Contents

Tables

Figures

Appendices

3 Air Quality Impact

3.1 Legislation, Standards, and Guidelines

3.1.1 General

3.1.1.1 The legislation and guidelines that are relevant to air quality impact assessment include, but not limited to, the following:

- Criteria and guidelines for evaluating and assessing air quality impact as specified in Section 1 of Annexes 4 and 12 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM);
- Air Pollution Control Ordinance (APCO) (Cap. 311);
- Air Pollution Control (Construction Dust) Regulation (Cap. 311R);
- Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation (Cap 311Z);
- Air Pollution Control (Fuel Restriction) Regulation (Cap. 311I);
- Air Pollution Control (Specified Processes) Regulations (Cap. 311F);
- Guidance Note on the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2 (16);
- Development Bureau Technical Circular (Works) No. 13/2020 Timely Application of Temporary Electricity and Water Supply for Public Works Contracts and Wider Use of Electric Vehicles in Public Works Contracts; and
- Practice Note on Control of Air Pollution in Vehicle Tunnels.

3.1.2 Environmental Impact Assessment Ordinance (EIAO) and Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)

3.1.2.1 The EIAO-TM is issued under section 16 of the EIAO. Annex 4 of the EIAO-TM sets out the criteria for evaluating air quality impact, and Annex 12 of the EIAO-TM sets out the general approaches and methodologies for assessment of air quality impact arising from designated projects.

3.1.3 Air Pollution Control Ordinance (APCO) (Cap. 311)

Air Quality Objective

3.1.3.1 The principal legislation for controlling air pollutants is the Air Pollution Control Ordinance (APCO) (Cap. 311) which provides a statutory framework for establishing the Air Quality Objectives (AQOs) and stipulating the anti-pollution requirements for air pollution sources. The AQOs stipulate limits on concentrations for 7 pollutants including Sulphur Dioxide (SO_2), Respirable Suspended Particulates (RSP), Fine Suspended Particulates (FSP), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Photochemical Oxidants (as Ozone (O_3)), and Lead (Pb). The current AQOs which took effect in January 2022 are listed in **Table 3.1**.

Table 3.1 Current Hong Kong Air Quality Objectives (HKAQO)

Pollutants	Limits on Concentration, μg/m^3 [1] (The Number of Exceedance per calendar year allowed is shown in brackets)				
	10-min	1-hr	8-hr	24-hr	Annual
SO_2	500 (3)			50 (3)	
RSP (PM_{10}) [2]				100 (9)	50
FSP ($PM_{2.5}$) [3]				50 (35/18) [4]	25
CO		30,000 (0)	10,000 (0)		
NO_2		200 (18)			40
O_3			160 (9)		
Pb					0.5

Notes:

[1] All measurements of the concentration of gaseous air pollutants, i.e. sulphur dioxide, nitrogen dioxide, ozone and carbon monoxide, are to be adjusted to a reference temperature of 293 Kelvin and a reference pressure of 101.325 kilopascal.

[2] Respirable suspended particulates (RSP) means suspended particles in air with a nominal aerodynamic diameter of 10 μm or less (i.e. PM_{10}).

[3] Fine suspended particulates (FSP) means suspended particles in air with a nominal aerodynamic diameter of 2.5 μm or less (i.e. $PM_{2.5}$).

[4] On a best endeavour basis, a more stringent standard of 24-hour AQO for FSP at concentration level of 50 μg/m^3 is adopted by setting the number of allowable exceedances to be 18 days per calendar year as the benchmark for conducting air quality impact assessments.

3.1.4 Air Pollution Control (Construction Dust) Regulation (Cap. 311R)

3.1.4.1 The Air Pollution Control (Construction Dust) Regulation specifies processes that require special dust control. The Contractors are required to inform the Environmental Protection Department (EPD) and adopt proper dust suppression measures while carrying out "Notifiable Works" (which requires prior notification by the regulation) and "Regulatory Works" to meet the requirements as defined under the regulation.

3.1.5 Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation (Cap. 311Z)

3.1.5.1 Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation specifies that all non-road mobile machinery (NRMMs), except for those exempted, used in specified activities and locations including construction sites, container terminals and back up facilities, restricted areas of the airport, designated waste disposal facilities and specified processes are required to comply with the prescribed emission standards.

3.1.6 Air Pollution Control (Fuel Restriction) Regulation (Cap. 311I)

3.1.6.1 Air pollution Control (Fuel Restriction) Regulation controls the types of fuel allowed for use and their sulphur contents in commercial and industrial processes to reduce sulphur dioxide (SO_2) emissions.

3.1.7 Air Pollution Control (Specified Processes) Regulations (Cap. 311F)

3.1.7.1 According to Part IV and Schedule 1 of the APCO, a number of polluting industrial processes are classified as Specified Processes (SPs), which are subject to more stringent emission control. A licence is required for the operation of SP. Cement Work (Concrete Batching Plant) which is SP would be involved during construction phase of the Project. The relevant requirements for this SP are discussed in **Section 3.1.8**.

3.1.8 Guidance Note on the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2 (16)

3.1.8.1 Apart from obtaining a SP licence under APCO, the SP shall be operated in accordance with the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2 (16) to prevent the emission of noxious or offensive emissions from their plants, prevent the discharge of such emissions into the atmosphere and render such emissions where discharged harmless and inoffensive. This Note sets out the minimum requirements for Cement Work (Concrete Batching Plant) in which the total silo capacity exceeds 50 tonnes and in which cement is handled or in which argillaceous and calcareous materials are used in the production of cement clinker, and works in which cement clinker is ground, including the allowable emission limit, fugitive emission control and monitoring requirements associated with the operation of SP.

3.1.8.2 The emission limit stipulated in the BPM is shown in **Table 3.2**.

Table 3.2 Concentration Limit for Emission from Cement Work

Pollutant	Concentration Limit (mg/m^3) [1]
Particulate matter	10

Note:
[1] The air pollutant concentration is expressed at reference conditions of 0°C temperature, 101.325 kPa pressure, and without correction for water vapour content. Introduction of diluted air to achieve the emission concentration limit shall not be permitted.

3.1.9 Development Bureau Technical Circular (Works) No. 13/2020

3.1.9.1 Development Bureau Technical Circular (Works) No. 13/2020 promulgates the policy on timely application of temporary electricity and water supply for public works contracts as well as wider use of electric vehicles (EVs) in public works contracts. All public works contracts, including design and build contracts and term contracts, the tender invitations of which are issued on or after 1 February 2021, shall observe the requirements as set out in this Circular.

3.1.10 Practice Note on Control of Air Pollution in Vehicle Tunnels

3.1.10.1 The Practice Note on Control of Air Pollution in Vehicle Tunnels provides guidelines on control of air pollution in vehicle tunnels. Air pollutant concentration limits are shown in **Table 3.3**.

Table 3.3 Tunnel Air Quality Guidelines

Pollutant	Average Time	Maximum Concentration	
		$\mu g/m^3$ [1]	ppm
CO	5 minutes	115,000	100
NO_2	5 minutes	1,800	1
SO_2	5 minutes	1,000	0.4

Note:
[1] Expressed at the reference condition of 298K and 101.325 kPa.

3.2 Description of the Environment

3.2.1 Existing Ambient Air Quality

3.2.1.1 The existing ambient air quality could be referred to the nearest EPD's Tuen Mun Air Quality Monitoring Station (AQMS). The latest air quality monitoring data (available up to 2022) of various air pollutants monitored at Tuen Mun AQMS is presented in **Table 3.4** and compared with the Air Quality Objectives (AQOs).

Table 3.4 Air quality monitoring data (Tuen Mun AQMS, 2018-2022)

Pollutant	Parameter	Concentrations (μg/m³) [1]						AQO (μg/m³) [2]
		2018	2019	2020	2021	2022	5-year Mean [2]	
SO_2	4th highest 10-minute	94	45	98	22	29	58 [12%]	500 (3)
	4th highest 24-hour	20	12	10	9	11	12 [25%]	50 (3)
NO_2	19th highest 1-hour	177	166	166	172	128	162 [81%]	200 (18)
	Annual	**47**	**47**	40	**44**	39	**43 [109%]**	40
CO	Max. 1-hour	1,900	2,050	1,650	1,720	1,480	1,760 [6%]	30,000
	Max. 8- hour	1,666	1,758	1,513	1,450	1,345	1,546 [15%]	10,000
O_3	10th highest 8-hour	**173**	**203**	**166**	**161**	**195**	**180 [112%]**	160 (9)
RSP	10th highest 24-hour	87	89	84	87	65	82 [82%]	100 (9)
	Annual	42	41	34	36	32	37 [74%]	50
FSP	19th highest 24-hour	47	46	41	42	39	43 [86%]	50 (18)
	Annual	**26**	24	20	19	18	21 [86%]	25

Notes:

[1] Monitoring results exceeding the AQO are in **bold**.

[2] The 5-year mean is the average of the five yearly concentrations. Percentage of the 5-year mean concentration to AQO is shown in [ ]. Number of exceedance allowed under the AQO is shown in ( ).

3.2.1.2 It can be seen from **Table 3.4** that there was a general decreasing trend for the 19th highest 1-hour NO_2 concentration since 2018 except for 2021 and the range was between 128μg/m³ and 177μg/m³ in the past 5 years, all complying with the AQO of 200μg/m³. The annual NO_2 concentrations exceeded the AQO of 40μg/m³, except 2020 and 2022. The Tuen Mun AQMS is located at Tuen Mun Public Library surrounded by several major roads including Tuen Mun Road, Castle Peak Road – Castle Peak Bay, Tuen Mun Heung Sze Wui Road, Tuen Hing Road, etc. It is likely that the vehicular emissions from these roads contribute to the high level of annual NO_2 concentrations.

3.2.1.3 The annual RSP concentrations were generally decreasing from 42μg/m³ to 32μg/m³ from 2018 to 2022 , except for Year 2021. The 10th highest daily RSP concentrations were ranged from 65μg/m³ to 89μg/m³. Both annual and 10th highest daily RSP comply with the AQO of 50μg/m³ and 100 μg/m³ in the past 5 years.

3.2.1.4 The annual FSP concentrations decreased from 26μg/m³ to 18μg/m³ over the past 5 years, whilst the 19th highest daily FSP concentrations dropped from 47μg/m³ to 39μg/m³ from 2018 to 2022, except for 2021. Exceedance was found in 2018 annual FSP concentration However, improvement was observed and the annual FSP comply with the respective AQOs in recent 4 years.

3.2.1.5 The 10th highest 8-hour averaged O_3 concentrations ranged from 161μg/m³ in 2021 to 203μg/m³ in 2019 and all exceeded the AQO of 160μg/m³ in the past 5 years. According to EPD's Air Quality in Hong Kong 2021 report, O_3 is not a pollutant directly emitted

from man-made sources but formed by photochemical reactions of primary pollutants such as NO_x and volatile organic compounds (VOCs) under sunlight. As it takes several hours for these photochemical reactions to take place, O_3 recorded in one place could be attributed to VOC and NO_x emissions from places afar. Hence, O_3 is more a regional air pollution problem.

3.2.1.6 Monitoring records of SO_2 and CO indicated that these two pollutants were in relatively low levels. Both pollutants were well within the AQOs.

3.2.2 Future Background Air Quality

3.2.2.1 It should be noted that the ambient air quality conditions described in the above sections are based on the historical monitoring data. The future background air quality is predicted by a regional air quality model named "Pollutants in the Atmosphere and their Transport over Hong Kong" (i.e. PATH).

3.2.2.2 The assessment area of the Project involves 23 grids in the latest PATH model (i.e. PATH v2.1). The Project is tentatively commissioned in Year 2033. According to the PATH v2.1 model results available from EPD's website (https://path.epd.gov.hk/index_en_2030.html), the background concentrations for Year 2030 are comparatively higher than that of Year 2035. The future background concentrations of the key pollutants predicted by the PATH v2.1 for Year 2030 are summarised in **Table 3.5** and **Table 3.6**. **Figures 3.1a to b** illustrate the locations of concerned PATH grids.

Table 3.5 Future background air quality for concerned PATH grids in Lam Tei Area

Pollutant	Parameter	Concentrations (μg/m^3)						
		21_43	21_44	21_45	22_43	22_44	22_45	AQO [1]
NO_2	19th highest 1-hour	91	91	93	87	90	89	200 (18)
	Annual	18	19	18	15	17	17	40
RSP	10th highest 24-hour	69	71	73	68	69	71	100 (9)
	Annual	27	27	27	27	27	27	50
FSP	19th highest 24-hour	36	37	38	37	37	37	50 (18)
	Annual	15	15	16	15	15	15	25

Note:
[1] Number of exceedance allowed under the AQO is shown in ( ).

Table 3.6 Future background air quality for concerned PATH grids in So Kwun Wat, Siu Lam, Tai Lam, Tsing Lung Tau and North Lantau Areas

Pollutant	Parameter	Concentrations (µg/m^3)										
		21_39	21_40	22_39	22_40	23_39	23_40	24_38	24_39	24_40	25_38	AQO [1]
NO_2	19th highest 1-hour	103	89	100	87	100	87	106	99	94	110	200 (18)
	Annual	27	21	25	18	24	18	26	22	20	25	40
RSP	10th highest 24-hour	68	69	69	67	69	67	67	67	67	68	100 (9)
	Annual	28	27	27	27	28	26	27	27	27	28	50
FSP	19th highest 24-hour	39	38	38	38	41	38	39	39	39	40	50 (18)
	Annual	15	15	15	15	16	15	15	15	15	15	25

Pollutant	Parameter	Concentrations (µg/m^3)									
		25_39	26_35	26_37	26_38	27_35	27_36	27_38	28_35	28_36	AQO [1]
NO_2	19th highest 1-hour	101	109	115	110	111	112	113	120	117	200 (18)
	Annual	22	23	30	27	24	25	28	27	27	40
RSP	10th highest 24-hour	67	65	66	69	65	65	68	64	64	100 (9)
	Annual	28	27	28	28	27	27	28	27	27	50
FSP	19th highest 24-hour	39	36	35	40	36	35	39	35	35	50 (18)
	Annual	15	15	15	16	15	15	16	14	14	25

Note:
[1] Number of exceedance allowed under the AQO is shown in ( ).

3.3 Representative Air Sensitive Receivers

3.3.1.1 In accordance with Annex 12 of the EIAO-TM, Air Sensitive Receivers (ASRs) include domestic premises, hotel, hostel, hospital, clinic, nursery, temporary housing accommodation, school, educational institution, office, factory, shop, shopping centre, place of public worship, library, court of law, sports stadium or performing arts centre. Any other premises or places with which, in terms of duration or number of people affected, has a similar sensitivity to the air pollutants as the aforelisted premises and places would also be considered as a sensitive receiver.

3.3.1.2 The alignment of Project can be generally divided into three sections, including areas of Lam Tei, So Kwun Wat, Siu Lam, Tai Lam, Tsing Lung Tau and North Lantau. Detailed description of the alignment shall be referred to **Section 2** and **Figure 1.1**.

3.3.1.3 Representative ASRs within the boundary of the Assessment Area (i.e. 500m from the boundary of the Project Site and associated works and temporary work site / works area during construction phase, and 500m from the Project Road and highway / tunnel operation and maintenance facilities during operational phase) have been identified. These ASRs include existing, committed and planned ASRs.

3.3.1.4 Existing ASRs are identified by means of topographic maps, aerial photos, building plans, and are verified by site inspections. Representative ASRs are described in clusters as follows:

ASRs in Lam Tei	• Residential developments (e.g. The Sherwood, Botania Villa, GreenView and Fu Tai Estate), village houses (e.g. Nai Wai, Tsoi Yuen Tsuen, Fuk Hang Tsuen, Wo Ping San Tsuen and Fu Tei Ha Tsuen), recreational facilities (e.g. Fuk Hang Playground and Lam Tei Basketball Court), school (e.g. Madam Lau Kam Lung Secondary School Of Miu Fat Buddhist Monastery), as well as temples (e.g. Miu Fat Buddhist Monastery and Tin Hau Temple)
ASRs in So Kwun Wat, Siu Lam and Tai Lam	• Residential developments (e.g. The Terrace, Skypoint Royale, Avignon and Grand Pacific Heights), recreational facilities (e.g. Golden Beach Children Play Area), schools (e.g. Harrow International School, Chu Hai College of Higher Education and S.T.F.A. Lee Kam Primary School), as well as government, institution and community facilities (e.g. Tai Lam Correctional Institution, Siu Lam Psychiatric Centre and Treatment Centre - Glorious Praise Fellowship)
ASRs in Tsing Lung Tau	• Residential developments (e.g. Hong Kong Garden, L'Aquatique and Vistacove) and village houses (e.g. Choi Yuen Tsuen and Ka Loon Tsuen)
ASRs in North Lantau	• Village houses (e.g. Tai Chuen) and offices (e.g. Lantau Toll Plaza Administration Building)
ASRs in Pillar Point	• Hong Kong Science Museum Exhibition Workshop and Goodman Westlink

3.3.1.5 Planned/committed ASRs are identified by referring to the following relevant documents:

- Lam Tei and Yick Yuen Outline Zoning Plan (OZP) (No. S/TM – LTYY/12);
- Hung Shui Kiu and Ha Tsuen OZP (No. S/HSK/2);
- Tuen Mun OZP (No. S/TM/36);
- Tong Yan San Tsuen OZP (No. S/YL – TYST/14);
- So Kwun Wat OZP (No. S/TM – SKW/14);
- Tsuen Wan West OZP (No. S/TWW/20);
- North – East Lantau OZP (No. S/I – NEL/12);
- Planning Applications under of S.16 / S.12a Town Planning Ordinance; and
- Land Sale Programme published by the Lands Department.

3.3.1.6 In addition to the developments planned / zoned according to the above plans, other planned / committed development projects within the assessment area have also been reviewed and identified. These include the Planned Public Housing in Hung Shui Kiu/Ha Tsuen New Development Area, Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun, as well as Planned Lam Tei North East Development. The planning information, tentative layout drawings and implementation programme of these concurrent development projects are provided by corresponding project proponents if available.

3.3.1.7 The planned population intake year for the Planned Public Housing in Hung Shui Kiu/Ha Tsuen New Development Area within the assessment area is 2030. For the Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun, the planned population intake year is under review at the time of preparation of this EIA report. Nonetheless, as checked with Civil Engineering and Development Department (CEDD), by the time when Route 11 (R11) is commissioned (i.e. 2033), the existing premises and land within the areas shall have been resumed for

these planned developments. Hence, only planned ASRs within these development areas are considered for operational air quality assessment.

3.3.1.8 The Planned Lam Tei North East Development is also identified as one of the concurrent development project within the Assessment Area. There is also no available information on the planned population intake year at the time of preparation of this EIA report. As confirmed by CEDD, since the Planned Lam Tei North East Development is still being under early feasibility study stage and the planning details of the development are not yet available during the course of this EIA Study, assessments on the Planned Lam Tei North East Development will be covered in its separate EIA. Hence, they are not included as ASRs in this EIA Study. Nonetheless, it is anticipated that the existing ASRs would still exist in the area after commissioning of R11 and before land resumed for Planned Lam Tei North East Development, hence are considered in the assessment.

3.3.1.9 The locations of representative ASRs for air quality impact assessment are summarized in **Table 3.7** to **Table 3.11** and are shown in **Figures 3.2a** to **e** and **Figures 3.3a** to **d**. In addition to discrete ASRs, contour plots covering the whole 500m assessment area are also prepared at the worst affected level and worst scenario years to ensure no exceedance at all air sensitive areas, as shown in **Figures 3.6a** to **3.11d**. The selected ASRs and coverage of the assessment area in Lam Tei area are the same as those in Tuen Mun Bypass (TMB) EIA.

Table 3.7 Representative ASRs for Air Quality Impact Assessment in Lam Tei Area

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase[7] (m)	Approx. distance from Project during Operational Phase[7] (m)	Operation/ Construction Phase ASR
Existing ASRs										
A001	Wo Ping San Tsuen House 198	Res	13.7	10	1.5	10	-	430	340	Both
A002	Wo Ping San Tsuen Village House	Res	18.2	10	1.5	10	-	380	300	Both
A003	Wo Ping San Tsuen Village House	Res	18.2	10	1.5	10	-	350	280	Both
A004	Wo Ping San Tsuen House 145	Res	16.4	10	1.5	10	-	250	210	Both
A008	Tsoi Yuen Tsuen House 283	Res	18.8	10	1.5	10	-	40	50	Both
A009	Tsoi Yuen Tsuen House 282	Res	18.1	10	1.5	10	-	30	50	Both
A010	Tsoi Yuen Tsuen House 74	Res	17.9	10	1.5	10	-	30	40	Both
A011	Fuk Hang Tsuen House 152	Res	17.8	10	1.5	10	-	<10	20	Both
A012	Tsoi Yuen Tsuen Village House	Res	17.3	10	1.5	10	-	<10	20	Both
A013	Tsoi Yuen Tsuen House 159	Res	15.2	10	1.5	10	-	20	30	Both
A014	Tsoi Yuen Tsuen Village House	Res	15.7	10	1.5	10	-	20	40	Both
A015	Tsoi Yuen Tsuen House 166	Res	13.8	10	1.5	10	-	50	70	Both
A016	Tsoi Yuen Tsuen House 189	Res	13.3	10	1.5	10	-	60	80	Both
A017	Tsoi Yuen Tsuen Village House	Res	12.2	10	1.5	10	-	40	60	Both
A020	Nai Wai House 332	Res	11.9	10	1.5	10	-	150	160	Both
A021	Nai Wai Village House	Res	10.4	10	1.5	10	-	200	210	Both
A022	Nai Wai House 248	Res	11.3	10	1.5	10	-	240	260	Both
A023	Nai Wai Village House	Res	10.5	10	1.5	10	-	270	290	Both
A024	Yorks Field Garden	Res	14.8	10	1.5	10	-	410	430	Both
A025	Tsoi Yuen Tsuen House 211A	Res	12.8	10	1.5	10	-	290	300	Both
A026	Nai Wai Temple	Wor	12.3	10	1.5	10	-	380	390	Both
A027	Nai Wai House 158	Res	12.3	10	1.5	10	-	310	330	Both
A028	Belrose Place Block A	Res	10.7	10	1.5	10	-	330	350	Both
A029	Tsing Yick Road Village House	Res	8.9	10	1.5	10	-	410	430	Both
A030	Tsing Yick Road Village House	Res	8.7	10	1.5	10	-	430	440	Both
A031	Lam Tei Pet Garden	Rec	9.7	N/A	1.5	1.5	-	250	250	Both
A032	Fuk Hang Playground Basketball Court	Rec	9.1	N/A	1.5	1.5	-	240	250	Both
A033	Fuk Hang Tsuen Road House 2	Res	10	10	1.5	10	-	210	210	Both
A034	Fuk Hang Tsuen Road House 11	Res	10.5	10	1.5	10	-	150	160	Both
A035	Fuk Hang Tsuen Road Garden	Rec	10.4	N/A	1.5	1.5	-	140	150	Both
A036	Fuk Hang Tsuen Road House 18	Res	10.9	10	1.5	10	-	90	100	Both
A037	Fortress Garden Block 8	Res	9	10	1.5	10	-	430	440	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase[7] (m)	Approx. distance from Project during Operational Phase[7] (m)	Operation/ Construction Phase ASR
A038	Tuen Tsz Wai Village House	Res	8	10	1.5	10	-	350	360	Both
A039	Tuen Tsz Wai House 565	Res	8.7	10	1.5	10	-	360	380	Both
A040	Farmer Restaurant	Com	8.7	15	1.5	15	-	440	460	Both
A041	Miu Fat Buddhist Monastery Ksitigarbha Hall	Wor	10.5	5	1.5	5	-	210	220	Both
A042	Miu Fat Buddhist Monastery	Wor	8.5	35	1.5	50	-	250	260	Both
A043	Madam Lau Kam Lung Secondary School of Miu Fat Buddhist Monastery	Edu	9.1	25	1.5	30	-	210	220	Both
A044	Miu Fat Buddhist Monastery Elderly Home	Res	10.9	25	1.5	30	-	240	250	Both
A045	Temple at Lam Tei	Wor	10.4	5	1.5	1.5	-	270	290	Both
A046	Lam Tei House 20	Res	10.1	10	1.5	10	-	240	260	Both
A047	The Sherwood Block 1	Res	11.1	50	1.5	50	-	140	160	Both
A048	The Sherwood Block 2	Res	11.1	50	1.5	50	-	140	160	Both
A049	The Sherwood Block 3	Res	11.1	50	1.5	50	-	150	160	Both
A050	The Sherwood Block 4	Res	11.1	50	1.5	50	-	160	170	Both
A051	The Sherwood Block 5	Res	11.1	50	1.5	50	-	170	190	Both
A052	The Sherwood Podium	Com	11.4	5	1.5	5	-	50	70	Both
A053	The Sherwood Block 13	Res	11.4	45	1.5	50	-	70	80	Both
A054	The Sherwood Block 12	Res	11.4	45	1.5	50	-	80	90	Both
A055	The Sherwood Block 11	Res	11.4	45	1.5	50	-	90	100	Both
A056	The Sherwood Block 10	Res	11.4	45	1.5	50	-	100	120	Both
A057	The Sherwood Block 9	Res	11.4	45	1.5	50	-	110	130	Both
A058	Lam Tei Main Street House 88	Res	13	10	1.5	10	-	240	250	Both
A059	Tuen Mun San Tsuen House 110	Res	11.9	10	1.5	10	-	300	320	Both
A060	Store at Lam Tei Main Street House 128	Com	14.5	10	1.5	10	-	140	150	Both
A061	Botania Villa Block 1	Res	11.5	45	1.5	50	-	160	180	Both
A062	Botania Villa Podium	Rec	11.5	5	1.5	5	-	150	160	Both
A063	Botania Villa Block 10	Res	11.5	45	1.5	50	-	170	190	Both
A064	GreenView Podium	Rec	15	5	1.5	5	-	160	170	Both
A065	GreenView	Res	15	45	1.5	50	-	170	190	Both
A066	Botania Villa Block 9	Res	11.5	45	1.5	50	-	200	220	Both
A067	Fuk Hang Tsuen House 12	Res	13.3	10	1.5	10	-	<10	20	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase[7] (m)	Approx. distance from Project during Operational Phase[7] (m)	Operation/ Construction Phase ASR
A068	The Church of Christian Faith Lam Tei Gospel Church	Wor	14.9	5	1.5	5	-	60	70	Both
A069	Property Agency at Fuk Hang Tsuen Road	Res	14.1	5	1.5	1.5	-	120	130	Both
A070	Fuk Hang Tsuen House 25	Res	14.4	10	1.5	10	-	<10	20	Both
A071	Fuk Hang Tsuen House 458	Res	14.1	10	1.5	10	-	<10	20	Both
A072	Fuk Hang Tsuen Village House	Res	19.3	10	1.5	10	-	<10	60	Both
A073	Fuk Hang Tsuen Village House	Res	19.6	10	1.5	10	-	<10	20	Both
A074	Fuk Hang Tsuen Village House	Res	15.7	10	1.5	10	-	<10	20	Both
A075	Fuk Hang Tsuen Village House	Res	16	10	1.5	10	-	20	30	Both
A076	Fuk Hang Tsuen Houses 59 - 61	Res	17.1	10	1.5	10	-	40	70	Both
A077	Church of Christian Faith Lam Tei Gospel Church	Wor	17.8	10	1.5	10	-	60	90	Both
A078	Fuk Hang Tsuen Village House	Res	17.1	10	1.5	10	-	90	130	Both
A079	Tin Hau Temple at Fuk Hang Tsuen Road	Wor	17.3	5	1.5	1.5	-	50	120	Both
A080	Tuen Mun Heung Fuk Hang Tsuen Village Office	GIC	17.3	10	1.5	10	-	50	130	Both
A081	Lam Tei Fa Pao Association	GIC	12	5	1.5	1.5	-	100	200	Both
A082	Fuk Hang Tsuen House 130	Res	11.6	10	1.5	10	-	60	160	Both
A083	Fuk Hang Tsuen Village House	Res	10.9	10	1.5	10	-	120	210	Both
A084	Fuk Hang Tsuen Village House	Res	9	10	1.5	10	-	190	280	Both
A085	To Yuen Wai House 160	Res	8.5	10	1.5	10	-	280	370	Both
A086	To Yuen Wai House 85	Res	9.9	10	1.5	10	-	420	N/A	Construction [8]
A087	Tan Kwai Tsuen Village House	Res	21.4	10	1.5	10	-	440	350	Both
A088	Tung Fuk Road Village House	Res	25.7	10	1.5	10	-	230	150	Both
A089	Tung Fuk Road Village House	Res	30.8	10	1.5	10	-	220	130	Both
A090	Tung Fuk Road Village House	Res	26.8	10	1.5	10	-	110	20	Both
A091	Tung Fuk Road Village House	Res	26.2	10	1.5	10	-	50	10	Both
A092	Tung Fuk Road Village House	Res	28.1	10	1.5	10	-	50	20	Both
A093	Tung Fuk Road Village House	Res	25.6	10	1.5	10	-	70	50	Both
A094	Fuk Hang Tsuen House 178	Res	29.3	10	1.5	10	-	160	120	Both
A095	Fuk Hang Tsuen Village House	Res	26.4	10	1.5	10	-	120	80	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase[7] (m)	Approx. distance from Project during Operational Phase[7] (m)	Operation/ Construction Phase ASR
A096	Fuk Hang Tsuen Village House	Res	32.1	10	1.5	10	-	180	160	Both
A097	Tin Hau Temple at Fuk Hang Tsuen Path	Wor	29.6	5	1.5	1.5	-	190	180	Both
A098	Fuk Hang Tsuen Village House	Res	32.9	10	1.5	10	-	170	170	Both
A099	Fuk Hang Tsuen Village House	Res	30	10	1.5	10	-	<10	30	Both
A100	Chui Fuk Road Village House	Res	19.2	10	1.5	10	-	30	40	Both
A101	Chui Fuk Road Village House	Res	23.5	10	1.5	10	-	30	50	Both
A102	Chui Fuk Road Village House	Res	29	10	1.5	10	-	<10	40	Both
A103	Fu Fuk Road Village House	Res	16.7	10	1.5	10	-	30	40	Both
A104	Fu Tei Ha Tsuen Village House	Res	17.3	10	1.5	10	-	30	50	Both
A105	Fu Tei Ha Tsuen Village House	Res	17.7	10	1.5	10	-	<10	40	Both
A106	Fu Tei Ha Tsuen Village House	Res	9.1	10	1.5	10	-	40	120	Both
A107	Fu Tei Ha Tsuen Village House	Res	7.6	10	1.5	10	-	250	330	Both
A108	Fu Tei Ha Tsuen Village House	Res	7.1	10	1.5	10	-	320	400	Both
A109	Fu Tei Ha Tsuen House 52	Res	7.3	10	1.5	10	-	450	N/A	Construction [8]
A110	Fu Tei Ha Tsuen Village House	Res	18.3	10	1.5	10	-	100	100	Both
A111	Sin Fat Hang Yuen Temple	Wor	27.5	5	1.5	1.5	-	160	170	Both
A112	Nam On Buddhist Monastery	Wor	18.5	5	1.5	1.5	-	170	170	Both
A113	Fu Tei Ha Tsuen Village House	Res	20.5	10	1.5	10	-	250	250	Both
A114	Fu Tei Ha Tsuen Village House	Res	14.9	10	1.5	10	-	190	250	Both
A115	Fu Tei Ha Tsuen Village House	Res	12.4	10	1.5	10	-	220	290	Both
A116	Fu Tai Estate - Ning Tai House	Res	15	120	1.5	120	-	370	450	Both
A117	Fu Tai Estate - Yat Tai House	Res	12	120	1.5	120	-	390	470	Both
A118	Fu Tai Estate - Yan Tai House	Res	13	120	1.5	120	-	460	N/A	Construction [8]
A119	Fu Tai Estate - Oi Tai House	Res	11	115	1.5	120	-	450	N/A	Construction [8]
Planned/Committed ASRs										
P001	Proposed Public Housing at Ping Shan South and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	13	170	1.5	180	N/A	530	460	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase[7] (m)	Approx. distance from Project during Operational Phase[7] (m)	Operation/ Construction Phase ASR
P002a	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	Res/ GIC/ Com	19	160	1.5	180	N/A	150	120	Both
P002b	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	Res/ GIC/ Com	19	160	1.5	180	N/A	100	120	Both
P002c	Podium with potential non-domestic facilities for Proposed Public Housing at Lam Tei North	GIC/ Com	19	15	1.5	15	N/A	90	100	Both
P003a	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	Res/ GIC/ Com	18	160	1.5	180	N/A	200	210	Both
P003b	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	Res/ GIC/ Com	18	160	1.5	180	N/A	220	230	Both
P003c	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	Res/ GIC/ Com	18	160	1.5	180	N/A	240	250	Both
P004a	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	Res/ GIC/ Com	20	160	1.5	180	N/A	100	110	Both
P004b	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	Res/ GIC/ Com	20	160	1.5	180	N/A	170	190	Both
P005a	Proposed Public Housing at Lam Tei North	Res	20	160	1.5	180	N/A	30	50	Both
P005b	Proposed Public Housing at Lam Tei North	Res	20	160	1.5	180	N/A	30	40	Both
P006	Proposed Temporary Place of Recreation, Sports or Culture (Indoor Recreation Centre)	Rec	17	5	1.5	1.5	N/A	40	60	Both
P007a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	13	180	1.5	180	N/A	140	160	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase[7] (m)	Approx. distance from Project during Operational Phase[7] (m)	Operation/ Construction Phase ASR
P007b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	13	180	1.5	180	N/A	140	160	Both
P008a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	12	180	1.5	180	N/A	50	80	Both
P008b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	12	180	1.5	180	N/A	90	110	Both
P008c	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	12	180	1.5	180	N/A	70	90	Both
P008d	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	12	180	1.5	180	N/A	20	40	Both
P009a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	10	180	1.5	180	N/A	20	40	Both
P009b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	10	180	10	180	N/A	70	90	Both
P010	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	12	180	10	180	N/A	90	110	Both
P011	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	10	180	1.5	180	N/A	70	90	Both
P012a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	10	180	1.5	180	N/A	150	160	Both
P012b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities [6]	Res/ GIC/ Com	10	180	1.5	180	N/A	210	220	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase[7] (m)	Approx. distance from Project during Operational Phase[7] (m)	Operation/ Construction Phase ASR
P013a	Planned Public Housing in Hung Shui Kiu/Ha Tsuen New Development Area and Podium with retail use	Res/ Com	11	160	1.5	180	2030	470	490	Both
P014	Proposed Development of Elderly Home by Pok Oi Hospital	Res	12.8	60	1.5	80	2026	20	40	Both
P015	Proposed Development of Elderly Home by Pok Oi Hospital	Res	13.4	60	1.5	80	2026	20	40	Both
P016	Proposed Development of Elderly Home by Pok Oi Hospital	Res	13	60	1.5	80	2026	20	30	Both
P017	Proposed Comprehensive Development Area in Lot 2883 in D.D. 130	Res	14.5	15	1.5	15	N/A	220	300	Both
P018	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	Res	16.5	40	1.5	50	N/A	130	190	Both
P019	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	Res	17.3	40	1.5	50	N/A	70	150	Both
P020	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	Res	18.5	40	1.5	50	N/A	20	100	Both
P021	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	Res	19.5	40	1.5	50	N/A	20	60	Both
P022	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	Res	20.6	40	1.5	50	N/A	<10	50	Both
P025	Temporary Place of Recreation, Sports or Culture (Sports Training Ground)	Rec	30.3	15	1.5	15	N/A	<10	40	Both

Notes:

[1] ASR ID A005 to A007, A018, A019, P023 and P024 are not used.

[2] Com – Commercial; Edu – Education; GIC – Government, Institution and Community; Hos – Hospital/Clinic; Off – Office; Rec – Park/ Recreational; Res – Residential; and Wor – Worship.

[3] ASR location, height, the lowest and highest floor with air sensitive use (i.e. lowest and highest assessment heights) are determined based on site survey, building plan and latest layout plan, where available and applicable. For all planned ASRs, the lowest assessment height is assumed to be 1.5m, except those ASRs located above planned PTIs.

[4] Building heights are rounded up to the nearest 5m. Height of village houses are assumed to be 10m, which is the common height of a typical 3-storey village house.

[5] The assessment heights are set at 10 levels (1.5, 5, 10, 15, 20, 30, 50, 80, 120 and 180 mAG) (see details in **Table 3.20**). The highest assessment height of each ASR has covered the top level of the building, e.g. for P021, the building height is 40m, the highest assessment height is up to 50m.

[6] Population intake years are only presented for committed/planned ASRs. For those without confirmed population intake programme, it is indicated as N/A in the table. For committed/planned developments with development programme to be implemented before commissioning of R11, only planned ASRs in the development area have been included in the assessment. There is no confirmed programme on population intake for Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun. As checked with CEDD, the existing premises and land within the housing site areas shall have been resumed for these planned developments by the time when R11 is commissioned. Hence, only planned ASRs within these development areas are included for operational air quality assessment. For other committed/planned developments where there is no available information on the programme on both population intake and land resumption, both existing and planned ASRs in the development area have been included in the assessment. The locations of representative ASRs for Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun are based on conceptual plan provided by CEDD. For planned development where layout plan is not available, minimum setback distance from the respective roads according to the Hong Kong Planning Standards and Guidelines would be adopted.

[7] The Project during Construction Phase refers to the boundary of the Project Site and associated works and temporary work site / works area, and the Project during Operation Phase refers to road and highway / tunnel and their associated operation and maintenance facilities during operational phase.

[8] These ASRs are not representative ASRs during operational phase since they are beyond 500m assessment area of operational phase.

Table 3.8 Representative ASRs for Air Quality Impact Assessment in So Kwun Wat, Siu Lam and Tai Lam Areas

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
Existing ASRs										
A201	So Kwun Wat Tsuen Village House	Res	73.8	10	1.5	10	-	110	170	Both
A202	So Kwun Wat Tsuen Village House	Res	26	10	1.5	10	-	20	80	Both
A203	So Kwun Wat Tsuen Village House	Res	34	10	1.5	10	-	30	90	Both
A204	So Kwun Wat Tsuen House 501	Res	30.4	10	1.5	10	-	30	80	Both
A205	Harrow International School Hong Kong	Edu	39	30	1.5	30	-	30	40	Both
A206	The Highland H21	Res	49.1	20	1.5	20	-	170	190	Both
A207	The Highland H7	Res	49.1	20	1.5	20	-	210	270	Both
A208	Harrow International School Basketball Court	Edu	42.7	5	1.5	5	-	20	60	Both
A209	Harrow International School Hong Kong Main Building	Edu	37.5	30	1.5	30	-	20	70	Both
A210	The Terrace H10	Res	40.9	15	1.5	15	-	40	90	Both
A211	The Terrace Tower 7	Res	40.9	25	1.5	30	-	80	130	Both
A212	The Terrace Balcony Garden	Rec	40.9	5	1.5	5	-	20	70	Both
A213	The Terrace H3	Res	40.9	15	1.5	15	-	30	80	Both
A214	The Terrace Tower 9	Res	40.9	25	1.5	30	-	50	130	Both
A215	The Terrace H2	Res	40.9	15	1.5	15	-	40	100	Both
A216	The Laguna Tower 12	Res	23.5	45	1.5	50	-	50	90	Both
A217	The Laguna Podium	Rec	23.5	5	1.5	5	-	40	90	Both
A218	The Laguna Tower 1	Res	23.5	65	1.5	80	-	120	160	Both
A219	The Laguna Tower 1	Res	23.5	65	1.5	80	-	140	180	Both
A220	Tuen Mun Court	Res	25.6	90	1.5	120	-	390	420	Both
A221	Seaview Garden Block 5	Res	16	100	1.5	120	-	420	440	Both
A222	Village House near Tsing Yung Street	Res	11.7	10	1.5	10	-	340	360	Both
A223	Castle Peak Bay Immigration Centre	Off	7.9	50	1.5	50	-	210	230	Both
A224	Castle Peak Road - Castle Peak Bay House 85	Res	12.1	15	1.5	15	-	360	380	Both
A225	Chu Hai College of Higher Education	Edu	7.9	40	1.5	50	-	90	110	Both
A226	Immigration Service Institute of Training and Development	Off	7	55	1.5	80	-	210	230	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
A227	Chu Hai College of Higher Education Student's Dormitory	Res	17.1	30	1.5	30	-	40	70	Both
A228	Cafeteria Old Beach Sitting-out Area	Rec	3.7	N/A	1.5	1.5	-	300	320	Both
A229	Villa La Plage House 26	Res	4.5	20	1.5	20	-	200	230	Both
A230	Mun Fat Lane House 3	Res	16.6	10	1.5	10	-	60	80	Both
A231	Villa La Plage House 15	Res	4.8	20	1.5	20	-	160	180	Both
A232	Mun Fat Lane House 2	Res	14	15	1.5	15	-	90	110	Both
A233	Villa La Plage House 2	Res	7.3	20	1.5	20	-	160	180	Both
A234	Blessing Villa Block A	Res	10.2	10	1.5	10	-	140	160	Both
A235	Mun Fat Lane House 6	Res	17.5	10	1.5	10	-	70	90	Both
A236	Golden Beach Children Play Area	Rec	6.8	N/A	1.5	1.5	-	180	200	Both
A237	Spring Seaview Terrace Block A	Res	9.3	50	1.5	50	-	110	140	Both
A238	Spring Seaview Terrace Podium	Rec	9.3	10	1.5	10	-	110	140	Both
A239	Palm Beach Podium	Rec	10	15	1.5	15	-	10	40	Both
A240	Palm Beach Block 2	Res	10	55	1.5	80	-	30	50	Both
A241	Monte Carlo Villas Block A6	Res	12.1	10	1.5	10	-	110	130	Both
A242	Monte Carlo Villas Block A1	Res	12.3	10	1.5	10	-	120	130	Both
A243	Hong Kong Gold Coast Block 1	Res	5.1	70	1.5	80	-	130	140	Both
A244	Hong Kong Gold Coast Block 2	Res	5.1	70	1.5	80	-	140	150	Both
A245	Hong Kong Gold Coast Block 3	Res	5.1	70	1.5	80	-	150	170	Both
A246	Hong Kong Gold Coast Block 4	Res	5.1	65	1.5	80	-	160	180	Both
A247	Tin Hau Temple at Gold Coast	Wor	5.6	10	1.5	10	-	180	210	Both
A248	Skypoint Royale Tower 7	Res	12.2	60	1.5	80	-	10	30	Both
A249	Skypoint Royale Tower 6	Res	12.2	60	1.5	80	-	<10	30	Both
A250	Seacoast Royale Tower 5	Res	13.5	60	1.5	80	-	40	50	Both
A254	So Kwun Wat Tsuen House 520	Res	12.3	10	1.5	10	-	80	100	Both
A255	So Kwun Wat Tsuen House 510	Res	17.9	10	1.5	10	-	20	40	Both
A256	So Kwun Wat Tsuen Village House	Res	19.5	10	1.5	10	-	40	60	Both
A257	So Kwun Wat Tsuen Village House	Res	11	10	1.5	10	-	80	100	Both
A258	PLK Women's Welfare Club Western District Fung Lee Pui Yiu Primary School	Edu	5.2	20	1.5	20	-	170	190	Both
A259	S.T.F.A. Lee Kam Primary School	Edu	5.5	30	1.5	30	-	100	130	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
A260	S.T.F.A. Lee Kam Primary School Playground	Edu	13.6	N/A	1.5	1.5	-	70	100	Both
A261	Aegean Coast Tower 8	Res	6.2	90	1.5	120	-	240	260	Both
A262	Aegean Coast Shopping Arcade	Com	6.2	5	1.5	5	-	210	230	Both
A263	Aegean Coast Tower 5	Res	6.2	90	1.5	120	-	320	350	Both
A264	Aegean Coast Club House	Rec	6.2	10	1.5	10	-	280	310	Both
A265	Aegean Coast Tower 1	Res	6.2	90	1.5	120	-	390	440	Both
A266	Aegean Coast Tennis Court	Rec	6.2	N/A	1.5	1.5	-	230	290	Both
A267	Property Agency at So Kwun Wat Road	Off	4.2	5	1.5	1.5	-	190	240	Both
A268	So Kwun Wat Tsuen Village House	Res	3	10	1.5	10	-	280	320	Both
A269	So Kwun Wat Tsuen Village House	Res	11.3	10	1.5	10	-	320	360	Both
A270	Nim Wan Village House	Res	27.4	10	1.5	10	-	450	480	Both
A272	So Kwun Wat Tsuen Village House	Res	39.2	10	1.5	10	-	<10	30	Both
A273	So Kwun Wat Tsuen House 410	Res	18.4	10	1.5	10	-	10	40	Both
A274	So Kwun Wat Tsuen Village House	Res	34.3	10	1.5	10	-	<10	<10	Both
A275	So Kwun Wat Tsuen Village House	Res	63.2	10	1.5	10	-	10	50	Both
A276	Lo Tsing Shan Tsuen Village House	Res	56.2	10	1.5	10	-	60	90	Both
A277	Lo Tsing Shan Tsuen Village House	Res	64	10	1.5	10	-	40	70	Both
A278	Lo Tsing Shan Tsuen Village House	Res	23.3	10	1.5	10	-	<10	10	Both
A279a	Avignon Tower 11	Res	11.2	45	1.5	50	-	<10	50	Both
A279b	Avignon Tower 11	Res	11.2	45	1.5	50	-	<10	40	Both
A280	Avignon Club House	Rec	16.5	10	1.5	10	-	30	80	Both
A281	Avignon Tower 10	Res	11.2	45	1.5	50	-	10	30	Both
A282	Avignon Tower 9	Res	11.2	45	1.5	50	-	20	40	Both
A283	So Kwun Wat Tsuen Village House	Res	4	10	1.5	10	-	200	240	Both
A284	So Kwun Wat Tsuen Village House	Res	12.6	10	1.5	10	-	230	260	Both
A285	So Kwun Wat Tsuen Village House	Res	22	10	1.5	10	-	290	340	Both
A286	Siu Sau Village House 15B	Res	33	10	1.5	10	-	360	470	Both
A287	Emerald Bay Phase 1 Tower 1	Res	16.6	65	1.5	80	-	190	240	Both
A288	Avignon House 1	Res	16.8	20	1.5	20	-	170	220	Both
A289	Avignon Sitting-out Area	Rec	11	N/A	1.5	1.5	-	50	80	Both
A290	Avignon Tower 5	Res	8	50	1.5	50	-	20	40	Both
A291	Avignon Tower 5	Res	8	50	1.5	50	-	<10	30	Both
A292	Avignon Tower 3	Res	8	50	1.5	50	-	<10	30	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
A293	Avignon Tower 2	Res	11.9	40	1.5	50	-	50	70	Both
A294	Avignon Tower 1	Res	11.9	40	1.5	50	-	90	110	Both
A295	NAPA Tower 3	Res	20.4	35	1.5	50	-	190	200	Both
A296	A.D. & F.D. of Pok Oi Hospital Mrs Cheng Yam On Millennium School Basketball Court	Edu	30.1	5	1.5	1.5	-	140	420	Both
A297	A.D. & F.D. of Pok Oi Hospital Mrs Cheng Yam On Millennium School	Edu	30.1	30	1.5	30	-	140	420	Both
A298	York International Pre-School	Edu	26.1	5	1.5	1.5	-	190	400	Both
A299	OMA OMA Podium	Rec	25.5	20	1.5	20	-	220	380	Both
A300	OMA OMA Tower 1	Res	25.5	60	1.5	80	-	240	370	Both
A301	Lepont Tower 1B	Res	29.3	65	1.5	80	-	300	310	Both
A302	Lepont House 18	Res	16	30	1.5	30	-	250	270	Both
A303	So Kwun Wat Tsuen Village House	Res	7	10	1.5	10	-	150	170	Both
A304	So Kwun Wat Tsuen Village House	Res	6	10	1.5	10	-	70	80	Both
A305	So Kwun Wat Tusen Village House 251	Res	7.3	10	1.5	10	-	20	20	Both
A306	So Kwun Wat Tsuen Village House	Res	5.2	10	1.5	10	-	20	40	Both
A307	So Kwun Wat Tsuen Village House 220	Res	6.3	10	1.5	10	-	120	130	Both
A308	So Kwun Wat Tsuen Village House	Res	7.5	10	1.5	10	-	260	270	Both
A309	Tin Hau Temple at So Kwun Wat Tsuen	Wor	8.5	5	1.5	1.5	-	440	450	Both
A310	So Kwun Wat Tsuen Area 2 House 160A	Res	12.3	10	1.5	10	-	390	400	Both
A311	So Kwun Wat San Tsuen House 45	Res	11.6	10	1.5	10	-	120	130	Both
A312	So Kwun Wat San Tsuen House 16	Res	9.9	10	1.5	10	-	150	160	Both
A313	So Kwun Wat San Tsuen House 25	Res	10.9	10	1.5	10	-	130	140	Both
A314	So Kwun Wat San Tsuen House 26	Res	11.3	10	1.5	10	-	160	170	Both
A315	So Kwun Wat Sun Tsuen House 31	Res	11.5	10	1.5	10	-	170	190	Both
A316	So Kwun Wat Tsuen Village House	Res	31.7	10	1.5	10	-	140	150	Both
A317	So Kwun Wat Sun Tsuen Village House	Res	13.9	10	1.5	10	-	70	80	Both
A318	So Kwun Wat Team-building Centre	Rec	17.5	N/A	1.5	1.5	-	<10	20	Both
A401	1001 Grandview Terrace	Res	98.8	10	1.5	10	-	90	490	Both
A402	Siu Lam Village House	Res	31.2	10	1.5	10	-	30	360	Both
A403	Siu Lam Village House	Res	30.6	10	1.5	10	-	80	350	Both
A404	Grand Pacific Heights Block 6	Res	6.3	95	1.5	120	-	150	350	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
A405	Siu Lam Village House	Res	27.9	10	1.5	10	-	100	270	Both
A406	Treatment Centre - Glorious Praise Fellowship (Hong Kong)	GIC	35.5	10	1.5	10	-	80	130	Both
A407	Treatment Centre - Glorious Praise Fellowship (Hong Kong)	GIC	31.1	10	1.5	10	-	100	140	Both
A408	Siu Lam Village House	Res	24.9	10	1.5	10	-	40	70	Both
A409	Siu Lam Village House	Res	42.9	10	1.5	10	-	20	40	Both
A410	Siu Lam Village House	Res	21	10	1.5	10	-	40	60	Both
A411	Hong Kong Christian Prayer Fellowship Ltd.	Wor	16.1	10	1.5	10	-	110	140	Both
A412	Grand Pacific Heights Block 10	Res	6.3	90	1.5	120	-	180	230	Both
A413	Grand Pacific Heights Block 1	Res	6.3	95	1.5	120	-	300	410	Both
A414	Siu Lam Village House	Res	20.8	10	1.5	10	-	50	100	Both
A415	Siu Lam Village House	Res	27.3	10	1.5	10	-	20	70	Both
A416	Siu Lam Village House	Res	20.8	10	1.5	10	-	<10	10	Both
A417	Siu Lam Village House	Res	38.7	10	1.5	10	-	20	70	Both
A418	Siu Lam Village House	Res	38.7	10	1.5	10	-	40	80	Both
A419	Siu Lam Village House	Res	49.4	10	1.5	10	-	<10	20	Both
A420a	Siu Lam Village House	Res	46.5	10	1.5	10	-	<10	40	Both
A421	Correctional Services Department Siu Lam Psychiatric Centre Senior Officers' Married Quarters House 3	Res	70.1	10	1.5	10	-	220	260	Both
A422	Correctional Services Department Officers' Married Quarters Siu Lam Psychiatric Centre Block B	Res	84.1	25	1.5	30	-	230	280	Both
A423	Correctional Services Department Officers' Married Quarters Siu Lam Psychiatric Centre Block A	Res	78.8	15	1.5	15	-	280	350	Both
A424	Siu Lam Psychiatric Centre	GIC	58.6	20	1.5	20	-	300	380	Both
A425	Tai Lam Correctional Institution	GIC	3.9	5	1.5	5	-	20	50	Both
A426	Tai Lam Staff Mess	Rec	4.2	10	1.5	10	-	190	240	Both
A427	Tai Lam Correctional Institution Junior Staff Married Quarters Block E	Res	4.9	20	1.5	20	-	80	130	Both
A428	Tai Lam Dental Clinic	Hos	4.9	5	1.5	5	-	<10	50	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
A429	Tai Lam Correctional Institution Staff Quarters	Res	4.9	10	1.5	10	-	20	80	Both
A430	Tai Lam Correctional Institution	GIC	31.1	5	1.5	5	-	160	240	Both
A431	Tai Lam Centre for Women	GIC	21.1	30	1.5	30	-	190	210	Both
A432	Luen On San Tsuen House 73	Res	16.6	10	1.5	10	-	160	160	Both
A433	Luen On San Tsuen House 74	Res	18.8	10	1.5	10	-	120	120	Both
A434	Luen On San Tsuen House 78	Res	4.9	10	1.5	10	-	50	60	Both
A435	Luen On San Tsuen House 80	Res	4	10	1.5	10	-	60	60	Both
A436	Luen On San Tsuen House 112	Res	4	5	1.5	1.5	-	<10	10	Both
A437	Luen On San Tsuen House 105	Res	3	10	1.5	10	-	10	10	Both
A438	Tai Lam Chung Tsuen House 156	Res	4.7	10	1.5	10	-	10	20	Both
A439	Tai Lam Chung Tsuen Houses 1-2	Res	3.6	10	1.5	10	-	30	40	Both
A440	Tai Lam Chung Tsuen House 19	Res	6.2	10	1.5	10	-	50	90	Both
A441	Tai Lam Chung Tsuen House 28B	Res	9.3	10	1.5	10	-	110	150	Both
A442	Tai Lam Chung Tsuen House 90	Res	3.6	10	1.5	10	-	150	160	Both
A443	Tai Lam Chung Tsuen House 96	Res	6.2	10	1.5	10	-	170	180	Both
A444	Tai Lam Chung Tsuen House 106	Res	7.2	10	1.5	10	-	170	180	Both
A445	Luen On San Tsuen Basketball Court	Rec	3.1	N/A	1.5	1.5	-	40	50	Both
A446	Luen On Shan Tsuen Village House	Res	2.6	10	1.5	10	-	60	60	Both
A447	Luen On Shan Tsuen Village House	Res	2.5	10	1.5	10	-	70	70	Both
A448	Luen On San Tsuen House 62	Res	2.4	10	1.5	10	-	130	130	Both
A449	Luen On San Tsuen Village Office	GIC	3.5	5	1.5	1.5	-	340	350	Both
A450	Tai Lam Chung Tsuen House 206	Res	4.4	10	1.5	10	-	<10	10	Both
A451	Tai Lam Charcoal Barbecue	Com	3.9	5	1.5	1.5	-	<10	10	Both
A452	Tai Lam Chung Tsuen House 261	Res	4.1	10	1.5	10	-	<10	20	Both
A453	Wai Lan Rehabilitation Centre	GIC	2.9	5	1.5	1.5	-	50	60	Both
A454	Hong Kong Customs College Trainee Dormitory I	Res	4	20	1.5	20	-	150	150	Both
A455	Hong Kong Customs College Football Field	Edu	3.9	N/A	1.5	1.5	-	280	280	Both
A456	Hong Kong Customs College Football Field	Edu	3.8	N/A	1.5	1.5	-	380	390	Both
C001	So Kwun Wat San Tsuen Village House	Res	8.7	10	1.5	10	-	290	N/A	Construction [8]

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
C002	Lepont Tower 3B	Res	29.1	65	1.5	80	-	150	N/A	Construction [8]
C003	Lepont Tower 6A	Res	16	75	1.5	80	-	150	N/A	Construction [8]
C004	Lepont Podium	Rec	16	10	1.5	10	-	130	N/A	Construction [8]
C005	A.D. & F.D. of Pok Oi Hospital Mrs Cheng Yam On Millennium School	Edu	30.1	30	1.5	30	-	90	N/A	Construction [9]
C006	OMA OMA Tower 2	Res	25.5	60	1.5	80	-	130	N/A	Construction [8]
C007	Siu Sau Village House	Res	40	10	1.5	10	-	60	N/A	Construction [9]
C008	Emerald Bay Phase 1 Tower 5A	Res	16.6	65	1.5	80	-	210	N/A	Construction [8]
C009	Siu Sau Village House 39	Res	40.6	10	1.5	10	-	20	N/A	Construction [9]
C010	Siu Sau Village House 91	Res	54.7	10	1.5	10	-	<10	N/A	Construction [9]
C011	Siu Sau Village House 112	Res	46.6	10	1.5	10	-	20	N/A	Construction [9]
C012	The Carmel House 85	Res	32.5	15	1.5	15	-	310	N/A	Construction [9]
C013	The Carmel Tower 2	Res	23	50	1.5	50	-	280	N/A	Construction [9]
C015	OMA by the Sea Tower 2	Res	22	55	1.5	80	-	260	N/A	Construction [9]
C016	The Aegean	Res	14	50	1.5	50	-	360	N/A	Construction [9]
C017	Siu Lam San Tsuen House 8	Res	33.4	10	1.5	10	-	240	N/A	Construction [9]
C018	Siu Sau Village House	Res	57	10	1.5	10	-	140	N/A	Construction [9]
C019	1005 Grandview Terrace	Res	99.1	10	1.5	10	-	80	N/A	Construction [9]

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
C020	1008B Grandview Terrace	Res	93.6	10	1.5	10	-	120	N/A	Construction [9]
C021	1004 Grandview Terrace	Res	86.9	10	1.5	10	-	200	N/A	Construction [9]
C022	1002 Grandview Terrace	Res	84.1	10	1.5	10	-	200	N/A	Construction [9]
C023	Peak Castle House 12	Res	35	20	1.5	20	-	190	N/A	Construction [9]
C024	Peak Castle House 22	Res	35	20	1.5	20	-	110	N/A	Construction [9]
C025	Siu Lam Village House	Res	39.9	10	1.5	10	-	130	N/A	Construction [9]
C026	The Castle Bay Block D10	Res	17.2	10	1.5	10	-	280	N/A	Construction [9]
Planned/Committed ASRs										
P201	Planned Residential Development at TMTL 520	Res	14.5	70	1.5	80	N/A	140	170	Both
P202	Planned Residential Development at TMTL 520	Res	17.2	70	1.5	80	N/A	220	260	Both
P203a	Proposed Comprehensive Residential Development in TMTL 496	Res	6.4	70	1.5	80	N/A	<10	40	Both
P203b	Proposed Comprehensive Residential Development in TMTL 496	Res	6.4	70	1.5	80	N/A	10	30	Both
P204	Proposed Comprehensive Residential Development in TMTL 496, Clubhouse	Rec	7.5	10	1.5	10	N/A	30	50	Both
P205a	Proposed Comprehensive Residential Development in TMTL 496	Res	7.4	80	1.5	80	N/A	10	30	Both
P205b	Proposed Comprehensive Residential Development in TMTL 496	Res	7.4	80	1.5	80	N/A	30	50	Both
P206	Proposed Elderly Centre	Res	5	30	1.5	30	N/A	100	160	Both
P207	Proposed Residential Development at Various Lots in D.D.374, Lawn Activity Area with Seating	Rec	10.5	N/A	1.5	1.5	2028	60	80	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
P208	Proposed Residential Development at Various Lots in D.D.374, Tower 8	Res	10.5	80	1.5	80	2028	70	90	Both
P209	Proposed Residential Development at Various Lots in D.D.374, Tower 7	Res	10.5	80	1.5	80	2028	90	110	Both
P210	Proposed Residential Development at Various Lots in D.D.374, Lawn Activity Area with Seating	Rec	13.8	N/A	1.5	1.5	2028	<10	10	Both
P211	Proposed Residential Development at Various Lots in D.D.374, Tower 1	Res	13.8	80	1.5	80	2028	<10	20	Both
P212	Proposed Residential Development at Various Lots in D.D.374, Tower 2	Res	13.8	80	1.5	80	2028	Within Boundary	10	Both
P213	Planned Development at TMTL 546	Res	14.1	90	1.5	120	N/A	Within Boundary	20	Both
P214	Planned Development at TMTL 546	Res	21	90	1.5	120	N/A	20	50	Both
P215	Planned Development at TMTL 546	Res	19.4	90	1.5	120	N/A	30	50	Both
P216	Proposed Comprehensive Residential Development at TMTL 518	Res	10.8	80	1.5	80	N/A	<10	20	Both
P217	Proposed Comprehensive Residential Development at TMTL 518	Res	10.8	90	1.5	120	N/A	<10	30	Both
P218	Proposed Comprehensive Residential Development at TMTL 518	Res	12.5	80	1.5	80	N/A	<10	20	Both
P219	Proposed Comprehensive Residential Development at TMTL 518	Res	12.5	90	1.5	120	N/A	10	30	Both
P220	Proposed Comprehensive Residential Development at TMTL 518	Res	12.5	80	1.5	80	N/A	30	50	Both
P251	Planned Development at TMTL 546	Res	23.1	90	1.5	120	N/A	Within Boundary	10	Both
P252	Planned Development at TMTL 546	Res	16.8	90	1.5	120	N/A	10	30	Both
P253	Planned Development at TMTL 546	Res	18	90	1.5	120	N/A	Within Boundary	10	Both
P401	Proposed Residential Development in TMTL 417	Res	3.5	80	1.5	80	N/A	80	90	Both
P402	Proposed Residential Development in TMTL 417	Res	4.2	80	1.5	80	N/A	100	100	Both

ASR ID [1]	Location [2]	Land Use [2]	Base Elevation (mPD)	Building Height [3] [4] (mAG)	Lowest Assessment Height [3] (mAG)	Highest Assessment Height [3] [5] (mAG)	Intake Year [6]	Approx. distance from Project during Construction Phase [7] (m)	Approx. distance from Project during Operational Phase [7] (m)	Operation/ Construction Phase ASR
P403	Proposed Residential Development in TMTL 417	Res	3.5	80	1.5	80	N/A	160	170	Both
P404	Proposed Residential Development in TMTL 417	Res	6	80	1.5	80	N/A	280	290	Both
P406	The Siu Lam Integrated Rehabilitation Services Complex	GIC	62.5	35	1.5	50	2024	420	480	Both

Notes:

[1] ASR ID A251 to A253, A271 and P221 to P250 are not used.

[2] Com – Commercial; Edu – Education; GIC – Government, Institution and Community; Hos – Hospital/Clinic; Off – Office; Rec – Park/ Recreational; Res – Residential; and Wor – Worship.

[3] ASR location, height, the lowest and highest floor with air sensitive use (i.e. lowest and highest assessment heights) are determined based on site survey, building plan and latest layout plan, where available and applicable. For all planned ASRs, the lowest assessment height is assumed to be 1.5m, except those ASRs located above planned PTIs.

[4] Building heights are rounded up to the nearest 5m. Height of village houses are assumed to be 10m, which is the common height of a typical 3-storey village house.

[5] The assessment heights are set at 10 levels (1.5, 5, 10, 15, 20, 30, 50, 80, 120 and 180 mAG) (see details in **Table 3.20**). The highest assessment height of each ASR has covered the top level of the building, e.g. for P021, the building height is 40m, the highest assessment height is up to 50m.

[6] Population intake years are only presented for committed/planned ASRs. For those without confirmed population intake programme, it is indicated as N/A in the table. For committed/planned developments with development programme to be implemented before commissioning of R11, only planned ASRs in the development area have been included in the assessment. For other committed/planned developments where there is no available information on the programme on both population intake and land resumption, both existing and planned ASRs in the development area have been included in the assessment. For planned development where layout plan is not available, minimum setback distance from the respective roads according to the Hong Kong Planning Standards and Guidelines would be adopted.

[7] The Project during Construction Phase refers to the boundary of the Project Site and associated works and temporary work site / works area, and the Project during Operation Phase refers to road and highway / tunnel and their associated operation and maintenance facilities during operational phase.

[8] These ASRs are not representative ASRs during operational phase since there are other ASRs which are located closer to the project alignment and their associated operation and maintenance facilities, and are more representative. Nonetheless, they are also covered in the contour plots.

[9] These ASRs are not representative ASRs during operational phase since they are beyond 500m assessment area of operational phase.

Table 3.9 Representative ASRs for Air Quality Impact Assessment in Tsing Lung Tau Area

ASR ID	Location [1]	Land Use [1]	Base Elevation (mPD)	Building Height [2] [3] (mAG)	Lowest Assessment Height [2] (mAG)	Highest Assessment Height [2] [4] (mAG)	Intake Year [5]	Approx. distance from Project during Construction Phase [6] (m)	Approx. distance from Project during Operational Phase [6] (m)	Operation/ Construction Phase ASR
Existing ASRs										
A501	Ka Loon Tsuen House 5	Res	30	10	1.5	10	-	110	140	Both
A502	Ka Loon Tsuen Village House	Res	22.8	10	1.5	10	-	50	80	Both
A503	Ka Loon Tsuen House 6	Res	18.5	10	1.5	10	-	70	100	Both
A504	Ka Loon Tsuen House 8	Res	21.9	10	1.5	10	-	50	80	Both
A505	Ka Loon Tsuen House 18	Res	37.1	10	1.5	10	-	20	40	Both
A506	Ka Loon Tsuen House 17	Res	43.8	10	1.5	10	-	<10	20	Both
A507	Ka Loon Tsuen House 20	Res	51.8	10	1.5	10	-	<10	30	Both
A508	Ka Loon Tsuen Village House	Res	51.8	10	1.5	10	-	<10	20	Both
A509	Ka Loon Tsuen House 21	Res	42.9	10	1.5	10	-	20	50	Both
A510	Vistacove 19	Res	26.9	15	1.5	15	-	70	110	Both
A511	Vistacove 5	Res	25.6	10	1.5	10	-	70	110	Both
A512	Vistacove 10	Res	25.6	10	1.5	10	-	30	70	Both
A513	Vistacove 1	Res	25.6	10	1.5	10	-	30	80	Both
A514	Castle Peak Road Tsing Lung Tau Houses 131-133	Res	5.4	10	1.5	10	-	30	80	Both
A515	Choi Yuen Tsuen Village House	Res	109.1	10	1.5	10	-	60	90	Both
A516	Choi Yuen Tsuen Village House	Res	86.1	10	1.5	10	-	30	50	Both
A517	Choi Yuen Tsuen Village House	Res	72.3	10	1.5	10	-	<10	10	Both
A518	Choi Yuen Tsuen Village House	Res	71	10	1.5	10	-	<10	20	Both
A519	Choi Yuen Tsuen Village House	Res	101.5	10	1.5	10	-	<10	70	Both
A520	Choi Yuen Tsuen Village House	Res	99	10	1.5	10	-	20	60	Both
A521	L'Aquatique Block 1	Res	8.5	55	1.5	80	-	<10	160	Both
A522	L'Aquatique Block 1	Res	8.5	55	1.5	80	-	30	140	Both
A523	Hong Kong Garden - Savoy Heights	Res	23.2	65	1.5	80	-	120	220	Both
A524	Hong Kong Garden - Perfetto Senso	Res	32.7	65	1.5	80	-	70	120	Both
A525	Hong Kong Garden Swimming Pool	Rec	27	5	1.5	5	-	60	90	Both
A526	Hong Kong Garden - Palace	Res	38.8	85	1.5	120	-	10	40	Both
A527	Hong Kong Garden - Genial	Res	38	85	1.5	120	-	<10	50	Both
A528	Hong Kong Garden - Courser	Res	35.3	85	1.5	120	-	30	50	Both
A529	Hong Kong Garden - Manhattan Heights	Res	31.8	85	1.5	120	-	60	80	Both
A530	Choi Yuen Tsuen House 5B	Res	52.5	10	1.5	10	-	<10	20	Both

ASR ID	Location [1]	Land Use [1]	Base Elevation (mPD)	Building Height [2] [3] (mAG)	Lowest Assessment Height [2] (mAG)	Highest Assessment Height [2] [4] (mAG)	Intake Year [5]	Approx. distance from Project during Construction Phase [6] (m)	Approx. distance from Project during Operational Phase [6] (m)	Operation/ Construction Phase ASR
A531	Hong Kong Garden - Kingston Heights	Res	29.3	90	1.5	120	-	90	130	Both
A532	Hong Kong Garden - Hoover Heights	Res	26	70	1.5	80	-	100	140	Both
A533	Hong Kong Garden - Fontana Heights	Res	26	70	1.5	80	-	40	100	Both
A534	Hong Kong Garden Tennis Court	Rec	28.5	5	1.5	1.5	-	60	140	Both
A535	Hong Kong Garden - Jade Heights	Res	8.8	40	1.5	50	-	200	240	Both
A536	Hong Kong Garden - Imperial Heights	Res	8.4	40	1.5	50	-	220	290	Both
A537	Hong Kong Garden Block 1	Res	9.1	55	1.5	80	-	240	320	Both
A538	Hong Kong Garden - Estoril Heights	Res	24.9	70	1.5	80	-	30	180	Both
A539	Tsing Lung Tau New Village House	Res	40.2	10	1.5	10	-	80	260	Both
A540	Hong Kong Garden Block 6	Res	12.7	70	1.5	80	-	150	320	Both
A541	Royal Sea Crest Podium	Rec	9.8	10	1.5	10	-	130	320	Both
A542	Royal Sea Crest Tower 1	Res	9.8	85	1.5	120	-	200	380	Both
A543	Lung Tang Court Block B	Res	5.3	40	1.5	50	-	290	460	Both
A544	Store at Tsing Lung Tau Tsuen	Com	5	10	1.5	10	-	340	N/A	Construction [8]
A545	Yuen Tun Village House 6	Res	16.1	10	1.5	10	-	310	490	Both
A546	Tsing Lung Tau New Village House	Res	41.2	10	1.5	10	-	180	370	Both
A547	Tsing Lung Tau New Village House	Res	60	10	1.5	10	-	220	420	Both
A548	Tsing Lung Tau New Village House	Res	40	10	1.5	10	-	310	N/A	Construction [8]
A549	Tsing Lung Tau New Village House	Res	46.2	10	1.5	10	-	420	N/A	Construction [8]
Planned/Committed ASRs										
C201	Transitional Housing at 115 Castle Peak Road Tsing Lung Tau [7]	Res	11.8	10	1.5	10	2023	Within Boundary	N/A	Construction [7]
C202	Transitional Housing at 115 Castle Peak Road Tsing Lung Tau [7]	Res	11.8	10	1.5	10	2023	Within Boundary	N/A	Construction [7]

Notes:

[1] Com – Commercial; Edu – Education; GIC – Government, Institution and Community; Hos – Hospital/Clinic; Off – Office; Rec – Park/ Recreational; Res – Residential; and Wor – Worship.

[2] ASR location, height, the lowest and highest floor with air sensitive use (i.e. lowest and highest assessment heights) are determined based on site survey, building plan and latest layout plan, where available and applicable. For all planned ASRs, the lowest assessment height is assumed to be 1.5m, except those ASRs located above planned PTIs.

[3] Building heights are rounded up to the nearest 5m. Height of village houses are assumed to be 10m, which is the common height of a typical 3-storey village house.

[4] The assessment heights are set at 10 levels (1.5, 5, 10, 15, 20, 30, 50, 80, 120 and 180 mAG) (see details in **Table 3.20**). The highest assessment height of each ASR has covered the top level of the building, e.g. for P021, the building height is 40m, the highest assessment height is up to 50m.

[5] Population intake years are only presented for committed/planned ASRs. For committed/planned developments with development programme to be implemented before commissioning of R11, only planned ASRs in the development area have been included in the assessment. For planned development where layout plan is not available, minimum setback distance from the respective roads according to the Hong Kong Planning Standards and Guidelines would be adopted.
[6] The Project during Construction Phase refers to the boundary of the Project Site and associated works and temporary work site / works area, and the Project during Operation Phase refers to road and highway / tunnel and their associated operation and maintenance facilities during operational phase.
[7] The operation period for the Transitional Housing at 115 Castle Peak Road Tsing Lung Tau is from 2023 to 2027, and hence would no longer exist after commencement of the Project (i.e. 2033) and is not considered as ASR during operational stage.
[8] These ASRs are not representative ASRs during operational phase since they are beyond 500m assessment area of operational phase.

Table 3.10 Representative ASRs for Air Quality Impact Assessment in North Lantau Area

ASR ID	Location [1]	Land Use [1]	Base Elevation (mPD)	Building Height [2] [3] (mAG)	Lowest Assessment Height [2] (mAG)	Highest Assessment Height [2] [4] (mAG)	Intake Year [5]	Approx. distance from Project during Construction Phase[6] (m)	Approx. distance from Project during Operational Phase[6] (m)	Operation/ Construction Phase ASR
Existing ASRs										
A601	Lantau Toll Plaza Administration Building	Off	43.9	20	1.5	20	-	10	10	Both
A602	Tai Chuen House 11	Res	9	10	1.5	10	-	140	280	Both
A603	Tai Chuen House 10	Res	18	10	1.5	10	-	70	320	Both
A604	Yi Chuen Village House	Res	11.7	10	1.5	10	-	260	350	Both

Notes:
[1] Com – Commercial; Edu – Education; GIC – Government, Institution and Community; Hos – Hospital/Clinic; Off – Office; Rec – Park/ Recreational; Res – Residential; and Wor – Worship.
[2] ASR location, height, the lowest and highest floor with air sensitive use (i.e. lowest and highest assessment heights) are determined based on site survey, building plan and latest layout plan, where available and applicable. For all planned ASRs, the lowest assessment height is assumed to be 1.5m, except those ASRs located above planned PTIs.
[3] Building heights are rounded up to the nearest 5m. Height of village houses are assumed to be 10m, which is the common height of a typical 3-storey village house.
[4] The assessment heights are set at 10 levels (1.5, 5, 10, 15, 20, 30, 50, 80, 120 and 180 mAG) (see details in **Table 3.20**). The highest assessment height of each ASR has covered the top level of the building, e.g. for P021, the building height is 40m, the highest assessment height is up to 50m.
[5] Population intake years are only presented for committed/planned ASRs. There is no planned/committed ASRs in North Lantau Area.
[6] The Project during Construction Phase refers to the boundary of the Project Site and associated works and temporary work site / works area, and the Project during Operation Phase refers to Road and highway / tunnel and their associated operation and maintenance facilities during operational phase.

Table 3.11 Representative ASRs for Air Quality Impact Assessment in Pillar Point Area

ASR ID	Location [1]	Land Use [1]	Base Elevation (mPD)	Building Height [2] [3] (mAG)	Lowest Assessment Height [2] (mAG)	Highest Assessment Height [2] [4] (mAG)	Intake Year [5]	Approx. distance from Project during Construction Phase[6] (m)	Approx. distance from Project during Operational Phase[6] (m)	Operation/ Construction Phase ASR
Existing ASRs										
C101	Hong Kong Science Museum Exhibition Workshop	Off/ Ind	12.5	15	1.5	10	-	470	N/A	Construction [7]
C102	Goodman Westlink	Off/ Ind	9.5	20	1.5	20	-	320	N/A	Construction [7]

Notes:

[1] Com – Commercial; Edu – Education; GIC – Government, Institution and Community; Hos – Hospital/Clinic; Off – Office; Rec – Park/ Recreational; Res – Residential; and Wor – Worship.

[2] ASR location, height, the lowest and highest floor with air sensitive use (i.e. lowest and highest assessment heights) are determined based on site survey, building plan and latest layout plan, where available and applicable. For all planned ASRs, the lowest assessment height is assumed to be 1.5m, except those ASRs located above planned PTIs.

[3] Building heights are rounded up to the nearest 5m. Height of village houses are assumed to be 10m, which is the common height of a typical 3-storey village house.

[4] The assessment heights are set at 10 levels (1.5, 5, 10, 15, 20, 30, 50, 80, 120 and 180 mAG) (see details in **Table 3.20**). The highest assessment height of each ASR has covered the top level of the building, e.g. for P021, the building height is 40m, the highest assessment height is up to 50m.

[5] Population intake years are only presented for committed/planned ASRs. There is no planned/committed ASRs in Pillar Point Area.

[6] The Project during Construction Phase refers to the boundary of the Project Site and associated works and temporary work site / works area, and the Project during Operation Phase refers to Road and highway / tunnel and their associated operation and maintenance facilities during operational phase.

[7] These ASRs are not representative ASRs during operational phase since they are beyond 500m assessment area of operational phase.

3.4 Construction Impacts

3.4.1 General

3.4.1.1 According to Clause 3.4.4.2 of the EIA Study brief (ESB - 352/2022), the assessment area for air quality impact assessment shall be defined by a distance of 500m from the boundary of the Project Area and the associated work sites / areas, which shall be extended to include major existing, committed and planned air pollutant emission sources identified to have a bearing on the environmental acceptability of the Project. **Figures 3.2a** to **e** illustrate the assessment area.

3.4.2 Identification of Pollution Sources and Emission Inventory

3.4.2.1 **Section 4.4.2** has discussed the tentative construction plant inventory envisioned at this stage. It is noted that the Contractor would consider the engineering data available at the time of construction, and review and update the tentative construction plant inventory as necessary. The Contractor would also review the contemporary circumstances and site constraints, and optimise the quantity of on-site machinery. This would help to reduce the gaseous and particulate matters emission for construction site. A summary of the key construction activities is given below.

- Site clearance and formation;
- Reclamation;
- Construction of at-grade/elevated carriageways and slip roads;
- Construction of administration buildings in administration areas at Lam Tei and North Lantau;
- Construction of ventilation buildings at Lam Tei, So Kwun Wat, Siu Lam, Tai Lam and Tsing Lung Tau;
- Construction of tunnel sections at Lam Tei, So Kwun Wat, Siu Lam, Tai Lam and Tsing Lung Tau;
- Construction of tunnel portal structures at Lam Tei, So Kwun Wat, Siu Lam, Tai Lam and Tsing Lung Tau;
- Construction of structures for Tsing Lung Bridge, e.g. anchorages, towers, etc;
- Installation of noise mitigation measures;
- Construction and demolition of explosive magazine sites;
- Demolition for existing barriers;
- Construction and demolition of barging facilities, concrete batching plants, haul roads, stockpiling areas etc;
- Slope works, including blasting works;
- Geotechnical works; and
- Landscaping works.

3.4.2.2 The key project-induced emission source that may potentially affect air quality during construction phase is the dust emission associated with various construction activities as discussed above. **Appendix 3.1** and **Figure 2.2** show the tentative locations of the above key construction activities. These locations are the latest

information at this stage and the Constructor will review and adjust during the construction phase as necessary. **Appendix 3.1** also includes the separation distances between representative ASRs and key construction activities. **Section 2.9** and **Section 2.11** have also summarised both the construction methodology and construction programme envisioned at this stage. The tentative construction period is from Year 2026 to Year 2033, and the tentative typical working hours is 7:00am to 7:00pm from Monday to Saturday for general works and 24 hours a day for tunnelling works. The Consultant in Detailed Design stage and the Contractor would conduct a more detailed review on both the construction programme and construction methodology when more detailed engineering information and ground investigation (GI) data becomes available in the next stage.

3.4.2.3 Many of the above construction activities would involve earthworks of different scale. In order to reduce the associated dust emission, regular watering on all exposed construction areas with dust emission (see **Section 3.4.5**) as a good site practice will be implemented. Vehicle washing facilities will also be provided at every designated vehicular exit point. Since all vehicles will be washed at exit points and vehicle loaded with the dusty materials will be covered by clean and impervious sheeting before leaving construction sites, dust nuisance from construction vehicle movement outside construction sites is unlikely to be significant.

3.4.3 Review of Dust Monitoring Data

3.4.3.1 A review of dust monitoring data during the construction phase of recent infrastructure projects, including Tung Chung New Town Extension (TCNTE), Central-Wan Chai Bypass (CWB), Central Kowloon Route (CKR), Tseung Kwan O – Lam Tin Tunnel (TKOLTT), Development of Anderson Road Quarry site – Road Improvement Works (ARQRIW) and Widening and Reconstruction of Tai Po Road (Sha Tin Section) (TPR) have also been conducted. According to their respective EIA Reports, none of these projects has involved open blasting and concrete batching plants but different types of other construction activities have been carried out. TCNTE is a large scale development project which involves a large extent reclamation works (i.e. around 129ha) and the associated road works, while CWB, CKR and TKOLTT are mega road and tunnel projects with a smaller reclamation area ranging from around 1ha to around 4ha. Tunnelling works such as cut-and-cover, drill-and-blast as well as drill-and-break have been carried out. ARQRIW is a road improvement project with some slope-cutting works, while TPR is a road project of smaller scale, where both of them are located in close vicinity of ASRs. Good site practices and standard dust control measures such as regular watering were adopted in all these projects. Some existing ASRs were located in close vicinity of construction works and therefore selected as Dust Monitoring Stations (DMSs) for impact monitoring during the construction phase of the projects. DMSs which are located close to the construction works of the abovementioned projects have been selected for review.

3.4.3.2 For TCNTE, 99% of the measured 1-hr TSP levels were below 200$\mu g/m^3$ and all of them were below 250 $\mu g/m^3$, in spite of the large extent of reclamation works of around 129ha and associated road works on the reclaimed land being carried out at a short distance of around 15m away from the DMS. Only 1 measurement event (i.e. 0.1% of the 858 measurement events in total) of exceedance of action level was recorded during the construction phase. It was also found that the exceedance

was likely due to the hazy weather condition instead of the construction activities of the Project upon investigation. No exceedance of limit level was recorded.

3.4.3.3 For CKR, the selected DMSs were located at a distance of around 45m from the portal of drill-and-blast tunnel as well as cut-and-cover tunnel, and around 150m to around 210m from the reclamation works, and around 75m to the road works. The measured 1-hr TSP levels were very low and below 150μg/m^3. No exceedance of action levels nor limit levels was recorded.

3.4.3.4 For CWB, the selected DMSs were located at a distance of around 5m to 50m from the reclamation works, cut-and-cover tunnelling works and road works. It is observed that 95% to 99% of the measured 1-hr TSP levels were below 250μg/m^3, and most of the records were below 450μg/m^3 (only 1 measurement event above 500μg/m^3). Out of the 4002 measurement records, there were only 7 measurement events of exceedance of action level (<0.5%) and 1 measurement event of exceedance of limit level (<0.1%). All of the exceedances were not related to the construction of the projects. Despite that there was an occasional exceedance of limit level recorded, it was due to the construction activities of other projects nearby as well as the high level of background air pollution as supported by the high air quality health index in that district on that day.

3.4.3.5 For TKOLTT, the selected DMS was located at a distance of around 15m from reclamation works and around 50m from the cut-and-cover tunnelling works. All of the measured 1-hr TSP levels were below 300μg/m^3. No exceedance of action levels nor limit levels was recorded.

3.4.3.6 For ARQ, the selected DMSs were located at a distance of around 8m to around 20m from the slope works and road works. Most of the measured 1-hr TSP levels (except 1 measurement event) were below 300μg/m^3, in spite of the very small separation distance from the construction works. Only 2 measurement events (i.e. 0.2% of the 831 measurement events in total) of exceedance of action level were recorded at one of the DMSs during the construction phase. It was also found that the exceedances were not related to the construction activities of the Project upon investigation. No exceedance of limit level was recorded.

3.4.3.7 For TPR, the selected DMSs were located at a distance of around 15m to around 175m from the road works. All of the measured 1-hr TSP levels were very low and below 150μg/m^3, in spite of the small separation distance from the construction works at some DMSs. No exceedance of action levels nor limit levels was recorded.

3.4.4 Prediction and Evaluation of Construction Impact

3.4.4.1 As discussed in **Section 2.7**, the Project comprises of a combination of tunnel, viaduct / at-grade road and vehicular bridge sections, reclamation, etc. in different areas. The following sections discuss the prediction and evaluation of construction dust impacts for different areas.

Lam Tei Area

3.4.4.2 The construction works in Lam Tei Area include site formation works, slope works, stockpiling, haul roads, construction of the underground magazine site, at-grade / elevated carriageways / slip roads, tunnel portal, administration building and ventilation building, as well as erection of site offices, in the vicinity of the existing Lam Tei Quarry. About 50% of the spoil generated by the Project in the vicinity of the Lam Tei Quarry would be conveyed back to the Lam Tei Quarry for

processing and Lam Tei Quarry would have the capacity to handle those spoil. This would avoid unnecessary double handling of spoil and is a positive step to minimise dust generation as much as practicable. Where practicable, a conveyor system would also be adopted to convey the spoil from tunnelling works to Lam Tei Quarry. The Contractor will review the possibility of powering the conveyor system by electricity to avoid gaseous emission from the conveyor system as far as practicable. This conveyor system would also be suitably installed with dust enclosure where practicable to minimise dust generation as well. This would also minimise on-site lorry movements and hence the associated dust generation.

3.4.4.3 The ASRs in the vicinity of existing Lam Tei Quarry include residential uses (e.g. village houses) in Lo Fu Hang and those along Yuen Long Highway (e.g. Fuk Hang Tsuen, Tsoi Yuen Tsuen). Few of the ASRs would have a relatively short separation from the site boundary, in the order of less than 20m. The separation distance between ASRs and slope works, tunnel portal, administration building, ventilation buildings, etc. would be relatively larger, generally in the order of more than 50m. As discussed in **Section 3.4.3**, the dust monitoring records from other infrastructure projects of similar scale and nature have demonstrated that dust impacts could be readily mitigated by good practices including but not limited to watering. Also, sequence of construction works would be adopted to avoid dusty construction activities to be carried out simultaneously close to ASRs as far as practicable. The Contractor shall consider actual site constraints and circumstances, and devise the practicable approach to implement suitable phasing. Hence, adverse dust impacts are not anticipated provided that the good practices as included in **Section 3.4.5** are implemented by the Contractor.

3.4.4.4 Blasting will be required for construction of tunnel sections at Lam Tei and some of the slope works. For tunnel sections, the separation distances from the ASRs are in the order of more than 230m from the tunnel portal. Enclosures would be used to confine dust and filters would be installed at exhaust and fresh air intake (FAI) locations of the enclosures, with TSP and RSP removal efficiency of 99% or above. For open blasting for slope works, the blast face is typically in the order of 500 to 1,500m^2 and blasting would only be conducted typically 1 to 2 times a day (but subject to actual site conditions). The separation distances from the ASRs are in the order of more than 50m from the open blasting for slope works. According to the Air Pollution Control (Construction Dust) Regulation, the areas within 30m from the blasting area will be wetted with water prior to blasting and blasting shall not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted. Where necessary, mist spraying measures will be installed at the mucking out locations. With all these proper designs, best site practices and appropriate mitigation measures in place, adverse dust impact due to blasting for tunnel sections and slope works is not anticipated.

3.4.4.5 Other than the area in the vicinity of existing Lam Tei Quarry, construction works are also required near Fuk Hang Tsuen and Tsoi Yuen Tsuen for the construction of mainly viaduct and slip roads. Other than some site formation works, piling works would be required for the construction of foundation and columns. Where practicable, pre-cast segments would be adopted for the deck sections. The dust generated by piling works and installation of the pre-cast segments is not anticipated to be significant. The separation distances from the ASRs are in the order of at least 20m from foundation / piling works. Adverse dust impacts due to foundation works and column construction are therefore not anticipated. However,

there would be some ASRs such as residential uses (e.g. village houses) within 20m from the site boundary. The mitigation measures as in **Section 3.4.5** would be required to control the generation of dust in this area. Also, sequence of construction works would be adopted to avoid dusty construction activities to be carried out simultaneously close to ASRs as far as practicable. The Contractor shall consider actual site constraints and circumstances, and devise the practicable approach to implement suitable phasing.

3.4.4.6 The construction in the vicinity of Lam Tei Quarry would also need a stockpiling area of 4,000 m^2 with capacity of 10,000 m^3 and a concrete batching plant (by another project) in the vicinity of the Lam Tei Quarry. Stockpiling of spoil would require suitable watering, tarpaulin cover, etc. to minimise the impacts caused by wind erosion. Concrete batching plant would need measures such as fabric filtering system and other measures as stipulated in the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2 (16). While many of the spoil generated from the tunnelling work would be conveyed back to the Lam Tei Quarry as explained above, some of the spoil would still need to be transported off-site for further processing in designated facilities (e.g. fill bank). Besides, construction vehicles would also be required to transport various materials to and from the construction sites as necessary. In order to minimise the loading on existing roads (e.g. Fuk Hang Tsuen Road, Castle Peak Road, etc.), the Contractor will implement traffic measures to minimize the amount of induced traffic, optimize the non-peak hours for travelling and design the travelling routes to maximize the distance from the nearby ASRs, etc. where practicable. This would largely help to minimise the nuisance from both traffic and environmental perspectives. It is also noted that the traffic induced by various construction works in Lam Tei Area as discussed above (including tunnelling, stockpiling, slope works, construction of administration building and ventilation buildings, etc.) would vary as the construction progresses. For example, the construction traffic generated during the initial and later stages would likely be less than those during the peak construction period which would constitute a relatively shorter period (approximately less than 20% of the overall construction period in Lam Tei Area). The Consultant in Detailed Design stage and the Contractor shall review all the contemporary issues (e.g. constructability, site constraints, detailed GI information, etc.) to optimise the construction methodology and the generation of construction vehicles. For Lam Tei Area in particular, the latest available information at this stage suggests that the construction traffic generated along Fuk Hang Tsuen Road and Castle Peak Road would be typically in the order of 20 construction vehicles per hour per direction. During the peak construction phase, the construction traffic generated may increase to 60 trucks per hour per direction. As explained above, vehicle washing facilities will be provided at every designated vehicular exit point. Since all vehicles will be washed at exit points and vehicles loaded with the dusty materials will be covered by clean and impervious sheeting before leaving construction sites, dust nuisance from construction vehicle movement outside construction sites is unlikely to be significant.

So Kwun Wat Area

3.4.4.7 The construction works in So Kwun Wat Area include site formation works, slope works, construction of slip roads, tunnel portal and ventilation building, stockpiling, etc. The ASRs in the vicinity include residential uses (e.g. village

houses, residential buildings, educational institution, etc.) on both sides of Tuen Mun Road. Few of the ASRs would have a relatively short separation from the site boundary, in the order of less than 20m. The separation distance between ASRs and slope works, tunnel portal, ventilation building, stockpiling, etc. would be relatively larger, generally in the order of at least 20m. As discussed in **Section 3.4.3**, the dust monitoring records from other infrastructure projects of similar scale and nature have demonstrated that dust impacts could be readily mitigated by good practices including but not limited to watering. Also, sequence of construction works would be adopted to avoid dusty construction activities to be carried out simultaneously close to ASRs as far as practicable. The Contractor shall consider actual site constraints and circumstances, and devise the practicable approach to implement suitable phasing. Hence, adverse dust impacts are not anticipated provided that the good practices as included in **Section 3.4.5** are implemented by the Contractor.

3.4.4.8 The construction in the vicinity of So Kwun Wat Area would also need stockpiling areas of 1,100 m^2 with capacity of 10,000m^3 and of 5,600 m^2 with capacity of 20,000m^3 in the vicinity of So Kwun Wat Tsuen and Kwun Fat Street respectively. Stockpiling of spoil would require suitable watering, tarpaulin cover, etc., to minimise the impacts caused by wind erosion. Construction vehicles would be required to transport various materials to and from the construction sites as necessary. In order to minimise the loading on existing roads (e.g. So Kwun Wat Road, Kwun Fat Street, etc.), the Contractor will implement traffic measures to minimize the amount of induced traffic, optimize the non-peak hours for travelling and design the travelling routes to maximize the distance from the nearby ASRs, etc. where practicable. This would largely help to minimise the nuisance from both traffic and environmental perspectives. It is also noted that the traffic induced by various construction works in So Kwun Wat Area as discussed above (including tunnelling, stockpiling, slope works, construction of ventilation buildings, etc.) would vary as the construction progresses. For example, the construction traffic generated during the initial and later stages would likely be less than those during the peak construction period which would constitute a relatively shorter period (approximately less than 10% of the overall construction period in So Kwun Wat Area). The Consultant in Detailed Design stage and the Contractor shall review all the contemporary issues (e.g. constructability, site constraints, detailed GI information, etc.) to optimise the construction methodology and the generation of construction vehicles. For So Kwun Wat Area in particular, the latest available information at this stage suggests that the construction traffic generated along So Kwun Wat Road and Kwun Fat Street would be typically in the order of 20 and 60 construction vehicles per hour per direction respectively. During the peak construction phase, the construction traffic generated may increase to 25 and 90 trucks per hour per direction for So Kwun Wat Road and Kwun Fat Street respectively. As explained above, vehicle washing facilities will be provided at every designated vehicular exit point. Since all vehicles will be washed at exit points and vehicles loaded with the dusty materials will be covered by clean and impervious sheeting before leaving construction sites, dust nuisance from construction vehicle movement outside construction sites is unlikely to be significant.

Tai Lam Chung Area

3.4.4.9 The construction works in Tai Lam Chung Area include site formation works, slope works, construction of tunnel portals, viaduct construction, widening of Tai Lam Chung Road, etc. The ASRs in the vicinity include residential uses (e.g. village houses, residential buildings, educational institution, etc.) in the vicinity of Tai Lam Chung Tsuen and the Tai Lam Correctional Institution. Where practicable, pre-cast segments would be adopted for the deck sections construction. The widening of Tai Lam Chung Road would only increase the width by approximately 3m. Few of the ASRs would have a relatively short separation from the site boundary, in the order of less than 20m. The separation distance between ASRs and slope works, tunnel portal, etc. would be relatively larger, in the order of more than 70m, while that of stockpiling area is less than 20m. As discussed in **Section 3.4.3**, the dust monitoring records from other infrastructure projects of similar scale and nature have demonstrated that dust impacts could be readily mitigated by good practices including but not limited to watering. Also, sequence of construction works would be adopted to avoid dusty construction activities to be carried out simultaneously close to ASRs as far as practicable. The Contractor shall consider actual site constraints and circumstances, and devise the practicable approach to implement suitable phasing. Hence, adverse dust impacts are not anticipated provided that the good practices as included in **Section 3.4.5** are implemented by the Contractor.

3.4.4.10 The construction in the vicinity of Tai Lam Chung Area would also need a stockpiling area of 5,200m^2 with capacity of 10,000m^3 at the end of Tai Lam Chung Road. Stockpiling of spoil would require suitable watering, tarpaulin cover, etc., to minimise the impacts caused by wind erosion. Construction vehicles would be required to transport various materials to and from the construction sites as necessary. In order to minimise the loading on existing roads (e.g. Tai Lam Chung Road, etc.), the Contractor will implement traffic measures to minimize the amount of induced traffic, optimize the non-peak hours for travelling and design the travelling routes to maximize the distance from the nearby ASRs, etc. where practicable. This would largely help to minimise the nuisance from both traffic and environmental perspectives. It is also noted that the traffic induced by various construction works in Tai Lam Chung Area as discussed above (including tunnelling, stockpiling, slope works and construction of ventilation building, etc.) would vary as the construction progresses. For example, the construction traffic generated during the initial and later stages would likely be less than those during the peak construction period which would constitute a relatively shorter period. The Consultant in Detailed Design stage and the Contractor shall review all the contemporary issues (e.g. constructability, site constraints, detailed GI information, etc.) to optimise the construction methodology and the generation of construction vehicles. For Tai Lam Chung Area in particular, the latest available information at this stage suggests that the construction traffic generated along Tai Lam Chung Road would be typically in the order of 35 construction vehicles per hour per direction. During the peak construction phase, the construction traffic generated may increase to 50 trucks per hour per direction. As explained above, vehicle washing facilities will be provided at every designated vehicular exit point. Since all vehicles will be washed at exit points and vehicles loaded with the dusty materials will be covered by clean and impervious sheeting before leaving

construction sites, dust nuisance from construction vehicle movement outside construction sites is unlikely to be significant.

Tsing Lung Tau Area

3.4.4.11 The construction works in Tsing Lung Tau Area include site formation works, slope works, realignment of Tuen Mun Road, construction of slip roads, tunnel portal, northern anchorage for Tsing Lung Bridge and ventilation building, and erection of site offices, reclamation for the column for Tsing Lung Bridge, temporary jetty for barges, stockpiling, etc. Most of the spoil generated by the construction of the anchorage for Tsing Lung Bridge would be utilised for the reclamation. This would avoid unnecessary double handling of spoil and is a positive step to minimise dust generation as much as practicable. Where practicable, a conveyor system would also be adopted to convey the spoil from tunnelling works for the reclamation works. This would also minimise the on-site lorry movement and hence the associated dust generation.

3.4.4.12 The ASRs in the vicinity include residential uses (e.g. village houses, and residential buildings) along Castle Peak Road and Tuen Mun Road. Few of the ASRs would have a relatively short separation from the site boundary, in the order of less than 20m. The separation distance between ASRs and slope works, tunnel portal, northern anchorage for Tsing Lung Bridge, ventilation building, etc. would be relatively larger, generally in the order of more than 30m. In addition, blasting will be required for some of the slope works. The blast face is typically in the order of 500 to 1,500m^2 and blasting would only be conducted typically 1 to 2 times a day (but subject to actual site conditions). The separation distances from the ASRs are in the order of more than 150m from the open blasting for slope works. According to the Air Pollution Control (Construction Dust) Regulation, the areas within 30m from the blasting area will be wetted with water prior to blasting and blasting shall not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted. Where necessary, mist spraying measures will be installed at the mucking out locations. Also, sequence of construction works would be adopted to avoid dusty construction activities to be carried out simultaneously close to ASRs as far as practicable. The Contractor shall consider actual site constraints and circumstances, and devise the practicable approach to implement suitable phasing. With all these proper designs, best site practices and appropriate mitigation measures in place, adverse dust impact due to blasting for slope works is not anticipated.

3.4.4.13 A small reclamation along the coastline of Tsing Lung Tau is also required for the construction of Tsing Lung Bridge. Reclamation activities conducted underneath the sea level would unlikely generate any significant dust. However, once the reclamation level reaches above the sea level, wind erosion would inevitably generate some fugitive dust. This reclamation area would only occupy an area of about 2.2ha above the sea level. The nearest ASR is the transitional housing located at Tsing Lung Tau and the separation distance from this reclamation work is less than 20m. Dust control measures similar to those for site formation and excavation would be required.

3.4.4.14 As discussed in **Section 3.4.3**, the dust monitoring records from TCNTE (with around 129ha of reclamation area from around 15m away from the DMS) demonstrated that dust impacts could be readily mitigated by good practices including but not limited to watering. Hence, adverse dust impacts are not

anticipated provided that the good practices as included in **Section 3.4.5** are implemented by the Contractor.

3.4.4.15 In addition, only approximately 2 construction vessels (including barges, tug boats, etc.) are required at a time for reclamation works. Each construction vessels would manoeuvre around 2 times per week for fill transport and construction means.

3.4.4.16 The construction in the vicinity of Tsing Lung Tau Area would also need a stockpiling area of 2,500m^2 with capacity of 3,600m^3 on the proposed reclaimed land in Tsing Lung Tau. Stockpiling of spoil would require suitable watering, tarpaulin cover, etc., to minimise the impacts caused by wind erosion. While majority of the various materials will be transported through the barging facilities, construction vehicles would still be required to transport various materials to and from the construction sites as necessary. In order to minimise the loading on existing roads (e.g. Castle Peak Road, etc.), the Contractor will implement traffic measures to minimize the amount of induced traffic, optimize the non-peak hours for travelling and design the travelling routes to maximize the distance from the nearby ASRs, etc. where practicable. This would largely help to minimise the nuisance from both traffic and environmental perspectives. It is also noted that the traffic induced by various construction works in Tsing Lung Tau Area as discussed above (including tunnelling, stockpiling, slope works, realignment of Tuen Mun Road, construction of northern anchorage for Tsing Lung Bridge and ventilation building, etc.) would vary as the construction progresses. For example, the construction traffic generated during the initial and later stages would likely be less than those during the peak construction period which would constitute a relatively shorter period. The Consultant in detailed design stage and the Contractor shall review all the contemporary issues (e.g. constructability, site constraints, detailed GI information, etc.) to optimise the construction methodology and the generation of construction vehicles. For Tsing Lung Tau Area in particular, the latest available information at this stage suggests that the construction traffic generated along Castle Peak Road would be typically in the order of 15 construction vehicles per hour per direction. During the peak construction phase, the construction traffic generated may increase to 20 trucks per hour per direction. As explained above, vehicle washing facilities will be provided at every designated vehicular exit point. Since all vehicles will be washed at exit points and vehicles loaded with the dusty materials will be covered by clean and impervious sheeting before leaving construction sites, dust nuisance from construction vehicle movement outside construction sites is unlikely to be significant.

North Lantau Area

3.4.4.17 The construction works in North Lantau Area include site formation works, slope works, construction of viaduct, slip roads, southern anchorage for Tsing Lung Bridge, local realignment of North Lantau Highway, stockpiling, etc. The ASRs in the vicinity include residential uses (e.g. village houses) in the vicinity of San Po Tsui at a separation distance of about 250m, and Lantau Toll Plaza Administration Building at less than 20m from the construction of slip roads.

3.4.4.18 In addition, blasting will be required for some of the slope works. The blast face is typically in the order of 500 to 1,500m^2 and blasting would only be conducted typically 1 to 2 times a day (but subject to actual site conditions). The separation distances from the ASRs are in the order of around 300m from the open blasting for slope works. According to the Air Pollution Control (Construction Dust)

Regulation, the areas within 30m from the blasting area will be wetted with water prior to blasting and blasting shall not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted. Where necessary, mist spraying measures will be installed at the mucking out locations. Also, sequence of construction works would be adopted to avoid dusty construction activities to be carried out simultaneously close to ASRs as far as practicable. The Contractor shall consider actual site constraints and circumstances, and devise the practicable approach to implement suitable phasing. With all these proper designs, best site practices and appropriate mitigation measures in place, adverse dust impact due to blasting for slope works is not anticipated.

3.4.4.19 As discussed in **Section 3.4.3**, the dust monitoring records from other infrastructure projects of similar scale and nature have demonstrated that dust impacts could be readily mitigated by good practices including but not limited to watering. Hence, adverse dust impacts are not anticipated provided that the good practices as included in **Section 3.4.5** are implemented by the Contractor.

3.4.4.20 The construction in the vicinity of North Lantau Area would also need a stockpiling area of 4,000 m^2 with capacity of 10,000m^3 and a concrete batching plant in To Kau Wan. Stockpiling of spoil would require suitable watering, tarpaulin cover, etc., to minimise the impacts caused by wind erosion. While many of the spoil generated from the slope cutting would be conveyed back to the concrete batching plant in To Kau Wan, some of the spoil would still need to be transported off-site for further processing in designated facilities (e.g. fill bank) via barging facility in To Kau Wan. Nevertheless, construction vehicles would still be required to transport various materials to and from the construction sites as necessary. In order to minimise the loading on existing roads (e.g. North Lantau Highway and the connecting local roads, etc.), the Contractor will implement traffic measures to minimize the amount of induced traffic, optimize the non-peak hours for travelling and design the travelling routes to maximize the distance from the nearby ASRs, etc. where practicable. This would largely help to minimise the nuisance from both traffic and environmental perspectives. It is also noted that the traffic induced by various construction works in Tsing Lung Tau Area as discussed above (including stockpiling, slope works, construction of southern anchorage for Tsing Lung Bridge, local realignment of North Lantau Highway and construction of ventilation building, etc.) would vary as the construction progresses. For example, the construction traffic generated during the initial and later stages would likely be less than those during the peak construction period which would constitute a relatively shorter period. The Consultant in Detailed Design stage and the Contractor shall review all the contemporary issues (e.g. constructability, site constraints, detailed GI information, etc.) to optimise the construction methodology and the generation of construction vehicles. For North Lantau Area in particular, the latest available information at this stage suggests that the construction traffic generated along North Lantau Highway and the connecting local roads would be minimal, in the order of 10 construction vehicles per day per direction. As explained above, vehicle washing facilities will be provided at every designated vehicular exit point. Since all vehicles will be washed at exit points and vehicles loaded with the dusty materials will be covered by clean and impervious sheeting before leaving construction sites, dust nuisance from construction vehicle movement outside construction sites is unlikely to be significant.

Explosive Magazine Sites

3.4.4.21 In order to facilitate the drill-and-blast tunnelling works, a total of 3 explosive magazine sites (1 at Lam Tei, 1 at Siu Lam, and 1 at Pillar Point) are required, which would be share used with the TMB construction. As explained in **Section 2**, the proposed magazine site at Lam Tei would take the form as an underground magazine site. Some underground blasting would be required for the construction of the underground magazine. The explosive magazine site at Siu Lam was once used for explosive magazine site and the explosive magazine site at Pillar Point was also once used for other purposes. Hence extensive site formation and excavation is also not required for Siu Lam and Pilar Point. However, some at-grade structures would be constructed to facilitate the storage of explosives. These at-grade structures would be dismantled prior to the end of the construction period.

3.4.4.22 The ASRs in the vicinity of explosive magazine site at Lam Tei include residential uses (e.g. village houses) in Lo Fu Hang and those along Yuen Long Highway and have a separation distance of 140m. Enclosures would be used to confine dust and filters would be installed at exhaust and FAI locations of the enclosures, with TSP and RSP removal efficiency of 99% or above. According to the Air Pollution Control (Construction Dust) Regulation, the areas within 30m from the blasting area will be wetted with water prior to blasting and blasting shall not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted. Where necessary, mist spraying measures will be installed at the mucking out locations. With all these proper designs, best site practices and appropriate mitigation measures in place, adverse dust impact due to blasting for the underground magazine site is not anticipated.

3.4.4.23 As the site formation work for the explosive magazine site at Siu Lam has been largely completed, the remaining work would be mainly for the superstructure of the explosive storage area, which is unlikely to generate significant dust. ASRs in the vicinity include residential uses (e.g. Grandview Terrace) in the vicinity of Siu Sau Village, which have a separation distance of about 200m. Adverse dust impacts are not anticipated provided that the good practices as included in **Section 3.4.5** are implemented by the Contractor.

3.4.4.24 Similar to the explosive magazine site at Siu Lam, the site formation work for the explosive magazine site at Pillar Point has been largely completed. The remaining work would be mainly for the superstructure of the explosive storage area, which is unlikely to generate significant dust. ASRs in the vicinity include office / industrial uses (e.g. Goodman Westlink and Hong Kong Science Museum Exhibition Workshop) in the vicinity of Siu Lang Shui, which have a separation distance of more than 350m. Adverse dust impacts are not anticipated provided that the good practices as included in **Section 3.4.5** are implemented by the Contractor.

3.4.4.25 Once the blasting works are completed, the superstructure of these 3 explosive magazine sites would be demolished. Suitable landscaping works would be implemented. Adverse dust impacts are not anticipated for the decommissioning of these explosive magazine sites.

Barging Facilities

3.4.4.26 There will be a total of 3 barging facilities for the Project. Two of these facilities would be located at the coastline of North Lantau, with one at To Kau Wan and

another one at San Po Tsui. The one in San Po Tsui is mainly for storage purpose. There would only be 1 barge per day and there would be no land-based access. These 2 sites had been previously used in other infrastructure projects as barging facilities as well. The surface area within these 2 barging facilities are largely paved. The nearest ASRs include the village houses at San Po Tsui which are located at approximately 80m away from the barging facility at San Po Tsui, and the nearest ASRs include the Lantau Toll Plaza Administration Building which is located at approximately 90m away from the barging facility at To Kau Wan.

3.4.4.27 The remaining barging facility is located at the reclamation near Tsing Lung Tau. In general, the spoil will be unloaded to the barges directly from trucks. A stockpile area is proposed at the reclaimed land of the Project. The nearest ASRs include the transitional housing at Tsing Lung Tau which are located at approximately 140m away from the barging point.

3.4.4.28 According to the current construction planning, the number of construction vessels, either from tug boat or the barge, would be limited to 4, 1 and 6 trips per day for the barging facilities at To Kau Wan, San Po Tsui, and Tsing Lung Tau respectively. Given the separation distance from the ASRs and the low number of barges utilisation, adverse dust impacts are not anticipated provided good design measures are implemented. To suppress the dust emission, all unloading activities at the berths of the barging facility will be carried out inside an enclosed system with a 3-side screen with top cover and provision of a water spraying system. Regular watering on all exposed stockpile as a good site practice will also be implemented. All construction vehicles will be washed at the exit before leaving the construction worksites. Besides, the entire area of the barging facility will be properly paved with concrete, bituminous materials or hardcores to avoid dusty material on the road surface. After unloading the spoil onto barge inside the enclosed system with a 3-side screen with top cover, the trucks would be sprayed by water inside the unloading point. All vehicles would also be washed at the exit point before leaving the barging facility. With frequent vehicle washing and proper road paving, it could effectively reduce the resuspension of loose material on the road surface due to vehicle movement within the barging facility. In addition, as discussed, the Contractor will implement traffic measures to minimize the amount of induced traffic, optimize the non-peak hours for travelling and design the travelling routes to maximize the distance from the nearby ASRs, etc. where practicable. Dust emission from construction truck movement is therefore considered insignificant. These barging facilities would be decommissioned after use.

3.4.4.29 For the gaseous emissions from the construction barges, given the limited number of trips per day, and these construction barges are transient in nature, the emission from these construction vessels are considered relatively small. In addition, the engine of the barge shall be switched-off during berthing as far as practicable. Provision of on-shore power supply shall also be considered wherever possible to minimize air quality impact from the marine vessels, with consideration of actual site constraints or circumstances to be further reviewed during detail design stage. Therefore, gaseous emission from construction barges is considered insignificant.

Concrete Batching Plants

3.4.4.30 There would be a concrete batching plant (CBP) proposed under the Project at North Lantau Area, while another CBP at Lam Tei Area proposed by Underground

Quarrying at Lam Tei (separate project) will also be utilized for the Project. Their exact silo capacity is yet to be determined by the Contractor but is likely to be less than 10,000 tonne for each of the CBP. The ASRs in the vicinity of CBP at Lam Tei include residential uses (e.g. village houses) in Lo Fu Hang and those along Yuen Long Highway and have a separation distance of at least 120m. The ASRs in the vicinity of the works area of CBP at North Lantau include residential uses (e.g. village houses) in the vicinity of To Kau Wan and Lantau Toll Plaza Administration Building and have a separation distance of more than 90m.

3.4.4.31 Under Schedule 1 of the APCO, the operation of the proposed CBPs would be classified as a SP. A licence is required for the operation of CBPs. The Contractor shall apply for the licence and operate the CBPs according to the requirements stated under the licence as well as the relevant best practicable means (BPM). With proper implementation of the fugitive emission control as included in **Section 3.4.5.8**, adverse dust impacts are not anticipated from the operation of CBPs.

Noise Mitigation Measures

3.4.4.32 As explained in **Section 2**, some of the existing noise barriers in Lam Tei Area and Tsing Lung Tau Area would need to be demolished and new noise barriers / enclosures would be installed to comply with the respective noise criteria (See **Section 4** for the locations of the new noise barriers). Both the demolishment and installation of the structure of these noise barriers (e.g. steel columns, acoustic panels, etc.) would also unlikely generate adverse dust impacts. The implication on air quality during temporary demolition of existing noise barriers during construction phase is discussed in **Section 3.4.4.43**.

Others

3.4.4.33 GI works would also be required to facilitate the detailed design and construction of the Project. These GI works would require using some GI rigs at certain locations to be determined during the detailed design stage and the construction phase. Given the relatively small scale of using the drilling rigs, it is unlikely to generate adverse dust impacts.

3.4.4.34 Landscaping works would also be required to enhance the design of the Project. These landscaping works would involve some relatively minor earthworks to facilitate planting of trees, shrubs and other landscaping elements. It is unlikely that landscaping works would generate adverse dust impacts.

Consideration of Cumulative Impacts

3.4.4.35 **Section 2.12** has identified a list of concurrent projects to be considered in this EIA to address any significant cumulative impacts. The following sections discuss the cumulative impacts for each area.

3.4.4.36 For Lam Tei Area, concurrent projects include TMB, Widening of Yuen Long Highway (Section between Lam Tei Quarry and Tong Yan San Tsuen Interchange), Hung Shui Kiu / Ha Tsuen New Development Area, Underground Quarrying at Lam Tei, Tuen Mun , Site Formation and Infrastructure Works for Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun , and Development at Lam Tei North East. For TMB, the works area in Lam Tei Area would be much smaller than of the Project. The project proponent of TMB is the same as the Project and would implement the equivalent

set of dust control measures as the Project. Close liaison between the contractors of R11 and the concurrent projects would be maintained to minimise dusty activities to be conducted concurrently as far as practicable. Adverse cumulative dust impacts from TMB are therefore not anticipated.

3.4.4.37 The studies for the Underground Quarrying at Lam Tei, Tuen Mun and Development at Lam Tei North East are still on-going and there are no definitive design information at the time of preparing this EIA. Nevertheless, it is anticipated that their studies would consider all committed projects in the vicinity, including but not limited to the Project during their subsequent study. As any other studies by government, it is anticipated that they will also implement all the best practices to abate dust impacts where practicable. Close liaison between the contractors of R11 and the concurrent projects would be maintained to minimise dusty activities to be conducted concurrently, if any, as far as practicable. On this basis, adverse cumulative dust impacts from these projects are therefore not anticipated.

3.4.4.38 The Hung Shui Kiu / Ha Tsuen New Development Area is being implemented by the respective project proponent. The majority of the HSK project is located beyond 500m from the Project. Only a small portion of site formation works would be within the 500m assessment area of the Project. According to the approved EIA for HSK New Town Development (https://www.epd.gov.hk/eia/english/alpha/aspd_552.html), they will implement all the best practices to abate dust impacts where practicable. Close liaison between the contractors of R11 and the concurrent project would be maintained to minimise dusty activities to be conducted concurrently as far as practicable. On this basis, adverse cumulative dust impacts from HSK New Town Development are therefore not anticipated.

3.4.4.39 For the Site Formation and Infrastructure Works for Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun, it would mainly involve site clearance, site formation and superstructure. As any other developments for public housing, it is anticipated that they will also implement all the best practices to abate dust impacts where practicable. Close liaison between the contractors of R11 and the concurrent project would be maintained to minimise dusty activities to be conducted concurrently as far as practicable. On this basis, adverse cumulative dust impacts from the Site Formation and Infrastructure Works for Proposed Public Housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun are therefore not anticipated.

3.4.4.40 For So Kwun Wat and Tai Lam Chung Area, the concurrent project includes the Cycle Track between Tsuen Wan and Tuen Mun. Close liaison between the contractors of R11 and the concurrent project would be maintained to minimise dusty activities to be conducted concurrently as far as practicable. Given the relatively small scale of this cycle track, together with the good practices that they would implement, adverse cumulative dust impacts are therefore not anticipated.

3.4.4.41 For Tsing Lung Tau Area, the concurrent project includes the Cycle Track between Tsuen Wan and Tuen Mun. As discussed in **Section 3.4.4.40**, as the concurrent project is in relatively small scale with implementation of good practices and that close liaison with the contractor of concurrent project would be maintained to minimise dusty activities to be conducted concurrently as far as practicable, adverse cumulative dust impacts are not anticipated.

3.4.4.42 For North Lantau Area, concurrent projects include Road P1 (Tai Ho – Sunny Bay Section), Tsing Yi-Lantau Link (TYLL) and Hong Kong Island West – Northeast Lantau (HKIW-NEL) Link. All these projects are still undergoing their respective studies and there is no definitive design information at the time of preparing this EIA. Nevertheless, it is anticipated that their studies would consider all committed projects in the vicinity, including but not limited to the Project during their subsequent study. As any other studies by government, it is anticipated that they will also implement all the best practices to abate dust impacts where practicable. Close liaison between the contractors of R11 and the concurrent projects would be maintained to minimise dusty activities to be conducted concurrently, if any, as far as practicable. On this basis, adverse cumulative dust impacts from these projects are therefore not anticipated.

Potential Impact during Interim Period with Removal of Existing Noise Barriers during Construction Phase

3.4.4.43 As explained in **Section 2**, a small section of existing vertical noise barrier at the stub end of the slip road connecting to Yuen Long Highway Road would need to be demolished during the construction. A temporary noise barrier of the same height will be installed prior to demolition of the existing barrier. A permanent noise barrier of the same height will be reprovisioned upon completion of the construction of the slip road and before its commissioning. Besides, two sections of existing cantilevered noise barrier on the eastbound and westbound of Tuen Mun Road would also need to be demolished during the realignment works. The cantilevered barriers will be permanently replaced by a semi-enclosure and three sections of cantilevered barriers. During construction stage, the vertical parts and top cover of the proposed semi-enclosure will be installed prior to demolition of the existing cantilevered noise barriers on westbound and eastbound in stages. The temporary barrier and permanent barrier/semi-enclosure will be built in place seamlessly and hence there is no interim scenario without the presence of the noise barriers, thus no implication on air quality during the construction stage.

3.4.5 Good Site Practice and Recommendations

3.4.5.1 Good site practices and recommendations are suggested below to minimise any air quality impact during construction works. The dust levels would also be monitored and managed under an Environmental Monitoring and Audit (EM&A) programme as specified in the EM&A Manual to ensure that no nearby ASRs will be subject to adverse air quality impact.

Construction Dust Control

3.4.5.2 The Contractor is also obliged to follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation and good site practice as follows:

- Any excavated or stockpile of dusty material including those on barges should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable for the excavation or unloading;
- Site hoardings of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Subject to site constraints, the Contractor may review the practicability of taller site

hoarding for ASRs in close vicinity to the site boundary. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;

- Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;
- Any skip hoist for material transport should be totally enclosed by impervious sheeting;
- Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;
- Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;
- Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and
- Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabilisers within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies. These measures shall take into account the development programme and implementation phases of the future top-side development.

Emission control on Non-Road Mobile Machinery (NRMMs)

3.4.5.3 Fuel combustion from the use of powered mechanical equipment (PME) during construction works would be a source of air emission. To improve air quality, EPD has introduced the Air Pollution Control (NRMMs) (Emission) Regulation, which came into operation in 2015 to regulate emissions from machines and non-road vehicles. Ultra-low sulphur diesel (ULSD) with a sulphur content of not more than 0.005% by weight and a viscosity of not more than 6 centistokes at 40^{o}C will be used as much as practicable to minimise SO_2 emissions. Under the Regulation, NRMMs, except those exempted, are required to comply with the prescribed emission standards. All regulated machines sold or leased for use in Hong Kong must be approved or exempted with a proper label in a prescribed format issued by EPD. Only approved or exempted NRMMs with a proper label are allowed to be used in specified activities and locations including construction sites. The Contractor would also review the contemporary circumstances and site constraints and optimise the quantity of on-site machinery. This would help to reduce the gaseous and PM emission for construction site.

3.4.5.4 In addition, the following good site practices that can control and reduce the emission from the use of NRMMs from the Project are recommended:

- Regulated machines shall be used and exempted NRMMs should be avoided where practicable;

- Optimize the number of on-site machinery to minimize gaseous and PM emissions for each construction site with consideration of actual site constraints or circumstances;
- Use cleaner fuel such as ultra-low sulphur diesel in diesel-operated construction plant to reduce sulphur dioxide emission;
- Zero emission or clean fuels shall be considered as far as practicable for transportation activities;
- Use of electric PMEs where practicable;
- Connect construction plant and equipment to main electricity supply and avoid use of diesel generators and diesel-powered equipment as far as practicable;
- Switch off the engine of PMEs when idling;
- Implement regular and proper maintenance for plant and equipment; and
- Employ plant and equipment of adequate size and power output and avoid overloading of the plant.

Emission Control Measures for Drill-and-Blast Activities

3.4.5.5 The following measures related to drill-and-blast activities should be incorporated:

- Impermeable blast covers at the mucking out locations should be shut;
- The blasting should only be carried out in a fully enclosed environment;
- All neighbouring construction activities should be suspended during blasting;
- The areas within 30m from the blasting area should be wetted with water prior to blasting and blasting shall not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted; and
- Where necessary, mist spraying measures should be installed at the mucking out locations.

Emission Control Measures for Open Blasting Activities

3.4.5.6 The following measures related to open blasting activities should be incorporated:

- Provision of blast cages or roof-over protective cover, which are risk control measure, but also help to reduce a large amount of dust emission;
- Water spray before blasting and on blasted material prior to transportation;
- Minimise the distance fall and drop height from conveyors during loading and unloading; and
- Covered conveyors, transfer and unloading points with dust extraction system.

Emission Control Measures for Barging Facilities

3.4.5.7 Vehicle washing facilities will be provided at every designated exit point of the construction worksites. All construction vehicles will be washed at the exit before leaving the construction worksites. As a good practice, the entire area of the

barging facility should be paved with concrete, bituminous materials or hardcores. All vehicles would also be washed at the exit point before leaving the barging facility. For the unloading of the spoil at the berth, the unloading points at the barging facility are recommended to be provided with an enclosed system with 3-side screen with top cover and provision of water spraying system. The same design has also been recommended and adopted in other projects such as Central Kowloon Route, Shatin to Central Link and Hong Kong Express Rail Link. Besides, regular watering once per hour on all exposed stockpiles shall be implemented to achieve a dust removal efficiency of 50% or above. After unloading the spoil into barge inside the enclosed system, the trucks should be sprayed by water inside the unloading point. If barges would need to stay overnight at the barging point, spoils on the deck of the barges shall be covered by tarpaulin to avoid dust emission. In addition, the engine of the barge shall be switched-off during berthing as far as practicable. Provision of on-shore power supply shall also be considered wherever possible to minimize air quality impact from the marine vessels, with consideration of actual site constraints or circumstances to be further reviewed during detail design stage.

Emission Control Measures for Concrete Batching Plant

3.4.5.8 Apart from the good site practices, the Contractor shall also follow the requirements stipulated in the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2 (16) as follows to minimise the fugitive emissions arising from the operation of CBPs:

- The loading, unloading, handling, transfer or storage of cement, pulverised fuel ash (PFA) and/or other equally dusty materials shall be conducted in a totally enclosed system acceptable to EPD;
- All dust-laden air or waste gas generated by the processes shall be properly extracted and vented to fabric filtering system to meet the required emission limit;
- Vents of all silos shall be fitted with fabric filtering system to meet the required emission limit;
- Vents of cement/PFA weighing scale shall be fitted with fabric filtering system to meet the required emission limit;
- Seating of pressure relief valves of all silos shall be checked at least once a week during the process of filling dusty materials into the silos;
- The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rock, sand, stone aggregate, shall be carried out in such a manner to prevent or minimize dust emissions;
- The raw materials shall be adequately wetted before and during the loading, unloading and handling operations. Effective manual or automatic water spraying system shall be provided and used at all unloading areas, stock piles and material discharge points;

- All receiving hoppers for unloading materials shall be enclosed on three sides up to 3 metres above the unloading point. In no case shall these hoppers be used as the material storage devices;
- Aggregates with a nominal size less than or equal to 5 millimeters should be stored in totally enclosed structures such as storage bins and should not be handled in open area. Where there is sufficient buffer area surrounding the concrete batching plant, ground stockpiling may be used. The stockpile shall be enclosed at least on top and 3 sides and with flexible curtain to cover the entrance side;
- The opening between the storage bin and weighing scale of the materials shall be fully enclosed;
- The belt conveyors for handling materials shall be enclosed on top and 2 sides with a metal board at the bottom to eliminate any dust emission due to wind-whipping effect. Other type of enclosure will also be accepted by EPD if it can be demonstrated that the proposed enclosure can achieve same performance;
- All conveyor transfer points shall be totally enclosed. Openings on the enclosure for the passage of conveyors shall be fitted with effective flexible seals;
- Scrapers shall be provided at the turning points of all conveyors to remove dust adhered to the belt surface;
- Conveyors discharged to stockpiles of materials shall be arranged to minimize free fall as far as practicable. All free falling transfer points from conveyors to stockpiles shall be fitted with chute(s) or flexible curtain to minimize dust emission due to wind-whipping effect and shall be water sprayed;
- Mixer trucks shall be loaded in such a way to minimise airborne dust emissions;
- All access and route roads within the premises shall be paved and adequately wetted;
- Vehicle cleaning facilities shall be provided at the site exit of the premises and used to clean leaving vehicles;
- There shall be no visible run-off of sediment-laden water from the vehicle cleaning facilities to areas outside the premises;
- Closure device shall be provided on mixer trucks for preventing spillage of concrete from the concrete discharge outlet of mixer trucks; and
- A high standard of housekeeping shall be maintained. All spillages or deposits of materials on ground, support structures or roofs shall be cleaned up promptly by a cleaning method acceptable to EPD. Any dumping of materials at open area shall be prohibited.

3.4.6 Residual Impacts

3.4.6.1 With implementation of dust control measures specified in Air Pollution Control (Construction Dust) Regulation and other relevant statutory requirements, and also implementation of comprehensive EM&A programme throughout the construction

stage, the dust levels will be properly controlled and monitored to ensure that no nearby ASRs will be subject to adverse residual dust impact.

3.5 Operational Impacts

3.5.1 General

3.5.1.1 The assessment area for air quality impact assessment during operational phase shall be defined by a distance of 500m from the Project Road and highway / tunnel operation and maintenance facilities as identified in the EIA study, which shall be extended to include major existing, committed and planned air pollutant emission sources identified to have a bearing on the environmental acceptability of the Project. **Figures 3.1a to b** illustrate the 500m study area from the boundary of the Project site.

3.5.1.2 The assessment shall take into account the impacts of emission sources from vehicles from open roads and viaducts of the Project and the existing road network within the assessment area, proposed tunnel portals and ventilation buildings of the Project, industrial chimneys, marine vessels within the assessment area, and major point sources located within 4 km from the project boundary, which should be modelled by dispersion model to account for the spatial variations in concentrations induced by them. The assessment shall also take into account the impacts of emission sources from nearby concurrent projects.

3.5.2 Identification of Representative Air Pollutants

3.5.2.1 According to Appendix B, Clause 5 (ii) of the EIA Study Brief, the key / representative air pollutant parameters for the project shall be identified, including the types of pollutants and their averaging time concentration.

3.5.2.2 The air quality pollutant source during the operational phase of the Project would be the emission from vehicles travelling on the new and existing roads. The tailpipe emission would comprise various pollutants, including Nitrogen Oxides (NO_x), Respirable Suspended Particulates (RSP), Fine Suspended Particulates (FSP), Sulphur Dioxides (SO_2), Carbon Monoxide (CO), Lead (Pb), Toxic Air Pollutants (TAP), etc.

3.5.2.3 EPD has tightened the statutory motor vehicle diesel and unleaded petrol specification to EURO V level, which has capped the sulphur content from 0.005% to 0.001 % since December 2007. The road transport only contributes a very small amount of SO_2 emission. It can also be seen from **Section 3.2** that the SO_2 background concentrations are very low (14% of AQO for 4th highest 10-minute SO_2 and 30% of AQO for 4th highest 24-hour SO_2). SO_2 is not a critical air pollutant of concern for this road project. Similarly, the monitored CO background concentrations are very low, only 6% and 16% of the AQO for the maximum 1-hour CO and maximum 8-hour CO respectively. CO is also not a critical air pollutant of concern for this road project.

3.5.2.4 According to the EPD's "Air Quality in Hong Kong 2021", O_3 is a regional air pollution problem. It is not a pollutant directly emitted from pollution sources but formed by photochemical reaction between NO_x and VOCs in the presence of sunlight. In the presence of large amounts of NO_x in the roadside environment, O_3 reacts with NO to give NO_2 and thus results in O_3 removal. O_3 is therefore not

considered as a key air pollutant for the operational air quality assessment of this road project.

3.5.2.5 As leaded petrol had been banned in Hong Kong in 1999, it is no longer considered as a primary source in Hong Kong. According to the "Annual Air Quality Monitoring Results - Air Quality in Hong Kong 2021" from EPD, the annual lead level ranged from 9 ng/m^3 (at Kwun Tong) to 11 ng/m^3 (at Kwai Chung, Tung Chung, Yuen Long and Tuen Mun), which is about 1.8% to 2.2% of AQO (i.e. 500 ng/m^3). The concentration was much lower than the AQO of 0.5 µg/m^3. Therefore, lead is also not considered as a key / representative air pollutant for the operational air quality assessment for this road project.

3.5.2.6 According to the EPD's "Assessment of Toxic Air Pollutant Measurements in Hong Kong Final Report, 2003", dioxins, carbonyls, PCBs and most toxic elemental species are not considered as primary sources of vehicular emissions. Therefore, these pollutants are not considered as key pollutants for this road project.

3.5.2.7 Vehicular emissions may be a source of diesel particulate matters, Polycylic aromatic hydrocarbons (PAHs), and VOCs. Elemental carbon, which constitutes a large portion of diesel particulate matters mass, is commonly used as a surrogate for diesel particulate matter. According to EPD's "Assessment of Toxic Air Pollutant Measurements in Hong Kong Final Report, 2003", the Government has put great efforts to reduce particulate emission from the vehicular fleet. Based on "Measurements and Validation for the Twelve-month Particulate Matter Study in Hong Kong in 2021", the elemental carbon showed a significant decrease in concentration in Kwai Chung Station by 36% from 2015 to 2021 (data before 2015 is not available), in Clear Water Bay Station by 59% from 2011 to 2021 (data before 2011 is not available), as well as in Mong Kok, Yuen Long and Tsuen Wan by 84%, 76% and 72% from 2000 to 2021 respectively. With the continual efforts by EPD to reduce particulate emission from the vehicles, it is not considered as a key air pollutant for the operational air quality assessment of this road project.

3.5.2.8 The most important PAH is Benzo[a]pyrene (BaP) because of its high cancer risk, and it is often selected as a marker for PAH group. With reference to US and European Community air quality guidelines, the European commission sets a very stringent guideline for annual concentration of 1 ng/m^3 for BaP. According to the latest EPD's Air Quality in Hong Kong 2021, the concentration of BaP level was 0.05 ng/m^3 and 0.09 ng/m^3 monitored at Tsuen Wan and Central/Western stations respectively in 2021, which was far below the guidelines of European Communities of 1 ng/m^3. Hence, PAHs are not considered as a key air pollutant for quantitative air quality assessment for this road project.

3.5.2.9 According to EPD's "Assessment of Toxic Air Pollutant Measurements in Hong Kong Final Report, 2003", benzene and 1,3-butadiene amongst the VOC compounds are the most significant for Hong Kong. With reference to US and European Community air quality guidelines, the European commission sets a very stringent guideline for annual concentration of 5 µg/m^3 for benzene. The UK Air Quality Standard for 1,3-butadiene is 2.25 µg/m^3. According to the "Air Quality in Hong Kong 2021", the concentrations of benzene and 1,3-butadiene were 0.45 µg/m^3 and 0.04 µg/m^3 at Tsuen Wan station, as well as 0.67 µg/m^3 and 0.04 µg/m^3 at Central/Western station in 2021, which were far below the guidelines of European Communities of 5 µg/m^3 and the UK Air Quality Standard of 2.25 µg/m^3.

Hence, VOCs are also not considered as a key air pollutant for quantitative air quality assessment for this road project.

3.5.2.10 As concluded, only the NOx, RSP and FSP are considered as the key representative pollutant for the operational air quality assessment of the Project. The 1-hour and annual average NO_2 concentrations, 24-hour and annual average RSP and FSP concentrations at each identified ASR are assessed and compared with the AQO to determine their compliance.

3.5.3 Identification of Pollution Sources

Project-induced Emission Sources

3.5.3.1 Vehicular emission is the major air pollution source during operational phase of the Project. The alignment of the Project is divided into three sections: Northern Section (Tuen Mun to So Kwun Wat); Central Section (So Kwun Wat to Tai Lam Chung); and Southern Section (Tai Lam Chung to North Lantau). Detailed description of the alignment shall be referred to **Section 2** and **Figure 1.1**.

3.5.3.2 Vehicular emissions are anticipated from the proposed open road sections at the Lam Tei Quarry Interchange, So Kwun Wat Interchange, connecting roads from So Kwun Wat Link Road to Siu Lam, So Kwun Wat - Siu Lam Open Road Section, Tam Lam Chung River Viaduct, Tsing Lung Tau Interchange, Tsing Lung Bridge and North Lantau Interchange.

3.5.3.3 Besides, vehicular emissions inside the proposed Lam Tei Tunnel, So Kwun Wat Link Road and Tai Lam Chung Tunnels (North and South Sections) would be emitted via the tunnel portals and the six proposed ventilation buildings. For the ventilation building for Tai Lam Chung Tunnel (North Section), it would only be used for emergency use such as smoke extraction during fire accident, therefore, it has not been included as an emission source. The tunnel ventilation system will be designed to remove/dilute vehicular emission to achieve the air quality standards specified in EPD's "Practice Note on Control of Air Pollution in Vehicle Tunnels", and to reduce discharge of emission from the portals.

Other Major Pollution Emissions in the Immediate Neighbourhood

Vehicular Emission from Existing Roads and Concurrent Projects

3.5.3.4 Other than the Project roads, vehicular emissions from the existing road networks, other concurrent road projects including TMB, Widening of Fuk Hang Tsuen Road, Widening of Yuen Long Highway (Section between Lam Tei Quarry and Tong Yan San Tsuen Interchange), Widening of Castle Peak Road – Castle Peak Bay, TYLL, HKIW-NEL Link and Road P1 (Tai Ho – Sunny Bay Section), induced traffic from planned development projects and their associated road infrastructures, such as the Hung Shui Kiu/Ha Tsuen New Development Area, Development at Lam Tei North East, Proposed Public Housing at Ping Shan South, Lam Tei North and Nai Wai Development, etc. within the assessment area would also have cumulative air quality impact on nearby ASRs. The table below shows a summary of concurrent projects that would generate cumulative impact from open road and induced traffic. **Figure 2.7** shows the location of the concurrent projects.

Table 3.12 Concurrent Projects included in the Operational Air Quality Assessment

Concurrent Projects	Tentative Commissioning Year
Tuen Mun Bypass	2033
Tsing Yi-Lantau Link (TYLL)	2033
Hong Kong Island West – Northeast Lantau Link (HKIW-NEL Link)	2033/2034
Road P1 (Tai Ho – Sunny Bay Section)	2030
Widening of Yuen Long Highway (Section between Lam Tei Quarry and Tong Yan San Tsuen Interchange)	2033
Widening of Castle Peak Road – Castle Peak Bay	Second Quarter of 2024
Widening of Fuk Hang Tsuen Road	First Quarter of 2025
Hung Shui Kiu/Ha Tsuen New Development Area	First stage: Year 2024-2025; Second stage: Year 2030-2032; and Third stage in Year 2036
Proposed Public Housing at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai Development	Programme is under review and to be commissioned after R11 is in place.

Emission from Public Transport Interchanges (PTIs) and Heavy Goods Vehicle (HGV)/ Coach Parking

3.5.3.5 The Public Transport Interchanges (PTIs) and Heavy Goods Vehicle (HGV)/ coach parking are potential vehicular emission sources. All existing and planned PTIs (with available information and implementation programme) as well as major HGV/coach parking sites have been identified. There are a total of 2 planned major PTIs and 6 existing major HGV/ coach parking sites that are identified as major air pollution sources within the 500m distance from the Project boundary as shown in **Figures 3.4a** to **b**. They include the following and are assessed using precise approach. No existing PTI is identified within the assessment area.

Planned PTIs
- Planned PTI at Proposed Public Housing at Nai Wai, Lam Tei (PTI05) (to be commissioned after R11 is in place, as advised by CEDD.)
- Planned PTI at Proposed Public Housing at Lam Tei North, Lam Tei, Tuen Mun (PTI06) (to be commissioned after R11 is in place, as advised by CEDD.)

Major Existing HGV/ Coach Parking
- Carpark near Tung Lei Path (HCP02b), Lam Tei
- Carpark near Tat Fuk Road (HCP04), Lam Tei
- Carpark near To Lai Road (HCP09), Lam Tei
- Carpark near Fu Hang Tsuen Road (HCP11), Lam Tei
- Carpark near Castle Peak Road (HCP17), Tsing Lung Tau
- Carpark near Tsing Ying Road (HCP25), So Kwun Wat

3.5.3.6 In addition to the above, all other parking sites within the 500m assessment area have also been considered in the air quality impact assessment by broad-brush approach.

Industrial Emissions

3.5.3.7 Industrial emissions are one of the potential air pollution sources during operational phase of the Project. Chimney survey and desktop study have been conducted in June 2023 to identify existing and planned chimneys within 500m of the Project site boundary.

3.5.3.8 One existing chimney at Polystyrene Foam Products Factory Limited at Fuk Hang Tsuen Road, Lam Tei has been identified (**Figure 3.5a**). The chimney was also identified in the approved EIA report of Hung Shui Kiu New Development Area (AEIAR-203/2016). Nonetheless, based on site verification, location of the chimney has been updated. The chimney emission has been included in the assessment. Besides, there are other chimneys identified in the approved EIA report of Hung Shui Kiu New Development Area (AEIAR-203/2016). Except the chimney at Polystyrene Foam Products Factory Limited, all other chimneys are outside the 500m assessment area of the Project.

3.5.3.9 In addition, a chimney was also identified at Wan Hing Machine Factory in Nai Wai, Lam Tei. However, the industrial premise including the chimney is within the site boundary of the Proposed Public Housing Development at Nai Wai. As checked with CEDD, the land shall be resumed and the industrial premise including the chimney will be removed before commissioning of R11 in 2033. Therefore, this chimney is not considered in the assessment.

3.5.3.10 Within 500m assessment area, there is one existing SP, i.e. the Lam Tei Quarry. According to CEDD's Departmental Report 2015-2019, Lam Tei Quarry and the associated asphalt plant will cease operation in Year 2022/23[1]. The Lam Tei Underground Quarry is being planned under Agreement No. CE51/2020(GE) Underground Quarrying at Lam Tei, Tuen Mun – Investigation, Design and Construction (**Figure 2.7**). As advised by CEDD, the underground quarry will be commissioned in Year 2025. However, since the design of the Lam Tei Underground Quarry is yet to be confirmed at the time of preparing this EIA, as agreed with CEDD, its cumulative air quality impact will be assessed and addressed in the respective EIA.

Marine Emissions

3.5.3.11 The proposed Tsing Lung Bridge will traverse the Ha Pang Fairway (**Figure 3.5b)**. The marine traffic activities along Ha Pang Fairway and its inshore traffic zones consist of ocean-going vessels (OGVs), river trade vessels (RTVs), Pearl River Delta (PRD) ferries and local vessels. Marine emission is the major air pollution sources in this area. Besides, the existing Gold Coast Marina **(Figure 3.5b)** is partially within 500m of the Project boundary at So Kwun Wat area. As advised by Project Marine Traffic Consultant, on-shore electricity power is provided. Hence, marine emission during berthing at the marina is not anticipated but maneuvering mode from pleasure vessels is still considered as potential pollution source. Cumulative air quality impact due to the gaseous emission from marine vessels has been considered.

Major Emission Point Sources within 4km

3.5.3.12 Major point source within 4km from the Project that might also have influence on the air quality is the Asphalt Surfaces (International) Limited, which is located approximately 3.4km away from the Project (**Figure 3.5b**). Two chimneys, including one for rotary dryer drum and one for thermal oil heater, are identified as the major point sources.

1 Civil Engineering and Development Department, 2019. Management of Quarries (https://www.ceddreport201519.gov.hk/en/projects-services-detail/quarrying)

3.5.4 Assessment Methodology

3.5.4.1 The assessment has been conducted based on the best available information at the time of preparing the EIA and has considered the impacts of emission sources from road vehicles, nearby industrial and marine emission sources within the assessment area, as well as major point sources within 4 km from the Project which should be modelled by dispersion models to account for the spatial variations in concentrations induced by them.

3.5.4.2 The air quality impact assessments have been carried out according to Guidelines on Assessing the 'TOTAL' Air Quality Impacts to include the following three tiers of emission source contribution as appropriate:

Tier 1 Primary contribution from the project-induced emission sources including:

- Vehicular emission from the open roads of the proposed R11
- Vehicular emission from the proposed tunnel portals and ventilation buildings of R11

Tier 2 Secondary contribution due to the pollutant-emitting activities in the immediate neighbourhood within the assessment area and major point source within 4km including:

Major Emission Sources within 500m of the Project

- Vehicular emission from the existing road networks and other planned concurrent projects (including road projects and planned development projects as described in **Section 3.5.3** above)
- Vehicular emission from two major planned PTIs and 6 HGV /coach parking sites by precise approach and all other parking sites within the 500m assessment area by broad-brush approach
- Industrial emission from the existing chimney at Polystyrene Foam Products Factory Limited
- Marine emission from Ha Pang Fairway and its inshore traffic zone
- Marine emission at Gold Coast Marina

Major Point Sources within 4km of the Project

- Emission from asphalt plant at Asphalt Surfaces (International) Limited, Tsing Yi

Tier 3 Background contribution including:

- Other sources, such as territory-wide road, Hong Kong International Airport, power plants, marine emission from ocean going vessels, passenger ferries and container terminals, other major point sources outside 4km, etc.

3.5.4.3 The corresponding Tier 1 and Tier 2 emissions are modelled in near-field dispersion models, while the Tier 3 emissions are modelled in far-field dispersion model PATH. The cumulative operational air quality impact is the combination of the contributions from all near-field and far-field sources.

Determination of Assessment Year

3.5.4.4 According to the EIA Study Brief No. ESB-352/2022, the air pollution impacts of future road traffic are calculated based on the highest emission strength from road vehicles in the assessment area within the next 15 years upon commissioning of

the Project. The selected year of assessment should represent the highest emission scenario given the combination of vehicular emission factors and traffic flow for the selected year.

3.5.4.5 Based on the current programme, R11 is planned for commissioning in Year 2033. Sensitivity tests have been carried out for Year 2033 (R11 commissioning), 2036, 2041, 2046 and 2048 (15 years after R11 commissioning) to determine the highest emission scenario. Vehicular tailpipe emissions from roads are calculated using EMFAC-HK version 4.3. The traffic forecast data provided by the Project Traffic Engineer, which has been endorsed by the Transport Department, are given in **Appendix 3.2**. Results of the sensitivity tests are summarised in **Table 3.13** below. It can be found that the highest emission scenarios are found to be Year 2033 for PM (i.e. RSP and FSP) and Year 2048 for NOx.

Table 3.13 Summary Results of Sensitivity Tests

Year	Annual Vehicular Emission (tonnes)		
	NOx	RSP	FSP
2033	152	**9.2**	**8.4**
2036	132	7.3	6.7
2041	138	7.6	7.0
2046	149	7.9	7.3
2048	**154**	8.2	7.5

Vehicular Emission from Open Roads

3.5.4.6 Vehicular emissions have been predicted using the EMFAC-HK v4.3. As mentioned above, Year 2033 for PM and 2048 for NOx are selected as the worst assessment years for the air pollution impacts of future road traffic during operational phase. Since the PATH model has been rerun with removal of the vehicular emission within the respective grids to avoid double-counting (see **Section 3.5.4.41** for details), the coverage of the road network in the near-field assessment has been extended beyond 500m of the open roads. The extent of the road coverage including the Project roads, existing roads and concurrent planned roads for Year 2033 and 2048 are given in **Appendix 3.3**.

3.5.4.7 The running emission factors for each vehicle class travelling at different speeds have been determined using the daily profile of the lowest temperature and relative humidity for each month derived from Year 2021 data from the nearest weather station (i.e. Tuen Mun Children and Juvenile Home Weather Station) for assessing the short-term air quality impact. For long term impact, the daily profile of average temperature and relative humidity for each month has been adopted (**Appendix 3.5**). The maximum speed of medium goods vehicle, heavy goods vehicle and bus travelling on any road at a speed in excess of 70kph shall be limited to 70kph; while that of public light bus on any road at a speed in excess of 80kph shall be limited to 80kph according to Road Traffic Ordinance (Cap. 374). The speeds for these types of vehicles for calculation of the running emission factors have therefore been capped accordingly.

3.5.4.8 The start emission for all types of vehicles other than franchised buses has been assessed on roads. There is no start emission on expressways, trunk roads, primary distributors, and district distributors. The road network assumed with no cold start and with cold start is shown in **Appendix 3.3**. Since there is no project-specific

vehicle population data and the VKT is related to vehicle population, the number of trips from the local roads within the study area are estimated based on its vehicle-kilometre-travelled (VKT) and ratio of the default trip to default VKT of the whole territory of Hong Kong in the EMFAC-HK model adjusted by percentage of minor road network from Annual Traffic Census 2021 (see **Appendix 3.4)**. Similar to running emission factors, the daily profile of the lowest temperature and relative humidity for short term impact and daily profile of the average temperature and relative humidity for long term impact for each month has been adopted. The maximum start emission factors among different sitting times (from 5min to 720min) have been used for estimation of the cold start emission for conservative assessment.

3.5.4.9 According to EPD's "Guidelines on Choice of Models and Model Parameters", the individual initial tailpipe NO_2/NO_X ratio of each EMFAC-HK vehicle type has been adopted to calculate the initial NO_2 and residual NO tailpipe emission rates. The initial NO_2 emissions for each vehicle type predicted by EmFAC-HK v4.3 have been directly adopted.

3.5.4.10 The composite vehicular emission factors for each road link for Year 2033 and 2048 are given in **Appendix 3.5**.

3.5.4.11 The USEPA approved near-field air dispersion model, CALINE4 developed by the California Department of Transport is used to assess vehicular emissions impact from all existing and planned open road network. The existing and at-source noise mitigation measures as proposed in **Section 4** including the roadside barriers and semi-enclosures have been considered in the model and their locations shall be referred to **Appendix 3.5.**

3.5.4.12 Grid-specific meteorological data extracted from the latest EPD's PATH v2.1 model is adopted in CALINE4 model, including relevant temperature, wind speed, wind direction and mixing height. The stability classes are modelled from PCRAMMET model. The mixing height is capped between 131m and 1,941m as per the real meteorological data in Year 2015. For the treatment of calm hours, the wind speeds are limited to 1m/s for those lower than 1m/s as per the PATH v2.1 model.

3.5.4.13 Surface roughness and the wind standard deviation are estimated in accordance with the "Guideline on Air Quality Models (Revised), 1986", as summarised in **Table 3.14**.

Table 3.14 Summary of Wind Standard Deviation for Surface Roughness

Period / Location/ Parameters		Assumptions
Grid 22_40, 22_43, 23_40, 24_39, 24_40, 25_37, 25_38, 25_39, 26_35, 26_37, 26_38, 27_35, 27_36, 27_37, 28_35 and 28_36	Surface roughness (cm)	50
	Wind standard deviation (degrees)	1) 28.6 for A & B Stability Classes; 2) 22.3 for C Stability Class; 3) 15.9 for D Stability Class; 4) 9.5 for E Stability Class; and 5) 4.8 for F Stability Class.
Grid 21_39, 21_40, 21_43, 21_44, 21_45, 22_39, 22_44, 22_45, 23_39, 24_38 and 27_38	Surface roughness (cm)	100
	Wind standard deviation (degrees)	1) 32.9 for A & B Stability Classes; 2) 25.6 for C Stability Class; 3) 18.3 for D Stability Class; 4) 11 for E Stability Class; and 5) 5.6 for F Stability Class.

3.5.4.14 Owing to the limitation of CALINE4 model, road elevation is limited to 10m which may underestimate the pollutant concentrations at ASRs located 10mPD or above. Some elevated roads or viaducts within the 500m Assessment Area are higher than 10mPD (in range of 3mPD to 98mPD). Thus, contribution from the elevated roads over 10mPD is modelled separately from the other roads. For the roads below 10mPD, both the actual heights of ASR and roads are adopted. For the section of elevated roads higher than 10mPD, adjustment on both heights of roads and ASR has been made so that height variation for roads higher than 10mPD can be reflected in the dispersion model for a conservative assessment. **Table 3.15** provides an example of the adjusted heights adopted in the models.

Table 3.15 Example of Adjusted Height adopted in Caline4 Models

ASR Level (mPD)	Road Level (Road Group)			
	0-10 mPD (Group 1)	11-20 mPD (Group 2)	21-30 mPD (Group 3)	31-40 mPD (Group 4)
≤ 10	1. No adjustment for both road and ASR height	1. Adjusted Road Height: Cap at 10m 2. No adjustment for ASR	1. Adjusted Road Height: Cap at 10m 2. Adjusted Height for ASR: 1.5m	
>10 and ≤ 20		1. Adjusted Road Height: -10m 2. Adjusted height for ASR: -10m	1. Adjusted Road Height: Cap at 10m 2. Adjusted height for ASR: -10m	1. Adjusted Road Height: Cap at 10m 2. Adjusted Height for ASR: 1.5m
>20 and ≤ 30			1. Adjusted Road Height: -20m 2. Adjusted height for ASR: -20m	1. Adjusted Road Height: Cap at 10m 2. Adjusted height for ASR: -20m
>30				1. Adjusted Road Height: -30m 2. Adjusted height for ASR: -30m

Note:
[1] Only example (i.e. for roads up to 40mPD) is given in the table above. Same approach of height adjustment is applied to road levels higher than 40mPD in the assessment.

3.5.4.15 In addition, for barriers along existing roads or proposed noise barriers (see **Appendix 3.5**), the line source is modelled at the tip of the barrier and the mixing width is limited to the actual uncovered road width in order to address the associated secondary environmental impact.

3.5.4.16 A summary of modelling parameters for CALINE4 are listed in **Table 3.16**.

Table 3.16 Model Parameters for CALINE4

Parameter	Input
Meteorological Data	Year 2015 MCIP data extracted from PATH model
Mixing Height	Year 2015 MCIP data extracted from PATH model and is capped to between 131m and 1941m as per the real meteorological data recorded by Hong Kong Observatory in Year 2015
Stability Class	Year 2015 MCIP data extracted from PATH model
NOx to NO2 Ratio	Ozone Limiting Method (OLM) for 1-hour NO_2 OLM / Jenkin's Method for annual NO_2 (Details refer to **Section 3.5.4.47**)
Assessment heights	1.5m, 5m, 10m, 15m, 20m, 30m, 50m, 80m, 120m and 180m above ground

Emission from Proposed Tunnel Portals and Ventilation Buildings

3.5.4.17 Based on current design of R11 provided by Project Engineer, vehicular emission inside the proposed tunnels will be dispersed into atmosphere via the following portals at both ends and ventilation buildings (**Appendix 3.6**):

Table 3.17 Discharge of Proposed Tunnel Portals and Ventilation Buildings

Tunnel Section	Tunnel Portal	Ventilation Buildings	Discharge split between portals and Ventilation Buildings (VBs) [1]	Discharge split for Ventilation Buildings (VBs) [1]
Lam Tei Tunnel (LTT)	• LTT- North Portal • LTT- South Portal	• LTT- North Ventilation Building (LTT-NVB) • LTT- South Ventilation Building (LTT-SVB)	40 : 60	50 : 50
So Kwun Wat Link Road (SKWLR)	• SKWLR – East Portal • SKWLR – West Portal	• SKWLR - East Ventilation Building (SKWLR -EVB) • SKWLR - West Ventilation Building (SKWLR -WVB)	40 : 60	50 : 50
Tai Lam Chung Tunnel (North Section) (TLCTN)	• TLCTN – East Portal • TLCTN – West Portal	-	100% via portals	-
Tai Lam Chung Tunnel (South Section) (TLCTS)	• TLCTS – North Portal • TLCTS – South Portals (including Southwest and Southeast Portals)	• TLCTS – North Ventilation Building (TLCTS – NVB) • TLCTS – South Ventilation Building (TLCTS – SVB)	40 : 60	50 : 50

Note:
[1] The discharge split between portals and ventilation buildings is based on current design which was advised by the Project Engineer

3.5.4.18 Besides, the cumulative air quality impacts due to the proposed TMB tunnel portal and its associated North Ventilation Building in Lam Tei, the proposed TYLL tunnel portal as well as the proposed HKIW-NEL Link tunnel portals have been addressed. The latest tunnel and ventilation system design of TMB, TYLL tunnel and HKIW-NEL Link are given in the following:

Table 3.18 Discharge of Portals and Ventilation Buildings of Concurrent Projects

Tunnel Section	Tunnel Portal	Ventilation Buildings	Discharge split between portals and Ventilation Buildings (VBs) [2]	Discharge split for Ventilation Buildings (VBs) [2]
TMB	• TMB- North Portal [1] • TMB- South Portal	• TMB- North Ventilation Building (TMB-NVB) [1] • TMB- Middle Ventilation Building (TMB-MVB) • TMB- South Ventilation Building (TMB-SVB)	40 : 60	1/3 from each VB
HKIW- NEL Link	• North Lantau Tunnel 1 - North Portal • North Lantau Tunnel 1 - South Portal	No Ventilation Building	100% from portal	NA
Tsing Yi Lantau Link	• North Lantau Tunnel 2 Northeast Portal	No Ventilation Building	100% from portal	NA

Notes:
[1] Only north portal and north ventilation building of TMB are within 500m of R11 and hence included in the assessment.
[2] The discharge split between portals and ventilation buildings for TMB is based on current design which was advised by the respective Project Engineer; while the preliminary design of the tunnels of HKIW- NEL Link and Tsing Yi Lantau Link (i.e. all from portals) is advised from Project Proponent.

3.5.4.19 It should be noted that the ventilation schemes as presented in **Table 3.17** and **Table 3.18** are the best available information provided by the Project Engineer at the time of preparing this EIA. During the subsequent design stage and the operational stage, the ventilation engineer should conduct reviews on the ventilation scheme covering different periods of a day, taking into account the contemporary circumstance such as latest traffic forecast, traffic composition, EV uptake, update

on the ambient air quality, etc., and then review and update the air quality assessment as necessary to demonstrate full compliance of the AQO. These reviews would allow the designer and operator to optimize the operation of the ventilation system without compromising the compliance of AQO.

3.5.4.20 Vehicular emissions inside the tunnels of R11, TMB, TYLL, and HKIW – NEL Link are determined based on the traffic flow and the emission factors from the EMFAC-HK v4.3 similar to those for open roads as discussed above. The portal emissions are modelled in accordance with the Permanent International Association of Road Congress Report published in 1991 (PIARC, 1991). It is assumed that the pollutant will be ejected from the portal as a portal jet such that 2/3 of the total emissions will be dispersed within the first 50m from the portal, and 1/3 of the total emissions within the second 50m. To take into account the horizontal jet effect, portal emission is modelled as "Volume" sources in AERMOD. Detailed calculations of portal emission are given in **Appendix 3.6**. A summary of AERMOD modelling parameters is given in **Table 3.20**.

3.5.4.21 Based on the current design of R11, the emission from all ventilation buildings (i.e. LTT-NVB, LTT-SVB, SKWLR-EVB, SKWLR-WVB, TLCTS–NVB and TLCTS – SVB) will be discharged in an upward direction at roof. The TMB-NVB from the concurrent project TMB will be discharged in a horizontal direction through wall louvre. The latest design parameters of different ventilation buildings are summarised in **Table 3.19** below, and detailed calculations of the emission discharge are given in **Appendix 3.6**. The emissions from ventilation buildings are modelled as "Point" sources for R11 and as "Pointhor" sources for TMB in AERMOD. A summary of AERMOD modelling parameters is given in **Table 3.20**

Table 3.19 Latest Design Parameters of Ventilation Buildings

Tunnel Section	Ventilation Buildings	Discharge Area (m^2)	Discharge Direction	Discharge Louvre Bottom Level (mAG)	Discharge Velocity (m/s)
Lam Tei Tunnel (LTT)	LTT-NVB	360	Upward	24	6
	LTT-SVB	360	Upward	24	6
So Kwun Wat Link Road (SKWLR)	SKWLR-EVB	240	Upward	24	6
	SKWLR-WVB	240	Upward	24	6
Tai Lam Chung Tunnel (South Section) (TLCTS)	TLCTS-NVB	460	Upward	24	6
	TLCTS-SVB	460	Upward	24	6
Tuen Mun Bypass (TMB)	TMB-NVB	120	Horizontal	21	3

Table 3.20 Modelling Parameters in AERMOD

Parameters	Input
Modelling Mode	Urban with terrain option
Meteorological data	Year 2015 MCIP data extracted from PATH v2.1 model is provided by EPD. The wind speeds are capped at 1m/s for those from PATH v2.1 below 1m/s
Mixing Height	Year 2015 MCIP data extracted from PATH model and is capped to between 131m and 1941m as per the real meteorological data recorded by Hong Kong Observatory in Year 2015

Parameters	Input
Anemometer Height	9m (According to EPD's Guidelines on Choice of Models and Model Parameters)
Albedo	Determined within 10km x 10km region from the Project
Bowen Ratio	Determined within 10km x 10km region from the Project
Surface Roughness	Surface characteristic determined within 1km for each PATH grid
Assessment heights	1.5m, 5m, 10m, 15m, 20m, 30m, 50m, 80m, 120m and 180m above ground

Emission from Public Transport Interchanges

3.5.4.22 The emissions from the planned PTIs at Nai Wai and Lam Tei North have also been included in the assessment as conservative approach.

3.5.4.23 The traffic data of the two planned PTIs (i.e. PTI at Nai Wai and PTI at Lam Tei North) are provided by the Project Traffic Consultant. The bus services for the two planned PTIs are obtained from CEDD's Study on Site Formation and Infrastructure Works for proposed Public housing Developments at Ping Shan South, Yuen Long, Lam Tei North and Nai Wai, Tuen Mun; and the sitting time, idling time and travelling speed are derived based on site observation on some existing PTIs in New Territories West covering Hung Shui Kiu and Tuen Mun. The emission has been assessed using precise approach in accordance with EPD's guideline "Calculation of Start Emissions in Air Quality Impact Assessment".

3.5.4.24 According to PN1/22 Practice Note for Control of Air Pollution in Semi-Confined Public Transport Interchanges, all drivers using the PTI shall generally switch off the vehicle engines while waiting. Idling emission should be minimized. For conservative assessment, idling emission inside PTIs has also been considered in the assessment. The cold idling emission factors have been made reference to EPD's Note on Calculation of Start Emissions in Air Quality Impact Assessment; while the warm idling emission are estimated based on the emission factors for different Euro engine types in accordance with PIARC Road Tunnels: Vehicle Emissions and Air Demand for Ventilation, 2019. The calculation of the idling emissions for the PTIs are given in **Appendix 3.7**.

3.5.4.25 For buses with Selective Catalytic Reduction Device (SCR), the "adjusted" start emissions (i.e. excluding idling emission for 1 min for buses) are released over a longer period (i.e. 700m) after the engine starts. Detailed calculation of the emissions for the 2 PTIs is given in **Appendix 3.7**.

3.5.4.26 Both planned PTIs will be decked. However, detailed design for the planned PTI is not available during the stage of this EIA. It is assumed that the emissions from the PTI are dispersed at the entry and exit openings of the PTI and without forced mechanical ventilation. Emissions from the planned PTIs are modelled as "Area" sources in AERMOD. Start emission on spread distance outside the PTIs has been modelled as "Line" source in AERMOD with appropriate modelling parameters on the mixing width, source height and initial vertical dimension according to the USEPA guidelines "Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas". A summary of AERMOD modelling parameters is given in **Table 3.20** above and in **Appendix 3.7**.

Emission from HGV and Coach Parking Sites

3.5.4.27 The start emissions from all parking sites have already been assessed on open roads based on the estimated trips from default trip and default VKT of the whole territory of Hong Kong in the EMFAC-HK model as described in **Section 3.5.4.8**. Nonetheless, there are 6 existing HGV and coach parking sites that are considered to contribute significantly to the air quality impacts, and thus their associated emissions have been also assessed using the same approach as PTI above and double-counted in the assessment.

3.5.4.28 The trip data and assumption on sitting time at the parking sites are derived based on traffic survey and provided by the Project Traffic Consultant. These sites are for parking use and vehicle idling for passengers dropping off and picking up is not found. The travelling speed within the parking sites is estimated based on site observation. The start emission has been assessed in accordance with EPD's guideline "Calculation of Start Emissions in Air Quality Impact Assessment". For petrol vehicle, the start emissions are instantly released at the time when the engine starts. For LPG vehicle and diesel vehicle with SCR, the start emissions are released over a longer period (i.e. 150m for LPG vehicle and 700m for diesel vehicle with SCR) after the engine starts. Detailed calculation of the emissions for the 6 parking sites is given in **Appendix 3.7**. All the HGV parking sites are open sites without mechanical ventilation and are modelled as AREAPOLY source by AERMOD. A summary of AERMOD modelling parameters is given in **Table 3.20** above and in **Appendix 3.7**

Emission from Chimneys and Other Industrial Operation

3.5.4.29 Information for the chimney at Polystyrene Foam Products Factory Limited, including emission rates and source parameters including stack height, exit temperature, exit velocity and internal diameter of the stack, was not provided by the operators. Hence, the chimney information has been made reference to the approved EIA report of Hung Shui Kiu New Development Area (AEIAR-203/2016).

3.5.4.30 Major point source within 4km from the Project site boundary, i.e. rotary dryer drum and thermal oil heater for Asphalt Surfaces (International) Limited, has also been included in the near-field dispersion models. The emission rates, source parameters including stack height, exit temperature, exit velocity, internal diameter of the stacks, as well as its operation hours (i.e. 24 hours) are made reference to its respective SP register and Air Pollution Control Plan.

3.5.4.31 Detailed calculation of the emission rates for these chimneys and industrial operation and the modelling parameters are given in **Appendix 3.8**. A summary of AERMOD modelling parameters is given in **Table 3.20** above.

Marine Emission from Fairway and Gold Coast Marina

3.5.4.32 The marine traffic activities within Ha Pang Fairway and its inshore traffic zones include the following types of vessels:

- OGVs comprising container vessel, bulk carrier, tanker and cruise liner;
- RTVs comprising container vessel, bulk carrier, tanker, local light/barge/cargo junk, local bunker vessel, and tug and tow;

- PRD ferries; and
- Local vessels

3.5.4.33 The marine traffic projection is provided by the Project Marine Traffic Consultant. As advised, there is a general growth in the marine traffic and hence Year 2048 marine traffic forecast for different types of the vessels has been adopted for conservative assessment. The marine traffic data for Year 2048 is presented in **Appendix 3.10a** to **g** and Marine Department's reply letter on the traffic data is given in **Appendix 3.9**.

3.5.4.34 For OGVs, RTVs and PRD ferries, the marine emissions have been estimated based on the engine powers (for OGVs and RTVs), load factors and emission factors, in accordance with the methodology in EPD's "Study on Marine Emission Inventory". Desktop studies on the engine powers for different PRD ferries have been conducted. The travelling speeds along the fairway are provided by the Project Marine Traffic Consultant and are in slow cruising mode and used for calculation of the Time-in-mode (TIM). Detailed calculation of the emissions and assumptions have been presented in **Appendix 3.10a** to **g** and the documents referred therein. The marine emissions from OGVs, RTVs and PRD ferries included in the near-field dispersion model have covered the whole grids of 27_38, 26_37, 27_37, 26_36, 27_36 and 28_36.

3.5.4.35 Based on the data provided by the Project Marine Traffic Consultant, the local vessels at Ha Pang Fairway and its inshore traffic zones contain the following vessel types:

- Local ferries;
- Fast launches including government vessels and pilot boats;
- Small crafts – pleasure vessels and fishing sampans; and
- Small crafts – tugboats and workboats.

3.5.4.36 Desktop research on the engine powers of the local ferries, pleasure vessels, fishing sampan, government vessels and pilot boats have been conducted to obtain the representative local specific data for emission calculation. For small craft – tugboats, they are those of small size and hence it is considered equivalent to those tugs of GRT 0-499 class, i.e. same as the average of Grade II tug boat of locally licensed vessel according to EPD's "Study on Marine Emission Inventory". The small craft – workboats are mainly cargo junk as advised by Project Marine Traffic Consultant and hence engine power has been made reference to that of EPD's "Study on Marine Emission Inventory".

3.5.4.37 For local ferries, small craft – tugboat and small craft – workboat, the emission factors have been made reference to those vessels of similar nature, type and scale in the EPD's "Study on Marine Emission Inventory". For those without relevant information in the EPD's "Study on Marine Emission Inventory" (i.e. local pleasure vessels, fishing sampan, government vessels and pilot boat), the emission factors have been made reference to the "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder (USEPA, 2008)". Tier 2 emission factors are adopted, which assume the average age of all vessels is more than 40 years old in Year 2048 for conservative assessment.

3.5.4.38 The travelling speeds for local vessels are provided by the Project Marine Traffic Consultant and used for calculation of the TIM. Detailed calculation of the emissions and assumptions for different types of local vessels at Ha Pang Fairway and its inshore traffic zones and Gold Coast Marina are presented in **Appendix 3.10d** to **h** and the documents referred therein. The emissions at Ha Pang Fairway and its inshore traffic zones included in the near-field dispersion model have covered the whole grids of 27_38, 26_37, 27_37, 26_36, 27_36 and 28_36; while those at Gold Coast Marina within 500m Assessment Area has been assessed in the near-field dispersion model and double-counted in the PATH model.

3.5.4.39 The marine emissions are modelled as point sources / horizontal point sources in AERMOD. A summary of AERMOD modelling parameters is given in **Table 3.20** above. Detailed modelling parameters could be referred to **Appendix 3.10a** to **h**.

Far-field Source Contribution (i.e. Future Background Air Quality)

3.5.4.40 PATH is a regional air quality model developed by EPD to simulate air quality over Hong Kong against the PRD as background. The latest PATH v2.1 model has been adopted for predicting the future background in this study.

3.5.4.41 Since the vehicular emission and marine emission within the concerned grids (i.e. Grid 22_40, 23_40, 24_40, 21_39, 22_39, 23_39, 24_39, 25_39, 25_38, 26_38, 27_38, 26_37, 27_37, 27_36 and 27_35 for vehicular emission and Grid 27_38, 26_37, 27_37, 26_36, 27_36 and 28_36 for marine emission) are modelled by the near-field dispersion models, PATH model has been rerun with the removal of these emissions from the respective grids to avoid the double counting in the cumulative assessment for So Kwun Wat, Siu Lam, Tai Lam, Tsing Lung Tau and North Lantau Areas.

3.5.4.42 It is anticipated that the emission control technology will be progressively improving in future years and hence the background concentrations shall be progressively reduced. In comparison of the PATH background pollutant concentrations between Years 2030 and 2035, the predicted concentrations are found higher in Year 2030. Therefore, the PATH model for Year 2030 has been rerun for conservative assessment for So Kwun Wat, Siu Lam, Tai Lam, Tsing Lung Tau and North Lantau Areas. **Appendix 3.11** shows the removal of the emission in the PATH re-run.

3.5.4.43 For Lam Tei area, the Year 2030 PATH background concentrations have been directly adopted for calculation of cumulative impacts and near-field impacts are double-counted for conservative assessment.

Cumulative Impacts

3.5.4.44 The cumulative air quality impact is a combination of the emission impacts contributed from the near-field and far-field sources on an hourly basis.

3.5.4.45 In consideration of the number of exceedance allowance of the hourly and daily AQOs, the pollutant concentrations beyond the AQOs allowance limits (i.e. the 19^{th} highest 1-hour NO_2 concentrations, the 10^{th} highest 24-hour RSP and 19^{th} highest 24-hour FSP concentrations) have been determined at each ASR. The annual predicted concentrations have also been assessed where applicable and all predicted levels are then compared with the respective AQOs.

3.5.4.46 For short term impact assessment, Ozone Limiting Method (OLM) is adopted for conversion of residual NO to NO_2, using the predicted O_3 levels from updated PATH model. In accordance with EPD's *"Guidelines on Choice of Models and Model Parameters"*, the initial NO_2:NO_x ratio for emissions from chimneys, industrial operation and marine emission are assumed to be 10%.

3.5.4.47 Whereas for long term impact assessment, OLM is also used for conversion of residual NO to NO_2, using the predicted O_3 levels from updated PATH model. However, the OLM method for prediction of long term impact is considered as conservative assessment. For critical ASRs, a more precise Jenkin's method is adopted. The annual NO_2 concentrations are estimated using project specific empirical relationship derived from the latest available monitoring results from EPD's General AQMSs (at Tap Mun, Yuen Long, North, Kwai Chung, Tsuen Wan, Tuen Mun, Tung Chung) and Roadside AQMSs (at Mong Kok and Central). The empirical relationship is described by a fitted curve of the selected annual NO_2 and NO_x monitoring data through the formula below[2, 3]:

$$[NO_2] = \frac{-Z \pm \sqrt{Z^2 - 4[NO_x][Ox]}}{2}$$

where $Z = ([NO_x] + [Ox] + {}^{J}/_{K})$

[NOx] = NO_x concentration
[NO_2] = NO_2 concentration
[Ox] = Sum of NO_2 and O_3 concentration
J = Photolysis rate of NO_2
K = Rate coefficient of the reaction between NO and O_3

3.5.4.48 It is found that the curve would fit the monitoring data when J/K is 17 and [O_x] is 98μg/m^3 without any underestimation (details refer to **Appendix 3.12**).

3.5.4.49 According to EPD's "Guidelines on Choice of Models and Model Parameters", PATH's output on RSP concentrations has also been adjusted as follows:

- 10th highest daily RSP concentration: add 11.0 μg/m^3;
- Annual RSP concentration: add 10.3 μg/m^3;
- 19th and 36th highest daily FSP concentration: Nil; and
- Annual FSP concentration: add 3.5 μg/m^3.

3.5.5 Prediction and Evaluation of Impacts

3.5.5.1 The predicted 19th highest 1-hour NO_2 concentrations, 10th highest 24-hour RSP concentrations, 19th highest 24-hour FSP concentrations and annual NO_2/RSP/ FSP concentrations are calculated and presented in **Appendix 3.13**, and summarised in **Table 3.21** to **Table 3.24** below.

3.5.5.2 In Lam Tei area (i.e. near the proposed Lam Tei Tunnel), higher pollutant concentrations are generally predicted at existing / planned ASRs (e.g. A036 Fuk

2 Jenkin M E, 2004a. Analysis of sources and partitioning of oxidant in the UK – Part 1: The NOx-dependence of annual mean concentrations of nitrogen dioxide and ozone. Atmospheric Environment, 38, 5117-5129.

3 Environment Agency UK 2007. Review of methods for NO to NO_2 conversion in plumes at short ranges (https://www.gov.uk/government/publications/review-of-methods-for-no-to-no2-conversion-in-plumes-at-short-ranges)

Hang Tsuen Road House 18 and P007b Proposed Public Housing at Nai Wai Block 6 and Podium, etc.) located adjacent to the major roads (including Kong Sham Western Highway and Fuk Hang Tsuen Road, etc.). Nonetheless, the predicted annual NO_2 concentrations (the most critical pollutant) range from 17μg/m^3 to 33μg/m^3, which are well within the respective AQO.

3.5.5.3 In So Kwun Wat, Siu Lam and Tai Lam areas (i.e. near the proposed So Kwun Wat Link Road, So Kwun Wat – Siu Lam Open Road Section, Tai Lam Chung River Viaduct, and Tai Lam Chung Tunnel (North Section)), higher pollutant concentrations are also predicted at existing ASRs (e.g. A226 Immigration Service Institute of Training and Development) located adjacent to the major roads (including Castle-Peak Road – Castle Peak Bay and Tuen Mun Road, etc.). The predicted annual NO_2 concentrations range from 18μg/m^3 to 34μg/m^3, which are also well within the respective AQO.

3.5.5.4 In Tsing Lung Tau area (i.e. near the proposed Tai Lam Chung Tunnel (South Section) and Tsing Lung Bridge), the highest annual NO_2 concentration (i.e. 39 μg/m^3) is predicted at ASR A514 Castle Peak Road Tsing Lung Tau House 131-133, which is still within the AQO. Nonetheless, the contribution due to road emission is low (about 2 μg/m^3) and the high annual NO_2 concentration is mainly contributed from the emission from the marine traffic activity at the Ha Pang Fairway and its inshore traffic zone (14 μg/m^3). The contribution breakdown is given in **Table 3.25** below.

3.5.5.5 ASRs in North Lantau area are far away from the proposed Tsing Lung Bridge, other roads and emission sources, the predicted pollutant concentrations are well within the respective AQOs. The predicted annual NO_2 concentrations range from 26μg/m^3 to 30μg/m^3.

3.5.5.6 All in all, it is concluded that the predicted cumulative 19th highest 1-hour NO_2 concentrations, 10th highest 24-hour RSP concentrations, 19th highest 24-hour FSP concentrations and annual NO_2/RSP/FSP concentrations at all identified representative ASRs are within the respective AQOs.

3.5.5.7 Based on the assessment results, the worst hit level is generally found at 1.5m. Hence, contour of 19th highest 1-hour NO_2 concentrations, 10th highest 24-hour RSP concentrations, 19th highest 24-hour FSP concentrations and annual NO_2/RSP/FSP concentrations at 1.5m are plotted (**Figures 3.6a to 3.11d**). Contour plots indicate that there is no exceedance at all air sensitive uses, except for the TMB highway / tunnel operation and maintenance facilities (i.e. the northern ventilation building, satellite building and operation area in Lam Tei) where exceedance of 19th highest 1-hour NO_2 concentrations and annual NO_2 concentrations is predicted.

3.5.5.8 The NO_2 exceedance zones identified in **Figure 3.6a** (19th highest 1-hour NO_2 concentrations) and **Figure 3.7a** (annual NO_2 concentrations) represents exceedance at 1.5mAG. As mentioned in above section, in Lam Tei area, the Year 2030 PATH background concentrations have been directly adopted for calculation of cumulative impacts and near-field impacts are double-counted. Hence, the concentration contours are indeed on conservative side. Based on the contour plots, the eastern part of the proposed Northern Ventilation Building, the whole satellite building and a tiny portion of the operation area would fall within the exceedance zone. The same exceedance zones are found in the EIA of TMB.

3.5.5.9 The Northern Ventilation Building is unmanned and hence is not considered as air sensitive use. The proposed operation area is largely outside the exceedance zone. As advised by TMB's Project Engineer, since the uses, layout and design of the operation area are not yet available at EIA stage, it is feasible that it could be planned and designed to avoid adverse air quality impacts. If there are planned air sensitive uses, the operation area will be properly designed such that any openings, openable windows, and/or FAIs will be located and avoided from the predicted exceedance zone at 1.5mAG (e.g. by provision of fixed glazed window or blank facades, and FAIs to be located away or proposed air sensitive uses outside the exceedance zone). Further review of the layout and design of operation area will be conducted in Detailed Design Stage to ensure compliance of the AQOs. For the proposed satellite building, air filtering system with at least 40% NO_2 removal efficiency [4] shall be installed in the TMB project in order to achieve AQO compliance. The air filtering system and NO_2 removal efficiency will be further reviewed in Detailed Design Stage of TMB to ensure that the air quality impacts at all sensitive uses at the TMB highway / tunnel operation and maintenance facilities could comply within the AQOs. With proper design and implementation of necessary mitigation measures at TMB's highway / tunnel operation and maintenance facilities, adverse air quality impacts are therefore not anticipated during operational phase of the Project.

3.5.5.10 It should also be noted that the prediction is generally based on conservative assumptions. In particular, the assessment has not taken into account the use of electric vehicles. To further improve the air quality, the Government had released Hong Kong's first Roadmap on Popularisation of Electric Vehicles and the Clean Air Plan for Hong Kong 2035 in March and June 2021 respectively. It sets a target to stop new registration of fuel-propelled and hybrid Private Cars in 2035 or earlier. The Government has been also proactively encouraging the use of electric commercial vehicles by promoting trials for electric public transport as well as offering first registration tax concessions and a New Energy Transport Fund. With popularisation of electric vehicles, it is reasonably anticipated that the use of electric vehicles would become more common and vehicular emission impacts shall be progressively improving in long run.

Table 3.21 Cumulative NO_2, RSP and FSP Concentrations in Lam Tei Area

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
Existing ASRs							
A001	Wo Ping San Tsuen House 198	106	23	71	27	38	16
A002	Wo Ping San Tsuen Village House	105 to 106	23 to 24	71	27	38	16
A003	Wo Ping San Tsuen Village House	101 to 102	22 to 23	71	27	38	15 to 16
A004	Wo Ping San Tsuen House 145	101	22 to 23	71	27	38	15
A008	Tsoi Yuen Tsuen House 283	97 to 100	22 to 23	69	27	37	15

[4] As advised by TMB's Project Engineer, the removal efficiency of 40% is deduced from modelling results of the worst concentrations of these areas at various heights in both long term and short term NO_2.

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
Criteria		**200**	**40**	**100**	**50**	**50**	**25**
A009	Tsoi Yuen Tsuen House 282	96 to 97	22	69	27	37	15
A010	Tsoi Yuen Tsuen House 74	97 to 98	22 to 23	69	27	37	15
A011	Fuk Hang Tsuen House 152	100 to 101	23 to 24	69	27	37	15
A012	Tsoi Yuen Tsuen Village House	100 to 102	23 to 24	69	27	37	15
A013	Tsoi Yuen Tsuen House 159	99 to 101	22 to 23	69	27	37	15
A014	Tsoi Yuen Tsuen Village House	99	22 to 23	69	27	37	15
A015	Tsoi Yuen Tsuen House 166	105	25	71	27 to 28	38	16
A016	Tsoi Yuen Tsuen House 189	104 to 105	24 to 25	71	27	38	16
A017	Tsoi Yuen Tsuen Village House	103 to 104	25	71	27	38	16
A020	Nai Wai House 332	101	23 to 24	71	27	38	16
A021	Nai Wai Village House	101	24	71	27	37	16
A022	Nai Wai House 248	100 to 101	24	71	27	37	16
A023	Nai Wai Village House	102 to 106	24 to 26	71	27 to 28	37	16
A024	Yorks Field Garden	94 to 97	20 to 22	71	27	38	15
A025	Tsoi Yuen Tsuen House 211A	97 to 98	22	71	27	37	16
A026	Nai Wai Temple	96	21	73	27	38	16
A027	Nai Wai House 158	97	22	71	27	37	16
A028	Belrose Place Block A	100 to 109	22 to 24	73	27	38	16
A029	Tsing Yick Road Village House	97 to 100	23 to 24	73	27	38	16
A030	Tsing Yick Road Village House	99 to 100	23 to 24	73	27	38	16
A031	Lam Tei Pet Garden	111	NA	72	NA	38	NA
A032	Fuk Hang Playground Basketball Court	107	NA	72	NA	38	NA
A033	Fuk Hang Tsuen Road House 2	103 to 108	25 to 27	72	28	38	16
A034	Fuk Hang Tsuen Road House 11	105 to 113	26 to 32	72	28	38	16
A035	Fuk Hang Tsuen Road Garden	121	NA	72	NA	38	NA
A036	Fuk Hang Tsuen Road House 18	105 to 121	27 to 33	72	28	38	16
A037	Fortress Garden Block 8	100 to 101	23 to 24	71 to 72	27	38	16
A038	Tuen Tsz Wai Village House	101 to 102	23 to 24	72	27	38	16
A039	Tuen Tsz Wai House 565	102 to 104	23 to 24	71 to 72	27	38	16
A040	Farmer Restaurant	102 to 108	22 to 25	71 to 72	27 to 28	37 to 38	16
A041	Miu Fat Buddhist Monastery Ksitigarbha Hall	102	24	72	27	38	16
A042	Miu Fat Buddhist Monastery	93 to 101	21 to 24	71	27	37 to 38	15 to 16
A043	Madam Lau Kam Lung Secondary School of Miu Fat Buddhist Monastery	98 to 102	22 to 24	71 to 72	27	38	16
A044	Miu Fat Buddhist Monastery Elderly Home	99 to 101	22 to 23	71	27	38	16
A045	Temple at Lam Tei	101	23	71	27	38	16
A046	Lam Tei House 20	101	23	71	27	38	16
A047	The Sherwood Block 1	94 to 107	21 to 27	71 to 72	27 to 28	37 to 38	15 to 16
A048	The Sherwood Block 2	93 to 107	21 to 27	71 to 72	27 to 28	37 to 38	15 to 16
A049	The Sherwood Block 3	94 to 111	21 to 26	71 to 72	27 to 28	37 to 38	15 to 16
A050	The Sherwood Block 4	95 to 106	21 to 25	71 to 72	27 to 28	37 to 38	15 to 16
A051	The Sherwood Block 5	95 to 103	21 to 25	71 to 72	27	37 to 38	15 to 16
A052	The Sherwood Podium	108 to 111	28 to 30	72	28	38	16
A053	The Sherwood Block 13	94 to 110	21 to 28	71 to 72	27 to 28	37 to 38	15 to 16

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A054	The Sherwood Block 12	95 to 109	21 to 27	71 to 72	27 to 28	37 to 38	15 to 16
A055	The Sherwood Block 11	95 to 109	21 to 27	71 to 72	27	37 to 38	15 to 16
A056	The Sherwood Block 10	95 to 107	21 to 26	71 to 72	27	37 to 38	15 to 16
A057	The Sherwood Block 9	95 to 106	21 to 26	71 to 72	27	37 to 38	15 to 16
A058	Lam Tei Main Street House 88	101	23	71	27	37 to 38	16
A059	Tuen Mun San Tsuen House 110	100 to 101	23	71	27	37	16
A060	Store at Lam Tei Main Street House 128	101 to 108	23 to 27	71 to 72	27	38	16
A061	Botania Villa Block 1	95 to 106	21 to 25	71 to 72	27	37 to 38	15 to 16
A062	Botania Villa Podium	104 to 105	25 to 26	72	27	38	16
A063	Botania Villa Block 10	95 to 104	21 to 25	71 to 72	27	37 to 38	15 to 16
A064	GreenView Podium	104 to 110	24 to 27	71 to 72	27	38	16
A065	GreenView	94 to 108	21 to 26	71 to 72	27	37 to 38	15 to 16
A066	Botania Villa Block 9	94 to 105	21 to 25	71 to 72	27	37 to 38	15 to 16
A067	Fuk Hang Tsuen House 12	105	25	72	27 to 28	38	16
A068	The Church of Christian Faith Lam Tei Gospel Church	103	24	72	27	38	16
A069	Property Agency at Fuk Hang Tsuen Road	103	27	72	27	38	16
A070	Fuk Hang Tsuen House 25	107 to 108	25	72	28	38	16
A071	Fuk Hang Tsuen House 458	107 to 108	26	72	28	38	16
A072	Fuk Hang Tsuen Village House	103 to 104	22 to 23	69	27	37	15
A073	Fuk Hang Tsuen Village House	103 to 105	23	69	27	37	15
A074	Fuk Hang Tsuen Village House	110 to 111	27	72	28	38	16
A075	Fuk Hang Tsuen Village House	108 to 111	27 to 28	72	28	38	16
A076	Fuk Hang Tsuen Houses 59 - 61	108	26 to 27	72	28	38	16
A077	Church of Christian Faith Lam Tei Gospel Church	107	25 to 26	72	28	38	16
A078	Fuk Hang Tsuen Village House	105	25 to 26	72	27 to 28	38	16
A079	Tin Hau Temple at Fuk Hang Tsuen Road	108	26	72	28	38	16
A080	Tuen Mun Heung Fuk Hang Tsuen Village Office	105 to 109	25 to 26	72	28	38	16
A081	Lam Tei Fa Pao Association	107	25	72	27	38	16
A082	Fuk Hang Tsuen House 130	105 to 106	25 to 26	72	28	38	16
A083	Fuk Hang Tsuen Village House	105	25	72	27 to 28	38	16
A084	Fuk Hang Tsuen Village House	104	24	72	27	38	16
A085	To Yuen Wai House 160	103 to 104	24 to 25	72	27 to 28	38	16
A087	Tan Kwai Tsuen Village House	94	18	69	27	37	15
A088	Tung Fuk Road Village House	97 to 98	18 to 19	69	27	37	15
A089	Tung Fuk Road Village House	94 to 97	18	69	27	37	15
A090	Tung Fuk Road Village House	99	19	69	27	37	15
A091	Tung Fuk Road Village House	101	20	69	27	37	15
A092	Tung Fuk Road Village House	102 to 104	20	69	27	37	15
A093	Tung Fuk Road Village House	103 to 107	20	69	27	37	15
A094	Fuk Hang Tsuen House 178	99 to 100	19	69	27	37	15
A095	Fuk Hang Tsuen Village House	101 to 102	19 to 20	69	27	37	15
A096	Fuk Hang Tsuen Village House	96 to 98	18	69	27	37	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A097	Tin Hau Temple at Fuk Hang Tsuen Path	97	18	69	27	37	15
A098	Fuk Hang Tsuen Village House	96	18	69	27	37	15
A099	Fuk Hang Tsuen Village House	101 to 103	20	69	27	37	15
A100	Chui Fuk Road Village House	104 to 105	21 to 22	69	27	37	15
A101	Chui Fuk Road Village House	104	21 to 22	69	27	37	15
A102	Chui Fuk Road Village House	104 to 105	22	69	27	37	15
A103	Fu Fuk Road Village House	102 to 103	21	69	27	37	15
A104	Fu Tei Ha Tsuen Village House	110 to 111	24	71	27	38	16
A105	Fu Tei Ha Tsuen Village House	109 to 111	24 to 25	71 to 72	27	37 to 38	16
A106	Fu Tei Ha Tsuen Village House	110	24	71	27	37	16
A107	Fu Tei Ha Tsuen Village House	105	23	71	27	37	16
A108	Fu Tei Ha Tsuen Village House	104 to 105	23 to 24	71	27	37	16
A110	Fu Tei Ha Tsuen Village House	103	21	69	27	37	15
A111	Sin Fat Hang Yuen Temple	103	20	69	27	37	15
A112	Nam On Buddhist Monastery	103	20	69	27	37	15
A113	Fu Tei Ha Tsuen Village House	100	20	69	27	36	15
A114	Fu Tei Ha Tsuen Village House	101	20	69	27	36	15
A115	Fu Tei Ha Tsuen Village House	100	20	69	27	36	15
A116	Fu Tai Estate - Ning Tai House	91 to 100	18 to 20	69	27	36	15
A117	Fu Tai Estate - Yat Tai House	91 to 100	18 to 20	69	27	36	15
Planned ASRs							
P001	Proposed Public Housing at Ping Shan South and Podium with potential non-domestic facilities	89 to 95	17 to 20	71	27	37 to 38	15
P002a	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	90 to 100	17 to 22	69	27	37	15
P002b	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	90 to 97	17 to 22	69	27	37	15
P002c	Podium with potential non-domestic facilities for Proposed Public Housing at Lam Tei North	97 to 100	21 to 22	69	27	37	15
P003a	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	90 to 95	17 to 20	69	27	37	15
P003b	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	90 to 95	17 to 20	69	27	37	15
P003c	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	90 to 94	17 to 20	69	27	37	15
P004a	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	90 to 95	17 to 21	69	27	37	15
P004b	Proposed Public Housing at Lam Tei North and Podium with potential non-domestic facilities	90 to 95	17 to 21	69	27	37	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
P005a	Proposed Public Housing at Lam Tei North	90 to 101	17 to 23	69	27	37	15
P005b	Proposed Public Housing at Lam Tei North	90 to 100	17 to 23	69	27	37	15
P006	Proposed Temporary Place of Recreation, Sports or Culture (Indoor Recreation Centre)	97	22	69	27	37	15
P007a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 105	19 to 24	71	27	37 to 38	15 to 16
P007b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 124	19 to 30	71 to 72	27 to 28	37 to 38	15 to 16
P008a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 105	19 to 26	71 to 72	27 to 28	37 to 38	15 to 16
P008b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 115	19 to 29	71 to 72	27 to 28	37 to 38	15 to 16
P008c	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 104	19 to 25	71 to 72	27 to 28	37 to 38	15 to 16
P008d	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 105	19 to 26	71 to 72	27 to 28	37 to 38	15 to 16
P009a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 106	19 to 26	71 to 72	27 to 28	37 to 38	15 to 16
P009b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 102	19 to 24	71	27	37 to 38	15 to 16
P010	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 101	19 to 24	71	27	37 to 38	15 to 16
P011	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 103	19 to 25	71 to 72	27 to 28	37 to 38	15 to 16
P012a	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 107	19 to 26	71 to 72	27 to 28	37 to 38	15 to 16
P012b	Proposed Public Housing at Nai Wai and Podium with potential non-domestic facilities	91 to 105	19 to 26	71	27 to 28	37 to 38	15 to 16
P013a	Planned Public Housing in Hung Shui Kiu/Ha Tsuen New Development Area and Podium with retail use	93 to 100	18 to 25	73	27	38	16
P014	Proposed Development of Elderly Home by Pok Oi Hospital	92 to 106	20 to 28	71 to 72	27 to 28	37 to 38	15 to 16
P015	Proposed Development of Elderly Home by Pok Oi Hospital	92 to 105	20 to 26	71 to 72	27 to 28	37 to 38	15 to 16

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
Criteria		**200**	**40**	**100**	**50**	**50**	**25**
P016	Proposed Development of Elderly Home by Pok Oi Hospital	92 to 104	20 to 25	71 to 72	27	37 to 38	15 to 16
P017	Proposed Comprehensive Development Area in Lot 2883 in D.D. 130	102 to 105	23 to 24	71	27	38	16
P018	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	95 to 109	21 to 27	71 to 72	27	37 to 38	15 to 16
P019	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	97 to 111	21 to 27	71 to 72	27 to 28	37 to 38	15 to 16
P020	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	98 to 107	21 to 26	71 to 72	27 to 28	37 to 38	15 to 16
P021	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	97 to 114	21 to 29	71 to 72	27 to 28	37 to 38	15 to 16
P022	Proposed Comprehensive Development in D.D. 130 and Adjoining Government Land	97 to 113	21 to 30	71 to 72	27 to 28	37 to 38	15 to 16
P025	Temporary Place of Recreation, Sports or Culture (Sports Training Ground)	104 to 111	20 to 21	69	27	37	15

Note:
[1] NA indicates the AQO is not applicable for those ASRs (e.g. park, garden, outdoor play/recreational area, sitting areas, etc.) since people inside these premises would not stay for long duration and subject to long-term impacts.

Table 3.22 Cumulative NO_2, RSP and FSP Concentrations in So Kwun Wat, Siu Lam and Tai Lam Areas

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
Criteria		**200**	**40**	**100**	**50**	**50**	**25**
Existing ASRs							
A201	So Kwun Wat Tsuen Village House	91 to 92	18 to 19	67	27	38	15
A202	So Kwun Wat Tsuen Village House	93	20	67	27	38	15
A203	So Kwun Wat Tsuen Village House	101 to 102	24	68	27	38	15
A204	So Kwun Wat Tsuen House 501	101 to 102	24 to 25	68	27	38	15
A205	Harrow International School Hong Kong	99 to 102	23 to 25	68	27	38	15
A206	The Highland H21	99 to 100	23 to 24	68	27	38	15
A207	The Highland H7	90 to 92	22 to 23	69	27	39	15
A208	Harrow International School Basketball Court	101 to 102	24	68	27	38	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A209	Harrow International School Hong Kong Main Building	100 to 104	23 to 26	68	27	38	15 to 16
A210	The Terrace H10	104 to 107	27 to 28	68	28	39	15 to 16
A211	The Terrace Tower 7	103 to 105	26 to 28	68	28	39	15 to 16
A212	The Terrace Balcony Garden	106 to 107	NA	68	NA	39	NA
A213	The Terrace H3	104 to 107	27 to 28	68	28	39	15 to 16
A214	The Terrace Tower 9	103 to 105	26 to 28	68	28	39	15 to 16
A215	The Terrace H2	104 to 105	27 to 28	68	28	39	15 to 16
A216	The Laguna Tower 12	103 to 107	26 to 29	68	28	39	15 to 16
A217	The Laguna Podium	107	29	68	28	39	16
A218	The Laguna Tower 1	102 to 107	25 to 29	68	28	39	15 to 16
A219	The Laguna Tower 1	102 to 108	25 to 29	68	28	39	15 to 16
A220	Tuen Mun Court	89 to 99	20 to 24	69	27	38 to 39	15 to 16
A221	Seaview Garden Block 5	89 to 98	20 to 24	69	27	38 to 39	15
A222	Village House near Tsing Yung Street	107 to 109	29 to 30	68	28	39	16
A223	Castle Peak Bay Immigration Centre	104 to 110	27 to 30	68	28	39	15 to 16
A224	Castle Peak Road - Castle Peak Bay House 85	106 to 111	28 to 30	68	28	39	16
A225	Chu Hai College of Higher Education	104 to 110	26 to 30	68	28	39	15 to 16
A226	Immigration Service Institute of Training and Development	103 to 121	26 to 34	68	28	39	15 to 16
A227	Chu Hai College of Higher Education Student's Dormitory	106 to 113	27 to 30	68	28	39 to 40	16
A228	Cafeteria Old Beach Sitting-out Area	109	NA	68	NA	39	NA
A229	Villa La Plage House 26	107 to 112	28 to 30	68	28	39	16
A230	Mun Fat Lane House 3	108	28 to 29	68	28	39 to 40	16
A231	Villa La Plage House 15	108 to 115	28 to 32	68	28	39 to 40	16
A232	Mun Fat Lane House 2	106 to 109	28 to 31	68	28	39	16
A233	Villa La Plage House 2	108 to 126	27 to 32	68	28	39 to 40	16
A234	Blessing Villa Block A	112 to 121	28 to 31	68	28	39 to 40	16
A235	Mun Fat Lane House 6	107 to 108	28 to 30	68	28	39	16
A236	Golden Beach Children Play Area	107	NA	68	NA	39	NA
A237	Spring Seaview Terrace Block A	104 to 116	26 to 30	68	28	39 to 40	15 to 16
A238	Spring Seaview Terrace Podium	107 to 119	28 to 31	68	28	39 to 40	16
A239	Palm Beach Podium	107 to 109	29 to 30	68	28	39	16
A240	Palm Beach Block 2	102 to 110	26 to 31	68	28	39	15 to 16
A241	Monte Carlo Villas Block A6	106 to 113	28 to 30	68	28	39	16
A242	Monte Carlo Villas Block A1	106 to 113	28 to 30	68	28	39	16
A243	Hong Kong Gold Coast Block 1	99 to 111	22 to 27	68 to 69	27	38 to 39	15 to 16
A244	Hong Kong Gold Coast Block 2	99 to 110	22 to 27	68 to 69	27	38 to 39	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A245	Hong Kong Gold Coast Block 3	99 to 108	22 to 26	68 to 69	27	38	15
A246	Hong Kong Gold Coast Block 4	99 to 108	22 to 27	68 to 69	27	38	15
A247	Tin Hau Temple at Gold Coast	104 to 109	25 to 29	69	27	38 to 39	15 to 16
A248	Skypoint Royale Tower 7	98 to 104	22 to 26	68 to 69	27	38 to 39	15 to 16
A249	Skypoint Royale Tower 6	98 to 104	22 to 26	68 to 69	27	38 to 39	15 to 16
A250	Seacoast Royale Tower 5	98 to 104	22 to 25	68 to 69	27	38	15
A254	So Kwun Wat Tsuen House 520	103 to 104	25	69	27	38	15
A255	So Kwun Wat Tsuen House 510	103 to 104	25 to 26	69	27	38 to 39	15 to 16
A256	So Kwun Wat Tsuen Village House	102 to 105	25 to 26	68 to 69	27	38	15 to 16
A257	So Kwun Wat Tsuen Village House	104 to 105	26	69	27	38 to 39	15 to 16
A258	PLK Women's Welfare Club Western District Fung Lee Pui Yiu Primary School	103 to 105	25 to 26	68 to 69	27	38	15 to 16
A259	S.T.F.A. Lee Kam Primary School	101 to 107	24 to 27	68 to 69	27 to 28	38 to 39	15 to 16
A260	S.T.F.A. Lee Kam Primary School Playground	107	28	69	28	39	16
A261	Aegean Coast Tower 8	97 to 104	22 to 25	68 to 69	27	38	15
A262	Aegean Coast Shopping Arcade	104 to 105	25 to 26	68 to 69	27	38	15
A263	Aegean Coast Tower 5	97 to 104	22 to 25	68	27	38	15
A264	Aegean Coast Club House	104	25	68 to 69	27	38	15
A265	Aegean Coast Tower 1	97 to 104	22 to 26	68	27	38	15
A266	Aegean Coast Tennis Court	106	NA	69	NA	38	NA
A267	Property Agency at So Kwun Wat Road	104	25	69	27	39	16
A268	So Kwun Wat Tsuen Village House	104 to 105	25 to 26	69	27	39	16
A269	So Kwun Wat Tsuen Village House	103 to 104	25 to 26	69	27	38 to 39	16
A270	Village House near Nim Wan	101 to 103	24 to 25	68	27	38	15
A272	So Kwun Wat Tsuen Village House	100 to 101	23 to 24	68	27	38	15
A273	So Kwun Wat Tsuen House 410	101 to 102	25	68	27	38	15
A274	So Kwun Wat Tsuen Village House	99 to 100	24	68	27	38	15
A275	So Kwun Wat Tsuen Village House	90	19	67	27	38	15
A276	Lo Tsing Shan Tsuen Village House	89	19	67	27	38	15
A277	Lo Tsing Shan Tsuen Village House	89	19	67	27	38	15
A278	Lo Tsing Shan Tsuen Village House	100	24	68	27	38	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A279a	Avignon Tower 11	100 to 103	23 to 25	68	27	38	15
A279b	Avignon Tower 11	100 to 103	23 to 25	68	27	38	15
A280	Avignon Club House	102	24	68	27	38	15
A281	Avignon Tower 10	100 to 103	23 to 25	68	27	38	15
A282	Avignon Tower 9	100 to 102	23 to 25	68	27	38	15
A283	So Kwun Wat Tsuen Village House	101 to 102	24 to 25	68	27	38	15
A284	So Kwun Wat Tsuen Village House	101 to 102	24 to 25	68	27	38	15
A285	So Kwun Wat Tsuen Village House	100 to 101	24	68	27	38	15
A286	Siu Sau Village House 15B	99 to 100	23 to 24	68	27	38	15
A287	Emerald Bay Phase 1 Tower 1	98 to 102	22 to 24	68	27	38	15
A288	Avignon House 1	101 to 102	23 to 24	68	27	38	15
A289	Avignon Sitting-out Area	105	NA	68	NA	41	NA
A290	Avignon Tower 5	101 to 105	23 to 25	68	27 to 28	41	15
A291	Avignon Tower 5	101 to 108	23 to 26	68 to 69	27 to 28	41	15 to 16
A292	Avignon Tower 3	101 to 110	23 to 27	68 to 69	27 to 28	41	15 to 16
A293	Avignon Tower 2	101 to 109	23 to 27	68 to 69	27 to 28	41	15 to 16
A294	Avignon Tower 1	101 to 108	23 to 26	68 to 69	27 to 28	41	15 to 16
A295	NAPA Tower 3	100 to 107	23 to 26	68	27 to 28	41	15 to 16
A296	A.D. & F.D. of Pok Oi Hospital Mrs Cheng Yam On Millennium School Basketball Court	105	25	68	28	41	15
A297	A.D. & F.D. of Pok Oi Hospital Mrs Cheng Yam On Millennium School	100 to 103	23 to 24	68	27	41	15
A298	York International Pre-School	105	25	68	28	41	15
A299	OMA OMA Podium	102 to 110	23 to 28	68 to 69	27 to 28	41	15 to 16
A300	OMA OMA Tower 1	99 to 105	22 to 25	68	27 to 28	41	15
A301	Lepont Tower 1B	99 to 103	22 to 23	68	27	41	15
A302	Lepont House 18	102 to 103	23 to 25	68	27 to 28	41	15
A303	So Kwun Wat Tsuen Village House	103	24	68	28	41	15
A304	So Kwun Wat Tsuen Village House	103 to 104	24 to 25	68	28	41	15
A305	So Kwun Wat Tusen Village House 251	105 to 109	25 to 26	68	28	41	15 to 16
A306	So Kwun Wat Tsuen Village House	105 to 107	25 to 26	68	28	41	15 to 16
A307	So Kwun Wat Tsuen Village House 220	103	24	68	27	41	15
A308	So Kwun Wat Tsuen Village House	102	23	68	27	41	15
A309	Tin Hau Temple at So Kwun Wat Tsuen	103	23	68	28	41	15
A310	So Kwun Wat Tsuen Area 2 House 160A	93	19	67	26	38	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A311	So Kwun Wat San Tsuen House 45	106	23	67	27	40	15
A312	So Kwun Wat San Tsuen House 16	106	23	67	27	40	15
A313	So Kwun Wat San Tsuen House 25	105	23	67	27	40	15
A314	So Kwun Wat San Tsuen House 26	104	23	67	27	40	15
A315	So Kwun Wat Sun Tsuen House 31	102	22	68	27	39	15
A316	So Kwun Wat Tsuen Village House	103 to 105	22	67	27	39	15
A317	So Kwun Wat Sun Tsuen Village House	103	23	68	28	39	16
A318	So Kwun Wat Team-building Centre	104	23	68	28	39	16
A401	1001 Grandview Terrace	99	23	68	27	41	15
A402	Siu Lam Village House	102	23	68	27	41	15
A403	Siu Lam Village House	103	22	67	27	39	15
A404	Grand Pacific Heights Block 6	96 to 103	21 to 22	67	27	39	15
A405	Siu Lam Village House	103	22	67	27	39	15
A406	Treatment Centre - Glorious Praise Fellowship (Hong Kong)	102	22	67	27	39	15
A407	Treatment Centre - Glorious Praise Fellowship (Hong Kong)	102	22	67	27	39	15
A408	Siu Lam Village House	103	22	67	27	39	15
A409	Siu Lam Tsuen House	103 to 104	23	67	27	40	15
A410	Siu Lam Village House	104	23	67	27	40	15
A411	Hong Kong Christian Prayer Fellowship Ltd.	102	22	67	27	39	15
A412	Grand Pacific Heights Block 10	96 to 103	21 to 22	67	27	39	15
A413	Grand Pacific Heights Block 1	102 to 107	25 to 26	67	27	39	15
A414	Siu Lam Village House	103	23	67	27	39	15
A415	Siu Lam Village House	104	23 to 24	67	27	39	15
A416	Siu Lam Village House	106	24	67	27	40	15
A417	Siu Lam Village House	105	23	67	27	39	15
A418	Siu Lam Village House	104	23	67	27	39	15
A419	Siu Lam Village House	104 to 105	23	67	27	39	15
A420a	Siu Lam Village House	103 to 104	23	67	27	39	15
A421	Correctional Services Department Siu Lam Psychiatric Centre Senior Officers' Married Quarters House 3	106 to 107	26	67	27	39	15
A422	Correctional Services Department Officers' Married Quarters Siu Lam Psychiatric Centre Block B	103	25 to 26	67	27	39	15
A423	Correctional Services Department Officers' Married	103	26	67	27	39	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
Criteria		**200**	**40**	**100**	**50**	**50**	**25**
	Quarters Siu Lam Psychiatric Centre Block A						
A424	Siu Lam Psychiatric Centre	104	26	67	27	39	15
A425	Tai Lam Correctional Institution	107	25	68	28	40	16
A426	Tai Lam Staff Mess	104	23	67	28	39	15
A427	Tai Lam Correctional Institution Junior Staff Married Quarters Block E	105	23	67	28	40	15
A428	Tai Lam Dental Clinic	107	25	68	28	40	16
A429	Tai Lam Correctional Institution Staff Quarters	106	24	67	28	40	16
A430	Tai Lam Correctional Institution	104	22	67	28	39	15
A431	Tai Lam Centre for Women	102 to 103	22	67	28	39	15
A432	Luen On San Tsuen House 73	108 to 109	25	68	28	40	15
A433	Luen On San Tsuen House 74	108 to 109	25	68	28	40	15
A434	Luen On San Tsuen House 78	109 to 110	25	68	28	40	15
A435	Luen On San Tsuen House 80	109	25	68	28	40	15
A436	Luen On San Tsuen House 112	109	26	68	28	40	15
A437	Luen On San Tsuen House 105	109	25	68	28	40	15
A438	Tai Lam Chung Tsuen House 156	109	25 to 26	68	28	40	15
A439	Tai Lam Chung Tsuen Houses 1-2	109	26	68	28	40	15
A440	Tai Lam Chung Tsuen House 19	109	26	68	28	40	15
A441	Tai Lam Chung Tsuen House 28B	109	25	68	28	40	15
A442	Tai Lam Chung Tsuen House 90	109	25	68	28	40	15
A443	Tai Lam Chung Tsuen House 96	109	25	68	28	40	15
A444	Tai Lam Chung Tsuen House 106	109	25	68	28	40	15
A445	Luen On San Tsuen Basketball Court	109	NA	68	NA	40	NA
A446	Luen On Shan Tsuen Village House	109 to 110	25	68	28	40	15
A447	Luen On Shan Tsuen Village House	109	25 to 26	68	28	40	15
A448	Luen On San Tsuen House 62	109	25 to 26	68	28	40	15
A449	Luen On San Tsuen Village Office	108	27	67	27	40	15
A450	Tai Lam Chung Tsuen House 206	109 to 110	25	68	28	40	15
A451	Tai Lam Charcoal Barbecue	109	26	68	28	40	15
A452	Tai Lam Chung Tsuen House 261	109	26	68	28	40	15
A453	Wai Lan Rehabilitation Centre	109	26	68	28	40	15

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A454	Hong Kong Customs College Trainee Dormitory I	109	25 to 26	68	28	40	15
A455	Hong Kong Customs College Football Field	109	26	68	28	40	15
A456	Hong Kong Customs College Football Field	109	27	67	27	39	15
Planned/Committed ASRs							
P201	Planned Residential Development at TMTL 520	99 to 105	22 to 24	68	27 to 28	41	15
P202	Planned Residential Development at TMTL 520	99 to 103	22 to 24	68	27 to 28	41	15
P203a	Proposed Comprehensive Residential Development in TMTL 496	98 to 104	23 to 25	68	27	38	15
P203b	Proposed Comprehensive Residential Development in TMTL 496	98 to 105	23 to 26	68	27	38	15
P204	Proposed Comprehensive Residential Development in TMTL 496, Clubhouse	102 to 103	25	68	27	38	15
P205a	Proposed Comprehensive Residential Development in TMTL 496	98 to 104	22 to 25	68	27	38	15
P205b	Proposed Comprehensive Residential Development in TMTL 496	98 to 103	22 to 26	68	27	38	15
P206	Proposed Elderly Centre	101 to 105	24 to 27	68 to 69	27 to 28	38 to 39	15 to 16
P207	Proposed Residential Development at Various Lots in D.D.374, Lawn Activity Area with Seating	107	NA	69	NA	39	NA
P208	Proposed Residential Development at Various Lots in D.D.374, Tower 8	98 to 106	22 to 27	68 to 69	27	38 to 39	15 to 16
P209	Proposed Residential Development at Various Lots in D.D.374, Tower 7	98 to 105	22 to 26	68 to 69	27	38 to 39	15 to 16
P210	Proposed Residential Development at Various Lots in D.D.374, Lawn Activity Area with Seating	105	NA	69	NA	39	NA
P211	Proposed Residential Development at Various Lots in D.D.374, Tower 1	98 to 104	22 to 26	68 to 69	27	38 to 39	15 to 16
P212	Proposed Residential Development at Various Lots in D.D.374, Tower 2	98 to 104	22 to 26	68 to 69	27	38 to 39	15 to 16
P213	Planned Development at TMTL 546	97 to 104	22 to 25	68 to 69	27	38 to 39	15 to 16
P214	Planned Development at TMTL 546	97 to 103	22 to 25	68 to 69	27	38	15

ASR ID	Location	Range of Pollutant Concentration (μg/m³) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
P215	Planned Development at TMTL 546	97 to 103	22 to 25	68 to 69	27	38	15
P216	Proposed Comprehensive Residential Development at TMTL 518	99 to 104	22 to 27	68 to 69	27	38 to 39	15 to 16
P217	Proposed Comprehensive Residential Development at TMTL 518	101 to 107	25 to 30	68	27 to 28	39	15 to 16
P218	Proposed Comprehensive Residential Development at TMTL 518	102 to 108	26 to 30	68	28	39 to 40	15 to 16
P219	Proposed Comprehensive Residential Development at TMTL 518	101 to 109	25 to 30	68	27 to 28	39 to 40	15 to 16
P220	Proposed Comprehensive Residential Development at TMTL 518	102 to 108	26 to 30	68	28	39 to 40	15 to 16
P251	Planned Development at TMTL 546	97 to 104	22 to 25	68 to 69	27	38 to 39	15 to 16
P252	Planned Development at TMTL 546	97 to 103	22 to 25	68 to 69	27	38	15
P253	Planned Development at TMTL 546	97 to 104	22 to 26	68 to 69	27	38 to 39	15 to 16
P401	Proposed Residential Development in TMTL 417	107 to 109	24 to 26	68	28	40	15
P402	Proposed Residential Development in TMTL 417	107 to 110	24 to 26	68	28	40	15
P403	Proposed Residential Development in TMTL 417	107 to 110	24 to 26	68	28	40	15
P404	Proposed Residential Development in TMTL 417	107 to 109	24 to 26	68	28	40	15
P406	The Siu Lam Integrated Rehabilitation Services Complex	103 to 105	25 to 26	67	27	39	15

Note:
[1] NA indicates the AQO is not applicable for those ASRs (e.g. park, garden, outdoor play/recreational area, sitting areas, etc.) since people inside these premises would not stay for long duration and subject to long-term impacts.

Table 3.23 Cumulative NO_2, RSP and FSP concentrations in Tsing Lung Tau Area

ASR ID	Location	Range of Pollutant Concentration (μg/m³) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
Existing ASRs							
A501	Ka Loon Tsuen House 5	116 to 118	34 to 35	67	28	36	16
A502	Ka Loon Tsuen Village House	118	35 to 36	67	28	36	16
A503	Ka Loon Tsuen House 6	119	37	67	28	36	16
A504	Ka Loon Tsuen House 8	118	36	67	28	36	16

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
	Criteria	**200**	**40**	**100**	**50**	**50**	**25**
A505	Ka Loon Tsuen House 18	114 to 115	33 to 34	67	28	36	16
A506	Ka Loon Tsuen House 17	115	32 to 33	67	28	36	16
A507	Ka Loon Tsuen House 20	115	32	67	28	36	16
A508	Ka Loon Tsuen Village House	115	32	67	28	36	16
A509	Ka Loon Tsuen House 21	116	32 to 33	67	28	36	16
A510	Vistacove 19	115 to 117	33 to 34	66 to 67	28	36	16
A511	Vistacove 5	116 to 117	34 to 35	67	28	36	16
A512	Vistacove 10	117	34	67	28	36	16
A513	Vistacove 1	117	34 to 35	67	28	36	16
A514	Castle Peak Road Tsing Lung Tau Houses 131-133	118 to 122	33 to 39	67	28	36	16
A515	Choi Yuen Tsuen Village House	107	25 to 26	69	28	40	16
A516	Choi Yuen Tsuen Village House	109 to 112	26 to 29	69	28	40	16
A517	Choi Yuen Tsuen Village House	114 to 129	29 to 33	69 to 70	28 to 29	41	16
A518	Choi Yuen Tsuen Village House	113 to 114	27 to 28	69	28	41	16
A519	Choi Yuen Tsuen Village House	110 to 112	27 to 28	68	28	38	16
A520	Choi Yuen Tsuen Village House	110 to 111	27	68	28	38	16
A521	L'Aquatique Block 1	110 to 121	28 to 36	68 to 69	28 to 29	38 to 39	16
A522	L'Aquatique Block 1	110 to 120	28 to 35	68 to 69	28 to 29	38 to 39	16
A523	Hong Kong Garden - Savoy Heights	109 to 114	27 to 32	68	28	38	16
A524	Hong Kong Garden - Perfetto Senso	109 to 114	27 to 31	68	28	38	16
A525	Hong Kong Garden Swimming Pool	114	NA	68	NA	38	NA
A526	Hong Kong Garden - Palace	109 to 114	27 to 30	68	28	38	16
A527	Hong Kong Garden - Genial	109 to 113	26 to 30	68	28	38	16
A528	Hong Kong Garden - Courser	109 to 113	26 to 30	68	28	38	16
A529	Hong Kong Garden - Manhattan Heights	109 to 113	26 to 29	68	28	38	16
A530	Choi Yuen Tsuen House 5B	113	29	68	28	38	16
A531	Hong Kong Garden - Kingston Heights	109 to 113	26 to 29	68	28	38	16
A532	Hong Kong Garden - Hoover Heights	109 to 113	27 to 28	68	28	38	16
A533	Hong Kong Garden - Fontana Heights	109 to 113	26 to 28	68	28	38	16
A534	Hong Kong Garden Tennis Court	113	NA	68	NA	38	NA
A535	Hong Kong Garden - Jade Heights	111 to 115	27 to 29	68	28	38	16
A536	Hong Kong Garden - Imperial Heights	111 to 115	27 to 29	68	28	38	16

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
Criteria		**200**	**40**	**100**	**50**	**50**	**25**
A537	Hong Kong Garden Block 1	110 to 115	27 to 29	68	28	38	16
A538	Hong Kong Garden - Estoril Heights	109 to 113	26 to 28	68	28	38	16
A539	Tsing Lung Tau New Village House	112	27	68	28	38	16
A540	Hong Kong Garden Block 6	110 to 113	26 to 28	68	28	38	16
A541	Royal Sea Crest Podium	113	28	68	28	38	16
A542	Royal Sea Crest Tower 1	109 to 113	26 to 28	68	28	38	16
A543	Lung Tang Court Block B	112 to 114	27 to 28	68	28	38	16
A545	Yuen Tun Village House 6	112 to 113	27	68	28	38	16
A546	Tsing Lung Tau New Village House	112	27	68	28	38	16
A547	Tsing Lung Tau New Village House	113 to 114	27	68	28	38 to 39	16

Note:
[1] NA indicates the AQO is not applicable for those ASRs (e.g. park, garden, outdoor play/recreational area, sitting areas, etc.) since people inside these premises would not stay for long duration and subject to long-term impacts.

Table 3.24 Cumulative NO_2, RSP and FSP Concentrations in North Lantau Area

ASR ID	Location	Range of Pollutant Concentration (μg/m^3) among assessment heights					
		NO_2 (Year 2048)		RSP (Year 2033)		FSP (Year 2033)	
		1-hour (19th highest)	Annual	24-hour (10th highest)	Annual	24-hour (19th highest)	Annual
Criteria		**200**	**40**	**100**	**50**	**50**	**25**
Existing ASRs							
A601	Lantau Toll Plaza Administration Building	114 to 117	26 to 29	65 to 66	27 to 28	36 to 37	15
A602	Tai Chuen House 11	118	30	65	27	35	15
A603	Tai Chuen House 10	118	30	65	27	35	15
A604	Yi Chuen Village House	118	28	64	27	35	15

Table 3.25 Contribution Breakdown of ASRs with Highest Annual NO_2 Concentration in Respective Areas

Annual NO_2 concentration (ug/m^3)	Lam Tei	So Kwun Wat, Siu Lam and Tai Lam	Tsing Lung Tau	North Lantau
	A036	A226	A514	A602
	Fuk Hang Tsuen Road House 18	Immigration Service Institute of Training and Development	Castle Peak Road Tsing Lung Tau Houses 131-133	Tai Chuen House 11
Chimney	3	<1	<1	<1
Marine	-[1]	<1	14	4
Open road [2]	10	9	2	2
Portal	<1	<1	<1	<1
VB	<1	<1	<1	<1
PTI	<1	<1	<1	<1

Annual NO_2 concentration (ug/m^3)	Lam Tei	So Kwun Wat, Siu Lam and Tai Lam	Tsing Lung Tau	North Lantau
	A036	A226	A514	A602
	Fuk Hang Tsuen Road House 18	Immigration Service Institute of Training and Development	Castle Peak Road Tsing Lung Tau Houses 131-133	Tai Chuen House 11
PATH Background	19	25	23	24
Cumulative impact	33	34	39	30

Notes:
[1] There is no marine emission at Lam Tei Area.
[2] The contribution breakdown is presented for the ASRs with highest cumulative concentration from all sources including the background. The presented contribution from open roads (including Project roads) to the selected ASRs may not be the highest amongst all ASRs in the respective area.

3.5.6 Recommended Mitigation Measures

3.5.6.1 According to the operational air quality assessment results, adverse cumulative air quality impact during operational phase of the Project is not anticipated. However, the TMB's entire satellite building and tiny portion of operation area would fall within the exceedance zone. As advised by TMB's Project Engineer, if there are any planned air sensitive uses within the operation area, it will be properly designed such that any openings, openable windows, and/or FAIs will be located and avoided from the predicted exceedance zone at 1.5mAG (e.g. by provision of fixed glazed window or blank facades, and FAIs to be located away or proposed air sensitive uses outside the exceedance zone). Further review of the layout and design of operation area will be conducted in Detailed Design Stage to ensure compliance of the AQOs. For the proposed satellite building, air filtering system with at least 40% NO_2 removal efficiency shall be installed in the TMB project in order to achieve AQO compliance. The air filtering system and NO_2 removal efficiency will be further reviewed in Detailed Design Stage of TMB to ensure that the air quality impacts at all sensitive uses at the TMB highway / tunnel operation and maintenance facilities could comply within the AQOs.

3.5.6.2 It should be noted that the ventilation schemes as presented in **Table 3.17** and **Table 3.18** are the best available information provided by the Project Engineer at the time of preparing this EIA. During the subsequent design stage and the operational stage, the ventilation engineer should conduct reviews on the ventilation scheme covering different periods of a day, taking into account the contemporary circumstance such as latest traffic forecast, traffic composition, EV uptake, update on the ambient air quality, etc., and then review and update the air quality assessment as necessary to demonstrate full compliance of the AQO. These reviews would allow the designer and operator to optimize the operation of the ventilation system without compromising the compliance of AQO.

3.5.7 Residual Impacts

3.5.7.1 According to the operational air quality impact assessment results, with proper design and mitigation measures at TMB's highway / tunnel operation and maintenance facilities, no adverse residual air quality impact during operational phase of the Project is anticipated.