TABLE OF CONTENTS

3. AIR QUALITY 3-1

3.1 Introduction 3-1
3.2 Environmental Legislations, Standards and Guidelines 3-1
3.3 Description of Environment 3-3
3.4 Identification of Air Sensitive Receivers 3-9
3.5 Identification of Environmental Impacts 3-20
3.6 Assessment Methodology 3-29
3.7 Prediction and Evaluation of Environmental Impacts 3-40
3.8 Mitigation of Adverse Environmental Impacts 3-75
3.9 Evaluation of Residual Impacts 3-76
3.10 Environmental Monitoring and Audit 3-77
3.11 Environmental Acceptability of Schedule 2 Designated Projects 3-78
3.12 Conclusion 3-79

List of Tables

Table 3.1 Air Quality Objectives for Hong Kong
Table 3.2 Air Quality Standards for Non-AQO Criteria Pollutants
Table 3.3 Average Concentrations of Pollutants in the Recent Five Years (Year 2018 – 2022) at Yuen Long EPD Air Quality Monitoring Station
Table 3.4 Background Air Pollutants in Year 2030 Extracted from PATH Model (PATHv2.1)
Table 3.5 Background Air Pollutants in Year 2035 Extracted from PATH Model (PATHv2.1)
Table 3.6 Representative Air Sensitive Receivers in the vicinity of STLMC DN
Table 3.7 Vehicular Emission Burden in the Study Area
Table 3.8 Summary of Assessment Scenarios and Contributing Sources
Table 3.9 Conversion Factors from 1-hour to 30-minute Averaging Time
Table 3.10 Summary of Measured Odour Emission for the Pig Farm 18/19/P43
Table 3.11 Estimated Odour Emission for the Retained Pig Farm 18/19/Y10
Table 3.12 Aerial Photo of the San Tin Barracks Sewage Treatment Works
Table 3.13 Estimated Odour Emission for the San Tin Barracks STW
Table 3.14 Conversion Factors to 5-second Mean Concentration
Table 3.15 Construction of DPs Involved in Development Stages
Table 3.16 Construction Activities with Major Dust Emission in Each Development Stage
Table 3.17 Estimated Cut and Fill Volumes for the Development by Year
Table 3.18 Worst Predicted Cumulative RSP and FSP Concentrations at Representative ASRs in Year 2031
Table 3.19 Worst Predicted Cumulative NO_2 and SO_2 Concentrations at Representative ASRs in Year 2031
Table 3.20 Worst Predicted Cumulative RSP and FSP Concentrations at Representative ASRs in Year 2034
Table 3.21 Worst Predicted Cumulative NO_2 and SO_2 Concentrations at Representative ASRs in Year 2034
Table 3.22 Worst Predicted Cumulative RSP and FSP Concentrations at Representative ASRs in Year 2039
Table 3.23 Worst Predicted Cumulative NO_2 and SO_2 Concentrations at Representative ASRs in Year 2039
Table 3.24 Worst Predicted Cumulative Odour Concentrations at Representative Air Sensitive Receivers
Table 3.25 Comparison of Odour Impact between Existing and Future Scenarios

List of Figures

Figure 3.1	Locations of Representative Sensitive Receivers
Figure 3.2	Contour of Predicted 10th Highest Cumulative Daily RSP Concentration at 1.5 mAG (µg/m^3) (Year 2031)
Figure 3.3	Contour of Predicted Cumulative Annual RSP Concentration at 1.5 mAG (µg/m^3) (Year 2031)
Figure 3.4	Contour of Predicted 19th Highest Cumulative Daily FSP Concentration at 1.5 mAG (µg/m^3) (Year 2031)
Figure 3.5	Contour of Predicted Cumulative Annual FSP Concentration at 1.5 mAG (µg/m^3) (Year 2031)
Figure 3.6	Contour of Predicted 19th Highest Cumulative Hourly NO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2031)
Figure 3.7	Contour of Predicted Cumulative Annual NO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2031)
Figure 3.8	Contour of Predicted 10th Highest Cumulative Daily RSP Concentration at 1.5 mAG (µg/m^3) (Year 2034)
Figure 3.9	Contour of Predicted Cumulative Annual RSP Concentration at 1.5 mAG (µg/m^3) (Year 2034)
Figure 3.10	Contour of Predicted 19th Highest Cumulative Daily FSP Concentration at 1.5 mAG (µg/m^3) (Year 2034)
Figure 3.11	Contour of Predicted Cumulative Annual FSP Concentration at 1.5 mAG (µg/m^3) (Year 2034)
Figure 3.12	Contour of Predicted 19th Highest Cumulative Hourly NO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2034)
Figure 3.13	Contour of Predicted Cumulative Annual NO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2034)
Figure 3.14	Contour of Predicted 4th Highest Cumulative 10-Min SO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2031 and 2034)
Figure 3.15	Contour of Predicted 4th Highest Cumulative Daily SO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2031 and 2034)
Figure 3.16	Contour of Predicted 10th Highest Cumulative Daily RSP Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.17	Contour of Predicted Cumulative Annual RSP Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.18	Contour of Predicted 19th Highest Cumulative Daily FSP Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.19	Contour of Predicted Cumulative Annual FSP Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.20	Contour of Predicted 19th Highest Cumulative Hourly NO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.21	Contour of Predicted Cumulative Annual NO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.22	Contour of Predicted 4th Highest Cumulative 10-Min SO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.23	Contour of Predicted 4th Highest Cumulative Daily SO_2 Concentration at 1.5 mAG (µg/m^3) (Year 2039)
Figure 3.24	Contour of Predicted 5-Second Average Odour Concentration at 1.5 mAG (OU/m^3)
Figure 3.25	Contour of Predicted 5-Second Average Odour Concentration at 5 mAG (OU/m^3)
Figure 3.26	Contour of Predicted 5-Second Average Odour Concentration at 10 mAG (OU/m^3)
Figure 3.27	Contour of Predicted 5-Second Average Odour Concentration at 15 mAG (OU/m^3)
Figure 3.28	Contour of Predicted 5-Second Average Odour Concentration at 20 mAG (OU/m^3)
Figure 3.29	Contour of Predicted 19th Highest Cumulative Hourly NO_2 Concentration at 5 mAG (µg/m^3) (Year 2031)
Figure 3.30	Contour of Predicted Cumulative Annual NO_2 Concentration at 5 mAG (µg/m^3) (Year 2031)
Figure 3.31	Contour of Predicted 19th Highest Cumulative Hourly NO_2 Concentration at 5 mAG (µg/m^3) (Year 2034)
Figure 3.32	Contour of Predicted Cumulative Annual NO_2 Concentration at 5 mAG (µg/m^3) (Year 2034)

Figure 3.33 Contour of Predicted 19th Highest Cumulative Hourly NO_2 Concentration at 5 mAG ($\mu g/m^3$) (Year 2039)
Figure 3.34 Contour of Predicted Cumulative Annual NO_2 Concentration at 5 mAG ($\mu g/m^3$) (Year 2039)

List of Appendices

Appendix 3.1 (Not Used)
Appendix 3.2 (Not Used)
Appendix 3.3 Calculation of EPP Emission Source
Appendix 3.4 Traffic Data
Appendix 3.5 Calculation of Vehicular Emission Source
Appendix 3.6 Calculation of Emissions Associated with Transport Interchange Hub
Appendix 3.7 Calculation of Emissions from Portal
Appendix 3.8 (Not Used)
Appendix 3.9 Emission Inventory of Major Stack in 4km Boundary
Appendix 3.10 Calculation of Odour Emission Source at EPP, FWPF and SPS
Appendix 3.11 Calculation of Odour Emission Source at Retained Pig Farm and RTS
Appendix 3.12 Calculation of Odour Emission Source at San Tin Barracks STW
Appendix 3.13 Determination of Surface Characteristics
Appendix 3.14 Detailed Prediction Results (Operation Phase, Year 2031)
Appendix 3.15 Detailed Prediction Results (Operation Phase, Year 2034)
Appendix 3.16 Detailed Prediction Results (Operation Phase, Year 2039)
Appendix 3.17 Detailed Prediction Results (Odour Impact)
Appendix 3.18 Frequency and Magnitude of Odour Exceedance for ASRs within Exceedance Zone
Appendix 3.19 Derivation of Cumulative Annual Average NO_X-to-NO_2 Conversion Equation using Jenkin Method
Appendix 3.20 Comparison of Odour Impact between Existing and Future Scenarios

3. AIR QUALITY

3.1 Introduction

3.1.1.1 This section presents an assessment of potential air quality impacts arising from the construction and operation of the Project. 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 3.4.3 and Appendix B and B-1 of the EIA Study Brief (ESB-340/2021).

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

- New primary distributor and new district distributor roads (DP1);
- New San Tin Lok Ma Chau Effluent Polishing Plant (STLMC EPP) (DP2);
- New Water Reclamation Plant (DP3);
- Revitalisation of San Tin Eastern Main Drainage Channel (DP6);
- Recreational Development within Deep Bay Buffer Zone 2 (DP7).

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:

- Refuse Transfer Station (RTS) (DP4);
- 400kV Electricity Substation (DP5).

3.2 Environmental Legislations, Standards and Guidelines

3.2.1.1 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.

3.2.2 Air Quality Objectives & Technical Memorandum on EIA Process

3.2.2.1 *Air Pollution Control Ordinance* provides the statutory authority for controlling air pollutants from a variety of sources. *Hong Kong Air Quality Objectives* (AQOs), which stipulate the maximum allowable concentrations over specific periods for typical pollutants, should be met. The prevailing AQOs are summarized in **Table 3.1**.

Table 3.1 Air Quality Objectives for Hong Kong

Pollutants	Averaging Time	Concentration Limit (μg/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
Carbon Monoxide (CO)	1-hour	30,000	0
	8-hour	10,000	0

Pollutants	Averaging Time	Concentration Limit (µg/m³) [1]	Number of Exceedance Allowed per Year
Ozone (O_3)	8-hour	160	9
Lead (Pb)	Annual[4]	0.5	NA

Note:
[1] Gaseous pollutants 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] For government projects, the number of exceedance allowed per year for daily FSP is 18 times only.

3.2.2.2 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).

3.2.3 Air Quality Standards for Non-AQO Criteria Pollutants

3.2.3.1 Aside from the AQO criteria pollutants mentioned in **Section 3.2.2**, Methane (CH_4), Hydrogen Chloride (HCl), Hydrogen Fluoride (HF) and Formaldehyde (CH_2O) would also be emitted from the combustion of biogas at the proposed biogas engine and boilers. 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 3.2**.

Table 3.2 Air Quality Standards for Non-AQO Criteria Pollutants

Pollutants	Averaging Time	Air Quality Standard (µg/m³)	Reference
Methane	1-hour	600,000	TEEL-0 (the threshold concentration below which most people will experience no adverse health effects) from *https://edms.energy.gov/pac/Docs/Revision_26_Table4.pdf*
HCl	1-hour	2100	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
HF	1-hour	240	https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary
	Annual	14	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 (http://www.oehha.ca.gov/tcdb/index.asp).

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 (foundation and superstructure construction and demolition) 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 minimize dust emission, while carrying out construction works, to the acceptable level.

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

3.2.5.1 *Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation* comes into effect on 1 June 2015. Under the Regulation, Non-road mobile machinery (NRMMs), except those exempted, are required to comply with the prescribed emission standards. From 1 September 2015, all regulated machines sold or leased for use in Hong Kong must be approved or exempted with a proper label in a prescribed format issued by EPD. Starting from 1 December 2015, only approved or exempted NRMMs with a proper label are allowed to be used in specified activities and locations including construction sites. The Contractor is required to ensure the adopted machines or non-road vehicle under the Project could meet the prescribed emission standards and requirement.

3.2.6 Air Pollution Control (Fuel Restriction) Regulation

3.2.6.1 *Air Pollution Control (Fuel Restriction) Regulation* 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 *Development Bureau Technical Circular (Works) 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 times 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 Project Site Location

3.3.1.1 The site area of STLMC DN is about 610 hectares and locates to the west of Kwu Tung North and Fanling North New Development Areas (NDAs), Fanling and Sheung Shui New Towns and to the northeast of Yuen Long and Tin Shui Wai New Towns. It is bound to the North by San Tin Highway and the Lok Ma Chau Boundary Control Point and to the South by San Tin Barracks and its neighbouring hills.

3.3.1.2 The Project site currently has a mixed urban-rural character. The predominant uses to the north are wetland as well as brownfield sites including open storage yards with some village developments. Land in the south is mainly occupied by low-density residential and village developments with some scattered brownfield operations (mainly open storage, warehouse and workshop uses).

3.3.1.3 No chimney emission source is found within the Project area. However, there are nine existing livestock farms (seven pig farms and two chicken farms) located within the Project area, and two livestock farms (one pig farm and one chicken farm) located in the vicinity of the Project boundary. These livestock farms are existing odour emission sources within the study area.

3.3.2 Background Concentration by Observation

3.3.2.1 The nearest EPD Air Quality Monitoring Station to the Project Site is the North Air Quality Monitoring Station (AQMS) situated at Po Wing Road Sport Centre which has been operating since July 2020 and is under the land use type "New Town: Residential". Owing to insufficient data for time before Year 2020 and in Year 2020, the background observation refers to the next closest station with the same land use type instead, i.e. Yuen Long AQMS at Yuen Long District Office Building as published in *Air Quality in Hong Kong*. The annual average monitoring data recorded at EPD's Yuen Long Air Quality Monitoring Station has shown an overall decreasing trend of pollutants' concentration in the past five years. The recent five years (2018 – 2022) average concentrations of air pollutants relevant to the Project are summarized in **Table 3.3**.

Table 3.3 Average Concentrations of Pollutants in the Recent Five Years (Year 2018 – 2022) at Yuen Long EPD Air Quality Monitoring Station

Pollutant	Averaging Time	AQO	Pollutant Concentration (μg/m^3)				
			2018	2019	2020	2021	2022
Respirable Suspended Particulates (RSP)	10th Highest 24-hour	100 (9)	75	83	77	73	56
	Annual	50	37	37	30	30	25
Fine Suspended Particulates (FSP)	19th Highest 24-hour	50 (18)	41	38	33	36	38
	Annual	25	20	20	16	17	16
Nitrogen Dioxide (NO_2)	19th Highest	200 (18)	150	161	135	148	122
	Annual	40	43	44	32	40	37
Sulphur Dioxide (SO_2)	4th Highest 10-min	500 (3)	52	42	26	24	21
	4th Highest 24-hour	50 (3)	16	11	10	14	7

3.3.2.2 Apart from the air quality monitoring data, EPD has released a set of background levels from "Pollutants in the Atmosphere and their Transport over Hong Kong", PATH model (PATHv2.1). The population intake is expected to take place in three major phases during Year 2031 and Year 2039. Relevant dataset of Year 2030 and Year 2035 in the assessment area extracted from PATHv2.1 model, and are presented in **Table 3.4** and **Table 3.5** respectively.

Table 3.4 Background Air Pollutants in Year 2030 Extracted from PATH Model (PATHv2.1)

Pollutant	Averaging Time	AQO [1]	Data Summary	PATH v2.1 Grid in Year 2030 [2]												
				28,51	28,52	28,53	29,50	29,51	29,52	29,53	29,54	29,55	30,50	30,51	30,52	30,53
Respirable Suspended Particulates (RSP) [3]	24-hr	100 (9)	Max.	91	91	91	91	88	93	91	91	93	92	88	94	91
			10th Max.	68	70	70	69	68	70	69	70	70	69	68	69	68
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	50	-	27	28	27	28	27	28	27	27	28	27	27	28	27
Fine Suspended Particulates (FSP) [4]	24-hr	50 (18)	Max.	**75**	**75**	**74**	**75**	**72**	**76**	**75**	**74**	**76**	**76**	**72**	**77**	**75**
			19th Max.	36	37	36	38	34	38	35	35	37	37	35	38	34
			No. of Exceedance(s)	11	11	11	11	10	11	11	11	11	11	10	11	11
	Annual	25	-	16	16	16	16	15	16	16	16	16	16	15	16	15
Nitrogen Dioxide (NO_2)	1-hour	200 (18)	Max.	171	181	182	171	173	185	187	188	190	175	177	185	189
			19th Max.	112	116	125	105	112	121	125	133	140	102	111	125	129
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	40	-	15	17	16	12	13	17	16	17	19	11	12	15	15
Sulphur Dioxide (SO_2)	10-min	500 (3)	Max.	52	61	65	48	51	61	65	70	72	53	52	59	64
			4th Max.	52	61	65	48	51	61	65	70	72	53	52	59	64
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0
	24-hr	50 (3)	Max.	16	17	18	15	16	17	18	20	23	15	16	16	18
			4th Max.	12	13	14	11	12	12	13	15	16	11	11	12	13
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0

Pollutant	Averaging Time	AQO [1]	Data Summary	PATH v2.1 Grid in Year 2030 [2]											
				30,54	30,55	31,50	31,51	31,52	31,53	31,54	31,55	32,51	32,52	32,53	32,54
Respirable Suspended Particulates (RSP) [3]	24-hr	100 (9)	Max.	91	94	91	90	93	92	91	92	92	94	95	92
			10th Max.	69	71	69	69	68	68	69	70	69	69	69	68
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	50	-	27	28	27	27	28	27	27	28	27	28	28	27
Fine Suspended Particulates (FSP) [4]	24-hr	50 (18)	Max.	**74**	**76**	**74**	**73**	**77**	**76**	**75**	**75**	**76**	**78**	**79**	**75**
			19th Max.	35	37	37	37	37	36	35	36	38	38	39	35
			No. of Exceedance(s)	11	11	11	11	11	11	11	11	11	11	11	10
	Annual	25	-	15	16	15	15	16	16	16	16	16	16	16	15
Nitrogen Dioxide (NO_2)	1-hour	200 (18)	Max.	194	195	176	179	183	188	195	199	179	182	185	190
			19th Max.	134	142	91	101	113	129	134	141	96	103	116	132
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	40	-	16	20	10	11	14	15	15	18	12	13	16	14
Sulphur Dioxide (SO_2)	10-min	500 (3)	Max.	73	78	57	58	61	69	82	90	56	67	73	79
			4th Max.	73	78	57	58	61	69	82	90	56	67	73	79
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0
	24-hr	50 (3)	Max.	21	24	15	16	16	18	22	24	16	16	17	20
			4th Max.	14	16	11	11	12	13	14	17	11	12	12	13
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
[1] Values in ( ) mean the number of exceedances allowed per year.
[2] Bolded values mean exceedance of the AQO limit values.
[3] Annual FSP concentration is adjusted by adding 3.5 µg/m³ with reference to Guidelines on Choice of Models and Model Parameters.
[4] Daily and annual RSP concentration is adjusted by adding 11.0 µg/m³ and 10.3 µg/m³ respectively with reference to Guidelines on Choice of Models and Model Parameters.
[5] All concentration units are in microgram per cubic metre (µg/m³).

Table 3.5 Background Air Pollutants in Year 2035 Extracted from PATH Model (PATHv2.1)

Pollutant	Averaging Time	AQO [1]	Data Summary	PATH v2.1 Grid in Year 2035 [2]												
				28,51	28,52	28,53	29,50	29,51	29,52	29,53	29,54	29,55	30,50	30,51	30,52	30,53
Respirable Suspended Particulates (RSP) [3]	24-hr	100 (9)	Max.	90	91	90	91	87	92	91	91	93	92	88	93	91
			10th Max.	68	70	70	69	67	70	69	70	70	69	68	69	67
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	50	-	27	28	27	27	26	28	27	27	28	27	27	28	27
Fine Suspended Particulates (FSP) [4]	24-hr	50 (18)	Max.	**74**	**74**	**74**	**75**	**71**	**75**	**74**	**74**	**75**	**76**	**71**	**77**	**74**
			19th Max.	35	36	35	38	34	37	34	35	37	37	35	38	34
			No. of Exceedance(s)	10	11	11	11	10	11	11	11	11	11	10	11	10
	Annual	25	-	15	16	15	16	15	16	15	15	16	15	15	16	15
Nitrogen Dioxide (NO_2)	1-hour	200 (18)	Max.	170	180	182	170	172	184	186	188	189	174	176	185	188
			19th Max.	107	115	125	103	110	117	124	132	140	100	108	121	127
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	40	-	13	15	14	11	12	15	14	16	18	10	11	13	14
Sulphur Dioxide (SO_2)	10-min	500 (3)	Max.	52	61	65	48	51	61	65	70	72	53	52	59	64
			4th Max.	52	61	65	48	51	61	65	70	72	53	52	59	64
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0
	24-hr	50 (3)	Max.	16	17	18	15	16	17	18	20	23	15	16	16	18
			4th Max.	12	13	14	11	12	12	13	15	16	11	11	12	13
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0	0

Pollutant	Averaging Time	AQO [1]	Data Summary	PATH v2.1 Grid in Year 2035 [2]											
				30,54	**30,55**	**31,50**	**31,51**	**31,52**	**31,53**	**31,54**	**31,55**	**32,51**	**32,52**	**32,53**	**32,54**
Respirable Suspended Particulates (RSP) [3]	24-hr	100 (9)	Max.	90	93	90	89	92	91	91	92	91	94	94	91
			10th Max.	69	71	68	69	68	68	69	70	69	69	69	68
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	50	-	27	28	27	27	27	27	27	27	27	28	28	27
Fine Suspended Particulates (FSP) [4]	24-hr	50 (18)	Max.	**73**	**76**	**74**	**73**	**76**	**75**	**74**	**75**	**75**	**77**	**78**	**75**
			19th Max.	35	37	37	37	36	35	35	36	38	38	38	35
			No. of Exceedance(s)	11	11	11	11	11	11	11	11	11	11	11	10
	Annual	25	-	15	16	15	15	16	15	15	16	15	16	16	15
Nitrogen Dioxide (NO_2)	1-hour	200 (18)	Max.	193	195	176	178	183	187	195	199	178	181	184	190
			19th Max.	134	141	88	98	110	127	134	141	94	103	111	131
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0
	Annual	40	-	15	19	9	10	12	13	14	17	10	12	13	13
Sulphur Dioxide (SO_2)	10-min	500 (3)	Max.	73	78	57	58	61	69	82	90	56	67	73	79
			4th Max.	73	78	57	58	61	69	82	90	56	67	73	79
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0
	24-hr	50 (3)	Max.	21	24	15	16	16	18	22	24	16	16	17	20
			4th Max.	14	16	11	11	12	13	14	17	11	12	12	13
			No. of Exceedance(s)	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
[1] Values in ( ) mean the number of exceedances allowed per year.
[2] Bolded values mean exceedance of the AQO limit values.
[3] Annual FSP concentration is adjusted by adding 3.5 µg/m^3 with reference to Guidelines on Choice of Models and Model Parameters.
[4] Daily and annual RSP concentration is adjusted by adding 11.0 µg/m^3 and 10.3 µg/m^3 respectively with reference to Guidelines on Choice of Models and Model Parameters.
[5] All concentration units are in microgram per cubic metre (µg/m^3).

3.4 Identification of Air Sensitive Receivers

3.4.1.1 In accordance with Annex 12 of the EIAO-TM, any domestic premises, hotel, hostel, hospital, clinic, nursery, temporary housing accommodation, school, educational institution, office, factory, shop, shopping centre, place of public worship, library, court of law, sports stadium or performing arts centre are considered as ASRs.

3.4.1.2 In accordance with Clause 3.4.4.2 of the EIA Study Brief, 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. Illustration of the proposed assessment area is presented in **Figure 3.1**. 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 STLMC DN, a review has been conducted based on Revised Recommended Outline Development Plan (RODP) for STLMC DN and relevant available information including topographic maps, Outline Zoning Plans (OZPs) (such as OZP Plan No. S/YL-NTM/12 – Ngau Tam Mei, S/YL-ST/8 – San Tin, S/YL-MP/6 – Mai Po & Fairview Park HSK/2, S/KTN/3 – Kwu Tung North) and other published plans in the vicinity of the Project site. The representative ASRs within the assessment area are identified and presented in **Table 3.6** below. Their locations are illustrated in **Figure 3.1**.

Table 3.6 Representative Air Sensitive Receivers in the vicinity of STLMC DN

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
A01	Shek Wu Wai	V	Existing	< 5	1.5, 5, 10	√	√
A02	Shek Wu Wai	V	Existing	< 5	1.5, 5, 10	√	√
A03	Shek Wu Wai	V	Existing	< 5	1.5, 5, 10	√	√
A04	Village house	V	Existing	10	1.5, 5, 10	√	√
A05	San Tin Village	V	Existing	15	1.5, 5, 10	√	√
A06	Site office	V	Existing	30	1.5, 5, 10	√	√
A07	Wing Ping Tsuen	V	Existing	20	1.5, 5, 10	√	√
A08	Tun Yu School	E	Existing	130	1.5, 5, 10	√	√
A09	Tsing Lung Tsuen	V	Existing	35	1.5, 5, 10	√	√
A10	San Lung Tsuen	V	Existing	195	1.5, 5, 10	√	√
A11	Fan Tin Tsuen	V	Existing	230	1.5, 5, 10	√	√
A12	Yan Shau Wai	V	Existing	65	1.5, 5, 10	√	√
A13	Chau Tau Tsuen	V	Existing	10	1.5, 5, 10, 15	√	√
A14	Pun Uk Tsuen	V	Existing	70	1.5, 5, 10, 15, 20, 30	√	√
A15	Ha Wan Fisherman San Tsuen	V	Existing	75	1.5, 5, 10	√	√
A16	Lok Ma Chau Village	V	Existing	45	1.5, 5, 10, 15	√	√
A17	Mai Po San Tsuen	V	Existing	80	1.5, 5, 10	√	√
A18	Mai Po San Tsuen	V	Existing	65	1.5, 5, 10	√	√
A19	Rolling Hills	R	Existing	10	1.5, 5, 10	√	√
A20	Rolling Hills	R	Existing	10	1.5, 5, 10	√	√
A21	Scenic Heights	R	Existing	< 5	1.5, 5, 10	√	√
A22	Scenic Heights	R	Existing	10	1.5, 5, 10	√	√
A23	Maple Garden	R	Existing	20	1.5, 5, 10	√	√
A24	Maple Garden	R	Existing	10	1.5, 5, 10	√	√
A25	San Tin Barracks	N/A	Existing	20	1.5, 5	√	√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
A26	San Tin Barracks	N/A	Existing	5	1.5, 5, 10, 15	√	√
A27	San Tin Barracks	N/A	Existing	25	1.5, 5	√	√
A28	San Tin Barracks	N/A	Existing	< 5	1.5, 5, 10	√	√
A29	San Tin Barracks	N/A	Existing	10	1.5, 5, 10, 15	√	√
A30	San Tin Barracks	N/A	Existing	45	1.5, 5	√	√
A31	Ki Lun Tsuen	V	Existing	185	1.5	√	√
A32	Europa Garden	R	Existing	460	1.5, 5, 10, 20, 30, up to 50	√	√
A33	Village house	V	Existing	175	1.5, 5, 10, 15	√	√
P101	Planned Primary School	E	E.2.5	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P102	Planned Public Housing [1]	RSc	RSc.2.1	Within project boundary	14, 15, 20, 30, up to 150		√
P103	Planned Public Housing	RSc	RSc.2.1	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 160		√
P104	Planned Public Housing [1]	RSc	RSc.2.2	Within project boundary	14, 15, 20, 30, up to 150		√
P105	Planned Public Housing [1]	RSc	RSc.2.2	Within project boundary	14, 15, 20, 30, up to 150		√
P106	Planned Public Housing [1]	RSc	RSc.2.2	Within project boundary	19, 20, 30, up to 160		√
P107	Planned Private Housing [1]	R	R1.2.3	Within project boundary	5, 10, 15, 20, 30, up to 150		√
P108	Planned Private Housing [1]	R	R1.2.3	Within project boundary	13, 15, 20, 30, up to 150		√
P109	Planned Private Housing	R	R1.2.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 130		√
P110	Planned Village Resite	V	V.3.1	Within project boundary	1.5, 5, 10		√
P111	Planned Village Resite	V	V.3.1	Within project boundary	1.5, 5, 10		√
P112	Planned Logistics, Storage and Warehouse	OU(LSW)	OU(LSW).1.1	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 130		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P113	Planned Information and Technology - Zone 2	OU(I&T)	OU(I&T)2.1.1	Within project boundary	1.5, 5, 10, 20, 30, up to 90		√
P114	Planned Information and Technology - Zone 2	OU(I&T)	OU(I&T)2.1.1	Within project boundary	1.5, 5, 10, 20, 30, up to 90		√
P115	Planned Information and Technology - Zone 2 [2]	OU(I&T)	OU(I&T)2.1.1	Within project boundary	5, 10, 20, 30, up to 90		√
P116	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.7	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 100		√
P117	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.7	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 100		√
P118	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.8	Within project boundary	1.5, 5, 10, 20, 30, up to 90		√
P119	Planned Information and Technology - Zone 3 [3]	OU(I&T)	OU(I&T)3.1.8	Within project boundary	20, 30, up to 70		√
P120	Planned Information and Technology - Zone 3 [3]	OU(I&T)	OU(I&T)3.1.8	Within project boundary	20, 30, up to 70		√
P121	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.7	Within project boundary	1.5, 5, 10, 20, 30, up to 70		√
P122	Planned Information and Technology - Zone 3 [2]	OU(I&T)	OU(I&T)3.1.5	Within project boundary	5, 10, 15, 20, 30, up to 110		√
P123	Planned Information and Technology - Zone 3 (Government Data Centre)	OU(I&T)	OU(I&T)3.1.6	Within project boundary	1.5, 5, 10, 20, 30, up to 50		√
P124	Planned Information and Technology - Zone 3 (Government Data Centre)	OU(I&T)	OU(I&T)3.1.6	Within project boundary	1.5, 5, 10, 20, 30, up to 50		√
P125	Planned Information and Technology - Zone 3 [2]	OU(I&T)	OU(I&T)3.1.4	Within project boundary	5, 10, 20, 30, up to 70		√
P126	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.4	Within project boundary	1.5, 5, 10, 20, 30, up to 90		√
P127	Planned Information and Technology - Zone 1	OU(I&T)	OU(I&T)1.1.1	Within project boundary	1.5, 5, 10, 15, 20		√
P128	Planned Information and Technology - Zone 1	OU(I&T)	OU(I&T)1.1.1	Within project boundary	1.5, 5, 10, 20, 30, up to 90		√
P129	Planned Information and Technology - Zone 1	OU(I&T)	OU(I&T)1.1.1	Within project boundary	1.5, 5, 10, 20, 30, up to 80		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P130	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 130		√
P131	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 120		√
P132	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 120		√
P133	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 130		√
P134	Planned Information and Technology - Zone 3 (Data Centre) [2]	OU(I&T)	OU(I&T)3.1.2	Within project boundary	5, 10, 20, 30, up to 60		√
P135	Planned Information and Technology - Zone 3 (Data Centre)	OU(I&T)	OU(I&T)3.1.2	Within project boundary	1.5, 5, 10, 20, 30, up to 60		√
P136	Planned Information and Technology - Zone 3 (Data Centre)	OU(I&T)	OU(I&T)3.1.1	Within project boundary	1.5, 5, 10, 20, 30, up to 80		√
P137	Planned AFCD Fisheries Research Centre	OU(I&T)	OU(I&T)6.1.1	Within project boundary	1.5, 5, 10		√
P138	Planned Customs Dog Base	GIC	G.1.1	Within project boundary	1.5, 5, 10		√
P139	Planned Customs Dog Base	GIC	G.1.1	Within project boundary	1.5, 5, 10		√
P140	Planned Information and Technology - Zone 5	OU(I&T)	OU(I&T)5.1.2	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P141	Planned Information and Technology - Zone 5	OU(I&T)	OU(I&T)5.1.2	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P142	Planned Information and Technology - Zone 5	OU(I&T)	OU(I&T)5.1.2	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P143	Planned Information and Technology - Zone 5 [2]	OU(I&T)	OU(I&T)5.1.2	Within project boundary	5, 10, 15, 20, 30		√
P144	Planned Information and Technology - Zone 5	OU(I&T)	OU(I&T)5.1.1	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P145	Planned Open Space	O	O.1.2	Within project boundary	1.5		√
P146	Planned Open Space	O	O.1.2	Within project boundary	1.5		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P147	Planned Open Space	O	O.1.2	Within project boundary	1.5		√
P148	Planned Open Space	O	O.1.2	Within project boundary	1.5		√
P149	Planned Open Space	O	O.1.3	Within project boundary	1.5		√
P150	Planned Open Space	O	O.1.3	Within project boundary	1.5		√
P151	Planned Open Space	O	O.1.3	Within project boundary	1.5		√
P152	Planned AFCD Fisheries Research Centre	OU(I&T)	OU(I&T)6.1.1	Within project boundary	1.5, 5, 10		√
P153	Planned Secondary School	E	E.2.4	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P201	Planned Reserve	GIC	G.5.4	Within project boundary	1.5, 5, 10, 15, 20, 30, 40		√
P202	Planned Fire Service NT Workshop, Uniform Store and General Store	GIC	G.5.3	Within project boundary	1.5, 5, 10		√
P203	Planned Sports Centre	GIC	G.5.1	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P204	Planned 2 Primary School	E	E.2.1	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P205	Planned 2 Primary School	E	E.2.1	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P206	Planned Reserve (Potential Education Facilities)	E	E.5.3	Within project boundary	1.5, 5, 10, 15, 20, 30, 40		√
P207	Planned Reserve	GIC	G.5.5	Within project boundary	1.5, 5, 10, 15, 20, 30, 40		√
P208	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.9	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 110		√
P209	Planned Information and Technology - Zone 3	OU(I&T)	OU(I&T)3.1.9	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 110		√
P210	Planned Information and Technology - Zone 1	OU(I&T)	OU(I&T)1.1.3	Within project boundary	1.5, 5, 10, 20, 30, up to 80		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P211	Planned Lok Ma Chau Police Station cum Operational Base, Petrol Station and Dangerous Goods Storage	GIC	G.1.5	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P213	Planned Information and Technology - Zone 1	OU(I&T)	OU(I&T)1.1.3	Within project boundary	1.5, 5		√
P214	Planned Logistics, Storage and Warehouse	OU(LSW)	OU(LSW).1.2	Within project boundary	1.5, 5, 10, 20, 30, up to 50		√
P215	Planned Information and Technology - Zone 1 [1]	OU(I&T)	OU(I&T)1.1.2	Within project boundary	7, 10, 15, 20, 30, up to 60		√
P216	Planned Information and Technology - Zone 1 [1]	OU(I&T)	OU(I&T)1.1.2	Within project boundary	7, 10, 15, 20, 30, up to 60		√
P217	Planned Information and Technology - Zone 1	OU(I&T)	OU(I&T)1.1.2	Within project boundary	1.5, 5, 10, 20, 30, up to 90		√
P219	Planned Information and Technology - Zone 2	OU(I&T)	OU(I&T)2.1.2	Within project boundary	1.5, 5, 10, 20, 30, up to 70		√
P220	Planned Information and Technology - Zone 2	OU(I&T)	OU(I&T)2.1.2	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 120		√
P221	Planned Information and Technology - Zone 2 [2]	OU(I&T)	OU(I&T)2.1.2	Within project boundary	5, 10, 15, 20, 30, up to 120		√
P222	Planned 3 Secondary School	E	E.2.3	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P223	Planned 3 Secondary School	E	E.2.3	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P224	Planned Public Housing [1]	RSc	RSc.2.6	Within project boundary	14, 15, 20, 30, up to 150		√
P225	Planned Public Housing [1]	RSc	RSc.2.6	Within project boundary	14, 15, 20, 30, up to 150		√
P226	Planned Public Housing [1]	RSc	RSc.2.4	Within project boundary	14.5, 15, 20, 30, up to 150		√
P227	Planned Public Housing [1]	RSc	RSc.2.4	Within project boundary	14.5, 15, 20, 30, up to 150		√
P228	Planned Private Housing [1]	R	R1.2.1	Within project boundary	5, 10, 15, 20, 30, up to 140		√
P229	Planned Private Housing [1]	R	R1.2.1	Within project boundary	10, 15, 20, 30, up to 140		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P230	Planned Private Housing [1]	R	R1.2.2	Within project boundary	5, 10, 15, 20, 30, up to 140		√
P231	Planned Public Housing [1]	RSc	RSc.2.5	Within project boundary	9.5, 10, 15, 20, 30, up to 150		√
P232	Planned Open Space	O	O.5.3	Within project boundary	1.5, 5, 10		√
P233	Planned Primary School	E	E.2.2	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P234	Planned Reserve	GIC	G.5.12	Within project boundary	1.5, 5, 10, 15, 20, 30, 40		√
P235	Planned Primary School	E	E.5.2	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P236	Planned GIC Complex [3]	GIC	G.5.11	Within project boundary	20, 30, up to 50		√
P237	Planned Joint User Government Office [3]	GIC	G.5.10	Within project boundary	20, 30, up to 110		√
P238	Planned Potential Healthcare Facilities [3]	GIC	G.5.8	Within project boundary	20, 30, up to 80		√
P239	Planned Reserve [3]	GIC	G.5.9	Within project boundary	20, 30, 40		√
P240	Planned Primary School	E	E.5.1	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P241	Planned Cultural & Recreational Complex	GIC	G.5.7	Within project boundary	1.5, 5, 10, 15, 20		√
P242	Planned Cultural & Recreational Complex	GIC	G.5.7	Within project boundary	1.5, 5, 10, 15, 20		√
P243	Planned Cultural & Recreational Complex	GIC	G.5.7	Within project boundary	1.5, 5, 10, 20, 30, up to 50		√
P244	Planned Cultural & Recreational Complex	GIC	G.5.7	Within project boundary	1.5, 5, 10, 20, 30, up to 50		√
P245	Planned Secondary School	E	E.3.3	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P246	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 120		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P247	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 120		√
P248	Planned Logistics, Storage and Warehouse	OU(LSW)	OU(LSW).4.1	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 150		√
P249	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 130		√
P250	Planned Logistics, Storage and Warehouse	OU(LSW)	OU(LSW).4.1	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 150		√
P251	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.4	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 140		√
P252	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.4	Within project boundary	1.5, 5, 10, 20, 30, up to 90		√
P253	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.3	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 140		√
P254	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.1	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 130		√
P255	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.2	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 150		√
P256	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.5	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 150		√
P257	Planned Information and Technology - Zone 4	OU(I&T)	OU(I&T)4.4.5	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 160		√
P258	Planned Public Housing [1]	RSc	RSc.3.2	Within project boundary	14, 15, 20, 30, up to 150		√
P259	Planned Public Housing [1]	RSc	RSc.3.2	Within project boundary	14, 15, 20, 30, up to 150		√
P260	Planned Primary School	E	E.3.1	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P261	Planned Public Housing [1]	RSc	RSc.3.1	Within project boundary	14, 15, 20, 30, up to 150		√
P262	Planned Youth Facilities	GIC	G.3.2	Within project boundary	1.5, 5, 10, 20, 30, up to 80		√
P263	Planned FSD staff quarters, Divisional Fire Station-cum-Ambulance Depot, Operational Base for Tactical Support Unit and Community Emergency Preparedness Experiential Learning	GIC	G.3.1	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 190		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P264	Planned Private Housing [1]	R	R1.3.2	Within project boundary	10, 15, 20, 30, up to 140		√
P265	Planned Private Housing [1]	R	R1.3.2	Within project boundary	5, 10, 15, 20, 30, up to 140		√
P266	Planned Private Housing [1]	R	R1.3.1	Within project boundary	10, 15, 20, 30, up to 140		√
P267	Planned Private Housing [1]	R	R1.3.1	Within project boundary	10, 15, 20, 30, up to 140		√
P268	Planned 1 Primary School + 1 Secondary School	E	E.3.2	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P269	Planned 1 Primary School + 1 Secondary School	E	E.3.2	Within project boundary	1.5, 5, 10, 15, 20, 30		√
P270	Planned Sport Centre [2]	GIC	G.5.14	Within project boundary	5, 10, 15, 20, 30		√
P271	Planned Open Space	O	O.1.1	Within project boundary	1.5		√
P272	Planned Open Space	O	O.1.1	Within project boundary	1.5		√
P301	Planned Public Housing [1]	RSc	RSc.2.3	Within project boundary	14, 15, 20, 30, up to 180		√
P302	Planned Public Housing [1]	RSc	RSc.2.3	Within project boundary	14, 15, 20, 30, up to 170		√
P303	Planned Public Housing [1]	RSc	RSc.2.3	Within project boundary	14, 15, 20, 30, up to 170		√
P304	Planned Mix use (San Tin Station) [1]	OU(MU)	OU(MU)1.2.1	Within project boundary	17, 20, 30, up to 170		√
P305	Planned Mix use (San Tin Station)	OU(MU)	OU(MU)1.2.1	Within project boundary	1.5, 5, 10, 15, 20, 30, up to 190		√
P306	Planned Mix use (San Tin Station) [1]	OU(MU)	OU(MU)1.2.1	Within project boundary	17, 20, 30, up to 160		√
P307	Planned Mix use (San Tin Station) [1]	OU(MU)	OU(MU)1.2.1	Within project boundary	17, 20, 30, up to 170		√
P308	Planned Public Housing [1]	RSc	RSc.2.7	Within project boundary	14, 15, 20, 30, up to 150		√

ASR ID	Description	Land Use	Site ID	Shortest Distance from Site Boundary (m)	Assessment Height (mAG)	Potentially Affected	
						By Construction	By Operation
P309	Planned Public Housing [1]	RSc	RSc.2.7	Within project boundary	14, 15, 20, 30, up to 150		√
P310	Planned Cultural & Recreational Complex	GIC	G.5.7	Within project boundary	1.5, 5, 10, 15, 20		√
P311	Planned Cultural & Recreational Complex	GIC	G.5.7	Within project boundary	1.5, 5, 10, 15, 20		√
P312	Planned Reserve	GIC	G.3.3	Within project boundary	1.5, 5, 10, 15, 20, 30, 40		√
P313	Planned Reserve [2]	GIC	G.5.13	Within project boundary	5, 10, 15, 20, 30, 40		√
P314	Planned Mixed use (Station near Chau Tau) [1]	OU(MU)	OU(MU)2.1.1	Within project boundary	27, 30, 40, up to 140		√
P315	Planned Mixed use (Station near Chau Tau) [1]	OU(MU)	OU(MU)2.1.1	Within project boundary	22, 30, 40, up to 200		√
P316	Planned Mixed use (Station near Chau Tau) [1]	OU(MU)	OU(MU)2.1.1	Within project boundary	27, 30, 40, up to 160		√
P317	Planned Wetland Conservation Park Management Office	GIC	G.1.3	Within project boundary	1.5, 5, 10		√

Remarks:
RSc – Public Housing Site, R – Private Housing, OU(MU) – Other Specified Uses (Mixed Use), V – Village Type Development, E – Education, GIC – Government, Institution or Community, OU(I&T) – Other Specified Uses (I&T Park), OU(LSW) – Other Specified Uses (Logistics Storage and Warehouse), N/A – Unclassified.
[1] Podium design has been adopted in the block layout. There is no air sensitive uses, including openable window, fresh air intake of central air conditioning, and recreational uses in open space below the first assessment height.
[2] The lobby at 1.5mAG is central air conditioned. There is no air sensitive uses, including openable window, fresh air intake of central air conditioning, and recreational uses in open space below 5mAG.
[3] The lobby at 1.5mAG is central air conditioned. There is no air sensitive uses, including openable window, fresh air intake of central air conditioning, and recreational uses in open space below 20mAG.

3.5 Identification of Environmental Impacts

3.5.1 Construction Phase

3.5.1.1 Major construction works for the Project would include the site development in the RODP and construction of the 7 DPs which include:

- Construction of New primary distributor and district distributor roads (DP1);
- Construction of New San Tin Lok Ma Chau Effluent Polishing Plant (STLMC EPP) (DP2);
- Construction of New Water Reclamation Plant (DP3);
- Construction of Refuse Transfer Station (RTS) (DP4);
- Construction of 400kV Electricity Substation (DP5).
- Revitalization of San Tin Eastern Main Drainage Channel (STEMDC) (DP6);
- Recreational Development within Deep Bay Buffer Zone 2 (DP7).

3.5.1.2 Based on the tentative construction programme, the Project will be developed in three stages, namely Initial Phase, Main Phase and Remaining Phase. The construction works of Initial Phase will commence in Q4 2024 and the population intake is expected in Year 2031 – 2033. Main Phase will commence in Year 2027 and its population intake is expected in Year 2034 – 2038. Remaining Phase will commence in 2032 and population intake is expected in Year 2039. The tentative typical working hours would be 7:00am to 7:00pm on weekdays. A summary of the key construction activities is given below and the locations of the Project Areas are shown in **Appendix 2.1**. Details of the tentative construction programme is presented in **Appendix 2.2**.

(A) Initial Phase

- North of the Project Area
  - Site Formation and development for drainage pumping station, sewerage pumping station, G/IC, I&T, Open Space and Amenity areas;
  - Construction of Primary Distributor Road P1, District Distributor Roads D4 and D6, and local roads;
- Northeast of the Project Area
  - Site Formation and development for drainage pumping station, G/IC, I&T and Amenity areas, 400kV ESS, Refuse Transfer Station cum Resource Recovery Facilities, Logistic, Storage and Warehouse;
  - Construction of Primary Distributor Road P1, District Distributor Road D6, and local roads;
- Northwest of the Project Area
  - Site Formation and development for G/IC, I&T, LSW, Amenity areas and Open Space;
  - Construction of district Distributor Road D3 and local roads;
- Southwest of the Project Area
  - Site Formation and development for Effluent Polishing Plant, Sewage Pumping Station, Water Reclamation Plant, G/IC, Residential Development and Amenity areas;
  - Construction of District Distributor Roads D1 and D2, and local roads;
- South of San Tin Interchange

    - Site Formation and development for Sewerage Pumping Station, G/IC and Amenity areas;
    - Construction of District Distributor Road D1 and local roads;
- South of the Project Area
    - Site Formation and development for Water Service Reservoirs;
    - Widening of sections of San Tin Highway and construction of local roads.

(B) Main Phase

- North of the Project Area
    - Site Formation and development for I&T areas;
- Northeast of the Project Area
    - Site Formation and development for I&T areas;
- Northwest of the Project Area
    - Site Formation and development for G/IC, I&T and Open Space areas;
- Southwest of the Project Area
    - Site Formation and development for G/IC and Amenity areas;
- South of San Tin Interchange
    - Site Formation and development for G/IC, Residential Development, Open Space and Amenity areas;
    - Construction of District Distributor Road D1, and local roads
- South of the Project Area
    - Site Formation and development for G/IC, Residential Development, Open Space and Amenity areas;
    - Construction of District Distributor Roads D1 and D2, and local roads;
- Southeast of the Project Area
    - Site Formation and development for G/IC, I&T, LSW, Open Space and Amenity areas, and 400kV ESS;
    - Construction of District Distributor Road D5 and local roads.

(C) Remaining Phase

- Northeast of the Project Area
    - Site Formation and development for Commercial Development areas;
- Northwest of the Project Area
    - Site Formation and development for Wetland Conservation Park Management Office;
- South of San Tin Interchange
    - Site Formation and development for G/IC areas;
- South of the Project Area
    - Site Formation and development for G/IC, Residential and Commercial Development and Open Space areas;
    - Construction of District Distributor Road D1.

Identification of Key Air Pollutants of Emission from Construction Activities

3.5.1.3 Most of the above construction activities would involve excavation, spoiling handling, backfilling of different scale. These dusty construction activities and wind erosion of exposed sandfill areas would cause potential fugitive emission in particulates. Regular water on exposed construction sandfill 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.

3.5.1.4 On-site use of diesel-powered engines is also the potential source for other gaseous pollutants, such as NO_2, 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.

Concurrent Project

3.5.1.5 *Northern Link (NOL) Phase 2* by MTR Corporate Limited is one of the concurrent project which includes a railway of about 10.7 kilometres between the Kam Sheung Road Station and KTU Station, with three intermediate stations at San Tin, Ngau Tam Mei and Au Tau. The location of NOL is illustrated in **Figure 2.15**. The construction will commence in Year 2025 for completion by Year 2034. San Tin Station and associated ventilation shafts and ancillary facilities which lie inside STLMC DN is expected be constructed at the same time as the construction works for the Project according to the latest construction programme.

3.5.1.6 *Kwu Tung North New Development Area (KTN NDA) – Advance Works* and *Remaining Phase* are the concurrent projects in the east of STLMC DN. The location of KTN NDA is illustrated in **Figure 2.15.** The construction works of Advance Works commenced in Year 2019 for completion by Year 2026, while the one for Remaining Phase will commence in Year 2024 for completion in Year 2031. Referring to the latest construction programme, most of the site formation work under Advance Works were completed and would likely be completed by end 2024.

3.5.1.7 *Development of Lok Ma Chau Loop – Main Works Package 1* is to develop the Loop with higher education as the leading land use, complemented by high-tech R&D and C&C industries. The location of the Loop is illustrated in **Figure 2.12.** The project comprises the development and supporting infrastructure which includes road within the Loop, external connection roads such as Western Connection Road, Eastern Connection Road and the Direct Link to MTR LMC Station, sewage treatment works, flushing water service reservoir, district cooling systems (provisional), fire station cum ambulance depot, electricity substations, drainage and sewage systems, water supply network and public utilities. The construction works has commenced in July 2021 for operation commencement in Year 2026. In accordance with the construction programme, site clearance and site formation works have been completed. It is anticipated that the coming construction activities would major involve in superstructural works and would not be dusty activities. With the implementation of the dust suppression measures as recommended in the EIA Report for Development of Lok Ma Chau Loop, the potential cumulative dust impact is anticipated to be minimal.

Review of Dust Monitoring Data of Past Project

3.5.1.8 A review of dust monitoring data during construction phase of similar infrastructure projects including North East New Territories New Development Areas (NENT) and Hong Kong Express Rail Link (XRL) has been conducted. The NENT is a large-scale development project and the project site area is about 614 ha which is similar to that of this Project (610 ha). The XRL is also a large scope infrastructural project and its length is approximately 26 km long which is longer than that of NOL. XRL involves the operation of concrete batching plant during construction while NOL also requires concrete batching plant of similar scale to support its construction. The work sites of both projects were located in close vicinity of ASRs. 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 concrete batching plant, 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 both projects were selected for review.

3.5.1.9 For NENT Project, the measured 1-hr TSP and 24-hr TSP levels at all monitoring stations were below the action levels of 300 $\mu g/m^3$ and 150 $\mu g/m^3$ respectively and limit levels of 500 $\mu g/m^3$ and 260 $\mu g/m^3$ respectively during site clearance and site formation with the monitoring locations located from the work site boundary from 1m to 169 m. No exceedance of action level and limit level was recorded.

3.5.1.10 For XRL Project, during 2010 – 2018, the measured 24-hr TSP levels at all monitoring stations located from 11m – 153m from the work site boundary complied with limit level of 260 $\mu g/m^3$ except two measurement events of exceedance recorded. After investigation, the exceedance was not related to the construction of the project. In fact, over 99% of the measured 24-hr TSP levels at all monitoring stations were below the action level (i.e. 146 - 217 $\mu g/m^3$) during the whole construction period.

3.5.1.11 In view of the insignificant dust impact caused by these past similar scale projects, the potential construction dust impact by the Project is evaluated qualitatively.

3.5.2 Operation Phase

Vehicular Emission from Proposed Primary Distributor and District Distributor Roads (DP1) and Other Roads

3.5.2.1 Primary Distributor Road P1, District Distributors Road D1, D2, D3, D4, D5 and D6, collectively as DP1, and associated connecting local roads are proposed under the Project to support the population of the Project. The locations of these roads are illustrated in **Figure 2.1**. Potential vehicular emission would arise from these proposed roads and affect both existing and planned ASRs.

3.5.2.2 Vehicular emission from existing roads within 500m assessment area also contributes to the ambient air quality. Major roads within 500m assessment area include San Tin Highway, Fanling Highway, Castle Peak Road – Mai Po and Castle Peak Road – San Tin, etc. These open road emissions were also considered in the modelling assessment.

Vehicular Emission associated with Concerned Facilities

3.5.2.3 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 assessment area, such as PTI, logistics facilities, parking sites, were identified and their locations are illustrated in **Appendix 3.6**. There are existing and planned PTIs within 500m assessment area. Two Transport Interchange Hub (TIH) are proposed under RODP to provide for a convenient and pleasant setting for multi-modal transport interchange activities.

3.5.2.4 Eight existing HGV / Coach parking sites identified within 500m assessment area are generally small, with less than 20 HGV / Coach parking lots. Location ID8 will be removed before the operation phase of the Project in Year 2031 and Location ID 6 & 7 are occupied by vehicle dealer with very limited access of vehicle. 24-hour site surveys were conducted at the five existing HGV/Coach parking sites (ID1 – 5) with infrequent access of HGV and coach observed throughout the day, hence limited vehicular emission from these parking sites is expected. Trip frequencies of the parking sites (ID1 – 5) can be found in **Appendix 3.6**. Start emissions of all vehicle types (except FBSD and FBDD) from these parking sites (ID1 – 5) are considered by broad-brush approach in which the emissions are allocated along the concerned roads around these HGV/Coach parking lots.

3.5.2.5 In summary, the concerned facilities considered in the modelling assessment by precise approach include:

- Existing Lok Ma Chau Station PTI;
- Planned Lok Ma Chau Loop PTI;
- Planned TIH at proposed station near Chau Tau;
- Planned San Tin Station TIH;
- Planned PTI in Pang Loon Tei; and
- Three existing logistics facilities.

Proposed Effluent Polishing Plant (EPP) (DP2)

3.5.2.6 A new sewage treatment works, namely tertiary effluent polishing plant, is proposed at Site OU(EPP)5.3 to support the population of the Project. The treatment capacity of the EPP is proposed to be at 125,000 m^3/day. Apart from the sewage treatment works, the proposed EPP will also offer the conversion of sewage gas into electricity to support the plant's operation or for export. Its location is illustrated in **Appendix 3.3**.

3.5.2.7 Biogas is expected to be generated as a by-product from the anaerobic digestion process in the co-digestion of sludge and food wastes. Biogas generated 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 pretreated and fed to the combined heat and power (CHP) units and steam boiler as fuel. The combustion of biogas in the CHP generator produces electricity and heat for sludge digester, while heat produced from the combustion of biogas in the steam boiler serves the heating demands in the sludge treatment process use. Continuous heating is required in the anaerobic co-digestion process for the biomass feeding to the digesters and heat loss compensation from the digesters. Heat produced by the CHP units will supply heat for the digestion process. Duty plus sufficient standby CHP units are expected to ensure uninterrupted power and heat generation. Meanwhile, steam from the steam boiler will be utilized to provide the needed thermal energy for the sludge dryer to achieve the required dryness in the digested sludge for disposal. Both flue gas emission from the CHP units and boiler were considered in the modelling assessment.

3.5.2.8 Waste gas burners are to be connected to the biogas holders and combust any waste gas in case of emergency. Duty plus sufficient standby CHP units are to ensure uninterrupted biogas consumption. In view of the high operation reliability of CHPs and provision of standby units, biogas flaring by waste gas burner would be rare and only be carried out during emergency.

Proposed FWPF and RTS

3.5.2.9 The proposed FWPF and RTS involve no anerobic digestion, biogas generation nor biogas combustion. No air pollutant emission is expected from these two proposed facilities, except odour emission. The processes in details and associated odour emissions are addressed in **Section 3.5.3**.

Revitalisation of STEMDC *(DP6) and Recreational Development within Deep Bay Buffer Zone 2 (DP7)*

3.5.2.10 The revitalisation of STEMDC involves naturalism of channel banks and planting with native vegetation to enhance ecological and landscape value, and flood attenuation measures to improve flood resilience. Recreational development within Deep Bay Buffer Zone 2 would propose open space with tree and water features for enjoy of public, which would not cause any air emission. No air and odour emission is anticipated during the operation of DP6 and DP7.

Proposed Innovation and Technology Uses

3.5.2.11 The proposed Innovative and Technology (I&T) uses in STNLMC DN involve developments including R&D facilities, research and production labs, data centres, offices, convention premises, potential advance manufacturing uses, and other general uses such as talent accommodation, retails and food & beverages, open space, recreation and entertainment facilities, etc. No air and odour emission is expected from these uses. Should there be any noxious emission in the future use, separate air quality impact assessment shall be conducted to show acceptable air quality impact on the nearby uses based on the prevailing AQOs. Relevant regulations such as APCO shall also be followed.

Proposed Healthcare Facilities

3.5.2.12 Potential healthcare facilities are proposed at Site G.5.8 under the RODP. To support its daily operation, it will be equipped with electric boiler. Therefore, no air quality impact due to the healthcare facilities is anticipated.

Concurrent Project

3.5.2.13 NOL will operate to provide a mass transit for the population in STLMC DN. NOL will 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 was thus considered limited and was not assessed.

3.5.2.14 Planned roads under KTN NDA lie within 500m assessment area of STLMC DN. Furthermore, the traffic induced by population in KTN NDA would travel along Fanling Highway and San Tin Highway, which run through the STLMC DN and would cause indirect air quality impact on the existing and planned ASRs under the RODP. The potential air quality impact due to planned roads and induced traffic was considered in the modelling assessment. Their locations are illustrated in **Appendix 3.5**.

3.5.2.15 Planned roads under Lok Ma Chau Loop also lies within 500m assessment area of STLMC DN. Similarly, the traffic induced by population in Lok Ma Chau Loop would travel along Ha Wan Tsuen East Road and Lok Ma Chau Road which run through the STLMC DN and would cause indirect air quality impact on the existing and planned ASRs under the RODP. Some of planned roads under Strategic Study on Major Roads beyond 2030 would also lie within 500m assessment area of STLMC DN. The potential air quality impact due to planned roads and induced traffic was considered in the modelling assessment. Their locations are illustrated in **Appendix 3.5**.

Major Point Source within 4 km from the Project Boundary

3.5.2.16 The asphalt plant (Tar and Bitumen Works) at Man Kam To Road operated by K. Wah Asphalt Limited under SP Licence No. L-15-035(2) is identified as a major point source within 4 km from the Project boundary. The location of the asphalt plant is illustrated in **Appendix 3.9**. The terrain in Northern Hong Kong is generally flat. The plume from the stack would transport long distance encountering no physical obstruction and cause direct impact on area on the Project site. Therefore, the stack sources of this asphalt plant were considered in the modelling assessment.

Identification of Key Air Pollutants of Emission during Operation Phase

3.5.2.17 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.

3.5.2.18 The combustion during the operation of CHPs and boilers of the proposed EPP also 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.

3.5.3 Operation Phase (Odour Impact)

Proposed Effluent Polishing Plant (EPP) (DP2)

3.5.3.1 A new sewage treatment works, namely tertiary effluent polishing plant, is proposed at Site OU(EPP)5.3 to support the population of the Project. The treatment capacity of the EPP is proposed to be at 125,000 m^3/day. The proposed EPP will offer tertiary treatment to the sewage with food waste/sewage sludge co-digestion. The EPP would include inlet works (screen, inlet pump, conveyor, compactor, grit classifier, equalization tank, and skip), sewage treatment units (sedimentation tanks, and biological treatment unit), sludge treatment units (sludge blend tank, centrifuge, sludge holding tank, dryer, sidestream treatment facilities and skip) and food waste reception facilities (food waste bunker and preparation tank), etc. All these treatment units/facilities with potential odour emission will be covered and the exhausted air will be conveyed to deodourizers 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 deodourizing units. The preliminary layout plan of the EPP is shown in **Appendix 3.10**. The emission from deodorizing units of proposed EPP was considered in the modelling assessment. As discussed in **Section 3.5.2.7**, biogas generated by the co-digestion process will have H_2S removed by sulphur absorption vessels before combustion. The generated biogas will undergo treatment in sulphur absorption vessels to remove H_2S by the filter, the H_2S will be bound and the resulting solid precipitate is disposed of as solid waste, which is not expected to emit any odourous gases. In addition, the Anammox process will also be adopted for sewage treatment. Anammox technology utilizes a lower energy ammonification process to convert ammonia (NH_3) in the sewage to nitrogen gas to reduce the overall NH_3 emission from the plant. The locations of the deodourizing units are illustrated in **Appendix 3.10**.

3.5.3.2 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 proved 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 Food Waste Pre-treatment Facilities (FWPF)

3.5.3.3 Potential odour source of the typical FWPF would be the food waste reception hall, and pre-treatment of food waste and transportation of the raw food waste to the FWPF. The incoming food waste would be transported by fully enclosed trucks to avoid odour nuisance. The surface of the enclosed trucks shall be washed upon exit and kept clean to avoid any food waste residue which would cause odour nuisance during transport. The food waste reception hall and other treatment facilities will be enclosed and the odorous air in these facilities will be vented to the deodourizing unit for odour treatment prior to discharge to the environment. The food waste pretreatment facilities will adopt mechanical treatment for impurities removal and size reduction, turning food waste into a consistent semi-fluid product for subsequent food waste/sewage sludge anaerobic co-digestion conducted off-site in the proposed EPP. Thus, only odour emission is expected in the proposed FWPF, i.e. no other air pollutant emission is involved. The pretreated food waste will be transported by fully enclosed pipes to the proposed EPP to avoid odour nuisance.

3.5.3.4 There is no detailed design of the FWPF at this stage, however, the FWPF will be enclosed with negative pressure to prevent untreated odourous air from discharging to the atmosphere. Instead, the odorous air in this facility will be vented to the deodourizing unit for odour treatment prior to discharge to the environment. The ventilation exhaust location of the FWPF has not been confirmed at this moment but the exhaust outlet of the proposed FWPF should be located away from all nearby ASRs as far as possible for minimization of the odour impact. The odour emission from proposed FWPF was considered in the modelling assessment. The locations of the deodourizing units are illustrated in **Appendix 3.10**.

Proposed Sewage Pumping Stations (SPSs)

3.5.3.5 Three SPSs are proposed at Site OU.1.2, OU.3.2 and OU.5.7 with design capacities of 30,176 m^3/day, 52,317 m^3/day and 96,484 m^3/day respectively. Their locations are illustrated in **Appendix 3.10**. All potential odour sources of SPSs 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 deodourisers with odour removal efficiency of at least 95% before discharging to the atmosphere. The odour emission from these three SPSs was assessed quantitatively, together with other odour emission sources such as the proposed EPP and RTS. The locations of the DO exhaust are illustrated in **Appendix 3.10**. Screening wastes would also be stored in covered containers, packed and handled carefully inside the screen houses within reinforced 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.

Proposed Refuse Transfer Station (RTS) (DP4)

3.5.3.6 The new RTS is proposed at the Site OU.1.9, northeastern part of STLMC DN and have a design capacity of 3,000 tonnes per day (tpd). The RTS handles 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 anerobic digestion, biogas production nor combustion would be involved in the proposed RTS. Potential odour would arise from the handling of municipal solid waste (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.

3.5.3.7 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, potential odour impact from the proposed RTS on nearby ASRs would be assessed. The odour at the exhaust of the deodourizing system shall be continuously monitored.

3.5.3.8 The design of the RTS and a separate Schedule 2 EIA for the proposed RTS will be conducted by another party, therefore, the design of the RTS is not available at this stage. The ventilation exhaust location of the RTS has not been confirmed at this moment but the exhaust outlet of the proposed RTS should be located away from all nearby ASRs as far as possible for minimization of the odour impact. The proposed RTS was considered in the modelling assessment. Its location is illustrated in **Appendix 3.10**.

Proposed Refuse Collection Point (RCP)

3.5.3.9 The proposed RCPs will be provided with proper ventilation, deodourizing and exhaust system with high odour removal efficiency to minimise the potential odour nuisance on nearby ASRs. Commercially available odour control device[1] could achieve at least 95% and 80% removal on H_2S and NH_3 respectively, where H_2S and NH_3 are the primary odourous gas from municipal solid waste. The RCPs would be fully enclosed with ventilation system to ensure negative pressure. Good site practices will be also adopted to enhance the hygiene of the RCPs by frequent washing, proper covering of refuse bins, closing of roller shutters and proper maintenance of the ventilation, deodourizing and exhaust systems. A monitoring and sanction mechanism would be observed by Food and Environmental Hygiene Department (FEHD) to ensure satisfactory service by waste collection contractors such that the potential odour nuisance due to RCPs would be very limited.

3.5.3.10 During transportation of MSW, refuse collection vehicle (RCV) would be of fully-enclosed type to avoid odour spread. In addition, the route for the RCV between RCP and RTS would be designed so as to minimise the potential odour impact from these vehicles to the ASRs in the vicinity of the routing. The drivers of RCV should follow the procedures for cleaning of the RCV in accordance with *Code of Practice on the Operation of Refuse Collection Vehicles* issued by EPD and Transport Department so as to keep the RCV in a clean and hygienic condition. Therefore, no adverse odour nuisance would be expected from the operation of RCVs.

Retained Existing Livestock Farm

3.5.3.11 All existing livestock farms within the Project boundary would be removed under the Project, except an existing pig farm (EPD Farm Code: 18/19/Y10; AFCD LKL No. LK871), which would be retained[2]. The retained pig farm would be a potential odour source in the assessment area and was considered in the modelling assessment. Its location is illustrated in **Appendix 3.11**.

Existing Sewage Treatment Works at San Tin Barracks (San Tin Barracks STW)

3.5.3.12 San Tin Barracks lies in the southeast of STLMC DN and is adjacent to the proposed site development under the RODP. A sewage treatment works is identified in the western barracks and is visible outside the fence at the perimeter. The barracks is restricted area, thus site visit is not possible. Referring to the aerial photo as shown in **Table 3.12**, the sewage treatment works (STW) at San Tin Barracks consists of two circular shaped tanks, two smaller rectangular tanks and one rectangular tank. Site visits at the perimeter were conducted in mid September 2022 and end December 2023. The concerned STW was confirmed to be in operation but no odour from the STW was perceived during the site visit. Since the STW is still in operation, its potential odour impact shall be assessed. The emission from this existing STW was therefore considered in the modelling assessment. Its location is illustrated in **Appendix 3.12**.

Proposed Water Reclamation Plant (WRP) (DP3)

3.5.3.13 A Water Reclamation Plant (WRP) is also proposed at Site G.3.13, located next to the EPP. Owing to the high effluent standard of the EPP, the tertiary treated effluent is odourless and is subject for water reclamation. According to DSD's definition on the reclaimed water[3], it is highly treated effluent water which is clear in appearance, odourless and is safe for use. The reclamation process involves disinfection process which is also odourless. Hence, potential odour emission from the WRP is not anticipated.

[1] Nano Confined Catalytic Oxidation (NCCO) could achieve H_2S and NM_3 removal efficiencies at more than 96.97% and 95.65% respectively. Nano Plasma-Driven Catalysis (PDCC) could achieve H_2S and NM_3 removal efficiencies at 95% and 80% - 85% respectively. The data is provided from the manufacturer.
[2] The number of livestock farms to be retained shall be subject to further discussion with departments.
[3] DSD's website : http://www.dsd.gov.hk/EN/Sewerage/Environmental_Consideration/Reclaimed_Water/

3.6 Assessment Methodology

3.6.1 Construction Phase

3.6.1.1 With reference to past air quality monitoring data, the construction of similar 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 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 of STLMC DN in the area.

3.6.2 Operation Phase

Vehicular Emission and Start Emission from Proposed Primary Distributor and District Distributor Roads (DP1) and Other Roads

3.6.2.1 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 DP roads under the ROPD including Road P1, D1, D2, D3, D4, D5 and D6, and existing open roads within 500m assessment area such as San Tin Highway and Fanling Highway.

3.6.2.2 EMFAC-HK v4.3 was adopted to estimate the vehicular emission factors in NO_2, NO, RSP and FSP in various travelling speeds and ambient conditions, i.e. the lowest temperature and relative humidity in each season with reference to the observation in Year 2021 by HKO meteorological stations at Beas River in Sheung Shui, Shek Kong and Sheung Shui. The resulting emission factors were applied for both short-term and long-term impacts.

3.6.2.3 According to the Hong Kong Roadmap on Popularization of Electric Vehicles released by the Environmental Bureau, long-term policy and plans have been formulated to promote the goal of zero vehicle emission before the 2050s. Gradual changeover to electric-private cars (E-PC) is expected during the Project, which results in less PC with tailpipe emission in the future. The trend of newly registered E-PC in future years was assumed in linear growth from the recent percentage in first registered vehicle list in TD, to the target 100% newly registered E-PC by Year 2035. The population of PC in EMFAC, which are the fleet accounted for tailpipe emission, was then adjusted accordingly to reflect the changeover of E-PC. Detailed assumptions and calculations are presented in **Appendix 3.5**.

3.6.2.4 The traffic data for each road in 500m study area comprises 24-hour traffic flow with vehicle percentage, travelling speed in 18 vehicle classes and is presented in **Appendix 3.4**. Transport Department (TD) agreement on the adopted traffic data is also presented in the appendix. 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 was 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 were further divided by the hourly flow to obtain a composite emission rate in gram per miles per vehicle, ready for input to the dispersion model. The detailed calculation of vehicular emission source is presented in **Appendix 3.5**.

3.6.2.5 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 start, while no start emission along district distributor or expressway is anticipated. For the assessment purpose, broad-brush approach was adopted which assumed start emission at all local roads irrelevant to the actual location of engine start. Also, all vehicle classes were assumed to have potential trip start on local road, except franchised bus (FBSD and FBDD) which usually starts its engine at its termini throughout its service route. Start emission from the 5 existing parking sites (ID1 – 5) were also calculated by broad-brush approach along their access roads.

3.6.2.6 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 and Trips/VKT ratio extracted from Traffic Census. Detailed estimation of start emission is presented in **Appendix 3.5**.

Vehicular Emission Associated with Concerned Facilities

3.6.2.7 Running, idling and start emissions within the existing Lok Ma Chau Station PTI, planned Lok Ma Chau Loop PTI, three existing logistics facilities, one planned PTI in Pang Loon Tei and the two planned TIHs were assessed with precise approach. Open-air design was considered for each facility. Data concerning engine start at these concerned locations, such as the frequency and soak time, were collected in 24-hour site survey on a normal working day and are presented in **Appendix 3.6**. 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 were extracted from EMFAC-HK v4.3. The detailed calculation of start emission is presented in **Appendix 3.6**.

Determination of Assessment Year for Vehicular Emission

3.6.2.8 The population intake is expected to take place in three phases, namely Initial Phase (Year 2031 – 2033), Main Phase (Year 2034 – 2038) and Remaining Phase (Year 2039). The assessment year for open road vehicular emission of each phase was determined by the year with the highest vehicular emission burden within the assessment area within the next 15 years after the first population intake year, i.e. Year 2031 – 2046. The vehicular emission burdens in NO_X, RSP and FSP for Initial Phase (Year 2031, 2032 and 2033), Main Phase (Year 2034, 2036 and 2038) and Remaining Phase (Year 2039, 2042, and 2046) were estimated with EMFAC-HK v4.3 and are presented in **Table 3.7**. Owing to the nearby development which also induces traffic to the connecting highways such as Fanling Highway and San Tin Highway, an ultimate scenario denoted as Year 2046+, which takes account of these bypassing traffic, is also considered. The traffic data is presented in **Appendix 3.4** and the assumptions adopted in EMFAC-HK is presented in **Appendix 3.5**. Based on the burden results, vehicular emission of Year 2031 was selected for Initial Phase, Year 2034 for Main Phase and Year 2039 for Remaining Phase and Post-2046.

Table 3.7 Vehicular Emission Burden in the Study Area

Development Stage	Year	Vehicular Emission Burden (kg per day)		
		NO_X	RSP	FSP
Initial Phase	<u>2031</u>	<u>374.1</u>	<u>16.3</u>	<u>15.0</u>
	2032	341.8	14.6	13.5
	2033	337.1	12.8	11.8
Main Phase	<u>2034</u>	<u>396.9</u>	<u>13.7</u>	<u>12.6</u>
	2036	345.2	8.8	8.1
	2038	378.7	9.0	8.3
Remaining Phase	<u>2039</u>	<u>464.7</u>	<u>10.2</u>	<u>9.3</u>
	2042	392.4	9.2	8.5
	2046	404.2	9.1	8.4
Post-2046	2048	397.3	8.9	8.2

Remark:
Emission burden of wintertime is presented, which is the highest among the four seasons.
Underlined value indicates the highest among the period.

Proposed Effluent Polishing Plant (EPP) (DP2)

3.6.2.9 Biogas is produced as a by-product from the co-digestion process. 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.

3.6.2.10 The design of the proposed EPP was referenced to Yuen Long South Effluent Polishing Plant (YLSEPP) as presented in its approved EIA Report (AEIA-237/2022) and modified the plant design by engineers with the need of STLMC DN. Based on the preliminary design of the proposed EPP, there would be 3 CHP units and a boiler. Therefore, 3 CHP units identical to the design of YLSEPP 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**.

3.6.2.11 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 were also predicted.

Concurrent Project

3.6.2.12 Concurrent projects, namely Strategic Study on Major Roads beyond 2030, KTN NDA and Lok Ma Chau Loop, would also induce traffic within the development plan. This induced traffic has been accounted in the traffic data and presented in **Appendix 3.4**. Vehicular emission from proposed roads was estimated with the same approach as discussed in **Section 3.6.2.1** and **3.6.2.6**. The detailed calculation of vehicular emission source is presented in **Appendix 3.5**.

Major Point Source

3.6.2.13 The stack emission of the identified asphalt plant was considered in the cumulative air quality assessment. The information including valid emission strength, corresponding air pollutant control measures of emission sources and their emission duration which is applicable is extracted from the SP Licence Registry and taken into account in the assessment. The corresponding emission details and spatial location are presented in **Appendix 3.9**.

Summary of Assessment Scenarios and Contributing Sources

3.6.2.14 **Table 3.8** summarizes the assessment scenarios and sources considered in the assessments.

Table 3.8 Summary of Assessment Scenarios and Contributing Sources

Assessment Scenario	Vehicular Emission	PATH Background	DP under RODP	Other Sources
Initial Phase (Year 2031 – 2033)	Year 2031	Year 2030	• Road P1 D1 (part), D2, D3, D4, D6 • EPP	• LMC Station PTI • LMC Loop PTI • Existing Logistics Facilities
Main Phase (Year 2034 – 2038)	Year 2034	Year 2030	• All DP Roads (except section of D1 at RSc.2.7) • EPP	• LMC Station PTI • LMC Loop PTI • PTI in Pang Loon Tei • Existing Logistics Facilities

Assessment Scenario	Vehicular Emission	PATH Background	DP under RODP	Other Sources
Remaining Phase + 2046+ (Year 2039 – 2048)	Year 2039	Year 2035	• All DP Roads • STLMC EPP	• LMC Station PTI • LMC Loop PTI • PTI in Pang Loon Tei • San Tin TIH • TIH at Proposed Station near Chau Tau • Existing Logistics Facilities

Remark:
1. All open roads within the assessment area are also included in each scenario.

Dispersion Modelling and Modelling Approach for Proposed EPP and Major Point Source

3.6.2.15 According to *Guidelines on Assessing the 'TOTAL' Air Quality Impacts* by EPD, an integrated modelling system PATHv2.1 which is developed and maintained by EPD was applied to provide background pollutant concentrations in assessing the total impact in the study area. In addition, Weather Research and Forecast (WRF) meteorological data were adopted for modelling.

3.6.2.16 American Meteorological Society (AMS) and U.S. Environmental Protection Agency (EPA) Regulatory Model (AERMOD), the HKEPD approved air dispersion model, was applied to predict the air quality impacts at the representative ASRs due to the emission of chimneys of Proposed EPP and the asphalt plant. Hourly and annual averages of NO_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.

3.6.2.17 Hourly meteorological conditions including wind data, temperature, relative humidity, pressure, cloud cover and mixing height of Year 2015 were extracted from the WRF meteorological data adopted in the PATHv2.1 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 were handled manually to set wind direction between 0° – 0.1° to be 360°. The height of the input data was assumed to be 9 metres above ground for the first layer of the WRF data as input.

3.6.2.18 The wind speed and mixing heights in the WRF data were further adjusted before meteorological pre-processing by AERMET. The minimum wind speed was capped at 1 metre per second. The mixing height was capped between 131 metres and 1941 metres according to the observation in Year 2015 by HKO. After pre-processed by AERMET, the mixing height was verified once again and adjusted to the capped range if necessary.

3.6.2.19 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 3.13**. Flat terrain was applied in AERMOD.

Dispersion Modelling and Modelling Approach for Open Road

3.6.2.20 CALINE4, the USEPA approved line source air dispersion model developed by the California Department of Transport was used to assess the secondary contribution due to vehicular emission from road networks within 500 m assessment area.

3.6.2.21 The surface roughness is dependent on the land use characteristics, which is estimated to be 10% of average height of physical structure within 1 km radius of the Project Site. Typically, the value is assumed to be 370 cm and 100 cm for urban and new development respectively. The assessment area comprises low-rise buildings and highways, and thus surface roughness of 100 cm was assumed.

3.6.2.22 The hourly meteorological data including wind speed, wind direction, air temperature and Pasquill-Gifford stability class of the relevant grids from the WRF Meteorological data (same basis for PATH model), were employed for the model run.

Dispersion Modelling and Modelling Approach for Portal Emission

3.6.2.23 There is planned full enclosure along Fanling Highway outside Europa Garden in Kwu Tung, which is under KTN NDA. AERMOD was applied for the prediction of air pollutant contributions due to portal emissions. Details of model parameters refer to **Section 3.6.2.16 – 3.6.2.19**.

3.6.2.24 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 emission inventory of portals is presented in **Appendix 3.7**.

Cumulative impact of Criteria Air Pollutants

3.6.2.25 Cumulative air pollutant concentration at ASR was derived by the sum of contributions by various sources, and background contribution from PATHv2.1 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.

3.6.2.26 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 PATHv2.1. Regarding vehicular emission, NO_2 and NO were predicted separately in CALINE4. Following the principle of OLM, the total predicted vehicular NO_2 is estimated as below:

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

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

3.6.2.27 Similarly, NO_2-to-NO_X ratio of 10% was adopted for the emission from CHP/boiler, 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*. Same NO_2-to-NO_X ratio was adopted for the emission from diesel burning of the asphalt plant.

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

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

3.6.2.28 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 Yuen Long (the closest station), Tap Mun Station (background station with no vehicular emission), and three roadside stations (stations dominated by vehicular emission). The resulting curve was 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 3.19**.

3.6.2.29 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.

3.6.2.30 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[4] as shown below, such that the 1-hour average concentrations predicted by the AERMOD model were converted to 30-minute average concentrations. The conversion factors for different Pasquill stability classes are listed in **Table 3.9.** As a conservative approach, the AERMOD predicted maximum 1-hour average formaldehyde concentration at each ASRs was 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 3.9**

Table 3.9 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
D	0.2	1.15
E	0.167	1.12
F	0.167	1.12

4 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

3.6.3 Operation Phase (Odour Impact)

Proposed Effluent Polishing Plant (EPP) (DP2)

3.6.3.1 The proposed EPP will serve the catchment of the proposed STLMC DN, which will mainly consist of residential, commercial uses, as well as Innovation and Technology (I&T) 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 effluent polishing plants (EPPs) in Hong Kong are referenced, such as Yuen Long South EPP (YLSEPP) and Shek Wu Hui EPP (SWHEPP) which both treat domestic sewage without seawater flushing. The proposed EPP is also a tertiary treatment plant receiving similar nature of sewage without seawater flushing and adopts the same sewage treatment processes as the one adopted in SWHEPP and YLSEPP, i.e. MBBR. The SOERs or odour emission rates of YLSEPP and SWHEPP were referenced to its approved EIA studies, e.g. YLSEPP (AEIAR-237/2022) and SWHEPP (AEIAR-175/2013), and the resulting odour emission rates were modified with the design of the proposed EPP.

3.6.3.2 All treatment units of the proposed EPP with potential odour emission will be covered and the exhausted air will be conveyed to the deodourizer(s) for treatment before discharge to the environment. Two-stage deodourization system with overall practical odour removal efficiency of 97%, namely bio-filters and dry scrubbing (carbon or impregnated media), will be implemented to treat the odourous exhaust. With reference to the "*Code of Practice on Assessment and Control of Odour Nuisance from Waste Water Treatment Works, April 2005*" 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 deodourization may cause potential odour impact during the operation phase. With reference to the odour emission rate of each type of sewage treatment facilities adopted in YLSEPP, 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 details is presented in **Appendix 3.10**.

Proposed Food Waste Pre-Treatment Facilities (FWPF)

3.6.3.3 The odour emission inventory of the proposed FWPF will be subject to its planning and engineering design. Based on the latest design information, the FWPF will have a capacity of 100 tpd. For the assessment purpose, the respective odour emission strength would be referenced to the H_2S and NH_3 monitoring record at the food waste pre-treatment facilities of the Food Waste / Sludge Anaerobic Co-Digestion Tai Po Pilot Plant which is at a capacity of 50 tpd. Two units of similar configuration were assumed in the calculation, which accounts for the capacity of 100 tpd in total. Similar to the reference plant, activated carbon filter will be applied to treat the odourous exhaust. The odour emission in details is presented in **Appendix 3.10**.

Proposed SPSs at Site OU.1.2, OU.3.2 and OU.5.7

3.6.3.4 The wet well of the proposed SPS with potential odour emission will be covered and the exhausted air will be conveyed to the deodourizer with 95% odour removal efficiency (>99.5% removal for H_2S) for treatment before discharge to the environment. The odour emission in details is presented in **Appendix 3.10**.

Proposed Refuse Transfer Station (RTS) (DP4)

3.6.3.5 The new RTS is proposed at Site OU.1.9, western part of the STLMC DN. The design capacity would be around 3,000 tpd based on the latest design information and it is similar to the throughput of West Kowloon Transfer Station (WKTS), currently operating 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.

3.6.3.6 6-stack configuration is assumed for the proposed RTS, similar to expanded WKTS with 3,182 tpd. The uncontrolled odour emission referred to the highest total H_2S and NH_3 concentrations monitored at all DO inlets of current WKTS from Jan 2021 to May 2022 and was adjusted accordingly, from its 2,700 tpd to 3,000 tpd of the proposed RTS. The monitored data was also contributed by the odour emission from the grease trap treatment facility at WKTS. It is considered as a worst-case assumption for the proposed RTS though it has no grease trap treatment involved. 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 3.11**.

Retained Existing Livestock Farm

3.6.3.7 Under Agreement No. CE 28/2019(CE) Study on Phase One Development of New Territories North – San Tin / Lok Ma Chau Development Note – Feasibility Study, the owner of the retained pig farm was approached for obtaining consent for odour sampling at the pig farm. However, the owner refused to grant access for site inspection and odour sampling. A written request for site inspection and odour sampling to the contact of the owner of the retained pig farm has been issued in July 2022 but no response has been received so far. Alternative odour assessment would be employed as presented below.

3.6.3.8 For the purpose of odour impact assessment of the Project, the odour emission parameters of the retained pig farm would be estimated with reference to the findings of odour sampling at an existing pig farm (Farm Code: 18/19/P43) documented in a *Working Paper on Odour Sampling Results and Odour Emission Inventory – Pig Farm LK801*[5] (the WP) conducted under the CE 28/2019(CE) Study. In view of the similarities of the retained pig farm and the sampled pig farm (18/19/P43) in terms of nature (both are open-form pig farms), and rearing capacity (1,500 for sampled pig farm; 1,200 for the retained pig farm), reference would be made to odour sampling result reported in the WP for estimating the odour emission parameters of the retained pig farm. The odour emission strength of the odour sources in the sampled pig farm with reference to the WP are listed in below **Table 3.10**.

Table 3.10 Summary of Measured Odour Emission for the Pig Farm 18/19/P43

ID	Description	Odour Emission Area, m^2	Specific Odour Emission Rate (SOER), $OU/m^2 \cdot s$ [2]
1-5	Pig House	524.63	2.89[3]
6-9	Pig House	1234.93	2.89[3]
A	Collection Tank	17.02	51.34
B	Waste segregation facility	6.42	14.04
C	Sludge Storage Tank	13.20	44.96
D-F	Anaerobic Digestion Tank	25.20	12.35
L-O and Q	Aeration Tank	84.00	0.77
P	Sedimentation Tank	5.20	0.12
R	Sedimentation Tank	25.80	0.12
S	Sludge Storage Tank – Basin for solid residues	10.23	0.28
	Sludge Storage Tank -	10.23	44.96
RB	Rubbish Bin Holding Area	6.00	0.07

Remarks:

[5] Working Paper on Odour Sampling Results and Odour Emission Inventory – Pig Farm LK801 (Revision 2) dated 31 January 2022 which has been approved by EPD.

[1] SOER refers to the values reported in Working Paper on Odour Sampling Results and Odour Emission Inventory – Pig Farm LK801 (Revision 2) dated 31 January 2022 which has been approved by EPD.
[2] In the referenced odour survey, SOER was determined with the sampling flow rate and area covered with flux hood or wind tunnel.
[3] According to the referenced odour survey, two SOERs were determined for the excrement on the floor of the same pig house, which were 1.86 OU/m^2·s and 3.91 OU/m^2·s respectively. It showed that odour emission varied over the floor of the pig house. As an estimate, an average value of 2.89 OU/m^2·s is therefore adopted for the overall SOER of a pig house.

3.6.3.9 Since the retained pig farm (capacity of 1,200) and the sampled pig farm (capacity of 1,500) would have similar capacity, the specific odour emission rate (SOER) in the retained pig farm would be estimated the same as that in the sampled pig farm 18/19/P43. The estimated odour emission rates for the retained pig farm are listed in **Table 3.11**. The locations of these odour emission sources in the retained pig farm would be referenced from the farm layout plan provided by AFCD, as shown in **Appendix 3.11**.

Table 3.11 Estimated Odour Emission for the Retained Pig Farm 18/19/Y10

ID	Use	Dimension, m [2]			Area, m^2	Assumed SOER, OU/m^2·s [1]	SOER Reference from Pig Farm 18/19/P43 [1]
PF01	Pig House	3.78	x	5.76	21.8	2.89	Pig House
PF02	Pig House	6.03	x	2.92	17.6	2.89	Pig House
PF03	Pig House	10	x	23.6	236	2.89	Pig House
PF04	Pig House	3.6	x	7.6	27.4	2.89	Pig House
PF05	Pig House	4.7	x	30.98	145.6	2.89	Pig House
PF06	Pig House	2	x	5.88	11.8	2.89	Pig House
PF07	Pig House	5.7	x	6	34.2	2.89	Pig House
PF08	Pig House	4.9	x	15.44	75.7	2.89	Pig House
PF09	Pig House	4.8	x	3.5	16.8	2.89	Pig House
PF10	Pig House	3.3	x	8.8	29.0	2.89	Pig House
PF11	Pig House	4.45	x	6.02	26.8	2.89	Pig House
12	Feed Store	9.4	x	5.92	55.6	[3]	[3]
13	Store Room	2.75	x	3.25	8.9	[3]	[3]
PF14	Pig House	3	x	8.96	26.8	2.89	Pig House
PF15	Pig House	7.26	x	5.99	43.5	2.89	Pig House
PF16	Pig House	9.95	x	2.94	29.3	2.89	Pig House
PF17	Pig House	12.11	x	10.95	132.6	2.89	Pig House
PF18	Pig House	15.25	x	5.08	77.5	2.89	Pig House
PF19	Pig House	10.15	x	7.98	81.0	2.89	Pig House
PF20	Pig House	4.2	x	9.86	41.4	2.89	Pig House
PF21	Pig House	6.36	x	6.15	39.1	2.89	Pig House
PF22	Pig House	-		-	88.5	2.89	Pig House
PF23	Pig House	12	x	9	108	2.89	Pig House
PFA	Collection Tank	2	x	2	4	51.34	Collection Tank
PFB	Collection Tank	2	x	2	4	51.34	Collection Tank
PFC	Collection Tank	2	x	2	4	51.34	Collection Tank
PFD	Waste segregation facility		-		1 [4]	14.04	Waste segregation facility
PFE	Sludge Storage Tank	11	x	1.7	18.7	44.96	Sludge Storage Tank
PFF	Sludge Storage Tank	2	x	12.3	24.6	44.96	Sludge Storage Tank

ID	Use	Dimension, m [2]	Area, m^2	Assumed SOER, $OU/m^2 \cdot s$ [1]	SOER Reference from Pig Farm 18/19/P43 [1]
PFG	Filtration Tank[5]	9 x 3.5	31.5	12.35	Anaerobic Digestion Tank
PFH	Filtration Tank[5]	9 x 3.5	31.5	12.35	Anaerobic Digestion Tank
PFI	Filtration Tank[5]	9 x 3.5	31.5	12.35	Anaerobic Digestion Tank
PFJ	Filtration Tank[5]	9 x 3.5	31.5	12.35	Anaerobic Digestion Tank
PFK	Aeration Tank	4.2 x 3.4	14.28	0.77	Aeration Tank
PFL	Aeration Tank	5.2 x 3.4	17.68	0.77	Aeration Tank
PFM	Aeration Tank	5.2 x 3.4	17.68	0.77	Aeration Tank
PFN	Aeration Tank	5.2 x 7	36.4	0.77	Aeration Tank
PFO	Sedimentation Tank	2.8 x 6.4	17.92	0.12	Sedimentation Tank

Remarks:
[1] SOER refers to the value reported in Working Paper on Odour Sampling Results and Odour Emission Inventory – Pig Farm LK801 (Revision 2) dated 31 January 2022 which has been approved by EPD.
[2] Dimension of the odour sources referenced to the farm layout plan provided by AFCD and is presented in **Appendix 3.11**.
[3] The area was not identified odourous for odour sampling for Pig Farm 18/19/P43.
[4] It is a stand-alone machine identified from the farm layout plan. 1 m^2 is assumed for the purpose of calculation.
[5] The area was not identified odourous for odour sampling for Pig Farm 18/19/P43. SOER of anaerobic digestion tank as a necessary wastewater treatment process is adopted for assessment purpose to avoid underestimation of odour impact.

Existing Sewage Treatment Works at San Tin Barracks (San Tin Barracks STW)

3.6.3.10 While the engineering information of San Tin Barracks STW is not available, the potential odour sources of sewage treatment facilities would be identified by aerial photo as shown in **Table 3.12**. It is expected that the sewage would be mainly domestic sewage. With reference to our STW design experience, the facilities at San Tin Barracks STW is of a secondary treatment level which comprises inlet works, sedimentation, bioreactor and a sludge thickening process.

Table 3.12 Aerial Photo of the San Tin Barracks Sewage Treatment Works

3.6.3.11 Given that the type of sewage received and the expected process conducted at these tanks, odour emission rates of inlet works, sedimentation tank and bioreactors in the San Tin Barracks STW therefore generally make reference to the odour emission rates of tanks with similar type of treatment units in Shek Wu Hui STW which also receive major domestic sewage without seawater flushing. The Shek Wu Hui STW emission rates are presented in the approved EIA Report for NENT (AEIAR-175/2013). For the sludge treatment tank, as the sludge is not digested, the odour strength would be higher. Its emission strength is proposed to adopt the sludge mixing tank of YLEPP as presented in its approved EIA Report (AEIAR-220/2019). The estimated odour emission rates are presented in **Table 3.13**. The odour emission in details is presented in **Appendix 3.12**.

Table 3.13 Estimated Odour Emission for the San Tin Barracks STW

ID	Use	Dimension, m [1]	Area, m^2	Assumed SOER, $OU/m^2 \cdot s$	SOER Reference [2] [3]
STBSTW_01	Inlet works	5.6 x 10.6	59.4	3.26	S1 Inlet pumping station of SWHSTW
STBSTW_02	Sedimentation Tank	5.6 x 10.6	59.4	4.03	S6 Primary Sedimentation Tank of SWHSTW
STBSTW_03	Bioreactor	Diameter = 11m	95	1.65	S7 Bioreactor of SWHSTW
STBSTW_04	Bioreactor	Diameter = 11m	95	1.65	S7 Bioreactor of SWHSTW
STBSTW_05	Sludge Treatment Tank	9.4 x 11.6	109	26.42	Sludge Mixing Tank of YLEPP

Remarks:
[1] Determined with GeoInfo Map Hong Kong.
[2] SOERs of SWHSTW refer to **Appendix 3.8** of NENT Development EIA (AEIAR-175/2013)
[3] SOERs of YLEPP refer to **Appendix 3.9** of YLEPP EIA (AEIAR-220/2019)

Dispersion Modelling & Modelling Approach for Odour Source

3.6.3.12 With reference to Clause 3.4.3 and Appendices B and B-1 of the EIA Study Brief ESB-340/2021 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.

3.6.3.13 Cumulative odour impact within 500m from these odour sources, namely the proposed EPP, RTS and FWPF, proposed SPSs, Retained Pig Farm and San Tin Barracks STW, were assessed. It is assumed that the proposed deodorizing units/system of the proposed EPP and the proposed RTS 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 deodorizers was modelled as point source, while odour emission from the retained pig farm was modelled as volume and area sources for pig houses and tank surfaces respectively.

3.6.3.14 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.

3.6.3.15 The handling of meteorology input and determination of surface characteristics refer to **Section 3.6.2.17 – 3.6.2.19**.

3.6.3.16 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 of source and stability classes are listed in **Table 3.14** below. Pasquill-Gifford stability refers to the dataset based on the WRF meteorological data.

Table 3.14 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 3.15**.

Table 3.15 Construction of DPs Involved in Development Stages

Development Stage	DP-related Construction Works
Initial Phase	DP1 – Construction of Road P1, D1 (part), D2, D3, D4, D6 DP2 – Construction of EPP DP3 – Construction of WRP DP4 – Construction of RTS DP6 – Revitalisation of STEMDC DP7 – Recreational Development within Deep Bay Zone 2 (O.1.2, O.1.3)
Main Phase	DP1 – Construction of Road D1 (part), D5 DP5 – Construction of 400kv Electricity Substation DP6 – Revitalisation of STEMDC DP7 – Recreational Development within Deep Bay Zone 2 (O.1.1)
Remaining Phase	DP1 – Construction of Road D1 (section at RSc.2.7)

3.7.1.2 Construction works of general sites generally involves site formation works and construction of superstructures. New primary distributor and district distributor roads are to be laid within STLMC DN, while the existing road system is to be largely demolished, realigned or upgraded. A new sewage treatment works with treatment capacity of 125,000 m^3/day , namely tertiary effluent polishing plant, is to be built at Site OU(EPP).5.3. A new water reclamation plant with capacity of 112,500 m^3/day is to built at Site OU(WRP).5.2. A new refuse transfer station with capacity 3,000 tpd is to be built at Site OU.1.9. Two 400kV electricity substations are to be built at Site OU.1.7 and OU.4.2. The revitalisation of STEMDC involves provision of flood attenuation measures such as underground storage tanks, integrated ponds and retention ponds at the upstream and provision of green embarkment and open space with floodable landscape along the revitalised channels. Open space at O.1.1, O.1.2 and O.1.3 are to be developed to recreational purpose for the enjoyment of general public.

3.7.1.3 Potential construction dust impact would arise from the abovementioned construction works which involve site formation, excavation, backfilling, stockpiling, spoil handling, vehicle movement on haul roads, wind erosion of the exposed site area. 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. **Table 3.16** summarizes the duration of dusty construction activities of each development stage. 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 works of Initial Phase would start in December 2024 and be completed by Year 2028. Site formation works of Main Phase would start in Year 2027 and be completed by Year 2029, however some of them such as I&T sites in the northwest would be as early as Year 2026, which are concurrent with Initial Phase. Site formation works of Remaining Phase would start in Year 2032 and be completed by Year 2034. Nevertheless, the construction programme is subject to land resumption schedule in the future. The exact locations of 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, cut and fill volumes to be handing in each construction years are summarized in **Table 3.17** which is also presented in Chapter 7 of this Report. The major excavation and backfilling works will commence in Year 2025 and peak in Year 2027 – 2028. The intensity of excavation and backing filling works will decrease significantly after Year 2028, when the site formation works of Initial Phase is completed. The transport of these excavated spoils would require 5 trucks per hectare per day starting from Year 2025, which is equivalent to 1021 trucks per day for the area of Initial Phase. In Year 2026, larger active work area is expected because of some site formation works of Main Phase, however 4 trucks is required per hectare per day, 1 truck less than the one in Year 2025. Site formation works will peak in Year 2027 and 2028, though it remains 5 trucks per hectare per day. The demand of dump trucks is expected to significantly decline to 1 – 2 trucks per hectare per day from Year 2029 to Year 2031. For Remaining Phase during Year 2032 - 3024, maximum of 8 trucks is required per hectare per day, which is equivalent to less than 300 trucks per day owing to smaller size of active work sites.

Table 3.16 Construction Activities with Major Dust Emission in Each Development Stage

Development Stage	Construction Activities	Duration
Initial Phase	Site Clearance, Site Formation Works, Excavation and Backfilling	December 2024 – 2028
Main Phase	Site Clearance, Site Formation Works, Excavation and Backfilling	2026 – 2029
Remaining Phase	Site Clearance, Site Formation Works, Excavation and Backfilling	2032 – 2034

Table 3.17 Estimated Cut and Fill Volumes for the Development by Year

Year [1]	Cut Volume (m^3)	Fill Volume (m^3)	No. of Trucks Required (Vehicle per day)	No. of Trucks Required (Vehicle per hectare per day)
2025	2,059,200	596,000	1021	5
2026	2,606,200	1,290,800	1293	4
2027	1,069,200	3,664,000	1817	5
2028	1,050,400	3,493,900	1733	5
2029	675,900	835,200	414	2

2030	233,400	382,400	190	1
2031	439,500	204,000	218	1
2032	566,100	172,100	281	8
2033	430,300	110,000	213	6
2034	218,400	69,900	108	4

Note:
[1] The site clearance and site formation works shall commence in Dec 2024. It is therefore assumed that no cut and fill volumes is anticipated in 2024.
[2] The data is extracted from Chapter 7, Waste Management Implication of this EIA Report.

3.7.1.5 The excess spoil from the excavation works would be transported with dump trucks out of the construction works sites to disposal outlet. The induced traffic would cause vehicle emission along the routes. Dump trucks would collect spoils from the construction works sites and transport via San Tin Highway, Yuen Long Highway, Tuen Mun Road to Tuen Mun Area 38 Fill Bank. Transportation routes in detailed refers to **Table 7.7**. Maximum of 200 vehicles per day is expected for transporting waste during construction phase. The routings should avoid the use of local roads and the truck traffic should avoid peak hours, as far as practicable. 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 would be caused by the transportation of spoils along the routes.

3.7.1.6 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 should be covered with impervious sheets, as far as practicable. 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.

3.7.1.7 In order to avoid any intensive works at a location close to ASR, site formation works will be conducted individually at each site, subject to the land resumption schedule. Several worksfronts would be implemented if a development site is large in size. 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.

3.7.1.8 Nevertheless, some ASRs would exist close to the project boundary at 10 metres or less, such as Shek Wui Wai (A01 – A03) enclosed by the Project, Chau Tau Tsuen (A13) in the northeast, Rolling Hill (A19) and Scenic Heights (A21) in the northwest. Dusty activities should be located away from these nearby ASRs 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.

3.7.1.9 San Tin Station of NOL and three ancillary buildings, namely San Tin Ancillary Building, Kwu Tung Ancillary Building, Pak Shek Au Ancillary Building are to be built within STLMC DN. Kwu Tung Ancillary Building and Pak Shek Au Ancillary Building lie within the area of Initial Phase, while San Tin Station and San Tin Ancillary Building lie within the area of Main Phase. Major construction works of station box and ancillary buildings including excavation and backfilling works would be carried out concurrently with Initial Phase or Main Phase, subject to their location. Kwu Tung Ancillary Building and Pak Shek Au Ancillary Building are to be completed by the population intake of Initial Phase, such that no planned ASR of Initial Phase is affected by the NOL construction works. Owing to the larger footprint of San Tin Station, its construction works are expected to be conducted in several workfronts. San Tin Station and San Tin Ancillary Building are to be completed by the population intake of Main Phase, such that no planned ASR of Main Phase is affected. It is anticipated that appropriate dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation*, such as regularly watering and paved haul road, would also be implemented by the contractors of NOL, resulting in minimum fugitive dust emission from their construction activities. Close liaison with the contractor of NOL will be taken place to minimize any construction activities to be taken place in the proximity at the same time.

3.7.1.10 Major construction works of KTN NDA within the assessment area would include the modification of the road interchange and the site formation works for amenity sites and district cooling system. The associated construction works have commenced in Year 2019 and to be completed in Year 2031, which would be concurrent with Initial Phase and Main Phase of STLMC DN. It is anticipated that appropriate dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation*, such as regularly watering and paved haul road, would also be implemented by the contractors of KTN NDA, resulting in minimum fugitive dust emission from their construction activities. Close liaison with the contractor of KTN NDA will be taken place to minimize any construction activities to be taken place in the proximity at the same time.

3.7.1.11 Major construction works of the Loop within the assessment area are mostly site formation works and construction of superstructure. The associated construction works have commenced in Year 2021 for operation commencement in Year 2026, which would be concurrent with Initial Phase of STLMC DN. It is anticipated that appropriate dust suppression measures stipulated in *Air Pollution Control (Construction Dust) Regulation*, such as regularly watering and paved haul road, would also be implemented by the contractors of the Loop, resulting in minimum fugitive dust emission from their construction activities. Close liaison with the contractor of the Loop will be taken place to minimize any construction activities to be taken place in the proximity at the same time.

3.7.1.12 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 STLMC DN, 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 STLMC DN in the area.

Potential Odour Impact from Revitalisation of STEMDC (DP6) during Construction Phase

3.7.1.13 The total volume of the excavated materials from the revitalisation works of STEMDC would be about 57 m^3. Assuming works are to be carried out 6 days per week in 48 weeks, the daily excavated materials would be about 0.20 m^3/day. Hence, only minor excavation of the nullah bed material would be required for the revitalisation works of STEMDC. Potential odour nuisance would be expected during excavation and handling of the nullah bed material. Odour mitigation measures such as covering the stockpiles of the excavated odour materials with tarpaulin and locating it away from air sensitive receivers (ASRs) as far as possible, and removing off site as soon as possible within 24 hours, are to be implemented when appropriate. No adverse odour nuisance is anticipated.

3.7.2 Operation Phase

Cumulative Air Quality Impact

3.7.2.1 The cumulative air quality impact due to proposed DP roads and EPP under the RODP, existing and planned open roads, planned portal within 500m assessment area, 4-km major point source and background concentration at representative ASRs in Year 2031, 2034 and

2039 have been evaluated. Noise mitigation measures are proposed along San Tin Highways, and the assessment has incorporated such measures. The details of proposed noise mitigation measures refer to **Figure 4.13**. The predicted cumulative air quality impact on the representative ASRs in Year 2031, 2034 and 2039 are summarized in **Table 3.18** – **Table 3.23** respectively. The predictions showed that daily and annual averages of RSP and FSP, 10-min and daily averages of SO_2, and hourly and annual averages of NO_2 at representative ASRs would comply with the AQOs. The predicted CO concentration was well below the relevant AQOs. The detailed predictions with breakdown of contribution by sources in Year 2031, 2034 and 2039 are presented in **Appendix 3.14, Appendix 3.15** and **Appendix 3.16** respectively.

3.7.2.2 According to the discrete results, the worst affected level would be 1.5 metres above ground (mAG) for those locations as their first level of air sensitive use. The contour plots of RSP, FSP, SO_2 and NO_2 at 1.5mAG are illustrated in **Figure 3.2** – **Figure 3.7** and **Figure 3.14** – **3.15** for Year 2031**, Figure 3.8** – **Figure 3.15** for Year 2034 and **Figure 3.16** – **Figure 3.23** for Year 2039. No exceedance in RSP, FSP, and SO_2 was predicted in the assessment area except that:

- exceedance in annual NO_2 was predicted in Year 2031 along the San Tin Highway, Fanling Highway, Lok Ma Chau Road, the proposed local road L5 and the proposed local road L13 north of the retained villages,
- exceedance in hourly NO_2 was predicted in Year 2034 along the San Tin Highway and Lok Ma Chau Road, and exceedance in annual NO_2 was predicted in Year 2034 along San Tin Highway, Ha Wan Tsuen East Road, Lok Ma Chau Road, and the proposed local road L13 north of the retained villages,
- exceedance in hourly NO_2 was predicted in Year 2039 along the San Tin Highway, Ha Wan Tsuen East Road and Lok Ma Chau Road, and exceedance in annual NO_2 was predicted in Year 2039 along San Tin Highway, Ha Wan Tsuen East Road, and Lok Ma Chau Road, and the proposed local road L13 north of the retained villages.

Yet there is no existing air sensitive use in the area, such as openable window, fresh air intakes of ventilation system or recreational uses in open space. No planned air sensitive use should be located within the exceedance zones at 5mAG or below. The contour plots of hourly and annual average NO_2 contour plots at 5mAG illustrated in **Figure 3.29 – Figure 3.34** which show the exceedance zones would be limited within the road alignment areas. No adverse air quality impact is anticipated during the operation phase of the development plan.

Non-AQO Criteria Pollutants by the Proposed EPP

3.7.2.3 The predicted methane, HCl, HF and formaldehyde concentrations at representative ASRs in Year 2031, 2034 and 2039 would be well below the respective standards as stated in **Section 3.2.3**. The detailed prediction results are presented in **Appendix 3.15** for Year 2031 and 2034, and **Appendix 3.16** for Year 2039 respectively.

Table 3.18 Worst Predicted Cumulative RSP and FSP Concentrations at Representative ASRs in Year 2031

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
A01	70	28	38	17
A02	70	28	38	17
A03	70	28	38	16
A04	70	29	39	17
A05	69	28	36	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
A06	69	28	37	17
A07	69	28	35	16
A08	68	28	35	16
A09	70	29	38	17
A10	68	27	35	16
A11	68	27	35	16
A12	68	27	35	16
A13	69	28	36	16
A14	69	28	35	16
A15	69	27	35	16
A16	69	27	35	16
A17	71	29	38	17
A18	71	29	39	17
A19	68	27	35	15
A20	68	27	35	15
A21	71	29	38	17
A22	71	29	38	17
A23	71	29	38	17
A24	68	27	35	15
A25	69	27	37	15
A26	69	28	38	16
A27	69	28	37	16
A28	69	28	37	16
A29	69	28	37	16
A30	69	28	37	16
A31	69	28	38	16
A32	70	29	39	17
A33	68	27	35	16
P101	71	29	39	17
P102	68	27	35	15
P103	71	29	38	17
P104	71	29	38	17
P105	71	29	38	17
P106	71	29	38	17
P107	68	27	35	15
P108	68	27	35	15
P109	70	29	38	17
P110	70	28	38	17

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
P111	70	28	38	16
P112	69	28	36	16
P113	68	28	36	16
P114	69	28	37	17
P115	69	28	36	16
P116	68	28	36	16
P117	68	28	36	16
P118	68	28	36	16
P119	69	28	35	16
P120	69	28	35	16
P121	69	28	36	16
P122	69	28	36	16
P123	69	28	36	16
P124	69	28	36	16
P125	69	28	36	16
P126	70	28	35	16
P127	70	28	35	16
P128	70	28	35	16
P129	70	28	36	16
P130	69	28	35	16
P131	70	28	36	16
P132	69	28	35	16
P133	70	28	35	16
P134	69	27	35	16
P135	69	27	35	16
P136	69	27	35	16
P137	69	27	35	16
P138	70	27	35	16
P139	70	27	35	16
P140	72	28	37	16
P141	72	28	37	16
P142	72	28	37	16
P143	72	29	37	16
P144	72	28	37	16
P145	68	28	35	16
P146	68	28	35	16
P147	70	29	39	17
P148	70	29	39	17

ASRID	10th Highest Daily Average RSP Conc. (µg/m³) (AQO: 100 µg/m³)	Annual RSP Conc. (µg/m³) (AQO: 50 µg/m³)	19th Highest Daily Average FSP Conc. (µg/m³) (AQO: 50 µg/m³)	Annual FSP Conc. (µg/m³) (AQO: 25 µg/m³)
P149	71	29	39	17
P150	71	29	39	17
P151	71	29	38	17
P152	70	28	35	16
P153	69	27	35	16

Remark:
Bolded value indicates exceedance in relevant criterion.

Table 3.19 Worst Predicted Cumulative NO_2 and SO_2 Concentrations at Representative ASRs in Year 2031

ASRID	4th Highest 10-min Average SO_2 Conc. (µg/m³) (AQO: 500 µg/m³)	4th Highest Daily Average SO_2 Conc. (µg/m³) (AQO: 50 µg/m³)	19th Highest Hourly Average NO_2 Conc. (µg/m³) (AQO: 200 µg/m³)	Annual Average NO_2 Conc. (µg/m³) (AQO: 40 µg/m³)
A01	60	12	131	17
A02	60	12	134	18
A03	60	12	130	16
A04	60	12	135	28
A05	66	14	143	31
A06	69	14	145	29
A07	65	14	144	26
A08	66	14	141	25
A09	60	12	133	21
A10	65	14	139	19
A11	65	14	141	19
A12	65	14	139	22
A13	82	16	139	24
A14	82	16	136	20
A15	73	16	137	20
A16	73	15	136	18
A17	63	13	142	24
A18	64	13	139	27
A19	52	13	122	16
A20	52	13	129	15
A21	62	13	137	21
A22	62	13	136	21
A23	62	13	134	20
A24	52	12	125	16
A25	59	12	105	11

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m^3) (AQO: 500 μg/m^3)	4th Highest Daily Average SO_2 Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Hourly Average NO_2 Conc. (μg/m^3) (AQO: 200 μg/m^3)	Annual Average NO_2 Conc. (μg/m^3) (AQO: 40 μg/m^3)
A26	62	12	129	14
A27	61	13	115	13
A28	62	13	115	13
A29	61	13	115	13
A30	61	13	115	14
A31	67	13	108	13
A32	74	14	141	23
A33	80	15	133	17
P101	62	13	141	26
P102	52	13	127	16
P103	62	13	140	23
P104	62	13	133	19
P105	62	13	136	20
P106	62	14	135	20
P107	52	13	126	17
P108	52	13	118	15
P109	62	13	130	19
P110	60	12	134	18
P111	60	12	131	17
P112	69	15	140	24
P113	69	14	143	28
P114	69	14	148	31
P115	69	14	138	26
P116	69	14	136	28
P117	69	14	137	27
P118	69	14	137	27
P119	82	16	136	19
P120	82	16	136	18
P121	82	16	145	28
P122	69	14	144	29
P123	82	16	140	28
P124	82	16	142	25
P125	82	16	152	24
P126	73	16	147	25
P127	73	16	146	24
P128	73	16	144	24

ASRID	4th Highest 10-min Average SO_2 Conc. (µg/m^3) (AQO: 500 µg/m^3)	4th Highest Daily Average SO_2 Conc. (µg/m^3) (AQO: 50 µg/m^3)	19th Highest Hourly Average NO_2 Conc. (µg/m^3) (AQO: 200 µg/m^3)	Annual Average NO_2 Conc. (µg/m^3) (AQO: 40 µg/m^3)
P129	73	16	147	26
P130	73	16	143	23
P131	73	16	148	28
P132	73	16	140	21
P133	73	16	144	24
P134	73	15	140	21
P135	73	15	140	20
P136	73	15	137	21
P137	73	15	139	20
P138	73	15	142	21
P139	73	15	140	20
P140	78	18	149	24
P141	78	18	151	25
P142	78	18	147	23
P143	78	18	154	26
P144	78	18	146	23
P145	65	14	141	25
P146	65	14	139	24
P147	60	12	139	27
P148	60	12	139	28
P149	60	12	144	31
P150	62	13	150	33
P151	62	13	141	25
P152	73	15	144	22
P153	52	13	135	21

Table 3.20 Worst Predicted Cumulative RSP and FSP Concentrations at Representative ASRs in Year 2034

ASRID	10th Highest Daily Average RSP Conc. (µg/m^3) (AQO: 100 µg/m^3)	Annual RSP Conc. (µg/m^3) (AQO: 50 µg/m^3)	19th Highest Daily Average FSP Conc. (µg/m^3) (AQO: 50 µg/m^3)	Annual FSP Conc. (µg/m^3) (AQO: 25 µg/m^3)
A01	70	28	38	17
A02	70	28	38	17
A03	70	28	38	17
A04	70	29	39	17
A05	69	28	35	16
A06	69	28	36	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
A07	68	28	35	16
A08	68	28	35	16
A09	70	29	38	17
A10	68	27	35	16
A11	68	27	35	16
A12	68	27	35	16
A13	69	28	35	16
A14	69	28	35	16
A15	69	27	35	16
A16	69	27	35	16
A17	71	29	38	17
A18	71	29	39	17
A19	68	27	35	15
A20	68	27	35	15
A21	71	29	38	17
A22	71	29	38	17
A23	71	29	38	17
A24	68	27	35	15
A25	69	27	37	15
A26	70	28	38	16
A27	69	28	37	16
A28	69	28	37	16
A29	69	28	37	16
A30	69	28	37	16
A31	69	28	38	16
A32	70	29	39	17
A33	68	27	35	16
P101	71	29	38	17
P102	68	27	35	15
P103	71	29	38	17
P104	71	29	38	17
P105	71	29	38	17
P106	71	29	38	17
P107	68	27	35	15
P108	68	27	35	15
P109	70	29	38	17
P110	70	28	38	17
P111	70	28	38	17

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
P112	69	28	36	16
P113	68	28	36	16
P114	68	28	36	16
P115	68	28	36	16
P116	68	28	36	16
P117	68	28	36	16
P118	68	28	36	16
P119	69	28	35	16
P120	69	28	35	16
P121	69	28	36	16
P122	68	28	36	16
P123	69	28	36	16
P124	69	28	35	16
P125	69	28	36	16
P126	70	28	35	16
P127	70	28	35	16
P128	70	28	35	16
P129	70	28	35	16
P130	69	27	35	16
P131	70	28	36	16
P132	69	27	35	16
P133	70	28	35	16
P134	69	27	35	16
P135	69	27	35	16
P136	69	27	35	16
P137	69	28	35	16
P138	70	28	35	16
P139	70	27	35	16
P140	72	28	37	16
P141	72	28	37	16
P142	72	28	37	16
P143	72	29	37	16
P144	72	28	37	16
P145	68	27	35	16
P146	68	27	35	16
P147	70	29	38	17
P148	70	29	38	17
P149	70	29	39	17

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
P150	71	29	39	17
P151	71	29	38	17
P152	70	28	35	16
P153	68	27	35	15
P201	71	29	38	17
P202	71	29	38	17
P203	71	29	38	17
P204	70	28	38	17
P205	70	28	38	17
P206	70	28	38	17
P207	70	29	38	17
P208	70	29	38	17
P209	71	29	38	17
P210	70	29	38	17
P211	70	29	38	17
P213	70	29	38	17
P214	70	29	38	17
P215	68	27	35	16
P216	68	27	35	16
P217	68	28	35	16
P219	68	28	36	16
P220	69	28	36	16
P221	68	28	36	16
P222	68	27	35	15
P223	68	27	35	15
P224	68	27	35	15
P225	68	27	35	15
P226	68	27	35	15
P227	68	27	35	15
P228	68	27	35	15
P229	70	28	38	16
P230	70	28	38	17
P231	68	27	35	15
P232	68	27	35	15
P233	68	27	35	15
P234	68	27	35	15
P235	70	28	38	16
P236	70	28	38	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
P237	70	28	38	16
P238	70	28	38	16
P239	69	28	37	16
P240	69	28	37	16
P241	70	29	38	17
P242	70	29	38	17
P243	70	28	38	17
P244	70	28	38	17
P245	68	27	35	16
P246	69	28	38	16
P247	69	28	37	16
P248	69	28	37	16
P249	69	28	37	16
P250	69	28	37	16
P251	69	28	37	16
P252	69	28	37	16
P253	69	28	37	16
P254	69	28	37	16
P255	69	28	37	16
P256	69	28	37	16
P257	69	28	37	16
P258	69	28	37	16
P259	69	28	37	16
P260	68	28	36	16
P261	68	28	36	16
P262	68	28	36	16
P263	68	28	36	16
P264	68	28	36	16
P265	68	28	36	16
P266	69	28	37	16
P267	68	28	36	16
P268	68	28	36	16
P269	68	28	36	16
P270	69	28	36	16
P271	68	28	35	16
P272	68	28	35	16

Table 3.21 Worst Predicted Cumulative NO_2 and SO_2 Concentrations at Representative ASRs in Year 2034

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m^3) (AQO: 500 μg/m^3)	4th Highest Daily Average SO_2 Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Hourly Average NO_2 Conc. (μg/m^3) (AQO: 200 μg/m^3)	Annual Average NO_2 Conc. (μg/m^3) (AQO: 40 μg/m^3)
A01	60	12	135	18
A02	60	12	137	20
A03	60	12	136	18
A04	60	12	136	26
A05	66	14	143	28
A06	69	14	145	29
A07	65	14	144	25
A08	66	14	141	24
A09	60	12	132	21
A10	65	14	135	19
A11	65	14	137	19
A12	65	14	140	21
A13	82	16	138	22
A14	82	16	136	20
A15	73	16	137	20
A16	73	15	136	18
A17	63	13	145	25
A18	64	13	137	26
A19	52	13	122	16
A20	52	13	123	15
A21	62	13	135	20
A22	62	13	132	20
A23	62	13	131	19
A24	52	12	122	16
A25	59	12	108	11
A26	62	12	130	16
A27	61	13	119	14
A28	62	13	119	15
A29	61	13	125	16
A30	61	13	123	16
A31	67	13	108	13
A32	74	14	136	21
A33	80	15	132	17
P101	62	13	139	23
P102	52	13	125	15

ASRID	4th Highest 10-min Average SO_2 Conc. (µg/m^3) (AQO: 500 µg/m^3)	4th Highest Daily Average SO_2 Conc. (µg/m^3) (AQO: 50 µg/m^3)	19th Highest Hourly Average NO_2 Conc. (µg/m^3) (AQO: 200 µg/m^3)	Annual Average NO_2 Conc. (µg/m^3) (AQO: 40 µg/m^3)
P103	62	13	139	22
P104	62	13	131	19
P105	62	13	133	19
P106	62	14	134	20
P107	52	13	127	17
P108	52	13	124	15
P109	62	13	132	19
P110	60	12	137	20
P111	60	12	134	20
P112	69	15	140	24
P113	69	14	142	26
P114	69	14	144	28
P115	69	14	140	25
P116	69	14	136	24
P117	69	14	137	24
P118	69	14	135	24
P119	82	16	136	19
P120	82	16	136	18
P121	82	16	141	24
P122	69	14	150	28
P123	82	16	143	27
P124	82	16	137	23
P125	82	16	162	25
P126	73	16	148	25
P127	73	16	145	24
P128	73	16	147	24
P129	73	16	147	26
P130	73	16	143	23
P131	73	16	154	30
P132	73	16	140	22
P133	73	16	148	25
P134	73	15	143	22
P135	73	15	140	21
P136	73	15	138	22
P137	73	15	139	23
P138	73	15	145	26

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m³) (AQO: 500 μg/m³)	4th Highest Daily Average SO_2 Conc. (μg/m³) (AQO: 50 μg/m³)	19th Highest Hourly Average NO_2 Conc. (μg/m³) (AQO: 200 μg/m³)	Annual Average NO_2 Conc. (μg/m³) (AQO: 40 μg/m³)
P139	73	15	140	22
P140	78	18	149	24
P141	78	18	151	26
P142	78	18	147	24
P143	78	18	159	29
P144	78	18	146	23
P145	65	14	141	24
P146	65	14	141	23
P147	60	12	133	25
P148	60	12	134	26
P149	60	12	150	31
P150	62	13	151	32
P151	62	13	141	26
P152	73	15	145	26
P153	52	13	130	18
P201	67	14	139	23
P202	63	13	134	21
P203	62	15	138	23
P204	60	12	136	18
P205	60	12	134	18
P206	60	12	139	21
P207	60	12	141	23
P208	63	13	131	21
P209	62	13	136	22
P210	62	13	132	22
P211	60	12	135	23
P213	60	12	139	26
P214	60	12	138	24
P215	64	14	140	22
P216	64	14	139	24
P217	65	14	141	27
P219	69	14	141	26
P220	69	14	142	29
P221	69	14	141	27
P222	52	13	126	14
P223	53	13	122	14

ASRID	4th Highest 10-min Average SO_2 Conc. (µg/m^3) (AQO: 500 µg/m^3)	4th Highest Daily Average SO_2 Conc. (µg/m^3) (AQO: 50 µg/m^3)	19th Highest Hourly Average NO_2 Conc. (µg/m^3) (AQO: 200 µg/m^3)	Annual Average NO_2 Conc. (µg/m^3) (AQO: 40 µg/m^3)
P224	53	13	120	12
P225	53	13	121	12
P226	52	13	114	13
P227	52	13	117	13
P228	52	13	124	16
P229	60	12	134	17
P230	60	12	133	18
P231	53	13	119	14
P232	53	13	123	15
P233	53	13	123	14
P234	54	13	113	12
P235	61	12	134	17
P236	61	12	129	15
P237	61	12	129	15
P238	61	12	129	16
P239	61	13	119	14
P240	61	13	126	17
P241	61	12	133	21
P242	61	12	138	22
P243	60	12	136	19
P244	60	12	135	19
P245	66	14	142	20
P246	67	13	110	13
P247	63	13	114	14
P248	63	13	114	14
P249	63	13	114	14
P250	62	13	117	15
P251	62	13	123	17
P252	62	13	119	16
P253	62	13	114	14
P254	62	13	115	15
P255	61	13	123	16
P256	61	13	125	19
P257	61	13	125	18
P258	61	13	116	15
P259	61	13	116	15

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m^3) (AQO: 500 μg/m^3)	4th Highest Daily Average SO_2 Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Hourly Average NO_2 Conc. (μg/m^3) (AQO: 200 μg/m^3)	Annual Average NO_2 Conc. (μg/m^3) (AQO: 40 μg/m^3)
P260	70	15	136	19
P261	69	15	133	17
P262	69	15	135	19
P263	69	15	136	21
P264	69	14	137	18
P265	69	15	139	21
P266	61	13	122	16
P267	69	14	138	18
P268	69	14	138	19
P269	69	14	139	20
P270	69	14	168	29
P271	65	14	143	27
P272	65	14	146	27

Table 3.22 Worst Predicted Cumulative RSP and FSP Concentrations at Representative ASRs in Year 2039

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
A01	69	28	38	16
A02	70	28	38	16
A03	69	28	38	16
A04	70	28	38	17
A05	68	27	35	16
A06	68	28	36	16
A07	68	27	35	15
A08	68	27	35	16
A09	69	28	38	16
A10	68	27	34	15
A11	68	27	34	15
A12	68	27	34	15
A13	69	27	35	16
A14	69	27	35	16
A15	69	27	35	15
A16	69	27	35	15
A17	70	28	38	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m3) (AQO: 100 μg/m3)	Annual RSP Conc. (μg/m3) (AQO: 50 μg/m3)	19th Highest Daily Average FSP Conc. (μg/m3) (AQO: 50 μg/m3)	Annual FSP Conc. (μg/m3) (AQO: 25 μg/m3)
A18	70	29	38	17
A19	68	27	34	15
A20	68	27	34	15
A21	70	28	37	16
A22	70	28	38	16
A23	70	28	37	16
A24	68	27	34	15
A25	69	27	37	15
A26	69	28	38	16
A27	69	27	37	16
A28	69	27	37	16
A29	69	27	37	16
A30	69	27	37	16
A31	69	28	38	16
A32	70	28	38	16
A33	68	27	35	15
P101	70	28	37	16
P102	68	27	34	15
P103	71	28	37	16
P104	70	28	37	16
P105	71	28	37	16
P106	71	28	38	16
P107	68	27	34	15
P108	68	27	34	15
P109	70	28	37	16
P110	69	28	38	16
P111	69	28	38	16
P112	68	27	36	16
P113	68	27	36	16
P114	68	27	36	16
P115	68	27	36	16
P116	68	27	35	16
P117	68	27	35	16
P118	68	27	35	16
P119	69	27	35	16
P120	69	27	35	15
P121	69	27	35	16
P122	68	27	36	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m³) (AQO: 100 μg/m³)	Annual RSP Conc. (μg/m³) (AQO: 50 μg/m³)	19th Highest Daily Average FSP Conc. (μg/m³) (AQO: 50 μg/m³)	Annual FSP Conc. (μg/m³) (AQO: 25 μg/m³)
P123	69	28	35	16
P124	69	27	35	16
P125	69	28	35	16
P126	69	27	35	16
P127	69	27	35	15
P128	69	27	35	15
P129	69	27	35	16
P130	69	27	35	15
P131	70	27	35	16
P132	69	27	35	15
P133	69	27	35	16
P134	69	27	35	15
P135	69	27	35	15
P136	69	27	35	15
P137	69	27	35	15
P138	69	27	35	16
P139	69	27	35	15
P140	72	28	37	16
P141	72	28	37	16
P142	71	28	37	16
P143	72	28	37	16
P144	71	28	37	16
P145	68	27	34	15
P146	68	27	34	15
P147	69	28	38	16
P148	69	28	38	16
P149	70	28	38	16
P150	70	28	38	16
P151	70	28	38	16
P152	69	27	35	16
P153	68	27	34	15
P201	71	28	38	16
P202	70	28	38	16
P203	71	28	38	16
P204	69	28	38	16
P205	69	28	38	16
P206	70	28	38	16
P207	70	28	38	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
P208	70	28	38	16
P209	70	28	38	16
P210	70	28	38	16
P211	69	28	38	16
P213	69	28	38	16
P214	69	28	38	16
P215	68	27	34	15
P216	68	27	34	15
P217	68	27	34	15
P219	68	27	36	16
P220	68	28	36	16
P221	68	27	36	16
P222	68	27	35	15
P223	68	27	35	15
P224	68	27	35	15
P225	68	27	35	15
P226	68	27	35	15
P227	68	27	35	15
P228	68	27	35	15
P229	69	28	38	16
P230	69	28	38	16
P231	68	27	35	15
P232	68	27	35	15
P233	68	27	35	15
P234	68	27	35	15
P235	69	28	38	16
P236	69	28	38	16
P237	69	28	38	16
P238	69	28	38	16
P239	69	27	37	16
P240	69	27	37	16
P241	69	28	38	16
P242	69	28	38	16
P243	70	28	38	16
P244	69	28	38	16
P245	68	27	34	15
P246	69	28	38	16
P247	69	27	37	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
P248	69	27	37	16
P249	69	27	37	16
P250	69	27	37	16
P251	69	27	37	16
P252	69	27	37	16
P253	69	27	37	16
P254	69	27	37	16
P255	69	27	37	16
P256	69	27	37	16
P257	69	27	37	16
P258	69	27	37	16
P259	69	27	37	16
P260	68	27	35	16
P261	68	27	35	15
P262	68	27	35	16
P263	68	27	35	16
P264	68	27	35	16
P265	68	27	35	16
P266	69	27	37	16
P267	68	27	35	16
P268	68	27	35	16
P269	68	27	35	16
P270	69	28	36	16
P271	68	27	34	15
P272	68	27	34	15
P301	68	27	35	15
P302	68	27	34	15
P303	68	27	34	15
P304	68	27	35	15
P305	68	27	35	15
P306	69	28	38	16
P307	69	28	38	16
P308	69	28	38	16
P309	69	28	38	16
P310	69	28	38	16
P311	69	28	38	16
P312	69	27	37	16
P313	69	28	35	16

ASRID	10th Highest Daily Average RSP Conc. (μg/m^3) (AQO: 100 μg/m^3)	Annual RSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Daily Average FSP Conc. (μg/m^3) (AQO: 50 μg/m^3)	Annual FSP Conc. (μg/m^3) (AQO: 25 μg/m^3)
P314	67	27	34	15
P315	68	27	35	16
P316	67	27	34	15
P317	70	28	38	16

Table 3.23 Worst Predicted Cumulative NO_2 and SO_2 Concentrations at Representative ASRs in Year 2039

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m^3) (AQO: 500 μg/m^3)	4th Highest Daily Average SO_2 Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Hourly Average NO_2 Conc. (μg/m^3) (AQO: 200 μg/m^3)	Annual Average NO_2 Conc. (μg/m^3) (AQO: 40 μg/m^3)
A01	60	12	135	18
A02	60	12	138	21
A03	60	12	137	19
A04	60	12	135	24
A05	66	14	142	27
A06	69	14	143	28
A07	65	14	143	24
A08	66	14	137	24
A09	60	12	130	20
A10	65	14	132	18
A11	65	14	136	18
A12	65	14	137	19
A13	82	16	138	20
A14	82	16	136	18
A15	73	16	136	19
A16	73	15	135	17
A17	63	13	147	26
A18	63	13	151	28
A19	52	13	120	15
A20	52	13	123	14
A21	62	13	132	19
A22	62	13	131	19
A23	62	13	129	18
A24	52	12	119	15
A25	59	12	107	10

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m^3) (AQO: 500 μg/m^3)	4th Highest Daily Average SO_2 Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Hourly Average NO_2 Conc. (μg/m^3) (AQO: 200 μg/m^3)	Annual Average NO_2 Conc. (μg/m^3) (AQO: 40 μg/m^3)
A26	62	12	128	14
A27	61	13	118	13
A28	62	13	119	13
A29	61	13	123	14
A30	61	13	121	15
A31	67	13	107	12
A32	74	14	131	19
A33	80	15	132	16
P101	62	13	135	21
P102	52	13	122	14
P103	62	13	135	20
P104	62	13	130	17
P105	62	13	132	18
P106	62	14	129	18
P107	52	13	123	15
P108	52	13	122	14
P109	62	13	130	17
P110	60	12	135	20
P111	60	12	136	20
P112	69	15	138	23
P113	69	14	139	24
P114	69	14	139	25
P115	69	14	141	23
P116	69	14	132	21
P117	69	14	131	21
P118	69	14	133	21
P119	82	16	136	18
P120	82	16	136	17
P121	82	16	141	22
P122	69	14	151	26
P123	82	16	138	25
P124	82	16	137	21
P125	82	16	156	24
P126	73	16	144	23
P127	73	16	142	22

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m³) (AQO: 500 μg/m³)	4th Highest Daily Average SO_2 Conc. (μg/m³) (AQO: 50 μg/m³)	19th Highest Hourly Average NO_2 Conc. (μg/m³) (AQO: 200 μg/m³)	Annual Average NO_2 Conc. (μg/m³) (AQO: 40 μg/m³)
P128	73	16	145	22
P129	73	16	145	24
P130	73	16	140	21
P131	73	16	153	29
P132	73	16	140	20
P133	73	16	147	24
P134	73	15	140	20
P135	73	15	139	20
P136	73	15	137	21
P137	73	15	139	21
P138	73	15	145	24
P139	73	15	141	20
P140	78	18	149	23
P141	78	18	150	25
P142	78	18	148	22
P143	78	18	163	28
P144	78	18	146	22
P145	65	14	142	23
P146	65	14	142	23
P147	60	12	134	25
P148	60	12	135	25
P149	60	12	151	30
P150	62	13	148	29
P151	62	13	142	26
P152	73	15	144	24
P153	52	13	129	17
P201	67	14	166	25
P202	63	13	134	21
P203	62	15	136	21
P204	60	12	137	19
P205	60	12	134	18
P206	60	12	136	23
P207	60	12	141	23
P208	63	13	129	21
P209	62	13	134	22

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m^3) (AQO: 500 μg/m^3)	4th Highest Daily Average SO_2 Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Hourly Average NO_2 Conc. (μg/m^3) (AQO: 200 μg/m^3)	Annual Average NO_2 Conc. (μg/m^3) (AQO: 40 μg/m^3)
P210	62	13	130	21
P211	60	12	134	22
P213	60	12	139	24
P214	60	12	138	23
P215	64	14	139	21
P216	64	14	138	22
P217	64	14	141	25
P219	69	14	138	24
P220	69	14	142	26
P221	69	14	139	24
P222	52	13	126	14
P223	53	13	122	13
P224	53	13	120	12
P225	53	13	120	11
P226	52	13	115	12
P227	52	13	115	12
P228	52	13	124	15
P229	60	12	134	16
P230	60	12	134	18
P231	53	13	119	13
P232	53	13	122	14
P233	53	13	122	13
P234	54	13	112	11
P235	61	12	133	16
P236	61	12	128	14
P237	61	12	126	14
P238	61	12	128	14
P239	61	13	119	13
P240	61	13	123	16
P241	61	12	133	19
P242	61	12	139	23
P243	60	12	134	18
P244	60	12	139	20
P245	66	14	143	20
P246	67	13	109	12

ASRID	4th Highest 10-min Average SO_2 Conc. (μg/m^3) (AQO: 500 μg/m^3)	4th Highest Daily Average SO_2 Conc. (μg/m^3) (AQO: 50 μg/m^3)	19th Highest Hourly Average NO_2 Conc. (μg/m^3) (AQO: 200 μg/m^3)	Annual Average NO_2 Conc. (μg/m^3) (AQO: 40 μg/m^3)
P247	63	13	111	13
P248	63	13	115	13
P249	63	13	111	13
P250	62	13	115	14
P251	62	13	118	15
P252	61	13	118	15
P253	62	13	112	13
P254	62	13	115	15
P255	61	13	122	15
P256	61	13	122	17
P257	61	13	123	17
P258	61	13	116	14
P259	61	13	116	14
P260	70	15	133	19
P261	69	14	132	16
P262	69	15	133	18
P263	69	15	133	20
P264	69	14	137	17
P265	69	15	139	21
P266	61	13	121	15
P267	69	14	136	17
P268	69	14	137	18
P269	69	14	136	19
P270	69	14	171	29
P271	65	14	140	25
P272	65	14	142	25
P301	52	13	122	12
P302	52	13	121	14
P303	52	13	120	14
P304	52	13	120	12
P305	52	13	123	14
P306	61	12	130	14
P307	61	12	130	15
P308	61	12	130	15
P309	61	12	129	15

ASRID	4th Highest 10-min Average SO_2 Conc. (µg/m³) (AQO: 500 µg/m³)	4th Highest Daily Average SO_2 Conc. (µg/m³) (AQO: 50 µg/m³)	19th Highest Hourly Average NO_2 Conc. (µg/m³) (AQO: 200 µg/m³)	Annual Average NO_2 Conc. (µg/m³) (AQO: 40 µg/m³)
P310	61	12	131	17
P311	60	12	136	19
P312	61	13	122	16
P313	69	14	172	28
P314	65	14	132	17
P315	69	14	136	19
P316	64	14	132	17
P317	62	13	133	22

3.7.3 Operational Phase (Odour Impact)

3.7.3.1 The cumulative odour impact due to the proposed EPP, FWPF, RTS, the three SPSs and the retained pig farm and the existing San Tin Barracks STW were predicted at the representative ASRs and are summarized in **Table 3.24**. Detailed prediction results are presented in **Appendix 3.17**. The prediction showed that the cumulative 5-second average odour concentrations would comply with the 5 OU/m³ of the EIAO-TM criterion among planned ASRs. However, the maximum predicted cumulative odour concentration at existing ASRs A26 and A33 would be 13.94 OU/m³ and 12.59 OU/m³ respectively, which results in non-compliance with the EIAO-TM criterion of 5 OU/m³.

Table 3.24 Worst Predicted Cumulative Odour Concentrations at Representative Air Sensitive Receivers

ASR ID	Maximum 5-second Average Odour Concentration (OU/m³) (EIAO-TM: 5 OU/m³)
A01	0.90
A02	1.52
A03	1.16
A04	0.90
A05	0.65
A06	0.86
A07	0.54
A08	0.58
A09	0.70
A10	0.52
A11	0.44
A12	0.35
A13	3.70
A14	1.70
A15	0.82
A16	0.57
A17	0.49
A18	1.16
A19	0.51

ASR ID	Maximum 5-second Average Odour Concentration (OU/m^3) (EIAO-TM: 5 OU/m^3)
A20	0.49
A21	0.58
A22	0.63
A23	0.54
A24	0.55
A25	2.10
A26	**13.94**
A27	3.87
A28	2.51
A29	2.31
A30	2.04
A31	0.42
A32	1.78
A33	**12.59**
P101	0.56
P102	0.57
P103	0.54
P104	0.53
P105	0.52
P106	0.49
P107	0.79
P108	0.93
P109	0.92
P110	0.98
P111	1.06
P112	2.50
P113	1.30
P114	1.63
P115	1.50
P116	3.15
P117	3.20
P118	3.98
P119	3.00
P120	2.87
P121	1.91
P122	1.33
P123	1.60
P124	1.80
P125	1.45
P126	1.01
P127	0.83
P128	0.72
P129	0.65

ASR ID	Maximum 5-second Average Odour Concentration (OU/m^3) (EIAO-TM: 5 OU/m^3)
P130	0.82
P131	0.93
P132	0.77
P133	0.80
P134	0.74
P135	0.64
P136	0.70
P137	0.39
P138	0.39
P139	0.59
P140	0.76
P141	0.78
P142	0.73
P143	0.82
P144	0.95
P145	0.49
P146	0.45
P147	0.75
P148	1.10
P149	0.96
P150	0.58
P151	0.79
P152	0.37
P153	0.63
P201	0.75
P202	0.78
P203	0.61
P204	0.93
P205	1.01
P206	0.95
P207	0.71
P208	1.17
P209	0.73
P210	0.73
P211	0.76
P213	0.81
P214	0.70
P215	0.46
P216	0.55
P217	0.60
P219	1.39
P220	1.63
P221	1.66

ASR ID	Maximum 5-second Average Odour Concentration (OU/m^3) (EIAO-TM: 5 OU/m^3)
P222	0.92
P223	1.05
P224	1.31
P225	1.44
P226	1.13
P227	1.17
P228	1.24
P229	1.01
P230	1.23
P231	2.26
P232	2.57
P233	3.09
P234	4.44
P235	4.36
P236	2.43
P237	3.35
P238	2.37
P239	2.31
P240	4.05
P241	3.58
P242	2.25
P243	1.30
P244	1.45
P245	1.08
P246	0.72
P247	0.75
P248	0.81
P249	0.78
P250	0.91
P251	1.38
P252	1.78
P253	0.83
P254	0.98
P255	1.18
P256	1.39
P257	1.38
P258	1.01
P259	0.97
P260	0.97
P261	1.05
P262	1.19
P263	1.14
P264	0.96

ASR ID	Maximum 5-second Average Odour Concentration (OU/m^3) (EIAO-TM: 5 OU/m^3)
P265	1.07
P266	0.99
P267	0.90
P268	0.92
P269	0.92
P270	0.96
P271	0.46
P272	0.44
P301	0.88
P302	0.90
P303	0.67
P304	1.32
P305	1.51
P306	1.35
P307	2.02
P308	2.75
P309	3.00
P310	2.30
P311	1.41
P312	1.76
P313	0.90
P314	0.69
P315	1.13
P316	0.63
P317	0.62

Remark:
Bolded value indicates exceedance in relevant criterion.

3.7.3.2 According to the predictions presented in the **Appendix 3.17**, the predicted maximum 5-second average cumulative odour concentration would occur at 1.5mAG, 5mAG, 10mAG, 15mAG and 20mAG, therefore contour plots of the cumulative odour concentrations at these levels are illustrated in **Figures 3.24** – **3.28**. Exceedance of odour impact was predicted at 1.5mAG, 5mAG, 10mAG and 15mAG in vicinity of the existing San Tin Barracks STW, over Site A.5.3, G.5.8, G.5.9, G.5.10, G.5.11, G.5.12, E.5.1, E.5.2, O.2.1, O.5.3, OU.5.8, OU.5.9 and OU.5.10. The government use buildings at Site G.5.8, G.5.9, G.5.10, G.5.11 and G.5.12 are to be air conditioned and their fresh air intakes are to be positioned at 20mAG or above. The school blocks at E.5.1 and E.5.2 are to be positioned away from the exceedance area. Site A.5.3 is a planned amenity site, while Site O.2.1 and O.5.3 are planned open space, and no air sensitive use exists. Site OU.5.8, OU.5.9 and OU.5.10 are District Cooling System Plant (DCS) and Electricity Substation (ESS), where no air sensitive use exists. With these building design considerations, no planned air sensitive use is expected at these altitudes in the exceedance area. However, the exceedance of odour impact would appear at the existing ASR A26, a building of the existing San Tin Barracks, at 1.5mAG, 5mAG and 10mAG.

3.7.3.3 Exceedance of odour impact were also predicted at 1.5mAG, 5mAG, 10mAG and 15mAG in the vicinity of Retained Pig Farm, over Site A.1.7, A.1.8, A.1.15, OU(I&T)3.1.8, OU.1.7, OU.1.8 and OU.1.9. The exceedance was also predicted at 20mAG in the vicinity of Retained Pig Farm. The buildings at Site OU(I&T)3.1.8 are to be air conditioned and its fresh air intakes are to be positioned at 20mAG or above, thus no air sensitive use is expected within the exceedance zone. Its recreational use in the open air, if any, shall be positioned away from the exceedance area. Site A.1.7, A.1.8 and A.1.15 are planned amenity sites, where no air sensitive use exists. Site OU.1.7, OU.1.8 and OU.1.9 are Electricity Substation (ESS), RCP and RTS respectively, and have no air sensitive use. Should there be any on-site office, it should be located away from the exceedance area. With implementation of the abovementioned building design, no planned air sensitive use is expected at these altitudes in the exceedance area. However, the exceedance of odour impact would appear at 1.5mAG, 5mAG, 10mAG and 15mAG at the existing ASR A33, an existing village house uphill of the pig farm.

3.7.3.4 The exceedance of odour impact were also predicted at the proposed EPP and FWPF at 10mAG, 15mAG and 20mAG, at proposed SPS at Site OU.1.2 at 1.5mAG and at proposed SPSs at Site OU.3.2 and OU.5.7 at 1.5mAG and 5mAG. However, the exceedance area was confined within the site boundaries and there is no existing ASRs in these exceedance areas. Should there be any fresh air intake at the proposed EPP and FWPF, it would be located away from these exceedance areas, i.e. 5mAG or below. No adverse odour impact due to the operation of the proposed EPP, FPPF and SPSs on any planned ASR is anticipated.

Exceedance Magnitude, Frequency and Odour Contribution by the Project

3.7.3.5 Owing to the exceedance predicted at the existing ASRs A26 and A33, their prediction results were further analyzed. The exceedance magnitude, exceedance frequency and the corresponding odour contribution by the Project and existing odour sources are presented in **Appendix 3.18**. For ASR A26, the existing San Tin Barracks STW is the closest odour source which is around 70 metres away in the north, while the closest odour source by the Project, the proposed SPS at OU.5.7, is much further away, 910 metres away in the northwest. It is expected that the existing San Tin Barracks STW is the dominant odour source because of the close proximity to A26. The breakdown of the odour contributions showed that the existing San Tin Barracks STW has contributed the most, up to 13.92 OU/m^3, during the time of exceedance. The frequency of exceedance in odour concentration at A26 is up to 0.89% of time in a year. While exceedance occurred, the Project would contribute less than 0.02 OU/m^3 only, as shown in Table 1 of **Appendix 3.18**, which is less than 0.4% of the odour criterion.

3.7.3.6 Similarly for ASR A33, the Retained Pig Farm which is around 130 metres away in the southwest is the closest odour source, while the closest odour source by the Project, the proposed RTS, is further south, around 420 metres away. Given the close proximity to A33, it is expected that the Retained Pig Farm is the dominant odour source. The breakdown of the odour contribution showed that the Retained Pig Farm contributed the most, up to 12.55 OU/m^3, during the time of exceedance. The frequency of exceedance in odour concentration at A33 is up to 6.00% of time in a year. The Project would contribute less than 0.07 OU/m^3 only for exceedance at A33, as shown in Table 1 of **Appendix 3.18**, which is less than 1.4% of the odour criterion.

3.7.3.7 Regarding the odour sources by the Project, namely the proposed EPP, FWPF, RTS, and the three SPSs, optimal design against the potential odour impact has been considered. All odour sources in the EPP will be covered and with odourous gas conveyed for treatment at DOs with 2-stage deodourization system at overall practical odour removal efficiency of 97%. The proposed DOs would be two-stage biofilters and dry scrubbing (carbon or impregnated media). The exhaust of the DO is also designed to located furthest away and pointing away from any ASRs as far as practicable to further minimize any odour impact on the ASRs. Further relocation of DO exhaust away from ASRs would be limited by engineering constraint, e.g. limitation of space and height restriction.

3.7.3.8 Although the detailed design of FWPF is not available at this stage, optimal design is recommended to minimize the potential odour impact. The FWPF will be enclosed with negative pressure to prevent untreated foul air escaping the structure. The odorous air will be vented to the deodourizing unit with activated carbon filter for odour treatment prior to discharge. The exhaust of the DO is also designed to be located furthest away and pointing away from any ASRs as far as practicable to further minimize any odour impact on the ASRs. Further relocation of DO exhaust away from ASRs would be limited by engineering constraint, e.g. limitation of space and height restriction.

3.7.3.9 Similar to other existing RTSs in Hong Kong, proven odour control measures would be implemented in the design of the proposed RTS, such as enclosing the odourous facilities, maintaining negative pressure to prevent foul air from escaping the building, and provision of odour removal system (i.e. wet chemical scrubber with H_2S and NH_3 removal efficiencies of 99.9% and 90% respectively) at the ventilation exhaust to control odour emission. The exhaust of the DO is also designed to be located furthest away and pointing away from any ASRs as far as practicable to further minimize any odour impact on the ASRs. Nevertheless, the design of the proposed RTS will be conducted by another party and its potential odour impact will be further evaluated in a separate Schedule 2 EIA to ensure its environmental acceptability.

3.7.3.10 For the proposed SPSs, appropriate mitigation measures commonly adopted in other existing SPSs in Hong Kong would be implemented in the design, such as enclosing the odourous facility, maintaining negative pressure to prevent foul air from escaping the building, and provision of odour removal system with odour removal efficiency of at least 95% (>99.5% removal for H_2S) at the ventilation exhaust to control the potential odour emission. The exhaust of the DO is also designed to be located furthest away and pointing away from any ASRs as far as practicable to further minimize any odour impact on the ASRs. Given the abovementioned optimal design, it is therefore considered that the odour control measures for the Project have been exhausted.

3.7.3.11 With the implementation of the Project, 9 existing livestock farms within the Project area will be removed. A further quantitative assessment with dispersion model has been conducted to compare the change in odour impact between Existing (Without Project) and Future (With Project) Scenarios and it is presented in **Appendix 3.20**. Comparing with the odour emission inventory under the Future scenario (i.e. with proposed EPP, FWPF, RTS, and SPSs), the reduction in odour emission would be around 84%. The comparison showed that there would be improvement in odour impact on both A26 and A33 with the implementation of the Project as summarized in **Table 3.25**. The change in spatial odour concentration within the exceedance areas were also evaluated and is presented in **Appendix 3.20**. The spatial comparison showed that no existing and future air sensitive uses within the exceedance zone, including openable window / fresh air intakes of the ventilation system or recreational uses in open space, would suffer from odour impact due to the Project. It is concluded that the Project would induce an improvement in cumulative odour impact for all existing ASRs at all assessment heights and all planned ASRs in the Project area in general compared to that of existing condition without removal of the nine livestock farms.

Table 3.25 Comparison of Odour Impact between Existing and Future Scenarios

ASR ID	Height (mAG)	5-second Average Odour Concentration (OU/m^3)		Change
		Future Scenario	Existing Scenario	
A26	1.5	**13.94**	**15.47**	-1.53
A26	5	**13.39**	**14.92**	-1.53
A26	10	**12.23**	**14.04**	-1.80
A26	15	4.74	**6.68**	-1.94
A33	1.5	**12.59**	**12.68**	-0.09
A33	5	**11.28**	**11.41**	-0.14
A33	10	**10.97**	**11.04**	-0.07
A33	15	**5.11**	**5.14**	-0.03

Remark:
Bold value indicates exceedance in odour criterion of 5 OU/m^3 stipulated in EIAO-TM.

3.7.3.12 In summary, with the implementation of odour control measures in design as discussed in **Section 3.5.3** and **Section 3.7.3,** the odour sources of the Project, namely the proposed EPP, FWPF, RTS, and the three SPSs, would contribute up to 0.16 OU/m^3 as shown in Table 2 of **Appendix 3.18**, where contributions from the Project alone are presented. These odour control measures for the Project have been exhausted. Improvement in odour impact on the concerned locations has been predicted with the implementation of the Project, i.e. environmental benefit is anticipated. Therefore, no adverse residual odour impact is expected due to the odour sources of the Project.

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.
- 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 the 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.

3.8.3 Operation Phase (Odour Impact)

3.8.3.1 With reference to **Section 3.7.3**, no adverse residual odour impact is anticipated due to the Project during the operational phase, with the implementation of odour control measures in design as mentioned in **Section 3.5.3**. No adverse residual odour impact is anticipated.

3.8.3.2 In view of the predicted exceedance of the odour impact at the existing ASRs as presented in **Section 3.7.3**, odour control measures of the Project have been reviewed. In general, all odour sources will be covered and the odourous gas will be conveyed to DOs for treatment, for example EPP with 2-stage deodourization system at overall practical odour removal efficiency of 97%, activated carbon filter for FWPF, and odour removal system with odour removal efficiency of at least 95% (>99.5% removal for H_2S) for the SPSs. Odour removal system for RTS has been assumed, while the detailed design will be confirmed in later separate Schedule 2 EIA. The exhaust of the DO is also designed to located furthest away and pointing away from any ASRs as far as practicable to further minimize any odour impact on the ASRs. It is therefore considered that the odour control measures for the Project have been exhausted.

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 impact is expected during the operation phase of the Project.

3.9.3 Operation Phase (Odour)

3.9.3.1 Within the Project area there are nine existing livestock farms which would be removed, including two chicken farms and seven pig farms located at the southern portion of the Project area. With the removal of these livestock farms and their odorous sources, it is anticipated the overall odour emission in the area would be improved. Comparing with the odour emission inventory under the 'with Project' scenario (i.e. with proposed EPP, FWPF, RTS, and SPSs), the reduction in odour emission would be around 84%, which indicates a significant improvement to the Project area in general.

3.9.3.2 With the implementation of odour control measures in design at the proposed EPP, FWPF, RTS and the three SPSs mentioned in **Section 3.5.3** and **Section 3.7.3**, the odour control measures have been exhausted.

3.9.3.3 Considering the cumulative odour impact due to the Project, the Retained Pig Farm and existing San Tin Barracks STW, exceedance of odour impact was predicted at attitude below 20mAG within the development sites discussed in **Section 3.7.3.2** and **3.7.3.3**. The uses at these sites are to be air conditioned with their fresh air intake positioned at 20mAG or above. No adverse residual odour impact would be expected at these planned ASRs.

3.9.3.4 Potential odour exceedances were predicted at two existing ASRs A26 and A33 for a short duration of time (up to 0.89% and 6.00% of time in a year) during operation phase of the Project. The Project would only contribute less than 0.02 OU/m^3 and less than 0.07 OU/m^3 at A26 and A33 respectively, less than 0.1 OU/m^3 during the non-compliance period. As mentioned in **Section 3.9.3.1**, the odour emission from existing livestock farms at the Project area would be significantly decrease as all existing nine livestock farms within the Project area would be removed. The Project would induce an improvement in odour impact for the Project area in general compared to that of existing condition without removal of the nine livestock farms as mentioned in **Section 3.7.3.11**.

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 NENT, the Loop and NOL, 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 Pollutants)

3.10.2.1 No adverse impact would be generated during the operation phase of the Project. No EM&A would be required during the operation of the Project.

3.10.3 Operation Phase (Odour)

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 effluent polishing plant, it is recommended to conduct the odour monitoring in terms of hydrogen sulphide (H_2S) at the deodorizers upon commissioning and in the first three years to determine whether it can meet the overall

97% 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 For the proposed FWPF, continuous monitoring of H_2S and NH_3 concentrations and air flow at the exhaust outlet of the deodourization system are recommended after commissioning to ensure the actual odour emission rate not exceeding the emission limit adopted in the calculation shown in **Appendix 3.10**.

3.10.3.3 For both STLMC EPP and FWPF, 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 deodourizers during operation of STLMC EPP / FWPF 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.

3.10.3.4 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 an EP would be submitted under this EIA for DP1, DP2, DP3, DP6 and DP7.

New Primary Distributor and District Distributor Road (DP1)

3.11.1.2 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 of these DP roads as mentioned in Section 3.7.

New San Tin Lok Ma Chau Effluent Polishing Plant (STLMC EPP) (DP2)

3.11.1.3 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 3.8.3**), 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.

New Water Reclamation Plant (DP3), Revitalisation of San Tin Eastern Main Drainage Channel (DP6), Recreational Development within Deep Bay Buffer Zone 2 (DP7)

3.11.1.4 With the proper implementation of dust mitigation measures for construction activities (as detailed in Section 3.8), no unacceptable dust impact during the constructional stage would be resulted from these DPs. There is no emission source associated with these facilities, thus there is no adverse operational air quality impact from these facilities.

Other DPs

3.11.1.5 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.

- Refuse Transfer Station (RTS) (DP4);
- 400kV Electricity Substation (DP5).

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 excavation, 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 the 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 vehicular emission from existing and planned open roads within 500m assessment area, emission from biogas facilities of the planned EPP, and 4-km major point source has been evaluated. The prediction results concluded that the cumulative NO_2, RSP, FSP and SO_2 concentrations at all existing and planned ASRs would comply with AQOs. The predicted methane, HCl, HF and formaldehyde 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, FWPF, RTS and the three SPSs, the Retained Pig Farm and Existing San Tin Barracks STW have been evaluated. The predicted odour impact on existing ASRs would comply with the criterion stipulated in EIAO-TM, except at ASR A26 and A33. Exceedance of odour impact was predicted at attitude of 15mAG or below within the development sites near the Retained Pig Farm and Existing San Tin Barracks STW. The uses at these sites are to be air conditioned with their fresh air intake positioned at 20mAG or above. Therefore, it is concluded that no adverse odour impact is anticipated at the existing and planned ASRs, except A26 and A33.

3.12.2.3 Potential odour exceedances were predicted at two existing ASRs A26 and A33 for a short duration of time (up to 0.89% and 6.00% of time in a year) during operation phase of the Project. The Project would only contribute less than 0.02 OU/m^3 at A26 and less than 0.07 OU/m^3 at A33 during non-compliance period, which is less than 0.1 OU/m^3. The odour control measures for the Project have been exhausted. Improvement in odour impact on the concerned locations (all existing ASRs at all assessment heights within the exceedance zone and project sites within the exceedance zone) has been predicted with the implementation of the Project, i.e. environmental benefit is anticipated. It is therefore concluded that there is no adverse residual odour impact arising from the Project.