

7 Construction Dust Impact Assessment

7.1 Introduction

This chapter presents the findings of the assessment of construction dust implications arising from the Project during the construction phase. All above-ground works areas with potential dust emission activities have been examined and their impacts assessed. With the implementation of on-site watering, potential environmental impacts associated with construction dust would be controlled to acceptable levels.

7.2 Legislation and Standards

For the criteria as regards air quality impact assessment, reference shall be made to the Hong Kong Planning Standards and Guidelines (HKPSG), the Air Pollution Control Ordinance (APCO) (Cap.311), and Annex 4 of the Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO).

The APCO (Cap.311) provides the power for controlling air pollutants from a variety of stationary and mobile sources and encompasses a number of Air Quality Objectives (AQOs). In addition to the APCO, the following overall policy objectives are laid down in Chapter 9 of the Hong Kong Planning Standards and Guidelines (HKPSG) as follows:

- a) Limit the contamination of the air in Hong Kong, through land use planning and through the enforcement of the APCO, to safeguard the health and well-being of the community; and
- b) Ensure that the AQO for 7 common air pollutants are met as soon as possible.

Currently, the AQOs stipulate limits on concentrations for 7 pollutants including sulphur dioxide (SO₂), Total Suspended Particulates (TSP), Respirable Suspended Particulates (RSP), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO), photochemical oxidants, and Lead (Pb). The AQOs are listed in the table below.

Table 7.1: Hong Kong Air Quality Objectives (HKAQO)

Pollutant	Limits on Concentration, ug/m ³ [1] (ppm in brackets)				
	1-hr [2]	8-hr [3]	24-hr [3]	3-Month [4]	Annual [4]
Sulphur Dioxide	800 (0.3)		350 (0.13)		80 (0.03)
Total Suspended Particulates	500 [7]		260		80
Respirable Suspended Particulates [5]			180		55
Carbon Monoxide	30,000 (26.2)	10,000 (8.7)			
Nitrogen Dioxide	300 (0.16)		150 (0.08)		80 (0.04)
Photochemical Oxidants (as ozone) [6]	240				
Lead				1.5	

Notes:

[1] Measured at 298K and 101.325 kPa.

[2] Not to be exceeded more than three times per year.

[3] Not to be exceeded more than once per year.

[4] Arithmetic mean.

[5] Respirable suspended particulates means suspended particulates in air with a nominal aerodynamic diameter of 10 micrometres or smaller.

[6] Photochemical oxidants are determined by measurement of ozone only.

[7] Not an AQO but is a criterion for evaluating air quality impacts as stated in Annex 4 of TM-EIAO.

The key air emission source from Project is the dust generated during construction phase at above-ground works areas. In this regard, air pollutant of concern would only include total suspended particulates (TSP) which has been assessed in this study. The dust emissions generated during grouting, bored tunnelling and drill-and-blast activities would be insignificant.

7.3 Ambient Air Quality Condition and Previous Monitoring Levels

Existing Air Sensitive Receivers (ASRs) in the vicinity of the project include various residential developments, educational institution etc (see **Section 7.4**). Key existing air pollution sources that may bear upon the air quality at Project at construction phase including work sites demarcated for construction and railway works, barging facilities and haul roads located nearby. Details of air pollution emission sources are discussed in **Section 7.5**.

Historical air quality monitoring data from the monitoring stations, namely the Tsuen Wan, Kwai Chung, Sham Shui Po, Kwun Tong, and Central/Western Monitoring stations operated by EPD, have been examined. The latest air quality monitoring data from 2006 to 2010 at these monitoring stations are tabulated in the table below. In order to determine the meaningful background air quality, the latest 5-year annual average would be adopted.

Table 7.2: TSP Monitoring Data in 2006-2010

Monitoring Station	Annual TSP Concentration (ug/m ³)					5-year Average
	2006	2007	2008	2009	2010	
Tsuen Wan	82	79	67	63	63	70.8 (89%)
Kwai Chung	81	85	79	70	71	77.2 (96%)
Sham Shui Po	79	79	81	77	76	78.4 (97%)
Kwun Tong	75	82	72	70	67	73.2 (92%)
Central/Western	78	77	78	73	76	76.4 (96%)
					Average:	75.2 (94%)

Note:

% of AQO is provided in the bracket.

Monitoring results exceeded AQO are shown as bolded characters.

The existing environment of the study area in Kowloon is mainly a densely populated and developed area with a mix of residential, commercial and institutional development. Given the developed nature of the study area and the similarity with the area surrounding EPD's monitoring stations in urban area, including Tsuen Wan, Kwai Chung, Sham Shui Po, Kwun Tong, and Central/Western Monitoring Stations, it is considered reasonable to adopt all the monitoring data from these stations to represent background conditions in the Kowloon Area. As such the background TSP concentration of 75.2 ug/m³ is therefore adopted.

Construction of the project will involve the emission of fugitive dusts and hence TSP has to be assessed for construction phase air quality impact. During the operational phase, only electrified trains would be operated and hence there will not be air quality emission.

7.4 Air Sensitive Receivers & Pollution Sources

7.4.1 Air Sensitive Receivers

With reference to EIA Study Brief No. ESB-233/2011 for Project, the study area for air quality impact assessment should generally be defined by a distance of 500m from the boundary of Project Site. Further, it should be extended to include major emission sources that may have a bearing on the environmental acceptability of the project. The study will also review the air quality impacts on the areas and other sensitive receivers beyond 500m from the Project site boundary, which may be potentially affected by the Project.

In accordance with Annex 12 of the TM-EIAO, Air Sensitive Receivers (ASRs) include domestic premises, hotel, hostel, hospital, clinic, nursery, temporary housing

accommodation, school, educational institution, office, factory, shop, shopping centre, place of public worship, library, court of law, sports stadium or performing arts centre. Any other premises or places with which, in terms of duration or number of people affected, has a similar sensitivity to the air pollutants as the aforesaid premises and places would also be considered as a sensitive receiver. Representative ASRs within a distance of 500m from the alignment, temporary work areas, and associated barging facilities have been identified.

These ASRs include both the existing and planned developments. Existing ASRs are identified by means of reviewing topographic maps, aerial photos, land status plans, supplemented by site inspections. They mainly include developed residential buildings with different storey high, educational institution of few storey high and hotels etc.

Planned/committed ASRs are identified by making reference to relevant Outline Zoning Plans (OZP), Outline Development Plans, Layout Plans and other published plans in the vicinity of the alignment, including:

- Approved Tsim Sha Tsui (KPA 1) Outline Zoning Plan (No. S/K1/26);
- Draft Yau Ma Tei (KPA 2) Outline Zoning Plan (No. S/K2/21);
- Draft Ho Man Tin (KPA 6&7) Outline Zoning Plan (No. S/K7/21);
- Approved Wang Tau Hom & Tung Tau (KPA 8) Outline Zoning Plan (No. S/K8/21)
- Approved Hung Hom (KPA 9) Outline Zoning Plan (No. S/K9/24);
- Approved Tsz Wan Shan, Diamond Hill & San Po Kong (KPA 11) Outline Zoning Plan (No. S/K11/25);
- Draft Kai Tak (KPA22) Outline Zoning Plan (No. S/K22/3)

The relevant stakeholders were also approached to obtain latest information on planning application, layout and building height. The major planned uses in the vicinity of the area include:

- Kai Tak Further Development proposed in Agreement No. CE35/2006 (CE) Kai Tak Development Engineering Study cum Design and Construction of Advance Works – Investigation, Design and Construction (Approved EIA Report: EIA-157/2008)

The locations of the representative ASRs for air quality assessment during the construction of the project are illustrated in **Figures 7.1.1 to 7.1.3**, and are summarised in the table below. Detailed information of representative ASRs are presented in **Appendix 7.1**.

Table 7.3: Representative air sensitive receivers

ASR ID	Location	Landuse ^[1]	No. of Storey	Approximate separation distance from project site boundary (m)
<i>DIH-5 Residential Premises along Fung Tak Road and Lunk Fung Street</i>				
DIH-5-1	Rainbow Home	R	11	70
DIH-5-2	Residential premises	R	6	70
DIH-5-5	Our Lady's Kindergarten	E	2	60
<i>DIH-6 Wong Tai Sin Fire Station and Quarters</i>				
DIH 6-1	Wong Tai Sin Fire Station and Quarters Block A	R	34	100
<i>DIH-7 Tropicana Gardens</i>				
DIH-7-1	Tropicana Gardens Block 2	R	25	190
DIH-7-2	Tropicana Garden Block 3	R	25	190
<i>DIH-8 Redmption Lutheran Church</i>				
DIH-8-1	Redemption Lutheran Church	W	3	130

ASR ID	Location	Landuse ^[1]	No. of Storey	Approximate separation distance from project site boundary (m)
DIH-9 Shek On Building				
DIH-9-1	Shek On Building	E + W	5	30
DIH-10 Hong Kong Sheung Hui Nursing Home				
DIH-10-1	Hong Kong Sheung Keung Hui Nursing Home	H	9	30
DIH-11 Lung Poon Court				
DIH-11-1	Lung Poon Court – Lung Wan House	R	34	<10
DIH-12 Galaxia				
DIH-12-1	Galaxia Tower B	R	44	100
DIH-12-2	Galaxia Tower E	R	43	40
DIH-13 Canossa Primary School				
DIH-13-1	Canossa Primary School	E	5	80
DIH-14 Rhythm Garden				
DIH-14-1	Rhythm Garden Block 2	R	22	<10
DIH-14-2	Rhythm Garden Block 5	R	22	<10
DIH-14-3	Rhythm Garden Block 8	R	22	110
DIH-14-4	Canossa Primary School (San Po Kong)	E	6	90
DIH-14-5	Rhythm Garden Block 1	R	22	<10
DIH-14-6	Rhythm Garden Block 3	R	22	<10
DIH-15 Choi Hung Estate				
DIH-15-1	Choi Hung Estate - Kam Wan House	R	20	100
DIH-15-2	Choi Hung Estate - Pik Hoi House	R	20	100
DIH-17 Chuk Yuen United Village				
DIH-17-1	Chuk Yuen United Village	R	1-3	60
DIH-25 Choi Hung Road Playground				
DIH-25-1	Football Field in Choi Hung Road Playground	GIC	-	80
DIH-26 Hammer Hill Road Leisure Pool				
DIH-26-1	Hammer Hill Road Leisure Pool	GIC	-	270
KAT-1 Kowloon Cognito College				
KAT-1-1	Kowloon Cognito College	E	5	210
HOM-3 Residential Premises along Shun Yung Street				
HOM-3-1	Fook Sing Mansion	R	18	240
HOM-3-2	Marigold Mansion Block A	R	20	280
HOM-4 Residential Premises along Valley Road				
HOM-4-1	Yee Fu Building	R	25	170
HOM-5 271 Chatham Road North				
HOM-5-1	271 Chatham Road North	R	5	110
HUH-1 Residential Premises and Educational Institution along Chatham Road North and Hong Chong Road				
HUH-1-1	Cartas Branchi College of Careers ^[2]	E	8	60
HUH-1-2	Lok Ka House	R	7	20
HUH-1-3	Wing Fung Building	R	8	<10
HUH-2 The Hong Kong Polytechnic University				

ASR ID	Location	Landuse ^[1]	No. of Storey	Approximate separation distance from project site boundary (m)
HUH-2-1	Hong Kong Polytechnic University - Cheung On Tak Lecture Theatre	E	6	100
HUH-3 Residential Premises along Shun Yung Street				
HUH-3-1	Royal Peninsula Block 2	R	42	140
HUH-4 The Metropolis Residence				
HUH-4-1	The Metropolis Residence Tower 2	R	18	130
HUH-5 Harbour Plaza Metropolis				
HUH-5-1	Harbour Plaza Metropolis	R	11	90
HUH-6 HK Fire Service Headquarters Building				
HUH-6-1	HK Fire Services Headquarters Building	GIC	13	90
HUH-7 Hotel Nikko Hong Kong				
HUH-7-1	Hotel Nikko Hong Kong	R	12	100
HUH-9 Hong Kong Coliseum				
HUH-9-1	Hong Kong Coliseum	P	1	<10
HUH-10 Harbourfront Horizon				
HUH-10-1	Harbourfront Horizon	R	22	240
HUH-11 China Travel Cargo Logistic Centre				
HUH-11-1	China Travel Cargo Logistic Centre	I	-	30

Note:

[1] R – residential; E – educational; I – Industrial; H – clinic/ home for the aged; W – worship; GIC – government, institution and community; P – performing arts centres

Table 7.4: Planned ASRs

ASR ID	Location	Landuse ^[1]	No. of Storey
KAT-P1 Residential premises near Kai Tak Station			
KAT-P1-1	Residential premises near Kai Tak Station	R	[3]
KAT-P1-2	Residential premises near Kai Tak Station	R	[3]
KAT-P1-3	Residential premises near Kai Tak Station	R	[3]
KAT-P1-4	Residential premises near Kai Tak Station	R	[3]
KAT-P1-5	Residential premises near Kai Tak Station	R	[3]
KAT-P1-6	Residential premises near Kai Tak Station	R	[3]
KAT-P1-7	Residential premises near Kai Tak Station	R	[3]
KAT-P2 Public Housing Development at ex-San Po Kong Flatted Factory			
KAT-P2-1	Public Housing Development at ex-San Po Kong Flatted Factory	R	[2]
HOM-P2 Proposed Dormitory for HKPU			
HOM-P2	Proposed Dormitory for HKPU	R	-

Notes:

[1] R – residential; E – educational; H – clinic/ home for the aged; W – worship; GIC – government, institution and community; P – performing arts centres

[2] To be determined by respective project proponents

[3] Not available from approved EIA Report: EIA-157/2008

7.4.2 Air Pollution Sources

Construction of the Project would inevitably generate air pollutants with potential impacts on neighbouring sensitive receivers. As discussed in **Section 3**, the key elements under this EIA include the HHS at Hung Hom Freight Yard, construction of KAT and DIH, and the modification works at HUH. It should be noted that the EIA studies for SCL (MKK-HUH),

SCL (HUH-ADM) and SCL (TAW-HUH) are assessed based on the design option of Diamond Hill Stabling Sidings (DHS). The worksites for the construction of HHS option considered in this EIA would therefore be different from the abovementioned EIA studies.

These air pollutant emission sources include fugitive dust from various construction activities, including excavation, stockpiling, and cut-and cover section for Project and fugitive dust from stockpiles within ex- Kai Tak Airport etc. There would be no concrete batching plant operating under the SCL (HHS).

Apart from the above construction activities, loading and unloading of materials at barging facilities for other projects would also generate potential dust impact. Based on the latest construction programme, 2 barging facilities will be needed to support the material transfer for SCL (MKK-HUH) and SCL (TAW-HUH). The locations of these barging facilities are listed below:

- Freight Pier at Hung Hom (shared use); and
- Kai Tak Runway

The proposed stabling sidings will be electrically operated, air quality impact associated with train emission is therefore not anticipated. Exhausts for general ventilation and smoke extraction facilities will also be carefully positioned to avoid causing nuisance to the surrounding environment. In addition, only light maintenance such as occasional track washing will be carried out during the operation of HHS. No significant air quality impact is therefore anticipated during the operational phase.

Since freight train (with diesel locomotive) operations have been discontinued, and intercity service would remain the same in fairly low frequency, less emission would be envisaged from diesel locomotives as compared to the current situation. No additional gaseous emission associated with diesel combustion, and hence no adverse operational air quality impact is therefore anticipated.

7.4.3 Potential Concurrent Projects

The tentative commencement year for the construction of Project is 2012, and would take approximately 6 years for completion. All concurrent projects, which may have cumulative environmental impacts during its construction period, have been identified and summarised in the table below. Details of these concurrent projects are given in **Section 7.5.3**.

Table 7.5: Key Concurrent Projects for Air Quality Assessment

Key Concurrent Projects	Tentative Construction Programme
Central Kowloon Route	2015 – 2020
Trunk Road T2	2012 – 2016
Kai Tak Development	2009 – 2021
Shatin to Central Link – Tai Wai to Hung Hom Section	2012 – 2018
Shatin to Central Link – Mong Kok East to Hung Hom Section (Phase I)	2012 – 2018
Shatin to Central Link – Hung Hom to Admiralty Section (Phase II)	2012 – 2020
Kwun Tong Line Extension	2011 – 2015
Polytechnic University Student Hostel at Ex-Valley Road Site	2009 – 2012
Tsz Wan Shan Pedestrian Link	2013 – 2015

There are 3 existing concrete batching plants (CBPs) within the ex-Kai Tak Airport area, including the Yue Xiu CBP, Glorious CBP, and Yau Lee CBP. Based on the latest information provided by relevant government departments, the Yue Xiu CBP, Glorious CBP and the associated sand depot would cease operation before SCL commences construction. The dust emissions from the Yau Lee CBP, on the other hand, have been included in the cumulative impact assessment. In addition, the landlot next to the proposed TKW (as shown in **Appendix 7.5**) could be used for concrete batching plant or sand depot

under short-term tenancy. Although the newly identified sites are yet to be confirmed, their potential emissions have been included in this assessment.

7.5 Construction Dust Assessment

7.5.1 Potential Source of Dust

A review has been conducted on the construction methodology (see **Section 3** for details) for various works areas at DIH, KAT and HHS. Construction dust will be potentially generated from mainly the land-based construction works including the following activities:

- Soil excavation;
- Backfilling;
- Temporary storage of spoil on site;
- Construction of portals and cut-&-cover tunnel;
- Temporary storage, handling and transportation of material at tunnel exit sites;
- Construction of infrastructure and utilities; and
- Loading and unloading of excavated materials / fill materials at barging facility

Since excavation and backfilling activities will involve large quantities of earthworks and silty material handling, it is anticipated that there may be elevated dust levels due to these activities if appropriate mitigation measures are not implemented.

7.5.2 Assessment Year

A review of the tentative construction programme has been conducted to identify the construction period which is deemed to have significant impact on nearby ASRs. Based on the construction programme as shown in **Appendix 7.2**, it is identified that all the dusty construction activities, such as cut-&-cover and open cut excavation, would be taken place during Year 2014, particularly the worksites for KAT, where cumulative impacts from other projects in Kai Tak area are anticipated.

7.5.3 Emission Inventory

Dust Emission associated with the Project

Fugitive dust impact assessments were carried out based on conservative assumptions of general construction activities which include the following:

- Heavy construction activities including site clearance, ground excavation, construction of the associated facilities, haul road etc;
- Wind erosion of all active open sites, including stockpile and barging area;
- Loading/unloading from trucks at barging facilities and stockpiles;
- All construction activities at work sites and areas that would be undertaken concurrently during the major construction period throughout Year 2014 in order to assess the worst case situation
- 12 hours a day from 7:00am to 7:00pm, except Sundays and public holidays.

The prediction of dust emissions is based on typical values and emission factors from United States Environmental Protection Agency (USEPA) Compilation of Air Pollution Emission Factors (AP-42), 5th Edition. Calculation of dust emission factors is given in **Appendix 7.3**. References of the calculations of dust emission factors for different dust generating activities are listed below. Detailed descriptions are also discussed in the following sections.

Table 7.6a: References of Dust Emission Factors for Different Activities

Operating Sites	Activities	Equations and Assumptions	Reference
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Operating Sites	Activities	Equations and Assumptions	Reference
All construction and excavation sites	Heavy construction activities including land clearance, ground excavation, cut and fill operations, construction of the facilities, haul road, etc	$E = 1.2 \text{ tons/acre/month of activity or}$ $= 2.69 \text{ Mg/hectare/month of activity}$	USEPA AP42, S.13.2.3.3
All construction sites, any stockpile areas, barging area (all open sites)	Wind Erosion	$E = 0.85 \text{ Mg/hectare/yr (24 hour emission)}$	USEPA AP42, S.11.9, Table 11.9.4
Barging facilities and/or any stockpiles	Loading/Unloading at barging facilities and any stockpile	$E = k(0.0016) \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (kg / megagram)}$ <p>k is particle size multiplier U is average wind speed M is material moisture content</p>	USEPA AP42, S13.2.4

i) *SCL – Stabling Sidings at Hung Hom Freight Yard – Heavy Construction Works, Wind Erosion and Stockpile*

Dust emission from construction vehicle movement will generally be limited within the confined worksites area and the emission factor given in AP-42 S.13.2.3.3 has taken this factor into account, as indicated in the approved EIA Study “*Kai Tak Development*” (EIA-157/208). Watering facilities will be provided at every designated vehicular exit point. Haul roads within the work sites would be paved and water spraying would be provided to keep them in wet condition. Since all vehicles will be washed at exit points and vehicle loaded with the dusty materials will be covered entirely by clean impervious sheeting before leaving the construction site, dust nuisance from construction vehicle movement outside the worksites is unlikely to be significant.

For stockpiling, it is recommended that vehicles will move to the stockpiling areas where C&D materials will be unloaded immediately. The vehicles will then be washed again before leaving the stockpiles in order to minimise generation of dusty materials. Therefore, the major dust generating activities at stockpiling areas will be originated mainly from wind erosion and loading/unloading of materials; and these will be assumed in the fugitive dust modelling.

For the calculation of 1-hour and 24-hour TSP concentration, an active operating area of 30% has been assumed at any one time. Based on the justification for the percentage of active area provided in **Appendix 7.4**, the actual percentage active area associated with construction works would however be less than 30% during the construction period. However, in order to be conservative, a 100% active area screening test has been undertaken initially for the short term hourly and daily TSP assessment as detailed in the **Section 7.5.4**.

For the calculation of annual TSP construction, the active works area over the entire year would be less than for a typical hour and typical day. On this basis, further information has been obtained from the Project Proponent, and it is confirmed that a 6% active operating area would be a practicable assumption. The active operating area for 1-hr, 24-hr and annual concentration has been agreed by the Engineer. **Appendix 7.4** presents the justification for the percentage of active areas.

It should be noted that there would still be some minor construction works being conducted during grouting. However, as all grouting works would be carried out in a caution way and fugitive dust generation can be controlled at a minimum level, there would be insignificant fugitive dust impacts from this source.

Dust Emission associated with Concurrent Projects

i) SCL – Tai Wai to Hung Hom Section

All the construction works, including site clearance, ground excavation, cut-&-cover tunnel section etc., presented in the EIA report for SCL (TAW-HUH) would be included in this assessment to account for the cumulative impacts. However, it should be noted that the construction works under the HHS options at KAT and DIH will be different from the original configuration adopted in the SCL (TAW-HUH) EIA. Hence dust emissions from the construction of Diamond Hill Stabling Siding (DHS), KAT and DIH based on the scheme assessed in the SCL (TAW-HUH) would be superseded and would not be included in the cumulative assessment as it is assumed in this EIA that the HHS options would be adopted and emissions from the construction of these elements are assessed based on the scheme proposed under the Project. Nevertheless, dust emission from the barging facilities adjacent to To Kwa Wan Typhoon Shelter (i.e. Kai Tak Runway) associated with SCL (TAW-HUH) would be included in the cumulative assessment in this EIA. Latest available information has been obtained from the EIA for SCL (TAW-HUH) and is adopted in the assessment.

ii) SCL – Mong Kok East to Hung Hom Section and Hung Hom to Admiralty Section

The other sections of the SCL, namely Mong Kok East to Hung Hom Section (SCL (MKK-HUH)), and Hung Hom to Admiralty Section (SCL (HUH-ADM)) would also have cumulative impacts. SCL (MKK-HUH) will include the realignment work for the existing East Rail Line tracks from south of Mong Kok East to the new HUH, while SCL (HUH-ADM) will include the construction of the section across the harbour from Hung Hom to Admiralty. Similar to the case for DHS, KAT and DIH mentioned above, since it is assumed in this EIA that the HHS option would be adopted, dust emission from the construction of HUH based on the scheme assessed in the SCL (MKK-HUH) would not be included in the cumulative assessment. Emission from the construction of HUH would be assessed as per the scheme proposed under the Project.

According to the current construction programme, construction works and dusty activity at the Freight Pier barging facility associated with the SCL (MKK-HUH) and SCL (HUH-ADM) will be interfacing this Project at Hung Hom Area. **Appendix 7.6** illustrates the possible arrangement in Freight Pier Barging Facility. As such, cumulative dust impact is therefore anticipated. Dust emission details have been obtained from the respective consultant and included in the assessment to account for the cumulative effect.

iii) Kwun Tong Line Extension (KTE) & associated EPIW

The KTE project is approximate 3km extension of the existing Kwun Tong Line from Yau Ma Tei Station to a new station at Whampoa and with an interchange with the SCL at the proposed HOM. It is expected to be completed in 2015.

With reference to the approved EIA Study “Kwun Tong Line Extension” (AEIAR-154/2010), construction works under KTE Project will likely be interfacing the Project in Hung Hom and Ho Man Tin areas. Potential dusty activities are generally similar to those associated with this Project. In particular, one rock crushing facility would be located at the worksite in HOM Station and two others would be located at the Freight Pier barging point. Hence, dust emissions are anticipated during unloading activities and the discharge point of the dust extraction systems. As such, cumulative dust impact is therefore anticipated. Dust emission details have been extracted from the approved EIA Study and all the assessment scenarios have been included in the assessment to account for the cumulative effect.

iv) Kai Tak Development

Redevelopment plan for the former Kai Tak Airport area is proposed to optimise the development potential of the ex-airport site. It covers a land area of about 328 hectares, including the ex-Kai Tak Airport and existing waterfront area at To Kwa Wan, Kowloon Bay etc. According to the current development plan, the infrastructure works are split into 7 sub-packages, such as Cruise Terminal Development, Trunk Road T2 etc. This development is anticipated to commence in 2009, with completion beyond 2020. A summary of infrastructures included in this assessment is given below:

- Trunk Road T2;
- Multi-purpose Stadium Complex;
- Kai Tak Nullah;
- Other infrastructures, including pumping stations, local roads and distributors.

Based on the construction programme presented in LegCo Papers on Kai Tak Development (LC Paper No. CB(1)570/08-09(03)), cumulative construction dust impact is expected during the interaction with major dusty construction works associated with the Project, which is expected to be undertaken in Year 2014. For the purpose of cumulative impact assessment, construction works which are located within 500m from the site boundary of this Project and are found to be overlapping with the major construction of Project during Year 2014 will be included. In addition, dust emission strengths presented in the approved EIA Study “*Kai Tak Development*” (KTD) (AEIAR-130/2009) are adopted where appropriate.

v) *Central Kowloon Route*

Central Kowloon Route (CKR) is a strategic road linking from Yau Ma Tai area to Kowloon Bay in order to relieve the vehicular traffic loading on the existing urban distributor roads. Based on the latest construction programme, the construction would likely be commenced in early 2015. For the purpose of conservative assessment, the associated construction works are considered to be overlapping with the construction of the Project and the cumulative construction dust impact is therefore taken into account. Latest available information presented in the KTD EIA is adopted where appropriate in the assessment.

vi) *Trunk Road T2*

Trunk Road T2 is a dual two-lane trunk road of approximately 3.6 km long connecting the CKR and Tseung Kwan O-Lam Tin Tunnel, and will form a new strategic highway network in order to relieve the existing heavily trafficked road network in the central and eastern Kowloon as well as Tseung Kwan O. However, the alignment of Trunk Road T2 is located at more than 500m from ASRs of the Project. No significant cumulative air quality impact is therefore anticipated.

vii) *Polytechnic University Student Hostel at Ex-Valley Road*

A student hostel to accommodate students from the Polytechnic University is proposed at the site bounded by Yan Fung Street to the North, Fat Kwong Street to the East, and Chatham Road North to the South. However, the construction will be completed by Year 2012. Hence, the associated cumulative air quality impact is not anticipated.

viii) *Tsz Wan Shan Pedestrian Link*

Covered walkway as well as lifts/escalators are proposed to connect the Tsz Wan Shan residential to the DIH Station. Based on the current construction programme, the associated construction works would likely interface with the major construction of the Project during Year 2014. Hence, cumulative dust impact is anticipated.

ix) *Concrete Batching Plants in ex-Kai Tak Airport area*

As discussed in **Section 7.5**, there are currently 3 existing concrete batching plants (CBPs) within the ex-Kai Tak Airport area, including the Yue Xiu CBP, Glorious CBP, and Yau Lee CBP. Based on the latest information, the Yue Xiu CBP, Glorious CBP and the associated sand depot would cease operation before SCL commences construction. Hence, there

would not be cumulative dust impacts from these 2 CBPs at their existing locations. The dust emissions from the Yau Lee CBP, on the other hand, have been included in the cumulative impact assessment.

It was noted at the time of reporting that the site next to TKW (as shown in **Appendix 7.5**) could be allocated for the use of a new concrete batching plant and sand depot under short-term tenancy. However, information on the capacity of these facilities was not available for the assessment. In order to reasonably consider cumulative impacts from the emissions of these potential albeit not yet committed sources, an estimation of the capacity of these facilities was made with reference to general practices of the industry. It was assumed that the production capacity of the concrete batching plant would be 280 m³ per hour and the total silo capacity would be 1050 tonnes. Dust emissions associated with the plant, including emission from the dust collectors of silos and mixers, and unloading of raw material to ground hopper within the plant and Kai Tak Barging Facility, have therefore been assessed.

However, it should be noted that, the concrete batching plant is controlled under the Specified Process and hence sufficient mitigation measures would be implemented to control the emission of dust. In general, the requirement and mitigation measures stipulated in the *Guidance Note on the Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2(93)* should be followed and implemented. In particular, in order to minimise the overall dust impact on nearby ASRs, the emission concentrations of the dust collector for the cement/PFA silos and mixer could be designed to not more than 30 mg/m³ and 40 mg/m³ respectively. For unloading of aggregate from trucks at the concrete batching plant, 3-sided enclosure with top cover and water sprays could be provided to the ground hopper. The enclosure could be designed in such a way that would minimise the gap between the enclosure structure and the truck itself, which in turn would prevent dust from escaping the enclosure. With provision of watering spraying system, dust generated from unloading activities would be further suppressed within the enclosure, and hence would achieve an overall dust removal efficiency of 95%. The above assumptions have therefore been adopted for the purpose of potential cumulative impact assessment in this EIA. However, it is understood that the design of the potential new CBP is still subject to change. Once the use of the site is committed, the Contractor is required to demonstrate that the future design of the concrete batching plant would not cause unacceptable impacts. References of the calculations of dust emission factors for different dust generating activities are listed below.

Table 7.6b: References of Dust Emission Factors for Concrete Batching Plant

Operating Sites	Activities	Equations and Assumptions	Reference
Concrete Batching Plant	Dust collector for Cement/PFA Silos	$E = 30 \text{ mg/m}^3$	Design emission concentration
	Dust collector for Mixer	$E = 40 \text{ mg/m}^3$	Design emission concentration
	Loading/Unloading at barging facilities	$E = k(0.0016) \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} (\text{kg / megagram})$ <p>k is particle size multiplier U is average wind speed M is material moisture content</p>	USEPA AP42, S13.2.4
	Unloading of Raw Material at Concrete Batching Plant	$E = 0.0035 \text{ kg per ton of aggregate handled}$	USEPA AP42, S11.12

7.5.4 Assessment Methodology

Dust impact assessment was undertaken using the Fugitive Dust Model (FDM) as approved by USEPA and EPD. It is a well-known Gaussian Plume model designed for computing air

dispersion model for fugitive dust sources. Modelling parameters including dust emission factors, particles size distributions, surface roughness, etc are referred to in EPD's "Guideline on choice of models and model parameters" and USEPA's AP-42. The density of dust will be assumed to be 2.5g/m^3 . The 5-year mean of the annual averaged TSP concentration will be taken as the background concentration. As mentioned in **Section 7.3**, the TSP background concentration of $75.2\mu\text{g/m}^3$ is adopted for the fugitive dust modelling. A surface roughness of 100 cm is assumed in the model to represent the terrain.

During daytime working hours (7am to 7pm), it is assumed that dust emissions would be generated from all dust generating activities and site erosion. During night-time non-working hours (7pm to 7am of the next day), Sunday and statutory holidays, dust emission source would only be site erosion as construction activities during these hours are ceased.

The worst-case 1-hour, worst-case 24-hour average and annual TSP concentrations were calculated mainly based on real meteorological data (for Year 2008) on wind direction, wind speed, temperature and stability collected from the nearest weather station, the Hong Kong Observatory meteorological station for the construction site in the Kowloon Area. The anemometer height at Hong Kong Observatory is 42m above ground. A summary showing the validity of meteorological data from Year 2004 – 2008 respective to different weather stations is shown in **Table 7.7**.

Table 7.7: Summary of data validity of meteorological data from Year 2004 – 2008

Stations	Data Validity				
	2004	2005	2006	2007	2008
Kai Tak	91%	96%	96%	89%	81%
King's Park	89%	92%	87%	90%	92%
HKO	97%	96%	95%	95%	95%
CPH	92%	94%	94%	93%	N/A

Fugitive dust assessment was conducted at 1.5m, 5m, 10m, 15m and 20m above local ground level. A summary of modelling parameters adopted in the assessment are given in the table below:

Table 7.8: Modelling Parameters

Parameters	Input	Remark
Particle size distribution	1.25um = 7% 3.75um = 20% 7.5um = 20% 12.5um = 18% 22.5um = 35%	Reference from S13.2.4.3 of USEPA AP-42
Background Concentration	5-year averaged value recorded at Tsuen Wan, Kwai Chung, Sham Shui Po, Kwun Tong and Central/Western Monitoring Stations	Tsuen Wan, Kwai Chung, Sham Shui Po, Kwun Tong, Central/Western Monitoring Stations for Kowloon Area ($75.2\mu\text{g/m}^3$)
Modeling mode	Flatted terrain	-
Meteorological data	Data recorded in 2008 at Hong Kong Observatory (HKO) Meteorological Station	HKO for Kowloon Area (i.e. DIH to HUH)
Anemometer Height	42m for HKO	-
Surface Roughness	100cm	-

Parameters	Input	Remark
Emission period	General construction activities during daytime working hours (7 am to 7 pm) Wind erosion during both day-time (7am to 7pm) and night-time (7pm to 7am of the next day)	-
ASR calculating levels	1.5, 5, 10, 15, and 20m	-

In terms of the construction programme, it should be noted that the sequencing of works for each works activity over each works site or area will be determined by the Contractor and is not known at this stage. However, due to the constrained size of the works sites and areas and the tight construction programme constraints, it will be necessary for active construction activities to be undertaken at moving multiple work phases spread across each site. Therefore, it is not feasible to identify the exact locations of individual dust emission sources. As such, for the long term annual predictions, the dust modelling assessment has assumed that the dust emissions would be distributed across the whole area of each site to reasonably represent this mode of working and the dust emission rates have been proportioned to produce the effect of 6% active works site. **Appendices 7.2** and **7.4** present the tentative construction programme and justification for the percentage of active areas respectively.

For the short term 1-hour and 24-hour periods, it is assumed that a total works area of 30% on each site would only be active at any one time and again active construction activities to be undertaken at moving multiple work faces spread across each site. Based upon this, works activities and plant would neither cover the whole site area nor be concentrated in certain areas of the site close to ASRs at any time during the construction period. However, notwithstanding that such a scenario would not be expected to occur, in order to be conservative, an initial screening test has been undertaken, namely "Tier 1 Screening Test". The Tier 1 screening test is conservative and has simulated an absolute worst case situation, whereby all the worksites would be active (i.e. 100%).

The purpose of this absolute worst case Tier 1 screening assessment is to highlight those areas where construction dust may accumulate and potentially become an issue. The hot spot areas identified in the Tier 1 assessment have been subsequently assessed by a more focused Tier 2 test, where it is assumed that the projected actual 30% active works areas for the construction site is positioned closest to the potentially worst affected ASRs, while emission from all the other sites remain at 100% as per Tier 1. Thus, the Tier 2 assessment is also very conservative as it assumes that all works activities with the associated plant would be undertaken in the closest proximity to the potentially affected ASRs at the same time, which as noted above would not occur.

For the concurrent projects, including SCL (TAW-HUH), SCL (MKK-HUH), SCL (HUH-ADM), KTE, the Polytechnic University Student Hostel, and the Tsz Wan Shan Pedestrian Link, similar assumptions have been made for the calculations of the emission factors for short and long-term assessments. For the committed Kai Tai Development (KTD), as mentioned above, the dust emission strength presented in the approved KTD EIA are adopted where appropriate.

7.5.5 Assessment Results - "Unmitigated" Scenario

Cumulative construction dust impacts arisen due to the construction of the Projects and concurrent projects listed in **Section 7.5.3** have been assessed. Cumulative unmitigated 1-hour, 24-hour, and annual TSP levels predicted at identified ASRs are given in **Tables 7.9a-b** respectively. Results show that exceedances of the relevant Air Quality Objectives (AQOs) would be predicted without mitigation. Mitigation measures are considered necessary to reduce predicted dust impacts. **Figures 7.2.0A – 7.2.0F** illustrate the

cumulative unmitigated 1-hour, 24-hour, and annual TSP concentrations in Diamond Hill-Kai Tak Area and Hung Hom-Ho Man Tin Area.

Table 7.9a: Predicted Unmitigated Cumulative 1-hour and 24-hour TSP Concentrations at various heights above Ground (including background concentration of 75.2 $\mu\text{g}/\text{m}^3$)

ASR ID	Location	1-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)					24-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m	1.5m	5m	10m	15m	20m
DIH-5-1	Rainbow Home	824	843	723	578	448	192	200	186	169	151
DIH-5-2	Residential premises	800	813	687	538	463	208	216	198	177	155
DIH-5-5	Our Lady's Kindergarten	677	701	616	512	423	178	185	173	160	145
DIH 6-1	Wong Tai Sin Fire Station and Quarters Block A	951	962	804	618	458	218	223	199	173	153
DIH-7-1	Tropicana Gardens Block 2	1241	1216	941	646	487	322	321	267	208	160
DIH-7-2	Tropicana Garden Block 3	1139	1128	896	639	480	290	291	248	199	158
DIH-8-1	Redemption Lutheran Church	1339	1287	955	619	490	401	397	322	244	181
DIH-9-1	Shek On Building	1923	1753	1144	631	514	715	655	438	261	199
DIH-10-1	Hong Kong Sheung Keung Hui Nursing Home	1856	1678	1081	615	516	687	634	431	260	201
DIH-11-1	Lung Poon Court – Lung Wan House	3021	2343	1226	823	589	1102	638	331	262	222
DIH-12-1	Galaxia Tower B	1734	1651	1216	877	665	442	417	341	284	236
DIH-12-2	Galaxia Tower E	2168	1998	1368	922	679	469	464	388	308	243
DIH-13-1	Canossa Primary School	1560	1438	1000	619	505	583	555	407	267	197
DIH-14-1	Rhythm Garden Block 2	1726	1755	1446	1171	917	378	339	313	285	255
DIH-14-2	Rhythm Garden Block 5	3079	2965	2217	1517	988	402	401	347	289	237
DIH-14-3	Rhythm Garden Block 8	2149	2123	1648	1204	882	440	450	405	351	296
DIH-14-4	Canossa Primary School (San Po Kong)	1708	1488	1214	1005	790	546	487	325	263	242
DIH-14-5	Rhythm Garden Block 1	1997	1685	1402	1111	829	470	388	298	275	250
DIH-14-6	Rhythm Garden Block 3	1894	1958	1666	1326	1001	339	350	324	291	255
DIH-15-1	Choi Hung Estate - Kam Wan House	1870	1915	1599	1288	994	220	227	206	191	178
DIH-15-2	Choi Hung Estate - Pik Hoi House	2411	2472	2064	1602	1178	278	284	249	219	198
DIH-17-1	Chuk Yuen United Village	830	846	725	577	446	259	266	238	205	172
DIH-25-1	Football Field in Choi Hung Road Playground	1521	1375	882	638	526	390	367	271	211	181
DIH-26-1	Hammer Hill Road Leisure Pool	1615	1713	1525	1292	1046	211	220	203	183	164
KAT-1-1	Kowloon Cognito College	1336	1276	942	691	527	546	533	415	297	206
HOM-3-1	Fook Sing Mansion	511	551	512	469	426	162	170	163	155	147
HOM-3-2	Marigold Mansion Block A	476	518	489	454	416	154	162	157	151	143
HOM-4-1	Yee Fu Building	416	454	432	405	374	148	155	152	150	147
HOM-5-1	271 Chatham Road North	432	473	450	422	390	148	157	156	157	169
HUH-1-1	Cartas Branchi College of Careers	429	470	448	421	390	164	158	158	158	157

ASR ID	Location	1-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)					24-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m	1.5m	5m	10m	15m	20m
	[2]										
HUH-1-2	Lok Ka House	462	458	432	429	405	191	161	158	166	166
HUH-1-3	Wing Fung Building	505	491	465	457	427	202	182	171	170	163
HUH-2-1	Hong Kong Polytechnic University - Cheung On Tak Lecture Theatre	1015	782	448	408	376	375	300	170	147	138
HUH-3-1	Royal Peninsula Block 2	1577	856	454	430	402	338	248	145	141	135
HUH-4-1	The Metropolis Residence Tower 2	926	774	430	384	361	304	271	190	148	132
HUH-5-1	Harbour Plaza Metropolis	1756	1230	549	367	321	287	257	184	137	127
HUH-6-1	HK Fire Services Headquarters Building	933	722	537	477	419	361	307	199	148	137
HUH-7-1	Hotel Nikko Hong Kong	1776	1354	601	461	412	367	300	175	144	135
HUH-9-1	Hong Kong Coliseum	Note [3]	Note [3]	394	374	352	Note [3]	Note [3]	170	134	127
HUH-10-1	Harbourfront Horizon	Note [3]	976	500	330	294	Note [3]	337	225	152	128
HUH-11-1	China Travel Cargo Logistic Centre	2179	936	467	440	410	650	277	176	145	138
KAT-P1-1	Residential premises near Kai Tak Station	See Note [1]									
KAT-P1-2	Residential premises near Kai Tak Station	See Note [1]									
KAT-P1-3	Residential premises near Kai Tak Station	See Note [2]									
KAT-P1-4	Residential premises near Kai Tak Station	See Note [2]									
KAT-P1-5	Residential premises near Kai Tak Station ^[4]	Note [3]	4872	2625	1505	1082	Note [3]	1010	601	400	286
KAT-P1-6	Residential premises near Kai Tak Station ^[4]	Note [3]	2106	1333	872	700	Note [3]	804	568	398	279
KAT-P1-7	Residential premises near Kai Tak Station	See Note [2]									
KAT-P2-1	Public Housing Development at ex-San Po Kong Flatted Factory	1889	1843	1403	990	703	536	498	349	311	271
HOM-P2	Proposed Dormitory for HKPU	468	510	484	451	415	151	159	155	149	142

Notes:

Values which exceeded AQO are shown as bolded characters

[1] The population intake of this project would be after Year 2016 (Referenced from approved Kai Tak Development EIA Report), and hence there are no cumulative construction dust impact from the projects

[2] The premises is located within the works site boundary, hence the population intake would be after the construction of the Project i.e. no impact from the Project

[3] No air sensitive use is observed at such levels –

Hong Kong Coliseum (HUH-9-1): Air sensitive use is on the podium of the HUH station, which is at least 10mAG. First assessment height is therefore considered at 10mAG.

Harbourfront Horizon (HUH-10-1): The first floor of residential units is situated on the podium, which is at least 5m above ground. First assessment height is therefore considered at 5mAG.

Residential premises near Kai Tak Station (KAT-P1-5 / KAT-P1-6): These residential premises are currently occupied for the construction of public rental housing, which would have a 5m height lift lobby on the ground floor. First assessment height is therefore considered at 5mAG

[4] The assessment results are for indication only as there are no air sensitive uses when the Yau Lee CBP is in operation.

Table 7.9b: Predicted Unmitigated Cumulative Annual TSP Concentrations at various heights above Ground (including background concentration of 75.2µg/m³)

ASR ID	Location	Annual TSP Concentrations at various height(µg/m ³)				
		1.5m	5m	10m	15m	20m
DIH-5-1	Rainbow Home	75.8	75.7	75.6	75.6	75.5
DIH-5-2	Residential premises	75.7	75.7	75.6	75.5	75.5
DIH-5-5	Our Lady's Kindergarten	75.6	75.6	75.6	75.5	75.5
DIH 6-1	Wong Tai Sin Fire Station and Quarters Block A	75.8	75.8	75.8	75.7	75.6
DIH-7-1	Tropicana Gardens Block 2	76.2	76.3	76.1	76.0	75.8
DIH-7-2	Tropicana Garden Block 3	76.1	76.1	76.0	75.9	75.8
DIH-8-1	Redemption Lutheran Church	77.8	77.9	77.5	77.0	76.6
DIH-9-1	Shek On Building	80.7	80.5	79.3	78.1	77.2
DIH-10-1	Hong Kong Sheung Keung Hui Nursing Home	80.7	80.5	79.4	78.2	77.3
DIH-11-1	Lung Poon Court – Lung Wan House	81.9	77.7	76.2	75.8	75.6
DIH-12-1	Galaxia Tower B	76.8	76.7	76.3	76.0	75.8
DIH-12-2	Galaxia Tower E	76.2	76.1	75.9	75.7	75.6
DIH-13-1	Canossa Primary School	79.5	79.5	78.7	77.8	77.1
DIH-14-1	Rhythm Garden Block 2	76.6	76.5	76.2	75.9	75.7
DIH-14-2	Rhythm Garden Block 5	76.6	76.5	76.3	76.1	75.9
DIH-14-3	Rhythm Garden Block 8	77.0	76.9	76.5	76.2	76.0
DIH-14-4	Canossa Primary School (San Po Kong)	78.1	77.8	76.8	76.2	75.9
DIH-14-5	Rhythm Garden Block 1	77.0	76.7	76.2	75.9	75.7
DIH-14-6	Rhythm Garden Block 3	76.5	76.5	76.2	75.9	75.7
DIH-15-1	Choi Hung Estate - Kam Wan House	75.8	75.8	75.8	75.7	75.6
DIH-15-2	Choi Hung Estate - Pik Hoi House	75.9	75.9	75.9	75.8	75.7
DIH-17-1	Chuk Yuen United Village	76.1	76.1	76.0	75.9	75.8
DIH-25-1	Football Field in Choi Hung Road Playground	78.8	78.7	78.0	77.3	76.7
DIH-26-1	Hammer Hill Road Leisure Pool	75.8	75.9	75.8	75.7	75.6
KAT-1-1	Kowloon Cognito College	79.4	79.4	78.8	78.1	77.4
HOM-3-1	Fook Sing Mansion	76.3	76.3	76.3	76.2	76.1
HOM-3-2	Marigold Mansion Block A	76.2	76.3	76.3	76.4	76.3
HOM-4-1	Yee Fu Building	76.2	76.3	76.4	76.5	76.5
HOM-5-1	271 Chatham Road North	76.5	76.6	76.7	77.0	76.9
HUH-1-1	Cartas Branchi College of Careers [2]	76.7	76.7	76.6	76.6	76.5
HUH-1-2	Lok Ka House	77.0	76.6	76.4	76.4	76.3
HUH-1-3	Wing Fung Building	77.3	76.7	76.3	76.2	76.1
HUH-2-1	Hong Kong Polytechnic University - Cheung On Tak Lecture Theatre	78.8	78.3	77.2	76.6	76.2
HUH-3-1	Royal Peninsula Block 2	77.3	77.1	76.5	76.2	76.0
HUH-4-1	The Metropolis Residence Tower 2	76.5	76.4	76.2	75.9	75.8
HUH-5-1	Harbour Plaza Metropolis	77.4	77.2	76.7	76.3	76.1
HUH-6-1	HK Fire Services Headquarters Building	80.4	80.2	79.1	78.1	77.3
HUH-7-1	Hotel Nikko Hong Kong	79.8	79.4	78.3	77.5	76.8
HUH-9-1	Hong Kong Coliseum	Note [3]	Note [3]	76.4	76.1	75.9
HUH-10-1	Harbourfront Horizon	Note [3]	79.2	77.7	76.8	76.3
HUH-11-1	China Travel Cargo Logistic Centre	80.6	77.5	76.4	76.0	75.9
KAT-P1-1	Residential premises near Kai Tak Station	See Note [1]				
KAT-P1-2	Residential premises near Kai Tak Station	See Note [1]				
KAT-P1-3	Residential premises near Kai Tak Station	See Note [2]				

ASR ID	Location	Annual TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m
KAT-P1-4	Residential premises near Kai Tak Station	See Note [2]				
KAT-P1-5	Residential premises near Kai Tak Station ^[4]	Note [3]	83.3	78.7	77.3	76.7
KAT-P1-6	Residential premises near Kai Tak Station ^[4]	Note [3]	83.3	82.0	80.9	79.8
KAT-P1-7	Residential premises near Kai Tak Station	See Note [2]				
KAT-P2-1	Public Housing Development at ex-San Po Kong Flatted Factory	78.3	78.2	77.5	76.8	76.4
HOM-P2	Proposed Dormitory for HKPU	76.2	76.3	76.3	76.4	76.2

Notes:

Values which exceeded AQO are shown as bolded characters

[1] The population intake of this project would be after Year 2016 (Referenced from approved Kai Tak Development EIA Report), and hence there are no cumulative construction dust impact from the projects

[2] The premises is located within the works site boundary, hence the population intake would be after the construction of the Project i.e. no impact from the Project

[3] No air sensitive use is observed at such levels –

Hong Kong Coliseum (HUH-9-1):

Air sensitive use is on the podium of the HUH station, which is at least 10mAG. First assessment height is therefore considered at 10mAG.

Harbourfront Horizon (HUH-10-1):

The first floor of residential units is situated on the podium, which is at least 5m above ground. First assessment height is therefore considered at 5mAG.

Residential premises near Kai Tak Station (KAT-P1-5 / KAT-P1-6):

These residential premises are currently occupied for the construction of public rental housing, which would have a 5m height lift lobby on the ground floor. First assessment height is therefore considered at 5mAG

[4] The assessment results are for indication only as there are no air sensitive uses when the Yau Lee CBP is in operation.

7.5.6 Recommended Mitigation Measures for Fugitive Dust

In order to reduce the dust emission from the Project and achieve compliances of TSP criteria at ASRs, the following specific mitigation measures are recommended:

- i) Mitigation measures in form of regular watering under a good site practice should be adopted. In accordance with the “Control of Open Fugitive Dust Sources” (USEPA AP-42) as given in **Appendix 7.4**, watering once per hour on exposed worksites and haul road is proposed to achieve dust removal efficiency of 91.7%. These dust suppression efficiencies are derived based on the average haul road traffic, average evaporation rate and an assumed application intensity of 1.8 L/m² for the respective watering frequencies (see **Appendix 7.4**). Any potential dust impact and watering mitigation would be subject to the actual site conditions. For example, a construction activity that produces inherently wet conditions or in cases under rainy weather, the above water application intensity may not be unreservedly applied. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.8 L/m² to achieve the respective dust removal efficiencies. The dust levels would be monitored and managed under an EM&A programme as specified in the EM&A Manual.

In addition to the abovementioned, the Contractor is also obliged to follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation. It stipulates the construction dust control requirements for both Notifiable (e.g. site formation) and Regulatory (e.g. road opening) Works to be carried out by the Contractor.

In accordance with the Air Pollution Control (Construction Dust) Regulation, the following dust suppression measures should also be incorporated by the Contractor to control the dust nuisance throughout the construction phase:

- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;
- Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;

- A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones;
- The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;
- When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;
- The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;
- Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;
- Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;
- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;
- Any skip hoist for material transport should be totally enclosed by impervious sheeting;
- Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;
- Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;
- Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and
- Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.

These requirements should be incorporated into the Contract Specification for the civil work. In addition, an audit and monitoring programme during the construction phase should be implemented by the Contractor to ensure that the construction dust impacts are controlled to within the HKAQO. Detailed requirements for the audit and monitoring programme are given separately in the EM&A manual.

7.5.7 Assessment Results - "Mitigated" Scenario

Short-term Assessment (Tier 1)

The maximum 1-hour and 24-hour TSP concentrations based on Tier 1 screening test have been assessed. **Table 7.10** below summaries the cumulative 1-hour and 24-hour TSP

impact (Tier 1) at identified ASRs. The results indicate that, for the majority of ASRs, exceedance of 1-hour and 24-hour TSP criteria are not anticipated even assuming the absolute worst case situation, whereby all the worksites would be active (i.e. 100%). However, for the ASRs at the residential premises near Kai Tak Station (KAT-P1-5), exceedance of 1-hour TSP criterion is predicted. As the Tier 1 assessment is for screening purposes only and would not represent the actual on-site situation, a more focused Tier 2 assessment has been undertaken.

In addition, contour of Tier 1 1-hour and 24-hour TSP concentrations are shown in the **Figures 7.2.1 – 7.2.4**. Contours indicate that there are no exceedances at other locations.

Table 7.10: Tier 1 Assessment - Predicted Mitigated Cumulative 1hr & 24-hr TSP Concentrations at various heights above Ground (including background concentration of 75.2 $\mu\text{g}/\text{m}^3$)

ASR ID	Location	1-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)					24-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m	1.5m	5m	10m	15m	20m
DIH-5-1	Rainbow Home	180	182	175	166	156	107	98	94	92	90
DIH-5-2	Residential premises	175	184	177	167	157	96	98	95	93	90
DIH-5-5	Our Lady's Kindergarten	187	178	172	164	154	98	95	93	91	89
DIH 6-1	Wong Tai Sin Fire Station and Quarters Block A	176	185	177	168	157	96	97	95	93	90
DIH-7-1	Tropicana Gardens Block 2	183	192	183	172	160	100	101	98	94	91
DIH-7-2	Tropicana Garden Block 3	181	190	182	171	159	98	100	97	94	91
DIH-8-1	Redemption Lutheran Church	186	195	186	174	161	108	107	103	98	93
DIH-9-1	Shek On Building	229	214	193	179	166	129	124	111	102	95
DIH-10-1	Hong Kong Sheung Keung Hui Nursing Home	223	208	195	180	166	127	122	111	103	96
DIH-11-1	Lung Poon Court – Lung Wan House	388	337	239	194	174	174	132	113	102	97
DIH-12-1	Galaxia Tower B	284	284	242	207	181	121	122	116	109	104
DIH-12-2	Galaxia Tower E	320	312	254	210	182	127	128	119	111	104
DIH-13-1	Canossa Primary School	198	201	191	178	164	118	116	109	102	96
DIH-14-1	Rhythm Garden Block 2	330	336	289	245	210	121	123	119	114	108
DIH-14-2	Rhythm Garden Block 5	484	439	337	266	213	133	132	120	112	105
DIH-14-3	Rhythm Garden Block 8	386	378	305	244	203	141	141	131	121	113
DIH-14-4	Canossa Primary School (San Po Kong)	268	277	254	225	195	121	117	115	111	107
DIH-14-5	Rhythm Garden Block 1	308	318	282	241	203	117	120	116	112	108
DIH-14-6	Rhythm Garden Block 3	353	360	312	261	217	123	125	120	114	108
DIH-15-1	Choi Hung Estate - Kam Wan House	329	339	299	255	214	104	106	104	101	98
DIH-15-2	Choi Hung Estate - Pik Hoi House	364	373	324	271	224	112	113	109	105	100
DIH-17-1	Chuk Yuen United Village	174	183	176	167	157	96	96	95	92	90
DIH-25-1	Football Field in Choi Hung Road Playground	206	214	201	185	169	107	109	104	99	94
DIH-26-1	Hammer Hill Road Leisure Pool	286	301	277	248	217	98	99	98	96	94
KAT-1-1	Kowloon Cognito	313	305	248	198	169	150	148	129	113	101

ASR ID	Location	1-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)					24-hour TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m	1.5m	5m	10m	15m	20m
	College										
HOM-3-1	Fook Sing Mansion	222	219	220	223	203	110	112	108	104	101
HOM-3-2	Marigold Mansion Block A	207	209	213	240	243	105	108	114	125	126
HOM-4-1	Yee Fu Building	199	197	211	260	308	106	108	112	129	146
HOM-5-1	271 Chatham Road North	237	211	216	288	352	119	120	123	147	168
HUH-1-1	Cartas Branchi College of Careers [2]	341	240	200	281	302	164	144	125	148	157
HUH-1-2	Lok Ka House	407	240	225	308	319	190	139	124	145	150
HUH-1-3	Wing Fung Building	441	280	255	286	273	202	149	140	145	139
HUH-2-1	Hong Kong Polytechnic University - Cheung On Tak Lecture Theatre	323	296	241	202	177	169	153	134	120	111
HUH-3-1	Royal Peninsula Block 2	219	189	165	155	148	128	119	108	104	101
HUH-4-1	The Metropolis Residence Tower 2	283	264	204	156	146	135	131	117	106	99
HUH-5-1	Harbour Plaza Metropolis	342	324	256	165	142	117	118	111	104	98
HUH-6-1	HK Fire Services Headquarters Building	225	203	185	171	157	135	126	110	105	101
HUH-7-1	Hotel Nikko Hong Kong	285	240	174	161	151	119	112	107	102	99
HUH-9-1	Hong Kong Coliseum	Note [3]	Note [3]	208	171	146	Note [3]	Note [3]	107	101	97
HUH-10-1	Harbourfront Horizon	Note [3]	241	182	146	137	Note [3]	124	105	101	96
HUH-11-1	China Travel Cargo Logistic Centre	413	265	183	169	155	193	140	116	109	103
KAT-P1-1	Residential premises near Kai Tak Station	See Note [1]									
KAT-P1-2	Residential premises near Kai Tak Station	See Note [1]									
KAT-P1-3	Residential premises near Kai Tak Station	See Note [2]									
KAT-P1-4	Residential premises near Kai Tak Station	See Note [2]									
KAT-P1-5	Residential premises near Kai Tak Station [4]	Note [3]	542	349	248	193	Note [3]	175	139	120	108
KAT-P1-6	Residential premises near Kai Tak Station [4]	Note [3]	300	242	207	191	Note [3]	154	133	115	103
KAT-P1-7	Residential premises near Kai Tak Station	See Note [2]									
KAT-P2-1	Public Housing Development at ex-San Po Kong Flatted Factory	336	332	274	224	186	146	139	126	118	111
HOM-P2	Proposed Dormitory for HKPU	198	206	222	236	235	108	110	116	122	115

Notes:

Values which exceeded AQO are shown as bolded characters

[1] The population intake of this project would be after Year 2016 (Referenced from approved Kai Tak Development EIA Report), and hence there are no cumulative construction dust impact from the projects

- [2] The premises is located within the works site boundary, hence the population intake would be after the construction of the Project i.e. no impact from the Project
- [3] No air sensitive use is observed at such levels –
- Hong Kong Coliseum (HUH-9-1): Air sensitive use is on the podium of the HUH station, which is at least 10mAG. First assessment height is therefore considered at 10mAG.
- Harbourfront Horizon (HUH-10-1): The first floor of residential units is situated on the podium, which is at least 5m above ground. First assessment height is therefore considered at 5mAG.
- Residential premises near Kai Tak Station (KAT-P1-5 / KAT-P1-6): These residential premises are currently occupied for the construction of public rental housing, which would have a 5m height lift lobby on the ground floor. First assessment height is therefore considered at 5mAG
- [4] The assessment results are for indication only as there are no air sensitive uses when the Yau Lee CBP is in operation.

Short-term Assessment (Tier 2)

A more focused Tier 2 assessment has been conducted such that the projected 30% active works areas for the adjacent construction site is positioned closest to the potentially worst affected ASRs, while emission from all the other sites remain at 100% as per Tier 1. As mentioned in **Section 7.5.4**, the Tier 2 assessment is also very conservative and would over predict the dust emissions that would unlikely occur.

The maximum 1-hour and 24-hour TSP concentrations at the ASRs highlighted in Tier 1 have been assessed. **Table 7.11** summaries the cumulative 1-hour and 24-hour TSP impact (Tier 2) at the Residential Premises near Kai Tak Station (KAT-P1-5). Results show that, the cumulative 1-hour and 24-hour TSP concentrations would comply with the respective criteria and as such, adverse short-term construction dust impact is not anticipated.

Contours have been plotted for 1-hour (Tier 2), and 24-hour (Tier 2) TSP concentrations at 1.5m and 5m above ground near the KAT Station to illustrate the short-term dust impact on the hot spot area at the worst affected level(s) of ASR, as presented in **Figures 7.2.5 – 7.2.8** respectively. It is indicated in these figures that there are no active air sensitive uses located within the area of exceedance, and hence adverse short-term dust impact is not anticipated in the identified hot spot areas.

Table 7.11: Tier 2 Assessment - Predicted Mitigated Cumulative 1-hour & 24-hour TSP Concentrations at various heights above Ground (including background concentration of 75.2 $\mu\text{g}/\text{m}^3$)

ASR ID	Location	1-hour TSP Concentrations at Various Height($\mu\text{g}/\text{m}^3$)					24-hour TSP Concentrations at Various Height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m	1.5m	5m	10m	15m	20m
KAT-P1-5	Residential premises near Kai Tak Station	Note [1]	360	212	169	147	Note [1]	151	119	104	97

Notes:

[1] No air sensitive use is observed at such levels –

Residential premises near Kai Tak Station (KAT-P1-5): These residential premises are currently occupied for the construction of public rental housing, which would have a 5m height lift lobby on the ground floor. First assessment height is therefore considered at 5mAG. The assessment results are for indication only as there are air sensitive uses when the Yau Lee CBP is in operation.

Long-term Assessment

The maximum predicted annual TSP concentrations at identified ASRs in the study area are given in **Table 7.12**. In summary, the predicted annual TSP concentrations would comply with the criterion of 80 $\mu\text{g}/\text{m}^3$, hence, there is no adverse long-term impact anticipated. Contours of annual TSP concentrations at 1.5m above ground have also been plotted in **Figures 7.2.9-10**. Results indicate full compliances of the relevant criteria predicted at all area adjacent to the work sites.

Table 7.12: Long-term Assessment - Predicted Mitigated Cumulative Annual TSP Concentrations at various heights above Ground (including background concentration of 75.2 $\mu\text{g}/\text{m}^3$)

ASR ID	Location	Annual TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m
DIH-5-1	Rainbow Home	75.5	75.5	75.4	75.3	75.3
DIH-5-2	Residential premises	75.4	75.4	75.4	75.3	75.3
DIH-5-5	Our Lady's Kindergarten	75.4	75.4	75.3	75.3	75.3
DIH-6-1	Wong Tai Sin Fire Station and Quarters Block A	75.4	75.4	75.3	75.3	75.3

ASR ID	Location	Annual TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m
DIH-7-1	Tropicana Gardens Block 2	75.4	75.4	75.4	75.3	75.3
DIH-7-2	Tropicana Garden Block 3	75.4	75.4	75.4	75.3	75.3
DIH-8-1	Redemption Lutheran Church	75.6	75.6	75.5	75.4	75.4
DIH-9-1	Shek On Building	75.9	75.8	75.7	75.6	75.5
DIH-10-1	Hong Kong Sheung Keung Hui Nursing Home	75.9	75.9	75.7	75.6	75.5
DIH-11-1	Lung Poon Court – Lung Wan House	76.0	75.5	75.4	75.3	75.3
DIH-12-1	Galaxia Tower B	75.4	75.4	75.4	75.3	75.3
DIH-12-2	Galaxia Tower E	75.4	75.4	75.3	75.3	75.3
DIH-13-1	Canossa Primary School	75.7	75.7	75.6	75.5	75.5
DIH-14-1	Rhythm Garden Block 2	75.5	75.5	75.4	75.4	75.4
DIH-14-2	Rhythm Garden Block 5	75.6	75.6	75.5	75.5	75.4
DIH-14-3	Rhythm Garden Block 8	75.8	75.7	75.6	75.5	75.4
DIH-14-4	Canossa Primary School (San Po Kong)	75.6	75.6	75.5	75.4	75.4
DIH-14-5	Rhythm Garden Block 1	75.5	75.5	75.4	75.4	75.3
DIH-14-6	Rhythm Garden Block 3	75.5	75.5	75.4	75.4	75.4
DIH-15-1	Choi Hung Estate - Kam Wan House	75.4	75.4	75.4	75.4	75.3
DIH-15-2	Choi Hung Estate - Pik Hoi House	75.4	75.4	75.4	75.4	75.4
DIH-17-1	Chuk Yuen United Village	75.4	75.4	75.4	75.3	75.3
DIH-25-1	Football Field in Choi Hung Road Playground	75.7	75.7	75.6	75.5	75.4
DIH-26-1	Hammer Hill Road Leisure Pool	75.4	75.4	75.4	75.3	75.3
KAT-1-1	Kowloon Cognito College	76.4	76.4	76.2	76.0	75.8
HOM-3-1	Fook Sing Mansion	76.0	76.1	76.1	76.0	75.9
HOM-3-2	Marigold Mansion Block A	76.0	76.1	76.1	76.2	76.1
HOM-4-1	Yee Fu Building	76.0	76.1	76.1	76.3	76.3
HOM-5-1	271 Chatham Road North	76.2	76.3	76.5	76.8	76.7
HUH-1-1	Cartas Branchi College of Careers [2]	76.5	76.5	76.4	76.4	76.4
HUH-1-2	Lok Ka House	76.8	76.4	76.2	76.2	76.1
HUH-1-3	Wing Fung Building	77.1	76.4	76.1	76.0	75.9
HUH-2-1	Hong Kong Polytechnic University - Cheung On Tak Lecture Theatre	77.1	76.7	76.2	75.9	75.7
HUH-3-1	Royal Peninsula Block 2	76.1	76.1	75.9	75.8	75.7
HUH-4-1	The Metropolis Residence Tower 2	75.8	75.9	75.8	75.7	75.6
HUH-5-1	Harbour Plaza Metropolis	76.8	76.6	76.3	76.0	75.8
HUH-6-1	HK Fire Services Headquarters Building	78.3	78.2	77.7	77.1	76.6
HUH-7-1	Hotel Nikko Hong Kong	77.6	77.5	77.1	76.6	76.3
HUH-9-1	Hong Kong Coliseum	Note [3]	Note [3]	76.0	75.8	75.7
HUH-10-1	Harbourfront Horizon	Note [3]	78.1	76.9	76.3	75.9
HUH-11-1	China Travel Cargo Logistic Centre	76.9	76.3	75.9	75.8	75.7
KAT-P1-1	Residential premises near Kai Tak Station	See Note [1]				
KAT-P1-2	Residential premises near Kai Tak Station	See Note [1]				
KAT-P1-3	Residential premises near Kai Tak Station	See Note [2]				
KAT-P1-4	Residential premises near Kai Tak Station	See Note [2]				
KAT-P1-5	Residential premises near Kai Tak Station [4]	Note [3]	76.6	76.0	75.8	75.6
KAT-P1-6	Residential premises near Kai Tak Station [4]	Note [3]	78.2	78.3	78.4	78.1
KAT-P1-7	Residential premises near Kai Tak Station	See Note [2]				
KAT-P2-1	Public Housing Development at	76.2	76.1	75.8	75.7	75.5

ASR ID	Location	Annual TSP Concentrations at various height($\mu\text{g}/\text{m}^3$)				
		1.5m	5m	10m	15m	20m
	ex-San Po Kong Flatted Factory					
HOM-P2	Proposed Dormitory for HKPU	76.0	76.0	76.1	76.1	76.0

Notes:

Values which exceeded AQO are shown as bolded characters

- [1] The population intake of this project would be after Year 2016 (Referenced from approved Kai Tak Development EIA Report), and hence there are no cumulative construction dust impact from the projects
- [2] The premises is located within the works site boundary, hence the population intake would be after the construction of the Project i.e. no impact from the Project
- [3] No air sensitive use is observed at such levels –
- Hong Kong Coliseum (HUH-9-1): Air sensitive use is on the podium of the HUH station, which is at least 10mAG. First assessment height is therefore considered at 10mAG.
- Harbourfront Horizon (HUH-10-1): The first floor of residential units is situated on the podium, which is at least 5m above ground. First assessment height is therefore considered at 5mAG.
- Residential premises near Kai Tak Station (KAT-P1-5 / KAT-P1-6): These residential premises are currently occupied for the construction of public rental housing, which would have a 5m height lift lobby on the ground floor. First assessment height is therefore considered at 5mAG
- [4] The assessment results are for indication only as there are no air sensitive uses when the Yau Lee CBP is in operation.

7.5.8 Residual Impacts for Fugitive Dust

With the implementation of the mitigation measures as stipulated in the Air Pollution Control (Construction Dust) Regulation, dust control measures and good site practices, the predicted 1-hour, 24-hour and annual TSP concentrations on area in the vicinity of the construction sites would comply with the relevant criteria. Hence, no adverse residual dust impact is anticipated.

7.6 Conclusion

An air quality impact assessment has been conducted for construction of Project. The fugitive dust assessment for the construction has concluded that watering in all works areas once per hour during working hours (7:00am – 7:00pm) would be required to control the fugitive dust impact. In addition, the Contractor is also recommended to adopt good site practices and is required to follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation.

Potential dust impact would be generated from the soil excavation activities, backfilling, site erosion, storage of spoil on site, and transportation of soil during the construction phase. Quantitative fugitive dust assessments have been conducted.

The results show that, in general, the predicted 1-hour and 24-hour and annual TSP concentrations at identified ASRs would comply with the respective criteria. Hence, it is concluded that there will not be any adverse residual air quality impacts.