TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

3. AIR QUALITY IMPACT ASSESSMENT

3.1 Introduction

3.1.1.1 Potential air quality impacts associated with the construction and operation phases of the Project are presented in this section. The air quality impact assessment has been conducted in accordance with the requirement in Annexes 4 and 12 of the EIAO-TM and the requirements in Section 3.4.4 and Appendix B and B-1 of the EIA Study Brief (ESB-360/2023).

3.1.1.2 An application for an Environmental Permit (EP) would be submitted for the following Schedule 2 Designated Projects (DPs) by CEDD and the potential air quality impact due to these DPs during construction and operation phases are addressed in this assessment. These DPs include:

- Construction of Marine Viaduct at TKO 132 (DP1);
- Reclamation Works at TKO 137 and TKO 132 (DP2);
- Construction and Operation of Effluent Polishing Plant (EPP) (DP3);

3.1.1.3 The following DPs would apply the EP through separate EIA studies but their potential impacts during construction and operation phases are also addressed in this assessment. These DPs include:

- Construction and Operation of Refuse Transfer Station (RTS) (DP4);
- Construction and Operation of Construction Waste Handling Facility (DP5);
- Construction and Operation of Electricity Facilities (DP6).

3.2 Environmental Legislation, Standards and Guidelines

3.2.1 Air Quality Objectives

3.2.1.1 The *Air Pollution Control Ordinance* provides the statutory authority for controlling air pollutants from a variety of sources. The *Hong Kong Air Quality Objectives* (AQOs), which stipulate the maximum allowable concentrations over specific periods for typical pollutants, should be met. The prevailing AQOs has been enforced since 1 January 2022 and is adopted for this preliminary assessment. The prevailing AQOs are listed in **Table 3.1**.

Table 3.1 Hong Kong Air Quality Objectives

Pollutants	Averaging Time	Concentration Limit ($\mu g/m^3$) [1]	Number of Exceedance Allowed per Year
Respirable Suspended Particulates (RSP or PM_{10}) [2]	24-hour	100	9
	Annual [4]	50	N/A
Fine Suspended Particulates (FSP or $PM_{2.5}$) [3]	24-hour	50	18 [5]
	Annual [4]	25	N/A
Nitrogen Dioxide (NO_2)	1-hour	200	18
	Annual [4]	40	N/A
Sulphur Dioxide (SO_2)	10-min	500	3
	24-hour	50	3
Ozone (O_3)	8-hour	160	9
Carbon Monoxide (CO)	1-hour	30,000	0
	8-hour	10,000	0
Lead (Pb)	Annual	0.5	N/A

Notes:
[1] Gaseous air pollutant is measured at 293K and 101.325kPa
[2] Suspended particulates in air with a nominal aerodynamic diameter of 10µm or smaller.

[3] Suspended particulates in air with a nominal aerodynamic diameter of 2.5µm or smaller.
[4] Arithmetic mean
[5] The preceding AQO allows 35 days of exceedance per calendar year for daily FSP. Instead, government and related projects shall adopt a more stringent standard with the number of allowable exceedance of 18 days per calendar year.

3.2.1.2 The AQOs are currently under review and it is recommended to be tightened further to protect public health. The potential updated AQO are summarized in **Table 3.2**.

Table 3.2 Potential Updated AQOs

Pollutants	Averaging Time	Concentration Limit (µg/m^3)	Number of Exceedance Allowed per Year
Respirable Suspended Particulates (RSP or PM_{10}) [2]	24-hour	75	9
	Annual [4]	30	N/A
Fine Suspended Particulates (FSP or $PM_{2.5}$) [3]	24-hour	37.5	18
	Annual [4]	15	N/A
Nitrogen Dioxide (NO_2)	1-hour	200	18
	24-hour	120	9
	Annual [4]	40	N/A
Sulphur Dioxide (SO_2)	10-min	500	3
	24-hour	40	3
Ozone (O_3)	8-hour	160	9
	Peak season	100	N/A
Carbon Monoxide (CO)	1-hour	30,000	0
	8-hour	10,000	0
	24-hour	4,000	0
Lead (Pb)	Annual	0.5	N/A

Notes:
[1] Gaseous air pollutant is measured at 293K and 101.325kPa
[2] Suspended particulates in air with a nominal aerodynamic diameter of 10µm or smaller.
[3] Suspended particulates in air with a nominal aerodynamic diameter of 2.5µm or smaller.
[4] Arithmetic mean

3.2.2 Air Quality Standards for Non-AQO Criteria Pollutants

3.2.2.1 Aside from the AQO criteria pollutants mentioned in **Section 3.2**, Methane (CH_4), Hydrogen Chloride (HCl), Hydrogen Fluoride (HF), Formaldehyde (CH_2O) would also be emitted from the combustion of biogas at the proposed effluent polishing plant. Vinyl chloride and Benzene would be emitted from the flare and landfill gas generator at SENTX. Methane (CH4) and Acetaldehyde would be emitted from the stacks at ASB Biodiesel (Hong Kong) Limited. In accordance with Annex 4 of EIAO-TM, for air pollutants with no established criteria under the Air Pollution Control Ordinance nor in the EIAO-TM, standards or criteria should be adopted by recognized international organizations. The air quality standards for these pollutants are therefore employed by making reference to standards by recognized international organizations and are detailed in **Table 3.3**.

Table 3.3 Air Quality Standards for Non-AQO Criteria Pollutants

Pollutants	Averaging Time	Air Quality Standard (µg/m^3)	Reference
Methane	1-hour	600,000	TEEL-0 (the threshold concentration below which most people will experience no adverse health effects) (https://edms3.energy.gov/pac/Docs/Revision_26_Table4.pdf)
HCl	1-hour	2100	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA

Pollutants	Averaging Time	Air Quality Standard (µg/m^3)	Reference
			(https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary)
	Annual	20	Integrated Risk Information System, USEPA (https://iris.epa.gov/ChemicalLanding/&substance_nmbr=396)
HF	1-hour	240	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary)
	Annual	14	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary)
Formaldehyde	30-min	100	World Health Organization Air Quality Guidelines for Europe (https://www.euro.who.int/__data/assets/pdf_file/0005/74732/E71922.pdf)
	Annual	9	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/chemicals/formaldehyde).
Vinyl chloride	1-hour	180000	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/chemicals/vinyl-chloride)
	Annual	100	Integrated Risk Information System, USEPA (https://iris.epa.gov/ChemicalLanding/&substance_nmbr=1001)
Benzene	1-hour	27	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/chemicals/benzene)
	8-hour	3	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/chemicals/benzene)
	Annual	3	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/chemicals/benzene)
Acetaldehyde	1-hour	470	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/chemicals/acetaldehyde)
	8-hour	300	Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database, California, USA (https://oehha.ca.gov/air/chemicals/acetaldehyde)
	Annual	9	Integrated Risk Information System, USEPA (https://iris.epa.gov/ChemicalLanding/&substance_nmbr=290)

Remark
1. The adoption of assessment criterion for individual non-AQO pollutant follows the following hierarchy: EPD > WHO > USEPA-IRIS > OEHHA > Other References.

3.2.3 Technical Memorandum of EIA Process

3.2.3.1 The criteria for evaluating air quality impacts and the guidelines for air quality assessment are laid out in Annex 4 and Annex 12 of the EIAO-TM.

3.2.3.2 In accordance with Annex 4 of EIAO-TM, the limit of 5 odour units based on an averaging time of 5 seconds for odour prediction assessment should not be exceeded at any air sensitive receiver (ASR).

3.2.4 Air Pollution Control (Construction Dust) Regulation

3.2.4.1 Notifiable and regulatory works are under the control of *Air Pollution Control (Construction Dust) Regulation*. This Project is expected to include notifiable works (work inside tunnel, superstructure construction and demolition, road construction work) and regulatory works (dusty material handling and excavation). Contractors and site agents are required to inform Environmental Protection Department (EPD) and adopt dust reduction measures to minimise dust emission, while carrying out construction works, to the acceptable level.

3.2.5 Best Practical Mean of Specified Process

3.2.5.1 "A Guidance Note on the Best Practical Means for Mineral Works (Stone Crushing Plants) BPM 11/1 (95)" by EPD requires that the particulates emission concentration limit of 50 mg/m^3 (expressed at reference condition, 0°C, 101.325 kPa).

3.2.5.2 "A Guidance Note on Technical, Management and Monitoring Requirements for Specified Process – Cement Works (Concrete Batching Plant) BPM 3/2 (16)" (BPM) by EPD requires particulates emission concentration limit of 10 mg/m^3 (expressed at reference condition, 0°C, 101.325 kPa) shall be satisfied by 1 January 2018.

3.2.6 Air Pollution Control (Fuel Restriction) Regulations

3.2.6.1 The *Air Pollution Control (Fuel Restriction) Regulations* was enacted in 1990 to impose legal control on the types of fuel allowed for use and their sulphur contents in commercial and industrial processes to reduce sulphur dioxide (SO_2) emissions. Since 1 October 2008, liquid fuel with a sulphur content not exceeding 0.005% by weight such as Ultra Low Sulphur Diesel (ULSD) shall be used, unless a valid certificate of compliance with emission limits issued by a competent examiner.

3.2.7 Development Bureau Technical Circular (Works)

3.2.7.1 The *Development Bureau Technical Circular (Works) No. 13/2020* (*DEVB TC(W) No. 13/2020)* is one of the environmental guidelines on timely application of temporary electricity and wider use of electric vehicles in public works contract. The project team should timely apply for the temporary electricity and water supply with a target that the necessary cables/water mains laying works could be completed before the commencement of works contract. The project team should also specify the use of EV(s) and installation of a designated medium-speed charger for each EV in each public contract.

3.2.7.2 *Development Bureau Technical Circular (Works) No. 1/2015* also requires that no exempted generators, air compressors, excavators and crawler cranes shall be allowed in the new capital works contracts of public works (including design and build contracts) with an estimated contract value exceeding $200 million, unless is at the discretion of the Architect/Engineer considering no feasible alternative.

3.3 Description of Environment

3.3.1 Background Concentration by AQMS

3.3.1.1 The nearest EPD fixed air quality monitoring station to the Project Site is the Tseung Kwan O Air Quality Monitoring Station (AQMS) situated at Tseung Kwan O Sports Centre which is under the land use type "Urban: Residential", as published in *Air Quality in Hong Kong*. The recent five-year (2019 - 2023) average concentrations of air pollutant relevant to the Project are summarized in **Table 3.4**. The monitoring results indicated that there was a decreasing trend in the nitrogen dioxide levels in general with spikes in Year 2021 and 2023. The respirable suspended particulates and fine suspended particulates levels were not more than 70% of respective AQOs. However, exceedance of hourly Ozone was recorded in Year 2019, 2022 and 2023.

Table 3.4 Concentrations of Pollutants in the Recent Five Years (Year 2019 – 2023) at Tseung Kwan O AQMS

Pollutant	Averaging Time	AQO[1]	Observed Concentration (µg/m³)[2]				
			2019	2020	2021	2022	2023
Respirable Suspended Particulates (RSP)	10th Highest 24-hour	100 (9)	60	52	50	46	50
	Annual	50	29	24	24	22	24
Fine Suspended Particulates (FSP)	19th Highest 24-hour	50 (18)	34	26	26	28	27
	Annual	25	17	12	13	13	15
Nitrogen Dioxide (NO_2)	19th Highest 1-hour	200 (18)	155	136	132	110	116
	Annual	40	29	23	26	21	22
Sulphur Dioxide (SO_2)	4th Highest 10-min	500 (3)	25	18	18	12	32
	4th Highest 24-hour	50 (3)	12	7	9	7	6
Ozone (O_3)	10th Highest 8-hour	160 (9)	**185**	158	158	**167**	**160**
Carbon Monoxide (CO)	Maximum Hourly	30000 (0)	2170	1670	1750	1210	1300
	Maximum 8-hour	10000 (0)	1935	1411	1375	1105	996

Notes:
[1] Value in ( ) refers the number of exceedances allowed per year.
[2] Bolded values mean exceedance of the AQO limit values.

3.3.1.2 The nearest EPD fixed air quality monitoring station with available data of non-AQO pollutants is Tsuen Wan. The air pollutant concentrations of non-AQO pollutants in the most recent 5 years (i.e. Year 2019-2023) are collected whenever possible, and are summarized in **Table 3.5**. For HCl, the maximum of the monitoring data of the chloride ion in Year 2018-2022 is used to calculate its annual concentration based on the following formula:

$$C_{HCl} = C_{Cl-} \times M_{HCl} / M_{Cl-} = 0.975\ \mu g/m^3 \times 36.4609 / 35.453 = 1.002\ \mu g/m^3$$

where
C_{HCl} = concentration of the HCl;
C_{Cl-} = concentration of the chloride ion;
M_{HCl} = molar weight of the HCl = 36.4609 g/mol; and
M_{Cl-} = molar weight of the chloride ion = 35.453 g/mol.

For the air pollutants HF and hourly HCl, there is no monitoring data available.

Table 3.5 Background Concentrations of Non-AQO Pollutants

Pollutants	Background Concentrations of Non-AQO Pollutants		
	Hourly (µg/m³)	8-Hour (µg/m³)	Annual (µg/m³)
Methane [1]	4.47E+03	-	-
HCl [2][7]	1.00E+00	-	1.00E+00
Formaldehyde [3][8]	3.30E+00	-	1.51E+00

Pollutants	Background Concentrations of Non-AQO Pollutants		
	Hourly (µg/m³)	8-Hour (µg/m³)	Annual (µg/m³)
Vinyl chloride [4]	4.00E-01	-	3.25E-01
Benzene [5]	2.00E+00	2.00E+00	1.13E+00
Acetaldehyde [6]	6.60E+00	6.60E+00	1.32E+00

Notes:

[1] The background concentrations of methane are obtained from monitoring data at SENTX (Year 2022-2023, https://sentx-ema.com.hk/ema-reports_annual.html).

[2] The background concentration of HCl is calculated from the chloride ion concentration obtained from monitoring data at Tsueng Kwan O AQMS (Year 2019-2023). The annual average background concentration of HCl is adopted as the hourly background concentration of HCl.

[3] The background concentrations of formaldehyde are obtained from monitoring data at Central West AQMS (Year 2019-2023).

[4] The background concentrations of vinyl chloride are obtained from monitoring data at SENTX (Year 2022-2023, https://sentx-ema.com.hk/ema-reports_annual.html).

[5] The background concentrations of benzene are obtained from monitoring data at SENTX (Year 2022-2023, https://sentx-ema.com.hk/ema-reports_annual.html).

[6] The background concentrations of acetaldehyde are obtained from monitoring data at Central West AQMS (Year 2019-2023).

[7] There is no monitoring data available for HF.

[8] Hourly background concentration is adopted when considering 30-min average of formaldehyde.

3.3.2 Background Concentration by Prediction

3.3.2.1 Apart from the air quality monitoring data, EPD has released a set of background levels predicted by "Pollutants in the Atmosphere and their Transport over Hong Kong", PATH model. The air pollutant concentrations in the assessment area, with reference to the dataset of Year 2030 in PATHv3.0, are summarized in **Table 3.6 and Table 3.7**.

Table 3.6 Background Air Pollutants at TKO 137 in Year 2030 Extracted from the PATHv3.0 Model

Pollutant	Averaging Time	AQO	Data Summary	PATH v3.0 Grid in Year 2030									
				49,27	49,28	49,29	50,26	50,27	50,28	50,29	51,27	51,28	51,29
RSP	24-hour	100 (9)	10th Highest	52.41	52.25	49.87	51.58	54.7	55.26	52.46	51.24	51.76	55.45
			Exceedance	0	0	0	0	0	0	0	0	0	0
	Annual	50	-	19.59	19.68	18.83	18.69	20.53	21.26	20.01	18.54	18.99	21.1
FSP	24-hour	50 (18,35)	19th Highest	30.06	30.07	27.76	28.04	32.11	32.83	31.16	27.44	29.35	32.68
			36th Highest	25.15	25.54	23.93	23.92	26.34	27	25.72	23.62	24.37	27.16
			Exceedance	0	0	0	0	0	1	0	0	0	0
	Annual	25	-	11.76	11.85	11.21	11.04	12.42	12.98	12.16	10.91	11.29	13.04
NO_2	1-hour	200(18)	19th Highest	55.02	59.53	64.32	51.43	56.11	56.07	59.17	54.38	53.44	56.14
			Exceedance	0	0	0	0	0	0	0	0	0	0
	24-hour	120(9)	10th Highest	23.24	23.14	23.23	22.85	23.42	21.76	21.45	21.61	20.47	20.88
			Exceedance	0	0	0	0	0	0	0	0	0	0
	Annual	40	-	11.66	11.15	10.54	10.93	11.34	10.23	10.33	10.67	9.63	9.96
SO_2	10-Min	500(3)	4th Highest	22.96	23.87	23.73	21.71	23.19	24.49	23.81	21.78	24.37	23.04
			Exceedance	0	0	0	0	0	0	0	0	0	0
	24-hour	50(3)	4th Highest	6.74	6.8	6.73	6.61	6.75	6.9	6.84	6.58	6.57	6.76
			Exceedance	0	0	0	0	0	0	0	0	0	0
O_3	8-hour	160(9)	10th Highest	**174.08**	**173.37**	**175.28**	**173.61**	**174.84**	**172.26**	**173.37**	**175.36**	**172.01**	**176.21**
			Exceedance	25	24	27	25	26	25	27	27	23	28
CO	1-hour	30000(0)	Highest	518.28	516.92	516.3	514.93	514.04	513.36	514.56	508.96	508.61	510.64
			Exceedance	0	0	0	0	0	0	0	0	0	0
	8-hour	10000(0)	Highest	482.02	479.9	480.48	479.93	481.22	477.38	480.02	481.2	477.47	481.02
			Exceedance	0	0	0	0	0	0	0	0	0	0
	24-hour	4000(0)	Highest	451.62	448.98	448.57	448.78	449.22	443.57	445.59	448.59	443.14	446.71
			Exceedance	0	0	0	0	0	0	0	0	0	0

Table 3.7 Background Air Pollutants at TKO 132 in Year 2030 Extracted from the PATHv3.0 Model

Pollutant	Averaging Time	AQO	Data Summary	PATH v3.0 Grid in Year 2030									
				46,30	47,29	47,30	47,31	48,29	48,30	48,31	48,32	49,30	49,31
RSP	24-hour	100(9)	10th Highest	49.33	49.76	49.6	49.9	49.23	49.34	48.87	50.69	49.29	49.08
			Exceedance	0	0	0	0	0	0	0	0	0	0
	Annual	50	-	18.58	18.77	18.5	18.7	18.62	18.47	18.34	19.06	18.49	18.32
FSP	24-hour	50 (18,35)	19th Highest	28.35	28.2	28.24	28.48	27.56	27.77	27.87	29	27.43	27.65
			36th Highest	23.32	23.38	23.29	23.62	23.27	23.13	23.12	24.41	23.01	23.12
			Exceedance	0	0	0	0	0	0	0	0	0	0
	Annual	25	-	11.06	11.2	10.96	11.16	11.05	10.94	10.86	11.52	10.94	10.83
NO_2	1-hour	200(18)	19th Highest	70.52	62.7	68.78	76.34	62.66	67.84	70.41	70.01	64.05	63.8
			Exceedance	0	0	0	0	0	0	0	0	0	0
	24-hour	120(9)	10th Highest	29.13	24.96	26.65	28.76	25	26.04	25.59	27.54	23.63	22.85
			Exceedance	0	0	0	0	0	0	0	0	0	0
	Annual	40	-	12.95	12.71	11.26	10.93	11.8	11.48	10.29	11.59	10.55	9.85
SO2	10-Min	500(3)	4th Highest	22.56	22.52	22.6	22.05	22.54	22.82	22.44	22.03	23.26	22.84
			Exceedance	0	0	0	0	0	0	0	0	0	0
	24-hour	50(3)	4th Highest	6.81	6.82	6.86	6.91	6.75	6.75	6.88	6.96	6.73	6.79
			Exceedance	0	0	0	0	0	0	0	0	0	0
O3	8-hour	160(9)	10th Highest	171.41	172.33	171.74	172.08	174.66	174.36	172.56	171.79	174.48	174.43
			Exceedance	20	24	21	21	25	26	23	20	26	26
CO	1-hour	30000(0)	Highest	515.81	510.1	509.67	511.71	515.6	512.82	511.15	515.44	515.73	516.47
			Exceedance	0	0	0	0	0	0	0	0	0	0
	8-hour	10000(0)	Highest	484.01	483.55	482.16	480.29	483.18	483.81	479.74	482.76	479.66	479.98
			Exceedance	0	0	0	0	0	0	0	0	0	0
	24-hour	4000(0)	Highest	456.74	453.54	447.88	447.35	452.82	453	446.9	452.41	447.17	447.6
			Exceedance	0	0	0	0	0	0	0	0	0	0

3.4 Identification of Air Sensitive Receivers

3.4.1 Representative Air Sensitive Receivers

3.4.1.1 In accordance with Annex 12 (Guidelines for Air Quality Assessment) 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 as ASRs.

3.4.1.2 In accordance with Clause 3.4.4.2 of the EIA Study Brief ESB360/2023, the assessment area for air quality impact assessment should be defined by a distance of 500m from the boundary of the Project site and the works of the Project. For identification of the representative ASRs within the assessment area that would likely be affected by the potential impacts from the construction and operation of TKO 132 & 137, a review has been conducted based on Recommended Outline Development Plan (RODP) for TKO 132 & 137 and relevant available information including topographic maps, Outline Zoning Plans (OZPs) (such as OZP Plan No. S/TKO/29 – Tseung Kwan O, S/K15/27 – Cha Kwo Ling, Yau Tong, Lei Yue Mun) and other published plans in the vicinity of the Project site. The representative ASRs within the assessment area are identified and presented in **Table 3.8** below. Their locations are illustrated in **Figure 3.1.1 & 3.1.2**. The planned ASRs under RODP will be further identified in the EIA Study according to the latest development plan.

Table 3.8 Representative Air Sensitive Receivers

ASR ID	Description	Land Use	Shortest Distance from Project Boundary (m)	Assessment Height (mAG)	Potentially Affected	
					By Construction	By Operation
A01	Admin Building of TKO Desalination Plant	OU	35	1.5, 5, 10, 15, 20, 30	✓	✓
A02	TVB City	OU	15	1.5, 5, 10, 15, 20, 30	✓	✓
A03	Hong Kong Aircraft Engineering Company (HAECO)	OU	110	1.5, 5, 10, 15, 20, 30	✓	✓
A04	P-Tech Landfill Gas (SENT) Co. Ltd.	I	< 5	1.5, 5, 10	✓	✓
A05	Hong Kong Aero Engine Services Limited	I	195	1.5, 5, 10, 15, 20	✓	✓
A06	Hong Kong Trade Development Council Exhibition Services & Logistics Centre	GIC	190	1.5, 5, 10, 15, 20	✓	✓
A07	Office Building of SENTX	GIC	10	1.5, 5, 10	✓	✓
A08	TVB City	OU	175	1.5, 5, 10, 15, 20, 30, up to 60	✓	✓
A09	TVB City	I	10	1.5, 5, 10, 15, 20	✓	✓
A10	TVB City	I	5	1.5, 5, 10, 15, 20, 30, up to 40	✓	✓

ASR ID	Description	Land Use	Shortest Distance from Project Boundary (m)	Assessment Height (mAG)	Potentially Affected	
					By Construction	By Operation
A50	Ocean Shores Tower 1	R	160	1.5, 5, 10, 15, 20, 30, up to 170	✓	✓
A51	Capri House 15	R	370	1.5, 5, 10, 15	✓	✓
A52	Tseung Kwan O Columbarium	OU	95	1.5, 5, 10, 15, 20, 30, up to 130	✓	✓
A53	Ma Pui Tsuen	V	200	1.5, 5, 10, 15	✓	✓
A54	Lei Yue Mun Village	V	385	1.5, 5, 10, 15	✓	✓
A55	Lei Yue Mun Estate	V	425	1.5, 5, 10, 15, 20, 30, up to 150	✓	✓
A56	Lau Shui Hang On Luen Village	V	145	1.5, 5, 10	✓	✓
A57	Lau Shui Hang On Luen Village	V	60	1.5, 5, 10	✓	✓
A58	Ocean Shores Tower 8	R	110	15, 20, 30, up to 170	✓	
A59	Ocean Shores Tower 17	R	< 5	15, 20, 30, up to 170	✓	
A60	Hong Kong Design Institute	E	40	1.5, 5, 10, 15, 20, 30, up to 70	✓	
A61	Tiu Keng Leng Sports Center	GIC	75	1.5, 5, 10, 15	✓	
A62	Ma Wan Tsuen	V	395	1.5, 5, 10	✓	✓
P01	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P02	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P03	Planned Police Station	GIC	Within RODP	1.5, 5, 10, 15, 20, 30, up to 110	✓	✓
P04	Planned Fire Station and Ambulance Depot	GIC	Within RODP	1.5, 5, 10, 15, 20, 30, up to 110	✓	✓
P05	Planned Government Office cum Sport Complex	GIC	Within RODP	5, 10, 15, 20, 30, up to 110		✓
P06	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 190	✓	✓

ASR ID	Description	Land Use	Shortest Distance from Project Boundary (m)	Assessment Height (mAG)	Potentially Affected	
					By Construction	By Operation
P07	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 190	✓	✓
P08	Planned Primary School	E	Within RODP	1.5, 5, 10, 15, 20, 30	✓	✓
P09	Planned Secondary School	E	Within RODP	1.5, 5, 10, 15, 20, 30	✓	✓
P10	Planned Integrated Complex	GIC	Within RODP	1.5, 5, 10, 15, 20, 30	✓	✓
P11	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P12	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P13	Planned Primary School	E	Within RODP	1.5, 5, 10, 15, 20, 30	✓	✓
P14	Planned Primary School	E	Within RODP	1.5, 5, 10, 15, 20, 30	✓	✓
P15	Planned Secondary School	E	Within RODP	1.5, 5, 10, 15, 20, 30	✓	✓
P16	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P17	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120	✓	✓
P18	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120		✓
P19	Planned Mixed Use	OU	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180		✓
P20	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 160		✓
P21	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P22	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P23	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 190	✓	✓

ASR ID	Description	Land Use	Shortest Distance from Project Boundary (m)	Assessment Height (mAG)	Potentially Affected	
					By Construction	By Operation
P24	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 190	✓	✓
P25	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P26	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P27	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P28	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P29	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P30	Planned Public Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180	✓	✓
P31	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P32	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P33	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 200	✓	✓
P34	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180		✓
P35	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180		✓
P36	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 180		✓
P37	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 160		✓
P38	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 160		✓

ASR ID	Description	Land Use	Shortest Distance from Project Boundary (m)	Assessment Height (mAG)	Potentially Affected	
					By Construction	By Operation
P39	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 160		✓
P40	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120	✓	✓
P41	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120	✓	✓
P42	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120	✓	✓
P43	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120		✓
P44	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120		✓
P45	Planned Private Housing	R	Within RODP	1.5, 5, 10, 15, 20, 30, up to 120		✓
P46	Planned Open Space	O	Within RODP	1.5		✓
P47	Planned Open Space	O	Within RODP	1.5		✓
P48	Planned Open Space	O	Within RODP	1.5		✓
P49	Planned Open Space	O	Within RODP	1.5		✓

Remarks:
RSc – Public Housing Site, R – Private Housing, OU – Other Specified Uses, OU(MU) – Other Specified Uses (Mixed Use), E – Education, I – Industrial Uses, GIC – Government, Institution or Community, V – Village Type Development, O – Open Space.

3.5 Identification of Environmental Impact

3.5.1 Construction Phase

3.5.1.1 Major construction works for the Project would include the site development in the RODP, 700m twin sewage twin rising mains, saltwater mains and freshwater mains, and construction of the Designated Projects including:

- Construction of marine viaduct connecting to land to be created off TKO 132 (DP1);
- Reclamation works (~ 20ha) at TKO 137 (DP2);
- Reclamation works (~ 19ha) off TKO 132 (DP2);
- Construction of Effluent Polishing Plant (EPP) at TKO 137 (DP3);
- Construction of Refuse Transfer Station (RTS) off TKO 132 (DP4);
- Construction of Construction Waste Handling Facility (CWHF) off TKO 132 (DP5); and
- Construction of Electricity Facilities off TKO 132 (DP6).

3.5.1.2 Fugitive dust emission arising from the construction of the Project including site formation, reclamation, excavation, slope cutting, spoil handling, stockpiling, barging point, road construction, wind erosion on the exposed area would pose potential dust impact on nearby existing air sensitive receivers (ASRs). Regular water on exposed construction areas, good site practices and dust suppression measures as stipulated in the *Air Pollution Control (Construction Dust) Regulation* will be implemented to minimize the potential dust impact during construction phase.

3.5.1.3 Vehicular emissions from induced construction traffic for the transportation of spoils/excavated materials would cause potential NO_X and particulates emission. On-site use of diesel-powered engines is also the potential source for other gaseous pollutants, such as NO_X, SO_2, CO and smoke. The emissions from the NRMM are regulated under the *Air Pollution Control (Non-Road Mobile Machinery) (Emission) Regulation*. Fuel with sulphur content not exceeding 0.005% by weight will be used to minimize SO_2 emission in accordance with the *Air Pollution Control (Fuel Restriction) Regulation*. In addition, the use of NRMMs with exempted label under the *Air Pollution Control (NRMM) Regulation* will be avoided as far as practicable. The equipment would also be properly maintained to minimize any emissions. Furthermore, the use of electrified NRMMs is unlikely to cause significant smoke and gaseous emissions. On-site power supply will be provided and the use of diesel generators and machinery will be avoided during the construction stage, as far as practicable. In view of the minor impact by NRMMs, particulates from construction activities would be the major air pollutant during construction phase.

3.5.1.4 Marine vessels such as barges are to be employed for the transport of excavated material for reclamation, filling and backfilling in TKO137 and off TKO 132. Dust mitigation measures, for example fully enclosed storage, sufficient watering, where practicable should be implemented to avoid dust nuisance during transport and handling of spoils. Also, there are potential marine emissions in NO_X, SO_2 and particulates by the induced marine vessels. All marine vessels are required to use compliant fuel, i.e. marine fuel with sulphur content not exceeding 0.5% by weight within Hong Kong waters, irrespective of whether they are sailing or berthing in accordance with *Air Pollution Control (Fuel for Vessels) Regulation*. On the other hand, for marine light diesel acquired from local supply, the local vessel should be using the marine light diesel with sulphur content not exceeding 0.05% by weight in accordance with *Air Pollution Control (Marine Light Diesel) Regulation*.

Concurrent Project in the vicinity of TKO 137 and TKO 132

3.5.1.5 *Fill Bank at Tseung Kwan O Area 137* is a designated project located within the Project site at TKO 137 and is operating under Environmental Permit EP-134/2002/Q. It involves construction, operation and removal of a temporary fill bank with stockpiling capacity of 12 million cubic metres of public fill with Construction and Demolition Material Crushing Facility, Construction and Demolition Material Sorting Facilities (C&DMSF), and two barging points. The fill bank will be decanted in phases starting from end of Year 2025 until Year 2030 to facilitate the development of TKO 137. Together with *Construction of Relocated Berthing Facilities and Associated Structures within Tseung Kwan O Area 137 Fill Bank*, the major operation of the fill bank will be retreated to the southern part of its site (more than 600m away from the residential area and as denoted as Phase J in **Appendix 2.3**) and continue to operate until land resumption by the Project by end of Year 2031. Referring to the Project programme, the first population intake at TKO137 would be Year 2030, before the closure of the fill bank, thus some planned ASRs under the Project exists during the remaining operation of the Fill Bank. Potential cumulative dust impact on existing ASRs during construction is expected and is assessed qualitatively.

3.5.1.6 *Desalination Plant at TKO and its proposed extension* is a concurrent project in the southeast of TKO 137 to construct and operate a desalination plant with water production capacity of 135 million litre per day (Mld) expandable to an ultimate water production capacity up to 270 Mld. Its construction and operation are governed by the Environmental Permit EP-503/2015/B and FEP-01/503/2015/B. Desalination Plant Phase 1 (TKODP1) has commissioned operation in July 2024. According to the contractual date of Desalination Plant Phase 2 (TKODP2), the associated investigation, design and construction works would be completed by January 2031.

Hence, the construction works is likely to be conducted at the same time as the construction works of the Project at TKO 137. Potential cumulative dust impact during construction phase is expected and is assessed qualitatively.

3.5.1.7 *South East New Territories Landfill extension* (SENTX) is a concurrent project located in the northeast of TKO 137 for the construction and operation of a landfill for waste under Environmental Permit EP-308/2008/C and FEP-01/308/2008/C. SENTX has already stopped waste filling activities since November 2021 and its extension SENTX continues to receive only construction waste for disposal. The SENTX is expected to be closed with its restoration works completed prior to the population intake at TKO 137. Potential cumulative dust impact during construction phase is expected and is assessed qualitatively.

3.5.1.8 *Cavern Development in Area around Tseung Kwan O* is a potential project in the north of TKO 137. The Government has been adopting a multi-pronged approach to enhance land supply, including cavern development. In view of this, a cavern is proposed at Fat Tong Chau under the project. The project is under planning and expected to be complete in Year 2032. However, as no details in construction programme is available at this stage, e.g. the period for cavern construction remains unknown, the potential cumulative dust impact is not assessed, unless further design information is made available.

3.5.1.9 *TKO Line Southern Extension (TKLSE)* will locate within the RODP of TKO 132 / TKO 137, however they are not part of the Project. A separate EIA study for TKLSE and its associated station will be undertaken by the respective project proponent. No design information is available at this stage of the Project. Therefore, the potential cumulative construction dust impact is not assessed, unless further design information is made available.

3.5.1.10 There is no current project with construction dust emission off TKO 132.

Review of Dust Monitoring Data of Past Project

3.5.1.11 A review of dust monitoring data during construction phase of similar infrastructure projects including North East New Territories New Development Areas (NENT) and Tung Chung New Town Extension (TCNTE) have been conducted. The NENT is a large-scale development project and the project site area is about 614 ha which is larger than that of this Project (103 ha for TKO 137 and around 20 ha for TKO 132). TCNTE is a large-scale development project with large extent of reclamation works of around 129 ha which is larger than that of this Project (20 ha for TKO 137 and around 19 ha for TKO 132). Good site practices and dust suppression measures as recommended in the EIA Report were adopted. Some existing ASRs were located in close vicinity of construction works, and selected as dust monitoring stations for impact monitoring during construction phase of the projects. In view of the above, the data of these monitoring stations of these projects were extracted from their monthly EM&A reports for review.

3.5.1.12 For NENT, the measured 1-hr TSP and 24-hr TSP levels at all monitoring stations were below the action levels (i.e. 279 – 303 μg/m^3 and 150 – 192 μg/m^3 respectively) and limit levels (i.e. 500 μg/m^3 and 260 μg/m^3 respectively) during site clearance and site formation (i.e. June 2020 – September 2024) with the monitoring locations located from the work site boundary from 1 m to 169 m. No exceedance of action level and limit level was recorded.

3.5.1.13 For TCNTE, the measured 1-hr TSP at all monitoring stations were below 200 μg/m^3 during the reclamation works and associated road works (i.e. July 2018 – September 2024) with the monitoring locations as close as 15m from the works. Only 1 exceedance of action levels was reported during the construction works, however, the hazy weather condition was also recorded, which is considered the cause of the observed exceedance. No exceedance of limit level was recorded.

3.5.1.14 In view of the no adverse dust impact caused by the past projects of larger scale, the potential construction dust impact by the Project is evaluated qualitatively.

3.5.2 Operation Phase (Air Pollutants)

3.5.2.1 The proposed water and sewerage mains from TKO 132 is located underground. These works would induce no additional ASR nor pose any air emission during operation phase. As such, these proposed works are not considered falling within the operational boundary of the proposed development, nor as works of the Project for assessment of potential air quality impact. The 500m assessment area of TKO 132 area during operation phase is refined and illustrated in **Figure 3.2.2**.

Vehicular Emission from Proposed Marine Viaduct (DP1), Proposed Open Roads and Existing Roads

3.5.2.2 Marine viaduct connecting the land created off TKO 132, local roads L1 – L8 at TKO 137 and other connecting roads are proposed to support the development under RODP. The commissioning years are Year 2030 for Road L2 – L4, Year 2031 for the marine viaduct, Year 2033 for Road L5 – L8 and northern section of Road L1, and Year 2038 for the remaining Road L1. The locations of these proposed roads are illustrated in **Figure 3.2.1 and 3.2.2**. Potential vehicular emission would arise from these proposed open roads and cause air quality impact to the existing and planned ASRs.

3.5.2.3 Vehicular emission from existing roads also contribute to the ambient air quality. Major roads within 500m assessment area include Tseung Lam Highway, Cross Bay Link, Wan Po Road. These open road emissions will be considered in the quantitative assessment. There are existing noise barriers along Cross Bay Link. These existing noise barriers within 500m assessment area have been considered in the air dispersion model.

Vehicular Emission associated with Concerned Facilities

3.5.2.4 Facilities with frequent operation associated with vehicles also contribute to ambient air quality by vehicular running, idling and start emission within the facilities of concerned. The facilities of concern within 500m assessment area, such as PTI, bus terminus, parking site are identified. Upon the traffic survey, existing bus terminus and parking site for all vehicle classes were identified within the assessment area. The following facilities concerned are considered in the assessment.

- Chun Wang Street Bus terminus
- Chun Wang Street Carpark
- Television Broadcasts Limited TVB City (Site B6)
- Wellcome Fresh Food Centre (Site B10)
- Planned temporary Public Transport Facilities at G/IC G3 (commences in Year 2030, closed in Year 2035)
- Planned temporary Public Transport Facilities at Open Space O5 (commences in Year 2033, closed in Year 2041)
- Planned permanent Public Transport Interchange at Private Housing Site PR1 (commences in Year 2035)
- Planned permanent Public Transport Interchange at Private Housing Site PR3 (commences in Year 2041)

3.5.2.5 Apart from the sites identified above, there are other industrial sites within the Tseung Kwan O InnoPark. 24-hour site surveys were conducted at these sites and observed that infrequent access of HGV and coach accessed these sites throughout the day. Detailed analysis is available in **Appendix 3.2**. Start emissions from these sites were considered by broad-brush approach in which the emissions are allocated along the concerned roads around these sites.

Proposed Effluent Polishing Plant at TKO 137 (EPP) (DP3)

3.5.2.6 A new Effluent Polishing Plant (EPP) is proposed at Site OU4 at TKO 137 to support the population of the Project. The location is illustrated in **Figure 3.1**. The proposed EPP is a secondary treatment plant with design capacity of 54,000 m^3 per day. The main facilities would include inlet works, primary sedimentation tank, bioreactor, sludge treatment facilities, digested sludge storage tank, biogas storage tank, CHP Building. Deodorizing unit would be provided to remove the odorous gas from treatment facilities before exhausting to the environment. Based on the latest design, the EPP would not collect the food wastes for co-digestion. The sewage sludge would be digested and all generated biogas will be fed to the sulphur absorption vessels to remove the hydrogen sulphide (H_2S) before storage in the biogas holders. The stored biogas will be fed to the 450kW Combined Heat and Power (CHP) unit and boiler as fuel. The combustion of biogas in the CHP generator produces electricity and heat for the use in EPP. Waste gas burner is equipped for emergency use when all CHPs are offline and will not operate during normal operation. One duty and one standby CHPs are proposed in the design to minimize the occurrence of emergency condition. The sludge digestion and CHP generator are under Phase 2 which will be commissioned in 2041 Q4. For normal operation, the flue gas emission from the CHP unit and boiler are considered in the quantitative assessment.

Proposed Refuse Transfer Station off TKO 132 (RTS)(DP4)

3.5.2.7 A new RTS is proposed on the land off TKO 132. Based on the best available information, RTS would involve no anaerobic digestion, biogas generation nor biogas combustion. No air pollutant emission is expected from the facility, except odour emission which has been discussed in Section **3.5.3** and considered in the quantitative assessment.

Proposed Construction Waste Handling Facility (CWHF) (DP5), Public Fill Transfer Facility (PFTF), Concrete Batching Plant (CBP), Electricity Facilities (DP6) off TKO 132

3.5.2.8 Proposed facilities off TKO 132 includes a construction waste handling facility (CWHF) with handling capacity of 3,000 tonnes per day, a public fill transfer facility (PFTF) with handling capacity of more than 1,000 trucks per day, and a concrete batching plant (CBP) with production rate of 240 m^3 per hour. These facilities would pose dust impact on nearby existing ASRs. Dust mitigation measures as stipulated in *Air Pollution (Construction Dust) Regulation* are generally applicable to CWHF and PFTF would be implemented. Should any crusher be used in the process, dust mitigation measures should refer to *A Guidance Note on the Best Practicable Means for Mineral Works (Stone Crushing Plants) (BPM 11/1 (95))*. For the operation of CBP, dust mitigation measures and good site practice stipulated in *A Guidance Note on the Technical, Management and Monitoring Requirements for Specified Process – Cement Works (Concrete Batching Plant) (BPM 3/2 (16))* should be implemented to abate the potential dust impacts during operation. Their potential cumulative dust impact due to these operations has been considered in the quantitative assessment.

3.5.2.9 Based on the available information provided by relevant department of CWHF, PFTF and CBP, or with reference to similar existing facilities, the activities considered as major potential dust emission sources are identified as follows in accordance with the specification given in *Compilation of Air Pollutant Emission Factors (AP-42), 5th Edition* issued by U.S. Environmental Protection Agency, and their corresponding control measures are summarized in **Table 3.9,Table 3.10** and **Table 3.11** respectively.

3.5.2.10 Based on the available information for CWHF provided by relevant department, the activities would be considered as major potential dust emission sources are identified as follows in accordance with the specification given in *Compilation of Air Pollutant Emission Factors (AP-42), 5th Edition* issued by U.S., and their corresponding control measures are summarized in **Table 3.9.** The reception of construction waste will be carried out partly inside a building at around 20 metres in height, and partly open space. Crushing, shredding, screening, sieving and sorting of construction waste will be carried out inside a workshop building at around 20 metres in height. Water spraying will be provided at spoil handing, crushing and sorting, and stockpiling. Stockpiling should be avoided as far as practicable. Should temporary stockpiling be needed, the stockpile should be wetted adequately and be cleared by the end of operation hour. The operation hour will be 08:00 to 22:00 tentatively. There would be no genset to be used in the premises and the crushing/screening facilities are electric powered. None of the activities would have odour issue.

Table 3.9 Emission Source of CWHF and Corresponding Control Measures

Emission Point Description	Pollutant	Control Measures
Material handling at Ancillary Building Area / Reception Area	Particulates	• Dust suppression with water sprinklers
Loading/unloading of Material at Barging Facility	Particulates	• Dust suppression with water sprinklers during handling activities and at stockpiles
Material Crushing and Shredding	Particulates	• Housed in enclosed workshop with dust collector • Dust suppression with watering
Screening and sieving after the Crushing and Shredding Processes	Particulates	• Housed in enclosed workshop with dust collector • Dust suppression with watering
Paved haul road	Particulates	• Paved road surface • Regularly wetting with water sprays • Speed limit of all vehicles at 10 km/hr
Wind Erosion at Material Storage Area during Non-working Hours	Particulates	• Covering of the stockpile as far as practicable

3.5.2.11 Based on the available information for PFTF provided by relevant department, the activities considered as major potential dust emission sources are identified as follows in accordance with the specification given in AP-42, and the corresponding control measures are summarized in **Table 3.10.** Water spraying will be provided at spoil handing, sorting and stockpiling. Stockpiling should be avoided as far as practicable. Should temporary stockpiling be needed, the stockpile should be wetted adequately and be cleared by the end of operation hour. The operation hour will be 08:00 to 22:00 tentatively. There would be no genset to be used in the premises and the crushing/screening facilities are electric powered. None of the activities would have odour issue.

Table 3.10 Emission Source of PFTF and Corresponding Control Measures

Emission Point Description	Pollutant	Control Measures
Material handling at Storage area	Particulates	• Dust suppression with water sprinklers
Loading/Unloading of Material to barge	Particulates	• 3-side and top enclosed tipping hall • Dust suppression with water sprinklers
Paved haul road	Particulates	• Paved road surface • Regularly wetting with water sprays • Speed limit of all vehicles at 10 km/hr
Wind Erosion at Material Storage Area during Non-working Hours	Particulates	• Covering of the stockpile as far as practicable

3.5.2.12 Based on the available information with reference to the CBP at TKO 137, which is considered applicable to the proposed CBP, the activities considered as major potential dust emission sources are identified as follows in accordance with the specification given in AP-42, and the corresponding control measures are summarized in **Table 3.11.** Typical dust control measures such as dust collector, water spraying at spoil handling and paved haul roads, and good site practice stipulated in BPM 3/2 (16) should be incorporated in the operation design. The operation hour will be assumed as 07:00 to 19:00. The equipment of CBP would be generally electric powered and there would be no genset to be used in the premises.

Table 3.11 Emission Source of CBP and Corresponding Control Measures

Emission Point Description	Pollutant	Control Measures
Dust Collector on Cement Silos / Cement Supplement Silo	Particulates	• Pumped pneumatically through cement pipes • Dust-tight silo • Equipped with a fabric dust collector at 99% dust removal efficiency. • Emission concentration less than 10 mg/m^3
Dust Collector on Mixers and Weigh Hoppers	Particulates	• Equipped with a fabric dust collector at 99% dust removal efficiency. • Emission concentration less than 10 mg/m^3
Unloading of Aggregate to Hopper by Conveyor Belt	Particulates	• 3-side and top enclosure • Dust Suppression with watering • Aggregate bins and its associated delivering conveyors to be housed inside a fully cladded structure
Discharge of Product Concrete to Concrete Mixer Truck	Particulates	• No dust emission is anticipated because of its moist nature. • Loading points housed with 3-side and top enclosure
Paved haul road	Particulates	• Paved road surface • Regularly wetting with water sprays • Speed limit of all vehicles at 10 km/hr

3.5.2.13 The transportation of waste material and product concrete to and from the Project site would induce traffic on the open roads. Vehicular emissions from these tankers or trucks are expected and were included in the modelling assessment.

Electricity Facilities (DP6)

3.5.2.14 New Electricity Facilities are proposed at the land off TKO 132. Based on the best available information which is presented in **Section 2**, the facilities comprise power receiving and conversion facilities, and thus no air pollutant emission is expected from its operation.

Marine Emission

3.5.2.15 The proposed uses on the land off TKO 132, including RTS, CWHF, PFTF and CBP would induce marine traffic during operation. Marine emission is expected and would pose potential air quality impact on the existing and proposed ASRs. Provision of shore power at berth shall be explored to minimize the marine emission during berthing and loading/unloading operation.

3.5.2.16 Apart from the induced marine traffic, there are also existing marine routes and anchorages within 500m assessment area of the Project, including Tathong Channel Traffic Separation Scheme and Junk Bay Dangerous Goods Anchorage. All these existing marine traffic also contributes to cumulative air quality impact. The marine traffic data from / to the Junk Bay Dangerous Goods Anchorage have been considered in the marine traffic inputs provided by Marine Consultants and the marine emissions have been considered in the quantitative assessment.

Concurrent Project in TKO137

3.5.2.17 *Fill Bank at Tseung Kwan O Area 137* under Environmental Permit EP-134/2002/Q will be decanted in phases starting from end of Year 2025 until Year 2030 to facilitate the development of TKO 137. As mentioned in **Section 3.5.1.5**, the major operation of the fill bank will be retreated to the southern part of its site (more than 600m away from the residential area) and continue to operate until land resumption by the Project by end of Year 2031. Therefore, no associated dust emission is expected to affect the ASRs during the operation of the Project.

3.5.2.18 *Desalination Plant at TKO and its proposed extension* under Environmental Permit EP-503/2015/B and FEP-01/503/2015/B does not have any gaseous emission, as concluded in its approved EIA Report AEIAR-192/2015.

3.5.2.19 SENTX has already stopped waste filling activities. SENTX has been commissioned since November 2021 to receive construction waste only. SENTX is expected to be closed with its restoration works completed prior to the population intake at TKO 137. SENTX is expected to be in the 30-year aftercare phase during the operation phase of the Project. The associated Leachate Treatment Plant, LFG Treatment Facility with flaring and LFG generator will continue to operate during the aftercare phase according to the approved *Environmental Review for SENT Landfill Extension, 2016*. Air pollutant emission from the flares and LFG generator is expected and has been considered in the quantitative assessment. There is also a synthetic natural gas plant (SNG) adjacent to SENTX, which does not incur any air pollutant emission.

3.5.2.20 It is expected that TKLSE would operate to provide a mass transit for the population at TKO 137. TKLSE would be electric-powered, and air-emission free during the normal operation. Exhaust for general ventilation and smoke extraction facilities will be carefully positioned to avoid causing any nuisance to the ambient. The potential air quality impact during operation phase is thus expected limited. Nevertheless, there is no design information available at this stage of the Project.

3.5.2.21 TKO-LTT and TKO Cross Bay Link, collectively known as Tseung Lam Highway, has been commissioned in December 2022. The vehicular emission of associated open road sections, portal and ventilation building emissions within 500m assessment area have been considered in the quantitative assessment.

3.5.2.22 HAECO is an Aircraft Engine Test Cell Facility at TKO and it has been operating since 1995. The air pollutant emission from its stacks was considered in the quantitative assessment, with reference to the approved *Environmental Review for SENT Landfill Extension, 2016.*

Other Existing Emission Sources

3.5.2.23 Tseung Kwan O InnoPark locates in the north of TKO 137. Several Specified Processes (SP) in the InnoPark are identified within 500m assessment area with reference to the SP Licence Registry maintained by EPD. Site visit has been conducted in Mar 2024 to confirm the existence of these chimneys and no other chimney source within the assessment area. These SPs include:

- Electricity Works by Television Broadcast Ltd. under SP Licence No.: L-7-022(5);
- Electricity Works by Digital Savvis Investment Management HK Ltd. under SP Licence No.: L-7-050(2);
- Electricity Works by China Unicom (Hong Kong) Global Center under SP Licence No.: L-7-043(2);
- Organic Chemical Works by ASB Biodiesel (Hong Kong) Limited under SP Licence No.: L-25-019(4);

3.5.2.24 These electricity works are of emergency nature, i.e. no gaseous emission is expected under normal circumstance. Therefore, only the emission by the organic chemical works under SP Licence No.: L-25-019(4) has been considered in the quantitative assessment.

3.5.2.25 Kai Tak Cruise Terminal is identified as a major point source within 4km from the Project boundary off TKO 132, while it is over 4km away from TKO 137. However, the area off TKO 132 is sheltered by the Devil's Peak and no direct line of sight is established to from the cruise terminal. No direct impact on the TKO 132 is anticipated. Therefore, the cruise terminal is not considered in the assessment.

Identification of Key Air Pollutants of Emission during Operation Phase

3.5.2.26 Vehicular emission is the dominant source of air pollutants within the development plan. The key air pollutants associated with vehicular emission during operation phase include NO_X, RSP and FSP.

3.5.2.27 Marine emission comprises a number of pollutants, including NO_2, RSP, FSP, SO_2, CO, VOC, etc. NO_2, RSP, FSP and SO_2 are considered as the key air pollutants associated with marine emission in the quantitative assessment.

3.5.2.28 Subject to design, the proposed EPP would involve biogas combustion during the operation of CHPs which would cause air pollutant emissions. The key air pollutants associated with biogas combustion include NO_X, RSP, FSP and SO_2. Trace amount of carbon monoxide, methane, formaldehyde, HCl and HF are also expected from the combustion of biogas.

3.5.2.29 Landfill gas combustion by flares and LFG generator would emit NO_X, CO, SO_2, benzene, vinyl chloride according to the approved EIA Report AEIAR-117/2008. NO_2 and SO_2 are considered as the key air pollutants associated with the landfill gas combustion in the quantitative assessment. The air quality impact in CO, benzene and vinyl chloride are also considered in the assessment.

3.5.2.30 Chimneys at ASB Biodiesel (Hong Kong) Limited would emit NO_2, CO, SO_2, RSP, FSP, acetaldehyde and methane according to the SP Licence No.: L-25-019(4). These air pollutants are considered in the assessment.

3.5.2.31 The proposed CWHF, PFTF and CBP off TKO 132 would emit NO, NO_2, RSP and FSP from their operation (with haul roads inside the facilities included). These air pollutants are considered in the assessment.

3.5.3 Operation Phase (Odour)

Proposed Effluent Polishing Plant at TKO 137(EPP) (DP3)

3.5.3.1 A new Effluent Polishing Plant is proposed at Site OU-04 at TKO 137 to support the population of the Project and will be constructed in two phases, namely Phase 1 (commissioning in 2034 Q4) and Phase 2 (commissioning in 2041 Q4). The location is illustrated in **Figure 3.1.1**. The proposed EPP would be a secondary treatment plant with design capacity of 39,000 m^3 per day in Phase 1 and with design capacity of 54,000 m^3 per day in ultimate scenario (Phase 1 + 2). The EPP would include inlet works (screen, inlet pump, conveyor, compactor, grit classifer, equalization tank and skip), sewage treatment units (sedimentation tanks and biological treatment), sludge treatment units (sludge blend tank, centrifuge, sludge holding tank, dryer, sidestream treatment facilities and skip), sludge digestion, CHP generator, etc. All these facilities of the EPP (including all deodorizing units) are to be constructed in Phase 1, except the sludge digestion, CHP generator which are under Phase 2. All the treatment units/facilities with potential odour emission will be covered and the exhausted air will be conveyed to deodorizing unit (with at least overall 95% odour removal efficiency) for treatment before exhausting to the environment. The potential odour source during the operation phase of the proposed EPP would therefore be the exhaust of the deodorizing unit. The residual odour emission from deodorizing unit has been considered in the quantitative assessment.

3.5.3.2 To remove aqueous ammonia from sludge return liquors, treatment is assumed in the design using Anammox technology as sidestream treatment. The Anammox technology would convert aqueous ammonia to nitrogen gas, which is non-odourous, to reduce potential odourous ammonia emission. During the process, insignificant emission of ammonia and nitrous oxide (N_2O) from the sidestream treatment facilities would be conveyed to DO for treatment prior to dicharge to the atmosphere.

3.5.3.3 The odour impact from sludge transfer tanks, if any, could be controlled by proper design and good cleaning practices of sludge transfer tanks. The opening of sludge transfer tank is the potential odour source during the transportation when there are gaps between the tank opening and its cover. Sludge tanks with its air-tightness proven by DSD should be deployed for transporting sludge. With thorough cleaning practice and regular condition test of the sludge tanks, odour emission and leachate leakage during storage and transportation are not anticipated.

Proposed Interim Pumping Station in TKO137

3.5.3.4 According to the engineering design, a sewage pumping station (SPS), also refers to as Interim Pumping Station, will be constructed in advance and commissioned to support the population intake at Site PU1&2 in Year 2030, diverting the sewage to Tseung Kwan O Preliminary Treatment Works. This SPS will be retained and integrated with the inlet works during the construction of the upcoming EPP. The inlet channel, coarse screen channel, outlet channel and wet well of the SPS will be constructed with the same dimensions as the ones of the upcoming EPP, i.e. the exposed areas with odour emission are expected to be the same. A deodorizing unit with similar efficiency (i.e. at least 95% odour removal efficiency and achieving 99.5% H_2S removal efficiency at the same time[1]) will be also deployed to treat the odorous gas from the SPS and the exhaust will be discharged at the same location as DO1 of the upcoming EPP. Comparing with the catchment of the entire TKO 137 by the EPP, the SPS will serve only the catchment of Site PU1&2 and its processing capacity is much less. Given the similar configuration of the components (e.g channels and wet well) and deodorizing unit but with less processing capacity, it is anticipated that the potential odour impact by the Interim Pumping Station is much less than the ones by the upcoming EPP. Hence, the quantitative odour impact assessment on the EPP serves as a worst-case scenario for the Interim Pumping Station.

Proposed Refuse Transfer Station off TKO132 (RTS) (DP4)

3.5.3.5 The new RTS proposed at the land off TKO 132 with its design capacity of 4000 tonnes per day. The RTS handles municipal solid waste (MSW) only and there is no grease trap waste treatment facility in the site. A wastewater treatment plant will be provided on-site to partially treat the leachate before discharging to public sewer as appropriate. No anaerobic digestion, biogas production nor combustion would be involved in the proposed RTS. Potential odour would arise from the handling of MSW at the tipping hall and the compactor hall, and the Wastewater Treatment Plant (WWTP) inside the proposed RTS. The WWTP will be electric powered such that there is no gaseous emission expected from the RTS.

3.5.3.6 Appropriate mitigation measures commonly adopted in other existing RTSs in Hong Kong would be considered in the design such as enclosing the odourous facilities, maintaining negative pressure to prevent foul air from escaping the building, and provision of odour removal system at the ventilation exhaust to control odour emission. The odour at the exhaust of the deodorizing unit shall be continuously monitored.

3.5.3.7 A separate application of Environmental Permit for the proposed RTS will be conducted by the proponent of the RTS, following the EIAO mechanism, when the design information is available. The ventilation exhaust location of the RTS will be located farthest away from all nearby ASRs as far as possible for minimization of the odour impact. The exhaust outlet of the proposed RTS have been assumed in the assessment. The proposed RTS has been considered in the quantitative assessment for its potential air quality and odour impacts on the identified ASRs. Its location is illustrated in **Figure 3.1.2**.

Proposed Sewage Pumping Station off TKO132 (SPS)

3.5.3.8 A sewage pumping station is proposed off TKO 132 with design capacity of 400 m^3/day. The location is illustrated in **Figure 3.1.2**. All potential odour sources of SPS are to be fully enclosed by reinforced concrete structure. Negative pressure would be maintained to prevent foul air from escaping the buildings. The odourous gas inside the SPSs would be conveyed to the provided deodorizing unit with odour removal efficiency of at least 95% (achieving 99.5% H_2S removal efficiency at the same time[1]) before discharging to the atmosphere. The odour emission from this SPS was assessed quantitatively. Screening wastes would also be stored in covered containers, packed and handled carefully inside the screen houses within reinforced

[1] Code of Practice on Assessment and Control of Odour Nuisance from Waste Water Treatment Works, April 2005 (https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2005/04/code-practice-assessment-control-odour-nuisance-waste-water-treatment-works/documents/0011715-pdf/0011715-pdf/govscot%3Adocument/0011715.pdf)

concrete structure before disposal at landfill site. As such, the chance of on-site and off-site odour nuisance from the removal/handling of screening wastes would be further minimised.

Concurrent Project with Odour Emission.

3.5.3.9 *Desalination Plant at TKO and its proposed extension* would pose potential odour impact owing to the chemical sludge as by-product and its handling. With reference to its approved EIA Report AEIAR-192/2015, the sludge produced in the desalination plant is similar to the sludge produced in water treatment works by WSD, which is very low in organic sulfate content, odour emission (such as H_2S) is expected to be low. The treatment and storage of the chemical sludge are enclosed inside building structure. Forced ventilation system with sufficient air change rate is equipped at the sludge treatment and storage building and the exhaust discharge is directed away from ASRs as far as practicable. Dewatered sludge is transported to landfill with enclosed trucks to minimize any off-site odour impact. With the implementation of all these measures, the chemical sludge produced in the desalination plant would cause very limited odour emission, if any. The potential cumulative odour impact is anticipated to be minimal, thus, it is not considered in the quantitative assessment.

3.5.3.10 SENTX is expected to be in the 30-year aftercare phase during the operation phase of the Project. SENTX is expected to be closed with its restoration works completed prior to the population intake at TKO 137. No waste filling activities and associated waste handling would be carried out, i.e. there is no respective odour emission. The associated Leachate Treatment Plant, LFG Treatment Facility with flaring and LFG generator will continue to operate during the aftercare phase. According to the approved *Environmental Review for SENT Landfill Extension, 2016*, the potential odour emission source during the aftercare phase would only be the open sequencing batch reactor (SBR) tanks which have been considered in the quantitative assessment.

3.6 Assessment Methodology

3.6.1.1 The air quality impact assessment will be conducted in accordance with the criteria and guidelines in Annexes 4 and 12 of the EIAO-TM and the requirement in Section 3.4.4 and Appendix B of the EIA Study Brief ESB-360/2023.

3.6.2 Construction Phase

3.6.2.1 With reference to past air quality monitoring data, the construction of similar but larger scale projects did not pose adverse dust impacts. It is anticipated that the Project would not cause adverse dust impacts during construction phase with the implementation of appropriate dust suppression measures. Therefore, qualitative assessment approach was adopted for construction dust and NO_2 and SO_2 impact assessment. A comprehensive EM&A programme with RSP and FSP real-time monitoring would be conducted to ensure the proper implementation of measures and the compliance of AQOs during the construction works at TKO 137 and off TKO 132.

3.6.3 Operation Phase (Criteria Air Pollutants)

3.6.3.1 During the operation phase, the population intake is expected to take place in different years (Year 2030 – Year 2041). As a conservative approach, a scenario with the following assumptions is adopted for criteria air pollutant modelling, with each emission discussed in the subsequent sections.

- For vehicular emission from proposed Marine Viaduct (DP1), proposed open roads and existing roads, emission factors in Calendar Year 2030 of EMFAC-HK 4.3 (highest emission factors) and traffic data in Year 2041 (highest traffic data during Year 2030 – Year 2046) are adopted.
- For vehicular emission from the concerned facilities in the Tseung Kwan O InnoPark, TKO 137 and TKO 132, all concerned facilities (bus termini, 2 planned permanent PTIs, 2 planned temporary PTFs and parking sites) are considered, with emission factors in Calendar Year 2030 of EMFAC-HK 4.3 (highest emission factors) and highest traffic data across Year 2030 – Year 2046 for each facility.

- The proposed facilities (proposed effluent polishing plant at TKO 137 (EPP), Proposed CWHF, PFTF, and CBP at TKO 132)) are in full operation.
- Existing industrial emissions will continue to operate.
- For marine emission, marine traffic data in Year 2041 (highest traffic data during Year 2030 – Year 2046) are adopted.

Vehicular Emission from Proposed Marine Viaduct (DP1), Proposed Open Roads and Existing Roads

3.6.3.2 The key air pollutant associated with vehicular emission during the operation phase are NO_2, RSP and FSP. Major open road emission sources include proposed marine viaduct connecting the land off TKO 132 and local roads L1 – L8 at TKO 137 under the ROPD, and existing open roads within 500m assessment area such as Tsung Lam Highway, Cross Bay Link, Wan Po Road.

3.6.3.3 EMFAC-HK v4.3 was adopted to estimate the vehicular emission factors in NO, NO_2, RSP and FSP in various travelling speeds and ambient conditions with reference to WRF meteorological data extracted from PATHv3.0. For short-term cumulative impacts, an approach of using daily profile of lowest temperature and relative humidity data in each hour for each month was adopted. For long-term cumulative impacts, an approach of using daily profile of averaged temperature and relative humidity data in each hour for each month was adopted.

3.6.3.4 The traffic data for each road in 500m study area comprises 24-hour traffic flow with vehicle percentage, travelling speed in 18 vehicle classes. The agreement on the adopted traffic data have been sought from Transport Department (TD). The induced traffic due to the Project including population intake, other specified uses, etc. has been taken into account in the traffic data. With reference to the traffic data, hourly emission factor of each open road is determined by summation of emission by each vehicle class which is product of traffic flow and emission factor at specific speed and ambient condition. The hourly emissions factors of NO, NO_2, RSP and FSP are further divided by the hourly flow to obtain a composite emission rate in g/s-m^2, ready for input to the dispersion model. The Smart Air Modelling Platform (SAMP v2.0) with ZEV scenario is used for the calculation of composite vehicular emission factor and emission rates. The detailed calculation of vehicular emission source was presented in **Appendix 3.1**.

3.6.3.5 Start emission refers to the air pollutants generated due to the ignition of the vehicle engines which is released at vehicle tailpipes. Start emission generally occurs on the local road where there is potential trip, while no start emission along district distributor or expressway is anticipated. For the assessment purpose, broad-brush approach is adopted, which assumes start emission at all local roads irrelevant to the actual location of engine start. Also, all vehicle classes were assumed to have potential trip on local road, including minibus and franchised bus which usually starts its engine at its termini throughout its service route.

3.6.3.6 Start emission factors of 18 vehicle classes at various soak times were extracted from EMFAC-HK v4.3, among which the highest factor is adopted for a vehicle class. Frequency of start emission of a vehicle type on a road is estimated by its forecasted VKT, Trips/VKT ratio extracted from EMFAC-HK v4.3 and local-road-to- territory-wide-road ratio (14.34%) extracted from 2022 Annual Traffic Census published by the Transport Department. SAMP v2.0 has accounted for the start emission when calculating the composite vehicular emission factor. The open road sources considered with start emission are illustrated in **Appendix 3.1**.

Vehicular Emission associated with Concerned Facilities

3.6.3.7 Running, idling and start emissions within the temporary PTFs and planned PTIs under TKO 137, existing bus terminus and parking sites in Tseung Kwan O InnoPark are assessed with precise approach. Two planned permanent PTIs at Site PR1 and PR3, two planned temporary PTFs at Site G3 and O5 are proposed under RODP, as shown in **Figure 3.1.1**. The planned PTIs at Site PR1 and PR3 are considered as decked and modelled as volume source, while open-air design was considered for all other parking sites, bus termini and PTFs. ProPECC PN1/22 will be followed in the design of the planned PTIs. For existing parking sites and bus termini, data concerning engine start at these concerned locations, such as the frequency and soak time, are collected in 24-hour site survey on a normal working day and the survey data is presented in **Appendix 3.2**. Data for the planned and proposed facilities was estimated by traffic forecast or by design. The start emissions calculation was conducted according to the "*Technical Note on the Calculation of Start Emissions in Air Quality Impact Assessment*". Start emission factors of vehicle types at various soak times are extracted from EMFAC-HK v4.3. Start emission factors of concerned vehicles at various soak times were extracted from EMFAC-HK v4.3. An approach of using the lowest temperature and relative humidity data in the year among all PATH grids covering the assessment area (i.e. 8ºC and 20%) was adopted. The detailed calculation of start emission is also presented in **Appendix 3.2**.

Determination of Assessment Year for Vehicular Emission

3.6.3.8 The population intake is expected to take place in different years (Year 2030 – Year 2041). As a conservative approach, open road vehicular emission is modelled with the highest emission factor (i.e. Year 2030) and the highest traffic data (i.e. Year 2041) during Year 2030 – Year 2046, including next 5 years after the full population intake in Year 2041. The traffic data is presented in **Appendix 3.1**.

Proposed Effluent Polishing Plant at TKO 137 (EPP) (DP3)

3.6.3.9 Biogas is produced as a by-product from the digestion process of sewage sludge. Biogas will be stored in the gas holders and then be utilized by CHP units to produce heat and electricity. Flue gas emission from the operation of Project would be expected from the combustion of biogas by CHP units and boiler. The exhaust gas from CHPs and boiler will be vented to the ambient via a stack.

3.6.3.10 The design of the proposed EPP refers to Hung Shui Kiu Effluent Polishing Plant (HSKEPP) as presented in its approved EIA Report (AEIAR-240/2022) but no food waste reception and co-digestion is anticipated. The design is further modified by engineers to meet the need of the Project. Based on the preliminary design of the proposed EPP, there would be a CHP unit and a boiler. Therefore, 1 CHP unit and 1 boiler with adjusted biogas consumption were adopted in the calculation. The details of the CHP and boiler emission are presented in **Appendix 3.3**.

3.6.3.11 The CHP and boiler only exist in Phase 2, i.e. there is no associated emission in Phase 1. CHP and boiler emission would peak in the ultimate scenario (Phase 1 + 2), thus the ultimate scenario was assessed. RSP, FSP, NO_2 and SO_2 concentrations were predicted at each identified ASRs at respective assessment heights. Carbon monoxide, methane, formaldehyde, HCl and HF, if any, were also predicted.

Proposed CWHF(DP5), PFTF, CBP and RTS off TKO 132

3.6.3.12 The proposed CWHF, PFTF and CBP off TKO 132 mainly involve spoil/material handling in their operations. Emission rates by sources would be estimated with activity data in accordance with the USEPA Compilation of Air Pollution Emission Factors (AP-42), 5th Edition. Activity data includes, but not limited to, material handling rate, percentage active area, moisture content, silt content, number of construction trucks and truck speed. The emission rates of CWHF, PFTF and CBP have been summarized in **Table 3.12 -** Table **3.14**. Detailed calculations of emission rates are presented in **Appendix 3.4**. The spatial distribution of effective dust emission sources has been illustrated in the appendix as well. Tailpipe emissions by accessing trucks along internal haul roads were considered in the proposed CWHF, PFTF, CBP and RTS. Visiting tipper trucks are solely for the transportation of construction waste/public fill and unloading at CWHF, PFTF and RTS, i.e. no parking/engine stop is expected. Concrete mixer trucks would undergo various procedures in the CBP, such as drum washing, loading of concrete product, quality control of product, etc. with their engine running and occasionally stopping if necessary. As a conservative assumption, start emission of these concrete mixer trucks were considered with broad-brush approach along the internal haul roads.

Table 3.12 Emission Rates for the Proposed CWHF

Emission Source	RSP Emission Rate	FSP Emission Rate	Remarks
Unloading of Construction Waste at Ancillary Building Area / Reception Area (CW01)	2.870×10^{-6} g/m²/s	6.723×10^{-7} g/m²/s	• Handling rate: 214 Mg/hr • Area of the storage: 8200 m² • Working hours: 08:00-22:00 (assumed for this EIA) • Dust suppression by watering
Loading and unloading of Construction Waste at Barging Facility (CW02)	1.810×10^{-6} g/m²/s	4.241×10^{-7} g/m²/s	• Handling rate: 214 Mg/hr • Area of the storage: 13000 m² • Working hours: 08:00-22:00 (assumed for this EIA) • Dust suppression by watering
Material Crushing and Shredding (CW03)	1.607×10^{-3} g/s	2.976×10^{-4} g/s	• Handling rate: 214 Mg/hr • 90% dust removal efficiency by enclosure with dust collector • Dust suppression by watering • Working hours: 08:00-22:00 (assumed for this EIA) • RSP emission factor: 2.700×10^{-4} kg/Mg • FSP emission rate: 5.000×10^{-5} kg/Mg
Screening and sieving after the Crushing and Shredding Processes (CW04)	2.202×10^{-3} g/s	1.488×10^{-4} g/s	• Handling rate: 214 Mg/hr • 90% dust removal efficiency by enclosure with dust collector • Dust suppression by watering • Working hours: 08:00-22:00 (assumed for this EIA) • RSP emission factor: 3.700×10^{-4} kg/Mg • FSP emission rate: 2.500×10^{-5} kg/Mg

Emission Source	RSP Emission Rate	FSP Emission Rate	Remarks
Wind Erosion during non-working hours (CW01-CW02)	1.275 × 10^{-6} g/s	1.941 × 10^{-7} g/s	• Percentage of area: 100% • Emission height: 0.5 m • Non-working hours: 22:00 – 08:00 of the other day (assumed for this EIA) • RSP emission factor: 0.4021 Mg/hectre/yr • FSP emission rate: 0.0612 Mg/hectre/yr
Paved haul roads within Project Site (HR01-HR04)	3.515 × 10^{-5} g/s·m^2 at maximum, subject to number and average weight of vehicles travelling per hour	8.504 × 10^{-6} g/s·m^2 at maximum, subject to number and average weight of vehicles travelling per hour	• 91.7% of dust suppression by watering every hour (Dust suppression percentage for unpaved haul road is adopted from the Approved EIA "Shuen Wan Golf Course") • RSP emission factor: 1.048 × 10^3 g/VKT • FSP emission factor: 2.535 × 10^2 g/VKT

Table 3.13 Emission Rates for the Proposed PFTF

Emission Source	RSP Emission Rate	FSP Emission Rate	Remarks
Loading and unloading of Material (PF01)	5.235 × 10^{-5} g/m^2/s	1.226 × 10^{-5} g/m^2/s	• Handling rate: 1192 Mg/hr • Area of the storage: 2500 m^2 • Working hours: 08:00-22:00 (assumed for this EIA) • Dust suppression by watering
Loading and unloading of Material (PF02)	1.700 × 10^{-5} g/m^2/s	3.981 × 10^{-6} g/m^2/s	Handling rate: 1192 Mg/hr • Area of the storage: 7700 m^2 • Working hours: 08:00-22:00 (assumed for this EIA) • Dust suppression by watering

Emission Source	RSP Emission Rate	FSP Emission Rate	Remarks
Unloading of Material at Tipping Hall (PF04-PF07)	2.727×10^{-5} g/m²/s	6.387×10^{-6} g/m²/s	• Handling rate: 298 Mg/hr • Area of the storage: 1200 m² • Working hours: 08:00-22:00 (assumed for this EIA) • Dust suppression by watering
Wind Erosion during non-working hours (PF01-PF02)	1.275×10^{-6} g/s	1.941×10^{-7} g/s	• Percentage of area actively operating: 100% • Emission height: 0.5 m • Non-working hours: 22:00 – 08:00 of the other day (assumed for this EIA) • RSP emission factor: 0.4021 Mg/hectre/yr • FSP emission rate: 0.0612 Mg/hectre/yr
Paved haul roads within Project Site (HR01-HR03)	5.033×10^{-4} g/m²/s at maximum, subject to number and average weight of vehicles travelling per hour	1.218×10^{-4} g/m²/s at maximum, subject to number and average weight of vehicles travelling per hour	• 91.7% of dust suppression by watering every hour (Dust suppression percentage for unpaved haul road is adopted from the ERR of TKO137 Fill Bank under VEP-627/2023) • RSP emission factor: 1.048×10^{3} g/VKT • FSP emission factor: 2.535×10^{2} g/VKT

Table 3.14 Emission Rates for the Proposed CBP

Emission Source	RSP Emission Rate	FSP Emission Rate	Remarks
Dust Collector on Cement Silo (CBP01-CBP02)	1.889×10^{-3} g/s	8.586×10^{-4} g/s	• Maximum emission concentration from exhaust: 10 mg/m³ • Exhaust rate of dust collector: 2000 m³/hr • Working hours: 07:00-19:00 (assumed for this EIA)
Dust Collector on Cement Supplement Silo & Weight Hoppers (CBP05-CBP09)	3.852×10^{-3} g/s	1.751×10^{-3} g/s	• Maximum emission concentration from exhaust: 10 mg/m³ • Exhaust rate of dust collector: 2600 m³/hr • Working hours: 07:00-19:00 (assumed for this EIA)

Emission Source	RSP Emission Rate	FSP Emission Rate	Remarks
Dust Collector on Mixer & Weigh Hoppers (CBP10-CBP11)	5.918×10^{-3} g/s	2.690×10^{-3} g/s	• Maximum emission concentration from exhaust: 10 mg/m^3 • Exhaust rate of dust collector: 7000 m^3/hr • Working hours: 07:00-19:00 (assumed for this EIA)
Unloading of Aggregate to Hopper by Conveyor belt (CBP12)	5.895×10^{-4} g/m^2/s	1.381×10^{-4} g/m^2/s	• Loading rate of materials: 255 Mg/hr • Area of storage: 18 m^2 • Working hours: 07:00-19:00 (assumed for this EIA)
Paved haul roads within Project Site (HR01-HR04)	2.548×10^{-5} g/s·m^2	6.166×10^{-6} g/s·m^2	• 91.7% of dust suppression by watering every hour (Dust suppression percentage for unpaved haul road is adopted from the Approved EIA "Shuen Wan Golf Course") • RSP emission factor: 1.576×10^2 g/VKT • FSP emission factor: 3.813×10 g/VKT • Working hours: 07:00-19:00 (assumed for this EIA)

Marine Emission

3.6.3.13 The marine traffic data in Year 2041 is adopted in the calculation with referenced to the Marine Traffic Impact Assessment (MTIA) prepared under this Project, which is endorsed by Marine Department. MTIA showed that the marine traffic will attain its highest in Year 2041 and be capped afterwards. Therefore, the marine traffic data in Year 2041 was adopted and served as a conservative approach.

3.6.3.14 With reference to the *Study on Marine Vessels Emission Inventory (MVEIS)* by HKUST, the marine emission is estimated in activity-based approach. The emission factors were derived in units of works (gram per kilowatt-hour), dependent on fractional load of the equipment during different vessel activity modes. The calculation can be summarized as below:

$$Emission = P \times FL \times T \times EF$$

where *P* is the installed power of equipment;
FL is fractional load of equipment in a specific mode;
T is operation time-in-mode; and
EF is fractional load emission factor of equipment.

3.6.3.15 Typical power equipment installed on marine vessels are Main Engine (ME) for propulsion, Auxiliary Engine (AE) for electricity and Auxiliary Boiler (AB) for fuel pre-heating and pumping. Subject to the vessel types, different combinations of engines are equipped on a vessel. For example, all 3 kinds of engines are equipped on fully cellular container vessel, no ME for barge, and no AB for pleasure vessel.

3.6.3.16 The vessel types adopted in the MTIA are matched with equivalent vessel types considered in MVEIS. Typical engine power rating, engine type, fuel type of each vessel type are adopted from MVEIS. Moreover, when there are multiple sub-groups for the same vessel type in MVEIS, typically the one with the largest gross registered tonnage (GRT), deadweight tonnage (DWT) or passenger carrying capacity (PAX) is adopted as a conservative approach. The detailed assumptions are presented in **Appendix 3.5**. The vessel types considered in the assessment include:

- Fully Cellular Container Vessel (category RTV)
- Dry Bulk Carrier (category RTV)
- Semi-container Vessel (category RTV)
- Fast Launch (category FL)
- Tug (category TT)
- Local Ferry (category LF)
- Pleasure Vessel (category SC)
- Small Fishing Vessel/Sampan (category SC)
- Fully Cellular Container Vessel (category OGV)

3.6.3.17 Typical engine load factor by vessel type and by operation mode refers to MVEIS. Engine load factor of marine source was then determined according to its vessel type and its operation mode, which is defined according to the vessel speed with reference to MVEIS and shown in **Table 3.15**.

Table 3.15 Operation Mode of Marine Vessels

Operation Mode	Vessel Speed
Cruise / Fairway Cruise	Over 12 knots
Slow Cruise	8 to 12 knots
Manoeuvring	1 to below 8 knots
Hotelling	Below 1 knot

3.6.3.18 The time-in-mode is estimated by the distance and vessel speed travelled in the corresponding mode.

3.6.3.19 Emission factors of SO_2, NO_X, RSP and FSP by vessel type and by operation mode refers to MVEIS and IMO Fourth Greenhouse Gas Study 2020. According to the *Air Pollution Control (Marine Light Diesel) Regulation*, the sulphur content of locally supplied marine light diesel is capped at 0.05%, and such fuel is assumed to be used by River Trade Vessels (RTV), Small Crafts (SCs), Tug Boats (TTs), Fast Launch (FLs) and Local Ferries (LFs). On the other hand, all Ocean-Going Vessels (OGVs) are required to use compliant fuels (sulphur content <= 0.5%) under the *Air Pollution Control (Fuel for Vessels) Regulation*. Therefore, it is assumed that all OGVs use marine diesel oil with a sulphur content of 0.5%. Together with the parameters discussed above, emission of a marine source is estimated with the equation discussed above.

3.6.3.20 The stack parameters refer to previous studies concerning nearby waters such as the approved EIA Report of Lei Yue Mun Waterfront Enhancement Project (AEIAR-219/2018) and Route 11 (Section between Yuen Long and North Lantau) (AEIAR-255/2023). The emission inventory is summarized in **Appendix 3.5**.

Concurrent Project

3.6.3.21 The SENTX will be in the aftercare phase during the Operation Phase of the Project, and only the flares and the LFG generator will continue to operate. Therefore, emission of flares and LFG generator in SENTX are considered, and their stack parameters refer to the approved *South East New Territories (SENT) Landfill Extension Technical Note on Operational Air Quality Impact Due to Proposed Design Changes (October 2019)*. The emission inventory is summarized in **Appendix 3.6**.

3.6.3.22 Emission from the stacks of HAECO refer to the approved the approved *Environmental Review for SENT Landfill Extension, 2016*. The emission inventory is summarized in **Appendix 3.6**.

Industrial Emission

3.6.3.23 The valid emission strength, corresponding pollution control measure of emission sources and their emission duration of ASB Biodiesel (Hong Kong) Limited (SP Licence No.: L-25-019(4)) were extracted from the SP Licence Registry and taken into account in this assessment. Locations of emission sources and the emission inventory are available in **Appendix 3.6**.

Dispersion Modelling and Modelling Approach for Proposed EPP, CWHF, PFTF, CBP, SENTX and Nearby Industrial Sources

3.6.3.24 According to *Guidelines on Assessing the 'TOTAL' Air Quality Impacts* by EPD, an integrated modelling system PATHv3.0 which is developed and maintained by EPD is applied to provide background pollutant concentrations in assessing the total impact in the study area. In addition, Weather Research and Forecast (WRF) meteorological data is adopted for modelling.

3.6.3.25 American Meteorological Society (AMS) and U.S. Environmental Protection Agency (EPA) Regulatory Model (AERMOD), the HKEPD approved air dispersion model, is applied to predict the air quality impacts at the representative ASRs due to the emission of proposed EPP, CWHF, PFTF, CBP, SENTX and nearby industrial sources. Hourly and annual averages of NO_2, 10-min and daily average of SO_2, daily and annual averages of RSP and FSP concentrations were predicted at each identified ASRs at various assessment height, ranging from 1.5 metres above ground to the roof level of ASR with intervals of every 10 metres.

3.6.3.26 Hourly meteorological conditions including wind data, temperature, relative humidity, pressure, cloud cover and mixing height of Year 2019 are extracted from the WRF meteorological data adopted in the PATHv3.0 system. The dataset by WRF should be intact and consistent among parameters. In order to avoid any hours misidentified as missing data by AERMOD and its associated components, the WRF met data are handled manually to set wind direction between 0° – 0.1° to be 360°. The height of the input data is assumed to be 8.5 metres above ground for the first layer of the WRF data as input.

3.6.3.27 The wind speed and mixing heights in the WRF data are further adjusted before meteorological pre-processing by AERMET. The minimum wind speed was capped at 0.5 metre per second. The mixing height was capped between the observed lower and upper bounds according to the observation in Year 2019 by HKO. After pre-processed by AERMET, the mixing height is verified once again and adjusted to the capped range if necessary.

3.6.3.28 Surface characteristic parameters such as albedo, Bowen ratio and surface roughness are required in the AERMET. The parameters are determined according to land use classified for the surrounding and the latest AERMOD Implementation Guide. The determination of the surface characteristics parameter is presented in **Appendix 3.7**.

3.6.3.29 Proposed EPP, CWHF, PFTF, CBP, emission sources of SENTX and nearby industrial sources were applied as urban sources because of the existing population in Tseung Kwan O and the upcoming population at TKO 137. Elevated terrain was applied in AERMOD.

3.6.3.30 Building downwash was applied in AERMOD for industrial emission with the available building layout and heights. The building layout and heights are presented in **Appendix 3.3**.

Dispersion Modelling and Modelling Approach for Open Road

3.6.3.31 According to *Technical Note for Modelling Vehicular Emission Using AERMOD* by EPD, AERMOD is also used to assess the vehicular emission from open road.

3.6.3.32 The mixing zone of a road source needs to be defined in the AERMOD. The top of plume is defined as 1.7 times of the average height of vehicle fleet on the road. The average height of vehicle fleet is determined for each road and is weighted by the total daily traffic flow of each vehicle class. The suggested average vehicle height of each vehicle class refers to the same technical note.

3.6.3.33 The existing barrier along Cross Bay Link were handled in *AERMOD* in accordance with *Technical Note for Modelling Vehicular Emission Using AERMOD* by EPD.

Dispersion Modelling and Modelling Approach for Portal Emission

3.6.3.34 Tunnel portal of TKO-LTT exists in the north of the TKO 132. AERMOD is applied for the prediction of air pollutant contributions due to the ventilation building and portal emission.

3.6.3.35 The ventilation building emission was modelled as a point source. The portal emission was modelled as adjacent volume sources in accordance with the recommendations in the *Permanent International Association of Road Congress Report (PIARC, 1991)*. The pollutants were assumed to eject from the portal as a portal jet such that 2/3 of the total emissions is dispersed within the first 50m of the portal and the other 1/3 of the total emissions within the second 50m. The lowest annual minimum temperature and RH among all PATH grids covering the 500m assessment area of the Project are adopted, and the Smart Air Modelling Platform (SAMP v2.0) with ZEV scenario is used for the calculation of composite vehicular emission factor and emission rates. The emission inventory of portals is presented in **Appendix 3.8**.

Dispersion Modelling and Modelling Approach for Marine Emission

3.6.3.36 AERMOD was applied to assess the marine emission in the nearby waters. Marine emission is line source in nature because of the mobile vessels along the route. However, the emission also resembles point source for its high exhaust temperature, exhaust velocity and higher release height. In consideration of these similarities, the marine emission along a route was modelled by numerous of point sources along the route with an interval of 50m and its emission strength is equally allocated to these point sources.

3.6.3.37 High speed vessels, fishing vessels, pleasure vessels, government vessels (mostly patrol boats) and others (mostly tugboats) generally equip with horizontal stack. These vessels are therefore modelled as point source with horizontal release in AERMOD.

Cumulative impact of Criteria Air Pollutants

3.6.3.38 Cumulative air pollutant concentration at ASR was derived by the sum of contributions by various sources, and background contribution from PATHv3.0 system on hour-by-hour basis. Averaging results, namely daily and annual, were derived from the cumulative hour-by-hour results in accordance with Title 40, Code of Federal Regulations, *US Environmental Protection Agency (USEPA 40 CFR) Part 51 "Revision to the Guideline on Air Quality Models, January 2017"*. If the total number of valid hours is less than 18 for 24-hour average, the total concentration should be divided by 18 for the 24-hour average. For annual average, the sum of all valid hourly concentrations was divided by the number of valid hours during the year. For daily average, cumulative results at each ASR amongst 365 days were ranked by highest concentration and compared with the maximum allowable concentration to determine the number of exceedance throughout a year. The air quality impact on ASRs was then evaluated by number of exceedance per annum against the criteria of EIAO-TM and AQOs.

3.6.3.39 Ozone Limiting Method (OLM) has been adopted for the conversion of short-term NO_X to NO_2 based on the ozone background concentration from PATHv3.0. Regarding vehicular emission, NO_2 and NO are predicted separately in AERMOD. Following the principle of OLM, the total predicted vehicular NO_2 is estimated as below:

$$[NO_2]_{vehicular} = [NO_2]_{predicted} + MIN\ \{[NO]_{predicted},\ or\ (46/48) \times [O_3]_{PATH}\}$$

where

$[NO_2]_{vehicular}$	is the total predicted vehicular NO_2 concentration
$[NO_2]_{predicted}$	is the predicted NO_2 concentration
$[NO]_{predicted}$	is the predicted NO concentration
MIN	means the minimum of the two values within the bracket
$[O_3]_{PATH}$	is the representative O_3 PATH concentration (from other contribution)
(46/48)	is the molecular weight of NO_2 divided by the molecular weight of O_3

3.6.3.40 Similarly, NO_2-to-NO_X ratio of 10% is adopted for the emission from CHP and boiler of proposed EPP, flares and LFG generator of SENTX, with reference to *Air Quality Studies for Heathrow: Base Case, Segregated Mode, Mixed Mode and Third Runway Scenario modelling using ADMS-Airport, Cambridge Environmental Research Consultants, 2007*.

$$[NO_2]_{stack} = f \times [NO_X]_{predicted} + \text{MIN}\{(1 - f) \times [NO_X]_{predicted}, \text{ or } (46/48) \times [O_3]_{PATH}\}$$

where

f	is the NO_2-to-NO_X ratio
$[NO_2]_{stack}$	is the total predicted NO_2 concentration
$[NO_X]_{predicted}$	is the predicted NO_X concentration
MIN	means the minimum of the two values within the bracket
$[O_3]_{PATH}$	is the representative O_3 PATH concentration (from other contribution)
(46/48)	is the molecular weight of NO_2 divided by the molecular weight of O_3

3.6.3.41 With reference to the *Guidance on Choice of Models and Model Parameters*, Jenkin method was adopted for the conversion of cumulative annual average NO_X to NO_2 by using the empirical relationship in observed annual mean of NO_X and NO_2 concentrations. The empirical relationship is derived from the annual mean observed data by relevant EPD's air quality monitoring stations (AQMS) including Tseung Kwan O (the closest station), Tap Mun Station (background station with no vehicular emission), and three roadside stations (stations dominated by vehicular emission). The resulting curve is adopted for the cumulative annual average NO_x to NO_2 conversion. Detailed derivation of NO_X-to-NO_2 conversion equation using Jenkin method is presented in **Appendix 3.9**.

3.6.3.42 According to "*Guidelines on the Estimation of 10-min average SO_2 Concentration for Air Quality Assessment in Hong Kong*", SO_2 concentration in 10-min average due to the stack emissions is estimated by applying stability-dependent multiplicative factor to 1-hour average model prediction by AERMOD.

3.6.3.43 For the estimation of formaldehyde, 1-hour to 30-minute conversion factors were calculated via a power law relationship with reference to Duffee et al., 1991[2] as shown below, such that the 1-hour average concentrations predicted by the AERMOD model are converted to 30-minute average concentrations. The conversion factors for different Pasquill stability classes are listed in **Table 3.16.** As a conservative approach, the AERMOD predicted maximum 1-hour average formaldehyde concentration at each ASRs is converted to 30-minute average using the highest conversion factor of 1.41.

$$C_l = C_s(t_s/t_l)^p$$

where

C_l = concentration for the longer time-averaging period;
C_s = concentration for the shorter time-averaging period;
t_s = shorter averaging time;
t_l = longer averaging time; and
p = power law exponent in **Table 3.16**

Table 3.16 Conversion Factors from 1-hour to 30-minute Averaging Time

Pasquill Stability Class	Power Law Exponent	1-hour to 30-minute Conversion Factor
A	0.5	1.41
B	0.5	1.41
C	0.333	1.26

[2] Richard A. Duffee, Martha A. O'Brien and Ned Ostojic, 'Odor Modeling - Why and How', Recent Developments and Current Practices in Odor Regulations, Controls and Technology, Air & Waste Management Association, 1991

Pasquill Stability Class	Power Law Exponent	1-hour to 30-minute Conversion Factor
D	0.2	1.15
E	0.167	1.12
F	0.167	1.12

3.6.4 Operation Phase (Odour)

Proposed Effluent Polishing Plant at TKO 137 (EPP) (DP3)

3.6.4.1 The proposed EPP will be a secondary treatment plant and serve the catchment of TKO 137 which will mainly consist of residential, commercial uses. Therefore, the characteristics of the sewage to be received by the proposed EPP would be mainly domestic and commercial sewage. To estimate the potential odour impact from the proposed EPP, specific odour emission rate (SOER) from other EPP in Hong Kong are referenced, such as Hung Shui Kiu EPP which is also a secondary treatment plan for residential and commercial sewage, subject to the nature of the sewage and treatment process. The odour emission rates are adjusted according to the design of the proposed EPP. All deodorizing units are to be constructed and commissioned under Phase 1. With the increase in design capacity of 39,000 m^3/day of Phase 1 to 54,000 m^3/day of ultimate scenario (Phase 1 + 2), the odour emission would peak in the ultimate scenario. Thus, the potential odour impact of the ultimate scenario (Phase 1 + 2) has been assessed, which also serves as a worst-case scenario for the Interim Pumping Station, as discussed in **Section 3.5.3.4**.

3.6.4.2 All treatment units of the proposed EPP with potential odour emission will be covered and the exhausted air will be conveyed to the deodorizing units for treatment before discharge to the environment. Two-stage deodorizing unit with overall practical odour removal efficiency of at least 95% (achieving 99.5% H_2S removal efficiency at the same time), namely bioscrubber and dry scrubbing (carbon or impregnated media), will be implemented to treat the odorous exhaust. With reference to the "*Code of Practice on Assessment and Control of Odour Nuisance from Waste Water Treatment Works, April 2005*" [3] published by the Scottish Executive, bio-filters and dry scrubbing (carbon or impregnated media) are the two common odour abatement technology, which can achieve at least 95% alone. The exhaust gas after deodorization may cause potential odour impact during the operation phase. The potential odour emission rates generated from the operation of the proposed EPP were estimated according to the treatment process design as well as the performance of deodorization treatment. The odour emission in detail is presented in **Appendix 3.10**.

Proposed Refuse Transfer Station off TKO 132 (RTS) (DP4)

3.6.4.3 The new RTS proposed at the land off TKO 132 with its design capacity of 4000 tonnes per day. The design refers to West Kowloon Transfer Station (WKTS) which is currently operation at 2,700 tpd and up to 3,182 tpd in 2034 based on *Agreement No. CE43/2018(EP) Refurbishment and Upgrading Studies for (A) West Kowloon Transfer Station and (B) Island West and Island East Transfer Stations – Investigation, Design and Construction*. Similar configuration of waste transfer building is anticipated, which consists of tipping hall, compactor hall, WWTP but no grease trap waste treatment facility, anaerobic digestor, nor biogas production and combustion. Hence, the respective odour emission strength and corresponding air pollutant control measures of proposed RTS are generally referenced to WKTS.

3.6.4.4 The proposed RTS is assumed to have 6-stack configuration, similar to the expanded WKTS. The uncontrolled odour emission referred to the highest total H_2S and NH_3 concentrations monitored at all DO inlets of current WKTS and was adjusted accordingly, from 2,700 tpd to

[3] https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2005/04/code-practice-assessment-control-odour-nuisance-waste-water-treatment-works/documents/0011715-pdf/0011715-pdf/govscot%3Adocument/0011715.pdf

4,000 tpd of the proposed RTS. The monitored data also accounted for the contribution from the grease trap treatment facility at WKTS. It is considered as a worst-case assumption for the proposed RTS though no grease trap treatment facility is anticipated. A wet chemical scrubber (with H_2S and NH_3 removal efficiencies of 99.9% and 90% respectively) is generally implemented at existing RTS as advised by EPD, thus it is adopted in the calculation. The odour emission in details is presented in **Appendix 3.10**.

Proposed Sewage Pumping Station (SPS)

3.6.4.5 The wet well of the proposed SPS with potential odour emission will be covered and the exhausted air will be conveyed to the deodorizing unit with 95% odour removal efficiency (achieving 99.5% H_2S removal efficiency at the same time[4]) for treatment before discharge to the environment. The SOER refers to the approved EIA for Sai O Trunk Sewage Pumping Station (AEIAR-230/2021) because of their similar operation nature. The odour emission in details is presented in **Appendix 3.10**.

Concurrent Project

3.6.4.6 According to the approved *Environmental Review for SENT Landfill Extension, 2016*, the SENTX will be in the aftercare phase during the Operation Phase of the Project, and the potential odour emission source will only be the open SBR tanks, with about 32% of the original emission strength. The emission inventory, including the adjusted emission strength, corresponding pollution control measure of emission sources and their emission duration of SENTX in aftercare phase is presented in **Appendix 3.10**.

Dispersion Modelling & Modelling Approach for Odour Source

3.6.4.7 With reference to Clause 3.4.4 and Appendix B and B-1 of the EIA Study Brief ESB-360/2023 and EPD's Guidelines for Local-Scale Air Quality Assessment Using Models, American Meteorological Society (AMS) and U.S. Environmental Protection Agency (EPA) Regulatory Model (AERMOD), the HKEPD approved air dispersion model, was employed to predict the odour impact at representative ASRs.

3.6.4.8 Cumulative odour impact within 500m from these odour sources, namely the proposed EPP, RTS, SPS and SENTX, were assessed. It is assumed that the proposed deodorizing units of the proposed EPP, RTS and SPS will operate continuously on a 24-hour-per-day basis with steady state ventilation rate and exhaust gas velocity in the assessment, unless otherwise specified. Odour emission from the exhaust outlet of the deodorizing unit were modelled as point source.

3.6.4.9 The assessment heights would be at predetermined heights above ground level according to the height of the ASRs. The contour plots of the predicted odour levels at the worst affected heights of the ASRs would also be produced.

3.6.4.10 The handling of meteorology input, determination of surface characteristics, classification of urban sources, input for building downwash refer to **Section 3.6.3.26 - 3.6.3.28** respectively.

3.6.4.11 If the odour emission sources are found to be wake-affected point sources, the 1-hour to 1-second conversion factors from Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW Approved Method) for wake-affected point sources would then be adopted. The conversion factors for wake-affected point sources converting 1-hour average to 1-second average concentration stipulated in NSW Approved Method would be adopted directly to convert the 1-hour concentration predicted by the AERMOD model to 5-second concentration as a conservative approach. The conversion factors for different types

[4] Code of Practice on Assessment and Control of Odour Nuisance from Waste Water Treatment Works, April 2005 (https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2005/04/code-practice-assessment-control-odour-nuisance-waste-water-treatment-works/documents/0011715-pdf/0011715-pdf/govscot%3Adocument/0011715.pdf)

of source and stability classes are listed in **Table 3.17** below. Pasquill-Gifford stability refers to the dataset based on the WRF meteorological data.

Table 3.17 Conversion Factors to 5-second Mean Concentration

Pasquill Stability Class	Conversion Factor	
	Wake Affected Point Source / Volume Source	Area
A	2.3	2.5
B	2.3	2.5
C	2.3	2.5
D	2.3	2.5
E	2.3	2.3
F	2.3	2.3

3.7 Prediction and Evaluation of Environmental Impacts

3.7.1 Construction Phase

3.7.1.1 Based on the RODP, the Project will be developed in three stages, namely Initial Phase, Main Phase and Remaining Phase. The development sites involved in each development stage are shown in **Appendix 2.1**. Apart from the general development sites, constructions of DPs are also involved in each development phase, as summarized in **Table 3.18**.

Table 3.18 Construction of DPs Involved in Development Stages

Development Stage	Construction Works
Initial Phase	TKO 137 DP2 – Reclamation Works (Phase 1A) (4.7 ha) DP2 – Reclamation Works (Phase 1B) (4.9 ha) DP2 – Reclamation Works (Phase 1C) (1.4 ha) DP3 – Site formation Works of EPP TKO 132 DP1 – Construction of Marine Viaduct DP2 – Reclamation Works (19.2 ha)
Main Phase	TKO 137 DP1 – Construction of Carriage Bridge DP2 – Reclamation Works (Phase 2A) (3.7 ha) DP2 – Reclamation Works (Phase 2B) (5.5 ha) DP3 – Construction of EPP (Phase 1) DP4 – Construction of RTS TKO 132 DP5 – Construction of CWHF DP6 – Construction of Electricity Facilities
Remaining Phase	TKO 137 DP3 – Construction of EPP (Phase 2)

3.7.1.2 Construction works of general sites generally involves site formation works and construction of superstructures. A single 2-carriageway road in the form of marine viaduct (DP1) is to be constructed to connect TKO-LTT and TKO 132. Reclamation works (DP2) are to be carried out to form 20 ha of land and 19.2 ha for the development of TKO137 and TKO 132 respectively. A new EPP with treatment capacity of 54,000 m^3/day (DP3) is to be built at Site OU4. A new RTS with capacity 4,000 tpd (DP4) is to be built at TKO 132 for serving existing and future developments in the territory east area. A Construction Waste Handling Facility (CWHF) with handling capacity of 3,000 tpd (DP5) will be built at TKO 132 to receive, handle and bulk transfer construction waste primarily generated from the territory east. Electricity facilities comprising power receiving and conversion facilities (DP6) will be built at TKO 132.

3.7.1.3 Potential construction dust impact would arise from the abovementioned construction works which involve site formation, reclamation, excavation, backfilling, stockpiling, spoil handling, barging point, vehicle movement on haul roads, wind erosion of the exposed site area, especially the reclaimed land. Among which, dominant dust emission would be associated with excavation and backfilling. The dust emission arising from the construction of superstructures is expected to be minor. Location of each development stage is illustrated in **Appendix 2.1** and the tentative construction programme refers to **Appendix 2.2**. According to the tentative construction programme, site formation/reclamation works of Initial Phase would start in December 2025 and be completed by December 2030. Site formation/reclamation works of Main Phase would start in October 2026 and be completed by December 2035. Site formation/reclamation works of Remaining Phase would start in December 2033 and be completed by December 2041. Nevertheless, the construction programme is subject to land resumption schedule in the future. The exact locations of reclamation, excavation and backfilling works at a specific time are not available at this stage.

3.7.1.4 According to the construction design by the engineer, 5,164,978 m^3 of total inert C&D material are expected from the reclamation works, the site formation works, construction of Marine Viaduct and construction of buildings and infrastructures. These excavated C&D materials (around 2,180,740 m^3) will be reused. The breakdown of C&D waste is presented in Chapter 7 of this Report. 15 barges with 3 tug boats and 33 barges with 4 tug boats are to be employed for the transport of excavated material for reclamation, filling/backfilling in TKO137 and TKO 132 respectively. The use of marine route is to reduce the traffic loading due to dump truck and its vehicular emission on land. These vessels will approach to / depart from Project sites via Eastern Fairway and Tathong Channel Traffic Separation. The excess spoil is to be transported to Tuen Mun Area 38 Fill Bank by barge (less than 1 barge a day) via Tathong Channel, Eastern Fairway, Hung Hom Fairway, Central Fairway, Northern Fairway, Ma Wan Fairway, Ha Pang Fairway, Castle Peak Fairway and Urmston Road Fairway. The marine route is illustrated in **Appendix 2.4**. The spoil carried by the barge would cause fugitive emission during sail. Mechanical cover or tarpaulin sheet should be used to avoid any dust pickup by gust. The induced marine traffic would cause emission in NOx, SO_2 and particulates along the routes. All marine vessels are required to use compliant fuel, i.e. marine fuel with sulphur content not exceeding 0.5% by weight within Hong Kong waters, irrespective of whether they are sailing or berthing in accordance with *Air Pollution Control (Fuel for Vessels) Regulation*. On the other hand, for marine light diesel acquired from local supply, the local vessel should be using the marine light diesel with sulphur content not exceeding 0.05% by weight in accordance with *Air Pollution Control (Marine Light Diesel) Regulation*. The working vessels will be arranged to spread over the reclamation sites and stay away from any existing onshore ASRs as far as practicable. The routes along the fairways would provide the farthest distance from the existing ASRs such that the associated air quality impact is reduced to minimum. The excavated material shall be wetted during handling and shall be covered properly when loaded on barge to avoid fugitive dust emission along the marine route. With the careful planning of marine route and the implementation of these mitigation measures, it is anticipated that no adverse air quality impact, nor dust impact would be caused by the transportation of waste along the marine routes.

3.7.1.5 The excess spoil and non-inert waste from the construction works would be transported with dump trucks out of the construction works sites to disposal outlet. The induced traffic would cause vehicle emission in NOx and particulates along the routes. Dump trucks would collect spoils / non-inert waste from the construction works sites and transport via marine/land routes out of TKO 137 and TKO 132, for example:

- Land route: via Wan Po Road, Cross Bay Link, to NENT/WENT landfill.
- Marine/Land route from TKO 132: via Tathhong Channal to TKO 137 then followed the same land route out of TKO 137.

3.7.1.6 Transportation routes in detailed refers to Table 7.15 of Waste Chapter and is illustrated in **Appendix 2.4**. Maximum of 231 vehicles per day is expected for transporting waste during construction phase. The land routings should avoid the use of local roads and the truck traffic should avoid peak hours, as far as practicable, such that the associated air quality impact due to dump trucks is minimized. Also, dump truck is equipped with water-tight container and mechanical cover, which would not cause fugitive dust emission on the open road. With the implementation of these mitigation measures, it is anticipated that no adverse air quality impact, nor dust impact would be caused by the transportation of waste along the land routes.

3.7.1.7 Dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation* would be implemented as far as practicable to abate the fugitive dust emission from the construction sites. Regular watering is to be provided at the excavation and backfilling works, spoil handing and exposed areas. Stockpile area/material storage area should be covered with impervious sheets during non-working hours, as far as practicable, to minimize the wind erosion. Barging point should be enclosed on 3 sides and top and equipped with water sprinklers for dust suppression during unloading of spoil. Haul roads should be paved and regularly wetted to suppress the fugitive dust emission caused by the travelling construction vehicles. Vehicles transporting dusty spoil should be properly covered with mechanical cover or tarpaulin sheets to avoid any dust pickup by gust during travel. Wheel washing facility would also be provided at each exit of construction sites such that no residue on the body of construction vehicle would cause dust emission on public roads. With the implementation of appropriate dust suppression measures and good site practices, the fugitive dust emission from the construction works would be reduced to minimum.

3.7.1.8 In order to avoid any intensive works at a location close to ASR, site formation works will be conducted in several workfronts. The maximum extent of each workfront would be around 300m x 100m. Should there be any ASR nearby, the work intensity should be adjusted accordingly such that no adverse dust impact on that ASR. Careful scheduling of nearby construction works will be managed with coordination or collaboration among development sites. With the implementation of individual construction works site by site and careful scheduling of works, construction works are managed to reduce in scale such that the associated fugitive dust emission is reduced.

3.7.1.9 The proposed twin sewerage twin rising mains, saltwater mains and freshwater mains will be laid by open cut method along Tseung Lam Highway Garden, Tong Yin Street to Chui Ling Road. Similarly, the construction works for the water/sewerage mains will be conducted section by section of about 100 metres in length to confine the extent of open-cut area and exposed area such that the potential dust emission is reduced.

3.7.1.10 Nevertheless, some ASRs would exist close to the Project boundary at 10 metres or less, such as P-Tech Landfill Gas (SENT) Co. Ltd. (A04) in the east of TKO 137. The locations of reclamation/works areas and their nearest ASRs are illustrated in **Appendix 3.13**. Dusty activities should be located away from this nearby ASR as far as practicable. In addition to regular watering, hoarding of not less than 3.5m high should be provided to shield off ASRs from these dusty works. Dust monitoring at these locations shall be considered to ensure the potential dust impact complying with AQOs during the construction phase.

3.7.1.11 Development sites in TKO137 will be completed by phases and evolve into planned ASRs upon population intake. The progression of the development in each population intake years, i.e. Year 2030, 2033, 2035, 2038 and 2041, are illustrated in **Appendix 3.13**. As shown in the appendix, the reclamation extent would be around 9.6 ha (i.e. Phase 1A + Phase 1B) before 2030, 1.4 ha (i.e. Phase 1C) in 2030, 9.2 ha (i.e. Phase 2A + Phase 2B) in 2033. **Table 3.19** summarizes the existing/planned ASR closest to a reclamation/works area in each population intake year.

Table 3.19 Existing/Planned ASR Closest to a Reclamation/Works Area at TKO 137 in Each Population Intake Year

Population Intake Year	Existing/ Planned ASR Closest to Construction Works Area	Closest Active Reclamation/ Works Area	Shortest Distance (m)	Distance (m) between Monitoring Location and Work Sites in Reference Projects
2030	Site E1 & E2 (P08, P09)	Reclamation Works (Phase 1C)	150m	NENT: 1 m – 169m TCNTC: 15m or above
		Road L2	20m	
2033	Site PU3 & PU4 (P07, P23)	Reclamation Works (Phase 2A)	410m	
	Admin Building of Desalination Plant (A01)	Reclamation Works (Phase 2B)	440m	
2035	(No dusty construction works except construction of superstructure at Site PR4)			
2038[2]	Site PU3, PU4, G4, PU5, PU6, PR4 (P07, P23, P11, P25, P28, P12, P41, P17)	Road L1	> 10m	
2041	(All construction works are complete)			

Remark:

[1] Construction of superstructures would cause minor dust emission only.

[2] Minor construction works are expected at Site O1 – O8. These minor construction works involve landscaping works and planting works only, which are not considered as dusty works.

3.7.1.12 The operation of temporary Fill Bank at TKO 137, in particular handling of public fill, would cause fugitive dust emission to the ambient. The fill bank will be decanted in phases starting from end of Year 2025 until Year 2030. The major operation of the fill bank will be retreated to the southern part of its site and continue to operate until land resumption by the Project by the end of 2031. The findings of the *Environmental Review Report of the Fill Bank in TKO Area 137* showed that the current operation would not cause any adverse air quality impact to the nearby existing receivers. The scale of the retreated fill bank and the capacity of public fill handling are expected to reduce significantly. Also, the planned ASRs in PU1&2 would be further away from the retreated fill bank. The dust suppression measures in practice such as regular watering would continue to be implemented by the contractor of the temporary fill bank, which abates the fugitive dust emission due to public fill handling to minimum. Close liaison with the contractor of the fill bank will be taken place to minimize any dusty activities to be taken place in the proximity at the same time. Therefore, the potential dust impact on the planned ASRs is expected to be less than the one caused by current operation. The decommissioning of the retreated fill bank would mainly involve the clearance of fill material. The clearance of fill material is similar to the fill material handling but exhausting the stockpile instead of storage. Any processing/ sorting facilities will be demolished, however, the associated dust impact would be limited. Therefore, the dust impact associated to the decommissioning of fill bank is similar to the one due to normal daily operation.

3.7.1.13 The Investigation, Design and Construction of TKODP2 commenced in Early June 2023 and the estimated works completion date is in January 2031. It is anticipated that the associated construction works would be concurrent with Initial Phase. Major construction works of the TKODP2 are mostly site formation works and construction of superstructure. It is anticipated that appropriate dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation*, such as regular watering and paved haul road, would also be implemented by the contractors of TKODP2, resulting in minimum fugitive dust emission from their construction activities. Close liaison with the contractor of the TKODP2 will be taken place to minimize any construction activities to be taken place in the proximity at the same time.

3.7.1.14 Based on the current practice, SENTX is expected to be closed with its restoration works completed prior to the population intake at TKO 137. The dust suppression measures in practice such as regular watering would continue to be implemented by the contractor of SENTX during operation and restoration phases, which abates the fugitive dust emission in waste and soil cover handling. Close liaison with the contractor of SENTX will be taken place to minimize any dusty activities to be taken place in the proximity at the same time.

3.7.1.15 With the implementation of workfronts for each development sites, careful scheduling of works, the effective dust suppression measures, good site practices and close liaison with contractors of concurrent works, no adverse dust impact on nearby ASRs in the assessment area due to the construction of TKO137 and TKO 132, and other concurrent projects is anticipated. A comprehensive EM&A programme with RSP and FSP real-time monitoring would be conducted to ensure the proper implementation of measures and the compliance of AQOs during the construction of TKO137 and TKO132 in the area.

3.7.2 Operation Phase (Criteria Air Pollutants)

Cumulative Air Quality Impact

3.7.2.1 The cumulative air quality impact due to proposed EPP, CWHF, PFTF, CBP and RTS under the RODP, existing industrial emission sources, proposed marine viaduct, existing and planned open roads, existing portal, temporary PTFs and planned PTIs, existing bus terminus and parking sites in Tseung Kwan O InnoPark, marine sources within 500m assessment area and background concentration on representative ASRs in the scenario described in **Section 3.6.3.1** have been evaluated. The predicted cumulative air quality impact on the representative ASRs is summarized in **Table 3.20** - **Table 3.21**. The predictions showed that daily and annual averages RSP and FSP concentrations, 10-min and daily averages SO_2 concentrations, and hourly, daily and annual averages NO_2 concentrations at representative ASRs would comply with the current AQOs and the potential updated AQOs. The predicted CO concentrations were well below the current AQOs and the potential updated AQOs. The detailed predictions with breakdown of contribution by sources are presented in **Appendix 3.11**.

3.7.2.2 According to the discrete results, the worst affected level would be 1.5 metres above ground (mAG) for daily and annual average RSP concentrations, daily and annual average FSP concentrations and hourly and annual average NO_2 concentrations in TKO 132 and TKO 137; 1.5 mAG for daily average NO_2 concentrations in TKO 137 and 10 mAG for daily average NO_2 concentrations in TKO 132; 1.5 mAG for 10-Min average SO_2 concentrations in TKO 132 and TKO 137, 10mAG for daily average SO_2 concentrations in TKO 137 and 15 mAG for daily average concentrations average SO_2 in TKO 132, 140mAG for hourly average CO in TKO 137 and 1.5 mAG for hourly average CO in TKO 132, 1.5mAG for 8-hour average CO concentrations in TKO 132 and TKO 137, and 1.5mAG for daily average CO concentrations in TKO 132 and 10 mAG for daily average CO concentrations in TKO 137. The contour plots at these worst affected levels are illustrated in **Figure 3.3 – Figure 3.14**. There is no air sensitive use within the exceedance zone of daily and annual RSP and FSP concentrations at the proposed PFTF in TKO 132 area. There is an exceedance zone of annual NO_2 concentration at 1.5 mAG within Site G3, and as a mitigation measure, the air sensitive use of the corresponding ASR P05 is designed to start at 5 mAG. The exceedance zones of annual NO_2 were predicted on Road L4 and L5 and Site O5. No air sensitive use is expected on the proposed roads. Site O5 is a proposed open space, i.e. long-term NO_2 impact is not applicable. In short, there is no ASRs located within the exceedance zones of all pollutants. No adverse air quality impact is anticipated during the operation phase of the development plan.

Table 3.20 Worst Predicted Cumulative RSP and FSP Concentrations at Representative ASRs during Operation Phase

ASRID	10th Highest Daily Average RSP Conc. (μg/m³) (Current AQO: 100 μg/m³, Proposed AQO: 75 μg/m³)	Annual RSP Conc. (μg/m³) (Current AQO: 50 μg/m³, Proposed AQO: 30 μg/m³)	19th Highest Daily Average FSP Conc. (μg/m³) (Current AQO: 50 μg/m³, Proposed AQO: 37.5 μg/m³)	Annual FSP Conc. (μg/m³) (Current AQO: 25 μg/m³, Proposed AQO: 15 μg/m³)
A01	55	21	32	12
A02	53	20	31	12
A03	53	20	31	12
A04	55	22	33	13
A05	53	20	31	12
A06	53	20	31	12
A07	55	21	33	13
A08	53	20	31	12
A09	53	20	31	13
A10	53	20	31	12
A50	49	19	28	11
A51	49	19	28	11
A52	50	19	29	11
A53	50	19	28	11
A54	51	19	28	11
A55	50	19	28	11
A56	54	21	29	12
A57	49	20	29	11
A62	51	19	28	11
P01	55	21	33	13
P02	55	21	33	13
P03	53	20	32	13
P04	53	21	32	13
P05	53	20	31	13
P06	55	22	33	13
P07	55	21	33	13
P08	55	22	33	13
P09	55	21	33	13
P10	55	21	33	13
P11	55	21	33	13
P12	55	21	32	12
P13	55	21	33	13
P14	55	21	32	13
P15	55	21	32	13
P16	55	21	33	13
P17	55	21	32	13
P18	55	21	32	12
P19	55	21	33	13

ASRID	10th Highest Daily Average RSP Conc. (μg/m³) (Current AQO: 100 μg/m³, Proposed AQO: 75 μg/m³)	Annual RSP Conc. (μg/m³) (Current AQO: 50 μg/m³, Proposed AQO: 30 μg/m³)	19th Highest Daily Average FSP Conc. (μg/m³) (Current AQO: 50 μg/m³, Proposed AQO: 37.5 μg/m³)	Annual FSP Conc. (μg/m³) (Current AQO: 25 μg/m³, Proposed AQO: 15 μg/m³)
P20	55	21	33	13
P21	53	20	31	12
P22	55	21	33	13
P23	55	22	33	13
P24	55	22	33	13
P25	55	21	33	13
P26	55	21	33	13
P27	55	21	33	13
P28	55	21	33	13
P29	55	21	33	13
P30	55	21	32	13
P31	55	21	33	13
P32	55	21	33	13
P33	55	21	33	13
P34	55	21	33	13
P35	55	21	33	13
P36	55	21	33	13
P37	55	21	33	13
P38	55	21	33	13
P39	55	21	33	13
P40	55	21	32	12
P41	55	21	33	13
P42	55	21	32	12
P43	55	21	32	12
P44	55	21	32	12
P45	55	21	32	12
P46	56	22	33	13
P47	56	22	33	13
P48	56	22	33	13
P49	55	22	33	13

Table 3.21 Worst Predicted Cumulative NO_2 and SO_2 Concentrations at Representative ASRs during Operation Phase

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m³) (Current AQO: 500 μg/m³, Proposed AQO: 500 μg/m³)	4th Highest Daily Average SO_2 Conc. (μg/m³) (Current AQO: 50 μg/m³, Proposed AQO: 40 μg/m³)	19th Highest Hourly Average NO_2 Conc. (μg/m³) (Current AQO: 200 μg/m³, Proposed AQO: 200 μg/m³)	10th Highest Daily Average NO_2 Conc. (μg/m³) (Proposed AQO: 120 μg/m³)	Annual Average NO_2 Conc. (μg/m³) (Current AQO: 40 μg/m³, Proposed AQO: 40 μg/m³)
A01	23	7	68	26	12
A02	24	7	115	50	21

ASRID	4th Highest 10-min Average SO_2 Conc. (µg/m³) (Current AQO: 500 µg/m³, Proposed AQO: 500 µg/m³)	4th Highest Daily Average SO_2 Conc. (µg/m³) (Current AQO: 50 µg/m³, Proposed AQO: 40 µg/m³)	19th Highest Hourly Average NO_2 Conc. (µg/m³) (Current AQO: 200 µg/m³, Proposed AQO: 200 µg/m³)	10th Highest Daily Average NO_2 Conc. (µg/m³) (Proposed AQO: 120 µg/m³)	Annual Average NO_2 Conc. (µg/m³) (Current AQO: 40 µg/m³, Proposed AQO: 40 µg/m³)
A03	31	7	72	28	13
A04	25	7	135	62	20
A05	36	8	175	92	31
A06	47	8	80	27	13
A07	31	9	82	33	15
A08	27	7	83	29	14
A09	24	7	121	56	24
A10	27	7	80	29	13
A50	22	7	79	31	12
A51	22	7	78	31	12
A52	23	7	74	31	13
A53	30	8	78	34	18
A54	24	7	77	31	15
A55	23	7	81	32	13
A56	25	7	76	34	16
A57	23	7	74	34	14
A62	27	8	84	34	17
P01	25	7	135	36	17
P02	25	7	141	63	18
P03	24	7	136	51	25
P04	25	7	168	73	36
P05	25	7	126	71	30
P06	25	7	113	39	20
P07	25	7	111	49	18
P08	25	7	102	50	22
P09	25	7	73	30	15
P10	27	7	78	33	16
P11	26	7	74	33	16
P12	23	7	71	28	14
P13	26	7	78	31	15
P14	23	7	80	32	16
P15	23	7	78	33	16
P16	25	7	132	41	17
P17	24	7	73	29	15
P18	23	7	70	28	14
P19	25	7	100	40	18
P20	26	7	77	33	17
P21	25	8	156	79	23
P22	25	7	130	39	16
P23	25	7	99	37	20

ASRID	4th Highest 10-min Average SO_2 Conc. (µg/m³) (Current AQO: 500 µg/m³, Proposed AQO: 500 µg/m³)	4th Highest Daily Average SO_2 Conc. (µg/m³) (Current AQO: 50 µg/m³, Proposed AQO: 40 µg/m³)	19th Highest Hourly Average NO_2 Conc. (µg/m³) (Current AQO: 200 µg/m³, Proposed AQO: 200 µg/m³)	10th Highest Daily Average NO_2 Conc. (µg/m³) (Proposed AQO: 120 µg/m³)	Annual Average NO_2 Conc. (µg/m³) (Current AQO: 40 µg/m³, Proposed AQO: 40 µg/m³)
P24	25	7	104	49	21
P25	27	7	83	32	15
P26	29	8	75	29	15
P27	28	7	71	31	16
P28	26	7	77	30	14
P29	27	7	78	29	14
P30	23	7	71	29	14
P31	25	7	134	33	16
P32	25	7	124	47	19
P33	25	7	108	33	14
P34	25	7	98	32	14
P35	25	7	106	42	18
P36	25	7	93	33	14
P37	26	7	84	28	14
P38	26	7	86	32	17
P39	25	7	70	25	13
P40	24	7	67	27	13
P41	25	7	70	28	14
P42	24	7	67	26	13
P43	24	7	67	26	13
P44	23	7	67	25	12
P45	23	7	67	26	12
P46	25	7	96	40	22
P47	25	7	166	60	27
P48	28	8	102	44	23
P49	26	7	103	42	20

Table 3.22 Worst Predicted Cumulative CO Concentrations at Representative ASRs during Operation Phase

ASRID	Highest Hourly Average CO Conc. (µg/m³) (Current AQO: 30000 µg/m³, Proposed AQO: 30000 µg/m³)	Highest 8-Hourly Average CO Conc. (µg/m³) (Current AQO: 10000 µg/m³, Proposed AQO: 10000 µg/m³)	Highest Daily Average CO Conc. (µg/m³) (Proposed AQO: 4000 µg/m³)
A01	521	481	453
A02	518	480	446
A03	515	480	446
A04	521	478	444
A05	627	576	461
A06	515	480	447

ASRID	Highest Hourly Average CO Conc. (μg/m³) (Current AQO: 30000 μg/m³, Proposed AQO: 30000 μg/m³)	Highest 8-Hourly Average CO Conc. (μg/m³) (Current AQO: 10000 μg/m³, Proposed AQO: 10000 μg/m³)	Highest Daily Average CO Conc. (μg/m³) (Proposed AQO: 4000 μg/m³)
A07	595	575	474
A08	516	480	446
A09	516	480	446
A10	587	490	447
A50	511	480	447
A51	511	480	447
A52	510	482	448
A53	510	483	448
A54	510	482	448
A55	510	482	448
A56	510	482	448
A57	513	484	453
A62	510	483	448
P01	558	487	452
P02	549	493	453
P03	516	480	447
P04	531	480	448
P05	594	512	450
P06	530	478	447
P07	537	479	448
P08	530	478	445
P09	523	478	444
P10	526	495	450
P11	525	484	448
P12	524	482	453
P13	534	488	453
P14	531	482	456
P15	527	481	454
P16	522	483	450
P17	524	484	453
P18	523	482	453
P19	531	486	450
P20	527	486	447
P21	648	527	461
P22	546	481	450
P23	533	490	452
P24	529	481	450
P25	527	491	448
P26	530	497	451
P27	526	491	451

ASRID	Highest Hourly Average CO Conc. (μg/m³) (Current AQO: 30000 μg/m³, Proposed AQO: 30000 μg/m³)	Highest 8-Hourly Average CO Conc. (μg/m³) (Current AQO: 10000 μg/m³, Proposed AQO: 10000 μg/m³)	Highest Daily Average CO Conc. (μg/m³) (Proposed AQO: 4000 μg/m³)
P28	525	485	448
P29	527	488	450
P30	527	482	453
P31	516	489	450
P32	525	478	449
P33	521	479	448
P34	523	482	447
P35	527	480	447
P36	524	488	447
P37	524	487	451
P38	528	491	451
P39	525	482	452
P40	524	485	452
P41	524	483	451
P42	523	484	453
P43	523	483	456
P44	522	482	450
P45	523	482	453
P46	528	494	446
P47	528	484	446
P48	527	499	444
P49	527	495	461

3.7.3 Non-AQO Criteria Pollutants

3.7.3.1 The predicted methane, HCl, HF, formaldehyde, vinyl chloride, benzene and acetaldehyde concentrations at representative ASRs during operation phase would be well below the respective standards as stated in **Section 3.2.2**. The results are summarized in **Table 3.23 - Table 3.26**, and detailed prediction results are presented in **Appendix 3.11**.

Table 3.23 Worst Predicted Cumulative Methane and HCl Concentrations at Representative ASRs during Operation Phase

ASRID	Highest Hourly Methane Conc. (μg/m³) (Criterion: 600,000 μg/m³)	Highest Hourly HCl Conc. (μg/m³) (Criterion: 2100 μg/m³)	Annual Average HCl Conc. (μg/m³) (Criterion: 20 μg/m³)
A01	4470.15	1.17	1.01
A02	4470.08	1.17	1.01
A03	4470.35	1.11	1.00
A04	4470.76	1.21	1.01
A05	4471.51	1.11	1.00
A06	4473.51	1.10	1.00

ASRID	Highest Hourly Methane Conc. (μg/m³) (Criterion: 600,000 μg/m³)	Highest Hourly HCl Conc. (μg/m³) (Criterion: 2100 μg/m³)	Annual Average HCl Conc. (μg/m³) (Criterion: 20 μg/m³)
A07	4485.37	2.19	1.10
A08	4469.87	1.12	1.01
A09	4469.71	1.14	1.01
A10	4470.22	1.13	1.01
A50	4468.67	1.06	1.00
A51	4468.87	1.06	1.00
A52	4468.10	1.04	1.00
A53	4468.33	1.05	1.00
A54	4468.26	1.05	1.00
A55	4468.33	1.05	1.00
A56	4468.39	1.06	1.00
A57	4468.32	1.05	1.00
A62	4468.26	1.05	1.00
P01	4471.41	1.26	1.01
P02	4470.76	1.21	1.01
P03	4470.27	1.18	1.01
P04	4470.33	1.18	1.01
P05	4470.10	1.17	1.01
P06	4473.41	1.39	1.01
P07	4471.53	1.26	1.01
P08	4471.17	1.24	1.01
P09	4470.18	1.17	1.01
P10	4473.29	1.38	1.04
P11	4473.20	1.38	1.03
P12	4474.09	1.43	1.01
P13	4482.16	1.97	1.04
P14	4478.68	1.74	1.02
P15	4475.12	1.50	1.01
P16	4470.19	1.18	1.01
P17	4472.94	1.36	1.01
P18	4472.38	1.32	1.01
P19	4475.52	1.53	1.03
P20	4472.35	1.32	1.03
P21	4470.31	1.18	1.01
P22	4471.36	1.25	1.01
P23	4477.59	1.67	1.03
P24	4475.42	1.52	1.03
P25	4473.56	1.40	1.04
P26	4476.70	1.61	1.06
P27	4477.34	1.65	1.05
P28	4475.27	1.51	1.03

ASRID	Highest Hourly Methane Conc. (μg/m³) (Criterion: 600,000 μg/m³)	Highest Hourly HCl Conc. (μg/m³) (Criterion: 2100 μg/m³)	Annual Average HCl Conc. (μg/m³) (Criterion: 20 μg/m³)
P29	4478.55	1.73	1.03
P30	4474.48	1.46	1.01
P31	4469.82	1.15	1.01
P32	4470.73	1.21	1.01
P33	4470.30	1.18	1.01
P34	4471.32	1.25	1.01
P35	4471.18	1.24	1.01
P36	4472.92	1.36	1.02
P37	4471.13	1.24	1.02
P38	4472.47	1.33	1.03
P39	4470.55	1.20	1.02
P40	4470.45	1.19	1.01
P41	4472.64	1.34	1.02
P42	4470.49	1.20	1.01
P43	4470.59	1.20	1.01
P44	4470.12	1.17	1.01
P45	4471.03	1.23	1.01
P46	4477.52	1.66	1.04
P47	4476.91	1.62	1.05
P48	4484.71	2.14	1.08
P49	4475.13	1.50	1.04

Table 3.24 Worst Predicted Cumulative Hydrogen Fluoride and Formaldehyde Concentrations at Representative ASRs during Operation Phase

ASRID	Highest Hourly Hydrogen Fluoride Conc. (μg/m³) (Criterion: 240 μg/m³)	Annual Average Hydrogen Fluoride Conc. (μg/m³) (Criterion: 14 μg/m³)	Highest 30-min Average Formaldehyde Conc. (μg/m³) (Criterion: 100 μg/m³)	Annual Average Formaldehyde Conc. (μg/m³) (Criterion: 9 μg/m³)
A01	0.02	0.00	3.54	1.52
A02	0.02	0.00	3.53	1.51
A03	0.01	0.00	3.45	1.51
A04	0.02	0.00	3.59	1.52
A05	0.01	0.00	3.46	1.51
A06	0.01	0.00	3.44	1.51
A07	0.12	0.01	4.96	1.65
A08	0.01	0.00	3.47	1.51
A09	0.01	0.00	3.50	1.51
A10	0.01	0.00	3.48	1.51
A50	0.01	0.00	3.37	1.51
A51	0.01	0.00	3.39	1.51
A52	0.00	0.00	3.35	1.51

ASRID	Highest Hourly Hydrogen Fluoride Conc. (μg/m³) (Criterion: 240 μg/m³)	Annual Average Hydrogen Fluoride Conc. (μg/m³) (Criterion: 14 μg/m³)	Highest 30-min Average Formaldehyde Conc. (μg/m³) (Criterion: 100 μg/m³)	Annual Average Formaldehyde Conc. (μg/m³) (Criterion: 9 μg/m³)
A53	0.00	0.00	3.37	1.51
A54	0.00	0.00	3.36	1.51
A55	0.00	0.00	3.37	1.51
A56	0.01	0.00	3.37	1.51
A57	0.00	0.00	3.37	1.51
A62	0.00	0.00	3.36	1.51
P01	0.03	0.00	3.65	1.52
P02	0.02	0.00	3.59	1.52
P03	0.02	0.00	3.55	1.52
P04	0.02	0.00	3.55	1.52
P05	0.02	0.00	3.53	1.52
P06	0.04	0.00	3.84	1.52
P07	0.03	0.00	3.67	1.53
P08	0.02	0.00	3.63	1.52
P09	0.02	0.00	3.54	1.52
P10	0.04	0.00	3.83	1.56
P11	0.04	0.00	3.82	1.55
P12	0.04	0.00	3.91	1.52
P13	0.10	0.00	4.66	1.56
P14	0.07	0.00	4.33	1.53
P15	0.05	0.00	4.00	1.52
P16	0.02	0.00	3.54	1.52
P17	0.04	0.00	3.80	1.52
P18	0.03	0.00	3.75	1.52
P19	0.05	0.00	4.04	1.54
P20	0.03	0.00	3.74	1.55
P21	0.02	0.00	3.55	1.52
P22	0.03	0.00	3.65	1.52
P23	0.07	0.00	4.23	1.55
P24	0.05	0.00	4.03	1.55
P25	0.04	0.00	3.86	1.56
P26	0.06	0.01	4.15	1.59
P27	0.06	0.00	4.21	1.57
P28	0.05	0.00	4.02	1.54
P29	0.07	0.00	4.32	1.55
P30	0.05	0.00	3.94	1.52
P31	0.01	0.00	3.51	1.52
P32	0.02	0.00	3.59	1.52
P33	0.02	0.00	3.55	1.52
P34	0.02	0.00	3.65	1.53
P35	0.02	0.00	3.63	1.53

ASRID	Highest Hourly Hydrogen Fluoride Conc. (μg/m³) (Criterion: 240 μg/m³)	Annual Average Hydrogen Fluoride Conc. (μg/m³) (Criterion: 14 μg/m³)	Highest 30-min Average Formaldehyde Conc. (μg/m³) (Criterion: 100 μg/m³)	Annual Average Formaldehyde Conc. (μg/m³) (Criterion: 9 μg/m³)
P36	0.04	0.00	3.80	1.54
P37	0.02	0.00	3.63	1.54
P38	0.03	0.00	3.75	1.55
P39	0.02	0.00	3.57	1.53
P40	0.02	0.00	3.57	1.53
P41	0.03	0.00	3.77	1.54
P42	0.02	0.00	3.57	1.52
P43	0.02	0.00	3.58	1.52
P44	0.02	0.00	3.54	1.52
P45	0.02	0.00	3.62	1.52
P46	0.07	0.00	4.23	1.56
P47	0.06	0.00	4.17	1.57
P48	0.11	0.01	4.90	1.62
P49	0.05	0.00	4.00	1.56

Table 3.25 Worst Predicted Cumulative Vinyl Chloride and Benzene Concentrations at Representative ASRs during Operation Phase

ASRID	Highest Hourly Vinyl Chloride Conc. (μg/m³) (Criterion: 18000 μg/m³)	Annual Average Vinyl Chloride Conc. (μg/m³) (Criterion: 100 μg/m³)	Highest Hourly Benzene Conc. (μg/m³) (Criterion: 27 μg/m³)	Highest 8-Hourly Average Benzene Conc. (μg/m³) (Criterion: 3 μg/m³)	Annual Average Benzene Conc. (μg/m³) (Criterion: 3 μg/m³)
A01	0.40	0.33	2.00	2.00	1.13
A02	0.40	0.33	2.00	2.00	1.13
A03	0.40	0.33	2.00	2.00	1.13
A04	0.40	0.33	2.00	2.00	1.13
A05	0.40	0.33	2.00	2.00	1.13
A06	0.40	0.33	2.00	2.00	1.13
A07	0.40	0.33	2.00	2.00	1.13
A08	0.40	0.33	2.00	2.00	1.13
A09	0.40	0.33	2.00	2.00	1.13
A10	0.40	0.33	2.00	2.00	1.13
A50	0.40	0.33	2.00	2.00	1.13
A51	0.40	0.33	2.00	2.00	1.13
A52	0.40	0.33	2.00	2.00	1.13
A53	0.40	0.33	2.00	2.00	1.13
A54	0.40	0.33	2.00	2.00	1.13
A55	0.40	0.33	2.00	2.00	1.13
A56	0.40	0.33	2.00	2.00	1.13
A57	0.40	0.33	2.00	2.00	1.13
A62	0.40	0.33	2.00	2.00	1.13
P01	0.40	0.33	2.00	2.00	1.13

ASRID	Highest Hourly Vinyl Chloride Conc. (μg/m³) (Criterion: 18000 μg/m³)	Annual Average Vinyl Chloride Conc. (μg/m³) (Criterion: 100 μg/m³)	Highest Hourly Benzene Conc. (μg/m³) (Criterion: 27 μg/m³)	Highest 8-Hourly Average Benzene Conc. (μg/m³) (Criterion: 3 μg/m³)	Annual Average Benzene Conc. (μg/m³) (Criterion: 3 μg/m³)
P02	0.40	0.33	2.00	2.00	1.13
P03	0.40	0.33	2.00	2.00	1.13
P04	0.40	0.33	2.00	2.00	1.13
P05	0.40	0.33	2.00	2.00	1.13
P06	0.40	0.33	2.00	2.00	1.13
P07	0.40	0.33	2.00	2.00	1.13
P08	0.40	0.33	2.00	2.00	1.13
P09	0.40	0.33	2.00	2.00	1.13
P10	0.40	0.33	2.00	2.00	1.13
P11	0.40	0.33	2.00	2.00	1.13
P12	0.40	0.33	2.00	2.00	1.13
P13	0.40	0.33	2.00	2.00	1.13
P14	0.40	0.33	2.00	2.00	1.13
P15	0.40	0.33	2.00	2.00	1.13
P16	0.40	0.33	2.00	2.00	1.13
P17	0.40	0.33	2.00	2.00	1.13
P18	0.40	0.33	2.00	2.00	1.13
P19	0.40	0.33	2.00	2.00	1.13
P20	0.40	0.33	2.00	2.00	1.13
P21	0.40	0.33	2.00	2.00	1.13
P22	0.40	0.33	2.00	2.00	1.13
P23	0.40	0.33	2.00	2.00	1.13
P24	0.40	0.33	2.00	2.00	1.13
P25	0.40	0.33	2.00	2.00	1.13
P26	0.40	0.33	2.00	2.00	1.13
P27	0.40	0.33	2.00	2.00	1.13
P28	0.40	0.33	2.00	2.00	1.13
P29	0.40	0.33	2.00	2.00	1.13
P30	0.40	0.33	2.00	2.00	1.13
P31	0.40	0.33	2.00	2.00	1.13
P32	0.40	0.33	2.00	2.00	1.13
P33	0.40	0.33	2.00	2.00	1.13
P34	0.40	0.33	2.00	2.00	1.13
P35	0.40	0.33	2.00	2.00	1.13
P36	0.40	0.33	2.00	2.00	1.13
P37	0.40	0.33	2.00	2.00	1.13
P38	0.40	0.33	2.00	2.00	1.13
P39	0.40	0.33	2.00	2.00	1.13
P40	0.40	0.33	2.00	2.00	1.13
P41	0.40	0.33	2.00	2.00	1.13
P42	0.40	0.33	2.00	2.00	1.13

ASRID	Highest Hourly Vinyl Chloride Conc. (μg/m³) (Criterion: 18000 μg/m³)	Annual Average Vinyl Chloride Conc. (μg/m³) (Criterion: 100 μg/m³)	Highest Hourly Benzene Conc. (μg/m³) (Criterion: 27 μg/m³)	Highest 8-Hourly Average Benzene Conc. (μg/m³) (Criterion: 3 μg/m³)	Annual Average Benzene Conc. (μg/m³) (Criterion: 3 μg/m³)
P43	0.40	0.33	2.00	2.00	1.13
P44	0.40	0.33	2.00	2.00	1.13
P45	0.40	0.33	2.00	2.00	1.13
P46	0.40	0.33	2.00	2.00	1.13
P47	0.40	0.33	2.00	2.00	1.13
P48	0.40	0.33	2.00	2.00	1.13
P49	0.40	0.33	2.00	2.00	1.13

Table 3.26 Worst Predicted Cumulative Acetaldehyde Concentrations at Representative ASRs during Operation Phase

ASRID	Highest Hourly Acetaldehyde Conc. (μg/m³) (Criterion: 470 μg/m³)	Highest 8-Hourly Average Acetaldehyde Conc. (μg/m³) (Criterion: 300 μg/m³)	Annual Average Acetaldehyde Conc. (μg/m³) (Criterion: 9 μg/m³)
A01	6.75	6.63	1.32
A02	8.24	6.90	1.33
A03	9.32	7.02	1.33
A04	7.23	6.70	1.32
A05	10.47	7.37	1.34
A06	12.47	8.10	1.36
A07	6.83	6.66	1.32
A08	8.84	6.98	1.33
A09	7.89	6.86	1.33
A10	9.18	7.23	1.33
A50	6.97	6.77	1.32
A51	6.94	6.71	1.32
A52	6.78	6.67	1.32
A53	6.84	6.70	1.33
A54	6.80	6.67	1.33
A55	6.82	6.68	1.32
A56	6.86	6.69	1.33
A57	6.91	6.70	1.32
A62	6.80	6.68	1.33
P01	7.39	6.75	1.32
P02	7.26	6.72	1.32
P03	7.77	6.84	1.33
P04	8.08	6.96	1.33
P05	7.96	6.91	1.33
P06	7.04	6.70	1.32
P07	7.01	6.68	1.32
P08	7.08	6.69	1.32
P09	7.42	6.73	1.33

ASRID	Highest Hourly Acetaldehyde Conc. (μg/m³) (Criterion: 470 μg/m³)	Highest 8-Hourly Average Acetaldehyde Conc. (μg/m³) (Criterion: 300 μg/m³)	Annual Average Acetaldehyde Conc. (μg/m³) (Criterion: 9 μg/m³)
P10	6.79	6.65	1.32
P11	6.76	6.65	1.32
P12	6.75	6.63	1.32
P13	6.77	6.65	1.32
P14	6.76	6.63	1.32
P15	6.75	6.63	1.32
P16	7.26	6.74	1.33
P17	6.78	6.64	1.32
P18	6.77	6.64	1.32
P19	6.91	6.66	1.32
P20	6.80	6.65	1.32
P21	7.68	6.95	1.33
P22	7.20	6.73	1.32
P23	6.86	6.66	1.32
P24	6.83	6.67	1.32
P25	6.78	6.65	1.32
P26	6.79	6.65	1.32
P27	6.77	6.65	1.32
P28	6.75	6.64	1.32
P29	6.76	6.65	1.32
P30	6.75	6.63	1.32
P31	7.49	6.78	1.33
P32	7.12	6.71	1.32
P33	7.09	6.71	1.32
P34	6.91	6.68	1.32
P35	7.02	6.68	1.32
P36	6.87	6.67	1.32
P37	6.83	6.65	1.32
P38	6.82	6.65	1.32
P39	6.80	6.64	1.32
P40	6.80	6.66	1.32
P41	6.76	6.64	1.32
P42	6.78	6.65	1.32
P43	6.78	6.65	1.32
P44	6.76	6.64	1.32
P45	6.76	6.63	1.32
P46	6.78	6.65	1.32
P47	6.79	6.66	1.32
P48	6.76	6.65	1.32
P49	6.76	6.65	1.32

3.7.4 Operation Phase (Odour)

3.7.4.1 The cumulative odour impact due to the proposed EPP, RTS, SPS, SENTX and ASB Biodiesel (Hong Kong) Limited were predicted at the representative ASRs and are summarized in **Table 3.27**. Detailed prediction results are presented in **Appendix 3.12**. The prediction showed that the cumulative 5-second average odour concentrations of existing and planned ASRs would comply with the 5 OU/m^3 of the EIAO-TM criterion.

3.7.4.2 According to the predictions presented in the **Appendix 3.12**, the predicted maximum 5-second average cumulative odour concentration would occur at 1.5mAG, therefore contour plots of the cumulative odour concentrations at these levels are illustrated in **Figure 3.15**. Exceedance of 5-second odour concentration were predicted at the proposed EPP, a facility housing the chimneys of SENTX and the deodourizing units of SENTX, where no air sensitive use is expected in these facilities.

Table 3.27 Worst Predicted Cumulative Odour Concentrations at Representative Air Sensitive Receivers

ASRID	Maximum 5-second Average Odour Concentration (OU/m^3) (EIAO-TM: 5 OU/m^3)
A01	0.22
A02	0.13
A03	0.14
A04	0.26
A05	0.14
A06	0.17
A07	1.63
A08	0.14
A09	0.13
A10	0.15
A50	0.29
A51	0.28
A52	0.37
A53	0.50
A54	0.46
A55	0.44
A56	0.67
A57	0.57
A62	0.33
P01	0.16
P02	0.18
P03	0.13
P04	0.12
P05	0.12
P06	0.55
P07	0.38
P08	0.35
P09	0.12
P10	0.99
P11	0.80
P12	0.36
P13	1.02
P14	0.47
P15	0.37
P16	0.12
P17	0.51
P18	0.36

ASRID	Maximum 5-second Average Odour Concentration (OU/m^3) (EIAO-TM: 5 OU/m^3)
P19	0.38
P20	0.77
P21	0.12
P22	0.26
P23	0.58
P24	1.45
P25	1.12
P26	1.75
P27	1.22
P28	0.72
P29	0.78
P30	0.36
P31	0.13
P32	0.18
P33	0.12
P34	0.15
P35	0.26
P36	0.17
P37	0.40
P38	0.72
P39	0.26
P40	0.21
P41	0.61
P42	0.31
P43	0.29
P44	0.16
P45	0.16
P46	0.58
P47	2.20
P48	1.97
P49	0.68

3.8 Mitigation of Adverse Environmental Impacts

3.8.1 Construction Phase

3.8.1.1 Dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation* and good site practices listed below should be carried out to further minimize construction dust impact.

- Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.
- Use of frequent watering for particularly dusty construction areas and areas close to ASRs.
- Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.
- For the work sites close to the ASRs with a separation distance less than 10 m, provide hoardings of not less than 3.5 m high from ground level along the site boundary; for the other work sites in general, provide hoarding not less than 2.4m high from ground level along site boundary except for site entrance or exit.
- Avoid position of material stockpiling areas, major haul roads and dusty works within the construction site close to concerned ASRs.

- Avoid unnecessary exposed earth.
- Locate all the dusty activities away from any nearby ASRs as far as practicable.
- Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs.
- Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.
- Barges for the reclamation works should have the spoil covered with mechanical cover or tarpaulin sheet to avoid any dust pickup during sail.
- Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.
- Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.
- Imposition of speed controls for vehicles on site haul roads.
- Instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.

3.8.1.2 Guidelines stipulated in EPD's Recommended Pollution Control Clauses for Construction Contracts should be incorporated in the contract document to abate dust impacts. These clauses include:

- The Contractor shall observe and comply with APCO and its subsidiary regulation, particularly *Air Pollution Control (Construction Dust) Regulation*.
- The Contractor shall undertake at all times to prevent dust nuisance as a result of the construction activities.
- The Contractor shall ensure that there will be adequate water supply /storage for dust suppression.
- The Contractor shall devise and arrange methods of working and carrying out the works in such a manner so as to minimize dust impact on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these methods are implemented properly.
- Before the commencement of any work, the Contractor may be required to submit the methods of working, plant, equipment and air pollution control system to be used on the site for the Engineer inspection and approval.

3.8.1.3 In order to help reduce carbon emission and pollution, timely application of temporary electricity and water supply would be made and electric vehicles would be adopted in accordance with *DEVB TC(W) No. 13/2020 – Timely Application of Temporary Electricity and Water Supply for Public Works Contracts and Wider Use of Electric Vehicles in Public Works Contracts* in the Project.

3.8.1.4 To minimize the exhaust emission from NRMMs during the construction phase, the following measures should be applied as far as practicable:

- Connect construction plant and equipment to main electricity supply and avoid use of diesel generators and diesel-powered equipment;
- Avoid exempted NRMMs as far as practicable; and
- Deploy electrified NRMMS as far as practicable.

3.8.2 Operation Phase

3.8.2.1 No adverse air quality impact is anticipated during the operational phase of the Project, thus mitigation measure is deemed not necessary.

3.8.2.2 However, specific site considerations are recommended to be implemented in order to avoid any potential air quality impact, which include:

- Air sensitive at Site G3 (P05) use should locate at 5mAG or above;

- Avoid any long-term air sensitive use at Site O5 which is a proposed open space; and
- Avoid any air sensitive use within the exceedance zones in the proposed RTS, PFTF and CWHF of TKO 132.

3.8.3 Operation Phase (Odour Impact)

3.8.3.1 No adverse odour impact is anticipated during the operational phase of the Project, thus mitigation measure is deemed not necessary.

3.9 Evaluation of Residual Impacts

3.9.1 Construction Phase

3.9.1.1 With the implementation measures specified in *Air Pollution Control (Construction Dust) Regulation* together with the recommended regular watering on the works areas, exposed surface and paved road, no residual impact would be expected from the construction of the Project.

3.9.2 Operation Phase

3.9.2.1 No residual air quality impact is expected during the operation phase of the Project.

3.9.3 Operation Phase (Odour Impact)

3.9.3.1 No residual odour impact is expected during the operation phase of the Project.

3.10 Environmental Monitoring and Audit

3.10.1 Construction Phase

3.10.1.1 EM&A for potential dust impacts are recommended during the construction phase of the Project so as to check compliance with legislative requirements. Details of the monitoring and audit programme are presented in a stand-alone EM&A Manual.

3.10.1.2 Close liaison with contractors of concurrent projects, including Fill Bank at TKO 137, TKODP2, and SENTX will be carried out for the purpose of minimizing the cumulative dust impact and facilitating the investigation of observed exceedance by dust monitoring if any. Detailed mechanism for liaison is presented in the EM&A Manual.

3.10.2 Operation Phase (Air Pollutant Emissions Impact)

3.10.2.1 No adverse impact would be generated at TKO 137 during the operation phase of the Project, therefore, no EM&A would be required at TKO 137 during the operation phase. The operation of CBP, CWHF and PFTF at TKO 132 would pose potential dust nuisance to nearby ASRs. Dust monitoring and site audit are proposed to be conducted during operation of CBP, CWHF and PFTF at TKO 132. The details of the EM&A programme for operation of these three facilities will be reviewed under separate studies (i.e. an EIA study under EIAO for CWHF, a Specified Process Licence Application under APCO for CBP and a Preliminary Environmental Review (PER) under planning and funding mechanism for PFTF) to be conducted by their respective project proponents. Should any crusher be involved used in the process, dust mitigation measures and monitoring requirements should refer to *A Guidance Note on the Best Practicable Means for Mineral Works (Stone Crushing Plants) (BPM 11/1 (95))*. The operation of CBP should follow the requirements stipulated in *A Guidance Note on the Technical, Management and Monitoring Requirements for Specified Process – Cement Works (Concrete Batching Plant) (BPM 3/2 (16))*.

3.10.3 Operation Phase (Odour Impact)

3.10.3.1 For the proposed EPP, commissioning test should be conducted for the CHP units and the boiler to ensure proper operation of the facilities. As H_2S is the major odour source associated with the proposed EPP, it is recommended to conduct the odour monitoring in terms of hydrogen sulphide (H_2S) at the deodorizing unit upon commissioning and in the first three years to determine whether it can meet the overall 95% odour removal performance requirement. Upon the third-year monitoring, the odour monitoring should be reviewed and agreed with EPD if the monitoring is required to be continued.

3.10.3.2 An Odour Complaint Registration System is also proposed in the EM&A programme to check whether the deodorizing units can fulfill the recommended odour removal performance. In addition, odour patrol should be carried out after regular and ad hoc maintenance or cleaning of the deodorizing unit during operation of the EPP to ensure no adverse odour impact arisen from the operation. Details of the monitoring and audit programme are contained in a stand-alone EM&A Manual and are applicable to both two stages of works.

3.10.3.3 Similar EM&A requirements, including continuous monitoring of H_2S and NH_3, and air flow at DO exhaust, odour complaint registration system and odour patrol, are recommended for the proposed RTS. However, the RTS is subject to further study by another party. The EM&A programme are to be determined in its associated study.

3.11 Environmental Acceptability of Schedule 2 Designated Projects

3.11.1.1 An application for EP would be submitted under this EIA for DP1, DP2, and DP3.

3.11.2 Construction of Carriageway Bridge at TKO 132 (DP1)

3.11.2.1 With the proper implementation of dust mitigation measures for construction activities (as detailed in **Section 3.8**), no unacceptable dust impact would be resulted from the proposed roads during the constructional stage. There is no adverse operational air quality impact due to these DP roads as mentioned in **Section 3.7.2**.

3.11.3 Reclamation Works at TKO 137 and off TKO 132 (DP2)

3.11.3.1 With the proper implementation of dust mitigation measures for construction activities (as detailed in **Section 3.8**), no unacceptable dust impact would be resulted from reclamation works at TKO 137 and off TKO132 during the constructional stage.

3.11.4 Construction and Operation of Effluent Polishing Plant (EPP) (DP3)

3.11.4.1 With the proper implementation of dust mitigation measures for construction activities (as detailed in **Section 3.8**), and odour mitigation measures as detailed in **Section 3.6.4**, no unacceptable dust impact during the constructional stage nor adverse air quality impact including odour impact during the operational stage would be resulted from the proposed EPP.

3.11.5 Other DPs

3.11.5.1 There will be separate EIA studies to assess the following Schedule 2 DPs. The air quality impact of these Schedule 2 DPs during construction and operation phases will be further investigated in their own EIA studies under the EIAO. The relevant EM&A requirements for these Schedule 2 DPs will also be provided under their own EIA studies.

- Construction and Operation of Refuse Transfer Station (RTS) (DP4);
- Construction and Operation of Construction Waste Handling Facility (DP5);
- Construction and Operation of Electricity Facilities (DP6).

3.12 Conclusion

3.12.1 Construction Phase

3.12.1.1 Potential air quality impact from the construction works of the Project would mainly be related to construction dust from reclamation, excavation, backfilling, material handling, spoil removal and wind erosion. Construction activities of the concurrent projects within 500m assessment area would also pose cumulative dust impact. With the implementation of mitigation measures specified in Air Pollution Control (Construction Dust) Regulation together with the recommended dust suppression measures including frequent watering on active works areas, exposed areas and unpaved haul roads and other site management measures such as good site practices, and EM&A programme, no adverse air quality impact on ASRs in the vicinity of the work sites would be anticipated during the construction stage.

3.12.2 Operation Phase

3.12.2.1 Cumulative air quality impact arising from the proposed marine viaduct, the proposed open roads, the proposed EPP, CWHF, PFTF, and CBP under the RODP, existing industrial emission sources, existing and planned open roads, existing portal, concerned facilities with vehicular emission and marine sources within 500m assessment area have been evaluated. The prediction results concluded that the cumulative NO_2, RSP, FSP, SO_2 and CO concentrations at all existing and planned ASRs would comply with AQOs. The predicted methane, HCl, HF, formaldehyde, vinyl chloride, benzene and acetaldehye concentrations would be well below the respective international standards. No adverse air quality impact on the existing and planned ASRs is anticipated.

3.12.2.2 Cumulative odour impact arising from proposed EPP, RTS, SPS, SENTX and ASB Biodiesel (Hong Kong) Limited have been evaluated. The predicted odour impact on existing and planned ASRs would comply with the criterion stipulated in EIAO-TM. No adverse odour impact on the existing and planned ASRs is anticipated.