Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network

October to December 2023

Statistical Summary of the Fourth quarter Monitoring Results

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1. Foreword

Since the Pearl River Delta (PRD) Regional Air Quality Monitoring Network came into operation on 30 November 2005, the PRD Regional Air Quality Index (RAQI) was reported to the public on a daily basis. Starting from 2006, half-yearly and annual air quality monitoring reports were also published every year. The network was subsequently enhanced and expanded in September 2014 and renamed to "Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network" (the "Network").

To cope with the enhancement of the network, the update of the national ambient air quality standards as well as the need for improving the reporting frequency of monitoring results, starting from 2014, the real-time hourly monitoring data was reported on a new internet platform to replace the daily RAQI, the half-yearly report was also replaced by a quarterly report while the annual air quality monitoring report was maintained. The quarterly report is a brief statistical summary of the regional air quality monitoring results in a quarter. The annual report, in addition to the reporting of the monitoring data, provides a more detailed analysis and comparison of the air quality in the year. From the fourth quarter of 2014, the statistical results of carbon monoxide (CO) and fine suspended particulates ($PM_{2.5}$ or FSP) were added to the report in addition to those of respirable suspended particulates (PM_{10} or RSP), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and ozone (O_3).

This report is the statistical summary of the monitoring results of the PRD Regional Air Quality Monitoring Network in October to December, the Fourth quarter of 2023. It is the forty report published in the form of a quarterly report and the thirty-seventh report with the statistical summaries of the six pollutants (i.e. PM_{10}, $PM_{2.5}$, SO_2, NO_2, O_3 and CO).

2. Introduction to Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network

The PRD Regional Air Quality Monitoring Network was jointly established by the Former Guangdong Provincial Environmental Monitoring Centre[1] (GDEMC) and the Environmental Protection Department of the Hong Kong Special Administrative Region (HKEPD) from 2003 to 2005, and commenced its operation to report the Regional Air Quality Index (RAQI) on 30 November 2005.

With the growing concerns of air pollution control and economic development of the region, the GDEMC[1] and HKEPD had worked in collaboration with the environmental protection cum meteorological authorities of Macao to enhance the network by extending the coverage of monitoring area to Guangdong, Hong Kong and Macao in September 2014. The enhancements included the addition of monitoring stations from 16 to 23 to further improve the spatial distribution and the inclusion of two new monitoring parameters, i.e. carbon monoxide (CO) and fine suspended particulates ($PM_{2.5}$), to enrich the air quality monitoring information. At the same time, the network was renamed to "Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network" (the "Network") while the "Quality Management Committee of Guangdong-Hong Kong-Macao Pearl River Delta Regional Air Quality Monitoring Network",

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[1] In 2003, when the network was established, the unit was named Guangdong Provincial Environmental Protection Monitoring Centre, which was renamed as Guangdong Provincial Environmental Monitoring Centre in 2008, and was renamed again as Ecological and Environmental Monitoring Centre of Guangdong in December 2020.

which was jointly established by the Ecological and Environmental Monitoring Centre of Guangdong (GDEEMC), HKEPD, Environmental Protection Bureau of Macau SARG and the Meteorological and Geophysical Bureau of Macao SARG, was responsible for quality management of the Network and dissemination of information.

The Network comprises 23 automatic air quality monitoring stations (see Figure 2.1) across the Guangdong-Hong Kong-Macao PRD region. Among these, eighteen stations are in the PRD, four stations in Hong Kong and one station in Macau.

All stations are installed with monitoring equipment to measure the ambient concentrations of PM_{10}, $PM_{2.5}$, SO_2, NO_2, O_3 and CO.

Annexes A and B show the site information of the monitoring stations in the Network and the methods used for measuring air pollutant concentrations respectively.
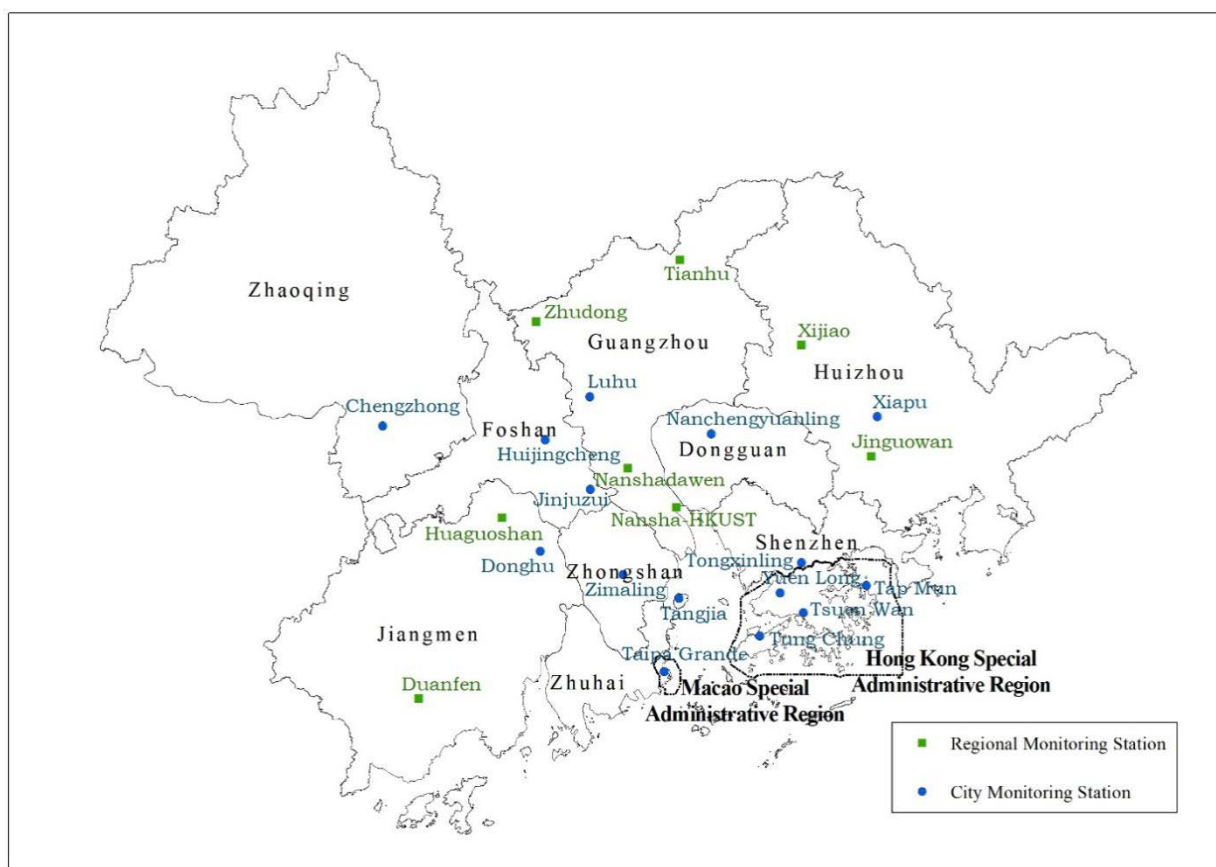
Figure 2.1：Spatial Distribution of Monitoring Stations in the Network[2]

3. Operation of the Network

The overall operation of the Network was smooth in the forth quarter of 2023. The average data capture rate of hourly air pollutant monitoring data measured at all monitoring stations was 98.3% in the second quarter.

4. Statistical Results of Pollutant Concentrations

Tables 4.1a to 4.6b list the detailed statistical results of the six air pollutants (SO_2, NO_2, O_3, CO, PM_{10} and $PM_{2.5}$) from October to December 2023. Per the amended *GB 3095-2012: Ambient Air Quality Standards*, starting from 2019, the concentrations of gaseous pollutants are calculated at a reference temperature of 298.15K and a pressure of 101.325 kPa, while the concentrations of PM_{10} and $PM_{2.5}$ are measured at real-time temperature and atmospheric pressure during monitoring.

Table 4.1a: The monthly maxima and minima of hourly averages of SO_2 [3]

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	3	10	3	11	3	14
Nanshadawen (Guangzhou)	6	20	8	23	1	28
Nansha-HKUST (Guangzhou)	1	10	1	16	4	25
Tianhu (Guangzhou)	4	9	5	14	1	13
Zhudong (Guangzhou)	6	22	8	32	3	32
Tongxinling (Shenzhen)	1	5	2	11	2	8
Jinjuzui (Foshan)	2	10	1	13	1	11
Huijingcheng (Foshan)	6	23	6	33	7	39
Tangjia (Zhuhai)	3	9	3	10	3	13
Donghu (Jiangmen)	3	15	4	23	4	46
Duanfen (Jiangmen)	6	21	3	21	5	36
Huaguoshan (Jiangmen)	3	27	3	26	3	29
Chengzhong (Zhaoqing)	3	56	6	67	4	139
Xiapu (Huizhou)	5	22	7	20	8	20
Shixia (Huizhou)	5	14	2	18	1	22
Jinguowan (Huizhou)	3	7	3	52	4	12
Zimaling (Zhongshan)	2	9	3	14	3	17
Nanchengyuanling (Dongguan)	4	14	1	11	2	22
Tap Mun (Hong Kong)	0	7	0	6	1	8
Tsuen Wan (Hong Kong)	4	10	4	12	4	17
Yuen Long (Hong Kong)	5	10	6	13	6	14
Tung Chung (Hong Kong)	4	12	5	12	6	18
Taipa Grande (Macao)	5	12	6	12	7	17

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[3] All pollutants, except for carbon monoxide, are measured in micrograms per cubic meter (μg/m^3). The unit for carbon monoxide concentration is milligrams per cubic meter (mg/m^3).

The above also applies to all the pollutant monitoring mentioned below.

Table 4.1b： The monthly maxima and minima of daily averages of SO₂

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	4	8	3	6	4	9
Nanshadawen (Guangzhou)	6	11	9	14	3	15
Nansha-HKUST (Guangzhou)	1	4	2	11	4	11
Tianhu (Guangzhou)	5	7	6	10	2	11
Zhudong (Guangzhou)	7	13	8	20	4	16
Tongxinling (Shenzhen)	2	4	3	7	3	6
Jinjuzui (Foshan)	3	7	1	6	1	8
Huijingcheng (Foshan)	6	10	6	16	8	20
Tangjia (Zhuhai)	4	7	4	6	4	8
Donghu (Jiangmen)	4	9	4	10	5	15
Duanfen (Jiangmen)	7	11	5	14	6	12
Huaguoshan (Jiangmen)	5	12	6	10	4	13
Chengzhong (Zhaoqing)	4	16	7	24	6	22
Xiapu (Huizhou)	6	11	8	12	9	13
Shixia (Huizhou)	6	10	7	11	2	9
Jinguowan (Huizhou)	3	5	4	10	4	8
Zimaling (Zhongshan)	3	7	4	7	4	9
Nanchengyuanling (Dongguan)	6	10	3	8	5	12
Tap Mun (Hong Kong)	1	4	1	4	1	5
Tsuen Wan (Hong Kong)	4	6	4	6	5	9
Yuen Long (Hong Kong)	5	8	6	9	7	10
Tung Chung (Hong Kong)	6	8	6	8	7	11
Taipa Grande (Macao)	6	8	7	9	7	12

Table 4.1c : The monthly averages of SO₂

Monitoring Station	October 2023	November 2023	December 2023
Luhu (Guangzhou)	6	5	6
Nanshadawen (Guangzhou)	8	11	10
Nansha-HKUST (Guangzhou)	2	6	8
Tianhu (Guangzhou)	6	8	7
Zhudong (Guangzhou)	10	12	7
Tongxinling (Shenzhen)	3	5	4
Jinjuzui (Foshan)	4	3	3
Huijingcheng (Foshan)	7	9	12
Tangjia (Zhuhai)	5	5	6
Donghu (Jiangmen)	6	7	8
Duanfen (Jiangmen)	9	8	8
Huaguoshan (Jiangmen)	8	8	8
Chengzhong (Zhaoqing)	8	13	12
Xiapu (Huizhou)	8	10	10
Shixia (Huizhou)	8	8	7
Jinguowan (Huizhou)	4	5	6
Zimaling (Zhongshan)	4	5	6
Nanchengyuanling (Dongguan)	8	5	8
Tap Mun (Hong Kong)	2	2	3
Tsuen Wan (Hong Kong)	5	5	6
Yuen Long (Hong Kong)	6	7	8
Tung Chung (Hong Kong)	6	7	8
Taipa Grande (Macao)	7	8	9

Table 4.2a: The monthly maxima and minima of hourly averages of NO$_2$

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	6	103	9	117	13	127
Nanshadawen (Guangzhou)	5	115	8	181	10	164
Nansha-HKUST (Guangzhou)	4	92	5	139	10	201
Tianhu (Guangzhou)	2	31	4	26	1	41
Zhudong (Guangzhou)	5	57	7	90	9	100
Tongxinling (Shenzhen)	4	58	4	91	6	89
Jinjuzui (Foshan)	4	67	11	138	11	156
Huijingcheng (Foshan)	2	124	12	181	13	179
Tangjia (Zhuhai)	5	57	6	82	9	134
Donghu (Jiangmen)	6	85	9	146	10	159
Duanfen (Jiangmen)	6	39	6	57	5	82
Huaguoshan (Jiangmen)	1	84	6	112	6	147
Chengzhong (Zhaoqing)	7	113	9	181	12	127
Xiapu (Huizhou)	4	48	8	92	7	97
Shixia (Huizhou)	2	74	1	42	2	70
Jinguowan (Huizhou)	6	28	7	63	2	66
Zimaling (Zhongshan)	4	63	6	97	7	156
Nanchengyuanling (Dongguan)	1	98	5	136	5	135
Tap Mun (Hong Kong)	1	24	1	49	1	56
Tsuen Wan (Hong Kong)	6	98	8	117	9	225
Yuen Long (Hong Kong)	9	106	10	128	11	230
Tung Chung (Hong Kong)	2	73	8	93	8	175
Taipa Grande (Macao)	5	61	5	117	11	141

Table 4.2b：The monthly maxima and minima of daily averages of NO$_2$

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	13	63	17	71	17	76
Nanshadawen (Guangzhou)	14	56	19	88	20	102
Nansha-HKUST (Guangzhou)	12	44	17	62	16	115
Tianhu (Guangzhou)	4	16	6	16	7	23
Zhudong (Guangzhou)	9	35	15	50	12	78
Tongxinling (Shenzhen)	9	24	9	44	10	55
Jinjuzui (Foshan)	9	44	19	75	16	112
Huijingcheng (Foshan)	14	70	18	118	23	125
Tangjia (Zhuhai)	10	31	13	49	17	79
Donghu (Jiangmen)	10	44	15	76	16	114
Duanfen (Jiangmen)	8	27	11	31	11	47
Huaguoshan (Jiangmen)	10	39	18	64	12	84
Chengzhong (Zhaoqing)	10	54	15	84	18	81
Xiapu (Huizhou)	8	23	12	46	12	56
Shixia (Huizhou)	4	17	4	18	6	32
Jinguowan (Huizhou)	7	18	10	23	11	34
Zimaling (Zhongshan)	7	38	14	54	12	96
Nanchengyuanling (Dongguan)	4	40	10	69	8	78
Tap Mun (Hong Kong)	2	10	3	14	5	24
Tsuen Wan (Hong Kong)	11	46	24	64	26	105
Yuen Long (Hong Kong)	16	49	20	73	27	96
Tung Chung (Hong Kong)	12	39	16	47	20	90
Taipa Grande (Macao)	11	34	13	60	22	103

Table 4.2c：The monthly averages of NO$_2$

Monitoring Station	October 2023	November 2023	December 2023
Luhu (Guangzhou)	27	46	43
Nanshadawen (Guangzhou)	31	49	48
Nansha-HKUST (Guangzhou)	24	38	49
Tianhu (Guangzhou)	6	11	13
Zhudong (Guangzhou)	18	32	31
Tongxinling (Shenzhen)	17	22	27
Jinjuzui (Foshan)	25	40	49
Huijingcheng (Foshan)	29	47	57
Tangjia (Zhuhai)	19	24	36
Donghu (Jiangmen)	24	38	48
Duanfen (Jiangmen)	19	20	28
Huaguoshan (Jiangmen)	26	38	40
Chengzhong (Zhaoqing)	26	49	42
Xiapu (Huizhou)	13	23	25
Shixia (Huizhou)	8	11	14
Jinguowan (Huizhou)	12	16	19
Zimaling (Zhongshan)	22	32	45
Nanchengyuanling (Dongguan)	17	34	35
Tap Mun (Hong Kong)	6	8	12
Tsuen Wan (Hong Kong)	32	39	50
Yuen Long (Hong Kong)	33	44	52
Tung Chung (Hong Kong)	26	28	44
Taipa Grande (Macao)	22	30	46

Table 4.3a：The monthly maxima and minima of hourly averages of O₃

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	2	240	2	248	1	166
Nanshadawen (Guangzhou)	1	351	1	300	1	267
Nansha-HKUST (Guangzhou)	1	230	1	317	1	260
Tianhu (Guangzhou)	25	218	29	218	11	193
Zhudong (Guangzhou)	1	257	1	297	1	218
Tongxinling (Shenzhen)	7	186	1	268	1	219
Jinjuzui (Foshan)	2	233	2	229	2	201
Huijingcheng (Foshan)	2	286	2	236	1	226
Tangjia (Zhuhai)	2	241	2	327	1	237
Donghu (Jiangmen)	2	244	3	370	2	302
Duanfen (Jiangmen)	2	184	2	196	1	267
Huaguoshan (Jiangmen)	1	257	1	379	1	241
Chengzhong (Zhaoqing)	6	220	6	250	6	189
Xiapu (Huizhou)	5	159	3	175	2	183
Shixia (Huizhou)	3	212	1	206	1	246
Jinguowan (Huizhou)	1	160	1	145	1	166
Zimaling (Zhongshan)	2	216	2	297	2	214
Nanchengyuanling (Dongguan)	5	247	2	258	2	240
Tap Mun (Hong Kong)	17	173	17	191	2	177
Tsuen Wan (Hong Kong)	13	207	6	145	3	153
Yuen Long (Hong Kong)	6	186	3	207	2	216
Tung Chung (Hong Kong)	6	226	5	229	1	217
Taipa Grande (Macao)	9	216	3	288	2	192

Table 4.3b：Daily maximum 8-hour averages of O$_3$ (the monthly maxima, minima and the 90th percentile)

Monitoring Station	October 2023			November 2023			December 2023		
	Min	Max	90th per	Min	Max	90th per	Min	Max	90th per
Luhu (Guangzhou)	36	201	150	12	191	166	13	135	108
Nanshadawen (Guangzhou)	32	288	189	26	238	195	15	204	131
Nansha-HKUST (Guangzhou)	24	182	157	45	258	183	8	174	152
Tianhu (Guangzhou)	51	211	127	42	201	172	36	166	134
Zhudong (Guangzhou)	21	209	129	30	212	197	14	157	139
Tongxinling (Shenzhen)	24	159	141	46	218	150	13	135	121
Jinjuzui (Foshan)	29	188	145	15	197	168	14	158	114
Huijingcheng (Foshan)	29	236	158	9	192	168	10	147	131
Tangjia (Zhuhai)	30	200	172	50	255	163	13	189	130
Donghu (Jiangmen)	28	206	188	21	287	203	14	188	124
Duanfen (Jiangmen)	34	164	157	42	167	155	12	205	128
Huaguoshan (Jiangmen)	21	226	164	7	300	178	7	178	109
Chengzhong (Zhaoqing)	45	190	161	47	209	187	27	146	104
Xiapu (Huizhou)	30	145	124	48	142	135	28	130	112
Shixia (Huizhou)	53	178	138	49	179	163	28	180	160
Jinguowan (Huizhou)	22	141	112	27	126	121	17	123	106
Zimaling (Zhongshan)	28	188	167	38	225	174	11	159	133
Nanchengyuanling (Dongguan)	36	231	181	29	199	179	20	185	137
Tap Mun (Hong Kong)	54	162	147	63	171	153	37	166	138
Tsuen Wan (Hong Kong)	43	136	120	53	129	110	18	99	82
Yuen Long (Hong Kong)	27	151	142	46	169	140	14	151	101
Tung Chung (Hong Kong)	27	166	122	44	153	116	7	122	89
Taipa Grande (Macao)	34	177	164	52	238	165	11	151	126

Table 4.3c：The monthly averages of O₃

Monitoring Station	October 2023	November 2023	December 2023
Luhu (Guangzhou)	58	51	37
Nanshadawen (Guangzhou)	73	66	40
Nansha-HKUST (Guangzhou)	66	71	44
Tianhu (Guangzhou)	83	102	77
Zhudong (Guangzhou)	56	58	40
Tongxinling (Shenzhen)	74	74	52
Jinjuzui (Foshan)	61	61	39
Huijingcheng (Foshan)	62	57	36
Tangjia (Zhuhai)	81	77	51
Donghu (Jiangmen)	77	74	46
Duanfen (Jiangmen)	68	67	50
Huaguoshan (Jiangmen)	58	60	35
Chengzhong (Zhaoqing)	70	65	46
Xiapu (Huizhou)	67	70	52
Shixia (Huizhou)	75	77	60
Jinguowan (Huizhou)	57	61	49
Zimaling (Zhongshan)	72	69	44
Nanchengyuanling (Dongguan)	73	69	49
Tap Mun (Hong Kong)	88	95	72
Tsuen Wan (Hong Kong)	69	67	45
Yuen Long (Hong Kong)	70	64	46
Tung Chung (Hong Kong)	62	61	39
Taipa Grande (Macao)	87	92	56

Table 4.4a：The monthly maxima and minima of hourly averages of CO

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	0.5	1.3	0.4	1.1	0.3	1.6
Nanshadawen (Guangzhou)	0.7	1.6	0.5	1.5	0.4	1.9
Nansha-HKUST (Guangzhou)	0.1	1.0	0.1	1.1	0.3	1.4
Tianhu (Guangzhou)	0.3	0.8	0.2	1.2	0.2	1.1
Zhudong (Guangzhou)	0.4	1.0	0.4	1.6	0.3	1.3
Tongxinling (Shenzhen)	0.0	1.1	0.0	1.4	0.3	1.5
Jinjuzui (Foshan)	0.2	1.2	0.4	1.3	0.3	2.1
Huijingcheng (Foshan)	0.5	1.7	0.6	2.2	0.4	2.8
Tangjia (Zhuhai)	0.3	0.8	0.2	0.8	0.2	1.0
Donghu (Jiangmen)	0.4	1.5	0.4	2.7	0.4	2.4
Duanfen (Jiangmen)	0.5	1.0	0.4	1.1	0.2	1.1
Huaguoshan (Jiangmen)	0.3	1.1	0.2	1.5	0.2	1.4
Chengzhong (Zhaoqing)	0.5	1.1	0.3	1.2	0.2	1.6
Xiapu (Huizhou)	0.5	0.9	0.3	1.3	0.4	2.0
Shixia (Huizhou)	0.4	1.1	0.2	1.1	0.5	1.7
Jinguowan (Huizhou)	0.6	0.9	0.4	1.0	0.5	1.0
Zimaling (Zhongshan)	0.3	0.8	0.3	1.0	0.3	1.2
Nanchengyuanling (Dongguan)	0.5	1.1	0.5	1.4	0.5	1.8
Tap Mun (Hong Kong)	0.2	0.9	0.3	1.0	0.3	0.8
Tsuen Wan (Hong Kong)	0.4	1.0	0.3	1.2	0.3	1.5
Yuen Long (Hong Kong)	0.4	1.2	0.3	1.1	0.5	1.6
Tung Chung (Hong Kong)	0.4	0.8	0.3	0.7	0.4	1.3
Taipa Grande (Macao)	0.4	1.1	0.4	1.1	0.4	1.1

Table 4.4b：Daily averages of CO (the monthly maxima, minima and the 95th percentile)

Monitoring Station	October 2023			November 2023			December 2023		
	Min	Max	95th per	Min	Max	95th per	Min	Max	95th per
Luhu (Guangzhou)	0.5	0.9	0.8	0.5	0.8	0.8	0.5	0.9	0.9
Nanshadawen (Guangzhou)	0.8	1.1	1.1	0.6	1.1	1.1	0.5	1.2	1.2
Nansha-HKUST (Guangzhou)	0.2	0.9	0.9	0.2	0.9	0.9	0.4	1.1	0.9
Tianhu (Guangzhou)	0.4	0.8	0.7	0.3	1.0	1.0	0.3	0.9	0.9
Zhudong (Guangzhou)	0.5	0.9	0.9	0.6	1.0	1.0	0.4	1.1	1.0
Tongxinling (Shenzhen)	0.2	0.9	0.9	0.1	0.8	0.8	0.5	0.9	0.9
Jinjuzui (Foshan)	0.4	0.7	0.7	0.5	0.9	0.9	0.4	1.0	0.9
Huijingcheng (Foshan)	0.6	1.2	1.1	0.6	1.5	1.3	0.5	1.7	1.4
Tangjia (Zhuhai)	0.3	0.7	0.7	0.3	0.6	0.6	0.4	0.9	0.9
Donghu (Jiangmen)	0.5	0.9	0.8	0.5	1.1	1.0	0.5	1.3	1.1
Duanfen (Jiangmen)	0.6	0.9	0.9	0.5	0.9	0.8	0.4	1.0	1.0
Huaguoshan (Jiangmen)	0.5	0.9	0.9	0.5	0.9	0.8	0.5	1.0	0.9
Chengzhong (Zhaoqing)	0.5	0.8	0.8	0.4	0.9	0.9	0.4	1.0	1.0
Xiapu (Huizhou)	0.6	0.8	0.8	0.5	0.8	0.8	0.5	0.9	0.9
Shixia (Huizhou)	0.4	0.9	0.9	0.3	0.9	0.8	0.6	1.0	0.9
Jinguowan (Huizhou)	0.6	0.9	0.8	0.5	1.0	0.9	0.5	0.8	0.8
Zimaling (Zhongshan)	0.3	0.7	0.7	0.4	0.8	0.7	0.4	0.9	0.8
Nanchengyuanling (Dongguan)	0.6	0.9	0.9	0.6	1.0	1.0	0.6	1.3	1.1
Tap Mun (Hong Kong)	0.2	0.8	0.8	0.3	0.8	0.8	0.3	0.7	0.7
Tsuen Wan (Hong Kong)	0.5	0.9	0.8	0.4	0.9	0.9	0.4	0.9	0.9
Yuen Long (Hong Kong)	0.5	1.0	0.9	0.4	0.8	0.8	0.6	1.0	0.9
Tung Chung (Hong Kong)	0.4	0.6	0.6	0.4	0.6	0.6	0.5	0.9	0.8
Taipa Grande (Macao)	0.5	0.9	0.9	0.5	0.9	0.9	0.5	1.0	1.0

Table 4.4c：The monthly averages of CO

Monitoring Station	October 2023	November 2023	December 2023
Luhu (Guangzhou)	0.6	0.7	0.7
Nanshadawen (Guangzhou)	1.0	0.9	0.8
Nansha-HKUST (Guangzhou)	0.5	0.5	0.7
Tianhu (Guangzhou)	0.6	0.7	0.6
Zhudong (Guangzhou)	0.7	0.8	0.8
Tongxinling (Shenzhen)	0.7	0.6	0.7
Jinjuzui (Foshan)	0.6	0.7	0.7
Huijingcheng (Foshan)	0.8	0.9	0.9
Tangjia (Zhuhai)	0.5	0.5	0.6
Donghu (Jiangmen)	0.7	0.7	0.7
Duanfen (Jiangmen)	0.8	0.7	0.7
Huaguoshan (Jiangmen)	0.7	0.7	0.7
Chengzhong (Zhaoqing)	0.7	0.7	0.7
Xiapu (Huizhou)	0.7	0.7	0.7
Shixia (Huizhou)	0.7	0.6	0.7
Jinguowan (Huizhou)	0.7	0.7	0.7
Zimaling (Zhongshan)	0.5	0.6	0.6
Nanchengyuanling (Dongguan)	0.8	0.8	0.9
Tap Mun (Hong Kong)	0.6	0.6	0.5
Tsuen Wan (Hong Kong)	0.7	0.6	0.6
Yuen Long (Hong Kong)	0.7	0.6	0.8
Tung Chung (Hong Kong)	0.5	0.5	0.7
Taipa Grande (Macao)	0.7	0.7	0.8

Table 4.5a：The monthly maxima and minima of daily averages of PM$_{10}$

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	11	68	14	99	14	86
Nanshadawen (Guangzhou)	13	78	18	116	15	125
Nansha-HKUST (Guangzhou)	14	66	19	111	26	135
Tianhu (Guangzhou)	6	55	7	63	4	54
Zhudong (Guangzhou)	13	91	18	88	8	106
Tongxinling (Shenzhen)	8	51	18	74	18	76
Jinjuzui (Foshan)	13	55	16	112	21	137
Huijingcheng (Foshan)	12	105	21	150	17	144
Tangjia (Zhuhai)	10	52	21	81	21	109
Donghu (Jiangmen)	17	63	18	133	16	140
Duanfen (Jiangmen)	9	55	23	71	18	99
Huaguoshan (Jiangmen)	19	69	25	120	17	128
Chengzhong (Zhaoqing)	7	74	13	115	6	135
Xiapu (Huizhou)	8	56	13	86	16	87
Shixia (Huizhou)	6	63	12	71	18	84
Jinguowan (Huizhou)	5	40	8	69	12	58
Zimaling (Zhongshan)	11	56	20	74	19	97
Nanchengyuanling (Dongguan)	8	68	13	105	14	108
Tap Mun (Hong Kong)	5	40	14	52	8	46
Tsuen Wan (Hong Kong)	2	42	12	45	16	68
Yuen Long (Hong Kong)	4	45	17	59	13	71
Tung Chung (Hong Kong)	6	44	11	59	10	68
Taipa Grande (Macao)	10	56	27	104	20	100

Table 4.5b：The monthly averages of PM$_{10}$

Monitoring Station	October 2023	November 2023	December 2023
Luhu (Guangzhou)	33	56	50
Nanshadawen (Guangzhou)	41	64	60
Nansha-HKUST (Guangzhou)	41	63	62
Tianhu (Guangzhou)	23	38	30
Zhudong (Guangzhou)	37	58	48
Tongxinling (Shenzhen)	30	45	47
Jinjuzui (Foshan)	36	60	70
Huijingcheng (Foshan)	43	71	73
Tangjia (Zhuhai)	33	48	51
Donghu (Jiangmen)	41	62	63
Duanfen (Jiangmen)	32	45	46
Huaguoshan (Jiangmen)	44	66	65
Chengzhong (Zhaoqing)	36	61	53
Xiapu (Huizhou)	34	55	48
Shixia (Huizhou)	28	46	40
Jinguowan (Huizhou)	25	38	33
Zimaling (Zhongshan)	34	47	49
Nanchengyuanling (Dongguan)	34	58	54
Tap Mun (Hong Kong)	22	30	28
Tsuen Wan (Hong Kong)	22	30	34
Yuen Long (Hong Kong)	26	36	40
Tung Chung (Hong Kong)	25	31	26
Taipa Grande (Macao)	38	56	62

Table 4.6a： The monthly maxima and minima of daily averages of PM$_{2.5}$

Monitoring Station	October 2023		November 2023		December 2023	
	Min	Max	Min	Max	Min	Max
Luhu (Guangzhou)	6	43	7	51	7	54
Nanshadawen (Guangzhou)	8	46	10	65	11	71
Nansha-HKUST (Guangzhou)	5	36	6	47	8	62
Tianhu (Guangzhou)	4	38	5	36	6	52
Zhudong (Guangzhou)	7	61	9	58	6	60
Tongxinling (Shenzhen)	2	32	7	41	7	46
Jinjuzui (Foshan)	6	35	6	48	10	65
Huijingcheng (Foshan)	4	32	7	65	7	55
Tangjia (Zhuhai)	4	36	8	50	6	91
Donghu (Jiangmen)	5	38	4	76	5	91
Duanfen (Jiangmen)	5	38	11	50	9	61
Huaguoshan (Jiangmen)	9	44	12	71	9	72
Chengzhong (Zhaoqing)	4	52	6	69	3	79
Xiapu (Huizhou)	5	35	7	43	9	47
Shixia (Huizhou)	4	47	6	50	9	64
Jinguowan (Huizhou)	4	31	6	35	8	33
Zimaling (Zhongshan)	8	41	11	55	8	61
Nanchengyuanling (Dongguan)	4	41	6	52	7	62
Tap Mun (Hong Kong)	2	26	8	28	5	28
Tsuen Wan (Hong Kong)	3	29	8	29	9	56
Yuen Long (Hong Kong)	3	29	9	36	9	57
Tung Chung (Hong Kong)	5	30	6	40	5	48
Taipa Grande (Macao)	2	29	8	47	7	57

Table 4.6b：The monthly averages of PM$_{2.5}$

Monitoring Station	October 2023	November 2023	December 2023
Luhu (Guangzhou)	22	29	30
Nanshadawen (Guangzhou)	26	34	35
Nansha-HKUST (Guangzhou)	20	26	29
Tianhu (Guangzhou)	16	23	22
Zhudong (Guangzhou)	25	35	30
Tongxinling (Shenzhen)	17	23	26
Jinjuzui (Foshan)	19	26	29
Huijingcheng (Foshan)	18	29	29
Tangjia (Zhuhai)	19	25	32
Donghu (Jiangmen)	22	31	36
Duanfen (Jiangmen)	19	25	28
Huaguoshan (Jiangmen)	28	36	36
Chengzhong (Zhaoqing)	25	37	32
Xiapu (Huizhou)	22	28	27
Shixia (Huizhou)	22	30	28
Jinguowan (Huizhou)	19	22	21
Zimaling (Zhongshan)	23	27	32
Nanchengyuanling (Dongguan)	21	28	30
Tap Mun (Hong Kong)	13	16	17
Tsuen Wan (Hong Kong)	15	17	23
Yuen Long (Hong Kong)	18	20	26
Tung Chung (Hong Kong)	17	17	14
Taipa Grande (Macao)	16	20	27

Annex A：Site Information of Monitoring Stations

Monitoring Stations	Address	Area Type	Sampling Height (Above P.D.)	Above Ground	Date Commenced Operation
Luhu (Guangzhou)	Jufong Garden of Luhu Park (Big yard, No. 11 Luhu Park)	City	30m	9m	Jan 1993
Nanshadawen[4] (Guangzhou)	Shinan Road, Dongchong Town, Nansha	City	23m	10m	Jan 2021
Nansha-HKUST[5] (Guangzhou)	HKUST Fok Ying Tung Research Institute, Nansha	Mixed educational/ commercial and residential/industrial	54m	28m	Oct 2004
Tianhu (Guangzhou)	Tianhu Park, Conghua	Background : rural	251m	13m	Oct 2004
Zhudong (Guangzhou)	Zhudong Village Committee, Chini Town, Huadu District	Rural	19m	10m	Dec 2011
Tongxinling[6] (Shenzhen)	Shennan Zhong Road, Futian District	City	38m	12m	Sep 1997
Jinjuzui (Foshan)	Foshan City Communist Party School, Jinjuzui, Shunde District	Tourist and cultural /educational	27m	17m	Oct 1999
Huijingcheng (Foshan)	No. 127, Fenjiang Nan Road, Chancheng District	Urban: mixed residential/commercial / industrial	24m	14m	Feb 2000
Tangjia (Zhuhai)	Qiao Island Mangrove Monitoring Station, Tangjia Town	Touristl/ eco-protected	13m	13m	Jan 2010
Donghu (Jiangmen)	Donghu Park, Jiangmen	City	17.5m	5m	Nov 2001
Duanfen (Jiangmen)	Duanfen Middle School, Taishan	Rural	15m	12m	Dec 2011
Huaguoshan (Jiangmen)	Huaguoshan, Taoyuan, Heshan	Rural	25m	15m	Feb 2012
Chengzhong (Zhaoqing)	No. 63, Zhengdong Road, Duanzhou District	Urban: mixed residential/commercial	38m	16m	Jun 2001

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[4] Modiesha (Guangzhou) station closed permanently owing to insufficient space after the extensive renovation work at station, whereas Nanshadawen (Guangzhou) station joined the network in the 1st quarter of 2021.

[5] Wanqingsha (Guangzhou) station was renamed as Nansha-HKUST (Guangzhou) station in the 1st quarter of 2019.

[6] Liyuan (Shenzhen) station was renamed as Tongxinling (Shenzhen) station in the 1st quarter of 2019.

Xiapu (Huizhou)	No. 4 Xiabuhengjiang Road No. 3, Huicheng District	Urban: commercial	49m	20m	Dec 1999
Shixia [7] (Huizhou)	Community Service Center, Shixiatun Village, Changning Town	Rural	44m	10m	Dec 2011
Jinguowan (Huizhou)	Jinguowan Ecological Farm, Huizhou	Residential	77m	8m	Oct 2004
Zimaling (Zhongshan)	Zimaling Park, Zhongshan	Mixed residential/ commercial	45 m	7m	Aug 2002
Nancheng-yuanling [8] (Dongguan)	Dongguan administration center	Mixed residential/ commercial/industrial	40 m	19m	May 2021
Tap Mun (Hong Kong)	Tap Mun Police Station	Background: rural	26m	11m	Apr 1998
Tsuen Wan (Hong Kong)	60 Tai Ho Road, Tsuen Wan	Urban: mixed residential/commercial / industrial	21m	17m	Aug 1988
Yuen Long (Hong Kong)	Yuen Long District Office, 269 Castle Peak Road, Yuen Long	New Town: residential	31m	25m	Jul 1995
Tung Chung (Hong Kong)	6 Fu Tung Street, Tung Chung	New Town: residential	34.5m	27.5m	Apr 1999
Taipa Grande (Macao)	Rampa do Observatorio, Taipa Grande	Rural	120m	3m (gaseous pollutants)[9]/ 5m (particulate matter)	Mar 1999

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[7] Xijiao (Huizhou) station was relocated to a monitoring station located in Shixiatun Village, Changning Town, Boluo County, Huizhou City in the 2nd quarter of 2023, and changed its name to " Shixia (Huizhou)"

[8] Nancheng-yuanling (Dongguan) station was relocated to Dongguan administration center in May 2021. The distance between the old and new sites is about 600 metres.

[9] Gaseous pollutants include Sulphur dioxide (SO_2), Nitrogen dioxide (NO_2), Ozone (O_3) and Carbon monoxide (CO).

Annex B: Measurement Methods of Air Pollutant Concentration

Pollutants	Measuring Principles
Sulphur dioxide (SO_2)	UV fluorescence / Differential Optical Absorption Spectroscopy
Nitrogen dioxide (NO_2)	Chemiluminescence / Differential Optical Absorption Spectroscopy
Ozone (O_3)	UV absorption / Differential Optical Absorption Spectroscopy
Respirable suspended particulates (PM_{10})	Oscillating microbalance (TEOM) / Beta particulate monitor
Fine suspended particulates ($PM_{2.5}$)	Oscillating microbalance (TEOM) / Beta particulate monitor / Hybrid nephelometric / radiometric particulate mass monitor
Carbon monoxide (CO)	Gas filter correlation infrared absorption method / Non-dispersive infrared absorption method