

Sensitivity Test for Modification/Temporary Removal of Existing Direct Noise Mitigation Measures

During construction phase, temporary removal of existing vertical noise barriers, cantilever noise barrier and semi-enclosure is required. This is due to insufficient headroom for the construction of proposed slip road SR2-1, SR3-1, SR4-1 and insufficient works area for the proposed road widening works for Shing Mun Tunnel Road (SMTR) (EB) near reserved T4 connection point CP-A. There is one location (refer to Works ID 1B in below table for details) where existing noise mitigation measure covered in the EP will be permanently removed. This is due to conflict at location of connection of proposed slip road SR3-1 to Tsing Sha Highway with the existing noise mitigation measure.

The affected sections are very short (the max. length of modification/temporary removal of noise mitigation measures is ~60m). As the direct noise mitigation measures of the affected sections will be re-provided or replaced by the proposed direct noise mitigation measures under this Project, the affected duration is expected to be limited (less than 6 months).

A summary of the tentative schedule and locations of modification/temporary removal and reprovision of existing noise mitigation measures is presented in below table and Figure 1 of this Appendix.

Tentative Schedule for Modification/Temporary Removal and Reprovision of Existing Noise Mitigation Measures

Works ID	Location of Works	Existing Noise Mitigation Measures	Tentative Date for Modification/Removal	Tentative Date for Reprovision	Approximate Extent, m	Duration without Measure, months
1A	Works Area A2	Semi-enclosure	Sep 2026	Jan 2027 – Feb 2027	55m	6
1B	Works Area A2	3m Vertical Noise Barrier	Oct 2026	Permanently removed for the construction of T4 (EB) Slip Road SR3-1	60m	N/A
2	Works Area A2	5m Vertical Noise Barrier	Oct 2026	Feb 2027 – Mar 2027	10m	6
3	Works Area A3 (CP-A)	6m Vertical Noise Barrier	Jun 2027 – Jul 2027	Sep 2027 – Nov 2027	5m	6
4	Works Area A3 (T4(WB) SR4-1)	5.8m (H) with 3m cantilever	Nov 2026	Jan 2027 – Feb 2027	20m	4

A sensitivity test has been conducted to investigate the potential air quality impact regarding the short-term AQOs (i.e. 1-hr NO₂, 1-hr TSP and 24-hr RSP & FSP). The assessment methodology and results are summarized below as follows.

Methodology

EMFAC-HK v4.2 model was adopted to estimate the vehicular emission rates of NO, NO₂, TSP, RSP and FSP in year 2026, and traffic data from 2028 was adopted to

calculate the composite emission factor as a conservative approach¹. Since the sole objective of the test is to investigate the short-term impact of change in noise mitigation measures, only open road emissions were considered and CALINE4 model was used to estimate pollutant concentrations at ASRs before and after modification/removal of the noise mitigation measures. As a conservative approach, 100% of NO_x is assumed to be NO₂ in this test, and the maximizing hour/24-hour average increase of each pollutant was compared with the respective cumulative pollutant concentrations of the ASRs to find out if there are any non-compliance of short-term AQOs.

For noise mitigation measure 1A and 4, the alignment of the road section was shifted by a distance equal to the covered extent to simulate the removal of the semi-enclosure and cantilever respectively. A total of 11 ASRs in vicinity to the noise mitigation measures were selected as shown in below table and **Figure 2** of this appendix. For the remaining sections (i.e. sections 1B, 2-3) of noise mitigation measures, due to the limitation of CALINE4 model, the abovementioned noise barriers haven't been considered in the modelling as conservative². Therefore, sensitivity tests for these sections is considered not necessary.

ASRs Selected for Sensitivity Test

Sensitivity Test ASR ID	Matching ASR ID	Description
ST1	-	Basketball Court
ST2	AWWTC2	Buddist Wong Wan Tin College
ST3	AWWTC1	Buddist Wong Wan Tin College
ST4	AMTH1	Mei Tao House, Mei Lam Estate
ST5	AMTH2	Mei Tao House, Mei Lam Estate
ST6	AKWB1	Kwai Wai Building
ST7	ACCS2	Lin Fung House
ST8	ACCS1	Lin Fung House
ST9	AHKHM1	Hong Kong Heritage Museum
ST10	AHKHM2	Hong Kong Heritage Museum
ST11	ASTP1	Sha Tin Park

¹ As there is no traffic data available for Year 2026, with regards to the vehicular emission factors, considering solely the natural retirement of aged vehicles and the replacement with newer vehicles with better exhaust technologies, the vehicular emission factors would be on a decreasing trend. In other words, the vehicular emission factors at 2026 would represent the highest vehicular emission factors within 2026 to 2028. Therefore, as a conservative approach for this assessment, the composite vehicular emission factor at Year 2026 is estimated from combination of the highest vehicular emission factors with the highest predicted traffic flow (i.e. at year 2028).

² For the current CALINE4 model, since the maximum input height for road sections is 10m while the actual height of the roads >10m, the effect of the removal of vertical barriers are already considered in the current model.

Results

The maximum concentration increase for each pollutant is summarized in the below table.

Pollutant	Max. Concentration Increase ($\mu\text{g}/\text{m}^3$)	ASR
NOx	11.04 (Max hourly)	ST5
TSP	0.34 (Max hour)	ST5
RSP	0.04 (Highest 24-hour average)	ST2
FSP	0.04 (Highest 24-hour average)	ST2

With reference to the cumulative pollutant concentrations in the construction phase (for TSP, RSP and FSP) and operation phase (for NOx), this increase is considered minor with regard to overall AQO compliance and non-compliance of AQOs is not expected. The detailed sensitivity test result is presented in Annex 1, and the projected cumulative concentrations are presented in Annex 2.

Figure 2.1

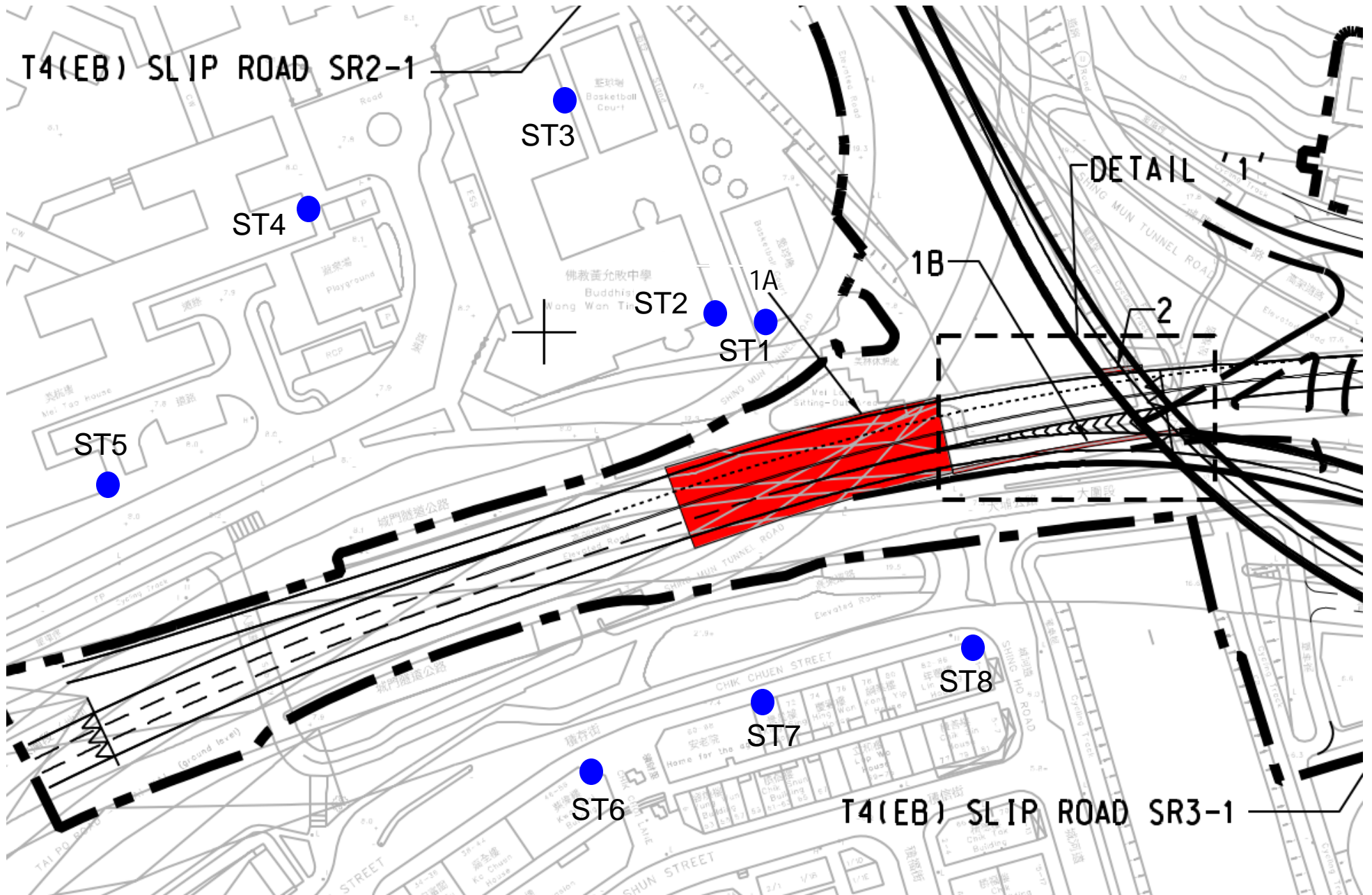
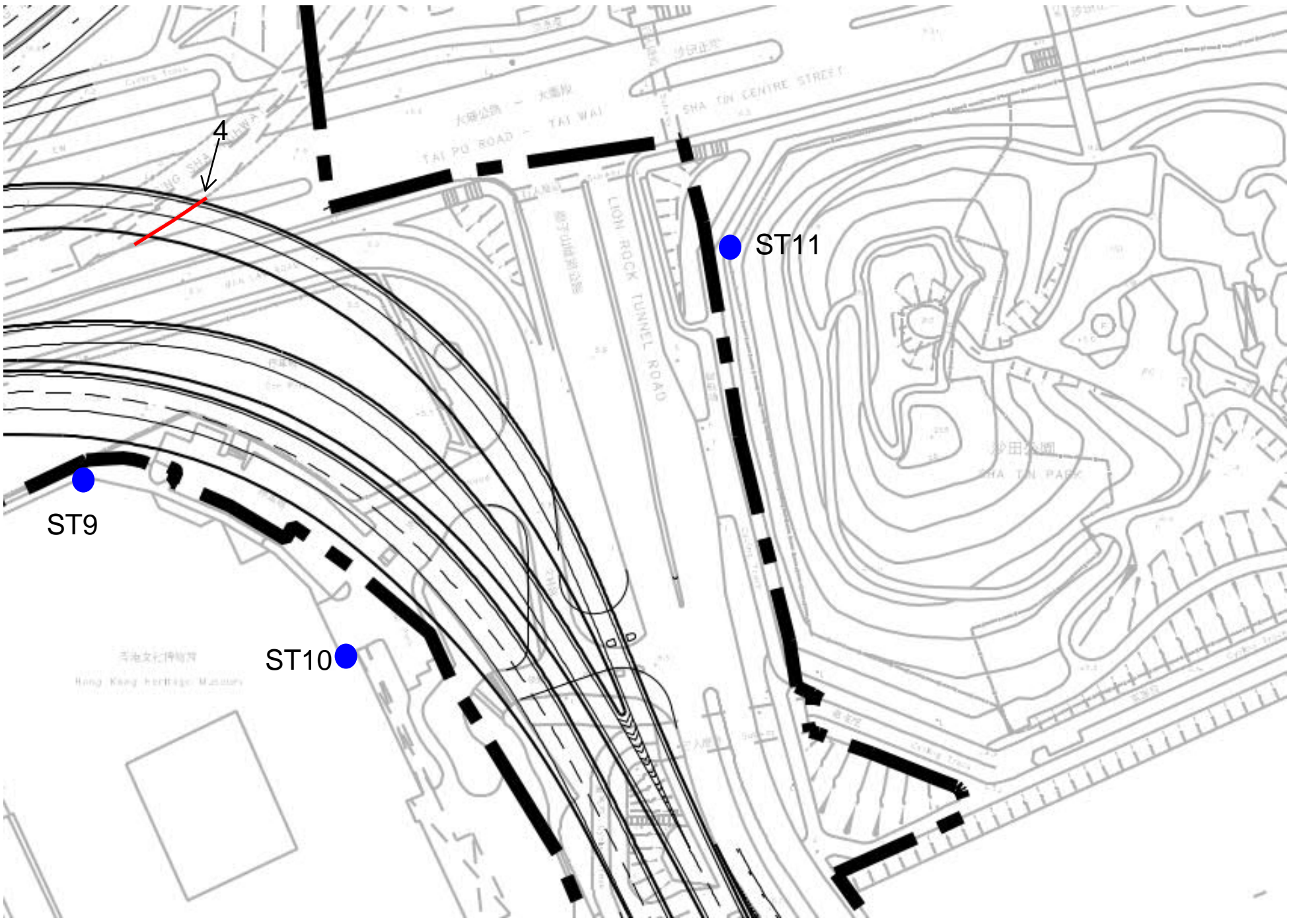


Figure 2.2



Annex 1: Detailed Results of Sensitivity Test for Removal of Noise Mitigation Measure 1A and 4 During Construction Phase (Year 2026) - Open Road Emissions

ASRs and Assessment Height (mAG)	Site	Max Hourly NOx Concentrations ($\mu\text{g}/\text{m}^3$)			Max Hourly TSP Concentrations ($\mu\text{g}/\text{m}^3$)			Highest 24-hr Average RSP Concentrations ($\mu\text{g}/\text{m}^3$)			Highest 24-hr Average FSP Concentrations ($\mu\text{g}/\text{m}^3$)		
		With Noise Mitigation Measure	Without Noise Mitigation Measure	Concentration Change (without - with noise mitigation measure)	With Noise Mitigation Measure	Without Noise Mitigation Measure	Concentration Change (without - with noise mitigation measure)	With Noise Mitigation Measure	Without Noise Mitigation Measure	Concentration Change (without - with noise mitigation measure)	With Noise Mitigation Measure	Without Noise Mitigation Measure	Concentration Change (without - with noise mitigation measure)
ST1 1.5	Basketball Court	260	260	0.0020	9	9	0.0000	2	2	0.0105	2	2	0.0094
ST2 1.5	Buddist Wong Wan Tin College	247	247	0.0120	9	9	0.0030	1	1	0.0124	1	1	0.0093
ST2 5	Buddist Wong Wan Tin College	244	244	0.0120	9	9	0.0040	1	1	0.0248	1	1	0.0229
ST2 10	Buddist Wong Wan Tin College	227	227	0.0117	8	8	0.0030	1	1	0.0448	1	1	0.0414
ST2 15	Buddist Wong Wan Tin College	203	203	0.0109	7	7	0.0040	1	1	0.0259	1	1	0.0239
ST2 20	Buddist Wong Wan Tin College	179	179	0.0102	6	6	0.0030	1	1	0.0038	1	1	0.0036
ST3 1.5	Buddist Wong Wan Tin College	167	167	0.0131	6	6	0.0040	1	1	0.0088	1	1	0.0079
ST3 5	Buddist Wong Wan Tin College	165	165	0.0129	6	6	0.0040	1	1	0.0085	1	1	0.0078
ST3 10	Buddist Wong Wan Tin College	157	157	0.0125	6	6	0.0040	1	1	0.0078	1	1	0.0072
ST3 15	Buddist Wong Wan Tin College	145	145	0.0118	5	5	0.0030	1	1	0.0062	1	1	0.0058
ST3 20	Buddist Wong Wan Tin College	130	130	0.0110	5	5	0.0030	1	1	0.0049	1	1	0.0037
ST4 1.5	Mei Tao House, Mei Lam Estate	183	183	0.0412	6	6	0.0012	1	1	0.0065	1	1	0.0059
ST4 5	Mei Tao House, Mei Lam Estate	181	181	0.0408	6	6	0.0012	1	1	0.0063	1	1	0.0058
ST4 10	Mei Tao House, Mei Lam Estate	173	173	0.0391	6	6	0.0012	1	1	0.0056	1	1	0.0051
ST4 15	Mei Tao House, Mei Lam Estate	160	160	0.0367	6	6	0.0011	1	1	0.0043	1	1	0.0039
ST4 20	Mei Tao House, Mei Lam Estate	145	145	0.0333	5	5	0.0010	1	1	0.0027	1	1	0.0024
ST4 30	Mei Tao House, Mei Lam Estate	111	111	0.0742	4	4	0.0007	1	1	-0.0003	1	1	-0.0003
ST4 40	Mei Tao House, Mei Lam Estate	81	81	0.0339	3	3	0.0005	0	0	-0.0008	0	0	-0.0007
ST4 50	Mei Tao House, Mei Lam Estate	59	59	0.0369	2	2	0.0011	0	0	-0.0004	0	0	-0.0005
ST4 60	Mei Tao House, Mei Lam Estate	45	45	0.0076	2	2	0.0002	0	0	-0.0007	0	0	-0.0006
ST4 70	Mei Tao House, Mei Lam Estate	36	36	-0.0006	1	1	0.0000	0	0	-0.0003	0	0	-0.0003
ST4 80	Mei Tao House, Mei Lam Estate	29	29	-0.0037	1	1	-0.0002	0	0	-0.0002	0	0	-0.0002
ST4 90	Mei Tao House, Mei Lam Estate	25	25	-0.0055	1	1	-0.0002	0	0	-0.0002	0	0	-0.0001
ST5 1.5	Mei Tao House, Mei Lam Estate	208	219	11.0359	7	8	0.3427	1	1	-0.0018	1	1	-0.0016
ST5 5	Mei Tao House, Mei Lam Estate	204	215	10.7845	7	8	0.3349	1	1	0.0063	1	1	0.0072
ST5 10	Mei Tao House, Mei Lam Estate	193	203	9.9916	7	7	0.3102	1	1	0.0064	1	1	0.0059
ST5 15	Mei Tao House, Mei Lam Estate	177	185	8.7864	6	6	0.2728	1	1	0.0052	1	1	0.0049
ST5 20	Mei Tao House, Mei Lam Estate	159	166	7.2254	6	6	0.2274	1	1	0.0029	1	1	0.0027
ST5 30	Mei Tao House, Mei Lam Estate	123	126	3.9739	4	4	0.1332	1	1	0.0008	0	0	0.0008
ST5 40	Mei Tao House, Mei Lam Estate	91	93	1.8271	3	3	0.0615	0	0	0.0018	0	0	0.0017
ST5 50	Mei Tao House, Mei Lam Estate	66	66	0.2520	2	2	0.0192	0	0	0.0004	0	0	0.0004
ST5 60	Mei Tao House, Mei Lam Estate	52	52	0.0543	2	2	0.0016	0	0	0.0007	0	0	0.0007
ST5 70	Mei Tao House, Mei Lam Estate	41	41	0.0035	1	1	0.0001	0	0	-0.0003	0	0	-0.0002
ST5 80	Mei Tao House, Mei Lam Estate	32	32	-0.0066	1	1	-0.0002	0	0	-0.0003	0	0	-0.0002
ST5 90	Mei Tao House, Mei Lam Estate	25	25	-0.0071	1	1	-0.0002	0	0	-0.0003	0	0	-0.0003
ST6 1.5	Kwai Wai Building	199	199	-0.0980	7	7	-0.0032	2	2	-0.0510	2	2	-0.0464
ST6 5	Kwai Wai Building	195	195	-0.0946	7	7	-0.0031	2	2	-0.0509	2	2	-0.0463
ST6 10	Kwai Wai Building	184	184	-0.0826	6	6	-0.0027	2	2	-0.0309	2	2	-0.0283
ST6 15	Kwai Wai Building	170	170	-0.0621	6	6	-0.0020	2	2	-0.0247	1	1	-0.0227
ST6 20	Kwai Wai Building	155	155	-0.0361	5	5	-0.0013	1	1	-0.0140	1	1	-0.0129
ST7 1.5	Lin Fung House	271	271	0.1404	10	10	0.0044	2	2	0.0053	2	2	0.0046
ST7 5	Lin Fung House	260	260	0.1487	9	9	0.0043	2	2	-0.0051	2	2	-0.0051
ST7 10	Lin Fung House	245	246	0.1394	9	9	0.0042	2	2	-0.0134	2	2	-0.0124
ST7 15	Lin Fung House	224	224	0.1247	8	8	0.0037	1	1	-0.0072	1	1	-0.0070
ST8 1.5	Lin Fung House	240	241	0.1519	9	9	0.0048	2	2	-0.0189	2	2	-0.0175
ST8 5	Lin Fung House	235	235	0.1494	8	8	0.0048	2	2	-0.0385	2	2	-0.0354
ST8 10	Lin Fung House	222	222	0.1542	8	8	0.0046	2	2	-0.0657	2	2	-0.0604
ST8 15	Lin Fung House	205	205	0.1407	7	7	0.0042	1	1	-0.0384	1	1	-0.0354
ST9 1.5	Hong Kong Heritage Museum	193	194	0.2519	7	7	0.0079	1	1	0.0051	1	1	0.0048
ST9 5	Hong Kong Heritage Museum	190	190	0.2505	6	6	0.0079	1	1	0.0027	1	1	0.0039
ST9 10	Hong Kong Heritage Museum	180	180	0.2459	6	6	0.0077	1	1	0.0057	1	1	0.0048
ST9 15	Hong Kong Heritage Museum	166	166	0.2382	6	6	0.0075	1	1	0.0042	1	1	0.0047
ST10 1.5	Hong Kong Heritage Museum	132	133	0.3228	5	5	0.0101	1	1	0.0017	1	1	0.0016
ST10 5	Hong Kong Heritage Museum	131	131	0.3210	5	5	0.0101	1	1	0.0017	1	1	0.0015
ST10 10	Hong Kong Heritage Museum	126	127	0.3153	4	4	0.0099	1	1	0.0015	1	1	0.0014
ST10 15	Hong Kong Heritage Museum	119	119	0.3058	4	4	0.0096	1	1	0.0013	1	1	0.0010
ST11 1.5	Sha Tin Park	230	231	1.1137	8	8	0.0331	1	1	-0.0002	1	1	-0.0019

Annex 2: Projected Cumulative Pollutant Concentrations During Temporary Removal of Noise Mitigation Measures

ASRs and Assessment Height (mAG)	Site	NO2 Concentrations ^[1] ($\mu\text{g}/\text{m}^3$)	TSP Concentrations ^[1] ($\mu\text{g}/\text{m}^3$)	RSP Concentrations ^[1] ($\mu\text{g}/\text{m}^3$)	FSP Concentrations ^[1] ($\mu\text{g}/\text{m}^3$)
		19 th Highest 1-hr Average	1st Highest 1-hr Average	10 th Highest 24-hr Average	10 th Highest 24-hr Average
AQO		200	500	100	75
ST1 ^[2] 1.5	Basketball Court	137	208	71	53
ST2 1.5	Buddist Wong Wan Tin College	126	215	72	53
ST2 5	Buddist Wong Wan Tin College	124	215	72	53
ST2 10	Buddist Wong Wan Tin College	121	215	71	53
ST2 15	Buddist Wong Wan Tin College	118	215	71	53
ST2 20	Buddist Wong Wan Tin College	114	215	71	53
ST3 1.5	Buddist Wong Wan Tin College	118	215	72	53
ST3 5	Buddist Wong Wan Tin College	118	215	72	53
ST3 10	Buddist Wong Wan Tin College	115	215	71	53
ST3 15	Buddist Wong Wan Tin College	114	215	71	53
ST3 20	Buddist Wong Wan Tin College	110	215	71	53
ST4 1.5	Mei Tao House, Mei Lam Estate	118	215	71	53
ST4 5	Mei Tao House, Mei Lam Estate	118	215	71	53
ST4 10	Mei Tao House, Mei Lam Estate	117	215	71	53
ST4 15	Mei Tao House, Mei Lam Estate	113	215	71	53
ST4 20	Mei Tao House, Mei Lam Estate	111	215	71	53
ST4 30	Mei Tao House, Mei Lam Estate	105	215	71	53
ST4 40	Mei Tao House, Mei Lam Estate	102	215	71	53
ST4 50	Mei Tao House, Mei Lam Estate	101	215	71	53
ST4 60	Mei Tao House, Mei Lam Estate	100	215	71	53
ST4 70	Mei Tao House, Mei Lam Estate	100	215	71	53
ST4 80	Mei Tao House, Mei Lam Estate	100	214	71	53
ST4 90	Mei Tao House, Mei Lam Estate	100	214	71	53
ST5 1.5	Mei Tao House, Mei Lam Estate	135	215	71	53
ST5 5	Mei Tao House, Mei Lam Estate	134	215	71	53
ST5 10	Mei Tao House, Mei Lam Estate	130	215	71	53
ST5 15	Mei Tao House, Mei Lam Estate	128	215	71	53
ST5 20	Mei Tao House, Mei Lam Estate	123	215	71	53
ST5 30	Mei Tao House, Mei Lam Estate	111	215	71	53
ST5 40	Mei Tao House, Mei Lam Estate	104	215	71	53
ST5 50	Mei Tao House, Mei Lam Estate	101	215	71	53
ST5 60	Mei Tao House, Mei Lam Estate	100	215	71	53
ST5 70	Mei Tao House, Mei Lam Estate	100	215	71	53
ST5 80	Mei Tao House, Mei Lam Estate	100	214	71	53
ST5 90	Mei Tao House, Mei Lam Estate	100	214	71	53
ST6 1.5	Kwai Wai Building	145	203	73	54
ST6 5	Kwai Wai Building	143	203	72	54
ST6 10	Kwai Wai Building	138	203	72	54
ST6 15	Kwai Wai Building	135	202	72	54
ST6 20	Kwai Wai Building	130	202	71	54
ST7 1.5	Lin Fung House	135	187	72	53
ST7 5	Lin Fung House	133	187	72	53
ST7 10	Lin Fung House	132	187	71	53
ST7 15	Lin Fung House	128	186	71	53
ST8 1.5	Lin Fung House	135	187	72	53
ST8 5	Lin Fung House	133	187	72	53
ST8 10	Lin Fung House	132	187	71	53
ST8 15	Lin Fung House	129	186	71	53
ST9 1.5	Hong Kong Heritage Museum	122	286	90	56
ST9 5	Hong Kong Heritage Museum	122	195	79	54
ST9 10	Hong Kong Heritage Museum	120	194	73	53
ST9 15	Hong Kong Heritage Museum	116	194	71	53
ST10 1.5	Hong Kong Heritage Museum	116	197	75	53
ST10 5	Hong Kong Heritage Museum	116	195	73	53
ST10 10	Hong Kong Heritage Museum	115	194	71	52
ST10 15	Hong Kong Heritage Museum	111	194	70	52
ST11 1.5	Sha Tin Park	123	194	70	52

Notes:

[1] Cumulative concentrations were projected by adding the concentration change at the maximizing hour of each pollutant and their respective cumulative concentrations presented.

[2] Concentration contours were used to project cumulative concentration.