3. AIR QUALITY

3.1 Introduction

3.1.1 This section presents the assessment on the potential air quality impacts that are likely to be generated during the construction and operation phases of the upgrading of the Tai O Sewage Treatment Works (Tai O STW), construction of Fan Kwai Tong Sewage Pumping Station (Fan Kwai Tong SPS) and Hang Mei Sewage Pumping Station (Hang Mei SPS) and the sewers works in Tai O. Appropriate mitigation measures were identified, where necessary, to mitigate the potential air quality impacts to acceptable levels.

3.1.2 This assessment has based on the criteria and guidelines for evaluation and assessment of air quality impacts as stated in Annexes 4 and 12 of the TM-EIAO and has covered the scope outlined in Section 3.4.1 of the EIA Study Brief.

3.2 Relevant Legislations, Standards & Guidelines

Environmental Impact Assessment Ordinance

3.2.1 For construction dust impact assessment, Annex 4 of TM-EIAO stipulates an hourly averaged of Total Suspended Particulate (TSP) concentration of 500 $\mu g/m^3$ measured at 298K (25°C) and 101.325kPa (1 atmosphere) should be met.

3.2.2 For odour impact assessment, Annex 4 of TM-EIAO stipulates an odour limit of 5 odour units based on an averaging time of 5 seconds at an air sensitive receiver should be met.

Air Pollution Control Ordinance

3.2.3 Hong Kong's air quality is regulated through the Air Pollution Control Ordinance (Cap. 311) (APCO). The APCO specifies Air Quality Objectives (AQOs), which are the statutory limits for pollutants and the maximum allowable number of times that these may be exceeded over specified periods. The AQOs that have been defined for the Criteria Pollutants (CP) are given in **Table 3.1**.

Table 3.1 : Hong Kong Air Quality Objectives

Pollutant	Averaging time	Concentration limit [1] ($\mu g/m^3$)	Number of exceedances allowed
Sulphur dioxide, SO_2	10-minute	500	3
	Daily	125	3
Respirable suspended particulates (PM10), RSP [2]	Daily	100	9
	Annual	50	Not applicable
Fine suspended particulates (PM2.5), FSP [3]	Daily	75	9
	Annual	35	Not applicable
Nitrogen Dioxide, NO_2	1-hour	200	18
	Annual	40	Not applicable
Ozone, O_3	8-hour	160	9
Carbon Monoxide, CO	1-hour	30,000	0
	8-hour	10,000	0
Lead	Annual	0.5	Not applicable

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 means suspended particles in air with a nominal aerodynamic diameter of 10 µm or less.

[3] Fine suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 2.5 µm or less.

Air Pollution Control (Construction Dust) Regulation

3.2.4 The APCO's subsidiary regulation Air Pollution Control (Construction Dust) Regulation defines notifiable and regulatory works activities that are subject to construction dust control.

Notifiable Works:

- Site formation;
- Reclamation;
- Demolition of a building;
- Work carried out in any part of a tunnel that is within 100m of any exit to the open air;
- Construction of the foundation of a building;
- Construction of the superstructure of a building; or
- Road construction work.

Regulatory Works:

- Renovation carried out on the outer surface of the external wall or the upper surface of the roof of a building;
- Road opening or resurfacing work;
- Slope stabilization work; or
- Any work involving any of the following activities-
  - Stockpiling of dusty materials;
  - Loading, unloading or transfer of dusty materials;
  - Transfer of dusty materials using a belt conveyor system;
  - Use of vehicles;
  - Pneumatic or power-driven drilling, cutting and polishing;
  - Debris handling;
  - Excavation or earth moving;
  - Concrete production;
  - Site clearance; or
  - Blasting.

3.2.5 Notifiable works require that advance notice of activities to be given to EPD. The Regulation also requires the works contractor to ensure that both notifiable works and regulatory works will be conducted in accordance with the Schedule of the Regulation, which provides dust control and suppression measures.

Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation

3.2.6 The Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation comes into operation on 1 June 2015. Under the Regulation, Non-road mobile machinery (NRMMs), except those exempted, are required to comply with the prescribed emission standards. From 1 September 2015, 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. Starting from 1 December 2015, only approved or exempted NRMMs with a proper label are allowed to be used in specified activities and locations including construction sites. The Contractor is required to ensure the adopted machines or non-road vehicle under the Project could meet the prescribed emission standards and requirement.

3.3 Baseline Environmental Conditions

3.3.1 The proposed sewage treatment upgrading works would be undertaken within the existing Tai O STW, Hang Mei and Fan Kwai Tong which are located at seashore at North of Tai O, Wang Hang Tsuen near Tai O Road and Nam Chung Tsuen, respectively.

3.3.2 The major land uses in the vicinity of the Project area include residential villages, local retail, knoll and marine environs. Tai O Road is the only road with vehicles activities in the area. Tai O Village is generally car-free except the common used transportation within the area by village vehicles called "VV vehicle" and the emergency vehicles.

3.3.3 Site visits to Tai O were conducted in March and October 2011. There were no major air pollution sources identified in the Project area. During the site visits to the existing Tai O STW, slight odour level was perceived in the uncovered areas of the sewage treatment facility such as the wet wells and screening at Tai O STW. Very weak or no odour was detected in other areas within the Tai O STW. No odour was detected outside the boundary of the Tai O STW and at the site locations of the proposed Hang Mei SPS and Fan Kwai Tong SPS. Recent visits were conducted in December 2014. No significant change in the Tai O STW and the two SPS's surrounding areas based on site observation.

3.3.4 There is currently no EPD-operated air quality monitoring station located in Tai O area. Historical air quality monitoring data from the nearest station, namely Tung Chung Air Quality Monitoring Station operated by EPD is taken to present the historical trend of the air quality condition near Tai O area. **Table 3.2** summarizes the historical air quality monitoring data at the Tung Chung Air Quality Monitoring Station from Year 2011 to Year 2015.

Table 3.2 Historical air quality monitoring data from Year 2011 to 2015 at EPD's Air Quality Monitoring Station (Tung Chung)

Pollutant	Year	Concentration of Averaging Time (µg/m^3)								
		10-min	1-Hour		Daily 8-Hour		Daily Concentration			Annual
		Highest	Highest	19th Highest	Highest	10th Highest	Highest	4th Highest	10th Highest	
SO_2	2011	N/A	90	N/A	N/A	N/A	52	38	N/A	N/A
	2012	N/A	91	N/A	N/A	N/A	38	33	N/A	N/A
	2013	N/A	96	N/A	N/A	N/A	54	39	N/A	N/A
	2014	91	82	N/A	N/A	N/A	41	35	N/A	N/A
	2015	99	90	N/A	N/A	N/A	38	22	N/A	N/A
	5-year mean	N/A	90	N/A	N/A	N/A	45	33	N/A	N/A
	AQO[1]	500 (3)	N/A	N/A	N/A	N/A	125 (3)		N/A	N/A
RSP (PM10)	2011	N/A	N/A	N/A	N/A	N/A	142	N/A	109	47
	2012	N/A	N/A	N/A	N/A	N/A	162	N/A	106	45
	2013	N/A	N/A	N/A	N/A	N/A	133	N/A	108	42
	2014	N/A	N/A	N/A	N/A	N/A	125	N/A	101	39
	2015	N/A	N/A	N/A	N/A	N/A	158	N/A	93	36
	5-year mean	N/A	N/A	N/A	N/A	N/A	144	N/A	103	42
	AQO[1]	N/A	N/A	N/A	N/A	N/A	100 (9)	N/A	100 (9)	50

Pollutant	Year	Concentration of Averaging Time (μg/m³)								
		10-min	1-Hour		Daily 8-Hour		Daily Concentration			Annual
		Highest	Highest	19th Highest	Highest	10th Highest	Highest	4th Highest	10th Highest	
FSP (PM2.5)	2011	N/A	N/A	N/A	N/A	N/A	96	N/A	78	32
	2012	N/A	N/A	N/A	N/A	N/A	103	N/A	74	28
	2013	N/A	N/A	N/A	N/A	N/A	93	N/A	76	26
	2014	N/A	N/A	N/A	N/A	N/A	85	N/A	65	24
	2015	N/A	N/A	N/A	N/A	N/A	126	N/A	65	22
	5-year mean	N/A	N/A	N/A	N/A	N/A	101	N/A	72	26
	AQO[1]	N/A	N/A	N/A	N/A	N/A	75 (9)	N/A	75 (9)	35
NO_2	2011	N/A	228	184	N/A	N/A	N/A	N/A	N/A	51
	2012	N/A	236	166	N/A	N/A	N/A	N/A	N/A	43
	2013	N/A	210	177	N/A	N/A	N/A	N/A	N/A	49
	2014	N/A	275	198	N/A	N/A	N/A	N/A	N/A	45
	2015	N/A	264	162	N/A	N/A	N/A	N/A	N/A	40
	5-year mean	N/A	243	177	N/A	N/A	N/A	N/A	N/A	46
	AQO[1]	N/A	200 (18)		N/A	N/A	N/A	N/A	N/A	40
O_3	2011	N/A	N/A	N/A	228	189	N/A	N/A	N/A	N/A
	2012	N/A	N/A	N/A	268	197	N/A	N/A	N/A	N/A
	2013	N/A	N/A	N/A	234	171	N/A	N/A	N/A	N/A
	2014	N/A	N/A	N/A	278	175	N/A	N/A	N/A	N/A
	2015	N/A	N/A	N/A	242	176	N/A	N/A	N/A	N/A
	5-year mean	N/A	N/A	N/A	250	182	N/A	N/A	N/A	N/A
	AQO[1]	N/A	N/A	N/A	160 (9)		N/A	N/A	N/A	N/A
CO	2011	N/A	2,290	N/A	2,188	N/A	N/A	N/A	N/A	N/A
	2012	N/A	2,660	N/A	2,461	N/A	N/A	N/A	N/A	N/A
	2013	N/A	1,810	N/A	1,640	N/A	N/A	N/A	N/A	N/A
	2014	N/A	2,230	N/A	1,692	N/A	N/A	N/A	N/A	N/A
	2015	N/A	1,780	N/A	1,416	N/A	N/A	N/A	N/A	N/A
	5-year mean	N/A	2,154	N/A	1,879	N/A	N/A	N/A	N/A	N/A
	AQO	N/A	30,000	N/A	10,000	N/A	N/A	N/A	N/A	N/A
TSP	2011	N/A	N/M	N/A	N/A	N/A	141	N/A	N/A	N/A
	2012	N/A	N/M	N/A	N/A	N/A	176	N/A	N/A	N/A
	2013	N/A	N/M	N/A	N/A	N/A	150	N/A	N/A	N/A
	2014	N/A	N/M	N/A	N/A	N/A	N/M	N/A	N/A	N/A
	2015	N/A	N/M	N/A	N/A	N/A	N/M	N/A	N/A	N/A
	5-year mean	N/A	N/M	N/A	N/A	N/A	156#	N/A	N/A	N/A
	AQO	N/A	500 [2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

[1] Values in ( ) mean the number of exceedances allowed.

[2] Not an AQO but is a criterion for evaluating construction dust impacts as stated in Annex 4 of TM-EIAO.

N/A – Not applicable since there are no AQOs for these parameters.

N/M – Not Measured.

– The TSP is not measured in 2014 and hence has not been taken to calculate the 5-year mean

3.3.5 Odour patrol was conducted in areas near the Tai O STW, proposed Hang Mei SPS and proposed Fan Kwai Tong SPS to review the existing background odour intensity of ambient air in the vicinity of the three locations in August 2012. As there has been no major change of land uses in the vicinity of these sites since the odour patrol was conducted, the background odour conditions are expected to be unchanged.

3.3.6 Based on the odour patrol survey results, sewage type odour was detected in areas close to the Tai O STW. No sewage type odour was detected in the other two surveyed locations near the proposed SPS's locations. Details of the odour survey methodology, locations and survey results are provided in **Appendix 3.1**.

3.4 Air Sensitive Receivers

3.4.1 The assessment area for air quality impact is defined by a distance of 500 meters from the boundary of the Project site. Within the assessment area, representative Air Sensitive Receivers (ASRs) have been identified, in accordance with the Annex 12 of the TM-EIAO. Domestic premises, hotel, hostel, hospital, clinic, nursery, temporary housing accommodation, school, educational institution, office, factory, shop, shopping centre, home for the aged and recreational activity areas are classified as ASRs.

3.4.2 The ASRs in the vicinity of the proposed works site were identified for the assessment and the locations of these ASRs and their nearest horizontal separation from the proposed works are listed in **Table 3.3:. Figure 3.1** to **Figure 3.14** show the locations of the ASRs.

Table 3.3: Representative Air Sensitive Receivers

ASR ID	Description of ASR	Nature of Use	Horizontal Distance to Nearest Works Area (m)	Nearest Works	Figure No.
SST*	CZSA Drug Treatment and Rehabilitation Centre for Male Drug Abusers**	Rehab Centre	1	Sewers works	3.1
RA*	Resting Area at Kau San Tei	Recreational activity areas	71	Sewers works	3.1
HST	Hung Shing Temple	Temple	19	Sewers works	3.3
SWCC	Hong Kong Shaolin Wushu Culture Centre	Recreational activity areas	6	Sewers works	3.3
STP3	No.6 Shek Tsai Po Street	Residential	1	Sewers works	3.3
STP2	No.16 Shek Tsai Po Street	Residential	1	Sewers works	3.3
STA1	No. 92 Shek Tsai Po Street	Residential	1	Sewers works	3.4
STA2	Tai O Alliance Church, Shek Tsai Po Street Section A	Church	1	Sewers works	3.3
STP4	No.88 Shek Tsai Po Street	Residential	1	Sewers works	3.4
STP5	No.21 Shek Tsai Po Street	Residential	1	Sewers works	3.4
STP6	No. 106 Shek Tsai Po Street	Residential	6	Sewers works	3.5
STP7	No. 100B Shek Tsai Po Street	Residential	7	Sewers works	3.3
STP	No. 63 Shek Tsai Po Street	Residential	1	Sewers works	3.4
STP1	No.391A Shek Tsai Po Street	Residential	1	Sewers works	3.5
PCT1*	No. 104 Po Chue Tam	Residential	135	Sewers works	3.2
PCT2*	No. 95 Po Chue Tam	Residential	8	Sewers works	3.2
TOJCC	Tai O Jockey Club Clinic	Clinic	9	Sewers works	3.5
TOTH	Tai O Town Hall	Recreational activity areas	2	Sewers works	3.5
KHB1	No. 81 Kat Hing Back Street	Residential	2	Sewers works	3.6
KHB2	No.33 Kat Hing Back Street	Residential	2	Sewers works	3.6
KHB3	No.69 Kat Hing Back Street	Residential	2	Sewers works	3.6
TOM	No.4 Tai O Market Street	Residential	1	Sewers works	3.6
TOWO1	No.10 Tai O Wing On Street	Residential	1	Sewers works	3.7
TWO2	No.25 Tai O Wing On Street	Residential	1	Sewers works	3.7

ASR ID	Description of ASR	Nature of Use	Horizontal Distance to Nearest Works Area (m)	Nearest Works	Figure No.
TOWO2	No.52 Tai O Wing On Street	Residential	1	Sewers works	3.7
TWO3	Christian and Missionary Alliance Tai O Kindergarten	Educational	1	Sewers works	3.7
TOWO3	No.100 Tai O Wing On Street	Residential	1	Sewers works	3.7
TOTP4	Wing Chor School	School	6	Sewers works	3.7
TTP2	No. 135 Tai O Tai Ping Street	Residential	1	Sewers works	3.7
TOTP3	No.150 Tai O Tai Ping Street	Residential	1	Sewers works	3.6
TTP1	No.178 Tai O Tai Ping Street	Residential	1	Sewers works	3.6
TOTP1	No.190 Tai O Tai Ping Street	Residential	2	Sewers works	3.6
BCM	Buddhist Cheung Mui Kwai Kindergarten	School	49	Sewers works	3.11
LHC	Lun Hin House, Lung Hin Court	Residential	14	Sewers works	3.7
KHH	Kam Him House	Residential	17	Sewers works	3.7
RG	Rest Garden, Tai O Road	Recreational activity areas	1	Sewers works	3.7
YTP*	Yim Tin Playground	Recreational activity areas	76	Sewers works	3.8
BHMC*	Buddhist Fat Ho Memorial College	School	32	Sewers works	3.11
TOFS*	Tai O Fire Station	GIC	17	Sewers works	3.11
WHV3*	No.1 Wang Hang Village	Residential	1	Sewers works	3.13
WHV2*	No. 4 Wang Hang Village	Residential	1	Sewers works	3.13
WHV1*	Wah Kwong Temple (Wang Hang Village)	Temple	1	Sewers works	3.13
WHV5*	No.14 Wang Hang Village	Residential	9	Sewers works	3.14
WHV4*	No.21 Wang Hang Village	Residential	1	Sewers works	3.14
WHV4a*	No.22 Wang Hang Village	Residential	1	Sewers works	3.14
WHV6*	No.18 Wang Hang Village	Residential	1	Sewers works	3.14
WHV7*	No. 25 Wang Hang Village	Residential	7	Sewers works	3.14
LUT4*	No.18 Leung UK Tsuen	Residential	1	Sewers works	3.9
LUT2*	No.21A Leung UK Tsuen	Residential	3	Sewers works	3.9
LUT1*	No.53 Leung UK Tsuen	Residential	1	Sewers works	3.9
LUT3*	No.52 Leung UK Tsuen	Residential	1	Sewers works	3.9
LUPG*	Leung Uk Playground	Recreational activity areas	1	Sewers works	3.9
NCT1*	No. 6 Nam Chung Tsuen	Residential	3	Sewers works	3.10
NCT3*	No. 7C Nam Chung Tsuen	Residential	1	Sewers works	3.10
NCT2*	No. 7I Nam Chung Tsuen	Residential	2	Sewers works	3.10
NCT5*	No. 9 Nam Chung Tsuen	Residential	15	Fan Kwai Tong SPS	3.10
PT2*[1]	Nam Chung Village Aqua Privy	GIC	1	Sewers works	3.10
NCT6*	No.10 Nam Chung Tsuen	Residential	8	Sewers works	3.10
NCT4*	No. 24 Nam Chung Tsuen	Residential	8	Sewers works	3.10
NTST1*	No.4 Nam Tong Sun Tsuen	Residential	1	Sewers works	3.10
GIC1*	Tin Hau Temple	Temple	258	Hang Mei SPS	3.12
GIC2*	Yeung Hau Temple	Temple	200	Sewers works	3.2
GIC3*	Open Area near public toilet of Kat Hing Back Street	GIC	20	Sewers works	3.2

Notes:

* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS

** The site is also known as “St. Stephen’s Tai O Family”.

[1] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.

3.5 Impact Assessment - Construction Phase

3.5.1 The potential air quality impacts arising during construction phase would be dust nuisance from the construction activities and odour emission from the temporary sewage treatment facilities. The construction activities involved for the upgrading of the Tai O STW and construction of the new sewage pumping stations (Hang Mei SPS and Fan Kwan Tong SPS) are generally longer term construction thus are considered to be major construction activities in comparison with the sewer works. Construction works for sewers installation would be of limited scale and short term in nature. The details are provided in the following sections.

Upgrading Works of Tai O STW and Construction of Hang Mei SPS and Fan Kwai Tong SPS

3.5.2 The major construction activities involved for the upgrading of the Tai O STW and construction of the sewage pumping stations (Hang Mei SPS and Fan Kwan Tong SPS) that would be potential source of construction dust include “Earth Handling / Loading, Unloading and stockpiling”, “Removal / unloading soil materials” and wind erosion on site. The construction works for the Tai O STW upgrading, Hang Mei SPS and Fan Kwan Tong SPS construction works will be confined within the proposed boundary.

3.5.3 In view of the traffic-free nature of Tai O, trucks hauling offsite is not expected. Vehicular movement on-site will only be limited to the small scale “VV vehicle” and the number that would be in use is expected to be low.

3.5.4 According to the design information at the time of preparation of this EIA, the existing treatment system will be decommissioned once sewage flow is switched over to the new temporary sewage treatment facilities. The existing treatment unit will be de-sludged using a conventional suction tanker and thoroughly refilled with clean water while pending demolition. Therefore, the existing system will not contribute any odour impact because all residual sludge will be removed.

3.5.5 The temporary sewage treatment facilities will comprise a small modern packaged type treatment unit. Modern packaged treatment units are typically based around a version of the activated sludge process, an aerobic biological treatment process treating to high quality secondary treated effluent level. Therefore, the temporary treatment facilities will generate less odour than the existing simple Imhoff Tank septic type treatment process. The sewage sludge from the temporary sewage treatment facilities will be transported to an enclosed sludge container by a fully enclosed piping system. Engineer confirmed that no venting for the enclosed sludge container and the sludge will be transferred through enclosed piping system. No odour emission would be anticipated from the sludge container and piping system. Sewage sludge will be disposed of via marine route as per the current operation, no odour impacts would be anticipated due to the transportation of sludge. Hence, odour impact from the temporary sewage treatment facilities would only be caused by the enclosed raw sewage tank through venting installed with dedorizing unit.

3.5.6 Appropriate dust control measures should be implemented during the construction stage in accordance with the requirements in the Air Pollution Control (Construction Dust) Regulation. Dust control techniques should be considered to control dust to a level not exceeding the AQOs as well as the 1-hour TSP guideline level of 500 $\mu g/m^3$. These measures include, but are not limited to, the following:

- Adoption of good site practices;
- Avoid practices likely to raise dust level;
- Frequent cleaning and damping down of stockpiles and dusty areas of the

site;
- Covering the exposed areas with tarpaulin;
- Reducing drop height during material handling;
- Provision of wheel-washing facilities for site vehicles leaving the site;
- Regular plant maintenance to minimize exhaust emission; and
- Sweep up dust and debris at the end of each shift.

Sewers Works

3.5.7 The potential dust generating construction activities associated with the sewers works will mainly be localised excavation. It is expected that the sewers works will be carried out by sections. Under normal practice, the sewers will be constructed in segments of up to 20m in length at any one time and each work front could be separated by a clearance distance. Construction works for each segment would be completed in 30 days with each construction activity would last for 1.5 days to 9 days.

3.5.8 Given each section of the works would be small scale, localised, and short-term, it would not be useful to perform dust dispersion modelling for this type of transient dust generation activities. Dust suppression and control measures stipulated in the Air Pollution Control (Construction Dust) Regulation would be applied.

3.5.9 These measures include, but are not limited to, the following:

- Adoption of good site practices;
- Avoid practices likely to raise dust level;
- Frequent cleaning and damping down of stockpiles and dusty areas of the site;
- Covering the exposed areas with tarpaulin;
- Reducing drop height during material handling;
- Regular plant maintenance to minimize exhaust emission; and
- Sweep up dust and debris at the end of each shift.

3.5.10 There will be no demolition of existing septic tanks under the current design. If it is necessary to demolish the existing septic tank during the construction period, the sludge in the septic tank would be transferred to enclosed container following the same procedure with the regular maintenance works for septic works. Therefore, no additional odour sources would be expected during the construction phase of the sewers works.

Cumulative Dust Impacts and Control Measures

3.5.11 Section 2.16 describes the potential interface issues between concurrent projects. Liaisons with each of the project proponents of these concurrent projects have been made in order to obtain the latest available information and details. The correspondences and the locations of concurrent projects are shown in **Appendix 3.4** and **Appendix 3.6**. Based on the liaison findings, the potential cumulative construction phase impacts are discussed below.

Improvement of Works at Tai O – Design and Construction

3.5.12 Based on the information provided by CEDD, the construction works of Phase 2 Stage 1 of “Improvement Works at Tai O” will tentatively commence in 2016 for completion in late 2018 / early 2019. Most of the construction works of this project in Tai O do not overlap with the project area of Phase 2 Stage 1 of “Improvement Works at Tai O” apart from a small area for the improvement to existing streetscapes in Tai O Yim Tin. The contractor would be requested to coordinate with

the contractor of CEDD and arrange the construction works schedule in order to avoid concurrent works to be carried out under two projects. Based on the latest available information within the report preparation period, there is no interface between the remaining works of "Improvement Works at Tai O" and this project. No cumulative dust impact would be expected.

Natural Terrain Hazard Mitigation Works

3.5.13 Based on the information provided by CEDD/GEO on this project, the contracts were scheduled tentatively to complete in December 2017. No cumulative dust impact would be expected.

Water Supply from Tung Chung to Tai O (Previously named as Improvement of Water Supply for Tai O Facelift)

3.5.14 Based on the information provided by WSD, the in-house design work of this project is suspended currently. No conflicts with this project concerning construction programme are anticipated at the current stage.

Replacement and Rehabilitation of Water Mains Stage 4, Mains On Hong Kong and Islands - Investigation, Design and Construction

3.5.15 The construction of Stage 4 works commenced in mid of 2012 and is anticipated for completion by mid of 2016. No cumulative dust impact would be expected.

HZMB and related projects, including HKLR, HKBCF and TM-CLKL

3.5.16 As the proposed works under HZMB and related projects would be sufficiently far away from the Tai O STW, no cumulative dust impact would be expected.

3.6 Construction Dust Impact Assessment Methodology

Construction Phase

Air Dispersion Model

3.6.1 The air pollutant concentrations were assessed in accordance with the Guidelines for Choice of Models and Model Parameters in Air Quality Assessment published by EPD. The extent of dust impacts arising from the construction phase have been predicted by using the Industrial Source Complex Short-Term 3 (ISCST3) model which has been developed and validated by the United States Environmental Protection Agency (USEPA) and accepted by EPD for regulatory applications.

Emissions Factors

3.6.2 The construction works at the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS site have the potential to generate fugitive dust from various construction activities and these are included in the ISCST3 dispersion model, including:

- Earth Handling / Loading, Unloading and Stockpiling;
- Removal / Unloading soil materials by excavators; and
- Wind erosion.

3.6.3 Whilst emissions from the sewers works are expected to be relatively low when compare with the construction work for upgrading works of Tai O STW, construction of Hang Mei SPS and Fan Kwai Tong SPS, for conservative approach, the model has included the dust sources of sewers works located within the 500m of the

upgrading works of Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS study area for the evaluation of the potential construction dust impacts.

3.6.4 The emission factors used for the prediction of construction dust emissions impacts were based on typical values referenced from USEPA Compilation of Air Pollution Emission Factors (AP-42), 5th Edition. The calculations of dust emission factors for different dust generating activities are detailed in **Appendix 3.2** and summarized below:

Earth Handling / Loading, Unloading and Stockpiling

Emission Rate = k x (0.0016) x $((U/2.2)^{1.3}/ (M/2)^{1.4})$ (reference: USEPA Chapter 13.2.4, 11/06ed)

Where k : Particle size multiplier
U : Mean wind speed (m/s)
M : Material moisture content (%),

Emission Factor of excavator unloading topsoil

Emission Rate = 0.02 kg/Mg (reference: USEPA AP-42, S.11.9, Table 11.9-4, 7/98ed. (Scraper unloading topsoil is adopted))

Emission Factor of topsoil removal by excavator

Emission Rate = 0.029 kg/Mg (reference: USEPA Ap-42, S.11.9, Table 11.9-4, 7/98ed. (Topsoil removal by scraper is adopted))

Wind Erosion

Emission Factor = 0.85 Mg/ha/yr (reference: USEPA Ap-42, S.11.9, Table 11.9-4)

Meteorological Data

3.6.5 The Memoscale Model 5 (MM5) meteorological data (Year 2010) has been extracted from the "Pollutants in the Atmosphere and their Transport over Hong Kong" (PATH) model and the hourly values for atmospheric stability from meteorological surface observations calculated by PCRAMMET for use in the ISCST3 modelling.

3.6.6 The PCRAMMET model has been used to take the regional scale MM5 meteorological data extracted from the PATH Model and used it to:

- calculate hourly values for atmospheric stability from meteorological surface observations;
- interpolate twice daily mixing heights to hourly values; and
- convert suitable format for air quality dispersion models.

3.6.7 The ISCST3 model has adopted grid-specific composite real meteorological data, including temperature, wind speed and direction, stability class and mixing height extracted and calculated from the MM5 data of the PATH and the PCRAMMET model. The location of the six grids covering the Project Study area ((6,22), (6,23), (6,24), (7,22), (7,23) and (7.24)) are shown in **Appendix 3.5**.

Assumptions

3.6.8 The air dispersion run has made the following assumptions:

- The study area is defined as "rural";
- A twelve-hour (07:00 to 19:00) working day during construction phase; and
- For the worst case scenarios, the 100% active worksite at Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS has been considered in the assessment.

Background Concentration extract from PATH Model

3.6.9 PATH model developed by EPD was used to quantify the background air quality for the assessment. As the commencement year of the construction phase is Year 2018, the hourly data of background concentration of RSP predicted (Year 2015) by the PATH model provided by EPD was adopted in the calculation of the cumulative results.

3.6.10 Only hourly RSP concentrations are available from PATH model. Conversion factors of 0.71 and 0.75 are applied on the annual and daily RSP concentration for estimating the annual and daily FSP concentrations, respectively with reference EPD's "Guideline on the Estimation of PM2.5 for Air Quality Assessment in Hong Kong". For hourly background TSP concentration, hourly RSP concentrations from PATH will be adopted, as particulate of sizes larger than 10 µm generated from far-field dust sources would have been largely settled before reaching the ASRs. Thus, it is reasonable to assume most of the particulates from far-field sources affecting ASRs will likely be those less than or equal to 10 µm (i.e. RSP).

Assessment Heights

3.6.11 Since most of the construction activities are at ground level, the likely cumulative dust impacts on the ASRs at 1.5m and 5m above ground were modelled.

Selected ASR for Dispersion Modeling Assessment

3.6.12 All representative ASRs selected and described in **Table 3.3** were used for the dispersion modelling assessment. In addition, for TSP, RSP and FSP concentration contour plots, assessment grid points were also included to cover the assessment area within 500m from the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

3.7 Prediction of Construction Dust Impact

Unmitigated Scenario

3.7.1 The modelling results for the hypothetical unmitigated scenarios are presented in **Table 3.4**. All the results presented in the tables included background concentration. The predicted results show that the ASRs located close to the construction site and at low elevations would be impacted by elevated dust level if no mitigation measures are applied, but the TSP, RSP and FSP are compliant with the TM-EIAO and AQOs criteria. Mitigation measures will be implemented to reduce the potential dust impacts.

3.7.2 According the assessment results in **Table 3.4** and **Table 3.5**, the dust impacts on the ASRs at 1.5m above ground is the worst case scenario. Therefore, the concentration contour plots of the assessment results of the unmitigated scenario for the cumulative effect of construction activities at 1.5m above ground of the Project are presented in **Figure 3.15 to Figure 3.19**.

3.7.3 Based on the above results, the unmitigated 1-hour averaged TSP, annual averaged RSP and annual averaged FSP levels with background are compliant with the relevant TM-EIAO and AQO criteria. The unmitigated Daily Averaged RSP and Daily Averaged FSP levels with background due to construction of the Project Site would exceed the relevant AQO concentration limits once but are compliant with the number of exceedances allowed under the AQO. In order to minimize the air quality impact, the mitigation measures as described in Section 3.10 will be implemented during the construction phase.

Table 3.4 : Predicted TSP, RSP and FSP Concentrations under Unmitigated Scenario

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³ [1]		Maximum Daily Averaged FSP, µg/m³ [1]		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
SST*	159.5	158.9	**121.7 (1)**	**121.6 (1)**	**91.0 (1)**	**90.9 (1)**	79.70	79.64	59.74	59.73	39.88	39.79	29.74	29.72
RA*	233.8	222.2	**121.6 (1)**	**121.5 (1)**	**90.4 (1)**	**90.3 (1)**	79.19	79.17	58.95	58.94	39.55	39.54	29.58	29.57
HST	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.70	79.70	59.74	59.74	39.67	39.67	29.69	29.69
SWCC	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.69	79.69	59.74	59.74	39.66	39.66	29.69	29.69
STP3	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.68	79.68	59.74	59.74	39.64	39.64	29.68	29.68
STP2	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.67	79.67	59.73	59.73	39.63	39.63	29.68	29.68
STA1	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.66	79.66	59.73	59.73	39.62	39.62	29.68	29.68
STA2	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.68	79.68	59.74	59.74	39.64	39.64	29.68	29.68
STP4	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.70	79.69	59.74	59.74	39.62	39.62	29.68	29.68
STP5	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.66	79.66	59.73	59.73	39.61	39.61	29.68	29.67
STP6*	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.86	79.86	59.78	59.78	39.61	39.61	29.68	29.67
STP7*	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.72	79.72	59.75	59.74	39.66	39.66	29.69	29.69
STP	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.66	79.66	59.73	59.73	39.61	39.60	29.67	29.67
STP1	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.87	79.86	59.78	59.78	39.64	39.63	29.68	29.68
PCT1*	158.3	152.8	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	80.67	80.59	59.97	59.95	39.77	39.75	29.71	29.71
PCT2*	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.97	79.96	59.81	59.80	39.66	39.66	29.69	29.69
TOJCC	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.90	79.89	59.79	59.78	39.66	39.66	29.69	29.69
TOTH	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.83	79.83	59.77	59.77	39.63	39.62	29.68	29.68
KHB1	156.2	156.2	**120.1 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.53	78.52	58.79	58.79	39.46	39.46	29.56	29.56
KHB2	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.51	78.51	58.79	58.79	39.46	39.46	29.56	29.55
KHB3	156.2	156.2	**120.1 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.53	78.53	58.79	58.79	39.46	39.46	29.56	29.56
TOM	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.64	78.62	58.81	58.80	39.46	39.46	29.55	29.55
TOWO1	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.44	78.44	58.78	58.77	39.45	39.45	29.55	29.55
TWO2	156.2	156.2	**120.1 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.64	78.62	58.81	58.80	39.46	39.46	29.56	29.55
TOWO2	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.54	78.53	58.79	58.79	39.47	39.47	29.56	29.56
TWO3	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.49	78.49	58.78	58.78	39.51	39.50	29.56	29.56
TOWO3	156.2	156.2	**120.3 (1)**	**120.2 (1)**	**90.1 (1)**	**90.0 (1)**	78.66	78.64	58.81	58.80	39.53	39.52	29.57	29.56

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³ [1]		Maximum Daily Averaged FSP, µg/m³ [1]		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
TOTP4	156.2	156.2	**120.1 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.56	78.55	58.79	58.79	39.52	39.51	29.57	29.56
TTP2	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.41	78.41	58.77	58.77	39.50	39.49	29.56	29.56
TOTP3	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.40	78.40	58.77	58.77	39.48	39.48	29.56	29.56
TTP1	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.39	78.39	58.76	58.76	39.47	39.47	29.56	29.56
TOTP1	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.38	78.38	58.76	58.76	39.47	39.46	29.56	29.56
BCM	156.3	156.3	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.40	78.40	58.77	58.77	39.52	39.51	29.57	29.56
LHC	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.80	78.71	58.83	58.82	39.53	39.51	29.57	29.57
KHH	156.2	156.2	**120.3 (1)**	**120.1 (1)**	**90.1 (1)**	**90.0 (1)**	78.79	78.73	58.83	58.82	39.63	39.59	29.59	29.58
RG	156.3	156.3	**120.2 (1)**	**120.1 (1)**	**90.1 (1)**	**90.0 (1)**	78.63	78.59	58.80	58.80	39.68	39.62	29.60	29.58
YTP*	171.1	154.2	**116.1 (1)**	**116.1 (1)**	**87.1 (1)**	**87.1 (1)**	77.29	76.86	57.70	57.58	38.75	38.59	28.85	28.82
BHMC*	156.4	156.4	**120.4 (1)**	**120.3 (1)**	**90.1 (1)**	**90.1 (1)**	78.40	78.37	58.77	58.76	39.48	39.46	29.56	29.55
TOFS*	156.4	156.4	**120.2 (1)**	**120.2 (1)**	**90.0 (1)**	**90.0 (1)**	78.42	78.37	58.77	58.76	39.50	39.45	29.56	29.55
WHV3*	156.2	156.2	**120.8 (1)**	**120.1 (1)**	**90.2 (1)**	**90.0 (1)**	78.57	78.34	58.81	58.75	39.58	39.45	29.58	29.55
WHV2*	156.2	156.2	**120.3 (1)**	**120.1 (1)**	**90.1 (1)**	**90.0 (1)**	78.72	78.39	58.84	58.76	39.61	39.46	29.59	29.56
WHV1*	156.2	156.2	**120.2 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.88	78.43	58.87	58.77	39.64	39.46	29.60	29.56
WHV5*	156.8	156.1	**116.9 (1)**	**116.3 (1)**	**87.3 (1)**	**87.1 (1)**	77.01	76.86	57.61	57.57	38.59	38.46	28.83	28.80
WHV4*	171.3	158.2	**116.6 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	76.88	76.86	57.58	57.57	38.84	38.49	28.89	28.80
WHV4a*	171.4	157.4	**116.6 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	76.87	76.86	57.57	57.57	38.78	38.49	28.87	28.81
WHV6*	175.0	155.5	**116.6 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	77.11	76.85	57.63	57.57	38.94	38.49	28.91	28.80
WHV7*	153.9	153.8	**116.2 (1)**	**116.2 (1)**	**87.1 (1)**	**87.1 (1)**	76.91	76.86	57.59	57.57	38.81	38.52	28.88	28.81
LUT4*	153.8	153.8	**116.8 (1)**	**116.3 (1)**	**87.3 (1)**	**87.1 (1)**	77.03	76.94	57.61	57.59	38.56	38.44	28.82	28.79
LUT2*	153.8	153.8	**116.7 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	76.96	76.90	57.60	57.58	38.67	38.44	28.85	28.79
LUT1*	154.1	153.8	**116.6 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	76.83	76.82	57.56	57.56	38.65	38.46	28.84	28.80
LUT3*	154.1	153.8	**116.7 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	76.82	76.81	57.56	57.56	38.66	38.46	28.84	28.80
LUPG*	153.9	153.8	**116.3 (1)**	**116.3 (1)**	**87.1 (1)**	**87.1 (1)**	77.04	76.81	57.62	57.56	38.62	38.47	28.83	28.80
NCT1*	153.8	153.8	**116.7 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	77.14	76.82	57.64	57.56	38.64	38.47	28.84	28.80
NCT3*	153.8	153.8	**116.9 (1)**	**116.4 (1)**	**87.3 (1)**	**87.2 (1)**	76.98	76.86	57.61	57.58	38.62	38.48	28.84	28.80

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³ [1]		Maximum Daily Averaged FSP, µg/m³ [1]		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
NCT2*	159.0	154.6	**116.5 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	77.00	76.81	57.61	57.56	38.79	38.51	28.87	28.81
NCT5*	158.3	153.8	**117.7 (1)**	**116.3 (1)**	**87.5 (1)**	**87.1 (1)**	76.99	76.90	57.61	57.59	38.66	38.48	28.84	28.80
PT2*[1]	156.0	153.8	**116.2 (1)**	**116.2 (1)**	**87.1 (1)**	**87.1 (1)**	76.83	76.80	57.57	57.56	38.85	38.46	28.89	28.80
NCT6*	153.8	153.8	**116.7 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	78.14	76.88	57.87	57.58	38.93	38.46	28.91	28.80
NCT4*	148.0	148.0	**117.1 (1)**	**117.0 (1)**	**87.8 (1)**	**87.7 (1)**	77.43	77.17	57.79	57.69	38.56	38.44	28.80	28.77
NTST1*	148.7	148.0	**117.6 (1)**	**117.0 (1)**	**87.9 (1)**	**87.7 (1)**	77.08	77.00	57.70	57.69	38.56	38.40	28.80	28.76
GIC1*	153.8	153.8	**116.3 (1)**	**116.3 (1)**	**87.1 (1)**	**87.1 (1)**	76.97	76.96	57.60	57.60	38.44	38.43	28.79	28.79
GIC2*	156.2	156.2	**120.2 (1)**	**120.2 (1)**	**90.1 (1)**	**90.1 (1)**	78.40	78.39	58.76	58.76	39.51	39.51	29.57	29.57
GIC3*	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.58	78.58	58.81	58.80	39.49	39.49	29.56	29.56
Maximum Concentration in AQOs [2]	*500[4]*		*100 (9)*		*75 (9)*		*100 (9)*		*75 (9)*		*50*		*35*	

Notes:

[1] Values in ( ) mean the number of exceedances against the AQOs.
[2] Values in ( ) mean the number of exceedances allowed.
[3] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.
[4] Not an AQO but is a criteria for evaluating air quality impacts as stated in Annex 4 of TM-EIAO.
* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.
- All the results presented in the table have included background concentration.
- Bold figure indicates exceedance of the concentration limit of relevant AQO.

Table 3.5 : Predicted Project's Own TSP, RSP and FSP Concentrations under Unmitigated Scenario

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³		Maximum Daily Averaged FSP, µg/m³		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
SST*	72.4	69.6	**4.2 (0)**	**4.0 (0)**	**1.0 (0)**	**0.9 (0)**	1.78	1.61	0.41	0.37	0.33	0.24	0.08	0.06
RA*	141.7	130.1	**3.1 (0)**	**2.8 (0)**	**0.7 (0)**	**0.7 (0)**	1.22	1.14	0.28	0.26	0.17	0.15	0.04	0.04
HST	61.6	58.2	**1.5 (0)**	**1.4 (0)**	**0.4 (0)**	**0.3 (0)**	0.72	0.70	0.17	0.16	0.12	0.12	0.03	0.03
SWCC	46.7	43.1	**1.6 (0)**	**1.4 (0)**	**0.4 (0)**	**0.3 (0)**	0.64	0.62	0.15	0.14	0.12	0.11	0.03	0.03
STP3	51.3	49.0	**1.2 (0)**	**1.1 (0)**	**0.3 (0)**	**0.3 (0)**	0.57	0.56	0.13	0.13	0.10	0.10	0.02	0.02
STP2	42.8	41.1	**1.1 (0)**	**1.1 (0)**	**0.3 (0)**	**0.2 (0)**	0.47	0.47	0.11	0.11	0.08	0.08	0.02	0.02
STA1	35.8	33.0	**1.1 (0)**	**1.1 (0)**	**0.3 (0)**	**0.2 (0)**	0.41	0.40	0.10	0.09	0.07	0.07	0.02	0.02
STA2	47.5	45.5	**1.2 (0)**	**1.1 (0)**	**0.3 (0)**	**0.3 (0)**	0.53	0.52	0.12	0.12	0.09	0.09	0.02	0.02
STP4	69.4	64.3	**1.4 (0)**	**1.3 (0)**	**0.3 (0)**	**0.3 (0)**	0.44	0.43	0.11	0.10	0.07	0.07	0.02	0.02
STP5	34.4	33.4	**0.8 (0)**	**0.8 (0)**	**0.2 (0)**	**0.2 (0)**	0.36	0.36	0.09	0.08	0.06	0.06	0.01	0.01
STP6*	34.0	32.5	**1.1 (0)**	**1.1 (0)**	**0.3 (0)**	**0.3 (0)**	0.45	0.42	0.11	0.11	0.07	0.06	0.02	0.01
STP7*	85.8	76.1	**1.8 (0)**	**1.6 (0)**	**0.4 (0)**	**0.4 (0)**	0.69	0.68	0.16	0.16	0.12	0.11	0.03	0.03
STP	28.3	26.4	**0.9 (0)**	**0.9 (0)**	**0.2 (0)**	**0.2 (0)**	0.32	0.32	0.07	0.07	0.06	0.06	0.01	0.01
STP1	44.8	42.8	**1.0 (0)**	**1.0 (0)**	**0.2 (0)**	**0.2 (0)**	0.60	0.59	0.14	0.14	0.09	0.09	0.02	0.02
PCT1*	106.5	91.7	**3.2 (0)**	**3.0 (0)**	**0.7 (0)**	**0.7 (0)**	1.52	1.46	0.35	0.34	0.22	0.21	0.05	0.05
PCT2*	55.0	52.7	**2.0 (0)**	**2.0 (0)**	**0.5 (0)**	**0.5 (0)**	0.79	0.74	0.18	0.18	0.12	0.11	0.03	0.03
TOJCC	63.7	60.5	**1.6 (0)**	**1.6 (0)**	**0.4 (0)**	**0.4 (0)**	0.68	0.67	0.16	0.16	0.11	0.11	0.03	0.03
TOTH	33.3	32.6	**0.8 (0)**	**0.8 (0)**	**0.2 (0)**	**0.2 (0)**	0.52	0.51	0.12	0.12	0.08	0.08	0.02	0.02
KHB1	19.1	16.9	**0.6 (0)**	**0.6 (0)**	**0.1 (0)**	**0.1 (0)**	0.41	0.41	0.10	0.09	0.08	0.08	0.02	0.02
KHB2	22.0	18.4	**0.6 (0)**	**0.5 (0)**	**0.1 (0)**	**0.1 (0)**	0.37	0.36	0.09	0.08	0.08	0.08	0.02	0.02
KHB3	20.9	18.0	**0.6 (0)**	**0.6 (0)**	**0.1 (0)**	**0.1 (0)**	0.37	0.36	0.09	0.08	0.08	0.08	0.02	0.02
TOM	27.2	26.3	**0.6 (0)**	**0.6 (0)**	**0.1 (0)**	**0.1 (0)**	0.39	0.38	0.09	0.09	0.07	0.07	0.02	0.02
TOWO1	27.1	24.3	**0.7 (0)**	**0.6 (0)**	**0.2 (0)**	**0.2 (0)**	0.41	0.39	0.09	0.09	0.07	0.07	0.02	0.01
TWO2	26.3	25.6	**0.7 (0)**	**0.7 (0)**	**0.1 (0)**	**0.1 (0)**	0.38	0.36	0.08	0.08	0.08	0.07	0.02	0.02
TOWO2	24.8	24.0	**0.6 (0)**	**0.6 (0)**	**0.1 (0)**	**0.1 (0)**	0.48	0.44	0.10	0.09	0.09	0.08	0.02	0.02
TWO3	30.0	20.4	**0.9 (0)**	**0.8 (0)**	**0.2 (0)**	**0.1 (0)**	0.57	0.52	0.11	0.10	0.12	0.11	0.02	0.02
TOWO3	46.3	30.9	**1.0 (0)**	**0.7 (0)**	**0.2 (0)**	**0.1 (0)**	0.68	0.62	0.12	0.11	0.14	0.13	0.03	0.03

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³		Maximum Daily Averaged FSP, µg/m³		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
TOTP4	47.6	32.8	**1.0 (0)**	**0.9 (0)**	**0.2 (0)**	**0.2 (0)**	0.59	0.55	0.11	0.10	0.13	0.12	0.03	0.02
TTP2	20.3	18.8	**0.8 (0)**	**0.7 (0)**	**0.2 (0)**	**0.1 (0)**	0.51	0.49	0.10	0.09	0.12	0.11	0.02	0.02
TOTP3	15.4	14.5	**0.7 (0)**	**0.6 (0)**	**0.1 (0)**	**0.1 (0)**	0.43	0.40	0.09	0.08	0.10	0.09	0.02	0.02
TTP1	15.1	14.4	**0.6 (0)**	**0.5 (0)**	**0.1 (0)**	**0.1 (0)**	0.38	0.37	0.08	0.08	0.09	0.08	0.02	0.02
TOTP1	11.3	11.1	**0.5 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.35	0.33	0.08	0.07	0.08	0.08	0.02	0.02
BCM	22.2	20.0	**1.0 (0)**	**0.8 (0)**	**0.3 (0)**	**0.2 (0)**	0.61	0.52	0.11	0.10	0.13	0.12	0.03	0.02
LHC	36.3	31.5	**1.3 (0)**	**1.1 (0)**	**0.2 (0)**	**0.2 (0)**	0.78	0.69	0.15	0.12	0.15	0.13	0.03	0.03
KHH	126.7	59.6	**2.6 (0)**	**1.4 (0)**	**0.4 (0)**	**0.3 (0)**	1.32	1.14	0.24	0.19	0.25	0.21	0.05	0.04
RG	72.5	49.2	**2.6 (0)**	**1.8 (0)**	**0.4 (0)**	**0.3 (0)**	1.37	1.13	0.25	0.19	0.29	0.24	0.06	0.05
YTP*	77.1	45.0	**4.9 (0)**	**2.6 (0)**	**0.9 (0)**	**0.5 (0)**	2.34	1.46	0.43	0.26	0.38	0.22	0.07	0.04
BHMC*	33.9	25.8	**0.7 (0)**	**0.5 (0)**	**0.2 (0)**	**0.1 (0)**	0.39	0.35	0.08	0.07	0.10	0.08	0.02	0.02
TOFS*	21.2	15.6	**0.6 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.46	0.28	0.11	0.06	0.11	0.06	0.02	0.01
WHV3*	17.1	10.6	**1.2 (0)**	**0.4 (0)**	**0.3 (0)**	**0.1 (0)**	0.79	0.27	0.19	0.06	0.20	0.07	0.05	0.02
WHV2*	15.8	12.7	**1.2 (0)**	**0.4 (0)**	**0.3 (0)**	**0.1 (0)**	0.75	0.27	0.18	0.06	0.22	0.08	0.05	0.02
WHV1*	37.2	10.0	**1.3 (0)**	**0.3 (0)**	**0.3 (0)**	**0.1 (0)**	0.86	0.27	0.20	0.06	0.25	0.08	0.06	0.02
WHV5*	20.7	13.4	**1.1 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.83	0.29	0.19	0.07	0.22	0.09	0.05	0.02
WHV4*	48.8	14.4	**2.0 (0)**	**0.6 (0)**	**0.5 (0)**	**0.1 (0)**	1.50	0.47	0.34	0.10	0.46	0.12	0.11	0.03
WHV4a*	48.6	15.1	**1.9 (0)**	**0.6 (0)**	**0.4 (0)**	**0.1 (0)**	1.45	0.47	0.33	0.11	0.41	0.12	0.09	0.03
WHV6*	57.2	13.3	**2.3 (0)**	**0.7 (0)**	**0.5 (0)**	**0.1 (0)**	2.00	0.48	0.47	0.11	0.57	0.11	0.13	0.03
WHV7*	31.8	13.1	**2.3 (0)**	**0.8 (0)**	**0.5 (0)**	**0.2 (0)**	1.52	0.58	0.35	0.12	0.44	0.15	0.10	0.03
LUT4*	14.7	13.7	**0.9 (0)**	**0.6 (0)**	**0.2 (0)**	**0.1 (0)**	0.72	0.34	0.16	0.07	0.19	0.06	0.04	0.01
LUT2*	21.2	18.7	**1.3 (0)**	**0.6 (0)**	**0.3 (0)**	**0.1 (0)**	0.88	0.34	0.20	0.07	0.30	0.07	0.07	0.01
LUT1*	16.1	14.2	**1.0 (0)**	**0.6 (0)**	**0.2 (0)**	**0.1 (0)**	0.77	0.36	0.18	0.07	0.28	0.09	0.06	0.02
LUT3*	23.4	20.8	**1.4 (0)**	**0.6 (0)**	**0.3 (0)**	**0.1 (0)**	0.83	0.37	0.19	0.07	0.29	0.09	0.07	0.02
LUPG*	28.4	25.3	**1.1 (0)**	**0.8 (0)**	**0.3 (0)**	**0.2 (0)**	0.88	0.38	0.19	0.08	0.25	0.10	0.06	0.02
NCT1*	34.4	23.0	**1.6 (0)**	**0.7 (0)**	**0.3 (0)**	**0.1 (0)**	1.05	0.38	0.24	0.08	0.27	0.10	0.06	0.02
NCT3*	24.9	13.2	**0.9 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.70	0.33	0.16	0.07	0.25	0.11	0.06	0.02

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³		Maximum Daily Averaged FSP, µg/m³		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
NCT2*	62.9	14.9	**1.8 (0)**	**0.7 (0)**	**0.4 (0)**	**0.1 (0)**	1.13	0.40	0.27	0.09	0.42	0.14	0.10	0.03
NCT5*	74.9	10.8	**2.6 (0)**	**0.7 (0)**	**0.6 (0)**	**0.2 (0)**	1.58	0.42	0.37	0.10	0.29	0.11	0.07	0.03
PT2*[1]	83.9	11.0	**4.3 (0)**	**0.6 (0)**	**1.0 (0)**	**0.1 (0)**	2.48	0.32	0.58	0.07	0.48	0.09	0.11	0.02
NCT6*	64.7	7.8	**3.8 (0)**	**0.6 (0)**	**0.9 (0)**	**0.1 (0)**	2.66	0.36	0.62	0.08	0.56	0.09	0.13	0.02
NCT4*	20.7	14.7	**1.3 (0)**	**0.7 (0)**	**0.3 (0)**	**0.1 (0)**	0.99	0.45	0.24	0.10	0.24	0.12	0.06	0.03
NTST1*	23.1	14.2	**1.0 (0)**	**0.5 (0)**	**0.2 (0)**	**0.1 (0)**	0.67	0.34	0.16	0.08	0.24	0.08	0.05	0.02
GIC1*	26.5	23.8	**0.9 (0)**	**0.8 (0)**	**0.2 (0)**	**0.1 (0)**	0.31	0.29	0.06	0.06	0.06	0.06	0.01	0.01
GIC2*	65.1	62.1	**1.6 (0)**	**1.6 (0)**	**0.4 (0)**	**0.4 (0)**	0.96	0.92	0.22	0.21	0.13	0.12	0.03	0.03
GIC3*	26.8	25.8	**1.1 (0)**	**1.1 (0)**	**0.3 (0)**	**0.2 (0)**	0.77	0.74	0.18	0.17	0.10	0.10	0.02	0.02

Notes:

[1] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.

* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

Mitigated Scenario

3.7.4 Typical dust control methods include ground watering, equipment and vehicle watering, proper handling of material and stockpile will be implemented. The assumptions of the dust removal efficiency achieved by dust control measures are provided below and detailed in **Appendix 3.2**. Details of the mitigation measures are provided in Section 3.10.

3.7.5 According to the "Control of Open Fugitive Dust Sources" cited in AP-42 issued by USEPA, average dust control efficiency (in percentage) can be estimated by equation 5-6 of the paper. It is assumed the watering application intensity to be 1.9 litres per m^2 which can achieve the 90% dust removal efficiency. **Appendix 3.2** shows the calculation of the water amount and frequency of watering to achieve the dust removal efficiency to 90%. Watering of site areas with wind erosion will be implemented to minimize construction dust generation as general good site practice during construction. Based on "Summary of Meteorological and Tidal Observation in Hong Kong - 2014" issued by Hong Kong Observatory, the range of mean daily evaporation recorded in monthly value is 2.2 mm to 5.3 mm. The potential average hourly daytime evaporation rate is 0.2mm/h for the worst scenario (i.e. 4.8mm/day). Based on these assumptions, 1.9 litre/m^2 of water application intensity during the first hour and subsequent application at 0.2 litre/m^2 is required to achieve the target dust removal efficiency and this would be included as a contract requirement. Calculation details are provided in **Appendix 3.2**.

3.7.6 The modelled results at all identified ASRs with the proposed mitigation measures are presented in **Table 3.6**.

3.7.7 The predicted impacts are found to have reduced with the proposed mitigation measures incorporated, and are still in compliance with the relevant TM-EIAO and AQOs criteria.

3.7.8 According the assessment results in **Table 3.6** and **Table 3.7**, the dust impacts on the ASRs at 1.5m above ground is the worst case scenario. Therefore, the concentration contour plots of the assessment results of the mitigated scenario for the cumulative effect of construction activities at 1.5m above ground of the Project are presented in **Figure 3.20 to Figure 3.24**.

Table 3.6 : Predicted TSP, RSP and FSP Concentrations under Mitigated Scenario

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³ [1]		Maximum Daily Averaged FSP, µg/m³ [1]		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
SST*	147.9	147.9	**121.5 (1)**	**121.4 (1)**	**90.9 (1)**	**90.9 (1)**	79.67	79.64	59.74	59.73	39.75	39.70	29.71	29.70
RA*	156.2	156.2	**121.0 (1)**	**120.9 (1)**	**90.2 (1)**	**90.2 (1)**	78.85	78.84	58.88	58.87	39.49	39.48	29.56	29.56
HST	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.68	79.68	59.74	59.74	39.63	39.62	29.68	29.68
SWCC	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.68	79.68	59.74	59.74	39.62	39.62	29.68	29.68
STP3	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.67	79.67	59.73	59.73	39.61	39.61	29.68	29.68
STP2	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.66	79.66	59.73	59.73	39.60	39.60	29.67	29.67
STA1	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.66	79.66	59.73	59.73	39.59	39.59	29.67	29.67
STA2	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.67	79.67	59.73	59.73	39.61	39.60	29.68	29.67
STP4	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.67	79.67	59.74	59.74	39.59	39.59	29.67	29.67
STP5	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.66	79.66	59.73	59.73	39.59	39.59	29.67	29.67
STP6*	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.77	79.77	59.76	59.76	39.59	39.59	29.67	29.67
STP7*	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.69	79.69	59.74	59.74	39.62	39.62	29.68	29.68
STP	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.65	79.65	59.73	59.73	39.59	39.58	29.67	29.67
STP1	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.78	79.77	59.76	59.76	39.60	39.60	29.67	29.67
PCT1*	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	80.30	80.25	59.89	59.88	39.69	39.68	29.69	29.69
PCT2*	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.86	79.85	59.78	59.78	39.62	39.62	29.68	29.68
TOJCC	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.79	79.79	59.76	59.76	39.62	39.62	29.68	29.68
TOTH	147.9	147.9	**121.1 (1)**	**121.1 (1)**	**90.8 (1)**	**90.8 (1)**	79.76	79.75	59.76	59.76	39.60	39.60	29.67	29.67
KHB1	156.2	156.2	**120.1 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.45	78.45	58.77	58.77	39.43	39.43	29.55	29.55
KHB2	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.44	78.44	58.77	58.77	39.44	39.43	29.55	29.55
KHB3	156.2	156.2	**120.1 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.45	78.45	58.78	58.77	39.44	39.43	29.55	29.55
TOM	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.51	78.50	58.79	58.78	39.43	39.43	29.55	29.55
TOWO1	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.40	78.40	58.77	58.77	39.43	39.43	29.55	29.55
TWO2	156.2	156.2	**120.1 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.51	78.50	58.78	58.78	39.44	39.43	29.55	29.55
TOWO2	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.45	78.45	58.78	58.77	39.45	39.44	29.55	29.55
TWO3	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.43	78.42	58.77	58.77	39.47	39.46	29.56	29.56
TOWO3	156.2	156.2	**120.3 (1)**	**120.2 (1)**	**90.1 (1)**	**90.0 (1)**	78.52	78.51	58.79	58.78	39.48	39.47	29.56	29.56

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³ [1]		Maximum Daily Averaged FSP, µg/m³ [1]		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
TOTP4	156.2	156.2	**120.1 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.47	78.46	58.78	58.78	39.47	39.47	29.56	29.56
TTP2	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.38	78.38	58.76	58.76	39.46	39.46	29.56	29.55
TOTP3	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.38	78.37	58.76	58.76	39.45	39.45	29.55	29.55
TTP1	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.37	78.37	58.76	58.76	39.44	39.44	29.55	29.55
TOTP1	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.36	78.36	58.76	58.76	39.44	39.44	29.55	29.55
BCM	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.38	78.38	58.76	58.76	39.48	39.47	29.56	29.56
LHC	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.60	78.55	58.80	58.79	39.49	39.47	29.56	29.56
KHH	156.2	156.2	**120.3 (1)**	**120.1 (1)**	**90.1 (1)**	**90.0 (1)**	78.59	78.56	58.80	58.79	39.55	39.52	29.58	29.57
RG	156.2	156.2	**120.2 (1)**	**120.1 (1)**	**90.1 (1)**	**90.0 (1)**	78.51	78.48	58.78	58.78	39.58	39.54	29.58	29.57
YTP*	153.9	153.9	**116.1 (1)**	**116.1 (1)**	**87.1 (1)**	**87.1 (1)**	77.26	76.83	57.70	57.57	38.63	38.52	28.83	28.81
BHMC*	156.2	156.2	**120.2 (1)**	**120.2 (1)**	**90.0 (1)**	**90.0 (1)**	78.38	78.36	58.76	58.76	39.45	39.43	29.55	29.55
TOFS*	156.2	156.2	**120.1 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.40	78.36	58.77	58.76	39.46	39.42	29.56	29.55
WHV3*	156.2	156.2	**120.5 (1)**	**120.1 (1)**	**90.1 (1)**	**90.0 (1)**	78.48	78.34	58.79	58.75	39.51	39.43	29.57	29.55
WHV2*	156.2	156.2	**120.2 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.56	78.36	58.81	58.76	39.52	39.43	29.57	29.55
WHV1*	156.2	156.2	**120.1 (1)**	**120.1 (1)**	**90.0 (1)**	**90.0 (1)**	78.66	78.39	58.83	58.76	39.54	39.43	29.58	29.55
WHV5*	154.3	154.2	**116.6 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.90	76.81	57.59	57.56	38.51	38.43	28.81	28.79
WHV4*	156.8	154.5	**116.4 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.82	76.81	57.56	57.56	38.67	38.45	28.85	28.80
WHV4a*	156.8	154.4	**116.4 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.81	76.80	57.56	57.56	38.63	38.45	28.84	28.80
WHV6*	157.4	154.1	**116.4 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.96	76.80	57.60	57.56	38.73	38.44	28.87	28.79
WHV7*	153.8	153.8	**116.2 (1)**	**116.2 (1)**	**87.1 (1)**	**87.1 (1)**	76.85	76.81	57.57	57.56	38.66	38.46	28.85	28.80
LUT4*	153.8	153.8	**116.6 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.94	76.87	57.60	57.58	38.49	38.41	28.81	28.79
LUT2*	153.8	153.8	**116.5 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.90	76.85	57.59	57.57	38.56	38.41	28.82	28.79
LUT1*	153.8	153.8	**116.4 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.79	76.78	57.55	57.55	38.54	38.43	28.82	28.79
LUT3*	153.9	153.8	**116.5 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.78	76.78	57.55	57.55	38.55	38.43	28.82	28.79
LUPG*	153.8	153.8	**116.3 (1)**	**116.2 (1)**	**87.1 (1)**	**87.1 (1)**	76.94	76.79	57.60	57.56	38.53	38.44	28.82	28.79
NCT1*	153.8	153.8	**116.5 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	76.99	76.79	57.61	57.56	38.54	38.43	28.82	28.79
NCT3*	153.8	153.8	**116.6 (1)**	**116.3 (1)**	**87.2 (1)**	**87.1 (1)**	76.92	76.84	57.60	57.57	38.53	38.44	28.82	28.79

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³ [1]		Maximum Daily Averaged FSP, µg/m³ [1]		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
NCT2*	154.7	153.9	**116.4 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	76.92	76.79	57.59	57.56	38.63	38.46	28.84	28.80
NCT5*	153.8	153.8	**117.1 (1)**	**116.3 (1)**	**87.3 (1)**	**87.1 (1)**	76.92	76.86	57.60	57.58	38.55	38.44	28.82	28.80
PT2*[1]	153.8	153.8	**116.2 (1)**	**116.2 (1)**	**87.1 (1)**	**87.1 (1)**	76.81	76.79	57.57	57.56	38.67	38.43	28.85	28.79
NCT6*	153.8	153.8	**116.5 (1)**	**116.2 (1)**	**87.2 (1)**	**87.1 (1)**	77.59	76.84	57.76	57.57	38.71	38.43	28.86	28.79
NCT4*	148.0	148.0	**117.1 (1)**	**117.0 (1)**	**87.8 (1)**	**87.7 (1)**	77.25	77.03	57.76	57.69	38.47	38.40	28.78	28.76
NTST1*	148.1	148.0	**117.3 (1)**	**117.0 (1)**	**87.8 (1)**	**87.7 (1)**	76.99	76.98	57.69	57.69	38.47	38.38	28.78	28.75
GIC1*	153.8	153.8	**116.2 (1)**	**116.2 (1)**	**87.1 (1)**	**87.1 (1)**	76.87	76.87	57.58	57.58	38.41	38.41	28.79	28.79
GIC2*	156.2	156.2	**120.2 (1)**	**120.2 (1)**	**90.0 (1)**	**90.0 (1)**	78.37	78.37	58.76	58.76	39.47	39.46	29.56	29.56
GIC3*	156.2	156.2	**120.0 (1)**	**120.0 (1)**	**90.0 (1)**	**90.0 (1)**	78.48	78.48	58.79	58.79	39.45	39.45	29.55	29.55
Maximum Concentration in AQOs [2]	*500[4]*		*100 (9)*		*75 (9)*		*100 (9)*		*75 (9)*		*50*		*35*	

Notes:

[1] Values in ( ) mean the number of exceedances against the AQOs.
[2] Values in ( ) mean the number of exceedances allowed.
[3] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.
[4] Not an AQO but is a criteria for evaluating air quality impacts as stated in Annex 4 of TM-EIAO.
* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.
- All the results presented in the table have included background concentration.
- Bold figure indicates exceedance of the concentration limit of relevant AQO.

Table 3.7 : Predicted Project's Own TSP, RSP and FSP Concentrations under Mitigated Scenario

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³		Maximum Daily Averaged FSP, µg/m³		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
SST*	23.0	13.9	**2.5 (0)**	**2.4 (0)**	**0.6 (0)**	**0.6 (0)**	1.08	0.97	0.27	0.24	0.21	0.15	0.05	0.04
RA*	29.2	22.6	**1.9 (0)**	**1.7 (0)**	**0.5 (0)**	**0.4 (0)**	0.74	0.69	0.18	0.17	0.10	0.10	0.03	0.02
HST	10.7	10.1	**1.0 (0)**	**0.9 (0)**	**0.2 (0)**	**0.2 (0)**	0.46	0.44	0.11	0.11	0.08	0.08	0.02	0.02
SWCC	9.2	8.1	**1.0 (0)**	**0.9 (0)**	**0.2 (0)**	**0.2 (0)**	0.40	0.39	0.10	0.10	0.08	0.07	0.02	0.02
STP3	8.9	8.5	**0.8 (0)**	**0.7 (0)**	**0.2 (0)**	**0.2 (0)**	0.35	0.35	0.09	0.09	0.06	0.06	0.02	0.02
STP2	8.1	7.3	**0.7 (0)**	**0.7 (0)**	**0.2 (0)**	**0.2 (0)**	0.31	0.31	0.08	0.08	0.05	0.05	0.01	0.01
STA1	6.2	5.7	**0.7 (0)**	**0.6 (0)**	**0.2 (0)**	**0.2 (0)**	0.25	0.25	0.07	0.06	0.05	0.05	0.01	0.01
STA2	8.5	7.9	**0.7 (0)**	**0.7 (0)**	**0.2 (0)**	**0.2 (0)**	0.34	0.33	0.08	0.08	0.06	0.06	0.01	0.01
STP4	12.1	11.2	**0.9 (0)**	**0.8 (0)**	**0.2 (0)**	**0.2 (0)**	0.29	0.29	0.07	0.07	0.05	0.05	0.01	0.01
STP5	6.7	6.3	**0.5 (0)**	**0.5 (0)**	**0.1 (0)**	**0.1 (0)**	0.23	0.23	0.06	0.06	0.04	0.04	0.01	0.01
STP6*	7.5	6.8	**0.7 (0)**	**0.7 (0)**	**0.2 (0)**	**0.2 (0)**	0.33	0.30	0.09	0.08	0.04	0.04	0.01	0.01
STP7*	14.9	13.2	**1.1 (0)**	**0.9 (0)**	**0.3 (0)**	**0.2 (0)**	0.43	0.42	0.11	0.11	0.07	0.07	0.02	0.02
STP	5.5	5.2	**0.6 (0)**	**0.5 (0)**	**0.1 (0)**	**0.1 (0)**	0.20	0.19	0.05	0.05	0.04	0.04	0.01	0.01
STP1	7.8	7.4	**0.6 (0)**	**0.6 (0)**	**0.2 (0)**	**0.2 (0)**	0.37	0.37	0.09	0.09	0.06	0.05	0.01	0.01
PCT1*	18.6	15.9	**2.0 (0)**	**1.9 (0)**	**0.5 (0)**	**0.5 (0)**	0.92	0.88	0.23	0.22	0.14	0.13	0.03	0.03
PCT2*	12.4	10.2	**1.2 (0)**	**1.2 (0)**	**0.3 (0)**	**0.3 (0)**	0.48	0.47	0.12	0.12	0.07	0.07	0.02	0.02
TOJCC	11.1	10.5	**1.0 (0)**	**0.9 (0)**	**0.2 (0)**	**0.2 (0)**	0.42	0.41	0.10	0.10	0.07	0.07	0.02	0.02
TOTH	5.8	5.7	**0.5 (0)**	**0.5 (0)**	**0.1 (0)**	**0.1 (0)**	0.31	0.31	0.08	0.08	0.05	0.05	0.01	0.01
KHB1	7.2	6.5	**0.4 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.25	0.24	0.06	0.06	0.05	0.05	0.01	0.01
KHB2	7.5	6.3	**0.3 (0)**	**0.3 (0)**	**0.1 (0)**	**0.1 (0)**	0.25	0.23	0.06	0.05	0.05	0.05	0.01	0.01
KHB3	7.5	6.8	**0.4 (0)**	**0.3 (0)**	**0.1 (0)**	**0.1 (0)**	0.22	0.22	0.06	0.05	0.05	0.05	0.01	0.01
TOM	5.9	5.3	**0.4 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.25	0.24	0.06	0.06	0.05	0.05	0.01	0.01
TOWO1	8.0	6.2	**0.5 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.25	0.24	0.06	0.06	0.05	0.04	0.01	0.01
TWO2	5.7	5.3	**0.4 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.27	0.24	0.06	0.06	0.05	0.05	0.01	0.01
TOWO2	9.2	6.9	**0.4 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.33	0.30	0.07	0.07	0.06	0.06	0.01	0.01
TWO3	13.7	9.3	**0.6 (0)**	**0.5 (0)**	**0.1 (0)**	**0.1 (0)**	0.37	0.33	0.09	0.07	0.08	0.07	0.02	0.02
TOWO3	15.1	10.1	**0.6 (0)**	**0.5 (0)**	**0.2 (0)**	**0.1 (0)**	0.45	0.40	0.08	0.08	0.09	0.09	0.02	0.02

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³		Maximum Daily Averaged FSP, µg/m³		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
TOTP4	14.2	9.8	**0.6 (0)**	**0.6 (0)**	**0.1 (0)**	**0.1 (0)**	0.39	0.35	0.08	0.07	0.09	0.08	0.02	0.02
TTP2	10.2	7.1	**0.7 (0)**	**0.5 (0)**	**0.2 (0)**	**0.1 (0)**	0.34	0.30	0.08	0.07	0.08	0.07	0.02	0.02
TOTP3	8.8	6.6	**0.5 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.30	0.28	0.07	0.06	0.07	0.06	0.01	0.01
TTP1	10.1	8.0	**0.5 (0)**	**0.4 (0)**	**0.1 (0)**	**0.1 (0)**	0.24	0.23	0.06	0.06	0.06	0.06	0.01	0.01
TOTP1	9.1	7.3	**0.3 (0)**	**0.3 (0)**	**0.1 (0)**	**0.1 (0)**	0.23	0.22	0.06	0.05	0.05	0.05	0.01	0.01
BCM	16.5	10.2	**0.9 (0)**	**0.6 (0)**	**0.2 (0)**	**0.2 (0)**	0.40	0.36	0.09	0.07	0.09	0.08	0.02	0.02
LHC	17.7	9.6	**0.8 (0)**	**0.7 (0)**	**0.2 (0)**	**0.1 (0)**	0.54	0.43	0.13	0.10	0.10	0.09	0.02	0.02
KHH	22.3	10.5	**1.5 (0)**	**1.0 (0)**	**0.3 (0)**	**0.2 (0)**	0.87	0.71	0.18	0.14	0.17	0.14	0.04	0.03
RG	22.2	9.1	**1.5 (0)**	**1.1 (0)**	**0.3 (0)**	**0.2 (0)**	0.89	0.70	0.18	0.14	0.20	0.16	0.04	0.03
YTP*	23.3	7.0	**3.2 (0)**	**1.6 (0)**	**0.6 (0)**	**0.3 (0)**	1.54	0.93	0.33	0.17	0.26	0.14	0.06	0.03
BHMC*	13.7	7.4	**0.5 (0)**	**0.3 (0)**	**0.1 (0)**	**0.1 (0)**	0.25	0.22	0.06	0.05	0.06	0.05	0.01	0.01
TOFS*	12.3	8.0	**0.4 (0)**	**0.3 (0)**	**0.1 (0)**	**0.1 (0)**	0.30	0.17	0.08	0.04	0.07	0.04	0.02	0.01
WHV3*	4.2	3.6	**0.8 (0)**	**0.2 (0)**	**0.2 (0)**	**0.1 (0)**	0.50	0.17	0.13	0.04	0.12	0.04	0.03	0.01
WHV2*	4.1	2.4	**0.7 (0)**	**0.2 (0)**	**0.2 (0)**	**0.1 (0)**	0.48	0.17	0.12	0.04	0.14	0.05	0.03	0.01
WHV1*	6.5	3.6	**0.8 (0)**	**0.2 (0)**	**0.2 (0)**	**0.1 (0)**	0.54	0.17	0.13	0.04	0.16	0.05	0.04	0.01
WHV5*	4.5	2.6	**0.6 (0)**	**0.3 (0)**	**0.2 (0)**	**0.1 (0)**	0.52	0.18	0.13	0.04	0.14	0.06	0.03	0.01
WHV4*	8.3	3.1	**1.2 (0)**	**0.4 (0)**	**0.3 (0)**	**0.1 (0)**	0.96	0.29	0.23	0.07	0.30	0.08	0.07	0.02
WHV4a*	8.3	3.5	**1.1 (0)**	**0.4 (0)**	**0.3 (0)**	**0.1 (0)**	0.94	0.30	0.23	0.07	0.26	0.08	0.06	0.02
WHV6*	9.6	3.2	**1.5 (0)**	**0.4 (0)**	**0.4 (0)**	**0.1 (0)**	1.31	0.29	0.32	0.07	0.36	0.07	0.09	0.02
WHV7*	9.1	3.6	**1.4 (0)**	**0.5 (0)**	**0.3 (0)**	**0.1 (0)**	0.98	0.35	0.25	0.08	0.29	0.09	0.07	0.02
LUT4*	12.5	9.1	**0.7 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.45	0.21	0.10	0.05	0.12	0.04	0.03	0.01
LUT2*	8.0	5.9	**0.8 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.53	0.20	0.13	0.05	0.19	0.04	0.05	0.01
LUT1*	10.6	7.9	**0.6 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.48	0.24	0.12	0.05	0.17	0.06	0.04	0.01
LUT3*	11.0	8.3	**0.8 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.52	0.23	0.13	0.06	0.18	0.06	0.04	0.01
LUPG*	10.6	8.1	**0.7 (0)**	**0.5 (0)**	**0.2 (0)**	**0.1 (0)**	0.54	0.26	0.13	0.06	0.16	0.07	0.04	0.01
NCT1*	9.0	6.4	**1.0 (0)**	**0.5 (0)**	**0.2 (0)**	**0.1 (0)**	0.64	0.24	0.16	0.05	0.17	0.06	0.04	0.01
NCT3*	7.8	6.4	**0.7 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.45	0.22	0.12	0.05	0.16	0.07	0.04	0.02

ASR	Maximum 1-hour Averaged TSP, µg/m³		Maximum Daily Averaged RSP, µg/m³		Maximum Daily Averaged FSP, µg/m³		10th Maximum Daily Averaged RSP, µg/m³		10th Maximum Daily Averaged FSP, µg/m³		Annual Averaged RSP, µg/m³		Annual Averaged FSP, µg/m³	
	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m	1.5m	5m
NCT2*	10.9	3.4	**1.1 (0)**	**0.5 (0)**	**0.3 (0)**	**0.1 (0)**	0.74	0.25	0.19	0.06	0.26	0.09	0.06	0.02
NCT5*	13.0	5.3	**1.6 (0)**	**0.4 (0)**	**0.4 (0)**	**0.1 (0)**	0.99	0.28	0.24	0.06	0.18	0.07	0.05	0.02
PT2*[1]	14.6	2.9	**2.7 (0)**	**0.4 (0)**	**0.7 (0)**	**0.1 (0)**	1.54	0.22	0.38	0.05	0.30	0.06	0.08	0.01
NCT6*	11.3	4.9	**2.4 (0)**	**0.5 (0)**	**0.6 (0)**	**0.1 (0)**	1.65	0.23	0.41	0.05	0.34	0.06	0.09	0.01
NCT4*	5.0	4.2	**0.8 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.64	0.32	0.16	0.08	0.15	0.07	0.04	0.02
NTST1*	4.0	3.7	**0.6 (0)**	**0.3 (0)**	**0.2 (0)**	**0.1 (0)**	0.43	0.23	0.11	0.06	0.15	0.05	0.04	0.01
GIC1*	13.1	8.1	**0.6 (0)**	**0.4 (0)**	**0.2 (0)**	**0.1 (0)**	0.20	0.18	0.05	0.04	0.04	0.04	0.01	0.01
GIC2*	16.5	13.2	**1.0 (0)**	**0.9 (0)**	**0.2 (0)**	**0.2 (0)**	0.61	0.56	0.15	0.15	0.08	0.08	0.02	0.02
GIC3*	8.9	7.3	**0.7 (0)**	**0.7 (0)**	**0.2 (0)**	**0.2 (0)**	0.48	0.46	0.12	0.11	0.07	0.06	0.02	0.02

Notes:

[1] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.

* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

3.8 Odour Assessment Methodology

Air Dispersion Model

3.8.1 The potential odour emissions arising from the operation of the upgraded Tai O STW and new Hang Mei SPS and Fan Kwai Tong SPS were predicted by using the Industrial Source Complex Short-Term 3 (ISCST3) model following the Guidelines for Choice of Models and Model Parameters in Air Quality Assessment published by EPD.

Emissions Inventory

Tai O Sewage Treatment Works

3.8.2 Potential odour sources identified in the STW include the following:

Construction Phase

- Temporary Sewage Treatment Facilities

Operational Phase

Preliminary Treatment Unit:

- Inlet Works and Flow Equalization Tank **(A)**
- 6mm Screen Channel **(B)**
- Grit Chambers **(C)**
- Storm Tank **(D)**
- Flow Distribution Tank 1 **(W)**
- 1-2mm Fine Screen Channel **(X)**
- Flow Distribution Tank 2 **(Y)**

MBR Treatment Unit:

- Wet Well Before MBR Tank **(Y1)**
- Anoxic Tank **(E)**
- Aerobic MBR Tank **(F)**
- Pump House and Header Tank **(Z)**

Sludge Treatment Unit:

- Sludge Holding Tank (Pre-thickener) **(L)**
- Sludge Digester **(P)**
- Sludge Holding Tank (Post-digester) **(N)**
- Sludge Dewatering Building **(J)**

Remark: **(X)** refers to the structure label of STW layout provided in Figure 2.2.

3.8.3 The General Layout Plan of the Tai O STW (**Figure 2.2**) shows the locations of these potential odour sources during the operational phase.

3.8.4 For planning the worst scenario, it is assumed in the odour impact assessment that total three MBR units will be operated in full capacity.

Hang Mei and Fan Kwai Tong Sewage Pumping Station

3.8.5 Potential odour sources identified in the SPSs mainly include the inlet chamber and wet well as shown in **Figure 2.4** and **2.5**.

Emissions Rates

3.8.6 For conservative analysis, the odour emission rates from Temporary Sewage Treatment Facilities, Preliminary Treatment Unit and Sludge Treatment Unit of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS were referenced to the odour emission rates provided in the approved EIA of Harbour Area Treatment Scheme (HATS) Stage 2A (Appendix 3-3 and Appendix 3-4) (Register No. AEIAR-121/2008). In view of the much lower sewage flow rates at Temporary Sewage Treatment Facilities, Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS is not expected to be worse than that in Stonecutters Island Sewage Treatment Works (SCISTW) and also municipal sewage will be treated, it is considered applicable to adopt the HATS odour emission rates as a conservative approach.

3.8.7 Odour measurement of air collected from an operative MBR sewage treatment facility in Hong Kong was conducted for estimating the odour emissions data of the aerobic MBR tank of the MBR treatment unit of the upgraded Tai O STW. Sewage treatment facility at Lo Wu Correctional Institution (LWCI) was chosen due to similar sewage condition and it also uses MBR treatment facility. Details of the odour measurements at sewage treatment facility of LWCI were provided in the "Report for odour emission Factor at STW (Law Wu)" prepared by Hong Kong Polytechnic University in **Appendix 3.3**. Corrections have been applied in estimating the emission rate taking into account of the difference in surface flow rate of the sewage and temperature difference. The calculations of the odour emission rates are also provided in **Appendix 3.3**.

Meteorological Data and Assumptions

3.8.8 The Memoscale Model 5 (MM5) meteorological data (Year 2010) has been extracted from the PATH model and the hourly values for atmospheric stability from meteorological surface observations calculated by PCRAMMET for use in the ISCST3 modelling.

3.8.9 The PCRAMMET model has been used to take the regional scale MM5 meteorological data extracted from the PATH Model and used it to:

- calculate hourly values for atmospheric stability from meteorological surface observations;
- interpolate twice daily mixing heights to hourly values; and
- convert suitable format for air quality dispersion models.

3.8.10 The ISCST3 model has adopted grid-specific composite real meteorological data, including temperature, wind speed and direction, stability class and mixing height extracted and calculated from the MM5 data of the PATH and the PCRAMMET model. The location details of the six grids covering the Project Study area ((6,22), (6,23), (6,24), (7,22), (7,23) and (7.24)) are given in **Appendix 3.5**.

3.8.11 The air dispersion run has made the following assumptions:

- The study area is defined as "rural";
- gradual plume rise options were considered in the model run; and
- A twelve-hour (07:00 to 19:00) working day during construction phase.

3.8.12 According to EPD's "Guidelines on Choice of Models and Model Parameters", it recommends the use of methodologies proposed by Duffee et al. and Keddie in performing the conversion from hourly to 5-second average concentration. However, it is not appropriate to adopt this peak-to-mean ratio for all types of odour sources. For the purpose of this assessment to produce more reasonable predictions for odour dispersion from point sources, reference is made to the peak-to-mean ratio stipulated in "Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales" published by the Department of Environment and Conservation, New South Wales, Australia (NSW Approved Method). As stated in the NSW Approved Method, where nearby buildings interfere with the trajectory and growth of the plume, the source is called a wake-affected point source. A point source is wake-affected if stack height is less than or equal to 2.5 times the height of buildings located within a distance of 5L (where L is the lesser of the height or width of the building) from the each release point. In accordance with the proposed layout, the 2.5m high emission points of deodourizing units for Temporary Sewage Treatment Facilities (3m high), Tai O STW (7.8m to 12.4 m high), Hang Mei SPS (5.5m high) and Fan Kwai Tong SPS (5.5m high) are located on one side of the buildings and hence the emission points are considered as wake-affected point sources in the assessment.

3.8.13 The dispersion modelling techniques employed for this assessment are to follow those described in EPD's "Guidelines on Choice of Models and Model Parameters" except the use of alternative peak-to-mean ratios for wake-affected point sources and area sources. It should be noted that the peak-to-mean ratios stated in the NSW Approved Method are derived based on experimental and theoretical analyses and assuming a 0.1% exceedance level (Ref.: Statistical Elements of Predicting the Impact of a Variety of Odour Sources, Peter R. Best, Karen E. Lunney and Christine A. Killip, Water Science and Technology, Australia, 44: 9 pp 157-164 2001).

3.8.14 In accordance with the NSW Approved Method, the conversion factors are used for converting the 1-hour average concentrations to 1-second average concentrations. As a conservative approach, these conversion factors would be directly adopted for converting the 1-hour average concentrations predicted by the ISCST3 model to 5-second average concentrations for compliance checking with the odour criteria. The conversion factors for different stability classes for wake-affected point sources are shown in **Table 3.8**. The overall conversion factors under different stability are adopted in the model to predicted 5-second averaged output.

Table 3.8 : Conversion Factors from 1-hour to 5-second Averaged Concentration

Pasquill Stability Class	Conversion Factor (1-hour to 5-second)
A	2.3
B	2.3
C	2.3
D	2.3
E	2.3
F	2.3

Note: Refer to "Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales" published by the Department of Environment and Conservation, New South Wales, Australia."

3.9 Prediction of Odour Impact

Unmitigated Scenario

Construction Phase

3.9.1 It should be noted that deodourizing units will be installed at the temporary sewage treatment facilities. Thus, the "unmitigated scenario" prediction results, assuming no deodourizing units, are presented as a hypothetical unmitigated scenario for comparison only. The predicted unmitigated cumulative odour levels at the selected ASRs are summarized in **Table 3.9.**

Table 3.9 : Predicted Worst-case 5-second Averaged Odour Concentration at Different Level above Ground during Construction Phase (Unmitigated – for Comparison Only)

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
SST*	1.95	1.51	0.68	0.45
RA*	2.41	2.07	1.18	0.54
HST	1.47	1.37	1.08	0.70
SWCC	1.32	1.20	0.86	0.49
STP3	1.17	1.10	0.90	0.63
STP2	0.94	0.89	0.73	0.52
STA1	0.78	0.75	0.65	0.50
STA2	1.07	1.01	0.83	0.59
STP4	0.62	0.59	0.50	0.37
STP5	0.68	0.65	0.55	0.41
STP6*	0.98	0.91	0.72	0.48
STP7*	1.02	0.94	0.74	0.48
STP	0.64	0.60	0.51	0.40
STP1	0.79	0.73	0.56	0.36
PCT1*	2.18	1.70	1.21	0.52
PCT2*	2.14	1.92	1.32	0.67
TOJCC	0.85	0.80	0.65	0.44
TOTH	0.81	0.75	0.57	0.36
KHB1	0.63	0.59	0.46	0.31
KHB2	0.85	0.81	0.69	0.52
KHB3	0.54	0.51	0.42	0.30
TOM	0.79	0.76	0.66	0.51
TOWO1	0.46	0.44	0.38	0.30
TWO2	0.74	0.70	0.61	0.49
TOWO2	0.74	0.71	0.61	0.48
TWO3	0.43	0.41	0.36	0.29
TOWO3	0.65	0.62	0.55	0.44
TOTP4	0.67	0.64	0.56	0.45
TTP2	0.35	0.33	0.29	0.23
TOTP3	0.36	0.34	0.29	0.23
TTP1	0.50	0.48	0.40	0.30
TOTP1	0.28	0.26	0.22	0.16
BCM	0.34	0.32	0.28	0.21
LHC	0.64	0.61	0.53	0.42
KHH	0.44	0.42	0.37	0.29
RG	0.58	0.56	0.49	0.39
YTP*	0.50	0.48	0.42	0.33
BHMC*	0.22	0.21	0.18	0.15
TOFS*	0.31	0.30	0.26	0.21
WHV3*	0.41	0.39	0.36	0.30
WHV2*	0.22	0.21	0.19	0.16

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
WHV1*	0.32	0.31	0.28	0.24
WHV5*	0.22	0.22	0.20	0.17
WHV4*	0.16	0.16	0.15	0.12
WHV4a*	0.18	0.18	0.16	0.14
WHV6*	0.21	0.20	0.18	0.16
WHV7*	0.22	0.21	0.19	0.16
LUT4*	0.22	0.21	0.19	0.16
LUT2*	0.17	0.16	0.15	0.12
LUT1*	0.36	0.35	0.32	0.27
LUT3*	0.34	0.34	0.31	0.26
LUPG*	0.26	0.25	0.23	0.20
NCT1*	0.22	0.22	0.20	0.17
NCT3*	0.28	0.27	0.24	0.21
NCT2*	0.36	0.35	0.31	0.27
NCT5*	0.35	0.34	0.31	0.26
PT2*[1]	0.29	0.28	0.25	0.22
NCT6*	0.33	0.32	0.29	0.24
NCT4*	0.06	0.06	0.06	0.05
NTST1*	0.27	0.26	0.24	0.21
GIC1*	0.22	0.21	0.19	0.16
GIC2*	2.03	1.84	1.29	0.78
GIC3*	0.94	0.85	0.60	0.32

Notes:

[1] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.

* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

Operational Phase

3.9.2 It should be noted that deodourizing units will be installed at the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS. Thus, the "unmitigated scenario" prediction results, assuming no deodourizing units, are presented as a hypothetical unmitigated scenario for comparison only. The predicted unmitigated cumulative odour levels at the selected ASRs are summarized in **Table 3.10**. The predicted unmitigated odour concentration contour plots at 1.5m, 5m, 10m and 15m above ground level are shown in **Figure 3.26** to **Figure 3.29.**

Table 3.10 : Predicted Worst-case 5-second Averaged Odour Concentration at Different Level above Ground during Operational Phase (Unmitigated – for Comparison Only)

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
SST*	28.95	40.58	52.39	34.85
RA*	15.04	18.81	30.31	38.65
HST	6.28	6.68	9.87	12.78
SWCC	8.52	9.58	12.00	13.35
STP3	5.82	6.03	7.91	9.73
STP2	5.70	6.26	7.67	8.85
STA1	4.68	4.62	5.50	7.36
STA2	5.73	6.13	7.79	9.19
STP4	5.95	6.39	7.52	8.55
STP5	5.57	5.88	6.65	7.27

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
STP6*	6.75	7.35	8.81	9.83
STP7*	6.27	7.31	9.96	12.20
STP	4.38	4.50	5.42	6.76
STP1	5.74	5.69	5.52	6.28
PCT1*	12.89	12.97	20.89	17.99
PCT2*	8.20	9.45	12.10	15.30
TOJCC	6.19	6.01	7.14	8.86
TOTH	8.61	7.74	5.79	6.83
KHB1	7.22	7.52	8.03	7.83
KHB2	5.83	5.68	6.35	7.82
KHB3	4.81	4.95	5.16	5.67
TOM	11.20	10.92	9.95	8.27
TOWO1	3.66	3.96	4.79	5.69
TWO2	10.98	10.72	9.84	8.32
TOWO2	9.27	9.03	8.22	7.02
TWO3	7.36	7.18	6.57	5.57
TOWO3	4.02	4.32	5.16	6.15
TOTP4	4.65	4.94	5.76	6.66
TTP2	3.76	4.01	4.68	5.43
TOTP3	3.96	3.96	3.90	4.64
TTP1	6.22	6.23	6.16	5.77
TOTP1	5.24	5.26	5.20	4.87
BCM	4.19	4.36	4.79	5.23
LHC	9.56	9.26	8.30	6.86
KHH	6.19	6.00	5.39	5.23
RG	4.47	4.67	5.22	5.84
YTP*	6.75	6.71	6.54	6.15
BHMC*	3.72	3.65	3.44	3.28
TOFS*	5.51	5.42	5.15	4.67
WHV3*	4.82	4.92	5.18	5.46
WHV2*	2.86	2.90	3.03	3.16
WHV1*	4.11	4.19	4.42	4.67
WHV5*	3.35	3.37	3.40	3.40
WHV4*	3.47	4.01	3.39	3.83
WHV4a*	3.66	5.22	3.57	4.51
WHV6*	3.96	9.97	6.82	4.55
WHV7*	4.03	5.23	3.93	3.78
LUT4*	3.41	3.36	3.21	3.14
LUT2*	4.37	4.36	4.31	4.17
LUT1*	4.66	4.67	4.70	4.66
LUT3*	4.32	4.33	4.35	4.32
LUPG*	3.16	3.17	3.19	3.22
NCT1*	3.53	3.51	3.43	3.28
NCT3*	5.34	5.32	5.23	5.02
NCT2*	5.70	6.88	5.51	5.23
NCT5*	8.30	10.36	6.31	5.34
PT2*[1]	5.31	14.10	9.90	4.52
NCT6*	9.84	15.39	8.72	4.44
NCT4*	4.03	3.96	3.72	3.35
NTST1*	4.86	4.85	4.79	4.64
GIC1*	3.15	3.14	3.11	3.02
GIC2*	10.11	10.12	13.83	18.19
GIC3*	5.42	5.27	6.17	8.12

Notes:

[1] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.

* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

\- Shaded figure indicates exceedance of the assessment criteria stipulated in the EIAO-TM.

3.9.3 Without any odour removing measures, exceedances in odour levels were predicted. Nonetheless, this assessment scenario is presented only for comparison purpose. Deodourising facility will be incorporated into the design as mitigation measures.

Mitigated Scenario

Construction Phase

3.9.4 Based on the current design, the odour emissions from the temporary sewage treatment facilities would be ventilated to a deodourizing unit. The deodourizing unit is designed to be able to achieve an odour removal efficiency of 97%. (The odour removal efficiency of not less than 99.5% is adopted in the EIA report of Comprehensive Development and Wetland Protection Near Yau Mei San Tsuen, EIA-227/2015). The detail of odour emission rate calculation are provided in **Appendix 3.3**.

3.9.5 The treated air would then be emitted at 2.5m above ground level based on the current design information. The predicted maximum mitigated odour levels at the selected ASRs are summarized in **Table 3.11**. With the odour removing measures, predicted odour levels at all selected ASRs will be significantly reduced and to meet the 5 odour units criteria.

Table 3.11 : Predicted Worst-case 5-second Averaged Odour Concentration at Different Level above Ground during Construction Phase (Mitigated)

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
SST*	0.06	0.05	0.02	0.01
RA*	0.07	0.06	0.04	0.02
HST	0.04	0.04	0.03	0.02
SWCC	0.04	0.04	0.03	0.01
STP3	0.04	0.03	0.03	0.02
STP2	0.03	0.03	0.02	0.02
STA1	0.02	0.02	0.02	0.02
STA2	0.03	0.03	0.02	0.02
STP4	0.02	0.02	0.01	0.01
STP5	0.02	0.02	0.02	0.01
STP6*	0.03	0.03	0.02	0.01
STP7*	0.03	0.03	0.02	0.01
STP	0.02	0.02	0.02	0.01
STP1	0.02	0.02	0.02	0.01
PCT1*	0.07	0.05	0.04	0.02
PCT2*	0.06	0.06	0.04	0.02
TOJCC	0.03	0.02	0.02	0.01
TOTH	0.02	0.02	0.02	0.01
KHB1	0.02	0.02	0.01	0.01
KHB2	0.03	0.02	0.02	0.02
KHB3	0.02	0.02	0.01	0.01

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
TOM	0.02	0.02	0.02	0.02
TOWO1	0.01	0.01	0.01	0.01
TWO2	0.02	0.02	0.02	0.01
TOWO2	0.02	0.02	0.02	0.01
TWO3	0.01	0.01	0.01	0.01
TOWO3	0.02	0.02	0.02	0.01
TOTP4	0.02	0.02	0.02	0.01
TTP2	0.01	0.01	0.01	0.01
TOTP3	0.01	0.01	0.01	0.01
TTP1	0.02	0.01	0.01	0.01
TOTP1	0.01	0.01	0.01	0.005
BCM	0.01	0.01	0.01	0.01
LHC	0.02	0.02	0.02	0.01
KHH	0.01	0.01	0.01	0.01
RG	0.02	0.02	0.01	0.01
YTP*	0.01	0.01	0.01	0.01
BHMC*	0.01	0.01	0.01	0.004
TOFS*	0.01	0.01	0.01	0.01
WHV3*	0.01	0.01	0.01	0.01
WHV2*	0.01	0.01	0.01	0.005
WHV1*	0.01	0.01	0.01	0.01
WHV5*	0.01	0.01	0.01	0.01
WHV4*	0.005	0.005	0.004	0.004
WHV4a*	0.01	0.01	0.005	0.004
WHV6*	0.01	0.01	0.01	0.005
WHV7*	0.01	0.01	0.01	0.005
LUT4*	0.01	0.01	0.01	0.005
LUT2*	0.01	0.005	0.004	0.004
LUT1*	0.01	0.01	0.01	0.01
LUT3*	0.01	0.01	0.01	0.01
LUPG*	0.01	0.01	0.01	0.01
NCT1*	0.01	0.01	0.01	0.01
NCT3*	0.01	0.01	0.01	0.01
NCT2*	0.01	0.01	0.01	0.01
NCT5*	0.01	0.01	0.01	0.01
PT2*[1]	0.01	0.01	0.01	0.01
NCT6*	0.01	0.01	0.01	0.01
NCT4*	0.002	0.002	0.002	0.001
NTST1*	0.01	0.01	0.01	0.01
GIC1*	0.01	0.01	0.01	0.00
GIC2*	0.06	0.06	0.04	0.02
GIC3*	0.03	0.03	0.02	0.01

Note:

- Estimated Values were rounded to one significant figure.

[1] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.

* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

3.9.6 No exceedances of odour level arising during the construction phase were predicted under the mitigated scenario. According the assessment results in **Table 3.10**, the odour impacts on the ASRs at 1.5m above ground is the worst case scenario. Therefore, the concentration contour plots of the assessment results of the mitigated scenario for the odour impact during the construction phase at 1.5m above ground are presented in **Figure 3.25**

Operational Phase

3.9.7 Based on the current design, the identified odour sources within the Tai O STW and Hang Mei SPS and Fan Kwai Tong SPS would be enclosed and all the odour emissions from the enclosed sources would be ventilated to a deodourizing unit. The deodourizing unit is designed to be able to achieve an odour removal efficiency of 97% for Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS. (The odour removal efficiency of not less than 99.5% is adopted in the EIA report of Comprehensive Development and Wetland Protection Near Yau Mei San Tsuen, EIA-227/2015). The odour emission rate and odour removal efficiency listed in **Table 3.12** shall be verified during commission test and periodic performance tests. Details of the calculation and provided in **Appendix 3.3**.

Table 3.12 : Design Information of Deodourizing Units (Mitigated)

		Odour removal efficiency of deodourization unit	Number of emission point	Total emission area (m^2)	Emission Rate per emission point (with mitigation) (OU/s)
Tai O STW	Room 1 – Preliminary Treatment Unit	97%	4	10	34.507
	Room 2- Treatment Unit	97%	4	8.3	11.912
	Room 3 – Sludge Treatment Unit	97%	6	13.5	40.015
Hang Mei Pumping Station		97%	1	1	5.274
Fan Kwai Tong Pumping Station		97%	1	1	5.274

3.9.8 The treated air would then be emitted at 2.5m above ground level based on the current design information. The predicted maximum mitigated odour levels at the selected ASRs are summarized in **Table 3.13**. With the odour removing measures, predicted odour levels at all selected ASRs will be significantly reduced and to meet the 5 odour units criteria.

3.9.9 The predicted mitigated odour concentration contour plots at 1.5m, 5m, 10m and 15m above ground level are shown in **Figure 3.30** to **Figure 3.33**.

Table 3.13 : Predicted Worst-case 5-second Averaged Odour Concentration at Different Level above Ground (Mitigated)

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
SST*	0.87	1.22	1.57	1.05
RA*	0.45	0.56	0.91	1.16
HST	0.19	0.20	0.30	0.38
SWCC	0.26	0.29	0.36	0.40
STP3	0.17	0.18	0.24	0.29
STP2	0.17	0.19	0.23	0.27
STA1	0.14	0.14	0.16	0.22
STA2	0.17	0.18	0.23	0.28
STP4	0.18	0.19	0.23	0.26
STP5	0.17	0.18	0.20	0.22
STP6*	0.20	0.22	0.26	0.29
STP7*	0.19	0.22	0.30	0.37
STP	0.13	0.13	0.16	0.20

ASR	Predicted Worst-case Odour Concentration, 5-second Averaged Odour Units			
	1.5m	5m	10m	15m
STP1	0.17	0.17	0.17	0.19
PCT1*	0.39	0.39	0.63	0.54
PCT2*	0.25	0.28	0.36	0.46
TOJCC	0.19	0.18	0.21	0.27
TOTH	0.26	0.23	0.17	0.20
KHB1	0.22	0.23	0.24	0.23
KHB2	0.17	0.17	0.19	0.23
KHB3	0.14	0.15	0.15	0.17
TOM	0.34	0.33	0.30	0.25
TOWO1	0.11	0.12	0.14	0.17
TWO2	0.33	0.32	0.30	0.25
TOWO2	0.28	0.27	0.25	0.21
TWO3	0.22	0.22	0.20	0.17
TOWO3	0.12	0.13	0.15	0.18
TOTP4	0.14	0.15	0.17	0.20
TTP2	0.11	0.12	0.14	0.16
TOTP3	0.12	0.12	0.12	0.14
TTP1	0.19	0.19	0.18	0.17
TOTP1	0.16	0.16	0.16	0.15
BCM	0.13	0.13	0.14	0.16
LHC	0.29	0.28	0.25	0.21
KHH	0.19	0.18	0.16	0.16
RG	0.13	0.14	0.16	0.18
YTP*	0.20	0.20	0.20	0.18
BHMC*	0.11	0.11	0.10	0.10
TOFS*	0.17	0.16	0.15	0.14
WHV3*	0.14	0.15	0.16	0.16
WHV2*	0.09	0.09	0.09	0.09
WHV1*	0.12	0.13	0.13	0.14
WHV5*	0.10	0.10	0.10	0.10
WHV4*	0.10	0.12	0.10	0.12
WHV4a*	0.11	0.16	0.11	0.14
WHV6*	0.12	0.30	0.20	0.14
WHV7*	0.12	0.16	0.12	0.11
LUT4*	0.10	0.10	0.10	0.09
LUT2*	0.13	0.13	0.13	0.13
LUT1*	0.14	0.14	0.14	0.14
LUT3*	0.13	0.13	0.13	0.13
LUPG*	0.09	0.10	0.10	0.10
NCT1*	0.11	0.11	0.10	0.10
NCT3*	0.16	0.16	0.16	0.15
NCT2*	0.17	0.21	0.17	0.16
NCT5*	0.25	0.31	0.19	0.16
PT2*[1]	0.16	0.42	0.30	0.14
NCT6*	0.30	0.46	0.26	0.13
NCT4*	0.12	0.12	0.11	0.10
NTST1*	0.15	0.15	0.14	0.14
GIC1*	0.09	0.09	0.09	0.09
GIC2*	0.30	0.30	0.42	0.55
GIC3*	0.16	0.16	0.18	0.24

Note:

[1] The existing land-use of the location is Aqua Privy. According the Tai O Outline Zoning Plan (No. S/I-TOF/1), this site is zoned as Government / Institution and Community (G/IC) use which may be used for potential air sensitive use. This is considered planned ASR.

* ASR located within the 500m radius of the boundary of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

3.9.10 No exceedances of odour level arising from the operation of the upgraded Tai O sewage treatment facilities including Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS were predicted under the mitigated scenario.

3.9.11 All ASRs selected and described in **Table 3.3** were used for the operational phase odour assessment. In addition, for odour concentration contour plots, assessment grid points were also included to cover the assessment area within 500m from the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS.

3.10 Mitigation Measures

Construction Phase

3.10.1 For the construction activities under the Project, suitable requirements stipulated in the Air Pollution Control (Construction Dust) Regulation shall be implemented during the construction activities to minimise the dust impact. It is recommended that typical dust control methods including the following good site practices should also be incorporated during construction phase:

- Watering every hour on unpaved areas and stockpiles of dusty materials (if no tarpaulin is provided) to reduce dust emissions by 90% (e.g. watering intensity at 1.9 litre/m^2 during the first hour, subsequent application at 0.2 litre/m^2 (water loss from evaporation) to achieve the target dust removal efficiency. Actual application shall depend on the site condition and weather conditions);
- Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces;
- Use of frequent watering for particularly dusty construction areas and areas close to ASRs;
- Vehicle washing facilities should be provided at every vehicle exit point;
- Where a site boundary adjoins a road, streets or other areas accessible to the public, hoarding of not less than 2.4m high from ground level should be provided along the entire length except for a site entrance or exit;
- Stockpiles of imported material kept on site shall be contained within hoarding, dampened and/or covered during dry and windy weather;
- Material stockpiled alongside trenches should be covered with tarpaulins;
- Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs;
- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or spayed with water to maintain the entire surface wet during the non-working hours;
- All dusty materials shall be sprayed with water prior to any loading, unloading or transfer operation so as to keep the dusty materials wet;
- Water sprays shall be used during the delivery and handling of sands aggregates and the like;
- All demolished items that may emit dust particles should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides within a day of demolition; and
- Odour emissions from the temporary sewage treatment facilities would be ventilated to a deodourizing unit. The deodourizing unit is designed to be able to achieve an odour removal efficiency of 97%.

Operational Phase

3.10.2 The enclosure provided for the odour sources of the upgraded Tai O STW and new Hang Mei SPS and Fan Kwai Tong SPS and the installation of deodorization units with 97% odour removal efficiency will reduce the potential odour impacts. Odour impacts after the upgrading works will be significantly reduced. The current design information of deodourizing units is summarized in **Table 3.9**.

3.10.3 In addition, good housekeeping practices listed below should be followed to control odour emissions from the plant and these standard practices should be included in the plant operator manual:

- Screens should be cleaned regularly to remove accumulated organic debris;
- Grit and screening transfer systems should be flushed regularly with water to remove organic debris and grit;
- Grit and screened materials should be transferred to closed containers to minimize odour escape;
- Sludge should be frequently withdrawn from tanks to prevent the production of gases;
- Sludge should be transferred to closed containers; and
- Sludge containers should be flushed with water regularly.

3.11 Environmental Monitoring and Audit Requirements

Construction Phase

3.11.1 As the construction dust impacts at all ASRs were predicted comply with the relevant criteria due to the construction activities, regular dust monitoring is not considered necessary during the construction phase of the Project. No exceedances of odour level arising during the construction phase were predicted under the mitigated scenario. However, regular site audits are recommended to ensure the dust control measures are properly implemented.

3.11.2 Details on the EM&A requirements for the construction activities of Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS are provided in the EM&A Manual.

Operational Phase

3.11.3 All the odorous gas arising from the sewage would be collected and properly treated by deodorization units with 97% odour removal efficiency for Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS. The predicted odour levels at the ASRs would comply with the TM-EIAO criterion. Odour monitoring and audit should be carried out during the commissioning stage to ensure the continuing effectiveness of the odour control measures. Details of monitoring and audit programme of odour due to the operation of Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS are presented in the EM&A Manual. Commissioning test of the deodorization unit is also a mandatory requirement to confirm the effectiveness of the odour removal efficiency is in compliance with the design criteria.

3.12 Conclusion

3.12.1 Dust generating activities were identified and evaluated. The dust impacts due to construction of the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS were predicted to comply with TM-EIAO and the AQOs criteria. Proper mitigation measures will be implemented to further reduce the construction dust emissions Regular site audits are recommended to ensure the dust control measures are properly implemented.

3.12.2 During the operational phase of the Project, odourous gas generated from the Tai O STW, Hang Mei SPS and Fan Kwai Tong SPS would be ventilated to the deodorization facility for treatment before discharge. The deodorization facility is designed to be able to achieve an odour removal efficiency of 97% for Tai O STW Hang Mei SPS and Fan Kwai Tong SPS. During sludge transportation, it is recommended that the sludge should be carried by enclosed container to avoid unacceptable odour nuisance. With proper mitigation measures incorporated into the design, odour impacts after the upgrading works will be significantly reduced, and no unacceptable odour impacts are anticipated. An EM&A programme will be implemented to ensure the continuing effectiveness of the odour control measures.