Appendix 3-12

Sensitivity Test of Vehicular Emissions Due to Traffic Generated by This Project

Appendix 3-12 Vehicular Emissions Induced by Proposed Development

1.0 Introduction

The proposed development has incorporated adequate setback distance from nearby roads so that adverse air quality impact upon the development site due to vehicular emissions from nearby road networks, is not anticipated.

During operation of the proposed development, there will be additional traffic generated as a result, which may potentially affect other nearby existing/ planned ASRs although it is expected that the increase in traffic flow due to this Project will arise insignificant impact given the small scale of this Project (70 houses).

There are existing ASRs in adjacent to the existing roads such as existing Fairview Park and village houses at Yau Mei San Tsuen). These ASRs are also adequately setback from the nearby road by the existing planting area/ slope along the edge of Yau Pok Road and Kam Pok Road. Thus, they should not be adversely affected by vehicular emissions as well.

A sensitivity test on vehicular emissions upon nearby roads as a result of the traffic generated by this Project, has been undertaken. The purpose of this test is to provide information that the concerned increase in traffic flow due to this Project will not worsen the air quality or has any adverse impact on nearby ASRs.

2.0 Selection of Representative ASRs

ASRs that have been identified for construction phase air quality assessment of this Project, are also selected for vehicular emissions impact assessment with due consideration of worst affected locations near the road edge. The locations of selected ASRs for vehicular emissions impact assessment are presented in Figure 1 below.

3.0 Methodology

3.1 Air Dispersion Model

The pollutants levels at the ASRs due to vehicular emission were calculated by the dispersion model “CALINE4”. The hourly concentrations of pollutants concerned at the representative ASRs have been predicted. The modelled hourly concentrations have been converted to daily average concentration by taking the average value of 24 hours in a day. Similarly, the annual concentration has been determined by taking the average value of 8760 hours in a year.

In order to represent a worst case scenario, it is assumed that all the road segments are located on the same elevation level (i.e. at-grade level) in the model.

3.2 Parameters

Traffic emission would consist of major pollutants including RSP, FSP, NO_2 and CO.

Sulphur dioxide is mainly generated by chimney emission and other local emission sources like open road traffic emission would have little contribution. SO_2 emission from chimney stack is not a concern for the Project due to absence of industrial chimney nearby (see Section 3.6.2.2 of EIA report), thus no further study is considered necessary.

Ozone is not a primary pollutant emitted from man-made sources but is formed by a set of complex chain reactions between various chemical species, including NOx and VOC, in the presence of sunlight. Therefore, O_3 recorded locally can be attributed to emission generated form places afar. O_3 concentration is highly influenced by regional sources instead of local emission sources. Thus, no further study is considered necessary.

Carbon monoxide is one of the primary pollutants emitted by road transport. Based on the statistics of emission inventory for 2012, road transport emission contributes 65% of CO emission. According to the highest hourly concentrations measured in 2013 at EPD's monitoring stations, highest hourly CO concentration is 4070$\mu g/m^3$ at Causeway Bay station in urban area nearby road carriageway and is still well below the acceptable standard. On the other hand, CO is used to be considered a less critical parameter due to its more relaxed standard and non-excessive emission in relation to open road traffic. Should the predicted NO_2, FSP and RSP concentration comply with relevant standard, no exceedance of CO concentration standard is anticipated.

Leaded petrol had been banned in Hong Kong since 1999 and is no longer considered a primary source in Hong Kong. Chimney emission may generate small amount of Pb emission. Owing to the absence of industrial chimney nearby, lead emission impact is not considered significant.

Having discussed above, RSP, FSP and NO_2 are focused in this study for assessment of air quality impact due to local emission sources (traffic emission).

3.3 Predicted Traffic Flow Generated/ Attracted by this Project

According to the traffic consultant of this Project, traffic generated from this Project will make use of nearby existing roads as the vehicular access such as a section of Yau Pok Road and Kam Pok Road. As Yau Pok Road is a one way road, vehicular access to the Project Site will be through Kam Pok Road and the existing vehicular bridge across Ngau Tam Mei Channel before turning into the Project Site. On the other hand, vehicles leaving the Project Site will be through Yau Pok Road only. Other existing roads such as Castle Peak Road and San Tin Highway are further away and the amount of traffic concerned will be negligible when compared with the road traffic travelling on these roads. Since this Project will arise more impacts on the section of Yau Pok Road and Kam Pok Road immediately adjacent to the Project Site, these sections of roads are assessed further. Please refer to Figure 1 for the existing road segments concerned in this vehicular emission assessment.

Information of traffic flow generated by this Project is provided by the traffic consultant. According to the provided information, this Project will likely to generate 27 vehicles/ hour during the AM Peak hour and 25 vehicle/ hour during the PM peak hour, respectively. The compositions of traffic flow will mainly be private cars from the development site as well as 3 school mini-buses and 1 refuse collection vehicle. Given such small number of traffic generated by this Project and that a majority of the concerned vehicles will be private cars only, it is unlikely that it will adversely affect any nearby ASRs.

3.4 Fleet Average Emission Factors

The emission model EMFAC-HK was adopted to calculate the vehicle emission factors of NO_2 and RSP. The following details the input assumptions of the model.

3.4.1 Methodology of EMFAC-HK Modeling

Objective

The aim of conducting EMFAC Model is to calculate project-specific vehicle emission factor of criteria air pollutants (e.g. NO_2 and RSP) arising from vehicular tailpipe emission on the road carriageways of the proposed development.

EMFAC-HK Model

The EMFAC-HK Model version 2.6 dated 2 Jan 2014 (the EMFAC-HK Model), which was the latest available version, was adopted.

Guideline and Document

Several guidelines and documents published by the EPD, which are available from the following EPD EMFAC-HK website (the EPD website), are referred for EMFAC-HK Model input:

- http://www.epd.gov.hk/epd/english/environmentinhk/air/guide_ref/emfac.html (the EPD website)
- Guideline on Modelling Vehicle Emissions (Revised on 2.1.2014) (the EPD Guideline)
- 2010 Licensed Vehicle by Age and Technology Group Fractions (the EPD Document)

3.4.2 Traffic Data

Predicted traffic data

Project specific peak hour traffic data generated by this Project during operational phase, is adopted in combination with emission factor based on EMFAC-HK Model (with calendar year set as 2018, the project completion year) to estimate the highest vehicular emission rate for each roadway.

Predicted traffic flow generated/ attracted by this Project is provided in Section 3.3 above.

Traffic data adopted in EMFAC-HK Model

As a conservative approach, the AM peak hour traffic data is adopted in order to represent a worst case scenario (i.e. total 27 vehicles/ hour, which comprises 23 private cars, 3 school mini-buses and 1 refuse collection vehicle). Private cars were modelled as “Private Cars (PC)” in the EMFAC model, while school buses and refuse collection vehicle were modelled as “Private Light Bus (>3.5t) (PV5)” and “Heavy Goods Vehicles (>=15t) (HGV8)” in the EMFAC model, respectively. A listing of the EMFAC-HK vehicle classes is provided in 1 below.

It has also been assumed that the AM peak hour traffic flow and traffic composition would persist for 24 hours of a day and throughout the whole year (i.e. 8760 hours). Speed limit of 50 kph was adopted for 24 hours for the concerned roads.

As discussed above, traffic generated by this Project will use only a section of Kam Pok Road and a section of Yau Pok Road for access. As both roads are local roads with similar characteristics and with a speed limit of 50kph, they were combined and modelled as one road in the EMFAC-HK model. Figure 1 shows the section of road carriageways that have been modelled.

Table 1 EMFAC-HK Vehicle Classes

Vehicle Class Description	Fuel Type	Gross Vehicle Weight (tonnes)	Symbol 1 (in csv output file)	Symbol 2 (in bcd output file & traffic data)
Private Cars (PC)	**ALL**	**ALL**	**PC**	**PC**
Taxi	ALL	ALL	Taxi	Taxi
Light Goods Vehicles (<=2.5t)	ALL	<=2.5t	LGV<=2.5t	LGV3
Light Goods Vehicles (2.5-3.5t)	ALL	>2.5-3.5t	LGV2.5-3.5t	LGV4
Light Goods Vehicles (3.5-5.5t)	ALL	>3.5-5.5t	LGV>3.5t	LGV6
Medium & Heavy Goods Vehicles (5.5-15t)	ALL	>5.5-15t	HGV<=15t	HGV7
Medium & Heavy Goods Vehicles (>=15t)	**ALL**	**>15t**	**HGV>15t**	**HGV8**
Public Light Buses	ALL	ALL	PLB	PLB
Private Light Buses (<=3.5t)	ALL	<=3.5t	PrLB<=3.5t	PV4
Private Light Buses (>3.5t)	**ALL**	**>3.5t**	**PrLB>3.5t**	**PV5**
Non-franchised Buses (<6.4t)	ALL	<=6.36t	NFB<=6.4t	NFB6
Non-franchised Buses (6.4-15t)	ALL	>6.36-15t	NFB6.4-15t	NFB7
Non-franchised Buses (>15t)	ALL	>15t	NFB>15t	NFB8
Single Deck Franchised Buses	ALL	ALL	FBSD	FBSD
Double Deck Franchised Buses	ALL	ALL	FBDD	FBDD
Motor Cycles	ALL	ALL	MC	MC

3.4.3 EMFAC-HK Input

<u>Geographical Area.</u>

"Hong Kong" is selected as the Geographical Area.

Calendar Year.

Year 2018 (Project completion year) is chosen as the Calendar Year in EMFAC-HK Model to represent the worst case scenario emissions (because the vehicle fleet will become cleaner over time as the fleet incorporates newer vehicles adhering to more stringent emission standards.

Season or Month.

Per the EPD Guideline, “Annual” is selected in this study to evaluate the highest vehicle emission within the Model Year.

Mode and Output.

EMFAC-HK Model is run in Emfac mode for calculating area fleet average emissions.

Temperature and Humidity.

Referring to 1-year weather data recorded at Hong Kong Observatory, the temperature ranges from 5.9°C to 33.8°C; relative humidity (RH) ranges from 21% to 100% (see Table 1 of Annex 1). For output configuration, temperature is set from 5°C to 35°C with increment of 5°C. RH is set from 20% to 100% with increment of 10%.

Speeds.

Speed limit of 50 kph was adopted. .

Exhaust / Evaporation Technology Fractions.

Vehicle classes are grouped with different exhaust and evaporation technology group indexes and technology fractions. Each technology group represents a distinct emission control technologies. Default exhaust and evaporation technology fractions are adopted in this assessment.

Population and Accrual Rate.

Default vehicle populations forecast and accrual rate in EMFAC-HK Model is adopted.

Trips and VKT.

Default trips and VKT for HK total is adopted.

Detailed impact rates will be generated with respect to each combination of temperature, RH and speed for running exhaust emission, and combination of temperature and duration for cold start emission.

3.4.4 Calculation of Emission Factors by EMFAC-HK Model Output

RSP and FSP emission factors generated using EMFAC-HK model have been reviewed. It is observed that the magnitude of FSP emission factor for individual combination of vehicle class, temperature, relative humidity and speed amounts to about 80% to 95% of RSP emission factor. The percentage is lowest for MC and highest for “PC”. On average, FSP emission factor amounts to about 90% of RSP emission factor.

In this study, NO_2 and RSP emission factor generated using EMFAC-HK are adopted. The FSP concentration is determined by applying a multiplying factor of 0.9 to the predicted concentration determined using RSP emission factor (note: it shall be noted that even the determined RSP level as shown in Annex 1 is adopted as FSP level, the contribution from FSP is still insignificant and is negligible).

Running Exhaust Emission Rate

To represent the worst case scenario, maximum running exhaust emission rate (g/km) among all combinations of temperature (5°C to 35°C) and humidity (20% to 100%) with respect to each combination of speed and vehicle class will be adopted for NOx, RSP, RSP – Brake Wear & RSP – Tire Wear. Total RSP emission rate = RSP + RSP – Brake Wear + RSP – Tire Wear.

For each road group (i.e. roads with same speed limit), hourly running exhaust emission rate (NOx/RSP) for each vehicle class is determined by:

Hourly running exhaust emission rate (NOx/RSP) for each vehicle class (g/veh-km) = ∑ [running exhaust emission rate for a particular speed x speed fraction of particular speed]

For each road, hourly composite running exhaust emission rate (NOx/RSP) is determined by:

Hourly composite running exhaust emission rate (NOx/RSP) (g/veh-km) = ∑ [hourly running exhaust emission rate for each vehicle class (determined for the corresponding road group) x % composition of corresponding vehicle class]

Starting Emission Rate

For cold start emission which is applicable to non-trunk road only, maximum starting emission (g/trip) among different durations (from 5min to 720min) is adopted. It is notable that only 8 of 16 vehicle classes would have starting emission.

Reference is made to "Agreement No. CE 45/2008 (CE) Liantang / Heung Yuen Wai Boundary Control Point and Associated Works" (EIA-190/2010) (the Liantang EIAR). In the EIA Report, correlation is established between number of trips and VMT/VKT. The estimated VMT/VKT for rural and local roads with possible cold start emission amounts to 13% of total VMT/VKT.

In this assessment, the assumption in Liantang EIAR is followed. EMFAC Model is used to generate HK total number of trips and VKT travelled in Year 2018 for each vehicle class. Trip per VKT for rural and local road for each class is determined by:

Trip/VKT (1/veh-km) for each vehicle class = HK total number of trips for each vehicle class ÷ (HK total VKT travelled for each vehicle class x 13%).

Based on the hourly VKT travelled data from project traffic consultant, hourly total cold start emission (gram) for each vehicle class along each road is determined by:

Hourly total cold start emission (g) for each vehicle class = starting emission rate for each vehicle class x Trip/VKT for each vehicle class x VKT travelled for each vehicle class along each road

The hourly total cold start emission rate for each road is the sum of hourly total cold start emission (gram) for each vehicle class along the same road. The hourly composite cold start emission rate is calculated by dividing the value using the hourly traffic flow:

Hourly total cold start emission (g) = ∑ [hourly total cold start emission for each vehicle class]

Hourly composite cold start emission rate (g/veh-km) = hourly total cold start emission ÷ hourly total VKT travelled.

3.4.5 Emission Factors Adopted for CALINE4 Modeling

Based on the methodology described above, hourly running exhaust emission rate and hourly cold start emission rate (applied to non-trunk road only) are determined for 24 hours. Annex 1 showed details of derivation of hourly composite running exhaust and cold start emission rates for CALINE4 modelling.

3.4.6 Meteorological Data

As discussed in 3.4.2 above, in order to represent a worst case scenario, it has also been assumed that the AM peak hour traffic flow and traffic composition would persist for 24 hours of a day and throughout the whole year (i.e. 8,760 hours). As such, the Caline4 was modelled using a worst case scenario.

Typical worst-case meteorological conditions were assumed as following:

- Wind direction: worst-case angle selected by model
- Wind speed: 1 m/s
- Directional Variability: 6°
- Stability Class: F
- Mixing Height: 500 m
- Temperature: 20 ℃

3.4.7 NOx/NO_2 Conversion

Ozone limiting method has been adopted to convert the predicted NOx concentration due to local emission sources to NO_2 concentration. The formula adopted for conversion is:

[NOx]p x 7.5% + Min(46/48 x [O3]a, [NOx]p x 92.5%) where

[NOx]p = predicted NOx concentration due to local emission sources;

[O3]a = background O3 concentration (from PATH model)

Note: tailpipe emission is assumed as 7.5% of NOx according to “Guidelines on Choice of Models and Model Parameters” published in EPD’s website; molecular mass of NO_2/O_3 is 46/48.

As a worst case scenario has been adopted using the AM peak hour traffic data, the highest hourly ozone level from PATH output file was then adopted for the above conversation. The Project Site and the concerned roads are within grid(20,40) in the PATH system, thus PATH output file for grid(20,40) in year 2015 has been adopted to represent a worst case scenario.

According to the PATH output file for grid(20,40), the highest hourly ozone level is 285.4 μg/m^3 under 25°C. The said ozone concentration was then adopted and converted to 20°C in the NOx/NO_2 conversion.

3.4.8 CALINE4 Modeling Parameters

Calculation of Hourly Average Pollutant Concentration

The peak hour traffic flow and determined hourly composite emission rate is adopted, which was then applied to all 24 hours (i.e. 24 sets of traffic flow and composite emission rate adopted in the modeling data file (see Table 5 of Annex 1).

The results of worst case scenario modelled, were then applied to every hour of a year. The average value of these results is taken as the annual average concentration. The average value of every 24 hours of result (from hour 1 (00:00-01:00) to 24 (23:00-00:00)) is taken as daily average concentration.

To determine maximum hourly and daily concentration, the maximum value among hourly and calculated daily concentration values are taken.

3.5 Assessment Results

According to the assessment results, the predicted RSP and FSP, NO_2 concentrations were very small and only represent up to 0.12%, 0.16%, and 6.4% of the relevant AQOs for RSP, FSP and NO_2, respectively, which is considered insignificant and will not have adverse impact on the ASRs. Details of the assessment results are provided in Annex 2.

As discussed above, the current assessment has been based on a very conservative approach by adopting air pollutants level generated from the AM peak hour based on a worst wind angle and meteorological conditions, and assumes that the pollutants would persists for 24 hours of a day and throughout the whole year. In reality, the traffic flow during most time of the day during non-peak hours would be much smaller, thus it is expected that the actual air pollutants generated by the traffic of this Project would be much smaller than the above predicted results.

As such, it is concluded that vehicular emissions on nearby roads due to increased traffic flow generated by this Project, will not worsen the air quality at nearby ASRs and will not result in any adverse air quality impact.

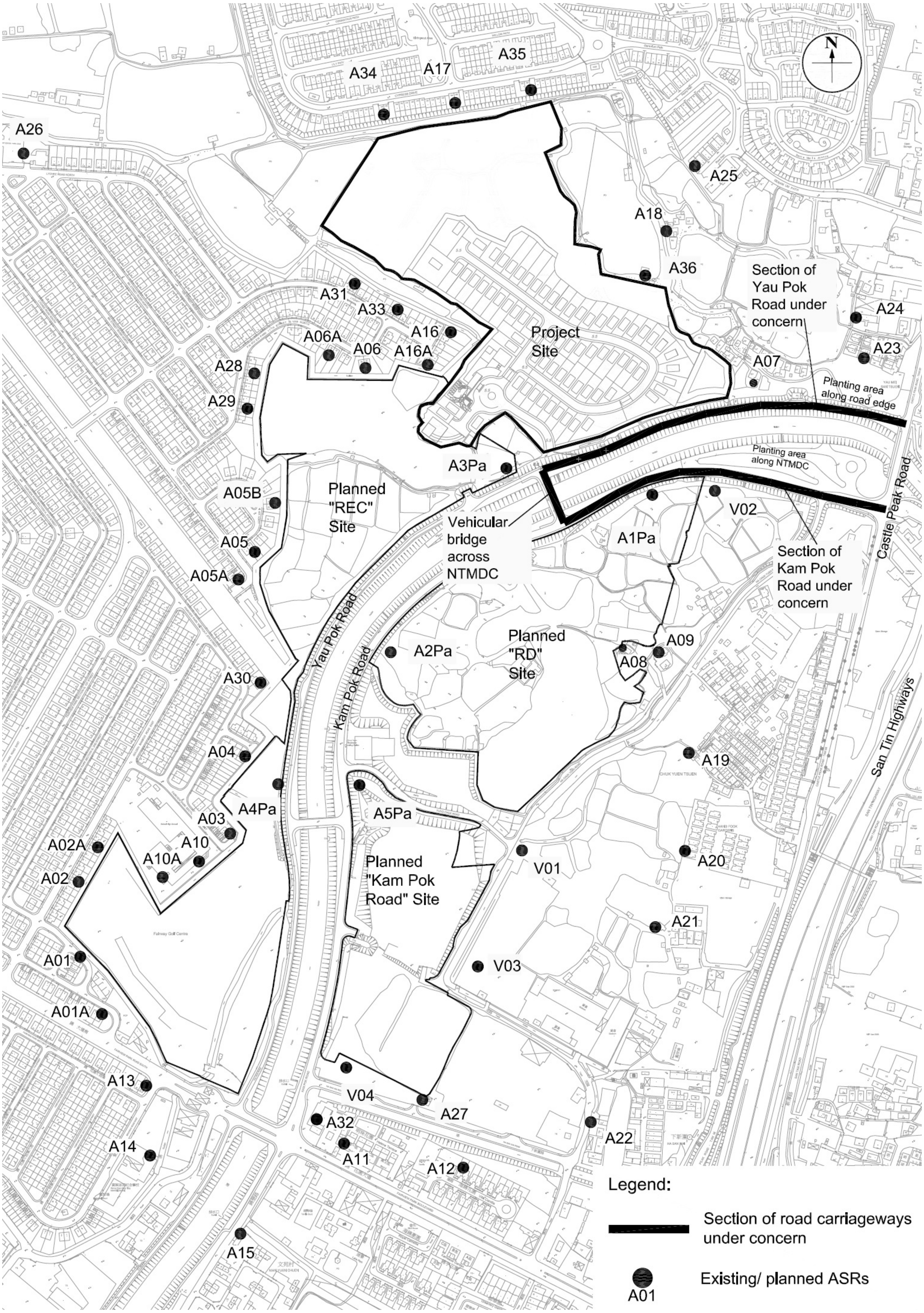

Figure 1 Locations of Representative ASRs Selected for Vehicular Emissions Impact Assessment

Annex 1

of Appendix 3-12

(Details of Determination of Running Exhaust and Starting Emission Rate)

Table 1: Summary of range of temperature and relative humidity in a year

Range of temp	5.9 to	33.8	°c
Range of RH	21 to	100	%

	Temperature																																							
RH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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31																1	1	2	1																					
32														1											1															
33														1	1		1	3	1						1															
34										1				1	2	1									1															
35														1			2																							
36											1			1	2	1			1					2																
37																	4	1	2					1																
38														1	1	1																								
39								1					1		2	1				1	1		1																	
40							1							1	1	2																								
41												1	2		2	4			2	2	1	2																		
42							1					3	1	2	3	1	5			3		3																		
43													1	2	2	1		3	3	3	1	1	1																	
44										1	1		2		2	2	1			1	3	4		1				1												
45						1	1				1			1	1	4	1		4	8		2	1	2																
46							1				1	2		1		3			1	2	5		1	3	1	2	1													
47						1					1	3	1	1	3	3	4	2	1	1	1	1	1	2		1														
48											2		4	1	1	1		4	3	4		1	1	4	1	2														
49						1		1					1	2	2	1	2	2	2	5	1	2	4	2	1	1														
50						1					1	1	1	1		2	1		2	2	2		2	4		1	1		1											
51									2		3	1	3			1		3	1	2	1	1	2	5	1				1											
52								1	1	1	2					2	1	3	2	5	4	2	3	3	1	2														
53								2	1		1		2		3	2	2	2	6	5	1	1	3	1																
54									1					1		1	2	1	2	2	3	6	2		1															
55										1	3			1	2	2	1	2	4	4		5		1	2	1				1			1							
56								1	1		2	2		2	1	1	6	5		2	8	1	3	1			2					1								
57									2	2	1		2	1	2	5	1	1	3	1	5	1	1	3	1		4	1	1			6		1						
58								1	1		1			1			3	2	2	3	5	4	1	3			2				1	2	1							
59									2	1	3		1			3	6	1	4	3	5	4	3	2	1	3	4		2	1		2	1							
60										1		2	1		1	6	4	2	5	3	2	1	4	2	1	3	2	2	1	1	1	4	1							
61									1	1	4				1	2	2	1	2	6	4	2	3	5	3	2	4	3	1	1	4	5	1							
62										1		1		1		4	1	1	5	4	5	6	7	6	6		5	3	2	4	2	7	3							
63										1		1	2	1	1	2	1	3	4	5	5	4	10	4	8	9	4	2	2	4	3	7	3							
64									1				1	1		2	2		4	6	5	4	8	8	6	6	3	3	1	4	2	8	3	2						
65										1	2	2	2	2		2	5	3	6	4	8	6	11	9	14	6	5	1		2	6	9	8	1						
66											1		1	2	1	3		4	5	7	4	4	4	7	10	6	1	1		1	6	13	7							
67									3		1			2	2	2	4	6	9	4	15	7	6	6	10	4	3	6	2	4	12	11	3							
68										1		1	2		2	2	2	4	5	11	4	6	5	9	10	5	2	5	2	11	19	17	1							
69										1		1	2		1	2	1	1	9	10	5	4	12	4	6	3		3	5	11	19	23	1							
70										1		3	1	3	2	4	1	3	7	9	11	4	13	15	6	4	4	6	3	9	19	11	1							
71												1			3	4	5	8	11	9	14	11	7	6	1	6	3	1	1	16	25	11								
72									1		2			2	3	3	3	3	10	12	9	12	6	4	3	7	3	7	11	18	26	7	1							
73									1	1	1				4	4	6	1	13	17	17	7	11	8	7	12	4	6	9	19	28	9								
74										1		1	1	2	5	5	3	5	8	9	9	8	10	6	4	3	6	3	18	23	30	4								
75										2	2	1	1	5	10	2	1	8	6	13	18	9	11	3	5	14	9	1	20	33	21	5								
76												1	1	3	1	6	5	12	9	17	8	8	6	6	5	15	8	7	20	36	12									
77										1		1	2	4	5	12	3	10	9	20	10	10	8	2	6	15	7	12	29	46	12	1								
78									1				1	3	6	6	8	4	15	18	11	10	12	2	9	19	9	13	39	44	3									
79									1	2	1		2		2	13	8	12	16	17	9	4	6	7	11	11	7	17	39	34	2									
80										1	2	1	1	4	8	16	9	21	19	26	20	11	11	8	7	13	8	28	51	42	3									
81									1	3	1	1		6	2	9	13	15	19	17	16	12	13	6	23	22	18	36	67	34	2									
82								1	2	6	3			3	4	23	17	18	18	16	20	13	4	9	18	22	19	43	81	28	2									
83									1	5	4	5	4	4	5	9	9	8	14	21	27	10	4	13	29	27	18	55	85	11										
84									1	3	1	2	1	6	12	11	9	26	10	14	10	12	4	13	28	24	27	33	83	5										
85									2	5	5		4	6	12	13	14	23	12	18	11	9	14	14	26	19	21	68	63	3										
86									4	3	4	2	10	6	9	6	9	21	10	27	12	6	9	19	20	24	33	59	46	2										
87								3	2	2	1		2	3	2	5	8	22	10	26	7	8	22	21	26	21	46	54	22											
88									2	3	1	1	3	3	1	4	6	22	10	25	13	14	24	23	33	27	61	34	18											
89									1	2			3			2	15	24	14	21	11	10	18	24	26	31	37	33	8											
90								1	1		5	1	2	2		3	17	29	20	10	13	9	12	23	18	37	42	24	4											
91								1	1	6	1			2	1	2	17	22	9	20	12	6	28	28	21	30	37	17												
92								1	3	2	1	1	3		2	2	22	10	12	9	10	9	22	24	20	28	29	7	1											
93								1	2		1	3	2	2	1	5	8	11	17	11	15	12	18	26	26	48	20	6	1											
94								1	3	4	1	2	2	2	1	6	8	14	15	6	15	16	16	23	22	26	15	1												
95								2		2		1	1	1	10	8	7	17	14	6	9	8	16	11	23	47	12	2												
96								1	1			1	1	5	4	11	9	18	8	11	16	15	19	15	28	26	11	3												
97								3						7	5	10	16	11	23	9	13	7	18	12	48	13	13	1												
98															2	6	9	16	15	8	10	9	9	17	34	14	1													
99															4	1	9	2	3	4	8	4	5	5	17	12	3													
100																					7																			

Table 2: Running emission for combination of speed and vehicle class (g/km) & starting emission for each vehicle class (g/trip) for Year 2018

Emission Type	**pollutant**	**SF/time**	**PC**	**Taxi**	**LGV3**	**LGV4**	**LGV6**	**HGV7**	**HGV8**	**PLB**	**PV4**	**PV5**	**NFB6**	**NFB7**	**NFB8**	**FBSD**	**FBDD**	**MC**
Running Exhaust	Nox	4	0.1067	1.0666	1.4077	1.4869	4.2776	5.5430	9.1474	1.5885	0.3698	1.6124	4.5842	9.2465	14.7524	15.8095	15.9523	0.8127
Running Exhaust	Nox	12	0.0904	0.9279	1.0891	1.2100	3.6485	4.6994	7.7511	1.5244	0.3182	1.4749	3.9428	7.9438	12.6581	13.4098	13.4635	0.7377
Running Exhaust	Nox	20	0.0782	0.8197	0.9081	1.0214	2.6643	3.3940	5.5925	1.4375	0.2789	1.2590	2.9224	5.8766	9.3430	9.6934	9.6426	0.6813
Running Exhaust	Nox	28	0.0692	0.7357	0.7888	0.8932	2.0667	2.6265	4.3269	1.4079	0.2491	1.1266	2.2739	4.5707	7.2634	7.5028	7.4486	0.6397
Running Exhaust	Nox	36	0.0625	0.6708	0.7121	0.8091	1.8370	2.3555	3.8835	1.4308	0.2267	1.0807	1.9972	4.0208	6.4010	6.7238	6.7256	0.6098
Running Exhaust	Nox	44	0.0577	0.6214	0.6687	0.7593	1.6976	2.1952	3.6219	1.4652	0.2101	1.0610	1.8247	3.6790	5.8671	6.2620	6.3074	0.5895
Running Exhaust	Nox	52	0.0543	0.5848	0.6536	0.7384	1.5837	2.0650	3.4096	1.5027	0.1983	1.0491	1.6827	3.3979	5.4283	5.8868	5.9701	0.5770
Running Exhaust	Nox	60	0.0522	0.5591	0.6647	0.7439	1.4953	1.9650	3.2467	1.5432	0.1907	1.0451	1.5711	3.1774	5.0847	5.5983	5.7137	0.5712
Running Exhaust	Nox	68	0.0512	0.5431	0.7023	0.7765	1.4323	1.8953	3.1333	1.5869	0.1870	1.0489	1.4900	3.0174	4.8362	5.3966	5.5381	0.5714
Running Exhaust	Nox	76	0.0512	0.5360	0.7689	0.8397	1.3947	1.8556	3.0692	1.6337	0.1869	1.0606	1.4394	2.9182	4.6828	5.2815	5.4434	0.5770
Running Exhaust	Nox	84	0.0524	0.5373	0.8702	0.9403	1.3826	1.8462	3.0545	1.6836	0.1905	1.0802	1.4193	2.8795	4.6246	5.2531	5.4295	0.5878
Running Exhaust	Nox	92	0.0547	0.5473	1.0154	1.0903	1.3959	1.8669	3.0892	1.7366	0.1984	1.1075	1.4296	2.9014	4.6615	5.3115	5.4965	0.6038
Running Exhaust	Nox	100	0.0585	0.5663	1.2196	1.3088	1.4347	1.9178	3.1733	1.7927	0.2112	1.1428	1.4704	2.9840	4.7936	5.4565	5.6443	0.6253
Running Exhaust	PM10-total	4	0.0180	0.0000	0.0521	0.0865	0.0981	0.2977	0.4525	0.1576	0.0425	0.0529	0.2335	0.4201	0.6126	0.0988	0.1351	0.0341
Running Exhaust	PM10-total	12	0.0114	0.0000	0.0393	0.0669	0.0840	0.2466	0.3777	0.1340	0.0283	0.0487	0.2102	0.3785	0.5245	0.0872	0.1173	0.0233
Running Exhaust	PM10-total	20	0.0076	0.0000	0.0310	0.0530	0.0605	0.1627	0.2545	0.0948	0.0199	0.0412	0.1701	0.3069	0.3780	0.0676	0.0875	0.0166
Running Exhaust	PM10-total	28	0.0054	0.0000	0.0252	0.0431	0.0439	0.1048	0.1690	0.0671	0.0146	0.0352	0.1394	0.2522	0.2740	0.0531	0.0660	0.0124
Running Exhaust	PM10-total	36	0.0040	0.0000	0.0209	0.0358	0.0369	0.0816	0.1344	0.0557	0.0113	0.0323	0.1255	0.2272	0.2306	0.0467	0.0568	0.0098
Running Exhaust	PM10-total	44	0.0031	0.0000	0.0178	0.0303	0.0336	0.0691	0.1163	0.0501	0.0091	0.0315	0.1203	0.2180	0.2096	0.0441	0.0526	0.0081
Running Exhaust	PM10-total	52	0.0026	0.0000	0.0154	0.0263	0.0320	0.0609	0.1050	0.0471	0.0076	0.0319	0.1206	0.2187	0.1997	0.0435	0.0511	0.0070
Running Exhaust	PM10-total	60	0.0022	0.0000	0.0137	0.0233	0.0322	0.0571	0.1006	0.0468	0.0067	0.0338	0.1263	0.2291	0.2006	0.0450	0.0521	0.0063
Running Exhaust	PM10-total	68	0.0020	0.0000	0.0123	0.0211	0.0341	0.0575	0.1031	0.0492	0.0061	0.0370	0.1373	0.2492	0.2125	0.0486	0.0558	0.0060
Running Exhaust	PM10-total	76	0.0020	0.0000	0.0114	0.0195	0.0377	0.0623	0.1126	0.0544	0.0057	0.0415	0.1538	0.2792	0.2353	0.0543	0.0621	0.0059
Running Exhaust	PM10-total	84	0.0020	0.0000	0.0108	0.0185	0.0431	0.0714	0.1289	0.0622	0.0057	0.0474	0.1757	0.3189	0.2690	0.0620	0.0709	0.0062
Running Exhaust	PM10-total	92	0.0021	0.0000	0.0105	0.0179	0.0503	0.0848	0.1521	0.0727	0.0058	0.0546	0.2030	0.3684	0.3137	0.0718	0.0824	0.0067
Running Exhaust	PM10-total	100	0.0024	0.0000	0.0106	0.0177	0.0592	0.1025	0.1822	0.0859	0.0063	0.0632	0.2357	0.4276	0.3693	0.0837	0.0965	0.0076
Starting emission	Nox	all	0.1606	1.7248	0.4038	0.0367	0	0	0	6.2325	0.3145	3.4363	0	0	0	0	0	0.4078
Starting emission	PM10-total	all	0.0045	0	0.0012	0.0005	0	0	0	0	0.0099	0.0001	0	0	0	0	0	0.0182

Note: running & starting emission based on highest value within temperature range of 5-35 °C and RH of 20-100% based on annual meteological data; starting emisison based on highest value among different durations before cold start

Emission factor generated using EMFAC mode for Year 2018

Table 3.1: Hourly running emission factor (g/km) for road group with speed limit of 50kph

Pollutant	hour of day	PC	Taxi	LGV3	LGV4	LGV6	HGV7	HGV8	PLB	PV4	PV5	NFB6	NFB7	NFB8	FBSD	FBDD	MC
Nox	00:00 ~ 01:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	01:00 ~ 02:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	02:00 ~ 03:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	03:00 ~ 04:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	04:00 ~ 05:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	05:00 ~ 06:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	06:00 ~ 07:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	07:00 ~ 08:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	08:00 ~ 09:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	09:00 ~ 10:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	10:00 ~ 11:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	11:00 ~ 12:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	12:00 ~ 13:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	13:00 ~ 14:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	14:00 ~ 15:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	15:00 ~ 16:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	16:00 ~ 17:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	17:00 ~ 18:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	18:00 ~ 19:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	19:00 ~ 20:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	20:00 ~ 21:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	21:00 ~ 22:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	22:00 ~ 23:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nox	23:00 ~ 24:00	0.0543	0.0000	0.0000	0.0000	0.0000	0.0000	3.4096	0.0000	0.0000	1.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	00:00 ~ 01:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	01:00 ~ 02:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	02:00 ~ 03:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	03:00 ~ 04:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	04:00 ~ 05:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	05:00 ~ 06:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	06:00 ~ 07:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	07:00 ~ 08:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	08:00 ~ 09:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	09:00 ~ 10:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	10:00 ~ 11:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	11:00 ~ 12:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	12:00 ~ 13:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	13:00 ~ 14:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	14:00 ~ 15:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	15:00 ~ 16:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	16:00 ~ 17:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	17:00 ~ 18:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	18:00 ~ 19:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	19:00 ~ 20:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	20:00 ~ 21:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	21:00 ~ 22:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	22:00 ~ 23:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PM10-total	23:00 ~ 24:00	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.1050	0.0000	0.0000	0.0319	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note: emission factor = Σ(fraction of occurrence of this speed x running emission factor of this speed) where speed = 4, 12, 20, … kph

Speed profiles for AM Peak Hour and PM Peak Hour are respectively adopted for AM (0000-1200) and PM (1200-2400) hours. Therefore, hourly running emission factors respectively within AM and PM hours and are the same .

Table 4: Summary of trip and VKT per day for vehicle class with starting emission in Year 2018

Model Year 2018	**PC**	**Taxi**	**LGV3**	**LGV4**	**PLB**	**PV4**	**PV5**	**MC**
Trip per day (HK total)	728866	72957	4676	178317	17392	6886	5727	273176
VKT per day (HK total)	13273332	6910044	103815	3415365	1200452	161813	134775	923354
VKT for rural & local road per day	1725533.16	898305.72	13495.95	443997.45	156058.76	21035.69	17520.75	120036.02
Trip/VKT for rural & local road	0.42240046	0.0812162	0.346474	0.4016172	0.1114452	0.327348	0.32687	2.2757836

Note: VKT for rural & local road per day = 13% of VKT per day (HK total) based on Liantang EIAR

Table 5: Hourly composite emission rate for each road link

Road No.	Speed Limit	Hour	Total Vehicle	Nox-running (g/km)	Nox-starting (g/km)	Nox emission (g/km)	Nox emission (g/mile)	RSP-running (g/km)	RSP-starting (g/km)	RSP emission (g/km)	RSP emission (g/mile)	Nox (g)	RSP (g)	Nox emission x 10000 (g/mile)	RSP emission x 100 (g/mile)
1A	50	00:00-01:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	01:00-02:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	02:00-03:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	03:00-04:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	04:00-05:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	05:00-06:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	06:00-07:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	07:00-08:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	08:00-09:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	09:00-10:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	10:00-11:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	11:00-12:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	12:00-13:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	13:00-14:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	14:00-15:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	15:00-16:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	16:00-17:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	17:00-18:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	18:00-19:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	19:00-20:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	20:00-21:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	21:00-22:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	22:00-23:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569
1A	50	23:00-24:00	27	0.2979	0.1812	0.4792	0.7711	0.0099	0.0016	0.0115	0.0186	10.6215	0.2558	7711.2539	1.8569

Annex 2

Of Appendix 3-12

(Predicted RSP, FSP and NO_2 Concentrations at Discrete ASRs)

Annex 2-1 Summary Table of RSP Concentration Due to Traffic Generated by this Project

		Project Contribution, μg/m^3		
ASR ID	**Height, m**	**Highest 24-h average ***	**10th highest 24-h average ***	**Annual average ***
A01	1.5	0.013	0.013	0.013
A01A	1.5	0.011	0.011	0.011
A02	1.5	0.014	0.014	0.014
A02A	1.5	0.015	0.015	0.015
A03	1.5	0.016	0.016	0.016
A04	1.5	0.019	0.019	0.019
A05	1.5	0.026	0.026	0.026
A05A	1.5	0.025	0.025	0.025
A05B	1.5	0.027	0.027	0.027
A06	1.5	0.025	0.025	0.025
A06A	1.5	0.023	0.023	0.023
A07	1.5	0.054	0.054	0.054
A08	1.5	0.02	0.02	0.02
A09	1.5	0.018	0.018	0.018
A10	1.5	0.015	0.015	0.015
A10A	1.5	0.015	0.015	0.015
A11	1.5	0.009	0.009	0.009
A12	1.5	0.008	0.008	0.008
A13	1.5	0.01	0.01	0.01
A14	1.5	0.009	0.009	0.009
A15	1.5	0.008	0.008	0.008
A16	1.5	0.023	0.023	0.023
A16A	1.5	0.026	0.026	0.026
A17	1.5	0.011	0.011	0.011
A18	1.5	0.014	0.014	0.014
A19	1.5	0.012	0.012	0.012
A20	1.5	0.01	0.01	0.01
A21	1.5	0.009	0.009	0.009
A22	1.5	0.008	0.008	0.008
A23	1.5	0.042	0.042	0.042
A24	1.5	0.03	0.03	0.03
A25	1.5	0.012	0.012	0.012
A26	1.5	0.012	0.012	0.012
A27	1.5	0.009	0.009	0.009
A28	1.5	0.023	0.023	0.023
A29	1.5	0.025	0.025	0.025
A30	1.5	0.023	0.023	0.023
A31	1.5	0.018	0.018	0.018
A32	1.5	0.009	0.009	0.009
A33	1.5	0.02	0.02	0.02
A34	1.5	0.012	0.012	0.012
A35	1.5	0.01	0.01	0.01
A36	1.5	0.015	0.015	0.015
A1Pa	1.5	0.04	0.04	0.04
A2Pa	1.5	0.027	0.027	0.027
A3Pa	1.5	0.061	0.061	0.061
A4Pa	1.5	0.018	0.018	0.018
A5Pa	1.5	0.017	0.017	0.017
V01	1.5	0.011	0.011	0.011
V02	1.5	0.035	0.035	0.035
V03	1.5	0.01	0.01	0.01
V04	1.5	0.01	0.01	0.01
A01	4.5	0.012	0.012	0.012
A01A	4.5	0.011	0.011	0.011
A02	4.5	0.014	0.014	0.014
A02A	4.5	0.015	0.015	0.015
A03	4.5	0.016	0.016	0.016
A04	4.5	0.019	0.019	0.019
A05	4.5	0.026	0.026	0.026
A05A	4.5	0.025	0.025	0.025
A05B	4.5	0.026	0.026	0.026
A06	4.5	0.024	0.024	0.024
A06A	4.5	0.022	0.022	0.022
A07	4.5	0.048	0.048	0.048
A08	4.5	0.019	0.019	0.019
A09	4.5	0.017	0.017	0.017
A10	4.5	0.015	0.015	0.015
A10A	4.5	0.014	0.014	0.014
A11	4.5	0.009	0.009	0.009
A12	4.5	0.008	0.008	0.008

		Project Contribution, µg/m^3		
ASR ID	Height, m	Highest 24-h average *	10th highest 24-h average *	Annual average *
A13	4.5	0.01	0.01	0.01
A14	4.5	0.009	0.009	0.009
A15	4.5	0.008	0.008	0.008
A16	4.5	0.022	0.022	0.022
A16A	4.5	0.025	0.025	0.025
A17	4.5	0.011	0.011	0.011
A18	4.5	0.013	0.013	0.013
A19	4.5	0.012	0.012	0.012
A20	4.5	0.01	0.01	0.01
A21	4.5	0.009	0.009	0.009
A22	4.5	0.007	0.007	0.007
A23	4.5	0.039	0.039	0.039
A24	4.5	0.028	0.028	0.028
A25	4.5	0.012	0.012	0.012
A26	4.5	0.011	0.011	0.011
A27	4.5	0.009	0.009	0.009
A28	4.5	0.022	0.022	0.022
A29	4.5	0.024	0.024	0.024
A30	4.5	0.023	0.023	0.023
A31	4.5	0.018	0.018	0.018
A32	4.5	0.009	0.009	0.009
A33	4.5	0.02	0.02	0.02
A34	4.5	0.011	0.011	0.011
A35	4.5	0.01	0.01	0.01
A36	4.5	0.015	0.015	0.015
A1Pa	4.5	0.032	0.032	0.032
A2Pa	4.5	0.026	0.026	0.026
A3Pa	4.5	0.055	0.055	0.055
A4Pa	4.5	0.017	0.017	0.017
A5Pa	4.5	0.016	0.016	0.016
V01	4.5	0.011	0.011	0.011
V02	4.5	0.03	0.03	0.03
V03	4.5	0.01	0.01	0.01
V04	4.5	0.009	0.009	0.009
A01	7.5	0.012	0.012	0.012
A01A	7.5	0.011	0.011	0.011
A02	7.5	0.013	0.013	0.013
A02A	7.5	0.015	0.015	0.015
A03	7.5	0.015	0.015	0.015
A04	7.5	0.018	0.018	0.018
A05	7.5	0.024	0.024	0.024
A05A	7.5	0.023	0.023	0.023
A05B	7.5	0.024	0.024	0.024
A06	7.5	0.022	0.022	0.022
A06A	7.5	0.021	0.021	0.021
A07	7.5	0.039	0.039	0.039
A08	7.5	0.016	0.016	0.016
A09	7.5	0.014	0.014	0.014
A10	7.5	0.014	0.014	0.014
A10A	7.5	0.014	0.014	0.014
A11	7.5	0.008	0.008	0.008
A12	7.5	0.007	0.007	0.007
A13	7.5	0.01	0.01	0.01
A14	7.5	0.009	0.009	0.009
A15	7.5	0.008	0.008	0.008
A16	7.5	0.02	0.02	0.02
A16A	7.5	0.023	0.023	0.023
A17	7.5	0.01	0.01	0.01
A18	7.5	0.012	0.012	0.012
A19	7.5	0.011	0.011	0.011
A20	7.5	0.009	0.009	0.009
A21	7.5	0.008	0.008	0.008
A22	7.5	0.007	0.007	0.007
A23	7.5	0.034	0.034	0.034
A24	7.5	0.025	0.025	0.025
A25	7.5	0.011	0.011	0.011
A26	7.5	0.011	0.011	0.011
A27	7.5	0.008	0.008	0.008
A28	7.5	0.021	0.021	0.021
A29	7.5	0.023	0.023	0.023
A30	7.5	0.021	0.021	0.021
A31	7.5	0.017	0.017	0.017
A32	7.5	0.009	0.009	0.009
A33	7.5	0.018	0.018	0.018

		Project Contribution, μg/m³		
ASR ID	**Height, m**	**Highest 24-h average ***	**10th highest 24-h average ***	**Annual average ***
A34	7.5	0.011	0.011	0.011
A35	7.5	0.01	0.01	0.01
A36	7.5	0.013	0.013	0.013
A1Pa	7.5	0.022	0.022	0.022
A2Pa	7.5	0.024	0.024	0.024
A3Pa	7.5	0.046	0.046	0.046
A4Pa	7.5	0.016	0.016	0.016
A5Pa	7.5	0.015	0.015	0.015
V01	7.5	0.01	0.01	0.01
V02	7.5	0.023	0.023	0.023
V03	7.5	0.009	0.009	0.009
V04	7.5	0.009	0.009	0.009

Range		**0.007 - 0.061**	**0.007 - 0.061**	**0.007 - 0.061**
Max.		**0.061**	**0.061**	**0.061**
AQO Criteria		**-**	**100**	**50**
% of AQO		**-**	**0.06%**	**0.12%**

Remark: * Estimated based on the worst case meteorological condition, wind speed, and wind angle taking account the peak hour traffic flow generated and attracted by this Project. As a conservative approach, it has been assumed that the estimated pollutant concentration during the peak hour would persist for 8760 hours of a year when calculating the daily and annual concentrations.

Annex 2-2 Summary Table of FSP Concentration Due to Traffic Generated by this Project

		Project Contribution, µg/m³		
ASR ID	Height, m	Highest 24-h average * & **	10th highest 24-h average	Annual average * & **
A01	1.5	0.012	0.012	0.012
A01A	1.5	0.010	0.010	0.010
A02	1.5	0.013	0.013	0.013
A02A	1.5	0.014	0.014	0.014
A03	1.5	0.014	0.014	0.014
A04	1.5	0.017	0.017	0.017
A05	1.5	0.023	0.023	0.023
A05A	1.5	0.023	0.023	0.023
A05B	1.5	0.024	0.024	0.024
A06	1.5	0.023	0.023	0.023
A06A	1.5	0.021	0.021	0.021
A07	1.5	0.049	0.049	0.049
A08	1.5	0.018	0.018	0.018
A09	1.5	0.016	0.016	0.016
A10	1.5	0.014	0.014	0.014
A10A	1.5	0.014	0.014	0.014
A11	1.5	0.008	0.008	0.008
A12	1.5	0.007	0.007	0.007
A13	1.5	0.009	0.009	0.009
A14	1.5	0.008	0.008	0.008
A15	1.5	0.007	0.007	0.007
A16	1.5	0.021	0.021	0.021
A16A	1.5	0.023	0.023	0.023
A17	1.5	0.010	0.010	0.010
A18	1.5	0.013	0.013	0.013
A19	1.5	0.011	0.011	0.011
A20	1.5	0.009	0.009	0.009
A21	1.5	0.008	0.008	0.008
A22	1.5	0.007	0.007	0.007
A23	1.5	0.038	0.038	0.038
A24	1.5	0.027	0.027	0.027
A25	1.5	0.011	0.011	0.011
A26	1.5	0.011	0.011	0.011
A27	1.5	0.008	0.008	0.008
A28	1.5	0.021	0.021	0.021
A29	1.5	0.023	0.023	0.023
A30	1.5	0.021	0.021	0.021
A31	1.5	0.016	0.016	0.016
A32	1.5	0.008	0.008	0.008
A33	1.5	0.018	0.018	0.018
A34	1.5	0.011	0.011	0.011
A35	1.5	0.009	0.009	0.009
A36	1.5	0.014	0.014	0.014
A1Pa	1.5	0.036	0.036	0.036
A2Pa	1.5	0.024	0.024	0.024
A3Pa	1.5	0.055	0.055	0.055
A4Pa	1.5	0.016	0.016	0.016
A5Pa	1.5	0.015	0.015	0.015
V01	1.5	0.010	0.010	0.010
V02	1.5	0.032	0.032	0.032
V03	1.5	0.009	0.009	0.009
V04	1.5	0.009	0.009	0.009
A01	4.5	0.011	0.011	0.011
A01A	4.5	0.010	0.010	0.010
A02	4.5	0.013	0.013	0.013
A02A	4.5	0.014	0.014	0.014
A03	4.5	0.014	0.014	0.014
A04	4.5	0.017	0.017	0.017
A05	4.5	0.023	0.023	0.023
A05A	4.5	0.023	0.023	0.023
A05B	4.5	0.023	0.023	0.023
A06	4.5	0.022	0.022	0.022
A06A	4.5	0.020	0.020	0.020
A07	4.5	0.043	0.043	0.043

		Project Contribution, µg/m^3		
ASR ID	Height, m	Highest 24-h average * & **	10th highest 24-h average	Annual average * & **
A08	4.5	0.017	0.017	0.017
A09	4.5	0.015	0.015	0.015
A10	4.5	0.014	0.014	0.014
A10A	4.5	0.013	0.013	0.013
A11	4.5	0.008	0.008	0.008
A12	4.5	0.007	0.007	0.007
A13	4.5	0.009	0.009	0.009
A14	4.5	0.008	0.008	0.008
A15	4.5	0.007	0.007	0.007
A16	4.5	0.020	0.020	0.020
A16A	4.5	0.023	0.023	0.023
A17	4.5	0.010	0.010	0.010
A18	4.5	0.012	0.012	0.012
A19	4.5	0.011	0.011	0.011
A20	4.5	0.009	0.009	0.009
A21	4.5	0.008	0.008	0.008
A22	4.5	0.006	0.006	0.006
A23	4.5	0.035	0.035	0.035
A24	4.5	0.025	0.025	0.025
A25	4.5	0.011	0.011	0.011
A26	4.5	0.010	0.010	0.010
A27	4.5	0.008	0.008	0.008
A28	4.5	0.020	0.020	0.020
A29	4.5	0.022	0.022	0.022
A30	4.5	0.021	0.021	0.021
A31	4.5	0.016	0.016	0.016
A32	4.5	0.008	0.008	0.008
A33	4.5	0.018	0.018	0.018
A34	4.5	0.010	0.010	0.010
A35	4.5	0.009	0.009	0.009
A36	4.5	0.014	0.014	0.014
A1Pa	4.5	0.029	0.029	0.029
A2Pa	4.5	0.023	0.023	0.023
A3Pa	4.5	0.050	0.050	0.050
A4Pa	4.5	0.015	0.015	0.015
A5Pa	4.5	0.014	0.014	0.014
V01	4.5	0.010	0.010	0.010
V02	4.5	0.027	0.027	0.027
V03	4.5	0.009	0.009	0.009
V04	4.5	0.008	0.008	0.008
A01	7.5	0.011	0.011	0.011
A01A	7.5	0.010	0.010	0.010
A02	7.5	0.012	0.012	0.012
A02A	7.5	0.014	0.014	0.014
A03	7.5	0.014	0.014	0.014
A04	7.5	0.016	0.016	0.016
A05	7.5	0.022	0.022	0.022
A05A	7.5	0.021	0.021	0.021
A05B	7.5	0.022	0.022	0.022
A06	7.5	0.020	0.020	0.020
A06A	7.5	0.019	0.019	0.019
A07	7.5	0.035	0.035	0.035
A08	7.5	0.014	0.014	0.014
A09	7.5	0.013	0.013	0.013
A10	7.5	0.013	0.013	0.013
A10A	7.5	0.013	0.013	0.013
A11	7.5	0.007	0.007	0.007
A12	7.5	0.006	0.006	0.006
A13	7.5	0.009	0.009	0.009
A14	7.5	0.008	0.008	0.008
A15	7.5	0.007	0.007	0.007
A16	7.5	0.018	0.018	0.018
A16A	7.5	0.021	0.021	0.021
A17	7.5	0.009	0.009	0.009
A18	7.5	0.011	0.011	0.011
A19	7.5	0.010	0.010	0.010
A20	7.5	0.008	0.008	0.008

		Project Contribution, µg/m^3		
ASR ID	**Height, m**	**Highest 24-h average * & ****	**10th highest 24-h average**	**Annual average * & ****
A21	7.5	0.007	0.007	0.007
A22	7.5	0.006	0.006	0.006
A23	7.5	0.031	0.031	0.031
A24	7.5	0.023	0.023	0.023
A25	7.5	0.010	0.010	0.010
A26	7.5	0.010	0.010	0.010
A27	7.5	0.007	0.007	0.007
A28	7.5	0.019	0.019	0.019
A29	7.5	0.021	0.021	0.021
A30	7.5	0.019	0.019	0.019
A31	7.5	0.015	0.015	0.015
A32	7.5	0.008	0.008	0.008
A33	7.5	0.016	0.016	0.016
A34	7.5	0.010	0.010	0.010
A35	7.5	0.009	0.009	0.009
A36	7.5	0.012	0.012	0.012
A1Pa	7.5	0.020	0.020	0.020
A2Pa	7.5	0.022	0.022	0.022
A3Pa	7.5	0.041	0.041	0.041
A4Pa	7.5	0.014	0.014	0.014
A5Pa	7.5	0.014	0.014	0.014
V01	7.5	0.009	0.009	0.009
V02	7.5	0.021	0.021	0.021
V03	7.5	0.008	0.008	0.008
V04	7.5	0.008	0.008	0.008

Range		**0.006 - 0.055**	**0.006 - 0.055**	**0.006 - 0.055**
Max.		**0.055**	**0.055**	**0.055**
AQO Criteria		**-**	**75**	**35**
% of AQO		**-**	**0.07%**	**0.16%**

Remark: * Estimated based on the worst case meteorological condition, wind speed, and wind angle taking account the peak hour traffic flow generated and attracted by this Project. As a conservative approach, it has been assumed that the estimated pollutant concentration during the peak hour would persist for 8760 hours of a year when calculating the daily and annual concentrations.

** The FSP concentration is calculated by multiply a ratio of 90% of the estimated RSP level. It shall be noted that even the determined RSP level is adopted as FSP level, the contribution of FSP is still insignificant and negligible.

Annex 2-3 Summary Table of NO_2 Concentration Due to Traffic Generated by this Project

		Project Contribution, μg/m^3		
ASR ID	Height, m	Highest 1-h average NOx *	19th highest 1-h average NOx *	Annual average NOx *
A01	1.5	0.52	0.52	0.52
A01A	1.5	0.48	0.48	0.48
A02	1.5	0.58	0.58	0.58
A02A	1.5	0.65	0.65	0.65
A03	1.5	0.67	0.67	0.67
A04	1.5	0.8	0.8	0.8
A05	1.5	1.09	1.09	1.09
A05A	1.5	1.05	1.05	1.05
A05B	1.5	1.13	1.13	1.13
A06	1.5	1.04	1.04	1.04
A06A	1.5	0.96	0.96	0.96
A07	1.5	2.23	2.23	2.23
A08	1.5	0.83	0.83	0.83
A09	1.5	0.74	0.74	0.74
A10	1.5	0.64	0.64	0.64
A10A	1.5	0.61	0.61	0.61
A11	1.5	0.36	0.36	0.36
A12	1.5	0.32	0.32	0.32
A13	1.5	0.43	0.43	0.43
A14	1.5	0.38	0.38	0.38
A15	1.5	0.34	0.34	0.34
A16	1.5	0.93	0.93	0.93
A16A	1.5	1.09	1.09	1.09
A17	1.5	0.47	0.47	0.47
A18	1.5	0.57	0.57	0.57
A19	1.5	0.52	0.52	0.52
A20	1.5	0.43	0.43	0.43
A21	1.5	0.39	0.39	0.39
A22	1.5	0.31	0.31	0.31
A23	1.5	1.72	1.72	1.72
A24	1.5	1.23	1.23	1.23
A25	1.5	0.52	0.52	0.52
A26	1.5	0.48	0.48	0.48
A27	1.5	0.36	0.36	0.36
A28	1.5	0.93	0.93	0.93
A29	1.5	1.02	1.02	1.02
A30	1.5	0.97	0.97	0.97
A31	1.5	0.77	0.77	0.77
A32	1.5	0.38	0.38	0.38
A33	1.5	0.84	0.84	0.84
A34	1.5	0.48	0.48	0.48
A35	1.5	0.43	0.43	0.43
A36	1.5	0.64	0.64	0.64
A1Pa	1.5	1.65	1.65	1.65
A2Pa	1.5	1.12	1.12	1.12
A3Pa	1.5	2.56	2.56	2.56
A4Pa	1.5	0.74	0.74	0.74
A5Pa	1.5	0.7	0.7	0.7
V01	1.5	0.47	0.47	0.47
V02	1.5	1.45	1.45	1.45
V03	1.5	0.42	0.42	0.42
V04	1.5	0.4	0.4	0.4
A01	4.5	0.52	0.52	0.52
A01A	4.5	0.47	0.47	0.47
A02	4.5	0.57	0.57	0.57
A02A	4.5	0.64	0.64	0.64
A03	4.5	0.66	0.66	0.66
A04	4.5	0.78	0.78	0.78
A05	4.5	1.06	1.06	1.06
A05A	4.5	1.01	1.01	1.01
A05B	4.5	1.09	1.09	1.09
A06	4.5	1	1	1
A06A	4.5	0.92	0.92	0.92
A07	4.5	2	2	2
A08	4.5	0.77	0.77	0.77
A09	4.5	0.69	0.69	0.69
A10	4.5	0.62	0.62	0.62
A10A	4.5	0.6	0.6	0.6
A11	4.5	0.36	0.36	0.36
A12	4.5	0.32	0.32	0.32

		Project Contribution, µg/m^3		
ASR ID	Height, m	Highest 1-h average NOx *	19th highest 1-h average NOx *	Annual average NOx *
A13	4.5	0.42	0.42	0.42
A14	4.5	0.38	0.38	0.38
A15	4.5	0.34	0.34	0.34
A16	4.5	0.89	0.89	0.89
A16A	4.5	1.05	1.05	1.05
A17	4.5	0.45	0.45	0.45
A18	4.5	0.54	0.54	0.54
A19	4.5	0.49	0.49	0.49
A20	4.5	0.42	0.42	0.42
A21	4.5	0.38	0.38	0.38
A22	4.5	0.31	0.31	0.31
A23	4.5	1.62	1.62	1.62
A24	4.5	1.17	1.17	1.17
A25	4.5	0.49	0.49	0.49
A26	4.5	0.48	0.48	0.48
A27	4.5	0.35	0.35	0.35
A28	4.5	0.91	0.91	0.91
A29	4.5	1	1	1
A30	4.5	0.93	0.93	0.93
A31	4.5	0.74	0.74	0.74
A32	4.5	0.38	0.38	0.38
A33	4.5	0.82	0.82	0.82
A34	4.5	0.47	0.47	0.47
A35	4.5	0.42	0.42	0.42
A36	4.5	0.61	0.61	0.61
A1Pa	4.5	1.32	1.32	1.32
A2Pa	4.5	1.08	1.08	1.08
A3Pa	4.5	2.3	2.3	2.3
A4Pa	4.5	0.73	0.73	0.73
A5Pa	4.5	0.67	0.67	0.67
V01	4.5	0.45	0.45	0.45
V02	4.5	1.26	1.26	1.26
V03	4.5	0.4	0.4	0.4
V04	4.5	0.39	0.39	0.39
A01	7.5	0.49	0.49	0.49
A01A	7.5	0.45	0.45	0.45
A02	7.5	0.56	0.56	0.56
A02A	7.5	0.61	0.61	0.61
A03	7.5	0.62	0.62	0.62
A04	7.5	0.74	0.74	0.74
A05	7.5	1	1	1
A05A	7.5	0.96	0.96	0.96
A05B	7.5	1.01	1.01	1.01
A06	7.5	0.92	0.92	0.92
A06A	7.5	0.87	0.87	0.87
A07	7.5	1.62	1.62	1.62
A08	7.5	0.66	0.66	0.66
A09	7.5	0.6	0.6	0.6
A10	7.5	0.6	0.6	0.6
A10A	7.5	0.57	0.57	0.57
A11	7.5	0.34	0.34	0.34
A12	7.5	0.31	0.31	0.31
A13	7.5	0.4	0.4	0.4
A14	7.5	0.36	0.36	0.36
A15	7.5	0.32	0.32	0.32
A16	7.5	0.83	0.83	0.83
A16A	7.5	0.96	0.96	0.96
A17	7.5	0.43	0.43	0.43
A18	7.5	0.49	0.49	0.49
A19	7.5	0.45	0.45	0.45
A20	7.5	0.39	0.39	0.39
A21	7.5	0.35	0.35	0.35
A22	7.5	0.3	0.3	0.3
A23	7.5	1.43	1.43	1.43
A24	7.5	1.04	1.04	1.04
A25	7.5	0.45	0.45	0.45
A26	7.5	0.45	0.45	0.45
A27	7.5	0.34	0.34	0.34
A28	7.5	0.86	0.86	0.86
A29	7.5	0.93	0.93	0.93
A30	7.5	0.88	0.88	0.88
A31	7.5	0.69	0.69	0.69
A32	7.5	0.36	0.36	0.36

		Project Contribution, µg/m^3		
ASR ID	**Height, m**	**Highest 1-h average NOx ***	**19th highest 1-h average NOx ***	**Annual average NOx ***
A33	7.5	0.77	0.77	0.77
A34	7.5	0.44	0.44	0.44
A35	7.5	0.4	0.4	0.4
A36	7.5	0.53	0.53	0.53
A1Pa	7.5	0.89	0.89	0.89
A2Pa	7.5	0.99	0.99	0.99
A3Pa	7.5	1.89	1.89	1.89
A4Pa	7.5	0.69	0.69	0.69
A5Pa	7.5	0.64	0.64	0.64
V01	7.5	0.42	0.42	0.42
V02	7.5	0.97	0.97	0.97
V03	7.5	0.38	0.38	0.38
V04	7.5	0.38	0.38	0.38

Range		**0.3 - 2.56**	**0.3 - 2.56**	**0.3 - 2.56**
Max.		**2.56**	**2.56**	**2.56**
AQO Criteria		**-**	**200**	**40**
% of AQO		**-**	**1.28%**	**6.40%**

Remark: * Estimated based on the worst case meteorological condition, wind speed, and wind angle taking account the peak hour traffic flow generated and attracted by this Project. As a conservative approach, it has been assumed that the estimated pollutant concentration during the peak hour would persist for 8760 hours of a year when calculating the daily and annual concentrations.