.5	13.7	6.55	18.8	19.9	1.61	-
Blasting	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Crushing	-	-	-	-	-	-	-	-
Stockpile Wind Erosion	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	38.4	55.2	52.1	63.6	69.4	77.4	60.8	14.0
Diesel Equipment	56.4	90.5	136	116	126	111	78.3	17.3
Diesel Generators	0.770	0.872	0.469	0.763	0.578	0.779	0.498	-
Total	116	179	202	187	215	209	141	31.3

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.7 Project emissions of TSP from vehicles-in-transit within the technical study area (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.483	0.483	0.455	0.446	0.437	0.665	1.78	0.373
Paved Roads	99.6	92.9	93.2	298	119	113	373	57.1
Total	100	93.4	93.7	298	119	114	375	57.5

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.8 Project emissions of PM_{10} from vehicles-in-transit within the technical study area (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.483	0.483	0.455	0.446	0.437	0.665	1.78	0.373
Paved Roads	19.1	17.8	17.9	57.2	22.9	21.6	71.6	11.0
Total	19.6	18.3	18.4	57.6	23.3	22.3	73.4	11.4

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.9 Project emissions of $PM_{2.5}$ from vehicles-in-transit within the technical study area (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.395	0.395	0.370	0.361	0.351	0.556	1.55	0.296
Paved Roads	4.62	4.32	4.33	13.8	5.53	5.24	17.3	2.65
Total	5.02	4.72	4.70	14.2	5.88	5.80	18.9	2.95

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.10 Project emissions of NO_X from vehicles-in-transit within the technical study area (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	5.85	5.86	5.08	4.68	4.29	9.14	32.5	3.20
Paved Roads	-	-	-	-	-	-	-	-
Total	5.85	5.86	5.08	4.68	4.29	9.14	32.5	3.20

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.11 Project emissions of SO_X from vehicles-in-transit within the technical study area (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.0381	0.0381	0.0372	0.0373	0.0366	0.0455	0.0930	0.0334
Paved Roads	-	-	-	-	-	-	-	-
Total	0.0381	0.0381	0.0372	0.0373	0.0366	0.0455	0.0930	0.0334

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.12 Project emissions of CO from vehicles-in-transit within the technical study area (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	27.6	27.8	23.3	22.4	21.2	21.1	24.5	16.7
Paved Roads	-	-	-	-	-	-	-	-
Total	27.6	27.8	23.3	22.4	21.2	21.1	24.5	16.7

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.13 Project emissions of TSP from vehicles-in-transit within the DMSA (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.148	0.149	0.138	0.137	0.134	0.131	0.129	0.109
Paved Roads	24.9	22.8	14.7	21.9	21.9	21.9	21.9	18.4
Total	25.0	22.9	14.8	22.0	22.0	22.0	22.0	18.5

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.14 Project emissions of PM_{10} from vehicles-in-transit within the DMSA (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.148	0.149	0.138	0.137	0.134	0.131	0.129	0.109
Paved Roads	4.77	4.38	2.83	4.20	4.20	4.20	4.20	3.54
Total	4.92	4.53	2.97	4.34	4.33	4.33	4.33	3.65

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.15 Project emissions of $PM_{2.5}$ from vehicles-in-transit within the DMSA (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.117	0.117	0.108	0.106	0.103	0.101	0.099	0.0827
Paved Roads	1.15	1.06	0.684	1.02	1.02	1.02	1.02	0.855
Total	1.27	1.18	0.792	1.13	1.12	1.12	1.12	0.938

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.16 Project emissions of NO_X from vehicles-in-transit within the DMSA (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	1.60	1.62	1.37	1.30	1.20	1.10	1.01	0.842
Paved Roads	-	-	-	-	-	-	-	-
Total	1.60	1.62	1.37	1.30	1.20	1.10	1.01	0.842

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.17 Project emissions of SO_X from vehicles-in-transit within the DMSA (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	0.0110	0.0110	0.0106	0.0108	0.0106	0.0105	0.0103	0.00902
Paved Roads	-	-	-	-	-	-	-	-
Total	0.0110	0.0110	0.0106	0.0108	0.0106	0.0105	0.0103	0.00902

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.18 Project emissions of CO from vehicles-in-transit within the DMSA (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Vehicles	8.26	8.42	6.75	6.78	6.45	6.12	5.59	4.67
Paved Roads	-	-	-	-	-	-	-	-
Total	8.26	8.42	6.75	6.78	6.45	6.12	5.59	4.67

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.19 Project emissions of TSP from Wuthrich Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	7.31	7.99	5.38	-	-	-	-	0.350
Drilling	3.08	3.37	2.27	-	-	-	-	0.148
Explosives	-	-	-	-	-	-	-	-
Blasting	1.54	1.54	0.770	-	-	-	-	0.770
Material Processing	0.513	0.561	0.378	-	-	-	-	0.0245
Grading	0.333	0.364	0.245	-	-	-	-	0.0159
Scraping	0.971	1.06	0.714	-	-	-	-	0.0465
Unpaved Roads	75.3	82.3	55.4	-	-	-	-	3.75
Paved Roads	0.00975	0.0108	0.0108	-	-	-	-	0.0108
Vehicles	0.00176	0.00189	0.00125	-	-	-	-	0.000382
Diesel Equipment	0.614	0.718	0.463	-	-	-	-	0.0233
Diesel Generators	0.0162	0.0186	0.0121	-	-	-	-	0.000690
Total	89.7	97.9	65.6	-	-	-	-	5.14

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.20 Project emissions of PM_{10} from Wuthrich Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	1.23	1.35	0.905	-	-	-	-	0.0589
Drilling	1.46	1.59	1.07	-	-	-	-	0.0698
Explosives	-	-	-	-	-	-	-	-
Blasting	0.801	0.801	0.400	-	-	-	-	0.400
Material Processing	0.188	0.206	0.138	-	-	-	-	0.00900
Grading	0.0975	0.107	0.0717	-	-	-	-	0.00466
Scraping	0.459	0.502	0.338	-	-	-	-	0.0220
Unpaved Roads	21.4	23.4	15.8	-	-	-	-	1.07
Paved Roads	0.00187	0.00208	0.00208	-	-	-	-	0.00208
Vehicles	0.00176	0.00189	0.00125	-	-	-	-	0.000382
Diesel Equipment	0.614	0.718	0.463	-	-	-	-	0.0233
Diesel Generators	0.0162	0.0186	0.0121	-	-	-	-	0.000690
Total	26.3	28.7	19.2	-	-	-	-	1.66

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.21 Project emissions of $PM_{2.5}$ from Wuthrich Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	0.768	0.839	0.565	-	-	-	-	0.0367
Drilling	0.221	0.241	0.162	-	-	-	-	0.0106
Explosives	-	-	-	-	-	-	-	-
Blasting	0.0462	0.0462	0.0231	-	-	-	-	0.0231
Material Processing	0.0282	0.0309	0.0208	-	-	-	-	0.00135
Grading	0.0103	0.0113	0.00760	-	-	-	-	0.000494
Scraping	0.0696	0.0760	0.0512	-	-	-	-	0.00333
Unpaved Roads	2.14	2.34	1.58	-	-	-	-	0.107
Paved Roads	0.000453	0.00050	0.000503	-	-	-	-	0.000503
Vehicles	0.00118	0.00127	0.000813	-	-	-	-	0.000262
Diesel Equipment	0.596	0.697	0.449	-	-	-	-	0.0226
Diesel Generators	0.0157	0.0180	0.0117	-	-	-	-	0.000669
Total	3.90	4.30	2.87	-	-	-	-	0.207

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.22 Project emissions of NO_X from Wuthrich Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	0.878	0.960	0.646	-	-	-	-	0.0420
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.0221	0.0239	0.0155	-	-	-	-	0.00209
Diesel Equipment	5.54	6.06	4.07	-	-	-	-	0.264
Diesel Generators	0.167	0.183	0.123	-	-	-	-	0.00794
Total	6.61	7.23	4.85	-	-	-	-	0.316

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.23 Project emissions of SO_X from Wuthrich Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	0.110	0.120	0.0807	-	-	-	-	0.00525
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.000118	0.000127	0.0000909	-	-	-	-	0.0000246
Diesel Equipment	0.0104	0.0114	0.00767	-	-	-	-	0.000499
Diesel Generators	0.000311	0.000339	0.000228	-	-	-	-	0.0000149
Total	0.121	0.132	0.0887	-	-	-	-	0.00579

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.24 Project emissions of CO from Wuthrich Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	3.73	4.08	2.75	-	-	-	-	0.179
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.142	0.153	0.102	-	-	-	-	0.0157
Diesel Equipment	2.97	3.33	2.20	-	-	-	-	0.131
Diesel Generators	0.0634	0.0707	0.0469	-	-	-	-	0.00289
Total	6.91	7.63	5.10	-	-	-	-	0.329

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.25 Project emissions of TSP from 85th Avenue Industrial Lands (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	6.44	8.57	18.5	16.4	17.4	-
Material Handling	-	-	0.0677	0.0902	0.194	0.173	0.184	-
Grading	-	-	1.14	1.52	3.27	2.91	3.09	-
Scraping	-	-	2.61	3.47	7.47	6.65	7.07	-
Unpaved Roads	-	-	74.1	98.6	212	189	201	-
Paved Roads	-	-	0.00415	0.00415	0.00415	0.00415	0.00415	-
Vehicles	-	-	0.000969	0.00121	0.00232	0.0145	0.0150	-
Diesel Equipment	-	-	0.266	0.381	0.884	0.787	0.873	-
Total	-	-	84.6	113	242	216	230	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.26 Project emissions of PM_{10} from 85th Avenue Industrial Lands (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	1.68	2.23	4.81	4.28	4.55	-
Material Handling	-	-	0.0320	0.0427	0.0919	0.0817	0.0869	-
Grading	-	-	0.334	0.445	0.957	0.852	0.905	-
Scraping	-	-	1.23	1.64	3.54	3.15	3.34	-
Unpaved Roads	-	-	21.1	28	60.4	53.7	57.1	-
Paved Roads	-	-	0.000797	0.000797	0.000797	0.000797	0.000797	-
Vehicles	-	-	0.000969	0.00121	0.00232	0.0145	0.015	-
Diesel Equipment	-	-	0.266	0.381	0.884	0.787	0.873	-
Total	-	-	24.6	32.7	70.7	62.9	66.9	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.27 Project emissions of $PM_{2.5}$ from 85th Avenue Industrial Lands (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	0.676	0.900	1.94	1.72	1.83	-
Material Handling	-	-	0.00485	0.00646	0.0139	0.0124	0.0132	-
Grading	-	-	0.0354	0.0471	0.101	0.0902	0.0959	-
Scraping	-	-	0.187	0.249	0.535	0.476	0.506	-
Unpaved Roads	-	-	2.11	2.80	6.04	5.37	5.71	-
Paved Roads	-	-	0.000193	0.000193	0.000193	0.000193	0.000193	-
Vehicles	-	-	0.000704	0.000871	0.00165	0.0116	0.0119	-
Diesel Equipment	-	-	0.258	0.370	0.858	0.763	0.847	-
Total	-	-	3.27	4.37	9.49	8.44	9.01	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.28 Project emissions of NO_X from 85th Avenue Industrial Lands (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	-	0.00640	0.00740	0.0138	0.190	0.186	-
Diesel Equipment	-	-	2.72	3.62	7.82	6.95	7.40	-
Total	-	-	2.73	3.63	7.83	7.14	7.59	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.29 Project emissions of SO_X from 85th Avenue Industrial Lands (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	-	0.0000571	0.0000722	0.000144	0.000465	0.000490	-
Diesel Equipment	-	-	0.00514	0.00684	0.0147	0.0131	0.0139	-
Total	-	-	0.00520	0.00691	0.0148	0.0136	0.0144	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.30 Project emissions of CO from 85th Avenue Industrial Lands (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	-	0.0413	0.0489	0.0935	0.126	0.122	-
Diesel Equipment	-	-	1.40	1.92	4.24	3.77	4.08	-
Total	-	-	1.44	1.97	4.33	3.90	4.20	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.31 Project emissions of TSP from West Pine Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	1.54	1.34	1.70	10.3	2.52	2.24	13.6	-
Drilling	1.16	1.01	1.28	7.78	1.90	1.69	10.2	-
Explosives	-	-	-	-	-	-	-	-
Blasting	0.770	0.770	0.770	1.54	0.770	0.770	1.54	-
Material Processing	0.289	0.251	0.32	1.94	0.473	0.421	2.55	-
Grading	0.0249	0.0216	0.0275	0.167	0.0407	0.0363	0.220	-
Scraping	0.365	0.318	0.404	2.45	0.598	0.533	3.22	-
Unpaved Roads	20.8	18.1	23.0	139	34.0	30.3	182	-
Paved Roads	0.00975	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108	-
Vehicles	0.000711	0.000670	0.000675	0.00214	0.000777	0.00071	0.00223	-
Diesel Equipment	0.138	0.121	0.160	1.22	0.265	0.236	1.65	-
Diesel Generators	0.00434	0.00379	0.00494	0.0411	0.00779	0.00694	0.0541	-
Total	25.1	21.9	27.7	164	40.6	36.2	215	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.32 Project emissions of PM_{10} from West Pine Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	0.259	0.226	0.287	1.74	0.424	0.378	2.29	-
Drilling	0.548	0.477	0.607	3.68	0.898	0.800	4.84	-
Explosives	-	-	-	-	-	-	-	-
Blasting	0.400	0.400	0.400	0.801	0.400	0.400	0.801	-
Material Processing	0.106	0.0922	0.117	0.710	0.173	0.154	0.935	-
Grading	0.00728	0.00633	0.00806	0.0488	0.0119	0.0106	0.0643	-
Scraping	0.173	0.15	0.191	1.16	0.283	0.252	1.52	-
Unpaved Roads	5.91	5.15	6.54	39.4	9.66	8.61	51.9	-
Paved Roads	0.00187	0.00208	0.00208	0.00208	0.00208	0.00208	0.00208	-
Vehicles	0.000711	0.000670	0.000675	0.00214	0.000777	0.000710	0.00223	-
Diesel Equipment	0.138	0.121	0.160	1.22	0.265	0.236	1.65	-
Diesel Generators	0.00434	0.00379	0.00494	0.0411	0.00779	0.00694	0.0541	-
Total	7.55	6.63	8.32	48.8	12.1	10.9	64.1	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.33 Project emissions of $PM_{2.5}$ from West Pine Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	0.162	0.141	0.179	1.08	0.265	0.236	1.43	-
Drilling	0.0830	0.0723	0.0919	0.557	0.136	0.121	0.733	-
Explosives	-	-	-	-	-	-	-	-
Blasting	0.0231	0.0231	0.0231	0.0462	0.0231	0.0231	0.0462	-
Material Processing	0.0159	0.0138	0.0176	0.107	0.0260	0.0232	0.140	-
Grading	0.000771	0.000671	0.000853	0.00517	0.00126	0.00112	0.00681	-
Scraping	0.0262	0.0228	0.0289	0.175	0.0428	0.0381	0.231	-
Unpaved Roads	0.591	0.515	0.654	3.94	0.966	0.861	5.19	-
Paved Roads	0.000453	0.000503	0.000503	0.000503	0.000503	0.000503	0.000503	-
Vehicles	0.000491	0.000464	0.000449	0.00131	0.00050	0.000456	0.00123	-
Diesel Equipment	0.134	0.117	0.156	1.19	0.257	0.229	1.60	-
Diesel Generators	0.00421	0.00368	0.00479	0.0399	0.00756	0.00673	0.0525	-
Total	1.04	0.910	1.16	7.14	1.73	1.54	9.43	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.34 Project emissions of NO_X from West Pine Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	0.330	0.287	0.365	2.21	0.541	0.481	2.91	-
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.00771	0.00704	0.00755	0.0323	0.00892	0.00775	0.0357	-
Diesel Equipment	1.50	1.31	1.67	10.2	2.47	2.20	13.4	-
Diesel Generators	0.0491	0.0428	0.0545	0.337	0.0809	0.0720	0.443	-
Total	1.89	1.65	2.10	12.8	3.10	2.76	16.8	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.35 Project emissions of SO_X from West Pine Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	0.0413	0.0359	0.0457	0.277	0.0676	0.0602	0.364	-
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.0000457	0.0000427	0.0000472	0.000172	0.0000575	0.0000527	0.000209	-
Diesel Equipment	0.00285	0.00248	0.00315	0.0191	0.00466	0.00415	0.0251	-
Diesel Generators	0.0000912	0.0000793	0.00010	0.000612	0.000149	0.000133	0.000805	-
Total	0.0443	0.0385	0.0490	0.297	0.0725	0.0645	0.390	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.36 Project emissions of CO from West Pine Quarry (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	1.40	1.22	1.55	9.41	2.30	2.05	12.4	-
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.0503	0.0461	0.0497	0.216	0.0607	0.0532	0.265	-
Diesel Equipment	0.755	0.658	0.849	5.61	1.31	1.16	7.47	-
Diesel Generators	0.0182	0.0158	0.0203	0.142	0.0309	0.0276	0.187	-
Total	2.22	1.94	2.47	15.4	3.70	3.29	20.3	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.37 Project emissions of TSP from Portage (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	22.8	22.8	-	-	-	-	-
Drilling	-	20.5	20.5	-	-	-	-	-
Explosives	-	-	-	-	-	-	-	-
Blasting	-	3.08	3.08	-	-	-	-	-
Material Processing	-	4.27	4.27	-	-	-	-	-
Grading	-	0.368	0.368	-	-	-	-	-
Scraping	-	5.40	5.40	-	-	-	-	-
Unpaved Roads	-	0.0561	0.0561	-	-	-	-	-
Paved Roads	-	44.2	44.2	-	-	-	-	-
Vehicles	-	0.00114	0.000705	-	-	-	-	-
Diesel Equipment	-	1.54	1.60	-	-	-	-	-
Diesel Generators	-	0.0907	0.0907	-	-	-	-	-
Total	-	102	102	-	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.38 Project emissions of PM_{10} from Portage (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	3.83	3.83	-	-	-	-	-
Drilling	-	9.68	9.68	-	-	-	-	-
Explosives	-	-	-	-	-	-	-	-
Blasting	-	1.60	1.60	-	-	-	-	-
Material Processing	-	1.57	1.57	-	-	-	-	-
Grading	-	0.108	0.108	-	-	-	-	-
Scraping	-	2.56	2.56	-	-	-	-	-
Unpaved Roads	-	0.0160	0.0160	-	-	-	-	-
Paved Roads	-	8.49	8.49	-	-	-	-	-
Vehicles	-	0.00114	0.000705	-	-	-	-	-
Diesel Equipment	-	1.54	1.60	-	-	-	-	-
Diesel Generators	-	0.0907	0.0907	-	-	-	-	-
Total	-	29.5	29.5	-	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.39 Project emissions of $PM_{2.5}$ from Portage (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	2.39	2.39	-	-	-	-	-
Drilling	-	1.47	1.47	-	-	-	-	-
Explosives	-	-	-	-	-	-	-	-
Blasting	-	0.0924	0.0924	-	-	-	-	-
Material Processing	-	0.235	0.235	-	-	-	-	-
Grading	-	0.0114	0.0114	-	-	-	-	-
Scraping	-	0.387	0.387	-	-	-	-	-
Unpaved Roads	-	0.00160	0.00160	-	-	-	-	-
Paved Roads	-	2.05	2.05	-	-	-	-	-
Vehicles	-	0.000957	0.000565	-	-	-	-	-
Diesel Equipment	-	1.49	1.55	-	-	-	-	-
Diesel Generators	-	0.0880	0.0880	-	-	-	-	-
Total	-	8.22	8.28	-	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.40 Project emissions of NO_X from Portage (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	-	4.88	4.88	-	-	-	-	-
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	0.0226	0.0111	-	-	-	-	-
Diesel Equipment	-	13.3	13.3	-	-	-	-	-
Diesel Generators	-	0.743	0.743	-	-	-	-	-
Total	-	18.9	18.9	-	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.41 Project emissions of SO_X from Portage (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	-	0.610	0.610	-	-	-	-	-
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	0.0000619	0.0000395	-	-	-	-	-
Diesel Equipment	-	0.0250	0.0250	-	-	-	-	-
Diesel Generators	-	0.00135	0.00135	-	-	-	-	-
Total	-	0.636	0.636	-	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.42 Project emissions of CO from Portage (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Drilling	-	-	-	-	-	-	-	-
Explosives	-	20.8	20.8	-	-	-	-	-
Blasting	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	0.163	0.0793	-	-	-	-	-
Diesel Equipment	-	7.17	7.29	-	-	-	-	-
Diesel Generators	-	0.313	0.313	-	-	-	-	-
Total	-	28.4	28.5	-	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.43 Project emissions of TSP from Del Rio (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	1.67	-	-	-	-	-	-	-
Grading	2.61	-	-	-	-	-	-	-
Diesel Equipment	0.151	-	-	-	-	-	-	-
Total	4.43	-	-	-	-	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.44 Project emissions of PM_{10} from Del Rio (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	0.790	-	-	-	-	-	-	-
Grading	0.763	-	-	-	-	-	-	-
Diesel Equipment	0.151	-	-	-	-	-	-	-
Total	1.70	-	-	-	-	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.45 Project emissions of $PM_{2.5}$ from Del Rio (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	0.120	-	-	-	-	-	-	-
Grading	0.0808	-	-	-	-	-	-	-
Diesel Equipment	0.146	-	-	-	-	-	-	-
Total	0.347	-	-	-	-	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.46 Project emissions of NO_X from Del Rio (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Diesel Equipment	1.43	-	-	-	-	-	-	-
Total	1.43	-	-	-	-	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.47 Project emissions of SO_X from Del Rio (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Diesel Equipment	0.00270	-	-	-	-	-	-	-
Total	0.00270	-	-	-	-	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.48 Project emissions of CO from Del Rio (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Diesel Equipment	0.763	-	-	-	-	-	-	-
Total	0.763	-	-	-	-	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.49 Project emissions of TSP from Area E (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	2.74	-
Scraping	-	-	-	-	-	-	11.1	-
Material Handling	-	-	-	-	-	-	1.65	-
Grading	-	-	-	-	-	-	8.97	-
Unpaved Roads	-	-	-	-	-	-	307	-
Paved Roads	-	-	-	-	-	-	2.76	-
Vehicles	-	-	-	-	-	-	0.125	-
Diesel Equipment	-	-	-	-	-	-	0.445	-
Total	-	-	-	-	-	-	335	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.50 Project emissions of PM_{10} from Area E (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	0.451	-
Scraping	-	-	-	-	-	-	5.27	-
Material Handling	-	-	-	-	-	-	0.779	-
Grading	-	-	-	-	-	-	2.62	-
Unpaved Roads	-	-	-	-	-	-	87.5	-
Paved Roads	-	-	-	-	-	-	0.530	-
Vehicles	-	-	-	-	-	-	0.125	-
Diesel Equipment	-	-	-	-	-	-	0.445	-
Total	-	-	-	-	-	-	97.7	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.51 Project emissions of $PM_{2.5}$ from Area E (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	0.288	-
Scraping	-	-	-	-	-	-	0.798	-
Material Handling	-	-	-	-	-	-	0.118	-
Grading	-	-	-	-	-	-	0.278	-
Unpaved Roads	-	-	-	-	-	-	8.75	-
Paved Roads	-	-	-	-	-	-	0.128	-
Vehicles	-	-	-	-	-	-	0.102	-
Diesel Equipment	-	-	-	-	-	-	0.432	-
Total	-	-	-	-	-	-	10.9	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.52 Project emissions of NO_X from Area E (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	1.70	-
Diesel Equipment	-	-	-	-	-	-	4.74	-
Total	-	-	-	-	-	-	6.44	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.53 Project emissions of SO_X from Area E (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	0.00362	-
Diesel Equipment	-	-	-	-	-	-	0.00849	-
Total	-	-	-	-	-	-	0.0121	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.54 Project emissions of CO from Area E (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Bulldozing	-	-	-	-	-	-	-	-
Scraping	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	-	-	-	-	-	-	0.531	-
Diesel Equipment	-	-	-	-	-	-	2.48	-
Total	-	-	-	-	-	-	3.01	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.55 Project emissions of TSP from Hudson's Hope Berm (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Diesel Equipment	-	-	-	1.59	1.60	-	-	-
Grading	-	-	-	3.22	3.22	-	-	-
Material Handling	-	-	-	0.00802	-	-	-	-
Total	-	-	-	4.82	4.82	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.56 Project emissions of PM_{10} from Hudson's Hope Berm (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Diesel Equipment	-	-	-	1.59	1.60	-	-	-
Grading	-	-	-	0.944	0.944	-	-	-
Material Handling	-	-	-	0.00379	-	-	-	-
Total	-	-	-	2.54	2.54	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.57 Project emissions of $PM_{2.5}$ from Hudson's Hope Berm (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Diesel Equipment	-	-	-	1.54	1.55	-	-	-
Grading	-	-	-	0.100	0.100	-	-	-
Material Handling	-	-	-	0.000574	-	-	-	-
Total	-	-	-	1.64	1.65	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.58 Project emissions of NO_X from Hudson's Hope Berm (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Diesel Equipment	-	-	-	23.0	23.0	-	-	-
Grading	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Total	-	-	-	23.0	23.0	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.59 Project emissions of SO_X from Hudson's Hope Berm (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Diesel Equipment	-	-	-	0.0314	0.0314	-	-	-
Grading	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Total	-	-	-	0.0314	0.0314	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.60 Project emissions of CO from Hudson's Hope Berm (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Diesel Equipment	-	-	-	8.23	8.25	-	-	-
Grading	-	-	-	-	-	-	-	-
Material Handling	-	-	-	-	-	-	-	-
Total	-	-	-	8.23	8.25	-	-	-

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.61 Project emissions of TSP from Road Infrastructure (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	6.33	3.78	18.1	15.9	6.24	-	-	-
Material Processing	-	0.113	0.264	0.489	0.489	-	-	-
Crushing	0.0818	0.0650	0.173	0.152	0.0601	-	-	-
Stockpile Wind Erosion	13.2	4.02	5.81	0.472	0.472	-	-	-
Grading	15.1	4.27	-	18.6	11.4	-	-	-
Paved Roads	694	856	163	535	375	-	-	-
Vehicles	0.196	0.240	0.0422	0.118	0.0799	-	-	-
Diesel Equipment	8.50	1.20	0.00374	8.08	6.35	-	-	-
Asphalt Plant	-	133	311	577	577	-	-	-
Total	737	1,003	498	1,156	977	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.62 Project emissions of PM_{10} from Road Infrastructure (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	2.99	1.79	8.56	7.51	2.95	-	-	-
Material Processing	-	0.0392	0.0915	0.170	0.170	-	-	-
Crushing	0.0364	0.0289	0.0770	0.0674	0.0267	-	-	-
Stockpile Wind Erosion	6.59	2.01	2.91	0.236	0.236	-	-	-
Grading	4.41	1.25	-	5.43	3.34	-	-	-
Paved Roads	133	164	31.2	103	72	-	-	-
Vehicles	0.196	0.240	0.0422	0.118	0.0799	-	-	-
Diesel Equipment	8.50	1.20	0.00374	8.08	6.35	-	-	-
Asphalt Plant	-	93.0	217	402	402	-	-	-
Total	156	264	260	527	487	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.63 Project emissions of $PM_{2.5}$ from Road Infrastructure (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	0.453	0.271	1.30	1.14	0.447	-	-	-
Material Processing	-	0.00588	0.0137	0.0254	0.0254	-	-	-
Crushing	0.00545	0.00433	0.0115	0.010	0.0040	-	-	-
Stockpile Wind Erosion	0.988	0.301	0.436	0.0354	0.0354	-	-	-
Grading	0.467	0.132	-	0.576	0.354	-	-	-
Paved Roads	32.2	39.7	7.55	24.9	17.4	-	-	-
Vehicles	0.158	0.193	0.0331	0.0905	0.0615	-	-	-
Diesel Equipment	8.24	1.16	0.00363	7.83	6.16	-	-	-
Asphalt Plant	-	65.1	152	281	281	-	-	-
Total	42.5	107	161	316	305	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.64 Project emissions of NO_X from Road Infrastructure (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Crushing	-	-	-	-	-	-	-	-
Stockpile Wind Erosion	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	5.20	6.38	1.17	3.62	2.43	-	-	-
Diesel Equipment	121	11.4	0.0436	118	93.2	-	-	-
Asphalt Plant	-	222	519	961	961	-	-	-
Total	126	240	520	1,083	1,057	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.65 Project emissions of SO_X from Road Infrastructure (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Crushing	-	-	-	-	-	-	-	-
Stockpile Wind Erosion	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.0166	0.0203	0.00422	0.0129	0.00868	-	-	-
Diesel Equipment	0.157	0.0216	0.0000825	0.163	0.126	-	-	-
Asphalt Plant	-	235	547	1014	1014	-	-	-
Total	0.174	235	547	1,014	1,014	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.66 Project emissions of CO from Road Infrastructure (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Material Handling	-	-	-	-	-	-	-	-
Material Processing	-	-	-	-	-	-	-	-
Crushing	-	-	-	-	-	-	-	-
Stockpile Wind Erosion	-	-	-	-	-	-	-	-
Grading	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	21.4	26.2	5.09	16.2	10.9	-	-	-
Diesel Equipment	41.2	5.77	0.0217	42.5	33.0	-	-	-
Asphalt Plant	-	526	1227	2272	2272	-	-	-
Total	62.6	558	1,232	2,331	2,316	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.67 Project emissions of TSP from Transmission Line Right-of-Way (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	0.374	0.612	0.238	-	-	-	-
Paved Roads	0.929	4.29	20.9	26.6	-	-	-	-
Vehicles	0.000422	0.0309	0.107	0.0787	-	-	-	-
Diesel Equipment	-	0.0627	0.180	0.117	-	-	-	-
Aircraft	0.000221	0.000221	0.00470	0.00470	-	-	-	-
Total	0.930	4.76	21.8	27.0	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.68 Project emissions of PM_{10} from Transmission Line Right-of-Way (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	0.110	0.179	0.0697	-	-	-	-
Paved Roads	0.178	0.823	4.01	5.10	-	-	-	-
Vehicles	0.000422	0.0309	0.107	0.0787	-	-	-	-
Diesel Equipment	-	0.0627	0.180	0.117	-	-	-	-
Aircraft	0.000216	0.000216	0.00459	0.00459	-	-	-	-
Total	0.179	1.03	4.48	5.37	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.69 Project emissions of $PM_{2.5}$ from Transmission Line Right-of-Way (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	0.0116	0.0190	0.00738	-	-	-	-
Paved Roads	0.0431	0.199	0.971	1.23	-	-	-	-
Vehicles	0.000279	0.0221	0.0749	0.0545	-	-	-	-
Diesel Equipment	-	0.0609	0.175	0.113	-	-	-	-
Aircraft	0.000214	0.000214	0.00455	0.00455	-	-	-	-
Total	0.0436	0.294	1.24	1.41	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.70 Project emissions of NO_X from Transmission Line Right-of-Way (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.00868	0.269	0.953	0.664	-	-	-	-
Diesel Equipment	-	0.582	1.73	1.13	-	-	-	-
Aircraft	0.000200	0.000200	0.00423	0.00423	-	-	-	-
Total	0.00888	0.851	2.69	1.80	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.71 Project emissions of SO_X from Transmission Line Right-of-Way (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.0000355	0.00199	0.00743	0.00552	-	-	-	-
Diesel Equipment	-	0.00110	0.00327	0.00215	-	-	-	-
Aircraft	0.000619	0.000619	0.0132	0.0132	-	-	-	-
Total	0.000655	0.00371	0.0239	0.0209	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.72 Project emissions of CO from Transmission Line Right-of-Way (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.0569	1.64	5.66	4.10	-	-	-	-
Diesel Equipment	-	0.320	0.904	0.578	-	-	-	-
Aircraft	0.00680	0.0068	0.144	0.144	-	-	-	-
Total	0.0637	1.97	6.71	4.82	-	-	-	-

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.73 Project emissions of TSP from Clearing (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	11.2	9.71	3.28	-	-	-	-	-
Unpaved Roads	385	335	113	-	-	-	-	-
Paved Roads	25.3	22.0	7.44	-	-	-	-	-
Vehicles	0.101	0.0877	0.0287	-	-	-	-	-
Diesel Equipment	2.92	2.52	0.787	-	-	-	-	-
Marine Vessels	0.0294	0.0294	0.0535	0.0535	0.0535	0.0535	0.0535	0.0535
Aircraft	1.32	1.10	0.921	-	-	-	-	-
Burning and Incineration	1,881	1,564	508	-	-	-	-	-
Clearing Activities	425	370	126	0.0535	0.0535	0.0535	0.0535	0.0535
Total	2,307	1,934	634	0.0535	0.0535	0.0535	0.0535	0.0535

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.74 Project emissions of PM_{10} from Clearing (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	3.27	2.84	0.960	-	-	-	-	-
Unpaved Roads	109	95.2	32.1	-	-	-	-	-
Paved Roads	4.86	4.23	1.43	-	-	-	-	-
Vehicles	0.101	0.0877	0.0287	-	-	-	-	-
Diesel Equipment	2.92	2.52	0.787	-	-	-	-	-
Marine Vessels	0.0291	0.0291	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529
Aircraft	1.28	1.07	0.899	-	-	-	-	-
Burning and Incineration	1,231	1,025	333	-	-	-	-	-
Clearing Activities	122	106	36.3	0.0529	0.0529	0.0529	0.0529	0.0529
Total	1,352	1,131	369	0.0529	0.0529	0.0529	0.0529	0.0529

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.75 Project emissions of $PM_{2.5}$ from Clearing (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	0.346	0.301	0.102	-	-	-	-	-
Unpaved Roads	10.9	9.52	3.21	-	-	-	-	-
Paved Roads	1.18	1.02	0.345	-	-	-	-	-
Vehicles	0.0717	0.0624	0.0202	-	-	-	-	-
Diesel Equipment	2.84	2.45	0.763	-	-	-	-	-
Marine Vessels	0.0257	0.0257	0.047	0.0470	0.0470	0.0470	0.0470	0.0470
Aircraft	1.27	1.06	0.890	-	-	-	-	-
Burning and Incineration	1,202	1,001	325	-	-	-	-	-
Clearing Activities	16.7	14.4	5.38	0.0470	0.0470	0.0470	0.0470	0.0470
Total	1,219	1,015	330	0.0470	0.0470	0.0470	0.0470	0.0470

NOTE:

All numbers less than 100 are rounded to three significant figures.

Table F.76 Project emissions of NO_X from Clearing (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	1.57	1.37	0.447	-	-	-	-	-
Diesel Equipment	24.5	21.2	7.18	-	-	-	-	-
Marine Vessels	1.90	1.90	2.78	2.78	2.78	2.78	2.78	2.78
Aircraft	3.00	2.50	2.10	-	-	-	-	-
Burning and Incineration	596	496	161	-	-	-	-	-
Clearing Activities	30.9	27.0	12.5	2.78	2.78	2.78	2.78	2.78
Total	627	523	174	2.78	2.78	2.78	2.78	2.78

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.77 Project emissions of SO_X from Clearing (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	0.00789	0.00686	0.00230	-	-	-	-	-
Diesel Equipment	0.0391	0.0339	0.0114	-	-	-	-	-
Marine Vessels	0.000704	0.000704	0.001030	0.00103	0.00103	0.00103	0.00103	0.00103
Aircraft	3.68	3.07	2.58	-	-	-	-	-
Burning and Incineration	13.80	11.40	3.69	-	-	-	-	-
Clearing Activities	3.73	3.11	2.59	0.00103	0.00103	0.00103	0.00103	0.00103
Total	17.53	14.51	6.28	0.00103	0.00103	0.00103	0.00103	0.00103

NOTE:
All numbers less than 100 are rounded to three significant figures.

Table F.78 Project emissions of CO from Clearing (in tonnes/year)

Emission Source	Year 1 2014	Year 2 2015	Year 3 2016	Year 4 2017	Year 5 2018	Year 6 2019	Year 7 2020	Year 8 2021
Grading	-	-	-	-	-	-	-	-
Unpaved Roads	-	-	-	-	-	-	-	-
Paved Roads	-	-	-	-	-	-	-	-
Vehicles	10.3	8.93	2.89	-	-	-	-	-
Diesel Equipment	10.5	9.14	3.01	-	-	-	-	-
Marine Vessels	0.123	0.123	0.180	0.180	0.180	0.180	0.180	0.180
Aircraft	0.388	0.324	0.272	-	-	-	-	-
Burning and Incineration	14,772	12,213	3,956	-	-	-	-	-
Clearing Activities	21.3	18.5	6.34	0.180	0.180	0.180	0.180	0.180
Total	14,793	12,232	3,962	0.180	0.180	0.180	0.180	0.180

NOTE:
All numbers less than 100 are rounded to three significant figures.

APPENDIX G

Dispersion Modelling Results

Table G.1 Maximum predicted concentrations of particulate matter without background at ground-truthed residences (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Residence 1	630.981	6232.372	5.6	1.0	9.1	25	3.5	0.09
Residence 2	630.756	6232.335	5.5	1.0	9.6	26	3.3	0.08
Residence 3	630.717	6232.314	5.4	1.1	9.7	26	3.4	0.09
Residence 4	630.581	6232.296	5.2	1.0	9.3	25	3.2	0.08
Residence 5	630.552	6232.296	5.2	1.0	9.1	25	3.2	0.08
Residence 6	630.247	6232.403	4.4	0.7	5.8	16	2.2	0.06
Residence 7	634.997	6230.486	2.4	0.7	3.3	10	2.6	0.06
Residence 8	634.862	6230.523	2.5	0.7	3.4	11	2.6	0.06
Residence 9	635.041	6230.506	2.4	0.7	3.3	10	2.5	0.06
Residence 10	635.124	6230.508	2.4	0.7	3.1	9.4	2.5	0.06
Residence 11	634.535	6230.703	2.5	0.8	3.4	11	2.7	0.07
Residence 12	634.579	6230.785	2.5	0.7	3.3	10	2.6	0.06
Residence 13	634.743	6230.833	2.3	0.7	3.1	9.7	2.5	0.06
Residence 14	634.840	6230.765	2.3	0.7	3.2	9.8	2.5	0.06
Residence 15	634.898	6230.703	2.4	0.7	3.2	9.9	2.5	0.06
Residence 16	634.982	6230.627	2.4	0.7	3.2	9.9	2.5	0.06
Residence 17	635.045	6230.755	2.3	0.7	3.0	9.3	2.4	0.06
Residence 18	635.042	6230.725	2.3	0.7	3.1	9.4	2.4	0.06
Residence 19	635.072	6230.654	2.4	0.7	3.1	9.5	2.5	0.06
Residence 20	635.123	6230.659	2.3	0.7	3.1	9.3	2.4	0.06
Residence 21	635.138	6230.587	2.3	0.7	3.1	9.5	2.5	0.06
Residence 22	630.252	6232.596	3.6	0.6	4.7	13	1.8	0.05
Residence 23	633.547	6231.980	4.0	1.0	6.0	19	3.8	0.1
Residence 24	633.549	6232.516	3.7	0.8	6.6	20	3.4	0.09
Residence 25	633.590	6232.546	3.7	0.8	6.5	20	3.4	0.09
Residence 26	633.545	6231.881	4.0	1.0	5.9	18	3.9	0.1
Residence 27	633.547	6231.893	4.0	1.0	5.9	18	3.9	0.1
Residence 28	634.090	6232.671	3.3	0.8	5.6	17	3.0	0.08
Residence 29	634.047	6232.473	3.6	0.8	5.5	16	3.2	0.08
Residence 30	634.132	6232.501	3.5	0.8	5.3	16	3.1	0.08
Residence 31	633.822	6232.438	3.6	0.8	6.0	18	3.3	0.09
Residence 32	633.703	6232.241	3.8	0.9	6.1	19	3.6	0.09
Residence 33	633.970	6232.454	3.5	0.8	5.7	17	3.2	0.08
Residence 34	632.469	6230.313	5.7	1.7	9.2	28	7.2	0.2
Residence 35	632.227	6231.391	6.9	1.9	11	36	8.2	0.2
Residence 36	630.438	6232.091	6.5	1.1	12	31	4.1	0.1
Residence 37	631.858	6231.027	8.7	2.3	12	40	9.9	0.2
Residence 38	631.693	6231.612	9.1	2.3	25	83	12	0.4
Residence 39	633.385	6231.479	4.2	1.1	5.5	17	4.4	0.1
Residence 40	634.217	6230.914	2.8	0.8	3.4	10	3.0	0.07
Residence 41	635.205	6230.478	2.3	0.7	3.0	8.9	2.5	0.06
Residence 42	634.888	6230.495	2.5	0.7	3.5	11	2.6	0.06
Residence 43	631.729	6232.627	5.6	0.9	8.2	24	3.5	0.1
Residence 44	631.892	6232.432	6.6	1.1	9.3	27	4.4	0.1
Residence 45	632.827	6232.458	4.7	1.0	7.2	21	4.1	0.1
Residence 46	633.108	6232.423	4.3	0.9	7.5	23	3.9	0.1
Residence 47	633.417	6232.513	3.9	0.8	6.8	21	3.5	0.09
Residence 48	630.233	6232.814	3.0	0.5	3.8	11	1.5	0.04
Residence 49	630.237	6232.750	3.2	0.5	4.0	12	1.5	0.05

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Residence 50	630.223	6232.954	2.7	0.5	3.4	10	1.3	0.04
Residence 51	630.236	6232.907	2.8	0.5	3.5	10	1.4	0.04
Residence 52	633.410	6233.370	2.7	0.7	5.0	15	3.0	0.09
Residence 53	633.348	6233.331	3.5	0.7	8.5	25	3.4	0.09
Residence 54	634.909	6233.462	2.1	0.5	3.9	12	2.0	0.05
Residence 55	634.900	6233.602	2.1	0.5	3.9	11	1.9	0.05
Residence 56	635.348	6233.713	1.8	0.4	3.5	10	1.7	0.05
Residence 57	629.555	6232.927	2.7	0.4	4.6	12	1.2	0.04
Residence 58	629.316	6232.906	2.7	0.4	4.8	13	1.1	0.04
Residence 59	629.323	6232.964	2.6	0.4	4.6	12	1.1	0.04
Residence 60	630.449	6232.305	5.0	1.0	8.3	23	3.0	0.07
Residence 61	635.088	6230.518	2.4	0.7	3.2	9.7	2.5	0.06
Residence 62	634.706	6230.715	2.4	0.7	3.3	10	2.6	0.06
Residence 63	634.632	6230.798	2.4	0.7	3.2	10	2.6	0.06
Residence 64	634.537	6230.925	2.5	0.7	3.2	9.9	2.7	0.07
Residence 65	634.738	6230.939	2.4	0.7	3.0	9.4	2.5	0.06
Residence 66	634.844	6230.924	2.3	0.7	3.0	9.3	2.5	0.06
Residence 67	634.799	6230.766	2.3	0.7	3.2	9.9	2.5	0.06
Residence 68	634.815	6230.761	2.3	0.7	3.2	9.9	2.5	0.06
Residence 69	634.889	6230.773	2.3	0.7	3.1	9.6	2.5	0.06
Residence 70	634.915	6230.769	2.3	0.7	3.1	9.6	2.5	0.06
Residence 71	634.844	6230.703	2.4	0.7	3.2	10	2.5	0.06
Residence 72	634.828	6230.713	2.4	0.7	3.2	10	2.5	0.06
Residence 73	634.951	6230.718	2.3	0.7	3.1	9.7	2.5	0.06
Residence 74	634.947	6230.768	2.3	0.7	3.1	9.5	2.5	0.06
Residence 75	635.008	6230.765	2.3	0.7	3.0	9.4	2.4	0.06
Residence 76	634.993	6230.715	2.3	0.7	3.1	9.6	2.5	0.06
Residence 77	635.076	6230.717	2.3	0.7	3.0	9.3	2.4	0.06
Residence 78	635.096	6230.718	2.3	0.7	3.0	9.2	2.4	0.06
Residence 79	635.089	6230.604	2.4	0.7	3.2	9.6	2.5	0.06
Residence 80	630.237	6232.630	3.5	0.6	4.5	13	1.7	0.05
Residence 81	628.453	6232.604	3.4	0.5	5.3	15	1.3	0.05
Residence 82	633.190	6230.482	3.7	1.1	5.1	15	4.4	0.1
Residence 83	633.355	6230.925	3.4	1.0	4.4	12	3.9	0.09
Residence 84	633.569	6230.686	3.2	1.0	4.0	13	3.6	0.09
Residence 85	635.202	6230.516	2.3	0.7	3.0	9.1	2.4	0.06
Residence 86	633.165	6232.660	3.9	0.8	6.1	18	3.4	0.09
Residence 87	630.279	6232.963	2.6	0.5	3.4	9.8	1.3	0.04

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.2 Maximum predicted concentrations of particulate matter with background at ground-truthed residences (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Residence 1	630.981	6232.372	21	6.0	35	51	8.9	0.9
Residence 2	630.756	6232.335	20	6.0	36	52	8.7	0.9
Residence 3	630.717	6232.314	20	6.1	36	52	8.8	0.9
Residence 4	630.581	6232.296	20	6.0	35	51	8.6	0.9
Residence 5	630.552	6232.296	20	6.0	35	51	8.6	0.9
Residence 6	630.247	6232.403	19	5.7	32	42	7.6	0.9
Residence 7	634.997	6230.486	17	5.7	30	36	8.0	0.9
Residence 8	634.862	6230.523	18	5.7	30	37	8.0	0.9
Residence 9	635.041	6230.506	17	5.7	29	36	7.9	0.9
Residence 10	635.124	6230.508	17	5.7	29	36	7.9	0.9
Residence 11	634.535	6230.703	17	5.7	30	37	8.1	0.9
Residence 12	634.579	6230.785	17	5.7	29	37	8.0	0.9
Residence 13	634.743	6230.833	17	5.7	29	36	7.9	0.9
Residence 14	634.840	6230.765	17	5.7	29	36	7.9	0.9
Residence 15	634.898	6230.703	17	5.7	29	36	7.9	0.9
Residence 16	634.982	6230.627	17	5.7	29	36	7.9	0.9
Residence 17	635.045	6230.755	17	5.7	29	36	7.8	0.9
Residence 18	635.042	6230.725	17	5.7	29	36	7.8	0.9
Residence 19	635.072	6230.654	17	5.7	29	36	7.9	0.9
Residence 20	635.123	6230.659	17	5.7	29	36	7.8	0.9
Residence 21	635.138	6230.587	17	5.7	29	36	7.9	0.9
Residence 22	630.252	6232.596	19	5.6	31	39	7.2	0.9
Residence 23	633.547	6231.980	19	6.0	32	45	9.2	0.9
Residence 24	633.549	6232.516	19	5.8	33	46	8.8	0.9
Residence 25	633.590	6232.546	19	5.8	33	46	8.8	0.9
Residence 26	633.545	6231.881	19	6.0	32	45	9.3	0.9
Residence 27	633.547	6231.893	19	6.0	32	45	9.3	0.9
Residence 28	634.090	6232.671	18	5.8	32	43	8.4	0.9
Residence 29	634.047	6232.473	19	5.8	32	43	8.6	0.9
Residence 30	634.132	6232.501	19	5.8	31	42	8.5	0.9
Residence 31	633.822	6232.438	19	5.8	32	44	8.7	0.9
Residence 32	633.703	6232.241	19	5.9	32	45	9.0	0.9
Residence 33	633.970	6232.454	18	5.8	32	43	8.6	0.9
Residence 34	632.469	6230.313	21	6.7	35	54	13	1.0
Residence 35	632.227	6231.391	22	6.9	37	62	14	1.0
Residence 36	630.438	6232.091	21	6.1	38	58	9.5	0.9
Residence 37	631.858	6231.027	24	7.3	38	66	15	1.0
Residence 38	631.693	6231.612	24	7.3	51	109	17	1.2
Residence 39	633.385	6231.479	19	6.1	32	43	9.8	0.9
Residence 40	634.217	6230.914	18	5.8	30	37	8.4	0.9
Residence 41	635.205	6230.478	17	5.7	29	35	7.9	0.9
Residence 42	634.888	6230.495	18	5.7	30	37	8.0	0.9
Residence 43	631.729	6232.627	21	5.9	34	50	8.9	0.9
Residence 44	631.892	6232.432	22	6.1	35	54	10	0.9
Residence 45	632.827	6232.458	20	6.0	33	48	9.5	0.9
Residence 46	633.108	6232.423	19	5.9	34	49	9.3	0.9
Residence 47	633.417	6232.513	19	5.8	33	47	8.9	0.9
Residence 48	630.233	6232.814	18	5.5	30	37	6.9	0.8
Residence 49	630.237	6232.750	18	5.5	30	38	6.9	0.9
Residence 50	630.223	6232.954	18	5.5	30	36	6.7	0.8

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Residence 51	630.236	6232.907	18	5.5	30	37	6.8	0.8
Residence 52	633.410	6233.370	18	5.7	31	41	8.4	0.9
Residence 53	633.348	6233.331	18	5.7	35	51	8.8	0.9
Residence 54	634.909	6233.462	17	5.5	30	38	7.4	0.9
Residence 55	634.900	6233.602	17	5.5	30	38	7.3	0.9
Residence 56	635.348	6233.713	17	5.4	30	36	7.1	0.9
Residence 57	629.555	6232.927	18	5.4	31	38	6.6	0.8
Residence 58	629.316	6232.906	18	5.4	31	39	6.5	0.8
Residence 59	629.323	6232.964	18	5.4	31	38	6.5	0.8
Residence 60	630.449	6232.305	20	6.0	35	49	8.4	0.9
Residence 61	635.088	6230.518	17	5.7	29	36	7.9	0.9
Residence 62	634.706	6230.715	17	5.7	29	36	8.0	0.9
Residence 63	634.632	6230.798	17	5.7	29	36	8.0	0.9
Residence 64	634.537	6230.925	18	5.7	29	36	8.1	0.9
Residence 65	634.738	6230.939	17	5.7	29	36	7.9	0.9
Residence 66	634.844	6230.924	17	5.7	29	35	7.9	0.9
Residence 67	634.799	6230.766	17	5.7	29	36	7.9	0.9
Residence 68	634.815	6230.761	17	5.7	29	36	7.9	0.9
Residence 69	634.889	6230.773	17	5.7	29	36	7.9	0.9
Residence 70	634.915	6230.769	17	5.7	29	36	7.9	0.9
Residence 71	634.844	6230.703	17	5.7	29	36	7.9	0.9
Residence 72	634.828	6230.713	17	5.7	29	36	7.9	0.9
Residence 73	634.951	6230.718	17	5.7	29	36	7.9	0.9
Residence 74	634.947	6230.768	17	5.7	29	36	7.9	0.9
Residence 75	635.008	6230.765	17	5.7	29	36	7.8	0.9
Residence 76	634.993	6230.715	17	5.7	29	36	7.9	0.9
Residence 77	635.076	6230.717	17	5.7	29	36	7.8	0.9
Residence 78	635.096	6230.718	17	5.7	29	35	7.8	0.9
Residence 79	635.089	6230.604	17	5.7	29	36	7.9	0.9
Residence 80	630.237	6232.630	18	5.6	31	39	7.1	0.9
Residence 81	628.453	6232.604	18	5.5	32	41	6.7	0.9
Residence 82	633.190	6230.482	19	6.1	31	41	10	0.9
Residence 83	633.355	6230.925	18	6.0	31	39	9.3	0.9
Residence 84	633.569	6230.686	18	6.0	30	39	9.0	0.9
Residence 85	635.202	6230.516	17	5.7	29	35	7.8	0.9
Residence 86	633.165	6232.660	19	5.8	32	45	8.8	0.9
Residence 87	630.279	6232.963	18	5.5	30	36	6.7	0.8

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.3 Maximum predicted concentrations of particulate matter without background at ground-truthed non-residences (in μg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[a]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 1	630.709	6228.334	21	5.7	41	89	30	0.6
Non-residence 2	630.724	6228.349	22	5.9	41	89	32	0.6
Non-residence 3	631.896	6230.979	8.6	2.3	17	57	9.9	0.2
Non-residence 4	630.996	6232.371	5.6	1.0	9.1	25	3.5	0.09
Non-residence 5	630.784	6232.310	5.5	1.1	9.8	27	3.6	0.09
Non-residence 6	630.699	6232.333	5.3	1.0	9.5	26	3.2	0.08
Non-residence 7	630.658	6232.313	5.4	1.2	9.7	26	3.5	0.09
Non-residence 8	630.599	6232.308	5.2	1.1	9.3	25	3.2	0.08
Non-residence 9	630.325	6232.338	4.7	0.9	7.0	19	2.6	0.07
Non-residence 10	630.351	6232.358	4.6	0.8	7.0	19	2.5	0.07
Non-residence 11	630.361	6232.357	4.6	0.8	7.1	19	2.5	0.07
Non-residence 12	630.319	6232.360	4.6	0.8	6.7	18	2.5	0.07
Non-residence 13	630.328	6232.360	4.6	0.8	6.8	18	2.5	0.07
Non-residence 14	630.302	6232.348	4.7	0.8	6.7	18	2.5	0.07
Non-residence 15	630.246	6232.343	4.7	0.8	6.3	17	2.4	0.07
Non-residence 16	630.255	6232.364	4.6	0.8	6.2	17	2.3	0.07
Non-residence 17	630.255	6232.349	4.6	0.8	6.3	17	2.4	0.07
Non-residence 18	630.896	6232.415	5.3	0.9	8.6	24	3.1	0.08
Non-residence 19	630.888	6232.417	5.3	0.9	8.6	24	3.1	0.08
Non-residence 20	630.895	6232.422	5.3	0.9	8.6	23	3.1	0.08
Non-residence 21	630.528	6232.328	4.9	1.0	8.8	24	2.9	0.07
Non-residence 22	630.527	6232.347	4.8	0.9	8.5	23	2.8	0.07
Non-residence 23	630.499	6232.316	5.0	1.0	8.8	23	3.0	0.07
Non-residence 24	630.473	6232.305	5.2	1.0	8.5	23	3.0	0.08
Non-residence 25	630.447	6232.321	4.9	1.0	8.3	22	2.9	0.07
Non-residence 26	630.301	6232.359	4.6	0.8	6.6	18	2.4	0.07
Non-residence 27	630.282	6232.385	4.5	0.8	6.2	17	2.3	0.06
Non-residence 28	630.933	6232.456	5.1	0.9	8.2	22	3.0	0.08
Non-residence 29	630.771	6232.361	5.3	1.0	9.2	25	3.2	0.08
Non-residence 30	635.021	6230.444	2.4	0.7	3.0	9	2.5	0.06
Non-residence 31	635.133	6230.463	2.4	0.7	3.0	8	2.5	0.06
Non-residence 32	634.933	6230.465	2.5	0.7	3.3	10	2.6	0.06
Non-residence 33	634.669	6230.722	2.4	0.7	3.3	10	2.6	0.06
Non-residence 34	634.373	6230.747	2.6	0.8	3.5	11	2.8	0.07
Non-residence 35	634.381	6230.741	2.6	0.8	3.5	11	2.8	0.07
Non-residence 36	634.454	6230.786	2.5	0.8	3.4	11	2.7	0.07
Non-residence 37	634.721	6230.824	2.4	0.7	3.1	10	2.5	0.06
Non-residence 38	634.904	6230.735	2.3	0.7	3.2	10	2.5	0.06
Non-residence 39	634.976	6230.724	2.3	0.7	3.1	10	2.5	0.06
Non-residence 40	634.975	6230.734	2.3	0.7	3.1	10	2.5	0.06
Non-residence 41	635.079	6230.582	2.4	0.7	3.2	10	2.5	0.06
Non-residence 42	634.982	6230.433	2.4	0.7	3.0	9	2.6	0.06
Non-residence 43	634.986	6230.434	2.4	0.7	3.0	9	2.6	0.06
Non-residence 44	634.990	6230.433	2.4	0.7	3.0	9	2.6	0.06
Non-residence 45	635.064	6230.733	2.3	0.7	3.0	9	2.4	0.06
Non-residence 46	635.559	6230.553	2.1	0.6	2.7	8	2.2	0.06
Non-residence 47	630.266	6232.703	3.3	0.6	4.3	12	1.6	0.05
Non-residence 48	630.244	6232.580	3.6	0.6	4.7	13	1.8	0.05
Non-residence 49	630.299	6232.482	4.0	0.7	5.6	16	2.1	0.06
Non-residence 50	633.556	6232.393	3.8	0.9	6.7	20	3.5	0.09

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 51	633.672	6232.107	3.9	0.9	5.8	19	3.6	0.09
Non-residence 52	633.541	6231.953	4.1	1.0	6.0	19	3.9	0.10
Non-residence 53	633.535	6231.964	4.1	1.0	6.0	19	3.9	0.10
Non-residence 54	631.988	6226.324	4.9	0.7	6.3	17	1.8	0.06
Non-residence 55	633.707	6232.186	3.9	0.9	5.9	18	3.6	0.09
Non-residence 56	634.245	6232.454	3.4	0.8	4.9	15	3.1	0.08
Non-residence 57	634.231	6232.707	3.4	0.8	5.3	16	3.0	0.08
Non-residence 58	634.232	6232.711	3.4	0.7	5.3	16	3.0	0.08
Non-residence 59	633.703	6232.491	3.6	0.8	6.4	19	3.4	0.09
Non-residence 60	633.718	6232.487	3.6	0.8	6.3	19	3.4	0.09
Non-residence 61	634.013	6232.543	3.4	0.8	5.7	17	3.2	0.08
Non-residence 62	634.065	6232.496	3.5	0.8	5.5	16	3.2	0.08
Non-residence 63	636.582	6232.572	1.5	0.4	2.5	8	1.5	0.04
Non-residence 64	634.044	6232.415	3.6	0.8	5.4	16	3.2	0.08
Non-residence 65	636.569	6232.484	1.4	0.4	2.4	7	1.5	0.04
Non-residence 66	634.109	6232.491	3.5	0.8	5.3	16	3.1	0.08
Non-residence 67	636.664	6232.507	1.4	0.4	2.3	7	1.5	0.04
Non-residence 68	634.117	6232.506	3.5	0.8	5.3	16	3.1	0.08
Non-residence 69	634.130	6232.514	3.5	0.8	5.3	16	3.1	0.08
Non-residence 70	636.698	6232.511	1.4	0.4	2.3	7	1.5	0.04
Non-residence 71	636.681	6232.499	1.4	0.4	2.3	7	1.5	0.04
Non-residence 72	636.727	6232.539	1.4	0.4	2.3	7	1.5	0.04
Non-residence 73	636.788	6232.473	1.4	0.4	2.2	7	1.5	0.04
Non-residence 74	633.847	6232.489	3.5	0.8	6.0	18	3.3	0.08
Non-residence 75	633.760	6232.438	3.6	0.8	6.2	19	3.4	0.09
Non-residence 76	634.147	6232.482	3.5	0.8	5.2	16	3.1	0.08
Non-residence 77	633.694	6232.129	3.9	0.9	5.8	18	3.6	0.09
Non-residence 78	633.664	6232.127	3.9	0.9	5.9	19	3.7	0.09
Non-residence 79	633.683	6232.132	3.9	0.9	5.8	18	3.6	0.09
Non-residence 80	633.703	6232.133	3.9	0.9	5.8	18	3.6	0.09
Non-residence 81	633.712	6232.132	3.8	0.9	5.8	18	3.6	0.09
Non-residence 82	633.695	6232.140	3.9	0.9	5.8	18	3.6	0.09
Non-residence 83	634.318	6232.305	3.4	0.8	4.6	15	3.1	0.08
Non-residence 84	633.676	6232.153	3.9	0.9	5.9	19	3.6	0.09
Non-residence 85	633.702	6232.170	3.9	0.9	5.9	18	3.6	0.09
Non-residence 86	636.793	6232.437	1.4	0.4	2.2	7	1.5	0.04
Non-residence 87	636.794	6232.426	1.3	0.4	2.2	6	1.5	0.04
Non-residence 88	636.747	6232.422	1.4	0.4	2.2	7	1.5	0.04
Non-residence 89	636.776	6232.519	1.4	0.4	2.3	7	1.4	0.04
Non-residence 90	633.791	6232.477	3.6	0.8	6.2	19	3.3	0.09
Non-residence 91	633.665	6232.282	3.7	0.9	6.3	19	3.6	0.09
Non-residence 92	633.664	6232.298	3.7	0.9	6.3	19	3.6	0.09
Non-residence 93	633.685	6232.296	3.7	0.9	6.2	19	3.5	0.09
Non-residence 94	633.676	6232.289	3.7	0.9	6.2	19	3.6	0.09
Non-residence 95	633.706	6232.222	3.9	0.9	6.0	19	3.6	0.09
Non-residence 96	633.703	6232.200	3.9	0.9	6.0	18	3.6	0.09
Non-residence 97	633.730	6232.221	3.8	0.9	5.9	18	3.5	0.09
Non-residence 98	633.806	6232.494	3.5	0.8	6.1	18	3.3	0.09
Non-residence 99	633.805	6232.498	3.5	0.8	6.1	18	3.3	0.09
Non-residence 100	636.768	6232.602	1.4	0.4	2.4	7	1.4	0.04
Non-residence 101	633.805	6232.503	3.5	0.8	6.1	18	3.3	0.09
Non-residence 102	633.908	6232.447	3.5	0.8	5.8	17	3.3	0.08
Non-residence 103	633.911	6232.490	3.5	0.8	5.9	18	3.3	0.08

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 104	632.547	6230.574	5.1	1.6	9.5	27	7.9	0.2
Non-residence 105	631.982	6231.163	7.7	2.2	12	38	9.5	0.2
Non-residence 106	631.982	6231.127	7.7	2.2	11	38	9.4	0.2
Non-residence 107	631.960	6231.110	7.8	2.2	12	38	9.5	0.2
Non-residence 108	632.131	6231.351	7.4	2.0	11	36	8.8	0.2
Non-residence 109	632.237	6231.408	6.9	1.8	11	36	8.1	0.2
Non-residence 110	630.192	6232.050	6.4	1.1	10	26	3.8	0.1
Non-residence 111	630.176	6232.008	6.6	1.1	11	29	4.1	0.1
Non-residence 112	630.031	6232.003	6.5	1.1	11	31	3.9	0.1
Non-residence 113	630.039	6231.965	6.8	1.2	12	33	4.2	0.1
Non-residence 114	630.433	6232.124	6.1	1.1	11	29	3.8	0.1
Non-residence 115	630.415	6232.072	6.5	1.2	12	32	4.2	0.1
Non-residence 116	630.397	6232.048	6.7	1.2	12	33	4.4	0.1
Non-residence 117	630.429	6232.027	7.0	1.2	13	35	4.7	0.1
Non-residence 118	630.394	6231.969	7.5	1.3	15	38	5.3	0.1
Non-residence 119	630.393	6231.980	7.4	1.3	14	37	5.2	0.1
Non-residence 120	630.419	6231.972	7.5	1.3	15	38	5.4	0.1
Non-residence 121	630.431	6231.946	7.9	1.4	16	41	5.8	0.2
Non-residence 122	630.345	6232.115	5.9	1.1	10	27	3.7	0.1
Non-residence 123	630.273	6232.059	6.4	1.1	9.9	27	3.9	0.1
Non-residence 124	630.296	6232.052	6.4	1.1	10	28	4.1	0.1
Non-residence 125	630.300	6232.083	6.2	1.1	9.9	27	3.8	0.1
Non-residence 126	630.256	6232.077	6.3	1.1	9.5	25	3.7	0.1
Non-residence 127	630.239	6232.054	6.6	1.1	10	27	3.9	0.1
Non-residence 128	628.501	6232.716	3.1	0.5	4.6	13	1.2	0.04
Non-residence 129	631.705	6231.574	9.7	2.3	25	83	12	0.4
Non-residence 130	633.145	6231.522	4.6	1.2	6.2	19	4.7	0.1
Non-residence 131	633.295	6231.506	4.4	1.2	5.8	18	4.5	0.1
Non-residence 132	633.349	6231.512	4.3	1.1	5.7	17	4.4	0.1
Non-residence 133	633.275	6231.506	4.4	1.2	5.8	18	4.5	0.1
Non-residence 134	633.386	6231.498	4.2	1.1	5.6	17	4.3	0.1
Non-residence 135	633.269	6230.441	3.7	1.1	5.0	15	4.2	0.1
Non-residence 136	633.237	6230.581	3.6	1.1	4.8	14	4.2	0.1
Non-residence 137	633.292	6230.470	3.6	1.1	4.9	15	4.2	0.1
Non-residence 138	633.261	6230.472	3.7	1.1	5.0	15	4.2	0.1
Non-residence 139	633.225	6230.449	3.7	1.1	5.0	15	4.3	0.1
Non-residence 140	633.391	6230.914	3.4	1.0	4.3	12	3.8	0.1
Non-residence 141	633.630	6230.661	3.2	1.0	4.0	13	3.5	0.1
Non-residence 142	633.628	6230.657	3.2	1.0	4.0	13	3.5	0.1
Non-residence 143	631.766	6232.355	6.7	1.2	9.8	29	4.6	0.1
Non-residence 144	631.411	6232.490	5.6	1.0	8.1	22	3.5	0.1
Non-residence 145	631.403	6232.484	5.6	1.0	8.1	22	3.6	0.1
Non-residence 146	631.876	6232.603	5.9	1.0	8.7	26	3.8	0.1
Non-residence 147	632.203	6232.437	6.6	1.1	8.1	24	4.5	0.1
Non-residence 148	632.427	6232.483	5.9	1.0	7.2	21	4.2	0.1
Non-residence 149	632.632	6232.445	5.3	1.0	7.6	22	4.2	0.1
Non-residence 150	632.430	6231.891	6.4	1.4	11	37	6.2	0.2
Non-residence 151	632.963	6232.611	4.2	0.9	6.4	19	3.6	0.1
Non-residence 152	632.828	6232.481	4.6	1.0	7.1	21	4.0	0.1
Non-residence 153	633.145	6232.700	3.9	0.8	6.0	18	3.4	0.1
Non-residence 154	633.134	6232.689	3.9	0.8	6.0	18	3.4	0.1
Non-residence 155	633.442	6232.703	3.6	0.8	6.1	18	3.2	0.1
Non-residence 156	633.084	6232.423	4.3	0.9	7.5	23	3.9	0.1

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 157	633.105	6232.405	4.3	0.9	7.6	23	4.0	0.1
Non-residence 158	633.046	6232.480	4.3	0.9	7.1	22	3.9	0.1
Non-residence 159	633.419	6232.447	3.9	0.9	7.0	21	3.6	0.1
Non-residence 160	633.452	6232.453	3.9	0.9	6.9	21	3.5	0.1
Non-residence 161	633.424	6232.451	3.9	0.9	7.0	21	3.6	0.1
Non-residence 162	633.127	6232.758	3.8	0.8	5.8	17	3.3	0.1
Non-residence 163	630.249	6232.842	3.0	0.5	3.7	11	1.4	0.04
Non-residence 164	630.298	6232.738	3.3	0.6	4.3	12	1.6	0.05
Non-residence 165	630.247	6232.782	3.1	0.5	3.9	11	1.5	0.05
Non-residence 166	634.386	6233.116	2.6	0.6	4.8	14	2.5	0.06
Non-residence 167	634.207	6232.732	3.4	0.7	5.4	16	3.0	0.07
Non-residence 168	635.335	6233.676	1.8	0.4	3.5	10	1.7	0.05
Non-residence 169	635.310	6233.690	1.8	0.4	3.5	10	1.7	0.05
Non-residence 170	636.056	6233.139	1.7	0.4	2.9	8	1.6	0.05
Non-residence 171	635.660	6233.183	1.9	0.5	3.4	10	1.7	0.05
Non-residence 172	635.581	6233.534	1.8	0.4	3.5	10	1.7	0.05
Non-residence 173	635.575	6233.206	2.0	0.5	3.5	10	1.8	0.05
Non-residence 174	635.529	6233.502	1.8	0.4	3.6	10	1.7	0.05
Non-residence 175	635.633	6233.267	1.9	0.4	3.5	10	1.7	0.05
Non-residence 176	635.687	6233.405	1.8	0.4	3.5	10	1.7	0.05
Non-residence 177	635.751	6233.348	1.8	0.4	3.4	10	1.7	0.05
Non-residence 178	635.820	6233.359	1.8	0.4	3.4	10	1.6	0.05
Non-residence 179	630.258	6232.922	2.7	0.5	3.5	10	1.4	0.04
Non-residence 180	634.541	6233.203	2.5	0.6	4.6	14	2.3	0.06
Non-residence 181	633.385	6233.309	2.7	0.7	5.0	16	3.1	0.09
Non-residence 182	633.348	6233.268	2.7	0.7	5.0	16	3.1	0.09
Non-residence 183	633.503	6233.342	2.6	0.7	4.9	15	2.9	0.08
Non-residence 184	633.633	6233.221	2.8	0.7	5.0	14	2.8	0.08
Non-residence 185	634.933	6233.444	2.1	0.5	3.9	12	2.0	0.05
Non-residence 186	635.804	6233.334	1.8	0.4	3.4	10	1.6	0.05
Non-residence 187	633.576	6233.209	2.9	0.7	5.0	15	2.8	0.08
Non-residence 188	635.793	6233.323	1.8	0.4	3.4	10	1.7	0.05
Non-residence 189	635.790	6233.311	1.8	0.4	3.4	10	1.7	0.05
Non-residence 190	633.658	6233.135	3.0	0.7	5.1	15	2.8	0.08
Non-residence 191	635.803	6233.303	1.8	0.4	3.4	10	1.7	0.05
Non-residence 192	633.656	6233.119	3.0	0.7	5.1	15	2.8	0.08
Non-residence 193	635.749	6233.372	1.8	0.4	3.4	10	1.7	0.05
Non-residence 194	634.690	6233.086	2.5	0.6	4.5	13	2.3	0.06
Non-residence 195	635.608	6233.285	1.9	0.4	3.5	10	1.7	0.05
Non-residence 196	636.833	6232.745	1.4	0.4	2.5	8	1.4	0.04
Non-residence 197	633.745	6233.168	2.9	0.7	5.0	15	2.7	0.08
Non-residence 198	636.822	6232.743	1.4	0.4	2.5	8	1.4	0.04
Non-residence 199	633.760	6233.162	2.9	0.7	5.0	15	2.7	0.08
Non-residence 200	636.790	6232.734	1.4	0.4	2.5	8	1.4	0.04
Non-residence 201	636.777	6232.764	1.4	0.4	2.5	8	1.4	0.04
Non-residence 202	633.639	6233.221	2.8	0.7	5.0	14	2.8	0.08
Non-residence 203	633.658	6233.220	2.8	0.7	5.0	14	2.7	0.08
Non-residence 204	633.619	6233.125	3.0	0.7	5.1	15	2.9	0.08
Non-residence 205	634.432	6233.402	2.3	0.5	4.4	13	2.2	0.06
Non-residence 206	634.423	6233.360	2.3	0.5	4.4	13	2.2	0.06
Non-residence 207	634.340	6233.269	2.4	0.6	4.6	13	2.3	0.06
Non-residence 208	634.914	6233.603	2.1	0.5	3.9	11	1.9	0.05
Non-residence 209	634.903	6233.556	2.1	0.5	3.9	11	1.9	0.05

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 210	635.007	6233.494	2.1	0.5	3.8	11	1.9	0.05
Non-residence 211	635.007	6233.556	2.0	0.5	3.8	11	1.9	0.05
Non-residence 212	635.030	6233.644	2.0	0.5	3.8	11	1.8	0.05
Non-residence 213	635.234	6233.722	1.9	0.4	3.6	11	1.7	0.05
Non-residence 214	635.199	6233.691	1.9	0.4	3.6	11	1.8	0.05
Non-residence 215	636.133	6233.165	1.7	0.4	2.9	8	1.6	0.04
Non-residence 216	629.360	6232.774	3.0	0.5	5.2	14	1.2	0.04
Non-residence 217	629.356	6232.783	3.0	0.5	5.2	14	1.2	0.04
Non-residence 218	629.578	6232.895	2.7	0.4	4.6	12	1.2	0.04
Non-residence 219	629.226	6232.883	2.9	0.4	4.7	13	1.1	0.04
Non-residence 220	629.334	6232.855	2.8	0.4	4.9	13	1.2	0.04
Non-residence 221	629.324	6232.873	2.8	0.4	4.9	13	1.2	0.04
Non-residence 222	629.292	6232.864	2.9	0.4	4.9	13	1.2	0.04
Non-residence 223	629.279	6232.862	2.9	0.4	4.9	13	1.2	0.04
Non-residence 224	629.331	6232.925	2.7	0.4	4.7	12	1.1	0.04
Non-residence 225	629.345	6232.916	2.7	0.4	4.7	12	1.1	0.04
Non-residence 226	629.348	6232.935	2.7	0.4	4.7	12	1.1	0.04
Non-residence 227	633.401	6232.733	3.5	0.8	5.9	18	3.2	0.08
Non-residence 228	630.655	6232.303	5.2	1.1	9.5	26	3.3	0.08
Non-residence 229	630.407	6232.300	4.9	1.0	8.0	22	2.9	0.07
Non-residence 230	630.452	6232.324	4.9	1.0	8.3	22	2.8	0.07
Non-residence 231	630.360	6232.328	4.8	0.9	7.5	20	2.7	0.07
Non-residence 232	630.809	6232.413	5.1	0.9	8.6	24	3.0	0.08
Non-residence 233	630.679	6232.377	4.9	0.9	8.8	24	2.9	0.07
Non-residence 234	635.280	6230.416	2.3	0.7	2.9	8	2.4	0.06
Non-residence 235	634.753	6230.706	2.4	0.7	3.3	10	2.6	0.06
Non-residence 236	634.459	6230.807	2.5	0.8	3.3	10	2.7	0.07
Non-residence 237	634.485	6230.766	2.5	0.8	3.4	11	2.7	0.07
Non-residence 238	634.674	6230.781	2.4	0.7	3.2	10	2.5	0.06
Non-residence 239	634.719	6230.837	2.4	0.7	3.1	10	2.5	0.06
Non-residence 240	634.543	6230.948	2.5	0.7	3.1	10	2.7	0.06
Non-residence 241	634.915	6230.724	2.3	0.7	3.2	10	2.5	0.06
Non-residence 242	634.915	6230.654	2.4	0.7	3.2	10	2.5	0.06
Non-residence 243	635.018	6230.724	2.3	0.7	3.1	9	2.5	0.06
Non-residence 244	635.096	6230.655	2.3	0.7	3.1	9	2.4	0.06
Non-residence 245	635.128	6230.627	2.3	0.7	3.1	9	2.4	0.06
Non-residence 246	635.559	6230.527	2.1	0.6	2.7	8	2.3	0.06
Non-residence 247	630.258	6232.565	3.7	0.6	4.9	14	1.8	0.05
Non-residence 248	631.977	6226.320	4.9	0.7	6.3	17	1.8	0.06
Non-residence 249	633.954	6232.464	3.5	0.8	5.7	17	3.2	0.08
Non-residence 250	634.021	6232.502	3.5	0.8	5.6	17	3.2	0.08
Non-residence 251	636.675	6232.516	1.4	0.4	2.3	7	1.5	0.04
Non-residence 252	636.764	6232.524	1.4	0.4	2.3	7	1.5	0.04
Non-residence 253	633.791	6232.481	3.6	0.8	6.2	19	3.3	0.09
Non-residence 254	633.682	6232.260	3.8	0.9	6.2	19	3.6	0.09
Non-residence 255	633.808	6232.445	3.6	0.8	6.1	18	3.3	0.09
Non-residence 256	633.820	6232.470	3.5	0.8	6.1	18	3.3	0.09
Non-residence 257	631.968	6231.106	7.7	2.2	11	38	9.4	0.2
Non-residence 258	632.215	6231.407	6.9	1.9	11	36	8.2	0.2
Non-residence 259	630.179	6231.985	6.8	1.2	12	31	4.3	0.1
Non-residence 260	630.455	6232.103	6.4	1.1	12	31	4.1	0.1
Non-residence 261	630.434	6231.940	8.0	1.4	16	42	5.9	0.2
Non-residence 262	630.116	6232.674	3.2	0.6	4.1	12	1.6	0.05

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 263	628.548	6232.661	3.2	0.5	4.9	13	1.3	0.05
Non-residence 264	631.692	6231.654	8.8	2.2	24	78	11	0.4
Non-residence 265	633.277	6231.494	4.4	1.2	5.8	18	4.5	0.1
Non-residence 266	633.164	6230.500	3.8	1.2	5.1	15	4.4	0.1
Non-residence 267	633.210	6230.535	3.6	1.1	4.9	15	4.3	0.1
Non-residence 268	633.276	6230.498	3.6	1.1	4.9	15	4.2	0.1
Non-residence 269	633.220	6230.512	3.6	1.1	4.9	15	4.3	0.1
Non-residence 270	633.590	6230.696	3.2	1.0	4.0	12	3.6	0.09
Non-residence 271	634.866	6230.491	2.5	0.7	3.5	11	2.7	0.06
Non-residence 272	631.883	6232.606	5.9	1.0	8.7	26	3.8	0.1
Non-residence 273	632.540	6232.426	5.6	1.1	7.6	22	4.3	0.1
Non-residence 274	632.425	6231.891	6.4	1.4	11	37	6.2	0.2
Non-residence 275	633.140	6232.682	3.9	0.8	6.0	18	3.4	0.09
Non-residence 276	633.196	6232.449	4.2	0.9	7.3	22	3.8	0.1
Non-residence 277	630.243	6232.781	3.1	0.5	3.9	12	1.5	0.05
Non-residence 278	630.280	6232.975	2.6	0.5	3.4	10	1.3	0.04
Non-residence 279	635.385	6233.556	1.9	0.4	3.5	10	1.8	0.05
Non-residence 280	635.106	6233.424	2.0	0.5	3.8	11	1.9	0.05
Non-residence 281	635.812	6233.348	1.8	0.4	3.4	10	1.6	0.05
Non-residence 282	635.182	6233.689	1.9	0.4	3.6	11	1.8	0.05
Non-residence 283	636.388	6232.996	1.5	0.4	2.7	8	1.5	0.04
Non-residence 284	629.248	6233.007	2.6	0.4	4.4	12	1.0	0.04
Non-residence 285	629.176	6232.862	2.9	0.4	4.7	13	1.1	0.04
Non-residence 286	629.578	6232.917	2.7	0.4	4.6	12	1.2	0.04
Non-residence 287	629.256	6232.919	2.8	0.4	4.7	12	1.1	0.04

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.4 Maximum predicted concentrations of particulate matter with background at ground-truthed non-residences (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[a]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 1	630.709	6228.334	18	5.4	20	38	6.6	0.8
Non-residence 2	630.724	6228.349	18	5.4	21	39	6.5	0.8
Non-residence 3	631.896	6230.979	18	5.4	20	38	6.5	0.8
Non-residence 4	630.996	6232.371	20	6.0	22	49	8.4	0.9
Non-residence 5	630.784	6232.310	17	5.7	18	36	8.0	0.9
Non-residence 6	630.699	6232.333	17	5.7	18	36	7.9	0.9
Non-residence 7	630.658	6232.313	17	5.7	18	35	7.9	0.9
Non-residence 8	630.599	6232.308	17	5.7	18	36	7.9	0.9
Non-residence 9	630.325	6232.338	17	5.7	18	36	7.9	0.9
Non-residence 10	630.351	6232.358	17	5.7	18	36	7.9	0.9
Non-residence 11	630.361	6232.357	17	5.7	18	36	7.9	0.9
Non-residence 12	630.319	6232.360	17	5.7	18	36	7.9	0.9
Non-residence 13	630.328	6232.360	17	5.7	18	36	7.9	0.9
Non-residence 14	630.302	6232.348	17	5.7	18	36	7.8	0.9
Non-residence 15	630.246	6232.343	17	5.7	18	36	7.9	0.9
Non-residence 16	630.255	6232.364	17	5.7	18	36	7.8	0.9
Non-residence 17	630.255	6232.349	17	5.7	18	35	7.8	0.9
Non-residence 18	630.896	6232.415	17	5.7	19	36	7.9	0.9
Non-residence 19	630.888	6232.417	18	5.6	19	39	7.1	0.8
Non-residence 20	630.895	6232.422	18	5.5	22	41	6.7	0.8
Non-residence 21	630.528	6232.328	19	6.1	20	41	9.8	0.9
Non-residence 22	630.527	6232.347	18	6.0	20	39	9.3	0.9
Non-residence 23	630.499	6232.316	18	6.0	20	39	9.0	0.9
Non-residence 24	630.473	6232.305	17	5.7	19	35	7.8	0.9
Non-residence 25	630.447	6232.321	19	5.8	21	45	8.8	0.9
Non-residence 26	630.301	6232.359	18	5.5	19	36	6.7	0.8
Non-residence 27	630.282	6232.385	16	5.1	16	30	5.8	0.8
Non-residence 28	630.933	6232.456	16	5.1	16	30	5.8	0.8
Non-residence 29	630.771	6232.361	16	5.1	16	30	5.8	0.8
Non-residence 30	635.021	6230.444	16	5.1	16	30	5.8	0.8
Non-residence 31	635.133	6230.463	16	5.1	17	31	5.9	0.8
Non-residence 32	634.933	6230.465	16	5.1	17	31	5.9	0.8
Non-residence 33	634.669	6230.722	16	5.1	17	31	5.9	0.8
Non-residence 34	634.373	6230.747	16	5.1	17	31	5.9	0.8
Non-residence 35	634.381	6230.741	15	5.1	16	28	5.7	0.8
Non-residence 36	634.454	6230.786	16	5.1	16	30	5.8	0.8
Non-residence 37	634.721	6230.824	16	5.1	16	30	5.8	0.8
Non-residence 38	634.904	6230.735	16	5.1	16	30	5.8	0.8
Non-residence 39	634.976	6230.724	16	5.1	16	30	5.8	0.8
Non-residence 40	634.975	6230.734	16	5.1	16	30	5.8	0.8
Non-residence 41	635.079	6230.582	16	5.1	16	30	5.8	0.8
Non-residence 42	634.982	6230.433	16	5.1	16	30	5.8	0.8
Non-residence 43	634.986	6230.434	16	5.1	16	30	5.8	0.8
Non-residence 44	634.990	6230.433	16	5.1	17	31	5.9	0.8
Non-residence 45	635.064	6230.733	16	5.1	16	30	5.9	0.8
Non-residence 46	635.559	6230.553	16	5.1	16	30	5.9	0.8
Non-residence 47	630.266	6232.703	16	5.1	16	30	5.9	0.8
Non-residence 48	630.244	6232.580	16	5.1	16	30	5.9	0.8
Non-residence 49	630.299	6232.482	16	5.1	17	30	5.9	0.8
Non-residence 50	633.556	6232.393	16	5.1	17	31	5.9	0.8

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 51	633.672	6232.107	16	5.1	16	29	5.7	0.8
Non-residence 52	633.541	6231.953	16	5.1	16	30	5.8	0.8
Non-residence 53	633.535	6231.964	16	5.1	16	29	5.7	0.8
Non-residence 54	631.988	6226.324	16	5.1	16	29	5.7	0.8
Non-residence 55	633.707	6232.186	16	5.1	17	31	5.9	0.8
Non-residence 56	634.245	6232.454	16	5.1	17	31	5.9	0.8
Non-residence 57	634.231	6232.707	16	5.1	17	31	5.9	0.8
Non-residence 58	634.232	6232.711	16	5.1	17	30	5.9	0.8
Non-residence 59	633.703	6232.491	16	5.1	17	31	5.9	0.8
Non-residence 60	633.718	6232.487	16	5.2	16	29	6.0	0.8
Non-residence 61	634.013	6232.543	16	5.2	16	30	6.1	0.8
Non-residence 62	634.065	6232.496	16	5.3	17	30	6.3	0.8
Non-residence 63	636.582	6232.572	16	5.3	17	30	6.3	0.8
Non-residence 64	634.044	6232.415	16	5.3	17	30	6.3	0.8
Non-residence 65	636.569	6232.484	16	5.2	16	30	6.1	0.8
Non-residence 66	634.109	6232.491	16	5.2	16	29	6.0	0.8
Non-residence 67	636.664	6232.507	16	5.3	17	30	6.3	0.8
Non-residence 68	634.117	6232.506	16	5.2	16	30	6.1	0.8
Non-residence 69	634.130	6232.514	16	5.2	16	29	6.0	0.8
Non-residence 70	636.698	6232.511	16	5.3	17	30	6.3	0.8
Non-residence 71	636.681	6232.499	16	5.2	16	29	6.0	0.8
Non-residence 72	636.727	6232.539	16	5.2	16	30	6.1	0.8
Non-residence 73	636.788	6232.473	16	5.2	16	30	6.1	0.8
Non-residence 74	633.847	6232.489	16	5.2	16	30	6.1	0.8
Non-residence 75	633.760	6232.438	16	5.2	16	30	6.1	0.8
Non-residence 76	634.147	6232.482	16	5.2	16	30	6.1	0.8
Non-residence 77	633.694	6232.129	16	5.2	16	30	6.1	0.8
Non-residence 78	633.664	6232.127	16	5.2	16	30	6.1	0.8
Non-residence 79	633.683	6232.132	16	5.2	16	30	6.1	0.8
Non-residence 80	633.703	6232.133	16	5.2	16	29	6.0	0.8
Non-residence 81	633.712	6232.132	16	5.2	16	30	6.1	0.8
Non-residence 82	633.695	6232.140	16	5.2	16	29	6.0	0.8
Non-residence 83	634.318	6232.305	16	5.2	16	30	6.1	0.8
Non-residence 84	633.676	6232.153	16	5.2	17	30	6.1	0.8
Non-residence 85	633.702	6232.170	16	5.2	17	30	6.1	0.8
Non-residence 86	636.793	6232.437	16	5.2	17	30	6.1	0.8
Non-residence 87	636.794	6232.426	16	5.2	17	30	6.1	0.8
Non-residence 88	636.747	6232.422	16	5.2	17	30	6.1	0.8
Non-residence 89	636.776	6232.519	16	5.2	17	30	6.1	0.8
Non-residence 90	633.791	6232.477	16	5.2	17	30	6.1	0.8
Non-residence 91	633.665	6232.282	16	5.1	16	30	5.9	0.8
Non-residence 92	633.664	6232.298	16	5.1	16	30	5.9	0.8
Non-residence 93	633.685	6232.296	16	5.1	16	30	5.9	0.8
Non-residence 94	633.676	6232.289	16	5.1	17	30	5.9	0.8
Non-residence 95	633.706	6232.222	16	5.1	16	30	5.9	0.8
Non-residence 96	633.703	6232.200	16	5.1	16	30	5.9	0.8
Non-residence 97	633.730	6232.221	16	5.1	16	30	5.9	0.8
Non-residence 98	633.806	6232.494	16	5.1	16	30	5.9	0.8
Non-residence 99	633.805	6232.498	16	5.1	16	30	5.9	0.8
Non-residence 100	636.768	6232.602	16	5.1	16	30	5.9	0.8
Non-residence 101	633.805	6232.503	16	5.1	16	30	5.9	0.8
Non-residence 102	633.908	6232.447	16	5.2	17	30	6.1	0.8
Non-residence 103	633.911	6232.490	16	5.1	16	30	5.9	0.8

Receptor ID	UTM Easting	UTM Northing	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
	(km)	(km)	24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 104	632.547	6230.574	16	5.2	16	29	6.0	0.8
Non-residence 105	631.982	6231.163	16	5.2	16	29	6.0	0.8
Non-residence 106	631.982	6231.127	16	5.2	16	29	6.0	0.8
Non-residence 107	631.960	6231.110	16	5.2	16	29	6.0	0.8
Non-residence 108	632.131	6231.351	16	5.2	16	29	6.0	0.8
Non-residence 109	632.237	6231.408	15	5.1	16	28	5.7	0.8
Non-residence 110	630.192	6232.050	15	5.1	16	28	5.7	0.8
Non-residence 111	630.176	6232.008	16	5.2	17	31	5.8	0.8
Non-residence 112	630.031	6232.003	16	5.2	16	29	6.0	0.8
Non-residence 113	630.039	6231.965	16	5.2	16	29	6.0	0.8
Non-residence 114	630.433	6232.124	15	5.1	16	28	5.8	0.8
Non-residence 115	630.415	6232.072	15	5.1	16	28	5.8	0.8
Non-residence 116	630.397	6232.048	16	5.2	16	29	6.0	0.8
Non-residence 117	630.429	6232.027	15	5.1	16	28	5.8	0.8
Non-residence 118	630.394	6231.969	16	5.2	16	29	6.0	0.8
Non-residence 119	630.393	6231.980	15	5.1	16	28	5.8	0.8
Non-residence 120	630.419	6231.972	16	5.2	16	29	6.0	0.8
Non-residence 121	630.431	6231.946	16	5.2	16	29	6.0	0.8
Non-residence 122	630.345	6232.115	16	5.2	16	29	6.0	0.8
Non-residence 123	630.273	6232.059	16	5.2	16	29	6.0	0.8
Non-residence 124	630.296	6232.052	16	5.2	16	29	6.0	0.8
Non-residence 125	630.300	6232.083	16	5.2	16	29	6.0	0.8
Non-residence 126	630.256	6232.077	16	5.2	16	29	6.0	0.8
Non-residence 127	630.239	6232.054	16	5.2	16	29	6.0	0.8
Non-residence 128	628.501	6232.716	16	5.2	16	29	6.0	0.8
Non-residence 129	631.705	6231.574	15	5.1	16	28	5.6	0.8
Non-residence 130	633.145	6231.522	15	5.1	16	28	5.6	0.8
Non-residence 131	633.295	6231.506	15	5.1	16	28	5.6	0.8
Non-residence 132	633.349	6231.512	16	5.1	17	30	5.7	0.8
Non-residence 133	633.275	6231.506	16	5.1	17	30	5.7	0.8
Non-residence 134	633.386	6231.498	16	5.2	18	32	5.9	0.8
Non-residence 135	633.269	6230.441	16	5.1	17	31	5.7	0.8
Non-residence 136	633.237	6230.581	16	5.1	17	30	5.7	0.8
Non-residence 137	633.292	6230.470	16	5.1	17	30	5.7	0.8
Non-residence 138	633.261	6230.472	16	5.1	17	30	5.7	0.8
Non-residence 139	633.225	6230.449	16	5.1	17	30	5.7	0.8
Non-residence 140	633.391	6230.914	16	5.1	17	30	5.7	0.8
Non-residence 141	633.630	6230.661	16	5.1	17	30	5.7	0.8
Non-residence 142	633.628	6230.657	15	5.0	16	28	5.5	0.8
Non-residence 143	631.766	6232.355	16	5.1	17	30	5.7	0.8
Non-residence 144	631.411	6232.490	16	5.1	17	30	5.7	0.8
Non-residence 145	631.403	6232.484	36	10.7	43	115	35.2	1.4
Non-residence 146	631.876	6232.603	37	10.9	44	115	37.5	1.4
Non-residence 147	632.203	6232.437	21	6.0	22	51	8.9	0.9
Non-residence 148	632.427	6232.483	21	6.1	22	53	9.0	0.9
Non-residence 149	632.632	6232.445	20	6.0	22	52	8.6	0.9
Non-residence 150	632.430	6231.891	20	6.2	22	52	8.9	0.9
Non-residence 151	632.963	6232.611	20	6.1	22	51	8.6	0.9
Non-residence 152	632.828	6232.481	20	5.9	21	45	8.0	0.9
Non-residence 153	633.145	6232.700	20	5.8	21	45	7.9	0.9
Non-residence 154	633.134	6232.689	20	5.8	21	45	7.9	0.9
Non-residence 155	633.442	6232.703	20	5.8	21	45	7.9	0.9
Non-residence 156	633.084	6232.423	20	5.8	21	43	7.8	0.9

Receptor ID	UTM Easting	UTM Northing	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
	(km)	(km)	24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 157	633.105	6232.405	20	5.8	21	43	7.7	0.9
Non-residence 158	633.046	6232.480	20	5.8	21	43	7.8	0.9
Non-residence 159	633.419	6232.447	20	5.9	21	50	8.5	0.9
Non-residence 160	633.452	6232.453	20	5.9	21	50	8.5	0.9
Non-residence 161	633.424	6232.451	20	6.0	22	50	8.3	0.9
Non-residence 162	633.127	6232.758	17	5.7	18	36	7.9	0.9
Non-residence 163	630.249	6232.842	17	5.7	19	36	7.9	0.9
Non-residence 164	630.298	6232.738	17	5.7	19	35	8.0	0.9
Non-residence 165	630.247	6232.782	17	5.7	18	36	7.8	0.9
Non-residence 166	634.386	6233.116	19	6.0	22	45	9.3	0.9
Non-residence 167	634.207	6232.732	20	5.7	21	43	7.2	0.9
Non-residence 168	635.335	6233.676	16	5.4	18	33	6.9	0.8
Non-residence 169	635.310	6233.690	19	5.8	21	44	8.7	0.9
Non-residence 170	636.056	6233.139	19	5.8	21	45	8.8	0.9
Non-residence 171	635.660	6233.183	18	5.8	21	42	8.5	0.9
Non-residence 172	635.581	6233.534	19	5.9	22	45	9.0	0.9
Non-residence 173	635.575	6233.206	19	5.9	22	45	9.1	0.9
Non-residence 174	635.529	6233.502	19	5.9	22	45	9.0	0.9
Non-residence 175	635.633	6233.267	19	5.9	22	45	9.0	0.9
Non-residence 176	635.687	6233.405	19	5.9	22	44	9.0	0.9
Non-residence 177	635.751	6233.348	19	5.9	22	45	9.0	0.9
Non-residence 178	635.820	6233.359	18	5.8	20	41	8.5	0.9
Non-residence 179	630.258	6232.922	19	5.9	22	45	9.0	0.9
Non-residence 180	634.541	6233.203	16	5.4	18	33	6.9	0.8
Non-residence 181	633.385	6233.309	16	5.4	18	33	6.9	0.8
Non-residence 182	633.348	6233.268	19	5.8	21	45	8.7	0.9
Non-residence 183	633.503	6233.342	19	5.9	22	45	9.0	0.9
Non-residence 184	633.633	6233.221	19	5.9	22	45	9.0	0.9
Non-residence 185	634.933	6233.444	23	7.2	29	64	15	1.0
Non-residence 186	635.804	6233.334	23	7.2	29	65	15	1.0
Non-residence 187	633.576	6233.209	22	7.0	28	62	14	1.0
Non-residence 188	635.793	6233.323	22	6.8	27	62	13	1.0
Non-residence 189	635.790	6233.311	21	6.1	23	53	9.2	0.9
Non-residence 190	633.658	6233.135	22	6.1	23	55	9.5	0.9
Non-residence 191	635.803	6233.303	21	6.1	24	57	9.3	0.9
Non-residence 192	633.656	6233.119	22	6.2	24	59	9.6	0.9
Non-residence 193	635.749	6233.372	21	6.1	23	56	9.2	0.9
Non-residence 194	634.690	6233.086	22	6.2	23	58	9.6	0.9
Non-residence 195	635.608	6233.285	22	6.2	23	59	9.8	0.9
Non-residence 196	636.833	6232.745	22	6.2	23	61	10	0.9
Non-residence 197	633.745	6233.168	23	6.3	24	64	11	0.9
Non-residence 198	636.822	6232.743	22	6.3	24	63	11	0.9
Non-residence 199	633.760	6233.162	23	6.3	24	65	11	0.9
Non-residence 200	636.790	6232.734	23	6.4	24	67	11	0.9
Non-residence 201	636.777	6232.764	21	6.1	23	53	9.3	0.9
Non-residence 202	633.639	6233.221	21	6.1	23	53	9.2	0.9
Non-residence 203	633.658	6233.220	21	6.1	22	51	9.1	0.9
Non-residence 204	633.619	6233.125	22	6.1	23	53	9.3	0.9
Non-residence 205	634.432	6233.402	18	5.5	22	39	6.6	0.8
Non-residence 206	634.423	6233.360	25	7.3	34	110	18	1.2
Non-residence 207	634.340	6233.269	20	6.2	24	45	10	0.9
Non-residence 208	634.914	6233.603	21	6.0	21	49	8.9	0.9
Non-residence 209	634.903	6233.556	21	6.0	21	49	9.0	0.9

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 210	635.007	6233.494	21	6.0	22	52	9.2	0.9
Non-residence 211	635.007	6233.556	22	6.1	23	51	9.9	0.9
Non-residence 212	635.030	6233.644	21	6.0	22	47	9.6	0.9
Non-residence 213	635.234	6233.722	20	6.0	22	48	9.6	0.9
Non-residence 214	635.199	6233.691	21	6.4	27	63	12	1.0
Non-residence 215	636.133	6233.165	20	6.0	22	47	9.4	0.9
Non-residence 216	629.360	6232.774	18	5.5	19	38	6.9	0.8
Non-residence 217	629.356	6232.783	18	5.6	20	41	7.9	0.9
Non-residence 218	629.578	6232.895	17	5.4	19	37	7.1	0.8
Non-residence 219	629.226	6232.883	17	5.4	19	37	7.1	0.8
Non-residence 220	629.334	6232.855	17	5.4	18	35	7.0	0.8
Non-residence 221	629.324	6232.873	17	5.4	18	36	7.1	0.8
Non-residence 222	629.292	6232.864	17	5.4	18	37	7.1	0.8
Non-residence 223	629.279	6232.862	17	5.5	18	36	7.2	0.8
Non-residence 224	629.331	6232.925	17	5.4	18	36	7.1	0.8
Non-residence 225	629.345	6232.916	17	5.4	18	36	7.1	0.8
Non-residence 226	629.348	6232.935	17	5.4	18	36	7.1	0.8
Non-residence 227	633.401	6232.733	18	5.7	21	41	8.1	0.9
Non-residence 228	630.655	6232.303	16	5.4	18	34	6.8	0.8
Non-residence 229	630.407	6232.300	16	5.4	18	34	6.8	0.8
Non-residence 230	630.452	6232.324	18	5.7	21	41	8.2	0.9
Non-residence 231	630.360	6232.328	18	5.6	21	41	8.1	0.9
Non-residence 232	630.809	6232.413	18	5.7	21	41	8.3	0.9
Non-residence 233	630.679	6232.377	17	5.5	20	39	7.6	0.9
Non-residence 234	635.280	6230.416	17	5.5	19	38	7.3	0.9
Non-residence 235	634.753	6230.706	17	5.5	19	38	7.3	0.9
Non-residence 236	634.459	6230.807	17	5.5	19	37	7.3	0.9
Non-residence 237	634.485	6230.766	17	5.4	19	37	7.2	0.9
Non-residence 238	634.674	6230.781	17	5.4	19	37	7.2	0.8
Non-residence 239	634.719	6230.837	17	5.4	18	35	7.0	0.8
Non-residence 240	634.543	6230.948	18	5.5	21	40	6.6	0.8
Non-residence 241	634.915	6230.724	18	5.4	21	39	6.5	0.8
Non-residence 242	634.915	6230.654	19	5.8	21	44	8.6	0.9
Non-residence 243	635.018	6230.724	20	5.9	21	50	8.4	0.9
Non-residence 244	635.096	6230.655	17	5.7	18	36	8.0	0.9
Non-residence 245	635.128	6230.627	18	5.8	19	37	8.1	0.9
Non-residence 246	635.559	6230.527	17	5.7	18	36	7.9	0.9
Non-residence 247	630.258	6232.565	18	5.7	18	36	8.1	0.9
Non-residence 248	631.977	6226.320	17	5.7	18	36	7.9	0.9
Non-residence 249	633.954	6232.464	17	5.7	19	36	7.9	0.9
Non-residence 250	634.021	6232.502	17	5.7	18	36	7.9	0.9
Non-residence 251	636.675	6232.516	17	5.7	19	36	7.8	0.9
Non-residence 252	636.764	6232.524	17	5.7	19	36	7.8	0.9
Non-residence 253	633.791	6232.481	17	5.6	19	34	7.7	0.9
Non-residence 254	633.682	6232.260	19	5.6	20	40	7.2	0.9
Non-residence 255	633.808	6232.445	20	5.6	21	43	7.2	0.9
Non-residence 256	633.820	6232.470	19	5.8	21	43	8.6	0.9
Non-residence 257	631.968	6231.106	18	5.8	21	43	8.6	0.9
Non-residence 258	632.215	6231.407	16	5.4	18	33	6.9	0.8
Non-residence 259	630.179	6231.985	16	5.4	18	33	6.9	0.8
Non-residence 260	630.455	6232.103	19	5.8	21	45	8.7	0.9
Non-residence 261	630.434	6231.940	19	5.9	22	45	9.0	0.9
Non-residence 262	630.116	6232.674	19	5.8	21	44	8.7	0.9

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Non-residence 263	628.548	6232.661	19	5.8	21	44	8.7	0.9
Non-residence 264	631.692	6231.654	22	6.9	28	62	14	1.0
Non-residence 265	633.277	6231.494	22	6.2	23	57	9.7	0.9
Non-residence 266	633.164	6230.500	21	6.1	23	57	9.5	0.9
Non-residence 267	633.210	6230.535	23	6.4	24	68	11	1.0
Non-residence 268	633.276	6230.498	18	5.6	19	38	7.0	0.8
Non-residence 269	633.220	6230.512	18	5.5	22	40	6.7	0.8
Non-residence 270	633.590	6230.696	19	6.2	20	41	9.8	0.9
Non-residence 271	634.866	6230.491	19	6.1	20	41	9.7	0.9
Non-residence 272	631.883	6232.606	18	6.0	20	39	9.0	0.9
Non-residence 273	632.540	6232.426	18	5.7	19	37	8.1	0.9
Non-residence 274	632.425	6231.891	21	6.0	22	52	9.2	0.9
Non-residence 275	633.140	6232.682	21	6.1	22	49	9.7	0.9
Non-residence 276	633.196	6232.449	19	5.8	21	44	8.8	0.9
Non-residence 277	630.243	6232.781	19	5.9	21	49	9.2	0.9
Non-residence 278	630.280	6232.975	18	5.5	19	36	6.7	0.8
Non-residence 279	635.385	6233.556	17	5.4	19	37	7.2	0.8
Non-residence 280	635.106	6233.424	17	5.5	19	38	7.3	0.9
Non-residence 281	635.812	6233.348	17	5.4	18	36	7.0	0.8
Non-residence 282	635.182	6233.689	17	5.4	19	37	7.2	0.8
Non-residence 283	636.388	6232.996	17	5.4	18	34	6.9	0.8
Non-residence 284	629.248	6233.007	18	5.4	20	38	6.4	0.8
Non-residence 285	629.176	6232.862	18	5.4	21	39	6.5	0.8
Non-residence 286	629.578	6232.917	18	5.4	20	38	6.6	0.8
Non-residence 287	629.256	6232.919	18	5.4	21	39	6.5	0.8

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.5 Maximum predicted concentrations of particulate matter without background at unknown buildings (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 1	644.950	6225.018	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 2	644.872	6225.507	0.6	0.1	1.3	3.6	0.4	0.01
Unknown Building 3	644.880	6225.504	0.6	0.1	1.3	3.6	0.4	0.01
Unknown Building 4	644.952	6225.002	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 5	644.955	6224.971	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 6	644.947	6224.943	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 7	644.947	6224.925	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 8	644.963	6224.933	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 9	644.882	6225.060	0.6	0.1	1.3	3.5	0.4	0.01
Unknown Building 10	643.566	6225.463	0.7	0.1	1.6	4.4	0.5	0.02
Unknown Building 11	643.559	6225.463	0.7	0.1	1.6	4.4	0.5	0.02
Unknown Building 12	643.374	6225.135	0.8	0.1	1.6	4.4	0.5	0.02
Unknown Building 13	643.404	6225.133	0.7	0.1	1.6	4.4	0.5	0.02
Unknown Building 14	643.403	6225.138	0.7	0.1	1.6	4.4	0.5	0.02
Unknown Building 15	643.969	6223.120	0.5	0.1	0.8	2.2	0.3	0.01
Unknown Building 16	643.834	6224.638	0.7	0.1	1.3	3.7	0.4	0.02
Unknown Building 17	643.831	6224.618	0.7	0.1	1.3	3.7	0.4	0.02
Unknown Building 18	644.950	6225.063	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 19	644.943	6225.062	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 20	644.951	6225.052	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 21	644.953	6225.057	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 22	644.933	6225.059	0.6	0.1	1.2	3.5	0.4	0.01
Unknown Building 23	644.990	6224.918	0.6	0.1	1.2	3.3	0.4	0.01
Unknown Building 24	644.990	6224.939	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 25	644.873	6225.014	0.6	0.1	1.2	3.5	0.4	0.01
Unknown Building 26	644.713	6224.856	0.6	0.1	1.2	3.5	0.4	0.01
Unknown Building 27	644.760	6224.826	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 28	644.816	6224.832	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 29	644.815	6224.853	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 30	644.843	6224.892	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 31	644.871	6224.825	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 32	644.906	6224.940	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 33	644.867	6224.969	0.6	0.1	1.2	3.4	0.4	0.01
Unknown Building 34	643.667	6225.359	0.7	0.1	1.6	4.3	0.5	0.02
Unknown Building 35	643.773	6225.267	0.7	0.1	1.5	4.2	0.5	0.02
Unknown Building 36	643.797	6225.227	0.7	0.1	1.5	4.2	0.5	0.02
Unknown Building 37	643.806	6225.168	0.7	0.1	1.5	4.2	0.5	0.02
Unknown Building 38	643.808	6225.162	0.7	0.1	1.5	4.2	0.5	0.02
Unknown Building 39	643.766	6225.177	0.7	0.1	1.5	4.2	0.5	0.02
Unknown Building 40	643.683	6225.204	0.7	0.1	1.5	4.3	0.5	0.02
Unknown Building 41	643.681	6225.221	0.7	0.1	1.5	4.3	0.5	0.02
Unknown Building 42	643.634	6225.271	0.7	0.1	1.6	4.3	0.5	0.02
Unknown Building 43	643.633	6225.252	0.7	0.1	1.6	4.3	0.5	0.02
Unknown Building 44	643.894	6223.384	0.5	0.09	0.9	2.4	0.3	0.01
Unknown Building 45	643.856	6223.461	0.5	0.09	0.9	2.5	0.3	0.01
Unknown Building 46	644.033	6223.096	0.5	0.08	0.8	2.2	0.3	0.01
Unknown Building 47	644.849	6225.100	0.6	0.1	1.3	3.5	0.4	0.01
Unknown Building 48	644.708	6225.309	0.6	0.1	1.3	3.7	0.4	0.01
Unknown Building 49	644.412	6224.131	0.6	0.10	1.0	2.8	0.4	0.01
Unknown Building 50	644.406	6224.149	0.6	0.10	1.0	2.8	0.4	0.01

Receptor ID	UTM Easting	UTM Northing	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
	(km)	(km)	24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 51	643.639	6225.491	0.7	0.1	1.6	4.3	0.5	0.02
Unknown Building 52	643.623	6225.483	0.7	0.1	1.6	4.4	0.5	0.02
Unknown Building 53	643.691	6225.415	0.7	0.1	1.6	4.3	0.5	0.02
Unknown Building 54	643.709	6225.375	0.7	0.1	1.5	4.3	0.5	0.02
Unknown Building 55	643.700	6225.363	0.7	0.1	1.5	4.3	0.5	0.02
Unknown Building 56	643.664	6225.368	0.7	0.1	1.6	4.3	0.5	0.02
Unknown Building 57	642.358	6232.697	0.8	0.2	1.1	3.1	0.6	0.02
Unknown Building 58	642.370	6232.697	0.8	0.2	1.1	3.1	0.6	0.02
Unknown Building 59	641.707	6232.306	0.8	0.2	1.2	3.5	0.7	0.02
Unknown Building 60	641.716	6232.294	0.8	0.2	1.2	3.5	0.7	0.02
Unknown Building 61	639.639	6231.988	1.0	0.3	1.3	4.0	0.9	0.03
Unknown Building 62	639.669	6231.968	1.0	0.3	1.4	4.0	0.9	0.03
Unknown Building 63	641.692	6232.162	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 64	639.724	6231.971	1.0	0.3	1.4	4.0	0.9	0.03
Unknown Building 65	641.692	6232.158	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 66	642.008	6232.583	0.8	0.2	1.1	3.2	0.6	0.02
Unknown Building 67	639.730	6231.945	1.0	0.3	1.4	4.1	0.9	0.03
Unknown Building 68	641.731	6232.165	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 69	641.983	6232.575	0.8	0.2	1.1	3.2	0.6	0.02
Unknown Building 70	639.694	6231.927	1.0	0.3	1.4	4.1	0.9	0.03
Unknown Building 71	641.719	6232.146	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 72	641.977	6232.585	0.8	0.2	1.1	3.2	0.6	0.02
Unknown Building 73	641.745	6232.141	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 74	641.764	6232.131	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 75	641.939	6232.450	0.8	0.2	1.1	3.3	0.7	0.02
Unknown Building 76	641.800	6232.154	0.8	0.2	1.2	3.5	0.7	0.02
Unknown Building 77	641.817	6232.160	0.8	0.2	1.2	3.5	0.7	0.02
Unknown Building 78	641.827	6232.134	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 79	641.220	6232.063	0.8	0.2	1.3	3.7	0.7	0.02
Unknown Building 80	641.784	6232.059	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 81	641.219	6232.071	0.8	0.2	1.3	3.7	0.7	0.02
Unknown Building 82	641.751	6232.050	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 83	641.219	6232.085	0.8	0.2	1.3	3.7	0.7	0.02
Unknown Building 84	641.208	6232.134	0.9	0.2	1.2	3.7	0.7	0.02
Unknown Building 85	641.842	6232.556	0.8	0.2	1.1	3.2	0.7	0.02
Unknown Building 86	641.200	6232.134	0.9	0.2	1.2	3.7	0.7	0.02
Unknown Building 87	641.242	6232.144	0.9	0.2	1.2	3.6	0.7	0.02
Unknown Building 88	641.273	6232.106	0.8	0.2	1.2	3.7	0.7	0.02
Unknown Building 89	641.267	6232.081	0.8	0.2	1.3	3.7	0.7	0.02
Unknown Building 90	641.350	6232.123	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 91	641.913	6232.471	0.8	0.2	1.1	3.3	0.7	0.02
Unknown Building 92	641.360	6232.149	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 93	641.339	6232.148	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 94	641.334	6232.133	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 95	641.329	6232.136	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 96	641.319	6232.130	0.8	0.2	1.2	3.6	0.7	0.02
Unknown Building 97	641.716	6232.361	0.8	0.2	1.2	3.4	0.7	0.02
Unknown Building 98	641.726	6232.330	0.8	0.2	1.2	3.4	0.7	0.02
Unknown Building 99	642.420	6232.706	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 100	641.719	6232.315	0.8	0.2	1.2	3.4	0.7	0.02
Unknown Building 101	642.414	6232.697	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 102	641.708	6232.314	0.8	0.2	1.2	3.5	0.7	0.02
Unknown Building 103	641.729	6229.020	0.9	0.2	1.2	3.5	0.7	0.02

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 104	641.715	6229.015	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 105	641.684	6229.037	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 106	641.664	6229.052	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 107	641.684	6229.050	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 108	641.698	6229.109	0.9	0.2	1.2	3.4	0.7	0.02
Unknown Building 109	641.689	6228.896	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 110	641.669	6228.915	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 111	641.657	6228.840	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 112	641.665	6228.834	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 113	644.398	6226.367	0.7	0.1	1.3	3.4	0.4	0.01
Unknown Building 114	643.881	6226.485	0.7	0.1	1.3	3.6	0.5	0.02
Unknown Building 115	644.029	6226.070	0.7	0.1	1.4	3.8	0.5	0.01
Unknown Building 116	644.017	6226.086	0.7	0.1	1.4	3.8	0.5	0.01
Unknown Building 117	642.838	6226.416	0.9	0.2	1.4	4.1	0.6	0.02
Unknown Building 118	642.945	6226.433	0.8	0.2	1.4	4.0	0.6	0.02
Unknown Building 119	642.936	6226.428	0.8	0.2	1.4	4.0	0.6	0.02
Unknown Building 120	642.888	6226.854	0.8	0.2	1.4	3.8	0.6	0.02
Unknown Building 121	642.854	6226.949	0.8	0.2	1.4	3.8	0.6	0.02
Unknown Building 122	643.847	6226.177	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 123	643.840	6226.157	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 124	643.865	6226.164	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 125	643.882	6226.134	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 126	643.897	6226.107	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 127	643.902	6226.101	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 128	643.599	6226.038	0.8	0.2	1.5	4.1	0.5	0.02
Unknown Building 129	643.616	6226.337	0.7	0.1	1.3	3.8	0.5	0.02
Unknown Building 130	643.663	6226.211	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 131	643.697	6226.185	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 132	643.719	6226.149	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 133	643.736	6226.142	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 134	643.744	6226.087	0.7	0.1	1.4	4.0	0.5	0.02
Unknown Building 135	643.748	6226.078	0.7	0.1	1.4	4.0	0.5	0.02
Unknown Building 136	643.753	6226.063	0.7	0.1	1.4	4.0	0.5	0.02
Unknown Building 137	641.735	6229.039	0.9	0.2	1.2	3.5	0.7	0.02
Unknown Building 138	643.909	6226.161	0.7	0.1	1.4	3.8	0.5	0.02
Unknown Building 139	643.834	6226.210	0.7	0.1	1.4	3.8	0.5	0.02
Unknown Building 140	643.384	6226.373	0.8	0.2	1.4	3.9	0.5	0.02
Unknown Building 141	643.418	6226.364	0.8	0.2	1.4	3.9	0.5	0.02
Unknown Building 142	642.743	6226.973	0.8	0.2	1.4	3.8	0.6	0.02
Unknown Building 143	642.768	6226.982	0.8	0.2	1.4	3.8	0.6	0.02
Unknown Building 144	642.672	6226.501	0.9	0.2	1.4	4.1	0.6	0.02
Unknown Building 145	642.676	6226.447	0.9	0.2	1.4	4.1	0.6	0.02
Unknown Building 146	643.764	6226.139	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 147	643.755	6226.147	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 148	643.768	6226.152	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 149	643.779	6226.166	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 150	643.757	6226.160	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 151	643.771	6226.180	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 152	643.753	6226.187	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 153	643.720	6226.203	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 154	643.744	6226.210	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 155	643.832	6226.175	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 156	643.172	6226.037	0.8	0.2	1.5	4.3	0.5	0.02

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 157	643.203	6225.978	0.8	0.2	1.6	4.4	0.5	0.02
Unknown Building 158	643.484	6226.166	0.8	0.1	1.4	4.0	0.5	0.02
Unknown Building 159	643.367	6226.160	0.8	0.2	1.5	4.1	0.5	0.02
Unknown Building 160	643.528	6226.061	0.8	0.1	1.5	4.1	0.5	0.02
Unknown Building 161	643.545	6226.046	0.8	0.2	1.5	4.1	0.5	0.02
Unknown Building 162	643.536	6226.004	0.8	0.1	1.5	4.2	0.5	0.02
Unknown Building 163	643.472	6226.157	0.8	0.1	1.4	4.1	0.5	0.02
Unknown Building 164	643.587	6226.050	0.8	0.1	1.5	4.1	0.5	0.02
Unknown Building 165	643.185	6226.306	0.8	0.2	1.4	4.0	0.5	0.02
Unknown Building 166	643.027	6226.363	0.8	0.2	1.4	4.1	0.6	0.02
Unknown Building 167	641.436	6228.659	0.9	0.2	1.3	3.7	0.7	0.02
Unknown Building 168	642.961	6226.254	0.8	0.2	1.5	4.2	0.6	0.02
Unknown Building 169	644.004	6226.153	0.7	0.1	1.3	3.8	0.5	0.01
Unknown Building 170	643.970	6226.198	0.7	0.1	1.3	3.8	0.5	0.02
Unknown Building 171	643.973	6226.201	0.7	0.1	1.3	3.8	0.5	0.02
Unknown Building 172	643.968	6226.204	0.7	0.1	1.3	3.8	0.5	0.02
Unknown Building 173	643.956	6226.214	0.7	0.1	1.3	3.8	0.5	0.02
Unknown Building 174	641.724	6227.960	0.9	0.2	1.3	3.9	0.7	0.02
Unknown Building 175	641.741	6227.953	0.9	0.2	1.3	3.9	0.7	0.02
Unknown Building 176	641.677	6228.058	0.9	0.2	1.3	3.9	0.7	0.02
Unknown Building 177	641.672	6228.099	0.9	0.2	1.3	3.8	0.7	0.02
Unknown Building 178	641.666	6228.095	0.9	0.2	1.3	3.9	0.7	0.02
Unknown Building 179	643.902	6226.128	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 180	643.908	6226.118	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 181	643.914	6226.110	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 182	643.882	6226.168	0.7	0.1	1.4	3.8	0.5	0.02
Unknown Building 183	643.875	6226.180	0.7	0.1	1.4	3.8	0.5	0.02
Unknown Building 184	639.183	6227.195	1.2	0.3	1.9	5.8	0.9	0.03
Unknown Building 185	639.162	6227.197	1.3	0.3	1.9	5.8	0.9	0.03
Unknown Building 186	638.997	6227.336	1.3	0.3	2.0	6.0	0.9	0.03
Unknown Building 187	639.202	6227.203	1.2	0.3	1.9	5.8	0.9	0.03
Unknown Building 188	643.875	6226.185	0.7	0.1	1.4	3.8	0.5	0.02
Unknown Building 189	643.868	6226.221	0.7	0.1	1.3	3.8	0.5	0.02
Unknown Building 190	643.761	6226.051	0.7	0.1	1.4	4.0	0.5	0.02
Unknown Building 191	643.782	6226.058	0.7	0.1	1.4	4.0	0.5	0.02
Unknown Building 192	643.814	6226.081	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 193	643.801	6226.090	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 194	643.797	6226.103	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 195	643.794	6226.117	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 196	643.793	6226.138	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 197	643.767	6226.128	0.7	0.1	1.4	3.9	0.5	0.02
Unknown Building 198	643.268	6226.302	0.8	0.2	1.4	4.0	0.5	0.02
Unknown Building 199	643.292	6226.276	0.8	0.2	1.4	4.0	0.5	0.02
Unknown Building 200	643.216	6226.347	0.8	0.2	1.4	4.0	0.5	0.02
Unknown Building 201	643.224	6226.078	0.8	0.2	1.5	4.3	0.5	0.02
Unknown Building 202	643.256	6226.097	0.8	0.2	1.5	4.2	0.5	0.02
Unknown Building 203	643.288	6226.117	0.8	0.2	1.5	4.2	0.5	0.02
Unknown Building 204	643.339	6226.147	0.8	0.2	1.5	4.1	0.5	0.02
Unknown Building 205	643.303	6226.155	0.8	0.2	1.5	4.1	0.5	0.02
Unknown Building 206	622.081	6236.050	0.4	0.06	0.6	1.9	0.1	0.006
Unknown Building 207	622.088	6235.938	0.4	0.06	0.7	1.9	0.1	0.007
Unknown Building 208	622.090	6235.975	0.4	0.06	0.7	1.9	0.1	0.007
Unknown Building 209	621.912	6235.742	0.4	0.06	0.7	1.9	0.1	0.006

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$ 24-hour	$PM_{2.5}$ Annual	PM_{10} 24-hour	TSP 24-hour	TSP Annual	Dustfall[(a)] 24-hour
Unknown Building 210	622.223	6235.981	0.4	0.06	0.7	2.0	0.1	0.007
Unknown Building 211	622.240	6235.939	0.4	0.06	0.7	2.0	0.1	0.007
Unknown Building 212	643.342	6232.985	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 213	642.375	6232.724	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 214	642.401	6232.723	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 215	643.329	6233.006	0.7	0.2	1.0	3.1	0.6	0.02
Unknown Building 216	642.416	6232.748	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 217	643.334	6233.011	0.7	0.2	1.0	3.1	0.6	0.02
Unknown Building 218	642.409	6232.755	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 219	643.338	6233.028	0.7	0.2	1.0	3.1	0.6	0.02
Unknown Building 220	642.398	6232.749	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 221	643.335	6233.152	0.7	0.2	1.0	3.0	0.6	0.02
Unknown Building 222	642.392	6232.749	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 223	643.308	6233.164	0.7	0.2	1.0	3.0	0.6	0.02
Unknown Building 224	642.368	6232.771	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 225	643.304	6233.215	0.7	0.2	1.0	3.0	0.6	0.02
Unknown Building 226	642.409	6232.760	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 227	643.336	6233.207	0.7	0.2	1.0	3.0	0.6	0.02
Unknown Building 228	643.314	6233.263	0.7	0.2	1.0	3.0	0.6	0.02
Unknown Building 229	626.029	6235.450	0.8	0.1	1.3	3.6	0.3	0.01
Unknown Building 230	643.303	6233.282	0.7	0.2	1.0	2.9	0.6	0.02
Unknown Building 231	643.334	6233.306	0.7	0.2	1.0	2.9	0.6	0.02
Unknown Building 232	643.313	6233.331	0.7	0.2	1.0	2.9	0.6	0.02
Unknown Building 233	643.300	6233.326	0.7	0.2	1.0	2.9	0.6	0.02
Unknown Building 234	643.203	6233.002	0.7	0.2	1.0	3.1	0.6	0.02
Unknown Building 235	643.196	6232.991	0.7	0.2	1.0	3.1	0.6	0.02
Unknown Building 236	643.246	6232.984	0.7	0.2	1.0	3.1	0.6	0.02
Unknown Building 237	643.191	6232.960	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 238	643.239	6232.950	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 239	643.231	6232.911	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 240	646.432	6233.677	0.5	0.1	0.7	2.1	0.4	0.01
Unknown Building 241	646.501	6233.734	0.5	0.1	0.7	2.1	0.3	0.01
Unknown Building 242	626.927	6234.611	1.1	0.2	1.8	5.1	0.4	0.02
Unknown Building 243	643.244	6232.893	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 244	643.200	6232.869	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 245	646.378	6233.687	0.5	0.1	0.7	2.1	0.4	0.01
Unknown Building 246	643.189	6232.851	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 247	646.378	6233.691	0.5	0.1	0.74	2.1	0.4	0.01
Unknown Building 248	643.204	6232.854	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 249	646.354	6233.688	0.5	0.1	0.7	2.2	0.4	0.01
Unknown Building 250	643.219	6232.853	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 251	646.357	6233.709	0.5	0.1	0.7	2.1	0.4	0.01
Unknown Building 252	643.238	6232.844	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 253	643.016	6232.721	0.7	0.2	1.1	3.2	0.6	0.02
Unknown Building 254	643.326	6232.944	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 255	643.315	6232.981	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 256	642.409	6232.764	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 257	642.409	6232.768	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 258	642.434	6232.773	0.7	0.2	1.1	3.1	0.6	0.02
Unknown Building 259	642.331	6232.741	0.8	0.2	1.1	3.1	0.6	0.02
Unknown Building 260	642.316	6232.728	0.8	0.2	1.1	3.1	0.6	0.02
Unknown Building 261	642.298	6232.715	0.8	0.2	1.1	3.1	0.6	0.02
Unknown Building 262	642.963	6232.725	0.7	0.2	1.1	3.2	0.6	0.02

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 263	621.923	6235.219	0.5	0.07	0.7	2.1	0.2	0.007
Unknown Building 264	621.936	6235.188	0.5	0.07	0.7	2.1	0.2	0.007
Unknown Building 265	621.979	6235.185	0.5	0.07	0.7	2.2	0.2	0.007
Unknown Building 266	625.563	6235.174	0.9	0.1	1.4	3.9	0.3	0.01
Unknown Building 267	625.767	6235.142	0.9	0.1	1.4	4.0	0.3	0.01
Unknown Building 268	627.442	6234.203	1.3	0.2	2.1	5.9	0.5	0.02
Unknown Building 269	626.401	6234.964	1.0	0.2	1.5	4.4	0.3	0.02
Unknown Building 270	626.381	6234.964	1.0	0.1	1.5	4.4	0.3	0.02
Unknown Building 271	626.452	6235.114	0.9	0.1	1.4	4.2	0.3	0.01
Unknown Building 272	626.453	6235.109	0.9	0.1	1.4	4.2	0.3	0.01
Unknown Building 273	626.630	6235.208	0.9	0.1	1.4	4.0	0.3	0.01
Unknown Building 274	626.467	6235.141	0.9	0.1	1.4	4.1	0.3	0.01
Unknown Building 275	626.461	6235.127	0.9	0.1	1.4	4.1	0.3	0.01
Unknown Building 276	626.495	6235.173	0.9	0.1	1.4	4.1	0.3	0.01
Unknown Building 277	626.425	6235.038	0.9	0.1	1.5	4.3	0.3	0.01
Unknown Building 278	621.996	6237.816	0.3	0.04	0.5	1.4	0.08	0.005
Unknown Building 279	622.012	6237.737	0.3	0.04	0.5	1.4	0.09	0.005
Unknown Building 280	622.051	6237.728	0.3	0.04	0.5	1.4	0.09	0.005
Unknown Building 281	622.041	6237.751	0.3	0.04	0.5	1.4	0.09	0.005
Unknown Building 282	622.038	6237.770	0.3	0.04	0.5	1.4	0.09	0.005
Unknown Building 283	622.001	6237.816	0.3	0.04	0.5	1.4	0.08	0.005
Unknown Building 284	622.656	6235.987	0.5	0.07	0.7	2.1	0.2	0.008
Unknown Building 285	625.996	6235.432	0.8	0.1	1.3	3.7	0.3	0.01
Unknown Building 286	625.963	6235.416	0.8	0.1	1.3	3.7	0.3	0.01
Unknown Building 287	625.953	6235.405	0.8	0.1	1.3	3.7	0.3	0.01

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.6 Maximum predicted concentrations of particulate matter with background at unknown buildings (in μg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 1	644.950	6225.018	16	5.1	27	30	5.8	0.8
Unknown Building 2	644.872	6225.507	16	5.1	27	30	5.8	0.8
Unknown Building 3	644.880	6225.504	16	5.1	27	30	5.8	0.8
Unknown Building 4	644.952	6225.002	16	5.1	27	30	5.8	0.8
Unknown Building 5	644.955	6224.971	16	5.1	27	30	5.8	0.8
Unknown Building 6	644.947	6224.943	16	5.1	27	30	5.8	0.8
Unknown Building 7	644.947	6224.925	16	5.1	27	30	5.8	0.8
Unknown Building 8	644.963	6224.933	16	5.1	27	30	5.8	0.8
Unknown Building 9	644.882	6225.060	16	5.1	27	30	5.8	0.8
Unknown Building 10	643.566	6225.463	16	5.1	28	31	5.9	0.8
Unknown Building 11	643.559	6225.463	16	5.1	28	31	5.9	0.8
Unknown Building 12	643.374	6225.135	16	5.1	28	31	5.9	0.8
Unknown Building 13	643.404	6225.133	16	5.1	28	31	5.9	0.8
Unknown Building 14	643.403	6225.138	16	5.1	28	31	5.9	0.8
Unknown Building 15	643.969	6223.120	15	5.1	27	28	5.7	0.8
Unknown Building 16	643.834	6224.638	16	5.1	28	30	5.8	0.8
Unknown Building 17	643.831	6224.618	16	5.1	28	30	5.8	0.8
Unknown Building 18	644.950	6225.063	16	5.1	27	30	5.8	0.8
Unknown Building 19	644.943	6225.062	16	5.1	27	30	5.8	0.8
Unknown Building 20	644.951	6225.052	16	5.1	27	30	5.8	0.8
Unknown Building 21	644.953	6225.057	16	5.1	27	30	5.8	0.8
Unknown Building 22	644.933	6225.059	16	5.1	27	30	5.8	0.8
Unknown Building 23	644.990	6224.918	16	5.1	27	30	5.8	0.8
Unknown Building 24	644.990	6224.939	16	5.1	27	30	5.8	0.8
Unknown Building 25	644.873	6225.014	16	5.1	27	30	5.8	0.8
Unknown Building 26	644.713	6224.856	16	5.1	27	30	5.8	0.8
Unknown Building 27	644.760	6224.826	16	5.1	27	30	5.8	0.8
Unknown Building 28	644.816	6224.832	16	5.1	27	30	5.8	0.8
Unknown Building 29	644.815	6224.853	16	5.1	27	30	5.8	0.8
Unknown Building 30	644.843	6224.892	16	5.1	27	30	5.8	0.8
Unknown Building 31	644.871	6224.825	16	5.1	27	30	5.8	0.8
Unknown Building 32	644.906	6224.940	16	5.1	27	30	5.8	0.8
Unknown Building 33	644.867	6224.969	16	5.1	27	30	5.8	0.8
Unknown Building 34	643.667	6225.359	16	5.1	28	31	5.9	0.8
Unknown Building 35	643.773	6225.267	16	5.1	28	30	5.9	0.8
Unknown Building 36	643.797	6225.227	16	5.1	28	30	5.9	0.8
Unknown Building 37	643.806	6225.168	16	5.1	28	30	5.9	0.8
Unknown Building 38	643.808	6225.162	16	5.1	28	30	5.9	0.8
Unknown Building 39	643.766	6225.177	16	5.1	28	30	5.9	0.8
Unknown Building 40	643.683	6225.204	16	5.1	28	30	5.9	0.8
Unknown Building 41	643.681	6225.221	16	5.1	28	30	5.9	0.8
Unknown Building 42	643.634	6225.271	16	5.1	28	31	5.9	0.8
Unknown Building 43	643.633	6225.252	16	5.1	28	31	5.9	0.8
Unknown Building 44	643.894	6223.384	16	5.1	27	29	5.7	0.8
Unknown Building 45	643.856	6223.461	16	5.1	27	29	5.7	0.8
Unknown Building 46	644.033	6223.096	15	5.1	27	28	5.7	0.8
Unknown Building 47	644.849	6225.100	16	5.1	27	30	5.8	0.8
Unknown Building 48	644.708	6225.309	16	5.1	28	30	5.8	0.8
Unknown Building 49	644.412	6224.131	16	5.1	27	29	5.7	0.8
Unknown Building 50	644.406	6224.149	16	5.1	27	29	5.7	0.8

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 51	643.639	6225.491	16	5.1	28	31	5.9	0.8
Unknown Building 52	643.623	6225.483	16	5.1	28	31	5.9	0.8
Unknown Building 53	643.691	6225.415	16	5.1	28	31	5.9	0.8
Unknown Building 54	643.709	6225.375	16	5.1	28	30	5.9	0.8
Unknown Building 55	643.700	6225.363	16	5.1	28	31	5.9	0.8
Unknown Building 56	643.664	6225.368	16	5.1	28	31	5.9	0.8
Unknown Building 57	642.358	6232.697	16	5.2	27	29	6.0	0.8
Unknown Building 58	642.370	6232.697	16	5.2	27	29	6.0	0.8
Unknown Building 59	641.707	6232.306	16	5.2	27	30	6.1	0.8
Unknown Building 60	641.716	6232.294	16	5.2	27	30	6.1	0.8
Unknown Building 61	639.639	6231.988	16	5.3	28	30	6.3	0.8
Unknown Building 62	639.669	6231.968	16	5.3	28	30	6.3	0.8
Unknown Building 63	641.692	6232.162	16	5.2	27	30	6.1	0.8
Unknown Building 64	639.724	6231.971	16	5.3	28	30	6.3	0.8
Unknown Building 65	641.692	6232.158	16	5.2	27	30	6.1	0.8
Unknown Building 66	642.008	6232.583	16	5.2	27	29	6.0	0.8
Unknown Building 67	639.730	6231.945	16	5.3	28	30	6.3	0.8
Unknown Building 68	641.731	6232.165	16	5.2	27	30	6.1	0.8
Unknown Building 69	641.983	6232.575	16	5.2	27	29	6.0	0.8
Unknown Building 70	639.694	6231.927	16.0	5.3	28	30	6.3	0.8
Unknown Building 71	641.719	6232.146	16	5.2	27	30	6.1	0.8
Unknown Building 72	641.977	6232.585	16	5.2	27	29	6.0	0.8
Unknown Building 73	641.745	6232.141	16	5.2	27	30	6.1	0.8
Unknown Building 74	641.764	6232.131	16	5.2	27	30	6.1	0.8
Unknown Building 75	641.939	6232.450	16	5.2	27	30	6.0	0.8
Unknown Building 76	641.800	6232.154	16	5.2	27	30	6.1	0.8
Unknown Building 77	641.817	6232.160	16	5.2	27	30	6.1	0.8
Unknown Building 78	641.827	6232.134	16	5.2	27	30	6.1	0.8
Unknown Building 79	641.220	6232.063	16	5.2	27	30	6.1	0.8
Unknown Building 80	641.784	6232.059	16	5.2	27	30	6.1	0.8
Unknown Building 81	641.219	6232.071	16	5.2	27	30	6.1	0.8
Unknown Building 82	641.751	6232.050	16	5.2	27	30	6.1	0.8
Unknown Building 83	641.219	6232.085	16	5.2	27	30	6.1	0.8
Unknown Building 84	641.208	6232.134	16	5.2	27	30	6.1	0.8
Unknown Building 85	641.842	6232.556	16	5.2	27	29	6.1	0.8
Unknown Building 86	641.200	6232.134	16	5.2	27	30	6.1	0.8
Unknown Building 87	641.242	6232.144	16	5.2	27	30	6.1	0.8
Unknown Building 88	641.273	6232.106	16	5.2	27	30	6.1	0.8
Unknown Building 89	641.267	6232.081	16	5.2	27	30	6.1	0.8
Unknown Building 90	641.350	6232.123	16	5.2	27	30	6.1	0.8
Unknown Building 91	641.913	6232.471	16	5.2	27	30	6.0	0.8
Unknown Building 92	641.360	6232.149	16	5.2	27	30	6.1	0.8
Unknown Building 93	641.339	6232.148	16	5.2	27	30	6.1	0.8
Unknown Building 94	641.334	6232.133	16	5.2	27	30	6.1	0.8
Unknown Building 95	641.329	6232.136	16	5.2	27	30	6.1	0.8
Unknown Building 96	641.319	6232.130	16	5.2	27	30	6.1	0.8
Unknown Building 97	641.716	6232.361	16	5.2	27	30	6.1	0.8
Unknown Building 98	641.726	6232.330	16	5.2	27	30	6.1	0.8
Unknown Building 99	642.420	6232.706	16	5.2	27	29	6.0	0.8
Unknown Building 100	641.719	6232.315	16	5.2	27	30	6.1	0.8
Unknown Building 101	642.414	6232.697	16	5.2	27	29	6.0	0.8
Unknown Building 102	641.708	6232.314	16	5.2	27	30	6.1	0.8
Unknown Building 103	641.729	6229.020	16	5.2	27	30	6.1	0.8

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 104	641.715	6229.015	16	5.2	27	30	6.1	0.8
Unknown Building 105	641.684	6229.037	16	5.2	27	30	6.1	0.8
Unknown Building 106	641.664	6229.052	16	5.2	27	30	6.1	0.8
Unknown Building 107	641.684	6229.050	16	5.2	27	30	6.1	0.8
Unknown Building 108	641.698	6229.109	16	5.2	27	30	6.1	0.8
Unknown Building 109	641.689	6228.896	16	5.2	27	30	6.1	0.8
Unknown Building 110	641.669	6228.915	16	5.2	27	30	6.1	0.8
Unknown Building 111	641.657	6228.840	16	5.2	27	30	6.1	0.8
Unknown Building 112	641.665	6228.834	16	5.2	27	30	6.1	0.8
Unknown Building 113	644.398	6226.367	16	5.1	27	30	5.8	0.8
Unknown Building 114	643.881	6226.485	16	5.1	28	30	5.9	0.8
Unknown Building 115	644.029	6226.070	16	5.1	28	30	5.9	0.8
Unknown Building 116	644.017	6226.086	16	5.1	28	30	5.9	0.8
Unknown Building 117	642.838	6226.416	16	5.2	28	30	6.0	0.8
Unknown Building 118	642.945	6226.433	16	5.2	28	30	6.0	0.8
Unknown Building 119	642.936	6226.428	16	5.2	28	30	6.0	0.8
Unknown Building 120	642.888	6226.854	16	5.2	28	30	6.0	0.8
Unknown Building 121	642.854	6226.949	16	5.2	28	30	6.0	0.8
Unknown Building 122	643.847	6226.177	16	5.1	28	30	5.9	0.8
Unknown Building 123	643.840	6226.157	16	5.1	28	30	5.9	0.8
Unknown Building 124	643.865	6226.164	16	5.1	28	30	5.9	0.8
Unknown Building 125	643.882	6226.134	16	5.1	28	30	5.9	0.8
Unknown Building 126	643.897	6226.107	16	5.1	28	30	5.9	0.8
Unknown Building 127	643.902	6226.101	16	5.1	28	30	5.9	0.8
Unknown Building 128	643.599	6226.038	16	5.1	28	30	5.9	0.8
Unknown Building 129	643.616	6226.337	16	5.1	28	30	5.9	0.8
Unknown Building 130	643.663	6226.211	16	5.1	28	30	5.9	0.8
Unknown Building 131	643.697	6226.185	16	5.1	28	30	5.9	0.8
Unknown Building 132	643.719	6226.149	16	5.1	28	30	5.9	0.8
Unknown Building 133	643.736	6226.142	16	5.1	28	30	5.9	0.8
Unknown Building 134	643.744	6226.087	16	5.1	28	30	5.9	0.8
Unknown Building 135	643.748	6226.078	16	5.1	28	30	5.9	0.8
Unknown Building 136	643.753	6226.063	16	5.1	28	30	5.9	0.8
Unknown Building 137	641.735	6229.039	16	5.2	27	30	6.1	0.8
Unknown Building 138	643.909	6226.161	16	5.1	28	30	5.9	0.8
Unknown Building 139	643.834	6226.210	16	5.1	28	30	5.9	0.8
Unknown Building 140	643.384	6226.373	16	5.1	28	30	5.9	0.8
Unknown Building 141	643.418	6226.364	16	5.1	28	30	5.9	0.8
Unknown Building 142	642.743	6226.973	16	5.2	28	30	6.0	0.8
Unknown Building 143	642.768	6226.982	16	5.2	28	30	6.0	0.8
Unknown Building 144	642.672	6226.501	16	5.2	28	30	6.0	0.8
Unknown Building 145	642.676	6226.447	16	5.2	28	30	6.0	0.8
Unknown Building 146	643.764	6226.139	16	5.1	28	30	5.9	0.8
Unknown Building 147	643.755	6226.147	16	5.1	28	30	5.9	0.8
Unknown Building 148	643.768	6226.152	16	5.1	28	30	5.9	0.8
Unknown Building 149	643.779	6226.166	16	5.1	28	30	5.9	0.8
Unknown Building 150	643.757	6226.160	16	5.1	28	30	5.9	0.8
Unknown Building 151	643.771	6226.180	16	5.1	28	30	5.9	0.8
Unknown Building 152	643.753	6226.187	16	5.1	28	30	5.9	0.8
Unknown Building 153	643.720	6226.203	16	5.1	28	30	5.9	0.8
Unknown Building 154	643.744	6226.210	16	5.1	28	30	5.9	0.8
Unknown Building 155	643.832	6226.175	16	5.1	28	30	5.9	0.8
Unknown Building 156	643.172	6226.037	16	5.2	28	31	5.9	0.8

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$ 24-hour	$PM_{2.5}$ Annual	PM_{10} 24-hour	TSP 24-hour	TSP Annual	Dustfall[(a)] 24-hour
Unknown Building 157	643.203	6225.978	16	5.1	28	31	5.9	0.8
Unknown Building 158	643.484	6226.166	16	5.1	28	30	5.9	0.8
Unknown Building 159	643.367	6226.160	16	5.1	28	30	5.9	0.8
Unknown Building 160	643.528	6226.061	16	5.1	28	30	5.9	0.8
Unknown Building 161	643.545	6226.046	16	5.1	28	30	5.9	0.8
Unknown Building 162	643.536	6226.004	16	5.1	28	30	5.9	0.8
Unknown Building 163	643.472	6226.157	16	5.1	28	30	5.9	0.8
Unknown Building 164	643.587	6226.050	16	5.1	28	30	5.9	0.8
Unknown Building 165	643.185	6226.306	16	5.2	28	30	5.9	0.8
Unknown Building 166	643.027	6226.363	16	5.2	28	30	6.0	0.8
Unknown Building 167	641.436	6228.659	16	5.2	27	30	6.1	0.8
Unknown Building 168	642.961	6226.254	16	5.2	28	30	6.0	0.8
Unknown Building 169	644.004	6226.153	16	5.1	28	30	5.9	0.8
Unknown Building 170	643.970	6226.198	16	5.1	28	30	5.9	0.8
Unknown Building 171	643.973	6226.201	16	5.1	28	30	5.9	0.8
Unknown Building 172	643.968	6226.204	16	5.1	28	30	5.9	0.8
Unknown Building 173	643.956	6226.214	16	5.1	28	30	5.9	0.8
Unknown Building 174	641.724	6227.960	16	5.2	28	30	6.1	0.8
Unknown Building 175	641.741	6227.953	16	5.2	28	30	6.1	0.8
Unknown Building 176	641.677	6228.058	16	5.2	28	30	6.1	0.8
Unknown Building 177	641.672	6228.099	16	5.2	28	30	6.1	0.8
Unknown Building 178	641.666	6228.095	16	5.2	28	30	6.1	0.8
Unknown Building 179	643.902	6226.128	16	5.1	28	30	5.9	0.8
Unknown Building 180	643.908	6226.118	16	5.1	28	30	5.9	0.8
Unknown Building 181	643.914	6226.110	16	5.1	28	30	5.9	0.8
Unknown Building 182	643.882	6226.168	16	5.1	28	30	5.9	0.8
Unknown Building 183	643.875	6226.180	16	5.1	28	30	5.9	0.8
Unknown Building 184	639.183	6227.195	16	5.3	28	32	6.3	0.8
Unknown Building 185	639.162	6227.197	16	5.3	28	32	6.3	0.8
Unknown Building 186	638.997	6227.336	16	5.3	28	32	6.3	0.8
Unknown Building 187	639.202	6227.203	16	5.3	28	32	6.3	0.8
Unknown Building 188	643.875	6226.185	16	5.1	28	30	5.9	0.8
Unknown Building 189	643.868	6226.221	16	5.1	28	30	5.9	0.8
Unknown Building 190	643.761	6226.051	16	5.1	28	30	5.9	0.8
Unknown Building 191	643.782	6226.058	16	5.1	28	30	5.9	0.8
Unknown Building 192	643.814	6226.081	16	5.1	28	30	5.9	0.8
Unknown Building 193	643.801	6226.090	16	5.1	28	30	5.9	0.8
Unknown Building 194	643.797	6226.103	16	5.1	28	30	5.9	0.8
Unknown Building 195	643.794	6226.117	16	5.1	28	30	5.9	0.8
Unknown Building 196	643.793	6226.138	16	5.1	28	30	5.9	0.8
Unknown Building 197	643.767	6226.128	16	5.1	28	30	5.9	0.8
Unknown Building 198	643.268	6226.302	16	5.1	28	30	5.9	0.8
Unknown Building 199	643.292	6226.276	16	5.1	28	30	5.9	0.8
Unknown Building 200	643.216	6226.347	16	5.2	28	30	5.9	0.8
Unknown Building 201	643.224	6226.078	16	5.1	28	30	5.9	0.8
Unknown Building 202	643.256	6226.097	16	5.1	28	30	5.9	0.8
Unknown Building 203	643.288	6226.117	16	5.1	28	30	5.9	0.8
Unknown Building 204	643.339	6226.147	16	5.1	28	30	5.9	0.8
Unknown Building 205	643.303	6226.155	16	5.1	28	30	5.9	0.8
Unknown Building 206	622.081	6236.050	15	5.1	27	28	5.5	0.8
Unknown Building 207	622.088	6235.938	15	5.1	27	28	5.5	0.8
Unknown Building 208	622.090	6235.975	15	5.1	27	28	5.5	0.8
Unknown Building 209	621.912	6235.742	15	5.1	27	28	5.5	0.8

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 210	622.223	6235.981	15	5.1	27	28	5.5	0.8
Unknown Building 211	622.240	6235.939	15	5.1	27	28	5.5	0.8
Unknown Building 212	643.342	6232.985	16	5.2	27	29	6.0	0.8
Unknown Building 213	642.375	6232.724	16	5.2	27	29	6.0	0.8
Unknown Building 214	642.401	6232.723	16	5.2	27	29	6.0	0.8
Unknown Building 215	643.329	6233.006	16	5.2	27	29	6.0	0.8
Unknown Building 216	642.416	6232.748	16	5.2	27	29	6.0	0.8
Unknown Building 217	643.334	6233.011	16	5.2	27	29	6.0	0.8
Unknown Building 218	642.409	6232.755	16	5.2	27	29	6.0	0.8
Unknown Building 219	643.338	6233.028	16	5.2	27	29	6.0	0.8
Unknown Building 220	642.398	6232.749	16	5.2	27	29	6.0	0.8
Unknown Building 221	643.335	6233.152	16	5.2	27	29	6.0	0.8
Unknown Building 222	642.392	6232.749	16	5.2	27	29	6.0	0.8
Unknown Building 223	643.308	6233.164	16	5.2	27	29	6.0	0.8
Unknown Building 224	642.368	6232.771	16	5.2	27	29	6.0	0.8
Unknown Building 225	643.304	6233.215	16	5.2	27	29	6.0	0.8
Unknown Building 226	642.409	6232.760	16	5.2	27	29	6.0	0.8
Unknown Building 227	643.336	6233.207	16	5.2	27	29	6.0	0.8
Unknown Building 228	643.314	6233.263	16	5.2	27	29	6.0	0.8
Unknown Building 229	626.029	6235.450	16	5.1	27	30	5.7	0.8
Unknown Building 230	643.303	6233.282	16	5.2	27	29	6.0	0.8
Unknown Building 231	643.334	6233.306	16	5.2	27	29	6.0	0.8
Unknown Building 232	643.313	6233.331	16	5.2	27	29	6.0	0.8
Unknown Building 233	643.300	6233.326	16	5.2	27	29	6.0	0.8
Unknown Building 234	643.203	6233.002	16	5.2	27	29	6.0	0.8
Unknown Building 235	643.196	6232.991	16	5.2	27	29	6.0	0.8
Unknown Building 236	643.246	6232.984	16	5.2	27	29	6.0	0.8
Unknown Building 237	643.191	6232.960	16	5.2	27	29	6.0	0.8
Unknown Building 238	643.239	6232.950	16	5.2	27	29	6.0	0.8
Unknown Building 239	643.231	6232.911	16	5.2	27	29	6.0	0.8
Unknown Building 240	646.432	6233.677	15	5.1	27	28	5.7	0.8
Unknown Building 241	646.501	6233.734	15	5.1	27	28	5.7	0.8
Unknown Building 242	626.927	6234.611	16	5.2	28	31	5.8	0.8
Unknown Building 243	643.244	6232.893	16	5.2	27	29	6.0	0.8
Unknown Building 244	643.200	6232.869	16	5.2	27	29	6.0	0.8
Unknown Building 245	646.378	6233.687	15	5.1	27	28	5.8	0.8
Unknown Building 246	643.189	6232.851	16	5.2	27	29	6.0	0.8
Unknown Building 247	646.378	6233.691	15	5.1	27	28	5.8	0.8
Unknown Building 248	643.204	6232.854	16	5.2	27	29	6.0	0.8
Unknown Building 249	646.354	6233.688	15	5.1	27	28	5.8	0.8
Unknown Building 250	643.219	6232.853	16	5.2	27	29	6.0	0.8
Unknown Building 251	646.357	6233.709	15	5.1	27	28	5.8	0.8
Unknown Building 252	643.238	6232.844	16	5.2	27	29	6.0	0.8
Unknown Building 253	643.016	6232.721	16	5.2	27	29	6.0	0.8
Unknown Building 254	643.326	6232.944	16	5.2	27	29	6.0	0.8
Unknown Building 255	643.315	6232.981	16	5.2	27	29	6.0	0.8
Unknown Building 256	642.409	6232.764	16	5.2	27	29	6.0	0.8
Unknown Building 257	642.409	6232.768	16	5.2	27	29	6.0	0.8
Unknown Building 258	642.434	6232.773	16	5.2	27	29	6.0	0.8
Unknown Building 259	642.331	6232.741	16	5.2	27	29	6.0	0.8
Unknown Building 260	642.316	6232.728	16	5.2	27	29	6.0	0.8
Unknown Building 261	642.298	6232.715	16	5.2	27	29	6.0	0.8
Unknown Building 262	642.963	6232.725	16	5.2	27	29	6.0	0.8

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Unknown Building 263	621.923	6235.219	15	5.1	27	28	5.6	0.8
Unknown Building 264	621.936	6235.188	15	5.1	27	28	5.6	0.8
Unknown Building 265	621.979	6235.185	15	5.1	27	28	5.6	0.8
Unknown Building 266	625.563	6235.174	16	5.1	28	30	5.7	0.8
Unknown Building 267	625.767	6235.142	16	5.1	28	30	5.7	0.8
Unknown Building 268	627.442	6234.203	16	5.2	28	32	5.9	0.8
Unknown Building 269	626.401	6234.964	16	5.1	28	31	5.7	0.8
Unknown Building 270	626.381	6234.964	16	5.1	28	31	5.7	0.8
Unknown Building 271	626.452	6235.114	16	5.1	28	30	5.7	0.8
Unknown Building 272	626.453	6235.109	16	5.1	28	30	5.7	0.8
Unknown Building 273	626.630	6235.208	16	5.1	28	30	5.7	0.8
Unknown Building 274	626.467	6235.141	16	5.1	28	30	5.7	0.8
Unknown Building 275	626.461	6235.127	16	5.1	28	30	5.7	0.8
Unknown Building 276	626.495	6235.173	16	5.1	28	30	5.7	0.8
Unknown Building 277	626.425	6235.038	16	5.1	28	30	5.7	0.8
Unknown Building 278	621.996	6237.816	15	5.0	27	28	5.5	0.8
Unknown Building 279	622.012	6237.737	15	5.0	27	28	5.5	0.8
Unknown Building 280	622.051	6237.728	15	5.0	27	28	5.5	0.8
Unknown Building 281	622.041	6237.751	15	5.0	27	28	5.5	0.8
Unknown Building 282	622.038	6237.770	15	5.0	27	28	5.5	0.8
Unknown Building 283	622.001	6237.816	15	5.0	27	28	5.5	0.8
Unknown Building 284	622.656	6235.987	15	5.1	27	28	5.6	0.8
Unknown Building 285	625.996	6235.432	16	5.1	27	30	5.7	0.8
Unknown Building 286	625.963	6235.416	16	5.1	27	30	5.7	0.8
Unknown Building 287	625.953	6235.405	16	5.1	27	30	5.7	0.8

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.7 Maximum predicted concentrations of particulate matter without background at schools (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Aboriginal Education Center	633.609	6235.391	1.3	0.2	3.1	9.3	0.7	0.03
Alwin Holland	633.853	6236.278	1.1	0.2	2.3	6.8	0.5	0.02
Baldonnel Elementary	642.961	6232.724	0.7	0.2	1.1	3.2	0.6	0.02
Bert Ambrose Elementary	633.698	6237.244	0.8	0.1	1.3	3.9	0.3	0.01
Bert Bowes Middle School	632.695	6235.420	1.3	0.2	1.9	5.9	0.6	0.02
Board Office	633.204	6236.129	1.1	0.2	1.6	4.9	0.5	0.02
Charlie Lake Elementary	626.866	6238.375	0.6	0.1	0.8	2.7	0.2	0.01
CM Finch Elementary	632.665	6236.509	0.9	0.1	1.5	4.5	0.4	0.02
Dr. Kearney Middle School	634.341	6236.419	0.9	0.2	2.7	8.0	0.5	0.02
Duncan Cran Elementary	635.468	6234.477	1.5	0.3	2.8	8.2	1.3	0.04
Ecole Central Elementary	633.100	6235.426	1.4	0.2	2.2	6.4	0.6	0.03
Facilities & Transportation	632.721	6235.227	1.5	0.2	2.1	6.2	0.7	0.03
Key Learning Centre	632.856	6235.390	1.4	0.2	2.0	5.8	0.6	0.02
North Peace Secondary	634.926	6234.932	1.3	0.3	2.5	7.5	1.1	0.04
Energetic Learning Campus	634.926	6234.932	1.3	0.3	2.5	7.5	1.1	0.04
Northern BC Distance Education	632.856	6235.390	1.4	0.2	2.0	5.8	0.6	0.02
Open Learning	632.856	6235.390	1.4	0.2	2.0	5.8	0.6	0.02
Robert Ogilvie Elementary	635.074	6235.572	1.1	0.2	1.8	5.3	0.8	0.03
Student Support Services	633.204	6236.129	1.1	0.2	1.6	4.9	0.5	0.02
Taylor Elementary	643.346	6227.033	0.8	0.2	1.4	3.7	0.5	0.02
Technology Services	633.204	6236.129	1.1	0.2	1.6	4.9	0.5	0.02
Upper Halfway Elementary	633.204	6236.129	1.1	0.2	1.6	4.9	0.5	0.02
Wonowon Elementary	633.204	6236.129	1.1	0.2	1.6	4.9	0.5	0.02

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.8 Maximum predicted concentrations of particulate matter with background at schools (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Aboriginal Education Center	633.609	6235.391	16	5.2	29	35	6.1	0.8
Alwin Holland	633.853	6236.278	16	5.2	28	33	5.9	0.8
Baldonnel Elementary	642.961	6232.724	16	5.2	27	29	6.0	0.8
Bert Ambrose Elementary	633.698	6237.244	16	5.1	28	30	5.7	0.8
Bert Bowes Middle School	632.695	6235.420	16	5.2	28	32	6.0	0.8
Board Office	633.204	6236.129	16	5.2	28	31	5.8	0.8
Charlie Lake Elementary	626.866	6238.375	16	5.1	27	29	5.6	0.8
CM Finch Elementary	632.665	6236.509	16	5.1	28	31	5.8	0.8
Dr. Kearney Middle School	634.341	6236.419	16	5.2	29	34	5.9	0.8
Duncan Cran Elementary	635.468	6234.477	16	5.3	29	34	6.7	0.8
Ecole Central Elementary	633.100	6235.426	16	5.2	28	33	6.0	0.8
Facilities & Transportation	632.721	6235.227	16	5.2	28	32	6.1	0.8
Key Learning Centre	632.856	6235.390	16	5.2	28	32	6.0	0.8
North Peace Secondary	634.926	6234.932	16	5.3	29	34	6.5	0.8
Energetic Learning Campus	634.926	6234.932	16	5.3	29	34	6.5	0.8
Northern BC Distance Education	632.856	6235.390	16	5.2	28	32	6.0	0.8
Open Learning	632.856	6235.390	16	5.2	28	32	6.0	0.8
Robert Ogilvie Elementary	635.074	6235.572	16	5.2	28	32	6.2	0.8
Student Support Services	633.204	6236.129	16	5.2	28	31	5.8	0.8
Taylor Elementary	643.346	6227.033	16	5.2	28	30	5.9	0.8
Technology Services	633.204	6236.129	16	5.2	28	31	5.8	0.8
Upper Halfway Elementary	633.204	6236.129	16	5.2	28	31	5.8	0.8
Wonowon Elementary	633.204	6236.129	16	5.2	28	31	5.8	0.8

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.9 Maximum predicted concentrations of particulate matter without background at child care facilities (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Chunkey Monkey Daycare	634.736	6235.411	1.3	0.23	2.0	6.0	0.8	0.03
Oscare Daycare/Oscare Tots	632.978	6235.501	1.3	0.21	2.0	5.7	0.6	0.02
The Zoo Daycare	634.054	6236.232	1.0	0.2	2.6	7.8	0.5	0.02
Little Kritters Daycare	624.101	6239.158	0.3	0.05	0.5	1.6	0.1	0.005
ABC & 123 Family Daycare	635.818	6234.246	1.4	0.3	3.0	8.9	1.4	0.0
Baby Bear Daycare	634.940	6234.929	1.3	0.3	2.5	7.5	1.1	0.04
Rascals	626.867	6238.356	0.6	0.08	0.8	2.8	0.2	0.01
Building Blocks Daycare	632.341	6235.672	1.2	0.2	1.8	5.4	0.5	0.02
Kidz Club	635.485	6234.438	1.5	0.3	2.9	8.4	1.3	0.04
Northern Lights College Daycare	632.978	6235.501	1.3	0.2	2.0	5.7	0.6	0.02
Little Bear Family Daycare	634.746	6235.411	1.3	0.2	2.0	5.9	0.8	0.03
Little Peanuts Family Daycare	636.173	6234.279	1.3	0.3	2.8	8.3	1.3	0.04
Little Pigs Family Daycare	633.130	6236.459	1.0	0.2	1.5	4.6	0.4	0.02
Nanny Norma’s Daycare	633.845	6237.086	0.9	0.1	1.5	4.3	0.3	0.02
Pitter Patter Day Care	635.907	6234.821	1.3	0.3	2.5	7.2	1.1	0.04
Puddle Jumpers	633.845	6237.086	0.9	0.1	1.5	4.3	0.3	0.02
Seeds to Sow	634.341	6235.509	1.2	0.2	2.7	8.1	0.7	0.03
The Playground Family Daycare	635.666	6234.938	1.2	0.3	2.5	7.4	1.0	0.03
The Wiggles and Giggles Daycare	632.583	6235.781	1.2	0.2	1.8	5.3	0.5	0.02
TJ’s Playhouse	634.310	6235.425	1.2	0.2	2.7	8.1	0.8	0.03
Tot’s and Tikes Family Daycare	633.117	6236.197	1.0	0.2	1.6	4.8	0.4	0.02
The Stepping Stones Centre	635.815	6235.192	1.2	0.2	2.3	7.0	0.9	0.03
Aboriginal Head Start	633.003	6235.697	1.2	0.2	1.8	5.4	0.5	0.02
Child Development Centre	632.929	6236.112	1.1	0.2	1.6	4.9	0.4	0.02
Keeginaw Pre-School	633.173	6235.032	1.6	0.3	3.0	8.8	0.8	0.03
Totem Pre-School	635.236	6235.541	1.1	0.2	1.9	5.6	0.8	0.03
Rise and Shine Clubhouse	635.020	6235.584	1.2	0.2	1.8	5.4	0.8	0.03
Barney and Friends Family Daycare	643.482	6226.539	0.8	0.2	1.4	3.7	0.5	0.02
Hudson's Hope Playschool	643.946	6225.250	0.7	0.1	1.5	4.1	0.4	0.02

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm²-d.

Table G.10 Maximum predicted concentrations of particulate matter with background at child care facilities (in μg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Chunkey Monkey Daycare	634.736	6235.411	16	5.2	28	32	6.2	0.8
Oscare Daycare/Oscare Tots	632.978	6235.501	16	5.2	28	32	6.0	0.8
The Zoo Daycare	634.054	6236.232	16	5.2	29	34	5.9	0.8
Little Kritters Daycare	624.101	6239.158	15	5.0	27	28	5.5	0.8
ABC & 123 Family Daycare	635.818	6234.246	16	5.3	29	35	6.8	0.8
Baby Bear Daycare	634.940	6234.929	16	5.3	29	34	6.5	0.8
Rascals	626.867	6238.356	16	5.1	27	29	5.6	0.8
Building Blocks Daycare	632.341	6235.672	16	5.2	28	32	5.9	0.8
Kidz Club	635.485	6234.438	16	5.3	29	35	6.7	0.8
Northern Lights College Daycare	632.978	6235.501	16	5.2	28	32	6.0	0.8
Little Bear Family Daycare	634.746	6235.411	16	5.2	28	32	6.2	0.8
Little Peanuts Family Daycare	636.173	6234.279	16	5.3	29	35	6.7	0.8
Little Pigs Family Daycare	633.130	6236.459	16	5.1	28	31	5.8	0.8
Nanny Norma’s Daycare	633.845	6237.086	16	5.1	28	31	5.7	0.8
Pitter Patter Day Care	635.907	6234.821	16	5.3	29	33	6.5	0.8
Puddle Jumpers	633.845	6237.086	16	5.1	28	31	5.7	0.8
Seeds to Sow	634.341	6235.509	16	5.2	29	34	6.1	0.8
The Playground Family Daycare	635.666	6234.938	16	5.3	29	34	6.4	0.8
The Wiggles and Giggles Daycare	632.583	6235.781	16	5.2	28	31	5.9	0.8
TJ’s Playhouse	634.310	6235.425	16	5.2	29	34	6.2	0.8
Tot’s and Tikes Family Daycare	633.117	6236.197	16	5.2	28	31	5.8	0.8
The Stepping Stones Centre	635.815	6235.192	16	5.2	29	33	6.3	0.8
Aboriginal Head Start	633.003	6235.697	16	5.2	28	32	5.9	0.8
Child Development Centre	632.929	6236.112	16	5.2	28	31	5.8	0.8
Keeginaw Pre-School	633.173	6235.032	17	5.3	29	35	6.2	0.8
Totem Pre-School	635.236	6235.541	16	5.2	28	32	6.2	0.8
Rise and Shine Clubhouse	635.020	6235.584	16	5.2	28	32	6.2	0.8
Barney and Friends Family Daycare	643.482	6226.539	16	5.1	28	30	5.9	0.8
Hudson's Hope Playschool	643.946	6225.250	16	5.1	28	30	5.8	0.8

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.11 Maximum predicted concentrations of particulate matter without background at health care facilities (in μg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Fort St John Hospital and Health Care	633.715	6235.551	1.2	0.2	3.0	9.0	0.7	0.03
Fort St John Medical Clinic	633.889	6235.722	1.1	0.2	3.0	9.0	0.6	0.03
Fort St John Pharmacy and Wellness Centre	633.623	6235.735	1.2	0.2	2.6	7.8	0.6	0.02
The Taylor Medical Clinic	643.866	6225.592	0.71	0.1	1.5	4.2	0.5	0.02
ABC Medical Clinic	633.516	6235.725	1.2	0.2	2.5	7.2	0.6	0.02
North Peace Medical Clinic	633.554	6235.725	1.2	0.2	2.5	7.4	0.6	0.02

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.12 Maximum predicted concentrations of particulate matter with background at health care facilities (in μg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Fort St John Hospital and Health Care	633.715	6235.551	16	5.2	29	35	6.1	0.8
Fort St John Medical Clinic	633.889	6235.722	16	5.2	29	35	6.0	0.8
Fort St John Pharmacy and Wellness Centre	633.623	6235.735	16	5.2	29	34	6.0	0.8
The Taylor Medical Clinic	643.866	6225.592	16	5.1	28	30	5.9	0.8
ABC Medical Clinic	633.516	6235.725	16	5.2	29	33	6.0	0.8
North Peace Medical Clinic	633.554	6235.725	16	5.2	29	34	6.0	0.8

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm^2-d.

Table G.13 Maximum predicted concentrations of particulate matter without background at senior care facilities (in μg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Heritage Manor III	633.568	6236.327	1.1	0.2	1.8	5.3	0.4	0.02
Peace Lutheran Apt #1,	633.439	6236.439	1.0	0.2	1.5	4.6	0.4	0.02
Peace Lutheran Apt #2,	633.517	6236.442	1.0	0.2	1.6	4.8	0.4	0.02
The Sunset Home	633.588	6236.708	0.9	0.1	1.5	4.4	0.4	0.02
North Peace Care Centre	633.381	6236.534	1.0	0.2	1.5	4.5	0.4	0.02
Abbeyfield Houses of Fort St. John	635.602	6235.204	1.2	0.2	2.3	7.1	0.9	0.03
New Senior Housing	633.553	6236.243	1.1	0.2	1.9	5.5	0.5	0.02

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm²-d.

Table G.14 Maximum predicted concentrations of particulate matter with background at senior care facilities (in μg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	$PM_{2.5}$		PM_{10}	TSP		Dustfall[(a)]
			24-hour	Annual	24-hour	24-hour	Annual	24-hour
Heritage Manor III	633.568	6236.327	16	5.2	28	31	5.8	0.8
Peace Lutheran Apt #1,	633.439	6236.439	16	5.2	28	31	5.8	0.8
Peace Lutheran Apt #2,	633.517	6236.442	16	5.2	28	31	5.8	0.8
The Sunset Home	633.588	6236.708	16	5.1	28	31	5.8	0.8
North Peace Care Centre	633.381	6236.534	16	5.1	28	31	5.8	0.8
Abbeyfield Houses of Fort St. John	635.602	6235.204	16	5.2	29	33	6.3	0.8
New Senior Housing	633.553	6236.243	16	5.2	28	32	5.8	0.8

NOTE:

(a) 24-hour average based on worst-case 30-day period; units in mg/dm²-d.

Table G.15 Maximum predicted concentrations of NO_2 and SO_2 at ground-truthed residences (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	NO_2			SO_2		
			1-Hour	24-Hour	Annual	1-Hour	24-Hour	Annual
Residence 1	630.981	6232.372	158	33	3.8	2.6	0.2	0.02
Residence 2	630.756	6232.335	160	34	4.2	2.4	0.2	0.02
Residence 3	630.717	6232.314	160	34	4.8	2.3	0.2	0.03
Residence 4	630.581	6232.296	160	34	4.1	2.0	0.2	0.02
Residence 5	630.552	6232.296	160	34	4.3	2.1	0.2	0.02
Residence 6	630.247	6232.403	153	26	2.8	2.2	0.2	0.01
Residence 7	634.997	6230.486	136	21	3.4	0.7	0.1	0.01
Residence 8	634.862	6230.523	139	21	3.5	0.8	0.1	0.01
Residence 9	635.041	6230.506	135	20	3.4	0.7	0.1	0.01
Residence 10	635.124	6230.508	134	20	3.3	0.7	0.1	0.01
Residence 11	634.535	6230.703	141	23	3.5	0.8	0.10	0.01
Residence 12	634.579	6230.785	141	23	3.4	0.8	0.09	0.01
Residence 13	634.743	6230.833	141	22	3.2	0.9	0.08	0.01
Residence 14	634.840	6230.765	141	22	3.3	0.9	0.09	0.01
Residence 15	634.898	6230.703	141	21	3.3	0.9	0.10	0.01
Residence 16	634.982	6230.627	139	21	3.3	0.8	0.1	0.01
Residence 17	635.045	6230.755	141	21	3.2	0.8	0.09	0.01
Residence 18	635.042	6230.725	140	21	3.2	0.8	0.09	0.01
Residence 19	635.072	6230.654	138	21	3.2	0.8	0.10	0.01
Residence 20	635.123	6230.659	138	20	3.2	0.7	0.10	0.01
Residence 21	635.138	6230.587	136	20	3.3	0.7	0.1	0.01
Residence 22	630.252	6232.596	151	22	2.3	1.7	0.2	0.009
Residence 23	633.547	6231.980	147	31	3.6	1.3	0.1	0.01
Residence 24	633.549	6232.516	144	26	3.1	1.5	0.1	0.01
Residence 25	633.590	6232.546	144	25	3.0	1.5	0.1	0.01
Residence 26	633.545	6231.881	147	32	3.7	1.4	0.1	0.01
Residence 27	633.547	6231.893	147	32	3.7	1.4	0.1	0.01
Residence 28	634.090	6232.671	143	24	2.8	1.4	0.1	0.01
Residence 29	634.047	6232.473	144	26	3.0	1.5	0.1	0.01
Residence 30	634.132	6232.501	144	25	3.0	1.5	0.1	0.01
Residence 31	633.822	6232.438	146	27	3.1	1.6	0.1	0.01
Residence 32	633.703	6232.241	146	29	3.3	1.6	0.1	0.01
Residence 33	633.970	6232.454	144	26	3.0	1.5	0.1	0.01
Residence 34	632.469	6230.313	149	38	7.0	2.3	0.2	0.02
Residence 35	632.227	6231.391	154	42	6.3	2.8	0.2	0.03
Residence 36	630.438	6232.091	164	37	3.9	2.7	0.2	0.02
Residence 37	631.858	6231.027	170	44	8.2	3.3	0.3	0.03
Residence 38	631.693	6231.612	161	44	7.0	3.0	0.4	0.03
Residence 39	633.385	6231.479	150	35	4.4	1.7	0.1	0.02
Residence 40	634.217	6230.914	143	25	3.6	0.9	0.09	0.01
Residence 41	635.205	6230.478	132	20	3.3	0.7	0.1	0.01
Residence 42	634.888	6230.495	138	21	3.5	0.8	0.1	0.01
Residence 43	631.729	6232.627	150	27	3.4	2.0	0.2	0.01
Residence 44	631.892	6232.432	150	32	4.0	2.3	0.2	0.02
Residence 45	632.827	6232.458	145	27	3.5	1.6	0.2	0.01
Residence 46	633.108	6232.423	146	28	3.4	1.5	0.2	0.01
Residence 47	633.417	6232.513	145	26	3.1	1.4	0.1	0.01
Residence 48	630.233	6232.814	148	19	2.0	1.4	0.1	0.008
Residence 49	630.237	6232.750	149	20	2.0	1.5	0.1	0.008
Residence 50	630.223	6232.954	147	17	1.8	1.3	0.1	0.007
Residence 51	630.236	6232.907	147	18	1.8	1.3	0.1	0.007

Residence 52	633.410	6233.370	114	21	2.2	1.0	0.1	0.008
Residence 53	633.348	6233.331	147	22	2.4	1.0	0.1	0.009
Residence 54	634.909	6233.462	127	18	1.9	1.2	0.07	0.007
Residence 55	634.900	6233.602	122	18	1.8	1.2	0.07	0.007
Residence 56	635.348	6233.713	117	16	1.7	0.76	0.06	0.007
Residence 57	629.555	6232.927	148	15	1.6	1.4	0.1	0.007
Residence 58	629.316	6232.906	148	16	1.6	1.4	0.1	0.007
Residence 59	629.323	6232.964	147	16	1.6	1.3	0.1	0.007
Residence 60	630.449	6232.305	159	33	4.4	2.2	0.2	0.02
Residence 61	635.088	6230.518	135	20	3.3	0.7	0.11	0.01
Residence 62	634.706	6230.715	141	22	3.3	0.8	0.09	0.01
Residence 63	634.632	6230.798	141	23	3.3	0.8	0.09	0.01
Residence 64	634.537	6230.925	142	23	3.4	0.8	0.08	0.01
Residence 65	634.738	6230.939	141	22	3.2	0.9	0.08	0.01
Residence 66	634.844	6230.924	141	22	3.2	1.0	0.08	0.01
Residence 67	634.799	6230.766	141	22	3.3	0.9	0.09	0.01
Residence 68	634.815	6230.761	141	22	3.3	0.9	0.09	0.01
Residence 69	634.889	6230.773	141	22	3.2	0.9	0.09	0.01
Residence 70	634.915	6230.769	141	21	3.2	0.8	0.09	0.01
Residence 71	634.844	6230.703	141	22	3.3	0.9	0.10	0.01
Residence 72	634.828	6230.713	141	22	3.3	0.9	0.10	0.01
Residence 73	634.951	6230.718	141	21	3.3	0.8	0.09	0.01
Residence 74	634.947	6230.768	141	21	3.2	0.8	0.09	0.01
Residence 75	635.008	6230.765	141	21	3.2	0.8	0.09	0.01
Residence 76	634.993	6230.715	141	21	3.2	0.8	0.09	0.01
Residence 77	635.076	6230.717	140	21	3.2	0.8	0.09	0.01
Residence 78	635.096	6230.718	139	21	3.2	0.8	0.09	0.01
Residence 79	635.089	6230.604	137	20	3.3	0.7	0.1	0.01
Residence 80	630.237	6232.630	150	22	2.2	1.6	0.2	0.009
Residence 81	628.453	6232.604	146	22	1.8	1.6	0.2	0.008
Residence 82	633.190	6230.482	147	31	5.0	1.3	0.1	0.02
Residence 83	633.355	6230.925	147	30	4.4	1.2	0.1	0.02
Residence 84	633.569	6230.686	145	28	4.3	1.0	0.1	0.01
Residence 85	635.202	6230.516	133	20	3.3	0.7	0.1	0.01
Residence 86	633.165	6232.660	143	24	3.0	1.4	0.2	0.01
Residence 87	630.279	6232.963	147	17	1.8	1.2	0.1	0.007

Table G.16 Maximum predicted concentrations of NO_2 and SO_2 at ground-truthed non-residences (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	NO_2			SO_2		
			1-hour	24-hour	Annual	1-hour	24-hour	Annual
Non-residence 1	630.709	6228.334	182	49	23	4.4	0.5	0.06
Non-residence 2	630.724	6228.349	182	49	24	4.5	0.5	0.06
Non-residence 3	631.896	6230.979	182	43	8.4	3.2	0.3	0.03
Non-residence 4	630.996	6232.371	158	33	3.8	2.6	0.2	0.02
Non-residence 5	630.784	6232.310	160	36	5.0	2.5	0.2	0.03
Non-residence 6	630.699	6232.333	160	34	4.1	2.2	0.2	0.02
Non-residence 7	630.658	6232.313	160	34	5.8	2.2	0.2	0.04
Non-residence 8	630.599	6232.308	160	34	4.5	2.0	0.2	0.02
Non-residence 9	630.325	6232.338	156	29	3.5	2.3	0.2	0.02
Non-residence 10	630.351	6232.358	156	29	3.3	2.2	0.2	0.02
Non-residence 11	630.361	6232.357	156	29	3.3	2.2	0.2	0.02
Non-residence 12	630.319	6232.360	155	28	3.2	2.2	0.2	0.02
Non-residence 13	630.328	6232.360	155	29	3.2	2.2	0.2	0.02
Non-residence 14	630.302	6232.348	155	28	3.3	2.3	0.2	0.02
Non-residence 15	630.246	6232.343	154	27	3.2	2.4	0.2	0.02
Non-residence 16	630.255	6232.364	154	27	3.0	2.3	0.2	0.01
Non-residence 17	630.255	6232.349	154	27	3.1	2.3	0.2	0.02
Non-residence 18	630.896	6232.415	158	32	3.4	2.4	0.2	0.02
Non-residence 19	630.888	6232.417	158	32	3.4	2.4	0.2	0.02
Non-residence 20	630.895	6232.422	158	32	3.4	2.4	0.2	0.02
Non-residence 21	630.528	6232.328	159	32	3.9	2.1	0.2	0.02
Non-residence 22	630.527	6232.347	158	32	3.5	2.0	0.2	0.02
Non-residence 23	630.499	6232.316	159	32	4.4	2.1	0.2	0.02
Non-residence 24	630.473	6232.305	159	33	4.7	2.2	0.2	0.03
Non-residence 25	630.447	6232.321	158	31	4.2	2.2	0.2	0.02
Non-residence 26	630.301	6232.359	155	28	3.2	2.3	0.2	0.02
Non-residence 27	630.282	6232.385	154	27	2.9	2.2	0.2	0.01
Non-residence 28	630.933	6232.456	158	31	3.3	2.4	0.2	0.01
Non-residence 29	630.771	6232.361	159	33	3.7	2.3	0.2	0.02
Non-residence 30	635.021	6230.444	134	20	3.4	0.7	0.1	0.01
Non-residence 31	635.133	6230.463	133	20	3.3	0.7	0.1	0.01
Non-residence 32	634.933	6230.465	137	21	3.5	0.8	0.1	0.01
Non-residence 33	634.669	6230.722	141	22	3.4	0.8	0.09	0.01
Non-residence 34	634.373	6230.747	142	24	3.6	0.8	0.09	0.01
Non-residence 35	634.381	6230.741	142	24	3.6	0.8	0.09	0.01
Non-residence 36	634.454	6230.786	142	24	3.5	0.8	0.09	0.01
Non-residence 37	634.721	6230.824	141	22	3.2	0.9	0.08	0.01
Non-residence 38	634.904	6230.735	141	21	3.3	0.9	0.09	0.01
Non-residence 39	634.976	6230.724	141	21	3.2	0.8	0.09	0.01
Non-residence 40	634.975	6230.734	141	21	3.2	0.8	0.09	0.01
Non-residence 41	635.079	6230.582	136	20	3.3	0.7	0.1	0.01
Non-residence 42	634.982	6230.433	134	20	3.4	0.7	0.1	0.01
Non-residence 43	634.986	6230.434	134	20	3.4	0.7	0.1	0.01
Non-residence 44	634.990	6230.433	134	20	3.4	0.7	0.1	0.01
Non-residence 45	635.064	6230.733	140	21	3.2	0.8	0.09	0.01
Non-residence 46	635.559	6230.553	126	18	3.0	0.6	0.10	0.01
Non-residence 47	630.266	6232.703	149	21	2.1	1.5	0.1	0.009
Non-residence 48	630.244	6232.580	151	23	2.3	1.7	0.2	0.01
Non-residence 49	630.299	6232.482	152	25	2.6	1.9	0.2	0.01
Non-residence 50	633.556	6232.393	145	27	3.2	1.5	0.1	0.01
Non-residence 51	633.672	6232.107	146	30	3.4	1.5	0.2	0.01

Non-residence 52	633.541	6231.953	147	32	3.7	1.3	0.1	0.01
Non-residence 53	633.535	6231.964	147	32	3.7	1.3	0.1	0.01
Non-residence 54	631.988	6226.324	146	25	3.2	1.3	0.1	0.009
Non-residence 55	633.707	6232.186	146	29	3.4	1.6	0.2	0.01
Non-residence 56	634.245	6232.454	143	25	3.0	1.4	0.1	0.01
Non-residence 57	634.231	6232.707	142	23	2.8	1.3	0.1	0.01
Non-residence 58	634.232	6232.711	142	23	2.8	1.3	0.1	0.01
Non-residence 59	633.703	6232.491	145	26	3.1	1.5	0.1	0.01
Non-residence 60	633.718	6232.487	145	26	3.1	1.5	0.1	0.01
Non-residence 61	634.013	6232.543	144	25	2.9	1.5	0.1	0.01
Non-residence 62	634.065	6232.496	144	25	3.0	1.5	0.1	0.01
Non-residence 63	636.582	6232.572	120	17	1.8	0.3	0.04	0.006
Non-residence 64	634.044	6232.415	144	26	3.0	1.5	0.1	0.01
Non-residence 65	636.569	6232.484	121	17	1.8	0.4	0.04	0.006
Non-residence 66	634.109	6232.491	144	25	3.0	1.5	0.1	0.01
Non-residence 67	636.664	6232.507	119	17	1.8	0.3	0.04	0.006
Non-residence 68	634.117	6232.506	144	25	3.0	1.5	0.1	0.01
Non-residence 69	634.130	6232.514	144	25	3.0	1.5	0.1	0.01
Non-residence 70	636.698	6232.511	118	16	1.8	0.3	0.04	0.006
Non-residence 71	636.681	6232.499	119	17	1.8	0.3	0.04	0.006
Non-residence 72	636.727	6232.539	117	16	1.8	0.3	0.04	0.006
Non-residence 73	636.788	6232.473	117	16	1.8	0.3	0.04	0.006
Non-residence 74	633.847	6232.489	144	26	3.0	1.5	0.1	0.01
Non-residence 75	633.760	6232.438	146	27	3.1	1.6	0.1	0.01
Non-residence 76	634.147	6232.482	144	25	3.0	1.5	0.1	0.01
Non-residence 77	633.694	6232.129	146	30	3.4	1.6	0.2	0.01
Non-residence 78	633.664	6232.127	146	30	3.4	1.5	0.2	0.01
Non-residence 79	633.683	6232.132	146	30	3.4	1.5	0.2	0.01
Non-residence 80	633.703	6232.133	146	29	3.4	1.6	0.2	0.01
Non-residence 81	633.712	6232.132	146	29	3.4	1.6	0.2	0.01
Non-residence 82	633.695	6232.140	146	29	3.4	1.6	0.2	0.01
Non-residence 83	634.318	6232.305	144	25	3.0	1.5	0.1	0.01
Non-residence 84	633.676	6232.153	146	29	3.4	1.6	0.2	0.01
Non-residence 85	633.702	6232.170	146	29	3.4	1.6	0.2	0.01
Non-residence 86	636.793	6232.437	117	16	1.8	0.3	0.04	0.006
Non-residence 87	636.794	6232.426	117	16	1.8	0.3	0.04	0.006
Non-residence 88	636.747	6232.422	118	16	1.8	0.3	0.04	0.006
Non-residence 89	636.776	6232.519	116	16	1.8	0.3	0.04	0.006
Non-residence 90	633.791	6232.477	146	26	3.1	1.5	0.1	0.01
Non-residence 91	633.665	6232.282	146	28	3.3	1.6	0.1	0.01
Non-residence 92	633.664	6232.298	146	28	3.3	1.6	0.1	0.01
Non-residence 93	633.685	6232.296	146	28	3.3	1.6	0.1	0.01
Non-residence 94	633.676	6232.289	146	28	3.3	1.6	0.1	0.01
Non-residence 95	633.706	6232.222	146	29	3.3	1.6	0.2	0.01
Non-residence 96	633.703	6232.200	146	29	3.3	1.6	0.2	0.01
Non-residence 97	633.730	6232.221	146	29	3.3	1.6	0.2	0.01
Non-residence 98	633.806	6232.494	145	26	3.0	1.5	0.1	0.01
Non-residence 99	633.805	6232.498	145	26	3.0	1.5	0.1	0.01
Non-residence 100	636.768	6232.602	116	16	1.8	0.3	0.04	0.006
Non-residence 101	633.805	6232.503	145	26	3.0	1.5	0.1	0.01
Non-residence 102	633.908	6232.447	144	26	3.0	1.6	0.1	0.01
Non-residence 103	633.911	6232.490	144	26	3.0	1.5	0.1	0.01
Non-residence 104	632.547	6230.574	150	37	6.0	1.6	0.2	0.02
Non-residence 105	631.982	6231.163	161	43	7.5	3.2	0.3	0.03
Non-residence 106	631.982	6231.127	161	43	7.5	3.2	0.3	0.03
Non-residence 107	631.960	6231.110	162	43	7.6	3.2	0.3	0.03

Non-residence 108	632.131	6231.351	156	43	6.7	2.8	0.3	0.03
Non-residence 109	632.237	6231.408	154	42	6.3	2.5	0.2	0.03
Non-residence 110	630.192	6232.050	160	33	3.7	3.3	0.3	0.02
Non-residence 111	630.176	6232.008	161	34	3.9	3.4	0.3	0.02
Non-residence 112	630.031	6232.003	159	30	4.0	3.6	0.3	0.02
Non-residence 113	630.039	6231.965	160	32	4.2	3.7	0.3	0.02
Non-residence 114	630.433	6232.124	163	36	3.8	2.6	0.2	0.02
Non-residence 115	630.415	6232.072	164	37	4.0	2.8	0.2	0.02
Non-residence 116	630.397	6232.048	164	38	4.0	2.9	0.2	0.02
Non-residence 117	630.429	6232.027	165	39	4.2	2.9	0.2	0.02
Non-residence 118	630.394	6231.969	166	40	4.4	3.0	0.2	0.02
Non-residence 119	630.393	6231.980	166	40	4.3	3.0	0.2	0.02
Non-residence 120	630.419	6231.972	166	40	4.4	3.0	0.2	0.02
Non-residence 121	630.431	6231.946	167	41	4.6	3.0	0.2	0.02
Non-residence 122	630.345	6232.115	162	35	3.7	2.8	0.2	0.02
Non-residence 123	630.273	6232.059	162	35	3.8	3.1	0.2	0.02
Non-residence 124	630.296	6232.052	162	36	3.9	3.1	0.2	0.02
Non-residence 125	630.300	6232.083	162	35	3.7	3.0	0.2	0.02
Non-residence 126	630.256	6232.077	161	34	3.7	3.1	0.2	0.02
Non-residence 127	630.239	6232.054	161	34	3.8	3.2	0.3	0.02
Non-residence 128	628.501	6232.716	146	21	1.7	1.4	0.1	0.007
Non-residence 129	631.705	6231.574	162	44	7.2	2.9	0.4	0.03
Non-residence 130	633.145	6231.522	151	37	4.5	1.9	0.1	0.02
Non-residence 131	633.295	6231.506	150	35	4.4	1.8	0.1	0.02
Non-residence 132	633.349	6231.512	150	35	4.4	1.7	0.1	0.02
Non-residence 133	633.275	6231.506	150	36	4.4	1.8	0.1	0.02
Non-residence 134	633.386	6231.498	150	35	4.3	1.7	0.1	0.02
Non-residence 135	633.269	6230.441	146	31	5.0	1.3	0.1	0.02
Non-residence 136	633.237	6230.581	147	31	4.8	1.2	0.1	0.02
Non-residence 137	633.292	6230.470	146	31	4.9	1.2	0.1	0.02
Non-residence 138	633.261	6230.472	146	31	4.9	1.2	0.1	0.02
Non-residence 139	633.225	6230.449	146	31	5.0	1.3	0.1	0.02
Non-residence 140	633.391	6230.914	146	30	4.4	1.2	0.1	0.02
Non-residence 141	633.630	6230.661	144	28	4.3	1.0	0.1	0.01
Non-residence 142	633.628	6230.657	144	28	4.3	1.0	0.1	0.01
Non-residence 143	631.766	6232.355	150	32	4.4	2.4	0.2	0.02
Non-residence 144	631.411	6232.490	152	27	3.4	2.5	0.2	0.02
Non-residence 145	631.403	6232.484	152	28	3.5	2.5	0.2	0.02
Non-residence 146	631.876	6232.603	151	29	3.6	2.0	0.2	0.02
Non-residence 147	632.203	6232.437	153	32	4.0	2.8	0.2	0.02
Non-residence 148	632.427	6232.483	148	29	3.7	3.2	0.3	0.02
Non-residence 149	632.632	6232.445	145	29	3.6	3.0	0.2	0.02
Non-residence 150	632.430	6231.891	151	42	5.0	2.1	0.2	0.02
Non-residence 151	632.963	6232.611	143	24	3.2	1.5	0.2	0.01
Non-residence 152	632.828	6232.481	145	27	3.4	1.6	0.2	0.01
Non-residence 153	633.145	6232.700	142	24	3.0	1.4	0.2	0.01
Non-residence 154	633.134	6232.689	143	24	3.0	1.4	0.2	0.01
Non-residence 155	633.442	6232.703	143	24	2.9	1.4	0.1	0.01
Non-residence 156	633.084	6232.423	146	28	3.4	1.5	0.2	0.01
Non-residence 157	633.105	6232.405	146	28	3.4	1.5	0.2	0.01
Non-residence 158	633.046	6232.480	145	27	3.3	1.5	0.2	0.01
Non-residence 159	633.419	6232.447	145	27	3.2	1.4	0.1	0.01
Non-residence 160	633.452	6232.453	145	27	3.2	1.5	0.1	0.01
Non-residence 161	633.424	6232.451	145	27	3.2	1.4	0.1	0.01
Non-residence 162	633.127	6232.758	142	23	2.9	1.4	0.2	0.01
Non-residence 163	630.249	6232.842	148	19	1.9	1.4	0.1	0.008

Non-residence 164	630.298	6232.738	149	21	2.1	1.4	0.1	0.009
Non-residence 165	630.247	6232.782	149	19	2.0	1.4	0.1	0.008
Non-residence 166	634.386	6233.116	140	20	2.3	1.1	0.09	0.009
Non-residence 167	634.207	6232.732	142	23	2.8	1.3	0.1	0.01
Non-residence 168	635.335	6233.676	118	16	1.7	0.8	0.06	0.007
Non-residence 169	635.310	6233.690	118	16	1.7	0.8	0.06	0.007
Non-residence 170	636.056	6233.139	123	17	1.8	0.5	0.05	0.006
Non-residence 171	635.660	6233.183	128	18	1.9	0.9	0.06	0.007
Non-residence 172	635.581	6233.534	121	16	1.7	0.7	0.06	0.007
Non-residence 173	635.575	6233.206	129	18	1.9	0.9	0.06	0.007
Non-residence 174	635.529	6233.502	122	17	1.7	0.7	0.06	0.007
Non-residence 175	635.633	6233.267	127	17	1.8	0.8	0.06	0.007
Non-residence 176	635.687	6233.405	123	17	1.7	0.6	0.06	0.007
Non-residence 177	635.751	6233.348	123	17	1.7	0.6	0.06	0.007
Non-residence 178	635.820	6233.359	122	17	1.7	0.6	0.06	0.006
Non-residence 179	630.258	6232.922	147	18	1.8	1.3	0.1	0.007
Non-residence 180	634.541	6233.203	138	19	2.1	1.1	0.09	0.008
Non-residence 181	633.385	6233.309	117	22	2.2	1.0	0.1	0.009
Non-residence 182	633.348	6233.268	117	22	2.3	1.0	0.1	0.009
Non-residence 183	633.503	6233.342	113	22	2.2	1.0	0.1	0.008
Non-residence 184	633.633	6233.221	126	22	2.3	1.0	0.1	0.009
Non-residence 185	634.933	6233.444	128	18	1.9	1.2	0.07	0.007
Non-residence 186	635.804	6233.334	123	17	1.7	0.6	0.1	0.006
Non-residence 187	633.576	6233.209	125	22	2.3	1.0	0.1	0.009
Non-residence 188	635.793	6233.323	123	17	1.7	0.6	0.06	0.006
Non-residence 189	635.790	6233.311	124	17	1.8	0.6	0.06	0.006
Non-residence 190	633.658	6233.135	133	23	2.4	1.1	0.1	0.009
Non-residence 191	635.803	6233.303	124	17	1.8	0.6	0.06	0.006
Non-residence 192	633.656	6233.119	134	23	2.4	1.1	0.1	0.009
Non-residence 193	635.749	6233.372	123	17	1.7	0.6	0.06	0.006
Non-residence 194	634.690	6233.086	141	20	2.2	1.0	0.08	0.009
Non-residence 195	635.608	6233.285	127	17	1.8	0.9	0.06	0.007
Non-residence 196	636.833	6232.745	113	16	1.7	0.3	0.03	0.006
Non-residence 197	633.745	6233.168	134	22	2.3	1.0	0.1	0.009
Non-residence 198	636.822	6232.743	114	16	1.7	0.3	0.03	0.006
Non-residence 199	633.760	6233.162	135	22	2.3	1.0	0.1	0.009
Non-residence 200	636.790	6232.734	114	16	1.7	0.3	0.03	0.006
Non-residence 201	636.777	6232.764	114	16	1.7	0.3	0.03	0.006
Non-residence 202	633.639	6233.221	126	22	2.3	1.0	0.1	0.009
Non-residence 203	633.658	6233.220	127	22	2.3	1.0	0.1	0.009
Non-residence 204	633.619	6233.125	132	23	2.4	1.1	0.1	0.009
Non-residence 205	634.432	6233.402	127	20	2.0	1.1	0.09	0.008
Non-residence 206	634.423	6233.360	129	20	2.0	1.1	0.09	0.008
Non-residence 207	634.340	6233.269	133	20	2.1	1.1	0.09	0.008
Non-residence 208	634.914	6233.603	121	18	1.8	1.2	0.07	0.007
Non-residence 209	634.903	6233.556	123	18	1.8	1.2	0.07	0.007
Non-residence 210	635.007	6233.494	126	17	1.9	1.2	0.07	0.007
Non-residence 211	635.007	6233.556	123	17	1.8	1.2	0.07	0.007
Non-residence 212	635.030	6233.644	120	17	1.8	1.2	0.07	0.007
Non-residence 213	635.234	6233.722	117	16	1.7	0.9	0.06	0.007
Non-residence 214	635.199	6233.691	118	16	1.7	1.0	0.06	0.007
Non-residence 215	636.133	6233.165	121	17	1.7	0.4	0.04	0.006
Non-residence 216	629.360	6232.774	150	17	1.7	1.6	0.1	0.007
Non-residence 217	629.356	6232.783	150	17	1.7	1.6	0.1	0.007
Non-residence 218	629.578	6232.895	149	15	1.6	1.5	0.1	0.007
Non-residence 219	629.226	6232.883	148	17	1.6	1.5	0.1	0.007

Non-residence 220	629.334	6232.855	149	17	1.6	1.5	0.1	0.007
Non-residence 221	629.324	6232.873	149	17	1.6	1.5	0.1	0.007
Non-residence 222	629.292	6232.864	149	17	1.6	1.5	0.1	0.007
Non-residence 223	629.279	6232.862	149	17	1.6	1.5	0.1	0.007
Non-residence 224	629.331	6232.925	148	16	1.6	1.4	0.1	0.007
Non-residence 225	629.345	6232.916	148	16	1.6	1.4	0.1	0.007
Non-residence 226	629.348	6232.935	148	16	1.6	1.4	0.1	0.007
Non-residence 227	633.401	6232.733	143	24	2.9	1.4	0.1	0.01
Non-residence 228	630.655	6232.303	160	35	4.4	2.2	0.2	0.02
Non-residence 229	630.407	6232.300	158	32	3.9	2.3	0.2	0.02
Non-residence 230	630.452	6232.324	158	31	4.0	2.2	0.2	0.02
Non-residence 231	630.360	6232.328	157	30	3.7	2.3	0.2	0.02
Non-residence 232	630.809	6232.413	159	32	3.4	2.3	0.2	0.02
Non-residence 233	630.679	6232.377	159	32	3.5	2.1	0.2	0.02
Non-residence 234	635.280	6230.416	129	19	3.3	0.6	0.1	0.01
Non-residence 235	634.753	6230.706	141	22	3.3	0.9	0.10	0.01
Non-residence 236	634.459	6230.807	142	24	3.5	0.8	0.09	0.01
Non-residence 237	634.485	6230.766	142	23	3.5	0.8	0.09	0.01
Non-residence 238	634.674	6230.781	141	22	3.3	0.8	0.09	0.01
Non-residence 239	634.719	6230.837	141	22	3.2	0.9	0.08	0.01
Non-residence 240	634.543	6230.948	142	23	3.3	0.8	0.07	0.01
Non-residence 241	634.915	6230.724	141	21	3.3	0.9	0.09	0.01
Non-residence 242	634.915	6230.654	141	21	3.3	0.9	0.1	0.01
Non-residence 243	635.018	6230.724	141	21	3.2	0.8	0.09	0.01
Non-residence 244	635.096	6230.655	138	21	3.2	0.7	0.10	0.01
Non-residence 245	635.128	6230.627	137	20	3.2	0.7	0.1	0.01
Non-residence 246	635.559	6230.527	126	18	3.0	0.6	0.1	0.010
Non-residence 247	630.258	6232.565	151	23	2.4	1.7	0.2	0.010
Non-residence 248	631.977	6226.320	146	25	3.2	1.3	0.1	0.009
Non-residence 249	633.954	6232.464	144	26	3.0	1.5	0.1	0.01
Non-residence 250	634.021	6232.502	144	25	3.0	1.5	0.1	0.01
Non-residence 251	636.675	6232.516	119	17	1.8	0.3	0.04	0.006
Non-residence 252	636.764	6232.524	117	16	1.8	0.3	0.04	0.006
Non-residence 253	633.791	6232.481	146	26	3.0	1.5	0.1	0.01
Non-residence 254	633.682	6232.260	146	29	3.3	1.6	0.1	0.01
Non-residence 255	633.808	6232.445	146	27	3.1	1.6	0.1	0.01
Non-residence 256	633.820	6232.470	145	26	3.1	1.5	0.1	0.01
Non-residence 257	631.968	6231.106	162	43	7.6	3.2	0.3	0.03
Non-residence 258	632.215	6231.407	154	43	6.3	3.0	0.3	0.03
Non-residence 259	630.179	6231.985	162	35	3.9	3.4	0.3	0.02
Non-residence 260	630.455	6232.103	164	37	3.9	2.6	0.2	0.02
Non-residence 261	630.434	6231.940	167	42	4.6	3.0	0.2	0.02
Non-residence 262	630.116	6232.674	151	19	2.1	1.7	0.1	0.008
Non-residence 263	628.548	6232.661	146	21	1.7	1.4	0.1	0.007
Non-residence 264	631.692	6231.654	159	43	6.7	3.0	0.4	0.03
Non-residence 265	633.277	6231.494	150	36	4.4	1.8	0.1	0.02
Non-residence 266	633.164	6230.500	147	32	5.0	1.3	0.1	0.02
Non-residence 267	633.210	6230.535	147	31	4.9	1.2	0.1	0.02
Non-residence 268	633.276	6230.498	146	31	4.9	1.2	0.1	0.02
Non-residence 269	633.220	6230.512	147	31	4.9	1.2	0.1	0.02
Non-residence 270	633.590	6230.696	145	28	4.3	1.0	0.1	0.01
Non-residence 271	634.866	6230.491	139	21	3.5	0.8	0.1	0.01
Non-residence 272	631.883	6232.606	151	29	3.6	2.0	0.2	0.02
Non-residence 273	632.540	6232.426	147	30	3.8	3.1	0.3	0.02
Non-residence 274	632.425	6231.891	151	42	5.0	2.0	0.2	0.02
Non-residence 275	633.140	6232.682	143	24	3.0	1.4	0.2	0.01

Non-residence 276	633.196	6232.449	145	27	3.3	1.4	0.2	0.01
Non-residence 277	630.243	6232.781	149	19	2.0	1.4	0.1	0.008
Non-residence 278	630.280	6232.975	146	17	1.8	1.2	0.1	0.007
Non-residence 279	635.385	6233.556	122	16	1.8	0.9	0.06	0.007
Non-residence 280	635.106	6233.424	128	17	1.9	1.1	0.07	0.007
Non-residence 281	635.812	6233.348	122	17	1.7	0.6	0.06	0.006
Non-residence 282	635.182	6233.689	118	16	1.7	1.1	0.06	0.007
Non-residence 283	636.388	6232.996	119	17	1.7	0.3	0.04	0.006
Non-residence 284	629.248	6233.007	147	16	1.5	1.3	0.1	0.006
Non-residence 285	629.176	6232.862	148	18	1.6	1.5	0.1	0.007
Non-residence 286	629.578	6232.917	148	15	1.6	1.4	0.1	0.007
Non-residence 287	629.256	6232.919	148	17	1.6	1.4	0.1	0.007

Table G.17 Maximum predicted concentrations of NO_2 and SO_2 at unknown buildings (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	NO_2			SO_2		
			1-hour	24-hour	Annual	1-hour	24-hour	Annual
Unknown Building 1	644.950	6225.018	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 2	644.872	6225.507	33	4.3	0.6	0.2	0.03	0.002
Unknown Building 3	644.880	6225.504	33	4.3	0.5	0.2	0.03	0.002
Unknown Building 4	644.952	6225.002	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 5	644.955	6224.971	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 6	644.947	6224.943	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 7	644.947	6224.925	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 8	644.963	6224.933	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 9	644.882	6225.060	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 10	643.566	6225.463	39	5.4	0.7	0.2	0.04	0.002
Unknown Building 11	643.559	6225.463	39	5.4	0.7	0.2	0.04	0.002
Unknown Building 12	643.374	6225.135	39	5.4	0.7	0.2	0.04	0.002
Unknown Building 13	643.404	6225.133	39	5.4	0.7	0.2	0.04	0.002
Unknown Building 14	643.403	6225.138	39	5.4	0.7	0.2	0.04	0.002
Unknown Building 15	643.969	6223.120	31	4.0	0.4	0.2	0.03	0.001
Unknown Building 16	643.834	6224.638	35	4.8	0.6	0.2	0.04	0.002
Unknown Building 17	643.831	6224.618	35	4.8	0.6	0.2	0.04	0.002
Unknown Building 18	644.950	6225.063	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 19	644.943	6225.062	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 20	644.951	6225.052	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 21	644.953	6225.057	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 22	644.933	6225.059	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 23	644.990	6224.918	31	4.2	0.5	0.2	0.03	0.002
Unknown Building 24	644.990	6224.939	31	4.2	0.5	0.2	0.03	0.002
Unknown Building 25	644.873	6225.014	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 26	644.713	6224.856	31	4.4	0.5	0.2	0.03	0.002
Unknown Building 27	644.760	6224.826	31	4.4	0.5	0.2	0.03	0.002
Unknown Building 28	644.816	6224.832	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 29	644.815	6224.853	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 30	644.843	6224.892	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 31	644.871	6224.825	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 32	644.906	6224.940	31	4.3	0.5	0.2	0.03	0.002
Unknown Building 33	644.867	6224.969	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 34	643.667	6225.359	38	5.2	0.7	0.2	0.04	0.002
Unknown Building 35	643.773	6225.267	37	5.1	0.6	0.2	0.04	0.002
Unknown Building 36	643.797	6225.227	37	5.1	0.6	0.2	0.04	0.002
Unknown Building 37	643.806	6225.168	37	5.0	0.6	0.2	0.04	0.002
Unknown Building 38	643.808	6225.162	37	5.0	0.6	0.2	0.04	0.002
Unknown Building 39	643.766	6225.177	37	5.1	0.6	0.2	0.04	0.002
Unknown Building 40	643.683	6225.204	38	5.1	0.6	0.2	0.04	0.002
Unknown Building 41	643.681	6225.221	38	5.2	0.6	0.2	0.04	0.002
Unknown Building 42	643.634	6225.271	38	5.2	0.6	0.2	0.04	0.002
Unknown Building 43	643.633	6225.252	38	5.2	0.6	0.2	0.04	0.002
Unknown Building 44	643.894	6223.384	32	4.2	0.4	0.2	0.03	0.001
Unknown Building 45	643.856	6223.461	32	4.3	0.4	0.2	0.03	0.001
Unknown Building 46	644.033	6223.096	31	4.0	0.4	0.1	0.03	0.001
Unknown Building 47	644.849	6225.100	32	4.3	0.5	0.2	0.03	0.002
Unknown Building 48	644.708	6225.309	33	4.4	0.6	0.2	0.03	0.002
Unknown Building 49	644.412	6224.131	31	4.4	0.5	0.2	0.03	0.001
Unknown Building 50	644.406	6224.149	31	4.4	0.5	0.2	0.03	0.001
Unknown Building 51	643.639	6225.491	38	5.3	0.7	0.2	0.04	0.002

Unknown Building 52	643.623	6225.483	38	5.3	0.7	0.2	0.04	0.002
Unknown Building 53	643.691	6225.415	38	5.2	0.7	0.2	0.04	0.002
Unknown Building 54	643.709	6225.375	38	5.2	0.6	0.2	0.04	0.002
Unknown Building 55	643.700	6225.363	38	5.2	0.6	0.2	0.04	0.002
Unknown Building 56	643.664	6225.368	38	5.2	0.7	0.2	0.04	0.002
Unknown Building 57	642.358	6232.697	44	6.6	0.9	0.2	0.03	0.003
Unknown Building 58	642.370	6232.697	44	6.6	0.9	0.2	0.03	0.003
Unknown Building 59	641.707	6232.306	46	7.1	1.0	0.2	0.03	0.003
Unknown Building 60	641.716	6232.294	46	7.1	1.0	0.2	0.03	0.003
Unknown Building 61	639.639	6231.988	68	9.8	1.3	0.2	0.03	0.004
Unknown Building 62	639.669	6231.968	67	9.7	1.3	0.2	0.04	0.004
Unknown Building 63	641.692	6232.162	49	7.1	1.0	0.2	0.03	0.003
Unknown Building 64	639.724	6231.971	66	9.6	1.2	0.2	0.04	0.004
Unknown Building 65	641.692	6232.158	49	7.1	1.0	0.2	0.03	0.003
Unknown Building 66	642.008	6232.583	46	6.9	0.9	0.2	0.03	0.003
Unknown Building 67	639.730	6231.945	67	9.6	1.2	0.2	0.04	0.004
Unknown Building 68	641.731	6232.165	49	7.0	1.0	0.2	0.03	0.003
Unknown Building 69	641.983	6232.575	46	6.9	0.9	0.2	0.03	0.003
Unknown Building 70	639.694	6231.927	68	9.7	1.3	0.2	0.04	0.004
Unknown Building 71	641.719	6232.146	49	7.1	1.0	0.2	0.03	0.003
Unknown Building 72	641.977	6232.585	46	6.9	0.9	0.2	0.03	0.003
Unknown Building 73	641.745	6232.141	49	7.0	1.0	0.2	0.03	0.003
Unknown Building 74	641.764	6232.131	49	7.0	1.0	0.2	0.03	0.003
Unknown Building 75	641.939	6232.450	46	7.0	1.0	0.2	0.03	0.003
Unknown Building 76	641.800	6232.154	48	7.0	1.0	0.2	0.03	0.003
Unknown Building 77	641.817	6232.160	48	6.9	1.0	0.2	0.03	0.003
Unknown Building 78	641.827	6232.134	48	6.9	1.0	0.2	0.03	0.003
Unknown Building 79	641.220	6232.063	54	7.6	1.0	0.2	0.03	0.003
Unknown Building 80	641.784	6232.059	50	6.9	1.0	0.2	0.03	0.003
Unknown Building 81	641.219	6232.071	54	7.6	1.0	0.2	0.03	0.003
Unknown Building 82	641.751	6232.050	50	7.0	1.0	0.2	0.03	0.003
Unknown Building 83	641.219	6232.085	53	7.6	1.0	0.2	0.03	0.003
Unknown Building 84	641.208	6232.134	53	7.6	1.0	0.2	0.03	0.003
Unknown Building 85	641.842	6232.556	47	7.1	1.0	0.2	0.03	0.003
Unknown Building 86	641.200	6232.134	53	7.6	1.0	0.2	0.03	0.003
Unknown Building 87	641.242	6232.144	52	7.6	1.0	0.2	0.03	0.003
Unknown Building 88	641.273	6232.106	53	7.5	1.0	0.2	0.03	0.003
Unknown Building 89	641.267	6232.081	53	7.5	1.0	0.2	0.03	0.003
Unknown Building 90	641.350	6232.123	52	7.4	1.0	0.2	0.03	0.003
Unknown Building 91	641.913	6232.471	46	7.0	1.0	0.2	0.03	0.003
Unknown Building 92	641.360	6232.149	51	7.4	1.0	0.2	0.03	0.003
Unknown Building 93	641.339	6232.148	51	7.5	1.0	0.2	0.03	0.003
Unknown Building 94	641.334	6232.133	52	7.5	1.0	0.2	0.03	0.003
Unknown Building 95	641.329	6232.136	52	7.5	1.0	0.2	0.03	0.003
Unknown Building 96	641.319	6232.130	52	7.5	1.0	0.2	0.03	0.003
Unknown Building 97	641.716	6232.361	47	7.2	1.0	0.2	0.03	0.003
Unknown Building 98	641.726	6232.330	46	7.1	1.0	0.2	0.03	0.003
Unknown Building 99	642.420	6232.706	44	6.5	0.9	0.2	0.03	0.003
Unknown Building 100	641.719	6232.315	46	7.1	1.0	0.2	0.03	0.003
Unknown Building 101	642.414	6232.697	44	6.5	0.9	0.2	0.03	0.003
Unknown Building 102	641.708	6232.314	46	7.1	1.0	0.2	0.03	0.003
Unknown Building 103	641.729	6229.020	69	7.3	1.1	0.2	0.04	0.003
Unknown Building 104	641.715	6229.015	69	7.3	1.1	0.2	0.04	0.003
Unknown Building 105	641.684	6229.037	70	7.3	1.1	0.2	0.04	0.003
Unknown Building 106	641.664	6229.052	70	7.3	1.1	0.2	0.04	0.003
Unknown Building 107	641.684	6229.050	70	7.3	1.1	0.2	0.04	0.003

Unknown Building 108	641.698	6229.109	71	7.2	1.1	0.2	0.04	0.003
Unknown Building 109	641.689	6228.896	68	7.4	1.1	0.2	0.04	0.003
Unknown Building 110	641.669	6228.915	69	7.4	1.1	0.2	0.04	0.003
Unknown Building 111	641.657	6228.840	68	7.4	1.1	0.2	0.04	0.003
Unknown Building 112	641.665	6228.834	68	7.4	1.1	0.2	0.04	0.003
Unknown Building 113	644.398	6226.367	37	4.9	0.7	0.2	0.03	0.002
Unknown Building 114	643.881	6226.485	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 115	644.029	6226.070	37	5.2	0.7	0.2	0.04	0.002
Unknown Building 116	644.017	6226.086	37	5.2	0.7	0.2	0.04	0.002
Unknown Building 117	642.838	6226.416	46	6.3	0.8	0.2	0.04	0.003
Unknown Building 118	642.945	6226.433	45	6.4	0.9	0.2	0.04	0.003
Unknown Building 119	642.936	6226.428	45	6.5	0.9	0.2	0.04	0.003
Unknown Building 120	642.888	6226.854	48	6.4	0.8	0.2	0.04	0.003
Unknown Building 121	642.854	6226.949	49	6.4	0.8	0.2	0.04	0.003
Unknown Building 122	643.847	6226.177	37	5.4	0.7	0.2	0.04	0.002
Unknown Building 123	643.840	6226.157	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 124	643.865	6226.164	37	5.4	0.7	0.2	0.04	0.002
Unknown Building 125	643.882	6226.134	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 126	643.897	6226.107	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 127	643.902	6226.101	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 128	643.599	6226.038	39	5.9	0.9	0.2	0.04	0.003
Unknown Building 129	643.616	6226.337	39	5.6	0.7	0.2	0.04	0.002
Unknown Building 130	643.663	6226.211	38	5.6	0.7	0.2	0.04	0.002
Unknown Building 131	643.697	6226.185	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 132	643.719	6226.149	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 133	643.736	6226.142	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 134	643.744	6226.087	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 135	643.748	6226.078	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 136	643.753	6226.063	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 137	641.735	6229.039	70	7.2	1.1	0.2	0.04	0.003
Unknown Building 138	643.909	6226.161	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 139	643.834	6226.210	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 140	643.384	6226.373	41	5.9	0.8	0.2	0.04	0.002
Unknown Building 141	643.418	6226.364	41	5.8	0.8	0.2	0.04	0.002
Unknown Building 142	642.743	6226.973	50	6.5	0.9	0.2	0.04	0.003
Unknown Building 143	642.768	6226.982	50	6.5	0.9	0.2	0.04	0.003
Unknown Building 144	642.672	6226.501	48	6.5	0.8	0.2	0.04	0.003
Unknown Building 145	642.676	6226.447	47	6.5	0.8	0.2	0.04	0.003
Unknown Building 146	643.764	6226.139	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 147	643.755	6226.147	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 148	643.768	6226.152	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 149	643.779	6226.166	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 150	643.757	6226.160	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 151	643.771	6226.180	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 152	643.753	6226.187	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 153	643.720	6226.203	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 154	643.744	6226.210	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 155	643.832	6226.175	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 156	643.172	6226.037	41	6.1	0.9	0.2	0.04	0.003
Unknown Building 157	643.203	6225.978	41	5.9	0.8	0.2	0.04	0.003
Unknown Building 158	643.484	6226.166	39	5.7	0.7	0.2	0.04	0.002
Unknown Building 159	643.367	6226.160	40	5.8	0.8	0.2	0.04	0.002
Unknown Building 160	643.528	6226.061	39	5.7	0.8	0.2	0.04	0.003
Unknown Building 161	643.545	6226.046	39	5.8	0.8	0.2	0.04	0.003
Unknown Building 162	643.536	6226.004	39	5.6	0.8	0.2	0.04	0.002
Unknown Building 163	643.472	6226.157	40	5.7	0.8	0.2	0.04	0.002

Unknown Building 164	643.587	6226.050	39	5.7	0.8	0.2	0.04	0.003
Unknown Building 165	643.185	6226.306	42	6.1	0.8	0.2	0.04	0.003
Unknown Building 166	643.027	6226.363	44	6.3	0.8	0.2	0.04	0.003
Unknown Building 167	641.436	6228.659	67	7.7	1.1	0.2	0.05	0.003
Unknown Building 168	642.961	6226.254	44	6.2	0.8	0.2	0.04	0.003
Unknown Building 169	644.004	6226.153	37	5.2	0.7	0.2	0.04	0.002
Unknown Building 170	643.970	6226.198	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 171	643.973	6226.201	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 172	643.968	6226.204	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 173	643.956	6226.214	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 174	641.724	6227.960	57	7.6	1.0	0.2	0.04	0.003
Unknown Building 175	641.741	6227.953	57	7.5	1.0	0.2	0.04	0.003
Unknown Building 176	641.677	6228.058	56	7.6	1.1	0.2	0.04	0.003
Unknown Building 177	641.672	6228.099	56	7.6	1.1	0.2	0.04	0.003
Unknown Building 178	641.666	6228.095	56	7.6	1.1	0.2	0.04	0.003
Unknown Building 179	643.902	6226.128	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 180	643.908	6226.118	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 181	643.914	6226.110	37	5.3	0.7	0.2	0.04	0.002
Unknown Building 182	643.882	6226.168	37	5.4	0.7	0.2	0.04	0.002
Unknown Building 183	643.875	6226.180	37	5.4	0.7	0.2	0.04	0.002
Unknown Building 184	639.183	6227.195	70	9.9	1.3	0.3	0.06	0.004
Unknown Building 185	639.162	6227.197	70	9.9	1.3	0.3	0.06	0.004
Unknown Building 186	638.997	6227.336	66	10	1.4	0.3	0.06	0.004
Unknown Building 187	639.202	6227.203	69	9.8	1.3	0.3	0.06	0.004
Unknown Building 188	643.875	6226.185	37	5.4	0.7	0.2	0.04	0.002
Unknown Building 189	643.868	6226.221	37	5.4	0.7	0.2	0.04	0.002
Unknown Building 190	643.761	6226.051	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 191	643.782	6226.058	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 192	643.814	6226.081	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 193	643.801	6226.090	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 194	643.797	6226.103	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 195	643.794	6226.117	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 196	643.793	6226.138	38	5.4	0.7	0.2	0.04	0.002
Unknown Building 197	643.767	6226.128	38	5.5	0.7	0.2	0.04	0.002
Unknown Building 198	643.268	6226.302	42	6.0	0.8	0.2	0.04	0.002
Unknown Building 199	643.292	6226.276	41	5.9	0.8	0.2	0.04	0.002
Unknown Building 200	643.216	6226.347	43	6.0	0.8	0.2	0.04	0.002
Unknown Building 201	643.224	6226.078	41	6.0	0.8	0.2	0.04	0.003
Unknown Building 202	643.256	6226.097	41	5.9	0.8	0.2	0.04	0.003
Unknown Building 203	643.288	6226.117	40	5.9	0.8	0.2	0.04	0.002
Unknown Building 204	643.339	6226.147	40	5.9	0.8	0.2	0.04	0.002
Unknown Building 205	643.303	6226.155	40	5.9	0.8	0.2	0.04	0.002
Unknown Building 206	622.081	6236.050	23	4.1	0.3	0.2	0.02	0.001
Unknown Building 207	622.088	6235.938	23	4.1	0.3	0.2	0.02	0.001
Unknown Building 208	622.090	6235.975	23	4.1	0.3	0.2	0.02	0.001
Unknown Building 209	621.912	6235.742	23	4.1	0.3	0.2	0.02	0.001
Unknown Building 210	622.223	6235.981	25	4.2	0.3	0.2	0.02	0.001
Unknown Building 211	622.240	6235.939	25	4.3	0.3	0.2	0.02	0.001
Unknown Building 212	643.342	6232.985	39	5.7	0.8	0.2	0.02	0.003
Unknown Building 213	642.375	6232.724	44	6.6	0.9	0.2	0.03	0.003
Unknown Building 214	642.401	6232.723	44	6.5	0.9	0.2	0.03	0.003
Unknown Building 215	643.329	6233.006	39	5.7	0.8	0.2	0.02	0.003
Unknown Building 216	642.416	6232.748	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 217	643.334	6233.011	39	5.7	0.8	0.2	0.02	0.003
Unknown Building 218	642.409	6232.755	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 219	643.338	6233.028	39	5.7	0.8	0.2	0.02	0.003

Unknown Building 220	642.398	6232.749	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 221	643.335	6233.152	40	5.7	0.8	0.2	0.02	0.003
Unknown Building 222	642.392	6232.749	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 223	643.308	6233.164	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 224	642.368	6232.771	44	6.6	0.9	0.2	0.02	0.003
Unknown Building 225	643.304	6233.215	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 226	642.409	6232.760	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 227	643.336	6233.207	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 228	643.314	6233.263	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 229	626.029	6235.450	49	7.7	0.5	0.3	0.04	0.003
Unknown Building 230	643.303	6233.282	41	5.8	0.8	0.2	0.02	0.003
Unknown Building 231	643.334	6233.306	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 232	643.313	6233.331	41	5.8	0.8	0.2	0.02	0.003
Unknown Building 233	643.300	6233.326	41	5.8	0.8	0.2	0.02	0.003
Unknown Building 234	643.203	6233.002	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 235	643.196	6232.991	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 236	643.246	6232.984	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 237	643.191	6232.960	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 238	643.239	6232.950	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 239	643.231	6232.911	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 240	646.432	6233.677	24	3.5	0.5	0.1	0.01	0.002
Unknown Building 241	646.501	6233.734	24	3.4	0.5	0.1	0.01	0.002
Unknown Building 242	626.927	6234.611	73	9.5	0.7	0.4	0.05	0.003
Unknown Building 243	643.244	6232.893	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 244	643.200	6232.869	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 245	646.378	6233.687	25	3.5	0.5	0.1	0.01	0.002
Unknown Building 246	643.189	6232.851	40	5.8	0.8	0.1	0.02	0.003
Unknown Building 247	646.378	6233.691	25	3.5	0.5	0.1	0.01	0.002
Unknown Building 248	643.204	6232.854	40	5.8	0.8	0.1	0.02	0.003
Unknown Building 249	646.354	6233.688	25	3.5	0.5	0.1	0.01	0.002
Unknown Building 250	643.219	6232.853	40	5.8	0.8	0.2	0.02	0.003
Unknown Building 251	646.357	6233.709	25	3.5	0.5	0.1	0.01	0.002
Unknown Building 252	643.238	6232.844	41	5.7	0.8	0.2	0.02	0.003
Unknown Building 253	643.016	6232.721	41	5.9	0.8	0.1	0.02	0.003
Unknown Building 254	643.326	6232.944	40	5.7	0.8	0.2	0.02	0.003
Unknown Building 255	643.315	6232.981	39	5.7	0.8	0.2	0.02	0.003
Unknown Building 256	642.409	6232.764	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 257	642.409	6232.768	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 258	642.434	6232.773	44	6.5	0.9	0.2	0.02	0.003
Unknown Building 259	642.331	6232.741	45	6.6	0.9	0.2	0.03	0.003
Unknown Building 260	642.316	6232.728	45	6.6	0.9	0.2	0.03	0.003
Unknown Building 261	642.298	6232.715	45	6.6	0.9	0.2	0.03	0.003
Unknown Building 262	642.963	6232.725	41	6.0	0.9	0.2	0.02	0.003
Unknown Building 263	621.923	6235.219	26	4.4	0.3	0.2	0.02	0.001
Unknown Building 264	621.936	6235.188	26	4.4	0.3	0.2	0.02	0.001
Unknown Building 265	621.979	6235.185	27	4.4	0.3	0.2	0.02	0.001
Unknown Building 266	625.563	6235.174	53	8.0	0.5	0.5	0.03	0.002
Unknown Building 267	625.767	6235.142	54	8.1	0.5	0.4	0.04	0.002
Unknown Building 268	627.442	6234.203	81	10	0.8	0.5	0.06	0.004
Unknown Building 269	626.401	6234.964	57	8.6	0.6	0.3	0.04	0.003
Unknown Building 270	626.381	6234.964	57	8.6	0.6	0.3	0.04	0.003
Unknown Building 271	626.452	6235.114	58	8.3	0.6	0.3	0.04	0.003
Unknown Building 272	626.453	6235.109	58	8.3	0.6	0.3	0.04	0.003
Unknown Building 273	626.630	6235.208	60	8.2	0.6	0.3	0.04	0.003
Unknown Building 274	626.467	6235.141	58	8.3	0.6	0.3	0.04	0.003
Unknown Building 275	626.461	6235.127	58	8.3	0.6	0.3	0.04	0.003

Unknown Building 276	626.495	6235.173	58	8.2	0.6	0.3	0.04	0.003
Unknown Building 277	626.425	6235.038	58	8.5	0.6	0.3	0.04	0.003
Unknown Building 278	621.996	6237.816	18	3.0	0.2	0.1	0.01	0.0008
Unknown Building 279	622.012	6237.737	18	3.1	0.2	0.1	0.01	0.0008
Unknown Building 280	622.051	6237.728	18	3.1	0.2	0.1	0.01	0.0008
Unknown Building 281	622.041	6237.751	18	3.1	0.2	0.1	0.01	0.0008
Unknown Building 282	622.038	6237.770	18	3.1	0.2	0.1	0.01	0.0008
Unknown Building 283	622.001	6237.816	18	3.0	0.2	0.1	0.01	0.0008
Unknown Building 284	622.656	6235.987	29	4.6	0.3	0.3	0.02	0.001
Unknown Building 285	625.996	6235.432	50	7.7	0.5	0.3	0.04	0.003
Unknown Building 286	625.963	6235.416	50	7.7	0.5	0.3	0.04	0.003
Unknown Building 287	625.953	6235.405	51	7.7	0.5	0.3	0.04	0.003

Table G.18 Maximum predicted concentrations of NO_2 and SO_2 at schools (in μg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	NO_2			SO_2		
			1-hour	24-hour	Annual	1-hour	24-hour	Annual
Aboriginal Education Center	633.609	6235.391	92	11	0.9	0.5	0.06	0.003
Alwin Holland	633.853	6236.278	74	7.7	0.7	0.3	0.04	0.003
Baldonnel Elementary	642.961	6232.724	41	6.0	0.9	0.2	0.02	0.003
Bert Ambrose Elementary	633.698	6237.244	67	6.7	0.5	0.2	0.03	0.002
Bert Bowes Middle School	632.695	6235.420	96	9.3	0.9	0.6	0.10	0.004
Board Office	633.204	6236.129	70	7.6	0.7	0.4	0.05	0.003
Charlie Lake Elementary	626.866	6238.375	27	4.2	0.3	0.7	0.06	0.003
CM Finch Elementary	632.665	6236.509	60	7.0	0.6	0.5	0.05	0.003
Dr. Kearney Middle School	634.341	6236.419	73	8.0	0.7	0.3	0.03	0.003
Duncan Cran Elementary	635.468	6234.477	90	12	1.3	0.4	0.05	0.005
Ecole Central Elementary	633.100	6235.426	98	9.5	0.9	0.5	0.07	0.004
Facilities & Transportation	632.721	6235.227	106	11	0.9	0.6	0.1	0.004
Key Learning Centre	632.856	6235.390	99	9.3	0.9	0.5	0.09	0.004
North Peace Secondary	634.926	6234.932	71	9.6	1.1	0.4	0.05	0.004
Energetic Learning Campus	634.926	6234.932	71	9.6	1.1	0.4	0.05	0.004
Northern BC Distance Education	632.856	6235.390	99	9.3	0.9	0.5	0.09	0.004
Open Learning	632.856	6235.390	99	9.3	0.9	0.5	0.09	0.004
Robert Ogilvie Elementary	635.074	6235.572	61	8.2	0.9	0.3	0.04	0.003
Student Support Services	633.204	6236.129	70	7.6	0.7	0.4	0.05	0.003
Taylor Elementary	643.346	6227.033	44	6.0	0.8	0.2	0.04	0.002
Technology Services	633.204	6236.129	70	7.6	0.7	0.4	0.05	0.003
Upper Halfway Elementary	633.204	6236.129	70	7.6	0.7	0.4	0.05	0.003
Wonowon Elementary	633.204	6236.129	70	7.6	0.7	0.4	0.05	0.003

Table G.19 Maximum predicted concentrations of NO_2 and SO_2 at child care facilities (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	NO_2			SO_2		
			1-hour	24-hour	Annual	1-hour	24-hour	Annual
Chunkey Monkey Daycare	634.736	6235.411	68	9.0	0.9	0.4	0.05	0.003
Oscare Daycare/Oscare Tots	632.978	6235.501	95	8.8	0.8	0.5	0.08	0.004
The Zoo Daycare	634.054	6236.232	74	8.1	0.7	0.3	0.04	0.003
Little Kritters Daycare	624.101	6239.158	35	3.1	0.2	0.3	0.02	0.001
ABC & 123 Family Daycare	635.818	6234.246	98	13	1.4	0.4	0.04	0.005
Baby Bear Daycare	634.940	6234.929	71	9.6	1.1	0.4	0.05	0.004
Rascals	626.867	6238.356	27	4.2	0.3	0.7	0.06	0.003
Building Blocks Daycare	632.341	6235.672	77	8.5	0.8	0.7	0.1	0.004
Kidz Club	635.485	6234.438	92	12	1.3	0.4	0.05	0.005
Northern Lights College Daycare	632.978	6235.501	95	8.8	0.8	0.5	0.08	0.004
Little Bear Family Daycare	634.746	6235.411	68	9.0	0.9	0.4	0.05	0.003
Little Peanuts Family Daycare	636.173	6234.279	95	13	1.3	0.3	0.04	0.005
Little Pigs Family Daycare	633.130	6236.459	68	7.4	0.6	0.3	0.05	0.003
Nanny Norma's Daycare	633.845	6237.086	69	6.8	0.5	0.2	0.03	0.002
Pitter Patter Day Care	635.907	6234.821	81	11	1.1	0.3	0.04	0.004
Puddle Jumpers	633.845	6237.086	69	6.8	0.5	0.2	0.03	0.002
Seeds to Sow	634.341	6235.509	75	9.8	0.9	0.4	0.05	0.003
The Playground Family Daycare	635.666	6234.938	78	10	1.1	0.3	0.04	0.004
The Wiggles and Giggles Daycare	632.583	6235.781	76	8.0	0.8	0.5	0.09	0.003
TJ's Playhouse	634.310	6235.425	77	10	0.9	0.5	0.05	0.003
Tot's and Tikes Family Daycare	633.117	6236.197	67	7.5	0.7	0.4	0.05	0.003
The Stepping Stones Centre	635.815	6235.192	72	9.8	1.0	0.3	0.04	0.004
Aboriginal Head Start	633.003	6235.697	87	8.0	0.8	0.5	0.07	0.003
Child Development Centre	632.929	6236.112	68	7.5	0.7	0.4	0.06	0.003
Keeginaw Pre-School	633.173	6235.032	109	12	1.0	0.6	0.08	0.004
Totem Pre-School	635.236	6235.541	59	8.0	0.9	0.3	0.04	0.003
Rise and Shine Clubhouse	635.020	6235.584	62	8.3	0.9	0.3	0.04	0.003
Barney and Friends Family Daycare	643.482	6226.539	41	5.8	0.8	0.2	0.04	0.002
Hudson's Hope Playschool	643.946	6225.250	36	4.9	0.6	0.2	0.04	0.002

Table G.20 Maximum predicted concentrations of NO_2 and SO_2 at health care facilities (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	NO_2			SO_2		
			1-hour	24-hour	Annual	1-hour	24-hour	Annual
Fort St John Hospital and Health Care	633.715	6235.551	87	10	0.9	0.5	0.05	0.003
Fort St John Medical Clinic	633.889	6235.722	80	9.6	0.8	0.5	0.05	0.003
Fort St John Pharmacy and Wellness Centre	633.623	6235.735	83	9.3	0.8	0.4	0.05	0.003
The Taylor Medical Clinic	643.866	6225.592	37	5.1	0.7	0.2	0.04	0.002
ABC Medical Clinic	633.516	6235.725	85	9.1	0.8	0.4	0.05	0.003
North Peace Medical Clinic	633.554	6235.725	84	9.2	0.8	0.4	0.05	0.003

Table G.21 Maximum predicted concentrations of NO_2 and SO_2 at senior care facilities (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	NO_2			SO_2		
			1-hour	24-hour	Annual	1-hour	24-hour	Annual
Heritage Manor III	633.568	6236.327	73	7.6	0.7	0.3	0.04	0.003
Peace Lutheran Apt #1,	633.439	6236.439	72	7.5	0.6	0.3	0.04	0.003
Peace Lutheran Apt #2,	633.517	6236.442	73	7.5	0.6	0.3	0.04	0.003
The Sunset Home	633.588	6236.708	72	7.3	0.6	0.3	0.04	0.003
North Peace Care Centre	633.381	6236.534	72	7.4	0.6	0.3	0.04	0.003
Abbeyfield Houses of Fort St. John	635.602	6235.204	70	9.5	1.0	0.3	0.04	0.004
New Senior Housing	633.553	6236.243	73	7.6	0.7	0.3	0.04	0.003

Table G.22 Maximum predicted concentrations of CO at ground-truthed residences (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	Without Background		With Background	
			1-hour	8-hour	1-hour	8-hour
Residence 1	630.981	6232.372	179	54	408	214
Residence 2	630.756	6232.335	167	58	396	218
Residence 3	630.717	6232.314	161	60	390	221
Residence 4	630.581	6232.296	159	54	388	214
Residence 5	630.552	6232.296	158	55	387	216
Residence 6	630.247	6232.403	139	45	368	206
Residence 7	634.997	6230.486	60	23	289	184
Residence 8	634.862	6230.523	61	24	290	184
Residence 9	635.041	6230.506	59	23	288	183
Residence 10	635.124	6230.508	59	23	288	183
Residence 11	634.535	6230.703	66	26	295	186
Residence 12	634.579	6230.785	66	26	295	186
Residence 13	634.743	6230.833	65	25	294	185
Residence 14	634.840	6230.765	64	24	293	185
Residence 15	634.898	6230.703	63	24	292	184
Residence 16	634.982	6230.627	61	24	290	184
Residence 17	635.045	6230.755	62	23	291	184
Residence 18	635.042	6230.725	62	23	291	184
Residence 19	635.072	6230.654	61	23	290	183
Residence 20	635.123	6230.659	60	23	289	183
Residence 21	635.138	6230.587	59	23	288	183
Residence 22	630.252	6232.596	121	38	350	198
Residence 23	633.547	6231.980	106	36	335	197
Residence 24	633.549	6232.516	97	30	326	190
Residence 25	633.590	6232.546	94	29	323	190
Residence 26	633.545	6231.881	110	38	339	198
Residence 27	633.547	6231.893	110	37	339	198
Residence 28	634.090	6232.671	83	26	312	186
Residence 29	634.047	6232.473	93	28	322	189
Residence 30	634.132	6232.501	89	28	318	188
Residence 31	633.822	6232.438	96	30	325	191
Residence 32	633.703	6232.241	101	33	330	193
Residence 33	633.970	6232.454	95	29	324	189
Residence 34	632.469	6230.313	123	48	352	209
Residence 35	632.227	6231.391	156	62	385	222
Residence 36	630.438	6232.091	171	58	400	218
Residence 37	631.858	6231.027	193	79	422	240
Residence 38	631.693	6231.612	190	59	419	219
Residence 39	633.385	6231.479	133	44	362	204
Residence 40	634.217	6230.914	74	29	303	189
Residence 41	635.205	6230.478	57	22	286	182
Residence 42	634.888	6230.495	61	24	290	184
Residence 43	631.729	6232.627	155	46	384	206
Residence 44	631.892	6232.432	168	53	397	213
Residence 45	632.827	6232.458	126	38	355	198
Residence 46	633.108	6232.423	117	34	346	195
Residence 47	633.417	6232.513	102	30	331	191
Residence 48	630.233	6232.814	106	30	335	191
Residence 49	630.237	6232.750	110	32	339	193
Residence 50	630.223	6232.954	97	26	326	187
Residence 51	630.236	6232.907	100	28	329	188

Residence 52	633.410	6233.370	80	25	309	186
Residence 53	633.348	6233.331	111	26	340	186
Residence 54	634.909	6233.462	90	19	319	180
Residence 55	634.900	6233.602	91	19	320	179
Residence 56	635.348	6233.713	64	17	293	177
Residence 57	629.555	6232.927	108	21	337	182
Residence 58	629.316	6232.906	99	21	328	181
Residence 59	629.323	6232.964	96	20	325	181
Residence 60	630.449	6232.305	154	62	383	222
Residence 61	635.088	6230.518	59	23	288	183
Residence 62	634.706	6230.715	64	25	293	185
Residence 63	634.632	6230.798	66	25	295	186
Residence 64	634.537	6230.925	69	26	298	187
Residence 65	634.738	6230.939	66	25	295	185
Residence 66	634.844	6230.924	65	25	294	185
Residence 67	634.799	6230.766	64	24	293	185
Residence 68	634.815	6230.761	64	24	293	185
Residence 69	634.889	6230.773	63	24	293	184
Residence 70	634.915	6230.769	63	24	292	184
Residence 71	634.844	6230.703	63	24	292	185
Residence 72	634.828	6230.713	64	24	293	185
Residence 73	634.951	6230.718	62	24	291	184
Residence 74	634.947	6230.768	63	24	292	184
Residence 75	635.008	6230.765	62	24	291	184
Residence 76	634.993	6230.715	62	24	291	184
Residence 77	635.076	6230.717	61	23	290	183
Residence 78	635.096	6230.718	61	23	290	183
Residence 79	635.089	6230.604	60	23	289	183
Residence 80	630.237	6232.630	118	36	347	197
Residence 81	628.453	6232.604	127	23	356	183
Residence 82	633.190	6230.482	94	37	323	197
Residence 83	633.355	6230.925	97	35	326	196
Residence 84	633.569	6230.686	83	32	312	192
Residence 85	635.202	6230.516	58	22	287	183
Residence 86	633.165	6232.660	110	32	339	192
Residence 87	630.279	6232.963	95	27	324	188

Table G.23 Maximum predicted concentrations of CO at ground-truthed non-residences (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	Without Background		With Background	
			1-hour	8-hour	1-hour	8-hour
Non-residence 1	630.709	6228.334	339	116	568	277
Non-residence 2	630.724	6228.349	342	120	571	280
Non-residence 3	631.896	6230.979	244	80	473	240
Non-residence 4	630.996	6232.371	181	55	410	215
Non-residence 5	630.784	6232.310	161	64	390	224
Non-residence 6	630.699	6232.333	160	57	389	217
Non-residence 7	630.658	6232.313	179	91	408	251
Non-residence 8	630.599	6232.308	159	71	388	231
Non-residence 9	630.325	6232.338	155	52	384	212
Non-residence 10	630.351	6232.358	147	50	376	211
Non-residence 11	630.361	6232.357	147	51	376	211
Non-residence 12	630.319	6232.360	145	50	374	210
Non-residence 13	630.328	6232.360	146	50	375	210
Non-residence 14	630.302	6232.348	147	50	376	210
Non-residence 15	630.246	6232.343	152	49	381	209
Non-residence 16	630.255	6232.364	145	48	374	208
Non-residence 17	630.255	6232.349	148	49	377	209
Non-residence 18	630.896	6232.415	162	53	391	213
Non-residence 19	630.888	6232.417	161	53	390	213
Non-residence 20	630.895	6232.422	161	52	390	213
Non-residence 21	630.528	6232.328	155	54	384	215
Non-residence 22	630.527	6232.347	154	53	383	213
Non-residence 23	630.499	6232.316	157	58	386	219
Non-residence 24	630.473	6232.305	155	69	384	229
Non-residence 25	630.447	6232.321	162	56	391	216
Non-residence 26	630.301	6232.359	144	49	373	210
Non-residence 27	630.282	6232.385	141	47	370	208
Non-residence 28	630.933	6232.456	162	51	391	211
Non-residence 29	630.771	6232.361	159	55	388	215
Non-residence 30	635.021	6230.444	58	23	287	183
Non-residence 31	635.133	6230.463	58	22	287	183
Non-residence 32	634.933	6230.465	60	24	289	184
Non-residence 33	634.669	6230.722	65	25	294	185
Non-residence 34	634.373	6230.747	70	27	299	187
Non-residence 35	634.381	6230.741	70	27	299	187
Non-residence 36	634.454	6230.786	68	26	297	187
Non-residence 37	634.721	6230.824	65	25	294	185
Non-residence 38	634.904	6230.735	63	24	292	184
Non-residence 39	634.976	6230.724	62	24	291	184
Non-residence 40	634.975	6230.734	62	24	291	184
Non-residence 41	635.079	6230.582	60	23	289	183
Non-residence 42	634.982	6230.433	59	23	288	183
Non-residence 43	634.986	6230.434	59	23	288	183
Non-residence 44	634.990	6230.433	59	23	288	183
Non-residence 45	635.064	6230.733	62	23	291	184
Non-residence 46	635.559	6230.553	55	20	284	181
Non-residence 47	630.266	6232.703	111	35	340	195
Non-residence 48	630.244	6232.580	122	38	351	199
Non-residence 49	630.299	6232.482	135	44	364	204
Non-residence 50	633.556	6232.393	97	31	326	192
Non-residence 51	633.672	6232.107	99	34	328	194

Non-residence 52	633.541	6231.953	109	37	338	197
Non-residence 53	633.535	6231.964	109	37	338	197
Non-residence 54	631.988	6226.324	106	41	335	201
Non-residence 55	633.707	6232.186	101	33	330	193
Non-residence 56	634.245	6232.454	86	27	315	187
Non-residence 57	634.231	6232.707	80	25	309	185
Non-residence 58	634.232	6232.711	80	25	309	185
Non-residence 59	633.703	6232.491	92	30	321	190
Non-residence 60	633.718	6232.487	93	30	322	190
Non-residence 61	634.013	6232.543	90	28	319	188
Non-residence 62	634.065	6232.496	92	28	321	188
Non-residence 63	636.582	6232.572	53	18	282	178
Non-residence 64	634.044	6232.415	95	29	324	189
Non-residence 65	636.569	6232.484	54	18	283	178
Non-residence 66	634.109	6232.491	90	28	319	188
Non-residence 67	636.664	6232.507	53	18	282	178
Non-residence 68	634.117	6232.506	89	28	318	188
Non-residence 69	634.130	6232.514	89	27	318	188
Non-residence 70	636.698	6232.511	52	18	281	178
Non-residence 71	636.681	6232.499	53	18	282	178
Non-residence 72	636.727	6232.539	52	18	281	178
Non-residence 73	636.788	6232.473	52	17	281	178
Non-residence 74	633.847	6232.489	95	29	324	189
Non-residence 75	633.760	6232.438	95	30	324	191
Non-residence 76	634.147	6232.482	89	28	318	188
Non-residence 77	633.694	6232.129	100	34	329	194
Non-residence 78	633.664	6232.127	99	34	328	194
Non-residence 79	633.683	6232.132	100	34	329	194
Non-residence 80	633.703	6232.133	100	34	329	194
Non-residence 81	633.712	6232.132	101	34	330	194
Non-residence 82	633.695	6232.140	100	34	329	194
Non-residence 83	634.318	6232.305	89	28	318	188
Non-residence 84	633.676	6232.153	100	34	329	194
Non-residence 85	633.702	6232.170	101	33	330	194
Non-residence 86	636.793	6232.437	52	17	281	178
Non-residence 87	636.794	6232.426	52	18	281	178
Non-residence 88	636.747	6232.422	52	18	281	178
Non-residence 89	636.776	6232.519	52	17	281	178
Non-residence 90	633.791	6232.477	94	30	323	190
Non-residence 91	633.665	6232.282	99	32	328	193
Non-residence 92	633.664	6232.298	99	32	328	192
Non-residence 93	633.685	6232.296	100	32	329	192
Non-residence 94	633.676	6232.289	100	32	329	192
Non-residence 95	633.706	6232.222	101	33	330	193
Non-residence 96	633.703	6232.200	101	33	330	193
Non-residence 97	633.730	6232.221	102	33	331	193
Non-residence 98	633.806	6232.494	94	30	323	190
Non-residence 99	633.805	6232.498	94	30	323	190
Non-residence 100	636.768	6232.602	54	18	283	179
Non-residence 101	633.805	6232.503	94	30	323	190
Non-residence 102	633.908	6232.447	97	29	326	189
Non-residence 103	633.911	6232.490	95	29	324	189
Non-residence 104	632.547	6230.574	110	45	339	206
Non-residence 105	631.982	6231.163	173	72	402	232
Non-residence 106	631.982	6231.127	174	72	403	233
Non-residence 107	631.960	6231.110	176	74	405	234

Non-residence 108	632.131	6231.351	165	65	394	226
Non-residence 109	632.237	6231.408	156	61	385	222
Non-residence 110	630.192	6232.050	184	53	413	213
Non-residence 111	630.176	6232.008	193	54	422	215
Non-residence 112	630.031	6232.003	220	49	449	209
Non-residence 113	630.039	6231.965	222	50	451	211
Non-residence 114	630.433	6232.124	168	56	397	217
Non-residence 115	630.415	6232.072	172	58	401	218
Non-residence 116	630.397	6232.048	174	58	403	219
Non-residence 117	630.429	6232.027	177	60	406	220
Non-residence 118	630.394	6231.969	181	61	410	222
Non-residence 119	630.393	6231.980	180	61	409	221
Non-residence 120	630.419	6231.972	182	62	411	222
Non-residence 121	630.431	6231.946	184	63	413	223
Non-residence 122	630.345	6232.115	165	55	394	216
Non-residence 123	630.273	6232.059	176	55	405	215
Non-residence 124	630.296	6232.052	175	56	404	216
Non-residence 125	630.300	6232.083	170	55	399	215
Non-residence 126	630.256	6232.077	174	54	403	214
Non-residence 127	630.239	6232.054	181	55	410	215
Non-residence 128	628.501	6232.716	113	21	342	181
Non-residence 129	631.705	6231.574	187	61	416	222
Non-residence 130	633.145	6231.522	123	46	352	207
Non-residence 131	633.295	6231.506	132	44	361	205
Non-residence 132	633.349	6231.512	137	44	366	204
Non-residence 133	633.275	6231.506	130	45	359	205
Non-residence 134	633.386	6231.498	132	43	361	204
Non-residence 135	633.269	6230.441	92	36	321	197
Non-residence 136	633.237	6230.581	94	36	324	197
Non-residence 137	633.292	6230.470	92	36	321	196
Non-residence 138	633.261	6230.472	93	36	322	197
Non-residence 139	633.225	6230.449	92	36	321	197
Non-residence 140	633.391	6230.914	94	35	324	195
Non-residence 141	633.630	6230.661	82	32	311	192
Non-residence 142	633.628	6230.657	82	32	311	192
Non-residence 143	631.766	6232.355	188	63	417	224
Non-residence 144	631.411	6232.490	179	50	408	210
Non-residence 145	631.403	6232.484	180	50	409	211
Non-residence 146	631.876	6232.603	155	46	384	207
Non-residence 147	632.203	6232.437	180	44	409	204
Non-residence 148	632.427	6232.483	183	41	412	201
Non-residence 149	632.632	6232.445	139	39	368	200
Non-residence 150	632.430	6231.891	140	47	369	208
Non-residence 151	632.963	6232.611	120	35	349	195
Non-residence 152	632.828	6232.481	126	38	355	198
Non-residence 153	633.145	6232.700	111	32	340	192
Non-residence 154	633.134	6232.689	111	32	340	193
Non-residence 155	633.442	6232.703	98	28	327	188
Non-residence 156	633.084	6232.423	118	35	347	195
Non-residence 157	633.105	6232.405	117	34	346	195
Non-residence 158	633.046	6232.480	118	35	347	195
Non-residence 159	633.419	6232.447	102	31	331	192
Non-residence 160	633.452	6232.453	101	31	330	192
Non-residence 161	633.424	6232.451	101	31	330	192
Non-residence 162	633.127	6232.758	111	32	340	192
Non-residence 163	630.249	6232.842	103	30	332	190

Non-residence 164	630.298	6232.738	108	34	337	194
Non-residence 165	630.247	6232.782	107	32	336	192
Non-residence 166	634.386	6233.116	81	21	310	181
Non-residence 167	634.207	6232.732	80	25	309	185
Non-residence 168	635.335	6233.676	67	17	296	177
Non-residence 169	635.310	6233.690	68	17	297	177
Non-residence 170	636.056	6233.139	56	18	285	178
Non-residence 171	635.660	6233.183	68	18	297	179
Non-residence 172	635.581	6233.534	58	17	287	178
Non-residence 173	635.575	6233.206	73	18	302	179
Non-residence 174	635.529	6233.502	62	17	291	178
Non-residence 175	635.633	6233.267	68	19	297	179
Non-residence 176	635.687	6233.405	55	18	284	178
Non-residence 177	635.751	6233.348	56	18	285	178
Non-residence 178	635.820	6233.359	55	18	284	178
Non-residence 179	630.258	6232.922	98	28	327	188
Non-residence 180	634.541	6233.203	83	20	312	181
Non-residence 181	633.385	6233.309	81	26	310	186
Non-residence 182	633.348	6233.268	84	26	313	186
Non-residence 183	633.503	6233.342	79	25	308	185
Non-residence 184	633.633	6233.221	78	25	307	185
Non-residence 185	634.933	6233.444	90	19	319	180
Non-residence 186	635.804	6233.334	55	18	284	178
Non-residence 187	633.576	6233.209	78	25	307	185
Non-residence 188	635.793	6233.323	56	18	285	178
Non-residence 189	635.790	6233.311	56	18	285	178
Non-residence 190	633.658	6233.135	78	25	307	185
Non-residence 191	635.803	6233.303	56	18	285	178
Non-residence 192	633.656	6233.119	78	25	307	185
Non-residence 193	635.749	6233.372	55	18	284	178
Non-residence 194	634.690	6233.086	81	21	310	181
Non-residence 195	635.608	6233.285	69	19	298	179
Non-residence 196	636.833	6232.745	51	17	280	177
Non-residence 197	633.745	6233.168	77	24	306	185
Non-residence 198	636.822	6232.743	51	17	280	177
Non-residence 199	633.760	6233.162	77	24	306	185
Non-residence 200	636.790	6232.734	51	17	280	178
Non-residence 201	636.777	6232.764	51	17	280	178
Non-residence 202	633.639	6233.221	78	25	307	185
Non-residence 203	633.658	6233.220	78	25	307	185
Non-residence 204	633.619	6233.125	79	25	308	185
Non-residence 205	634.432	6233.402	84	20	313	181
Non-residence 206	634.423	6233.360	83	20	312	181
Non-residence 207	634.340	6233.269	82	21	311	181
Non-residence 208	634.914	6233.603	91	19	320	179
Non-residence 209	634.903	6233.556	90	19	319	179
Non-residence 210	635.007	6233.494	90	19	319	179
Non-residence 211	635.007	6233.556	90	19	319	179
Non-residence 212	635.030	6233.644	89	19	318	180
Non-residence 213	635.234	6233.722	71	17	300	177
Non-residence 214	635.199	6233.691	79	18	308	178
Non-residence 215	636.133	6233.165	55	18	284	178
Non-residence 216	629.360	6232.774	108	23	337	183
Non-residence 217	629.356	6232.783	108	23	337	183
Non-residence 218	629.578	6232.895	110	22	339	182
Non-residence 219	629.226	6232.883	99	21	328	181

Non-residence 220	629.334	6232.855	102	22	331	182
Non-residence 221	629.324	6232.873	101	21	330	182
Non-residence 222	629.292	6232.864	101	21	330	182
Non-residence 223	629.279	6232.862	101	21	330	182
Non-residence 224	629.331	6232.925	98	21	327	181
Non-residence 225	629.345	6232.916	99	21	329	181
Non-residence 226	629.348	6232.935	99	21	328	181
Non-residence 227	633.401	6232.733	99	28	328	188
Non-residence 228	630.655	6232.303	161	61	390	221
Non-residence 229	630.407	6232.300	153	52	382	213
Non-residence 230	630.452	6232.324	156	54	385	214
Non-residence 231	630.360	6232.328	158	54	387	214
Non-residence 232	630.809	6232.413	157	52	386	213
Non-residence 233	630.679	6232.377	157	53	386	213
Non-residence 234	635.280	6230.416	56	22	285	182
Non-residence 235	634.753	6230.706	64	25	293	185
Non-residence 236	634.459	6230.807	68	26	297	187
Non-residence 237	634.485	6230.766	67	26	296	186
Non-residence 238	634.674	6230.781	65	25	294	185
Non-residence 239	634.719	6230.837	65	25	294	185
Non-residence 240	634.543	6230.948	69	26	298	186
Non-residence 241	634.915	6230.724	63	24	292	184
Non-residence 242	634.915	6230.654	62	24	291	184
Non-residence 243	635.018	6230.724	62	24	291	184
Non-residence 244	635.096	6230.655	60	23	290	183
Non-residence 245	635.128	6230.627	60	23	289	183
Non-residence 246	635.559	6230.527	55	20	284	181
Non-residence 247	630.258	6232.565	124	39	353	200
Non-residence 248	631.977	6226.320	106	40	335	201
Non-residence 249	633.954	6232.464	95	29	324	189
Non-residence 250	634.021	6232.502	93	28	322	188
Non-residence 251	636.675	6232.516	53	18	282	178
Non-residence 252	636.764	6232.524	52	17	281	178
Non-residence 253	633.791	6232.481	94	30	323	190
Non-residence 254	633.682	6232.260	100	32	329	193
Non-residence 255	633.808	6232.445	95	30	324	191
Non-residence 256	633.820	6232.470	95	30	324	190
Non-residence 257	631.968	6231.106	175	73	404	233
Non-residence 258	632.215	6231.407	158	62	387	222
Non-residence 259	630.179	6231.985	196	55	425	216
Non-residence 260	630.455	6232.103	171	57	400	218
Non-residence 261	630.434	6231.940	185	63	414	223
Non-residence 262	630.116	6232.674	123	31	352	191
Non-residence 263	628.548	6232.661	110	21	339	181
Non-residence 264	631.692	6231.654	193	56	422	217
Non-residence 265	633.277	6231.494	130	45	359	205
Non-residence 266	633.164	6230.500	95	37	324	198
Non-residence 267	633.210	6230.535	94	36	323	197
Non-residence 268	633.276	6230.498	93	36	322	196
Non-residence 269	633.220	6230.512	94	37	323	197
Non-residence 270	633.590	6230.696	83	32	312	192
Non-residence 271	634.866	6230.491	61	24	290	184
Non-residence 272	631.883	6232.606	155	46	384	207
Non-residence 273	632.540	6232.426	167	40	396	200
Non-residence 274	632.425	6231.891	140	47	369	208
Non-residence 275	633.140	6232.682	111	32	340	193

Non-residence 276	633.196	6232.449	114	33	343	194
Non-residence 277	630.243	6232.781	108	31	337	192
Non-residence 278	630.280	6232.975	94	27	323	187
Non-residence 279	635.385	6233.556	71	17	300	178
Non-residence 280	635.106	6233.424	89	19	318	179
Non-residence 281	635.812	6233.348	55	18	284	178
Non-residence 282	635.182	6233.689	80	18	309	178
Non-residence 283	636.388	6232.996	54	18	283	178
Non-residence 284	629.248	6233.007	93	20	322	181
Non-residence 285	629.176	6232.862	100	21	329	181
Non-residence 286	629.578	6232.917	109	22	338	182
Non-residence 287	629.256	6232.919	98	21	327	181

Table G.24 Maximum predicted concentrations of CO at unknown buildings (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	Without Background		With Background	
			1-hour	8-hour	1-hour	8-hour
Unknown Building 1	644.950	6225.018	17	6.7	246	167
Unknown Building 2	644.872	6225.507	18	6.6	247	167
Unknown Building 3	644.880	6225.504	18	6.6	247	167
Unknown Building 4	644.952	6225.002	17	6.7	246	167
Unknown Building 5	644.955	6224.971	17	6.7	246	167
Unknown Building 6	644.947	6224.943	17	6.7	246	167
Unknown Building 7	644.947	6224.925	17	6.7	246	167
Unknown Building 8	644.963	6224.933	17	6.6	246	167
Unknown Building 9	644.882	6225.060	17	6.7	246	167
Unknown Building 10	643.566	6225.463	21	7.5	250	168
Unknown Building 11	643.559	6225.463	21	7.5	250	168
Unknown Building 12	643.374	6225.135	21	7.7	250	168
Unknown Building 13	643.404	6225.133	21	7.7	250	168
Unknown Building 14	643.403	6225.138	21	7.7	250	168
Unknown Building 15	643.969	6223.120	15	6.2	244	167
Unknown Building 16	643.834	6224.638	20	7.4	249	168
Unknown Building 17	643.831	6224.618	20	7.4	249	168
Unknown Building 18	644.950	6225.063	17	6.6	246	167
Unknown Building 19	644.943	6225.062	17	6.7	246	167
Unknown Building 20	644.951	6225.052	17	6.6	246	167
Unknown Building 21	644.953	6225.057	17	6.6	246	167
Unknown Building 22	644.933	6225.059	17	6.7	246	167
Unknown Building 23	644.990	6224.918	17	6.6	246	167
Unknown Building 24	644.990	6224.939	17	6.6	246	167
Unknown Building 25	644.873	6225.014	17	6.7	246	167
Unknown Building 26	644.713	6224.856	18	6.9	247	167
Unknown Building 27	644.760	6224.826	18	6.8	247	167
Unknown Building 28	644.816	6224.832	17	6.8	246	167
Unknown Building 29	644.815	6224.853	17	6.8	246	167
Unknown Building 30	644.843	6224.892	17	6.8	246	167
Unknown Building 31	644.871	6224.825	17	6.7	246	167
Unknown Building 32	644.906	6224.940	17	6.7	246	167
Unknown Building 33	644.867	6224.969	17	6.7	246	167
Unknown Building 34	643.667	6225.359	21	7.5	250	168
Unknown Building 35	643.773	6225.267	21	7.4	250	168
Unknown Building 36	643.797	6225.227	21	7.4	250	168
Unknown Building 37	643.806	6225.168	20	7.4	249	168
Unknown Building 38	643.808	6225.162	20	7.4	249	168
Unknown Building 39	643.766	6225.177	21	7.5	250	168
Unknown Building 40	643.683	6225.204	21	7.5	250	168
Unknown Building 41	643.681	6225.221	21	7.5	250	168
Unknown Building 42	643.634	6225.271	21	7.5	250	168
Unknown Building 43	643.633	6225.252	21	7.5	250	168
Unknown Building 44	643.894	6223.384	16	6.5	245	167
Unknown Building 45	643.856	6223.461	16	6.6	245	167
Unknown Building 46	644.033	6223.096	15	6.2	244	166
Unknown Building 47	644.849	6225.100	18	6.7	247	167
Unknown Building 48	644.708	6225.309	18	6.8	247	167
Unknown Building 49	644.412	6224.131	17	6.9	246	167
Unknown Building 50	644.406	6224.149	17	6.9	246	167
Unknown Building 51	643.639	6225.491	21	7.5	250	168

Unknown Building 52	643.623	6225.483	21	7.5	250	168
Unknown Building 53	643.691	6225.415	21	7.5	250	168
Unknown Building 54	643.709	6225.375	21	7.5	250	168
Unknown Building 55	643.700	6225.363	21	7.5	250	168
Unknown Building 56	643.664	6225.368	21	7.5	250	168
Unknown Building 57	642.358	6232.697	20	7.0	249	167
Unknown Building 58	642.370	6232.697	20	7.0	249	167
Unknown Building 59	641.707	6232.306	21	7.9	250	168
Unknown Building 60	641.716	6232.294	21	7.8	250	168
Unknown Building 61	639.639	6231.988	30	11	259	171
Unknown Building 62	639.669	6231.968	30	11	259	171
Unknown Building 63	641.692	6232.162	22	7.9	251	168
Unknown Building 64	639.724	6231.971	29	11	258	171
Unknown Building 65	641.692	6232.158	22	7.9	251	168
Unknown Building 66	642.008	6232.583	21	7.4	250	168
Unknown Building 67	639.730	6231.945	30	11	259	171
Unknown Building 68	641.731	6232.165	22	7.8	251	168
Unknown Building 69	641.983	6232.575	21	7.5	250	168
Unknown Building 70	639.694	6231.927	30	11	259	171
Unknown Building 71	641.719	6232.146	22	7.8	251	168
Unknown Building 72	641.977	6232.585	21	7.5	250	168
Unknown Building 73	641.745	6232.141	22	7.8	251	168
Unknown Building 74	641.764	6232.131	22	7.7	251	168
Unknown Building 75	641.939	6232.450	21	7.5	250	168
Unknown Building 76	641.800	6232.154	22	7.7	251	168
Unknown Building 77	641.817	6232.160	22	7.7	251	168
Unknown Building 78	641.827	6232.134	22	7.6	251	168
Unknown Building 79	641.220	6232.063	24	8.2	253	169
Unknown Building 80	641.784	6232.059	22	7.7	251	168
Unknown Building 81	641.219	6232.071	24	8.2	253	169
Unknown Building 82	641.751	6232.050	22	7.8	251	168
Unknown Building 83	641.219	6232.085	24	8.2	253	169
Unknown Building 84	641.208	6232.134	23	8.2	252	169
Unknown Building 85	641.842	6232.556	21	7.7	250	168
Unknown Building 86	641.200	6232.134	24	8.2	253	169
Unknown Building 87	641.242	6232.144	23	8.2	252	168
Unknown Building 88	641.273	6232.106	24	8.1	253	168
Unknown Building 89	641.267	6232.081	24	8.1	253	168
Unknown Building 90	641.350	6232.123	23	8.0	252	168
Unknown Building 91	641.913	6232.471	21	7.6	250	168
Unknown Building 92	641.360	6232.149	23	8.0	252	168
Unknown Building 93	641.339	6232.148	23	8.1	252	168
Unknown Building 94	641.334	6232.133	23	8.1	252	168
Unknown Building 95	641.329	6232.136	23	8.1	252	168
Unknown Building 96	641.319	6232.130	23	8.1	252	168
Unknown Building 97	641.716	6232.361	21	7.9	250	168
Unknown Building 98	641.726	6232.330	21	7.8	250	168
Unknown Building 99	642.420	6232.706	20	6.9	249	167
Unknown Building 100	641.719	6232.315	21	7.8	250	168
Unknown Building 101	642.414	6232.697	20	6.9	249	167
Unknown Building 102	641.708	6232.314	21	7.9	250	168
Unknown Building 103	641.729	6229.020	31	8.7	260	169
Unknown Building 104	641.715	6229.015	31	8.8	260	169
Unknown Building 105	641.684	6229.037	32	8.8	261	169
Unknown Building 106	641.664	6229.052	32	8.9	261	169
Unknown Building 107	641.684	6229.050	32	8.8	261	169

Unknown Building 108	641.698	6229.109	32	8.8	261	169
Unknown Building 109	641.689	6228.896	31	8.8	260	169
Unknown Building 110	641.669	6228.915	31	8.8	260	169
Unknown Building 111	641.657	6228.840	31	8.8	260	169
Unknown Building 112	641.665	6228.834	30	8.8	259	169
Unknown Building 113	644.398	6226.367	17	6.3	246	167
Unknown Building 114	643.881	6226.485	18	6.5	247	167
Unknown Building 115	644.029	6226.070	19	6.8	248	167
Unknown Building 116	644.017	6226.086	19	6.8	248	167
Unknown Building 117	642.838	6226.416	20	7.4	249	168
Unknown Building 118	642.945	6226.433	20	7.6	249	168
Unknown Building 119	642.936	6226.428	20	7.9	249	168
Unknown Building 120	642.888	6226.854	21	6.8	250	167
Unknown Building 121	642.854	6226.949	21	6.7	250	167
Unknown Building 122	643.847	6226.177	19	6.9	248	167
Unknown Building 123	643.840	6226.157	19	6.9	248	167
Unknown Building 124	643.865	6226.164	19	6.9	248	167
Unknown Building 125	643.882	6226.134	19	6.9	248	167
Unknown Building 126	643.897	6226.107	19	6.9	248	167
Unknown Building 127	643.902	6226.101	19	6.9	248	167
Unknown Building 128	643.599	6226.038	22	8.9	251	169
Unknown Building 129	643.616	6226.337	19	6.9	248	167
Unknown Building 130	643.663	6226.211	19	7.0	248	167
Unknown Building 131	643.697	6226.185	19	7.0	248	167
Unknown Building 132	643.719	6226.149	19	7.0	248	167
Unknown Building 133	643.736	6226.142	19	7.0	248	167
Unknown Building 134	643.744	6226.087	19	7.0	248	167
Unknown Building 135	643.748	6226.078	19	7.0	248	167
Unknown Building 136	643.753	6226.063	19	7.0	248	167
Unknown Building 137	641.735	6229.039	31	8.7	260	169
Unknown Building 138	643.909	6226.161	19	6.8	248	167
Unknown Building 139	643.834	6226.210	19	6.9	248	167
Unknown Building 140	643.384	6226.373	19	7.0	248	167
Unknown Building 141	643.418	6226.364	19	7.0	248	167
Unknown Building 142	642.743	6226.973	22	6.8	251	167
Unknown Building 143	642.768	6226.982	22	6.8	251	167
Unknown Building 144	642.672	6226.501	21	7.5	250	168
Unknown Building 145	642.676	6226.447	21	7.5	250	168
Unknown Building 146	643.764	6226.139	19	7.0	248	167
Unknown Building 147	643.755	6226.147	19	7.0	248	167
Unknown Building 148	643.768	6226.152	19	7.0	248	167
Unknown Building 149	643.779	6226.166	19	6.9	248	167
Unknown Building 150	643.757	6226.160	19	7.0	248	167
Unknown Building 151	643.771	6226.180	19	6.9	248	167
Unknown Building 152	643.753	6226.187	19	6.9	248	167
Unknown Building 153	643.720	6226.203	19	7.0	248	167
Unknown Building 154	643.744	6226.210	19	6.9	248	167
Unknown Building 155	643.832	6226.175	19	6.9	248	167
Unknown Building 156	643.172	6226.037	20	7.8	249	168
Unknown Building 157	643.203	6225.978	20	7.5	249	168
Unknown Building 158	643.484	6226.166	19	7.2	248	167
Unknown Building 159	643.367	6226.160	20	7.3	249	168
Unknown Building 160	643.528	6226.061	20	7.2	249	168
Unknown Building 161	643.545	6226.046	20	7.4	249	168
Unknown Building 162	643.536	6226.004	20	7.3	249	168
Unknown Building 163	643.472	6226.157	19	7.2	249	167

Unknown Building 164	643.587	6226.050	20	7.4	249	168
Unknown Building 165	643.185	6226.306	20	7.3	249	168
Unknown Building 166	643.027	6226.363	20	7.3	249	168
Unknown Building 167	641.436	6228.659	30	9.2	259	169
Unknown Building 168	642.961	6226.254	20	7.5	249	168
Unknown Building 169	644.004	6226.153	19	6.8	248	167
Unknown Building 170	643.970	6226.198	19	6.8	248	167
Unknown Building 171	643.973	6226.201	19	6.8	248	167
Unknown Building 172	643.968	6226.204	19	6.8	248	167
Unknown Building 173	643.956	6226.214	19	6.8	248	167
Unknown Building 174	641.724	6227.960	25	8.3	254	169
Unknown Building 175	641.741	6227.953	25	8.3	254	169
Unknown Building 176	641.677	6228.058	25	8.5	254	169
Unknown Building 177	641.672	6228.099	25	8.5	254	169
Unknown Building 178	641.666	6228.095	25	8.5	254	169
Unknown Building 179	643.902	6226.128	19	6.9	248	167
Unknown Building 180	643.908	6226.118	19	6.9	248	167
Unknown Building 181	643.914	6226.110	19	6.9	248	167
Unknown Building 182	643.882	6226.168	19	6.9	248	167
Unknown Building 183	643.875	6226.180	19	6.9	248	167
Unknown Building 184	639.183	6227.195	34	12	263	173
Unknown Building 185	639.162	6227.197	34	12	263	173
Unknown Building 186	638.997	6227.336	32	13	261	173
Unknown Building 187	639.202	6227.203	33	12	262	173
Unknown Building 188	643.875	6226.185	19	6.8	248	167
Unknown Building 189	643.868	6226.221	19	6.8	248	167
Unknown Building 190	643.761	6226.051	19	7.1	248	167
Unknown Building 191	643.782	6226.058	19	7.0	248	167
Unknown Building 192	643.814	6226.081	19	7.0	248	167
Unknown Building 193	643.801	6226.090	19	7.0	248	167
Unknown Building 194	643.797	6226.103	19	7.0	248	167
Unknown Building 195	643.794	6226.117	19	7.0	248	167
Unknown Building 196	643.793	6226.138	19	7.0	248	167
Unknown Building 197	643.767	6226.128	19	7.0	248	167
Unknown Building 198	643.268	6226.302	19	7.2	248	168
Unknown Building 199	643.292	6226.276	19	7.2	248	168
Unknown Building 200	643.216	6226.347	20	7.2	249	168
Unknown Building 201	643.224	6226.078	20	7.4	249	168
Unknown Building 202	643.256	6226.097	20	7.4	249	168
Unknown Building 203	643.288	6226.117	20	7.4	249	168
Unknown Building 204	643.339	6226.147	20	7.3	249	168
Unknown Building 205	643.303	6226.155	20	7.3	249	168
Unknown Building 206	622.081	6236.050	15	3.4	244	164
Unknown Building 207	622.088	6235.938	15	3.5	244	164
Unknown Building 208	622.090	6235.975	15	3.5	244	164
Unknown Building 209	621.912	6235.742	15	3.5	244	164
Unknown Building 210	622.223	6235.981	16	3.6	245	164
Unknown Building 211	622.240	6235.939	16	3.6	245	164
Unknown Building 212	643.342	6232.985	17	6.0	246	166
Unknown Building 213	642.375	6232.724	20	7.0	249	167
Unknown Building 214	642.401	6232.723	20	7.0	249	167
Unknown Building 215	643.329	6233.006	17	6.0	246	166
Unknown Building 216	642.416	6232.748	20	6.9	249	167
Unknown Building 217	643.334	6233.011	17	6.0	246	166
Unknown Building 218	642.409	6232.755	20	6.9	249	167
Unknown Building 219	643.338	6233.028	17	6	246	166

Unknown Building 220	642.398	6232.749	20	7.0	249	167
Unknown Building 221	643.335	6233.152	18	6.1	247	166
Unknown Building 222	642.392	6232.749	20	7.0	249	167
Unknown Building 223	643.308	6233.164	18	6.1	247	166
Unknown Building 224	642.368	6232.771	20	7.0	249	167
Unknown Building 225	643.304	6233.215	18	6.1	247	166
Unknown Building 226	642.409	6232.760	20	6.9	249	167
Unknown Building 227	643.336	6233.207	18	6.1	247	166
Unknown Building 228	643.314	6233.263	18	6.1	247	166
Unknown Building 229	626.029	6235.450	29	6.9	258	167
Unknown Building 230	643.303	6233.282	18	6.1	247	166
Unknown Building 231	643.334	6233.306	18	6.1	247	166
Unknown Building 232	643.313	6233.331	18	6.1	247	166
Unknown Building 233	643.300	6233.326	18	6.1	247	166
Unknown Building 234	643.203	6233.002	18	6.1	247	166
Unknown Building 235	643.196	6232.991	18	6.1	247	166
Unknown Building 236	643.246	6232.984	18	6.1	247	166
Unknown Building 237	643.191	6232.960	18	6.1	247	166
Unknown Building 238	643.239	6232.950	18	6.1	247	166
Unknown Building 239	643.231	6232.911	18	6.1	247	166
Unknown Building 240	646.432	6233.677	12	3.5	241	164
Unknown Building 241	646.501	6233.734	12	3.5	241	164
Unknown Building 242	626.927	6234.611	37	10	266	171
Unknown Building 243	643.244	6232.893	18	6.1	247	166
Unknown Building 244	643.200	6232.869	18	6.1	247	166
Unknown Building 245	646.378	6233.687	12	3.6	241	164
Unknown Building 246	643.189	6232.851	18	6.1	247	166
Unknown Building 247	646.378	6233.691	12	3.6	241	164
Unknown Building 248	643.204	6232.854	18	6.1	247	166
Unknown Building 249	646.354	6233.688	12	3.6	241	164
Unknown Building 250	643.219	6232.853	18	6.1	247	166
Unknown Building 251	646.357	6233.709	12	3.6	241	164
Unknown Building 252	643.238	6232.844	18	6.1	247	166
Unknown Building 253	643.016	6232.721	18	6.3	247	167
Unknown Building 254	643.326	6232.944	17	6.0	246	166
Unknown Building 255	643.315	6232.981	17	6.0	246	166
Unknown Building 256	642.409	6232.764	20	6.9	249	167
Unknown Building 257	642.409	6232.768	20	6.9	249	167
Unknown Building 258	642.434	6232.773	20	6.9	249	167
Unknown Building 259	642.331	6232.741	20	7.1	249	167
Unknown Building 260	642.316	6232.728	20	7.1	249	167
Unknown Building 261	642.298	6232.715	20	7.1	249	167
Unknown Building 262	642.963	6232.725	18	6.3	247	167
Unknown Building 263	621.923	6235.219	16	3.9	245	164
Unknown Building 264	621.936	6235.188	16	4.0	245	164
Unknown Building 265	621.979	6235.185	17	4.0	246	164
Unknown Building 266	625.563	6235.174	33	7.3	262	168
Unknown Building 267	625.767	6235.142	28	7.4	257	168
Unknown Building 268	627.442	6234.203	45	12	274	172
Unknown Building 269	626.401	6234.964	31	8.2	260	168
Unknown Building 270	626.381	6234.964	31	8.1	260	168
Unknown Building 271	626.452	6235.114	31	8.3	260	169
Unknown Building 272	626.453	6235.109	31	8.4	260	169
Unknown Building 273	626.630	6235.208	31	8.7	260	169
Unknown Building 274	626.467	6235.141	31	8.4	260	169
Unknown Building 275	626.461	6235.127	31	8.4	260	169

Unknown Building 276	626.495	6235.173	30	8.4	259	169
Unknown Building 277	626.425	6235.038	31	8.3	260	169
Unknown Building 278	621.996	6237.816	9.9	2.5	239	163
Unknown Building 279	622.012	6237.737	10	2.5	239	163
Unknown Building 280	622.051	6237.728	10	2.5	239	163
Unknown Building 281	622.041	6237.751	10	2.5	239	163
Unknown Building 282	622.038	6237.770	10	2.5	239	163
Unknown Building 283	622.001	6237.816	9.9	2.5	239	163
Unknown Building 284	622.656	6235.987	19	4.1	248	164
Unknown Building 285	625.996	6235.432	28	6.8	257	167
Unknown Building 286	625.963	6235.416	28	6.7	257	167
Unknown Building 287	625.953	6235.405	28	6.7	257	167

Table G.25 Maximum predicted concentrations of CO at schools (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	Without Background		With Background	
			1-hour	8-hour	1-hour	8-hour
Aboriginal Education Center	633.609	6235.391	42	14	271	174
Alwin Holland	633.853	6236.278	31	10	260	171
Baldonnel Elementary	642.961	6232.724	18	6.3	247	167
Bert Ambrose Elementary	633.698	6237.244	28	7.8	257	168
Bert Bowes Middle School	632.695	6235.420	44	14	273	175
Board Office	633.204	6236.129	32	9.5	261	170
Charlie Lake Elementary	626.866	6238.375	32	7.7	261	168
CM Finch Elementary	632.665	6236.509	39	8.5	268	169
Dr. Kearney Middle School	634.341	6236.419	30	10	259	171
Duncan Cran Elementary	635.468	6234.477	41	13	270	173
Ecole Central Elementary	633.100	6235.426	44	13	274	174
Facilities & Transportation	632.721	6235.227	48	16	277	177
Key Learning Centre	632.856	6235.390	45	14	274	175
North Peace Secondary	634.926	6234.932	35	12	264	172
Energetic Learning Campus	634.926	6234.932	35	12	264	172
Northern BC Distance Education	632.856	6235.390	45	14	274	175
Open Learning	632.856	6235.390	45	14	274	175
Robert Ogilvie Elementary	635.074	6235.572	28	10	257	171
Student Support Services	633.204	6236.129	32	9.5	261	170
Taylor Elementary	643.346	6227.033	19	6.2	248	167
Technology Services	633.204	6236.129	32	9.5	261	170
Upper Halfway Elementary	633.204	6236.129	32	9.5	261	170
Wonowon Elementary	633.204	6236.129	32	9.5	261	170

Table G.26 Maximum predicted concentrations of CO at child care facilities (in µg/m^3)

Receptor ID	UTM Easting (km)	UTM Northing (km)	Without Background		With Background	
			1-hour	8-hour	1-hour	8-hour
Chunkey Monkey Daycare	634.736	6235.411	31	11	260	172
Oscare Daycare/Oscare Tots	632.978	6235.501	43	13	272	173
The Zoo Daycare	634.054	6236.232	31	11	260	171
Little Kritters Daycare	624.101	6239.158	16	2.9	245	163
ABC & 123 Family Daycare	635.818	6234.246	44	14	273	174
Baby Bear Daycare	634.940	6234.929	35	12	264	172
Rascals	626.867	6238.356	33	7.7	262	168
Building Blocks Daycare	632.341	6235.672	49	13	278	173
Kidz Club	635.485	6234.438	42	13	271	174
Northern Lights College Daycare	632.978	6235.501	43	13	272	173
Little Bear Family Daycare	634.746	6235.411	31	11	260	172
Little Peanuts Family Daycare	636.173	6234.279	43	14	272	174
Little Pigs Family Daycare	633.130	6236.459	31	8.6	260	169
Nanny Norma's Daycare	633.845	6237.086	29	8.0	258	168
Pitter Patter Day Care	635.907	6234.821	37	12	266	172
Puddle Jumpers	633.845	6237.086	29	8.0	258	168
Seeds to Sow	634.341	6235.509	33	13	262	173
The Playground Family Daycare	635.666	6234.938	35	11	264	172
The Wiggles and Giggles Daycare	632.583	6235.781	43	11	272	171
TJ's Playhouse	634.310	6235.425	34	13	263	173
Tot's and Tikes Family Daycare	633.117	6236.197	30	8.9	259	169
The Stepping Stones Centre	635.815	6235.192	32	11	261	171
Aboriginal Head Start	633.003	6235.697	39	11	268	172
Child Development Centre	632.929	6236.112	34	9.2	263	170
Keeginaw Pre-School	633.173	6235.032	49	18	278	178
Totem Pre-School	635.236	6235.541	28	9.8	257	170
Rise and Shine Clubhouse	635.020	6235.584	28	10	257	171
Barney and Friends Family Daycare	643.482	6226.539	18	6.8	247	167
Hudson's Hope Playschool	643.946	6225.250	20	7.3	249	168

Table G.27 Maximum predicted concentrations of CO at health care facilities (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	Without Background		With Background	
			1-hour	8-hour	1-hour	8-hour
Fort St John Hospital and Health Care	633.715	6235.551	39	13	268	174
Fort St John Medical Clinic	633.889	6235.722	36	13	265	173
Fort St John Pharmacy and Wellness Centre	633.623	6235.735	37	12	266	173
The Taylor Medical Clinic	643.866	6225.592	20	7.3	249	168
ABC Medical Clinic	633.516	6235.725	38	12	267	173
North Peace Medical Clinic	633.554	6235.725	38	12	267	173

Table G.28 Maximum predicted concentrations of CO at senior care facilities (in µg/m³)

Receptor ID	UTM Easting (km)	UTM Northing (km)	Without Background		With Background	
			1-hour	8-hour	1-hour	8-hour
Heritage Manor III	633.568	6236.327	31	9.6	260	170
Peace Lutheran Apt #1,	633.439	6236.439	30	8.8	259	169
Peace Lutheran Apt #2,	633.517	6236.442	31	9.0	260	169
The Sunset Home	633.588	6236.708	30	8.5	259	169
North Peace Care Centre	633.381	6236.534	30	8.6	259	169
Abbeyfield Houses of Fort St. John	635.602	6235.204	32	10	261	171
New Senior Housing	633.553	6236.243	31	9.9	260	170

APPENDIX H

Glossary

Table of contents

1.0 Glossary of Terms

Ambient air quality:

State of outdoor air quality from an environmental perspective, usually measured based on concentrations of contaminants in the air.

Air quality criteria:

Criteria, expressed as objectives and standards, developed by environmental and health authorities to provide guidance for environmental protection decisions. These criteria may be based on the effects of the contaminant on human health, wildlife, vegetation, and aesthetic qualities such as odour or visibility.

Ambient concentration:

Measure of the level of a contaminant in the atmosphere, typically at ground level, expressed as a mass per volume of air (e.g., micrograms per cubic metre) or volume of contaminant per volume of air (e.g., parts per billion).

Area source:

Stationary source of air pollutants that is too small and too numerous to require an authorization under Ministry of Environment laws. In emission inventories, this is a diffuse source of air contaminant emissions or a grouping of sources (e.g., home heating in a residential area). In dispersion modelling, it is treated as a two-dimensional source (or grouping of sources) of diffuse air contaminant emissions that emanates from a broad area (e.g., amalgamated emissions from mobile equipment and/or general activities in an open pit, fugitive dust from stockpiles).

Atmospheric stability:

Measure of resistance to vertical motion in the air.

Background:

A single value representing the representative background concentration of a criteria air contaminant.

Baseline:

Air quality conditions, in terms of emissions or ambient concentrations, associated with existing sources in the study area including all human-caused and natural sources.

Box plot:

Graphical summary representation of a frequency distribution, usually showing specified percentiles or other statistics of the frequency distribution.

Climate normals:

The arithmetic mean of climatological elements over 30 years used to describe the average climate conditions at a location.

Criteria air contaminant:

Air contaminants for which British Columbia or Canada have ambient air quality criteria (objectives or standards). Criteria air contaminants include total suspended particulates (TSP), particulate matter with a diameter less than 10 microns (PM_{10}), particulate matter with a diameter less than 2.5 microns ($PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and carbon monoxide (CO).

Deposition:

Deposition is the settling of particles or gases onto a surface. Wet and dry deposition refer to the settling with or without precipitation. Typical units for dustfall deposition are milligrams per metre squared per day.

Dispersion:

Process by which contaminants emitted from a source mix with ambient air and are transported downwind and thereby decrease in concentration the further they are measured from the source.

Dispersion modelling:

Mathematical simulation of contaminant dispersion in the atmosphere used to predict downwind concentrations of contaminants.

Dustfall:

The amount of particulate matter of all size classes that deposit onto a collection surface in a given amount of time.

Emission inventory:

Summary of emission rates of air contaminants from all point, area and mobile sources in a defined area, which could be the property of an industrial facility or a geopolitical boundary.

Emission rate:

The rate at which contaminants are released into the atmosphere from a source such as a stack. Typically expressed as a mass per unit time (e.g. grams per second or tonnes per year).

Emission factor:

Measure of the amount of contaminant discharged into the atmosphere, expressed as a quantity of contaminant released per unit activity associated with the release (e.g., kilograms per tonne of material handled, grams per vehicle kilometres travelled).

Frequency distribution:

Displays the number of occurrences per chosen intervals, which are usually mutually exclusive and complete, i.e. each occurrence falls into exactly one interval.

Fugitive dust:

Dust released into the atmosphere as a result of the mechanical disturbance of granular material exposed to air.

Heavy-duty vehicle:

Following the US Environmental Protection Agency's vehicle weight classification, a vehicle with a gross vehicle weight rating exceeding 8,500 lbs.

Land cover:

Physical cover on the earth's surface such as urban land, grassland, forested land, water, etc. Different land covers are associated with different geophysical parameters which in turn affect atmospheric dispersion and deposition processes.

Level A objective:

Provincial air quality objective. This level is the long-term goal for air quality and provides a basis for an anti-degradation policy for the unpolluted parts of the country, and for continuing development of control technology.

Level B objective:

Provincial air quality objective. This level is intended to provide adequate protection against effects on soil, water, vegetation, materials, visibility, personal comfort and well-being.

Level C objective:

Provincial air quality objective. This level denotes time-based concentrations of air contaminants beyond which, due to a diminishing margin of safety, appropriate action is required without delay to protect the health of the general public.

Light-duty vehicle:

Following the US Environmental Protection Agency's vehicle weight classification, a vehicle with a gross vehicle weight rating of up to 8,500 lbs.

Maximum acceptable objective:

Federal air quality objective. This level is intended to provide adequate protection against effects on soil, water, vegetation, materials, visibility, personal comfort and well-being.

Maximum desirable objective:

Federal air quality objective. This level is the long-term goal for air quality and provides a basis for an anti-degradation policy for the unpolluted parts of the country, and for continuing development of control technology.

Maximum tolerable objective:

Federal air quality objective. This level denotes time-based concentrations of air contaminants beyond which, due to a diminishing margin of safety, appropriate action is required without delay to protect the health of the general public.

Meteorological conditions:

Prevailing environmental conditions as they influence the prediction of dispersion.

Meteorological monitoring data:

Monitoring data of various meteorological elements including wind speed, wind direction, temperature, precipitation.

Mixing height:

The height above ground in which the lower atmosphere will undergo mechanical or turbulent mixing, producing a nearly homogenous air mass.

Mobile source:

A non-stationary source of air emissions such as a vehicle, backhoe, tractor, ship, train or airplane; typically associated with transportation, construction or agriculture

Off-road transportation:

Vehicle movements that do not take place on roads, rail, water, or in the air, for example operation of most on-site construction equipment, snowmobiles, recreational trail quads, and agricultural vehicles. Also classified as ‘other mobile sources’.

Oxides of nitrogen:

In the context of the air quality TDR, the term ‘oxides of nitrogen’ is used interchangeably with ‘nitrogen oxides’ (NO_x), referring to nitric oxide (NO) and nitrogen dioxide (NO_2).

Particulate matter:

Complex mixture of extremely small particles and liquid droplets suspended in the Earth’s atmosphere.

Percentile:

The n^{th} percentile is defined as the value that is greater than or equal to the n% lowest values and equal or less than the (100-n)% highest values. For example, 1% of all data are less than or equal to the 1st percentile. The median is the value that separates the lower and the upper half of all values and therefore is equal to the 50th percentile.

Photolysis:

Chemical reaction in which a compound is decomposed after absorbing a photon.

Point source:

In emission inventories, an industrial facility operating under an air quality permit or reporting emissions to a regulatory authority. In dispersion modelling, any single identifiable source of pollution from which contaminants are discharged (e.g., a stack).

Precursor:

Compound that participates in a chemical reaction that produces another compound.

Prognostic meteorological model:

A model that solves time-dependent equations of atmospheric circulation to predict future or simulate past meteorological conditions in an area.

Receptor:

A discrete point at which ambient concentrations and/or depositions are predicted in a dispersion model. Receptors can be specified as a grid of discrete points over an area or as individual points representing residences and other sensitive receptors.

Sulphur oxides (SO_x):

Refers to any of the following classes of sulphur and oxygen containing compounds: lower sulphur oxides (S_nO, S_7O_2, S_6O_2), sulphur monoxide (SO), sulphur dioxide (SO_2), sulphur trioxide (SO_3), and higher sulphur oxides (SO_y, $3<y\leq4$).

Surface roughness length:

A characteristic length of individual roughness elements that disturb air flow over the Earth's surface. It depends on the characteristics of individual roughness elements (e.g. size, geometry, permeability, and flexibility) and their arrangement relative to the mean wind.

Surface station:

A meteorological monitoring station that measures meteorological elements representative of ground-layer weather conditions, below an inversion.

Topography:

Surface shape and features of the Earth.

Total suspended particulate:

Particles less than approximately 100 microns (µm) in diameter that typically remain suspended in the air for some time.

Up-slope or down-slope flow:

Air movement up or down a slope caused by temperature differences between near-surface air over a slope and the adjacent lower terrain.

Up-Valley or down-valley flow:

Air movement in a valley caused by larger-scale flows being forced to follow the elongated topography of a valley (channelling) or by horizontal pressure gradients, which in turn are caused by temperature differences between a valley and adjacent areas.

Volume source:

A three-dimensional source (or grouping of sources) of diffuse air contaminant emissions that emanates from a point (e.g. fugitive dust from an isolated activity, emissions from a specific vent or window).

Wind rose:

A bar chart in polar format used to depict the frequency of occurrence of various wind speed classes and wind directions.

2.0 References

Nakićenović, N., and R. Swart (eds.), 2000. Special Report on Emissions Scenarios. A Special Report of Working Group III of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 599 pp.

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/34_145_93

http://www.fao.org/docrep/003/X0596E/x0596e01e.htm