3 EIA ON NEW DISTRIBUTOR ROADS SERVING THE PLANNED KTD

3.1 Introduction

3.1.1 This section presents an environmental impact assessment during construction and operational phase of new distributor roads serving the planned Kai Tak Development (KTD) that are classified as Designated Project (DP) under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (hereafter referred as "the DP1 Project" in this section). Potential environmental impacts associated with the DP1 Project have been identified and are summarized in **Table 3.1**.

Table 3.1 Summary of Environmental Impacts

	Construction Phase	Operational Phase
Air	✓	✓
Noise	✓	✓
Water Quality	✓	✓
Waste Management	✓	✓
Land Contamination	✓	×
Hazard to Life	×	×
Cultural Heritage	✓	×
Landscape and Visual Impact	✓	✓
Ecological Impact	×	×
Fisheries Impact	×	×

3.1.2 The scope of the DP1 Project is to construct the major elements of the future ground level road system namely Roads D1 to D4 within the KTD area. Road D1 is a dual 2-lane carriageway and approximately 1.3km long. Road D2 is a dual 3-lane carriageway and is approximately 1.1km long. Road D3 is a dual 2-lane carriageway and is about 2.3km long. Road D4 is a dual 2-lane carriageway and is about 0.9km long. These new distributor roads will serve the KTD area and to link KTD with the surrounding districts. The proposed layouts and general arrangements of the new distributor roads are shown in **Figures 3.0.1 to 3.0.20**.

3.2 Air Quality Impact

Environmental Legislation, Policies, Plans, Standards and Criteria

3.2.1 The criteria for evaluating air quality impacts and the guidelines for air quality impact assessment are set out in Annex 4 and Annex 12 of the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM).

Air Quality Objectives and EIAO-TM

3.2.2 The Air Pollution Control Ordinance (APCO) provides the statutory authority for controlling air pollutants from a variety of sources. The Hong Kong Air Quality Objectives (AQOs), which must be satisfied, stipulate the maximum allowable concentrations over specific periods for typical pollutants. The relevant AQOs are listed in **Table 3.2**.

Table 3.2 Hong Kong Air Quality Objectives

Pollutant	Maximum Concentration (μg m^{-3}) (1)			
	Averaging Time			
	1 hour (2)	8 hour (3)	24 hour (3)	Annual (4)
Total Suspended Particulates (TSP)	-	-	260	80
Respirable Suspended Particulates (RSP) (5)	-	-	180	55
Sulphur Dioxide (SO_2)	800	-	350	80
Nitrogen Dioxide (NO_2)	300	-	150	80
Carbon Monoxide (CO)	30,000	10,000	-	-
Photochemical Oxidants (as Ozone, O_3) (6)	240	-	-	-

Notes:
(1) Measured at 298 K 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) Suspended particulates in air with a nominal aerodynamic diameter of 10 μm or smaller.
(6) Photochemical oxidants are determined by measurement of ozone only.

3.2.3 The EIAO-TM stipulates that the hourly TSP level should not exceed 500 μgm^{-3} (measured at 25°C and one atmosphere) for construction dust impact assessment. Standard mitigation measures for construction sites are specified in the *Air Pollution Control (Construction Dust) Regulation*.

Air Pollution Control (Construction Dust) Regulation

3.2.4 Notifiable and regulatory works are under the control of *Air Pollution Control (Construction Dust) Regulation*. Notifiable works are site formation, reclamation, demolition, foundation and superstructure construction for buildings and road construction. Regulatory works are building renovation, road opening and resurfacing slope stabilisation, and other activities including stockpiling, dusty material handling, excavation, concrete works, stockpiling, dusty material handling etc. The DP1 Project is expected to include both notifiable works and regulatory works. Contractors and site agents are required to inform the Environmental Protection Department (EPD) on carrying out construction works and to adopt dust reduction measures to reduce dust emission to the acceptable level.

Practice Note on Control of Air Pollution in Vehicle Tunnels

3.2.5 The Practice Note on Control of Air Pollution in Vehicle Tunnel, prepared by the EPD provides guidelines on control of air pollution in vehicle tunnels. Guideline values on tunnel air quality are presented in **Table 3.3**.

Table 3.3 Tunnel Air Quality Guidelines (TAQG)

Air Pollutant	Averaging Time	Maximum Concentration	
		(μg/m^3) (1)	ppm
Carbon Monoxide (CO)	5 minutes	115,000	100
Nitrogen Dioxide (NO_2)	5 minutes	1,800	1
Sulphur Dioxide (SO_2)	5 minutes	1,000	0.4

Note: (1) Expressed at reference conditions of 298K and 101.325kPa.

Description of the Environment

3.2.6 The DP1 Project is located in the north apron, south apron, and the runway areas of the former Kai Tak Airport. There is no air quality monitoring station located in the proximity of the DP1 Project area. EPD's Sham Shui Po and Kwun Tong air quality monitoring stations are the nearest stations to the DP1 Project area. **Table 3.4** summarizes the annual average concentrations of the air pollutants recorded at these two monitoring stations in Year 2006.

Table 3.4 Annual Average Concentrations of Pollutants in Year 2006 at EPD's Sham Shui Po and Kwun Tong Air Quality Monitoring Stations

Pollutant	Annual Average AQO ($\mu g\ m^{-3}$)	Year 2006 Annual Average Concentration ($\mu g\ m^{-3}$)	
		Sham Shui Po station	Kwun Tong station
TSP	80	79	75
RSP	55	55	55
NO_2	80	67	61
SO_2	80	24	19

Air Quality Sensitive Receivers

3.2.7 In accordance with Annex 12 of the EIAO-TM, any 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 are considered to be an air sensitive receiver (ASR). Any other place with which, in terms of duration or number of people affected, has a similar sensitivity to the air pollutants as the aforelisted places are also considered to be an ASR, for example, playground, sitting area of parks / promenade.

3.2.8 In accordance with Section 3.4.5.3 of the EIA Study Brief No. ESB-152/2006, the air quality impact assessment area is defined by a distance of 500m expanded from the boundary of the KTD Project. The study area of air quality impact assessment for the KTD Project is shown in **Figure 3.1** which also covers the study area of the DP1 Project.

3.2.9 The identified representative ASRs are listed in **Table 3.5** and the corresponding locations are shown in **Figure 3.1**. The assessment height taken for the construction dust impact assessment was 1.5m above ground in view of the fact that the majority of the dust emissions would be emitted from the ground level, 1.5m is the height of normal human breathing zone. For operational phase impact assessment, the assessment heights were taken as 1.5m, 5m, 10m, 20m above ground and so on up to the maximum building height of the respective ASR.

Table 3.5 Summary of Representative Air Sensitive Receivers

ASRs	District (1)	Location	Existing / Planned Land Use	Max. Building Height, m (2)	Distance to this DP, m	Distributor Road
A1	KT	Cha Kwo Ling Tusen	Residential	5	1695	D3
A2	KT	Cha Kwo Ling	Residential	15	1637	D3
A3	KT	Laguna City IV	Residential	81	1370	D3
A4	KT	Laguna Park	Recreation	1.5	1336	D3
A5	KT	Hoi Bun Industrial Centre	Industrial	42	1050	D3
A6	KT	Seapower Industrial Centre	Industrial	33	868	D3
A7	KT	CAC Tower	Commercial	57	728	D3
A8	KT	Bite Industrial Building	Industrial	30	667	D3
A9	KT	Wharf T&T Square	Commercial	45	519	D4
A10	KT	Hoi Bun Road Park	Recreation	1.5	405	D4
A11	NTK	Kowloon Bay Factory Estate	Industrial	24	145	D4
A12	NTK	Kowloon Bay Motor Vehicle Exam Centre	Industrial	6	103	D4
A13	NTK	New Kowloon Bay Motor Vehicle Exam Centre	Industrial	3	84	D4
A14	NTK	Kai Fok Industrial Centre	Industrial	24	522	D3
A15	KB	Sing Tao Building	Commercial	30	537	D3
A16	KB	WSD Kowloon Bay Pipe Yard	Industrial	1.5	445	D3
A17	KB	Hong Kong International Trade & Exhibition Centre	Commercial	54	234	D2
A18	KB	Hong Kong Bank New Treasury Building	Commercial	12	266	D2
A19	KB	Electrical & Mechanical Services Department Headquarters	G/IC	21	90	D2
A20	KB	Sino Industrial Plaza	Industrial	30	207	D2
A21	KB	Skyline Tower	Commercial	117	154	D2
A22	KB	Football field	Recreation	1.5	231	D2
A23	KB	Kowloon Health Centre	G/IC	30	274	D2
A24	KB	Bicycle Track Near Richland Garden	Recreation	1.5	245	D2
A25	NCW	Richland Gardens Shopping Centre	Shopping Center	30	323	D2
A26	NCW	Richland Gardens	Residential	99	432	D2
A27	NCW	Kam Bik House, Choi Hung Estate	Residential	60	567	D1
A28	NCW	Pik Hoi House, Choi Hung Estate	Residential	60	525	D1
A29	NCW	Rhythm Garden	Residential	87	333	D1
A30	SPK	Cognitio College	Educational	18	164	D1
A31	SPK	Sir Robert Black Health Centre	Clinic	9	141	D1
A32	SPK	Lee Kau Yan Memorial School	Educational	10	126	D1
A33	SPK	Shek Ku Lung Road Playground	Recreation	1.5	64	D1
A34	SPK	Regal Oriental Hotel	Hotel	42	78	D1
A35	SPK	South Mansion	Residential	15	78	D1
A36	SPK	Jenford Building	Residential	12	72	D1
A37	KC	Sung Wong Toi Playground	Recreation	1.5	20	D1
A38	KC	Sung Wong Toi Garden	Recreation	1.5	220	D1
A39	TKW	Parc 22	Residential	33	303	D1
A40	TKW	Sky Tower	Residential	141	338	D1

ASRs	District (1)	Location	Existing / Planned Land Use	Max. Building Height, m (2)	Distance to this DP, m	Distributor Road
A41	TKW	Freder Centre	Industrial	153	305	D2
A42	TKW	K K Industrial Building	Industrial	12	236	D2
A43	TKW	HK Society for Blind hostel	Hostel	9	121	D2
A44	TKW	Mok Cheong Street Residential District	Residential	18	192	D2
A45	TKW	China Gas Company	Commercial	15	347	D2
A46	TKW	Ming Lun Street Residential District	Residential	21	332	D2
A47	TKW	Grand Waterfront	Residential	153	335	D2
A48	TKW	Merit Industrial Center	Industrial	36	464	D2
A49	TKW	Wei Chien Court	Residential	39	441	D2
A51	TKW	United Daily	Industrial	48	581	D2
A52	TKW	Holly Carpenter Primary School	Educational	18	588	D2
A53	TKW	Oblate Father's Primary School	Educational	21	664	D2
A54	TKW	Sui Ying Industrial Building	Industrial	33	773	D2
A55	TKW	Fook Shing Industrial Building	Industrial	36	865	D2
A56	TKW	Sunrise Villa	Residential	90	932	D2
A57	TKW	Wing Kwong Street Residential District	Residential	21	1226	D2
A58	TKW	CCC Kei To Secondary School	Educational	24	1244	D2
A59	TKW	Po Leung Kuk Ngan Po Ling College	Educational	27	1330	D2
A60	HH	Sunrise Plaza	Residential	39	1398	D2
A61	HH	Peninsula Square	Commercial	69	1374	D2
A62	HH	A.P.B Centre	Industrial	1.5	1284	D2
A63	HH	DSD To Kwan Wan PTW Workshop	G/IC	27	1189	D2
PA1	KTD	Site 1A1 (Planned)	Residential	115	276	D1
PA2	KTD	Site 1A1 (Planned)	Residential	115	323	D1
PA3	KTD	Site 1A1 (Planned)	Residential	115	335	D1
PA4	KTD	Site 1A1 (Planned)	Residential	115	350	D1
PA5	KTD	Site 1A1 (Planned)	Residential	115	327	D1
PA6	KTD	Site 1A2 (Planned)	Educational	40	385	D1
PA7	KTD	Site 1A3 (Planned)	Educational	40	398	D1
PA8	KTD	Site 1A4 (Planned)	Educational	40	504	D1
PA9	KTD	Site 1B1 (Planned)	Residential	115	381	D1
PA10	KTD	Site 1B1 (Planned)	Residential	115	407	D2
PA11	KTD	Site 1B1 (Planned)	Residential	115	291	D2
PA12	KTD	Site 1B1 (Planned)	Residential	115	290	D2
PA13	KTD	Site 1B1 (Planned)	Residential	115	202	D2
PA14	KTD	Site 1B1 (Planned)	Residential	115	149	D2
PA15	KTD	Site 1B4 (Planned)	Educational	40	63	D2
PA16	KTD	Site 1C1 (Planned)	G/IC	85	51	D1
PA17	KTD	Site 1D2 (Planned)	Commercial	95	93	D1
PA18	KTD	Site 1D3 (Planned)	G/IC	55	86	D1
PA19	KTD	Site 1D4 (Planned)	G/IC	95	34	D1
PA20	KTD	Site 1E1 (Planned)	G/IC	95	72	D1
PA21	KTD	Site 1E1 (Planned)	G/IC	95	256	D1
PA22	KTD	Site 1F1 (Planned)	Commercial	145	34	D1
PA23	KTD	Site 1F2 (Planned)	Commercial	170	60	D1
PA24	KTD	Site 1G2 (Planned)	G/IC	75	71	D1
PA25	KTD	Site 1H1 (Planned)	Residential	105	320	D1
PA26	KTD	Site 1H2 (Planned)	Residential	105	338	D1
PA27	KTD	Site 1H3 (Planned)	Residential	105	347	D2

ASRs	District (1)	Location	Existing / Planned Land Use	Max. Building Height, m (2)	Distance to this DP, m	Distributor Road
PA28	KTD	Site 1I1 (Planned)	Residential	95	143	D2
PA29	KTD	Site 1I2 (Planned)	Residential	95	127	D2
PA30	KTD	Site 1I3 (Planned)	Residential	95	122	D2
PA31	KTD	Site 1J1 (Planned)	G/IC	55	49	D2
PA32	KTD	Site 1J3 (Planned)	G/IC	25	91	D2
PA33	KTD	Site 1K1 (Planned)	Residential	105	403	D2
PA34	KTD	Site 1K2 (Planned)	Residential	105	417	D2
PA35	KTD	Site 1K3 (Planned)	Residential	95	439	D2
PA36	KTD	Site 1L1 (Planned)	Residential	95	105	D2
PA37	KTD	Site 1L2 (Planned)	Residential	95	67	D2
PA38	KTD	Site 1L3 (Planned)	Residential	95	44	D2
PA39	KTD	Site 1L4 (Planned)	Residential	25	30	D2
PA40	KTD	Site 1M1 (Planned)	Commercial	35	334	D1
PA41	KTD	Site 1M1 (Planned)	Commercial	35	81	D1
PA42	KTD	Site 1M2 (Planned)	Commercial	35	83	D1
PA43	KTD	Site 2A1 (Planned)	G/IC	65	83	D1
PA44	KTD	Site 2A2 (Planned)	G/IC	65	39	D1
PA45	KTD	Site 2A3 (Planned)	G/IC	65	31	D1
PA46	KTD	Site 2A4 (Planned)	G/IC	65	159	D1
PA47	KTD	Site 2A5 (Planned)	G/IC	65	62	D1
PA48	KTD	Site 2A6 (Planned)	G/IC	40	45	D1
PA49	KTD	Site 2B1 (Planned)	Residential	105	162	D1
PA50	KTD	Site 2B1 (Planned)	Residential	105	165	D1
PA51	KTD	Site 2B2 (Planned)	Residential	95	160	D1
PA52	KTD	Site 2B3 (Planned)	Residential	80	165	D1
PA53	KTD	Site 2B4 (Planned)	Residential	80	177	D1
PA54	KTD	Site 2B5 (Planned)	Residential	80	178	D1
PA55	KTD	Site 2B6 (Planned)	Residential	80	207	D1
PA56	KTD	Site 2D1 (Planned)	Recreation	40	143	D2
PA57	KTD	Site 2D1 (Planned)	Recreation	40	146	D2
PA58	KTD	Site 3C1 (Planned)	Hospital	55	31	D4
PA59	KTD	Site 3C1 (Planned)	Hospital	55	75	D4
PA60	KTD	Site 3C1 (Planned)	G/IC	55	72	D4
PA61	KTD	Site 3C1 (Planned)	Hospital	55	95	D4
PA62	KTD	Site 3D1 (Planned)	Commercial	95	60	D4
PA63	KTD	Site 3D2 (Planned)	Commercial	95	265	D4
PA64	KTD	Site 3D3 (Existing)/ Site 3D3 (Planned)	Industrial / Commercial	168 / 95	136	D4
PA65	KTD	Site 3D4 (Planned)	Commercial	95	138	D4
PA66	KTD	Site 3D4 (Planned)	Commercial	95	298	D4
PA67	KTD	Site 4A1 (Planned)	Residential	60	64	D3
PA68	KTD	Site 4A1 (Planned)	Residential	60	58	D3
PA69	KTD	Site 4A2 (Planned)	Commercial	40	170	D3
PA70	KTD	Site 4A3 (Planned)	Commercial	75	47	D3
PA71	KTD	Site 4A (Planned)	Recreation	1.5	90	D3
PA72	KTD	Site 4A (Planned)	Recreation	1.5	198	D3
PA73	KTD	Site 4A (Planned)	Recreation	1.5	53	D3
PA74	KTD	Site 4A (Planned)	Recreation	1.5	195	D3
PA75	KTD	Site 4A (Planned)	Recreation	1.5	64	D3
PA76	KTD	Site 4A (Planned)	Recreation	1.5	219	D3
PA77	KTD	Site 4B1 (Planned)	Residential	50	55	D3
PA78	KTD	Site 4B1 (Planned)	Residential	50	62	D3
PA79	KTD	Site 4B2 (Planned)	Residential	50	51	D3
PA80	KTD	Site 4B2 (Planned)	Residential	50	66	D3
PA81	KTD	Site 4B3 (Planned)	Residential	60	62	D3
PA82	KTD	Site 4B3 (Planned)	Residential	60	62	D3
PA83	KTD	Site 4B4 (Planned)	Residential	50	153	D3

ASRs	District (1)	Location	Existing / Planned Land Use	Max. Building Height, m (2)	Distance to this DP, m	Distributor Road
PA84	KTD	Site 4B4 (Planned)	Residential	50	58	D3
PA85	KTD	Site 4B5 (Planned)	Residential	40	64	D3
PA86	KTD	Site 4B5 (Planned)	Residential	40	56	D3
PA87	KTD	Site 4B5 (Planned)	Residential	40	56	D3
PA88	KTD	Site 4B5 (Planned)	Residential	40	61	D3
PA89	KTD	Site 4C1 (Planned)	Commercial	40	172	D3
PA90	KTD	Site 4C2 (Planned)	Commercial	50	158	D3
PA91	KTD	Site 4C3 (Planned)	Commercial	40	150	D3
PA92	KTD	Site 4C4 (Planned)	Commercial	40	153	D3
PA93	KTD	Site 4C5 (Planned)	Commercial	40	159	D3
PA94	KTD	Site 4D2 (Planned)	G/IC	1.5	463	D3
PA95	KTD	Site 4D2 (Planned)	G/IC	1.5	408	D3
PA96	KTD	Site 4D2 (Planned)	G/IC	1.5	656	D3
PA97	KTD	Site 4D2 (Planned)	G/IC	1.5	658	D3
PA98	KTD	Site 4D3 (Planned)	Commercial	30	228	D3
PA99	KTD	Site 4D3 (Planned)	Commercial	30	255	D3
PA100	KTD	Site 4D3 (Planned)	Commercial	30	451	D3
PA101	KTD	Site 4D3 (Planned)	Commercial	30	569	D3
PA102	KTD	Site 5A4 (Planned)	Residential	60	241	D2
PA103	KTD	Site 5A4 (Planned)	Residential	105	303	D2
PA104	KTD	Site 3B1 (Planned)	Undesignated	40	293	D3
PA105	KTD	Site 3B2 (Planned)	Undesignated	40	288	D3
PA106	KTD	Site 3B3 (Planned)	Undesignated	40	306	D3
PA107	KTD	Site 3B4 (Planned)	Undesignated	40	310	D3
PA108	KTD	Site 4D2 (Planned) Tourism node	Other Specified Uses	95	136	D3
PA109	KTD	Site 4D2 (Planned) Tourism node	Other Specified Uses	95	203	D3
PA110	KTD	Site 4D2 (Planned) Tourism node	Other Specified Uses	95	355	D3
PA111	KTD	Site 4D2 (Planned) Tourism node	Other Specified Uses	95	328	D3
PA112	KTD	Site 4D2 (Planned) Tourism node	Other Specified Uses	95	248	D3
PA113	KTD	Site 4D2 (Planned) Tourism node	Other Specified Uses	95	49	D3

Note: (1) KT – Kwun Tong; NTK – Ngau Tau Kok; KB – Kowloon Bay; NCW – Ngau Chi Wah; SPK – San Po Kong; KC – Kowloon City, TKW – To Kwa Wan; HH – Hung Hom; KTD – Kai Tak Development

(2) The maximum heights for Planned ASRs were made reference to the RODP.

Assessment Methodology

CONSTRUCTION PHASE (CONSTRUCTION DUST)

3.2.10 Fugitive Dust Model (FDM) was used to assess potential dust impact from the construction works. Dust emission is predicted based on emission factors from USEPA Compilation of Air Pollution Emission Factors (AP-42), 5th Edition. The major construction activities for the DP1 Project, which would be potential sources of construction dust in the Study Area, include soil excavation activities at work site and wind erosion of open site. **Table 3.6** gives the relevant clauses in AP-42 for emission factors adopted in this assessment. Detailed calculations of emission rates are presented in **Appendix 3.1**.

Table 3.6 Emission Factors for Construction Activities

Construction Activities	Emission Rate ($g/m^2/s$)	Remark
All construction work	E = 1.49684E-05	- 50% of works area with active dust emitting construction activities - 87.5% reduction by water suppression (watering eight times a day) - USEPA AP-42 5th ed., S.13.2.3.3
Barging point serving the Development at Anderson Road Project	E = 2.04236E-05	- USEPA AP-42 5th ED., S. 13.2.4 - Information for emission rate calculation was provided by Anderson Road Project Engineer - 75% reduction by water suppression for each unloading
Wind erosion for all construction work (including barging point)	E = 1.34767E-06	- 50% of works area with active construction activities - AP-42 5th ed., S.11.9 Table 11.9.4

3.2.11 The *Air Pollution Control (Construction Dust) Regulation* specifies that dust suppression measures such as watering should be applied for the construction site. Dust emission from the site would be reduced by 87.5% if watering with complete coverage of active construction area eight times a day. This assumption was adopted in the construction dust impact assessment.

3.2.12 For the purpose of this assessment, 12 working hours per day (08:00-18:00) and 26 working days per month were assumed for the dusty construction works in the assessment. Wind erosion of open work sites would take place over the whole day.

3.2.13 Based on the construction programme (**Appendix 2.2**), the early population intake at Sites1A1 & 1B1 and Phase 1 Berth of the cruise terminal would be around late 2012 and second quarter of 2013 respectively. Two worst-case scenarios namely before and after the early population intake period of late 2012 / mid 2013 have been examined in the construction dust impact assessment The construction activities under the two scenarios are detailed in **Table 3.7**. The scenarios presented are considered to be representative of the worst case situation. The figures showing locations of dusty construction site areas for each scenario are presented in **Appendix 3.1**. For construction of electricity substation, footbridge and subway enhancement, most of the works would involve superstructure construction and concreting works which are not dusty construction activities. Therefore, construction of electricity substation, footbridge and subway enhancement were not included in the model run. The construction activity for Package C is bioremediation treatment of sediment at Kai Tak Approach Channel which are mostly marine-based with no dusty activities, thus fugitive dust impact is not anticipated.

Table 3.7 Major Dust Generating Activities in the Worst Case Scenarios during Construction Phase

Activities	Period	
	Mid 2009 to Mid 2013	Mid 2013 to Late 2016
	Scenario 1	Scenario 2
Package A - Cruise Terminal Development (Phase 1 Berth), related advance works and Runway Park		
Phase 1 Berth	✓	
Road TD3, TD4, L14 and minor road works in Kowloon Bay	✓	
Modification off Taxiway Bridge	✓	
Pumping Station PS6	✓	
Fireboat Berth	✓	
Runway Park	✓	
Package B - Infrastructure works at North Apron, Phase 1 - Housing Sites and Government Offices		
Construction of Road D1 (part)	✓	
Local Roads L2, L3, L15 and associated footpaths at North Apron	✓	
Local Roads L4 & L5	✓	✓
Construction of Box Culvert (2.5m x 2.5m)	✓	
Construction of Box Culvert (3m x 2.8m)	✓	
Construction of Pumping Station PS1A	✓	✓
Construction of Road D1		✓
Construction of Road D2 (part)		✓
Construction of Road L1	✓	✓
Construction of Road L2 & L11 (part)		✓
Construction of Road L4 (Part) & L5		✓
Construction of Slip Road S7 & S8 of CKR/T2 Interchange		✓
Construction of Box Culvert (5m x 2.5m)	✓	✓
Upgrading of Pumping Station PS1	✓	✓
Package D - Kai Tak Nullah modification works		
Rebuild Kai Tak Nullah	✓	✓
Construction of DSD's Desilting Compounds at Kai Tak Nullah	✓	✓
Package E - Infrastructure works at runway and Metro Park		
600m Wide Opening in Runway	✓	✓
Construction of Road D3 (near at Metro Park)		✓
Construction of Road L12 & L13		✓
Conversion of TD3 into D3 with Street Lighting/ Landscaping	✓	✓

Activities	Period	
	Mid 2009 to Mid 2013	Mid 2013 to Late 2016
	Scenario 1	Scenario 2
Works(include Road L14)		
Conversion of TD4 into D4		✓
Elevated Landscape Deck above Road D3	✓	✓
Package F - Infrastructure works at North Apron, Phase 2		
Construction of Road D1, L7, L8, L9 & L16		✓
Construction of Drainage Culvert (2.5x2.5m)	✓	✓
Construction of Drainage Culvert (4x3m)	✓	✓
Construction of Drainage Culvert (5x4m)	✓	✓
Construction of Road D2, D3, L6, L17 & L19		✓
Pumping Station PS2		✓
Pumping Station NPS		✓
Upgrading of Pumping Station PS3	✓	✓
Stadium Complex		✓
Package G - Trunk Road T2 and infrastructure works at South Apron		
Construction of Trunk Road T2, Local Roads L10, L18 and associated footpaths at South Apron	✓	✓
Cut and Cover Section of T2	✓	✓
Kwun Tong Transportation Link	✓	✓
Other concurrent projects		
SCL Construction	✓	✓
CKR Construction	✓	✓
Anderson Road Project	✓	✓

3.2.14 The impact of fugitive dust sources on air quality depends upon the quantity as well as the drift potential of the dust particles emitted into the atmosphere. Large dust particles (i.e. over 100 μm in diameter) settle out near the source and particles that are between 30 and 100 μm in diameter are likely to undergo impeded settling. The main dust impacts are likely to arise from particles less than 30 μm in diameter, which have a greater potential to disperse over greater distances.

3.2.15 According to the Table of Aerodynamic Particle Size Multiplier for Equation 1 stated in S13.2.4.3 of USEPA AP-42, construction dust particles may be grouped into five particle size classes. Their size ranges are 0 – 2.5 μm, 2.5 – 5 μm, 5 – 10 μm, 10 – 15 μm and 15 – 30 μm, and the percentage of particles in each class was estimated to be 7%, 20%, 20%, 18% and 35%, respectively.

3.2.16 One year sequential meteorological data for the year 2006 from the South East Kowloon Weather Station were used to predict the 1-hour and 24-hour average TSP concentrations at representative discrete ASRs close to the construction works. As South East Kowloon Weather Station does not record temperature data, the ambient temperature data at the King's Park Weather Station were adopted. Since the construction activities would be undertaken at ground level, the worst dust impact on the ASRs would be at the ground floor of the ASRs. The height of 1.5m above ground, which is the breathing level of human, was adopted for construction dust impact assessment.

3.2.17 The background pollutant values adopted for this assessment are derived based on EPD's "Guideline on Assessing the 'TOTAL' Air Quality Impacts". The annual average concentrations of the pollutants measured at EPD's Sham Shui Po and Kwun Tong air quality monitoring stations in the latest five years (Year 2002 to 2006) are adopted as the background air quality as their locations are within and adjacent to the Study area. As most of the monitoring data in Year 2002 at Kwun Tong air quality station was missing, therefore the data of Year 2002 recorded at this station has not been taken into account in the calculation of background concentration. The five years TSP average monitoring data recorded at EPD's Kwun Tong and Sham Shui Po air quality monitoring stations are 78$\mu g/m^3$ and 79$\mu g/m^3$ respectively. For this assessment, 79$\mu g/m^3$ was taken as the TSP background concentration.

OPERATIONAL PHASE

3.2.18 Potential air quality impacts during the operational phase of the DP1 Project would be associated with the following pollution sources:

- Background pollutant concentrations based on five years averaged monitoring data from EPD monitoring stations at Sham Shui Po and Kwun Tong;
- Vehicle emissions from open sections of existing and proposed road networks within 500m from the project site boundary;
- Portal emissions from Road T2 Tunnel, proposed Road L1 tunnel, decked Road D2, tunnel section of Tseung Kwan O – Lam Tin Tunnel (near TKO/T2 interface), existing Kai Tak Tunnel and existing Eastern Harbour Crossing Tunnel (EHC) portal;
- Emissions from idling traffic at the toll plaza section of EHC near Yau Tong;
- Ventilation building emissions from Road T2 Tunnel, planned Central Kowloon Route (CKR), existing Kai Tak Tunnel and existing EHC;
- All industrial chimneys within 500m from the study boundary;
- Emission from the proposed hospital within KTD;
- Cruise ship emissions from the proposed cruise terminal at Kai Tak;
- Emission from the existing Typhoon Shelters
- Emission from Sai Tso Wan Landfill; and
- Planned heliport emission at the end of runway.

Background Pollutant Concentrations

3.2.19 The background pollutant values adopted for this assessment are derived based on EPD's "Guideline on Assessing the 'TOTAL' Air Quality Impacts". The annual average concentrations of the pollutants measured at EPD's Sham Shui Po and Kwun Tong air quality monitoring stations in the latest five years (year 2002 to 2006) are adopted as the background air quality as their locations are within and adjacent to the Study area. As most of the monitoring data in year 2002 at Kwun Tong air quality station was missing, therefore the data of year 2002 recorded at this station has not been taken into account in the calculation of background concentration. **Table 3.8** summarises the annual average concentrations of the pollutants (NO_2, RSP and SO_2) recorded at the two monitoring stations. For the purpose of this assessment, RSP, NO_2 and SO_2 concentration of 57, 67 and 24 $\mu g/m^3$ respectively were taken as background concentrations for the operational phase assessment.

Table 3.8 Annual Average Concentrations of Pollutants in Latest Five Years at Sham Shui Po and Kwun Tong Air Quality Monitoring Stations

Pollutant	Annual Average Concentration in Latest Five Years (2002-2006) ($\mu g\ m^{-3}$)	
	Sham Shui Po station	Kwun Tong station
RSP	55	57
NO_2	67	63
SO_2	24	19

Vehicle Emissions from Open Road

3.2.20 Under the Air Pollution Control (Motor Vehicle Fuel) Regulation, the sulphur content of diesel fuel is required to be less than 0.005%. In view of the low emission rates relative to the statutory limit, SO_2 would also comply with the AQO. Therefore, the CALINE4 dispersion model was used for calculation of the 1-hour average NO_2, 24-hour average NO_2, and 24-hour average RSP concentrations. Open sections of existing and planned road networks within 500 m from the boundary of the Study area were considered in the model and are listed as follows:

- new roads in the Kai Tak Development
- the existing roads

3.2.21 The predicted highest peak hour traffic flows and vehicle mixes for the road network within the next 15 years upon commencement of operation of the proposed road network at Year 2016 were taken to assess the worst-case air quality impacts. For the Kwun Tong Transportation Link (KTTL), the capacity traffic flow was assumed for conservative assessment. It is noted that some of planned land use such as Sites 1A, 1B, 1D4, 1J1 3C2 & 4D3 will be occupied prior to Year 2016 say around 2012. With reference to the Hong Kong Planning Standard and Guideline (HKPSG), the recommended buffer distance are at least 5m for local distributor road and 10m for district distributor road. The minimum buffer distance between the road and the site boundary of above mentioned site is 10m which is fulfil the HKPSG's recommendation. Adverse the vehicular impact for Sites 1A, 1B, 1D4, 1J1 3C2 & 4D3 when occupied prior to Year 2016 is not anticipated. Therefore, the adoption of the traffic forecast within the next 15 years upon commencement of operation of all road networks (i.e. next 15 years upon Year 2016) would be a conservative approach to represent the worst case scenario.

3.2.22 Peak hour traffic flows within and adjacent to the Study area would occur during daytime. The night time traffic flows would be low and the worst case scenario was therefore not encountered during night time. The projected 2031 peak hour traffic flows and vehicle compositions are attached in **Appendix 3.2**.

Fleet Average Emission Factors

Vehicle Classes

3.2.23 EMFAC-HK model was adopted to estimate the vehicle emission rates and inventories of exhaust, carbon monoxide, oxides of nitrogen and particulate matter.

3.2.24 The "vehicle fleet" refers to all motor vehicles operating on roads within this Study Area. The modelled fleet was broken down into 16 vehicle classes based on the information as shown on *Table 4.4 (Registration and Licensing of Vehicle by Fuel Type) of the Transport Monthly Digest (Sep 2007)* and vehicle population provided by EPD. The vehicle group classification was based on the definition in *The Annual Traffic Census 2006 – Appendix F Vehicle Classification System*.

3.2.25 Referring to *Transport Monthly Digest (Sep 2007)*, the number of Private Car using petrol and diesel are 366,517 and 2,103 respectively. The number of Motor Cycle is 36,491. Thus, the ratio of Private Car using petrol & diesel and Motor Cycle are 91.0% and 9.0% respectively. On the other hand, if exclusion of private car using diesel, the ratio of Private Car using petrol and Motor Cycle are 91.0% and 9.1% respectively. The ratio of the above two groupings are the same. It is therefore assumed that all private cars will be grouped as "petrol private car" in the model in view of negligible value. The proposal of grouping the "diesel private car" into the "petrol private car" is only applied in classification of vehicle classes. *The Transport Monthly Digest (Sep 2007)* also indicates that there were 3% light good vehicle using petrol fuel. As a conservative approach, all light good vehicles will be grouped as "diesel light good vehicle". As there is only one fuel type of LPG specified for "taxi" in accordance with *EPD Guideline on Modelling Vehicle Emissions Appendix I "EMFAC-HK: Vehicle Class Details",* all taxis will be classified as "LPG Taxi". The 16 vehicle classes which were modelled in EMFAC-HK are summarized in **Table 3.9** and the grouping of each vehicle class is shown in **Appendix 3.3.**

Table 3.9 Vehicle Classes in EMFAC-HK Model

Vehicle Class	Description	Fuel Type	Gross Vehicle Weight
MC1	Petrol Private Cars (PC) & Light Goods Vehicles (LGV)	Petrol	ALL
MC3	Diesel Private Cars & Light Goods Vehicles<2.5t	Diesel	<=2.5t
MC4	Diesel Private Cars & Light Goods Vehicles 2.5-3.5t	Diesel	>2.5-3.5t
MC5	Public Light Buses	LPG, Diesel	ALL
MC6	Light Goods Vehicles >3.5t	Diesel	>3.5-5.5t
MC7	Medium & Heavy Goods Vehicles with GVW 5.5-15t	Diesel	>5.5-15t
MC8	Medium & Heavy Goods Vehicles with GVW >=15t	Diesel	>15t
MC10	Double Deck Franchised Buses	Diesel	ALL
MC11	Motor Cycles	Petrol	ALL
Taxi3	Taxi	LPG	ALL
Taxi4	Private Light Buses <3.5t	LPG, Diesel	<=3.5t
Taxi5	Private Light Buses >3.5t	LPG, Diesel	>3.5t
Taxi6	Non- franchised Buses <6.4t	Diesel	<=6.4t
Taxi7	Non- franchised Buses 6.4-15t	Diesel	>6.4-15t
Taxi8	Non- franchised Buses >15t	Diesel	>15t
Taxi10	Single Deck Franchised Buses	Diesel	ALL

Road Grouping

3.2.26 With reference to the road design, the design speed limits of all road links within the Study Area included 50kph, 70kph and 80kph. Hence, three sets of emission factors for the three road types were calculated.

3.2.27 In accordance with the Road Traffic Ordinance, for any road with design speed limit of 70kph or above, the maximum speed limit for medium goods vehicles, heavy goods vehicles, buses and motor cycles shall be limited to 70kph and will be grouped into road types with design speed limit of 70kph.

Input Assumption in EMFAC-HK

3.2.28 The latest model version EMFAC-HK v1.2 provided by EPD was employed in this Study. The input parameters and model assumptions made in EMFAC-HK model are summarized as follows.

Modelling Modes

3.2.29 As suggested in EPD guideline, "Burden mode" which can provide hourly vehicular emissions according to the diurnal variations of traffic flow, temperature, relative humidity and speed, was selected for the DP1 Project. Both CVs and MVE17G CVS output file formats were produced.

Technology Fractions

Exhaust Technology Fractions

3.2.30 Each vehicle class had diverse technological factors in different years. According to the underlying assumption in EMFAC-HK, each vehicle class could be modelled by the individual behaviour of unique technology groups. Each technology group represented the same vehicle class had distinct emission control technologies, similar in-use deterioration rates and responded the same to repair. It means that the vehicles from the same class had the same emission standards or specific equipment installed on them (e.g. multi-port fuel injection, three-way catalyst, adaptive fuel controls, etc) which made them had the same performance.

3.2.31 The Up to Date Vehicle Licensed Number by Age and Technology Group Fractions provided in EPD's website was adopted in this assessment. Since the provided exhaust technology fractions were only up to Year 2003, for those after Year 2003 were projected in accordance with *EPD Guideline on Modelling Vehicle Emissions Appendix II "The Implementation Schedule of Vehicle Emission Standards in Hong Kong (Updated as at 17 August 2005)*" and *Appendix III "The Technology Group Indexes"*.

3.2.32 According to the EPD Guideline on Modelling Vehicle Emissions, it mentioned that the existing vehicle emission control programmes were included in the EMFAC-HK. No other vehicle emission control measures were assumed in the assessment, thus the projected breakdown (%) in Years 2004 – 2031 of private cars & light goods vehicles and breakdown (%) of diesel & LPG private light bus >3.5t were made reference to the default data.

3.2.33 An addition adjustment on the projection of single deck franchised bus (FBSD) was made. In accordance with EPD Guideline on Modelling Vehicle Emissions Appendix II, Implementation Schedule of Vehicle Emission Standards in Hong Kong (Updated as at 17 August 2005), the emission standard of diesel franchised buses were upgraded to Euro III since 1 October 2001. However, in accordance with the updated exhaust technology fractions provided by EPD, FBSD was not upgraded to EURO III in Year 2001. Thus, as a conservative approach, the emission standards of FBSD in Year 2001-2005 was assumed as Euro II and the emission standards of FBSD after Year 2005 would follow the Implementation Schedule of Vehicle Emission Standards in Hong Kong. The adjusted exhaust technology fractions are presented in **Appendix 3.4**.

Evaporative Technology Fractions

3.2.34 Evaporative technology fraction in the model was based on the default value.

Vehicle Population

3.2.35 As recommended in the *EPD Guideline on Modelling Vehicle Emissions*, the latest vehicle age distribution data provided in the EPD's website, that is, the Vehicle Population in Year 2003, was used except the population of private car and taxi.

3.2.36 After the implementation of stringent emission standard in 1998, there was no new certification of diesel private car registration in Hong Kong. Thus, the number of diesel private car was extracted and grouped into the "petrol private car". Since diesel Taxi started to switch to LPG from Year 2001 and only one fuel type of Taxi was available in EMFAC-HK Model, 100% LPG taxi was therefore be assumed in this assessment.

3.2.37 The then Environment, Transport and Works Bureau (ETWB) implemented an incentive scheme to encourage the early replacement of diesel light buses with LPG or electric ones since 2002. In view of the environmental report established by EPD, nearly 80% of new public light buses in 2004 operating on LPG. As a conservative approach, the incentive scheme for light buses would not be considered in this assessment.

3.2.38 According to the above assumptions, vehicle population in Year 2016 was calculated and is presented in **Appendix 3.5**.

Accrual Rate

3.2.39 The default accrual rates in EMFAC-HK were estimated from the local mileage data adjusted to reflect the total vehicle-mile-travelled (VMT) for each vehicle class. The default value was used.

Diurnal Variation of Daily Trips and Daily Vehicle-Mile-Travelled (VMT)

Diurnal Variation of Daily Trips

3.2.40 The diurnal variation of daily trips was used to estimate the start emissions of petrol vehicles, thus the trips of other vehicles would be zero. The number of trips per day of petrol vehicle was equal to the number of cold starts per day. The diurnal variation of daily trips could be estimated based on the ratio of trip/VMT in the entire territory and the Study Area. The number of vehicle trips was calculated by the following equation:

Vehicle Trip of Class 1 in the Study Area at hour 1 = VMT for vehicle class 1 in the Study Area at hour 1 × Vehicle trip of Class 1 in the territory*/VMT for vehicle class 1 in the territory*

* where the trip and VMT in the territory could be read from the default data of EMFAC-HK model

Diurnal Variation of Daily Vehicle Mile-Travelled (VMT)

3.2.41 Vehicle-mile-travelled (VMT) represents the total distance travelled on a weekday. The VMT was calculated by multiplying the number of vehicle which based on the forecast hourly traffic flow in Year 2031, which is the maximum traffic projects within 15 years upon the commissioning year of the DP1 Project, and the length of road travelled in the Study Area. The input in the model was by vehicle/fuel/hour.

3.2.42 The hourly profile of traffic flow was made reference to the *Annual Traffic Census 2006*. The major core station along Prince Edward Road East Road (No. 3003) was selected for representing the hourly profile of all roads within the Study Area. However, the same traffic breakdown in % would be applied to all hours.

3.2.43 Those assumptions of producing the hourly traffic flow and the traffic breakdown were approved by Transport Department. The adopted daily trips and VMT are summarized in **Appendix 3.6**.

Hourly Temperature and Relative Humidity Profile

3.2.44 According to the information provided by Hong Kong Observatory (HKO), South East Kowloon Weather Station was the nearest station of the DP1 Project. However, this station only records the wind direction and stability class. Thus, data recorded at King's Park meteorological station, which is the second nearest station to the Project site, were adopted for the model input.

Speed Fraction

3.2.45 The speed limits of each road were made reference to the Traffic AIDs from Transport Department. It was assumed that all vehicle classes had the same speed profile in the model.

3.2.46 In accordance with the Road Traffic Ordinance, for any road with design speed limit of 70kph or above, the maximum speed limit for medium goods vehicles, heavy goods vehicles, buses and buses shall be limited to 70kph. Thus, the speeds of medium goods vehicles, heavy goods vehicles and buses from the flow speed of 70kph, whichever is lower, are adopted.

3.2.47 To simulate the effect of different road speed during the rush and non-rush hour, sensitivity test has been done. The design road speed limits are assumed for representing the situation during non-rush hour, while the vehicle speed of peak hour flow (8:00a.m.-9:00a.m.) in Year 2031 which having the lowest traffic speed will be representing the situation during rush-hour.

3.2.48 The flow speeds were calculated based on the peak traffic flow in Year 2031 and volume/capacity ratio of different road type. For obtaining the speed fractions of each vehicle type, the vehicle speeds of each road link were first calculated and weighing by VMT. If the road links are in two-way direction, the vehicle speeds were calculated by weighing vehicle speeds of each direction. The calculated peak flow speed fractions are summarized in **Appendix 3.7**.

3.2.49 In the model, same road speeds are applied to all hours to demonstrate the effect of using peak flow speed and design speed. Based on the comparison of the total daily emission rate, the worst road speed fraction is applied for predicting the vehicle emissions. Model year of 2031 is adopted in the sensitivity test.

3.2.50 From the results of the sensitivity test, it indicates that higher total daily NO_X and RSP emissions will be obtained at lower road speed under road groups with design speed of 50kph, 70kph and 80kph except the total daily NO_X emission factors for vehicle types other than petrol private cars and taxi under road group with design speed of 80kph. Although the total daily NO_X emissions under scenario using design speed for vehicle types other than petrol private cars and taxi are less than 5% higher than that under scenario using peak flow speed, major vehicle types travel within the study area are petrol private cars and taxi (about 63% of the total number of vehicles). Thus, the peak hour flow speed in Year 2031 is applied to all hours for predicting the total hourly emissions in this assessment as a conservative approach. This sensitivity test results are presented in **Appendix 3.8**.

3.2.51 The fleet average emission factor under congestion traffic condition for calculating the emissions inside tunnel/full enclosure is also considered in the study. The travel speed is assumed as 10kph at all hours under congestion traffic condition.

Model Year

3.2.52 According to the construction programme, the completion of the Project would be in Year 2016. The air quality impact prediction would be based on the maximum traffic projections within 15 years upon operation of the Project. For the purpose of finding the worst emission year, 15 sets of vehicle emissions based on the emission control schemes from Year 2016 to 2031 by using the same VMT in 2031 were produced. The emission standards of each vehicle class were the major factor influencing the vehicle exhaust emission. According to the implementation schedule of emission standards, the latest program was up to Year 2006 or 2009. Better emission controlled vehicles (Euro IV and V) would replace the old pre-Euro diesel/petrol vehicles. The vehicle exhaust emissions of Year 2016 to Year 2031 were calculated. Sensitivity tests were undertaken to calculate the vehicle exhaust emissions in different year by using the VMT of each road category and the flow speed fractions in Year 2031. By using the peak hour flow speed in Year 2031 at all hours, the total daily NO_X an RSP emissions by 16 vehicle classes in different vehicle exhaust emission year from 2016 to 2031 are summarized in **Appendix 3.9**.

3.2.53 Comparing the total daily NO_X and RSP emissions under different vehicle exhaust emission years from Year 2016 to 2031, the highest vehicle emissions were found in Year 2016 using emission control scenario and were decreased from Year 2016 to 2031. Therefore, as a conservative approach, the emissions using emission control scenario in Year 2016 were adopted for this assessment.

3.2.54 As a conservative approach, the hourly emissions in Year 2016 were first divided by the number of vehicles and the distance travelled to obtain the emission factors in gram per miles per vehicle. The calculated maximum vehicle emission factors were then selected for incorporation into the air dispersion model. These conservative vehicle emission factors together with the forecasted Year 2031 peak traffic flow were adopted in this air quality impact assessment. The calculation of fleet vehicle emission for this assessment is presented in **Appendix 3.10**. The forecast traffic flow and speed fraction for year 2031 with 16 vehicle classes have been submitted to the Transport Department (TD) on 19 March 2008 and received no objection from TD on 15 April 2008 for using the forecasted traffic flow for the EIA. The response letter from TD is attached in **Appendix 3.11** for reference.

3.2.55 The calculated vehicular emissions for different vehicle categories under normal traffic condition and congestion traffic condition were listed in **Table 3.10** and **Table 3.11**, respectively**.**

3.2.56 Emission Factors for Year 2016 for Different Vehicle Classes (EMFAC-HK) under Normal Traffic Condition)

Table 3.10 Emission Factors for Year 2016 for Different Vehicle Classes (EMFAC-HK) under Normal Traffic Condition)

Vehicle Class	Description	Emission Factors for 2016, g/mile-veh					
		Road Type 1 (with design speed limit of 50kph)		Road Type 2 (with design speed limit of 70kph)		Road Type 3 (with design speed limit of 80kph)	
		NO_X	RSP	NO_X	RSP	NO_X	RSP
MC1	Petrol Private Cars (PC) & Light Goods Vehicles (LGV)	0.1577	0.0072	0.1502	0.0064	0.1363	0.0040
MC3	Diesel Private Cars & Light Goods Vehicles<2.5t	0.4284	0.1682	0.4053	0.1351	0.3898	0.1063
MC4	Diesel Private Cars & Light Goods Vehicles 2.5-3.5t	0.2898	0.0992	0.2760	0.0798	0.2674	0.0601
MC5	Public Light Buses	0.3121	0.2344	0.3143	0.2118	0.3258	0.1552
MC6	Light Goods Vehicles >3.5t	2.3674	0.2024	2.2447	0.1627	2.1809	0.1217
MC7	Medium & Heavy Goods Vehicles with GVW 5.5-15t	4.7748	0.3267	4.5221	0.2216	-	-
MC8	Medium & Heavy Goods Vehicles with GVW >=15t	6.0139	0.3124	5.5571	0.1940	-	-
MC10	Double Deck Franchised Buses	3.0364	0.1055	2.9914	0.0878	-	-
MC11	Motor Cycles	1.1568	0.0634	1.2549	0.0617	-	-
Taxi3	Taxi	0.2682	0.0289	0.2508	0.0244	0.2266	0.0159
Taxi4	Private Light Buses <3.5t	0.0000#	0.0000#	0.0000#	0.0000#	0.0000#	0.0000#
Taxi5	Private Light Buses >3.5t	0.3522	0.2604	0.3530	0.2263	0.3394	0.1673
Taxi6	Non- franchised Buses <6.4t	0.0000#	0.0000#	0.0000#	0.0000#	-	-
Taxi7	Non- franchised Buses 6.4-15t	3.9808	0.1882	3.8591	0.1374	-	-
Taxi8	Non- franchised Buses >15t	0.0000#	0.0000#	0.0000#	0.0000#	-	-
Taxi10	Single Deck Franchised Buses	3.1628	0.2100	3.2206	0.2135	-	-

Note:
Since there is no private light buses<3.5t, non-franchised buses <6.4t, non-franchised buses >15t travelled within the study area, the calculated emission factors for these vehicle classes are zero.

Table 3.11 Emission Factors for Year 2016 for Different Vehicle Classes (EMFAC-HK) under Congestion Traffic Condition

Vehicle Class	Description	Emission Factors for 2016, g/mile-veh					
		Road Type 1 (with design speed limit of 50kph)		Road Type 2 (with design speed limit of 70kph)		Road Type 3 (with design speed limit of 80kph)	
		NO_X	RSP	NO_X	RSP	NO_X	RSP
MC1	Petrol Private Cars (PC) & Light Goods Vehicles (LGV)	0.2131	0.0201	0.2132	0.0201	0.2132	0.0202
MC3	Diesel Private Cars & Light Goods Vehicles<2.5t	0.6021	0.2956	0.6005	0.3002	0.6024	0.2984
MC4	Diesel Private Cars & Light Goods Vehicles 2.5-3.5t	0.4191	0.1824	0.4191	0.1836	0.4190	0.1826
MC5	Public Light Buses	0.4743	0.4807	0.4763	0.4807	0.4749	0.4901
MC6	Light Goods Vehicles >3.5t	3.4179	0.3719	3.4178	0.3727	3.4180	0.3723
MC7	Medium & Heavy Goods Vehicles with GVW 5.5-15t	7.0419	0.6268	7.0420	0.6269	-	-
MC8	Medium & Heavy Goods Vehicles with GVW >=15t	8.6842	0.5648	8.6836	0.5610	-	-
MC10	Double Deck Franchised Buses	5.5264	0.2559	5.5260	0.2563	-	-
MC11	Motor Cycles	1.0151	0.0898	1.0148	0.0915	-	-
Taxi3	Taxi	0.3833	0.0875	0.3834	0.0875	0.3834	0.0877
Taxi4	Private Light Buses <3.5t	0.0000#	0.0000#	0.0000#	0.0000#	0.0000#	0.0000#
Taxi5	Private Light Buses >3.5t	0.5270	0.5153	0.5267	0.5159	0.5264	0.5158
Taxi6	Non- franchised Buses <6.4t	0.0000#	0.0000#	0.0000#	0.0000#	-	-
Taxi7	Non- franchised Buses 6.4-15t	5.9660	0.3743	5.9657	0.3736	-	-
Taxi8	Non- franchised Buses >15t	0.0000#	0.0000#	0.0000#	0.0000#	-	-
Taxi10	Single Deck Franchised Buses	5.8447	0.5219	5.8422	0.5337	-	-

Note:
Since there is no private light buses<3.5t, non-franchised buses <6.4t, non-franchised buses >15t travelled within the study area, the calculated emission factors for these vehicle classes are zero.

3.2.57 Subsequent to the completion of the EMFAC-HK modelling with the results tabulated above,, the design traffic speed of link no. 185 and 186 have been amended from 80kph to 70kph. In accordance with the calculated VMT, the VMT for these two links are 5082.5, which accounts for only 0.9% and 1.4% of the total VMT for road group with design speed of 70kph (551703.6) and 80kph (369773), respectively. Besides, the maximum difference between the calculated fleet average emission factors for road group with design speed of 70kph and 80kph is only about 10%. Thus, the associated effect of the revision of the traffic speed for the two links from 80kph to 70kph on the calculated fleet average emission factors would be very minimal and rerun of the EMFAC-HK model was not performed.

Model Assumptions for Open Road Vehicle Emission

3.2.58 The dispersion modelling was undertaken based on 360 predetermined worst case meteorological conditions to determine the highest predicted pollutant concentration amongst the 360 wind directions. The following summarises the worst case meteorological conditions to be adopted in the CALINE4 model:

- Wind speed : 1 m/s
- Wind direction : 360 wind directions
- Resolution : 1°
- Wind variability : 24°
- Stability class : D
- Surface roughness : 1 m
- Mixing height : 500 m

3.2.59 The CALINE4 model calculates hourly concentrations only. With reference to the Screening Procedures for Estimating the Air Quality Impact of Stationary Source (EPA-454/R-92-019), a conversion factor of 0.4 was used to convert the 1-hour average concentrations to 24-hour average concentrations.

3.2.60 As discussed in **Section 2.7** of this EIA Report, the Through Road L3 is one of the alternative option of KTD. The predicted concentration arising from Through Road L3 was added to the base scheme to evaluate the worst case impact under this alternative option.

3.2.61 Secondary air quality impacts arising from the implementation of roadside noise barriers and enclosures were also incorporated into the air quality model. For the existing noise barrier, noise semi-enclosure along the Kwun Tong Bypass and landscape deck over the proposed Road D3, it was assumed that dispersion of the traffic pollutants would have effect similar to assuming that traffic pollutants would be emitted from the top of the barrier and noise semi-enclosures at a point close to the opening of semi-enclosures. The calculation of open road emissions are summarised in **Appendix 3.12**. The locations of open road emission sources are shown in **Appendix 3.13**.

3.2.62 Emissions from vehicles at the EHC toll plaza near Yau Tong was included in the model based on the assumption that the vehicles are queuing on all lanes approaching or leaving the tunnel portal for a distance of 100m. The maximum steady queues at the EHC toll plaza and emission factors are referring to the approved Further Development of Tseung Kwan O Feasibility Study EIA Report (Register No.: AEIAR-092/2005). The calculation of EHC toll plaza emissions are summarised in **Appendix 3.14**.

Portal and Ventilation Building Emissions

3.2.63 The Industrial Source Complex Short Term (ISCST3) dispersion model was used to predict the portal emissions. The portal emissions to be considered in the model include the following:

- Portal emissions from the proposed Road L1 Tunnel, Road D2 Landscape Deck, Trunk Road T2 Tunnel and tunnel section of Tseung Kwan O – Lam Tin Tunnel (near TKO/T2 interface);
- Portal emissions from the existing Kai Tak Tunnel and EHC Tunnel;
- Ventilation buildings for the proposed CKR and Road T2; and
- Ventilation buildings for the existing Kai Tak Tunnel and EHC Tunnel.

3.2.64 Based on the latest available design scheme, the section of Road D2 below the landscape deck of the Stadium Complex would be enclosed by solid structure on the sides for most of its length. For the purpose of conservative assessment, it is assumed that the vehicular emission from the decked section of Road D2 will emit from the both ends of the landscape deck as portal emissions.

3.2.65 The portal emissions (NO_2 and RSP) were calculated based on the vehicle emission rates (EMFAC-HK) and vehicle flows in the prediction year.

3.2.66 Portal emissions were modelled in accordance with the Permanent International Association of Road Congress Report (PIARC, 1991). Pollutants are assumed to eject from the portal as a portal jet such that 2/3 of the total emissions were dispersed within the first 50 m of the portal and 1/3 of the total emissions within the second 50 m.

3.2.67 Hourly meteorological data for the year 2006 (including wind speed, wind direction, air temperature, Pasquill stability class and mixing height) of the South East Kowloon Weather Station was employed for the model run. As South East Kowloon Weather Station does not record temperature data, the ambient temperature data recorded at the King's Park Weather Station were adopted. The urban dispersion mode in ISCST3 model was selected. For the calculation of NO_2 concentrations, the vehicular emission factor for NO_x was used and the conversion factor from NO_x to NO_2 for all roads and portal emissions of tunnels and ventilation building was based on the Ambient Ratio Method (assuming 20% of NO_x to be NO_2) which is an acceptable approach as stipulated in EPD Guidelines on Choice of Models and Model Parameters.

3.2.68 The total emissions from the tunnel were calculated based on the predicted Year 2031 peak hour traffic flow and the traffic composition from the traffic forecast. As there is no detailed information for the proposed Road T2 at the time of carrying out of this EIA, the following ventilation design was adopted for this study. On the KTD side, it is assumed that the 40% traffic emission from Road T2 Tunnel westbound would be expelled from the portal and another 60% would be extracted and discharged at the northern vent shaft of Road T2 Tunnel. On the southern portal side (Kwun Tong side), it is also assumed that 50% of the traffic emissions from Road T2 Tunnel eastbound would be expelled from the portal and another 50% emission would be extracted and discharged at the southern vent shaft of Road T2 Tunnel next to the Tunnel Administration Building.

3.2.69 For the emissions of Kai Tak Tunnel Ventilation Building, 50% of the traffic emissions from the tunnel would be expelled from the portal and 50% of the tunnel emissions would be extracted and discharged at the vent shaft of Kai Tak Tunnel Ventilation Building.

3.2.70 As checked with the Highways Department, the project proponent of CKR, there was no detailed information for the proposed CKR at the time of carrying out of this EIA. The assumption of ventilation design was therefore made reference to the approved SEKDCFS EIA Report. It has been assumed that all the tunnel emissions would be exhausted from the vent shafts and there would be no portal emission at the KTD exit.

3.2.71 The locations of portals and ventilation building emissions are shown in **Figure 3.2**. The detailed calculation of emission rates of the portals and the ventilation buildings are shown in **Appendix 3.14** and summarised in **Table 3.12** below.

Table 3.12 Portal and Ventilation Building Emissions

Location	Type	Tunnel Length	Exhaust Height	Ventilation Building Exhaust Velocity	Total Emission	
					NO_2 (g/s)	RSP (g/s)
Road L1 (N/B & S/B)	Portal	243	-	-	7.308E-03	2.853E-03
Road D2 Landscape Deck (E/B & W/B)	Portal	214	-	-	6.668E-03	2.443E-03
Road T2 (N/B)	Portal	2640	-	-	7.640E-02	2.125E-02
Road T2 (S/B)	Portal	2640	-	-	8.848E-02	2.471E-02
Kai Tak Tunnel (E/B)	Portal	900	-	-	2.576E-02	8.910E-03
Kai Tak Tunnel (W/B)	Portal	900	-	-	3.242E-02	1.067E-02
EHC (E/B)	Portal	1800			4.516E-02	1.263E-02
TKO-LLT (E/B)	Portal	140			9.547E-03	2.621E-03
TKO-LLT (W/B)	Portal	140			1.030E-02	2.814E-03
CKR*	Vent. Building	1260	33	10	2.017E-01	9.072E-02
Road T2 Ventilation Building inside KTD site	Vent. Building	2640	24	10	1.146E-01	3.188E-02
Road T2 Ventilation Building (Kwun Tong)	Vent. Building	2640	6	10	8.848E-02	2.471E-02
Kai Tak Tunnel	Vent. Building	900	20	10	5.818E-02	1.958E-02
EHC Ventilation Building	Vent. Building	1800	17	2.12	1.054E-01	2.948E-02

Note: * The total length of tunnel section of CKR is about 3.9km long, it is assumed air emission within about 1.26km long of tunnel section would be emitted from the Ventilation Building in KTD.

Cumulative Impact

3.2.72 As mentioned above, background pollutant levels within and adjacent to the Study Area, vehicle emissions from open sections of the existing and planned road networks, tunnel portal and ventilation building emissions, all of these contributed to the cumulative impact.

3.2.73 Besides the vehicular emissions, emissions from the cruise vessels using the proposed cruise terminal at Kai Tak, emission from proposed hospital at Kai Tak, proposed heliport, typhoon shelters and chimney emissions within 500m from the DP1 Project site boundary would also contribute to the cumulative air quality impact. The detailed emissions for above sources are presented in **Section 6** of this Report.

3.2.74 The pollutant concentrations at the ASRs were predicted by both CALINE4 and ISCST3 models, where

- the CALINE4 model was used to predict the open road emissions from the existing and planned road networks; and
- the ISCST3 model was used to predict all the portal emissions and ventilation shaft emissions, chimney emissions, emission from hospital, cruise ship, proposed heliport and typhoon shelters.

3.2.75 To obtain the cumulative pollutant concentration at each receptor, the predicted values from the CALINE4 and the ISCST3 models are added together with the background pollutant concentrations.

Vehicular Emission Impact (Inside the Tunnel / Deckover)

3.2.76 In accordance with the "Practice Note on Control of Air Pollution in Vehicle Tunnels", the air quality inside the tunnel should achieve the EPD recommended standard of 1ppm NO_2 concentration. The emission rate of CO is about 23 times of the NO_2 emission rate with reference to vehicle emission derived from the EMFAC Model (**Appendix 3.10**), however, the ratio of guideline standard of CO (5-minutes) concentration to NO_2 (5-minutes) concentration in g/m^3 is 64 to 1. Therefore, if the predicted NO_2 concentration complies with the standard, the CO concentration would also comply with the standard. Under the Air Pollution Control (Motor Vehicle Fuel) Regulation, the sulphur content of diesel fuel is required to be less than 0.005%. In view of the low emission rates relative to the statutory limit, SO_2 would also comply with the tunnel air quality limit. Therefore, NO_2 was selected as the most critical air pollutant for in-tunnel air quality assessment for the planned landscape deck on Road D2 and Road L1 tunnel.

3.2.77 The air quality inside the planned landscape deck and tunnel were calculated based on the empirical formulas of fluid dynamics. Two scenarios were considered in the assessment, i.e. normal traffic flow condition and congested traffic flow condition. It was assumed that under normal traffic flow condition, the vehicles are at a speed of 50 kph, whereas under congested mode, the vehicles are at a speed of 10 kph, the separation between vehicles is assumed to be 1 m. Different emission factors for normal condition (which presented in **3.2.56**) and congestion condition (emission factor with traffic speed at 10kph) are used to calculate the air quality under the deckover.

Identification of Environmental Impacts

Construction Dust

3.2.78 The major potential air quality impact during the construction phase of the DP1 Project will be dust arising from haul road emissions, open site erosion, excavation and filling activities. Civil works related to the demolition of existing structures and construction of infrastructure will also cause emissions.

3.2.79 The concurrent works for the SCL, CKR, Road T2 and Anderson Road Projects have also been taken into account in assessing the impacts.

Operational Phase

3.2.80 The major air pollutant sources during operational phase of the DP1 Project would be vehicular emissions, portal emissions from the proposed T2 tunnel, as well as the emissions from CKR Ventilation Shaft Building, Kai Tak Tunnel Ventilation Building and Road T2 Ventilation Shaft Building. Other than emissions from tunnel portals, long sections of landscape deck / deckovers may also result in portal emissions. Within the study area, it is identified that the planned landscape deck above a section of Road D2 and Road L1 tunnel may result in portal emissions. It should be noted that based on the latest available design scheme, the section of Road D2 below the landscape deck of the Stadium Complex would be enclosed by solid structure on the sides. For the purpose of conservative assessment, it is assumed that the decked section of Road D2 will be in the form of tunnel for assessing the portal emission impact and the in-tunnel air quality impact.

3.2.81 Besides vehicular emissions, emissions from the cruise vessels, emission from proposed hospital, proposed heliport, typhoon shelters and chimney emissions within 500m from the DP1 Project boundary would also contribute to the cumulative air quality impact. The detailed emission data are presented in **Section 6** of this Report.

3.2.82 The proposed Road T2 Tunnel (DP10) and CKR (DP11) will be constructed by CEDD and Highways Department respectively. The air quality impacts inside the two proposed tunnels will be adequately addressed in a separate EIA report to be prepared and submitted under the EIAO by CEDD and Highways Department.

3.2.83 The in-tunnel air quality impact assessment for those tunnels and landscape deck covered under this study are listed below:

- Planned Landscape Deck at Road D2
- Road L1 Tunnel

3.2.84 As discussed in **Section 2**, car park will be proposed under the landscape deck of the Stadium Complex. The ventilation systems of the proposed car park should follow the requirements stipulated in EPD's Practice Note on Control of Air Pollution in Car Parks in order to avoid any adverse air quality impacts within the carpark.

Prediction and Evaluation of Environmental Impacts

Construction Dust

3.2.85 The maximum predicted cumulative 1-hour and 24-hour average TSP levels for construction of the DP1 Project are summarised in **Table 3.13**. Based on results indicated in **Table 3.13**, no exceedance of 1-hour average and 24-hour average TSP guideline and AQO is predicted at the ASRs at 1.5m above ground. The predicted cumulative maximum 1-hour average and 24-hour average TSP concentration contours at 1.5m above local ground are shown in **Figure 3.3 to 3.6** (the bolded contours represent the respective AQOs) and no air sensitive uses are identified within the areas with predicted exceedances.

Table 3.13 Predicted Cumulative Maximum 1-hour Average TSP Concentrations at 1.5m above ground

ASRs	Scenario 1 (Mid 2009 to Mid 2013)		Scenario 2 (Mid 2013 to Late 2016)	
	Predicted 1-hr TSP conc.[1]	Predicted 24-hr TSP conc.[2]	Predicted 1-hr TSP conc.[1]	Predicted 24-hr TSP conc.[2]
A1	228	131	250	133
A2	163	117	165	116
A3	161	114	183	112
A4	163	115	189	114
A5	187	117	174	114
A6	170	111	188	118
A7	170	114	196	124
A8	191	118	208	130
A9	203	124	211	137
A10	218	125	224	139
A11	234	128	240	144
A12	210	123	219	140
A13	238	140	247	159
A14	267	161	280	169
A15	251	152	304	170
A16	250	149	325	173
A17	304	168	384	220
A18	212	133	267	166
A19	235	161	315	191
A20	194	132	253	156
A21	200	144	248	161
A22	174	128	218	144
A23	160	115	196	126
A24	191	131	212	132
A25	237	124	217	122
A26	234	139	211	117
A27	210	118	177	110
A28	254	128	178	113
A29	192	121	298	156
A30	219	114	308	134
A31	376	183	410	192
A32	290	145	312	169
A33	191	119	303	182
A34	190	118	326	170
A35	208	117	350	176
A36	206	117	360	183
A37	209	107	289	154
A38	193	104	245	139
A39	206	103	230	133
A40	217	106	247	138
A41	229	110	274	149
A42	236	113	291	156
A43	283	123	409	195
A44	251	130	358	182
A45	222	129	239	138
A46	222	121	245	143
A47	246	143	258	152
A48	477	207	481	212
A49	217	128	301	153

ASRs	Scenario 1 (Mid 2009 to Mid 2013)		Scenario 2 (Mid 2013 to Late 2016)	
	Predicted 1-hr TSP conc.[1]	Predicted 24-hr TSP conc.[2]	Predicted 1-hr TSP conc.[1]	Predicted 24-hr TSP conc.[2]
A50	212	115	245	135
A51	197	110	236	128
A52	194	111	265	154
A53	188	108	231	124
A54	182	107	204	114
A55	174	106	197	124
A56	165	106	271	151
A57	162	106	223	131
A58	163	106	220	127
A59	159	103	221	128
A60	154	101	201	117
A61	152	100	258	117
A62	157	101	202	126
A63	160	102	169	117
PA1(4)	N/A	N/A	207	123
PA2(4)	N/A	N/A	216	121
PA3(4)	N/A	N/A	225	124
PA4(4)	N/A	N/A	239	128
PA5(4)	N/A	N/A	242	131
PA6(4)	N/A	N/A	198	117
PA7(4)	N/A	N/A	196	119
PA8(4)	N/A	N/A	210	121
PA9(4)	N/A	N/A	257	137
PA10(4)	N/A	N/A	235	131
PA11(4)	N/A	N/A	227	126
PA12(4)	N/A	N/A	254	131
PA13(4)	N/A	N/A	253	141
PA14(4)	N/A	N/A	292	155
PA15(4)	N/A	N/A	363	193
PA16(4)	N/A	N/A	366	180
PA19(4)	N/A	N/A	274	158
PA31(4)	N/A	N/A	372	199
PA98(4)	N/A	N/A	260	148
PA99(4)	N/A	N/A	246	142
PA100(4)	N/A	N/A	231	133
PA101(4)	N/A	N/A	228	134

Note: (1) An hourly averaged TSP guideline level of 500µg/m^3 should not be exceeded.
(2) A 24-hour averaged TSP criteria of 260µg/m^3 should not be exceeded.
(3) Background TSP concentration of 79µg/m^3 was included.
(4) The population intake should be after late Year 2012

Operational Phase (Vehicular Emission Impact)

3.2.86 Taking into account vehicle emissions from open road networks, portal and ventilation building emissions from the tunnels, portal emissions from Road T2, existing Kai Tak Tunnel, proposed Road L1 tunnel and the decked section of Road D2, the 1-hour average NO_2, 24-hour average NO_2 and 24-hour average RSP concentrations were predicted and the highest pollutant concentrations at each ASR under the worst case scenario were calculated.

3.2.87 Predicted worst-case 1-hr average and 24-hr average NO_2 and 24-hr average RSP concentration at the selected air sensitive receivers at different assessment heights are presented in **Appendix 3.16**.

3.2.88 Based on the above prediction, no exceedance of the 1-hour average NO_2, 24-hour average NO_2 and 24-hour average RSP AQOs would occur at any representative ASRs in the Study Area. From the results, it is found that the maximum pollutant concentrations would occur at 1.5m above ground (the lowest assessment height).

Cumulative Impact

3.2.89 Besides vehicular emissions, emissions from the cruise ships, proposed hospital, proposed heliport, existing typhoon shelters, and industrial chimney emissions (include Sai Tso Wan Landfill) would all contribute to the cumulative air quality impact at KTD. The cumulative 1-hour and 24-hour average NO_2 and SO_2 and 24-hour RSP were calculated and the range of predicted concentrations are presented in **Table 3.14**. The detailed results are presented in **Appendix 3.17**.

Table 3.14 Summary of Predicted Results

Emission Sources	Predicted Concentration, μg/m³				
	NO_2		SO_2		RSP
	1-hr average	24-hr average	1-hr average	24-hr average	24-hr average
EM1	72 – 190	68 – 106	N/A	N/A	57 – 70
EM1a	67 – 75	67 – 70	N/A	N/A	57– 58
EM2	67 – 82	67 – 70	24 – 348	24 – 121	57 – 59
EM3	69 – 118	67 – 76	118 – 927 at A7, 45 – 343 at other ASRs	27 – 177	57 – 61
EM4	92 – 826 at PA108-113, 86 – 253 at other ASRs	72 – 380 at PA108-113, 72 – 109 at other ASRs	145 – 4075 at PA108-113, 681 – 1016 at PA64*, 341 – 410 at PA64**, 110 – 674 at other ASRs	52 – 1698 at PA108-113, 48 – 247 at other ASRs	60 – 228 at PA108-113, 60 – 80 at other ASRs
EM5	71 –169	68 – 84	27 – 105	24 – 38	57 – 66
EM6	67 – 145	67 – 87	24 – 88	24 – 40	57 – 86
C.I.	114 – 835 at PA108-113, 118 – 256 at other ASRs	84 – 384 at PA108-113, 77 – 116 at other ASRs	125 – 927 at A7, 145 – 4075 at PA108-113, 681 – 1016 at PA64*, 341 – 410 at PA64**, 126 – 674 at other ASRs	52 – 1698 at PA108-113, 53 – 247 at other ASRs	64 – 229 at PA108-113, 61 – 91 at other ASRs

Note:
EM1: Predicted worst-case concentration due to vehicular emissions (include open road, portals & ventilation buildings) alone
EM1a: Predicted worst-case concentration due to vehicular emissions (through Road L3) alone
EM2: Predicted worst-case concentration due to emission from the proposed hospital at Kai Tak alone
EM3: Predicted worst-case concentration due to chimney emissions from San Po Kong and Kwun Tong industrial areas alone
EM4: Predicted worst-case concentration due to cruise emissions from the proposed cruise terminal at Kai Tak alone
EM5: Predicted worst-case concentration due to typhoon shelters emissions alone
EM6: Predicted worst-case concentration due to heliport emission alone
C.I.: Predicted worst-case concentration due to cumulative Impacts from all the above emission sources
Bolded and underlined value exceeds the AQO criteria
* Predicted results for the outdoor air quality at PA64 at assessment heights from 100m to 170m above ground.
** Predicted results for the indoor air quality at PA64 at assessment heights from 100m to 170m above ground (see S.3.2.93 for details).

3.2.90 **Emission from Proposed Hospital at Kai Tak:** As shown in **Table 3.14** above, no adverse impact due to proposed hospital site. Further air quality assessment should be carried out and results should be submitted to EPD for application of installation chimney for any potential chimney emissions within the hospital site to ensure that there would not be unacceptable air quality impacts on the surrounding ASRs.

3.2.91 **Chimney Emissions within 500m the Project Boundary:** Existing ASR A7 is predicted to have exceedance of the 1-hr average AQO for SO_2 due to the existing chimney emissions from San Po Kong and Kwun Tong industrial areas. The predicted exceedances are not associated with the potential emissions from the DP1 Project. Since the fresh air intake of ASR A7 is located at 10m above ground, adverse impact at ASR A7 from chimney emission is therefore not expected. Adverse air quality impact due to the DP1 Project is also not expected.

3.2.92 **Cruise Emissions:** Based on the predicted results, Site 4D2 (Planned) Tourism Node (PA108 to PA113) is predicted to exceed both the 1-hr average and 24-hr average of NO_2 and SO_2 and 24-hr average RSP AQOs. Exceedances of the AQOs for both 1-hr and 24-hr average SO_2 are predicted at 50m and above. Exceedances of the 1-hr NO_2, 24-hr average NO_2 and 24-hr average RSP are predicted at above 60m, 55m and 90m, respectively. In order to account for the possible variation of stack height of the cruise vessels, the affected heights would be taken as from 40m or above. Given that the Tourism Node is a commercial ASR which will be centrally air-conditioned, it is therefore recommended in this EIA Report as a mitigation measure to position the fresh air intakes of the central air-conditioning system of the Tourism Node at locations with acceptable air quality (i.e. below 40m above ground for the Tourism Node) by future land lease control (see also Table 19.1). With the implementation of this proposed mitigation measure, adverse air quality impacts at the Tourism Node (PA108 to PA113) are not expected.

3.2.93 For ASR PA64, the modelling results demonstrated that no exceedances were predicted from ground level up to the height limit of the site stipulated in the OZP (i.e. up to 95m above ground or 100mPD). However, exceedance of the 1-hr average AQO for SO_2 was found at outdoor environment of ASR PA64 at a height of above 110m to 170m above ground. With reference to the currently available information, the site is under construction as an industrial use building with a maximum height of about 168m above ground. Besides, in accordance with the information shown in the building design drawings of the concerned industrial building, the building will be centrally air-conditioned. Based on the experience of building service engineer and reference design guidelines for air-conditioning system, for an industrial building with central air-conditioning system, the fresh air intake rate would be about 10% of the indoor air supply rate. In other words, the indoor air would be completely replaced by the outside air in about 10 hours and that the outdoor air would be mixed with the indoor air in the air-conditioning system prior to distributing to the occupiers of the building. For the purpose of assessing the worst-case hourly average concentration at those ASRs located within the industrial building at the height of more than 95m above ground (at assessment heights of 100m to 170m above ground), it is conservatively assuming that the indoor air would be completely replaced by the outside air through the fresh air intakes in about 6 hours. The predicted maximum 6-hour average concentration predicted at the site boundary of the industrial building at the respective assessment height is therefore taken as the worst-case hourly average concentration respired by the ASRs located within the industrial building. The predicted 1-hour average SO_2 concentration within the building at assessment heights of 100m to 170m above ground would be in the range of 341 – 410 $\mu g/m^3$ and demonstrated that no adverse indoor air quality impact at PA64 is expected.

3.2.94 **Cumulative Impact:** Based on the predicted results, ASRs A7 and PA108 to PA113 are predicted to exceed some of the AQOs. The exceedances are due to the pollution source near to the respective ASR. The affected ASRs are all commercial ASRs. With proper design measure, adverse air quality impacts at the ASRs would not be expected. The predicted cumulative maximum 1-hour average and 24-hour average for both NO_2 and SO_2 and 24-hour average RSP concentration contours at 1.5m, 15m, 35m, 40m, 55m, 70m, 95m, 120m, 150m & 160m above local ground are shown in **Figures 3.7** to **3.11** (the bolded contours represent the respective AQOs). As shown in **Figures 3.7, 3.8, 3.9 and 3.10**, localised exceedances of 1-hour average and 24-hour AQO for SO_2 and NO_2 were found at Kwun Tong Industrial area and To Kwa Wan area. The localised exceedances are due to the existing chimney emissions from Kwun Tong industrial area and To Kwa Wan areas and are not associated with the potential emissions from the DP1 Project.

Operational Phase (Vehicular Emission Impact Inside the Tunnel / Landscape Deck)

3.2.95 The air quality assessment inside the decked section of Road D2 and Road L1 tunnel are summarised in **Table 3.15** below. The predicted results show compliance of the Tunnel Air Quality Objective. Detailed calculations and results are presented in **Appendix 3.15**.

Table 3.15 Predicted NO_2 Concentration Inside the Tunnel / Landscape Deck

Location	NO_2 Concentration ($\mu g/m^3$)	
	Normal traffic	Congested traffic
Road L1 tunnel (S/B & N/B)	181	543
Road D2 (E/B & W/B)	72	87
Tunnel Air Quality Objective	1,800	1,800

Mitigation of Environmental Impacts

Construction Phase

3.2.96 As shown in **Table 3.13**, the cumulative maximum 1-hour average and 24-hour average TSP concentrations are predicted to comply with the TSP criteria at all representative ASRs with watering of the active works area eight times a day. In order to reduce the dust impacts further, requirements of the *Air Pollution Control (Construction Dust) Regulation* shall be adhered to during the construction period. An environmental monitoring and audit program shall be implemented to monitor the construction process in order to enforce controls and modify methods of work if dusty conditions arise. In addition, the following good site practices are recommended to minimise dust impacts during transportation and handling of dusty materials:

- Stockpiling site(s) should be lined with impermeable sheeting and bunded. Stockpiles should be fully covered by impermeable sheeting to reduce dust emission.
- Misting for the dusty material should be carried out before being loaded into the vehicle.
- Any vehicle with an open load carrying area should have properly fitted side and tail boards.
- Material having the potential to create dust should not be loaded from a level higher than the side and tail boards and should be dampened and covered by a clean tarpaulin.
- The tarpaulin should be properly secured and should extent at least 300 mm over the edges of the sides and tailboards. The material should also be dampened if necessary before transportation.
- The vehicles should be restricted to maximum speed of 10 km per hour and confined haulage and delivery vehicle to designated roadways insider the site. On-site unpaved roads should be compacted and kept free of lose materials.
- Vehicle washing facilities should be provided at every vehicle exit point.
- The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.

- Every main haul road should be scaled with concrete and kept clear of dusty materials or sprayed with water so as to maintain the entire road surface wet.
- Every stock of more than 20 bags of cement should be covered entirely by impervious sheeting placed in an area sheltered on the top and the three sides.
- Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites.

Operational Phase

3.2.97 In accordance with the assessment results, no AQO exceedance is predicted at the existing and planned residential ASRs. Exceedances of the 1-hr and 24-hr average AQOs are only predicted at the upper levels of the planned commercial ASRs and mainly due to cruise ship emissions from the proposed cruise terminal at Kai Tak and existing commercial ASR due to the existing chimney emissions in Kwun Tong, and To Kwa Wan areas. Contribution of the vehicular emissions from the DP1 Project to these predicted exceedances are insignificant. Mitigation measures for the DP1 Project during the operational phase are therefore not necessary.

Residual Environmental Impact

Construction Phase

3.2.98 With the implementation of the proposed mitigation measures and the dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation* during the construction phase, no adverse residual air quality impact would be expected.

Operational Phase

3.2.99 The predicted cumulative air quality impacts on the existing and planned residential ASRs are complying with the AQO. Exceedances of the 1-hr and 24-hr average AQOs are only predicted at the upper levels of the planned commercial ASRs and mainly due to cruise ship emissions from the proposed cruise terminal at Kai Tak and existing commercial ASR due to the existing chimney emissions in Kwun Tong, and To Kwa Wan areas. Contribution of the vehicular emissions from the DP1 Project to these predicted exceedances are insignificant. Residual air quality impacts due to the DP1 Project during the operational phase are therefore not expected.

Environmental Monitoring and Audit

Construction Phase

3.2.100 With the implementation of the proposed dust suppression measures, good site practices and dust monitoring and audit programme, acceptable dust impact would be expected at the ASRs. Details of the monitoring requirements such as monitoring locations, frequency of baseline and impact monitoring are presented in the EM&A Manual.

Operational Phase

3.2.101 No environmental monitoring and audit during the operational phase is considered necessary.

Summary

Construction Phase

3.2.102 The major potential air quality impact during the construction phase of the DP1 Project will be dust arising from haul road emissions, open site erosion, excavation and filling activities. Civil works related to the demolition of existing structures and construction of infrastructure will also cause emissions. Two worst case scenarios of the construction schedules have been identified and assessed. With implementation of eight times watering, the findings of the construction phase air quality assessment indicate that no exceedance of the 1-hour and 24-hour average TSP criteria are predicted at ASRs in the vicinity of the construction sites. In order to ensure compliance with the TSP criteria at the ASRs at all times, the dust suppression measures and requirements of the *Air Pollution Control (Construction Dust) Regulation* should be adhered to during the construction period. In addition, a comprehensive dust monitoring and audit programme are recommended to ensure the effective implementation of dust suppression measures.

Operational Phase

3.2.103 The cumulative pollutant concentrations associated with the vehicle emissions from open road networks, portal and ventilation building emissions from tunnels, portal emissions from Road T2, existing Kai Tak Tunnel, proposed Road L1 tunnel and the decked section of Road D2 have been assessed.

3.2.104 The predicted cumulative air quality impacts on the existing and planned residential ASRs are complying with the AQO. Exceedances of the 1-hr and 24-hr average AQOs are only predicted at the upper levels of the planned commercial ASRs and mainly due to cruise ship emissions from the proposed cruise terminal at Kai Tak and existing commercial ASR due to the existing chimney emissions in Kwun Tong, and To Kwa Wan areas. Contribution of the vehicular emissions to these predicted exceedances are insignificant. Residual air quality impacts due to the DP1 Project during the operational phase are therefore not expected.

3.2.105 The air quality inside the decked section of Road D2 and Road L1 tunnel would comply with EPD in-tunnel air quality standards.

3.3 Noise Impact

Environmental Legislation, Policies, Plans, Standards and Criteria

General

3.3.1 Noise impact was assessed in accordance with the criteria and methodology given in the Technical Memoranda (TMs) under the Noise Control Ordinance (NCO), and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

3.3.2 The NCO and EIAO provide the statutory framework for noise control. Assessment procedures and standards are set out in the five TMs listed below:

- TM on Environmental Impact Assessment Process (EIAO-TM)
- TM on Noise from Construction Work other than Percussive Piling (GW-TM)
- TM on Noise from Percussive Piling (PP-TM)
- TM on Noise from Construction Work in Designated Areas (DA-TM)
- TM on Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM)

Construction Noise – General Construction

3.3.3 The NCO provides the statutory framework for noise control of construction work, other than percussive piling, using powered mechanical equipment (PME) between the hours of 1900 and 0700 hours or at any time on Sundays and general holiday (that is, restricted hours). Noise control on construction activities taking place at other times is subject to the *Criteria for Evaluating Noise Impact* stated in Table 1B of Annex 5 in the EIAO-TM. The noise limit is $L_{eq\ (30\ minutes)}$ 75 dB(A) at the façades of dwellings and 70 dB(A) at the façade of schools (65 dB(A) during examinations).

3.3.4 Between 1900 and 0700 hours and all day on Sundays and public holidays, activities involving the use of PME for the purpose of carrying out construction work is prohibited unless a construction noise permit (CNP) has been obtained. A CNP may be granted provided that the Acceptable Noise Level (ANL) for the NSRs can be complied with. ANLs are assigned depending upon the area sensitive rating (ASR). The corresponding basic noise levels (BNLs) for evening and night time periods are given in **Table 3.16**.

Table 3.16 Construction Noise Criteria for Activity other than Percussive Piling

Time Period	Basic Noise Level (BNLs)		
	ASR A	ASR B	ASR C
Evening (1900 to 2300 hours) (1)	60	65	70
Night (2300 to 0700 hours)	45	50	55

Notes: (1) Includes Sundays and Public Holidays during daytime and evening

3.3.5 Despite any description or assessment made in this EIA on construction noise aspects, there is no guarantee that a Construction Noise Permit (CNP) will be issued for this DP construction. The Noise Control Authority will consider a well-justified CNP application, once filed, for construction works within restricted hours as guided by the relevant Technical Memoranda issued under the Noise Control Ordinance. The Noise Control Authority will take into account of contemporary conditions / situations of adjoining land uses and any previous complaints against construction activities at the site before making his decision in granting a CNP. Nothing in this EIA shall bind the Noise Control Authority in making his decision. If a CNP is to be issued, the Noise Control Authority shall include in it any condition he thinks fit. Failure to comply with any such conditions will lead to cancellation of the CNP and prosecution action under the NCO.

Operational Road Traffic Noise

3.3.6 For road traffic noise, Annex 5, Table 1A "A Summary of Noise Criteria" of the EIAO-TM defines the criteria $L_{10(1\ hour)}$ for the road traffic noise at various noise sensitive receivers (NSRs):

- 70dB(A) at the façades of residential dwellings, hotels, offices;
- 65dB(A) at the façades of schools, places of public worship, courts of law, places where unaided voice communication is required; and
- 55dB(A) at the façades of hospital or clinics.

3.3.7 If any façades of NSRs are still exposed to predicted noise levels exceeding the relevant noise criteria after the implementation of all direct mitigation measures, provision of indirect technical remedies in the form of acoustic insulation and air conditioning should be considered under the EIAO-TM and the ExCo Directive "Equitable Redress for Persons Exposed to Increased Noise Resulting from the Use of New Roads". The eligibility for indirect technical remedies shall be tested against the following three criteria:

- the predicted overall noise level from the new road, together with other traffic noise in the vicinity must be above a specified noise level (for example, 70 dB(A) for domestic premises and 65 dB(A) for educational institutions, all in L10 (1 hour)); and
- the predicted overall noise level is at least 1.0 dB(A) more than the prevailing traffic noise level, that is, the total traffic noise level existing before the works to construct the road commence; and
- the contribution to the increase in the predicted overall noise level from the new road must be at least 1.0 dB(A).

3.3.8 For the purpose of the traffic noise assessment in this Report, the roads within 300m from the proposed project alignment are included in the assessment. All roads are described as one of the following:

- 'Existing' Roads: includes Prince Edward Road East, Kwun Tong Bypass and other existing roads around KTD.
- 'New' Roads: includes all new roads created and roads substantially altered in KTD.

3.3.9 The noise contribution from "New" roads should be less than 70 dB(A) at any dwellings (less than 65 dB(A) for educational institutions and places of public worship), so as to satisfy the relevant noise criteria, and there should not be any increase in traffic noise impact. In the case of an NSR where existing noise levels already exceeded the relevant criteria, any increase in noise level contributed by the "new" roads should be less than 1.0 dB(A). The extent of 'New' roads under the DP1 Project is depicted in **Appendix 3.18**.

Description of Environment

3.3.10 The DP1 Project is located in the north apron, south apron, and the runway areas of the former Kai Tak Airport. The existing land uses in adjoining areas are commercial, industrial, residential and recreational uses. Prince Edward Road East, Kwun Tong Bypass and other distributor networks are dominant noise sources in the area.

Noise Sensitive Receivers

3.3.11 In order to evaluate the construction and operational noise impacts from the DP1 Project, representative Noise Sensitive Receivers (NSRs) within the Study Area are identified for assessment. Only the first layer of NSRs has been identified for assessment because it would provide acoustic shielding to those receivers at further distance behind. As the centrally air-conditioned buildings do not rely on opened windows for ventilation, the noise standard as stipulated in Table 1 Annex 5 of EIAO-TM would not be applicable, and hence these buildings are not selected for noise impact assessment. For example, Fire Station with quarter at Site 2A8, the quarter will most likely be centrally air-conditioned with window insulation. Therefore, Fire Station with quarter is not classified as a NSR. For the NSRs at housing sites (Site 1A and 1B), the latest site layout plan is obtained from the Hong Kong Housing Authority (HKHA). The population of intake would be around later 2012 for these two sites. **Table 3.17** and **Figure 3.12** show the representative NSRs for this noise impact assessment. The photographs of the representative NSRs are shown in **Appendix 3.19**.

Table 3.17 Representative Noise Sensitive Receivers for Noise Impact Assessment

NSRs	District[(1)]	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
N1	KT	Cha Kwo Ling Tsuen	Residential	5	✓	✓
N2	KT	Cha Kwo Ling	Residential	15	✓	✓
N3	KT	Laguna City IV	Residential	81	✓	✓
N4	KB	Buddhist Chi King Primary School	Educational	24	✓	✓
N5	KB	S.K.H Kowloon Bay Kei Lok Primary School	Educational	27	✓	✓
N6	NCW	Richland Gardens	Residential	99	✓	✓
N7	NCW	Luk Ching House, Choi Hung Estate	Residential	60	✓	✓
N8	NCW	Kam Pik House, Choi Hung Estate	Residential	21	✓	✓
N9	NCW	Pik Hoi House, Choi Hung Estate	Residential	60	✓	✓
N10A	SPK	Rhythm Garden (Block 7)	Residential	87	✓	✓
N10B	SPK	Rhythm Garden (Block 9)	Residential	87	✓	✓
N11	SPK	Cognitio College	Educational	18	✓	✓
N12	SPK	Sir Robert Black Health Centre	Clinic	9	✓	✓
N13	SPK	Lee Kau Yan Memorial School	Educational	10	✓	✓
N14	SPK	South Mansion	Residential	15	✓	✓
N15	SPK	Jenford Building	Residential	12	✓	✓
N16	KC	Parc 22	Residential	33	✓	✓
N17	KC	Sky Tower	Residential	141	✓	✓
N18	KC	HK Society for Blind hostel	Residential	9	✓	✓

NSRs	District[(1)]	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
N19	TKW	Mok Cheong Street Residential District	Residential	18	✓	✓
N20A	TKW	Grand Waterfront	Residential	153	✓	✓
N20B	TKW	Grand Water Front	Residential	153	✓	✓
N21	TKW	Hang Chien Court	Residential	39	✓	✓
N22	TKW	Wei Chien Court	Residential	39	✓	✓
N23	TKW	Holly Carpenter Primary School	Educational	18	✓	✓
N24	TKW	Oblate Father's Primary School	Educational	21	✓	✓
N25	TKW	Sunrise Villa	Residential	90	✓	✓
N26	TKW	Wing Kwong Street Residential District	Residential	21	✓	✓
N27	TKW	CCC Kei To Secondary School	Educational	24	✓	✓
N28	TKW	Po Leung Kuk Ngan Po Ling College	Educational	27	✓	✓
N29	TKW	Sunrise Plaza	Residential	39	✓	✓
N30	TKW	Ming Lung Street	Residential	7	✓	✓
N31	SPK	Canossa Primary School (San Po Kong)	Educational	3	✓	✓
N32	TKW	Holy Trinity Church	Place of Public Worship	3	✓	✓
PN1	SPK	Rhine Harbour (Planned)	Residential	130	✓	✓
PN2	KTD	Site 1A1 (Planned)	Residential	115	✓	✓
PN3	KTD	Site 1A1 (Planned)	Residential	115		✓
PN4	KTD	Site 1A1 (Planned)	Residential	115		✓
PN5	KTD	Site 1A1 (Planned)	Residential	115		✓
PN6A	KTD	Site 1A1 (Planned)	Residential	115		✓
PN6B	KTD	Site 1A1 (Planned)	Residential	115		✓
PN7A	KTD	Site 1A1 (Planned)	Residential	115		✓
PN7B	KTD	Site 1A1 (Planned)	Residential	115		✓
PN8	KTD	Site 1A1 (Planned)	Residential	115		✓
PN9	KTD	Site 1A1 (Planned)	Residential	115		✓
PN10	KTD	Site 1A1 (Planned)	Residential	115		✓
PN11	KTD	Site 1A1 (Planned)	Residential	115		✓
PN12	KTD	Site 1A1 (Planned)	Residential	115		✓
PN13	KTD	Site 1A1 (Planned)	Residential	115		✓
PN14	KTD	Site 1A1 (Planned)	Residential	115		✓
PN15	KTD	Site 1A1 (Planned)	Residential	115		✓
PN16	KTD	Site 1A1 (Planned)	Residential	115		✓
PN17	KTD	Site 1A1 (Planned)	Residential	115		✓
PN18	KTD	Site 1A2 (Planned)	Educational	40		✓
PN19	KTD	Site 1A3 (Planned)	Educational	40		✓
PN20	KTD	Site 1A4 (Planned)	Educational	40		✓
PN21	KTD	Site 1B1 (Planned)	Residential	115		✓
PN22	KTD	Site 1B1 (Planned)	Residential	115		✓
PN23A	KTD	Site 1B1 (Planned)	Residential	115		✓
PN23B	KTD	Site 1B1 (Planned)	Residential	115		✓
PN23C	KTD	Site 1B1 (Planned)	Residential	115		✓
PN24	KTD	Site 1B1 (Planned)	Residential	115		✓
PN25	KTD	Site 1B1 (Planned)	Residential	115		✓
PN26	KTD	Site 1B1 (Planned)	Residential	115		✓

NSRs	District[(1)]	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
PN27	KTD	Site 1B1 (Planned)	Residential	115		✓
PN28	KTD	Site 1B1 (Planned)	Residential	115		✓
PN29	KTD	Site 1B1 (Planned)	Residential	115		✓
PN30A	KTD	Site 1B1 (Planned)	Residential	115		✓
PN30B	KTD	Site 1B1 (Planned)	Residential	115		✓
PN31A	KTD	Site 1B1 (Planned)	Residential	115		✓
PN31B	KTD	Site 1B1 (Planned)	Residential	115		✓
PN32	KTD	Site 1B1 (Planned)	Residential	115		✓
PN33	KTD	Site 1B1 (Planned)	Residential	115		✓
PN34	KTD	Site 1B1 (Planned)	Residential	115		✓
PN35	KTD	Site 1B1 (Planned)	Residential	115	✓	✓
PN36	KTD	Site 1B2 (Planned)	Educational	40		✓
PN37	KTD	Site 1B3 (Planned)	Educational	40		✓
PN38	KTD	Site 1B4 (Planned)	Educational	40		✓
PN39	KTD	Site 1I1 (Planned)	Residential	95		✓
PN40	KTD	Site 1I1 (Planned)	Residential	95		✓
PN41	KTD	Site 1I2 (Planned)	Residential	95		✓
PN42	KTD	Site 1I2 (Planned)	Residential	95		✓
PN43	KTD	Site 1I3 (Planned)	Residential	95		✓
PN44	KTD	Site 1I3 (Planned)	Residential	95		✓
PN45	KTD	Site 1K1 (Planned)	Residential	105		✓
PN46	KTD	Site 1H2 (Planned)	Residential	105		✓
PN47	KTD	Site 1L2 (Planned)	Residential	95		✓
PN48	KTD	Site 1K3 (Planned)	Residential	95		✓
PN49	KTD	Site 1K2 (Planned)	Residential	105		✓
PN50	KTD	Site 1L2 (Planned)	Residential	95		✓
PN51	KTD	Site 1L3 (Planned)	Residential	45		✓
PN52	KTD	Site 1L3 (Planned)	Residential	45		✓
PN53	KTD	Site 1L3 (Planned)	Residential	95		✓
PN54	KTD	Site 1L1 (Planned)	Residential	95		✓
PN55	KTD	Site 2B1 (Planned)	Residential	105		✓
PN56	KTD	Site 2B1 (Planned)	Residential	105		✓
PN57	KTD	Site 2B2 (Planned)	Residential	95		✓
PN58	KTD	Site 2B3 (Planned)	Residential	80		✓
PN59	KTD	Site 2B4 (Planned)	Residential	80		✓
PN60	KTD	Site 2B5 (Planned)	Residential	80		✓
PN61	KTD	Site 2B6 (Planned)	Residential	80		✓
PN62	KTD	Site 2B6 (Planned)	Residential	80		✓
PN63	KTD	Site 4A1 (Planned)	Residential	60		✓
PN64	KTD	Site 4B5 (Planned)	Residential	40		✓
PN65	KTD	Site 5A4 (Planned)	Residential	60		✓
PN66	KTD	Site 5A4 (Planned)	Residential	105		✓
PN67	KTD	Site 5C5 (Planned)	Educational	40		✓
PN68	KTD	Site 5C6 (Planned)	Educational	40		✓
PN69	KTD	Site 1D3 (Planned)	Community Use with hostel	55		✓
PN70	KTD	Site 1D3 (Planned)	Community Use with hostel	55		✓
PN71	KTD	Site 1E1 (Planned)	Mixed Use	95		✓
PN72	KTD	Site 1E1 (Planned)	Mixed Use	95		✓
PN73	KTD	Site 1F1 (Planned)	Mixed Use	95		✓
PN74	KTD	Site 1M1	CDA	35		✓

NSRs	District[(1)]	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
PN75	KTD	Site 1M2	CDA	170		✓
PN76	KTD	Site 3B1 (Planned)	Undesignated	40		✓
PN77	KTD	Site 3B2 (Planned)	Undesignated	40		✓
PN78	KTD	Site 3B3 (Planned)	Undesignated	40		✓
PN79	KTD	Site 3B4 (Planned)	Undesignated	40		✓
PN80	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN80A	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN81	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN82	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN83	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN84	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN84A	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN85	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN86	KTD	Site 3C1 (Planned)	Hospital / Clinic	55		✓
PN87A	KTD	Site 3E1 (Planned)	Commercial	95		✓
PN87B	KTD	Site 3E1 (Planned)	Commercial	95		✓
PN88	KTD	Site 3D2 (Planned)	Commercial	95		✓
PN89	KTD	Site 3D2 (Planned)	Commercial	95		✓
PN90	KTD	Site 3D3 (Planned)	Commercial	95		✓
PN91A	KTD	Site 3D4 (Planned)	Commercial	95		✓
PN91B	KTD	Site 3D4 (Planned)	Commercial	95		✓
PN92	KTD	Site 3D4 (Planned)	Commercial	95		✓
PN92A	KTD	Site 3D4 (Planned) facing the existing public cargo working area	Commercial	95		✓
PN93	TKW	Sung Wong Toi Road CDA site	CDA	95		✓
PN94	TKW	Sung Wong Toi Road CDA site	CDA	95		✓
PN95	TKW	Sung Wong Toi Road CDA site	CDA	95		✓
PN96	KTD	Site 2A1 (Planned)	Commercial	65		✓
PN97	KTD	Site 2A2 (Planned)	Commercial	65		✓
PN98	KTD	Site 2A3 (Planned)	Commercial	65		✓
PN99	KTD	Site 2A4 (Planned)	Commercial	55		✓
PN100	KTD	Site 2A5 (Planned)	Commercial	55		✓
PN101	KTD	Site 2A6 (Planned)	Commercial	55		✓
PN102	KTD	Site 4A2 (Planned)	Commercial	40		✓
PN103	KTD	Site 4C1 (Planned)	Commercial	40		✓
PN104	KTD	Site 4C2 (Planned)	Commercial	40		✓
PN105	KTD	Site 4C3 (Planned)	Commercial	40		✓
PN106	KTD	Site 4C4 (Planned)	Commercial	40		✓
PN107	KTD	Site 4C5 (Planned)	Commercial	40		✓
PN108	KTD	Site 4A3 (Planned)	Commercial	40		✓
PN109	SPK	Choi Hung Road CDA Site (Planned)	CDA	Unknown		✓

NSRs	District[(1)]	Location	Existing / Planned Land Use	Max. Building Height, m	Construction Phase	Operational Phase
PN110	SPK	Ex-San Po Kong Flatted Factory	Residential	100		✓
PN111	SPK	Ex-San Po Kong Flatted Factory	Residential	100		✓
PN112	SPK	Ex-San Po Kong Flatted Factory	Residential	100		✓

Note: (1) KT – Kwun Tong; NTK – Ngau Tau Kok; KB – Kowloon Bay; NCW – Ngau Chi Wah; SPK – San Po Kong; KC – Kowloon City, TKW – To Kwa Wan; HH – Hung Hom; KTD – Kai Tak Development

Assessment Methodology

Construction Noise during Unrestricted Hours

3.3.12 The construction activities of the DP1 Project taking place concurrently within 300 m of a given NSR are considered to contribute to the cumulative impact at that NSR. Noise sources from the areas greater than this distance were excluded from the assessment.

3.3.13 The methodology outlined in the GW-TM was used for the assessment of construction noise (excluding percussive piling). Sound Power Levels (SWLs) of the equipment was taken from Table 3 of this TM. Where no SWL is provided in the GW-TM, reference was made to BS 5228 or other previous similar studies or from measurements taken at other sites in Hong Kong.

3.3.14 Referring to the construction programme of the KTD Project and other projects within the study area, it is noted that construction period of following projects might overlap with the DP1 Project:

- Cruise Terminal Development and related advance works
- Infrastructure works at North Apron, Phase 1 - Housing Sites and Government Offices
- Kai Tak Nullah modification works
- Infrastructure works at runway and Metro Park
- Infrastructure works at North Apron, Phase 2
- Trunk Road T2 and infrastructure works at South Apron
- SCL Construction
- CKR Construction
- Anderson Road Project, etc.

3.3.15 The above concurrent construction activities are considered to contribute to the cumulative impact at the noise assessment points and were included in the cumulative assessment if any of these construction activities are undertaken within 300m of a given noise assessment point. Locations of notional sources and distance for NSRs are given in **Appendix 3.20**.

3.3.16 A positive 3 dB(A) façade correction was added to the predicted noise levels in order to account for the facade effect at each noise assessment point.

Operational Road Traffic Noise

3.3.17 Traffic noise was predicted using the methodology provided in the UK Department of Transport Calculation of Road Traffic Noise (CRTN) 1988. The assessment was based on projected peak hour flows for the worst year within 15 years after opening of the road. Road traffic noise levels is presented in terms of noise levels exceeded for 10% of the one-hour period during the peak traffic flow, i.e. $L_{10,1hr}$ dB(A). The projected 2031 morning peak hour traffic flows and vehicle compositions are attached in **Appendix 3.21**. The roads with traffic flow below 50 veh/hr were not considered in this assessment. For the Kwun Tong Transportation Link (KTTL), the capacity traffic flow was assumed for conservative assessment.

3.3.18 Traffic speeds adopted in the noise model are summarised as below:

Road	Speed limit
Kwun Tong Bypass	80kph
Kwun Tong Bypass (near Richland Garden)	70kph
Prince Edward Road East	70kph
Kai Tak Airport Tunnel	70kph
Central Kowloon Route	80kph
Road T2	80kph
Road D1, D2, D3 & D4	50kph
Other Roads	50kph

3.3.19 Only roads within 300m (perpendicular distance) from each NSR were considered in the assessment for that NSR.

3.3.20 As mentioned in **Section 2.7** of this EIA Report, Through Road L3 is an alternative option to be assessed in this EIA. According to the road layout provided in the ROPD (dated May 2008), vehicles can only reach and leave the three school site and Public Rental Housing site at Site 1A1 via Road L2 and Road L3 (with cul-de-dac at the end). There is no connection between Road L3 and the existing Eastern Road. In order to improve the traffic circulation in the area, it has been proposed to study the feasibility of alternating the current non-through arrangement at the end of Road L3 to a through road, assuming the proposed through road is a one-way road. Under this alternative option, low noise surfacing will be proposed for the Through Road L3 under the mitigated scenario.

3.3.21 The existing noise screening structures and mitigation measures on Prince Edward Road East and Kwun Tong Bypass listed below were taken into account in the assessment:

- Low noise surfacing on the existing Prince Edward Road East and Kwun Tong Bypass;
- 4m high barrier along N/B of Kwun Tong Bypass and its slip road; and
- Semi-enclosures along Kwun Tong Bypass near Richland Gardens and Choi Hung Estate.

3.3.22 The building layout plan with mitigation measures (1.5m vertical fins) for Site 1A1 and 1B1 are provided by the Housing Department and was adopted in this assessment under the unmitigated scenario.

3.3.23 As discussed in **Section 2.6**, a promenade deck has been proposed along the section of Road D3 on the former runway which serves to minimize the traffic noise impact to the adjacent development from this road. The proposed promenade deck was incorporated into the traffic noise assessment under the unmitigated scenario.

Identification of Environmental Impacts

Construction Phase

3.3.24 The potential construction impact arising from the DP1 Project includes construction of road network, land formation, tunnel construction and other related works. These construction activities will involve the use of Powered Mechanical Equipment (PME) including breakers, excavators, lorries, mobile cranes, concrete truck mixers, pokers, rollers, etc. The use of PMEs adopted for the assessment are detailed in **Appendix 3.22**.

3.3.25 The construction activities of the DP1 Project will coincide with the barging point facilities for the Anderson Road Project. The barging point project is to be implemented by CEDD/Special Duties (Works) from Jan 2008 through Dec 2014. The barging point facilities are located at middle Runway for transporting the surplus C&D materials from the development area to receptor sites. Given the shortest notional source distance to NSR is more than 1km, the related cumulative construction noise impact arising from these barging facilities was not assessed.

Operational Phase

3.3.26 Operational phase impacts will arise from the road traffic noise. The proposed road network in Kai Tak Development comprises of district distributors and local distributors. Together with the existing heavily trafficked roads surrounding the development site, potential impact by road traffic noise would affect the planned NSRs within the development site.

Prediction and Evaluation of Environmental Impacts

Construction Phase

3.3.27 For normal daytime working hours, exceedances of the construction noise criteria ($L_{eq\ (30\text{-}min)}$ 75 dB(A) for residential uses and 70 dB(A) for educational institutions (65 dB(A) during examinations)) are predicted at representative NSRs in the absence of mitigation measures. Details of construction noise calculations and results are presented in **Appendix 3.23**. Results show that the predicted cumulative noise levels related to the concurrent construction works of the DP1 Project are in the range of 45 to 92 dB(A) $L_{eq\ (30\text{-}min)}$. A summary of the unmitigated construction noise levels at the representative NSRs during normal daytime working hours within the construction period of the DP1 Project is listed in **Table 3.18**. Noise mitigation measures would therefore be required to reduce noise levels for compliance of the noise standard.

Table 3.18 Summary of Cumulative Unmitigated Construction Noise Levels at Representative NSRs During Normal Daytime Working Hours

NSR	Noise Criteria, dB(A)	Predicted Unmitigated Construction Noise Levels during Normal Daytime Working Hour ($L_{eq\ (30\text{-}min)}$, dB(A))	Exceedance, dB(A)
N1	75	54 - 81	6
N2	75	54 - 77	2
N3	75	56 - 73	0
N4	65/70*	64 - 76	11/6
N5	65/70*	63 - 78	13/8
N6	75	61 - 81	6
N7	75	59 - 87	12
N8	75	58 - 81	6
N9	75	58 - 79	4
N10	75	58 - 84	9
N11	65/70*	59 - 84	19/14

NSR	Noise Criteria, dB(A)	Predicted Unmitigated Construction Noise Levels during Normal Daytime Working Hour ($L_{eq\ (30\text{-}min)}$, dB(A))	Exceedance, dB(A)
N12	75	60 - 84	9
N13	65/70*	60 - 82	17/12
N14	75	60 - 89	14
N15	75	60 - 86	11
N16	75	59 - 78	3
N17	75	60 - 82	7
N18	75	63 - 83	8
N19	75	62 - 82	7
N20A	75	61 - 76	1
N20B	75	61 - 82	7
N21	75	61 - 82	7
N22	75	60 - 80	5
N23	65/70*	60 - 91	26/21
N24	65/70*	59 - 70	5/0
N25	75	58 - 78	3
N26	75	57 - 74	0
N27	65/70*	57 - 74	9/4
N28	65/70*	57 - 76	11/6
N29	75	57 - 72	0
N30	75	62 - 80	5
N31	65/70*	45 - 58	0
N32	75	59 - 79	4
PN1	75	60 - 84	9
PN2	75	66 - 92	17
PN35	75	69 - 81	10

Note: *For normal daytime working hours, the noise criteria are 70 dB(A) and 65 dB(A) for normal teaching periods and examination periods, respectively.

Operational Phase

Operational Road Traffic Noise

3.3.28 Traffic noise levels have been predicted at representative noise assessment points including existing residential, institutional uses, and future uses on planned receivers. **Appendix 3.24** gives the breakdown of the noise contributions from the new roads and existing roads at all representative existing and planned NSRs for the RODP as well as for the Through Road L3 alternative option. Sample output files for 10 representative assessment points are included in **Appendix 3.25**. Road-plots of the traffic noise model, the existing low noise surfacing and noise barrier are shown in **Appendix 3.25**.

3.3.29 Without the noise mitigation measures in place, the predicted noise levels at the identified NSRs would range from 42 to 87 dB(A) $L_{10\ (1\text{-}hour)}$. The following paragraphs discuss the potential noise impacts at difference area of NSRs under this study.

3.3.30 **Existing NSRs (N1 to N32) and Planned (NSR PN1, PN93 – PN95 & PN109):** The predicted noise levels at all existing NSRs (except N21 to N23) and planned NSR PN1, PN93 to PN95 & PN109 exceeded the noise criterion of 70 dB(A) or 65 dB(A) for schools or 55dB(A) for clinics. However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A).

3.3.31 For the existing school and clinic, the on-site survey has revealed that all of these NSRs have already been noise insulated with air-conditioners. With the provision of air-conditioners, it is considered that the traffic noise impact would be minimised by keeping the windows closed. Therefore, traffic noise impact at these NSRs would be insignificant. Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.

3.3.32 **Site 1A:** The predicted noise levels at PN6A, PN6B, PN7A, PN18, PN19, PN20 & PN20A exceeded the noise criterion of 70 dB(A) or 65 dB(A) for schools. However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). In addition, the piling work already completed on Site 1A1, alternative land use arrangement for this site is considered not feasible. The low-rise nature of schools will make any noise mitigation measures such as cantilever barriers more effective than for the case of high-rise domestic development. There is not enough non-sensitive uses e.g. carpark, commercial uses as noise screen. Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.

3.3.33 Under the Through Road L3 alternative option, the predicted noise levels at Site 1A are similar to the basic option without through road except PN19A & PN20A. The predicted noise level at PN19A & PN 20A exceeded the noise criterion of 65dB(A) and increased by up to 8 dB(A) when compared with the basic option. Mitigation measures should be considered for Through Road L3 to minimise the associated noise impact, alternatively, the layout of the affected schools could be designed to avoid sensitive façade facing the major traffic noise sources or provided with window insulation and air conditioning.

3.3.34 **Site 1B1:** The predicted noise levels at PN23A to PN23C, PN26, PN29, PN30A to PN31B & PN33 exceeded noise criterion of 70 dB(A). It is identified that the 'New' road noise contribution to the overall noise level would be more than 1.0 dB(A). The major noise source is Road L2 and Kwun Tong Bypass that contributed significant traffic noise impact to these NSRs. Hence, direct mitigation measures on 'New' road (Road L2) are required to reduce the traffic noise impact.

3.3.35 **Site 1B2 to 1B4:** The predicted overall noise levels at PN36, PN37 & PN38 exceeded the noise criterion of 65 dB(A). The 'New' roads noise contribution to the overall noise levels would be more than 1.0 dB(A). The major noise sources are Road L2 and Road L4. Hence, direct mitigation measures at Road L2 and Road L4 are required for the affected NSRs.

3.3.36 **Site 1I1:** The predicted overall noise levels at PN39 & PN40 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings. Hence, direct mitigation measures at Road L4 would be required to reduce the noise impact from 'New' roads for PN39 & PN40.

3.3.37 **Site 1L2 and 1L3:** The predicted overall noise levels at PN50, PN51 & PN52 exceeded the noise criterion of 70 dB(A). The 'New' road (Road D2) noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings. Hence, direct mitigation measures at Road D2 would be required to reduce the noise impact from 'New' roads for PN50, PN51 & PN52.

3.3.38 **Site 2B6:** The predicted noise levels at planned NSRs for PN61 & PN62 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.

3.3.39 **Site 5A4:** The predicted noise levels at planned NSRs for PN65 and PN66 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. The 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.

3.3.40 **Site 3C (Hospital / Clinic):** The predicted noise levels at planned NSRs for PN80 to PN86 exceeded the noise criterion of 55 dB(A). However, the noise exceedances are caused by both existing road, the planned Road T2 and local road.

3.3.41 **Other Sites within KTD area:** The predicted traffic noise impacts for other planned NSRs PN69 – PN108 (except PN93 - PN95) within KTD area are summarized in **Table 3.19**. The noise exceedances are caused by both existing road and "New" roads. All the affected NSRs are either commercial uses, mixed uses or community uses and allowed some noise sensitive uses. For PN71-73 and PN87-92, the land use allows domestic uses which will require planning permission from the Town Planning Board. These planning applications should include assessments on the traffic noise impact to demonstrate that the proposed development would not result in adverse impact for the development.

Table 3.19 Summary of Traffic Noise Impact for Other Sites within KTD area

NSR	Location	Planned Land Use	Major Noise Sources	Noise Level Above criterion, dB(A)		
				70	65	55
PN69	Site 1D3	Community Use with hostel	Prince Edward Road East	✓	✓	✓
PN70	Site 1D3	Community Use with hostel	Road D1	✓	✓	✓
PN71	Site 1E1	Mixed Use	Prince Edward Road East & Road D1	✓	✓	✓
PN72	Site 1E1	Mixed Use	Prince Edward Road East	✓	✓	✓
PN73	Site 1F1	Mixed Use	Road D1	✓	✓	✓
PN74	Site 1M1	CDA	Prince Edward Road East	✓	✓	✓
PN75	Site 1M2	CDA	Prince Edward Road East	✓	✓	✓
PN76	Site 3B1	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN77	Site 3B2	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN78	Site 3B3	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN79	Site 3B4	Undesignated	Kwun Tong Bypass & Road T2	✓	✓	✓
PN87A	Site 3E1	Commercial with sensitive uses	Lam Chak Street	✓	✓	✓
PN87B	Site 3E1	Commercial with sensitive uses facing to Road D3	Road D3 & D4			✓
PN88	Site 3D2	Commercial with sensitive uses	Cheung Yip Street	✓	✓	✓
PN89	Site 3D2	Commercial with sensitive uses	Kwun Tong Bypass	✓	✓	✓
PN90	Site 3D3	Commercial with sensitive uses	Cheung Yip Street	✓	✓	✓
PN91A	Site 3D4	Commercial with sensitive uses	Kai Hing Road Kwun Tong Bypass	✓	✓	✓
PN91B	Site 3D4	Commercial with sensitive uses	Kwun Tong Bypass	✓	✓	✓
PN92	Site 3D4	Commercial with sensitive uses	Kai Hing Road	✓	✓	✓

NSR	Location	Planned Land Use	Major Noise Sources	Noise Level Above criterion, dB(A)		
				70	65	55
PN96	Site 2A1	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN97	Site 2A2	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN98	Site 2A3	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN99	Site 2A4	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN100	Site 2A5	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN101	Site 2A6	Commercial with sensitive uses	Prince Edward Road East & Road D1	✓	✓	✓
PN102	Site 4A2	Commercial with sensitive uses	Road L12 & Road L13		✓	✓
PN103	Site 4C1	Commercial with sensitive uses	Road L13		✓	✓
PN104	Site 4C2	Commercial with sensitive uses	Road L13		✓	✓
PN105	Site 4C3	Commercial with sensitive uses	Road L13		✓	✓
PN106	Site 4C4	Commercial with sensitive uses	Road L13		✓	✓
PN107	Site 4C5	Commercial with sensitive uses	Road L13		✓	✓
PN108	Site 4A3	Commercial with sensitive uses	Road L12		✓	✓

3.3.42 **Ex-San Po Kong Flatted Factory:** The predicted overall noise levels at PN111 & PN112 exceeded the noise criterion of 70 dB(A). The 'New' road (slip road from Prince Edward Road East to San Po Kong) noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings. Hence, mitigation measure would be required to reduce the noise impact from 'New' roads for PN111 & PN112.

Mitigation of Environmental Impacts

Construction Phase

3.3.43 In order to reduce the excessive noise impacts at the affected NSRs during normal daytime working hours, mitigation measures such as adopting quiet powered mechanical equipment, movable noise barriers and temporary noise barriers are recommended. The contractor(s) may be able to obtain particular models of plant that are quieter than the PMEs given in GW-TM. It is considered too restrictive to specify that a contractor has to use specific items of plant for the construction operations. It is practical to specify the total SWL of all plant to be used on site so that the contractor(s) is allowed some flexibility to select plant to suit his needs.

3.3.44 The use of quiet plant associated with the construction works is prescribed in British Standard "Noise Control on Construction and Open Sites, BS5228: Part 1: 1997" which contains the SWLs for specific quiet PME. The SWLs for quiet PMEs adopted for the assessment are detailed in **Appendix 3.26**.

3.3.45 To alleviate the construction noise impact on the affected NSRs, movable noise barrier for Asphalt Paver, Breaker, Excavator and Hand-held breaker and full enclosure for Air Compressor, Bar Bender, Concrete Pump, Generator and Water Pump are proposed. Movable temporary noise barriers that can be located close to noisy plant and be moved iteratively with the plant along a worksite or close to the PME can be very effective for screening noise from NSRs. A typical design which has been used locally is a wooden framed barrier with a small cantilevered upper portion of superficial density no less than 14kg/m^2 on a skid footing with 25mm thick internal sound absorptive lining. This measure is particularly effective for low level zone of NSRs. A cantilevered top cover would be required to achieve screening benefits at upper floors of NSRs. It is anticipated that suitably designed barriers could achieve at least 5 - 10dB(A) reduction. For a conservative assessment, only a reduction of 5dB(A) was assumed. A sketch of typical temporary noise barrier and enclosure are illustrated in **Figure 3.13**.

3.3.46 The use of full enclosure has been considered in this assessment to shelter relatively static plant including air compressor, bar bender, concrete pump, generator and water pump. These enclosures can provide about 10dB(A) noise reduction.

3.3.47 Noise reduction from the use of mitigation measures including quiet plant, noise barrier and enclosure for construction plants as described in above has been applied in the assessment. Detailed results of construction noise assessment for "mitigated" scenario are given in **Appendix 3.27**. The predicted cumulative noise levels and the exceedance over daytime construction noise criteria are summarised in the following **Table 3.20**.

Table 3.20 Summary of Cumulative Mitigated Construction Noise Levels at Representative NSRs During Normal Daytime Working Hours

NSR	Noise Criteria, dB(A)	Predicted Mitigated Construction Noise Levels during Normal Daytime Working Hour ($L_{eq\ (30\text{-}min)}$ dB(A))	Exceedance, dB(A)	Duration, Month
N1	75	41 - 71	0	0
N2	75	42 - 70	0	0
N3	75	43 - 67	0	0
N4	65/70*	51 - 68	3/0	Examination Period
N5	65/70*	51 - 70	5/0	Examination Period
N6	75	49 - 73	0	0
N7	75	46 - 75	0	0
N8	75	45 - 73	0	0
N9	75	45 - 71	0	0
N10	75	45 - 75	0	0
N11	65/70*	47 - 75	10/5	66 include examination period
N12	75	47 - 74	0	0
N13	65/70*	47 - 74	9/4	66 include examination period
N14	75	47 - 78	3	12
N15	75	47 - 75	0	0
N16	75	46 - 70	0	0
N17	75	47 - 75	0	0
N18	75	50 - 76	1	7
N19	75	50 - 75	0	0
N20A	75	48 - 70	0	0
N20B	75	48 - 78	3	60

NSR	Noise Criteria, dB(A)	Predicted Mitigated Construction Noise Levels during Normal Daytime Working Hour ($L_{eq\ (30\text{-}min)}$ dB(A))	Exceedance, dB(A)	Duration, Month
N21	75	48 - 78	3	60
N22	75	48 - 75	0	0
N23	65/70*	47 - 86	21/16	24 include examination period
N24	65/70*	47 - 64	0/0	0
N25	75	45 - 71	0	0
N26	75	45 - 68	0	0
N27	65/70*	45 - 68	3/0	Examination Period
N28	65/70*	44 - 70	5/0	
N29	75	44 - 66	0	0
N30	75	50 - 74	0	0
N31	60/70*	32 - 51	0	0
N32	75	46 - 70	0	0
PN1	75	47 - 75	0	0
PN2	75	58 - 86	11	39
PN35	75	62 - 73	0	0

Note: *For normal daytime working hours, the noise criteria are 70 dB(A) and 65 dB(A) for normal teaching periods and examination periods, respectively.

3.3.48 With the exception of NSRs N4, N5, N11, N13, N14, N18, N20B, N21, N23, N27, N28 & PN2, the predicted mitigated construction noise levels arising from the DP1 Project at all other NSRs selected for construction noise impact assessment would comply with the EIAO-TM construction noise criteria.

Operational Road Traffic Noise

3.3.49 Mitigation measures would be proposed for 'New' roads if there would be adverse environmental impact. If the NSRs are affected by noise from other existing roads, mitigation measures are required to reduce the noise from the 'New' roads to a level that it

- is not higher than the noise standard; and
- has no significant contribution to the overall noise from other existing roads if the cumulative noise level (i.e. noise from the new road together with other existing roads) exceeds the noise standard.

3.3.50 As discussed in **Sections 3.3.30** to **3.3.41**, mitigation measures on some 'New' roads would be required to mitigate the noise impact at Site 1A2 to 1A4 (under the Through Road L3 alternative option), Site 1B (Road L2 & L4), Site 1I1 (Road L4), Site 1L2 (Road D2), Site 1L3 (Road D2) & Site 2A6 (Road L9). However, it should be noted that the new local roads are not part of the DP1 Project. A figure shown the noise mitigation measures are presented in **Figure 3.14**. The detailed mitigation measures are discussed below:

3.3.51 **Site 1A2 to 1A4 (School Site):** the predicted overall noise levels at PN19, PN20 & PN20A exceeded the noise criterion of 65dB(A). In view of the site constraint, provision of noise tolerant building is not feasible. The layout of these planned schools may be arranged in a way to avoid the sensitive facades of the classrooms facing Roads L2 and L3 or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network.

3.3.52 Under the Through Road L3 alternative option, the predicted overall noise levels at PN19A & PN20A exceeded the noise criterion of 65 dB(A). Low noise surfacing is proposed for a section of Road L3 to minimize the traffic noise impact. With the proposed low noise surfacing, PN19A and PN20A facing the Through Road L3 would comply with the noise criteria. Yet the layout of these planned schools should still be arranged in a way to avoid the sensitive facades of the classrooms facing Road L2 or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network.

3.3.53 **Site 1B1:** It is identified that the 'New' road noise contribution to the overall noise level is more than 1.0dB(A) for PN23A to PN23C, PN26, PN29, PN30A to PN31B & PN33. The major noise source is Road L2 and Kwun Tong Bypass that contributed significant traffic noise impact on these NSRs even incorporated 1.5m vertical fins next to the sensitive facades.

3.3.54 As to reduce the traffic noise impact further, a number of mitigation measures have been reviewed. Owing to the site constraint, setback of buildings to west direction is not feasible. By rotating buildings orientation can reduce the view angle of flats at one wing, but on the other hand also increase the view angle of some flats on the other wings. It is therefore considered ineffective to reduce the noise levels. Noise tolerant buildings as a noise barrier have already been provided in front of those affected NSRs for screening the traffic noise impact from Road L2. Therefore, provision of noise barrier along Road L2 is ineffective and a section of low noise surfacing on Road L2 is proposed. In addition to the source treatment and low noise surfacing, 1.2 to 1.7m structural fins are also proposed at the location next to the sensitive facades of the affected dwellings. The proposed extent of low noise surfacing and structural fins locations are shown in **Figure 3.14**.

3.3.55 **Site 1B2 to 1B4 (School Site):** The predicted overall noise levels at PN36, PN37 & PN38 exceeded the noise criterion of 65 dB(A). The 'New' roads noise contribution to the overall noise levels would be more than 1.0 dB(A). The major noise sources are Road L2 and Road L4. In view of the site constraint, provision of noise tolerant building is not feasible. The layout of these planned schools may be arranged in a way to avoid the sensitive facades of the classrooms facing Roads L2 and L4 or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network. In addition, a section of low noise surfacing on Roads L2 and L4 are proposed. The extent of low noise surfacing is shown in **Figure 3.14**. .

3.3.56 **Site 1I1:** The predicted overall noise levels at PN39 & PN40 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings. .

3.3.57 In order to reduce the traffic noise impact, a number of mitigation measures have been reviewed. Owing to the site constraint, noise tolerant buildings are not feasible. By rotating buildings orientation can reduce the view angle of flats, but on the other hand also increase the view angle of some flats on the surrounding roads. It is therefore considered ineffective to reduce the noise levels. Therefore, low noise surfacing for a section of Road L4 and setback of the building within the site by about 5m to the southwest direction are proposed. The extent of low noise surfacing is shown in **Figure 3.14**. For the other effective mitigation measures such as special building design & architectural features / balcony, it would be subject to further investigation by the future developer.

3.3.58 **Site 1L2 and 1L3:** The predicted overall noise levels at PN50, PN51 & PN52 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings.

3.3.59 In order to reduce the traffic noise impact, a number of direct mitigation measures have been reviewed. By rotating building orientation can reduce the view angle of flats, but on the other hand also increase the view angle of some flats on the surrounding roads. Setback of the building by about 35m to the northwest direction at Site 1L3 and 5m at Site 1L2 are proposed as mitigation measures for traffic noise impact. For the other effective mitigation measures such as special building design & architectural features / balcony, it would be subject to further investigation by the future developer.

3.3.60 **Site 2B6:** The predicted noise levels at planned NSRs for PN61 & PN62 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. In the view of the 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Mitigation measures in the form of special building design (include noise tolerant building & single aspect building design) could be considered to reduce the traffic noise impact.

3.3.61 The proposed mitigation measures in the form of special building design include: (i) avoid any sensitive façades with openable window facing the existing Kowloon City Road network and (ii) for the sensitive facades facing the To Kwa Wan direction, either setback the facades by about 5m to the northeast direction or do not provide the facades with openable window. The identified special building design measures have been agreed with the Planning Department and the Lands Department. For the other effective mitigation measures such as other special building design & architectural features / balcony, it would be subject to further investigation by the future developer. The traffic noise mitigation measures are illustrated in **Figure 3.15**.

3.3.62 **Site 5A4:** The predicted noise levels at planned NSRs for PN65 and PN66 exceeded the noise criterion of 70 dB(A). However, the noise exceedances are caused by the existing roads. In the view of the 'New' road noise contribution to the overall noise level would be less than 1.0 dB(A) and the 'New' road noise levels at these NSRs would all be below 70 dB(A). Taking the redevelopment opportunity of this site, mitigation measures such as special building design (include noise tolerant building & single aspect building design) could be considered to reduce the traffic noise impact for future NSRs. It should be noted that the existing traffic noise impacts on the existing NSRs in Site 5A4 are not within the scope of this EIA study.

3.3.63 The proposed mitigation measures in the form of special building design include: (i) avoid any sensitive facades with openable window facing the existing To Kwa Wan Road or (ii) provision of 17.5m high noise tolerant building fronting To Kwa Wan Road and restrict the height of the residential block(s) located at less than 55m away from To Kwa Wan Road to no more than 25m above ground. The identified special building design measures have been agreed with the Planning Department and the Lands Department. For the other effective mitigation measures such as other special building design & architectural features / balcony, it would be subject to further investigation by the future developer. The traffic noise mitigation measures are illustrated in **Figure 3.15**.

3.3.64 **Site 3C (Hospital / Clinic):** The predicted noise levels at planned NSRs for PN80 to PN86 exceeded the noise criterion of 55 dB(A). As confirmed with Food and Health Bureau, the proposed hospital site will provide with window insulation and air conditioning, adverse traffic noise impacts at these NSRs are not expected. The documentation of confirmation from the Food and Health Bureau is included in **Appendix 18.1**.

3.3.65 **Other Sites within KTD area:** The predicted noise levels at planned NSRs for PN69 to PN108 (except PN93 – PN95) exceeded the noise criterion of 55, 65 & 70 dB(A). The noise contribution is from existing and "New" road. All the affected NSRs are either commercial uses, mixed uses or community uses some of which will most likely be centrally air-conditioned, the layout of the affected NSRs could be designed to avoid the noise sensitive uses facing the major traffic noise sources or providing the noise sensitive uses, like hotel, with window insulation and air conditioning. Adverse traffic noise impacts at these NSRs are not expected.

3.3.66 With reference to the OZP, a special design requirement should be incorporated for Site 1F1 facing the Station Square such that the residential element should commensurate with the commercial element in form as stated in OZP. The residential development could accommodate high quality hotel-like service apartment with its design and appearance befitting the image of the Kai Tak Center and commensurate with those premier commercial / office developments to its west and east. Adverse traffic noise impacts at these NSRs are not expected.

3.3.67 For those planned NSRs at Site 1E1, the residential development could be designed to avoid sensitive façade facing to the noise sources or incorporate hotel-like service apartment with the provision of central air conditioning. Adverse traffic noise impacts at these NSRs are not expected.

3.3.68 For any planned NSRs at Site 3D2 to 3D4 and Site 3E1, the residential development could be designed to avoid sensitive façade facing to the noise sources or incorporate hotel-like service apartment with the provision of central air conditioning. Furthermore, the planning applications should include assessments on the relevant technical and environmental concerns and demonstrate that the proposed development would not result in adverse traffic noise impact.

3.3.69 **Ex-San Po Kong Flatted Factory:** The predicted overall noise levels at PN111 & PN112 exceeded the noise criterion of 70 dB(A). The 'New' road noise contributions to the overall noise levels would be more than 1.0 dB(A) and the 'New' road noise levels at these NSRs would be above 70 dB(A) for residential dwellings.

3.3.70 In order to reduce the traffic noise impact, a number of direct mitigation measures have been reviewed. The proposed mitigation measures in the form of special building design should avoid any sensitive façades with openable window facing the slip road from Prince Edward Road East to San Po Kong. The traffic noise mitigation measures are illustrated in **Figure 3.15**. Since the proposed development is still subject to detailed design and the layout is yet to be finalised, other alternative effective mitigation measures including special building design for the development and at-source mitigation measures for the surrounding new local roads may also be considered respectively by the developer (namely the Housing Department) and the implementation and maintenance agents of the surrounding new local roads in the future.

3.3.71 **Appendix 3.28** presents the breakdown of noise contribution from the "New" roads and existing roads at all representative NSRs when all the proposed mitigation measures are in place. With these proposed measures in place, the predicted overall noise levels at all the representative NSRs comply with the noise criterion.

Evaluation of Residual Environmental Impact

Construction Phase

3.3.72 With the exception of N4, N5, N11, N13, N14, N18, N20B, N21, N23, N27, N28 & PN2, the construction noise levels at other NSRs selected for construction noise impact assessment are predicted to comply with the noise standards stipulated in the EIAO-TM with the implementation of the above-mentioned mitigation measures. Residual impacts at these affected NSRs are summarised in **Table 3.21**. It should be noted that the tabulated residual noise levels are the predicted noise levels assuming the NSRs with opened windows.

3.3.73 The on-site survey has revealed that N4, N5, N11, N13, N23, N27 and N28 have already been noise insulated with air-conditioners. With the provision of air-conditioners, it is considered that the noise impact would be minimized by keeping the windows closed during the construction activities. Notwithstanding this, due to more stringent noise criterion of 65 dB(A), it is recommended that particularly noisy construction activities, especially those associated with the construction of subway at Choi Hung Road, district distributor road (D1), local roads (L1, L2, L3, L4, L7, L8, L9, L11, L15, L16, L17 and L19), rebuild Kai Tak Nullah, landscape elevated walkway (LW-02, LW-03 & LW-04), SCL & CKR, should be scheduled to avoid examination periods of these NSRs as far as practicable. The Contractor should liaise with the school representative(s) to obtain the examination schedule so as to avoid noisy construction activities during school examination period.

Table 3.21 Construction Noise Residual Impacts

NSR	Exceedance of the EIAO-TM Criterion		Construction Activity Causing Exceedance	Approximate duration of Exceedance
	65 dB(A)	70 dB(A)		
N4	3 (Jul 2010 to Dec 2015)	0	• Local Roads L2, L3, L15 and associated footpaths at North Apron; • Local Roads L4; and SCL	Examination Period
N5	5 (Jul 2010 to Dec 2015)	0	• Local Roads L2, L3, L15 and associated footpaths at North Apron; • Local Roads L4; and SCL	Examination Period
N11	10 (Sept 2009 to Apr 2010 and Jul 2010 to Dec 2015)	5 (Jul 2010 to Dec 2015)	• Construction of Road D1 • Local Roads L1, L2, L3, L11, L15 and associated footpaths at North Apron • Drainage, Sewerage & Watermain • Construction of Footbridge at Rhythm Garden (LW-04) • Rebuild Kai Tak Nullah • Construction of Landscape Walkway LW-02 • SCL	66 month include examination period

NSR	Exceedance of the EIAO-TM Criterion		Construction Activity Causing Exceedance	Approximate duration of Exceedance
	65 dB(A)	70 dB(A)		
N13	9 (Sept 2009 to Apr 2010 and Jul 2010 to Dec 2015)	4 (Jul 2010 to Dec 2015)	• Construction of Road D1 • Local Roads L1, L2, L3, L11, L15 and associated footpaths at North Apron • Drainage, Sewerage & Watermain • Construction of Footbridge at Rhythm Garden (LW-04) • Construction of Landscape Walkway LW-03 • Underground Shopping Street (SB-01) • Upgrading of Pumping Station PS1 • Rebuild Kai Tak Nullah • Construction of Landscape Walkway LW-02 • SCL	66 month include examination period
N23	21 (Jan 2012 to Dec 2016)	16 (Jan 2015 to Dec 2016)	• Construction of Local Road L17 (Jan 2015 to Dec 2016) • CKR (Jan 2012 to Dec 2016)	24 month include examination period
N27	3 (Jan 2015 to Dec 2016)	0	• Construction of local road L19	Examination Period
N28	5 (Jan 2015 to Dec 2016)	0	• Construction of local road L19	Examination Period
NSR	**Exceedance of the EIAO-TM Criterion**		**Construction Activity Causing Exceedance**	**Approximate duration of Exceedance**
	75 dB(A)			
N14	2 (Jan 2015 to Dec 2015)		• Construction of Road D1, L7, L8, L9 & L16 • Underground Shopping Street (SB-01)	12 month
N18	1 (Jan 2015 to July 2015)		• SCL	7 month
N20B	3 (Jan 2012 to Dec 2016)		• CKR	60 month
N21	3 (Jan 2012 to Dec 2016)		• CKR	
PN2	11 (Oct 2012 to Dec 2015)		• SCL	39 month

3.3.74 For the N18, N20B, N21 & PN2, the exceedance is due to the CKR and SCL projects. In this assessment, it has been assumed that all PME items are operating and gathered within a worksite for a conservative assessment. There are uncertainties on the prediction of construction noise impact from CRK and SCL since the detailed construction method and arrangement of PME items are not available during the course of this EIA study. Therefore, the detailed mitigation measures and duration of residual impact would be subject to the detailed construction programme and activities of the respective projects. Furthermore, both the proposed CKR and SCL projects are Schedule 2 designated projects under the EIAO. The associated environmental impacts will be adequately addressed in further detailed EIA studies to be prepared and submitted under the EIAO by the respective project proponents.

3.3.75 In addition to the above-mentioned mitigation measures, the good site practices listed below shall be adopted by all the contractors to further ameliorate the noise impacts. Although the noise mitigating effects are not easily quantifiable and the benefits may vary with the site conditions and operating conditions, good site practices are easy to implement and do not impact upon the works schedule.

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program.
- Mobile plant, if any, should be sited as far away from NSRs as possible.
- Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum.
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs.
- Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

3.3.76 During school examination periods, the daytime construction noise criterion is 65dB(A) which is lower than the normal daytime school criterion of 70dB(A). Scheduling of construction works outside school examination period to less intrusive periods would definitely reduce the overall noise impacts at the NSRs and for ensuring compliance with the construction noise criterion at some of the NSRs, i.e. N4, N5, N27 and N28. The Contractor shall liaise with the school representative(s) to obtain the examination schedule and avoid noisy construction activities during school examination period.

Operational Phase

3.3.77 With the proposed noise mitigation measures in place, the 'New' road noise contributions to the overall noise levels at all representative NSRs would be less than 1.0 dB(A) and the 'New' road noise levels would all be below the relevant noise criteria. No adverse noise impacts arising from the 'New' roads would be predicted at any of the representative NSRs. Noise exceedances at the representative NSRs, if any, would be due to the existing roads. The effectiveness of direct mitigation measures, in terms of the number of residential dwellings and classrooms that will either be protected or benefited (by at least 1 dB(A)), has been shown in **Appendix 3.29**.

Environmental Monitoring and Audit

Construction Phase

3.3.78 An EM&A programme is recommended to be established according to the predicted occurrence of noisy activities. All the recommended mitigation measures for daytime normal working activities should be incorporated into the EM&A programme for implementation during construction. Details of the programme are provided in the EM&A Manual.

Operational Phase

3.3.79 No environmental monitoring and audit during the operational phase is considered necessary.

Summary

Construction Phase

3.3.80 This assessment has predicted the construction noise impacts of the DP1 Project during normal daytime working hours, taking into account other concurrent projects. The predicted unmitigated noise levels would range from 48 to 92 dB(A) at the representative NSRs. With the use of quiet PME, movable barriers and temporary barriers under the DP1 Project, the noise levels at the NSRs selected for construction noise impact assessment except N4, N5, N11, N13, N14, N18, N20B, N21, N23, N27, N28 & PN2 would comply with the construction noise standard.

3.3.81 Having exhausted practicable noise mitigation measures, N4, N5, N11, N13, N14, N18 N20B, N21, N23, N27, N28 & PN2 would exceed the noise criteria. However, the affected schools have been noise insulated with air conditioners and by keeping the windows closed during construction activities, adverse noise impacts at the indoor environment can be avoided. Notwithstanding this, it is recommended that the particularly noisy construction activities be scheduled to avoid examination period as far as practicable.

3.3.82 This impact assessment does indicate some noise exceedances for limited periods of time, even with the consideration of all practicable mitigation measures. During the actual construction period, as much as practically possible should be done to reduce the construction noise, and on-going liaison with all concerned parties and site monitoring should also be conducted during the course of the construction period.

3.3.83 A construction noise EM&A programme is recommended to check the compliance of the noise criteria during normal daytime working hours.

Operational Phase

3.3.84 The potential road traffic noise impacts have been assessed based on the worst case traffic flows in 2031. Without any noise mitigation measures in place, the predicted noise levels at the NSRs would range from 40 to 87 dB(A). Practicable traffic noise mitigation measures are therefore formulated for the planned NSRs with predicted noise levels exceeding the EIAO-TM traffic noise criteria.

3.3.85 Mitigation measures in the form of structural fins, low noise surfacing, special building design and building setback are proposed to mitigate the traffic noise impacts at Sites 1B1, 1I1, 1L2, 1L3, 2B6 & 5A4 and ex-San Po Kong Flatted Factory. The potential traffic noise impacts at these sites are contributed by both existing and 'New' roads. With the proposed noise mitigation measures, the predicted overall noise levels at these NSRs would comply with the noise criterion.

3.3.86 For those noise sensitive uses located within the planned sites of commercial, mixed use, and hospital / clinic, it is recommended that the noise sensitive uses should either be located away from the traffic-noise affecting facades of the site or, as the last resort, the sensitive uses should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network. For Site 1E1, 1F1, 3D2 to 3D4 and 3E1, the land use allows domestic uses which will require planning permission from the Town Planning Board. These planning applications should include assessments on the traffic noise impact to demonstrate that the proposed development would not result in adverse impact for the development.

3.3.87 For school sites 1A2, 1A3, 1A4, 1B2, 1B3 & 1B4, the layout of these planned schools should be arranged in a way to avoid the sensitive facades of the classrooms facing Roads L2, L3 and L4, or as the last resort all the classrooms should be noise insulated with air-conditioners to avoid unacceptable traffic noise impacts from the surrounding road network.

3.3.88 For those affected existing NSRs, the 'New' road noise contributions to the overall noise levels would be less than 1.0 dB(A) and the 'New' road noise levels would all be below the relevant noise criteria, although the overall noise levels would still exceed the relevant noise criteria. However, it should be noted that such noise exceedances at the representative NSRs are due to the existing roads. Hence, direct mitigation measures on 'New' roads are not required as they would not be effective in improving the noise environment at the sensitive receivers.

3.4 Water Quality Impact

Water Quality Sensitive Receivers

3.4.1 No existing water sensitive receiver (WSR) is identified within 300 m from the DP1 Project site boundary. The existing WSD flushing water intakes and cooling water intakes identified closest to the Kai Tak Development (KTD) Project site (which also covers the DP1 Project site) are shown in **Figure 8.2** and all of them are located outside the assessment area (i.e. 300 m from the DP1 Project site boundary) of the DP1 Project.

3.4.2 A new District Cooling System (DCS) will be implemented in the KTD area and the associated seawater intake would be considered as a planned WSR. Based on the RODP, the seawater intake will be located along the waterfront of the former Kai Tak airport runway (**Figure 8.5**).

Environmental Legislation, Policies, Plans, Standards and Criteria

3.4.3 The criteria for evaluating water quality impacts in this EIA Study include:

Environmental Impact Assessment Ordinance (EIAO)

3.4.4 The Technical Memorandum on Environmental Impact Assessment Process (Environmental Impact Assessment Ordinance) (EIAO-TM) was issued by EPD under Section 16 of the EIAO. It specifies the assessment method and criteria that are to be followed in this Study. Reference sections in the EIAO-TM provide the details of assessment criteria and guidelines that are relevant to the water quality impact assessment, including:

- Annex 6 – Criteria for Evaluating Water Pollution
- Annex 14 – Guidelines for Assessment of Water Pollution.

Water Quality Objectives

3.4.5 The Water Pollution Control Ordinance (WPCO) provides the major statutory framework for the protection and control of water quality in Hong Kong. According to the Ordinance and its subsidiary legislation, Hong Kong waters are divided into ten water control zones (WCZ). Corresponding statements of Water Quality Objectives (WQO) are stipulated for different water regimes (marine waters, inland waters, bathing beaches subzones, secondary contact recreation subzones and fish culture subzones) in each of the WCZ based on their beneficial uses. The study area is located within the Victoria Harbour WCZ (refer to **Figure 8.1**) and the corresponding WQOs are listed in **Table 3.22**.

Table 3.22 Summary of Water Quality Objectives for the Victoria Harbour WCZ

Parameters	Objectives	Sub-Zone
Offensive odour, tints	Not to be present	Whole zone
Visible foam, oil scum, litter	Not to be present	Whole zone
Dissolved oxygen (DO) within 2m of the seabed	Not less than 2.0mg/l for 90% of samples	Marine waters
Depth-averaged DO	Not less than 4.0mg/l for 90% of samples	Marine waters
pH	To be in the range of 6.5 - 8.5, change due to human activity not to exceed 0.2	Marine waters
Salinity	Change due to human activity not to exceed 10% of ambient	Whole zone
Temperature	Change due to human activity not to exceed 2 ^{o}C	Whole zone
Suspended solids (SS)	Not to raise the ambient level by 30% caused by human activity	Marine waters
Unionised ammonia (UIA)	Annual mean not to exceed 0.021mg/l as unionised form	Whole zone
Nutrients	Shall not cause excessive algal growth	Marine waters
Total inorganic nitrogen (TIN)	Annual mean depth-averaged inorganic nitrogen not to exceed 0.4mg/l	Marine waters
Toxic substances	Should not attain such levels as to produce significant toxic, carcinogenic, mutagenic or teratogenic effects in humans, fish or any other aquatic organisms.	Whole zone
	Human activity should not cause a risk to any beneficial use of the aquatic environment.	Whole zone

Source: Statement of Water Quality Objectives (Victoria Harbour (Phases One, Two and Three) Water Control Zone).

Water Supplies Department (WSD) Water Quality Criteria

3.4.6 Besides the WQOs stipulated under the WPCO, the WSD has specified a set of objectives for water quality at flushing water intakes. The list is shown in **Table 3.23**. The target limit for suspended solids (SS) at these intakes is 10mg/l or less.

Table 3.23 WSD's Water Quality Criteria for Flushing Water at Sea Water Intakes

Parameter (in mg/l unless otherwise stated)	Target Limit
Colour (HU)	< 20
Turbidity (NTU)	< 10
Threshold Odour Number (odour unit)	< 100
Ammoniacal Nitrogen	< 1
Suspended Solids	< 10
Dissolved Oxygen	> 2
Biochemical Oxygen Demand	< 10
Synthetic Detergents	< 5
E. coli (no. per 100ml)	< 20,000

Cooling Water Intake Standards

3.4.7 Based on a questionnaire survey conducted under the approved Comprehensive Feasibility Study for Wan Chai Development Phase II (CFSWDII) EIA [(1)], a SS limit of 40mg/l was adopted as the assessment criterion for Admiralty Centre intake and MTRC South intake. No information on the SS limit is available for other cooling water intakes. These findings have been confirmed by a telephone survey conducted under the recent approved EIA for the Hong Kong Convention and Exhibition Centre (HKCEC) Atrium Link Extension (ALE) and further verified by a questionnaire survey conducted under another recent approved EIA for the Dredging Works for Proposed Cruise Terminal at Kai Tak. The locations of the cooling water intakes are shown in **Figure 8.2**.

Technical Memorandum

3.4.8 Discharges of effluents are subject to control under the WPCO. The Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS) gives guidance on the permissible effluent discharges based on the type of receiving waters (foul sewers, storm water drains, inland and coastal waters). The limits control the physical, chemical and microbial quality of effluents. Any effluent from the DP1 Project must comply with the standards for effluents discharged into the foul sewers, inshore waters or marine waters of Victoria Harbour WCZ, as given in the TM-DSS.

Practice Note

3.4.9 A Practice Note for Professional Persons (ProPECC) was issued by the EPD to provide guidelines for handling and disposal of construction site discharges. The ProPECC PN 1/94 "Construction Site Drainage" provides good practice guidelines for dealing with ten types of discharge from a construction site. These include surface runoff, groundwater, boring and drilling water, bentonite slurry, water for testing and sterilisation of water retaining structures and water pipes, wastewater from building constructions, acid cleaning, etching and pickling wastewater, and wastewater from site facilities. Practices given in the ProPECC PN 1/94 should be followed as far as possible during construction to minimise the water quality impact due to construction activities.

Description of the Environment

Marine Water Quality

3.4.10 The EPD water quality monitoring stations, VM2 and VM4, in the Victoria Harbour WCZ is located in the vicinity of the DP1 Project area. A summary of the most recently published monitoring data (in 2006) for these stations is presented in **Table 3.24**. A summary of the published EPD monitoring data (in 2006) collected from the monitoring stations in the Kwun Tong Typhoon Shelter (VT4) and To Kwa Wan Typhoon Shelter (VT11) is presented in **Table 3.25**. Locations of the monitoring stations are shown in **Figure 8.2**. Stations VM2, VM4, VT4 and VT11 are considered to be representative of the water quality in the marine waters of the assessment area.

([1]) Territory Development Department (July 2001). Agreement No. CE 74/98, Wan Chai Development Phase II, Comprehensive Feasibility Study, Environmental Impact Assessment Report, Volume I – Text.

Table 3.24 Summary Statistics of Marine Water Quality in the Victoria Harbour WCZ in 2006

Parameter		Victoria Harbour East	Victoria Harbour Central	WPCO WQO (in marine waters)
		VM2	VM4	
Temperature (^{o}C)		23.5 (17.4 – 27.5)	23.6 (17.4 – 27.6)	Not more than 2 ^{o}C in daily temperature range
Salinity		31.7 (27.8 – 33.0)	31.6 (27.4 – 33.0)	Not to cause more than 10% change
Dissolved Oxygen (DO) (% Saturation)	Depth average	81 (49 – 97)	80 (61 – 94)	Not applicable
	Bottom	81 (36 – 103)	79 (47 – 98)	Not applicable
Dissolved Oxygen (DO) (mg/l)	Depth average	5.8 (3.4 – 7.1)	5.7 (4.1 – 7.3)	Not less than 4 mg/l for 90% of the samples
	Bottom	5.8 (2.5 – 7.4)	5.6 (3.2 – 7.2)	Not less than 2 mg/l for 90% of the samples
pH		7.9 (7.7 – 8.1)	7.9 (7.7 – 8.1)	6.5 - 8.5 (± 0.2 from natural range)
Secchi disc Depth (m)		2.0 (1.4 – 3.1)	2.0 (1.4 – 3.0)	Not applicable
Turbidity (NTU)		11.2 (5.4 – 23.4)	12.1 (5.6 – 23.4)	Not applicable
Suspended Solids (SS) (mg/l)		4.2 (1.2 – 12.8)	4.9 (1.1 – 12.3)	Not more than 30% increase
5-day Biochemical Oxygen Demand (BOD3) (mg/l)		0.6 (0.1 – 1.2)	0.7 (0.1 – 1.4)	Not applicable
Nitrite Nitrogen (NO_2-N) (mgN/l)		0.024 (0.004 – 0.084)	0.024 (0.006 – 0.079)	Not applicable
Nitrate Nitrogen (NO_3-N) (mgN/l)		0.10 (0.03 – 0.25)	0.11 (0.03 – 0.25)	Not applicable
Ammonia Nitrogen (NH_3-N) (mgN/l)		0.11 (0.04 – 0.20)	0.13 (0.05 – 0.23)	Not applicable
Unionised Ammonia (UIA) (mgN/l)		0.004 (0.001 – 0.007)	0.004 (0.002 – 0.007)	Not more than 0.021 mg/l for annual mean
Total Inorganic Nitrogen (TIN) (mgN/l)		0.23 (0.07 – 0.40)	0.26 (0.08 – 0.44)	Not more than 0.4 mg/l for annual mean
Total Nitrogen (TN) (mgN/l)		0.42 (0.20 – 0.64)	0.47 (0.22 – 0.69)	Not applicable
Orthophosphate Phosphorus (PO_4) (mgP/l)		0.03 (0.01 – 0.04)	0.03 (0.01 – 0.04)	Not applicable
Total Phosphorus (TP) (mgP/l)		0.05 (0.03 – 0.06)	0.05 (0.03 – 0.07)	Not applicable
Chlorophyll-*a* (µg/L)		3.0 (1.0 – 8.9)	2.9 (1.0 – 9.2)	Not applicable
E coli (cfu/100 ml)		1100 (58 – 14000)	2600 (510 – 12000)	Not applicable
Faecal Coliforms (cfu/100 ml)		2600 (130 – 25000)	6500 (1800 – 40000)	Not applicable

Notes:
1. Data source: *EPD's publication: "Marine Water Quality Monitoring in Hong Kong 2006"*
2. Except as specified, data presented are depth-averaged values calculated by taking the means of three depths: Surface, mid-depth, bottom.
3. Data presented are annual arithmetic means of depth-averaged results except for *E. coli and faecal coliforms* that are annual geometric means.
4. Data in brackets indicate the ranges.

Table 3.25 Summary Statistics of Marine Water Quality in the Kwun Tong and To Kwa Wan Typhoon Shelters in 2006

Parameter		Kwun Tong VT4	To Kwa Wan VT11	WPCO WQO (in marine waters)
Temperature (^{o}C)		23.9 (17.5 – 28.8)	23.5 (17.2 – 28.6)	Not more than 2 ^{o}C in daily temperature range
Salinity (ppt)		29.3 (23.2 – 31.4)	30.5 (21.8 – 32.7)	Not to cause more than 10% change
Dissolved Oxygen (DO) (% saturation)	Depth average	68 (29 – 112)	83 (56 – 115)	Not applicable
	Bottom	66 (26 – 110)	84 (54 – 117)	Not applicable
Dissolved Oxygen (DO) (mg/l)	Depth average	4.9 (2.0 – 7.6)	6.0 (3.9 – 7.9)	Not less than 4 mg/L for 90% of the samples
	Bottom	4.7 (1.8 – 7.4)	6.0 (3.7 – 8.0)	Not less than 2 mg/L for 90% of the samples
pH value		7.7 (7.4 – 8.1)	8.0 (7.7 – 8.3)	6.5 - 8.5 (± 0.2 from natural range)
Secchi disc (m)		1.4 (1.0 – 2.0)	1.7 (0.9 – 2.5)	Not applicable
Turbidity (NTU)		12.7 (4.1 – 30.1)	14.8 (9.0 – 22.1)	Not applicable
Suspended Solids (SS) (mg/l)		2.6 (1.2 – 3.5)	6.7 (2.4 – 20.6)	Not more than 30% increase
Silica (as SiO_2) (mg/l)		1.0 (0.4 – 1.8)	0.7 (0.2 – 1.6)	Not applicable
5-day Biochemical Oxygen Demand (BOD3) (mg/l)		2.2 (1.1 – 3.5)	1.0 (0.6 – 1.6)	Not applicable
Nitrite Nitrogen (NO_2-N) (mg/l)		0.157 (0.082 – 0.227)	0.029 (0.012 – 0.059)	Not applicable
Nitrate Nitrogen (NO_3-N) (mg/l)		0.34 (0.22 – 0.64)	0.16 (0.05 – 0.42)	Not applicable
Ammoniacal Nitrogen (NH_3-N) (mg/l)		0.48 (0.29 – 0.65)	0.12 (0.06 – 0.21)	Not applicable
Unionised Ammonia (UIA) (mg/l)		0.011 (0.005 – 0.016)	0.004 (0.002 – 0.006)	Not more than 0.021 mg/L for annual mean
Total Inorganic Nitrogen (TIN) (mg/l)		0.97 (0.71 – 1.42)	0.31 (0.13 – 0.54)	Not more than 0.4 mg/L for annual mean
Total Nitrogen (TN) (mg/l)		1.33 (1.02 – 1.82)	0.53 (0.39 – 0.80)	Not applicable
Ortho-Phosphate (PO_4) (mg/l)		0.214 (0.153 – 0.295)	0.028 (0.007 – 0.050)	Not applicable
Total Phosphorus (TP) (mg/l)		0.26 (0.20 – 0.36)	0.05 (0.04 – 0.06)	Not applicable
Chlorophyll-*a* (µg L-1)		18.2 (1.0 – 35.0)	7.9 (1.0 – 20.5)	Not applicable
E. coli (cfu per 100 mL)		9,200 (2,800 – 29,000)	1,100 (340 – 4,400)	Not applicable
Faecal Coliforms (cfu per 100 mL)		22,000 (4,400 – 78,000)	2,600 (860 – 8,300)	Not applicable

Notes:
1. Data source: *EPD's publication: "Marine Water Quality Monitoring in Hong Kong 2006"*
2. Except as specified, data presented are depth-averaged data.
3. Data presented are annual arithmetic means except for *E.coli and faecal coliforms* that are geometric means.
4. Data enclosed in brackets indicate ranges.

3.4.11 In 2006, marked improvements in the eastern and central Victoria Harbour (VM2 and VM4) since HATS Stage 1 was commissioned were generally sustained. Full compliance with the WQOs for dissolved oxygen, total inorganic nitrogen and unionized ammonia was achieved at these two stations.

3.4.12 In 2006, high levels of *E.coli* were recorded at the Kwun Tong and To Kwa Wan Typhoon Shelters indicating faecal contamination. A high level of total organic nitrogen was also recorded at the Kwun Tong Typhoon Shelter which breached the WQO.

Kai Tak Nullah

3.4.13 The water quality in Kai Tak Nullah (KTN) is monitored by EPD routinely. There are six monitoring stations (KN1 to KN5 and KN7) in KTN (**Appendix 8.13**). The downstream section of the KTN (i.e. Station KN1) is located within the KTD site boundary. A summary of EPD monitoring data collected in 2006 is presented in **Table 3.26**. No river water quality objective is available for KTN.

Table 3.26 Summary Statistics of 2006 River Water Quality for Kai Tak Nullah

Parameter	EPD Monitoring Station					
	KN1 (downstream)	**KN2**	**KN3**	**KN4**	**KN5**	**KN7 (upstream)**
DO (mg/L)	5.9 (4.1 – 7.2	6.8 (6.2 – 7.3)	7.6 (7.2 – 8.0)	8.0 (7.1 – 7.5)	7.9 (7.1 – 8.8)	7.4 (6.8 – 8.3)
pH	7.1 (7.0 – 7.5)	7.2 (7.0 – 7.3)	7.4 (7.1 – 7.5)	7.4 (7.1 – 7.5)	7.3 (7.1 – 7.5)	7.3 (7.0 – 7.4)
SS (mg/L)	9 (1 – 20)	10 (6 – 14)	10 (3 – 15)	7 (3 – 27)	8 (2 – 21)	6 (2 – 20)
BOD3 (mg/L)	7 (5 – 25)	3 (2 – 3)	2 (2 – 4)	3 (2 – 7)	3 (1 – 8)	3 (2 – 7)
COD (mg/L)	40 (13 – 58)	23 (22 – 32)	28 (13 – 29)	34 (18 – 57)	34 (13 – 58)	26 (16 – 49)
Oil & grease (mg/L)	0.5 (0.5 – 1.1)	0.5 (0.5 – 0.5)	0.5 (0.5 – 0.5)	0.5 (0.5 – 0.6)	0.5 (0.5 – 0.5)	0.5 (0.5 – 0.5)
Faecal coliforms (cfu/100mL)	1,100,000 (40,000 – 4,900,000)	110,000 (47,000 – 260,000)	110,000 (59,000 – 190,000)	120,000 (48,000 – 300,000)	120,000 (53,000 – 350,000)	120,000 (57,000 – 350,000)
E.coli (cfu/100mL)	580,000 (26,000 – 2,500,000)	53,000 (26,000 – 100,000)	39,000 (18,000 – 55,000)	51,000 (27,000 – 130,000)	47,000 (29,000 – 180,000)	48,000 (31,000 – 140,000)
NH_3-N (mg/L)	1.03 (0.49 – 6.70)	0.42 (0.13 – 0.60)	0.28 (0.11 – 0.51)	0.25 (0.10 – 0.85)	0.29 (0.09 – 0.80)	0.24 (0.09 – 0.67)
NO_3-N (mg/L)	4.7 (0.73 – 6.80)	5.45 (4.70 – 7.00)	5.90 (4.90 – 6.80)	5.40 (4.50 – 7.70)	5.40 (4.40 – 6.90)	5.35 (4.70 – 7.20)
TKN – soluble & particulate fractions (mg/L)	2.20 (1.70 – 8.70)	1.45 (1.00 – 1.60)	1.30 (0.94 – 1.70)	1.20 (0.90 – 1.90)	1.20 (0.80 – 1.90)	1.30 (0.88 – 1.80)
Ortho-P (mg/L)	1.75 (0.99 – 2.00)	1.90 (1.60 – 2.00)	1.95 (1.70 – 2.00)	1.80 (1.50 – 1.90)	1.75 (1.50 – 2.00)	1.75 (1.50 – 1.90)
TP – soluble & particulate fractions (mg/L)	2.00 (0.97 – 2.10)	2.05 (1.70 – 2.20)	2.05 (1.70 – 2.10)	1.90 (1.60 – 2.30)	1.90 (1.60 – 2.40)	1.90 (1.60 – 2.20)
Sulphide – soluble and particulate fractions (mg/L)	0.24 (0.02 – 4.30)	0.02 (0.02 – 0.02)	0.02 (0.02 – 0.02)	0.02 (0.02 – 0.02)	0.02 (0.02 – 0.02)	0.02 (0.02 – 0.05)
Aluminium (µg/L)	50 (50 – 80)	50 (50 – 50)	50 (50 – 50)	50 (50 – 50)	50 (50 – 50)	50 (50 – 70)
Cadmium (µg/L)	0.1 (0.1 – 0.3)	0.1 (0.1 – 0.1)	0.1 (0.1 – 0.1)	0.1 (0.1 – 0.1)	0.1 (0.1 – 0.1)	0.1 (0.1 – 0.1)
Chromium (µg/L)	1 (1 – 14)	1 (1 – 2)	1 (1 – 1)	1 (1 – 4)	1 (1 – 2)	1 (1 – 2)
Copper (µg/L)	9 (3 – 13)	7 (5 – 9)	8 (6 – 9)	7 (5 – 620)	7 (1 – 21)	9 (4 – 21)
Lead (µg/L)	1 (1 – 1)	1 (1 – 1)	1 (1 – 1)	1 (1 – 2)	1 (1 – 1)	1 (1 – 4)
Zinc (µg/L)	30 (20 – 950)	35 (30 – 60)	30 (20 – 60)	30 (20 – 910)	25 (10 – 630)	30 (20 – 770)

Notes:
1. Data source: *EPD's publication: "River Water Quality Monitoring in Hong Kong 2006"*
2. Data presented are annual arithmetic means of depth-averaged results except for *E.coli* and *faecal coliforms* that are annual geometric means.
3. Data in brackets indicate the ranges.
4. Equal values for annual medians (or geometric means) and ranges indicate that all data are the same as or below laboratory reporting limits.

Upper Section (KN7 and KN5)

3.4.14 These are the two most upper stations at KTN near Po Kong Village Road. This section receives both nature runoff and treated effluent from Tolo Harbour Effluent Export Scheme (THEES). The Water Quality Index (WQI) grading at KN7 and KN5 was recorded as 'Excellent' with a geometric mean *E.coli* count of 48,000 and 47,000 per 100 ml respectively.

Middle Section (KN4)

3.4.15 This is the middle section of the KTN. The WQI grading was classified as 'Excellent' and the geometric mean *E.coli* count is similar to KN7 and KN5 having a value of 51,000 per 100 ml. Comparing with KN7 and KN5, there are only minor changes in the water quality parameters.

Lower Section (KN3 to KN1)

3.4.16 This lower section is located within an old reclamation area with very flat gradient. The WQI grading was also classified as 'Excellent' at KN3 and KN2. However, under the influence of tidal flows, the flow condition is much slower than the upstream section and considerable deterioration of water quality along this stretch of KTN was observed as reflected by the worsening of water quality parameters. At KN1 near the outfall of KTN to Kai Tak Approach Channel (KTAC), the geometric mean *E.coli* count increases to 580,000 per 100 ml.

Kai Tak Approach Channel

3.4.17 Kai Tak Approach Channel (KTAC) is also one of the surrounding water bodies of the Project site and its water quality is currently under stressed condition. No long-term water quality data was collected at KTAC by EPD. Two baseline marine water quality surveys were carried out in October 2005 and January 2006 respectively under the Kai Tak Planning Review (KTPR) [(2)]. The survey locations include seven stations within the KTAC, namely AC1 - AC7, as shown in **Figure 8.3**. In each of the two baseline surveys, two monitoring events were carried out for typical spring and neap tides respectively. For each monitoring event, water quality measurements were taken once every three hours for a complete tidal cycle (roughly a 26-hour period).

3.4.18 The field survey results are tabulated in **Table 3.27** and **Table 3.28** for the two monitoring events. The survey results are presented as averaged concentrations (for suspended solids, ammonia nitrogen, total inorganic nitrogen and biochemical oxygen demand) and 10th percentile values (for bottom and depth-averaged dissolved oxygen). The field data showed a gradient of water quality from the inner KTAC to the outer KTAC. The levels of nitrogen nutrients, ammonia and *E.coli* were found to be very high in the KTAC. The DO levels breached the WQO in October 2005 but complied well with the WQO in January 2006. The TIN levels exceeded the WQO in KTAC for both dry and wet seasons.

[(2)] Agreement No. CE 4/2004 (TP) South East Kowloon Development Comprehensive Planning and Engineering Review Stage 1: Planning Review (Feasibility Study)

Table 3.27 Pollution Levels Measured at KTAC in October 2005

	Depth-averaged Suspended Solids	Depth-averaged Ammonia Nitrogen	Depth-averaged *E.coli*	Depth-averaged Total Inorganic Nitrogen	Depth-averaged BOD3	10th Percentile Bottom DO	10th Percentile Depth-averaged DO
	mg/L	mg/L	cfu/100mL	mg/L	mg/L	mg/L	mg/L
WQO:	**NA**	**NA**	**NA**	**0.4**	**NA**	**2**	**4**
AC1	25	0.9	115519	**3.11**	11	**0.99**	**1.48**
AC2	28	1.0	17960	**3.21**	10	**0.74**	**1.18**
AC3	19	0.9	60517	**3.53**	9	**1.14**	**1.47**
AC4	20	1.2	37857	**3.15**	10	**0.93**	**1.33**
AC5	21	1.2	28832	**3.28**	8	**1.19**	**1.54**
AC6	26	1.4	34375	**2.76**	9	**0.86**	**1.41**
AC7	27	0.8	15863	**2.60**	7	2.06	**2.20**

Bolded and shaded – Exceedance of WQO
NA – WQO is not available

Table 3.28 Pollution Levels Measured at KTAC in January 2006

	Depth-averaged Suspended Solids	Depth-averaged Ammonia Nitrogen	Depth-averaged *E.coli*	Depth-averaged Total Inorganic Nitrogen	Depth-averaged BOD3	10th Percentile Bottom DO	10th Percentile Depth-averaged DO
	Mg/L	mg/L	cfu/100mL	mg/L	mg/L	mg/L	mg/L
WQO:	**NA**	**NA**	**NA**	**0.4**	**NA**	**2**	**4**
AC1	6	1.6	126945	**4.7**	10	3.0	5.4
AC2	4	1.5	72689	**4.1**	7	2.6	3.8
AC3	20	1.6	111217	**4.6**	11	3.1	5.1
AC4	4	1.3	81229	**3.7**	7	3.4	5.0
AC5	4	1.7	129380	**3.9**	10	4.4	6.6
AC6	4	2.2	132126	**3.4**	9	3.8	4.7
AC7	5	0.9	11833	**1.9**	5	6.2	5.5

Bolded and shaded – Exceedance of WQO
NA – WQO is not available

Identification of Environmental Impacts

Operational Phase

3.4.19 Surface runoff from new roads proposed under the DP1 Project may be contaminated by oils leaked from passing vehicles. It is considered that impacts upon water quality will be minimal provided that the road works are designed with adequate drainage systems and appropriate oil interceptors, as required.

Construction Phase

3.4.20 Potential sources of water quality impacts arising from the construction of the road works will be similar to those of general land-based construction activities.

Stormwater Discharges

3.4.21 Stormwater and drainage discharges from the construction sites may contain considerable loads of SS and contaminants during construction activities. Potential water quality impact includes run-off and erosion of exposed bare soil and earth, drainage channels, earth working area and stockpiles. Minimum distances of 100 m shall be maintained between the existing or planned stormwater discharges and the existing or planned water intakes during construction and operation phases.

3.4.22 Local and coastal water pollution impact may be substantial if the construction site run-off is allowed to discharge into the storm drains or natural drainage without mitigation.

Construction Runoff and Drainage

3.4.23 Surface runoff generated from the construction site may contain increased loads of SS and contaminants. Potential pollution sources of site run-off may come from:

- contaminated ground water from any dewatering activities as a result of excavation;
- release of any bentonite slurries and other grouting materials with construction run-off, storm water or ground water dewatering process;
- wash water from dust suppression sprays and wheel washing facilities; and
- fuel, oil and lubricants from maintenance of construction vehicles and equipment.

General Construction Activities

3.4.24 The general construction works that will be undertaken for the roads and infrastructure will be primarily land-based and may have the potential to cause water pollution. These could result from the accumulation of solid waste such as packaging and construction materials, and liquid waste such as sewage effluent from the construction work force, discharge of bilge water and spillage of oil, diesel or solvents by vessels and vehicles involved with the construction. If uncontrolled, any of these could lead to deterioration in water quality. Increased nutrient levels result from contaminated discharges and sewage effluent could also lead to a number of secondary water quality impacts including decreases in DO concentrations and localised increase in NH3-N concentrations which could stimulate algal growth and reduction in oxygen levels.

3.4.25 Sewage will arise from sanitary facilities provided for the on-site construction work force. It is characterised by high level of BOD, NH3-N and E.coli counts. For some of the works areas, there will be no public sewers available for domestic sewage discharge on-site.

Assessment Methodology

3.4.26 The assessment of the potential impact of land-based construction activities on water quality has been undertaken in a qualitative manner. Proposed construction activities were reviewed to assess the land-based water quality impact upon the nearby water bodies. Practical water pollution control measures / mitigation proposals have then been recommended to prevent local flooding and to ensure that effluent discharged from the construction site will comply with the WPCO criteria. Consideration has been given to controlling potentially harmful impacts from site works and to the use of 'best' practice measures to minimise the potential for discharges of pollutants to the nearby waters of the Victoria Harbour.

Prediction and Evaluation of Potential Environmental Impacts

Operational Phase

3.4.27 Surface runoff from new roads proposed under the DP1 Project may be contaminated by oils leaked from passing vehicles. It is considered that impacts upon water quality will be minimal provided that the road works are designed with adequate drainage systems and appropriate oil interceptors, as required.

Construction Phase

General Construction Activities

3.4.28 The effects on water quality from general construction activities are likely to be minimal, provided that site drainage is well maintained and good construction practices are observed to ensure that litter, fuels, and solvents are managed, stored and handled properly.

3.4.30 Based on the Sewerage Manual, Part I, 1995 of the Drainage Services Department (DSD), the global unit flow factors for employed population of 0.06 m^3 per worker per day and commercial activities in year 2016 of 0.29 m^3 per worker per day have been used to estimate the sewage generation from the construction site. The total sewage production rate is estimated at 0.35 m^3 per worker per day. Therefore, with 100 construction workers working simultaneously at the construction site, a total of about 35 m^3 of sewage will be generated per day. The sewage should not be allowed to discharge directly into the surrounding water body without treatment. Chemical toilets and subsequently on-site sewer should be deployed at the construction site to collect and handle sewage from workers.

Construction Runoff and Drainage

3.4.31 Construction run-off and drainage may cause physical, chemical and biological effects. The physical effects could arise from any increase in SS from the construction site that could cause blockage of drainage channels and associated local flooding when heavy rainfall occurs, as well as local impact on water quality. High SS concentrations in marine water could lead to associated reduction in DO levels.

3.4.32 It is important that proper site practice and good site management be strictly followed to prevent run-off water and drainage water with high level of SS from entering the surrounding waters. With the implementation of appropriate measures to control run-off and drainage from the construction site, it is considered that disturbance of water bodies will be localised and deterioration in water quality will be minimal. Thus, unacceptable impacts on the water quality are not expected provided that the recommended measures described below are properly implemented.

Mitigation of Environmental Impacts

Operational Phase

3.4.33 For the operation of road works, a surface water drainage system would be provided to collect road runoff. It is recommended that the road drainage should be provided with adequately designed silt trap and oil interceptors, as necessary. The design of the operational stage mitigation measures for the road works shall take into account the guidelines published in ProPECC PN 5/93 “Drainage Plans subject to Comment by the EPD”

Construction Phase

3.4.34 It is important that appropriate measures are implemented to control runoff and drainage and prevent high loading of SS from entering the marine environment. Proper site management is essential to minimise surface water runoff, soil erosion and sewage effluents.

3.4.35 Any practical options for the diversion and re-alignment of drainage should comply with both engineering and environmental requirements in order to ensure adequate hydraulic capacity of all drains.

3.4.36 Construction site runoff and drainage should be prevented or minimised in accordance with the guidelines stipulated in the EPD's Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN 1/94). Good housekeeping and stormwater best management practices, as detailed in below, should be implemented to ensure that all construction runoff complies with WPCO standards and that no unacceptable impact on the WSRs arises due to construction of the DP1 Project. All discharges from the construction site should be controlled to comply with the standards for effluents discharged into the Victoria Harbour WCZ under the TM-DSS.

Construction Runoff

3.4.37 Exposed soil areas should be minimised to reduce the potential for increased siltation, contamination of runoff, and erosion. Construction runoff related impacts associated with the above ground construction activities can be readily controlled through the use of appropriate mitigation measures which include:

- use of sediment traps
- adequate maintenance of drainage systems to prevent flooding and overflow.

3.4.38 Construction site should be provided with adequately designed perimeter channel and pre-treatment facilities and proper maintenance. The boundaries of critical areas of earthworks should be marked and surrounded by dykes or embankments for flood protection. Temporary ditches should be provided to facilitate runoff discharge into the appropriate watercourses, via a silt retention pond. Permanent drainage channels should incorporate sediment basins or traps and baffles to enhance deposition rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94.

3.4.39 Ideally, construction works should be programmed to minimise surface excavation works during the rainy season (April to September). All exposed earth areas should be completed as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means.

3.4.40 Sediment tanks of sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m^3 capacity, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity is flexible and able to handle multiple inputs from a variety of sources and particularly suited to applications where the influent is pumped.

3.4.41 Open stockpiles of construction materials (for examples, aggregates, sand and fill material) of more than 50 m^3 should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.

3.4.42 Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.

3.4.43 Precautions to be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecast, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events.

3.4.44 Oil interceptors should be provided in the drainage system and regularly cleaned to prevent the release of oils and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain.

3.4.45 All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and located wheel washing bay should be provided at every site exit, and wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.

Drainage

3.4.46 It is recommended that on-site drainage system should be installed prior to the commencement of other construction activities. Sediment traps should be installed in order to minimise the sediment loading of the effluent prior to discharge into foul sewers. There should be no direct discharge of effluent from the site into the sea.

3.4.47 All temporary and permanent drainage pipes and culverts provided to facilitate runoff discharge should be adequately designed for the controlled release of storm flows. All sediment control measures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rain storms. The temporarily diverted drainage should be reinstated to its original condition when the construction work has finished or the temporary diversion is no longer required.

3.4.48 All fuel tanks and storage areas should be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oils from reaching the coastal waters of the Victoria Harbour WCZ.

Sewage Effluent

3.4.49 Construction work force sewage discharges on site are expected to be connected to the existing trunk sewer or sewage treatment facilities. The construction sewage may need to be handled by portable chemical toilets prior to the commission of the on-site sewer system. Appropriate numbers of portable toilets should be provided by a licensed contractor to serve the large number of construction workers over the construction site. The contractor should also be responsible for waste disposal and maintenance practices.

Stormwater Discharges

3.4.50 Minimum distances of 100 m should be maintained between the existing or planned stormwater discharges and the existing or planned seawater intakes.

Debris and Litter

3.4.51 In order to maintain water quality in acceptable conditions with regard to aesthetic quality, contractors should be required, under conditions of contract, to ensure that site management is optimised and that disposal of any solid materials, litter or wastes to marine waters does not occur.

Summary

Operational Phase

3.4.52 Surface runoff from new roads proposed under the DP1 Project may be contaminated by oils leaked from passing vehicles. It is considered that impacts upon water quality will be acceptable provided that the road works are designed with adequate drainage systems and appropriate oil interceptors, as required.

Construction Phase

3.4.53 Water quality impacts from land-based construction are associated with the surface runoff, effluent discharge from the site, and sewage from on-site construction workers. Impacts can be controlled to comply with the WPCO standards by implementing the recommended mitigation measures. No unacceptable residual impacts on water quality are anticipated.

3.5 Waste Management Implications

Environmental Legislation, Policies, Plans, Standards and Criteria

3.5.1 The criteria and guidelines for assessing waste management implications are set out in Annex 7 and Annex 15 of the Technical Memorandum on Environmental Impact Assessment Ordinance (EIAO-TM), respectively.

3.5.2 The following legislation relates to the handling, treatment and disposal of wastes in the Hong Kong SAR and has been used in assessing potential impacts:

- Waste Disposal Ordinance (Cap. 354)
- Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354)
- Land (Miscellaneous Provisions) Ordinance (Cap. 28)
- Public Health and Municipal Services Ordinance (Cap. 132) - Public Cleansing and Prevention of Nuisances Regulation
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354N)

Waste Management

3.5.3 The Waste Disposal Ordinance (WDO) prohibits the unauthorised disposal of wastes. Construction waste is defined as any substance, matter or thing that is generated from construction work and abandoned, whether or not it has been processed or stockpiled before being abandoned, but does not include any sludge, screenings or matter removed in or generated from any desludging, desilting or dredging works. Under the WDO, wastes can be disposed of only at designated waste disposal facilities.

3.5.4 Under the WDO, the Chemical Waste (General) Regulation 1992 provides regulations for chemical waste control, and administers the possession, storage, collection, transport and disposal of chemical wastes. The Environmental Protection Department (EPD) has also issued a guideline document, the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* (1992), which details how the Contractor should comply with the regulations on chemical wastes.

3.5.5 The Public Cleansing and Prevention of Nuisances Regulation provides control on illegal tipping of wastes on unauthorised (unlicensed) sites.

Chemical Waste

3.5.6 Under the Waste Disposal (Chemical Waste) (General) Regulations, all producers of chemical waste must register with EPD and treat their wastes, either utilising on-site plant licensed by EPD, or arranging for a licensed collector to transport the wastes to a licensed facility. The regulation also prescribes the storage facilities to be provided on site, including labelling and warning signs, and requires the preparation of written procedures and training to deal with emergencies such as spillages, leakages or accidents arising from the storage of chemical wastes.

Construction and Demolition (C&D) Materials

3.5.7 The current policy related to the disposal of C&D material is documented in the Works Branch Technical Circular No. 2/93, 'Public Dumps'. Construction and demolition materials that are wholly inert, namely public fill, should not be disposed of to landfill, but taken to public filling areas, which usually form part of reclamation schemes. The Land (Miscellaneous Provisions) Ordinance requires that dumping licences be obtained by individuals or companies who deliver public fill to public filling areas. The Civil Engineering and Development Department (CEDD) issues the licences under delegated powers from the Director of Lands.

3.5.8 Under the Waste Disposal (Charges for Disposal of Construction Waste) Regulation, enacted in January 2006, construction waste delivered to a landfill for disposal must not contain more than 50% by weight of inert material. Construction waste delivered to a sorting facility for disposal must contain more than 50% by weight of inert material, and construction waste delivered to a public fill reception facility for disposal must consist entirely of inert material. In accordance with the Environment, Transport and Works Bureau (ETWB) TCW No. 31/2004 "Trip Ticket System for Disposal of Construction and Demolition Materials", for all contracts that are expected to generate inert C&D materials (e.g. soil, broken rock, broken concrete and building debris etc.) requiring disposal from the site, the project office shall write to the Public Fill Committee (PFC) through the Secretary of the PFC to request a designated disposal ground for incorporation into the tender documents. For contracts where the estimated amount of non-inert C&D materials requiring disposal at landfill facilities equal or exceed $50m^3$, the project office shall seek confirmation from the Director of Environmental Protection (DEP) as to whether landfill facilities will be available for disposal of such materials. The DEP will designate landfill facilities, if available, for the contract. Where the estimated amount of non-inert C&D materials to be generated from the contract is less than $50m^3$, the project office is not required to apply to DEP for designated landfill facilities. However, the project office should still specify in the tender documents appropriate landfill facilities (e.g. Outlying Islands Transfer Facilities managed by the EPD, SENT Landfill at Tseung Kwan O, NENT Landfill at Ta Kwu Ling and WENT Landfill at Nim Wan).

3.5.9 Measures have been introduced under ETWB TCW No. 33/2002, "Management of Construction and Demolition Material Including Rock" to enhance the management of construction and demolition material, and to minimize its generation at source. The enhancement measures include: (i) drawing up a Construction and Demolition Material Management Plan (C&DMMP) at the feasibility study or preliminary design stage to minimize C&D material generation and encourage proper management of such material; (ii) vetting of the C&DMMP prior to upgrading of the project to Category A in the Public Works Programme; and (iii) providing the contractor with information from the C&DMMP in order to facilitate him in the preparation of the Waste Management Plan (WMP) and to minimize C&D material generation during construction. Projects generating C&D material less than 50,000m^3 or importing fill material less than 50,000m^3 are exempt from the C&DMMP. The new ETWB TCW No. 19/2005 "Environmental Management on Construction Sites" includes procedures on waste management requiring contractors to reduce the C&D material to be disposed of during the course of construction. Under ETWB TCW No. 19/2005, the contractor is required to prepare and implement an Environmental Management Plan (EMP) and the WMP becomes part of the EMP. Besides, ETWB TCW No.31/2004 "Trip Ticket System for Disposal of Construction and Demolition Materials" promulgates the latest trip ticket system for public works contracts including capital works contracts, term contracts and design and build contracts, where C&D materials including waste generated on site require disposal.

Assessment Methodology

General

3.5.10 The criteria for assessing waste management implications are outlined in Annex 7 of the EIAO-TM. The methods for assessing potential waste management impacts during the construction phase of the DP1 Project follow those presented in Annex 15 of the EIAO-TM and include the following:

- Estimation of the types and quantities of the wastes generated.
- Assessment of potential impacts from the management of solid waste with respect to potential hazards, air and odour emissions, noise, wastewater discharge and transport.
- Assessment of impacts on the capacity of waste collection, transfer and disposal facilities.

Identification of Environmental Impacts

3.5.11 The construction phase activities to be carried out for the proposed DP1 Project would generate a variety of wastes that can be divided into distinct categories based on their composition and ultimate method of disposal. The identified waste types include:

- C&D material
- Chemical waste
- General refuse

3.5.12 During the operational phase, other than small quantities of debris and litter that may be deposited on road surfaces, minimal waste would be generated from the DP1 Project.

3.5.13 Each type of waste arising is described below, together with an evaluation of the potential environmental impacts associated with the generation, handling, storage and transport of the waste.

Construction and Demolition Materials

3.5.14 Construction and demolition (C&D) material arising from construction activities such as site clearance, excavation works and site formation. Since all the roads will be constructed at grade level on the existing formed land, minimal C&D material and waste would be generated during the construction of the DP1 Project. Based on the latest information, the quantity of C&D material generated from the DP1 Project would be about 2,217 m^3.

Chemical Waste

3.5.15 The maintenance and servicing of construction plant and equipment may generate some chemical wastes such as cleaning fluids, solvents, lubrication oil and fuel. It is difficult to quantify the amount of chemical waste that will arise from the construction activities since it will be dependent on the contractor's maintenance requirements and the amount of plant utilised. However, it is anticipated that the quantity of chemical waste, such as lubricating oil and solvent produced from plant maintenance, would be small and in the order of a few cubic metres per month. The amount of chemical waste to be generated will be quantified in the site Waste Management Plan to be prepared by the contractor.

3.5.16 Chemical wastes arising during the construction phase may pose environmental, health and safety hazards if not stored and disposed of in an appropriate manner as stipulated in the Waste Disposal (Chemical Waste) (General) Regulations. The potential hazards include:

- Toxic effects to workers
- Adverse impacts on water quality from spills
- Fire hazards

3.5.17 Materials classified as chemical wastes will require special handling and storage arrangements before removal for appropriate treatment at the Chemical Waste Treatment Facility (CWTF) or other licensed facility. Wherever possible, opportunities should be taken to reuse and recycle materials. Mitigation and control requirements for chemical wastes are detailed below. Provided that the handling, storage and disposal of chemical wastes are in accordance with these requirements, adverse environmental impacts would not be expected to result.

General Refuse

3.5.18 The construction workforce would generate general refuse comprising food scraps, waste paper, empty containers, etc. As the introduction of these wastes is likely to have detrimental effects on water quality in the area, such refuse should be properly managed so intentional or accidental release to the surrounding environment does not occur. Disposal of refuse at sites other than approved waste transfer or disposal facilities shall be prohibited. Effective collection of site wastes would be required to prevent waste materials being blown around by wind, flushed or leached into the marine environment, or creating an odour nuisance. The waste storage area should be well maintained and cleaned regularly so as to prevent from attracting pests and vermin to the work sites.

3.5.19 With the implementation of waste management practices at the site, adverse environmental impacts on potential hazard, air and odour emissions, noise, wastewater discharge, and public transport would not be expected from the storage, handling and transportation of refuse.

Mitigation of Environmental Impacts

Good Site Practices

3.5.20 It is not anticipated that adverse waste management related impacts would arise, provided that good site practices are adhered to. Recommendations for good site practices during the construction activities include:

- Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site.
- Training of site personnel in proper waste management and chemical waste handling procedures.
- Provision of sufficient waste disposal points and regular collection for disposal.
- Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.
- A recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites).

Waste Reduction Measures

3.5.21 Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:

- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.
- Encourage collection of aluminium cans, PET bottles and paper by providing separate labelled bins to enable these wastes to be segregated from other general refuse generated by the work force.
- Any unused chemicals or those with remaining functional capacity should be recycled.
- Proper storage and site practices to minimise the potential for damage or contamination of construction materials.

Construction and Demolition Materials

3.5.22 Mitigation measures and good site practices should be incorporated in the contract document to control potential environmental impact from handling and transportation of C&D material. The mitigation measures include:

- Where it is unavoidable to have transient stockpiles of C&D material within the Project work site pending collection for disposal, the transient stockpiles shall be located away from waterfront or storm drains as far as possible.
- Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric.
- Skip hoist for material transport should be totally enclosed by impervious sheeting.
- Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving a construction site.
- The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.
- The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure dust materials do not leak from the vehicle.
- All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.
- The height from which excavated materials are dropped should be controlled to a minimum practical height to limit fugitive dust generation from unloading.

3.5.23 When delivering inert C&D material to public fill reception facilities, the material shall consist entirely of inert construction waste and of size less than 250mm or other sizes as agreed with the Secretary of the Public Fill Committee. In order to monitor the disposal of the surplus C&D material at the designed public fill reception facility and to control fly tipping, a trip-ticket system as stipulated in the ETWB TCW No. 31/2004 "Trip Ticket System for Disposal of Construction and Demolition Materials" should be included as one of the contractual requirements and implemented by an Environmental Team undertaking the Environmental Monitoring and Audit work. An Independent Environmental Checker should be responsible for auditing the results of the system.

Chemical Waste

3.5.24 After use, chemical wastes (for example, cleaning fluids, solvents, lubrication oil and fuel) should be handled according to the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Spent chemicals should be collected by a licensed collector for disposal at the CWTF or other licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

General Refuse

3.5.25 General refuse should be stored in enclosed bins or compaction units separate from C&D material. A licensed waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Effective collection and storage methods (including enclosed and covered area) of site wastes would be required to prevent waste materials from being blown around by wind, wastewater discharge by flushing or leaching into the marine environment, or creating odour nuisance or pest and vermin problem.

Evaluation of Residual Environmental Impacts

3.5.26 With the implementation of the recommended mitigation measures for the handling, transportation and disposal of the identified waste arisings, no residual impact is expected to arise during the construction of the proposed DP1 Project.

Environmental Monitoring and Audit

3.5.27 Waste management will be the contractor's responsibility to ensure that all wastes produced during the construction activities are handled and disposed of in accordance with the recommended mitigation measures and EPD's regulations and requirements. The mitigation measures recommended above should form the basis of the site Waste Management Plan to be developed by the contractor in the construction stage.

Summary

3.5.28 Types of wastes generated by the DP1 Project are likely to include C&D material from construction activities, general refuse from the workforce and chemical waste from the maintenance of construction plant and equipment. Provided that these identified waste arisings are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts would not be expected during the construction phase of the DP1 Project.

3.6 Land Contamination Impact

Environmental Legislation, Policies, Plans, Standards and Criteria

3.6.1 The *"Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair /Dismantling Workshop"* (the Guidance Note) issued by the Environmental Protection Department (EPD) shall be referred to for land contamination assessment.

3.6.2 The Practice Note for Professional Persons ProPECC PN3/94 "*Contaminated Land Assessment and Remediation"* issued by the EPD was widely used as the assessment guideline for contaminated sites. The Practice Note makes reference to criteria developed in the Netherlands (the "Dutch ABC Guidelines").

3.6.3 Starting from 15 August 2007, a new guideline, Risk-based Remediation Goals (RBRGs) stipulated in the "*Guidance Note for Contaminated Land Assessment and Remediation*" (the GN) and "*Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management*", dated July 2007 (the GM) were promulgated for use. A transition period of 3 months (from 15 August to 14 November 2007) was granted, during which project proponents were free to choose either the Dutch B levels stipulated in the ProPECC PN3/94 or the RBRGs stipulated in the GN and GM are used as the assessment guidelines for their contaminated sites.

3.6.4 In the context of this EIA Report, CAPs prepared for i) Radar Station and ii) ex-Government Flying Service (GFS) building have been defined to follow the ProPECC Note No. 3/94 and adopted the Dutch ABC Guidelines as the assessment guidelines for soil and screening levels for groundwater.

3.6.5 Since the Dutch criteria were established based on the assumption that groundwater is used as potable water, it is not so appropriate to be applied directly in Hong Kong where groundwater is not generally for potable use. Hence, the Dutch B levels would be only for screening out the chemicals-of-concern (COCs) for risk assessment and are not for assessing groundwater contamination in Hong Kong.

3.6.6 A risk-based assessment would therefore be carried out for groundwater contaminants with the concentration exceeding the Dutch B level to evaluate the risks posed to the sensitive receptors. The risk-based assessment that has been adopted in U.S. Environmental Protection Agency (USEPA) takes into account concentrations of individual contaminants in groundwater, the anticipated most sensitive human receptor and the potential exposure pathways. It should be noted that risk assessment could only be undertaken for those chemicals that have a recognized oral slope factor or oral reference dose.

3.6.7 Further consideration of contamination issues is provided in Section 3 (Potential Contaminated Land Issues) of Annex 19 "*Guidelines for Assessment of Impact on Sites of Cultural Heritage and Other Impacts*" of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

Description of Environment

3.6.8 The scope of the DP1 Project is to construct the major elements of the future ground level road system namely Roads D1 to D4 within the Kai Tak Development (KTD) area. These new distributor roads will mainly serve the tourism and leisure hub development at Runway South and the new developments including Kai Tak Government Offices and public housing developments at the North Apron. The proposed alignments of the new distributor roads are shown in **Figure 1.3** and their locations are tabulated in **Table 3.29**.

Table 3.29 Summary of Locations of the New Distributor Roads

Distributor Road Section	Location
D1	Within the North Apron of the Former Kai Tak Airport
D2	Within the North Apron of the Former Kai Tak Airport
D3	Within the North Apron and Runway of the Former Kai Tak Airport
D4	Along Cheung Yip Street (Part of the alignment encroached on the area of ex-GFS building, Radar Station and EMSD Kowloon Bay Vehicle Repair & Maintenance Workshop situated on the South Apron of the Former Kai Tak Airport)

Assessment Methodology

3.6.9 In this Study, land contamination assessment in the previous EIA studies for the Kai Tak Airport North Apron Decommissioning (hereafter known as NAKTA Decommissioning EIA) (EIAO Register No: AEIAR – 002/1998 and the Environmental Permit No.: EP-006/1998), the Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development (hereafter known as SEKDCFS EIA) (EIAO Register No: AEIAR-044/2001) and Decommissioning of the Former Kai Tak Airport other than the North Apron (hereafter known as KTA Decommissioning EIA) (EIAO Register No.AEIAR-114/2007) were reviewed. Some of the findings, wherever applicable, are summarised and adopted in this assessment. A summary table of site investigation findings reviewed in these EIAs and the relevant CAP, Contamination Assessment Report and /or Remediation Action Plan (CAR/RAP) has been provided in **Table 3.30**.

3.6.10 Additional information was also obtained through desktop review to further update the findings. In addition, site reconnaissance was also carried out to identify and confirm the potential contaminative landuses within the Study Area. **Figure 3.16** summarised the previous findings on land contamination that may pose impacts on the scheduled development in this Study, which are to be further elaborated in the following sections.

Review of Previous EIA Studies

NAKTA Decommissioning EIA

3.6.11 The NAKTA Decommissioning EIA was completed in April 1998 and approved under the EIA Ordinance in September 1998. The reference of the approved report in the EIAO Register is AEIAR-002/1998.

3.6.12 The land contamination impact assessment of the NAKTA Decommissioning EIA covered the North Apron of the former Kai Tak Airport (NAKTA) and the vicinity of the NAKTA area. The assessment started with a review of the Kai Tak Airport site history including records of historical leakage from the hydrant fuel system within the airport apron. A range of land uses with potential land contamination impact was also identified.

3.6.13 A detailed site investigation within the Kai Tak Airport had been undertaken to ascertain the nature, scale and extent of possible ground contamination resulted from known leaks of aviation fuels. The investigation was carried out in two phases.

3.6.14 The Phase 1 of the investigation characterised soil gas conditions in 195 boreholes to assess indirectly the likely subsurface soil contamination levels. The survey established the extent of the aviation fuel contamination and identified some “hotspots” coinciding approximately with the locations of historical leaks of aviation fuel and also with other

sources. Elevated levels of methane and anaerobic conditions were found in some areas.

3.6.15 The Phase 2 assessment included the installation of 77 groundwater wells and the collection of soil and groundwater samples for chemical analysis. This was to confirm the extent and nature of contamination so as to formulate feasible and site-specific remediation options. Results from Phase 2 of the investigation indicated that remediation is required at some areas within the NAKTA.

3.6.16 An Environmental Permit has already been obtained for the area of North Apron. The identified contaminated areas at the NAKTA had been cleaned up during the period from 1998 to 2007 in accordance with the Environmental Permit conditions. The permit holder, the then Territory Development Department (now namely Civil Engineering and Development Department), has implemented all necessary works for decommissioning accordingly.

SEKDCFS EIA

3.6.17 The SEKDCFS EIA was completed in July 2001 and approved under the EIAO in September 2001. The reference of the approved report in the EIAO Register is AEIAR-044/2001.

3.6.18 The SEKDCFS EIA reviewed two relevant studies namely Environmental Impact Assessment for the South East Kowloon Development Feasibility Study (SEKDFS EIA) and the NAKTA Decommissioning EIA, to provide the background information for assessment of land contamination impact of the EIA study. The SEKDCFS have identified some sites within the former Kai Tak Airport, which were mainly fuel storage tanks, which were not included in the NAKTA Decommissioning EIA and suggested that land contamination assessment on these sites would be needed when the sites become accessible. In addition, a preliminary contamination assessment (review of site history) at the ex-Government Flying Service (ex-GFS) building was conducted in the SEKDCFS EIA.

3.6.19 The SEKDCFS EIA also reviewed the conditions of the urban areas outside the former Kai Tak Airport at the time of the SEKDCFS EIA study. As provided in the EIA report, these urban areas as a whole did not have a major contamination problem but for specific hotspots, which might be of potential contamination concerns. Potential contaminative landuses in the urban areas included car repair workshops (clusters found in Ma Tau Wai and Kowloon Bay), various petrol stations, Ma Tau Kok gas works, bus terminals, passenger ferry pier at Kowloon City, Electrical and Mechanical Services Department (EMSD) workshops (Sung Wong Toi Road and Cheung Yip Street) and light industries (clusters found in Kwan Tong and Kowloon Bay).

KTA Decommissioning EIA

3.6.20 The Decommissioning of the Former Kai Tak Airport other than the North Apron was completed in October 2007 and approved under the EIAO in December 2007. The reference of the approved report in the EIAO Register is AEIAR-114/2007.

3.6.21 A detailed land contamination assessment was carried out under the KTA Decommissioning EIA to review the potential environmental issues associated with land contamination and to assess the implications of land contamination associated with the former Kai Tak Airport other than the North Apron.

3.6.22 Site investigations were conducted at the South Apron area, ex-GFS apron area, runway area and a narrow strip of North Apron in the period from December 2005 to June 2007. A total of 77 boreholes and 18 trial pits were constructed to define the nature, scale and extent of possible ground contamination resulted from past and current landuses on the former Kai Tak Airport other than the North Apron.

3.6.23 Site investigations results of the EIA study indicated that some individual areas in the south apron area were contaminated with metals and/or TPH. A small area in the narrow strip of the north apron near the Kai Tak Tunnel was contaminated with SVOC (benzo(a)pyrene). In addition, the ex-GFS apron area was contaminated with metals, TPH and VOCs (ethylbenzene and xylenes). No contamination was found in the runway area.

3.6.24 As suggested in the KTA Decommissioning EIA, TPH / VOCs / SVOC contaminated soil should be treated by biopiling while metals contaminated soil should be treated by solidification / stabilization. For soil contaminated with metals and TPH, the contaminated soil should be treated by biopiling first and followed by solidification / stabilization. An environmental permit (Environmental Permit No. EP-285/2008) has been granted by EPD on 8 January 2008 to Civil Engineering and Development Department (CEDD) for the implementation of all necessary decontamination works accordingly.

Table 3.30 Summary of findings in the relevant EIA reviewed

EIA reviewed	Site Investigation Findings	Date of Approval
NAKTA Decommissioning EIA		
NAKTA Decommissioning EIA	• 195 boreholes and 77 groundwater wells were installed for soil and groundwater contamination assessment. • Land Contamination hotspots were identified. Elevated levels of methane and anaerobic conditions were found in some areas. • The identified contaminated areas at the NAKTA had been cleaned up during the period from 1998 to 2007 in accordance with the Environmental Permit conditions.	September 1998 EIAO Register: AEIAR-002/1998
CAP, CAR/RAP for South East Kowloon Development Infrastructure at North Apron Area of Kai Tak Airport	• Accessed areas within NAKTA which were not covered in NAKTA decommissioning project due to accessibility issue. • 134 boreholes were constructed for the purpose of land contamination assessment. • Remediation were found to be necessary at 15 borehole locations with soil samples contaminated with metals, Benzo(a)pyrene and Total Petroleum Hydrocarbons (TPH) exceeding Dutch B/C levels. Findings from groundwater risk assessment indicated that the risk level associated with groundwater during construction was acceptable and no remediation for groundwater would be necessary. Free product, identified at one of the groundwater sampling wells, however, required remediation. • Solidification / stabilization and biopiling were recommended as the remediation method for metal contaminated soil and organic contaminated soil respectively whereas free product recovery was recommended for groundwater remediation.	CAP: June 2003 CAR/RAP: October 2005

EIA reviewed	Site Investigation Findings	Date of Approval
Remediation Report for South East Kowloon Development Infrastructure at North Apron Area of Kai Tak Airport	• The Remediation works were conducted according to the CAR/RAP of *South East Kowloon Development Infrastructure at North Apron Area of Kai Tak Airport* under Contract No. KL39/03 approved by Environmental Protection Department (EPD), HKSAR, in 2005 • Free product found in the groundwater monitoring well was manually skimmed off. For soil remediation, cement solidification/ stabilization (CSS) was implemented for heavy metal contaminated soil and biopiling was operated for organic contaminated soil as proposed in the approved CAR/RAP. The remediation works were conducted in the period from December 2005 to March 2007.	August 2007
SEKDCFS EIA		
SEKDCFS EIA	• Reviewed SEKDFS EIA and NAKTA Decommissioning EIA. • Identified Potential contamination hotspots within former Kai Tak Airport and the vicinity.	September 2001 EIAO Register: AEIAR-044/2001
KTA Decommissioning EIA		
KTA Decommissioning EIA	• Reviewed and assessed the implications of land contamination associated with the former Kai Tak Airport other than the North Apron. • A total of 77 boreholes and 18 trial pits were constructed to define the nature, scale and extent of possible land contamination resulted from past and current landuses on the former Kai Tak Airport other than the North Apron.	December 2007 EIAO Register: AEIAR-114/2007

EIA reviewed	Site Investigation Findings	Date of Approval
CAP for Assessment of Possible Land Contamination Associated with Decommissioned Fuel Pipeline and Hydrant System at South Apron of Former Kai Tak Airport CAR/RAP for the Decommissioned Fuel Pipeline and Hydrant System at South Apron of Former Kai Tak Airport	• 2 site investigations (SI) have been conducted. For the first SI, a total of 16 boreholes and 20 trial pits were constructed with 70 soil samples and 33 water samples collected and analysed for metal, TPH, benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), chlorinated hydrocarbons and heavy metals. • For the further SI, a total of 2 boreholes and 1 trial pit have been set up for soil and groundwater sampling. A total of 7 soil samples and 2 groundwater samples were collected for TPH and/or BTEX analyses. • 9 soil samples from the first SI were found with metals and TPH exceeding Dutch B/C levels while no exceedance was found in the further SI. • Biopiling was proposed to treat organic contaminated soil while Solidification/ Stabilization treatment was recommended for metal contaminated soil. For soil contaminated with TPH and metals, biopiling would be processed followed by cement solidification/ stabilization.	CAP: January 2006 CAR/RAP: December 2007
CAP at Runway Area (including the Narrow Strip of North Apron CAR/RAP at Runway Area and the Narrow Strip of North Apron	• A total of 39 boreholes were constructed and a total of 107 soil samples and 33 groundwater samples were collected and analysed for a range of metals, BTEX, TPH, PAHs and halogenated and non-halogenated hydrocarbons. • 1 soil samples was found with benzo(a)pyrene exceeding the Dutch B level. • Biopiling was proposed for the organic contamination found.	CAP: January 2007 CAR/RAP: December 2007
Supplementary CAP at South Apron Area of Former Kai Tak Airport (ex-GFS Apron Area), CAP, CAR/RAP at South Apron Area of Former Kai Tak Airport (ex-GFS Apron Area)	• 20 boreholes were constructed and a total of 65 soil samples and 20 groundwater samples were collected and analysed for a range of metals, BTEX, TPH, PAHs and halogenated and non-halogenated hydrocarbons. • 11 soil samples was contaminated with metals, TPH and VOCs (ethylbenzene and xylenes) exceeding Dutch B/C level. • Floating free products were observed in 3 groundwater wells. • Biopiling was proposed to treat organic contaminated soil while Solidification/ Stabilization treatment was recommended for metal contaminated soil. • Free products were proposed to be skimmed off from the water surface, drummed properly and stored in a designated storage area for the collection by a licensed chemical waste collector for proper disposal.	CAP: June 2007 CAR/RAP: December 2007

Identification of Sensitive Receivers

3.6.25 Construction workers are the most likely group to be exposed to any potential contaminated materials during the construction stage. The principle exposure routes for workers include:

- Direct ingestion of contaminated soils through eating or drinking / smoking on site; and
- Dermal contact with contaminated soils.

3.6.26 There would be no sensitive receivers during the operational phase of the DP1 Project provided that remediation actions if necessary are completed.

Identification of Potential Sources of Environmental Impact

3.6.27 Based on the reviewed findings of the previous EIA studies as presented above, all the contaminated areas identified in the North Apron of the former Kai Tak Airport had been cleaned up already. In addition, under the KTA decommissioning EIA, no contamination was found in the runway area and construction works for any future development in the runway area could proceed without the need of prior decontamination. As a result, it is considered that potential land contamination impact to the construction of Roads D1, D2 and D3 is not anticipated.

3.6.28 As part of the Road D4 alignment encroaches upon the South Apron, the land contamination assessment completed under the KTA decommissioning EIA was referred. The assessment included a CAP and a CAR/RAP, covering a section of Road D4 along the South Apron.

3.6.29 The assessment indicated discrete locations of contamination with TPH and heavy metals (lead and arsenic). The contamination extent was considered relatively confined and localized, and would not interfere with the proposed alignment of Road D4. Remediation would be carried out for the identified contamination areas according to the CAR/RAP approved in December 2007. The identified contamination localities which are in the closest proximity to Road D4 are indicated in **Figure 3.16** for reference.

3.6.30 Another small section of Road D4 alignment, which crosses over with part of the ex-GFS building, the Radar Station and the EMSD Kowloon Bay Vehicle Repair & Maintenance Workshop area, land contamination is anticipated from the past and current landuses. Potential sources of contamination, including underground fuel tanks, storage of dangerous good and spent oil, and vehicle repairing and maintenance activities, etc., were identified.

3.6.31 Site investigation works have been conducted at the ex-GFS building and the Radar Station to identify the presence of source of environmental impact. The details of site investigation are summarized below.

3.6.32 A comprehensive review on the current and historical land uses and past records of dangerous goods storage and chemical waste releases was conducted to identify the potential sources of contamination in relation to the land uses of EMSD Kowloon Bay Vehicle Repair & Maintenance Workshop. The evaluation of environmental impacts is also detailed in the following paragraphs.

Site Investigation for Land Contamination Assessment

3.6.33 In order to define the nature and extent of potential land contamination impacts, site investigations have been conducted at the Radar Station and ex-GFS building. The findings of the site investigations at Radar Station and ex-GFS building are summarized in the following sections.

Fieldwork and On-site Measurements

Radar Station

3.6.34 The SI works were conducted at the Radar Station from 14 September 2007 to 9 November 2007. A total of 5 boreholes were constructed (including one re-located sampling location). Groundwater sampling was conducted at all the boreholes. The as-built locations of sampling boreholes are shown in **Figure 5.2**. A total of 19 soil samples and 5 groundwater samples were collected and analyzed for TPH, BTEX, PAHs, phenol, chlorinated hydrocarbons and metals. Since the original CAP was submitted on 3 August 2007, the Dutch criteria were referred for the assessment. Due to inaccessibility of some sampling locations, the CAP was revised and approved by EPD on 20 May 2008.

3.6.35 During the SI, no distinctive, characteristic smell of soil and groundwater sample exhibiting signs of contamination was noticeable.

Ex-GFS Building

3.6.36 The SI works were conducted at the ex-GFS building from 14 September 2007 to 16 November 2007. A total of 14 boreholes and 4 trial pits were constructed. Groundwater sampling was conducted at all sampling locations except the 4 trial pits. The as-built locations of sampling boreholes are shown in **Figure 5.2**. A total of 54 soil samples and 14 groundwater samples were collected and analyzed for TPH, BTEX, PAH, phenol, chlorinated hydrocarbons and metals. Since the original CAP was submitted on 30 August 2007, the Dutch criteria were referred for the assessment. Due to inaccessibility of some sampling locations, the CAP was revised and approved by EPD on 13 June 2008.

3.6.37 During the SI, no distinctive, characteristic smell of soil and groundwater sample exhibiting signs of contamination was noticeable.

Laboratory Results of Soil Samples

3.6.38 Laboratory analytical results of collected soil samples revealed that the major contaminants in the soil sample collected are metals (lead, copper, zinc, cadmium, nickel and cobalt), TPH, Phenanthrene, Benzo(a)pyrene, Fluoranthene and Pyrene. The as-built sampling locations with contaminants exceeding the Dutch B level are shown in **Figure 5.3**.

Radar Station

3.6.39 Among the 19 soil samples collected, no exceedances to the Dutch B levels were recorded.

Ex-GFS Building

3.6.40 Among the 54 soil samples collected, TPH, PAHs (Phenanthrene, Benzo(a)pyrene, Fluoranthene and Pyrene) and metals (copper, lead, zinc, cadmium, nickel and cobalt) were found exceeding the Dutch B/C levels. Details of the exceedances are summarized in **Table 3.31** below.

Table 3.31 Summary of Soil Samples Exceeding the Dutch B/C Levels

Sample I.D.	Depth (m BBC)	Contaminant	Dutch Level (mg/kg)		Concentration (mg/kg)	Dutch Level Exceeded
			B	C		
GFSA-17	3.25-3.7	Lead	150	600	200	>B
GFSA-18	1	Phenanthrene	10	100	14	>B
		Benzo(a)pyrene	1	10	11	>C
		Fluoranthene	10	100	19	>B
		Pyrene	10	100	17	>B
GFSA-20	1	Zinc	500	3000	2000	>B
GFSA-22	3.25-3.7	Copper	100	500	150	>B
GFSB-01	1.65	TPH	1000	5000	2875	>B
GFSD-03	1	Cadmium	5	20	6	>B
		Lead	150	600	480	>B
		Zinc	500	3000	2300	>B
	3.3-3.75	Cadmium	5	20	510	>C
		Nickel	100	500	410	>B
		Cobalt	50	300	1200	>C
GFSD-04	2.2-2.65	Cadmium	5	20	15	>B
		Lead	150	600	430	>B
	3.2-3.65	Lead	150	600	300	>B

Laboratory Results of Groundwater Samples

3.6.41 Laboratory analytical results of collected groundwater samples within the Radar Station and ex-GFS building revealed some exceedances in the Dutch screening criteria, which are tabulated in **Table 3.32**. The concerned tested parameters include TPH, Phenanthrene and metals (cadmium, cobalt, copper, lead, zinc, barium, molybdenum, mercury and chromium).

Table 3.32 Summary of Groundwater Samples Exceeding the Dutch B/C Values

Sample I.D.	GW depth (m below ground)	Contaminant	Dutch Level		Concentration (µg/L)	Dutch Level Exceeded
			B	C		
Radar Station						
RSB-01	2.24	Cadmium	2.5	10	3.2	>B
		Copper	50	200	76	>B
		Lead	50	200	1600	>C
		Zinc	200	800	700	>B
		Barium	100	500	390	>B
		TPH	200	600	2871	>C
RSB-01A	2.20	Cadmium	2.5	10	3.8	>B
		Copper	50	200	92	>B
		Lead	50	200	1300	>C
		Zinc	200	800	670	>B
		Barium	100	500	250	>B
		TPH	200	600	259	>B
RSB-02	2.18	Lead	50	200	410	>C
		Zinc	200	800	310	>B
		Barium	100	500	170	>B
		TPH	200	600	435	>B
RSB-07	2.24	Lead	50	200	210	>C
		Zinc	200	800	210	>B
RSB-08	2.28	Lead	50	200	450	>C
		Zinc	200	800	510	>B
		Barium	100	500	640	>C
		TPH	200	600	250	>B
		Phenanthrene	2	10	2.3	>B
Ex-GFS Building						
GFSA-17	2.62	Mercury	0.5	2	1.2	>B
		Molybdenum	20	100	31	>B
		TPH	200	600	231	>B
GFSA-18	2.58	Lead	50	200	77	>B
		Zinc	200	800	250	>B
		Molybdenum	20	100	21	>B
		Barium	100	500	150	>B
		TPH	200	600	327	>B
GFSA-19	2.54	Lead	50	200	72	>B
		Molybdenum	20	100	39	>B
		Barium	100	500	120	>B
GFSA-20	2.73	Barium	100	500	110	>B
GFSA-21	2.53	Chromium	50	200	64	>B
		Lead	50	200	590	>C
		Zinc	200	800	420	>B
		Barium	100	500	610	>C
GFSA-22	2.68	Chromium	50	200	57	>B
		Lead	50	200	130	>B
		Zinc	200	800	250	>B
		Barium	100	500	220	>B
GFSD-01	2.69	Copper	50	200	55	>B
		Lead	50	200	550	>C
		Zinc	200	800	480	>B

Sample I.D.	GW depth (m below ground)	Contaminant	Dutch Level		Concentration (µg/L)	Dutch Level Exceeded
			B	C		
		Barium	100	500	340	>B
		TPH	200	600	365	>B
GFSD-02	2.83	Cadmium	2.5	10	2.7	>B
		Copper	50	200	59	>B
		Lead	50	200	2100	>C
		Zinc	200	800	1000	>C
		Barium	100	500	680	>C
GFSD-03	2.63	Cadmium	2.5	10	27	>C
		Lead	50	200	240	>C
		Zinc	200	800	470	>B
		Cobalt	50	200	200	>B
		Barium	100	500	650	>C
		TPH	200	600	740	>C
GFSD-04	2.31	Cadmium	2.5	10	3	>B
		Lead	50	200	320	>C
		Zinc	200	800	290	>B
		Barium	100	500	160	>B
		TPH	200	600	369	>B

3.6.42 As discussed earlier, the Dutch values for groundwater would serve to indicate the chemicals-of-concern (COCs) for risk assessment in Radar Station and ex-GFS building. A risk-based assessment was thus carried out for parameters which exceeded the Dutch B/C levels to evaluate the risks posed to the anticipated most sensitive human receptor.

3.6.43 For a worst-case scenario, the largest contaminant concentrations in the groundwater samples would be taken as the source concentrations for the risk calculation. Exceedance of the risk-based criteria would be qualified in two tiers. For non-carcinogens, firstly, the Total Pathway Hazard Index (TPHI) that is the sum of contaminant hazard quotients exceeds one (i.e. USEPA recommended hazard index). Secondly, the largest contaminant concentration exceeds the corresponding Risk Based Screening Level (RBSL) that is derived from the recognized oral reference dose. For carcinogens, the first is the Total Carcinogenic Risk that is the sum of contaminant carcinogenic risk exceeds 1x10-6 (i.e. USEPA lifetime cancer risk level). The second is the largest carcinogenic contaminant concentration exceeds the corresponding RBSL that is derived from the recognized carcinogenic oral slope factor.

3.6.44 It is shown in **Table 3.33** that the risk due to ingestion of groundwater by construction workers is warranted. It should be noted that the risk due to dermal contact with groundwater by site workers is uncertain. It is because the risk assessment regarding dermal contact cannot be undertaken as the toxicity and / or chemical specific data for the COCs do not exist. As such, it is recommended that personnel protective equipment (PPE) be used by site workers as a mitigation measure.

Table 3.33 Evaluation of Significance of Risk Due to Groundwater Contamination

Receptor	Significance of Risk due to Groundwater Contamination	Rationale
Construction workers for decommissioning / decontamination works (by ingestion)	Significant	Existence of potential risk.
Construction workers for decommissioning / decontamination works (by inhalation)	Insignificant	Decommissioning and decontamination works would be located in the outdoor area. Also, it is recommended that personal protective equipment (PPE) should be used by site workers as a mitigation measures.
Construction workers for decommissioning / decontamination works (by dermal contact)	Uncertain	Toxicity and / or chemical specific data do not exist for the COCs for risk assessment to be undertaken. As such, it is recommended that personal protective equipment (PPE) be used by site workers as a mitigation measure.
Future land users	Insignificant	As most of the contamination in the site would be removed after the decontamination works, the soil quality would be within Dutch B level and the groundwater contamination would be much reduced. In addition, the site will be covered by filling materials / concrete. Groundwater at the site will not be used as potable water or used for recreation / irrigation purposes.
Future construction workers	Insignificant	Contaminated soil is considered as the major contributor for elevated COCs in the groundwater. As most of the contamination in the site would be removed after the decontamination works, the soil quality would be within Dutch B level and the contaminants in groundwater would be much reduced.

3.6.45 For each parameter, the source concentration chosen for the risk assessment is the maximum concentration of that parameter found in the groundwater samples irrespective of their locations. Chromium was assumed to be Cr(VI) for conservative assessment. The maximum source concentrations (of groundwater samples) of the COCs (i.e. with concentration above the screening criteria) and their corresponding non-carcinogenic oral reference doses or carcinogenic slope factor are tabulated in **Table 3.34**. It should be noted that for lead, World Health Organisation's (WHO) oral reference dose (3.6×10^{-3} mg/kg-day) was adopted for the risk assessment.

Table 3.34 Maximum Source Concentrations and Non-carcinogenic Oral Reference Doses / Carcinogenic Oral Slope Factors of Chemicals of Concern

Parameter	Source Concentration	Sample I.D.	Noncarcinogenic Oral Reference Dose[a] (RfDo)	Minimum Noncarcinogenic Oral Reference Dose[a] (RfDo)	Carcinogenic Oral Slope Factor[b] (CSFo)
	[mg/L]		[mg/kg-day]	[mg/kg-day]	1/[mg/kg-day]
TPHs	2.871	RSB-01	0.03 to 5.00	0.03	Not applicable
Barium	0.68	GFSD-02	0.07	Not applicable	Not applicable
Cadmium	0.027	GFSD-03	0.0005	Not applicable	Not applicable
Chromium*	0.064	GFSA-21	0.003	Not applicable	Not applicable
Cobalt	0.2	GFSD-03	0.02	Not applicable	Not applicable
Copper	0.092	RSB-01A	0.04	Not applicable	Not applicable
Lead	2.1	GFSD-02	0.0036	Not applicable	Not applicable
Phenanthrene	0.0023	RSB-08	0.04	Not applicable	Not applicable
Mercury	0.0012	GFSA-17	0.0003	Not applicable	Not applicable
Molybdenum	0.039	GFSA-19	0.005	Not applicable	Not applicable
Xylenes	0.03	All**	0.2	Not applicable	Not applicable
Zinc	1	GFSD-02	0.3	Not applicable	Not applicable

Remarks:
[a] Source for TPHs : *TPH Criteria Working Group, 1999. Total Petroleum Hydrocarbons Criteria Working Group Series Volume 5 – Human Health Risk-Based Evaluation of Petroleum Release Sites: Implementing the Working Group Approach. Massachusetts, U.S.A., Amherst Scientific Publishers.*
Source for Ba, Cd, Cr, Co, Cu, Hg, Mo, Zn, Phenanthrene and Xylene:*USEPA Region IX Risk-based Concentration Table (revised on Oct 04), USEPA Region IX.*
Source for Pb: The value is referenced to the tolerable daily intake (TDI) from t*he National Institute of Public Health and the Environment (RIVM), The Netherlands, 2001.*
[b] Source for TPHs, Ba, Cd, Cr, Co, Cu, Hg, Mo, Zn, Phenanthrene and Xylene: *USEPA Region IX Risk-based Concentration Table (revised on Oct 04), USEPA Region IX*.
** All sampling locations showed the same concentrations for Xylenes (i.e. 30ug/L as the Dutch B level).
* Chromium is assumed to be Cr(VI) as conservative assessment.

3.6.46 The details of risk assessment have been attached in **Appendix 5.3**. According to the results of the risk assessments, the concentrations of all COCs do not exceed the calculated "allowable" concentrations (i.e. the risk-based criteria for remediation) and thus no remediation has been proposed for groundwater.

Prediction and Evaluation of Environmental Impacts

3.6.47 Site investigations findings (including the fieldworks and laboratory analytical results) and the estimation of soil and / or groundwater contamination extent for Radar Station and ex-GFS building have been summarized in the separate CAR and/or RAP as provided in **Appendices 5.2a-b**, respectively**.**

Soil Contamination

3.6.48 Site investigations for the land contamination assessment conducted at the Study Area indicated that some areas in the ex-GFS building area was contaminated with TPH, PAHs (Phenanthrene, Benzo(a)pyrene, Fluoranthene and Pyrene) and metals (copper, lead, zinc, cadmium, nickel and cobalt).

Estimation of Soil Contamination Extent

3.6.49 The estimated quantity of contaminated soil within the ex-GFS building is provided in **Table 3.35** below and illustrated in **Figure 5.4a-b**.

Table 3.35 Location, Depth and Estimated Quantity of Contaminated Soil

Zone I.D.	Sample I.D.	Depth (m BBC)	Contaminant	Concentration (mg/kg)	Estimated Contamination Extent		
					Vertical (m BBC)^	Horizontal (m^2)^	Estimated Volume (m^3)
Exceedances found in the soil samples collected below 0m to 1m BBC							
A	GFSA-18	1	Phenanthrene	14	0.5-1.5	36	36
			Benzo(a)pyrene	11			
			Fluoranthene	19			
			Pyrene	17			
B	GFSA-20	1	Zinc	2000	0.5-1.5	36	36
C	GFSD-03	1	Cadmium	6	0.5-1.5	36	36
			Lead	480			
			Zinc	2300			
Exceedances found in the soil samples collected below 1m to 6m BBC							
D	GFSB-01	1.65	TPH	2875	1.15-2.15	36*	36
E	GFSD-04	2.2-2.65	Cadmium	15	1.7-4.15	36	88.2
			Lead	430			
		3.2-3.65	Lead	300			
F	GFSA-17	3.25-3.7	Lead	200	2.75-4.2	36	52.2
G	GFSA-22	3.25-3.7	Copper	150	2.75-4.2	36	52.2
H	GFSD-03	3.3-3.75	Cadmium	510	2.8-4.25	36	52.2
			Nickel	410			
			Cobalt	1200			
Total Volume of Estimated Contaminated Soil=388.8m^3							

Remarks:
BBC= Below Base of Existing Concrete Pavement
^The actual volume may be different and is subject to confirmatory sampling and testing to be conducted during the course of proposed remediation processes
* Due to space constraint within the D.G. Store, 6m X 6m square centred at GFSB-01 may not be feasible. The frame for excavation would have to be adjusted on site based on the actual site condition.

3.6.50 As summarized in **Table 3.36**, about 388.8m^3 of contaminated soils identified within the ex-GFS building would need to be excavated and treated. There are 2 types of contaminated soil being identified based on the nature of contaminants (i.e. metal contaminated soil and organic contaminated soil). The volumes of soil contaminated by different types of contaminants have been estimated as tabulated in **Table 3.36**

Table 3.36 Estimated Quantity of Different Type of Contaminated Soil

Land	Contaminants	
	Metals Only	TPH/SVOCs
Ex-GFS building	316.8 m^3	72 m^3
Radar Station	Nil	Nil
Total	**316.8 m^3**	**72 m^3**

Note: The actual volume may be different and is subject to confirmatory sampling and testing to be conducted during the course of proposed remediation processes.

3.6.51 Based on the findings of land contamination assessment, the extent of identified contamination within the ex-GFS building and the Radar Station as shown in **Figure 5.4a-b** does not fall within the alignment of Road D4, therefore adverse environmental impact of the ex-GFS building and the Radar Station in respect of land contamination on Road D4 is not anticipated.

3.6.52 Since some small parts of the ex-GFS building and Radar Station including the transformer room and the generator room etc. were still under operation during the previous land contamination site investigation (SI), SI at those areas was not possible due to site accessibility and safety issues. For these remaining areas with potential land contamination concerns, a supplementary land contamination SI was recommended to be carried out upon the cessation of the operations under the Kai Tak Development Project. A supplementary sampling plan providing the sampling and laboratory analysis information for the supplementary SI in these areas has been provided in the respective CAR and CAR/RAP for Radar Station and ex-GFS building respectively.

3.6.53 However, as no exceedances in Dutch B level were found among the soil samples collected in the areas surrounding the inaccessible areas in both Radar Station and ex-GFS building, contamination, if any, within those inaccessible areas are considered localized and surmountable and its impacts on the surrounding environment are considered to be minimal. It should be noted that those inaccessible areas do not fall within the alignment of Road D4 and thus any contamination identified within those inaccessible areas in the future would not affect the assessment on DP1 Project presented in this section.

3.6.54 For the EMSD Kowloon Bay Vehicle Repair & Maintenance Workshop located outside the boundary of the former Kai Tak Airport, a comprehensive review on the current and historical landuses and past records of dangerous goods storage and chemical waste releases was conducted to identify the potential sources of contamination in relation to the landuses. The review found that the operation of the EMSD Kowloon Bay Vehicle Repair / Maintenance Workshop has been ceased. The review also identified the past and current landuses of the site include vehicle repairing and maintenance activities, dangerous goods storages, waste oil storage tanks, chemical waste storage, etc. The findings of the historical land uses together with the related concerns of the potential contamination area are summarized in the following **Table 3.37**.

Table 3.37 Summary of Reviewed Information on Potential Contaminative Land Uses

Potentially Contaminative Uses	Location	Historical Land Uses	Possible/Potential Sources of Contamination
EMSD Kowloon Bay Vehicle Maintenance Workshop	Cheung Yip Street	• 1959 Open Sea • 1967: Vacant • 1973: Warehouse • 1975: Vacant • 1982: Workshop identified	• Mineral oil, flammable liquid, solvent, paint, oily sludge, acidic electrolyte and heavy metal compound have been used, stored or generated in the workshop.

3.6.55 In view of the potential contaminative landuses of the EMSD Kowloon Bay Vehicle Maintenance Workshop, EMSD as the current occupant should conduct a land contamination assessment and complete the necessary remediation prior to handing over the site to the Government for the construction of the proposed Road D4 according to relevant EPD's guidelines.

Mitigation Measures

3.6.56 For the remediation to be conducted for the land contamination areas identified in the KTA Decommissioning EIA, the mitigation measures recommended in the KTA Decommissioning EIA Report as well as those stipulated in the corresponding Environmental Permit should be implemented to control and minimize the associated environmental impacts.

3.6.57 For any excavation works at Radar Station and ex-GFS building, as the risk due to dermal contact with groundwater by site workers is uncertain, it is recommended that personnel protective equipment (PPE) be used by site workers as a mitigation measure.

3.6.58 For EMSD Kowloon Bay Vehicle Repair and Maintenance Workshop, EMSD as the current occupant should conduct a detailed land contamination investigation in accordance with the GN, GM and the Guidance Note. After the completion of the SI works, CAR shall then be compiled for assessing soil and groundwater contamination. If land contamination is confirmed, a RAP should also be drawn up to formulate necessary remedial measures. EMSD should complete all necessary remediation prior to handing over the site to Government according to the CAR/RAP endorsed by EPD.

Residual Environmental Impacts

3.6.59 After necessary remediation actions are carried out at the contaminated areas, no adverse residual environmental impact in respect of land contamination is anticipated.

Environmental Monitoring and Audit Requirements

3.6.60 Details of the environmental monitoring and audit requirements, if required, will be provided in the EM&A Manual.

Conclusion

3.6.61 The implications of land contamination associated with the new distributor roads located within the planning boundary of the KTD, are presented in this section. In general, Road D1, D2 and D3 are completely located within the North Apron and runway of the former Kai Tak Airport, while Road D4 is located along the Cheung Yip Street and encroaches upon a small part of the South Apron. The remaining section of Road D4 alignment crosses over part of the ex-GFS building, the Radar Station and the EMSD Kowloon Bay Vehicle Repair / Maintenance Workshop.

3.6.62 Based on the reviewed findings from the previous EIA studies and additional information from desktop study and site inspection, no potential land contamination associated with Roads D1 to D3 is anticipated; while potential land contamination impacts in association with Road D4 are identified.

3.6.63 Some areas of the ex-GFS building were identified with metals or organic contamination while no contamination was found in Radar Station. Based on the findings of the land contamination assessment, the extent of the identified contamination within the ex-GFS building does not fall within the alignment of the Road D4.

3.6.64 The EMSD Kowloon Bay Vehicle Repair/Maintenance Workshop is outside the boundary of the former Kai Tak Airport, a comprehensive review has been conducted to review the potential contaminative land uses which might have potential impact on the proposed Road D4. The review found that the operation of the EMSD Kowloon Bay Vehicle Repair / Maintenance Workshop has ceased. The review also identified the past and current land uses of the site include vehicle repairing and maintenance activities, dangerous goods storages, waste oil storage tanks, chemical waste storage, etc.

3.6.65 In view of the potential contaminative landuses of the EMSD Kowloon Bay Vehicle Maintenance Workshop, EMSD as the current occupant should conduct a land contamination assessment and complete the necessary remediation upon future decommissioning and prior to handing over the site to the Government for construction of the proposed DP1 Project. The land contamination assessment should follow the prevailing EPD's GN, GM and Guidance Note.

3.6.66 The proposed Road D4 alignment would encroach upon a small part of the sites of the ex-GFS building, the Radar Station and the EMSD Kowloon Bay Vehicle Repairing and Maintenance Workshop. Since the extent of the identified contamination within the ex-GFS building does not fall within the alignment of Road D4, therefore upon completion of any necessary decontamination works at the EMSD Kowloon Bay Vehicle Repairing and Maintenance Workshop, no adverse residual environmental impact in respect of land contamination on the DP1 Project is anticipated.

3.7 Impact on Cultural Heritage

Environmental Legislation and Standards

3.7.1 Legislation, Standards, Guidelines and Criteria relevant to the consideration of cultural heritage impacts under this study include the following:

- Antiquities and Monuments Ordinance
- Environmental Impact Assessment Ordinance
- Hong Kong Planning Standards and Guidelines
- Technical Memorandum on Environmental Impact Assessment Process
- Criteria for Cultural Heritage Impact Assessment

Antiquities and Monuments Ordinance

3.7.2 The Antiquities and Monuments Ordinance (the Ordinance) provides the statutory framework for the preservation of objects of historical, archaeological and palaeontological interest. The Ordinance contains the statutory procedures for the Declaration of Monuments. The proposed monument can be any place, building, site or structure, which is considered to be of public interest by reason of its historical, archaeological or palaeontological significance.

3.7.3 Under Section 6 and subject to sub-section (4) of the Ordinance, the following acts are prohibited in relation to certain monuments, except under permit:

- To excavate, carry on building works, plant or fell trees or deposit earth or refuse on or in a proposed monument or monument
- To demolish, remove, obstruct, deface or interfere with a proposed monument or monument

3.7.4 The discovery of an Antiquity, as defined in the Ordinance must be reported to the Antiquities Authority (the Authority), or a designated person. The Ordinance also provides that, the ownership of every relic discovered in Hong Kong after the commencement of this Ordinance should vest in the Government from the moment of discovery. The Authority on behalf of the Government may disclaim ownership of the relic.

3.7.5 In addition, no archaeological excavation may be carried out by any person, other than the Authority and the designated person, without a licence issued by the Authority. A licence will only be issued if the Authority is satisfied that the applicant has sufficient scientific training or experience to enable him to carry out the excavation and search satisfactorily, is able to conduct, or arrange for, a proper scientific study of any antiquities discovered as a result of the excavation and search and has sufficient staff and financial support.

Environmental Impact Assessment Ordinance

3.7.6 The Environmental Impact Assessment Ordinance (EIAO) was implemented on 1 April 1998. Its purpose is to avoid, minimise, and control the adverse impact on the environment of designated projects, through the application of the EIA process and the Environmental Permit (EP) system.

Hong Kong Planning Standards and Guidelines (HKPSG)

3.7.7 Chapter 10 of the HKPSG details the principles of conservation of natural landscape and habitats, historical buildings and archaeological sites. It also addresses the issue of enforcement. The appendices of HKPSG have also listed the legislation and administrative controls for conservation, other conservation related measures in Hong Kong, and Government departments involved in conservation.

Technical Memorandum on Environmental Impact Assessment Process

3.7.8 The general criteria and guidelines for evaluating and assessing impacts to cultural heritage are listed in Annexes 10 and 19 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The guidelines state that preservation in totality and measures for the integration of sites of cultural heritage into the proposed project will be a beneficial impact.

Criteria for Cultural Heritage Impact Assessment

3.7.9 This document, as issued by the Antiquities and Monuments Office, outlines the specific technical requirements for conducting terrestrial archaeological and built heritage impact assessments. It includes the parameters and scope for the Baseline Study, specifically desk-based research, field survey and the reporting requirements. As well, the prerequisite conditions for conducting impact assessment and mitigation measures are presented in detail.

Assessment Methodology

3.7.10 A desk-based study has been undertaken to determine the nature and history of the sites for the proposed roads. This was achieved through reference to documentary, cartographical and photographic sources. This information was used to evaluate the heritage significance of any identified built heritage resources and areas determined to have the potential to contain archaeological resources. The information was also used to assess impacts and make mitigation recommendations as required.

Evaluation of Archaeological Potential

3.7.11 A section of the proposed Road D1 is situated in an area of archaeological potential, see the map in **Figure 3.17**. The proposed Roads D2, D3 and D4 are all located in areas of recent reclamation and contain no archaeological potential.

Evaluation of Built Heritage Potential

3.7.12 The proposed Road D1 is situated along the northern and western edge of the former Kai Tak Airport. As can be seen in **Figure 3.17**, the alignment of Road D1 runs along the edge of and into the reclamation. The alignment does not run in the vicinity of any built heritage resources.

3.7.13 The proposed Roads D2, D3 and D4 are all located on reclaimed land, see geological maps in **Figure 3.17** for the approximate locations of the alignments. Yet the alignment of Roads D3 and D4 are in the vicinity of Fire Station C together with its adjacent wind pole, runway and seawall.

Impact Assessment

3.7.14 The proposed Road D1 is situated in an area of archaeological potential. The archaeological investigation recently conducted for KTD confirmed that there is no archaeological potential in the vicinity of Road D1 except the area around Trench AA3. Further archaeological investigation and rescue excavation for the area around Trench AA3 will be conducted as the mitigation recommendations for KTD. No further archaeological investigation or mitigation will be required for Road D1. Proposed Road D1 is not in the vicinity of any built heritage resources and no adverse impacts will arise from the construction of Road D1.

3.7.15 The alignment of Roads D3 and D4 are in the vicinity of Fire Station C together with its adjacent pole, runway and seawall. However, the construction of Roads D3 and Road D4 would not encroach onto the site of Fire Station C and its adjacent wind pole. Besides, the construction of Roads D3 and Road D4 would also not affect the seawall and the shape of the runway, no adverse impacts on built heritage resources will arise from the construction of Roads D3 and D4. Besides, since the proposed Roads D2, D3 and D4 are all located on reclaimed land, the construction of the proposed Roads D2, D3 and D4 will not cause any adverse impacts on archaeological resources.

Mitigation of Environmental Impacts

3.7.16 Sections of the proposed Road D1 are situated in areas of archaeological potential. These areas have been addressed in the Archaeological Investigation for the Kai Tak Development and Trenches AA3, AA4 and AA2 were conducted in the vicinity of Road D1. The findings from Trenches AA2 and AA4 confirmed that there is no archaeological potential in these areas and that further investigation will not be necessary. The findings in Trench AA3 consisted of the recovery of a large amount of Sung Dynasty pottery and further archaeological investigation of the area around Trench AA3 is recommended in **Section 12** of this EIA Report. The purpose of the further archaeological investigation will be to determine if the area around Trench AA3 contains any evidence of the demolished village of Kau Pui Shek or archaeological deposit associated with the former Sacred Hill. The objectives will be achieved through an attempt to determine the extent of any in-situ archaeological deposits similar to the findings of Trench AA3. It is also an objective of the further archaeological investigation to specify the size and location of a rescue excavation commensurate with the nature and extent of Song Dynasty remains recovered in the vicinity of Trench AA3. Upon completion of the required rescue excavation in the vicinity of Trench AA3, the area would be ready for any future development including the construction of Road D1. The further archaeological investigation and the rescue excavation for the area around Trench AA3 are the mitigation recommendations for KTD as described in **Section 12** of this EIA.

3.7.17 No further investigation for Road D1 will be required under the DP1 Project.

Evaluation of Residual Environmental Impacts

3.7.18 No residual impacts are anticipated with respect to cultural heritage resources.

Environmental Monitoring and Audit

3.7.19 Further archaeological investigation and rescue excavation for the area around Trench AA3 will be conducted as the mitigation recommendations for KTD. No mitigation will be required for the proposed DP1 Project and no EM&A requirements will be necessary.

Summary

3.7.20 The proposed Roads D1, D2, D3 and D4 are not anticipated to cause any adverse impacts to any cultural heritage resources.

References

1. Agreement No. CE 32/99 Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development (SEKDCFS): Cultural Heritage Impact (2001) Ove Arup and Partners

2. Agreement No. CE4/2004 (TP) South East Kowloon Development Comprehensive Planning and Engineering Review Stage 1: Planning Review (Feasibility Study), (2006) City Planning – Maunsell Joint Venture

3. Hong Kong Geological Survey Sheet 11 (Hong Kong and Kowloon: Solid and Superficial Geology) Series HGM20, Scale 1: 20 000, Geotechnical Control Office Hong Kong 1986.

3.8 Landscape and Visual Impact

Environmental Legislation, Policies, Plans, Standards and Criteria

3.8.1 The following legislation, standards and guidelines are applicable to the evaluation of landscape and visual impacts associated with the construction and operation of the DP1 Project:

- Environmental Impact Assessment Ordinance (Cap.499.S.16) and the Technical Memorandum on EIA Process (EIAO-TM), particularly Annexes 10 and 18;
- Town Planning Ordinance (Cap 131);
- EIAO Guidance Note 8/2002;
- ETWB TCW No. 10/2005 - Planting on Footbridges and Flyovers;
- ETWB TCW No. 2/2004 - Maintenance of Vegetation and Hard Landscape Features, and Tree Preservation;
- ETWB TCW No. 29/2004 - Registration of Old and Valuable Trees, and Guidelines for their Preservation;
- ETWB TCW No. 3/2006 - Tree Preservation;
- ETWB TCW No. 36/2004 - Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS);
- Hong Kong Planning Standards and Guidelines;
- Land Administration Office Instruction (LAOI) Section D-12 - Tree Preservation;
- Study on Landscape Value Mapping of Hong Kong;
- WBTC No. 25/92 - Allocation of Space for Urban Street Trees; and
- WBTC No. 7/2002 - Tree Planting in Public Works.

3.8.2 Reference has also been made to the following studies:

- Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development; and
- Kai Tak Planning Review.

3.8.3 In addition, reference has been made to the following OZP:

- Approved Kai Tak (KPA22) Outline Zoning Plan no. S/K22/2 (6.11.2007);
- Approved Ngau Chi Wan (KPA 12) Outline Zoning Plan no. S/K12/16 (2.11.2004);
- Approved Ngau Tau Kok and Kowloon Bay (KPA 13 & 17) Outline Zoning Plan No.S/K13/25 (12. 9.2006);
- Approved Tsz Wan Shan, Diamond Hill & San Po Kong (KPA 11) Outline Zoning Plan No. S/K11/23 (22.08.2008);
- Approved Wang Tau Hom & Tung Tau (KPA 8) Outline Zoning Plan No. S/K8/17 (12.4.2005);
- Draft Kwun Tong (South) (KPA 14 Pt.) Outline Zoning Plan No. S/K14S/15 (5.10.2007);
- Draft Ma Tau Kok (KPA 10) Outline Zoning Plan No. S/K10/19 (18.01.2008); and
- Draft Hung Hom (KPA9) Outline Zoning Plan No. S/K9/21 (29.02.2008).

Assessment Methodology

3.8.4 Landscape and visual impacts have been assessed separately for the construction and operation phases.

3.8.5 The assessment of landscape impacts has involved the following procedure.

- ***Identification of the baseline landscape resources (physical and cultural) and landscape characters found within the study area.*** This is achieved by site visit and desktop study of topographical maps, information databases and photographs.

- ***Assessment of the degree of sensitivity to change of the landscape resources.*** This is influenced by a number of factors including whether the resource/character is common or rare, whether it is considered to be of local, regional, national or global importance, whether there are any statutory or regulatory limitations/ requirements relating to the resource, the quality of the resource/character, the maturity of the resource, and the ability of the resource/character to accommodate change.

The sensitivity of each landscape feature and character area is classified as follows:

High: Important landscape or landscape resource of particularly distinctive character or high importance, sensitive to relatively small changes.

Medium: Landscape or landscape resource of moderately valued landscape characteristics reasonably tolerant to change.

Low: Landscape or landscape resource, the nature of which is largely tolerant to change.

- ***Identification of potential sources of landscape impacts.*** These are the various elements of the construction works and operational procedures that would generate landscape impacts.

- ***Identification of the magnitude of landscape impacts.*** The magnitude of the impact (or magnitude of change) depends on a number of factors including the physical extent of the impact, the landscape and visual context of the impact, the compatibility of the project with the surrounding landscape; and the time-scale of the impact - i.e. whether it is temporary (short, medium or long term), permanent but potentially reversible, or permanent and irreversible. Landscape impacts have been quantified wherever possible.

The magnitude of landscape impacts is classified as follows:

Large: The landscape or landscape resource would suffer a major change.

Intermediate: The landscape or landscape resource would suffer a moderate change.

Small: The landscape or landscape resource would suffer slight or barely perceptible changes.

Negligible: The landscape or landscape resource would suffer no discernible change.

- ***Identification of potential landscape mitigation measures.*** These may take the form of adopting alternative designs or revisions to the basic engineering and architectural design to prevent and/or minimize adverse impacts; remedial measures such as colour and textural treatment of building features; and compensatory measures such as the implementation of landscape design measures (e.g. tree planting, creation of new open space etc) to compensate for unavoidable adverse impacts and to attempt to generate potentially beneficial long term impacts. A programme for the mitigation measures is provided. The agencies responsible for the funding, implementation, management and maintenance of the mitigation measures are identified.

- ***Prediction of the significance of landscape impacts before and after the implementation of the mitigation measures.*** By synthesizing the magnitude of the various impacts and the sensitivity of the various landscape resources it is possible to categories impacts in a logical, well-reasoned and consistent fashion. **Table 3.38** shows the rationale for dividing the degree of significance into four thresholds, namely insubstantial, slight, moderate, and substantial, depending on the combination of a negligible-small-intermediate-large magnitude of impact and a low-medium-high degree of sensitivity of landscape resource/character.

- ***Prediction of Acceptability of Impacts*****.** An overall assessment of the acceptability, or otherwise, of the impacts according to the five criteria set out in Annex 10 of the EIAO-TM.

Table 3.38 Relationship between Receptor Sensitivity and Impact Magnitude in Defining Impact Significance

Magnitude of Impact ((Both Adverse and Beneficial Impact are accessed.))	**Large**	Slight / Moderate	Moderate / Substantial	Substantial
	Intermediate	Slight / Moderate	Moderate	Moderate / Substantial
	Small	Insubstantial / Slight	Slight / Moderate	Slight / Moderate
	Negligible	Insubstantial	Insubstantial	Insubstantial
		Low	**Medium**	**High**
		Receptor Sensitivity (of Landscape Resource, Landscape Character Area or VSRs)		

Note: All impacts are Adverse unless otherwise noted with Beneficial.

3.8.6 The assessment of visual impacts has involved the following procedures.

- ***Identification of the Zones of Visual Influence during the construction and operation phases of the project.*** This is achieved by site visit and desktop study of topographic maps and photographs, and preparation of cross-sections to determine visibility of the project from various locations.

- ***Identification of the Visually Sensitive Receivers (VSRs) within the ZVIs at construction and operation phases.*** These are the people who would reside within, work within, play within, or travel through, the ZVIs.

- ***Assessment of the degree of sensitivity to change of the VSRs.*** Factors considered include:

  - the type of VSRs, which is classified according to whether the person is at home, at work, at play, or travelling. Those who view the impact from their homes are considered to be highly sensitive as the attractiveness or otherwise of the outlook from their home will have a substantial effect on their perception of the quality and acceptability of their home environment and their general quality of life. Those who view the impact from their workplace are considered to be only moderately sensitive as the attractiveness or otherwise of the outlook will have a less important, although still material, effect on their perception of their quality of life. The degree to which this applies depends on whether the workplace is industrial, retail or commercial. Those who view the impact whilst taking part in an outdoor leisure activity may display varying sensitivity depending on the type of leisure activity. Those who view the impact whilst travelling on a public thoroughfare will also display varying sensitivity depending on the speed of travel.

  - other factors which are considered (as required by EIAO GN 8/2002) include the value and quality of existing views, the availability and amenity of alternative views, the duration or frequency of view, and the degree of visibility.

The sensitivity of VSRs is classified as follows:

High: The VSR is highly sensitive to any change in their viewing experience.

Medium: The VSR is moderately sensitive to any change in their viewing experience.

Low: The VSR is only slightly sensitive to any change in their viewing experience.

- ***Identification of relative numbers of VSRs.*** This is expressed in term of whether there are many, medium, few VSRs in any one category of VSR.

- ***Identification of potential sources of visual impacts.*** These are the various elements of the construction works and operation that would generate visual impacts.

- ***Assessment of the potential magnitude of visual impacts***. Factors considered include
  - the compatibility with the surrounding landscape,
  - the duration of the impact,
  - the reversibility of the impact,
  - the scale of the impact and distance of the source of impact from the viewer, and
  - the degree of visibility of the impact, and the degree of which the impact dominates the field of vision of the viewer.

The magnitude of visual impacts is classified as follows:

Large: The VSRs would suffer a major change in their viewing experience.

Intermediate: The VSRs would suffer a moderate change in their viewing experience.

Small: The VSRs would suffer a small change in their viewing experience.

Negligible: The VSRs would suffer no discernible change in their viewing experience.

- ***Identification of potential visual mitigation measures.*** These may take the form of adopting alternative designs or revisions to the basic engineering and architectural design to prevent and/or minimize adverse impacts; remedial measures such as colour and textural treatment of building features; and tree planting to screen the roads and associated bridge structures. A programme for the mitigation measures is provided. The agencies responsible for the implementation, management and maintenance of the mitigation measures are identified.

- ***Prediction of the significance of visual impacts before and after the implementation of the mitigation measures.*** By synthesizing the magnitude of the various visual impacts and the sensitivity of the VSRs, and the numbers of VSRs that are affected, it is possible to categorize the degree of significance of the impacts in a logical, well-reasoned and consistent fashion. **Table 3.38** shows the rationale for dividing the degree of significance into four thresholds, namely, insubstantial, slight, moderate and substantial, depending on the combination of a negligible-small-intermediate-large magnitude of impact and a low-medium-high degree of sensitivity of VSRs. Consideration is also given to the relative numbers of affected VSRs in predicting the final impact significance - exceptionally low or high numbers of VSRs may change the result that might otherwise be concluded from **Table 3.38**.

The significance of visual impacts is categorized as follows:

Substantial:	Adverse / beneficial impact where the proposal would cause significant deterioration or improvement in existing visual quality.
Moderate:	Adverse / beneficial impact where the proposal would cause a noticeable deterioration or improvement in existing visual quality.
Slight:	Adverse / beneficial impact where the proposal would cause a barely perceptible deterioration or improvement in existing visual quality.
Insubstantial:	No discernible change in the existing visual quality.

- ***Prediction of Acceptability of Impacts.*** An overall assessment of the acceptability, or otherwise, of the impacts according to the five criteria set out in Annex 10 of the EIAO-TM.

3.8.7 Funding, implementation, management and maintenance of the mitigation proposals will be resolved according to the principles in EIAO-TM, ETWB TCW No. 2/2004 and 3/2006. All mitigation proposals in this report are practical and achievable within the known parameters of funding, implementation, management and maintenance. The suggested agents for the funding and implementation (and subsequent management and maintenance, if applicable) are indicated in **Table 3.44 and 3.45** included in the report.

Scope and Content of the Study

3.8.8 Scope and content of the study refer to **Section 3.1**. The DP1 Project is part of the KTD Project. As required by the EIA Study Brief, the area for the landscape impact assessment shall include all area within 500 metres from the boundary of the scope of the DP1 Project whilst the area for visual impact assessment shall be defined by the visual envelope from the Project and associated works.

Baseline Study

3.8.9 Baseline Study on Landscape Resources during the Construction and Operation Phase are shown in Figure 3.21A and 3.21B respectively. Key Existing and Planned Landscape Resources identified within the Study Areas are described below.

Physical Landscape Resources

Topography

3.8.10 The landform in the landscape study area which is the former Kai Tak Airport comprises flat reclaimed land with no features of topographical interest or value.

Ridgeline

3.8.11 The Ridgeline of the Kowloon Hills to the north of the southern areas of Kowloon provides a dramatic natural backdrop to the high-rise urban areas of Kowloon. The ridgeline is a physical landscape resource as well as a key visual resource in South East Kowloon. The ridgeline is partially breached by the existing high-rise developments particularly in Lam Tin, Sau Mau Ping and Ngau Tau Kok. Views to the natural ridgeline shall be preserved as far as possible particular from the strategic vantage points at Quarry Bay Park, Hong Kong Convention and Exhibition Centre New Wing, and Sun Yat Sen Memorial Park viewing from Hong Kong Island.

Victoria Harbour

3.8.12 Victoria Harbour is a unique public asset and natural heritage of Hong Kong, its preservation is for the benefit of the current generation as well as the future ones. This is considered to be of high value and sensitivity.

Drainage

3.8.13 There are no natural drainage features in the study area. The section of Kai Tak Nullah runs through the centre of the site and currently has little inherent landscape value.

Soil

3.8.14 The study area is the former Kai Tak Airport which primarily consists of concrete surface. There is no soil material which is of landscape interest and value.

Open Spaces

3.8.15 The study area is a densely urbanized area with limited open space which has significant amenity value. Approximately 11 nos. public open spaces with a total area of 18.5ha are identified, varying from small rest gardens, playgrounds, to large parks such as Kowloon Walled City Park and Hoi Sham Park. In general, within a densely urbanized area, all public open spaces are considered to be of high value and sensitivity due to their importance as landscape resources within the city.

Existing Trees

3.8.16 Broad brush tree survey has been carried out within the study area as show in **Figure 13.2A**. Within the study area, there are approximately 4,300 no. of trees. Tree species include *Acacia confusa*, *Ailanthus fordii*, *Aleurites moluccana*, *Araucaria heterophylla*, *Archontophoenix alexandrae*, *Bauhinia blakeana*, *Bombax ceiba*, *Bauhina variegata*, *Callistemon viminalis*, *Caryota ochlandra*, *Cassia siamea*, *Cassia surattensis*, *Casuarina equisetifolia*, *Celtis sinensis*, *Chrysalidocarpus lutescens*, *Cycas revoluta*, *Delonix regia*, *Eucalyptus citriodor*, *Eculyptus robusta*, *Erythrina variegata*, *Ficus altissima*, *Ficus benjamina*, *Ficus elastica*, *Ficus microcarpa*, *Ficus virens* var. *sublanceolata*, *Hibiscus tilaceus*, *Juniperus chinensis* cv. *Kaizuca*, *Lagerstroemia speciosa*, *Leucaena leucocephala*, *Livistona chinensis*, *Macaranga tanarius*, *Melaleuca quinquenervia*, *Michelia* x *alba*, *Morus alba*, *Phoenix roebelenii*, *Plumeria rubra* and *Roystonea regia.* Many of the trees are found within LCSD open spaces. They are in general of medium to high amenity value and sensitivity to change. Trees found within the former airport site are in low to medium amenity value and small in size. None of these trees are OVT nor Champion Trees.

Human Landscape Resources

Cultural Features

3.8.17 The current Hong Kong Aviation Club Buildings were first built in 1958 and then subsequently expanded in 1974 and consist of a hangar, workshops and club building. The buildings were formerly part of the Far East Flying Training School and were sold to the Aviation Club in 1983. The Far East Flying Training School was established in 1943 and moved to the Sung Wong Toi Road in 1958. The Aviation Club Buildings will be preserved under the proposed the KTD proposed development.

Historical Features

3.8.18 Song Wong Toi Inscription Rock was originally situated at the top of the Sacred Hill and is associated with the last emperor of the Sung Dynasty. On expansion of the airport it was moved to the Sung Wong Toi Garden to the north of Olympic Avenue, retaining its view corridor to Lei Yue Mun. The Sung Wong Toi Inscription Rock will not be affected by the infrastructure work of KTD. However, whether the Sung Wong Toi Inscription Rock will be relocated to the new Sung Wong Toi Park in KTD will be subject to future consideration by the project proponent of the new Sung Wong Toi Park.

3.8.19 The baseline landscape resources (primarily existing open spaces and trees) which will be potentially affected by the development, together with their sensitivity to change and ability to accommodate changes are described in **Table 3.39**. The locations of baseline landscape resources during construction and operation phase are mapped in **Figure 3.21A** and **3.21B** respectively. Photo views illustrating landscape resources are illustrated in **Figure 13.2.1** to **13.2.8** inclusive.

Planned Landscape Resources

3.8.20 Planned Landscape Resources as shown in Figure 3.21B, primarily open spaces, as proposed part of the KTD are also included in the baseline resources during construction phase. The impact on these planned landscape resources are also assessed in this Schedule 2 LVIA.

Landscape Character Areas

3.8.21 Landscape character zones have been identified within the Study Area in accordance with the Study on Landscape Value Mapping of Hong Kong. Landscape Character Areas identified during Construction and Operation are described in **Table 3.39** and illustrated in **Figure 3.22A and 3.22B**. Photo views illustrating the landscape character areas within the study area are illustrated in **Figure 13.3.1** to **13.3.3** inclusive.

3.8.22 KTD is further sub-divided in a number of sub-district in accordance with the land use and district identity. Therefore, during the operation phase, the LCA01 will be further sub-divided into a number of small LCAs as shown in **Figure 3.22B** in accordance with the sub-district identity and the impact on these LCAs due to DP1 is assessed.

Table 3.39 Landscape Resources / Landscape Character Areas and Their Sensitivity to Change

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
Existing Landscape Resources		
LR01	**Olympic Garden** This is a public local open space (~ 0.7ha) at the west end of the PERE and located under existing flyover network of Kowloon City, containing seating areas and planting beds. It is a popular resting and gathering place for local residents. Ornamental tree and shrub planting are provided throughout the open space. There are more than 100 trees with height around 4-13 m, spread 2-10 m, trunk diameter 120-500 mm. Species include *Bauhinia blakeana*, *Callistemon viminalis*, *Chrysalidocarpus lutescens*, *Ficus microcarpa*, *Lagerstroemia speciosa* and *Roystonea regia*.	High
LR02	**Sung Wong Toi Garden** This is a formal public open space (~ 0.4ha) where the Emperor's Rock is kept comprising formal clipped hedgerows and screen tree planting along the periphery of the open space. There are approximately 30 mature trees with height around 4-8 m, spread 3-10 m, trunk diameter 150-700 mm. Species include *Aleurites moluccana*, *Casuarina equisetifolia*, *Ficus microcarpa*, *Livistona chinensis* and *Macaranga tanarius*.	High
LR03	**Sung Wong Toi Playground** This is a public open space (~ 0.9ha) comprising basketball courts, meandering footpaths, seating areas and ornamental tree and shrub planting. There are more than 100 trees with height around 4-13 m, spread 2-8 m, trunk diameter 120-450 mm. Species include *Bauhinia blakeana*, *Bombax ceiba*, *Casuarina equisetifolia*, *Delonix regia* and *Ficus virens* var. *sublanceolata*.	High
LR04A	**Rest Garden near Nga Tsin Wai Road** The Rest Garden is a local open space (~ 0.2ha) with lush trees and shrub planting. It consists of children's play equipment and seating areas under tree shade primarily for passive recreation. There are approximately 10 mature trees with height around 4-8 m, spread 2-10 m, trunk diameter 300-750 mm. Species include *Aleurites moluccana* and *Ficus microcarpa*.	High
LR04B	**Amenity area near Sha Po Road** The amenity area consists of 26 trees of medium size and amenity value. The height of trees is around 5-6 m, spread 3 m, trunk diameter 150-200 mm. The species are mostly *Bauhinia blakeana*.	Medium

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LR05	**Shek Ku Lung Road Playground** This is an open space (~1.4ha) with predominantly hard surface primarily for active recreation provision. Five-a-side football pitches and tennis courts are the main elements in the open space. Seating areas are also provided. There are more than 330 trees with height around 4-9 m, spread 3-8 m, trunk diameter 150-600mm. Species include *Acacia confusa*, *Ailanthus fordii*, *Bauhinia blakeana*, *Bombax ceiba*, *Cassia surattensis*, *Delonix regia*, *Erythrina variegata*, *Ficus microcarpa*, *Macaranga tanarius*, *Melaleuca quinquenervia*, *Michelia* x *alba* and *Plumeria rubra*.	High
LR06	**Argyle Street Playground** This is an open space (~ 0.8ha) with predominantly hard surface primarily for active recreation provision. Football pitches are the main elements in the open space. Seating areas are also provided at the northern side of the playground. There are approximately 20 trees with height around 4-7 m, spread 3-10 m, trunk diameter 180-400 mm. Species include *Delonix regia* and *Lagerstroemia speciosa*.	High
LR07	**Trees in the Amenity Areas near Kai Fuk Road** There are approximately 760 trees found in the Amenity Areas near Kwun Tong Road with height around 4-5 m, spread 2 m, trunk diameter 100-180 mm. The amenity value of these trees is considered as medium. Predominant species consist of *Acacia confusa*, *Celtis sinensis*, *Casuarina equisetifolia*, *Ficus microcarpa*, *Hibiscus tiliaceus*, *Macaranga tanarius* and *Melaleuca quinquenervia*.	Medium
LR08	**Kai Tak East Playground** This is an open space (~ 1.4ha) with an indoor playground and predominantly hard surface for active recreation provision. There is an indoor game hall at the southeast of the playground. Football pitches and basketball courts are the main elements in this open space. Seating areas are provided along both sides of these pitches. There are 40 trees primarily along the periphery of the open space. Some trees are mature. The height of trees is around 3-11 m, spread 2-9 m, trunk diameter 100-600 mm. Species include *Acacia confusa*, *Ailanthus fordii*, *Aleurites moluccana*, *Bauhinia blakeana*, *Bombax ceiba*, *Delonix regia*, *Ficus microcarpa* and *Melaleuca quinquenervia*.	High

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LR09	**To Kwa Wan Recreation Ground** This is an open space (~ 2.8ha) with predominantly hard surface primarily for active recreation provision. There are approximately 150 trees in these amenity areas with height around 3-13 m, spread 2-7 m, trunk diameter 120-500 mm. Species include *Aleurites moluccana*, *Araucaria heterophylla*, *Bauhinia blakeana*, *Chrysalidocarpus lutescens*, *Juniperus chinensis* cv. *Kaizuca*, *Macaranga tanarius*, *Michelia* x *alba* and *Roystonea regia*.	High
LR11	**Kowloon Walled City Park and Carpenter Road Park** Kowloon Walled City Park is a one of the most historic sites in Kowloon. It is a regional open space (~ 3.3ha) in early Qing Dynasty style. The park consists of a mix of active and passive recreation in a tree and shrub landscape setting. It is a popular park for local residents and tourists. There are more than 350 trees of high amenity value with height around 4-10 m, spread 2-8 m, trunk diameter 200-700 mm. Species include *Aleurites moluccana*, *Bauhinia blakeana*, *Bombax ceiba*, *Delonix regia*, *Ficus microcarpa*, *Juniperus chinensis* cv. *Kaizuca*, *Lagerstroemia speciosa*, *Macaranga tanarius*, *Melaleuca quinquenervia*, *Michelia* x *alba* and *Roystonea regia*. Carpenter Road Park is a regional open space (~ 5.4 ha). The park provides active recreation with cycle track and passive recreation in a tree and shrub landscape setting. There are more than 150 trees of high amenity value with height around 4-8 m, spread 2-8 m, trunk diameter 200-500 mm. Predominate species include *Aleurites moluccana*, *Ficus microcarpa*, *Juniperus chinensis* cv. *Kaizuca* and *Roystonea regia*.	High
LR17	**Trees near Aviation Club Buildings** There are approximately 32 mature trees at the periphery of the development boundary along Song Wong Toi Road with height around 4-13 m, spread 3-7 m, trunk diameter 180-350 mm. The amenity value of these trees is considered as high. Predominant species consist of *Aleurites moluccana*, *Casuarina equisetifolia*, *Delonix regia*, *Ficus microcarpa*, *Macaranga tanarius* and *Morus alba*.	High
LR18	**Trees at the periphery of existing lot boundary along Sung Wong Toi Road** There are approximately 10 semi-mature/mature trees at the periphery of the existing lot boundary along Sung Wong Toi Road with height around 3-9 m, spread 3-10 m, trunk diameter 200-500 mm. The amenity value of these trees is considered as medium. Predominant species consist of *Bauhinia blakeana*, *Delonix regia, Ficus microcarpa*, *Macaranga tanarius*, *Michelia* x *alba* and *Phoenix roebelenii*.	Medium

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LR19	**Trees in the Amenity Areas along Sung Wong Toi Road** There are approximately 19 trees found in the Amenity Areas near the Ventilation Building of the Airport Tunnel along Sung Wong Toi Road with height around 3-12 m, spread 2-8 m, trunk diameter 150-500 mm. Predominant species consist of *Acacia confusa*, *Aleurites moluccana*, *Bauhinia blakeana*, *Ficus microcarpa* and *Phoenix roebelenii*.	Medium
LR20	**Trees in Amenity Areas of the interchange near Kwun Tong Road** There are approximately 30 trees found in the Amenity Areas near Kwun Tong Road with height around 4-9 m, spread 3-5 m, trunk diameter 120-300 mm. The amenity value of these trees is considered as medium. Predominant species consist of *Aleurites moluccana*, *Bauhinia blakeana, Bombax ceiba*, *Casuarina equisetifolia Ficus microcarpa*, *Leucaena leucocephala*, *Macaranga tanarius* and *Melaleuca quinquenervia*.	Medium
LR21	**Existing trees along the runway** There are more than 830 trees along runway. All the trees are immature mostly with height around 2-7 m, spread 1-4 m, trunk diameter 100-250 mm. The amenity value of these trees is considered as low. Species include *Casuarina equisetifolia*, *Chrysalidocarpus lutescens*, *Eucalyptus citriodora*, *Ficus benjamina*, *Ficus microcarpa*, *Hibiscus tiliaceus* and *Macaranga tanarius*.	Low
LR22	**Trees in Amenity Areas near the Interchange in Kowloon Bay** There are more than 510 existing trees in the amenity areas near the interchange in Kowloon Bay with height around 4-13 m, spread 2-7 m, trunk diameter 150-350 mm. The amenity value of these trees is considered as medium. Predominant species are *Aleurites moluccana*, *Bauhinia blakeana*, *Casuarina equisetifolia*, *Leucaena leucocephala* and *Melaleuca quinquenervia*.	Medium
LR23	**Trees in Amenity Areas of San Po Kong Interchange** There are approximately 38 trees in the amenity areas of San Po Kong Interchange with height around 4-8 m, spread 2-5 m, trunk diameter 150-300 mm. The amenity value of these trees is considered as medium. Species include *Ailanthus fordii*, *Callistemon viminalis*, *Cycas revoluta*, *Erythrina variegata*, *Lagerstroemia speciosa*, *Livistona chinensis* and *Phoenix roebelenii*.	Medium

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LR24	**Trees in Amenity Area near Rhythm Garden** There are approximately 30 trees in the amenity area adjacent to the internal road of Rhythm Garden with height around 4-8 m, spread 3-7 m, trunk diameter 150-400 mm. The amenity value of these trees is considered as medium. Predominant species include *Acacia confusa*, *Aleurites moluccana*, *Bombax ceiba*, *Caryota ochlandra*, *Casuarina equisetifolia*, *Delonix regia*, *Eucalyptus robusta*, *Ficus altissima*, *Ficus elastica*, *Ficus microcarpa*, *Lagerstroemia speciosa* and *Melaleuca quinquenervia*.	Medium
LR25	**Trees near Grand Waterfront** There are approximately 30 mature trees in the amenity areas near Grand Waterfront of height around 4-7 m, spread 3-7 m, trunk diameter 150-350 mm. The amenity value of these trees is considered as high. The species are mostly *Bombax ceiba* and *Melaleuca quinquenervia*.	High
LR26	**Trees in Amenity Areas of Choi Hung Road PTI** There are approximately 20 mature trees in the amenity planting beds and tree pits (~ 0.2ha) in the PTI. The height of trees is around 4-13 m, spread 3-10 m, trunk diameter 200-550 mm. The amenity value of these trees is considered as medium. Predominant species consist of *Acacia confusa*, *Bombax ceiba*, *Callistemon viminalis*, *Casuarina equisetifolia*, *Delonix regia*, *Ficus microcarpa*, *Ficus virens* and *Macaranga tanarius*.	Medium
LR27	**Trees in planned open space near Rhythm Garden** There are approximately 73 mature trees in the planned open space adjacent to Rhythm Garden with height around 4-10 m, spread 2-7 m, trunk diameter 150-450 mm. Some of the existing trees are found dead. In general, the amenity value of these trees is considered as medium. Predominant species consist of *Bombax ceiba*, *Delonix regia*, *Cassia surattensis*, *Casuarina equisetifolia*, *Ficus elastica* and *Macaranga tanarius*.	Medium
LR28	**Trees in North Apron of Former Airport** There are more than 500 trees in the amenity areas and on the podium near Kai Tak Government Building with height around 3-12 m, spread 2-6 m, trunk diameter 150-400 mm. The amenity value of these trees is considered as medium. Predominant species consist of *Aleurites moluccana*, *Archontophoenix alexandrae*, *Bauhinia blakeana*, *Caryota ochlandra*, *Cassia siamea, Delonix regia*, *Ficus microcarpa*, *Livistona chinensis* and *Phoenix roebelenii*.	Medium

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LR29	**Hoi Bun Road Park** This is an open space (~ 1.2ha) in the context of the surrounding industrial areas. Tree and shrub planting and sitting out area are provided. There are around 120 trees of common species with height around 3-11 m, spread 2-7 m, trunk diameter 200-350 mm. Predominant species include *Acacia confusa*, *Aleurites moluccana*, *Bauhinia variegata*, *Caryota ochlandra*, *Delonix regia*, *Ficus microcarpa*, *Livistona chinensis* and *Melaleuca quinquenervia*. A few of the trees are mature but most are of small to medium size.	High
LR31A	**Kai Tak Nullah** An open drainage channel running through the centre of the site with littlie landscape value.	Low
LR31B	**Victoria Harbour** It is a recognised and distinctive feature of Hong Kong worldwide, both as a tourist attraction and working port. The Harbour forms a centrepiece of the Hong Kong setting, with the airport runway forming a unique coastline to it.	High
Planned Landscape Resources		
LR32	**Planned Runway Park** It is a planned regional open space with an aviation theme next to the Cruise Terminal at Tourism and Leisure Hub.	High
LR33	**Planned Metro Park** It is a planned regional open space at the heart of KTD which connects the Sports Hub and Runway Princint.	High
LR34	**Planned Multi-purpose Stadium Complex Plaza** It is a planned landscape plaza at the Multi-purpose Stadium Complex which connect the Kai Tak City Centre and the Metro Park.	High
LR35	**Planned Sung Wong Toi Park** It is a planned district open space with an Sung Dynasty Theme at the Sports Hubs close to the hinterland.	High
LR36	**Planned Station Square** It is a planned open plaza outside the Kai Tak Station which interacts the commencial and residential uses at the Kai Tak City Centre.	High
LR38	**Planned Chinese Cultural Garden** It is a planned open space along the waterfront at Ma Tau Kok forms part of waterfront promenade at KTD.	High

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LR39	**Planned Promenade** It is a planned waterfront open space forms a promenade from Ma Tau Kok to Cha Kwo Ling.	High
Existing Landscape Character Areas		
LCA01	**Former Kai Tak Airport Landscape Character Area** This comprises the former Kai Tak Airport where the future development is to be located. This area is flat, open, primarily hard standing with a few existing buildings that relate to the use of the former airport at the north. The area is currently occupied by various parties for different temporary uses.	Low
LCA02	**Kowloon City and To Kwa Wan Grid Mixed Urban Landscape** This is an area of primarily mixed residential / commercial use. This comprises a mix of low to high buildings for residential and commercial uses. The streetscape is utilitarian with no soft or little landscape treatment.	Medium
LCA03	**Kowloon Bay Late 20C / Early 21C Commercial / Residential Complex Landscape** This is an area of primarily mixed residential / commercial use. This comprises a mix of low to high buildings for residential, commercial uses. The streetscape is utilitarian with no soft or little landscape treatment.	Medium
LCA04	**San Po Kong Industrial Urban Landscape** This is an area of industrial use. This comprises medium rise industrial buildings. Some of the low rise industrial buildings have been demolished for future development. The Planning Consultancy Study for San Po Kong Flatted Factory is under studied. The streetscape is utilitarian with no soft landscape treatment.	Low
LCA05	**Kwun Tong Industrial Urban Landscape** This is an area of industrial use. This comprises medium to high rise industrial buildings. The streetscape is utilitarian with no soft landscape treatment.	Low
LCA06	**Kowloon City and Choi Hung Residential Urban Landscape** This is an area of residential use. This comprises a mix of low to high rise buildings for residential uses. The streetscape is utilitarian with no soft or little landscape treatment.	Medium
LCA08	**Kwun Tong Typhoon Shelter Landscape** This is an area for typhoon shelter use in Kwun Tong. It is substantially enclosed by coast and offshore breakwater.	Low

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LCA09	**To Kwa Wan Typhoon Shelter Landscape** This is an area for typhoon shelter use in To Kwa Wan. It is substantially enclosed by coast and offshore breakwater.	Low
LCA11	**Victoria Harbour Inshore Water Landscape** This is an area of coastal water lying close to the shore and enclosed to a certain degree by landmasses or islands, which create a limited sense of enclosure or containment. Whilst the landscape is characterized predominantly by horizontality and muted hues of the coastal water, it also includes may marine activities of all kinds, including anchorages, commercial shipping lanes and ferry traffic. The result is a largely open, natural landscape which is punctuated by colours and noises of human features and activities.	High
LCA12	**Kowloon City Medium / High-rise Commercial Urban Landscape** This is an area predominantly of commercial, industrial and retail land uses. This comprises a mix of medium and high rise buildings. The streetscape is utilitarian with no soft or little landscape treatment.	Medium
Planned Landscape Character Areas (Within KTD)		
LCA01A	**Planned Kai Tak City Centre Urban Landscape** It is a new Kai Tak urban centre with a mixture of residential and commercial uses. The existing Kai Tak Nullah will be turned into a 'river' which it brings a natural element into the new modern city; and with natural landscape and plaza zone, the railway station shall be intended to locate in a park-like area.	Medium
LCA01B	**Planned Kai Tak Sports Hub Urban Landscape** The Main Stadium will be the new icon of South East Kowloon. It will provide great views out to the water for spectators seated in the stadium. Programming along the dedicated pedestrian walkways within the landscape deck connecting across Road D2 shall enhance connectivity between spaces. Large open areas around stadiums shall act as a plaza-like for gathering and holding difference functions.	Medium
LCA01C	**Planned Kai Tak Metro Park Urban Landscape** It consists of a 27ha Metro Park at the centre of South East Kowloon – both geographically and psychologically. Anchored by the Multi-purpose Stadium Complex at the northern base of the runway, this new landscape character area will be the signature public open space of South East Kowloon.	High
LCA01D	**Planned Kai Tak Runway Precinct Urban Landscape** It is a unique new ulinear harbourfront district with hotels and residential developments defined by the Runway Itself with water at the both sides.	Medium

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)
LCA01E	**Planned Kai Tak South Apron Corner Urban Landscape** It is a planned sub-district within KTD with GIC developments in an urban grid pattern. It is characterized by continuous linear waterfront promenade along the area.	Medium
LCA01F	**Planned Tourism and Leisure Hub Urban Landscape** It is a planned Tourism and Leisure Hub with Cruise Terminal, Shopping and Entertainment Destination and Runway Park. The Tourism and Leisure Hub, with its landmark architectural design, will serve as a waterfront tourist destination with a variety of attractions for both local residents and visitors.	Medium

Visual Envelope

3.8.23 DP1 is the ground level road system comprising four district distributor roads for the future KTD. In general, its Visual Envelope is defined by Victoria Harbour to the south, San Po Kong and Kowloon City to the north, Kowloon Bay to the east, and Ma Tau Kok to the west. The Visual Envelopes, i.e. zones of visual influence of DP1 during construction and operation phases are illustrated in **Figure 3.23A and 3.23B**.

Visually Sensitive Receivers (VSRs)

3.8.24 Given that the scale of DP1 is localized, only the key existing and planned VSRs in close vicinity to the project areas of DP1 during construction and operation phases have been identified and shown in **Figures 3.23A and 3.23B**. Photo views illustrating the VSRs within the study area are illustrated shown in **Figure 13.4A1** to **13.4A5**. Baseline viewpoints from Key VSRs at local level illustrating the quality of existing views are shown in **Figure 13.4A6** and **13.4A10**. The baseline assessment of existing VSRs at local level and the planned VSRs within KTD is shown in **Table 3.40**.

VSRs at Local Level

3.8.25 The sensitivity to change of the VSRs at local level is much depending on the location and distance from the individual distributor roads and hence the degree of visibility, as well as the VSR type which determines the duration and frequency of views. In general, the sensitivity of VSRs at the residential developments or open spaces in Ma Tau Kok, Kowloon City, San Po Kong and Kowloon Bay is considered to be high for they will have direct and frequent views towards the works areas of the distributor roads. During the operation phase, views from the VSRs in Kowloon Bay, Kwun Tong, To Kwa Wan and Hung Hom to the distributor roads will be blocked by the other planned VSRs within KTD.

3.8.26 For institutional, commercial and industrial VSRs, even if they locate in close proximity to the works areas of DP1, their sensitivity is considered to be medium as their views to the distributor roads are relatively shorter in duration and less in frequency. Motorists traveling on the major roads in the periphery of KTD and pedestrians walking along Sung Wong Toi Road have low sensitivity for their views are transient in nature.

3.8.27 There are a number of existing VSRs for which the current landuses are different from the planned landuses. Under this VIA study, the current landuse is used as the baseline for visual impact assessment for construction phase. Given the implementation programme of DP1 is long, it is assumed that when all the distributor roads are completed and in operation, the planned landuse will be in place and is used as the baseline for visual impact for operation phase.

VSRs at KTD per se

3.8.28 DP1 will be completed on site before most of the other future developments within KTD are in place. Planned VSRs within KTD will only be considered in the assessment for operation phase of DP1 as shown in **Figure 3.23B**. Most of the planned VSRs are located in close proximity to the individual distributor roads and will have direct and full views to them. The sensitivity of the planned VSRs in the future residential developments and open spaces in Kai Tak City Centre is considered to be high whilst that of the future commercial or GIC developments is considered to be medium.

Visual Resources

3.8.29 The Ridgeline of the Kowloon Hills to the north of the southern areas of Kowloon provides a dramatic natural backdrop to the high-rise urban areas of Kowloon. It is visual resource within the visual envelop. With the control of development height, views to the natural ridgeline have been preserved from the strategic vantage points at Quarry Bay Park, Hong Kong Convention and Exhibition Centre New Wing, and Sun Yat Sen Memorial Park viewing from Hong Kong Island.

3.8.30 Victoria Harbour is a unique public asset and natural visual resource of Hong Kong, providing an open sea view to the urban core along the northern coast of Hong Kong Island and the Kowloon Peninsula.

3.8.31 Major open spaces, including Sung Wong Toi Park, Station Square, Kai Tak River, Stadium Complex, Metro Park Runway Park, Cha Kwo Ling Park and Chinese Cultural Garden are proposed in the future KTD. Upon completion, these major green spaces will provide new visual resources to the surrounding VSRs.

Table 3.40 Visual Sensitive Receivers (VSRs) and Their Sensitivity to Change

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Number of Individuals (Many/ Medium/ Few/)	Quality of Existing View (Good/ Fair/ Poor)	Availability of Alternative Views (Yes/ No)	Average Distance between VSRs and Impact Source (m)	Degree of Visibility (Full/ Partial/ Glimpse)	Duration of View (Long/ Medium/ Short)	Frequency of View (Frequent/ Occasional/ Rare)	Sensitivity to Change (Low, Medium, High)
Existing VSRs at Local Level									
R1	Sky Tower and adjacent residential developments along Sung Wong Toi Road	Medium	Fair	No	20m	Full	Long	Frequent	High
R2	Medium-rise Residential Development along Ma Tau Chung Road	Medium	Fair	No	200m	Full	Long	Frequent	High
R3	Regal Oriental Hotel and Low to Medium-rise Residential Development in Kowloon City	Many	Fair	No	100m	Full	Long	Frequent	High
R5	Medium-rise Residential Development in San Po Kong	Many	Fair	No	100m	Full	Long	Frequent	High
R6	Rhythm Garden	Many	Fair	No	40m	Full	Long	Frequent	High
R7	Choi Hung Estate	Many	Fair	No	80m	Full	Long	Frequent	High
R9	Richland Gardens	Many	Fair	No	60m	Partial	Long	Frequent	High
R12	Residential Development in To Kwa Wan	Many	Fair	yes	200m	Partial	Long	Frequent	High
R14	Laguna Verde and Whampoa Garden	Many	Fair	Yes	1200m	Full	Long	Frequent	Medium
R16	Grand Waterfront (same planned use under KTD)	Medium	Fair	Yes	100m	Full	Long	Frequent	High
R17	Wyler Gardens	Many	Fair	Yes	200m	Partial	Long	Frequent	High
R18	Low-rise Residential Development adjacent to Grand Waterfront (same planned use under KTD)	Medium	Fair	Yes	100m	Partial	Long	Frequent	High
R19	R(A) zone at King Fuk Street	Medium	Fair	No	100m	Full	Long	Frequent	High
R20	R(A) zone to the southeast of Tung Tau Estate	Medium	Fair	No	150m	Full	Long	Frequent	High

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Number of Individuals (Many/ Medium/ Few/)	Quality of Existing View (Good/ Fair/ Poor)	Availability of Alternative Views (Yes/ No)	Average Distance between VSRs and Impact Source (m)	Degree of Visibility (Full/ Partial/ Glimpse)	Duration of View (Long/ Medium/ Short)	Frequency of View (Frequent/ Occasional/ Rare)	Sensitivity to Change (Low, Medium, High)
R21	Le Billionaire and adjacent R(A) Zone in Kowloon City	Medium	Fair	No	110m	Full	Long	Frequent	High
R22	Low-Rise Residential Development along Mok Cheong Street (planned CDA in operation stage)	Medium	Fair	No	200m	Full	Long	Frequent	High
R23	Harbourfront Landmark	Medium	Good	Yes	1500m	Full	Long	Frequent	Medium
C2	Harbour Plaza and Harbourfront	Many	Good	Yes	1500m	Full	Medium	Occasional	Medium
C4	Newport Centre (planned residential use under KTD)	Medium	Fair	Yes	100m	Full	Medium	Frequent	Medium – Construction Stage (High- Operation Stage)
GIC1	Evangel Hospital, Christian Alliance P.C. Lau Memorial International School, Notre Dame College, Holy Trinity Primary School, HK Planning Association Centre	Medium	Fair	Yes	150m	Partial	Medium	Occasional	Medium
GIC2	Ng Wah College, Lee Kau Yan Memorial School, Sir Robert Black Health Centre, Petrol Station	Medium	Fair	No	40m	Full	Medium	Occasional	Medium
GIC3	Cognitio College	Medium	Fair	No	40m	Full	Medium	Occasional	Medium
GIC5	Kai Tak Operation Base and Existing Electricity Substation (same planned uses under KTD)	Few	Fair	No	20m	Full	Medium	Occasional	Medium (construction stage only)
GIC6	EMSD Headquarter (same planned uses under KTD)	Few	Fair	No	20m	Full	Medium	Occasional	Medium (construction stage only)
GIC9	Kowloon Bay Vehicle Inspection Centre, Vehicle Examination Centre, Water Supplies Department Kowloon East Regional Building, Kowloon Bay Transfer Station, Kowloon Bay Government Land Transport Agency Transport Pool	Few	Fair	No	20m	Partial	Medium	Occasional	Medium

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Number of Individuals (Many/ Medium/ Few/)	Quality of Existing View (Good/ Fair/ Poor)	Availability of Alternative Views (Yes/ No)	Average Distance between VSRs and Impact Source (m)	Degree of Visibility (Full/ Partial/ Glimpse)	Duration of View (Long/ Medium/ Short)	Frequency of View (Frequent/ Occasional/ Rare)	Sensitivity to Change (Low, Medium, High)
GIC10	Kei To Secondary School, Po Leung Kuk Ngan Po Ling College	Medium	Good	No	1000m	Partial	Medium	Occasional	Medium
GIC12	Kowloon Bay Vehicle Servicing Station, Public Works Central Laboratory Building (planned GIC use and open space under KTD)	Medium	Fair	No	10m	Partial	Medium	Occasional	Medium (construction stage only)
GIC13	To Kwa Wan Sewage Treatment Works	Few	Fair	No	1000m	Partial	Medium	Occasional	Low
GIC14	Holy Carpenter Primary School and Oblate Father's Primary School (same planned uses under KTD)	Medium	Fair	No	600m	Partial	Medium	Occasional	Medium
GIC15	To Kwa Wan Motor Vehicle Inspection Centre and the adjacent cargo working area along Long Yuet Street (planned open space under KTD)	Medium	Fair	No	500m	Partial	Medium	Occasional	Medium
GIC18	EMSD Workshops (planned sewage pumping station and open space under KTD)	Medium	Fair	No	50m	Full	Long	Occasional	High
GIC20	Tai Wan Salt Water Pumping Station	Few	Good	Yes	1500m	Partial	Medium	Occasional	Low
GIC21	Police Operational Facility at Dyer Avenue	Few	Fair	Yes	1500m	Full	Medium	Occasional	Low
GIC22	Kowloon City Ferry Pier and bus terminal (planned ventilation shafts and waterfront promenade under KTD)	Few	Fair	No	1500m	Full	Short	Occasional	Low
GIC23	Kwun Tong Public Pier, Kwun Tong Ferry Pier Square and adjacent bus terminal (same planned use under KTD)	Medium	Fair	No	700m	Full	Long	Occasional	Medium
GIC25	Hong Kong Society for the Blind Factory (planned CDA in operation stage)	Medium	Fair	No	10m	Full	Long	Frequent	High
O1	Visitors at Olympic Garden	Medium	Fair	No	100m	Full	Short	Occasional	Medium
O2	Visitors at Sung Wong Toi Garden	Medium	Fair	No	100m	Full	Short	Occasional	High
O3	Visitors at Sung Wong Toi Playground	Medium	Fair	No	100m	Full	Short	Occasional	High

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Number of Individuals (Many/ Medium/ Few/)	Quality of Existing View (Good/ Fair/ Poor)	Availability of Alternative Views (Yes/ No)	Average Distance between VSRs and Impact Source (m)	Degree of Visibility (Full/ Partial/ Glimpse)	Duration of View (Long/ Medium/ Short)	Frequency of View (Frequent/ Occasional/ Rare)	Sensitivity to Change (Low, Medium, High)
O4	Visitors at Rest Garden next to Nga Tsin Wai Road	Medium	Fair	No	100m	Full	Short	Occasional	High
O5	Visitors at Shek Ku Lung Road Playground	Medium	Fair	No	60m	Full	Short	Occasional	High
O6	Visitors at Argyle Street Playground	Medium	Fair	No	100m	Partial	Short	Occasional	High
O7	Visitors at King Wan Street Playground (same planned use under KTD)	Medium	Fair	No	600m	Partial	Short	Occasional	Medium
O13	Visitors at Hoi Sham Park (same planned use under KTD)	Medium	Fair	No	700m	Partial	Short	Occasional	Medium
O14	Visitors at Hoi Bun Road Park	Medium	Fair	Yes	700m	Glimpse	Short	Occasional	Low
O17	Visitors at Tai Wan Shan Park & Tai Wan Shan Swimming Pool	Many	Fair	Yes	1500m	Partial	Short	Occasional	Low
I1	Industrial Buildings in San Po Kong (planned residential use in operation stage)	Many	Poor	No	40m	Full	Long	Occasional	Medium – Construction Stage High – Operation Stage
I2	Industrial buildings along Yuk Yat Street (planned residential use in operation stage)	Many	Fair	No	500m	Full	Long	Frequent	Medium
I4	Industrial Development along Mok Cheong Street (planned CDA in operation stage)	Medium	Poor	No	400m	Full	Long	Occasional	Low – Construction Stage High – Operation Stage
I5	Industrial/Office Developments and Godowns at Cheung Yip Street (planned commercial use under KTD)	Medium	Fair	Yes	300m	Partial	Medium	Occasional	Medium
OU1	Tunnel Administration Building (same planned use under KTD)	Few	Fair	No	10m	Full	Long	Occasional	Medium

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Number of Individuals (Many/ Medium/ Few/)	Quality of Existing View (Good/ Fair/ Poor)	Availability of Alternative Views (Yes/ No)	Average Distance between VSRs and Impact Source (m)	Degree of Visibility (Full/ Partial/ Glimpse)	Duration of View (Long/ Medium/ Short)	Frequency of View (Frequent/ Occasional/ Rare)	Sensitivity to Change (Low, Medium, High)
OU2	Business and Industrial Developments in Kowloon Bay (planned commercial use in operation stage)	Many	Fair	No	20m	Full	Long	Occasional	Medium
OU3	Business and Industrial Developments in San Po Kong (planned commercial use in operation stage)	Many	Poor	Yes	40m	Full	Long	Occasional	Medium
OU4	Business and Industrial Developments in Hung Hom (planned commercial use in operation stage)	Medium	Fair	No	1000m	Full	Long	Occasional	Medium
OU5	Business and Industrial Developments in Kwun Tong (planned commercial use in operation stage)	Many	Fair	No	500m	Full	Long	Occasional	Medium
OU6	Hong Kong International Trade and Exhibition Centre (same planned use under KTD)	Many	Good	No	0m	Full	Medium	Occasional	Medium
T1	Motorists on Prince Edward Road East	Many	Fair	Yes	20m	Full	Short	Occasional	Low
T2	Motorists on carriageway and Pedestrians on Footpaths along Sung Wong Toi Road	Many	Fair	Yes	20m	Full	Short	Occasional	Low
T3	Motorists on Kwun Tong Bypass	Many	Fair	Yes	20m	Full	Short	Occasional	Low
T4	Travelers of Harbour Traffic	Many	Fair	Yes	200m	Full	Medium	Occasional	Medium
Planned VSRs at Local Level									
R23P	Planned Residential Developments at Site 1A and 1B	Many	Fair	Yes	10m	Full	Medium	Frequent	High
R24P	Planned Residential Developments at Site 1H, II, 1J, IK, IL, and 2A	Many	Fair	Yes	10m	Full	Medium	Frequent	High
R25P	Planned Residential Development at Site 4B	Many	Fair	Yes	10m	Full	Medium	Frequent	High
C7P	Planned Commercial Developments at Site 2A	Many	Fair	Yes	10m	Full	Medium	Occasional	Medium
C8P	Planned Commercial Developments at Site 4C	Many	Fair	Yes	50m	Full	Medium	Occasional	Medium

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Number of Individuals (Many/ Medium/ Few/)	Quality of Existing View (Good/ Fair/ Poor)	Availability of Alternative Views (Yes/ No)	Average Distance between VSRs and Impact Source (m)	Degree of Visibility (Full/ Partial/ Glimpse)	Duration of View (Long/ Medium/ Short)	Frequency of View (Frequent/ Occasional/ Rare)	Sensitivity to Change (Low, Medium, High)
C9P	Planned Cruise Terminal and Tourism Related Uses at Site 2 and 3	Many	Fair	Yes	10m	Full	Medium	Occasional	High
GIC25P	Planned GIC Developments at Site 3B, 3C	Many	Fair	Yes	10m	Full	Medium	Occasional	Medium
GIC26P	Planned GIC Developments at Site 1C, 1D	Many	Fair	Yes	10m	Full	Medium	Occasional	Medium
GIC27P	Planned GIC Developments at Site 2C	Medium	Fair	Yes	20m	Partial	Medium	Occasional	Medium
GIC28P	Planned GIC Developments at Site 2A	Medium	Fair	Yes	20m	Partial	Medium	Occasional	Medium
GIC29P	Planned GIC Developments at Site 1A	Medium	Fair	Yes	20m	Partial	Medium	Occasional	Medium
GIC30P	Planned GIC Developments at Site 1B	Many	Fair	Yes	10m	Glimpse	Medium	Occasional	Low
GIC31P	Planned GIC Developments at Site 1N	Medium	Fair	Yes	20m	Partial	Medium	Occasional	Medium
CDA2P	Planned CDA Developments at Kai Tak City Centre	Many	Fair	Yes	10m	Full	Medium	Occasional	Medium
O19P	Planned Runway Park	Many	Fair	Yes	20m	Full	Medium	Occasional	High
O20P	Planned Metro Park	Many	Fair	Yes	10m	Full	Medium	Occasional	High
O21P	Planned Multi-purpose Stadium Complex	Many	Fair	Yes	10m	Full	Medium	Occasional	High
O22P	Planned Sung Wong Toi Park	Many	Fair	Yes	20m	Partial	Medium	Occasional	High
O23P	Planned Station Square	Many	Fair	Yes	10m	Full	Medium	Occasional	High
O24P	Planned Open Space at Site 3E	Many	Fair	Yes	200m	Partial	Medium	Occasional	High
O25P	Planned Promenade at Runway Precinct	Many	Fair	Yes	10m	Partial	Medium	Occasional	High
OU6P	Planned OU Development (Mixed Use) at Site 1E	Many	Fair	Yes	10m	Full	Medium	Occasional	High
OU7P	Planned OU Development at Site 1D	Few	Fair	Yes	10m	Partial	Medium	Occasional	Low

C = Commercial, C/R = Commercial/Residential, GIC = Government/Institution/Community, I = Industrial, O = Open space, OU = Other use, R = Residential, T = Transport related.

Landscape Impacts Assessment

Potential Sources of Impacts

3.8.32 The nature and scope of works are described in detail in **Section 3.1**. Sources of impacts in the construction phase would include:

Direct Impacts:

- construction of new distributor roads serving the planned KTD (the DP1 Project) and
- removal and disturbance of existing trees.

Indirect Impacts:

- construction traffic,
- the laying down of utilities, including water, drainage and power,
- temporary site access areas, site cabins and heavy machinery,
- after dark lighting and welding, and
- dust during dry weather

3.8.33 The sources of impacts of the project at the operation stage would be:

- operation of new distributor roads serving the planned KTD (the DP1 Project);

Degree of compatibility of the Project and associated Works

3.8.34 The DP1 Project are planned and further developed in accordance with the RODP. It is well integrated with existing and planned transportation networks. It is considered compatible to the adjacent landscape settings.

Nature and Magnitude of Unmitigated Landscape Impacts in Construction Phase

3.8.35 The magnitude of the impacts, before implementation of mitigation measures, on the landscape resources and landscape character areas that would occur in the construction phase are described below and tabulated in **Table 3.41**. All impacts are adverse unless otherwise stated.

3.8.36 Nature of unmitigated landscape impacts are primarily trees. The magnitude of impact are depending the numbers to be affected and the amenity of affected trees. Detail assessment are summarized in **Table 3.41**.

3.8.37 DP1 will be constructed when Residential Site at Site 1A and 1B at Kai Tak Centre (LCA01A) and the Cruise Terminal at Tourism and Leisure Hub (LCA01F) are in operation. The impact on these LCAs are identified and assessed.

Table 3.41 Significant Landscape Impacts of the Proposed Works during Construction Phase

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Impacts
LR07	Trees in the Amenity Areas near Kai Fuk Road	• distributor roads (this DP) construction to be commenced in around early 2009	• Approximately 40 trees will be affected by distributor roads (this DP), of which approximately 8 trees will be transplanted. Most of the affected trees are immature or small in size with height around 4-5 m, spread 2 m, trunk diameter 100-180 mm. The amenity value of these trees is considered as medium. Predominant species consist of *Acacia confusa*, *Celtis sinensis*, *Casuarina equisetifolia*, *Ficus microcarpa*, *Hibiscus tiliaceus*, *Macaranga tanarius* and *Melaleuca quinquenervia*	Intermediate
LR21	Existing Trees along the runway	• distributor roads (this DP) construction to be commenced in around early 2009	• Approximately 60 trees will be affected by distributor roads (this DP), of which approximately 30 trees will be transplanted. All the trees are immature mostly with height around 2-7 m, spread 1-4 m, trunk diameter 100-250 mm. The amenity value of these trees is considered as low. Species include *Casuarina equisetifolia*, *Chrysalidocarpus lutescens*, *Eucalyptus citriodora*, *Ficus benjamina*, *Ficus microcarpa*, *Hibiscus tiliaceus* and *Macaranga tanarius*.	Intermediate

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Impacts
LR28	Trees in North Apron of Former Airport	• development in Kai Tak City Centre, distributor roads (this DP) to be commenced in around mid 2009	• Approximately 200 trees will be affected by distributor roads (this DP), of which approximately 42 trees will be transplanted. All the trees are immature mostly with height around 3-12 m, spread 2-6 m, trunk diameter 150-400 mm. The amenity value of these trees is considered as low. Species include *Aleurites moluccana*, *Archontophoenix alexandrae*, *Bauhinia blakeana*, *Caryota ochlandra*, *Cassia siamea, Delonix regia*, *Ficus microcarpa*, *Livistona chinensis* and *Phoenix roebelenii*.	Large
LCA01	Former Kai Tak Airport Landscape Character Area	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts	Large
LCA01A	Planned Kai Tak City Centre Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts	Small
LCA01F	Planned Tourism and Leisure Hub Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts	Small
LCA02	Kowloon City and To Kwa Wan Grid Mixed Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts at the fringe of LCA2 which may cause incompatibility on the LCA.	Small
LCA03	Kowloon Bay Late 20C / Early 21C Commercial / Residential Complex Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts at the fringe of LCA3 which may cause incompatibility on the LCA.	Small

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Impacts
LCA04	San Po Kong Industrial Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts at the fringe of LCA4 which may cause incompatibility on the LCA.	Small
LCA05	Kwun Tong Industrial Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts at the fringe of LCA which may cause incompatibility on the LCA.	Small
LCA06	Kowloon City and Choi Hung Residential Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to construction works, excavation works, temporary works and associated impacts at the fringe of LCA which may cause incompatibility on the LCA.	Small
LCA07	Laguna City and Yau Tong Residential Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• There would be no landscape impacts on LCA07.	Negligible
LCA08	Kwun Tong Typhoon Shelter Landscape	• distributor roads (this DP) to be commenced in around early 2009	• There would be no landscape impacts on LCA08.	Negligible
LCA09	To Kwa Wan Typhoon Shelter Landscape	• distributor roads (this DP) to be commenced in around early 2009	• There would be no landscape impacts on LCA09.	Negligible
LCA10	Cha Ko Ling Miscellaneous Urban Fringe Landscape	• distributor roads (this DP) to be commenced in around early 2009	• There would be no landscape impacts on LCA10.	Negligible
LCA11	Victoria Harbour Inshore Water Landscape	• distributor roads (this DP) to be commenced in around early 2009	• There would be no landscape impacts on LCA11.	Negligible
LCA12	Kowloon City Medium / High-rise Commercial Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• There would be no landscape impacts on LCA12.	Negligible

ID No.	Landscape Resources/ Landscape Character Areas	Source of Impact	Description of Impacts	Magnitude of Impacts
LCA01A	Planned Kai Tak City Centre Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to operation of new distributor roads which may cause incompatibility on the LCA.	Intermediate
LCA01F	Planned Tourism and Leisure Hub Urban Landscape	• distributor roads (this DP) to be commenced in around early 2009	• Impact due to operation of new distributor roads which may cause incompatibility on the LCA.	Small

Nature and Magnitude of Unmitigated Landscape Impacts in Operation Phase.

3.8.38 The magnitude of the impacts, before implementation of mitigation measures, on the landscape resources and landscape character areas refer to **Table 3.42**

3.8.39 In general, the unmitigated impact on landscape resources are the same as during construction stage as all the changes are irreversible.

3.8.40 As the DP1 is planned as part of the overall KTD, it is considered that the unmitigated impact on the planned LCAs within KTD are considered as insubstantial. For impact on LCAs outside KTD, as the operation of DP1 will be confined to areas within KTD. The unmitigated impact on LCAs outside KTD is considered as insubstantial.

Table 3.42 Significance of Landscape Impacts in Construction and Operation Phases (All impact are adverse unless otherwise stated beneficial.)

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)		Magnitude of Change (Negligible, Small, Intermediate, Large)		Impact Significance Threshold BEFORE Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
		Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
Existing Landscape Resources											
LR01	Olympic Garden	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR02	Sung Wong Toi Garden	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR03	Sung Wong Toi Playground	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR04A	Rest Garden and amenity area near Nga Tsin Wai Road	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR04B	Amenity area near Sha Po Road	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR05	Shek Ku Lung Road Playground	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR06	Argyle Street Playground	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR07	Trees in the Amenity Areas near Kai Fuk Road	Medium	Medium	Intermediate	Intermediate	Moderate	Moderate	CM1, CM2, OM1, OM4	Slight	Slight	Slight
LR08	Kai Tak East Playground	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR09	To Kwa Wan Recreation Ground	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR11	Kowloon Walled City Park and Carpenter Road Park	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR17	Trees near Aviation Club Buildings	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR18	Trees at the periphery of existing lot boundary along Sung Wong Toi Road	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)		Magnitude of Change (Negligible, Small, Intermediate, Large)		Impact Significance Threshold BEFORE Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
		Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
LR19	Trees in the Amenity Areas along Sung Wong Toi Road	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR20	Trees in Amenity Areas of the interchange near Kwun Tong Road	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR21	Existing trees along the runway	Low	Low	Intermediate	Intermediate	Slight	Slight	CM1, CM2, OM1, OM4	Slight	Slight	Slight
LR22	Trees in Amenity Areas near the Interchange in Kowloon Bay	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR23	Trees in Amenity Areas of San Po Kong Interchange	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR24	Trees in Amenity Area of Rhythm Garden	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR25	Trees near Grant Waterfront	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR26	Trees in Amenity Areas of Choi Hung Road PTI	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR27	Trees in planned open space near Rhythm Garden	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR28	Trees in North Apron of Former Airport	Medium	Medium	Large	Large	Moderate	Moderate	CM1, CM2, OM1, OM4	Slight	Slight	Slight
LR29	Hoi Bun Road Park	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR31A	Kai Tak Nullah	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LR31B	Victoria Harbour	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)		Magnitude of Change (Negligible, Small, Intermediate, Large)		Impact Significance Threshold BEFORE Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
		Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
Planned Landscape Resources											
LR32	Planned Runway Park	-	High	-	Negligible	-	Insubstantial	-	-	-	Insubstantial
LR33	Planned Metro Park	-	High	-	Negligible	-	Insubstantial	-	-	-	Insubstantial
LR34	Planned Multi-purpose Stadium Complex	-	High	-	Negligible	-	Insubstantial	-	-	-	Insubstantial
LR35	Planned Sung Wong Toi Park	-	High	-	Negligible	-	Insubstantial	-	-	-	Insubstantial
LR36	Planned Station Square	-	High	-	Negligible	-	Insubstantial	-	-	-	Insubstantial
LR38	Planned Chinese Cultural Garden	-	High	-	Negligible	-	Insubstantial	-	-	-	Insubstantial
LR39	Planned Promenade	-	High	-	Negligible	-	Insubstantial	-	-	-	Insubstantial
Landscape Character Areas During Construction and Operation Phase											
LCA01	Former Kai Tak Airport Landscape Character Area (KTD in Operation Phase)	Low	High	Large	Negligible	Moderate	Insubstantial	CM1 to CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
LCA02	Kowloon City and To Kwa Wan Grid Mixed Urban Landscape	Medium	Medium	Small	Negligible	Slight	Insubstantial	CM1 to CM4	Slight	Insubstantial	Insubstantial
LCA03	Kowloon Bay Late 20C / Early 21C Commercial / Residential Complex Landscape	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	CM1 to CM4	Slight	Insubstantial	Insubstantial
LCA04	San Po Kong Industrial Urban Landscape	Low	Low	Negligible	Negligible	Insubstantial	Insubstantial	CM1 to CM4	Slight	Insubstantial	Insubstantial
LCA05	Kwun Tong Industrial Urban Landscape	Low	Low	Negligible	Negligible	Insubstantial	Insubstantial	CM1 to CM4	Slight	Insubstantial	Insubstantial

ID. No.	Landscape Resources / Landscape Characters	Sensitivity to Change (Low, Medium, High)		Magnitude of Change (Negligible, Small, Intermediate, Large)		Impact Significance Threshold BEFORE Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold AFTER Mitigation (Insubstantial, Slight, Moderate, Substantial)		
									Construction	Operation	
		Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
LCA06	Kowloon City and Choi Hung Residential Urban Landscape	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	CM1 to CM4	Slight	Insubstantial	Insubstantial
LCA08	Kwun Tong Typhoon Shelter Landscape	Low	Low	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LCA09	To Kwa Wan Typhoon Shelter Landscape	Low	Low	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LCA11	Victoria Harbour Inshore Water Landscape	High	High	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
LCA12	Kowloon City Medium / High-rise Commercial Urban Landscape	Medium	Medium	Negligible	Negligible	Insubstantial	Insubstantial	-	Insubstantial	Insubstantial	Insubstantial
Planned LCA											
LCA01A	Planned Kai Tak City Centre Urban Landscape	High	Medium	Small	Negligible	Moderate	Insubstantial	CM1 to CM4, OM1 to OM5	Slight	Moderate (Beneficial)	Substantial (Beneficial)
LCA01B	Planned Kai Tak Sports Hub Urban Landscape	-	Medium	-	-	-	-	OM1 to OM5	-	-	Substantial (Beneficial)
LCA01C	Planned Kai Tak Metro Park Urban Landscape	-	High	-	-	-	-	OM1 to OM5	-	-	Substantial (Beneficial)
LCA01D	Planned Kai Tak Runway Precinct Urban Landscape	-	Medium	-	-	-	-	OM1 to OM5	-	-	Substantial (Beneficial)
LCA01E	Planned Kai Tak South Apron Corner Urban Landscape	-	Medium	-	-	-	-	OM1 to OM5	-	-	Substantial (Beneficial)
LCA01F	Planned Tourism and Leisure Hub Urban Landscape	High	Medium	Small	Small	Moderate	Slight	CM1 to CM4, OM1 to OM5	Slight	Moderate (Beneficial)	Substantial (Beneficial)

Note: It is assumed that during the construction phase of DP1, part of the development in LCA01A and LCA01F will be completed. The impact on these areas due to DP1 during construction is assessed.

Visual Impacts Assessment

Potential Sources of Visual Impacts

3.8.41 The nature and scope of works are described in detail in **Section 3.1**. Sources of impacts in the construction phase would include:

Direct Impacts include visual incompatibility of the works to the surrounding landscape and degrading of visual quality due to the following activities:

- construction of new distributor roads serving the planned KTD (the DP1 Project) and
- removal and disturbance of existing trees.

Indirect Impacts:

- construction traffic,
- the laying down of utilities, including water, drainage and power,
- temporary site access areas, site cabins and heavy machinery,
- after dark lighting and welding, and
- dust during dry weather

3.8.42 The sources of impacts of the project at the operation phase would be visual enhancement, visual compatibility of the works to the surrounding landscape due to operation of new distributor roads serving the planned KTD (the DP1 Project);

Prediction and Evaluation of Visual Impacts

3.8.43 The magnitude of impacts, before the implementation of mitigation measures, on the VSRs during the construction phase is shown in **Table 3.43**.

Nature and Magnitude of Unmitigated Visual Impacts in Construction Phase

3.8.44 During the construction phase, the unmitigated visual impacts are adverse in nature and mainly include blockage of views to the visual resources, visual incompatibility of the construction works with the surroundings and degrading of visual quality of existing views. Since the scale of construction works for DP1 is localized, the potential impact on most of the VSRs is considered to be slight in general. Besides, residential VSRs near the future alignment of Road D1 will be subject to moderate impacts.

Nature and Magnitude of Unmitigated Visual Impacts in Operation Phase

3.8.45 During the operation phase, the major unmitigated visual impact is visual incompatibility with the surroundings. Since the scale of development for DP1 is localized, VSRs to be affected will be confined to those in the surroundings of the distributor roads. The potential impact on the VSRs at local level and at KTD per se is considered to be slight in general, except for some VSRs which will abut the future alignments of the distributor roads, e.g. the planned commercial and residential developments at Kai Tak City Centre, the planned Metro Park and residential development along Runway Precinct. The potential impacts on these VSRs will be considered as moderate.

Table 3.43 Significance of Visual Impacts in the Construction and Operation Phases (Note: All impacts adverse unless otherwise noted)

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
VSRs at Local Level												
R1	Sky Tower and adjacent residential developments along Sung Wong Toi Road	DP1	Small	Small	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
R2	Medium-rise Residential Development along Ma Tau Chung Road	DP1	Small	Small	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
R3	Regal Oriental Hotel and Low to Medium-rise Residential Development in Kowloon City	DP1	Small	Small	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
R5	Medium-rise Residential Development in San Po Kong	DP1	Small	Small	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
R6	Rhythm Garden	DP1	Small	Small	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
R7	Choi Hung Estate	DP1	Small	-	High	-	Moderate	-	CM3, CM4	Slight	-	-
R9	Richland Gardens	DP1	Small	-	High	-	Moderate	-	CM3, CM4	Slight	-	-
R12	Residential Development in To Kwa Wan	DP1	Small	-	High	-	Moderate	-	CM3, CM4	Slight	-	-
R14	Laguna Verde and Whampoa Garden	DP1	Small	-	Medium	-	Slight	-	CM3, CM4	Slight	-	-

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
R16	Grand Waterfront (same planned use under KTD)	DP1	Small	Small	High	High	Moderate	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
R17	Wyler Gardens	DP1	Small	-	High	-	Moderate	-	CM3, CM4	Slight	-	-
R18	Low-rise Residential Development adjacent to Grand Waterfront (same planned use under KTD)	DP1	Small	Small	High	High	Moderate	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
R19	R(A) zone at King Fuk Street	DP1	Small	Intermediate	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Slight	Slight
R20	R(A) zone to the southeast of Tung Tau Estate	DP1	Small	Small	High	High	Moderate	Slight	CM3, CM4, OM1 to OM5	Slight	Slight	Slight
R21	Le Billionaire and adjacent R(A) Zone in Kowloon City	DP1	Small	Small	High	High	Moderate	Slight	CM3, CM4, OM1 to OM5	Slight	Slight	Slight
R22	Low-Rise Residential Development along Mok Cheong Street (planned CDA in operation stage)	DP1	Small	Small	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Slight	Slight (Beneficial)
R23	Harbourfront Landmark	DP1	Small	-	High	-	Moderate	-	CM3, CM4	Slight	-	-
C2	Harbour Plaza and Harbourfront	DP1	Small	-	Medium	-	Slight	-	CM3, CM4	Slight	-	-
C4	Newport Centre (planned residential use under KTD)	DP1	Small	Small	Medium	High	Slight	Moderate	CM3, CM4, OM1 to OM5	Slight	Slight	Slight (Beneficial)

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
GIC1	Evangel Hospital, Christian Alliance P.C. Lau Memorial International School, Notre Dame College, Holy Trinity Primary School, HK Planning Association Centre	DP1	Small	Negligible	Medium	Medium	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
GIC2	Ng Wah College, Lee Kau Yan Memorial School, Sir Robert Black Health Centre, Petrol Station	DP1	Small	Small	Medium	Medium	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Slight	Slight
GIC3	Cognitio College	DP1	Small	Small	Medium	Medium	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Slight	Slight
GIC5	Kai Tak Operation Base and Existing Electricity Substation (same planned uses under KTD)	DP1	Intermediate	-	Medium	-	Moderate	-	CM3, CM4	Slight	-	-
GIC6	EMSD Headquarter (same planned uses under KTD)	DP1	Intermediate	-	Medium	-	Moderate	-	CM3, CM4	Slight	-	-
GIC9	Kowloon Bay Vehicle Inspection Centre, Vehicle Examination Centre, Water Supplies Department Kowloon East Regional Building, Kowloon Bay Transfer Station, Kowloon Bay Government Land Transport Agency Transport Pool	DP1	Small	Small	Medium	Medium	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
GIC10	Kei To Secondary School, Po Leung Kuk Ngan Po Ling College	DP1	Small	-	Medium	-	Slight	-	CM3, CM4	Slight	-	-
GIC12	Kowloon Bay Vehicle Servicing Station, Public Works Central Laboratory Building (planned GIC use and open space under KTD)	DP1	Intermediate	-	Medium	-	Moderate	-	CM3, CM4	Slight	-	-
GIC13	To Kwa Wan Sewage Treatment Works	DP1	Small	-	Low	-	Slight	-	CM3, CM4	Slight	-	-
GIC14	Holy Carpenter Primary School and Oblate Father's Primary School (same planned uses under KTD)	DP1	Small	-	Medium	-	Slight	-	CM3, CM4	Slight	-	-
GIC15	To Kwa Wan Motor Vehicle Inspection Centre and the adjacent cargo working area along Long Yuet Street (planned open space under KTD)	DP1	Small	-	Medium	-	Slight	-	CM3, CM4	Slight	-	-
GIC18	EMSD Workshops (planned sewage pumping station and open space under KTD)	DP1	Small	Small	High	High	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight
GIC20	Tai Wan Salt Water Pumping Station	DP1	Small	-	Low	-	Slight	-	CM3, CM4	Slight	-	-

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
GIC21	Police Operational Facility at Dyer Avenue	DP1	Small	-	Low	-	Slight	-	CM3, CM4	Slight	-	-
GIC22	Kowloon City Ferry Pier and bus terminal (planned ventilation shafts and waterfront promenade under KTD)	DP1	Small	-	Low	-	Slight	-	CM3, CM4	Insubstantial	-	-
GIC23	Kwun Tong Public Pier, Kwun Tong Ferry Pier Square and adjacent bus terminal (same planned use under KTD)	DP1	Small	-	Medium	-	Slight	-	CM3, CM4	Slight	-	-
GIC25	Hong Kong Society for the Blind Factory (planned CDA in operation stage)	DP1	Intermediate	Large	Medium	Medium	Moderate	Moderate	CM3, CM4, OM1 to OM5	Moderate	Slight	Slight (Beneficial)
O1	Visitors at Olympic Garden	DP1	Small	Small	Medium	Medium	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
O2	Visitors at Sung Wong Toi Garden	DP1	Large	Intermediate	High	High	Substantial	Moderate	CM3, CM4, OM1 to OM5	Moderate	Slight	Slight (Beneficial)
O3	Visitors at Sung Wong Toi Playground	DP1	Large	Intermediate	High	High	Substantial	Moderate	CM3, CM4, OM1 to OM5	Moderate	Slight	Slight (Beneficial)
O4	Visitors at Rest Garden next to Nga Tsin Wai Road	DP1	Small	Small	High	High	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
O5	Visitors at Shek Ku Lung Road Playground	DP1	Intermediate	Intermediate	High	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Slight	Slight (Beneficial)

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
O6	Visitors at Argyle Street Playground	DP1	Small	Small	High	High	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
O7	Visitors at King Wan Street Playground (same planned use under KTD)	DP1	Negligible	-	Medium	-	Insubstantial	-	CM3, CM4	Slight	-	-
O13	Visitors at Hoi Sham Park (same planned use under KTD)	DP1	Negligible	-	Medium	-	Insubstantial	-	CM3, CM4	Slight	-	-
O14	Visitors at Hoi Bun Road Park	DP1	Small	-	Low	-	Slight	-	CM3, CM4	Slight	-	-
O17	Visitors at Tai Wan Shan Park & Tai Wan Shan Swimming Pool	DP1	Small	-	Low	-	Slight	-	CM3, CM4	Slight	-	-
I1	Industrial Buildings in San Po Kong (planned residential use in operation stage)	DP1	Intermediate	Intermediate	Medium	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
I2	Industrial buildings along Yuk Yat Street (planned residential use in operation stage)	DP1	Small	-	Low	-	Slight	-	CM3, CM4	Slight	-	-
I4	Industrial Development along Mok Cheong Street (planned CDA in operation stage)	DP1	Substantial	Intermediate	Low	High	Moderate	Moderate	CM3, CM4, OM1 to OM5	Slight	Slight	Slight (Beneficial)

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
I5	Industrial/Office Developments and Godowns at Cheung Yip Street (planned commercial use under KTD)	DP1	Intermediate	Intermediate	Medium	Medium	Moderate	Moderate	CM3, CM4	Slight	Slight	Slight (Beneficial)
OU1	Tunnel Administration Building (same planned use under KTD)	DP1	Intermediate	Intermediate	Medium	Medium	Moderate	Moderate	CM3, CM4	Slight	Insubstantial	Slight (Beneficial)
OU2	Business and Industrial Developments in Kowloon Bay (planned commercial use in operation stage)	DP1	Small	Small	Medium	Medium	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Insubstantial
OU3	Business and Industrial Developments in San Po Kong (planned commercial use in operation stage)	DP1	Small	Small	Medium	Medium	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Slight	Slight
OU4	Business and Industrial Developments in Hung Hom (planned commercial use in operation stage)	DP1	Small	-	Medium	-	Slight	-	CM3, CM4, OM1 to OM5	Slight	-	-
OU5	Business and Industrial Developments in Kwun Tong (planned commercial use in operation stage)	DP1	Small	-	Medium	-	Slight	-	CM3, CM4, OM1 to OM5	Slight	-	-
OU6	Hong Kong International Trade and Exhibition Centre (same planned use under KTD)	DP1	Small	Small	Medium	Medium-	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
T1	Motorists on Prince Edward Road East	DP1	Small	Small	Low	Low	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
T2	Motorists on carriageway and Pedestrians on Footpaths along Sung Wong Toi Road	DP1	Small	Small	Low	Low	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
T3	Motorists on Kwun Tong Bypass	DP1	Small	Small	Low	Low	Slight	Slight	CM3, CM4, OM1 to OM5	Slight	Insubstantial	Slight (Beneficial)
T4	Travelers of Harbour Traffic	DP1	Small	-	Medium	-	Slight	-	CM3, CM4	Slight	-	-
Planned VSR												
R23P	Planned Residential Developments at Site 1A and 1B	DP1	-	Intermediate	-	High	-	Slight	OM1 to OM5	-	Insubstantial	Insubstantial
R24P	Planned Residential Developments at Site 1H, II, 1J, IK, IL, and 2A	DP1	-	Intermediate	-	High	-	Moderate	OM1 to OM5	-	Slight	Slight (Beneficial)
R25P	Planned Residential Development at Site 4B	DP1	-	Intermediate	-	High	-	Moderate	OM1 to OM5	-	Slight	Slight (Beneficial)
C7P	Planned Commercial Developments at Site 2A	DP1	-	Intermediate	-	Medium	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
C8P	Planned Commercial Developments at Site 4C	DP1	-	Intermediate	-	Medium	-	Slight	OM1 to OM5	-	Slight	Slight (Beneficial)

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
C9P	Planned Cruise Terminal and Tourism Related Uses at Site 2 and 3	DP1	-	Intermediate	-	High	-	Moderate	OM1 to OM5	-	Slight	Slight
GIC25P	Planned GIC Developments at Site 3B, 3C	DP1	-	Small	-	Medium	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
GIC26P	Planned GIC Developments at Site 1C, 1D	DP1	-	Intermediate	-	Medium	-	Moderate	OM1 to OM5	-	Slight	Slight (Beneficial)
GIC27P	Planned GIC Developments at Site 2C	DP1	-	Small	-	Medium	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
GIC28P	Planned GIC Developments at Site 2A	DP1	-	Small	-	Medium	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
GIC29P	Planned GIC Developments at Site 1A	DP1	-	Small	-	Medium	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
GIC30P	Planned GIC Developments at Site 1B	DP1	-	Small	-	Medium	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
GIC31P	Planned GIC Developments at Site 1N	DP1	-	Small	-	Medium	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
CDA2P	Planned CDA Developments at Kai Tak City Centre	DP1	-	Intermediate	-	Medium	-	Moderate	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
O19P	Planned Runway Park	DP1	-	Small	-	High	-	Slight	OM1 to OM5	-	Insubstantial	Slight
O20P	Planned Metro Park	DP1	-	Small	-	High	-	Slight	OM1 to OM5	-	Insubstantial	Slight

VSR Type & ID.	Key Visually Sensitive Receiver (VSR)	Main Source of Visual Impact	Magnitude of Impact (Negligible, Small, Intermediate, Large)		Receptor Sensitivity (Low, Medium, High)		Impact Significance Threshold Before Mitigation (Insubstantial, Slight, Moderate, Substantial)		Recommended Mitigation Measures	Residual Impact Significance Threshold After Mitigation (Insubstantial, Slight, Moderate, Substantial)		
										Construction	Operation	
			Construction	Operation	Construction	Operation	Construction	Operation			DAY 1	YEAR 10
O21P	Planned Multi-purpose Stadium Complex	DP1	-	Small	-	High	-	Slight	OM1 to OM5	-	Insubstantial	Slight
O22P	Planned Sung Wong Toi Park	DP1	-	Small	-	High	-	Slight	OM1 to OM5	-	Insubstantial	Slight
O23P	Planned Station Square	DP1	-	Small	-	High	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
O24P	Planned Open Space at Site 3E	DP1	-	Intermediate	-	High	-	Moderate	OM1 to OM5	-	Slight	Slight
O25P	Planned Promenade at Runway Precinct	DP1	-	Intermediate	-	Medium	-	Moderate	OM1 to OM5	-	Slight	Slight (Beneficial)
OU6P	Planned OU Development (Mixed Use) at Site 1E	DP1	-	Small	-	High	-	Slight	OM1 to OM5	-	Insubstantial	Slight (Beneficial)
OU7P	Planned OU Development at Site 1D	DP1	-	Small	-	Low	-	Slight	OM1 to OM5	-	Insubstantial	Insubstantial

C = Commercial, C/R = Commercial/Residential, GIC = Government/Institution/Community, I = Industrial, O = Open space, OU = Other use, R = Residential, T = Transport related.

Mitigation Measures

Proposed Design Measures for the Distributor Roads

3.8.45 The proposed distributor roads form part of the KTD and their alignments are formulated under the development and urban design frameworks for KTD. Proposed Design Measures incorporated in layout and design of the distributor roads are described below.

Aesthetic Design of Roads and Streetscapes

3.8.46 Roads and Streetscapes are potentially significant detractors to both the landscape and visual amenity of KTD. In order to minimize the impacts which they may cause, a series of measures have been incorporated in the development layout. These include:

- Creation of a pleasant pedestrian environment with sympathetic landscape treatments for the road networks within the site,
- Provision of road side planting, in particular trees, along all new distributor and local road where possible and practicable,
- Minimization the extent of utility reserves within pavement,
- Provide depression and tunneling of roads in order to reduce the visual impact and improve the landscape quality of the environment at ground level.

Provision of Compensatory Planting

3.8.47 As described above substantial number of public open space and streetscapes will be created as an integral part of KTD. This will provide opportunity for the compensation to the loss of any planting disturbed by the works. Based on a very broad brush estimate, approximate 5,000 nos. of trees can be planted within new open spaces and approximate 1,000 nos. of trees can be planted for new distributor roads.

Landscape and Visual Mitigation Measures during Construction and Operation Phase

3.8.48 Mitigation measures for the DP1 Project are shown in **Table 3.44 to 3.45** together with the Funding, Implementation and Maintenance Agency.

Table 3.44 Landscape and Visual Mitigation Measures during Construction Phase

ID No.	Landscape and Visual Mitigation Measure	Funding Agency	Implementation Agency
CM1[1]	All existing trees should be carefully protected during construction.	CEDD	CEDD
CM2[1]	Trees unavoidably affected by the works should be transplanted where practical. Detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBC 2/2004 and 3/2006. Final locations of transplanted trees should be agreed prior to commencement of the work.	CEDD	CEDD
CM3[1]	Control of night-time lighting.	CEDD	CEDD
CM4[1]	Erection of decorative screen hoarding.	CEDD	CEDD

Table 3.45 Landscape and Visual Mitigation Measure during Operation Phase

ID No.	Landscape and Visual Mitigation Measure	Funding Agency	Implementation Agency	Maintenance Agency
OM1	Compensatory tree planting should be incorporated into the proposed projects where trees are affected.	CEDD	CEDD	LCSD
OM2	Tall buffer screen tree / shrub / climber planting should be incorporated to soften hard engineering structures and facilities.	CEDD	CEDD	LCSD
OM3	Sensitive streetscape design should be incorporated along all new roads to reflect the new urban development in Kai Tak.	CEDD	CEDD	HyD/LCSD
OM4	Structure, ornamental tree / shrub / climber planting should be provided along roadside amenity strips and central dividers to enhance the townscape quality, where space is available.	CEDD	CEDD	LCSD
OM5	Aesthetically pleasing design as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities.	CEDD	CEDD	HyD/LCSD[1]

3.8.49 Illustration of mitigation measures are shown in **Figures 13.6**, **13.6.1** to **13.6.3** and **13.8A20** to **13.8A23**.

3.8.50 The Construction Phase measures listed above should be adopted from the commencement of construction and should be in place throughout the entire construction period. The Operation Phase measures listed above should be adopted during the detailed design, and be built as part of the construction works so that they are in place at the date of commissioning of the Project. However, it should be noted that the full effect of the soft landscape mitigation measures would not be appreciated for several years.

Residual Landscape and Visual Impact

Prediction of Significance of Impacts

3.8.51 The significance of the potential landscape and visual impacts during the construction and operation phases, before and after mitigation refer to **Table 3.42 and 3.43**. This assessment follows the proposed methodology and assumes that the appropriate mitigation measures identified in **Tables 3.44 and 3.45** above would be implemented, and that the full effect of the soft landscape mitigation measures would be realized after ten years.

Residual Landscape Impacts in Construction Phase

Impact on Existing Trees

3.8.52 Based on broad brush survey, approximate 300 trees within LR07, LR21 and LR28 will be in conflict with the distributor roads and affected by this DP. Among the affected trees, approximate 80 trees are proposed to be transplanted. Detailed tree preservation, transplanting and felling including compensatory planting proposals shall be submitted to relevant government departments for approval in accordance with WBTC no. 3/2006. None of the affected trees are LCSD Champion Trees or Registered Old and Valuable Trees. There are no rare species or endangered species but common species. All the trees with high amenity value which are unavoidably affected by the works will be transplanted where possible. It is considered transplanted trees will be recovered after Year 10 and the residual impact is slight.

Residual Impact on Landscape Character Areas

3.8.53 During Construction, there will still be slight residual impact on Landscape Character Areas. This residual impact is temporary in nature and therefore considered slight to insubstantial.

3.8.54 DP1 will be constructed when Residential Site at Site 1A and 1B at Kai Tak Centre (LCA01A) and the Cruise Terminal at Tourism and Leisure Hub (LCA01F) are in operation. The residual impact on these LCAs are considered slight.

Residual Visual Impact in Construction Phase

3.8.55 Given that the development scale of DP1 is localized, the residual visual impact on the VSRs is considered to be slight or insubstantial with the implementation of mitigation measures like erection of decorative screen hoarding. However, the mitigation measures proposed at ground level would not be able to mitigate the visual impacts for views from the higher level of some of the VSRs, in particular for those along Prince Edward Road East and Sung Wong Toi Road.

Residual Landscape Impacts in Operation Phase

Residual Impact on Existing Trees

3.8.56 Based on a very broad brush estimate, approximate 1,000 nos. of trees will be planted for new distributor roads to compensate for the loss of existing trees based on the proposed landscape master plan for KTD. Therefore, the overall cumulative residual impacts on existing trees are substantial beneficial in long term.

Residual Impact on Landscape Character Areas

3.8.57 There is no significant impact on landscape character areas due to the DP1 Project. The former Kai Tak Airport (LCA01) will dramatically be changed to a new sport, tourism and entertainment waterfront development. The Distributor Roads are all planned in accordance with PODP and RODP of the KTD. It is considered the residual impact due to the distributor roads on a new waterfront development is beneficial in long term.

Residual Visual impacts in Operation Phase

3.8.58 Residual visual impacts in operation phase will be confined to the VSRs in close proximity to the individual distributor roads for they will have direct and full views to the future road structures. These VSRs mainly include the planned CDA and residential developments in Ma Tau Kok, Sung Wong Toi Playground and the planned Sung Wong Toi Park and stadium complex, as well as the planned residential, CDA and GIC developments at future Kai Tak City Centre. With the implementation of design and mitigation measures like incorporation of aesthetic road and streetscape design and roadside tree planting, the residual adverse impact on these VSRs is considered to be slight. In the long term, the green measures could improve the visual quality of some of the VSRs and the potential residual impacts would be considered as beneficial.

3.8.59 VSRs located further away, such as those in industrial/business areas in Kowloon Bay and residential areas in Kowloon City, will only have partial or glimpsed views to the distributor roads and the residual impact on these VSRs is considered to be insubstantial.

3.8.60 The proposed alignments and layout for distributor roads have been developed from PODP under the Kai Tak Planning Review and then further refined and improved under this Engineering Review in the RODP. During the urban design and planning process, design measures have been incorporated in the development layout so as to minimize any potential adverse visual impact on the VSRs at KTD per se.

Summary

3.8.61 Overall, it is considered that the landscape and visual impacts due to DP1 during construction and operation phases are considered to be acceptable with the implementation of mitigation measures and in the long term beneficial.

3.9 Environmental Monitoring and Audit Requirement

3.9.1 This section further elaborates the requirements of EM&A for the DP1 Project, based on the assessment results of various environmental issues.

3.9.2 The objectives of carrying out EM&A for the DP1 Project include the following:

- to provide a database against which any environmental impacts of the DP1 Project can be determined;
- to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- to monitor the performance of the Project and the effectiveness of mitigation measures;
- to verify the environmental impacts predicted in this EIA;
- to determine project compliance with regulatory requirements, standards and government policies;
- to take remedial action if unexpected problems or unacceptable impacts arise; and
- to provide data to enable an environmental audit.

3.9.3 The following sections summarise the recommended EM&A requirements. Details of EM&A are provided in a stand-alone EM&A Manual.

Air Quality Impact

3.9.4 The construction work will inevitably lead to dust (TSP) emissions, mainly from excavation, filling activities, truck haulage and material handling. No exceedance of hourly and daily TSP criteria are predicted at air sensitive receivers (ASRs) in the vicinity of work sites with eight times daily watering on active work areas. With implementation of the proposed mitigation measures, dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation, good site practices and comprehensive dust monitoring and audit, the dust impact would be further diminished. Dust monitoring is recommended in the EM&A Manual to ensure the efficacy of the control measures.

3.9.5 With the implementation of suggested mitigation measures, the predicted air quality in the study area complies with the AQO during operational phase. No operational phase air quality monitoring and audit is proposed.

Noise Impact

3.9.6 Residual construction noise impacts from the DP1 Project, in addition to the concurrent construction tasks of other projects, could be expected at the NSRs identified in this EIA. Appropriate mitigation measures are required in order to alleviate the impacts to meet the EIAO-TM criteria. Noise monitoring during construction phase will need to be carried out to ensure that such mitigation measures are implemented properly.

3.9.7 No environmental monitoring and audit for potential noise impact during the operational phase is considered necessary.

Water Quality Impact

3.9.8 With the implementation of all the recommended mitigation measures, no unacceptable water quality impact would be expected from construction and operation of the DP1 Project. Site inspections should be undertaken routinely during the construction phase to inspect the works areas in order to ensure the recommended mitigation measures are properly implemented.

Waste Management Implications

3.9.9 Waste management will be the contractor's responsibility to ensure that all wastes produced during the construction of the DP1 Project are handled, stored and disposed of in accordance with the recommended good waste management practices and EPD's regulations and requirements. The recommended waste management measures in this section should form the basis of the site Waste Management Plan to be developed by the contractor at the construction stage.

3.9.10 It is recommended that the waste arisings generated during the construction activities should be audited periodically to determine if wastes are being managed in accordance with approved procedures and the site Waste Management Plan. The audits should look at all aspects of waste management including waste generation, storage, transport and disposal. An appropriate audit programme would be to undertake a first audit near the commencement of the construction works, and then to audit on a quarterly basis thereafter. In addition, the routine site inspections should check the implementation of the recommended good site practices and other waste management mitigation measures.

Land Contamination Impact

3.9.11 No environmental monitoring and audit requirements with regards to land contamination will be required for the DP1 Project.

Impact on Culture Heritage

3.9.12 No mitigation will be required for the proposed DP1 Project and no EM&A requirements will be necessary.

Landscape and Visual Impact

3.9.13 The EIA has recommended landscape and visual mitigation measures to be undertaken during construction and operation phases of the DP1 Project. The following paragraphs define the EM&A requirements to ensure the proposed landscape and visual impact mitigation measures are effectively implemented.

3.9.14 The construction phase EM&A of the landscape and visual environment and mitigation works shall be carried out as part of the site audit programme. Specific EM&A during operation phase of the DP1 Project is not required as long as the proposed mitigation measures in the EIA are fully implemented.

3.9.15 Baseline changes with respect to the landscape and visual environments should be carried out in reference to the recorded baseline conditions of the site as described in **Section 3.8** of the EIA. The monitoring should in particular record changes of each landscape resource, landscape character area and the view conditions of each visually sensitive receiver. Parameters used to describe changes in each of the above should be the same as in **Section 3.8** of the EIA.

3.9.16 The baseline monitoring should be conducted as a one-off site survey prior to commencement of any construction works.

3.9.17 All mitigation measures proposed in the EIA and implemented by the Contractor should be audited by a landscape auditor, as a member of the Environmental Team, on a regular basis to ensure compliance with the intended aims of the measures. Site inspection should be undertaken at least once every two weeks throughout the construction period.

3.9.18 In particular, the extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the contractor outside the limit of the works, including any damage to the existing trees and vegetation should be avoided.

3.9.19 The landscape auditor should also audit the proposed operation phase mitigation measures in the EIA and as depicted in the Landscape Mitigation Measures as shown in **Figure 13.6**, **13.6.1** to **13.6.3** to ensure that they are fully implemented within the project design and construction.

3.10 Implementation Schedule of the Proposed Mitigation Measures

Table 3.46 Implementation Schedule for Air Quality Measures

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.2	8 times daily watering of the work site with active dust emitting activities.	Work site / during construction	Contractor		✓			EIAO-TM
S3.2	Implementation of dust suppression measures stipulated in Air Pollution Control (Construction Dust) Regulation. The following mitigation measures, good site practices and a comprehensive dust monitoring and audit programme are recommended to minimize cumulative dust impacts. • Stockpiling site(s) should be lined with impermeable sheeting and bunded. Stockpiles should be fully covered by impermeable sheeting to reduce dust emission. • Misting for the dusty material should be carried out before being loaded into the vehicle. • Any vehicle with an open load carrying area should have properly fitted side and tail boards. • Material having the potential to create dust should not be loaded from a level higher than the side and tail boards and should be dampened and covered by a clean tarpaulin. • The tarpaulin should be properly secured and should extent at least 300 mm over the edges of the sides and tailboards. The material should also be dampened if necessary before transportation. • The vehicles should be restricted to maximum speed	Work site / during construction	Contractor		✓			EIAO-TM & Air Quality Objective

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	of 10 km per hour and confined haulage and delivery vehicle to designated roadways insider the site. On-site unpaved roads should be compacted and kept free of lose materials. • Vehicle washing facilities should be provided at every vehicle exit point. • The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores. • Every main haul road should be scaled with concrete and kept clear of dusty materials or sprayed with water so as to maintain the entire road surface wet. • Every stock of more than 20 bags of cement should be covered entirely by impervious sheeting placed in an area sheltered on the top and the three sides; and • Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites.							

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table 3.47 Implementation Schedule for Noise Measures

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.3	Use of quiet PME, movable barriers barrier for Asphalt Paver, Breaker, Excavator and Hand-held breaker and full enclosure for Air Compressor, Bar Bender, Concrete Pump, Generator and Water Pump.	Work Sites / Construction Period	Contractor		✓			EIAO-TM, NCO
S3.3	Good Site Practice: • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program. • Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program. • Mobile plant, if any, should be sited as far away from NSRs as possible. • Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum. • Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs. • Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities.	Work Sites / Construction Period	Contractor		✓			EIAO-TM, NCO
S3.3	Scheduling of Construction Works during School Examination Period	Construction site near to school / Examination Period	Contractor		✓			

* Des - Design, C - Construction, O – Operation, and Dec – Decommissioning

Table 3.48 Implementation Schedule for Water Quality Measures

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.4	***Operational Phase*** A surface water drainage system should be provided to collect road runoff. It is recommended that the road drainage should be provided with adequately designed silt trap and oil interceptors, as necessary. The design of the operational stage mitigation measures for the road works shall take into account the guidelines published in ProPECC PN 5/93 "Drainage Plans subject to Comment by the EPD"	Project site / during design and operational stages	CEDD	✓		✓		EIAO-TM, WPCO, ProPECC PN 5/93
S3.4	***Construction Phase*** <u>Construction Runoff</u> Exposed soil areas should be minimised to reduce the potential for increased siltation, contamination of runoff, and erosion. Construction runoff related impacts associated with the above ground construction activities can be readily controlled through the use of appropriate mitigation measures which include: • use of sediment traps • adequate maintenance of drainage systems to prevent flooding and overflow	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.4	Construction site should be provided with adequately designed perimeter channel and pre-treatment facilities and proper maintenance. The boundaries of critical areas of earthworks should be marked and surrounded by dykes or embankments for flood protection. Temporary ditches should be provided to facilitate runoff discharge into the appropriate watercourses, via a silt retention pond. Permanent drainage channels should incorporate sediment basins or traps and baffles to enhance deposition rates. The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94
S3.4	Ideally, construction works should be programmed to minimise surface excavation works during the rainy season (April to September). All exposed earth areas should be completed as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94
S3.4	Sediment tanks of sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m^3 capacity, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity is flexible and able to handle multiple inputs from a variety of sources and particularly suited to applications where the influent is pumped.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.4	Open stockpiles of construction materials (for examples, aggregates, sand and fill material) of more than 50 m^3 should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94
S3.4	Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94
S3.4	Precautions to be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecast, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94
S3.4	Oil interceptors should be provided in the drainage system and regularly cleaned to prevent the release of oils and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.4	All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and located wheel washing bay should be provided at every site exit, and wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94
S3.4	Drainage It is recommended that on-site drainage system should be installed prior to the commencement of other construction activities. Sediment traps should be installed in order to minimise the sediment loading of the effluent prior to discharge into foul sewers. There should be no direct discharge of effluent from the site into the sea.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94
S3.4	All temporary and permanent drainage pipes and culverts provided to facilitate runoff discharge should be adequately designed for the controlled release of storm flows. All sediment control measures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rain storms. The temporarily diverted drainage should be reinstated to its original condition when the construction work has finished or the temporary diversion is no longer required.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.4	All fuel tanks and storage areas should be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oils from reaching the coastal waters of the Victoria Harbour WCZ.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, ProPECC PN 1/94, WDO
S3.4	Sewage Effluent Construction work force sewage discharges on site are expected to be connected to the existing trunk sewer or sewage treatment facilities. The construction sewage may need to be handled by portable chemical toilets prior to the commission of the on-site sewer system. Appropriate numbers of portable toilets should be provided by a licensed contractor to serve the large number of construction workers over the construction site. The Contractor should also be responsible for waste disposal and maintenance practices.	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO
S3.4	Stormwater Discharges Minimum distances of 100 m should be maintained between the existing or planned stormwater discharges and the existing or planned seawater intakes	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, TM-DSS
S3.4	Debris and Litter In order to maintain water quality in acceptable conditions with regard to aesthetic quality, contractors should be required, under conditions of contract, to ensure that site management is optimised and that disposal of any solid materials, litter or wastes to marine waters does not occur	Work Sites / during construction	Contractor		✓			EIAO-TM, WPCO, WDO

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning

Table 3.49 Implementation Schedule for Waste Management Measures

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.5	Good Site Practices It is not anticipated that adverse waste management related impacts would arise, provided that good site practices are adhered to. Recommendations for good site practices during construction activities include: • Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site • Training of site personnel in proper waste management and chemical waste handling procedures • Provision of sufficient waste disposal points and regular collection for disposal • Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers • A recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites)	Work Sites / during construction	Contractor		√			EIAO-TM, WDO

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.5	Waste Reduction Measures Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include: • Sort C&D waste from demolition of the remaining structures to recover recyclable portions such as metals • Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal • Encourage collection of aluminium cans, PET bottles and paper by providing separate labelled bins to enable these wastes to be segregated from other general refuse generated by the work force • Any unused chemicals or those with remaining functional capacity should be recycled • Proper storage and site practices to minimise the potential for damage or contamination of construction materials	Work Sites / during construction	Contractor		√			EIAO-TM, WDO

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	Construction and Demolition Materials Mitigation measures and good site practices should be incorporated in the contract document to control potential environmental impact from handling and transportation of C&D material. The mitigation measures include: • Where it is unavoidable to have transient stockpiles of C&D material within the Project work site pending collection for disposal, the transient stockpiles shall be located away from waterfront or storm drains as far as possible. • Open stockpiles of construction materials or construction wastes on-site should be covered with tarpaulin or similar fabric. • Skip hoist for material transport should be totally enclosed by impervious sheeting. • Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving a construction site. • The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores. • The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure dust materials do not leak from the vehicle. • All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.	Work sites / during construction	Contractor and Independent Environmental Checker		√			ETWB TCW No. 33/2002, 31/2004, 19/2005

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
	• The height from which excavated materials are dropped should be controlled to a minimum practical height to limit fugitive dust generation from unloading. When delivering inert C&D material to public fill reception facilities, the material should consist entirely of inert construction waste and of size less than 250mm or other sizes as agreed with the Secretary of the Public Fill Committee. In order to monitor the disposal of the surplus C&D material at the designed public fill reception facility and to control fly tipping, a trip-ticket system as stipulated in the ETWB TCW No. 31/2004 "Trip Ticket System for Disposal of Construction and Demolition Materials" should be included as one of the contractual requirements and implemented by an Environmental Team undertaking the Environmental Monitoring and Audit work. An Independent Environmental Checker should be responsible for auditing the results of the system.	Work sites / during construction	Contractor and Independent Environmental Checker		√			ETWB TCW No. 33/2002, 31/2004, 19/2005
S3.5	Chemical Waste After use, chemical wastes (for example, cleaning fluids, solvents, lubrication oil and fuel) should be handled according to the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Spent chemicals should be collected by a licensed collector for disposal at the CWTF or other licensed facility, in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*	Work Sites / during construction	Contractor		√			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.5	General Refuse General refuse should be stored in enclosed bins or compaction units separate from C&D material. A licensed waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Effective collection and storage methods (including enclosed and covered area) of site wastes would be required to prevent waste materials from being blown around by wind, wastewater discharge by flushing or leaching into the marine environment, or creating odour nuisance or pest and vermin problem	Work Sites / during construction	Contractor		√			Waste Disposal Ordinance Water Pollution Control Ordinance

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Table 3.50 Implementation Schedule for Land Contamination Measures

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.6.57	For any excavation works conducted at Radar Station and ex-GFS building, • As the risk due to dermal contact with groundwater by site workers is uncertain, it is recommended that personnel protective equipment (PPE) be used by site workers as a mitigation measure.	Radar Station and ex-GFS building	Contractor		√			

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.6.58	For EMSD Kowloon Bay Vehicle Maintenance Workshop • EMSD as the current occupant should conduct a land contamination assessment and complete the necessary remediation according to the relevant guidelines prior to future handing over the site to the Government for construction of the proposed Road D4.	EMSD Kowloon Bay Vehicle Maintenance Workshop / Prior to construction of Road D4	EMSD		√			• "Guidance Note for Contaminated Land Assessment and Remediation" • "Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management" • "Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair /Dismantling Workshop".

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Table 3.51 Implementation Schedule for Landscape and Visual Impacts

EIA Ref	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*				Relevant Legislation and Guidelines
				Des	C	O	Dec	
S3.8.12	Construction Phase • All existing trees should be carefully protected during construction. • Trees unavoidably affected by the works should be transplanted where practical. Detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBC 2/2004 and 3/2006. Final locations of transplanted trees should be agreed prior to commencement of the work. • Control of night-time lighting. • Erection of decorative screen hoarding.	Works area / During Construction Phase	Contractor	✓	✓			EIAO-TM
S3.8.13	Operation Phase • Compensatory tree planting should be incorporated into the proposed projects where trees are affected. • Tall buffer screen tree / shrub / climber planting should be incorporated to soften hard engineering structures and facilities. • Sensitive streetscape design should be incorporated along all new roads to reflect the new urban development in Kai Tak. • Structure, ornamental tree / shrub / climber planting should be provided along roadside amenity strips and central dividers to enhance the townscape quality, where space is available. • Aesthetically pleasing design as regard to the form, material and finishes should be incorporated to all buildings, engineering structures and associated infrastructure facilities.	Project area / During Design stage and Operation Phase	CEDD	✓		✓		EIAO-TM

* Des - Design, C - Construction, O – Operation, and Dec - Decommissioning