



翠谷工程有限公司
Green Valley Landfill, Limited

South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.16

August 2023

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翠谷工程有限公司
Green Valley Landfill, Limited

South East New Territories (SENT) Landfill Extension

Environmental Certification Sheet EP-308/2008/B and FEP-01/308/2008/B


Reference Document/Plan

Document/Plan to be Certified/Verified:	Quarterly Environmental Monitoring & Audit Report No. 16 for South East New Territories (SENT) Landfill Extension
Date of Report:	23 August 2023

Reference EM&A Manual Requirement

EM&A Manual:	Section 11.4
The quarterly EM&A summary report shall be prepared by the ET, certified by the ET Leader and verified by the IEC. The quarterly EM&A summary report should contain all information listed under Section 11.4 of the approved EM&A Manual.	

ET Certification

I hereby certify that the above referenced document/plan complies with the above referenced EM&A Manual requirement.	
Terence Fong, Environmental Team Leader: (ERM Hong-Kong, Limited)	 Date: 23 August 2023

IEC Verification



I hereby verify that the above referenced document/plan complies with the above referenced EM&A Manual requirement.	
Claudine Lee, Independent Environmental Checker: (Meinhardt Infrastructure and Environment Limited)	 Date: 24 August 2023

South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.16

Environmental Resources Management

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Client: Green Valley Landfill Ltd.		Project No: 0465169			
Summary: This document presents the Quarterly EM&A Report No.16 for <i>South East New Territories (SENT) Landfill Extension</i>		Date: 23 August 2023			
		Approved by:  Terence Fong Partner			
0	Quarterly EM&A Report No.16	AL	TF	TF	23 Aug 23
Revision	Description	By	Checked	Approved	Date
<p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p> <p>This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.</p>		<p>Distribution</p> <p><input type="checkbox"/> Internal</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p> 			

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EXECUTIVE SUMMARY

The SENT Landfill Extension (SENTX) forms an integral part in the Strategic Plan in maintaining the continuity of landfill capacity in the Hong Kong for the cost-effective and environmentally satisfactory disposal of waste. ERM-Hong Kong, Limited (ERM) is commissioned to undertake the role of Environmental Team (ET) for the construction, operation/restoration and aftercare of SENTX Project (“the Project”) in accordance with the requirements specified in the Environmental Permit (EP), updated Environmental Monitoring and Audit (EM&A) Manual, the approved Environmental Impact Assessment (EIA) Report of the Project taking account of the latest design and other relevant statutory requirements. The construction (not including works related to site clearance and preparation) of the Project commenced on 2 January 2019.

This Quarterly EM&A report presents the EM&A works carried out during the period from 1 October 2022 to 31 December 2022 for the Project in accordance with the updated EM&A Manual.

Exceedance of Action and Limit Levels for Air Quality

Two exceedances of the Limit Level for landfill gas flare stack emission (SO₂) and one exceedance of Limit Level for landfill gas flare stack emission (Benzene) were recorded for air quality monitoring in the reporting period. The landfill gas flare stack emission (SO₂) exceedances on 14 October 2022 and 17 November 2022 and landfill gas flare stack emission (Benzene) exceedance on 13 December 2022 were considered Project-related upon further investigation.

Exceedance of Action and Limit Levels for Noise

No exceedance of Action and Limit Levels for operation/ restoration phase noise monitoring was recorded in the reporting period.

Exceedance of Action and Limit Levels for Water Quality

Six exceedances of the Limit Level for Leachate Level and one exceedance of Limit Level for leachate quality (Chromium) were recorded for water quality impact monitoring in the reporting period. The leachate level exceedances at Pump Station No. 4X from 1 October to 3 October 2022, the leachate level exceedances at Pump Station No. 3X on 3 November 2022 and Pump Station No. 4X from 3 November 2022 to 4 November 2022 and leachate (Chromium) exceedance on 6 December 2022 were considered Project-related upon further investigation.

Exceedance of Action and Limit Levels for Landfill Gas

One exceedance of the Limit Level for perimeter landfill gas monitoring was recorded in the reporting period. The perimeter landfill gas exceedance at LFG13 on 3 October 2022 was considered non Project-related upon further investigation.

Environmental Complaints, Summons and Prosecutions

There were no complaints, notification of summons or prosecution recorded in the reporting period.

Reporting Change

There was no reporting change in the reporting period.

1 INTRODUCTION

1.1 BACKGROUND

The SENT Landfill Extension (SENTX) forms an integral part in the Strategic Plan in maintaining the continuity of landfill capacity in the Hong Kong for the cost-effective and environmentally satisfactory disposal of waste. The *Environmental Impact Assessment (EIA) Report* and the associated *Environmental Monitoring and Audit (EM&A) Manual* for the construction, operation, restoration and aftercare of the SENTX (hereafter referred to as “the Project”) have been approved under the *Environmental Impact Assessment Ordinance (EIAO)* in May 2008 (Register No.: AEIAR-117/2008) (hereafter referred to as the approved EIA Report) and an Environmental Permit (EP-308/2008) (EP) was granted by the Director of Environmental Protection (DEP) on 5 August 2008.

Since then, applications for Variation of an Environmental Permit (No. VEP-531/2017) were submitted to EPD and the Variation of Environmental Permits (EP-308/2008/A and EP-308/2008/B) were granted on 6 January 2012 and 20 January 2017, respectively, as the Hong Kong SAR Government has decided to reduce the scale of the design scheme of SENTX assessed in the approved EIA Report and SENTX will only receive construction waste. In May 2018, a Further Environmental Permit (FEP) (FEP-01/308/2008/B) was granted to the SENTX’s contractor, Green Valley Landfill, Limited (GVL).

ERM-Hong Kong, Limited (ERM) and Meinhardt Infrastructure and Environment Limited (Meinhardt) are commissioned to undertake the roles of Environmental Team (ET) and the Independent Environmental Checker (IEC), respectively, to undertake the EM&A activities for the Project in accordance with the requirements specified in the EP, updated EM&A Manual ⁽¹⁾, approved EIA Report ⁽²⁾ taking account of the latest design and other relevant statutory requirements.

1.2 PROJECT DESCRIPTION

The SENTX is a piggyback landfill, occupying the southern part of the existing SENT Landfill (including its infrastructure area) and 13 ha of Tseung Kwan O (TKO) Area 137. A layout plan of the SENTX is shown in *Figure 1.1*. Under the latest design, the SENTX has a net void capacity of about 6.5 Mm³ and provides an additional lifespan of about 6 years, commencing operation upon exhaustion of the SENT Landfill. The SENTX will receive construction waste only.

- (1) ERM (2018). South East New Territories (SENT) Landfill Extension: Environmental Monitoring & Audit Manual
- (2) ERM (2007). South East New Territories (SENT) Landfill Extension – Feasibility Study: Environmental Impact Assessment Report

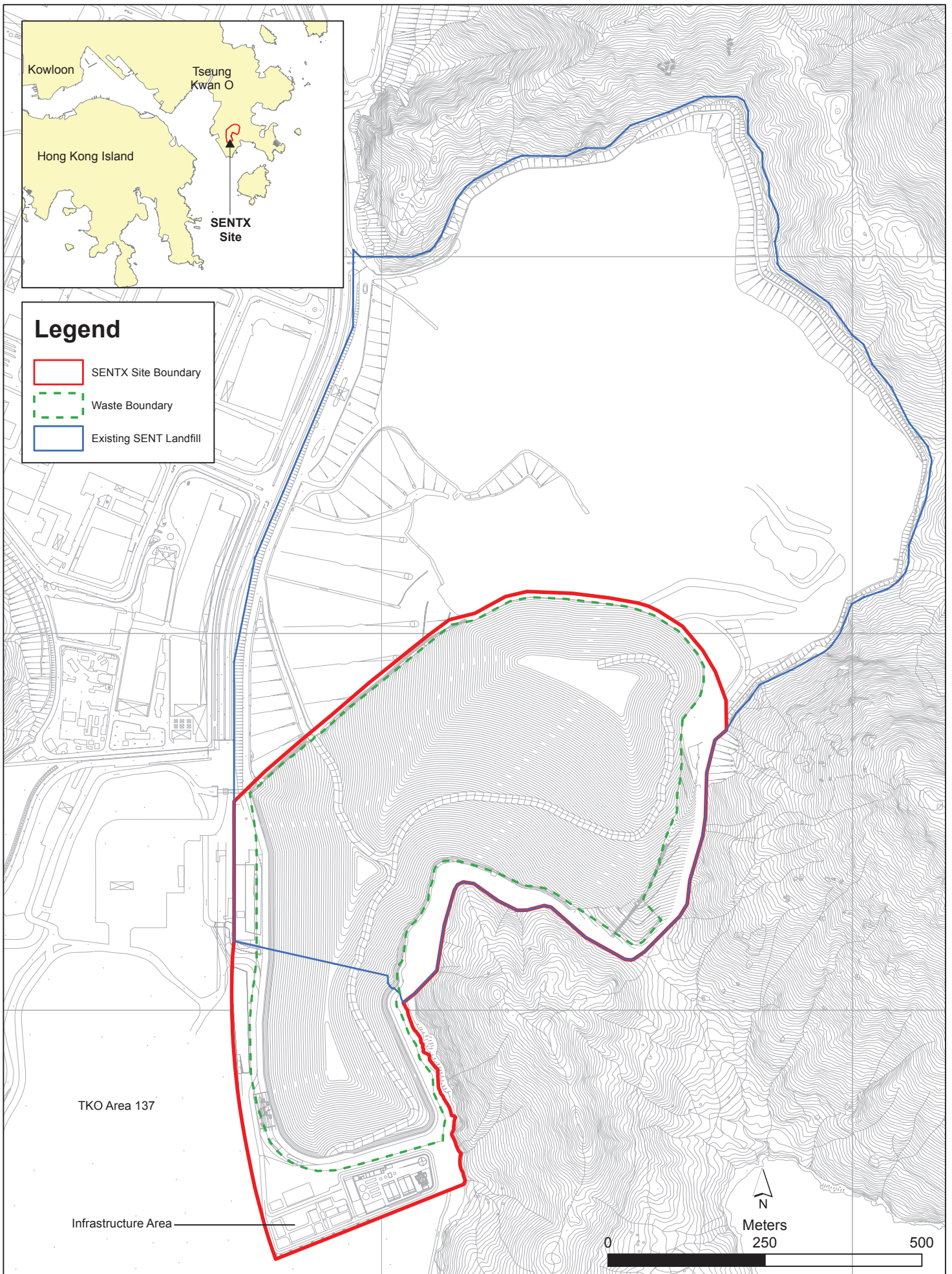


Figure 1.1

Layout Plan of SENTX

File: T:\GIS\CONTRACT\0354924\Mxd\0354924_Layout_Plan_of_SENTX.mxd
 Date: 5/9/2018

The key implementation milestones of the Project are indicatively summarised in *Table 1.1*. The construction works and operation of the Project commenced on 2 January 2019 and 21 November 2021, respectively.

Table 1.1 *Estimated Key Dates of Implementation Programme*

Key Stage of the Project	Indicative Date
Start construction	2 January 2019
Commissioning of new infrastructure facilities	2020
Demolition of existing infrastructure facilities	2021
Start waste intake at SENTX	21 November 2021
Estimated exhaustion date of SENTX	2027
End of aftercare for SENTX	2057

The major construction works of the SENTX includes:

- Site formation at the TKO Area 137 and the existing infrastructure area at SENT Landfill;
- Construction of surface and groundwater drainage systems;
- Construction of the leachate containment and collection systems;
- Construction of new leachate and landfill gas treatment facilities, site offices, maintenance yards at the new infrastructure area;
- Construction of new pipelines to transfer the leachate and landfill gas collected from the existing SENT Landfill to the treatment facilities at the new infrastructure area;
- Construction of the site access and new waste reception facilities; and
- Demolition of the facilities at the existing SENT Landfill infrastructure area.

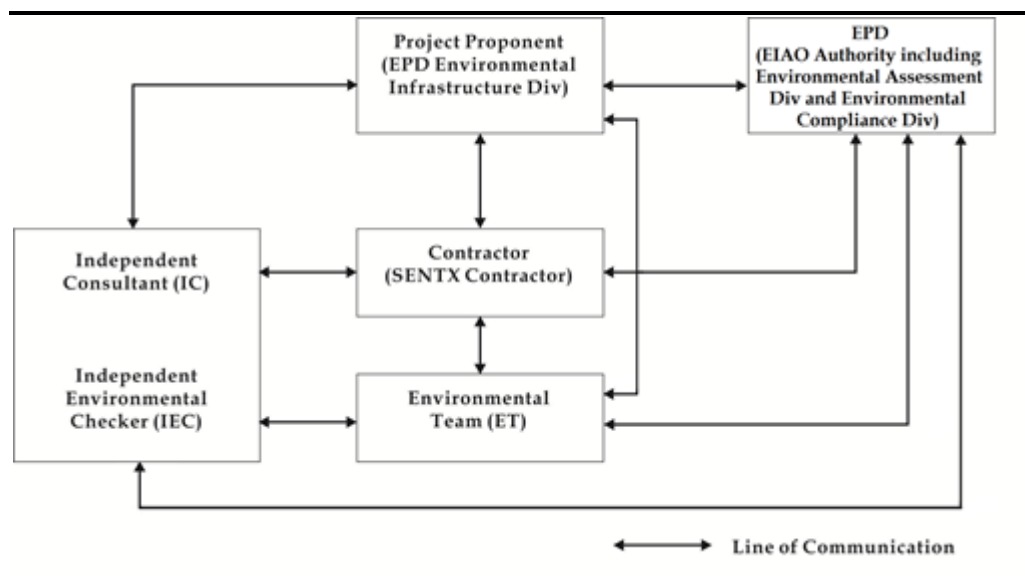
1.3 *SCOPE OF THE EM&A REPORT*

This is the Quarterly EM&A Report for the Project which summarises the key findings of the EM&A programme during the reporting period from 1 October 2022 to 31 December 2022 for the construction and operation works.

1.4 *PROJECT ORGANISATION*

The organisation structure of the Project is presented in *Figure 1.2*.

Figure 1.2 Organisation Chart



Contact details of the key personnel are summarized in *Table 1.2* below.

Table 1.2 Contact Information of Key Personnel

Party	Position	Name	Telephone
Contractor (Green Valley Landfill Limited)	Project Manager	Carl Lai	2706 8829
Environmental Team (ET) (ERM-Hong Kong, Limited)	ET Leader	Terence Fong	2271 3156
Independent Environmental Checker (IEC) (Meinhardt Infrastructure and Environment Limited)	IEC	Claudine Lee	2859 5409

1.5 SUMMARY OF CONSTRUCTION WORKS

The programme of the construction is shown in *Annex A*. As informed by the Contractor, the major works carried out in this reporting period include:

October 2022

- Rectification of defects at Landfill Gas (LFG) Plant, Leachate Treatment Plant (LTP), infrastructure area and waste reception area;
- Installation of roof planter at infrastructure area;
- Rectification of defects for underground utilities and pipe;
- Construction of Cell 4X and SENT tie in area and rock wall;
- Demolition of existing DP3 channel;

- Tree removal at Cell 4X and SENT tie in area;
- Deployment of liner at Cell 4X and SENT tie in area;
- Maintenance and improvement of temporary surface water drainage; and
- Rectification of utilities installation along Western bund of Cell 4X.

November 2022

- Rectification of defects at Landfill Gas (LFG) Plant, Leachate Treatment Plant (LTP), infrastructure area and waste reception area;
- Construction of Cell 4X and SENT tie in area;
- Maintenance and improvement of temporary surface water drainage;
- Rectification of utilities installation along Western bund of Cell 4X;
- Deployment of 1350g/m² non-woven geotextile cushion layer at Cell 4X Buttress Wall 1st bench; and
- Deployment of 540g/cm² non-woven geotextile, geocomposite, GCL, 60mil HDPE double-textured geomembrane, 80mil HDPE double-textured geomembrane at Cell 4X (tie-in with SENT landfill) at North side.

December 2022

- Rectification of defects at Landfill Gas (LFG) Plant, Leachate Treatment Plant (LTP), infrastructure area and waste reception area;
- Construction of Cell 4X tie-in to SENT and rockwall;
- Construction of Cell 4X overflow weir;
- Maintenance and improvement of temporary surface water drainage; and
- Construction of DP3 leachate pipe connection.

The implementation schedule of the mitigation measures recommended in the Updated EM&A Manual is presented in *Annex B*.

1.6

SUMMARY OF EM&A PROGRAMME REQUIREMENTS

The status for all environmental aspects are presented in *Table 1.3*. The EM&A requirements remained unchanged during the reporting period.

Table 1.3 Summary of Status for the Environmental Aspects under the Updated EM&A Manual

Parameters	Status
Air Quality	
Baseline Monitoring	The results of baseline air quality monitoring were reported in Baseline Monitoring Report and Pre-operation Baseline Monitoring Report and submitted to EPD under EP Condition 3.3
Impact Monitoring	On-going
Noise	
Baseline Monitoring	The results of baseline noise monitoring were reported in Baseline Monitoring Report and submitted to EPD under EP Condition 3.3
Impact Monitoring	On-going
Water Quality	
Baseline Monitoring	The results of baseline surface water quality monitoring were reported in Baseline Monitoring Report and Pre-operation Baseline Monitoring Report and submitted to EPD under EP Condition 3.3
Impact Monitoring	On-going
Landfill Gas	
Impact Monitoring	On-going
Waste Management	
Waste Monitoring	On-going
Landscape and Visual	
Baseline Monitoring	The results of baseline landscape and visual monitoring were reported in Baseline Monitoring Report and submitted to EPD under EP Condition 3.3
Construction Phase Audit	On-going
Site Environmental Audit	
Regular Site Inspection	On-going
Complaint Hotline and Email Channel	On-going
Environmental Log Book	On-going

Taking into account the operation works, impact monitoring of air quality, noise, water quality, landfill gas and waste management were carried out in the reporting period. The impact monitoring schedule of air quality, noise, water quality and landfill gas monitoring are provided in *Annex C*.

The EM&A programme also involved environmental site inspections and related auditing conducted by the ET for checking the implementation of the required environmental mitigation measures recommended in the approved EIA Report and relevant EP submissions. To promote the environmental awareness and enhance the environmental performance of the contractors, environmental trainings and regular environmental management meetings were conducted during the reporting period, which are summarised as below:

- Three environmental management meetings were held with the Contractor, ER, ET, IEC and EPD on 20 October 2022, 17 November 2022 and 15 December 2022; and
- Environmental toolbox trainings on the following topics were provided by the Contractor to the workers:
 - Good Vehicle Maintenance Practices on 5 October 2022;

- Mosquito Prevention on 19 October 2022;
- VOC and Smog on 9 November 2022;
- QPME on 23 November 2022;
- Construction Dust on 7 December 2022; and
- Chemical Waste Handling on 21 December 2022.

1.7 STATUS OF STATUTORY ENVIRONMENTAL COMPLIANCE WITH THE ENVIRONMENTAL PERMIT

The status of statutory environmental compliance with the EP conditions under the EIAO, submission status under the EP and implementation status of the recommended mitigation measures are presented in *Table 1.4*.

Table 1.4 *Status of Submissions required under the EP and Implementation Status of the recommended Mitigation Measures*

EP Condition	Submission/ Implementation Status	Status
2.3	Management Organisation of Main Construction Companies	Submitted and accepted by EPD.
2.4	Setting up of Community Liaison Group	Community Liaison Group was set up.
2.5	Submission of Detailed Landfill Gas Hazard Assessment Report	Submitted, and accepted by EPD on 10 January 2019.
2.6	Submission of Restoration and Ecological Enhancement Plan	Submitted to EPD on 28 June 2019.
2.7	Setting up of Trial Nursery	Trial Nursery works was commenced on 28 August 2019.
2.8	Advance Screen Planting	Advance Screen Planting works were completed on 28 June 2019.
2.9	Provision of Multi-layer Composite Liner System	Under implementation.

1.8 STATUS OF OTHER STATUTORY ENVIRONMENTAL REQUIREMENTS

The environmental licenses and permits (including EP, *Water Pollution Control Ordinance* (WPCO) discharge license, registration as a chemical waste producer, and construction noise permit) that are valid in the reporting period are presented in *Table 1.5*. No non-compliance with environmental statutory requirements was identified.

Table 1.5 *Status of Statutory Environmental Requirements*

Description	Ref No.	Status
Environmental Permit	EP-308/2008	Granted on 5 August 2008
Variation of Environmental Permit	EP-308/2008/A	Granted on 6 January 2012
	EP-308/2008/B	Granted on 20 January 2017
Further Environmental Permit	FEP-01/308/2008/B	Granted on 16 May 2018

Description	Ref No.	Status
Water Discharge License under WPCO (Permit Holder: GVL)	Licence No.: WT00041447-2022	Validity from 17 June 2022 to 30 June 2024
Billing Account for Disposal of Construction Waste	Chit Account Number: 5001692	Approved on 28 December 2005
Registration as a Chemical Waste Producer (Permit Holder: GVL)	5296-839-G2228-01	Issued on 31 December 2015
Construction Noise Permit (Permit Holder: GVL)	GW-RE0956-22	Validity from 23 September 2022 to 14 March 2023

The EM&A programme for the Project required environmental monitoring for air quality, noise, water quality and landfill gas as well as environmental site inspections for air quality, noise, water quality, landfill gas, waste management, and landscape and visual impacts. The EM&A requirements and related findings for each component are summarised in the following sections.

2.1 AIR QUALITY MONITORING

2.1.1 Dust Monitoring

Monitoring Requirements and Equipment

According to the updated EM&A Manual of the Project, impact dust monitoring (in term of Total Suspended Particulates (TSP)) was carried out at the four designated locations along the site boundary (i.e. AM1, AM2, AM3 and AM4) during the operation/restoration phase, at a 6-day interval.

The Action and Limit Levels of the air quality monitoring is provided in *Table 2.1* below.

Table 2.1 *Action and Limit Levels for 24-hour TSP*

Monitoring Station	Action Level	Limit Level
AM1 - SENTX Site Boundary (North)		
AM2 - SENTX Site Boundary (West, near DP3)	260 $\mu\text{g m}^{-3}$	260 $\mu\text{g m}^{-3}$
AM3 - SENTX Site Boundary (West, near RC15)		
AM4 - SENTX Site Boundary (West, near EPD building)		

High volume air samplers (HVSs) in compliance with the specifications listed under Section 3.2.2 of the updated EM&A Manual were used to measure 24-hour TSP levels at the CEDD dust monitoring stations. The HVSs were calibrated upon installation and thereafter at bi-monthly intervals to check the validity and accuracy of the results.

The equipment used in the impact air quality monitoring programme and monitoring locations are summarised in *Table 2.2* and illustrated in *Figure 2.1* respectively.

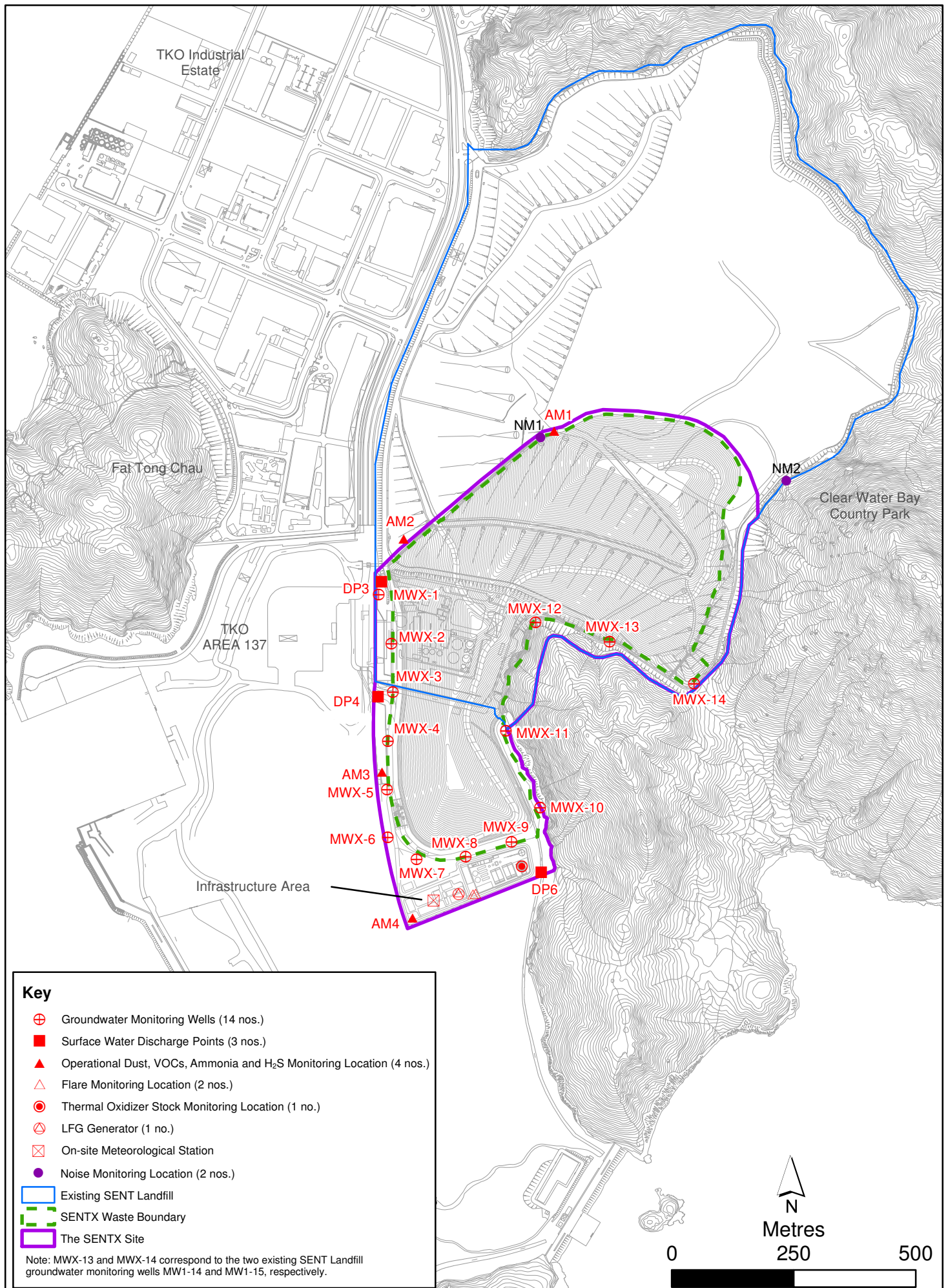


Figure 2.1

Environmental Monitoring Locations

Table 2.2 *Dust Monitoring Details*

Monitoring Station	Location	Parameter	Frequency and Duration	Monitoring Dates	Equipment
AM1	SENTX Site Boundary (North)	24-hour TSP	Once every 6 days	3, 9, 15, 21, 27 October 2022	Tisch TE-5170 (S/N: 1190)
AM2	SENTX Site Boundary (West, near DP3)			2, 8, 14, 20, 26 November 2022	Tisch TE-5170 (S/N: 1047)
AM3	SENTX Site Boundary (West, near RC15)				Tisch TE-5170 (S/N: 1258)
AM4	SENTX Site Boundary (West, near EPD building)			2, 8, 14, 20, 21, 26 December 2022	Tisch TE-5170 (S/N: 1101)

Monitoring Schedule for the Reporting Period

The schedule for air quality monitoring during the reporting period is provided in *Annex C*.

Results and Observations

The 24-hour TSP monitoring results are summarised in *Table 2.3*. The detailed monitoring results and the graphical presentation of the 24-hour TSP monitoring results at each monitoring location are provided in *Annex D1*.

Table 2.3 *Summary of 24-hour TSP Monitoring Results in the Reporting Period*

Month	Monitoring Station	24-hr TSP Concentration ($\mu\text{g m}^{-3}$)		Action Level ($\mu\text{g/m}^3$)	Limit Level ($\mu\text{g/m}^3$)
		Average	Range		
October 2022	AM1	93	64 - 136	260	260
	AM2	87	71 - 126	260	260
	AM3	134	111 - 194	260	260
	AM4	118	66 - 243	260	260
November 2022	AM1	111	45 - 228	260	260
	AM2	59	33 - 95	260	260
	AM3	83	45 - 126	260	260
	AM4	55	37 - 67	260	260
December 2022	AM1	107	29 - 225	260	260
	AM2	89	34 - 121	260	260
	AM3	124	66 - 180	260	260
	AM4	100	55 - 136	260	260

The major dust sources in the reporting period included fugitive dust emission from exposed area in SENTX, as well as nearby operations of the SENT landfill and the TKO Area 137 Fill Bank.

All the 24-hour TSP results were below the Action and Limit Levels at the monitoring locations in the reporting period. No action is thus required to be

undertaken in accordance with the Event and Action Plan presented in *Annex D2*.

Meteorological Data

Meteorological data obtained from the SENTX on-site meteorological monitoring station was used for the dust monitoring and is shown in *Annex D3*. It is considered that meteorological data obtained at the on-site meteorological monitoring station is representative of the Project area and could be used for the operation/restoration phase dust monitoring programme for the Project.

2.1.2 Odour Monitoring

Monitoring Requirements

According to the updated EM&A Manual of the Project, odour patrol was carried out along the site boundary during the operation/ restoration phase.

During the first month of operation, daily odour patrol (3 times per day) was conducted jointly by the ET and the IEC. The odour intensity detected was based on that determined by the IEC. In addition, an independent party (ALS Technichem (HK) Pty Ltd.) was appointed to undertake odour patrol together with the ET and IEC three times per week. During these patrols, the odour intensity detected was based on that determined by the independent third party.

Reduction of odour monitoring frequency from Period 1 (daily, three times per day) to Period 2 (weekly) was approved by EPD on 4 February 2022. Weekly odour patrol was conducted jointly by the ET and the IEC from 4 February 2022. In addition, an independent party (ALS Technichem (HK) Pty Ltd.) was appointed to undertake odour patrol together with the ET and IEC once every two weeks.

Reduction of odour monitoring frequency from Period 2 (weekly) to Period 3 (monthly) was approved by EPD on 2 June 2022. Monthly odour patrol was conducted jointly by the ET and the IEC from 28 June 2022. In addition, an independent party (ALS Technichem (HK) Pty Ltd.) was appointed to undertake odour patrol together with the ET and IEC quarterly.

The Action and Limit Levels for odour patrol is provided in *Table 2.4* below.

Table 2.4 *Action and Limit Levels for Odour Patrol*

Parameter	Action Level	Limit Level
Perceived odour intensity and odour complaints	<ul style="list-style-type: none"> • Odour intensity \geq Class 2 recorded; or • One documented complaint received 	<ul style="list-style-type: none"> • Odour intensity \geq Class 3 recorded on 2 consecutive patrol ^{(a) (b)}

Notes:

(a) i.e. either Class 3-strong or Class 4-extreme odour intensity.

(b) The exceedances of the odour intensity do not need to be recorded at the same location.

Odour patrol was conducted by trained personnel/competent persons with a specific sensitivity to a reference odour (i.e. on reference materials n-butanol with the concentration of 50ppm in nitrogen (v/v)) in compliance with Section 3.7.2 of the updated EM&A Manual patrolling and sniffing along the SENTX Site boundary to detect any odour.

The odour monitoring programme and patrol route are summarised in *Table 2.5* and illustrated in *Figure 2.2* respectively.

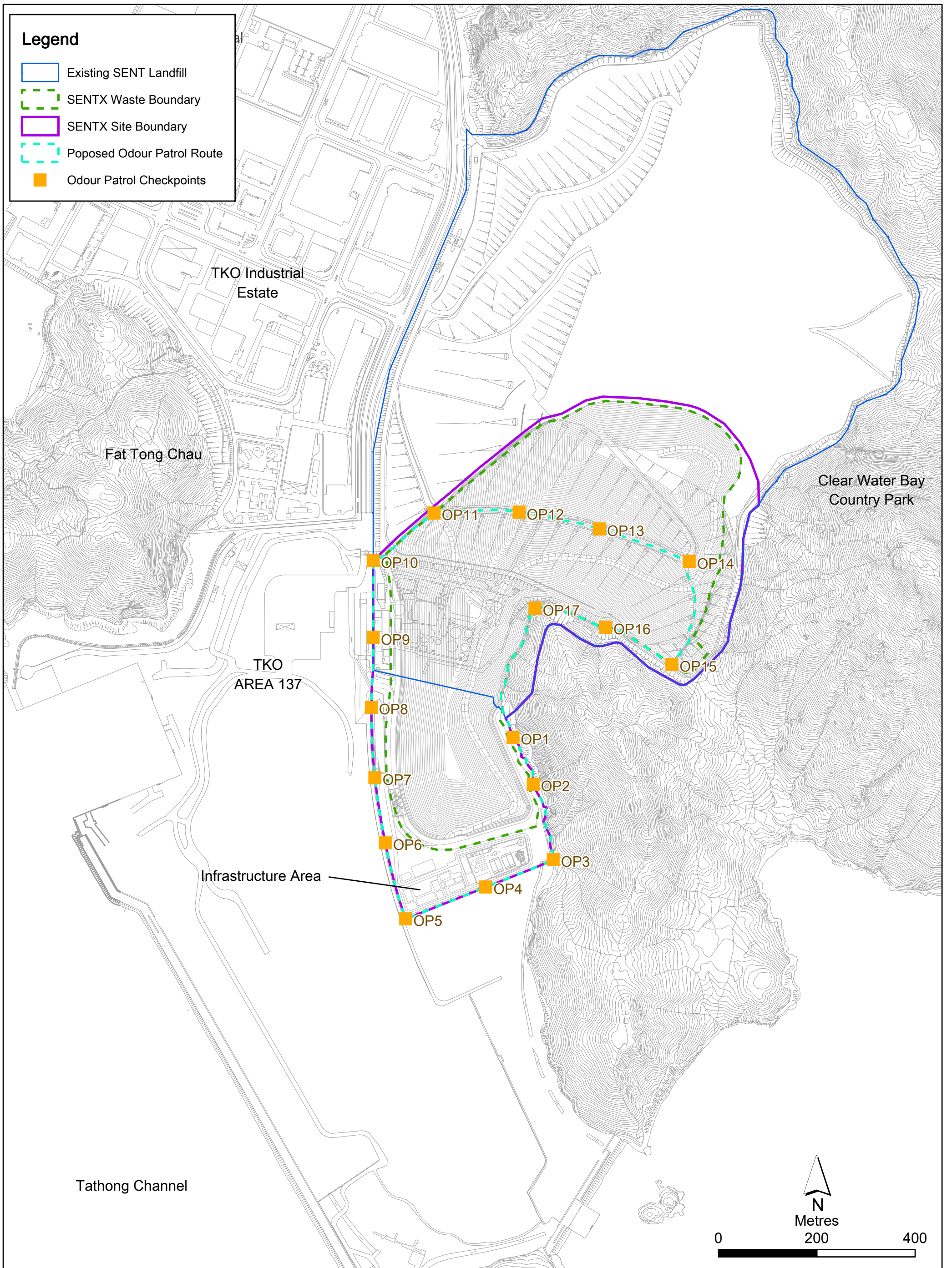


Figure 2.2

Odour Patrol Route for
Operation/ Restoration Phase Odour Monitoring

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Date: 18/8/2022

Environmental
Resources
Management



Table 2.5 Odour Monitoring Details

Patrol Locations	Parameters	Patrol Frequency ^(a)	Monitoring Dates and Time
Patrol along the SENTX Site Boundary (Checkpoints OP1 - OP17)	Odour Intensity (see Table 2.6)	<u>Period 1 - First month of operation</u>	<u>Conducted by ET & IEC:</u>
		Daily, three times a day in the morning, afternoon and evening/ night (between 18:00 and 22:00 hrs) conducted by the ET and the IEC	13 October 2022, 24 November 2022
		Three times per week on different days conducted by an independent third party together with the ET and IEC ^(b)	<u>Conducted by an independent third party, ET & IEC:</u> 13 December 2022
		<u>Period 2 - Three months following period 1 ^(c)</u>	
		Weekly conducted by the ET and the IEC	
		Once every two weeks conducted by an independent third party together with the ET and IEC ^(b)	
		<u>Period 3 - Throughout operation following period 2 ^(c)</u>	
		Monthly conducted by the ET and the IEC	
		Quarterly conducted by an independent third party together with the ET and IEC ^(b)	
Notes:			
(a) Reduction of monitoring frequency will be subject to the monitoring results to demonstrate environmentally acceptable performance.			
(b) Patrol shall be scheduled so that they are carried out together with the patrols to be carried out jointly by the ET and the IEC.			
(c) Commencement of each period will be justified by the ET Leader and verified by the IEC and will be subject to agreement with the EPD (EIAO Authority) and Project Proponent.			

Table 2.6 Odour Intensity Level

Class	Odour Intensity	Description
0	Not Detected	No odour perceived or an odour so weak that it cannot be easily characterised or described.
1	Slight	Identified odour, slight
2	Moderate	Identified odour, moderate
3	Strong	Identified odour, strong
4	Extreme	Severe odour

Monitoring Schedule for the Reporting Month

The schedule for odour patrol during the reporting period is provided in Annex C.

Results and Observations

The odour monitoring results are summarised and provided in *Table 2.7* and *Annex D4*, respectively.

Table 2.7 *Summary of Odour Monitoring Results in the Reporting Period*

Odour Checkpoints	Odour Intensity Class (Range)	Action Level	Limit Level
OP1	0	Odour intensity \geq Class 2 recorded	Odour intensity \geq Class 3 recorded on 2 consecutive patrol
OP2	0		
OP3	0		
OP4	0		
OP5	0		
OP6	0		
OP7	0		
OP8	0 - 1		
OP9	0 - 1		
OP10	0		
OP11	0		
OP12	0		
OP13	0		
OP14	0		
OP15	0		
OP16	0		
OP17	0		

The potential odour source in the reporting period included waste from tipping area and nearby operations of the Town Gas Plant.

All the odour monitoring results were below the Action and Limit Levels in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex D2*.

2.1.3 *Thermal Oxidiser, Landfill Gas Flare and Landfill Gas Generator Stack Emission Monitoring*

Monitoring Requirements and Equipment

According to the updated EM&A Manual of the Project, the performance of the thermal oxidiser, landfill gas flare and landfill gas generator was monitored when they are in operation. Gas samples were collected from the stack of the thermal oxidizer, landfill gas flare and landfill gas generator for laboratory analysis for NO₂, CO, SO₂, Benzene and Vinyl chloride and in-situ analysis for exhaust gas velocity at monthly interval and for laboratory analysis for non-methane organic compounds and ammonia (for thermal oxidizer only) at quarterly interval. The operating conditions of the thermal oxidiser, landfill gas flare and landfill gas generator were also monitored continuously.

The Limit Levels for stack emission of the thermal oxidiser, landfill gas flare and landfill gas generator are provided in *Tables 2.8 – 2.10* below.

Table 2.8 *Limit Levels for Stack Emission of the Thermal Oxidiser*

Parameters	Limit Level
NO ₂	1.58 gs ⁻¹
CO	0.53 gs ⁻¹
SO ₂	0.07 gs ⁻¹
Benzene	3.01 x 10 ⁻² gs ⁻¹
Vinyl chloride	2.23 x 10 ⁻³ gs ⁻¹
Gas combustion temperature	850°C (minimum)
Exhaust gas exit temperature	443K (minimum) ^(a)
Exhaust gas velocity	7.5 ms ⁻¹ (minimum) ^(a)
Note:	
(a) Level under full load condition.	

Table 2.9 *Limit Levels for Stack Emission of the Landfill Gas Flare*

Parameters	Limit Level
NO ₂	0.97 gs ⁻¹
CO	2.43 gs ⁻¹
SO ₂	0.22 gs ⁻¹
Benzene	4.14 x 10 ⁻⁴ gs ⁻¹
Vinyl Chloride	2.60 x 10 ⁻⁴ gs ⁻¹
Gas combustion temperature	815°C (minimum)
Exhaust gas exit temperature	923 K (minimum) ^(a)
Exhaust gas velocity	9.0 m s ⁻¹ (minimum) ^(a)
Note:	
(a) Level under full load condition.	

Table 2.10 *Limit Levels for Stack Emission of the Landfill Gas Generator*

Parameters	Limit Level
NO ₂	1.91 gs ⁻¹
CO	2.48 gs ⁻¹
SO ₂	0.528 gs ⁻¹
Benzene	2.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	1.88 x 10 ⁻⁵ gs ⁻¹
Gas combustion temperature	450°C (minimum)
Exhaust gas exit temperature	723K (minimum) ^(a)
Exhaust gas velocity	30.0 ms ⁻¹ (minimum) ^(a)
Note:	
(a) Level under full load condition.	

Gas samples were collected from the centroid of the stack with stainless steel sampling probe, into inert sample containers (i.e. Canister and Tedlar Bag) and transferred to ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066) laboratory within 24 hours of collection for direct analysis on a gas chromatography within 48 hours after collection. The flue gas velocity of the

gas stream at the exhaust of thermal oxidizer was determined by S-Pitot tube during the emission sampling.

The stack emission monitoring programme and monitoring locations are summarised in *Table 2.11* and illustrated in *Figure 2.1*, respectively.

Table 2.11 *Thermal Oxidiser, Landfill Gas Flare and Landfill Gas Generator Stack Emission Monitoring Details*

Monitoring Location	Parameter	Frequency	Monitoring Date
Stack of Thermal Oxidiser	Laboratory analysis for	Monthly for the first 12 months of operation and thereafter at quarterly intervals	17 October 2022, 17 November 2022, 13 December 2022
	• NO ₂		
	• CO		
	• SO ₂		
	• Benzene		
	• Vinyl chloride		
	In-situ analysis for		
	• Exhaust gas velocity		
	Laboratory analysis for	Quarterly for the 1 st year of operation ^(b)	17 November 2022
	• Non-methane organic compounds		
Laboratory analysis for	Quarterly	17 November 2022	
• Ammonia			
• Gas combustion temperature	Continuously	1 October - 31 December 2022	
• Exhaust temperature			
• Exhaust gas velocity ^(a)			
Stack of Landfill Gas Flare	Laboratory analysis for	Monthly for the first 12 months of operation and thereafter at quarterly intervals	14 October 2022, 17 November 2022, 13 December 2022
	• NO ₂		
	• CO		
	• SO ₂		
	• Benzene		
	• Vinyl chloride		
	In-situ analysis for		
	• Exhaust gas velocity		
	Laboratory analysis for	Quarterly for the 1 st year of operation ^(b)	17 November 2022
	• Non-methane organic compounds		
• Gas combustion temperature	Continuously	1 October - 31 December 2022	
• Exhaust temperature			
• Exhaust gas velocity ^(a)			

Monitoring Location	Parameter	Frequency	Monitoring Date
Stack of Landfill Gas Generator	Laboratory analysis for	Monthly for the first 12 months of operation and thereafter at quarterly intervals	14 October 2022, 18 November 2022 (c)
	<ul style="list-style-type: none"> • NO₂ • CO • SO₂ • Benzene • Vinyl chloride 		
	In-situ analysis for		
	<ul style="list-style-type: none"> • Exhaust gas velocity 		
	Laboratory analysis for	Quarterly for the 1 st year of operation (b)	18 November 2022
	<ul style="list-style-type: none"> • Non-methane organic compounds 		
	<ul style="list-style-type: none"> • Exhaust temperature • Exhaust gas velocity (a) 	Continuously	1 October - 31 December 2022

Note:

- (a) The exhaust gas velocity will be calculated based on the cross-section area of the stack and continuous monitored gas flow and combustion temperature data.
- (b) The monitoring results will be reviewed towards the end of the first year of operation to determine if monitoring of this parameter can be terminated upon agreement by the EIAO Authority, IEC and Project Proponent.
- (c) The Landfill Gas Generator was under maintenance in the reporting period.

Monitoring Schedule for the Reporting Month

The schedule for thermal oxidizer, landfill gas flare and landfill gas generator stack emission monitoring during the reporting period is provided in *Annex C*. The stack emission monitoring for landfill gas generator was attempted on 14 December 2022 and 28 December 2022. However, sampling of the landfill gas generator stack emission was unable to be carried out in December 2022 as the landfill gas generator was under maintenance.

Results and Observations

The thermal oxidizer, landfill gas flare and landfill gas generator stack emission monitoring results and detailed continuous monitoring results are summarised in *Tables 2.12 - 2.14* and provided in *Annex D5*, respectively.

Table 2.12 Summary of Thermal Oxidiser Stack Emission Monitoring in the Reporting Period

Parameters	Monitoring Results (Range in Bracket)	Limit Level
October 2022		
NO ₂	0.39 gs ⁻¹	1.58 gs ⁻¹
CO	<0.01 gs ⁻¹	0.53 gs ⁻¹
SO ₂	0.04 gs ⁻¹	0.07 gs ⁻¹
Benzene	<2 x 10 ⁻⁴ gs ⁻¹	3.01 x 10 ⁻² gs ⁻¹
Vinyl chloride	<1.3 x 10 ⁻⁴ gs ⁻¹	2.23 x 10 ⁻³ gs ⁻¹
Gas combustion temperature	926°C (901°C - 937°C)	850°C (minimum)
Exhaust gas exit temperature	1,248K (1,147K - 1,593K)	443K (minimum) ^(a)
Exhaust gas velocity	11.9 ms ⁻¹ ^(b)	7.5 ms ⁻¹ (minimum) ^(a)
November 2022		
NO ₂	0.28 gs ⁻¹	1.58 gs ⁻¹
CO	<0.01 gs ⁻¹	0.53 gs ⁻¹
SO ₂	0.07 gs ⁻¹	0.07 gs ⁻¹
Non-Methane Organic Carbons	<1.0 x 10 ⁻⁴ gs ⁻¹	-
Benzene	<1.0 x 10 ⁻⁴ gs ⁻¹	3.01 x 10 ⁻² gs ⁻¹
Vinyl chloride	<0.002 gs ⁻¹	2.23 x 10 ⁻³ gs ⁻¹
Ammonia	0.0423 gs ⁻¹	-(c)
Gas combustion temperature	946°C (906°C - 977°C)	850°C (minimum)
Exhaust gas exit temperature	1,224K (1,125K - 1,270K)	443K (minimum) ^(a)
Exhaust gas velocity	6.8 ms ⁻¹ ^(b)	7.5 ms ⁻¹ (minimum) ^(a)
December 2022		
NO ₂	1.06 gs ⁻¹	1.58 gs ⁻¹
CO	<0.01 gs ⁻¹	0.53 gs ⁻¹
SO ₂	0.03 gs ⁻¹	0.07 gs ⁻¹
Benzene	<1.0 x 10 ⁻⁴ gs ⁻¹	3.01 x 10 ⁻² gs ⁻¹
Vinyl chloride	<1.0 x 10 ⁻⁴ gs ⁻¹	2.23 x 10 ⁻³ gs ⁻¹
Gas combustion temperature	923°C (909°C - 934°C)	850°C (minimum)
Exhaust gas exit temperature	1,196K (1,145K - 1,283K)	443K (minimum) ^(a)
Exhaust gas velocity	7.9 ms ⁻¹ ^(b)	7.5 ms ⁻¹ (minimum) ^(a)

Note:

(a) Level under full load condition.

(b) The exhaust gas velocity was calculated based on the cross-section area of the stack and the gas flow and combustion temperature data measured during the stack emission monitoring. The limit level was not applicable as the stack was not operated under full load condition.

(c) The emission limit for ammonia is under review and will be supplemented in subsequent revision.

Table 2.13 Summary of Landfill Gas Flare Stack Emission Monitoring in the Reporting Period

Parameters	Monitoring Results (Range in Bracket)	Limit Level
October 2022		
NO ₂	0.013 gs ⁻¹	0.97 gs ⁻¹
CO	<0.01 gs ⁻¹	2.43 gs ⁻¹
SO ₂	0.26 gs ⁻¹	0.22 gs ⁻¹
Benzene	<1.22 x 10 ⁻⁴ gs ⁻¹	4.14 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<9.8 x 10 ⁻⁵ gs ⁻¹	2.60 x 10 ⁻⁴ gs ⁻¹
Gas combustion temperature	Flare 1: 908°C (820°C - 990°C) Flare 2: 872°C (820°C - 910°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,060K (988K - 1,183K) Flare 2: 1,076K (993K - 1,133K)	923 K (minimum) ^(a)
Exhaust gas velocity	6.5 ms ⁻¹ ^(b)	9.0 m s ⁻¹ (minimum) ^(a)
November 2022		
NO ₂	<0.02 gs ⁻¹	0.97 gs ⁻¹
CO	<0.01 gs ⁻¹	2.43 gs ⁻¹
SO ₂	1.27 gs ⁻¹	0.22 gs ⁻¹
Non-Methane Organic Carbons	<1.22 x 10 ⁻⁴ gs ⁻¹	-
Benzene	<9.8 x 10 ⁻⁵ gs ⁻¹	4.14 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<0.002 gs ⁻¹	2.60 x 10 ⁻⁴ gs ⁻¹
Gas combustion temperature	Flare 1: 856°C (820°C - 890°C) Flare 2: 854°C (820°C - 890°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,064K (1,030K - 1,093K) Flare 2: 1,077K (1,033K - 1,123K)	923 K (minimum) ^(a)
Exhaust gas velocity	8.9 ms ⁻¹ ^(b)	9.0 m s ⁻¹ (minimum) ^(a)
December 2022		
NO ₂	0.03 gs ⁻¹	0.97 gs ⁻¹
CO	0.783 gs ⁻¹	2.43 gs ⁻¹
SO ₂	0.16 gs ⁻¹	0.22 gs ⁻¹
Benzene	6.61 x 10 ⁻⁴ gs ⁻¹	4.14 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.35 x 10 ⁻⁴ gs ⁻¹	2.60 x 10 ⁻⁴ gs ⁻¹
Gas combustion temperature	Flare 1: 854°C (850°C - 910°C) Flare 2: 860°C (830°C - 890°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,075K (1,033K - 1,153K) Flare 2: 1,085K (1,033K - 1,123K)	923 K (minimum) ^(a)
Exhaust gas velocity	12.8 ms ⁻¹ ^(b)	9.0 m s ⁻¹ (minimum) ^(a)

Note:

(a) Level under full load condition.

(b) The exhaust gas velocity was calculated based on the cross-section area of the stack and the gas flow and combustion temperature data measured during the stack emission monitoring. The limit level was not applicable as the stack was not operated under full load condition.

Table 2.14 Summary of Landfill Gas Generator Stack Emission Monitoring in the Reporting Period

Parameters	Monitoring Results (Range in Bracket)	Limit Level
October 2022		
NO ₂	0.08 gs ⁻¹	1.91 gs ⁻¹
CO	0.56 gs ⁻¹	2.48 gs ⁻¹
SO ₂	0.006 gs ⁻¹	0.528 gs ⁻¹
Benzene	<1.12 x 10 ⁻⁴ gs ⁻¹	2.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<9.7 x 10 ⁻⁶ gs ⁻¹	1.88 x 10 ⁻⁵ gs ⁻¹
Exhaust gas exit temperature	ENGA: 866K (851K – 893K) ENGB : 860K (847K – 867K)	723K (minimum) (a)
Exhaust gas velocity	10.3 ms ⁻¹ (b)	30.0 ms ⁻¹ (minimum) (a)
November 2022		
NO ₂	0.01 gs ⁻¹	1.91 gs ⁻¹
CO	0.429 gs ⁻¹	2.48 gs ⁻¹
SO ₂	<0.001 gs ⁻¹	0.528 gs ⁻¹
Non-Methane Organic Carbons	<1.6 x 10 ⁻⁵ gs ⁻¹	-
Benzene	<1.28 x 10 ⁻⁵ gs ⁻¹	2.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<3.0 x 10 ⁻⁴ gs ⁻¹	1.88 x 10 ⁻⁵ gs ⁻¹
Exhaust gas exit temperature	ENGA: 904K (890K – 955K) ENGB : 898K (880K – 917K)	723K (minimum) (a)
Exhaust gas velocity	11.6 ms ⁻¹ (b)	30.0 ms ⁻¹ (minimum) (a)
December 2022		
NO ₂	-	1.91 gs ⁻¹
CO	-	2.48 gs ⁻¹
SO ₂	-	0.528 gs ⁻¹
Benzene	-	2.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	-	1.88 x 10 ⁻⁵ gs ⁻¹
Exhaust gas exit temperature	ENGA: - ENGB : -	723K (minimum) (a)
Exhaust gas velocity	-	30.0 ms ⁻¹ (minimum) (a)

Note:

(a) Level under full load condition.

(b) The exhaust gas velocity was calculated based on the cross-section area of the stack and the gas flow and combustion temperature data measured during the stack emission monitoring. The limit level was not applicable as the stack was not operated under full load condition.

(c) The Landfill Gas Generator was under maintenance in December 2022.

Limit Levels exceedances were recorded for landfill gas flare stack emission (SO₂ and Benzene) in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex D2* were undertaken. Investigation of the Action and Limit Levels exceedances was conducted and the investigation reports are presented in *Annex D7*. Based on the investigation conducted for the monitoring event with potential Limit Levels exceedance with the Contractor and the IEC, the landfill gas flare stack emission (SO₂) exceedance on 14 October 2022 and 17 November 2022 and the landfill

gas flare stack emission (Benzene) exceedance on 13 December 2022 were considered Project-related.

The Contractor was reminded to implement all relevant mitigation measures for the construction and operation works and maintain good site practice. The ET will keep track on the monitoring data and ensure Contractor's compliance of the environmental requirements.

2.1.4 *Ambient VOCs, Ammonia and H₂S Monitoring*

Monitoring Requirements and Equipment

According to the updated EM&A Manual of the Project, ambient VOCs, ammonia and H₂S monitoring was carried out at the four designated locations along the site boundary (i.e. AM1, AM2, AM3 and AM4) during the operation/restoration phase, at quarterly interval.

The Limit Levels for ambient VOCs, ammonia and H₂S monitoring is provided in *Table 2.15* below.

Table 2.15 *Limit Levels for Ambient VOCs, Ammonia and H₂S Monitoring*

Parameters	Limit Level (µg m⁻³)
Methane	NA ^(a)
Ammonia	180
H ₂ S	42
Dichlorodifluoro-methane	NA ^(a)
Vinyl Chloride	26
Methanol	2,660
Ethanol	19,200
Dimethylsulphide	8
Carbon Disulphide	150
Methylene Chloride	3,530
Chloroform	99
Methyl propionate	353
Butan-2-ol	667
1.1.1-Trichloroethane	5,550
1.2-Dichloroethane	210
Benzene	33
Carbon Tetrachloride	64
Dipropyl ether	NA ^(a)
Heptane	2,746
Trichloroethylene	5,500
Ethyl propionate	29
Methyl butanoate	30
Methanethiol	10
Toluene	1,244
Ethyl butanoate	71
Propyl benzene	19

Parameters	Limit Level ($\mu\text{g m}^{-3}$)
Octane	7,942
Propyl propionate	276
1,2-Dibromoethane (EDB)	39
Butyl acetate	7,240
Tetrachloroethylene	1,380
Ethyl benzene	738
Nonane	11,540
Ethanethiol	13
Decanes	3,608
Limonene	212
Butyl benzene	47
Undecane	5,562
Butanethiol	4
Terpenes	NA ^(a)
Xylenes	534
Dichlorobenzene	120

Notes:

(a) No relevant WHO/USEPA/CARB's ambient criteria, odour thresholds and WEL available.

VOCs

Ambient air samples were drawn into the pre-cleaned and vacuum canister directly when the valve of the flow controller (with preset flow rate) was opened. After sampling, the valve will be closed manually and the canister with VOCs gas samples were transported for laboratory analysis.

Methane

Pre-cleaned Tedlar bag was placed in the vacuum chamber. Ambient air was collected in the Tedlar bag under the vacuum condition when the pump is switched on. The Tedlar bag was filled up to 90% of total capacity to avoid leakage and bag deformation. After sampling, pump is switched off and the valve of Tedlar bag was closed manually. The air samples were transported back to laboratory for analysis.

Ammonia

Calibrated personal air pump was used to pump the air through a sulfuric acid-treated silica gel sorbent tube. Gaseous ammonia in air was then trapped in the sorbent tube. The tube was transported back to laboratory for analysis.

H₂S

H₂S in air is collected in mid-geet impingers by aspirating a measured volume of air through an alkaline suspension of cadmium hydroxide (as the absorbing solution). The sulphide is precipitated as cadmium sulphide to prevent air oxidation of the sulphide. Arabinogalactan is added to the cadmium hydroxide slurry prior to sampling to minimize photo-decomposition of the

precipitated cadmium sulphide. The solution is transported back to laboratory for analysis.

All air samples collected for laboratory analysis were transported to ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066) laboratory within 24 hours and analysed within 48 hours.

The ambient VOCs, ammonia and H₂S monitoring programme and monitoring locations are summarised in *Table 2.16* and illustrated in *Figure 2.1*, respectively.

Table 2.16 *Ambient VOCs, Ammonia and H₂S Monitoring Details*

Monitoring Station	Location	Parameter	Frequency	Monitoring Date
AM1	SENTX Site Boundary (North)	• Methane	Quarterly	17
AM2	SENTX Site Boundary (West, near DP3)	• Ammonia		November 2022
AM3	SENTX Site Boundary (West, near RC15)	• A suite of VOCs ^(a)		
AM4	SENTX Site Boundary (West, near EPD building)	• H ₂ S		

Notes:

(a) A suite of VOCs includes:

• Trichloroethylene	• Butyl benzene	• Dichlorobenzene
• Vinyl chloride	• Xylenes	• Methyl butanoate
• Methylene chloride	• Decanes	• Dipropyl ether
• Chloroform	• Undecane	• Methanethiol
• 1,2-dichloroethane	• Limonene	• Ethanethiol
• 1,1,1-trichloroethane	• Terpenes	• Butanethiol
• Carbon tetrachloride	• Ethanol	• Methanol
• Tetrachloroethylene	• Butan-2-ol	• Heptanes
• 1,2-dibromoethane	• Dimethylsulphide	• Octanes
• Benzene	• Methyl propionate	• Nonanes
• Toluene	• Ethyl propionate	• Dichlorodifluoromethane
• Carbon disulphide	• Propyl propionate	• Methane
• Propyl benzene	• Butyl acetate	
• Ethyl benzene	• Ethyl butanoate	

Monitoring Schedule for the Reporting Month

The schedule for ambient VOCs, ammonia and H₂S monitoring during the reporting period is provided in *Annex C*.

Results and Observations

The ambient VOCs, ammonia and H₂S monitoring results are summarized in *Tables 2.17* and provided in *Annex D6*.

Table 2.17 Summary of Ambient VOCs, Ammonia and H₂S Monitoring Results in the Reporting Period

Parameters	Limit Level ($\mu\text{g m}^{-3}$)	Monitoring Results ($\mu\text{g m}^{-3}$)			
		AM1	AM2	AM3	AM4
Ammonia	180	0.043	0.023	0.022	0.023
H ₂ S	42	<15	<15	<15	<15
Methane	NA ^(a)	0.0003 %(v/v)	0.0003 %(v/v)	0.00024 %(v/v)	0.00017 %(v/v)
1.1.1-Trichloroethane	5,550	<0.8	<0.8	<0.8	<0.8
1.2-Dibromoethane (EDB)	39	<1.0	<1.0	<1.0	<1.0
1.2-Dichloroethane	210	1.3	1.6	1.3	1.4
Benzene	33	0.9	1	0.8	0.9
Butan-2-ol	667	<0.6	<0.6	<0.6	<0.6
Butanethiol	4	<1.2	<1.2	<1.2	<1.2
Carbon Disulphide	150	<0.5	<0.5	<0.5	0.5
Carbon Tetrachloride	64	<0.6	<0.6	<0.6	<0.6
Chloroform	99	<0.8	<0.8	<0.8	<0.8
Decanes	3,608	<0.7	<0.7	<0.7	<0.7
Dichlorobenzene	120	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoro-methane	NA ^(a)	1.3	1.9	0.9	1.2
Dimethylsulphide	8	<0.2	<0.2	<0.2	<0.2
Dipropyl ether	NA ^(a)	<0.8	<0.8	<0.8	<0.8
Limonene	212	<0.4	<0.4	<0.4	<0.4
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	<3.8	<3.8	4.1
Ethyl butanoate	71	<1.0	<1.0	<1.0	<1.0
Ethyl propionate	29	<0.8	<0.8	<0.8	<0.8
Ethyl benzene	738	0.8	1	1.4	0.6
Heptane	2,746	<0.8	<0.8	<0.8	<0.8
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	15.8	<2.6	<2.6	18.3
Methyl butanoate	30	<0.8	<0.8	<0.8	<0.8
Methyl propionate	353	<0.7	<0.7	<0.7	<0.7
Methylene Chloride	3,530	4.6	6.1	5.7	4.6
Butyl acetate	76	<1.0	<1.0	<1.0	<1.0
Butyl benzene	47	<1.0	<1.0	<1.0	<1.0
Nonane	11,540	<0.9	<0.9	<0.9	<0.9
Propyl benzene	19	<0.8	<0.8	<0.8	<0.8
Octane	7,942	<0.9	<0.9	<0.9	<0.9
Propyl propionate	276	<1.0	<1.0	<1.0	<1.0
Terpenes	NA ^(a)	0.9	<0.8	1.2	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	2.6	3	3.6	2.6
Trichloroethylene	5,500	<1.1	<1.1	<1.1	<1.1
Undecane	5,562	<1.2	<1.2	<1.2	<1.2
Vinyl Chloride	26	<0.3	<0.3	<0.3	<0.3
Xylenes	534	0.7	1.1	3.3	0.6

Notes:

(a) No relevant WHO/USEPA/CARB's ambient criteria and WEL available.

All ambient VOCs, ammonia and H₂S monitoring results were below the Limit Levels in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex D2*.

2.2 NOISE MONITORING

2.2.1 Monitoring Requirements and Equipment

According to the updated EM&A Manual of the Project, impact noise monitoring was conducted weekly at the monitoring location (i.e. NM1) to obtain one set of 30-minute measurement between 07:00 and 19:00 hours on normal weekdays.

The Action and Limit Levels for operational noise of the Project are provided in *Table 2.18* below.

Table 2.18 *Action and Limit Levels for Operational Noise*

Time Period	Action Level ^(a)	Limit Level ^(b)
07:00 – 19:00 hrs on all days	When one documented complaint is received from any one of the noise sensitive receivers (NSRs)	65 dB(A) at NSRs ^(c)
19:00 – 23:00 hrs on all days		65 dB(A) at NSRs ^(c)
23:00 – 07:00 hrs on all days	75 dB(A) recorded at the monitoring station	55 dB(A) at NSRs ^(c)

Notes:

- (a) 75dB(A) along and at about 100m from the SENTX site boundary was set as the Action Level.
- (b) Limits specified in the GW-TM and IND-TM for construction and operational noise, respectively.
- (c) Limit Level only apply to operational noise without road traffic and construction activities noise.

Noise monitoring was performed by ALS Technichem (HK) Pty Ltd (HOKLAS Registration No. 066) using a sound level meter placed at the designated monitoring station NM1 (see *Figure 2.1*) in accordance with the requirements stipulated in the updated EM&A Manual. Acoustic calibrator was deployed to check the sound level meter at a known sound pressure level. Details of the deployed equipment are provided in *Table 2.19*.

Table 2.19 Noise Monitoring Details

Monitoring Station ⁽¹⁾	Location	Parameter	Frequency and Duration	Monitoring Dates	Equipment
NM1	SENTX Site Boundary (North)	L _{eq} (30 min) measurement between 07:00 and 19:00 hours on normal weekdays (Monday to Saturday)	Once per week for 30 mins during the operation period of the Project	5, 10, 17, 24 October 2022 3, 9, 15, 21, 28 November 2022 5, 15, 21, 28 December 2022	Sound Level Meter: Rion NL-52 (S/N: 00809405) Rion NL-52 (S/N: 00142581) Rion NL-31 (S/N: 00410247) Acoustic Calibrator: Rion NC-74 (S/N: 34657231) B&K 4231 (S&N: 2713428)

2.2.2 Monitoring Schedule for the Reporting Period

The schedule for noise monitoring during the reporting period is provided in *Annex C*.

2.2.3 Results and Observations

A total of 13 impact noise monitoring events were scheduled during the reporting period. The noise monitoring results are summarised in *Table 2.20* and graphically presented in *Annex E1*.

Table 2.20 Summary of Noise Monitoring Results in the Reporting Period

Month	Monitoring Station	Measured Noise Level L _{eq} (30 min), dB(A)		
		Average	Range	Action and Limit Level
October 2022	NM1	51.8	51.0 - 53.3	75
November 2022	NM1	50.8	48.1 - 52.7	75
December 2022	NM1	54.6	50.1 - 64.0	75

Major noise sources identified during the noise monitoring included noise from operations of the existing SENT landfill and the TKO Area 137 Fill Bank, aircrafts and insects.

No exceedance of the Action and Limit Levels for operation noise monitoring was recorded in the reporting period. No further mitigation measure was required in accordance with the Event and Action Plan presented in *Annex E2*.

2.3 WATER QUALITY MONITORING

2.3.1 Surface Water Quality Monitoring

Monitoring Requirements and Equipment

According to the updated EM&A Manual of the Project, impact surface water quality monitoring was carried out at the three designated surface water discharge points (i.e. DP3, DP4 and DP6) at monthly intervals during operation/restoration phase to ensure that the SENTX will not cause adverse water quality impact. Suspension of impact surface water quality monitoring at DP3 was approved under the Baseline Monitoring Report by EPD on 24 July 2019 until the actual commencement of construction works affecting DP3 in 2022.

The parameters as listed in *Table 2.22* were determined by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066).

The Action and Limit Levels of the surface water quality impact monitoring are provided in *Table 2.21*.

Table 2.21 *Action and Limit Levels for Surface Water Quality*

Parameters	Limit Level
DP4 & DP6	
Ammoniacal-nitrogen	> 7.1 mg/L
COD	> 30 mg/L
SS	> 20 mg/L

Notes:
The limit levels specified for other parameters in Table 10a of the *Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* shall also be followed.

The locations of the monitoring stations for the Project are shown in *Figure 2.1*. All *in situ* monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS or other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the surface water quality monitoring programme. Calibration for a DO meter was carried out before measurement according to the instruction manual of the equipment model. Details of the equipment used in the impact surface water quality monitoring works are provided in *Table 2.22*.

Table 2.22 Impact Surface Water Quality Monitoring Details

Monitoring Station	Location	Frequency	Monitoring Dates	Parameter	Equipment	
DP4	Surface water discharge point DP4	Monthly	24 October 2022, 21 November 2022, 21 December 2022	<ul style="list-style-type: none"> • pH • Electrical conductivity (EC) • DO • SS • COD • BOD₅ • TOC • Ammoniacal -nitrogen • Nitrate-nitrogen • Nitrite-nitrogen • TKN • TN • Phosphate • Sulphate • Sulphide • Carbonate • Oil & Grease 	<ul style="list-style-type: none"> • Bicarbonate • Chloride • Sodium • Potassium • Calcium • Magnesium • Nickel • Manganese • Chromium • Cadmium • Copper • Lead • Iron • Zinc • Mercury • Boron 	<ul style="list-style-type: none"> YSI Professional DSS (S/N: 17B100758) YSI Professional DSS (S/N: 17B102764)

Notes:

(a) Impact surface water quality monitoring at DP3 was suspended from the monitoring event on 25 July 2019 until the actual commencement of construction works affecting DP3 in 2022.

Monitoring Schedule for the Reporting Period

The schedule for surface water quality monitoring during the reporting period is provided in *Annex C*.

Results and Observations

Three regular monitoring events for impact surface water quality monitoring were scheduled at all designated monitoring stations during the reporting period. However, sampling could not be carried out at all monitoring events due to insufficient flow. Details of impact water quality monitoring event are provided in *Annex F1*.

No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex F2*.

2.3.2 Leachate Monitoring

Monitoring Requirements and Equipment

According to the updated EM&A Manual, continuous monitoring of leachate level and daily monitoring of effluent quality were carried out during the operation/restoration phase.

Reduction of effluent monitoring frequency (dry season) (from daily to monthly) was approved by EPD on 22 March 2022. Monthly effluent quality monitoring (dry season) shall be conducted from 23 March 2022. The reduction of effluent monitoring frequency (wet season) (from daily to monthly) was approved by EPD on 2 August 2022. Monthly effluent quality monitoring (wet season) shall be conducted from 3 August 2022.

Temperature, pH and volume of the effluent discharged from the leachate treatment plant were measured in-situ whereas the parameters as listed in *Table 2.23* were determined by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066).

The Limit Levels of the leachate monitoring are provided in *Table 2.23*

Table 2.23 *Limit Levels for Leachate Levels and Effluent Quality*

Parameters	Limit Level
Leachate Levels	
Leachate levels above the basal liner	1 m above the primary liner of the leachate containment system
Effluent Quality	
Temperature	> 43 °C
pH Value	6 - 10
Volume Discharged	>2,000 m ³
Suspended Solids (SS)	> 800 mg/L
Phosphate	> 25 mg/L
Sulphate	> 800 mg/L
Total Inorganic Nitrogen ^(a)	> 100 mg/L
Biochemical Oxygen Demand (BOD)	> 800 mg/L
Chemical Oxygen Demand (COD)	> 2,000 mg/L
Oil & Grease	> 20 mg/L
Boron	> 7,000 µg/L
Iron	> 5 mg/L
Cadmium	> 1 µg/L
Chromium	> 300 µg/L
Copper	> 1,000 µg/L
Nickel	> 700 µg/L
Zinc	> 700 µg/L
Note:	
(a) Total Inorganic Nitrogen include Ammoniacal-nitrogen, Nitrite-nitrogen and Nitrate-nitrogen.	

All *in situ* monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS or other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the leachate quality monitoring programme. Details of the equipment used are provided in *Table 2.24*.

Table 2.24 Leachate Levels and Effluent Quality Monitoring Details

Location	Frequency	Parameter	Monitoring Dates	Equipment
Leachate levels above the basal liner	Continuous	Leachate Levels	1 October – 31 December 2022	Pairs of pressure transducers
Effluent discharged from LTP	Daily for the first 3 months upon full operation of the LTP at wet season (Apr to Sep) and dry season (Oct to Mar), respectively and reduce to monthly thereafter subject to the monitoring results of the first 3 months for each season and agreement with the EIAO Authority, IEC and IC. ^(a)	<i>On-site Measurements:</i> <ul style="list-style-type: none"> • Volume • pH • Temperature <i>Laboratory analysis:</i> <ul style="list-style-type: none"> • Suspended Solids • COD • BOD₅ • TOC • Ammoniacal-nitrogen • Nitrate-nitrogen • Nitrite-nitrogen • Total Nitrogen • Sulphate • Phosphate • Oil & Grease • Alkalinity • Chloride • Calcium • Potassium • Magnesium • Iron • Zinc • Copper • Chromium • Nickel • Cadmium • Boron 	7 October 2022, 8 November 2022, 6 December 2022	TOA HM-30P (S/N: 790332)

Note:

(a) Reduction of monitoring frequency will be subject to the monitoring results to demonstrate environmentally acceptable performance.

Monitoring Schedule for the Reporting Month

The schedule for leachate monitoring during the reporting period is provided in *Annex C*.

Results and Observations

The leachate levels and effluent quality monitoring results are summarized in *Table 2.25* and *Table 2.26*, respectively. The detailed monitoring results are provided in *Annex F3* and *Annex F4*, respectively.

Table 2.25 Summary of Leachate Levels in the Reporting Period

Monitoring Location	Average Leachate Head Levels (cm) (Range in Bracket)	Limit Level (cm)
October 2022		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	70 (62 – 77)	> 178
Meter No. X-2	82 (64 – 88)	
Average	76 (64 – 83)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	73 (62 – 86)	> 180
Meter No. X-4	78 (66 – 90)	
Average	75 (64 – 88)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	66 (50 – 70)	> 175
Meter No. X-6	66 (62 – 70)	
Average	66 (58 – 70)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	79 (48 – 215)	> 186
Meter No. X-8	81 (52 – 213)	
Average	80 (50 – 214)	
November 2022		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	70 (62 – 77)	> 178
Meter No. X-2	80 (68 – 88)	
Average	75 (69 – 83)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	77 (62 – 88)	> 180
Meter No. X-4	75 (62 – 90)	
Average	76 (63 – 88)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	74 (50 – 182)	> 175
Meter No. X-6	74 (50 – 182)	
Average	74 (50 – 182)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	68 (48 – 232)	> 186
Meter No. X-8	72 (52 – 237)	
Average	70 (50 – 235)	
December 2022		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	71 (64 – 75)	> 178
Meter No. X-2	83 (73 – 88)	
Average	77 (70 – 82)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	78 (62 – 88)	> 180
Meter No. X-4	74 (59 – 84)	
Average	76 (62 – 86)	

Monitoring Location	Average Leachate Head Levels (cm) (Range in Bracket)	Limit Level (cm)
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	67 (64 - 70)	> 175
Meter No. X-6	67 (64 - 70)	
Average	67 (64 - 70)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	58 (48 - 65)	> 186
Meter No. X-8	62 (50 - 70)	
Average	60 (50 - 68)	

Table 2.26 *Summary of Effluent Quality Monitoring Results in the Reporting Period*

October 2022	Monitoring Results		Limit Level
Parameters			
Temperature	°C	35.3	> 43 °C
pH Value	pH unit	8.2	6 - 10
Volume Discharged	m ³	1,124	>2,000 m ³
Suspended Solids (SS)	mg/L	49	> 800 mg/L
Phosphate	mg/L	2.45	> 25 mg/L
Sulphate	mg/L	385	> 800 mg/L
Total Inorganic Nitrogen ^(a)	mg/L	65.91	> 100 mg/L
BOD	mg/L	8	> 800 mg/L
COD	mg/L	484	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	3400	> 7,000 µg/L
Iron	mg/L	0.73	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	74	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	74	> 700 µg/L
Zinc	µg/L	100	> 700 µg/L
November 2022			
Parameters			
Temperature	°C	30.6	> 43 °C
pH Value	pH unit	8.1	6 - 10
Volume Discharged	m ³	1,374	>2,000 m ³
Suspended Solids (SS)	mg/L	25.8	> 800 mg/L
Phosphate	mg/L	2.94	> 25 mg/L
Sulphate	mg/L	179	> 800 mg/L
Total Inorganic Nitrogen ^(a)	mg/L	33.72	> 100 mg/L
BOD	mg/L	9	> 800 mg/L
COD	mg/L	676	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	3880	> 7,000 µg/L
Iron	mg/L	1.20	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	88	> 300 µg/L

Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	92	> 700 µg/L
Zinc	µg/L	66	> 700 µg/L

December 2022		Monitoring Results	Limit Level
Parameters			
Temperature	°C	20.4	> 43 °C
pH Value	pH unit	8.3	6 - 10
Volume Discharged	m ³	1,995	>2,000 m ³
Suspended Solids (SS)	mg/L	51.2	> 800 mg/L
Phosphate	mg/L	12.70	> 25 mg/L
Sulphate	mg/L	97	> 800 mg/L
Total Inorganic Nitrogen (a)	mg/L	41.48	> 100 mg/L
BOD	mg/L	25	> 800 mg/L
COD	mg/L	1600	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	4380	> 7,000 µg/L
Iron	mg/L	3.33	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	343	> 300 µg/L
Copper	µg/L	29	> 1,000 µg/L
Nickel	µg/L	163	> 700 µg/L
Zinc	µg/L	234	> 700 µg/L

Limit Levels exceedances were recorded for leachate level monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex F2* were undertaken. Investigation of the Action and Limit Levels exceedances was conducted and the investigation report is presented in *Annex F6*. Based on the investigation conducted for the monitoring event with potential Limit Levels exceedance with the Contractor and the IEC, the leachate level exceedances at Pump Station No. 4X from 1 to 3 October 2022 and the leachate level exceedances at Pump Station No. 3X on 3 November 2022 and Pump Station No. 4X from 3 November 2022 to 4 November 2022 were considered Project-related.

Limit Level exceedance was recorded for leachate (Chromium) during water quality monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex F2* were undertaken. Investigation of the Action and Limit Levels exceedances was conducted and the investigation report is presented in *Annex F6*. Based on the investigation conducted for the monitoring event with potential Limit Levels exceedance with the Contractor and the IEC, the leachate (Chromium) exceedance on 6 December 2022 was considered Project related.

The Contractor was reminded to implement all relevant mitigation measures for the construction and operation works and maintain good site practice. The ET will keep track on the monitoring data and ensure Contractor's compliance of the environmental requirements.

2.3.3

Groundwater Monitoring

Monitoring Requirements and Equipment

According to the updated EM&A Manual of the Project with incorporation of the proposed updates under the Amendment Summary approved by EPD on 15 June 2020, groundwater monitoring was carried out at 14 perimeter groundwater monitoring wells (including 3 up-gradient wells and 11 down-gradient wells) (i.e. MWX-1 to MWX-14) to monitor the groundwater quality and level of the perimeter groundwater monitoring wells at monthly interval.

The Limit Levels for groundwater quality is provided in *Table 2.27* below.

Table 2.27 *Limit Levels for Groundwater Quality*

Location	Limit Levels	
	Ammoniacal-nitrogen (mg L ⁻¹)	COD (mg L ⁻¹)
MWX-1	5.00	30
MWX-2	5.00	30
MWX-3	5.00	30
MWX-4	7.63	36
MWX-5	5.00	30
MWX-6	5.00	46
MWX-7	6.55	36
MWX-8	15.85	50
MWX-9	7.30	71
MWX-10	5.00	30
MWX-11	5.00	30
MWX-12	5.00	30
MWX-13	5.00	30
MWX-14	5.00	30

A bladder pump with Teflon sampling tube and adjustable discharge rates was used for purging and taking of groundwater sample from the monitoring wells. Filtered groundwater samples were collected by connecting a disposable in-line filter system to the tubing of the sampling pump, prior to storage and analysis by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066).

A portable dip meter with 5mm accuracy was used for measurement of groundwater level at each well. The dip meter has an audio indicator of the water level and was checked before use.

The measurements of pH and electrical conductivity (EC) were undertaken *in situ*. *In situ* monitoring instruments in compliance with the specifications listed under Section 4.3.2 of the updated EM&A Manual were used to undertake the groundwater quality monitoring for the Project.

Details of the equipment used and the monitoring locations are summarised in *Table 2.28* and illustrated in *Figure 2.1*, respectively.

Table 2.28 Groundwater Monitoring Details

Monitoring Location	Frequency	Parameter	Monitoring Dates	Equipment
All groundwater monitoring wells (MWX-1 to MWX-14)	Monthly	<ul style="list-style-type: none"> • Water level • pH • EC • COD • BOD5 • TOC • Ammoniacal-nitrogen • Nitrate-nitrogen • Nitrite-nitrogen • TKN • TN • Sulphate • Sulphide • Carbonate • Bicarbonate • Phosphate 	<ul style="list-style-type: none"> • Chloride • Sodium • Potassium • Calcium • Magnesium • Nickel • Manganese • Chromium • Cadmium • Copper • Lead • Iron • Zinc • Mercury • Boron 	10, 11 October 2022, 7, 8 November 2022, 12, 13 December 2022 YSI Professional DSS (S/N: 15H103928)

Monitoring Schedule for the Reporting Month

The schedule for groundwater quality monitoring during the reporting period is provided in *Annex C*.

Results and Observations

The groundwater quality monitoring results and detailed monitoring results are summarised in *Table 2.29* and provided in *Annex F5*, respectively.

Table 2.29 Summary of Groundwater Monitoring Results in the Reporting Period

Location	Ammoniacal-nitrogen (mg L ⁻¹)				COD (mg L ⁻¹)			
	Monitoring Results			Limit Levels	Monitoring Results			Limit Levels
	Average	Min	Max		Average	Min	Max	
MWX-1	1.29	1.23	1.40	5.00	9	6	12	30
MWX-2	0.13	0.01	0.35	5.00	6	4	7	30
MWX-3	1.19	0.61	1.49	5.00	15	14	18	30
MWX-4	2.99	2.49	3.50	7.63	20	19	22	36
MWX-5	1.63	1.28	1.94	5.00	25	22	27	30
MWX-6	3.32	3.10	3.54	5.00	38	37	39	46
MWX-7	5.65	5.23	5.98	6.55	18	14	22	36
MWX-8	5.66	4.97	6.19	15.85	34	34	35	50
MWX-9	0.30	0.02	0.46	7.30	24	20	27	71
MWX-10	<0.01	<0.01	<0.01	5.00	12	8	18	30
MWX-11	0.05	<0.01	0.07	5.00	8	4	12	30
MWX-12	0.02	<0.01	0.02	5.00	5	4	7	30
MWX-13	<0.01	<0.01	<0.01	5.00	6	4	8	30
MWX-14	0.03	<0.01	0.03	5.00	6	3	8	30

All the groundwater monitoring results were below the Limit Levels in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex F2*.

2.4 LANDFILL GAS MONITORING

2.4.1 Monitoring Requirements

According to the updated EM&A Manual of the Project, landfill gas monitoring was carried out at the perimeter of the waste boundary (monitoring wells), area between the SENTX Site boundary and the waste boundary (surface emission), occupied on-site building, service voids, utilities pit and manholes in the vicinity of the SENTX (build-up of landfill gas) during the operation/restoration phase.

The Limit Levels for landfill gas monitoring is provided in *Table 2.30* below.

Table 2.30 Limit Levels for Landfill Gas Constituents

Parameters	Monitoring Location	Limit Level (% (v/v))	
Perimeter Landfill Gas Monitoring Wells ^(a)			
Methane & Carbon Dioxide		Methane	Carbon Dioxide
	LFG1	1.0	2.2
	LFG2	1.0	4.2
	LFG3	1.0	6.3
	LFG4	1.0	7.0
	LFG5	1.0	3.4
	LFG6	1.0	9.1
	LFG7	1.0	1.5

Parameters	Monitoring Location	Limit Level (% (v/v))	
	LFG8	1.0	1.7
	LFG9	2.5	1.7
	LFG10	1.0	1.6
	LFG11	3.0	2.0
	LFG12	13.2	1.5
	LFG13	22.5	2.7
	LFG14	1.0	1.6
	LFG15	18.2	2.0
	LFG16	1.0	1.7
	LFG17	10.5	2.1
	LFG18	2.3	1.9
	LFG19	6.3	3.1
	LFG20	1.0	4.2
	LFG21	1.0	4.3
	LFG22	1.0	3.9
	LFG23	1.0	10.3
	LFG24	1.0	4.0
	GP1	1.0	8.5
	GP2 (shallow)	1.0	11.4
	GP2 (deep)	1.0	10.4
	GP3 (shallow)	1.0	3.9
	GP3 (deep)	1.0	1.9
	GP4 (shallow)	1.0	2.3
	GP4 (deep)	1.0	5.6
	GP5 (shallow)	1.0	9.5
	GP5 (deep)	1.0	7.5
	GP6	1.0	7.8
	GP7	1.0	4.5
	GP12	1.0	2.3
	GP15	1.0	2.2
	P7	1.0	2.5
	P8	1.0	1.7
	P9	1.0	2.7
Service Voids, Utilities Pits and Manholes			
Methane (or flammable gas)	Service voids, utilities pits and manholes	1% by volume	
Permanent Gas Monitoring System			
Methane (or flammable gas)	Permanent Gas Monitoring System	1% by volume (20% LEL)	
Area Between the SENTX Site Boundary and Waste Boundary (Surface Emission)			
Flammable gas	Area between SENTX site boundary and waste boundary	30 ppm	
Notes:			
(a) Limit Levels established based on the pre-operation phase baseline and additional landfill gas monitoring results in the Pre-operation Baseline Monitoring Report.			

Gas analysers in compliance with the specifications listed under Section 5.4.1 of the updated EM&A Manual were used to monitor the gas parameters at the landfill gas monitoring wells, service voids, utilities pits and manholes. The gas analyser was calibrated by a laboratory accredited under HOKLAS at yearly intervals and checked before use to ensure the validity and accuracy of the results. A portable dip meter was used to monitor the water level in the monitoring wells.

Permanent gas monitoring systems with pre-set alarm levels for methane at 20% lower explosive limit (LEL, equivalent to 1% methane gas (v/v)) were installed and operated in all occupied on-site buildings at SENTX. A central control panel is equipped to alert site personnel when the gas concentration at any detector reaches the alarm level.

Flammable gas detector in compliance with the specifications listed under Section 5.4.1 of the updated EM&A Manual was used to measure flammable gas concentration. Flammable gas surface emission survey was conducted at a slow pace with the inlet tube of the meter probe a few centimeters above ground surface to detect flammable gas emitted from the ground surface.

Bulk gas samples were collected into inert sample containers (i.e. Tedlar Bag) and transferred to ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066) laboratory within 24 hours of collection for direct analysis on a gas chromatography within 48 hours after collection.

The equipment used in the landfill gas monitoring programme is summarised in *Table 2.31*. The landfill gas monitoring locations for perimeter landfill gas monitoring wells and service voids, utilities and manholes along the Site boundary and within the SENTX site are illustrated in *Figure 2.3 - 2.4* and *Annex G1*, respectively.

Table 2.31 *Landfill Gas Monitoring Details*

Monitoring Location	Frequency	Parameter	Monitoring Dates	Equipment
Perimeter landfill gas monitoring wells (LFG1 to LFG24, P7 to P9, GP1 to GP7, GP12 and GP15)	Monthly	<ul style="list-style-type: none"> • Methane • Carbon dioxide • Oxygen • Atmospheric pressure 	3 October 2022, 1 November 2022, 6 December 2022	GA5000 (S/N: G507306)
Service voids, utilities and manholes along the Site boundary and within the SENTX Site (UU1 to UU28)	Monthly	<ul style="list-style-type: none"> • Methane • Carbon dioxide • Oxygen 	5 October 2022, 4 November 2022, 9 December 2022	GA5000 (S/N: G507306)
Permanent gas monitoring system in all occupied on-site buildings	Continuous	<ul style="list-style-type: none"> • Methane (or flammable gas) by permanent gas monitoring system 	1 October – 31 December 2022	Permanent gas monitoring system

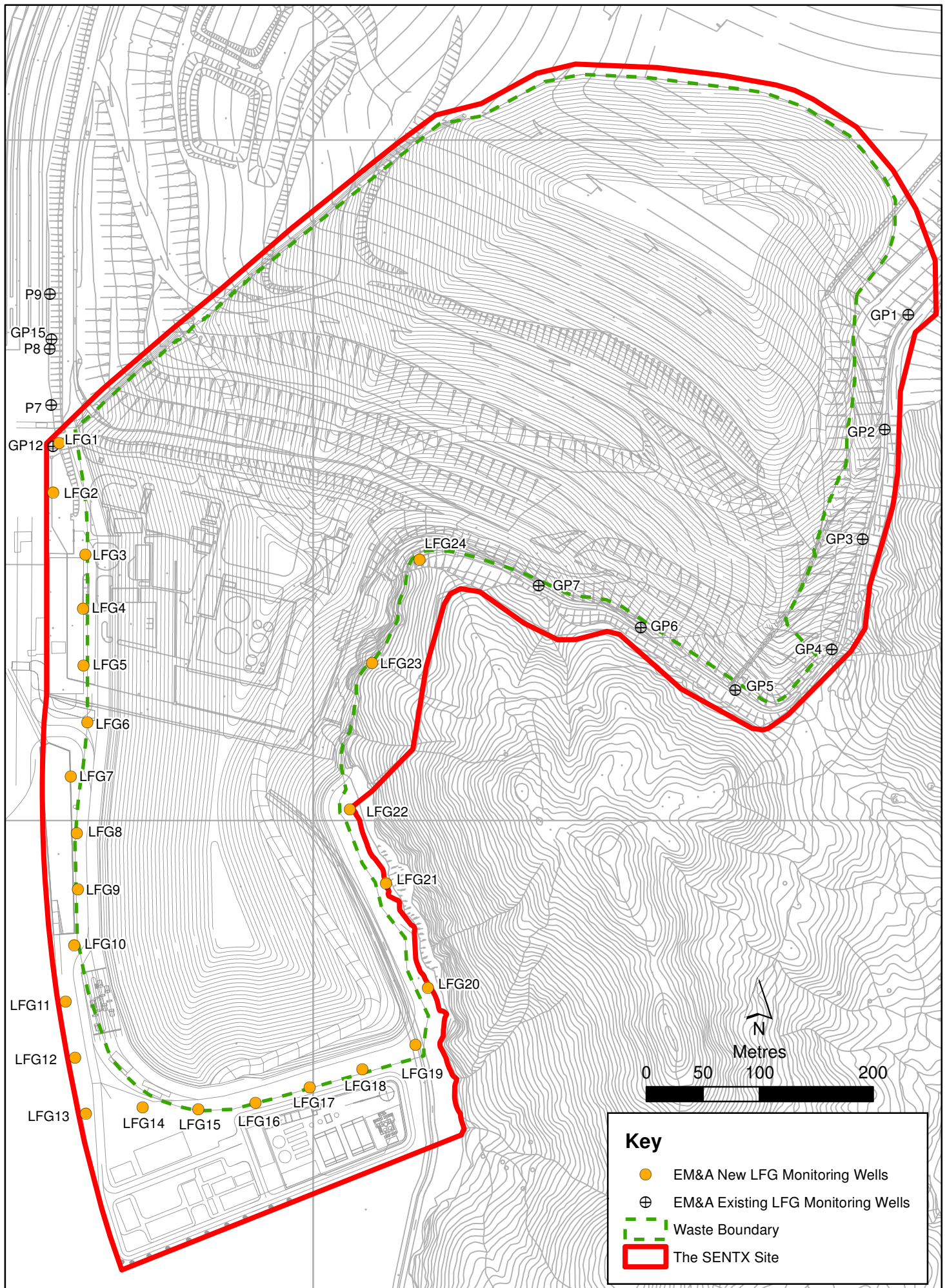


Figure 2.3

Location of Landfill Gas Monitoring Wells

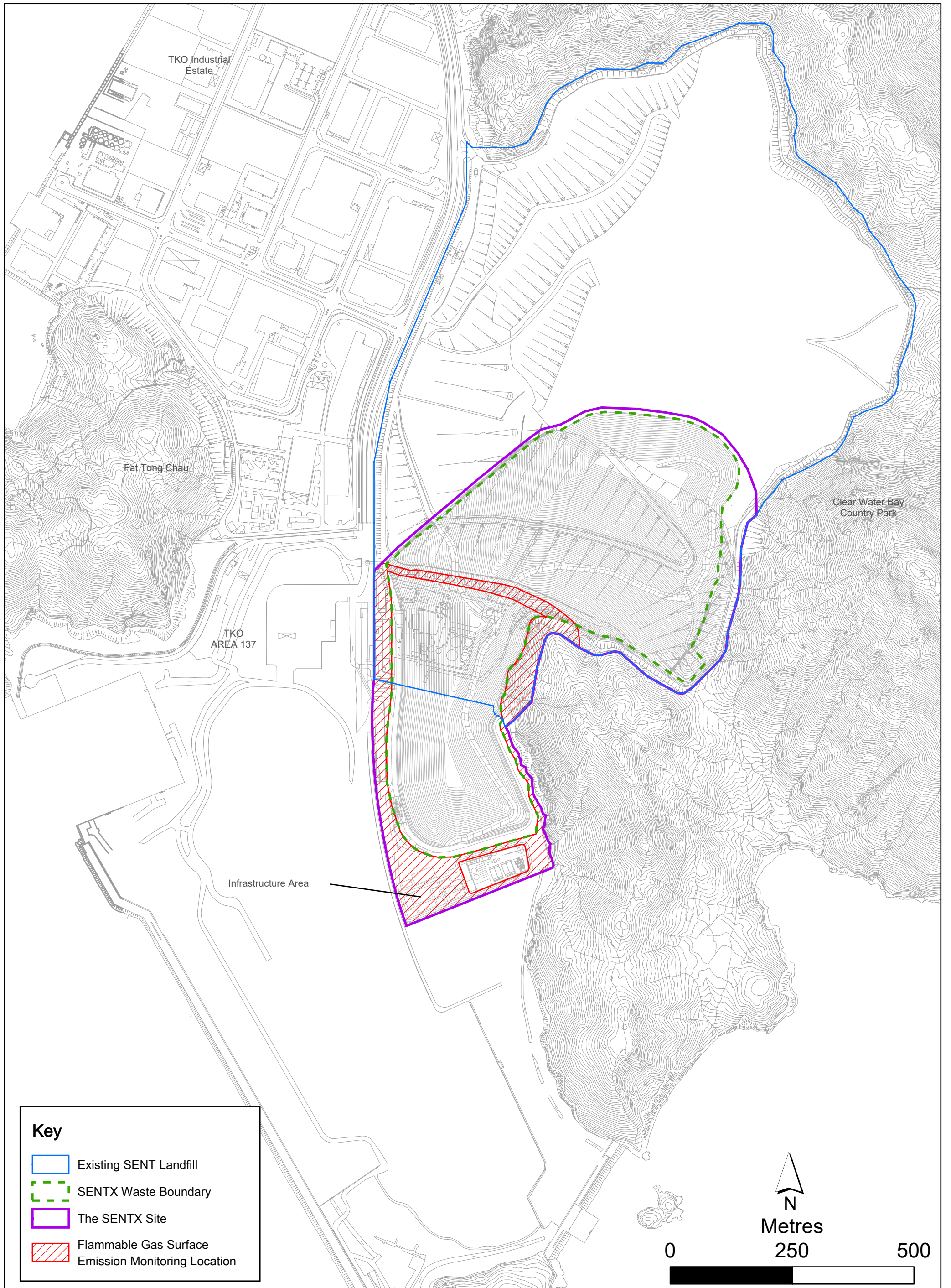


Figure 2.4

Flammable Gas Surface Emission Monitoring Locations

Areas between the SENTX Site boundary and the waste boundary and location of vegetation stress	Quarterly	<ul style="list-style-type: none"> • Flammable gas emitted from the ground surface 	18 November 2022	GMI Leak Surveyor (S/N: 554846)
Bulk gas sampling at least 2 of the perimeter LFG monitoring wells	Quarterly	<ul style="list-style-type: none"> • Methane • Carbon dioxide • Oxygen • Nitrogen • Carbon monoxide • Other flammable gas 	1 November 2022	Gas sampling pump and Tedlar bags

Monitoring Schedule for the Reporting Month

The schedule for dust monitoring during the reporting period is provided in *Annex C*.

Results and Observations

The landfill gas monitoring results are summarised and provided in *Tables 2.32 - 2.35 and Annex G2*, respectively.

Table 2.32 Summary of Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells in the Reporting Period

Location	Methane (% (v/v))				Carbon Dioxide (% (v/v))			
	Monitoring Results			Limit Level ^(a)	Monitoring Results			Limit Level ^(a)
	Average	Min	Max		Average	Min	Max	
LFG1	0.0	0.0	0.0	1.0	0.6	0.4	1.0	3.2
LFG2	0.0	0.0	0.0	1.0	1.5	1.2	2.1	4.3
LFG3	0.1	0.0	0.1	1.0	0.7	0.1	1.8	6.3
LFG4	0.0	0.0	0.0	1.0	0.1	0.0	0.1	7.0
LFG5	0.0	0.0	0.0	1.0	0.3	0.2	0.3	3.4
LFG6	0.0	0.0	0.0	1.0	0.4	0.1	0.9	9.1
LFG7	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.5
LFG8	0.0	0.0	0.0	12.6	0.1	0.0	0.1	2.4
LFG9	0.0	0.0	0.0	2.5	0.3	0.2	0.3	1.7
LFG10	0.0	0.0	0.0	3.5	0.0	0.0	0.0	1.6
LFG11	0.0	0.0	0.0	3.0	0.4	0.2	0.5	2.0
LFG12	0.0	0.0	0.0	13.2	0.0	0.0	0.0	1.5
LFG13	15.1	10.6	24.1	22.5	0.0	0.0	0.0	2.7
LFG14	0.0	0.0	0.0	5.2	0.2	0.1	0.2	1.8
LFG15	0.1	0.0	0.1	18.2	0.1	0.0	0.1	2.0
LFG16	0.1	0.0	0.1	1.0	0.1	0.0	0.1	2.0
LFG17	0.0	0.0	0.0	17.8	0.1	0.0	0.1	2.4
LFG18	0.0	0.0	0.0	2.3	0.1	0.0	0.1	2.1
LFG19	0.0	0.0	0.0	6.3	0.1	0.0	0.2	3.1
LFG20	0.0	0.0	0.0	1.0	0.5	0.0	0.8	4.6
LFG21	0.0	0.0	0.0	1.0	2.0	0.0	3.0	4.8
LFG22	0.0	0.0	0.0	1.0	1.5	0.0	2.3	4.0
LFG23	0.0	0.0	0.0	1.0	2.6	1.9	4.0	10.3
LFG24	0.0	0.0	0.0	1.0	0.3	0.0	0.5	4.7
GP1	0.0	0.0	0.0	1.0	6.6	6.4	7.1	10.6
GP2 (shallow)	0.0	0.0	0.0	1.0	0.5	0.5	0.5	11.4
GP2 (deep)	0.0	0.0	0.0	1.0	5.3	5.3	5.3	10.4
GP3 (shallow)	0.0	0.0	0.0	1.0	0.3	0.3	0.4	6.9
GP3 (deep)	0.0	0.0	0.0	1.0	0.2	0.1	0.2	5.6
GP4 (shallow)	0.0	0.0	0.0	1.0	0.2	0.2	0.2	11.6
GP4 (deep)	0.0	0.0	0.0	1.0	0.1	0.1	0.1	7.7
GP5 (shallow)	0.0	0.0	0.0	1.0	7.3	7.1	7.6	10.8
GP5 (deep)	0.0	0.0	0.0	1.0	0.0	0.0	0.0	7.5
GP6	0.0	0.0	0.0	1.0	3.9	2.8	6.0	8.4
GP7	0.0	0.0	0.0	1.0	0.1	0.0	0.3	4.5
GP12	0.0	0.0	0.0	1.0	0.1	0.1	0.1	2.3
GP15	0.0	0.0	0.0	1.0	0.1	0.0	0.1	2.2
P7	0.0	0.0	0.0	1.0	0.1	0.0	0.1	2.5
P8	0.0	0.0	0.0	1.0	0.1	0.0	0.1	1.7
P9	0.0	0.0	0.0	1.0	0.2	0.0	0.3	2.7

Notes:

(a) Limit Levels established based on the pre-operation phase baseline and additional landfill gas monitoring results in the Pre-operation Baseline Monitoring Report.

Table 2.33 Summary of Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes in the Reporting Period

Location	Methane (% (v/v))			
	Monitoring Results			Limit Levels
	Average	Min	Max	
UU01	0.0	0.0	0.0	1.0
UU02	0.0	0.0	0.0	1.0
UU03	0.0	0.0	0.1	1.0
UU04	0.0	0.0	0.1	1.0
UU05	0.0	0.0	0.0	1.0
UU06	0.0	0.0	0.2	1.0
UU07	0.0	0.0	0.1	1.0
UU08	0.0	0.0	0.2	1.0
UU09	0.0	0.0	0.0	1.0
UU10	0.0	0.0	0.0	1.0
UU11	0.0	0.0	0.0	1.0
UU12	Voided due to latest site programme and on-going operation work			1.0
UU13	0.0	0.0	0.0	1.0
UU14	0.0	0.0	0.0	1.0
UU15	0.0	0.0	0.0	1.0
UU16	0.0	0.0	0.0	1.0
UU17	Voided due to latest site programme and on-going operation work			1.0
UU18	0.0	0.0	0.0	1.0
UU19	0.0	0.0	0.1	1.0
UU20	0.0	0.0	0.0	1.0
UU21	0.0	0.0	0.0	1.0
UU22	0.0	0.0	0.0	1.0
UU23	0.0	0.0	0.0	1.0
UU24	0.0	0.0	0.1	1.0
UU25	0.0	0.0	0.1	1.0
UU26	0.0	0.0	0.1	1.0
UU27	0.0	0.0	0.2	1.0
UU28	0.0	0.0	0.1	1.0

Table 2.34 Summary of Landfill Gas Bulk Gas Sampling Monitoring Results in the Reporting Period

Parameters	Limit Level (LFG1) (a)	LFG1	Limit Level (LFG8) (a)	LFG8
Methane (% (v/v))	1.0	<0.0200	12.6	<0.020
Carbon Dioxide (% (v/v))	3.2	0.419	2.4	0.138
Oxygen (% (v/v))	-	15.6	-	17.2
Nitrogen (% (v/v))	-	80.6	-	79.2
Carbon Monoxide (% (v/v))	-	<0.020	-	<0.020
Hydrogen (% (v/v))	-	<0.020	-	<0.020
Ethane (ppmv)	-	<1.0	-	<1.0
Propane (ppmv)	-	<1.0	-	<1.0
Butane (ppmv)	-	<1.0	-	<1.0

Notes:

(a) Limit Levels established based on the pre-operation phase baseline and additional landfill gas monitoring results in the Pre-operation Baseline Monitoring Report.

Table 2.35 Summary of Flammable Gas Surface Emission Monitoring Results in the Reporting Period

GPS Coordinates		Monitoring Results (ppm)	Limit Level (ppm)
Latitude (N)	Longitude (E)		
22°16'26"	114°16'35"	25	30
22°16'26"	114°16'34"	11	

The alarm of the permanent gas monitoring systems with pre-set levels for methane at 20% lower explosive limit (LEL, equivalent to 1% methane gas (v/v)) was not triggered at all occupied on-site buildings at SENTX from October to December 2022.

Limit Levels exceedance was recorded for perimeter landfill gas monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex G3* were undertaken. Investigation of the Action and Limit Levels exceedances was conducted and the investigation report is presented in *Annex G4*. Based on the investigation conducted for the monitoring event with potential Limit Levels exceedance with the Contractor and the IEC, the perimeter landfill gas exceedance at LFG13 on 3 October 2022 is considered non Project-related.

The Contractor was reminded to implement all relevant mitigation measures for the construction and operation works and maintain good site practice. The ET will keep track on the monitoring data and ensure Contractor’s compliance of the environmental requirements.

2.5 LANDSCAPE AND VISUAL MONITORING

2.5.1 Monitoring Requirements

According to the updated EM&A Manual of the Project, the monthly landscape and visual audit was conducted on 27 October 2022, 17 November 2022 and 22 December 2022 to monitor the implementation of the landscape and visual mitigation measures during operation/ restoration phase.

All relevant environmental mitigation measures listed in the approved EIA Report and the updated EM&A Manual and their implementation status are summarised in *Annex B*.

2.5.2 Results and Observations

The Contractor has implemented environmental mitigation measures as stated in the approved EIA Report and the EM&A Manual.

Regarding the landscape and visual audit, the Contractor was reminded to maintain the advance screen planting works regularly to ensure effective screening of views of project works from the High Junk Peak Trail.

Site inspections were carried out on a weekly basis with the Contractor, IEC and ER to monitor the implementation of proper environmental pollution control and mitigation measures for air quality, noise, surface water quality and waste management under the Project. In the reporting period, 13 site inspections were carried out on 6, 13, 20 and 27 October, 3, 10, 17 and 24 November and 1, 8, 15, 22 and 29 December 2022.

Key observations during the site inspections are summarized in *Table 2.36*.

Table 2.36 *Key Observations Identified during the Site Inspections in this Reporting Period*

Inspection Date	Environmental Observations and Recommendations
6 October 2022	<ul style="list-style-type: none"> The contractor shall remove the general refuse accumulated at the surface channel near Paul Y area to ensure it is functioning properly at all times. The contractor shall remove the deposited silt accumulated at the surface channel near sump house 3 to ensure it is functioning properly at all times.
10 October 2022	<ul style="list-style-type: none"> The contractor shall remove the general refuse accumulated near Paul Y area to maintain site cleanliness.
20 October 2022	<ul style="list-style-type: none"> The contractor shall cover the stockpile of dusty materials by impervious sheeting near LTP to minimize dust impact issue. The contractor shall cover the exposed soil area near buttress wall area to reduce the contamination of runoff and erosion. The contractor shall refill flocculent agent in Wetsep at DP4 to ensure it is functioning properly at all times. The contractor shall remove the oil spillage near town gas plant and handle the clean-up materials as chemical waste. The contractor shall remove the general refuse accumulated at the channel leading to DP3, DP3 sediment pit, x10C channel and near Paul Y area to maintain site cleanliness.
27 October 2022	<ul style="list-style-type: none"> The contractor shall remove the general refuse accumulated at the x10C channel to ensure it is functioning properly at all times.
3 November 2022	<ul style="list-style-type: none"> The Contractor shall remove the stagnant water and general refuse accumulated at DP3 sedimentation pit and X10a channel near sump house 2 to ensure they are functioning properly at all times. The Contractor shall divert the SENTX surface water runoff affecting DP3 catchment area to the drop inlet X9 for discharge via sediment trap and DP4 in accordance with the Proposal on the Extension of Temporary Suspension of Surface Water Quality Monitoring at DP3. The Contractor shall review the operation and treatment capacity of the Wetseps near DP4 and DP6 to ensure all surface water is treated before discharge. The Contractor shall remove the general refuse accumulated at Paul Y area regularly to minimise odour and pest issues.

Inspection Date	Environmental Observations and Recommendations
10 November 2022	<ul style="list-style-type: none"> The Contractor shall remove the general refuse, deposited silt and grit accumulated at X9 drop inlet and general refuse at X10a channel near sump house no. 2 to ensure they are functioning properly at all times. The Contractor shall divert the SENTX surface water runoff affecting DP3 catchment area to the drop inlet X9 for discharge via sediment trap and DP4 in accordance with the Proposal on the Extension of Temporary Suspension of Surface Water Quality Monitoring at DP3. The Contractor shall remove the stagnant water accumulated in the drip tray at Wetseps near DP4 and handle the clean-up materials as chemical waste.
17 November 2022	<ul style="list-style-type: none"> The Contractor shall remove the deposited silt and grit accumulated at X10a channel regularly to ensure it is functioning properly at all times.
24 November 2022	<ul style="list-style-type: none"> The Contractor shall remove the deposited silt and grit accumulated at X10a channel and stagnant water accumulated at DP3 sedimentation pit to ensure they are functioning properly at all times. The Contractor shall divert the SENTX surface water runoff affecting DP3 catchment area to the drop inlet X9 for discharge via sediment trap and DP4 in accordance with the Proposal on the Extension of Temporary Suspension of Surface Water Quality Monitoring at DP3.
1 December 2022	<ul style="list-style-type: none"> The Contractor shall cover the stockpile of dusty materials by impervious sheeting in the Paul Y. area to minimize dust impact. The Contractor shall remove the deposited silt and grit accumulated at X10a channel and general refuse at X10 channel near DP3 regularly to ensure they are functioning properly at all times. The Contractor shall remove the silt and grit accumulated alongside X10 channel regularly to prevent surface run-off. The Contractor shall remove the general refuse accumulated at area X2 along the access road to site entrance to minimize odour and pest issues.
8 December 2022	<ul style="list-style-type: none"> The Contractor shall remove the general refuse accumulated at X10 channel near DP3 and the deposited silt and grit accumulated at X10a channel to ensure they are functioning properly at all times.
15 December 2022	<ul style="list-style-type: none"> The Contractor shall remove the deposited silt and grit accumulated at X10a channel regularly to ensure it is functioning properly at all times.
22 December 2022	<ul style="list-style-type: none"> The Contractor shall enhance watering at the main haul road along the tie-in area to minimise dust impact. The Contractor shall remove the general refuse, deposited silt and grit accumulated at X10a channel regularly to ensure it is functioning properly at all times.
29 December 2022	<ul style="list-style-type: none"> The Contractor shall remove the deposited silt and grit accumulated at X10a channel and the general refuse accumulated at X10 channel near DP3, X9 drop inlet and the channel downstream of the sediment trap to ensure they are functioning properly at all times.

The Contractor has rectified all of the observations identified during environmental site inspections in the reporting period. Key environmental deficiencies identified and the corresponding rectification actions are presented in *Table 2.37*.

Table 2.37 Summary of Environmental Deficiencies Identified and Corresponding Additional Control Measures

Deficiencies	Rectifications Implemented	Proposed Additional Control Measures
Surface Water		
Intercepting channels & drainage system	<ul style="list-style-type: none"> Reviewed drainage plan. 	<ul style="list-style-type: none"> Provision of additional drainage channels. Expedite the construction of permanent sediment trap and discharge culverts.
DP channels (design & regular silt removal)	<ul style="list-style-type: none"> Carried out regular maintenance and cleaning of channels. DP4 channel: Area near the channel was paved with concrete and a bund was built. DP6 channel: Gravel piles on the channel were covered with concrete which serve as blocks for running water and to divide the channel into several sections. A pump was placed in the water zone in the upstream section to pump water to the Wetsep for treatment prior to the discharge to the last section before the weir plate. DP6: Pipes through the gravel piles between different channel sections were covered with geotextiles to block debris and silt. 	N.A.
Stockpiles & exposed soil	<ul style="list-style-type: none"> Installed silt fencing near surface water channel along DP6 channel. 	<ul style="list-style-type: none"> Improve soil covering. Compaction and cover for stockpiles and soil slopes.
Wetsep (treatment capacity & number)	<ul style="list-style-type: none"> Reviewed Wetsep capacity. Chemicals dosage of the Wetsep was increased to enhance the efficiency. 	<ul style="list-style-type: none"> Install additional Wetsep.
Backflow / ponding during heavy rainfall	<ul style="list-style-type: none"> Raised with EPD (LDG) and CEDD. 	N.A.

2.7

WASTE MANAGEMENT STATUS

The Contractor has registered as a chemical waste producer under the Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting.

As informed by the Contractor, waste generated during this reporting period include mainly non-inert Construction Waste and chemical wastes. Reference has been made to the waste flow table prepared by the Contractor. The quantities of different types of wastes and imported fill materials are summarised in *Table 2.38*.

Table 2.38 Quantities of Different Waste Disposed and Imported Fill Materials

Month/ Year	Inert C&D Materials (in '000m ³)	Imported Fill (in '000kg)		Inert Construction Waste Re- used (in '000m ³)	Non-inert Construction Waste ^(c) (in '000m ³)	Recyclable Materials ^(d) (in '000kg)	Yard Waste (in '000kg)		Chemical Wastes (in '000kg)
		Rock	Soil				Y Park	SENT	
1 - 31 Oct 22	0	0	0	0	0.001	0	6.930	82.000	0.800
1 - 30 Nov 22	0	0	0	0	0	0	35.90	252.39	0.800
1 - 31 Dec 22	0	0	0	0	0.0747	0	0	0	0.8

Notes:

- (a) Inert construction wastes include hard rock and large broken concrete, and materials disposed as public fill. Density assumption: 1.6 (kg/L) for public fill.
- (b) Imported fill refers to materials generated from other project for on-site reuse.
- (c) Non-inert construction wastes include general refuse disposed at landfill. Density assumption: 0.9 (kg/L) for general refuse.
- (d) Recyclable materials include metals, paper, cardboard, plastics and others.

2.8 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

A summary of the Environmental Mitigation Implementation Schedule is presented in Annex B. The necessary mitigation measures were implemented properly for the Project.

2.9 SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

The operation/restoration phase noise monitoring results complied with the Action and Limit Levels in the reporting period.

Two exceedances of the Limit Level for landfill gas flare stack emission (SO₂) and one exceedance of Limit Level for landfill gas flare stack emission (Benzene) were recorded for air quality monitoring in the reporting period. The landfill gas flare stack emission (SO₂) exceedances on 14 October 2022 and 17 November 2022 and landfill gas flare stack emission (Benzene) exceedance on 13 December 2022 were considered Project-related upon further investigation.

Six exceedances of the Limit Level for Leachate Level and one exceedance of Limit Level for leachate quality (Chromium) were recorded for water quality impact monitoring in the reporting period. The leachate level exceedances at Pump Station No. 4X from 1 October to 3 October 2022, the leachate level exceedances at Pump Station No. 3X on 3 November 2022 and Pump Station No. 4X from 3 November 2022 to 4 November 2022 and leachate (Chromium) exceedance on 6 December 2022 were considered Project-related upon further investigation.

One exceedance of the Limit Level for perimeter landfill gas monitoring was recorded in the reporting period. The perimeter landfill gas exceedance at

LFG13 on 3 October 2022 was considered non Project-related upon further investigation.

Cumulative statistics on exceedances is provided in *Annex H*.

2.10 ***SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS***

There were no complaints, notification of summons or prosecution recorded in the reporting period.

Statistics on complaints, notifications of summons and successful prosecutions are summarised in *Annex H*.

This Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 October 2022 to 31 December 2022 in accordance with the updated EM&A Manual and the requirements of the Environmental Permit (EP-308/2008/B).

Air quality quality (24-hour TSP, odour, thermal oxidiser, landfill gas flare and landfill gas generator stack emission, ambient VOCs, ammonia and H₂S), noise, water quality (surface water, leachate and groundwater) and landfill gas monitoring were carried out in the reporting period. Results for noise monitoring complied with the Action and Limit Levels in the reporting period.

Two exceedances of the Limit Level for landfill gas flare stack emission (SO₂), one exceedance of Limit Level for landfill gas flare stack emission (Benzene), six exceedances of the Limit Level for Leachate Level, one exceedance of Limit Level for leachate quality (Chromium) and one exceedance of the Limit Level for perimeter landfill gas monitoring were recorded in the reporting period.

Thirteen environmental site inspections were carried out during the reporting period. Environmental deficiencies were identified during the site inspection and the Contractor has proposed additional control measures to rectify the deficiencies.

There were no complaints, notification of summons or prosecution recorded in the reporting period.

It is noted that most environmental pollution control and mitigation measures were properly implemented and the construction and operation activities of the Project did not introduce any adverse impact to the sensitive receivers in the reporting period. Yet, some environmental deficiencies were identified during the reporting period and additional control measures have been proposed by the Contractor to rectify the corresponding deficiencies. The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the monitoring programme was thus not recommended at this stage. The monitoring programme will be evaluated as appropriate in the next reporting period. The ET will keep track on the construction works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Annex A

Work Programme

WBS Path	Activity	Activity Name	Dur	Start	Finish	Phase	Predecessor Details	Successor Details	2018		2019		2020		2021		2022		2023		
									Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
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WBS Path	Activity ID	Activity Name	Dur	Start	Finish	Task ID	Predecessor Details	Successor Details	2018			2019			2020			2021			2022			2023		
									Q1	Q2	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
508	SA2.6.03	Civil Engineering Works	1269	02-Nov-19	13-Apr-23	30																				
510	SA2.6.03.1	Landfill Cell 2	449	02-Nov-19	23-Jan-21	810																				
511	6.03.2	63-1000 Earth bund (Eastern)	110	02-Nov-19	19-Feb-20	9	11-1100 FS, 23-2500 FS, 63-4200 FS, 63-1400 FS, 63-2800 FS	63-3000 FS, 63-1500 FS, 63-1800 FS, 63-1900 FS, 63-2000 FS, 63-2100 FS, 63-2200 FS, M12, 1 FS, 50, M12, 2 FS, 63-1100 FS																		
512	6.03.2	63-1100 Earth bund (Western)	110	20-Feb-20	08-Jun-20	84	11-1100 FS, 23-2500 FS, 63-1800 FS, 63-1400 FS, 63-3000 FS	63-1400 FS, 63-1500 FS, 63-1700 FS, 63-3500 FS, 63-3000 FS, 63-1200 FS																		
513	6.03.2	63-1200 Intercell bund (Cell 2/3)	90	09-Jun-20	06-Sep-20	734	11-1100 FS, 23-2500 FS, 63-1800 FS, 63-1400 FS, 63-3000 FS	63-1500 FS																		
514	6.03.2	63-1300 Site Formation	75	02-Nov-19	15-Jan-20	14	11-1100 FS, 23-2500 FS, 63-1800 FS, 63-1400 FS	63-1400 FS, 63-4200 FS																		
515	6.03.2	63-1400 Pump Station (PS42X)	45	09-Jun-20	23-Jul-20	84	63-1500 FS, 63-1100 FS	63-1600 FS, 63-1700 FS																		
516	6.03.2	63-1500 Lining Works	90	01-Oct-20	29-Dec-20	710	41-1500 FS, 63-1000 FS, 63-1100 FS, 63-1200 FS	63-1900 FS, M12, 3 FS, 63-2400 FS																		
517	6.03.2	63-1600 Protective Stone Laying & Leachate Collection Pipe	25	30-Dec-20	23-Jan-21	810	63-1500 FS, 41-1500 FS, 63-1400 FS	32-1800 FS, M12, 3 FS																		
518	6.03.2	63-1700 Install Leachate Force Main	75	24-Jul-20	06-Oct-20	84	63-1100 FS, 41-1500 FS, 63-1400 FS	54-2800 FS, M12, 3 FS																		
519	6.03.2	63-1800 Install Landfill Gas Pipe on earth bund	35	20-Feb-20	26-Mar-20	168	41-1500 FS, 63-1000 FS	54-4000 FS, M12, 3 FS																		
522	SA2.6.03.3	Landfill Cell 3	714	20-Feb-20	02-Feb-22	435																				
521	6.03.3	63-1900 Earth bund (Eastern)	110	20-Feb-20	08-Jun-20	9	11-1100 FS, 63-4200 FS, 63-1000 FS, 63-4000 FS, 63-2800 FS, 63-4200 FS	63-3000 FS, 63-3600 FS, 63-2400 FS, 63-2700 FS, M12, 1 FS, 50, M12, 2 FS, 63-2000 FS, 45, 63-2200 FS																		
522	6.03.3	63-2000 Earth bund (Western)	110	25-Apr-20	12-Aug-20	19	11-1100 FS, 63-1000 FS, 63-1900 FS, 45	63-2300 FS, 63-2400 FS, 63-2600 FS, 63-3700 FS, 63-3100 FS, 45																		
523	6.03.3	63-2100 Intercell bund (Cell 3/4)	105	29-Jun-20	11-Oct-20	789	11-1100 FS, 63-1000 FS, 63-4200 FS, 63-2000 FS, 45	63-2400 FS																		
524	6.03.3	63-2200 Site Formation	75	09-Jun-20	22-Aug-20	9	11-1100 FS, 63-1000 FS, 63-1900 FS	63-3200 FS																		
525	6.03.3	63-2300 Pump Station (PS43X)	45	23-Aug-20	16-Oct-20	9	63-2200 FS, 63-2000 FS	63-2500 FS, 63-2600 FS																		
526	6.03.3	63-2400 Lining Works	100	01-Oct-21	08-Jan-22	435	41-1500 FS, 63-1900 FS, 63-2000 FS, 63-2100 FS, 63-1500 FS	63-2500 FS, M12, 3 FS																		
527	6.03.3	63-2500 Protective Stone Laying & Leachate Collection Pipe	25	09-Jan-21	03-Feb-21	435	63-2400 FS, 41-1500 FS, 63-2300 FS	32-1700 FS, M12, 3 FS																		
528	6.03.3	63-2600 Install Leachate Force Main	75	07-Oct-20	20-Dec-20	9	63-2000 FS, 41-1500 FS, 63-2300 FS	53-2100 FS, 40, 54-2800 FS, M12, 3 FS																		
529	6.03.3	63-2700 Install Landfill Gas Pipe on earth bund	35	09-Jun-20	13-Jul-20	58	41-1500 FS, 63-1900 FS	54-4000 FS, M12, 3 FS																		
530	SA2.6.03.4	Landfill Cell 4	584	07-Sep-21	15-Apr-23	30																				
531	6.03.4	63-2800 Remaining Portion of Buttress Wall	120	07-Sep-21	04-Jan-22	494	62-1000 FS																			
532	6.03.4	63-2900 Earth bund (Western) incl. MSE Wall	120	07-Sep-21	04-Jan-22	239	62-1000 FS	63-3000 FS, 63-3100 FS, 63-3200 FS, 63-3400 FS, 63-3800 FS, 63-3000 FS, 63-4100 FS, 55-40, M, 6, 6 FS, 60, M, 9, 7 FS, 30, M, 9, 8 FS																		
533	6.03.4	63-3000 Site Formation	120	05-Jan-22	04-May-22	239	62-1000 FS, 62-1100 FS, 62-1200 FS, 63-2900 FS	63-3100 FS																		
534	6.03.4	63-3100 Pump Station (PS44X)	45	05-May-22	18-Jun-22	239	63-3000 FS, 63-2900 FS	63-3300 FS, 63-3400 FS																		
535	6.03.4	63-3200 Lining Works	135	01-Oct-22	12-Feb-23	0	41-1500 FS, 63-2900 FS	63-3300 FS, M12, 6 FS																		
536	6.03.4	63-3300 Protective Stone Laying & Leachate Collection Pipe	60	13-Feb-23	13-Apr-23	0	41-1500 FS, 63-3200 FS, 63-3100 FS	12-1900 FS, 32-1800 FS, M12, 6 FS																		
537	6.03.4	63-3400 Install Leachate Force Main & Remove Temporary Leachate Pipe	30	19-Jun-22	18-Jul-22	269	41-1500 FS, 63-2900 FS, 63-3100 FS	12-1900 FS, 32-1800 FS, M12, 6 FS																		
538	SA2.6.03.5	Drainage - Surface Run-Off	790	16-Jan-20	03-Feb-22	464																				
539	6.03.5	63-3500 Perimeter Channel (X0A) at Cell 2 Western Bund	15	09-Jan-20	23-Jun-20	1054	63-1100 FS	12-1900 FS																		
540	6.03.5	63-3600 Perimeter Channel (X10A) at Cell 2 Western Bund	30	09-Jun-20	08-Jul-20	1029	63-1100 FS	63-4000 FS																		
541	6.03.5	63-3700 Perimeter Channel (X10A) at Cell 3 Western Bund	30	13-Aug-20	11-Sep-20	964	63-2000 FS	63-4000 FS																		
542	6.03.5	63-3800 Perimeter Channel (X10A) at Cell 4 Western Bund	20	05-Jan-22	24-Jan-22	464	63-2900 FS	63-4000 FS																		
543	6.03.5	63-3900 Perimeter Channel (X10C) at Cell 4 Western Bund	15	05-Jan-22	19-Jan-22	469	63-2900 FS	63-4000 FS																		
544	6.03.5	63-4000 Connection to Existing OP3	10	25-Jan-22	03-Feb-22	464	63-3900 FS, 63-3900 FS, 63-3700 FS, 63-3800 FS	12-1900 FS																		
545	6.03.5	63-4100 Remove Cut-Off Channel C-7 at bottom of Buttress Wall	30	09-Jun-21	08-Jul-21	419	63-2900 SS, 40	63-3000 FS																		
546	6.03.5	63-4200 Temporary Channel (XT) at SENT Infrastructure Area	30	16-Jan-20	14-Feb-20	14	63-1300 FS	63-1900 FS, 63-2100 FS																		
547	SA2.6.03.6	Drainage - Ground Water	85	07-Sep-21	30-Nov-21	529																				
548	6.03.6	63-4300 Construct Temporary Channel (TC-1), from M11 to Existing LC-625	60	07-Sep-21	20-Oct-21	529	23-1900 FS, 11-1300 FS, 62-1000 FS	63-4400 FS																		
549	6.03.6	63-4400 Divert OCV at M11 to TC-1	5	27-Oct-21	31-Oct-21	529	63-4300 FS	63-4500 FS, M, 9, 9 FS																		
550	6.03.6	63-4500 Reconnection of GWP across Cell 4	30	01-Nov-21	30-Nov-21	529	62-1100 FS, 62-1200 FS, 63-4400 FS	12-1900 FS																		
551	SA2.6.03.8	Utilities - Works Associated with Utilities Undertakes	255	15-Nov-20	27-Jul-21	655																				
552	SA2.6.03.8.1	CLP	210	20-Dec-20	27-Jul-21	655																				
553	6.03.8.U1	63-4600 LFG Generator Ongrid Testing	180	30-Dec-20	27-Jun-21	655	32-2000 FS, 12-1200 FS, 64-4000 FS	63-4700 FS																		
554	6.03.8.U1	63-4700 LFG Generator Ongrid Inspection & Verify	30	28-Jun-21	27-Jul-21	655	63-4600 FS	12-1900 FS																		
555	SA2.6.03.8.2	Town Gas	55	15-Nov-20	08-Jan-21	855																				
556	6.03.8.U1	63-4800 Laying Gas Mains (from LFG to Town Gas PP)	45	15-Nov-20	29-Dec-20	855	64-4000 FF	63-4900 FS																		
557	6.03.8.U1	63-4900 Gas Meter Installation & Connection at LFG	10	30-Dec-20	08-Jan-21	855	63-4800 FS, 64-4000 FS	12-1900 FS																		
558	SA2.6.04	Building & E&M Works	661	01-Oct-19	22-Jul-21	660																				
559	SA2.6.04.1	Part X1 Area C	661	01-Oct-19	22-Jul-21	660																				
560	SA2.6.04.1.1	LFG Treatment Plant	661	01-Oct-19	22-Jul-21	660																				
561	6.04.C.02	64-1000 (2000) Storage 01 C Relocation	15	06-Jul-21	02-Jul-21	660	32-1500 FS	12-1900 FS																		
562	6.04.C.02	64-1100 Absorption Chiller (Optional)	90	01-Oct-19	29-Dec-19	1231	54-2200 FS	12-1900 FS																		
563	SA2.6.08	Landscaping Works	613	01-Apr-19	03-Dec-20	891																				
564	SA2.6.08.1	SENT Area																								

Annex B

Environmental Mitigation Implementation Schedule

Annex B Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks	
						D	C	O/R	A			
<i>Air Quality - Construction Phase</i>												
4.8.1	AQ1	<u>Blasting</u> <ul style="list-style-type: none"> The area within 30m of the blasting area will be wetted prior to blasting. Blasting will not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted, unless this is with the express prior permission of the Commissioner of Mines. loose material and stones in the Site will be removed prior to the blast operation During blasting, blast nets, screens and other protective covers will be used to prevent the projection of flying fragments and material resulting from blasting 	To minimise potential dust nuisance	Blasting area and 30m of blasting area	SENTX Contractor					✓	<i>Air Pollution Control (Construction Dust) Regulations</i>	Not applicable. Blasting is not required in the latest landfill design
4.8.1	AQ2	<u>Rock Drilling</u> <ul style="list-style-type: none"> Watering will be carried out at the rock drilling activities to avoid fugitive dust emissions. 	To minimise potential dust nuisance	Rock drilling area	SENTX Contractor					✓	<i>Air Pollution Control (Construction Dust) Regulations</i>	Not applicable. Rock drilling is not required in the latest landfill design

(1) D=Design; C=Construction; O/R=Operation/Restoration; A=Aftercare

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						D	C	O/R	A		
4.8.1	AQ3	<u>Site Access Road</u> <ul style="list-style-type: none"> The main haul road will be kept clear of dusty materials or sprayed with water. The main haul road will be paved with aggregate or gravel. Vehicle speed will be limited to 10kph. 	To minimise potential dust nuisance	Main haul road	SENTX Contractor				✓	<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>	Deficiency of mitigation measures but rectified by the Contractor
4.8.1	AQ4	<u>Stockpiling of Dusty Materials</u> <ul style="list-style-type: none"> Any stockpile of dusty materials will be covered entirely by impervious sheeting or placed in an area sheltered on the top and three sides or sprayed with water so as to ensure that the entire surface is wet. 	To minimise potential dust nuisance	All construction works area	SENTX Contractor				✓	<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>	Deficiency of mitigation measures but rectified by the Contractor
4.8.1	AQ5	<u>Loading, unloading or transfer of dusty materials</u> <ul style="list-style-type: none"> All dusty materials will be sprayed with water immediately prior to any loading, unloading or transfer operation so as to maintain the dusty material wet. 	To minimise potential dust nuisance	All construction works area	SENTX Contractor				✓	<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.1	AQ6	<u>Site Boundary and Entrance</u> <ul style="list-style-type: none"> Where a site boundary adjoins a road, street, service lane or other area accessible to the public, hoarding of height not less than 2.4m from ground level will be provided along the entire length of that portion of the site boundary except for the site entrance or exit. 	To minimise potential dust nuisance	Site boundary and entrance	SENTX Contractor				✓	<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>	Not applicable

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						D	C	O/R	A		
4.8.1	AQ7	<u>Excavation Works</u> <ul style="list-style-type: none"> Working area of any excavation or earth moving operation will be sprayed with water immediately before, during and immediately after the operation so as to ensure that the entire surface is wet. 	To minimise potential dust nuisance	All construction works area	SENTX Contractor				✓	<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.1	AQ8	<u>Building Demolition</u> <ul style="list-style-type: none"> The area where the demolition works are planned to take place will be sprayed with water immediately prior to, during and immediately after the demolition activities. Any dusty materials remaining after a stockpile is removed will be wetted with water and cleared from the surface of roads or street. 	To minimise potential dust nuisance	All construction works area	SENTX Contractor				✓	<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.1	AQ9	<u>Construction of the Superstructure of Building</u> <ul style="list-style-type: none"> Effective dust screens, sheeting or netting will be provided to enclose the scaffolding from the ground level up to the highest level of the scaffolding. 	To minimise potential dust nuisance	All construction works area	SENTX Contractor				✓	<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.1	AQ10	Should a stone crushing plant be needed on site, the control measures recommended in the <i>Best Practicable Means Requirement for Mineral Works (Stone Crushing Plants) BPM 11/1</i> should be implemented.	To minimise potential dust nuisance	Stone crushing plant/ construction phase	SENTX Contractor				✓	<i>Best Practicable Means Requirement for Mineral Works (Stone Crushing Plants) BPM 11/1</i>	Not applicable. Stone crushing plant is not required in the latest landfill design

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
4.8.1	AQ11	Good site practices such as regular maintenance and checking of the diesel powered mechanical equipment will be adopted to avoid any black smoke emissions and to minimize gaseous emissions.	To minimise potential dust nuisance	All construction works area	SENTX Contractor		✓			<i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.10.1	AQ12	Dust monitoring once every 6 days	Ensure the dust generated from the project meets the air quality requirement	At monitoring locations shown in <i>Figure 3.2a</i>	SENTX Contractor		✓			<i>HKAQO and EIAO-TM Annex 4</i>	Implemented
<i>Air Quality – Operation, Restoration and Aftercare Phases</i>											
4.8.2	AQ13	<u>Odour</u> • Enclosing the weighbridge area	To minimise odour nuisance	Weighbridge area	SENTX Contractor		✓	✓		<i>EIAO-TM Annex 4</i>	Not Applicable. As SENTX will receive construction waste only which is significantly less odorous, enclosing the weighbridge area is not necessary
4.8.2	AQ14	• Providing a vehicle washing facility before the exit of SENTX and providing sufficient signage to remind RCV drivers to pass through the facility before leaving SENTX	To minimise odour nuisance	Vehicle washing facility	SENTX Contractor		✓	✓		<i>EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ15	• Reminding the RCV drivers to empty the liquor collection sump and close the valve	To minimise odour nuisance	Tipping face	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. As SENTX will receive construction waste

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						D	C	O/R	A		
		before leaving the tipping face									only, which is relatively dry, the amount of liquor generated is expected to minimal
4.8.2	AQ16	<ul style="list-style-type: none"> Washing down the area where spillage of RCV liquor is discovered promptly 	To minimise odour nuisance	SENTX Site	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. As SENTX will receive construction waste only, which is relatively dry, the amount of liquor generated is expected to minimal.
4.8.2	AQ17	<ul style="list-style-type: none"> Reminding operators to properly maintain their RCVs and ensure that liquor does not leak from the vehicles 	To minimise odour nuisance	SENTX Site	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. As SENTX will receive construction waste only, which is relatively dry, the amount of liquor generated is expected to minimal.
4.8.2	AQ18	<ul style="list-style-type: none"> Installation of landfill gas control system to enhance collection of landfill gas from the waste mass and hence minimise odour associated with fugitive landfill gas emissions 	To minimise odour nuisance	SENTX Site	SENTX Contractor	✓	✓	✓		<i>EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ19	<ul style="list-style-type: none"> Progressive restoration of the areas which 	To minimise	SENTX Site	SENTX	✓	✓	✓		<i>EIAO-TM Annex 4</i>	Implemented

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						D	C	O/R	A		
		reach the finished profile (a final capping system including an impermeable liner will be put in place) and installation of a permanent landfill gas extraction system	odour nuisance		Contractor						
4.8.2	AQ20	<ul style="list-style-type: none"> Installing deodorizers along the site boundary adjacent to the ASRs 	To minimise odour nuisance	SENTX Site boundary	SENTX Contractor			✓	✓	EIAO-TM Annex 4	Not Applicable. As SENTX will receive construction waste only which is significantly less odorous, installation of deodorizers is not necessary.
4.8.2	AQ21	<ul style="list-style-type: none"> Erecting a vertical barrier, wall or structure softened by planting rows of trees/shrubs or landscape feature along the site boundary, particularly in the areas near the ASRs 	To minimise odour nuisance	SENTX Site boundary	SENTX Contractor	✓		✓	✓	EIAO-TM Annex 4	Implemented
4.8.2 and SENTX latest design	AQ22	<ul style="list-style-type: none"> Maintaining the size of the active tipping face not greater than 1,200 m² 	To minimise odour nuisance	Active tipping face	SENTX Contractor				✓	EIAO-TM Annex 4	Implemented
4.8.2	AQ23	<ul style="list-style-type: none"> Promptly covering the MSW with soil or selected inert materials to control odour emissions 	To minimise odour nuisance	Active tipping face	SENTX Contractor				✓	EIAO-TM Annex 4	Not Applicable. SENTX will not receive MSW.
4.8.2	AQ24	<ul style="list-style-type: none"> Maintaining the size of the special waste trench not greater than 6m (l) × 2.5m (w) 	To minimise odour nuisance	Special waste trench	SENTX Contractor				✓	EIAO-TM Annex 4	Not Applicable. SENTX will not have

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
											any special waste trench.
4.8.2 and SENTX latest design	AQ25	<ul style="list-style-type: none"> Covering daily covered area with a tarpaulin sheet or 300mm of soil after the landfill operating hours 	To minimise odour nuisance	Daily covered area	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ26	<ul style="list-style-type: none"> Covering special waste trench with 600 mm of soil and an impervious liner after 5 pm 	To minimise odour nuisance	Special waste trench	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. SENTX will not have any special waste trench.
4.8.2	AQ27	<ul style="list-style-type: none"> Covering the non-active tipping face with 600mm of soil and an impermeable liner (on top of the intermediate cover), which will not only control odour emissions from landfilled waste but also enhance landfill gas extraction by the landfill gas extraction system 	To minimise odour nuisance	Intermediate cover	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ28	<ul style="list-style-type: none"> Applying deodorizers or odour suppression agents to control odour emissions from the active tipping face and special waste trench, if any, through spraying or fogging equipment 	To minimise odour nuisance	Active tipping face and special waste trench	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. As SENTX will receive construction waste only which is significantly less odorous, installation of deodorizers is not necessary. Moreover, SENTX will not have any special waste

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
											trench.
4.8.2	AQ29	<ul style="list-style-type: none"> Providing a mobile cover with retractable or suitable opening to cover up the opening of the special waste trench except during waste deposition and a suitable odour removal unit. The mobile cover should be equipped with powered extraction and suitable odour removal unit for purifying the trapped gas inside the trench before release into the atmosphere 	To minimise odour nuisance	Special waste trench	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. SENTX will not have any special waste trench.
4.8.2 and SENTX latest design	AQ30	<ul style="list-style-type: none"> Providing a thermal oxidizer for the leachate treatment plant 	To minimise odour nuisance as a result of breakdown of thermal oxidizer	Leachate treatment plant	SENTX Contractor	✓	✓	✓		<i>EIAO-TM Annex 4</i>	Implemented
4.8.2 and SENTX latest design	AQ31	<ul style="list-style-type: none"> Enclosing all the leachate storage and treatment tanks (except for the Sequential Batch Reactor (SBR) or Membrane Bioreactor (MBR) tanks) and diverting the exhaust air from these tanks to a thermal oxidizer or flare to avoid potential odour emissions from the LTP 	To minimise odour nuisance	Leachate treatment plant	SENTX Contractor	✓	✓	✓		<i>EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ32	<ul style="list-style-type: none"> Rescheduling of waste filling activities on-site by avoiding waste filling activities carrying out at the northern area of the site in the summer months between July to November 	To minimise odour nuisance	SENTX Site	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. As SENTX will receive construction waste only which is significantly less

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
											odorous, rescheduling of waste filling activities is not necessary.
4.8.2 and SENTX latest design	AQ33	<u>Dust, Gaseous Emission and LFG including Volatile Organic Compounds (VOCs)</u> • Keeping the main haul road to the waste filling area wet by regular watering ;	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		<i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ34	• Compacting the exposed daily and intermediate covered areas well to avoid fugitive dust emission;	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		<i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ35	• Limiting the vehicle speed within SENTX site boundary;	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		<i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ36	• Providing vehicle washing bay to avoid vehicles carrying dust to public roads;	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		<i>HKAQO and EIAO-TM Annex 4</i>	Implemented
4.8.2	AQ37	• Switching off the engine when the diesel-driven equipment is idling;	To minimise gaseous emissions	SENTX Site	SENTX Contractor			✓	✓	-	Implemented
4.8.2	AQ38	• Maintaining the construction equipment properly to avoid any black smoke emissions;	To minimise gaseous emissions	SENTX Site	SENTX Contractor			✓	✓	-	Implemented
4.8.2	AQ39	Providing sufficient underground landfill gas collection system to capture the landfill gas	To minimise gaseous	SENTX Site	SENTX Contractor			✓	✓	<i>EIAO-TM Annex 4</i>	Implemented

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						D	C	O/R	A		
		generated as much as possible; and	emissions, including LFG and VOCs								
4.8.2	AQ40	Periodic inspections of the final cover should be undertaken to ensure that the capping layer is in good conditions at all times.	To minimise gaseous emissions, including LFG and VOCs	SENTX Site	SENTX Contractor			✓	✓	EIAO-TM Annex 4	Implemented
4.10.2	AQ41	Monitoring of ambient TSP once every 6 days	Ensure the dust emission from the project meets the dust requirement	At monitoring locations shown in <i>Figure 11.3a</i>	SENTX Contractor			✓	✓	HKAQO and EIAO-TM Annex 4	Implemented
4.10.2	AQ42	Monitoring of ambient VOCs, ammonia and H ₂ S, quarterly	Ensure the gaseous emission from the project meets the air quality requirement	At monitoring locations shown in <i>Figure 11.3a</i>	SENTX Contractor			✓	✓	Odour thresholds or 1% of Occupational Exposure Limit (OEL) as stipulated in the "UK Health and Safety Executive (HSE) EH 40/05 Occupational Exposure Limits", whichever is lower.	Implemented
4.10.2 and SENTX latest	AQ43	Monitoring of parameters for thermal oxidizer, flares and generator in accordance with requirements stated in Tables 3.4a, 3.5a and 3.6a of the EM&A Manual respectively.	Ensure the gaseous emission from the project meets the air	At the flares and thermal oxidizer stacks when they are	SENTX Contractor			✓	✓ ⁽¹⁾	Emission Limits specified in Contract	Implemented

(1) For LFG flare and LFG generator only.

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						D	C	O/R	A		
design			quality requirement	in operation							
4.10.2	AQ44	To confirm design assumption of ammonia, it is recommended that the ammonia concentration in the flue gas of the thermal oxidiser be monitored during the commissioning stage of the thermal oxidiser. If required, an emission standard will be set for ammonia for the thermal oxidiser based on the monitoring results. If no ammonia is detected in the flue gas during the decommissioning stage, the monitoring of ammonia in the flue gas of the thermal oxidiser could be discontinued.	Ensure the gaseous emission from the project meets the air quality requirement	At the thermal oxidizer stack during commissioning . If ammonia is detected during commissioning stage, the monitoring will continue.	SENTX Contractor			✓		Emission Limits determined during commissioning stage	Implemented
4.10.2 and SENTX latest design	AQ45	Odour patrol in accordance with requirements stated in Table 3.7a of the EM&A Manual.	Ensure the odour emission from the project meets the odour requirement	Along SENTX Site boundary	SENTX Contractor			✓		EIAO-TM Annex 4	Implemented
4.10.2	AQ46	Monitoring of meteorological station, continuously	Collect site specific meteorological data	At meteorological station shown in Figure 11.3a	SENTX Contractor		✓	✓	✓	-	Implemented
Noise - Construction Phase											
5.7.1	N1	Adopt good site practice listed below: <ul style="list-style-type: none"> Only well-maintained plant will be 	To minimise potential construction	All construction	SENTX Contractor			✓		Noise Control Ordinance (NCO) and	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		<p>operated on-site and plant should be serviced regularly during the construction program;</p> <ul style="list-style-type: none"> • Silencers or mufflers on construction equipment should be utilized and will be properly maintained during the construction program; • Mobile plant, if any, will be sited as far from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use will be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction will, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures will be effectively utilised, wherever practicable, in screening noise from on-site construction activities. 	noise nuisance.	works area						<i>EIAO-TM Annex 5</i>	
5.8	N2	Weekly noise monitoring	Ensure noise generated from the project meets the criteria	At monitoring locations shown in <i>Figure 6.4a</i>	SENTX Contractor		✓			<i>Noise Control Ordinance (NCO) and EIAO-TM Annex 5</i>	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
<i>Noise - Operation/Restoration Phase</i>											
5.7.2	N3	Adopt good site practice listed below: <ul style="list-style-type: none"> Choose quieter PME; Include noise levels specification when ordering new plant items; Locate fixed plant items or noise emission points away from the NSRs as far as practicable; Locate noisy machines in completely enclosed plant rooms or buildings; and Develop and implement a regularly scheduled plant maintenance programme so that plant items are properly operated and serviced. The programme should be implemented by properly trained personnel. 	To minimise potential operational noise nuisance.	Within the SENTX Site	SENTX Contractor			✓		<i>Noise Control Ordinance (NCO) and EIAO-TM Annex 5</i>	Implemented
									-		Implemented
									-		Implemented
									-		Implemented
5.8	N4	Weekly noise monitoring	Ensure noise generated from the project meets the criteria	At monitoring locations shown in Figure 6.4a	SENTX Contractor			✓		<i>Noise Control Ordinance (NCO) and EIAO-TM Annex 5</i>	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks	
						D	C	O/R	A			
<i>Water Quality – Construction Phase</i>												
6.8.1	WQ1	<u>Construction Runoff</u> <ul style="list-style-type: none"> Exposed soil areas will be minimised to reduce the contamination of runoff and erosion. 	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor					✓	<i>ProPECC PN 1/94</i> <i>EIAO-TM Annex 6</i>	Deficiency of mitigation measures but rectified by the Contractor
6.8.1	WQ2	<ul style="list-style-type: none"> Perimeter channels will be constructed in advance of site formation works and earthworks and intercepting channels will be provided for example along the edge of excavation. 	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor	✓	✓				<i>ProPECC PN 1/94</i> <i>Water Pollution Control Ordinance (WPCO)</i> <i>EIAO-TM Annex 6</i>	Implemented
6.8.1	WQ3	<ul style="list-style-type: none"> Silt removal facilities, channels and manholes will be maintained and the deposited silt and grit should be removed regularly to ensure they are functioning properly at all times. 	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor					✓	<i>ProPECC PN 1/94</i> <i>WPCO</i> <i>EIAO-TM Annex 6</i>	Deficiency of mitigation measures but rectified by the Contractor
6.8.1	WQ4	<ul style="list-style-type: none"> Temporary covers such as tarpaulin will also be provided to minimise the generation of high SS runoff. 	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor					✓	<i>ProPECC PN 1/94</i> <i>WPCO</i>	Implemented
6.8.1	WQ5	<ul style="list-style-type: none"> The surface runoff contained any oil and 	To minimise	All	SENTX					✓	<i>ProPECC PN 1/94</i>	Implemented

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						D	C	O/R	A		
		grease will pass through the oil interceptors.	potential water quality impacts arising from the construction works	construction works area	Contractor					WPCO EIAO-TM Annex 6	
6.8.1	WQ6	<ul style="list-style-type: none"> All sewer and drains will be sealed to prevent building debris, soil etc from entering public sewers/drains before commencing any demolition works 	To minimise potential water quality impacts arising from the demolition works	Infrastructure area at existing SENT Landfill	SENTX Contractor		✓			ProPECC PN 1/94 WPCO EIAO-TM Annex 6	Not applicable
6.8.1	WQ7	<ul style="list-style-type: none"> During the excavation works for the twin drainage tunnels, the recycle water for cooling the cutter head of the TBM will be conveyed to the sedimentation tanks for treatment and most of the treated water will be reused, where applicable and as much as possible, in the boring operations. 	To minimise potential water quality impacts arising from the tunnel works	Tunnel boring sites	SENTX Contractor		✓			ProPECC PN 1/94 WPCO EIAO-TM Annex 6	Not applicable. Excavation of drainage tunnels is not required in the latest landfill design.
6.8.1	WQ8	<ul style="list-style-type: none"> The fuel and waste lubricant oil from the on-site maintenance of machinery and equipment will be collected by a licensed chemical waste collector. 	To minimise potential water quality impacts arising from improper handling of fuel and oil	SENTX Site	SENTX Contractor		✓			ProPECC PN 1/94 WPCO Waste Disposal Ordinance (WDO)	Implemented
6.8.1	WQ9	<ul style="list-style-type: none"> Implementation of excavation schedules, lining and covering of excavated stockpiles 	To minimise contaminated stormwater run-off from the SENTX Site	All construction works	SENTX Contractor		✓			ProPECC PN 1/94 WPCO EIAO-TM Annex 6	Implemented

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						D	C	O/R	A		
6.13	WQ10	<ul style="list-style-type: none"> Monitoring of surface water quality will be conducted on a regular basis as stated in the EM&A Manual. 	To minimise potential water quality impacts on surface water arising from the construction works	SENTX Site	SENTX Contractor		✓			WPCO Water-TM	Implemented
6.8.2	WQ11	<u>Sewage Effluents</u> <ul style="list-style-type: none"> Sufficient chemical toilets will be provided for the construction workforce. 	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor		✓			WPCO	Implemented
6.8.2	WQ12	<ul style="list-style-type: none"> Untreated sewage will not be allowed to discharge into the surrounding water body. 	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor		✓			WPCO WDO	Deficiency of mitigation measures but rectified by the Contractor
6.8.2	WQ13	<ul style="list-style-type: none"> A licensed waste collector will be employed to clean the chemical toilets on a regular basis. 	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor		✓			WPCO WDO	Implemented
Water Quality - Operation/Restoration and Aftercare Phases											
6.9.1	WQ14	<u>Surface Water Management</u> <ul style="list-style-type: none"> Inspections of the drainage system, sand traps, settlement ponds and surface water 	To minimise potential water	SENTX Site	SENTX Contractor			✓		WPCO Technical Memorandum	Implemented

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						D	C	O/R	A		
		channels will be performed regularly to identify areas necessary for maintenance, cleaning or repair.	quality impacts on surface water arising from the landfill operations.							<i>Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Inshore Waters (Water-TM)</i> <i>EIAO-TM Annex 6</i>	
6.9.1	WQ15	<ul style="list-style-type: none"> Regular maintenance and replacement, if required, of the HDPE liner will be conducted to prevent degradation from affecting the performance of the capping system. 	To minimise potential water quality impacts on surface water arising from the landfill operations.	SENTX Site	SENTX Contractor			✓		WPCO <i>Water-TM</i> <i>EIAO-TM Annex 6</i>	Implemented
6.9.1	WQ16	<ul style="list-style-type: none"> Monitoring of surface water quality will be conducted on a regular basis as stated in the EM&A Manual. 	To minimise potential water quality impacts on surface water arising from the landfill operations.	SENTX Site	SENTX Contractor			✓	✓	WPCO <i>Water-TM</i>	Implemented
6.9.2 and SENTX latest design	WQ17	<u>Groundwater Management</u> <ul style="list-style-type: none"> The groundwater management facilities including the groundwater monitoring wells will be inspected regularly during routine groundwater monitoring programme. 	To minimise potential water quality impacts on groundwater arising from the landfill operations.	SENTX Site	SENTX Contractor			✓	✓	WPCO <i>Water-TM</i> <i>EIAO-TM Annex 6</i>	Implemented

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						D	C	O/R	A		
6.9.2	WQ18	<ul style="list-style-type: none"> Monitoring of groundwater water quality will be conducted on a regular basis as stated in the EM&A Manual. 	To minimise potential water quality impacts on groundwater arising from the landfill operations.	SENTX Site	SENTX Contractor			✓	✓	WPCO Water-TM EIAO-TM Annex 6	Implemented
SENTX latest design	WQ19	<u>Sewage</u> <ul style="list-style-type: none"> All sewage from the operation staff will be diverted to the LTP for treatment or public sewer, if available. 	To ensure proper handling of sewage	SENTX Site	SENTX Contractor			✓	✓	-	Implemented
6.9.3	WQ20	<u>Leachate Management</u> <ul style="list-style-type: none"> The leachate pump houses and related ancillary equipment will be inspected regularly and repairs, if necessary. 	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate pump houses and related ancillary equipment	SENTX Contractor			✓	✓	WPCO Water-TM EIAO-TM Annex 6	Implemented
6.9.3	WQ21	<ul style="list-style-type: none"> For equipment such as pumps that require routine scheduled maintenance, the maintenance will be performed following manufacturer's recommended frequency. 	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate pumps	SENTX Contractor			✓	✓	WPCO Water-TM	Implemented

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						D	C	O/R	A		
6.9.3	WQ22	<ul style="list-style-type: none"> Preventive maintenance will be implemented so that the possibility for forced shutdown during wet season will be kept to minimal. 	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	WPCO Water-TM EIAO-TM Annex 6	Implemented
6.9.3	WQ23	<ul style="list-style-type: none"> Emergency procedures or a contingency plan will be established when the LTP is malfunctioned. 	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	WPCO Water-TM EIAO-TM Annex 6	Implemented
6.9.3 and SENTX latest design	WQ24	<ul style="list-style-type: none"> There will be sufficient redundancy in the system to handle the leachate flow even if one treatment train is down for maintenance. The leachate may be required to temporarily store within the landfill if the leachate storage lagoon are full and leachate cannot be transported to the LTP for treatment. 	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	WPCO Water-TM EIAO-TM Annex 6	Implemented
6.13	WQ25	<ul style="list-style-type: none"> Monitor the quality of effluent discharged from the LTP 	To ensure discharge quality comply with WPCO requirement	Leachate treatment plant discharge point	SENTX Contractor			✓	✓	WPCO Water-TM	Implemented

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						D	C	O/R	A		
6.10.1	WQ26	<u>Potential Leakage of Leachate</u> • Regular groundwater quality monitoring will be carried out to monitor the performance of the leachate containment system.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	SENTX Site	SENTX Contractor		✓	✓		WPCO Water-TM	Implemented
6.10.1	WQ27	• Maintenance and replacement of the capping system should be carried out, if necessary, to prevent control infiltration and leachate seepage from any damaged cap.	To minimise potential water quality impacts on surrounding water bodies arising from the leachate leakage.	SENTX Site	SENTX Contractor		✓	✓		WPCO Water-TM EIAO-TM Annex 6	Implemented
6.10.1	WQ28	• Maintaining control of the leachate level through extraction	To minimise potential water quality impacts on surrounding water bodies arising from surface breakout of leachate.	SENTX Site	SENTX Contractor		✓	✓		WPCO Water-TM EIAO-TM Annex 6	Implemented
Waste Management – Construction Phase											
7.6.1	WM1	All the necessary waste disposal permits are obtained prior to the commencement of construction work.	To ensure compliance with relevant statutory	Before construction works	SENTX Contractor	✓	✓			WDO	Implemented

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						D	C	O/R	A		
			requirements	commence							
7.6.1	WM2	<p><u>Management of Waste Disposal</u></p> <p>The construction contractor will open a billing account with the EPD. Every construction waste or public fill load to be transferred to the Government waste disposal facilities such as public fill reception facilities, sorting facilities, landfills will required a valid "chit" which contains the information of the account holder to facilitate waste transaction recording and billing to the waste producer. A trip-ticket system will also be established to monitor the disposal of construction waste at the SENT Landfill and to control fly-tipping. The trip-ticket system will be included as one of the contractual requirements and implemented by the contractor.</p> <p>A recording system for the amount of waste generated, recycled and disposed of (including the disposal sites) will be established.</p>	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓		<p>WDO</p> <p><i>Waste Disposal (Charges for Disposal of Construction Waste) Regulation;</i></p> <p><i>Works Bureau Technical Circular No.31/2004; and</i></p> <p><i>Annex 5 and Annex 6 of Appendix G of ETWBTC No. 19/2005)</i></p>	Implemented	
7.6.1	WM3	<p><u>Measures for the Reduction of Construction Waste Generation</u></p> <p>Inert and non-inert construction waste will be segregated and stored in different containers or skips to facilitate reuse or recycling of the inert waste and proper disposal of the non-</p>	To reduce construction waste generation	SENTX Site	SENTX Contractor		✓		<p>WDO</p> <p><i>EIAO-TM Annex 7</i></p>	Implemented	

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						D	C	O/R	A		
		inert construction waste. Specific areas of the work site will be designated for such segregation and storage if immediate use is not practicable.									
7.6.1	WM4	<u>Chemical Waste</u> The construction contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i> .	To ensure proper handling of chemical waste	SENTX Site	SENTX Contractor		✓			WDO <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>	Implemented
7.6.1	WM5	<u>Sewage</u> An adequate number of portable toilets will be provided at the site to ensure that sewage from site staff is properly collected. The portable toilets will be desludged and maintained regularly by a specialist contractor.	To ensure proper handling of sewage	SENTX Site	SENTX Contractor		✓			WDO <i>EIAO-TM Annex 7</i>	Implemented
7.6.1 and SENTX latest design	WM6	<u>General Refuse</u> General refuse will be stored in enclosed bins separately from construction and chemical wastes. The general refuse will be delivered to a transfer station or other landfill, separately from construction and chemical wastes, on a daily basis to reduce odour, pest and litter impacts. Recycling bins will be provided at strategic locations to facilitate recovery of aluminium	To ensure proper handling of general refuse	SENTX Site	SENTX Contractor		✓			WDO <i>EIAO-TM Annex 7</i>	Deficiency of mitigation measures but rectified by the Contractor

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						D	C	O/R	A		
		can and waste paper from the SENTX Site. Materials recovered will be sold for recycling.									
7.6.1	WM7	<u>Staff Training</u> At the commencement of the construction works, training will be provided to workers on the concepts of site cleanliness and on appropriate waste management procedures, including waste reduction, reuse and recycling.	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓				Implemented
7.8	WM8	<u>Environmental Monitoring & Audit Requirements</u> Weekly audits of the waste management practices will be carried out during the construction phase. The audits examine all aspects of waste management including waste generation, storage, recycling, transport and disposal.	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓		WDO		Implemented
Waste Management - Operation/Restoration Phase											
7.6.2 and SENTX latest design	WM9	<u>Sludge</u> In case off-site disposal is required, the Contractor will ensure that sludge generated from the LTP will be delivered in closed container to other waste disposal facility e.g. other landfills or a sludge treatment facility, for proper disposal on a daily basis.	To ensure proper handling of sludge	SENTX Site	SENTX Contractor		✓		WDO EIAO-TM Annex 7		Implemented

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						D	C	O/R	A		
7.6.2	WM10	<u>Chemical Waste</u> The construction contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i> .	To ensure proper handling of chemical waste	SENTX Site	SENTX Contractor			✓		WDO <i>EIAO-TM Annex 7</i> <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i>	Implemented
7.6.2	WM11	<u>Sewage</u> All sewage from the operation staff will be diverted to the LTP for treatment or public sewer, if available.	To ensure proper handling of sewage	SENTX Site	SENTX Contractor			✓		WDO <i>EIAO-TM Annex 7</i>	Moved to mitigation measure under water quality WQ19. It is a measure for water quality rather than waste management.
7.6.2 and SENTX latest design	WM12	<u>General Refuse</u> General refuse will be stored in enclosed bins and disposed of at other landfills or transfer station on a daily basis to reduce odour, pest and litter impacts. Recycling bins will be provided at strategic locations to facilitate recovery of aluminium can and waste paper from the SENTX Site. Materials recovered will be sold for recycling.	To ensure proper handling of general refuse	SENTX Site	SENTX Contractor			✓		WDO <i>EIAO-TM Annex 7</i>	Implemented
Landfill Gas Hazards - Design and Construction Phase											
8.6.2 and SENTX	LFG1	Precautionary measures to be adopted by the contractors at the Project site and the adjacent	To protect workers from	All construction	SENTX Contractor			✓		<i>Paragraphs 8.3 to 8.49 of EPD's Landfill Gas</i>	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
latest design		development site within the landfill consultation zone are outlined in Paragraphs 8.3 to 8.49 of EPD's <i>Landfill Gas Hazard Assessment Guidance Notes (the Guidance Note)</i> . Those precautionary measures applicable to the SENTX will be confirmed in the detailed Qualitative Landfill Gas Hazard Assessment to be submitted by the contractor.	landfill gas risk	works area						<i>Hazards Assessment Guidance Note</i> <i>EIAO-TM Annex 7</i>	
8.6.2	LFG2	Monitoring will be undertaken when construction works are carried out in confined space within the consultation zone with reference to the monitoring requirements and procedures specified in Paragraphs 8.23 to 8.28 of EPD's <i>Guidance Note</i> will be followed. In the event of the trigger levels being exceeded, it is recommended that a person, such as the Safety Officer, is nominated, with deputies, to be responsible for dealing with any emergency which may occur due to landfill gas. In an emergency situation, the nominated person, or his deputies, shall have the necessary authority and shall ensure that the confined space is evacuated and the necessary works implemented for reducing the concentrations of gas. The appropriate organisations shall be contact.	To protect workers from landfill gas risk	Confined space within the construction works area	SENTX Contractor		✓				Implemented
8.6.3	LFG4	Implementation of engineering measures according to Contract Specification requirements. These measures will include	To protect workers from landfill gas risk	SENTX Site	SENTX Contractor	✓	✓	✓	✓	<i>EIAO-TM Annex 7</i>	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
8.6.3	LFG5	<p>the placement of liner and installation of landfill gas management system to contain, manage and control landfill gas.</p> <p>Engineering measures to significant engineering measures will be required in the design of the SENTX to protect the staff working in the infrastructure area. These measures include a combination of passive and active systems (examples are recommended in EPD's <i>Guidance Notes</i>).</p> <p>Landfill gas monitoring boreholes will be installed at the edge of the waste slope between the waste and the new infrastructure area to monitor the migration of landfill gas, if any.</p>	To protect workers from landfill gas risk	Infrastructure Area	SENTX Contractor	✓	✓			<p><i>EPD's Landfill Gas Hazards Assessment Guidance Note</i></p> <p><i>EIAO-TM Annex 7</i></p>	Implemented
<i>Landfill Gas Hazards - Operation, Restoration and Aftercare Phases</i>											
8.6.4	LFG7	<p>To train and ensure staff to take appropriate precautions at all times when entering enclosed spaces or plant rooms. Undertake regular monitoring of landfill gas at the perimeter boreholes to detect if there are any signs of off-site landfill gas migration. Prepare and implement emergency plan in case off-site landfill gas migration is detected.</p> <p>A permanent gas monitoring system with alarm will be installed and operated in all occupied on-site buildings.</p>	To protect workers from landfill gas risk	SENTX Site	SENTX Contractor		✓	✓		<p><i>Landfill Gas Hazards Assessment Guidance Note</i></p>	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
8.7 and SENTX latest design	LFG8	<u>Environmental Monitoring & Audit Requirements</u> Undertake regular monitoring of landfill gas within the SENTX and along the SENTX boundary as required by the Contract Specification.	To protect workers from landfill gas risk	Within the SENTX and along the SENTX boundary	SENTX Contractor		✓	✓		Implemented	
<i>Landfill Gas Hazards Assessment Guidance Note</i>											
Ecology – Construction Phase											
9.10.2	EC1	Measures to control construction runoff: <ul style="list-style-type: none"> Exposed soil areas will be minimised to reduce the contamination of runoff and erosion; To prevent stormwater runoff from washing across exposed soil surfaces, perimeter channels will be constructed in advance of site formation works and earthworks and intercepting channels will be provided for example along the edge of excavation; Silt removal facilities, channels and manholes will be maintained and the deposited silt and grit will be removed regularly to ensure they are functioning properly at all times; 	To minimise potential water quality impacts affecting ecological resources	All construction works area	SENTX Contractor		✓		<i>EIAO-TM Annex 16 ProPECC PN 1/94 Water Pollution Control Ordinance (WPCO) EIAO-TM Annex 6</i>	Implemented	
									-	Implemented	
									-	Implemented	

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks	
						D	C	O/R	A			
		<ul style="list-style-type: none"> Temporary covers such as tarpaulin will also be provided to minimise the generation of high suspended solids runoff; The surface runoff contained any oil and grease will pass through the oil interceptors; and, Control measures, including implementation of excavation schedules, lining and covering of excavated stockpiles will be implemented to minimise contaminated stormwater run-off from the SENTX site. 									-	Implemented
											-	Implemented
											-	Implemented
9.10.2 and SENTX latest design	EC2	<u>Good Construction Practice:</u>										
		<ul style="list-style-type: none"> Fences along the boundary of the SENTX Site will be erected before the commencement of works to prevent vehicle movements, and encroachment of personnel, onto adjacent areas. The work site boundaries will be regularly checked to ensure that they are not breached and that damage does not occur to surrounding areas. 	To minimise potential ecological impacts arising from the Project	SENTX Site	SENTX Contractor						✓	EIAO-TM Annex 16 Implemented
Ecology - Operation, Restoration and Aftercare Phases												
9.10.2	EC3	<u>Measures for Controlling Leakage of Landfill Leachate</u>										Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
9.10.2	EC4	Leachate will be contained within the SENTX Site by the proposed impermeable leachate containment system and collected by the installation of drainage system to prevent potential migration of leachate to habitats in the vicinity.	To minimise potential water quality impact affecting the ecological resources	SENTX Site	SENTX Contractor	✓	✓			<i>EIAO-TM Annex 16</i> <i>WPCO</i> <i>Water-TM</i> <i>EIAO-TM Annex 6</i>	Implemented
		<u>Measures for Controlling Migration of Landfill Gas</u>									
		Disturbance to habitat in the vicinity and associated wildlife due to migration of landfill gas will be prevented by proper management of the landfill gas generated from the SENTX. Ignition fires will be prohibited to occur within the boundary of the SENTX Site. Surface emission and off-site migration of landfill gas will be regularly monitored.	To minimise potential landfill gas migration affecting ecological resources	SENTX Site	SENTX Contractor	✓	✓			<i>EIAO-TM Annex 16</i>	
9.10.3 and SENTX latest design	EC5	The following compensation planting is recommended as the mitigation measures for the habitat affected due to the SENTX: <ul style="list-style-type: none"> Provision of 6 ha of mixed woodland planting to compensate the loss of shrubland; and Provision of a mosaic of grassland and shrubland in the remaining areas of the SENTX Site. Compensatory planting and restoration of the SENTX can be implemented progressively according to the filling plan of SENTX.	Compensation of habitat loss due to the Project	SENTX Site	SENTX Contractor	✓	✓			<i>EIAO-TM Annex 16</i>	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
9.10.3	EC6	The mixture of grassland, shrubland and woodland habitats are recommended to diversify the habitats for supporting various wildlife in particular butterflies, birds and herpetofauna and blend into the existing undisturbed ecological environment.	To diversify habitats	SENTX Site	SENTX Contractor			✓	✓	EIAO-TM Annex 16	Implemented
9.10.3	EC7	Indigenous plant species of shallow root system, softwood in nature and adaptive to sea shore habitat are recommended to be used in the restoration plan, which can establish well in coastal area with exposure to strong wind and salt spray, with sand soil base. Taking consideration of the relative poor substrate and the difficulties of establishment of some native trees in Hong Kong, it is recommended to include approximately 20% of non-native tree species in the compensatory woodland. The non-native tree species can serve as a nurse species to facilitate the establishment of the native tree species, especially the shading, and it can be replaced by established native tree species progressively. Plant species can also make reference to food plants of butterfly species (in particularly butterfly species of conservation interests recorded within the CWBCP).	To enhance ecological value of the habitats	SENTX Site	SENTX Contractor			✓	✓	EIAO-TM Annex 16	Implemented
9.10.3	EC8	It is also recommended that a trial nursery for native plant species be set up to fine tune the planting matrix and management intensity of the recommended indigenous tree species for	To select the most suitable indigenous tree species for the	SENTX Site	SENTX Contractor	✓		✓	✓	EIAO-TM Annex 16	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		the restoration of the SENTX. It should be noted that native shrubs and tree species had been used for restoration of the existing SENT Landfill, native plant species that could not successfully be established on the existing SENT Landfill should be reviewed before the preparation of the compensatory planting list. Special care and intensive management of native plant should be implemented in order to ensure proper establishment of the native plants.	SENTX								
9.12.1	EC9	<u>Environmental Monitoring & Audit Requirements</u> The implementation of the ecological mitigation measures should be checked as part of the environmental monitoring and audit procedures during the construction period.	To ensure that adverse ecological impacts are prevented	SENTX	SENTX Contractor	✓	✓	✓	EIAO-TM Annex 16	Implemented	
Landscape and Visual – Construction Phase											
10.6.5	LV1	CM1 - The construction area and area allowed for the contractor's office, leachate treatment plant and laboratory areas will be minimised to a practical minimum, to avoid impacts on adjacent landscape.	To minimise the landscape and visual impacts	SENTX Site	SENTX Contractor	✓			EIAO-TM Annex 18 and ETWBC 3/2006	Implemented	
10.6.5	LV2	CM2 - Topsoil, where identified, will be stripped and stored for re-use in the construction of the soft landscape works, where practical. The Contract Specification	To minimise the landscape and visual impacts	All construction works area	SENTX Contractor	✓			EIAO-TM Annex 18	Not applicable	

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		will include storage and reuse of topsoil as appropriate.									
10.6.5	LV3	CM3 - All existing trees at the edges of the landfill will be carefully protected during construction. Detailed Tree Protection Specification will be provided in the Contract Specification. Under this Specification, the Contractor will be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas.	To minimise the landscape and visual impacts	Potential impacted area	SENTX Contractor		✓			<i>EIAO-TM Annex 18 and ETWBC 3/2006</i>	Not applicable
10.6.5	LV4	CM4 - Trees unavoidably affected by the works will be transplanted, where necessary and practical. A detailed Tree Transplanting Specification will be provided in the Contract Specification, if applicable. Sufficient time for necessary tree root and crown preparation periods will be allowed in the project programme.	To minimise the landscape and visual impacts	Potential impacted area	SENTX Contractor	✓	✓			<i>EIAO-TM Annex 18 and ETWBC 3/2006</i>	Implemented
10.6.5 and SENTX latest design	LV5	CM5 - Within 3 months of taking possession of the SENTX Site, the Contractor will plant advance screen planting of native species at Light Standard size at 1.5m centres along the High Junk Peak Trail so as to screen views of the Works from the trail. Tree planting locations will be agreed with AFCD. Works will be completed within 9 months of taking possession of the SENTX Site.	To minimise the landscape and visual impacts	At High Junk Peak Hiking Trail	SENTX Contractor		✓			<i>EIAO-TM Annex 18</i>	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
10.6.5	LV6	CM6 - The Contractor's office, leachate treatment plant and laboratory will be given an aesthetic treatment in earth tones to reduce their visual impact and albedo and blend them into the surrounding landscape.	To minimise the landscape and visual impacts	Infrastructure area	SENTX Contractor	✓	✓			EIAO-TM Annex 18	Implemented
10.6.5	LV7	CM7 - The Contractor's office, leachate treatment plant and laboratory will be surrounded by a minimum of 5m wide and 0.75m high earth bund on the west and south sides planted with a dense screen of tree and shrub vegetation. Additional tree planting will be provided in unused spaces with thin infrastructure site, along access roads and in and around car parks. This will be supplemented with shrub planting, where appropriate.	To minimise the landscape and visual impacts	Infrastructure area	SENTX Contractor	✓	✓			EIAO-TM Annex 18 and ETWBC 7/2002	Not applicable
10.6.5	LV8	CM8 - Planting trials will be carried out in an on-site nursery prior to implementation of the first phase of restoration to establish the best planting matrix and management intensity of the recommended plant materials for the restoration.	To minimise the landscape and visual impacts	SENTX Site	SENTX Contractor			✓		EIAO-TM Annex 18	Implemented
11.4.1 and SENTX latest design	LV9	During the preparation of the detailed landscape design plan, the design submission will be audited against the recommendation proposed in the <i>ER Report</i> by the Registered Landscape Architect from the ET.	To ensure the implementation of mitigation measures proposed in this EIA Report	SENTX Site	SENTX Contractor/ET	✓	✓			EIAO-TM Annex 18	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
<i>Landscape and Visual – Operation/Restoration Phase</i>											
10.6.5 and SENTX latest design	LV10	OM1 - Landfill materials will be covered with general fill material or tarpaulin sheet on a daily basis to reduce visual impact.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		EIAO-TM Annex 18	Implemented
10.6.5 and SENTX latest design	LV11	OM2 - Filling and restoration will be phased during the course of operations in a minimum of 4 phases, the restoration of each phase to commence immediately on the completion of filling in that phase.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		EIAO-TM Annex 18	Implemented
10.6.5	LV12	OM3 - Catch fences will be erected at the perimeter of the waste boundary, to ensure that all waste stays within the site and is not blown into surrounding areas.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		EIAO-TM Annex 18	Implemented
10.6.5	LV13	OM4 - All night-time lighting will be reduced to a practical minimum both in terms of number of units and lux level and will be hooded and directional.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		EIAO-TM Annex 18	Implemented
11.4.2 and SENTX latest design	LV14	The condition of the restoration plantation will be audited at monthly intervals by a Registered Landscape Architect from the ET.	To check the restoration plantation	SENTX Site	SENTX Contractor/ET			✓		EIAO-TM Annex 18	Implemented

Annex C

Monitoring Schedule for This Reporting Period

**South East New Territories (SENT) Landfill Extension
EM&A Impact Monitoring Schedule during Operation/ Restoration Phase**

October 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3 Dust Monitoring Perimeter LFG Monitoring	4	5 Service Void LFG Monitoring Noise Monitoring	6	7 Leachate Monitoring	8
9 Dust Monitoring	10 Noise Monitoring Groundwater Monitoring	11 Groundwater Monitoring	12	13 Odour Monitoring	14 Stack Monitoring	15 Dust Monitoring
16	17 Stack Monitoring Noise Monitoring	18	19	20	21 Dust Monitoring	22
23	24 Noise Monitoring Surface Water Monitoring	25	26	27 Dust Monitoring	28	29
30	31					

**South East New Territories (SENT) Landfill Extension
EM&A Impact Monitoring Schedule during Operation/ Restoration Phase**

November 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 Perimeter LFG Monitoring Perimeter LFG Bulk Gas Sampling	2 Dust Monitoring	3 Noise Monitoring	4 Service Void LFG Monitoring	5
6	7 Groundwater Monitoring	8 Dust Monitoring Groundwater Monitoring Leachate Monitoring	9 Noise Monitoring	10	11	12
13	14 Dust Monitoring	15 Noise Monitoring	16	17 VOCs Monitoring Stack Monitoring	18 Flammable Gas Monitoring Stack Monitoring	19
20 Dust Monitoring	21 Surface Water Monitoring Noise Monitoring	22	23	24 Odour Monitoring	25	26 Dust Monitoring
27	28 Noise Monitoring	29	30			

**South East New Territories (SENT) Landfill Extension
EM&A Impact Monitoring Schedule during Operation/ Restoration Phase**

December 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2 Dust Monitoring	3
4	5 Noise Monitoring	6 Perimeter LFG Monitoring Leachate Monitoring	7	8 Dust Monitoring	9 Service Void LFG Monitoring	10
11	12 Groundwater Monitoring	13 Groundwater Monitoring Stack Monitoring Odour Monitoring	14 Dust Monitoring	15 Noise Monitoring	16	17
18	19	20 Dust Monitoring	21 Noise Monitoring Surface Water Monitoring	22	23	24
25	26 Dust Monitoring	27	28 Noise Monitoring Stack Monitoring	29	30	31

Annex D

Air Quality

Annex D1

24-hour TSP Monitoring Results

Table D1.1 24-hour TSP Monitoring Results at AM1

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
3 Oct 22	9:00	4 Oct 22	9:51	Sunny	64
9 Oct 22	9:00	10 Oct 22	9:07	Sunny	78
15 Oct 22	9:00	16 Oct 22	9:09	Sunny	98
21 Oct 22	9:00	22 Oct 22	9:12	Sunny	91
27 Oct 22	9:00	28 Oct 22	9:13	Sunny	136
2 Nov 22	9:00	3 Nov 22	9:14	Rainy	45
9 Nov 22	9:00	10 Nov 22	9:07	Fine	119
14 Nov 22	9:00	15 Nov 22	9:22	Fine	117
20 Nov 22	9:00	21 Nov 22	8:10	Fine	228
26 Nov 22	9:00	27 Nov 22	9:10	Fine	45
2 Dec 22	9:00	3 Dec 22	9:07	Fine	55
8 Dec 22	9:00	9 Dec 22	9:08	Fine	225
14 Dec 22	9:00	15 Dec 22	9:14	Fine	29
21 Dec 22	14:00	22 Dec 22	14:14	Fine	113
26 Dec 22	9:00	27 Dec 22	9:10	Fine	111
				Average	104
				Min	29
				Max	228

Figure D1.1 Graphical Presentation for 24-hr TSP Monitoring at AM1

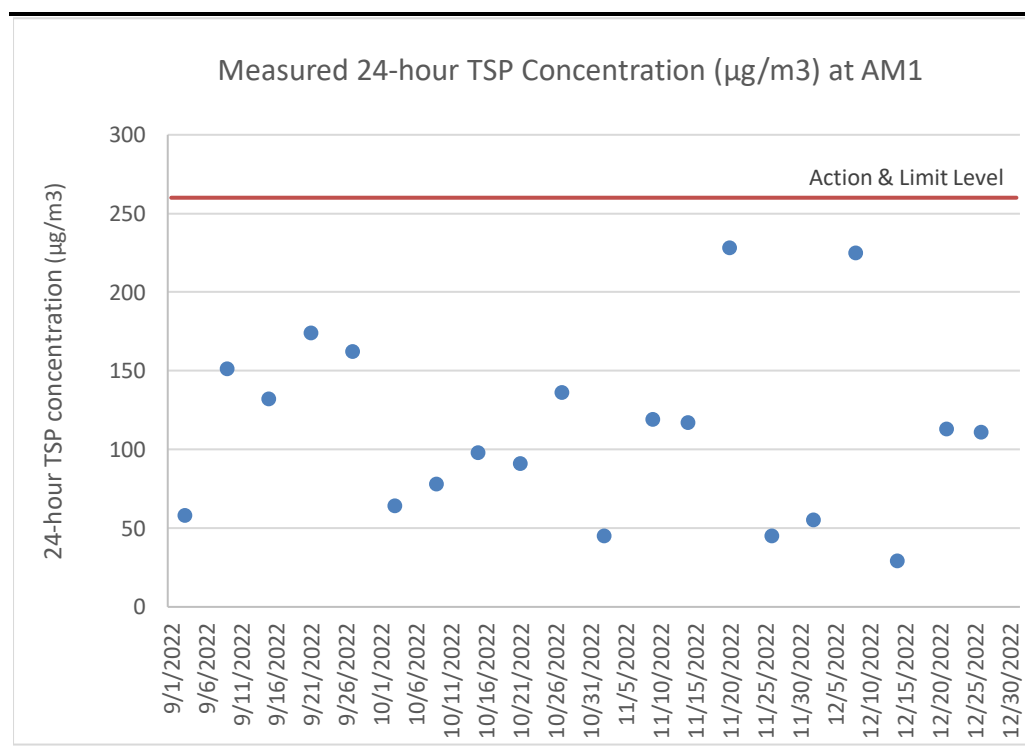


Table D1.2 24-hour TSP Monitoring Results at AM2

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu\text{g}/\text{m}^3$)
3 Oct 22	9:00	4 Oct 22	8:59	Sunny	76
9 Oct 22	9:00	10 Oct 22	8:59	Sunny	75
15 Oct 22	9:00	16 Oct 22	8:59	Sunny	89
21 Oct 22	9:00	22 Oct 22	9:01	Sunny	71
27 Oct 22	9:00	28 Oct 22	9:02	Sunny	126
2 Nov 22	9:00	3 Nov 22	9:00	Rainy	33
8 Nov 22	9:00	9 Nov 22	9:01	Fine	36
14 Nov 22	9:00	15 Nov 22	8:58	Fine	95
20 Nov 22	9:00	21 Nov 22	8:56	Fine	92
26 Nov 22	9:00	27 Nov 22	8:56	Fine	41
2 Dec 22	9:00	3 Dec 22	8:57	Fine	77
8 Dec 22	9:00	9 Dec 22	8:58	Fine	110
14 Dec 22	9:00	15 Dec 22	9:02	Fine	34
20 Dec 22	9:00	21 Dec 22	8:58	Fine	121
26 Dec 22	9:00	27 Dec 22	8:58	Fine	103
Average					79
Min					33
Max					126

Figure D1.2 Graphical Presentation for 24-hr TSP Monitoring at AM2

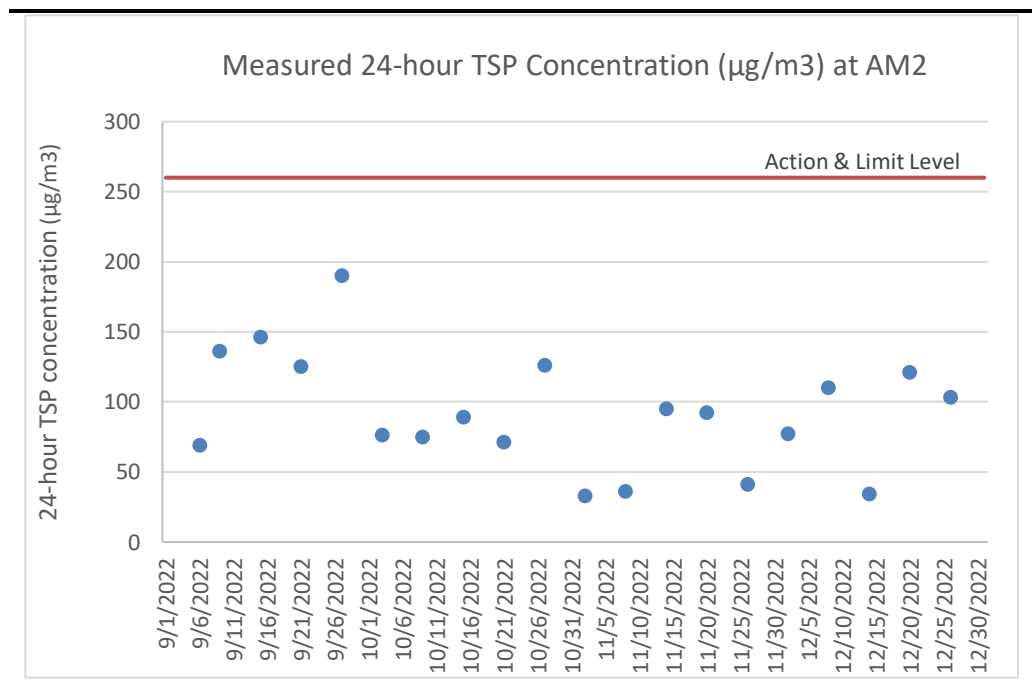


Table D1.3 24-hour TSP Monitoring Results at AM3

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu\text{g}/\text{m}^3$)
3 Oct 22	9:00	4 Oct 22	9:32	Sunny	111
9 Oct 22	9:00	10 Oct 22	9:33	Sunny	112
15 Oct 22	9:00	16 Oct 22	9:32	Sunny	194
21 Oct 22	9:00	22 Oct 22	9:34	Sunny	133
27 Oct 22	9:00	28 Oct 22	9:37	Sunny	118
2 Nov 22	9:00	3 Nov 22	8:50	Rainy	45
8 Nov 22	9:00	9 Nov 22	8:53	Fine	80
14 Nov 22	9:00	15 Nov 22	9:03	Fine	126
20 Nov 22	9:00	21 Nov 22	8:28	Fine	119
26 Nov 22	9:00	27 Nov 22	8:44	Fine	45
2 Dec 22	9:00	3 Dec 22	8:50	Fine	108
8 Dec 22	9:00	9 Dec 22	8:59	Fine	180
14 Dec 22	9:00	15 Dec 22	8:44	Fine	66
20 Dec 22	9:00	21 Dec 22	8:53	Fine	108
26 Dec 22	9:00	27 Dec 22	8:49	Fine	158
Average					114
Min					45
Max					194

Figure D1.3 Graphical Presentation for 24-hr TSP Monitoring at AM3

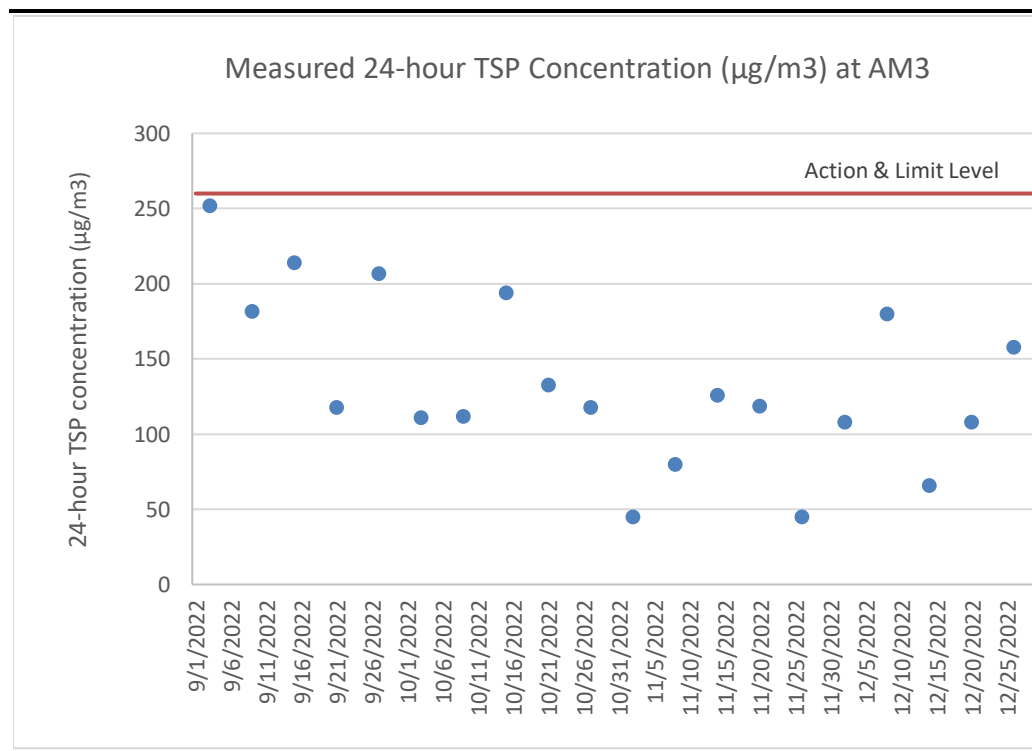
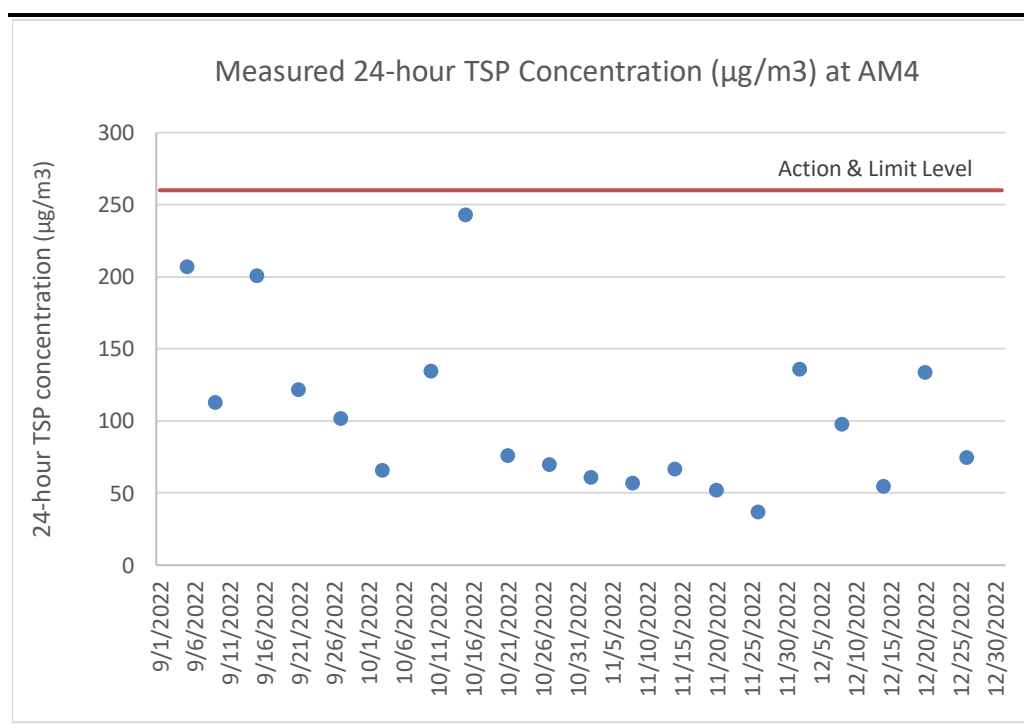


Table D1.4 24-hour TSP Monitoring Results at AM4

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu\text{g}/\text{m}^3$)
3 Oct 22	9:00	4 Oct 22	9:11	Sunny	66
10 Oct 22	11:45	11 Oct 22	11:50	Sunny	135
15 Oct 22	9:00	16 Oct 22	9:05	Sunny	243
21 Oct 22	9:00	22 Oct 22	8:58	Sunny	76
27 Oct 22	9:00	28 Oct 22	8:20	Sunny	70
2 Nov 22	9:00	3 Nov 22	8:19	Rainy	61
8 Nov 22	9:00	9 Nov 22	8:21	Fine	57
14 Nov 22	9:00	15 Nov 22	8:19	Fine	67
20 Nov 22	9:00	21 Nov 22	8:20	Fine	52
26 Nov 22	9:00	27 Nov 22	8:24	Fine	37
2 Dec 22	9:00	3 Dec 22	8:26	Fine	136
8 Dec 22	9:00	9 Dec 22	8:29	Fine	98
14 Dec 22	9:00	15 Dec 22	8:10	Fine	55
20 Dec 22	9:00	21 Dec 22	8:25	Fine	134
26 Dec 22	9:00	27 Dec 22	8:26	Fine	75
Average					91
Min					37
Max					243

Figure D1.4 Graphical Presentation for 24-hr TSP Monitoring at AM4



Annex D2

Event and Action Plan for Air Quality Monitoring

Annex D2 Event and Action Plan for Air Quality Monitoring During Operation/Restoration Phase

Event	Action		
	ET	IEC	Contractor
Exceedance of Action/Limit Level for dust monitoring	<ul style="list-style-type: none"> Identify the source(s) and investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures Ensure remedial measures are properly implemented Assess effectiveness of Contractor's remedial measures and keep the Project Proponent and IEC informed of the results Repeat measurement to confirm finding if exceedance is due to the Project Increase monitoring frequency to daily and continue until the monitoring results reduce to below action level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check monitoring data submitted by ET Check Contractor's working methods Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Take immediate action to avoid further exceedance Submit proposals for remedial measures to IEC Implement the agreed proposals Amend proposal if appropriate
Exceedance of Action Level for odour	<ul style="list-style-type: none"> Identify source(s) and investigate the cause(s) of exceedance or complaint Prepare the odour complaint form or the Notification of Exceedance within 24 hours Inform Contractor, IEC and Project Proponent whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures Ensure remedial measures are properly implemented Increase monitoring frequency to daily until odour not being detected for three consecutive days 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check monitoring data submitted by ET Check Contractor's working methods Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Rectify any unacceptable practice Amend working methods as required Implement amended working methods, if necessary

Event	Action		
	ET	IEC	Contractor
Exceedance of Limit Level for odour	<ul style="list-style-type: none"> Identify source(s) and investigate the cause(s) of exceedance or complaint Prepare the odour complaint form or the Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures Ensure remedial measures are properly implemented Assess effectiveness of Contractor's remedial measures and keep the Project Proponent and IEC informed of the results 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check with Contractor on the operating activities and implementation of odour mitigation measures Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Rectify any unacceptable practice Submit proposals for remedial measures to IEC within 3 working days of notification Implement the agreed proposal or amend working methods as required Resubmit proposals if problem still not under control
Exceedance of Limit Level for ambient VOCs, ammonia and H ₂ S at the monitoring locations	<ul style="list-style-type: none"> Identify the source(s) and investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures Ensure remedial measures are properly implemented Assess effectiveness of Contractor's remedial measures and keep the Project Proponent and IEC informed of the results Repeat measurement to confirm finding if exceedance is due to the Project Increase monitoring frequency to monthly and continue until the monitoring results reduce to below limit level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check with Contractor on the operating activities and implementation of landfill gas control measures Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Rectify any unacceptable practice Amend working methods as required Implement amended working methods, if necessary

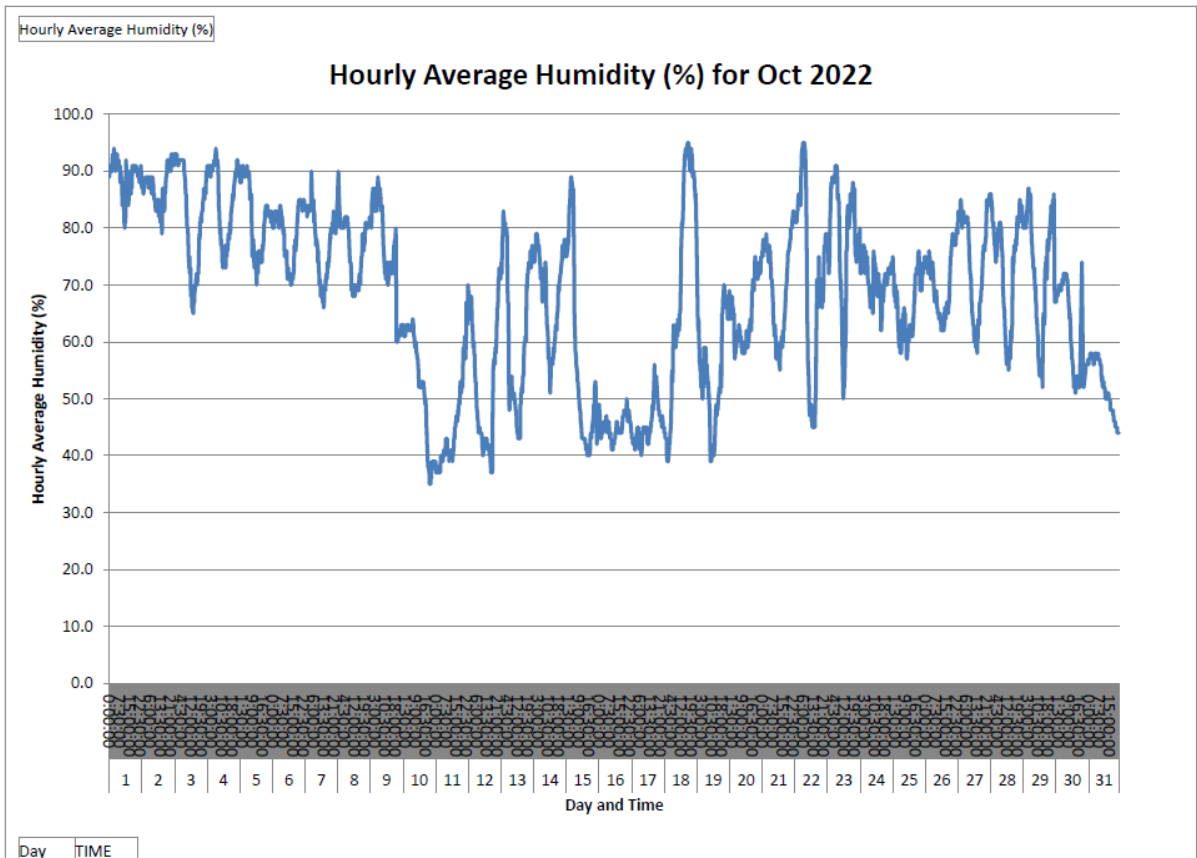
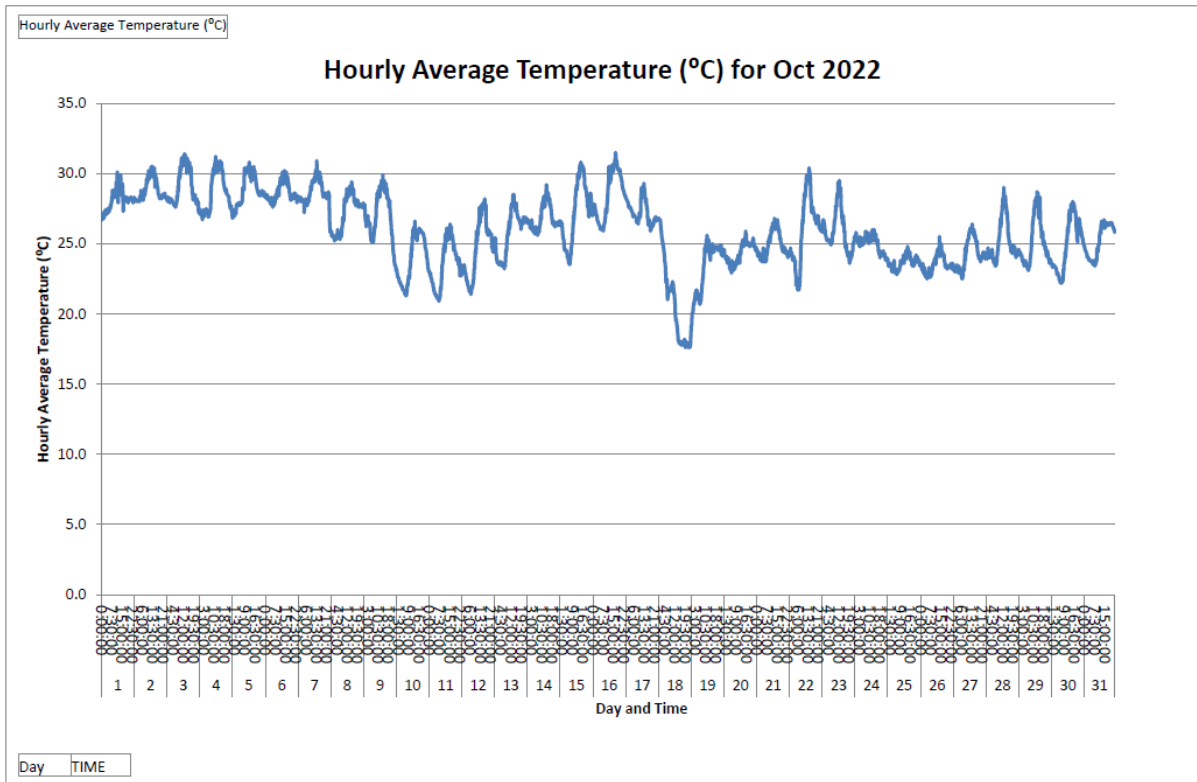
Event	Action		
	ET	IEC	Contractor
Exceedance of Limit Level of stack emission of the thermal oxidizer, flares and generator	<ul style="list-style-type: none"> Identify source(s) and investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures Ensure remedial measures are properly implemented Assess effectiveness of Contractor's remedial measures and keep the Project Proponent and IEC informed of the results Repeat measurement to confirm finding if exceedance is due to the Project Increase monitoring frequency to monthly when there are two consecutive exceedances and continue until the monitoring results reduce to below limit level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check with Contractor on the operating performance of the stack Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Rectify any unacceptable performance Amend design as required Implement amended design, if necessary

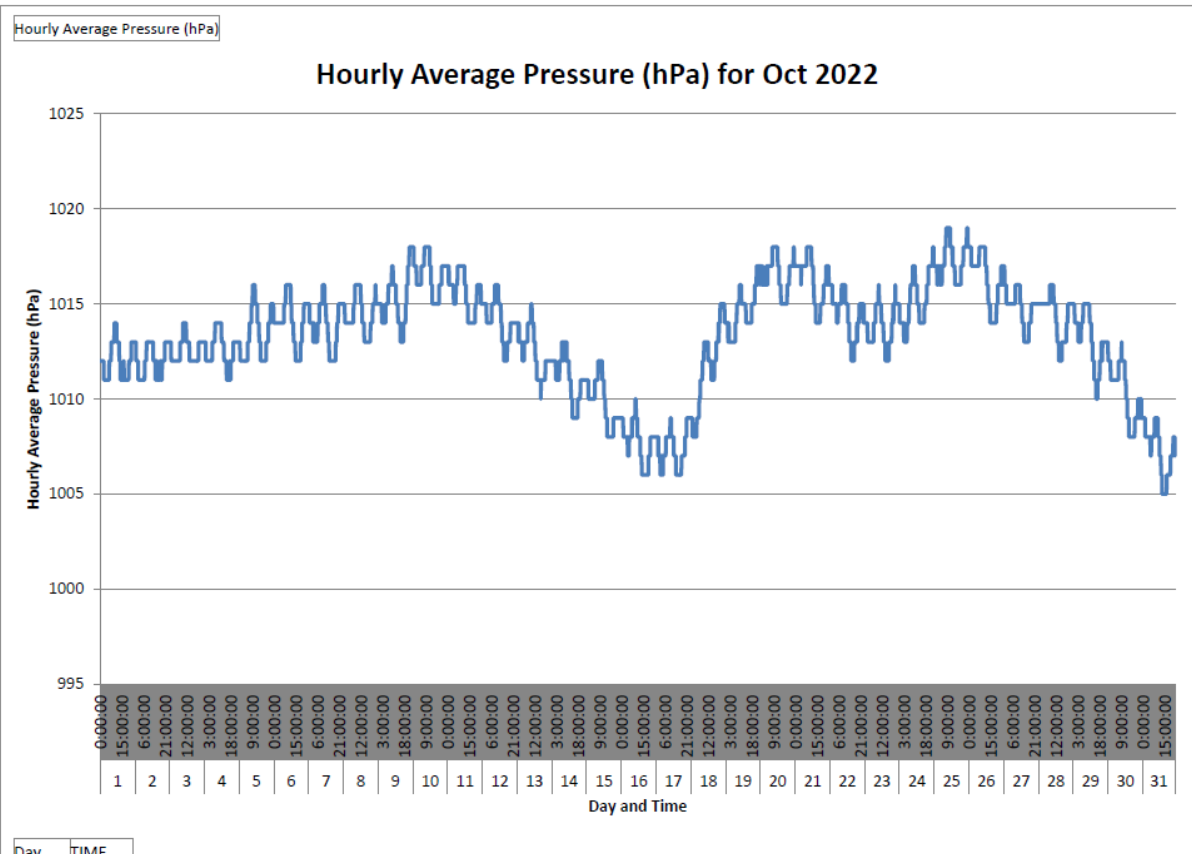
Annex D3

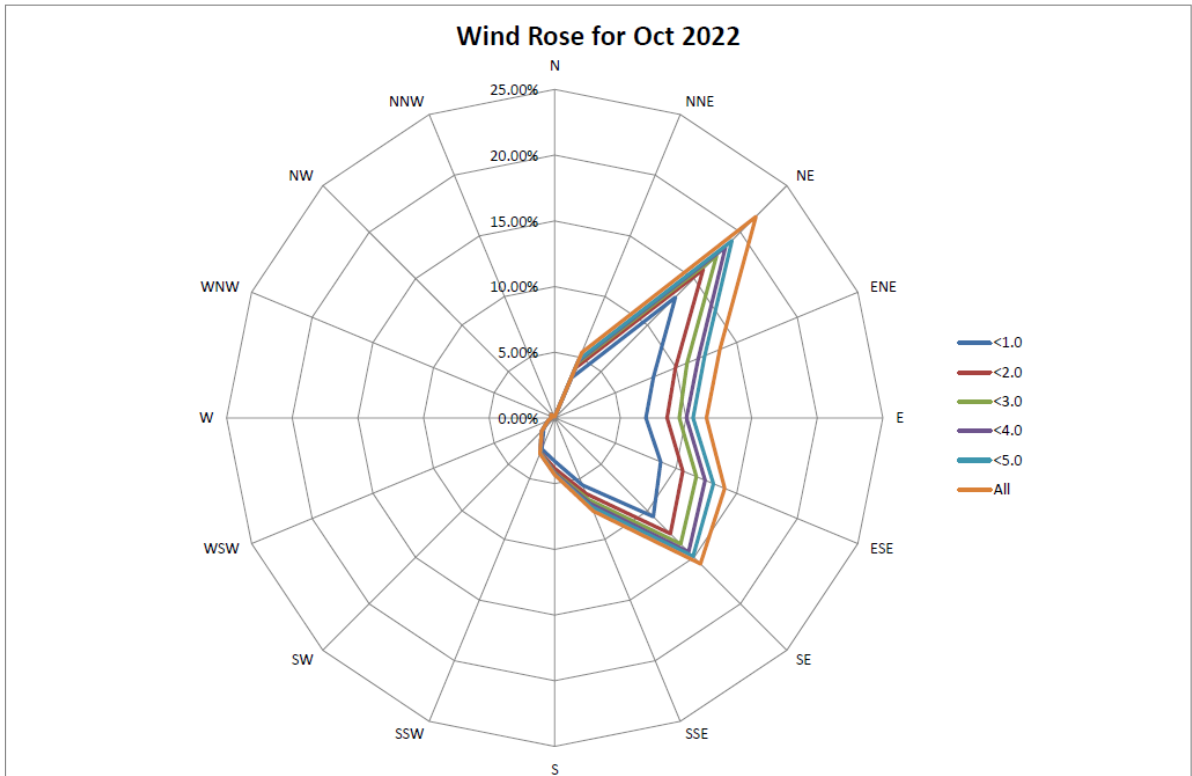
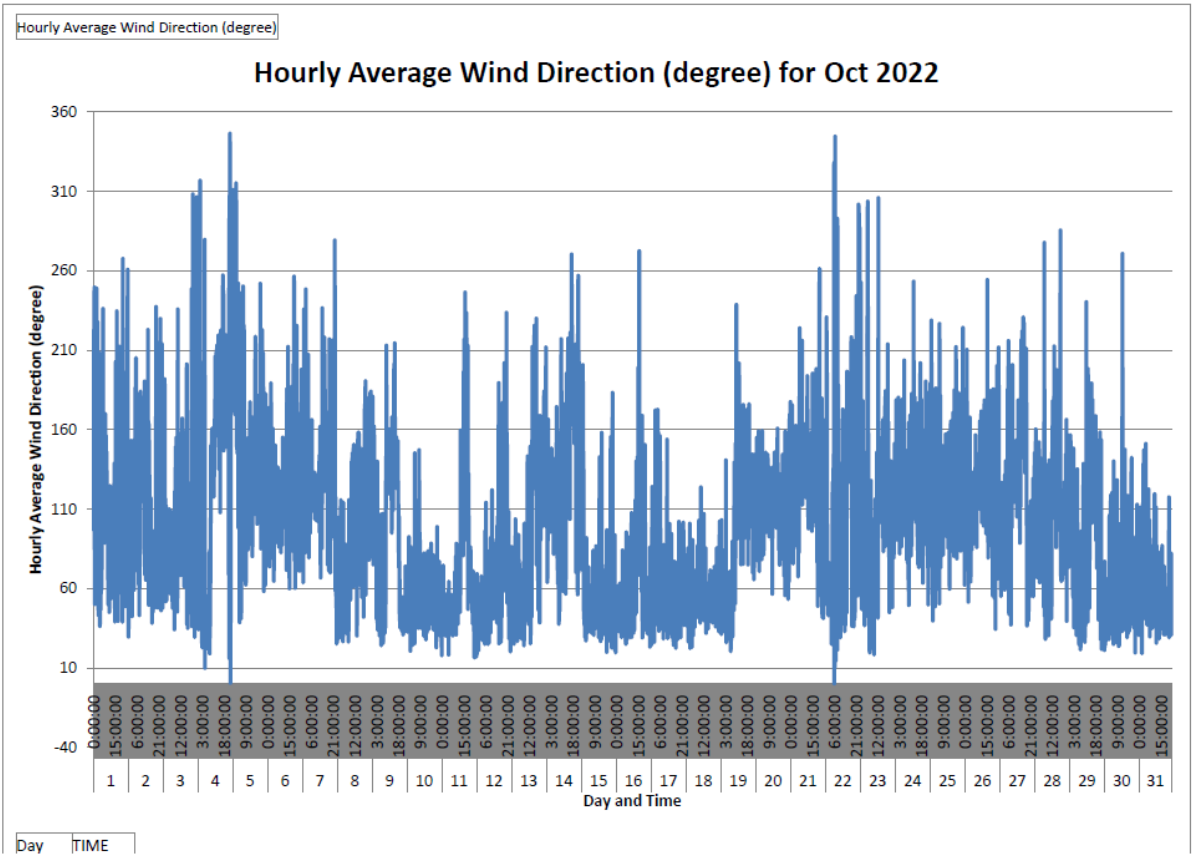
Meteorological Data

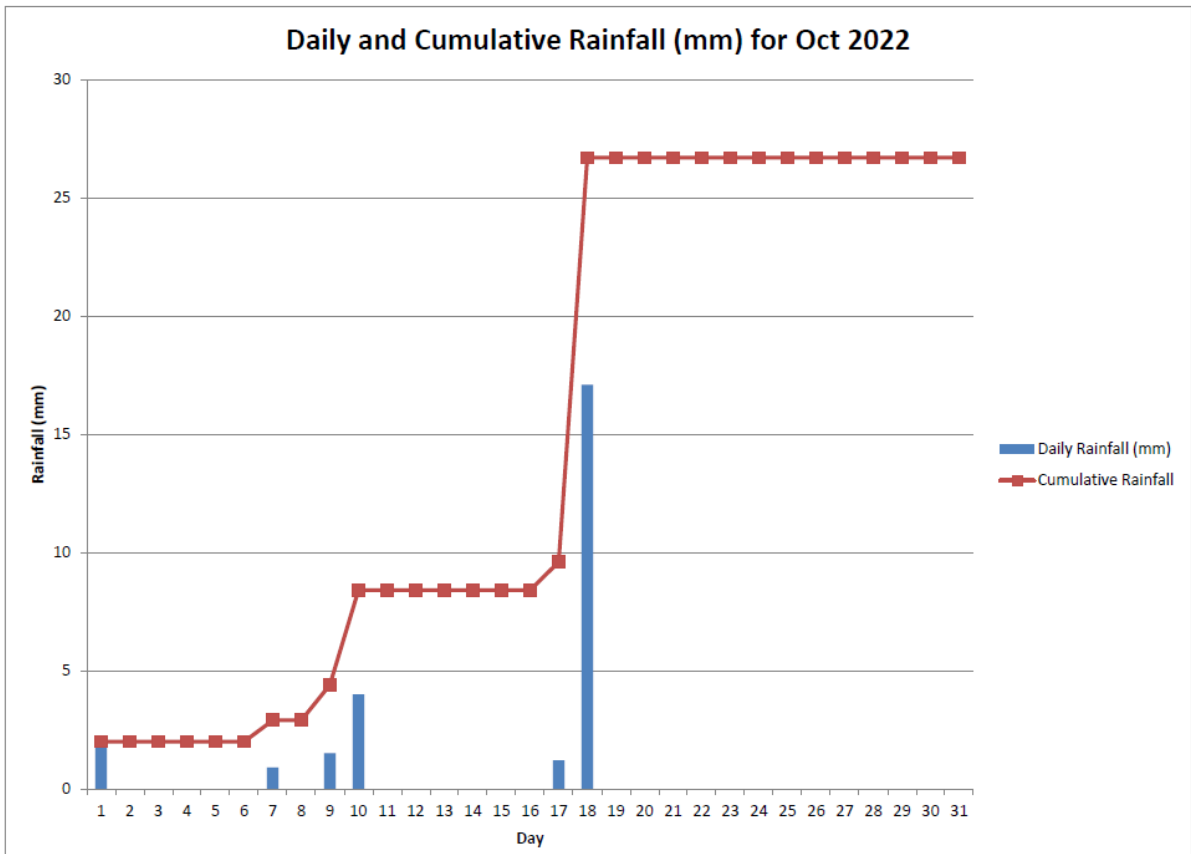
Annex D3 Meteorological Data

October 2022

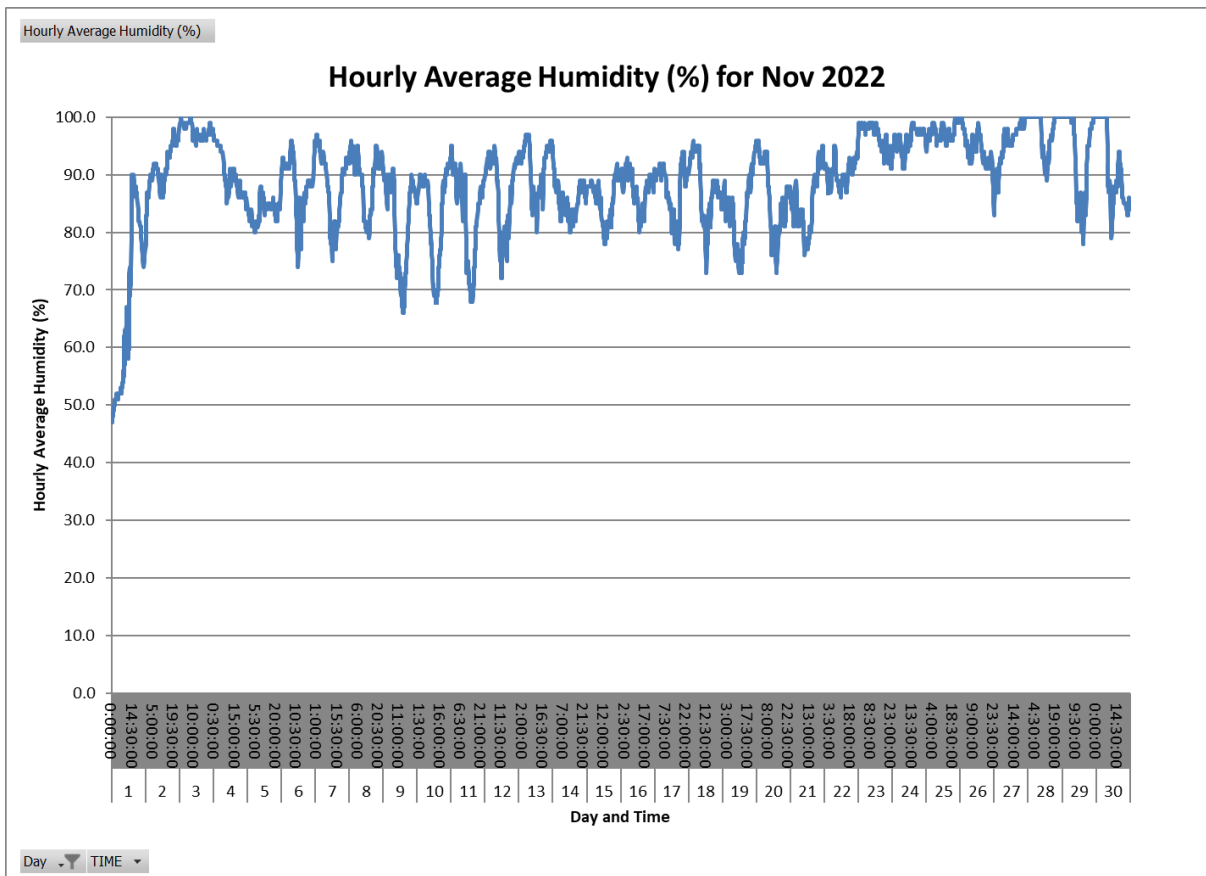
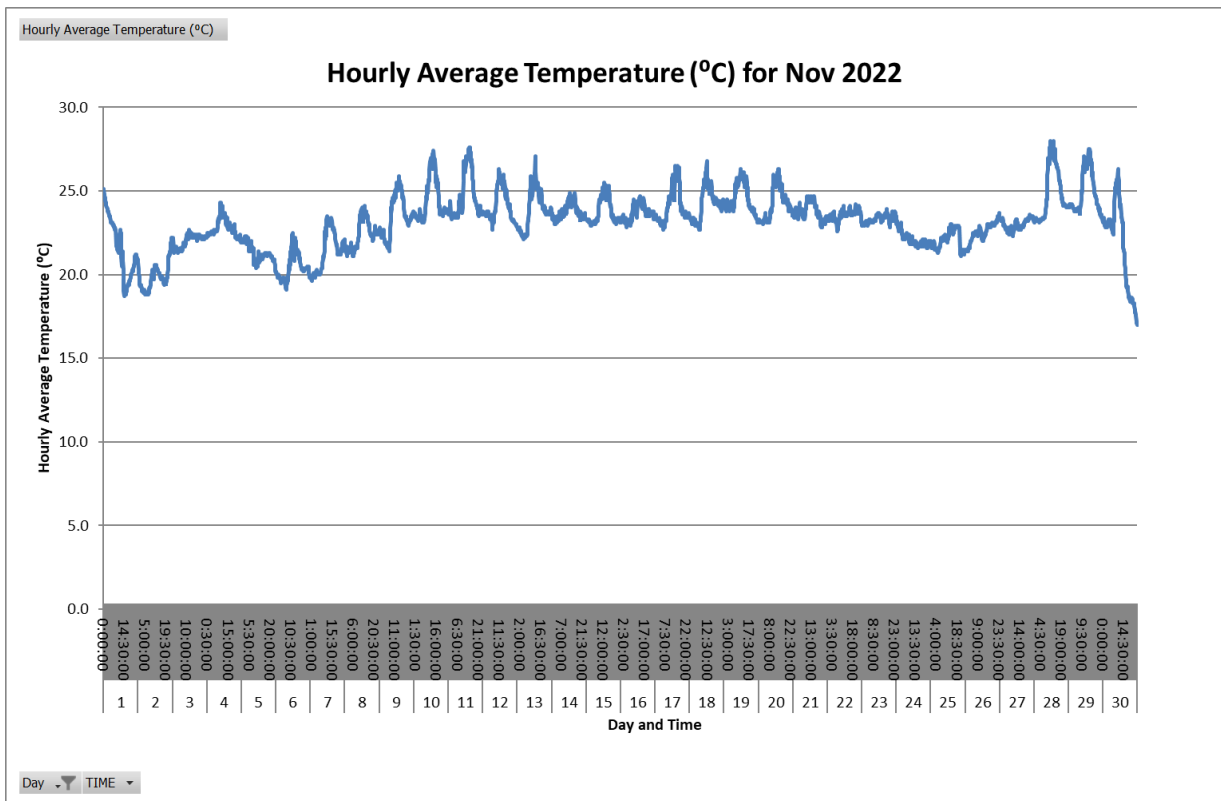






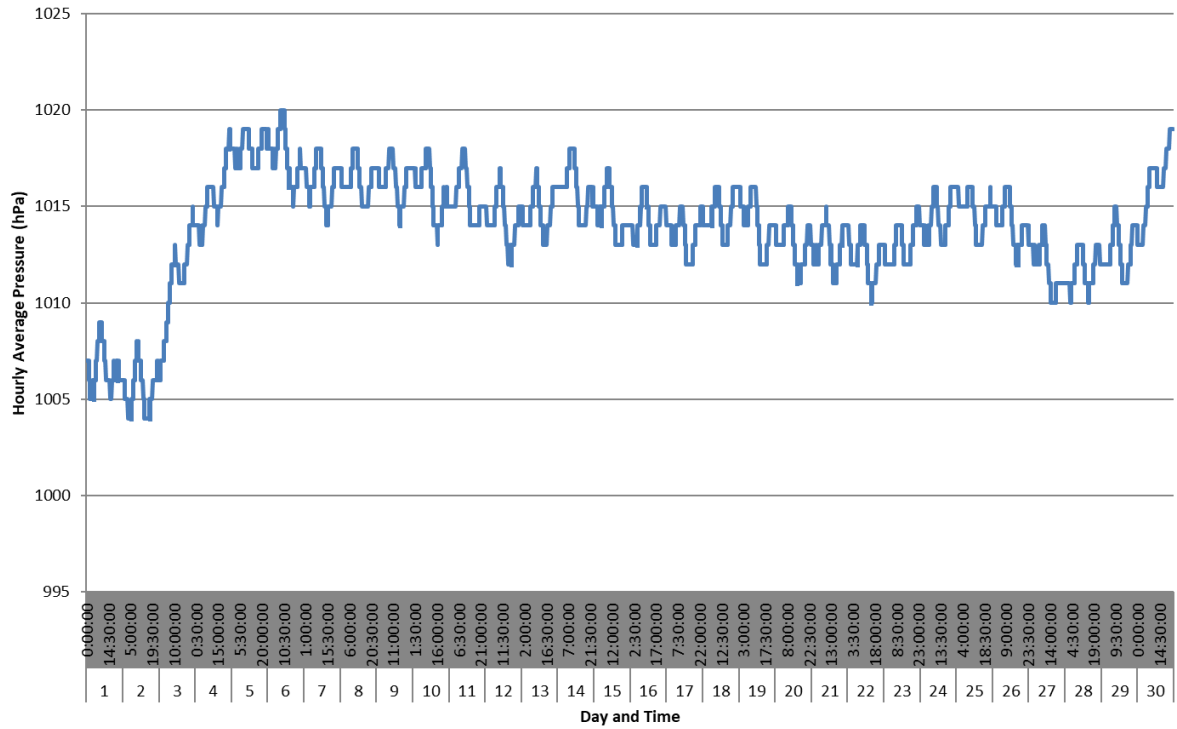


November 2022



Hourly Average Pressure (hPa)

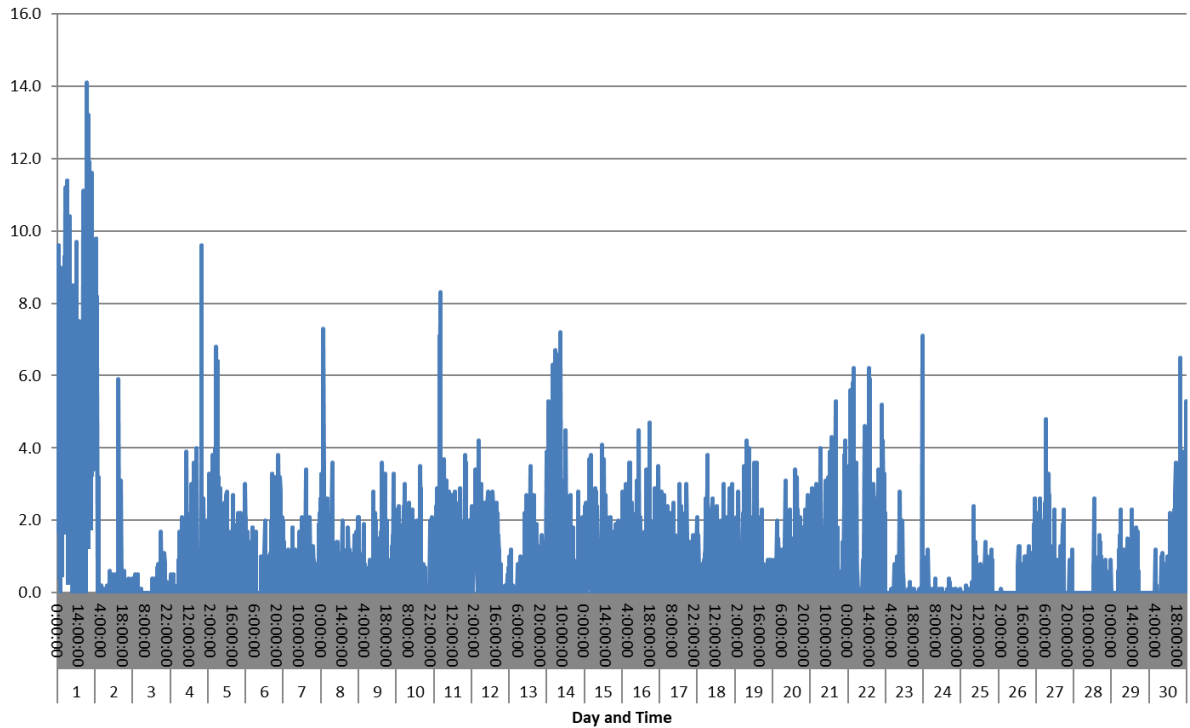
Hourly Average Pressure (hPa) for Nov 2022



Day TIME

Hourly Average Wind Speed (m/s)

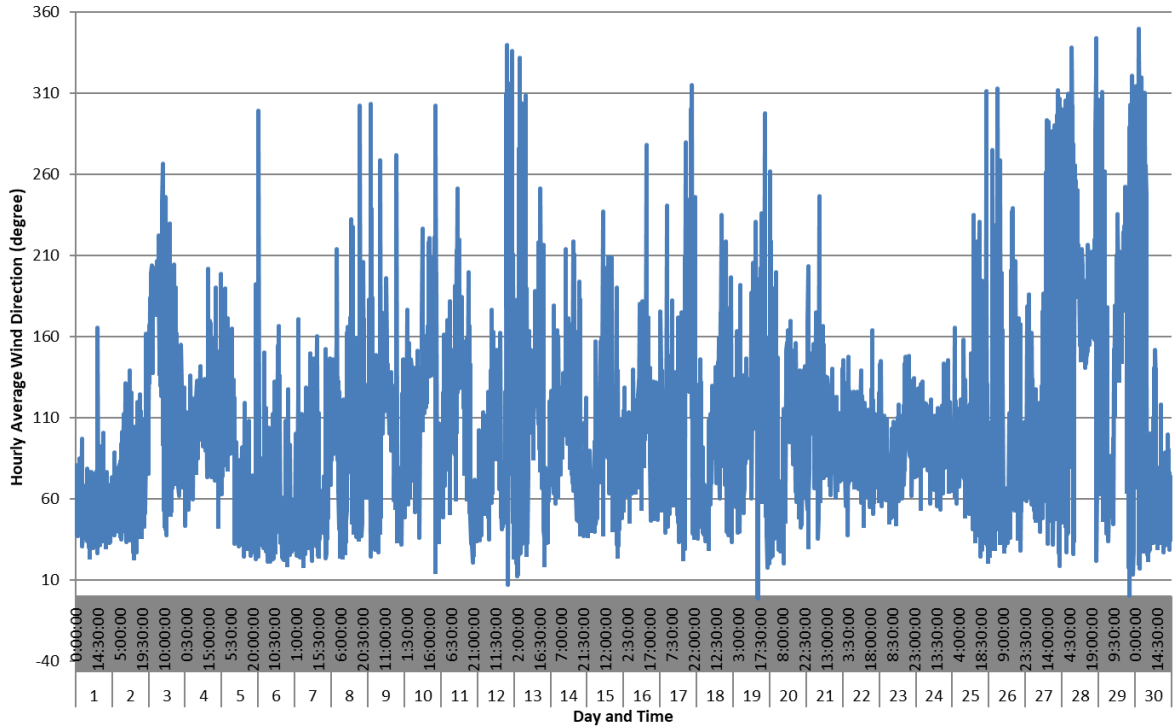
Hourly Average Wind Speed (m/s) for Nov 2022



Day TIME

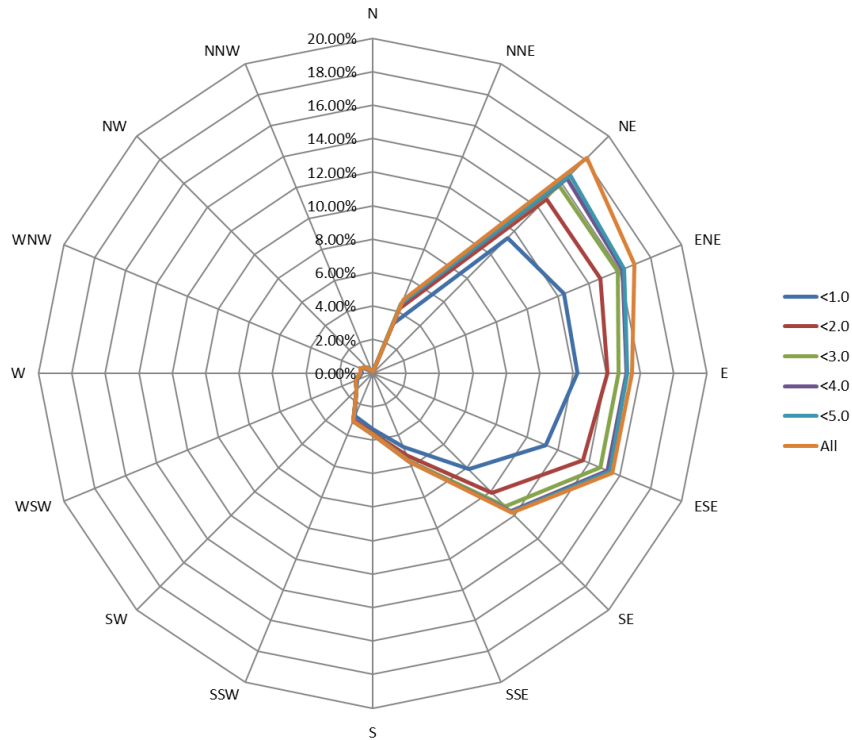
Hourly Average Wind Direction (degree)

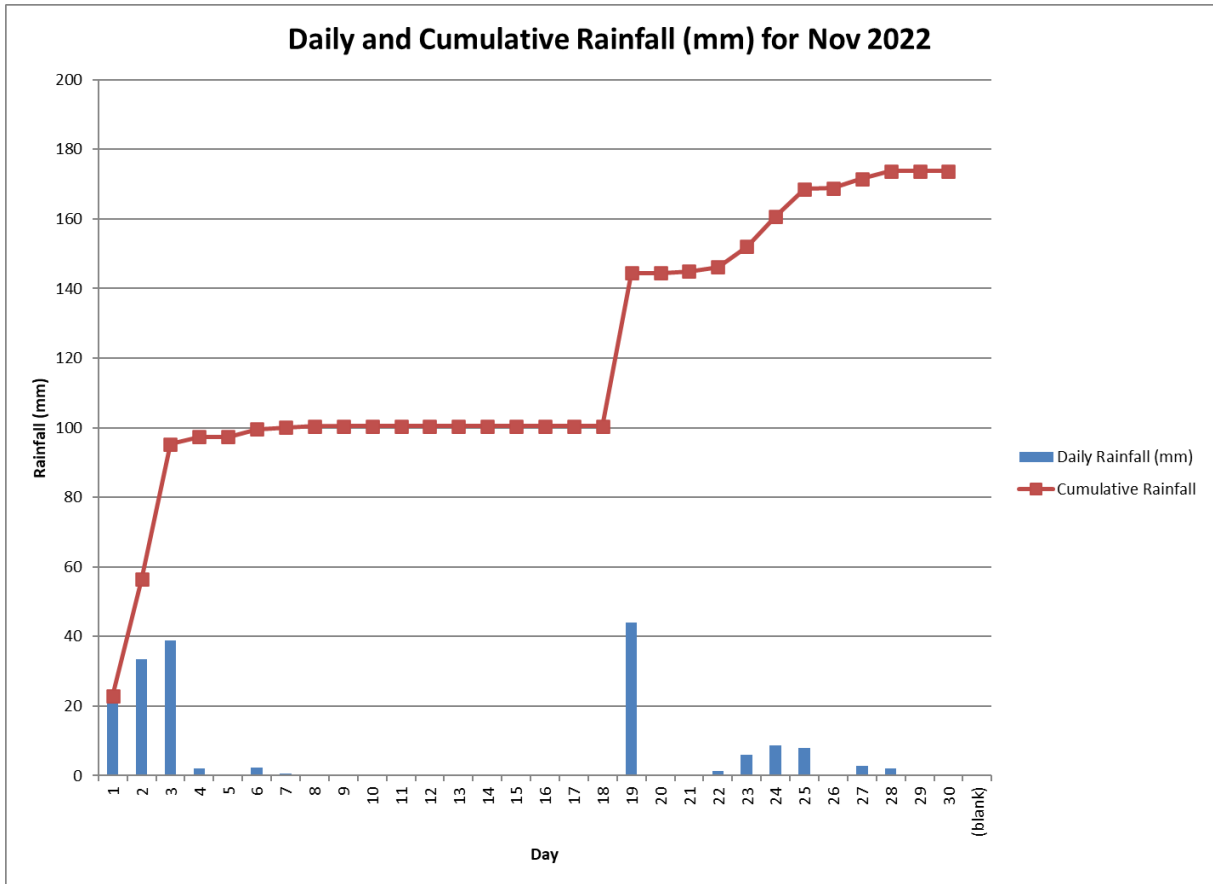
Hourly Average Wind Direction (degree) for Nov 2022

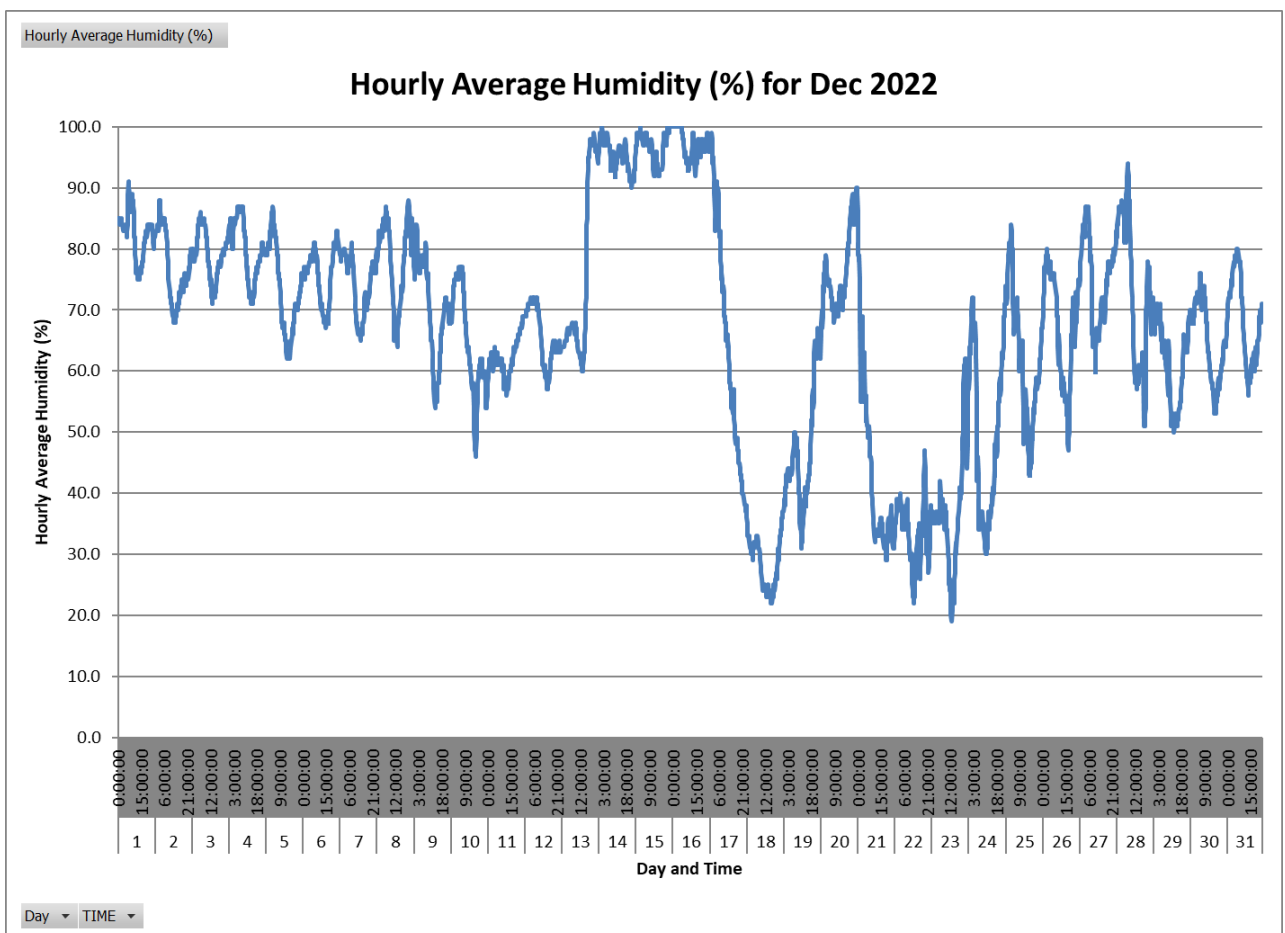
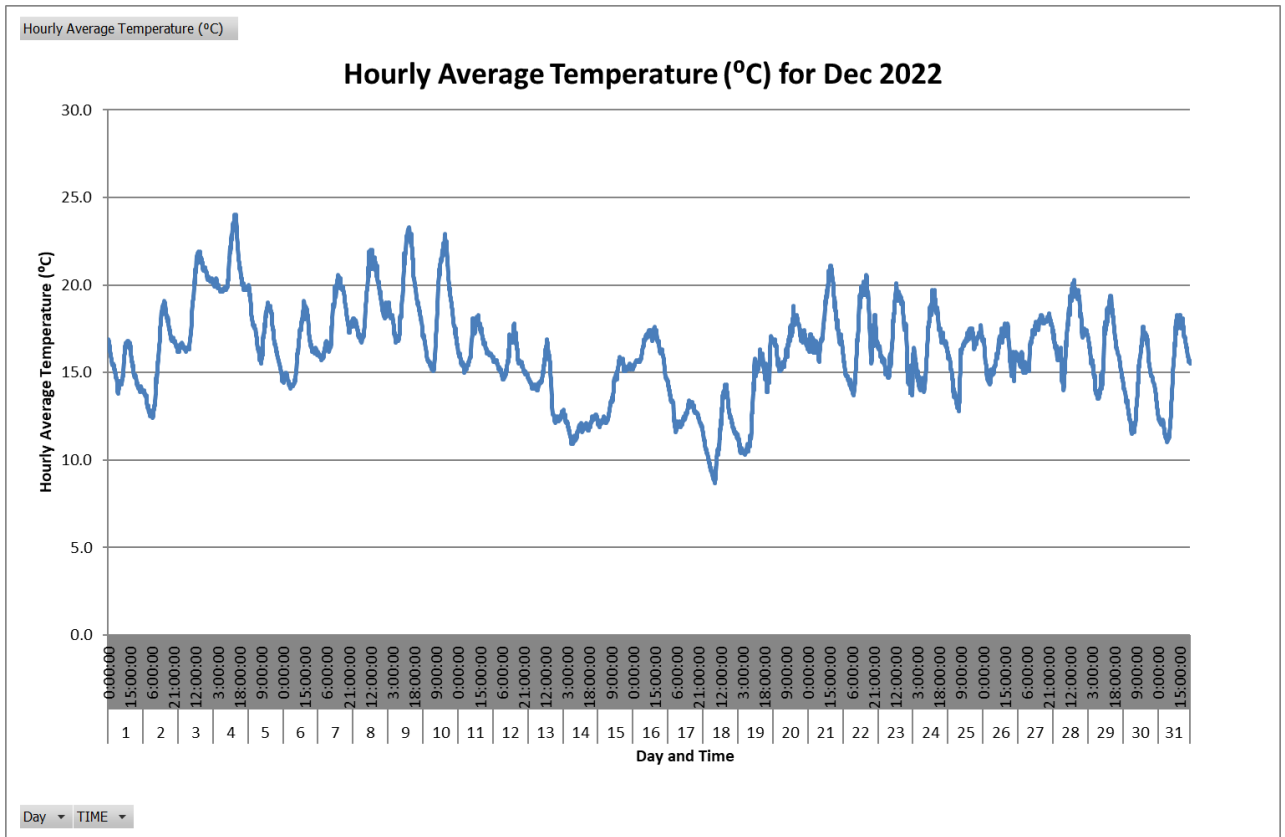


Day TIME

Wind Rose for Nov 2022

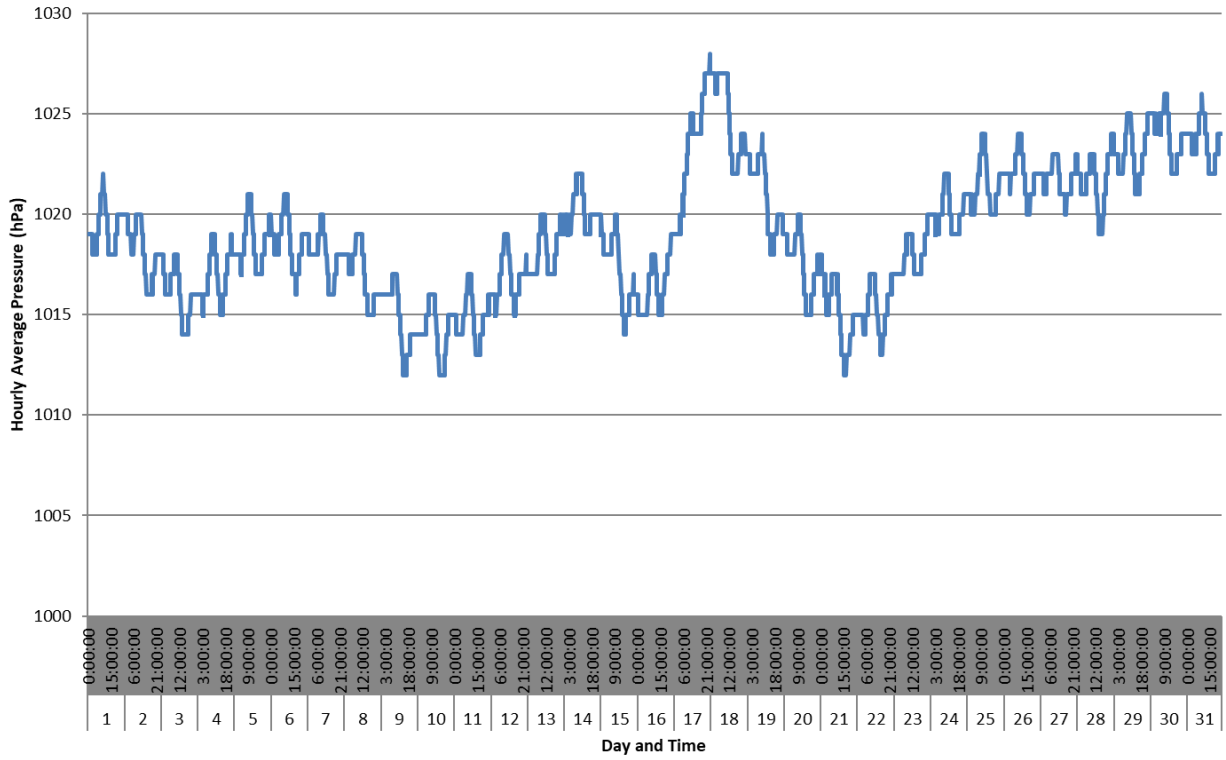






Hourly Average Pressure (hPa)

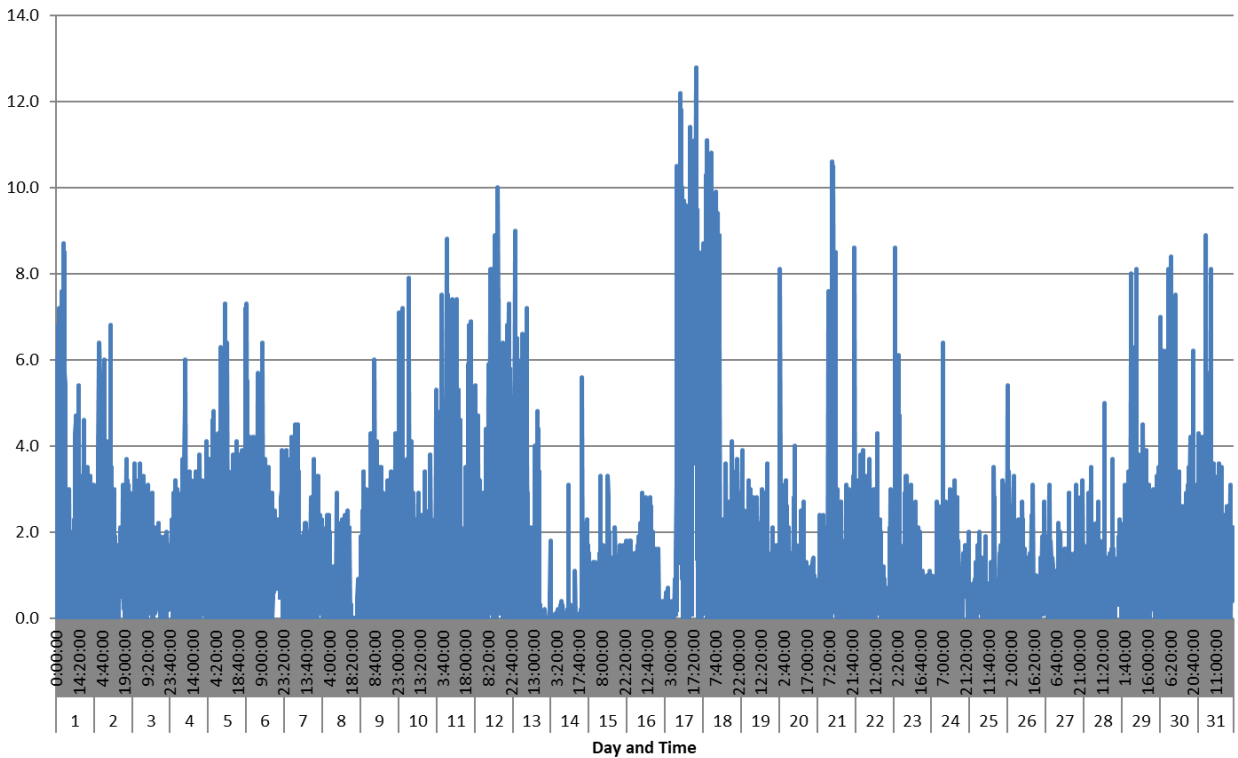
Hourly Average Pressure (hPa) for Dec 2022



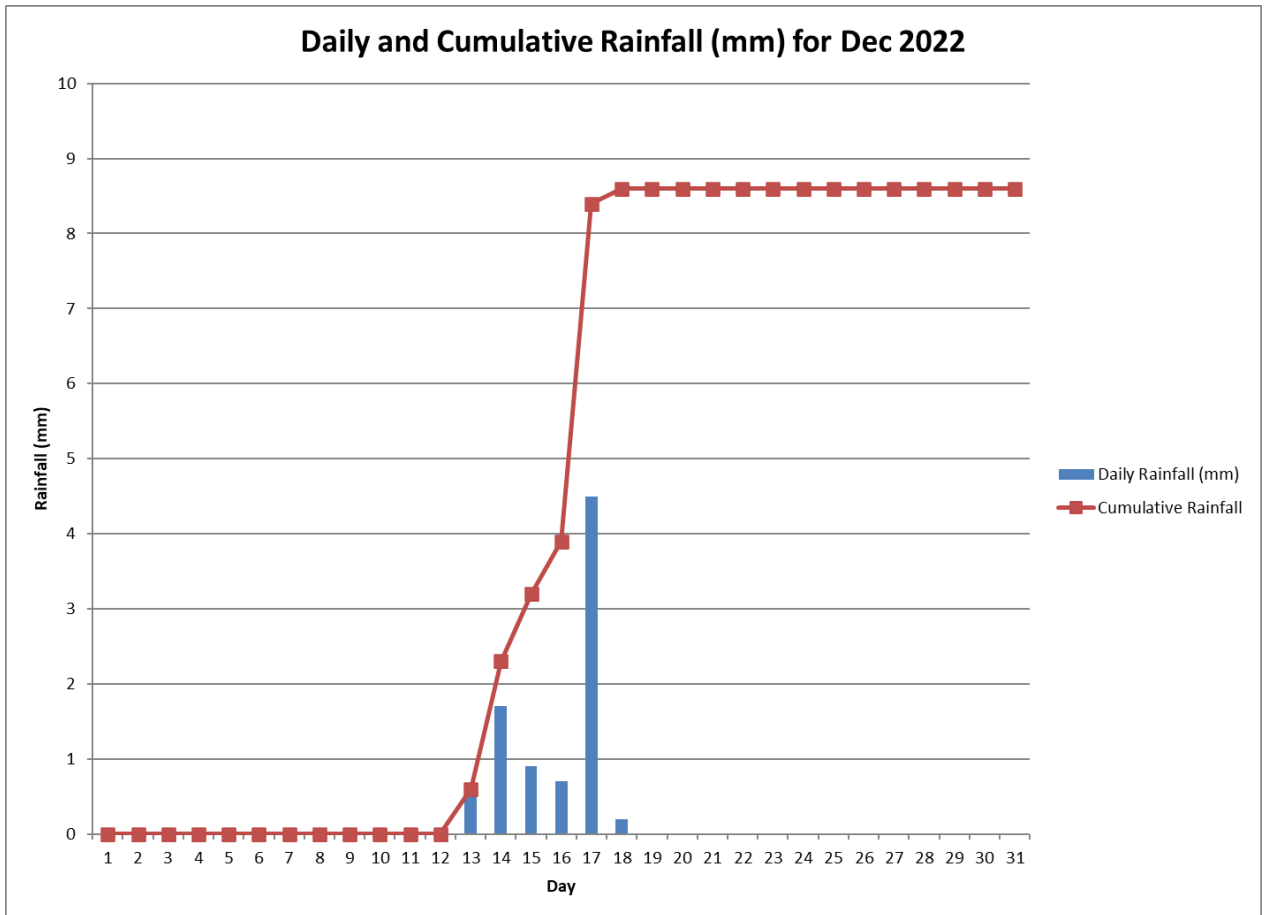
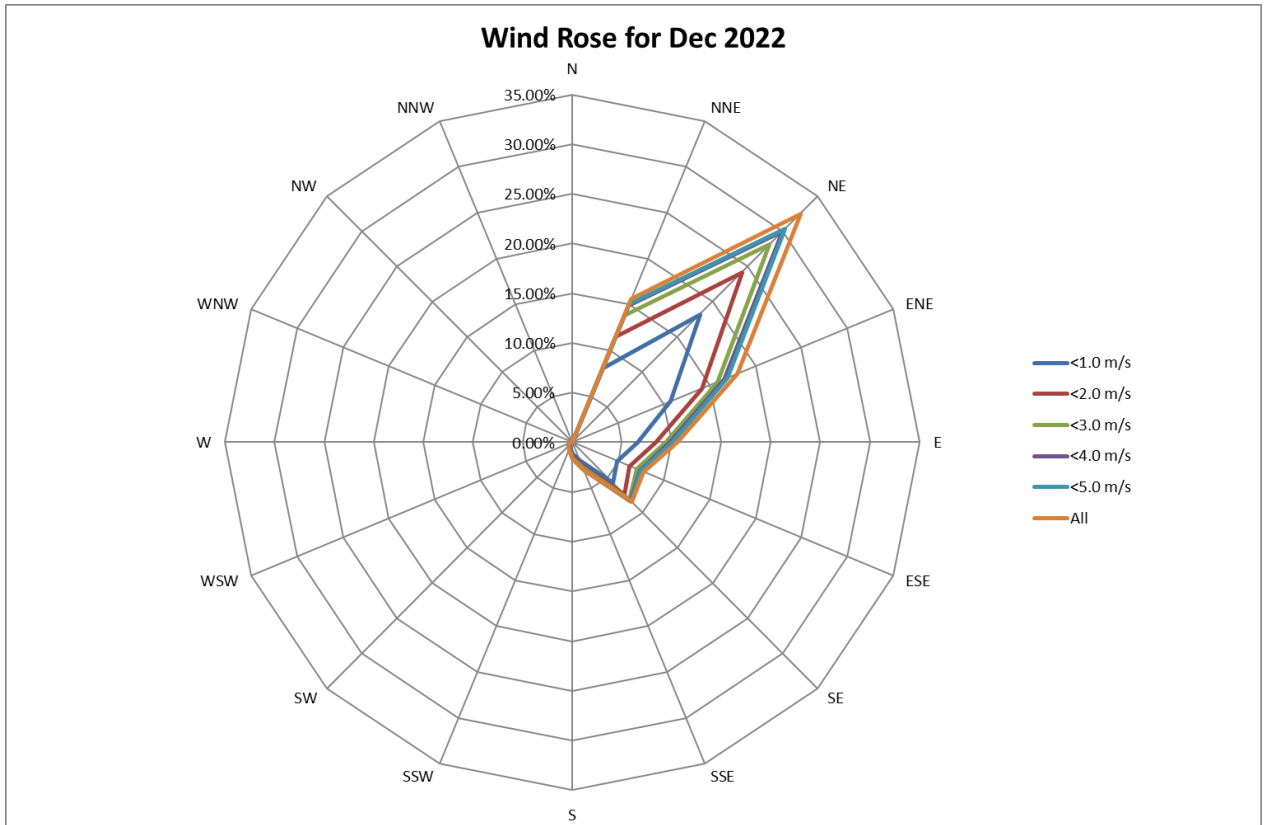
Day TIME

Hourly Average Wind Speed (m/s)

Hourly Average Wind Speed (m/s) for Dec 2022



Day TIME



Annex D4

Odour Monitoring Results

Table D4.1 Odour Monitoring Results

Date	Weather	Location	Time	Temperature (oC)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
13-Oct-22	Sunny	OP1	14:44	29.1	5.4	S	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP2	14:47	28.4	3.5	S	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP3	14:50	30.7	4.6	SE	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP4	14:52	31.1	2.4	E	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP5	14:54	30.0	3.8	S	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP6	14:56	29.8	1.7	NE	Yes	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP7	14:58	29.9	2.9	S	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP8	15:01	30.4	6.3	S	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP9	15:01	29.7	6.6	E	Yes	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP10	15:01	28.9	1.3	N	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP11	15:01	30.5	2.6	NE	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP12	15:24	29.4	1.3	E	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP13	15:18	28.4	0.0	N/A	N/A	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP14	15:15	28.6	2.6	N	No	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP15	14:20	30.5	1.4	W	Yes	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP16	14:25	31.5	2.2	W	Yes	0	N/A	N/A	N/A
13-Oct-22	Sunny	OP17	14:27	32.2	2.0	W	Yes	0	N/A	N/A	N/A
24-Nov-22	Shower	OP1	15:00	21.9	12.3	S	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP2	15:04	21.7	4.0	S	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP3	15:07	21.9	0.7	N	Yes	0	N/A	N/A	N/A
24-Nov-22	Shower	OP4	15:09	21.9	4.8	E	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP5	15:11	22.2	2.3	E	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP6	15:12	22.5	7.6	N	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP7	15:14	22.0	4.3	N	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP8	15:17	22.0	3.5	E	Yes	1	N/A	Tipping area	Waste
24-Nov-22	Shower	OP9	15:22	21.6	1.0	E	Yes	0	N/A	N/A	N/A
24-Nov-22	Shower	OP10	15:24	21.7	1.3	E	Yes	0	N/A	N/A	N/A
24-Nov-22	Shower	OP11	15:38	21.4	3.5	E	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP12	15:36	21.4	2.3	E	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP13	15:34	21.1	4.7	E	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP14	15:31	21.2	1.5	N	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP15	15:46	21.2	1.7	E	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP16	15:51	21.5	1.8	E	No	0	N/A	N/A	N/A
24-Nov-22	Shower	OP17	15:53	21.4	1.2	NE	No	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP1	14:29	16.4	2.2	NW	Yes	0	N/A	N/A	N/A

Date	Weather	Location	Time	Temperature (oC)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
13-Dec-22	Cloudy	OP2	14:33	16.4	2.6	N	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP3	14:36	17.0	0.8	NE	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP4	14:38	17.6	1.5	E	No	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP5	14:40	17.3	1.0	N	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP6	14:42	17.2	2.2	NE	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP7	14:44	16.7	1.6	N	No	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP8	14:47	17.7	2.3	NE	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP9	14:52	17.4	1.0	E	Yes	1	Towngas	Towngas plant	N/A
13-Dec-22	Cloudy	OP10	14:54	17.3	1.0	SE	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP11	15:09	16.4	1.6	NW	No	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP12	15:07	17.6	1.2	SW	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP13	15:04	16.6	0.7	SW	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP14	15:02	16.8	3.4	NE	Yes	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP15	15:26	15.2	1.5	SE	No	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP16	15:24	15.6	4.3	NW	No	0	N/A	N/A	N/A
13-Dec-22	Cloudy	OP17	15:20	15.2	1.7	E	Yes	0	N/A	N/A	N/A

Annex D5

Thermal Oxidizer, Landfill
Gas Flare and Landfill Gas
Generator Stack Emission
Monitoring Results

Table D5.1 Thermal Oxidiser Stack Emission Monitoring Results

Parameters	Monitoring Results (October 2022)
NO ₂	0.39 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	0.04 gs ⁻¹
Benzene	<2 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.3 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	11.9 ms ⁻¹
Parameters	Monitoring Results (November 2022)
NO ₂	0.28 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	0.07 gs ⁻¹
Benzene	<1.0 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.0 x 10 ⁻⁴ gs ⁻¹
Non-Methane Organic Carbons	<0.002 gs ⁻¹
Ammonia	0.0423 gs ⁻¹
Exhaust gas velocity	6.8 ms ⁻¹
Parameters	Monitoring Results (December 2022)
NO ₂	1.06 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	0.03 gs ⁻¹
Benzene	<1.0 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.0 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	7.9 ms ⁻¹

Table D5.2 Thermal Oxidiser Stack Continuous Monitoring Results

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms⁻¹) (a)
1 Oct 22	920	1240	
2 Oct 22	924	1246	
3 Oct 22	921	1238	
4 Oct 22	928	1444	
5 Oct 22	921	1593	
6 Oct 22	928	1486	
7 Oct 22	934	1334	
8 Oct 22	930	1280	
9 Oct 22	926	1272	
10 Oct 22	926	1243	
11 Oct 22	930	1264	
12 Oct 22	928	1206	11.9
13 Oct 22	922	1205	
14 Oct 22	935	1205	
15 Oct 22	931	1206	
16 Oct 22	927	1204	
17 Oct 22	931	1206	
18 Oct 22	928	1208	
19 Oct 22	901	1189	
20 Oct 22	934	1210	
21 Oct 22	934	1215	
22 Oct 22	927	1207	
23 Oct 22	917	1184	

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)
24 Oct 22	927	1212	
25 Oct 22	912	1193	
26 Oct 22	920	1207	
27 Oct 22	931	1206	
28 Oct 22	937	1210	
29 Oct 22	933	1209	
30 Oct 22	933	1204	
31 Oct 22	912	1147	
1 Nov 22	906	1125	
2 Nov 22	977	1270	
3 Nov 22	928	1200	
4 Nov 22	967	1266	
5 Nov 22	967	1254	
6 Nov 22	952	1236	
7 Nov 22	967	1250	
8 Nov 22	955	1240	
9 Nov 22	962	1247	
10 Nov 22	964	1251	
11 Nov 22	943	1232	
12 Nov 22	954	1241	
13 Nov 22	960	1246	
14 Nov 22	950	1236	
15 Nov 22	952	1239	
16 Nov 22	953	1240	6.8
17 Nov 22	957	1238	
18 Nov 22	933	1208	
19 Nov 22	945	1223	
20 Nov 22	964	1247	
21 Nov 22	938	1202	
22 Nov 22	939	1216	
23 Nov 22	923	1203	
24 Nov 22	925	1190	
25 Nov 22	930	1195	
26 Nov 22	910	1174	
27 Nov 22	953	1243	
28 Nov 22	950	1222	
29 Nov 22	935	1204	
30 Nov 22	928	1184	
1 Dec 22	922	1177	
2 Dec 22	915	1145	
3 Dec 22	916	1168	
4 Dec 22	933	1188	
5 Dec 22	918	1163	
6 Dec 22	927	1172	
7 Dec 22	922	1176	
8 Dec 22	926	1180	
9 Dec 22	920	1179	
10 Dec 22	924	1211	
11 Dec 22	922	1187	
12 Dec 22	925	1176	7.9
13 Dec 22	926	1177	
14 Dec 22	925	1167	
15 Dec 22	919	1178	
16 Dec 22	934	1219	
17 Dec 22	922	1161	
18 Dec 22	927	1174	
19 Dec 22	926	1194	
20 Dec 22	924	1197	

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)
21 Dec 22	923	1198	
22 Dec 22	921	1204	
23 Dec 22	927	1218	
24 Dec 22	924	1216	
25 Dec 22	927	1222	
26 Dec 22	926	1283	
27 Dec 22	909	1225	
28 Dec 22	919	1231	
29 Dec 22	923	1233	
30 Dec 22	921	1228	
31 Dec 22	928	1236	
Average	932	1223	8.9
Min	901	1125	6.8
Max	977	1593	11.9

Notes:

(a) The exhaust gas velocity was calculated based on the cross-section area of the stack and the gas flow and combustion temperature data measured during the stack emission monitoring.

Table D5.3 Landfill Gas Flare Stack Emission Monitoring Results

Parameters	Monitoring Results (October 2022)
	Flare 1 - F601
NO ₂	0.013 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	0.26 gs ⁻¹
Benzene	<1.22 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<9.8 x 10 ⁻⁵ gs ⁻¹
Exhaust gas velocity	6.5 ms ⁻¹
Parameters	Monitoring Results (November 2022)
	Flare 1 - F601
NO ₂	<0.02 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	1.27 gs ⁻¹
Benzene	<1.22 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<9.8 x 10 ⁻⁵ gs ⁻¹
Non-Methane Organic Carbons	<0.002 gs ⁻¹
Exhaust gas velocity	8.9 ms ⁻¹
Parameters	Monitoring Results (December 2022)
	Flare 1 - F601
NO ₂	0.03 gs ⁻¹
CO	0.783 gs ⁻¹
SO ₂	0.16 gs ⁻¹
Benzene	6.61 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.35 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	12.8 ms ⁻¹

Table D5.4 Landfill Gas Flare Stack Continuous Monitoring Results

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status
Flare 1 – F601				
1 Oct 22	924	1074		In Operation
2 Oct 22	910	988		In Operation
3 Oct 22	954	1183		In Operation
4 Oct 22	-	-		Under Maintenance
5 Oct 22	945	1006		In Operation
6 Oct 22	820	1023		In Operation
7 Oct 22	990	1013		In Operation
8 Oct 22	880	1073		In Operation
9 Oct 22	990	1163		In Operation
10 Oct 22	880	1083		In Operation
11 Oct 22	990	1083		In Operation
12 Oct 22	970	1093		In Operation
13 Oct 22	830	993		In Operation
14 Oct 22	830	1073		In Operation
15 Oct 22	900	1033		In Operation
16 Oct 22	890	1003	6.5	In Operation
17 Oct 22	980	1083		In Operation
18 Oct 22	900	1063		In Operation
19 Oct 22	900	1153		In Operation
20 Oct 22	935	1073		In Operation
21 Oct 22	950	1113		In Operation
22 Oct 22	925	1073		In Operation
23 Oct 22	890	1063		In Operation
24 Oct 22	820	1023		In Operation
25 Oct 22	960	1103		In Operation
26 Oct 22	880	1023		In Operation
27 Oct 22	960	1073		In Operation
28 Oct 22	890	1033		In Operation
29 Oct 22	850	1013		In Operation
30 Oct 22	870	1023		In Operation
31 Oct 22	820	1003		In Operation
1 Nov 22	890	1050		In Operation
2 Nov 22	865	1068		In Operation
3 Nov 22	871	1030		In Operation
4 Nov 22	859	1063		In Operation
5 Nov 22	870	1079		In Operation
6 Nov 22	860	1063		In Operation
7 Nov 22	845	1073		In Operation
8 Nov 22	850	1073		In Operation
9 Nov 22	835	1053		In Operation
10 Nov 22	830	1063		In Operation
11 Nov 22	860	1033		In Operation
12 Nov 22	860	1063	8.9	In Operation
13 Nov 22	830	1063		In Operation
14 Nov 22	830	1053		In Operation
15 Nov 22	860	1043		In Operation
16 Nov 22	860	1073		In Operation
17 Nov 22	850	1073		In Operation
18 Nov 22	870	1063		In Operation
19 Nov 22	840	1033		In Operation
20 Nov 22	850	1093		In Operation
21 Nov 22	850	1053		In Operation
22 Nov 22	850	1073		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status
23 Nov 22	-	-		Under Maintenance
24 Nov 22	-	-		Under Maintenance
25 Nov 22	890	1083		In Operation
26 Nov 22	820	1073		In Operation
27 Nov 22	880	1083		In Operation
28 Nov 22	870	1093		In Operation
29 Nov 22	880	1073		In Operation
30 Nov 22	850	1053		In Operation
1 Dec 22	890	1089		In Operation
2 Dec 22	860	1093		In Operation
3 Dec 22	870	1063		In Operation
4 Dec 22	910	1033		In Operation
5 Dec 22	890	1073		In Operation
6 Dec 22	890	1103		In Operation
7 Dec 22	850	1063		In Operation
8 Dec 22	840	1053		In Operation
9 Dec 22	860	1083		In Operation
10 Dec 22	890	1093		In Operation
11 Dec 22	870	1093		In Operation
12 Dec 22	880	1043		In Operation
13 Dec 22	890	1083		In Operation
14 Dec 22	870	1033		In Operation
15 Dec 22	860	1093	12.8	In Operation
16 Dec 22	860	1063		In Operation
17 Dec 22	870	1063		In Operation
18 Dec 22	-	-		Under Maintenance
19 Dec 22	870	1063		In Operation
20 Dec 22	860	1083		In Operation
21 Dec 22	870	1043		In Operation
22 Dec 22	880	1113		In Operation
23 Dec 22	860	1033		In Operation
24 Dec 22	880	1043		In Operation
25 Dec 22	880	1033		In Operation
26 Dec 22	870	1113		In Operation
27 Dec 22	900	1153		In Operation
28 Dec 22	890	1133		In Operation
29 Dec 22	880	1053		In Operation
30 Dec 22	870	1083		In Operation
31 Dec 22	860	1113		In Operation
Average	880	1067	9.4	
Min	820	988	6.5	
Max	990	1183	12.8	
Flare 2 - F602				
1 Oct 22	890	1103		In Operation
2 Oct 22	890	1098		In Operation
3 Oct 22	890	1053		In Operation
4 Oct 22	860	1093		In Operation
5 Oct 22	890	1083		In Operation
6 Oct 22	890	1083		In Operation
7 Oct 22	830	1053		In Operation
8 Oct 22	880	1093		In Operation
9 Oct 22	840	1053	6.5	In Operation
10 Oct 22	890	1073		In Operation
11 Oct 22	880	1093		In Operation
12 Oct 22	825	1033		In Operation
13 Oct 22	890	1093		In Operation
14 Oct 22	820	993		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status
15 Oct 22	880	1043		In Operation
16 Oct 22	880	1103		In Operation
17 Oct 22	880	1073		In Operation
18 Oct 22	830	1083		In Operation
19 Oct 22	830	1043		In Operation
20 Oct 22	910	1133		In Operation
21 Oct 22	880	1103		In Operation
22 Oct 22	890	1053		In Operation
23 Oct 22	900	1113		In Operation
24 Oct 22	890	1093		In Operation
25 Oct 22	840	1053		In Operation
26 Oct 22	860	1073		In Operation
27 Oct 22	900	1113		In Operation
28 Oct 22	860	1073		In Operation
29 Oct 22	890	1083		In Operation
30 Oct 22	880	1073		In Operation
31 Oct 22	870	1053		In Operation
1 Nov 22	840	1061		In Operation
2 Nov 22	890	1049		In Operation
3 Nov 22	880	1073		In Operation
4 Nov 22	890	1053		In Operation
5 Nov 22	850	1113		In Operation
6 Nov 22	850	1123		In Operation
7 Nov 22	890	1073		In Operation
8 Nov 22	860	1083		In Operation
9 Nov 22	850	1123		In Operation
10 Nov 22	840	1073		In Operation
11 Nov 22	860	1063		In Operation
12 Nov 22	870	1083		In Operation
13 Nov 22	870	1053		In Operation
14 Nov 22	840	1093		In Operation
15 Nov 22	820	1088	8.9	In Operation
16 Nov 22	870	1073		In Operation
17 Nov 22	880	1053		In Operation
18 Nov 22	870	1093		In Operation
19 Nov 22	830	1113		In Operation
20 Nov 22	820	1083		In Operation
21 Nov 22	850	1073		In Operation
22 Nov 22	840	1063		In Operation
23 Nov 22	830	1093		In Operation
24 Nov 22	860	1083		In Operation
25 Nov 22	850	1073		In Operation
26 Nov 22	820	1083		In Operation
27 Nov 22	850	1063		In Operation
28 Nov 22	880	1063		In Operation
29 Nov 22	830	1043		In Operation
30 Nov 22	830	1093		In Operation
1 Dec 22	830	1043		In Operation
2 Dec 22	880	1103		In Operation
3 Dec 22	850	1073		In Operation
4 Dec 22	850	1093		In Operation
5 Dec 22	880	1103		In Operation
6 Dec 22	860	1093		In Operation
7 Dec 22	850	1093		In Operation
8 Dec 22	870	1113		In Operation
9 Dec 22	840	1073		In Operation
10 Dec 22	870	1113		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status
11 Dec 22	870	1123		In Operation
12 Dec 22	870	1113		In Operation
13 Dec 22	860	1093		In Operation
14 Dec 22	860	1073	12.8	In Operation
15 Dec 22	860	1073		In Operation
16 Dec 22	840	1053		In Operation
17 Dec 22	-	-		Under Maintenance
18 Dec 22	890	1073		In Operation
19 Dec 22	850	1033		In Operation
20 Dec 22	-	-		Under Maintenance
21 Dec 22	-	-		Under Maintenance
22 Dec 22	-	-		Under Maintenance
23 Dec 22	-	-		Under Maintenance
24 Dec 22	-	-		Under Maintenance
25 Dec 22	-	-		Under Maintenance
26 Dec 22	-	-		Under Maintenance
27 Dec 22	-	-		Under Maintenance
28 Dec 22	-	-		Under Maintenance
29 Dec 22	-	-		Under Maintenance
30 Dec 22	-	-		Under Maintenance
31 Dec 22	-	-		Under Maintenance
Average	862	1079	9.4	
Min	820	993	6.5	
Max	910	1133	12.8	

Notes:

(a) The exhaust gas velocity was calculated based on the cross-section area of the stack and the gas flow and combustion temperature data measured during the stack emission monitoring.

Table D5.5 Landfill Gas Generator Stack Emission Monitoring Results

Parameters	Monitoring Results (October 2022)
NO ₂	0.08 gs ⁻¹
CO	0.56 gs ⁻¹
SO ₂	0.006 gs ⁻¹
Benzene	<1.12 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<9.7 x 10 ⁻⁶ gs ⁻¹
Exhaust gas velocity	10.3 ms ⁻¹
Parameters	Monitoring Results (November 2022)
NO ₂	0.01 gs ⁻¹
CO	0.429 gs ⁻¹
SO ₂	<0.001 gs ⁻¹
Benzene	<1.6 x 10 ⁻⁵ gs ⁻¹
Vinyl chloride	<1.28 x 10 ⁻⁵ gs ⁻¹
Non-Methane Organic Carbons	<3.0 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	11.6 ms ⁻¹
Parameters	Monitoring Results (December 2022) ^(a)
NO ₂	-
CO	-
SO ₂	-
Benzene	-
Vinyl chloride	-
Non-Methane Organic Carbons	-

Notes:

(a) The Landfill Gas Generator was under maintenance.

Table D5.6 Landfill Gas Generator Stack Continuous Monitoring Results

Date	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) ^(a)	Operation Status (Landfill Gas Generator in Operation)
ENGA			
1 Oct 22	861		In Operation
2 Oct 22	867		In Operation
3 Oct 22	865		In Operation
4 Oct 22	865		In Operation
5 Oct 22	865		In Operation
6 Oct 22	865		In Operation
7 Oct 22	864		In Operation
8 Oct 22	863		In Operation
9 Oct 22	860		In Operation
10 Oct 22	856		In Operation
11 Oct 22	855	10.3	In Operation
12 Oct 22	864		In Operation
13 Oct 22	865		In Operation
14 Oct 22	865		In Operation
15 Oct 22	851		In Operation
16 Oct 22	852		In Operation
17 Oct 22	855		In Operation
18 Oct 22	859		In Operation
19 Oct 22	865		In Operation
20 Oct 22	866		In Operation
21 Oct 22	867		In Operation
22 Oct 22	869		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status (Landfill Gas Generator in Operation)
23 Oct 22	874		In Operation
24 Oct 22	871		In Operation
25 Oct 22	873		In Operation
26 Oct 22	869		In Operation
27 Oct 22	874		In Operation
28 Oct 22	877		In Operation
29 Oct 22	877		In Operation
30 Oct 22	875		In Operation
31 Oct 22	893		In Operation
1 Nov 22	-		Under Maintenance
2 Nov 22	-		Under Maintenance
3 Nov 22	-		Under Maintenance
4 Nov 22	-		Under Maintenance
5 Nov 22	-		Under Maintenance
6 Nov 22	-		Under Maintenance
7 Nov 22	-		Under Maintenance
8 Nov 22	-		Under Maintenance
9 Nov 22	-		Under Maintenance
10 Nov 22	-		Under Maintenance
11 Nov 22	-		Under Maintenance
12 Nov 22	893		In Operation
13 Nov 22	892		In Operation
14 Nov 22	892		In Operation
15 Nov 22	890		In Operation
16 Nov 22	895	11.6	In Operation
17 Nov 22	896		In Operation
18 Nov 22	903		In Operation
19 Nov 22	916		In Operation
20 Nov 22	906		In Operation
21 Nov 22	907		In Operation
22 Nov 22	955		In Operation
23 Nov 22	-		Under Maintenance
24 Nov 22	-		Under Maintenance
25 Nov 22	-		Under Maintenance
26 Nov 22	-		Under Maintenance
27 Nov 22	-		Under Maintenance
28 Nov 22	-		Under Maintenance
29 Nov 22	-		Under Maintenance
30 Nov 22	-		Under Maintenance
1 Dec 22	-		Under Maintenance
2 Dec 22	-		Under Maintenance
3 Dec 22	-		Under Maintenance
4 Dec 22	-		Under Maintenance
5 Dec 22	-		Under Maintenance
6 Dec 22	-		Under Maintenance
7 Dec 22	-		Under Maintenance
8 Dec 22	-		Under Maintenance
9 Dec 22	-		Under Maintenance
10 Dec 22	-	-	Under Maintenance
11 Dec 22	-		Under Maintenance
12 Dec 22	-		Under Maintenance
13 Dec 22	-		Under Maintenance
14 Dec 22	-		Under Maintenance
15 Dec 22	-		Under Maintenance
16 Dec 22	-		Under Maintenance
17 Dec 22	-		Under Maintenance
18 Dec 22	-		Under Maintenance
19 Dec 22	-		Under Maintenance

Date	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status (Landfill Gas Generator in Operation)
20 Dec 22	-		Under Maintenance
21 Dec 22	-		Under Maintenance
22 Dec 22	-		Under Maintenance
23 Dec 22	-		Under Maintenance
24 Dec 22	-		Under Maintenance
25 Dec 22	-		Under Maintenance
26 Dec 22	-		Under Maintenance
27 Dec 22	-		Under Maintenance
28 Dec 22	-		Under Maintenance
29 Dec 22	-		Under Maintenance
30 Dec 22	-		Under Maintenance
31 Dec 22	-		Under Maintenance
Average	876	11.0	
Min	851	10.3	
Max	955	11.6	
ENGB			
1-Oct-22	847		In Operation
2-Oct-22	863		In Operation
3-Oct-22	861		In Operation
4-Oct-22	858		In Operation
5-Oct-22	860		In Operation
6-Oct-22	857		In Operation
7-Oct-22	864		In Operation
8-Oct-22	862		In Operation
9-Oct-22	859		In Operation
10-Oct-22	855		In Operation
11-Oct-22	856		In Operation
12-Oct-22	858	10.3	In Operation
13-Oct-22	862		In Operation
14-Oct-22	859		In Operation
15-Oct-22	858		In Operation
16-Oct-22	848		In Operation
17-Oct-22	859		In Operation
18-Oct-22	858		In Operation
19-Oct-22	857		In Operation
20-Oct-22	857		In Operation
21-Oct-22	861		In Operation
22-Oct-22	862		In Operation
23-Oct-22	867		In Operation
24-Oct-22	865		In Operation
25-Oct-22	865		In Operation
26-Oct-22	863		In Operation
27-Oct-22	864		In Operation
28-Oct-22	866		In Operation
29-Oct-22	866		In Operation
30-Oct-22	863		In Operation
31-Oct-22	865		In Operation
1 Nov 22	883		In Operation
2 Nov 22	882		In Operation
3 Nov 22	893		In Operation
4 Nov 22	892		In Operation
5 Nov 22	892		In Operation
6 Nov 22	898		In Operation
7 Nov 22	910		In Operation
8 Nov 22	910		In Operation
9 Nov 22	903		In Operation
10 Nov 22	917		In Operation
11 Nov 22	915		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status (Landfill Gas Generator in Operation)
12 Nov 22	907	11.6	In Operation
13 Nov 22	893		In Operation
14 Nov 22	890		In Operation
15 Nov 22	892		In Operation
16 Nov 22	890		In Operation
17 Nov 22	886		In Operation
18 Nov 22	893		In Operation
19 Nov 22	897		In Operation
20 Nov 22	880		In Operation
21 Nov 22	880		In Operation
22 Nov 22	914		In Operation
23 Nov 22	908		In Operation
24 Nov 22	909		In Operation
25 Nov 22	910		In Operation
26 Nov 22	896		In Operation
27 Nov 22	904		In Operation
28 Nov 22	901		In Operation
29 Nov 22	-		Under Maintenance
30 Nov 22	-		Under Maintenance
1 Dec 22	-		Under Maintenance
2 Dec 22	-		Under Maintenance
3 Dec 22	-		Under Maintenance
4 Dec 22	-		Under Maintenance
5 Dec 22	-		Under Maintenance
6 Dec 22	-		Under Maintenance
7 Dec 22	-		Under Maintenance
8 Dec 22	-		Under Maintenance
9 Dec 22	-		Under Maintenance
10 Dec 22	-		Under Maintenance
11 Dec 22	-		Under Maintenance
12 Dec 22	-	-	Under Maintenance
13 Dec 22	-		Under Maintenance
14 Dec 22	-		Under Maintenance
15 Dec 22	-		Under Maintenance
16 Dec 22	-		Under Maintenance
17 Dec 22	-		Under Maintenance
18 Dec 22	-		Under Maintenance
19 Dec 22	-		Under Maintenance
20 Dec 22	-		Under Maintenance
21 Dec 22	-		Under Maintenance
22 Dec 22	-		Under Maintenance
23 Dec 22	-		Under Maintenance
24 Dec 22	-		Under Maintenance
25 Dec 22	-		Under Maintenance
26 Dec 22	-		Under Maintenance
27 Dec 22	-		Under Maintenance
28 Dec 22	-		Under Maintenance
29 Dec 22	-		Under test run
30 Dec 22	-		Under test run
31 Dec 22	-		Under test run
Average	878	11.0	
Min	841	10.3	
Max	917	11.6	

Notes:

(a) The exhaust gas velocity was calculated based on the cross-section area of the stack and the gas flow and combustion temperature data measured during the stack emission monitoring.

Annex D6

Ambient VOCs, Ammonia and H₂S Monitoring Results

Table D6.1 Ambient VOCs, Ammonia and H₂S Monitoring Results

Parameters	Limit Level	Monitoring Results ($\mu\text{g m}^{-3}$)			
		AM1	AM2	AM3	AM4
Ammonia	180	0.043	0.023	0.022	0.023
H ₂ S	42	<15	<15	<15	<15
Methane	NA ^(a)	0.0003 %(v/v)	0.0003 %(v/v)	0.00024 %(v/v)	0.00017 %(v/v)
1.1.1-Trichloroethane	5,550	<0.8	<0.8	<0.8	<0.8
1.2-Dibromoethane (EDB)	39	<1.0	<1.0	<1.0	<1.0
1.2-Dichloroethane	210	1.3	1.6	1.3	1.4
Benzene	33	0.9	1	0.8	0.9
Butan-2-ol	667	<0.6	<0.6	<0.6	<0.6
Butanethiol	4	<1.2	<1.2	<1.2	<1.2
Carbon Disulphide	150	<0.5	<0.5	<0.5	0.5
Carbon Tetrachloride	64	<0.6	<0.6	<0.6	<0.6
Chloroform	99	<0.8	<0.8	<0.8	<0.8
Decanes	3,608	<0.7	<0.7	<0.7	<0.7
Dichlorobenzene	120	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoro-methane	NA ^(a)	1.3	1.9	0.9	1.2
Dimethylsulphide	8	<0.2	<0.2	<0.2	<0.2
Dipropyl ether	NA ^(a)	<0.8	<0.8	<0.8	<0.8
Limonene	212	<0.4	<0.4	<0.4	<0.4
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	<3.8	<3.8	4.1
Ethyl butanoate	71	<1.0	<1.0	<1.0	<1.0
Ethyl propionate	29	<0.8	<0.8	<0.8	<0.8
Ethyl benzene	738	0.8	1	1.4	0.6
Heptane	2,746	<0.8	<0.8	<0.8	<0.8
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	15.8	<2.6	<2.6	18.3
Methyl butanoate	30	<0.8	<0.8	<0.8	<0.8
Methyl propionate	353	<0.7	<0.7	<0.7	<0.7
Methylene Chloride	3,530	4.6	6.1	5.7	4.6
Butyl acetate	76	<1.0	<1.0	<1.0	<1.0
Butyl benzene	47	<1.0	<1.0	<1.0	<1.0
Nonane	11,540	<0.9	<0.9	<0.9	<0.9
Propyl benzene	19	<0.8	<0.8	<0.8	<0.8

Parameters	Limit Level	Monitoring Results ($\mu\text{g m}^{-3}$)			
		AM1	AM2	AM3	AM4
Octane	7,942	<0.9	<0.9	<0.9	<0.9
Propyl propionate	276	<1.0	<1.0	<1.0	<1.0
Terpenes	NA ^(a)	0.9	<0.8	1.2	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	2.6	3	3.6	2.6
Trichloroethylene	5,500	<1.1	<1.1	<1.1	<1.1
Undecane	5,562	<1.2	<1.2	<1.2	<1.2
Vinyl Chloride	26	<0.3	<0.3	<0.3	<0.3
Xylenes	534	0.7	1.1	3.3	0.6

Notes:

(a) No relevant WHO/USEPA/CARB's ambient criteria, odour thresholds and WEL available.

Annex D7

Investigation Reports of
Environmental Quality
Limit Exceedance

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	14 October 2022
Time	12:09 – 12:39
Monitoring Location	Landfill Gas Flare 1 (F601)
Parameter	Sulphur Dioxide (SO ₂)
Limit Levels	>0.22 g/s
Measured Level	0.26 g/s
Possible reason	<p>As confirmed by the Contractor, Landfill Gas Flare 1 (F601) was under normal operating conditions during the sampling event. The landfill gas flare emission monitoring results (NO₂, CO, Benzene, Vinyl chloride, gas combustion temperature, exhaust temperature and exhaust gas velocity) at Landfill Gas Flare 1 (F601) on 14 October 2022 were well within the respective limit levels. It is possible that the slight exceedance of SO₂ limit level measured on 14 October 2022 could be due to some short-term system instability (e.g. insufficient air, short gas residence time or ineffective mixing of landfill gas and air during the combustion) during the sampling event and excess SO₂ was formed from the oxidation of trace quantities of sulphur compounds in the landfill gas. Hence, the SO₂ exceedance at Landfill Gas Flare 1 (F601) on 14 October 2022 is considered to be Project related.</p> <p>In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 17 November 2022 (it should be noted that the turnaround time of the laboratory analysis of the flue gas sample is 3 weeks and the results were available on 6 December 2022) to confirm findings. Exceedance of SO₂ Limit Level was recorded at Landfill Gas Flare 1 (F601) (1.27 mg/L) during the sampling event. Landfill Gas Flare 1 (F601) showed consecutive exceedance of the landfill gas flare stack emission limit (SO₂).</p> <p>It should be noted that although the measured SO₂ level exceeded the limit level of the EM&A programme (which was set based on the stack design parameters), the slight exceedance of SO₂ on 14 October 2022 will not cause adverse air quality impact to the identified ASRs as the anticipated SO₂ concentrations at the identified ASRs will still be well below the respective AQO criteria with reference to the findings of the operational air quality impact assessment of the SENTX Environmental Review Report.</p>
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitoring the operating conditions of the

	flare to avoid any exceedance of the Limit Levels. The Contractor is also reminded to adjust the inlet flow and quality of the LFG during the routine gas well monitoring to ensure complete oxidation of the sulphur compounds (e.g. H ₂ S) in the landfill gas during LFG flaring.
Remarks	-

Prepared by: Abbey Lau
 Designation: Environmental Team
 Date: 27 December 2022

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	17 November 2022
Time	13:25 – 13:55
Monitoring Location	Landfill Gas Flare 1 (F601)
Parameter	Sulphur Dioxide (SO ₂)
Limit Levels	>0.22 g/s
Measured Level	1.27 g/s
Possible reason	<p>As confirmed by the Contractor, Landfill Gas Flare 1 (F601) was under normal operating conditions during the sampling event. The landfill gas flare emission monitoring results (NO₂, CO, Benzene, Vinyl chloride, gas combustion temperature, exhaust temperature and exhaust gas velocity) at Landfill Gas Flare 1 (F601) on 17 November 2022 were well within the respective limit levels. It is possible that the slight exceedance of SO₂ limit level measured on 17 November 2022 could be due to some short-term system instability (e.g. insufficient air, short gas residence time or ineffective mixing of landfill gas and air during the combustion) during the sampling event and excess SO₂ was formed from the oxidation of trace quantities of sulphur compounds in the landfill gas. Hence, the SO₂ exceedance at Landfill Gas Flare 1 (F601) on 17 November 2022 is considered to be Project related.</p> <p>In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 13 December 2022 (it should be noted that the turnaround time of the laboratory analysis of the flue gas sample is 3 weeks and the results were available on 9 January 2023) to confirm findings. The SO₂ concentration (0.16 g/s) measured on 13 December 2022 is well below Limit Level. There is no consecutive exceedance of SO₂ concentrations in the flue gas emission of Landfill Gas Flare 1 (F601).</p>
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitoring the operating conditions of the flare to avoid any exceedance of the Limit Levels. The Contractor is also reminded to adjust the inlet flow and quality of the LFG during the routine gas well monitoring to ensure complete oxidation of the sulphur compounds (e.g. H ₂ S) in the landfill gas during LFG flaring.
Remarks	-

Prepared by: Abbey Lau
 Designation: Environmental Team
 Date: 10 January 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	13 December 2022
Time	13:24 - 13:54
Monitoring Location	Landfill Gas Flare 1 (F601)
Parameter	Benzene
Limit Levels	>0.000414 g/s
Measured Level	0.000661 g/s
Possible reason	<p>As confirmed by the Contractor, Landfill Gas Flare 1 (F601) was under normal operating conditions during the sampling event. The landfill gas flare emission monitoring results (SO₂, NO₂, CO, Vinyl chloride, gas combustion temperature, exhaust temperature and exhaust gas velocity) at Landfill Gas Flare 1 (F601) on 13 December 2022 were well within the respective limit levels. It is possible that the slight exceedance of benzene limit level measured on 13 December 2022 could be due to some short-term system instability (e.g. insufficient air, short gas residence time or ineffective mixing of landfill gas and air during the combustion) during the sampling event. Hence, the benzene exceedance at Landfill Gas Flare 1 (F601) on 13 December 2022 is considered to be Project related.</p> <p>In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 17 January 2023 (it should be noted that the turnaround time of the laboratory analysis of the flue gas sample is 3 weeks and the results were available on 9 February 2023) to confirm findings. The benzene concentration (<0.000180 g/s) measured on 17 January 2023 is well below Limit Level. There is no consecutive exceedance of benzene concentrations in the flue gas emission of Landfill Gas Flare 1 (F601).</p>
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitoring the operating conditions of the flare to avoid any exceedance of the Limit Levels.
Remarks	-

Prepared by: Abbey Lau
 Designation: Environmental Team
 Date: 20 February 2023

Annex E

Noise

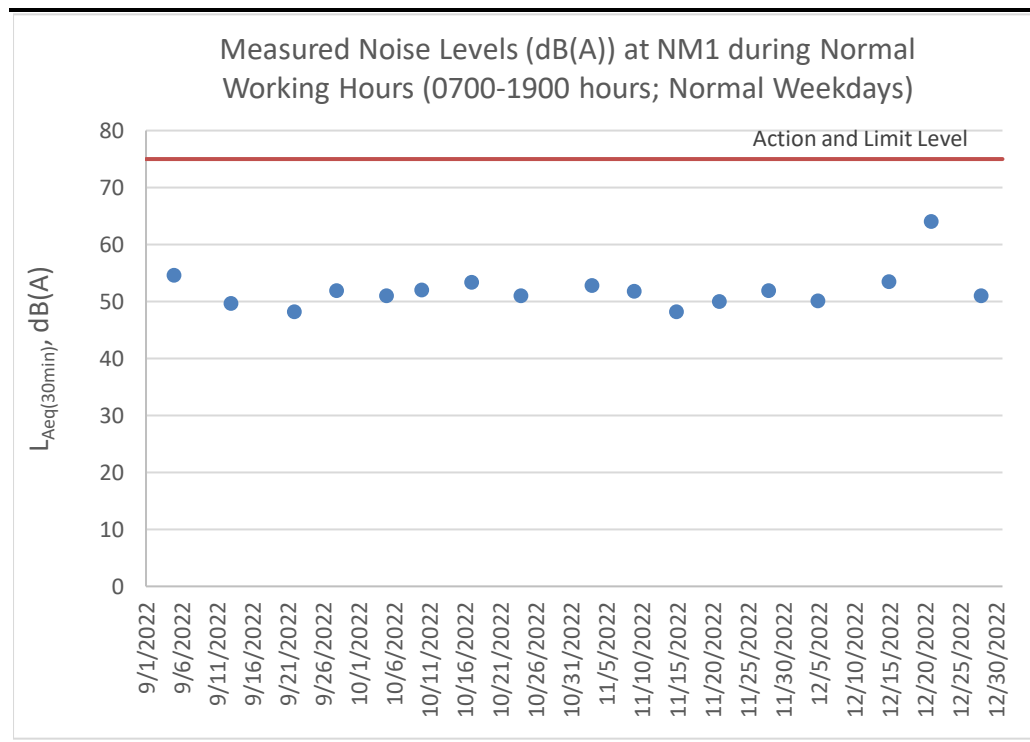
Annex E1

Noise Monitoring Results

Table E1.1 Measured Noise Levels (dB(A)) at NM1 during Normal Working Hours (0700-1900 hours; Normal Weekdays)

Date	Start Time	Finish Time	Weather	L ₁₀ (30min)	L ₉₀ (30min)	L _{eq} (30min)
5 Oct 22	13:50	14:20	Sunny	53.5	47.0	51.0
10 Oct 22	13:58	14:28	Cloudy	53.4	50.4	52.0
17 Oct 22	14:24	14:54	Cloudy	55.1	51.1	53.3
24 Oct 22	10:06	10:36	Sunny	52.8	47.1	51.0
3 Nov 22	13:15	13:45	Cloudy	55.2	48.8	52.7
9 Nov 22	14:06	14:36	Sunny	53.8	47.6	51.7
15 Nov 22	10:43	11:13	Sunny	49.9	44.2	48.1
21 Nov 22	10:20	10:50	Cloudy	52.3	46.6	49.9
28 Nov 22	10:25	10:55	Sunny	53.4	49.4	51.8
5 Dec 22	11:09	11:39	Cloudy	53.1	53.5	50.1
15 Dec 22	10:30	11:00	Cloudy	54.1	48.2	53.4
21 Dec 22	11:00	11:30	Sunny	67.8	55.6	64.0
28 Dec 22	10:20	10:50	Sunny	53.5	46.7	50.9
Average						52.3
Min						48.1
Max						64.0

Figure E1.1 Graphical Presentation for Noise Monitoring at NM1



Annex E2

Event and Action Plan for Noise Monitoring

Annex E2 *Event and Action Plan for Operational Noise Monitoring*

Event	Action		
	ET	IEC	Contractor
<p>Action Level</p> <ul style="list-style-type: none"> Identify the source(s) and investigate the cause(s) of exceedance and complaint Prepare Notification of Exceedance within 24 hours Inform Contractor, IEC and Project Proponent whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Have additional monitoring if exceedance is due to the Project. If exceedance stops, cease additional monitoring 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check monitoring data submitted by ET Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Submit proposals for remedial measures to IEC Implement the agreed proposals 	
<p>Limit Level</p> <ul style="list-style-type: none"> Identify the source(s) and investigate the cause(s) of exceedance and complaint Prepare Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD whether the cause of exceedance is due to the Project Analyse the operation of SENTX and investigate the causes of exceedance Provide interim report to Contractor, IEC, Project Proponent and EPD the causes of the exceedances Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Report the remedial measures implemented and the additional monitoring results to Contractor, IEC, Project Proponent and EPD Have additional monitoring if exceedance is due to the Project. If exceedance stops, cease additional monitoring 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check monitoring data submitted by ET Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Take immediate measures to avoid further exceedance Submit proposals for remedial measures to IEC within 3 working days of notification Implement the agreed proposals Resubmit proposals if problem still not under control Stop the relevant activity of works as determined by the Project Proponent until the exceedance is abated 	

Annex F

Water Quality

Annex F1

Surface Water Quality Monitoring Results

Table F1.1 Surface Water Quality Monitoring Results at DP4

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (oC)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks	
24 Oct 22	10:30	Sunny		Unable to collect water sample due to insufficient flow						-
21 Nov 22	09:50	Sunny		Unable to collect water sample due to insufficient flow						-
21 Dec 22	14:10	Sunny		Unable to collect water sample due to insufficient flow						-
					Average	-	-	-		
					Min	-	-	-		
					Max	-	-	-		

Table F1.2 Surface Water Quality Monitoring Results at DP6

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (oC)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks	
24 Oct 22	10:45	Sunny		Unable to collect water sample due to insufficient flow						-
21 Nov 22	10:00	Sunny		Unable to collect water sample due to insufficient flow						-
21 Dec 22	14:35	Sunny		Unable to collect water sample due to insufficient flow						-
					Average	-	-	-		
					Min	-	-	-		
					Max	-	-	-		

Annex F2

Event and Action Plan for Water Quality Monitoring

Annex F2 Event and Action Plan for Water Quality Monitoring During Operation/Restoration Phase

Event	Action		
	ET	IEC	Contractor
Exceedance of Limit Level for surface water monitoring	<ul style="list-style-type: none"> Identify source(s) of impact and investigate the cause(s) of exceedance Prepare Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Repeat measurement to confirm finding if exceedance is due to the Project Increase monitoring frequency to weekly if exceedance is due to the Project until no exceedance of Limit Level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check monitoring data submitted by ET Check Contractor's working methods Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Take immediate action to avoid further exceedance Submit proposals for remedial measures to IEC Implement the agreed proposals Amend proposal if appropriate
Exceedance of Limit Level for groundwater monitoring	<ul style="list-style-type: none"> Identify source(s) of impact and investigate the cause(s) of exceedance Prepare Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Repeat measurement to confirm finding if exceedance is due to the Project Increase monitoring frequency to weekly if exceedance is due to the Project until no exceedance of Limit Level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check monitoring data submitted by ET Check Contractor's working methods Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Divert groundwater collected at the collection sumps to the leachate treatment plant Submit proposals for remedial measures to IEC Rectify any unacceptable practice or design Amend working methods as required Implement amended working methods, if necessary

Event	Action		
	ET	IEC	Contractor
Exceedance of Limit Level for leachate level	<ul style="list-style-type: none"> Investigate the cause(s) of exceedance Prepare Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check with Contractor on the operating activities and performance of the leachate collection system Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Check the performance of the leachate collection system Rectify any unacceptable practice; Amend leachate collection design if required Implement amended leachate collection system, if necessary
Exceedance of Limit Level of effluent discharge from LTP	<ul style="list-style-type: none"> Investigate the cause(s) of exceedance Prepare Notification of Exceedance within 24 hours Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Repeat measurement to confirm finding if exceedance is due to the Project Increase monitoring frequency to weekly until no exceedance of Limit Level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Check with Contractor on the operation performance of the LTP Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Rectify any unacceptable practice; Carry out remedial measures or amend design as required Implement amended design, if necessary

Annex F3

Leachate Levels Monitoring Results

Table F3.1 Leachate Levels Monitoring Results (Pump Station No.1X (Cell 1X))

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
Pump Station No. 1X (Cell 1X)			
1-Oct-22	66	79	73
2-Oct-22	66	79	73
3-Oct-22	66	79	73
4-Oct-22	62	73	68
5-Oct-22	62	73	68
6-Oct-22	70	82	76
7-Oct-22	68	82	75
8-Oct-22	73	84	79
9-Oct-22	70	84	77
10-Oct-22	70	84	77
11-Oct-22	75	88	82
12-Oct-22	70	82	76
13-Oct-22	77	88	83
14-Oct-22	66	77	72
15-Oct-22	68	79	74
16-Oct-22	70	82	76
17-Oct-22	70	82	76
18-Oct-22	70	82	76
19-Oct-22	70	84	77
20-Oct-22	64	64	64
21-Oct-22	75	88	82
22-Oct-22	68	82	75
23-Oct-22	75	86	81
24-Oct-22	75	86	81
25-Oct-22	75	88	82
26-Oct-22	75	88	82
27-Oct-22	73	86	80
28-Oct-22	73	84	79
29-Oct-22	70	82	76
30-Oct-22	62	75	69
31-Oct-22	62	75	69
1-Nov-22	75	86	81
2-Nov-22	75	88	82
3-Nov-22	68	70	69
4-Nov-22	73	73	73
5-Nov-22	64	75	70
6-Nov-22	64	75	70
7-Nov-22	64	75	70
8-Nov-22	68	79	74
9-Nov-22	62	75	69
10-Nov-22	75	88	82
11-Nov-22	68	79	74
12-Nov-22	70	82	76
13-Nov-22	64	77	71
14-Nov-22	64	77	71
15-Nov-22	73	84	79
16-Nov-22	64	75	70
17-Nov-22	68	82	75
18-Nov-22	73	84	79
19-Nov-22	75	86	81
20-Nov-22	77	88	83
21-Nov-22	77	88	83
22-Nov-22	62	75	69
23-Nov-22	70	82	76
24-Nov-22	68	82	75

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
25-Nov-22	77	75	76
26-Nov-22	73	68	71
27-Nov-22	73	86	80
28-Nov-22	73	86	80
29-Nov-22	73	84	79
30-Nov-22	66	79	73
1-Dec-22	70	82	76
2-Dec-22	68	79	74
3-Dec-22	75	73	74
4-Dec-22	75	88	82
5-Dec-22	75	88	82
6-Dec-22	66	77	72
7-Dec-22	68	79	74
8-Dec-22	70	82	76
9-Dec-22	70	82	76
10-Dec-22	70	84	77
11-Dec-22	70	84	77
12-Dec-22	70	84	77
13-Dec-22	70	84	77
14-Dec-22	73	86	80
15-Dec-22	68	82	75
16-Dec-22	66	79	73
17-Dec-22	75	88	82
18-Dec-22	75	88	82
19-Dec-22	75	88	82
20-Dec-22	70	84	77
21-Dec-22	64	75	70
22-Dec-22	70	82	76
23-Dec-22	73	84	79
24-Dec-22	75	86	81
25-Dec-22	73	86	80
26-Dec-22	73	86	80
27-Dec-22	73	84	79
28-Dec-22	70	84	77
29-Dec-22	70	82	76
30-Dec-22	66	79	73
31-Dec-22	66	77	72
Average	70	81	76
Min	62	64	64
Max	77	88	83

Table F3.2 Leachate Levels Monitoring Results (Pump Station No.2X (Cell 2X))

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
Pump Station No. 2X (Cell 2X)			
1-Oct-22	66	70	68
2-Oct-22	66	70	68
3-Oct-22	66	70	68
4-Oct-22	79	84	82
5-Oct-22	79	84	82
6-Oct-22	75	82	79
7-Oct-22	70	75	73
8-Oct-22	70	70	70
9-Oct-22	62	66	64
10-Oct-22	62	66	64
11-Oct-22	82	86	84
12-Oct-22	70	75	73
13-Oct-22	82	88	85
14-Oct-22	66	73	70
15-Oct-22	79	84	82
16-Oct-22	70	75	73
17-Oct-22	70	75	73
18-Oct-22	79	84	82
19-Oct-22	75	79	77
20-Oct-22	86	90	88
21-Oct-22	70	75	73
22-Oct-22	79	84	82
23-Oct-22	66	70	68
24-Oct-22	66	70	68
25-Oct-22	73	79	76
26-Oct-22	79	84	82
27-Oct-22	84	88	86
28-Oct-22	64	68	66
29-Oct-22	70	75	73
30-Oct-22	79	86	74
31-Oct-22	79	86	83
1-Nov-22	84	90	87
2-Nov-22	64	68	66
3-Nov-22	68	68	68
4-Nov-22	62	66	64
5-Nov-22	75	79	77
6-Nov-22	86	90	88
7-Nov-22	86	90	88
8-Nov-22	73	66	70
9-Nov-22	73	70	72
10-Nov-22	70	66	68
11-Nov-22	64	62	63
12-Nov-22	82	79	81
13-Nov-22	86	82	84
14-Nov-22	86	82	84
15-Nov-22	73	70	72
16-Nov-22	84	82	83
17-Nov-22	68	66	67
18-Nov-22	79	77	78
19-Nov-22	88	84	86
20-Nov-22	79	77	78
21-Nov-22	79	77	78
22-Nov-22	88	84	86
23-Nov-22	70	66	68
24-Nov-22	82	79	81
25-Nov-22	66	62	64

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
26-Nov-22	77	73	75
27-Nov-22	82	79	81
28-Nov-22	82	79	81
29-Nov-22	79	75	77
30-Oct-22	70	68	69
1-Dec-22	86	82	84
2-Dec-22	75	70	73
3-Dec-22	84	82	83
4-Dec-22	79	75	77
5-Dec-22	79	75	77
6-Dec-22	88	84	86
7-Dec-22	68	64	66
8-Dec-22	77	73	75
9-Dec-22	84	82	83
10-Dec-22	66	62	64
11-Dec-22	82	77	80
12-Dec-22	82	77	80
13-Dec-22	86	82	84
14-Dec-22	68	64	66
15-Dec-22	75	70	73
16-Dec-22	82	77	80
17-Dec-22	88	84	86
18-Dec-22	64	59	62
19-Dec-22	64	59	62
20-Dec-22	75	70	73
21-Dec-22	82	77	80
22-Dec-22	88	84	86
23-Dec-22	68	64	66
24-Dec-22	75	70	73
25-Dec-22	86	82	84
26-Dec-22	86	82	84
27-Dec-22	62	66	64
28-Dec-22	75	70	73
29-Dec-22	79	75	77
30-Dec-22	84	82	83
31-Dec-22	79	77	78
Average	76	76	76
Min	62	59	62
Max	88	90	88

Table F3.3 Leachate Levels Monitoring Results (Pump Station No.3X (Cell 3X))

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
Pump Station No. 3X (Cell 3X)			
1-Oct-22	215	213	214
2-Oct-22	215	213	214
3-Oct-22	215	213	214
4-Oct-22	160	162	161
5-Oct-22	160	162	161
6-Oct-22	61	63	62
7-Oct-22	65	70	68
8-Oct-22	48	52	50
9-Oct-22	56	59	58
10-Oct-22	56	59	58
11-Oct-22	56	61	59
12-Oct-22	48	52	50
13-Oct-22	56	61	59
14-Oct-22	59	61	60
15-Oct-22	48	52	50
16-Oct-22	61	63	62
17-Oct-22	61	63	62
18-Oct-22	50	52	51
19-Oct-22	65	67	66
20-Oct-22	65	70	68
21-Oct-22	63	67	65
22-Oct-22	61	65	63
23-Oct-22	54	56	55
24-Oct-22	54	56	55
25-Oct-22	54	56	55
26-Oct-22	50	54	52
27-Oct-22	65	70	68
28-Oct-22	61	65	63
29-Oct-22	52	56	54
30-Oct-22	54	56	55
31-Oct-22	54	56	55
1-Nov-22	61	65	63
2-Nov-22	61	65	63
3-Nov-22	232	237	235
4-Nov-22	197	199	198
5-Nov-22	56	61	59
6-Nov-22	59	61	60
7-Nov-22	59	61	60
8-Nov-22	65	70	68
9-Nov-22	52	54	53
10-Nov-22	61	65	63
11-Nov-22	61	65	63
12-Nov-22	54	59	57
13-Nov-22	59	70	65
14-Nov-22	59	70	65
15-Nov-22	48	52	50
16-Nov-22	48	52	50
17-Nov-22	65	70	68
18-Nov-22	61	65	63
19-Nov-22	52	56	54
20-Nov-22	54	59	57
21-Nov-22	54	59	57
22-Nov-22	63	67	65
23-Nov-22	56	61	59
24-Nov-22	63	65	64
25-Nov-22	50	54	52

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
26-Nov-22	61	67	64
27-Nov-22	52	56	54
28-Nov-22	52	56	54
29-Nov-22	59	61	60
30-Nov-22	59	63	61
1-Dec-22	66	66	66
2-Dec-22	68	68	68
3-Dec-22	66	66	66
4-Dec-22	66	66	66
5-Dec-22	66	66	66
6-Dec-22	68	68	68
7-Dec-22	68	68	68
8-Dec-22	68	68	68
9-Dec-22	66	66	66
10-Dec-22	64	64	64
11-Dec-22	68	68	68
12-Dec-22	68	68	68
13-Dec-22	66	66	66
14-Dec-22	64	64	64
15-Dec-22	68	68	68
16-Dec-22	64	64	64
17-Dec-22	70	70	70
18-Dec-22	68	68	68
19-Dec-22	68	68	68
20-Dec-22	66	66	66
21-Dec-22	70	70	70
22-Dec-22	66	66	66
23-Dec-22	70	68	69
24-Dec-22	64	64	64
25-Dec-22	70	70	70
26-Dec-22	70	70	70
27-Dec-22	64	64	64
28-Dec-22	66	66	66
29-Dec-22	68	68	68
30-Dec-22	70	70	70
31-Dec-22	64	64	64
Average	71	74	72
Min	48	52	50
Max	232	237	235

Table F3.3 Leachate Levels Monitoring Results (Pump Station No.4X (Cell 4X))

Date	Meter No.X6 (cm)	Meter No.X7 (cm)	Average (cm)
Pump Station No. 4X (Cell 4X)			
1-Oct-22	215	213	214
2-Oct-22	215	213	214
3-Oct-22	215	213	214
4-Oct-22	160	162	161
5-Oct-22	160	162	161
6-Oct-22	61	63	62
7-Oct-22	65	70	68
8-Oct-22	48	52	50
9-Oct-22	56	59	58
10-Oct-22	56	59	58
11-Oct-22	56	61	59
12-Oct-22	48	52	50
13-Oct-22	56	61	59
14-Oct-22	59	61	60
15-Oct-22	48	52	50
16-Oct-22	61	63	62
17-Oct-22	61	63	62
18-Oct-22	50	52	51
19-Oct-22	65	67	66
20-Oct-22	65	70	68
21-Oct-22	63	67	65
22-Oct-22	61	65	63
23-Oct-22	54	56	55
24-Oct-22	54	56	55
25-Oct-22	54	56	55
26-Oct-22	50	54	52
27-Oct-22	65	70	68
28-Oct-22	61	65	63
29-Oct-22	52	56	54
30-Oct-22	54	56	55
31-Oct-22	54	56	55
1-Nov-22	61	65	63
2-Nov-22	61	65	63
3-Nov-22	232	237	235
4-Nov-22	197	199	198
5-Nov-22	56	61	59
6-Nov-22	59	61	60
7-Nov-22	59	61	60
8-Nov-22	65	70	68
9-Nov-22	52	54	53
10-Nov-22	61	65	63
11-Nov-22	61	65	63
12-Nov-22	54	59	57
13-Nov-22	59	70	65
14-Nov-22	59	70	65
15-Nov-22	48	52	50
16-Nov-22	48	52	50
17-Nov-22	65	70	68
18-Nov-22	61	65	63
19-Nov-22	52	56	54
20-Nov-22	54	59	57
21-Nov-22	54	59	57
22-Nov-22	63	67	65
23-Nov-22	56	61	59
24-Nov-22	63	65	64
25-Nov-22	50	54	52

Date	Meter No.X6 (cm)	Meter No.X7 (cm)	Average (cm)
26-Nov-22	61	67	64
27-Nov-22	52	56	54
28-Nov-22	52	56	54
29-Nov-22	59	61	60
30-Nov-22	59	63	61
1-Dec-22	63	67	65
2-Dec-22	52	56	54
3-Dec-22	48	52	50
4-Dec-22	65	67	66
5-Dec-22	65	67	66
6-Dec-22	65	70	68
7-Dec-22	65	70	68
8-Dec-22	61	65	63
9-Dec-22	56	61	59
10-Dec-22	48	52	50
11-Dec-22	50	54	52
12-Dec-22	50	54	52
13-Dec-22	59	63	61
14-Dec-22	54	59	57
15-Dec-22	63	67	65
16-Dec-22	50	52	51
17-Dec-22	59	65	62
18-Dec-22	63	67	65
19-Dec-22	63	67	65
20-Dec-22	63	67	65
21-Dec-22	65	70	68
22-Dec-22	61	65	63
23-Dec-22	59	63	61
24-Dec-22	54	50	52
25-Dec-22	50	54	52
26-Dec-22	50	54	52
27-Dec-22	59	63	61
28-Dec-22	65	70	68
29-Dec-22	50	54	52
30-Dec-22	56	61	59
31-Dec-22	61	65	63
Average	68	72	70
Min	48	50	50
Max	232	237	235

Figure F3.1 Graphical Presentation for Leachate Levels Monitoring (Pump Station No.1X (Cell 1X))

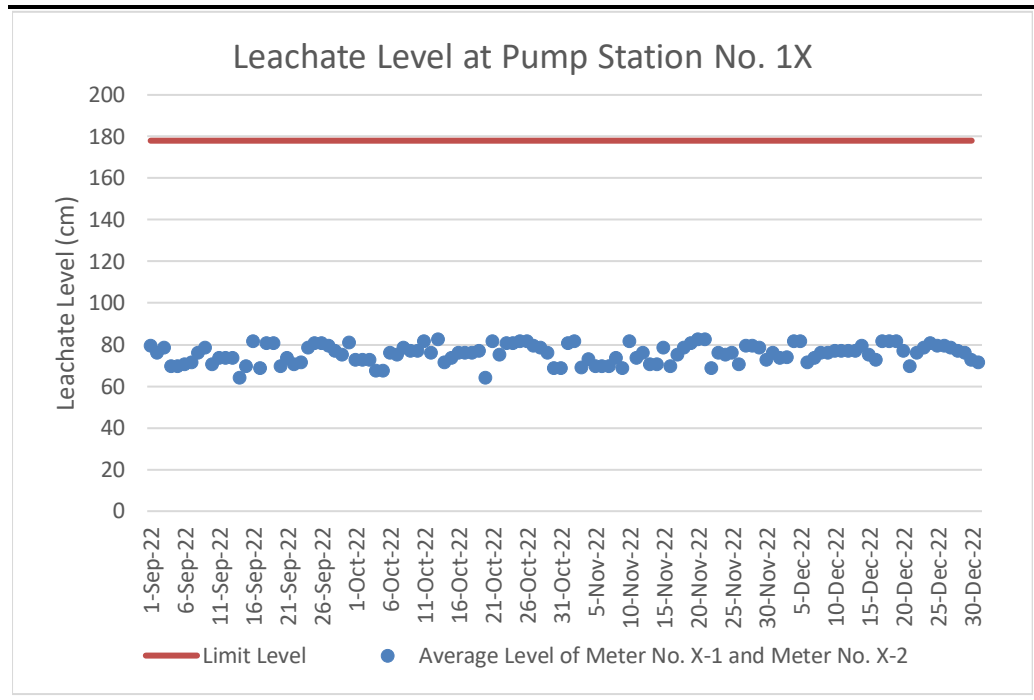


Figure F3.2 Graphical Presentation for Leachate Levels Monitoring (Pump Station No.2X (Cell 2X))

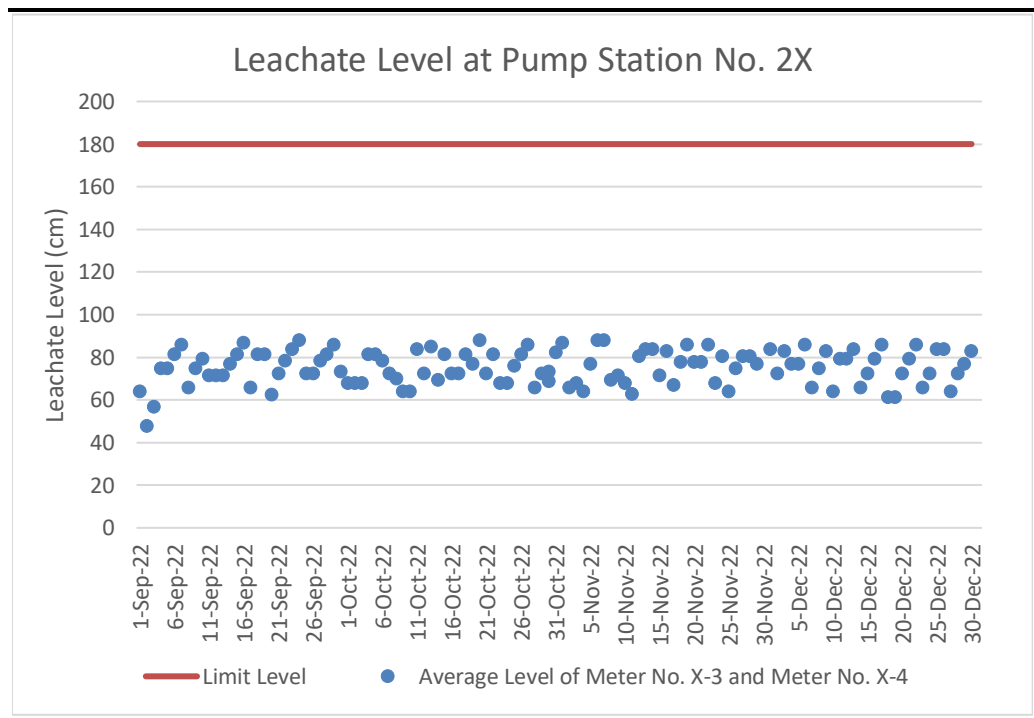


Figure F3.3 Graphical Presentation for Leachate Levels Monitoring (Pump Station No.3X (Cell 3X))

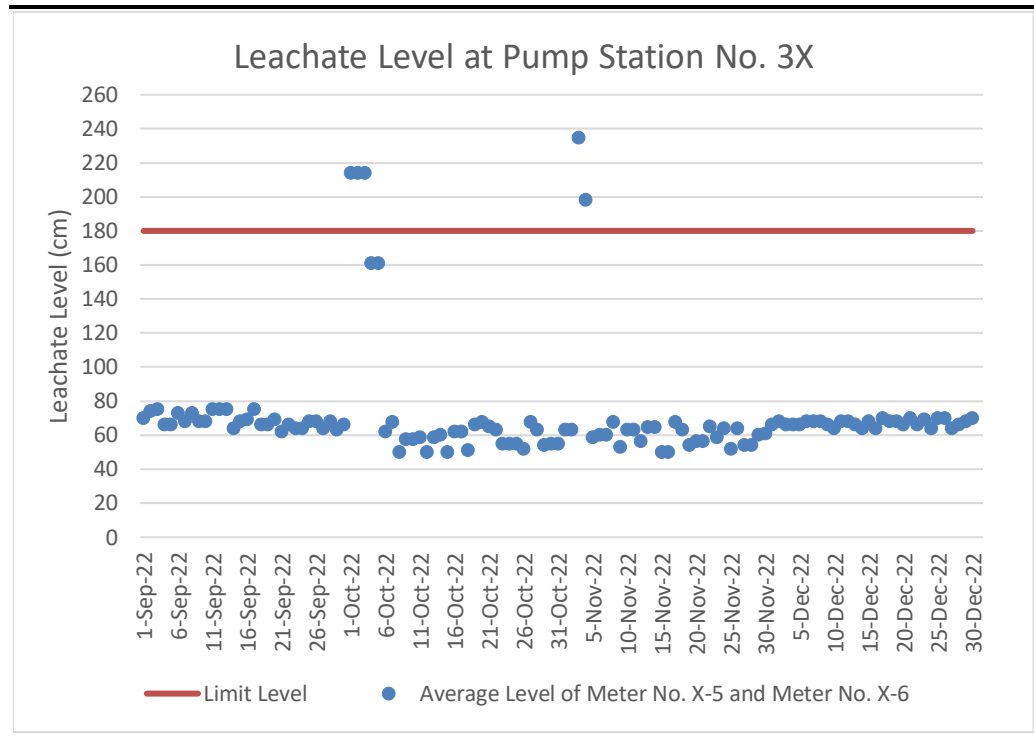
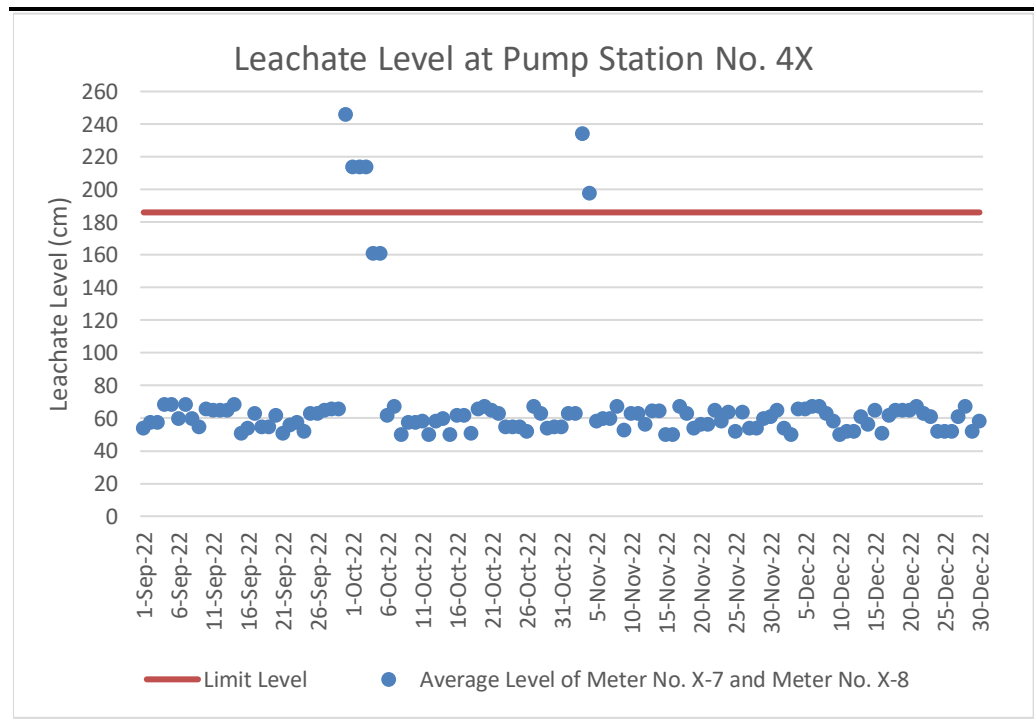


Figure F3.4 Graphical Presentation for Leachate Levels Monitoring (Pump Station No.4X (Cell 4X))



Annex F4

Effluent Quality Monitoring Results

Table F4.1 Effluent Monitoring Results

		7 Oct 22	8 Nov 22	6 Dec 22
On-site Measurements				
Temperature	°C	35.3	30.6	20.4
pH Value	pH Unit	8.2	8.1	8.3
Volume Discharged	m ³	1,124	1,374	1,995
Laboratory Analysis				
Suspended Solids (SS)	mg/L	49.0	25.8	51.2
Alkalinity	mg/L	1070	1650	1540
Ammoniacal-nitrogen	mg/L	0.44	0.33	0.16
Chloride	mg/L	1220	1390	2200
Nitrite-nitrogen	mg/L	0.07	0.09	0.32
Phosphate	mg/L	2.45	2.94	12.70
Sulphate	mg/L	385	179	97
Total Nitrogen	mg/L	101.0	70.2	128.0
Nitrate-nitrogen	mg/L	65.4	33.3	41.0
Total Inorganic Nitrogen	mg/L	65.91	33.72	41.48
Biochemical Oxygen Demand (BOD)	mg/L	8	9	25
Chemical Oxygen Demand (COD)	mg/L	484	676	1600
Oil & Grease	mg/L	<5	<5	<5
Total Organic Carbon (TOC)	mg/L	205	226	622
Boron	µg/L	3400	3880	4380
Calcium	mg/L	66.0	59.3	33.6
Iron	mg/L	0.73	1.20	3.33
Magnesium	mg/L	26.4	23.7	33.5
Potassium	mg/L	529	670	1020
Cadmium	µg/L	<1.0	<1.0	<1.0
Chromium	µg/L	74	88	343
Copper	µg/L	<10	<10	29
Nickel	µg/L	74	92	163
Zinc	µg/L	100	66	234

Annex F5

Groundwater Monitoring Results

Table F5.1 Groundwater Monitoring Results (October 2022)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	2.92	3.06	3.03	3.1	3.38	3.05	2.88	3.06	3.49	3.41	3.53	6.73	36.54	45.13
Bicarbonate Alkalinity as CaCO ₃	mg/L	90	251	186	<1	2	<1	<1	<1	53	189	167	54	16	11
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1	76	66	125	72	91	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	mg/L	90	251	186	127	68	197	85	133	53	189	167	54	16	11
pH Value	pH Unit	8	8	7.9	11.2	10.2	11.3	10.6	11.1	8.1	7.7	8	6.9	5.7	5.5
Electrical Conductivity	µS/cm	2080	953	1140	912	1020	1330	2110	1810	2060	1170	461	314	92	97
Ammonia as N	mg/L	1.23	0.02	1.47	2.49	1.28	3.1	5.23	4.97	0.43	<0.01	<0.01	<0.01	<0.01	<0.01
Chloride	mg/L	534	46	182	139	173	205	601	344	388	178	30	22	15	19
Nitrite as N	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
Reactive Phosphorus as P	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.04	<0.01	<0.01
Sulphate as SO ₄ - Turbidimetric	mg/L	83	187	112	71	137	98	70	218	371	130	30	60	3	2
Sulphide as S ₂	mg/L	0.2	<0.1	0.1	4.7	1.5	10.1	4	2.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/L	1.4	0.1	1.6	3.1	1.8	4.3	6.1	6.3	1	0.1	<0.1	0.2	<0.1	<0.1
Nitrate as N	mg/L	<0.01	0.64	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	1.2	0.1	<0.01	<0.01	0.1	0.11
Total Nitrogen as N	mg/L	1.4	0.8	1.6	3.1	1.8	4.3	6.1	6.3	2.3	0.2	<0.1	0.2	0.1	0.1
Boron	µg/L	240	190	210	200	240	200	480	190	380	240	70	20	20	10
Calcium	mg/L	60.7	62.3	82.7	40.6	16.8	34.4	32.5	56.6	120	95.7	62.7	27.2	0.92	0.9
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	23	52.4	6.44	<0.05	0.08	<0.05	<0.05	<0.05	4.12	8.96	3.27	4.55	1	1.02
Sodium	mg/L	293	50.9	112	95.5	140	161	309	238	266	128	25.9	23.9	11.4	12.2
Iron	mg/L	<0.04	<0.04	0.16	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.58	<0.04	<0.04
Potassium	mg/L	23.1	11.5	25.3	27.9	46.4	55.3	53.7	69.4	43.4	12.3	6.66	2.71	3.4	3.37
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	1	2	<1	<1	<1	1
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	800	152	1000	2	<1	<1	<1	<1	33	209	58	809	31	8
Nickel	µg/L	<1	<1	<1	<1	<1	2	<1	3	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	491	<10	<10
Biochemical Oxygen Demand	mg/L	<2	<2	<2	3	<2	8	2	2	2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	12	4	14	19	22	39	22	34	27	8	4	4	4	3
Total Organic Carbon	mg/L	3	2	5	4	7	8	4	10	8	3	1	<1	<1	<1

Table F5.2 Groundwater Monitoring Results (November 2022)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.07	3.1	3.15	3.27	3.23	3.09	2.91	3.07	3.46	3.34	3.46	6.8	36.3	44.87
Bicarbonate Alkalinity as CaCO ₃	mg/L	88	223	188	<1	<1	<1	12	<1	102	183	170	54	16	12
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1	90	64	141	51	92	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	mg/L	88	223	188	108	68	184	63	125	102	183	170	54	16	12
pH Value	pH Unit	8.1	8	7.9	10.9	10.6	11.3	10	11.1	8	7.9	8.1	7	5.7	5.6
Electrical Conductivity	µS/cm	1440	2340	946	848	1170	1230	2330	1760	1520	876	583	309	92	95
Ammonia as N	mg/L	1.4	0.35	0.61	2.98	1.94	3.33	5.73	5.82	0.02	<0.01	0.02	0.02	<0.01	0.03
Chloride	mg/L	326	514	119	150	198	199	642	342	234	97	50	21	14	18
Nitrite as N	mg/L	<0.01	<0.01	0.02	0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Reactive Phosphorus as P	mg/L	0.02	0.01	0.02	<0.01	<0.01	0.01	0.01	<0.01	<0.01	0.02	0.01	0.04	0.01	<0.01
Sulphate as SO ₄ - Turbidimetric	mg/L	66	162	96	75	154	87	48	184	278	106	54	58	3	3
Sulphide as S ₂	mg/L	0.2	<0.1	<0.1	4.4	0.7	5.7	1.6	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/L	1.4	0.4	0.8	3.5	2.4	3.9	6.1	7	0.5	0.1	0.1	0.2	0.1	<0.1
Nitrate as N	mg/L	<0.01	0.04	0.19	<0.01	<0.01	<0.01	<0.01	0.02	1.37	<0.01	<0.01	<0.01	0.09	0.12
Total Nitrogen as N	mg/L	1.4	0.5	1	3.5	2.4	3.9	6.1	7	1.8	0.1	0.1	0.2	0.2	0.2
Boron	µg/L	130	380	180	190	240	160	560	190	270	220	110	20	20	10
Calcium	mg/L	51.2	64.4	84	39.4	25.6	35.5	25.4	53.9	117	73.2	64.4	25.7	0.81	0.85
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	11.8	56.7	5.69	0.59	<0.05	<0.05	0.72	<0.05	4.44	5.49	3.37	1.06	0.96	0.88
Sodium	mg/L	191	315	85.2	106	165	160	384	246	168	95.3	45.2	23.5	13	13.6
Iron	mg/L	0.12	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.52	<0.04	<0.04
Potassium	mg/L	22	21.4	25.8	31.4	58.8	61.7	60.2	73.5	36.7	13.2	9.17	3.09	4.13	3.94
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1	1	<1	<1	<1	5	1	<1	<1	<1	<1
Lead	µg/L	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	610	34	690	1	<1	<1	<1	<1	28	5	319	789	21	8
Nickel	µg/L	<1	<1	<1	<1	1	1	<1	3	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	10	7	14	22	27	39	18	34	24	9	8	7	6	7
Total Organic Carbon	mg/L	4	2	8	6	8	8	4	11	10	7	6	2	3	2

Table F5.3 Groundwater Monitoring Results (December 2022)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	2.85	2.97	2.94	2.94	2.96	2.88	2.52	2.68	2.86	2.85	3.1	6.69	35.9	41.66
Bicarbonate Alkalinity as CaCO ₃	mg/L	88	253	142	3	8	<1	23	<1	105	213	214	54	17	12
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1	54	63	144	41	103	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	mg/L	88	253	142	57	72	172	64	120	105	213	214	54	17	12
pH Value	pH Unit	8.2	8.2	8.1	10.3	10.4	11.3	9.8	11.1	8.2	8	8.1	7.2	5.7	5.8
Electrical Conductivity	µS/cm	1280	930	1120	960	980	1200	2340	1680	1540	1310	687	310	93	97
Ammonia as N	mg/L	1.24	0.01	1.49	3.5	1.66	3.54	5.98	6.19	0.46	<0.01	0.07	<0.01	<0.01	<0.01
Chloride	mg/L	294	39	192	166	153	187	728	318	268	157	55	21	15	19
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Reactive Phosphorus as P	mg/L	0.01	0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	0.02	0.03	0.08	<0.01	<0.01
Sulphate as SO ₄ - Turbidimetric	mg/L	64	177	93	79	115	92	42	180	220	176	66	59	3	4
Sulphide as S ₂	mg/L	0.1	<0.1	<0.1	4.1	1.6	15	2.2	6.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/L	1.3	0.2	1.8	4	2.1	4.7	6.9	8.4	1	0.2	0.3	0.1	<0.1	<0.1
Nitrate as N	mg/L	<0.01	0.57	<0.01	<0.01	<0.01	0.01	<0.01	0.01	0.38	<0.01	<0.01	<0.01	0.09	0.1
Total Nitrogen as N	mg/L	1.3	0.8	1.8	4	2.1	4.7	6.9	8.4	1.4	0.2	0.3	0.1	0.2	0.1
Boron	µg/L	120	180	200	200	220	180	630	190	290	400	90	20	20	10
Calcium	mg/L	54.3	57.2	72.9	30.4	12.8	34.2	23.1	46.7	89	87.3	78.3	24	0.8	0.89
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	8.2	55.6	5.02	0.62	<0.05	<0.05	1.28	<0.05	5.74	7.14	5.12	4.13	0.88	0.74
Sodium	mg/L	150	47.9	116	118	136	153	369	230	172	146	43.6	23.9	13.2	13.2
Iron	mg/L	0.07	<0.04	0.09	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.34	<0.04	<0.04
Potassium	mg/L	18.7	11.6	26.7	28	51.3	58.2	52.7	68	32.8	17.5	9.52	3.12	3.99	3.65
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	644	149	923	1	<1	<1	<1	<1	52	135	604	654	21	8
Nickel	µg/L	<1	<1	<1	<1	1	2	<1	4	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Biochemical Oxygen Demand	mg/L	<2	<2	4	4	<2	7	<2	4	4	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	6	<2	18	20	27	37	14	35	20	18	12	5	8	8
Total Organic Carbon	mg/L	2	<1	10	14	16	20	8	22	7	10	8	3	5	5

Figure F5.1 Graphical Presentation for Groundwater Monitoring (MWX-1)

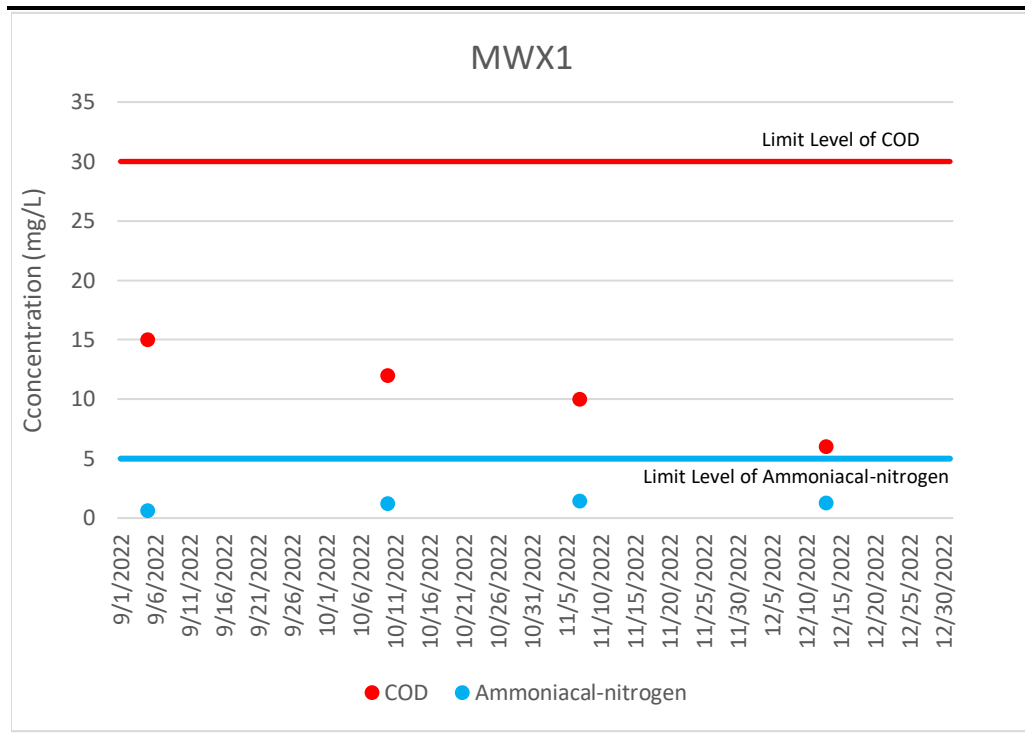


Figure F5.2 Graphical Presentation for Groundwater Monitoring (MWX-2)

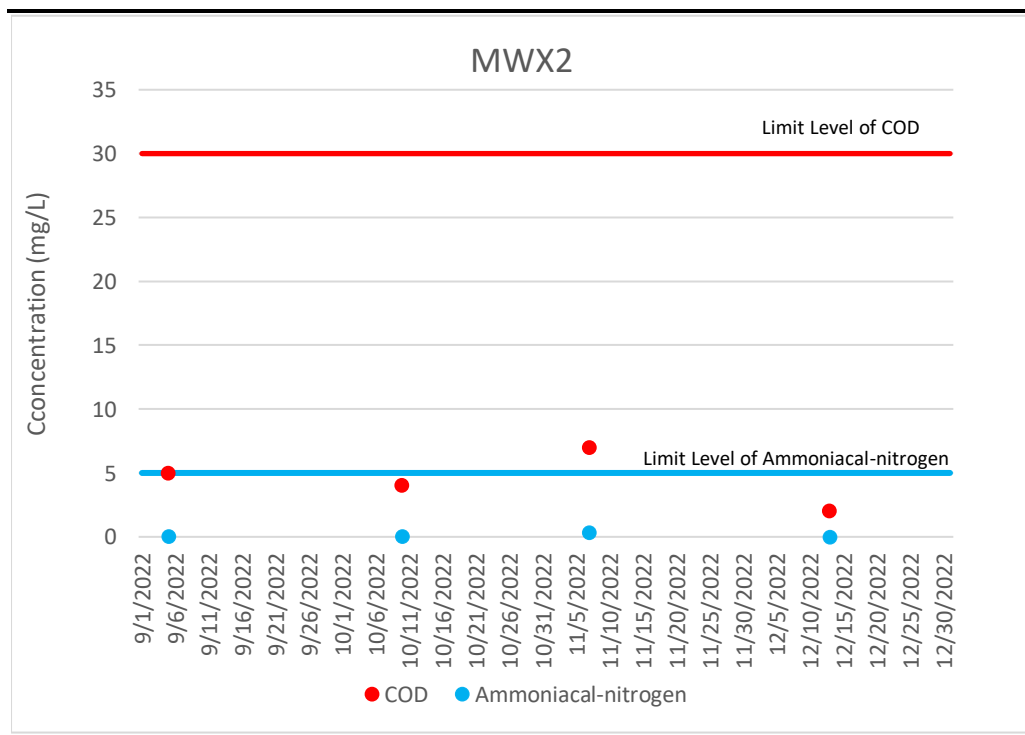


Figure F5.3 Graphical Presentation for Groundwater Monitoring (MWX-3)

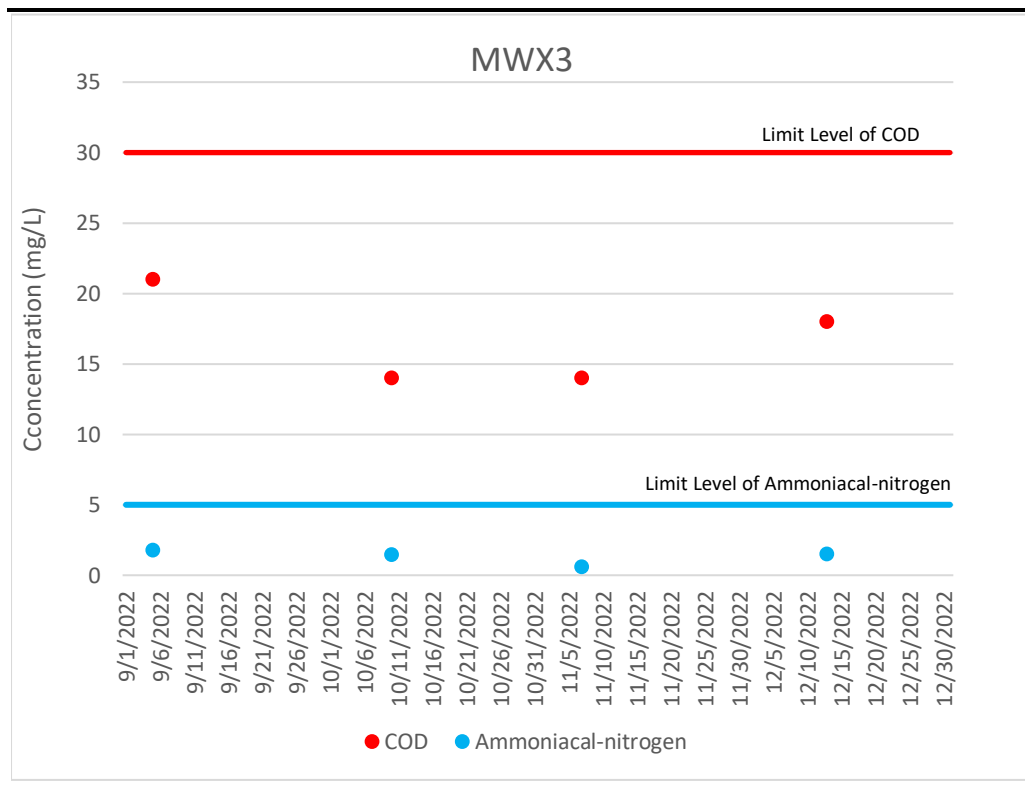


Figure F5.4 Graphical Presentation for Groundwater Monitoring (MWX-4)

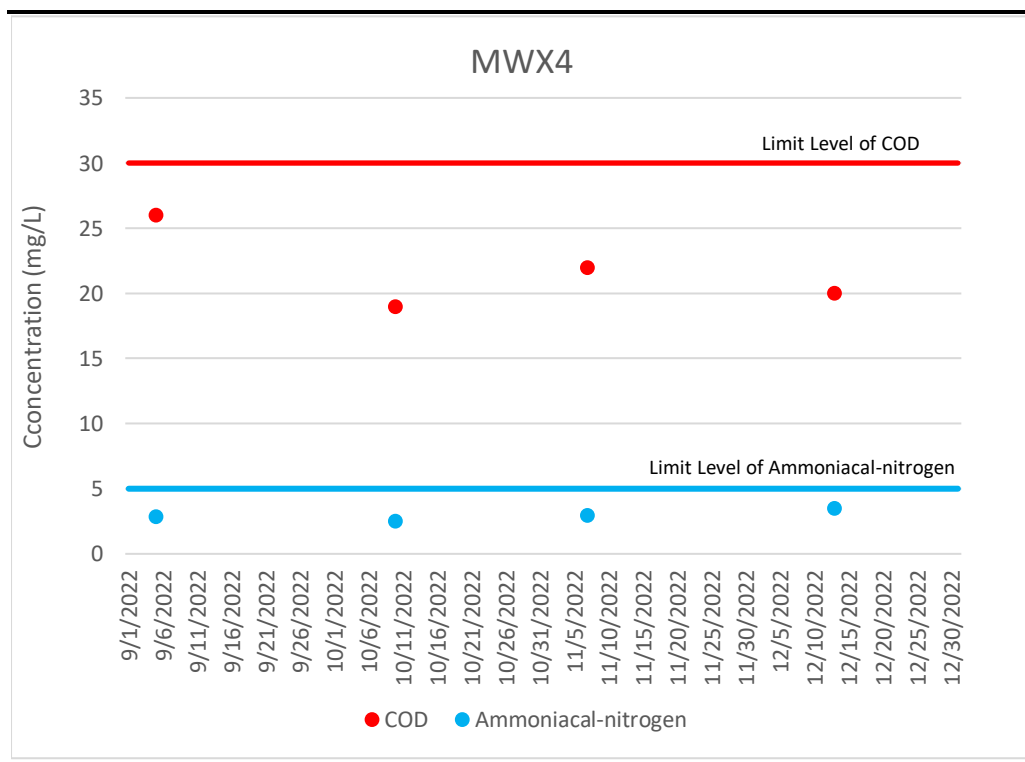


Figure F5.5 Graphical Presentation for Groundwater Monitoring (MWX-5)

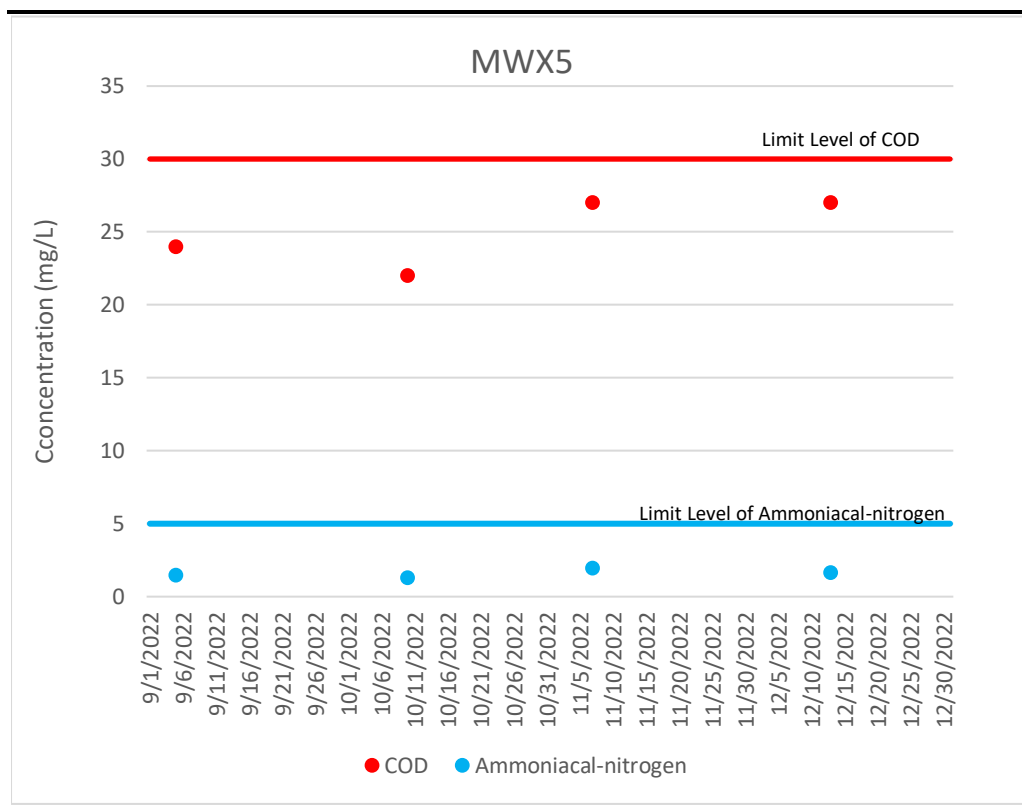


Figure F5.6 Graphical Presentation for Groundwater Monitoring (MWX-6)

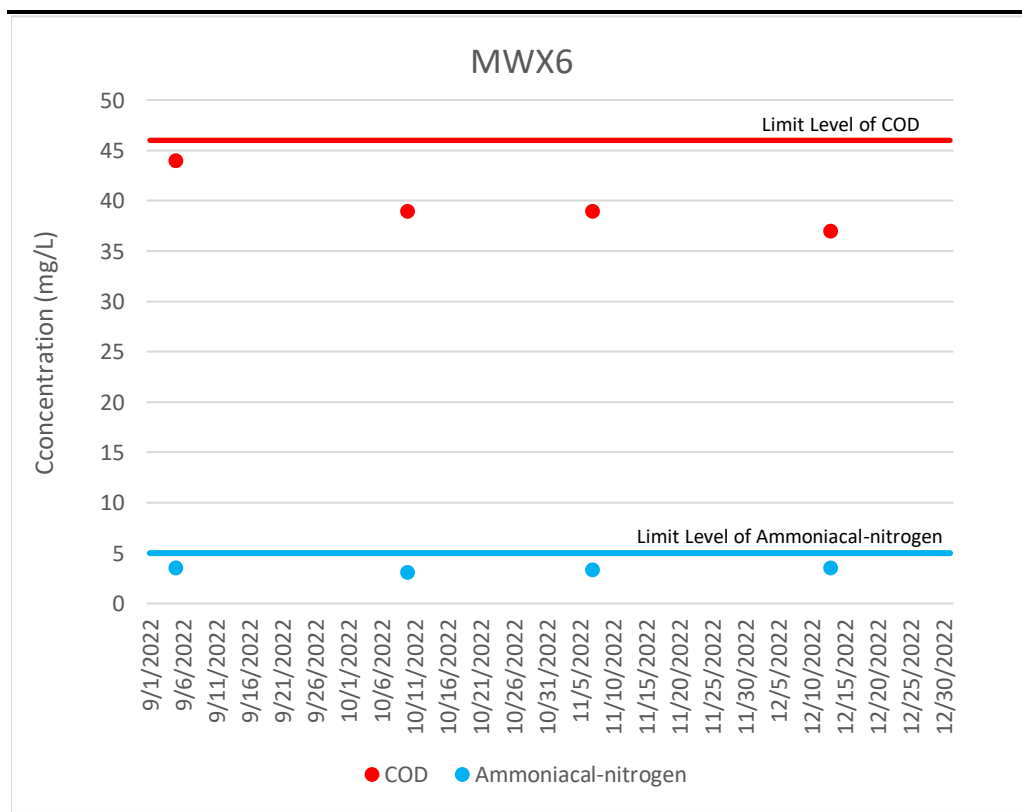


Figure F5.7 Graphical Presentation for Groundwater Monitoring (MWX-7)

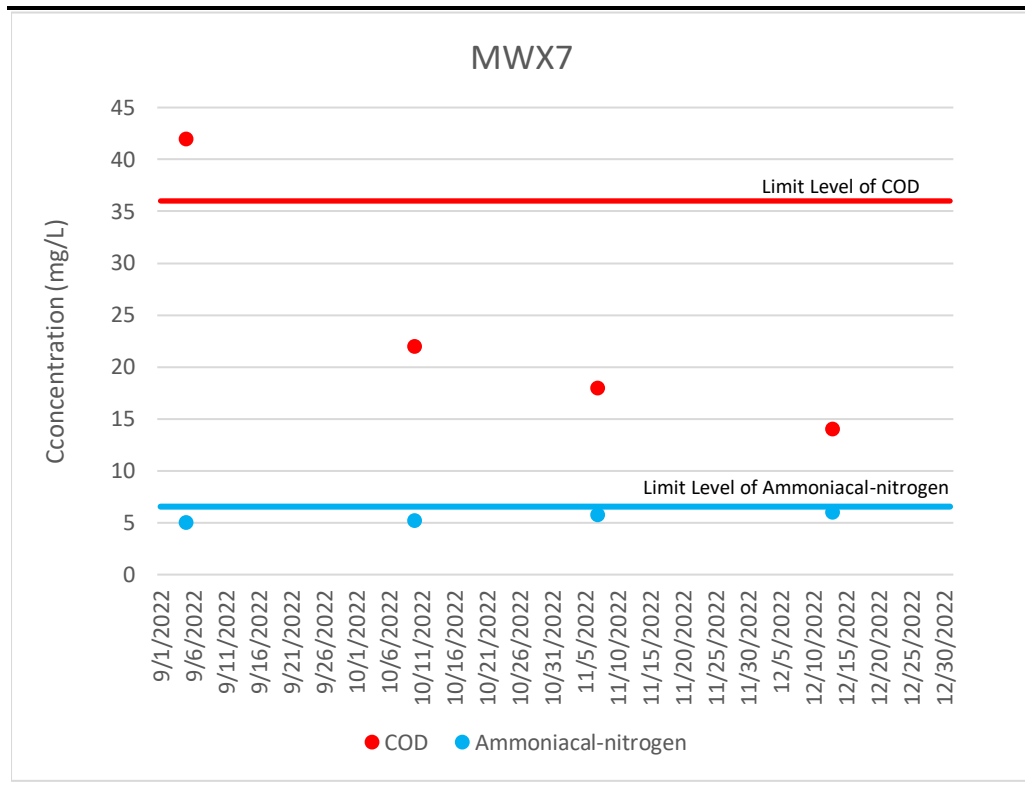


Figure F5.8 Graphical Presentation for Groundwater Monitoring (MWX-8)

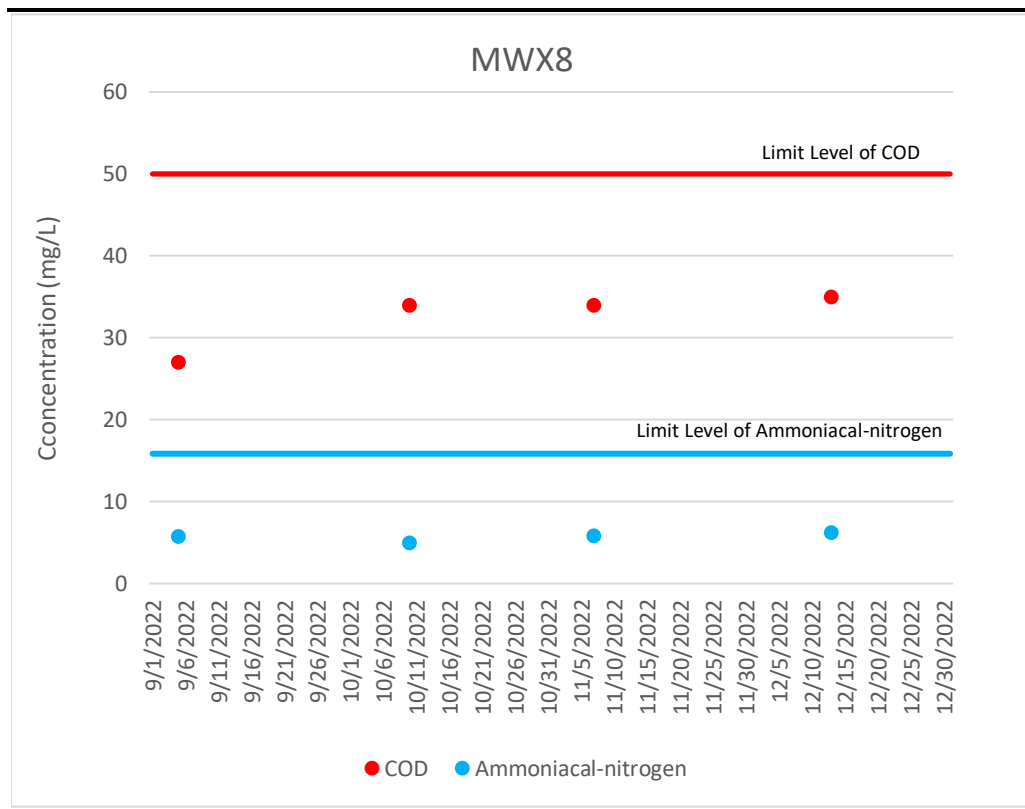


Figure F5.9 Graphical Presentation for Groundwater Monitoring (MWX-9)

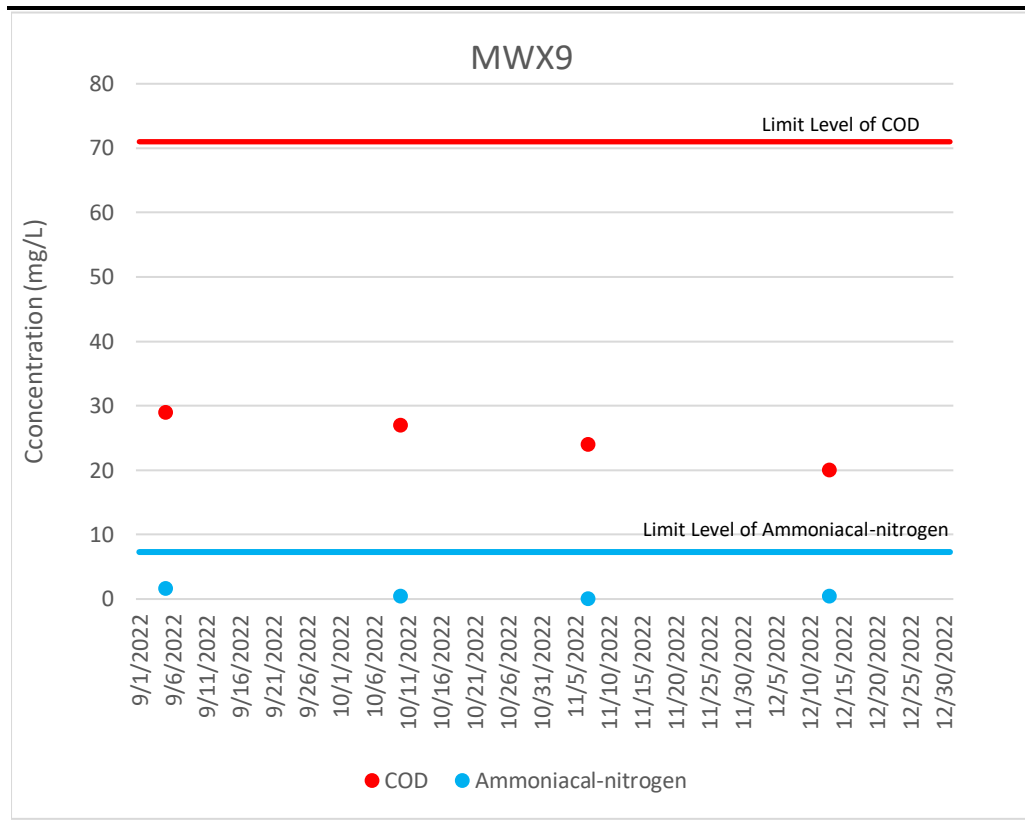


Figure F5.10 Graphical Presentation for Groundwater Monitoring (MWX-10)

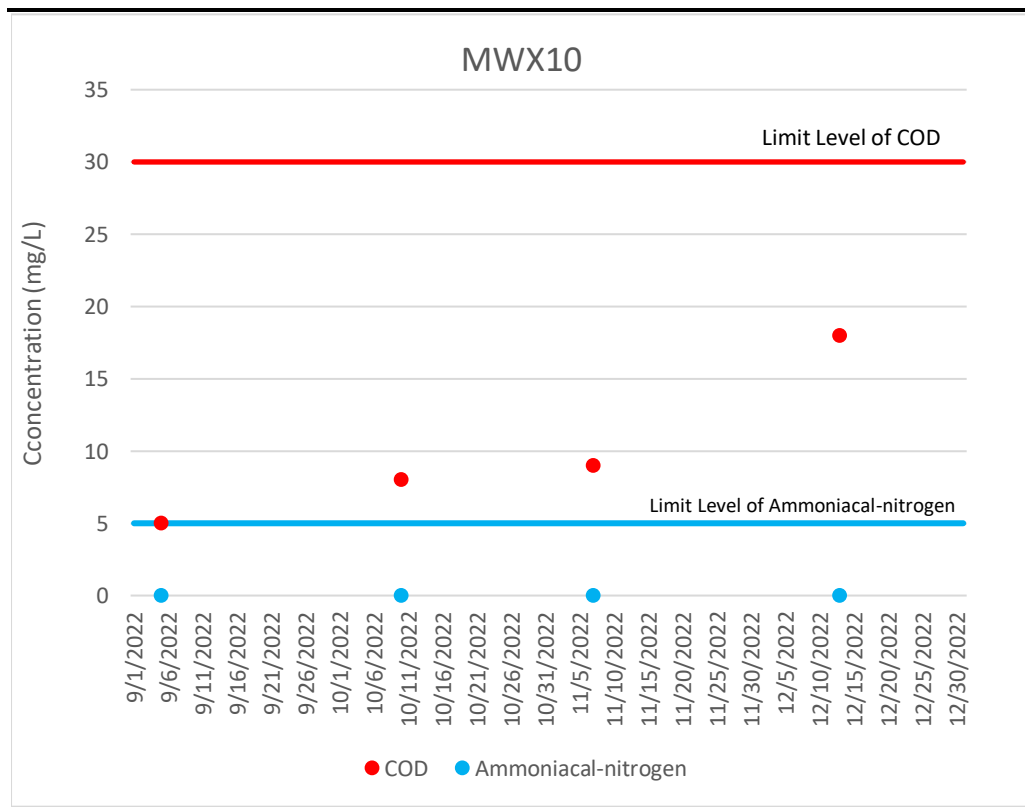


Figure F5.11 Graphical Presentation for Groundwater Monitoring (MWX-11)

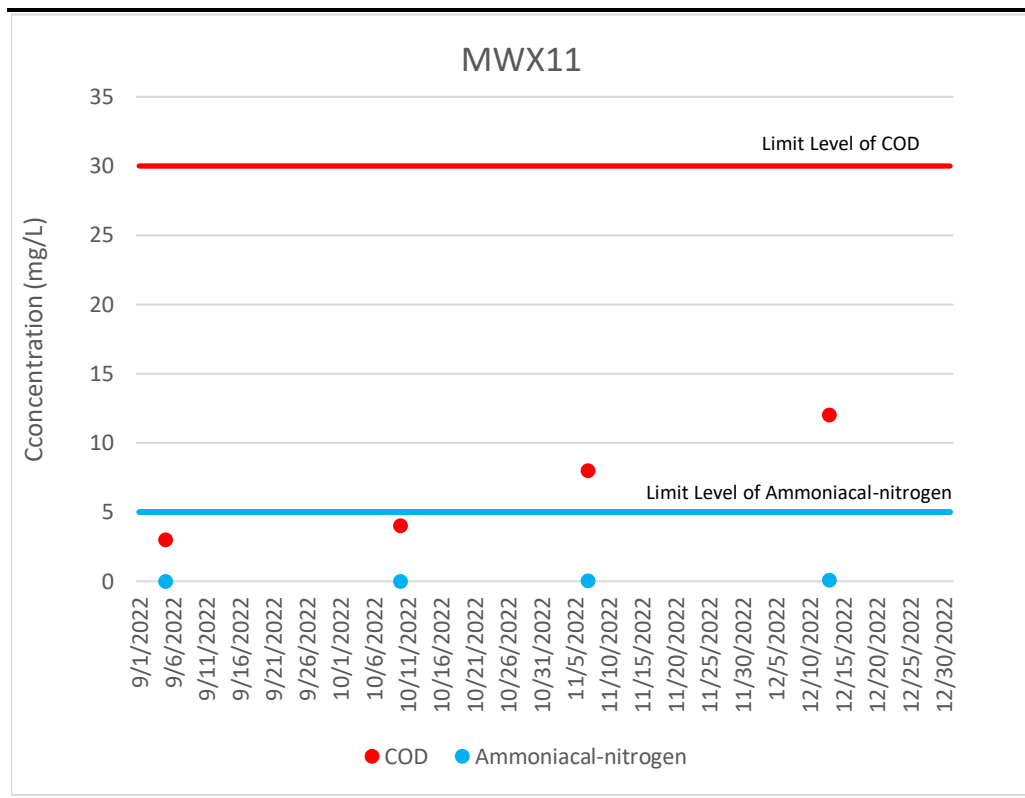


Figure F5.12 Graphical Presentation for Groundwater Monitoring (MWX-12)

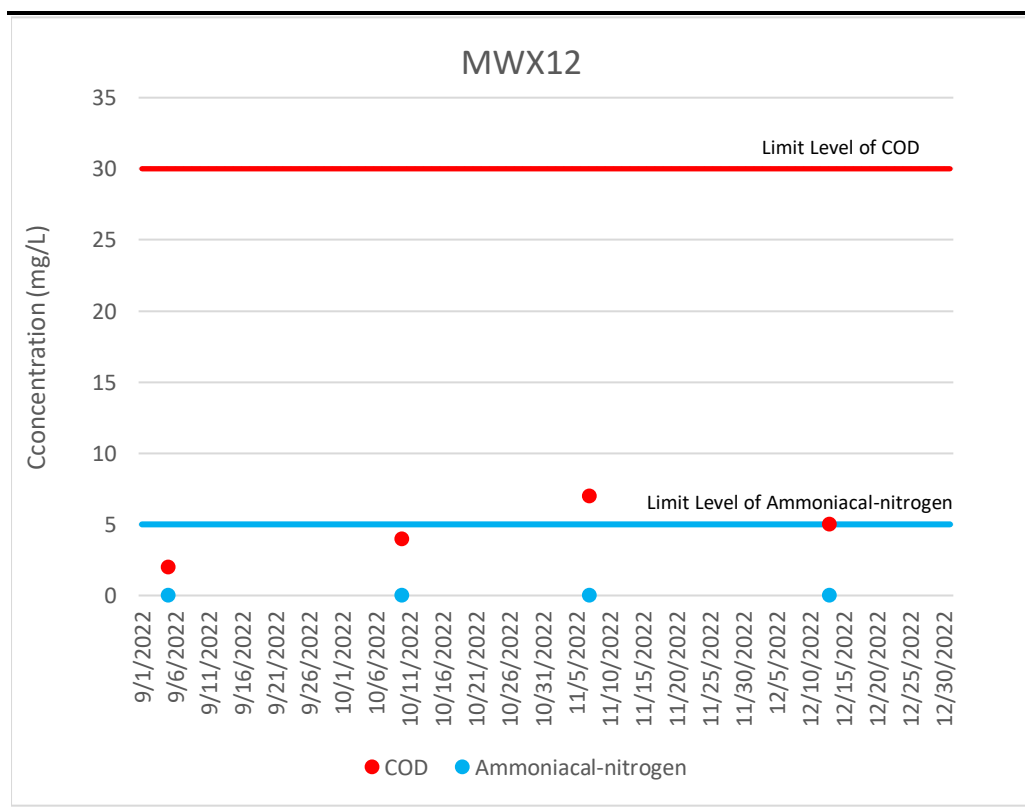


Figure F5.13 Graphical Presentation for Groundwater Monitoring (MWX-13)

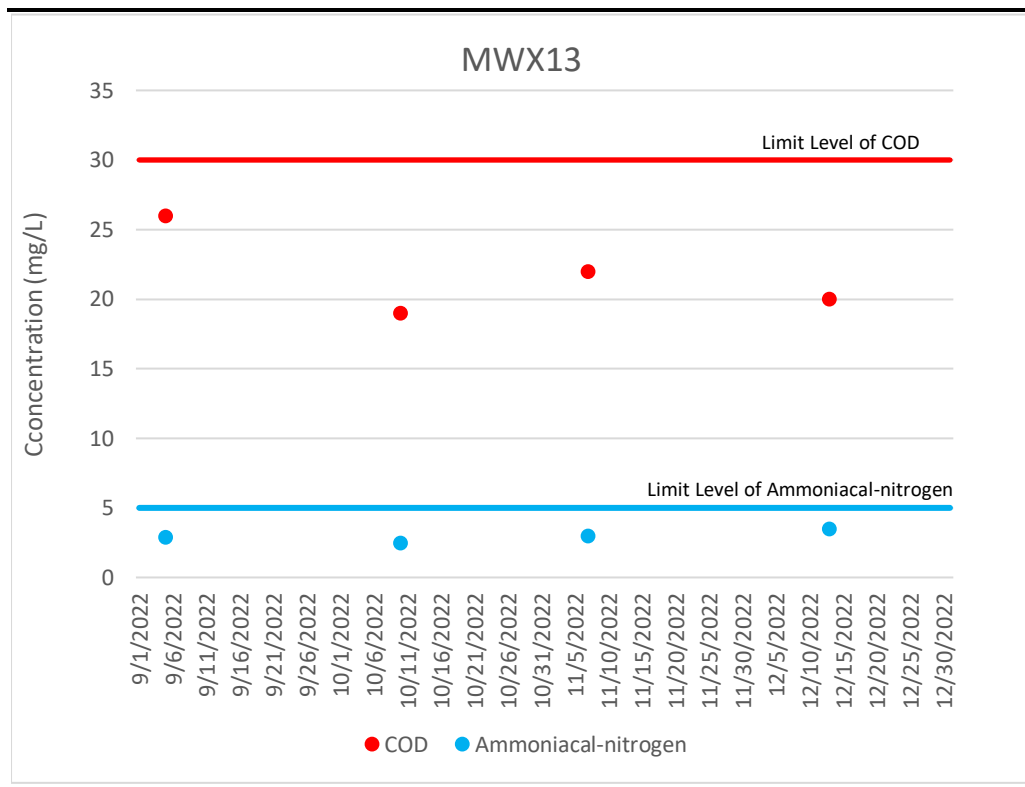
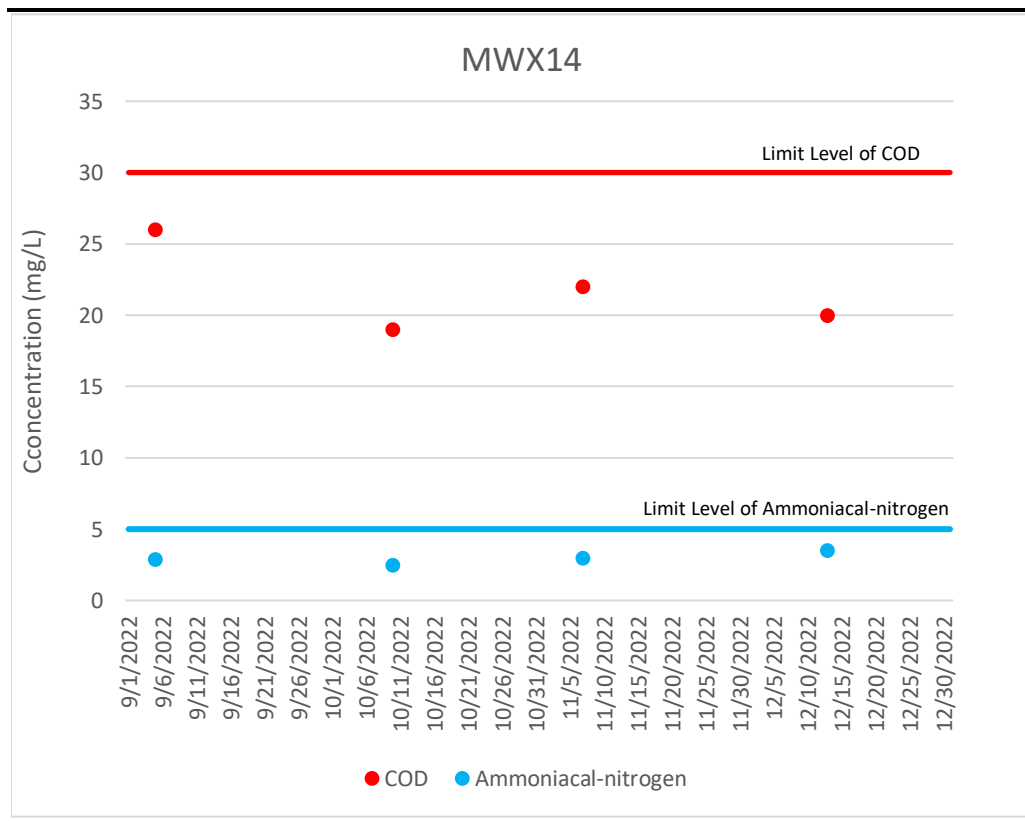


Figure F5.14 Graphical Presentation for Groundwater Monitoring (MWX-14)



Annex F6

Investigation Reports of
Environmental Quality
Limit Exceedance

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	30 September 2022 – 3 October 2022
Monitoring Location	Pump Station No. 4X (Cell 4X)
Parameter	Leachate level
Limit Levels	> 186 cm
Measured Level	<u>Average of Meter No. X-7 and No. X-8</u> 30 Sep 2022: 246 cm 1 Oct 2022: 254 cm 2 Oct 2022: 234 cm 3 Oct 2022: 212 cm
Possible reason	<p>As confirmed by the Contractor, the leachate collection system and leachate treatment plant were under normal operating conditions during the reporting period. From the on-site rainfall record of September and October 2022, heavy rainfall events (up to 98 mm per day) were recorded from 30 September to 3 October 2022. Amber rainstorm warning signal was also issued by the Hong Kong Observatory on 30 September 2022.</p> <p>Accumulation of surface water at Cell 4X basin was observed during the reporting period, which could contribute to the leachate level exceedances. Based on this observation, the leachate level exceedances at Pump Station No. 4X were deemed to Project-related activities.</p> <p>It is understood that the large volume of leachate (contaminated surface runoff) accumulated at Cell 4X has exceeded the leachate treatment capacity (daily maximum effluent discharge volume of 1,964 m³ recorded from 30 September to 3 October 2022, with daily effluent discharge limit of 2,000 m³ as stipulated in the WPCO license).</p>
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitor the operating conditions of the leachate collection system (e.g. set alarm when the leachate level reach about 80% of the Limit Level) and pump out the leachate for treatment to avoid any exceedance of the Limit Level.
Remarks	-

Prepared by: Abbey Lau
 Designation: Environmental Team
 Date: 23 November 2022

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	3 November 2022 (Pump Station No. 3X) 3 - 4 November 2022 (Pump Station No. 4X)
Monitoring Location	Pump Station No. 3X (Cell 3X) and No. 4X (Cell 4X)
Parameter	Leachate level
Limit Levels	Pump Station No. 3X: > 175 cm Pump Station No. 4X: > 186 cm
Measured Level	<u>Pump Station No. 3X (Average of Meter No. X-5 and No. X-6)</u> 3 Nov 2022: 182 cm <u>Pump Station No. 4X (Average of Meter No. X-7 and No. X-8)</u> 3 Nov 2022: 235 cm 4 Nov 2022: 195 cm
Possible reason	<p>From the on-site rainfall record of November 2022, heavy rainfall events (up to 39 mm per day) were recorded from 1 to 4 November 2022. Amber rainstorm warning signal was also issued by the Hong Kong Observatory on 3 November 2022. As confirmed by the Contractor, the leachate collection system and leachate treatment plant were under normal operating conditions during the reporting period. However, effluent discharge pipe relocation works were conducted from 31 October to 2 November 2022 (before the monitoring event) and effluent could not be discharged during the period, which could contribute to the leachate level exceedances. Based on the above, the leachate level exceedances at Pump Station No. 3X and 4X were deemed to Project-related activities.</p> <p>It is understood that the large volume of leachate (contaminated surface runoff) accumulated at Cell 3X and 4X has exceeded the leachate treatment capacity (daily maximum effluent discharge volume of 1,996 m³ recorded from 3 to 4 November 2022, with daily effluent discharge limit of 2,000 m³ as stipulated in the WPCO license).</p>
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitor the operating conditions of the leachate collection system (e.g. set alarm when the leachate level reach about 80% of the Limit Level) and pump out the leachate for treatment to avoid any exceedance of the Limit Level. The Contractor is also reminded to schedule LTP-related maintenance works during the dry season to ensure full operation of the LTP during rainy days.

Remarks	-
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Prepared by: Abbey Lau
Designation: Environmental Team
Date: 27 December 2022

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	6 December 2022
Time	14:10
Monitoring Location	Effluent discharged from Leachate Treatment Plant
Parameter	Chromium
Limit Levels	>300 µg/L
Measured Level	343 µg/L
Possible reason	<p>As confirmed by the Contractor, the Leachate Treatment Plant (LTP) was under normal operating conditions before and during the sampling event. The other leachate quality monitoring results at LTP on 6 December 2022 were well within the respective limit levels. It is possible that the slight exceedance of chromium limit level measured on 6 December 2022 could be due to treatment instability (e.g. short retention time or fluctuation of pH/temperature during the treatment process) which limit the chromium removal efficiency. Hence, the chromium exceedance at LTP on 6 December 2022 is considered to be Project related.</p> <p>In accordance with Table 4.5b of the updated EM&A Manual, repeat measurement was conducted on 4 January 2023 to confirm findings. Chromium concentration of 133 µg/L (below the Limit Level) was measured during the sampling event, which demonstrate no consecutive leachate quality impact at the LTP.</p>
Action Taken / Action to be Taken	<p>Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to implement relevant and appropriate mitigation measures according to the updated EM&A Manual to avoid any exceedance of the Action and Limit Levels.</p> <p>ET will continue to closely monitor the leachate quality monitoring results and collect additional data for investigation and further review, if necessary.</p>
Remarks	-

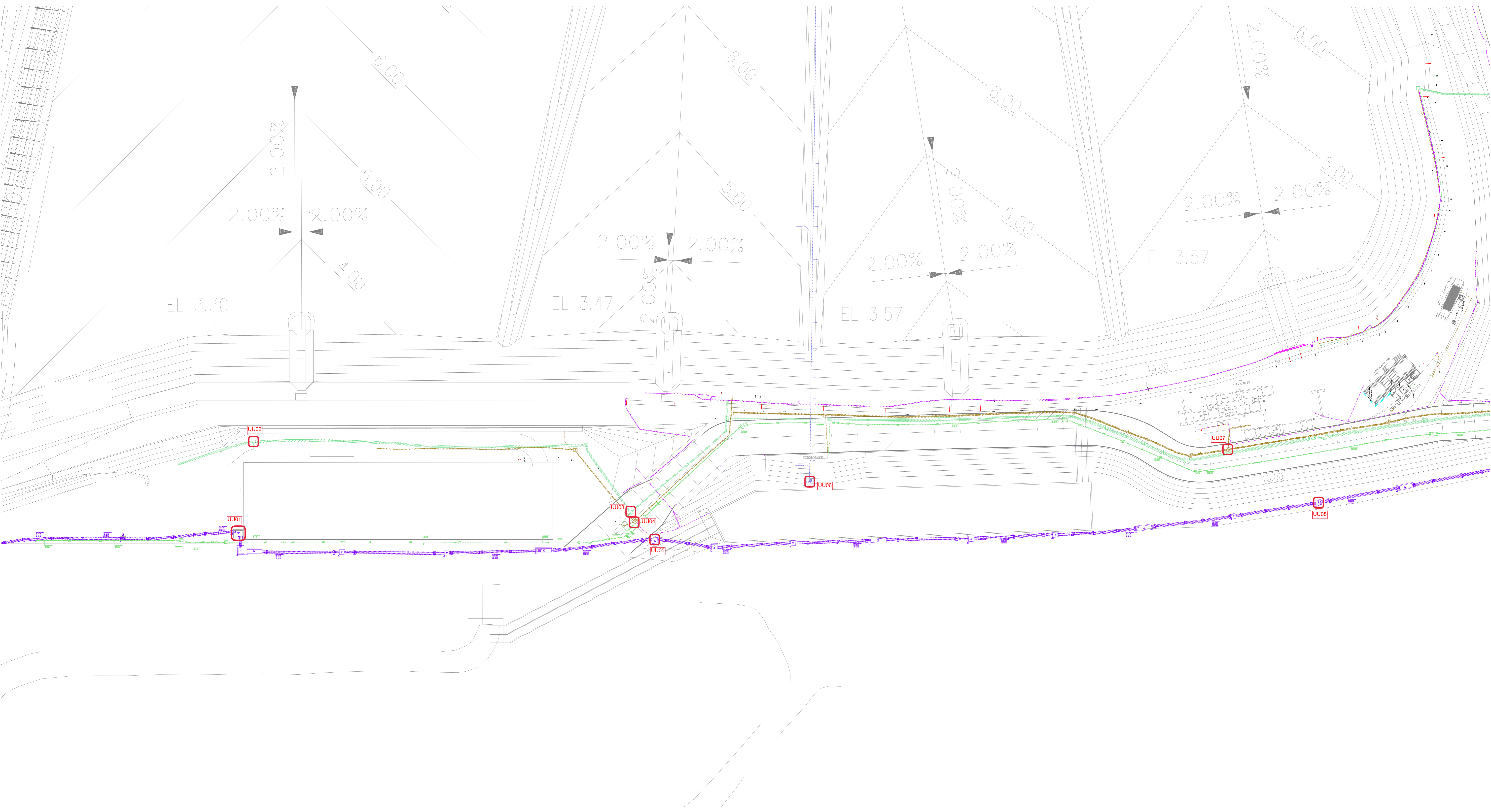
Prepared by: Abbey Lau
 Designation: Environmental Team
 Date: 20 February 2023

Annex G

Landfill Gas

Annex G1

Landfill Gas Monitoring
Locations for Service Voids,
Utilities and Manholes
along the Site Boundary and
Within the SENTX Site



Annex G2

Landfill Gas Monitoring Results

Table G2.1 Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells (October 2022)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	4.69	0.0	1.0	14.8
LFG2	3.77	0.0	2.1	15.1
LFG3	3.62	0.0	1.8	13.5
LFG4	3.77	0.0	0.0	18.8
LFG5	3.49	0.0	0.2	8.3
LFG6	3.81	0.0	0.9	13.2
LFG7	3.38	0.0	0.0	17.7
LFG8	3.46	0.0	0.0	19.6
LFG9	3.60	0.0	0.2	8.7
LFG10	3.80	0.0	0.0	19.4
LFG11	3.47	0.0	0.2	9.4
LFG12	3.60	0.0	0.0	19.7
LFG13	4.10	24.1	0.0	3.9
LFG14	5.10	0.0	0.1	19.5
LFG15	4.97	0.0	0.0	17.1
LFG16	4.55	0.0	0.0	18.6
LFG17	4.82	0.0	0.0	17.5
LFG18	3.90	0.0	0.0	18.9
LFG19	3.76	0.0	0.0	18.8
LFG20	3.95	0.0	0.0	19.1
LFG21	5.39	0.0	0.0	19.7
LFG22	6.72	0.0	0.0	19.3
LFG23	14.65	0.0	4.0	15.0
LFG24	25.97	0.0	0.0	18.1
GP1	Probe bent	0.0	7.1	10.2
GP2 (shallow)	Probe broken		Unmeasurable due to broken probe	
GP2 (deep)	Probe broken		Unmeasurable due to broken probe	
GP3 (shallow)	Probe bent	0.0	0.4	18.8
GP3 (deep)	Probe bent	0.0	0.1	19.3
GP4 (shallow)	Probe bent	0.0	0.2	19.1
GP4 (deep)	Probe bent	0.0	0.1	19.2
GP5 (shallow)	Probe bent	0.0	7.6	14.0
GP5 (deep)	12.92	0.0	0.0	19.2
GP6	10.03	0.0	6.0	12.0
GP7	2.40	0.0	0.3	18.3
GP12	Probe bent	0.1	0.1	19.3
GP15	3.67	0.2	0.0	19.8
P7	3.21	0.1	0.0	19.5
P8	2.89	0.2	0.0	19.8
P9	2.88	0.2	0.0	20.1

**Table G2.2 Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells
(November 2022)**

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.58	0.0	0.4	19.1
LFG2	2.47	0.0	1.2	19.1
LFG3	2.54	0.1	0.1	21.2
LFG4	2.5	0.0	0.1	21.2
LFG5	3.44	0.0	0.3	9.3
LFG6	2.49	0.0	0.1	21.1
LFG7	2.77	0.0	0.0	18.5
LFG8	2.7	0.0	0.1	21.3
LFG9	2.75	0.0	0.3	7.4
LFG10	2.41	0.0	0.0	21.4
LFG11	2.11	0.0	0.5	2.8
LFG12	2.56	0.0	0.0	21.4
LFG13	2.27	10.6	0.0	12.2
LFG14	2.06	0.0	0.2	12.8
LFG15	4.46	0.1	0.1	19.7
LFG16	2.62	0.1	0.1	20.9
LFG17	2.96	0.0	0.1	20.5
LFG18	2.95	0.0	0.1	20.4
LFG19	3.07	0.0	0.2	8.3
LFG20	2.99	0.0	0.8	19.6
LFG21	3.1	0.0	3.0	14.5
LFG22	2.77	0.0	2.3	12.3
LFG23	12.52	0.0	1.9	19.6
LFG24	6.36	0.0	0.5	20.1
GP1	Probe bent	0.0	6.4	13.4
GP2 (shallow)	Probe bent	0.0	0.5	19.6
GP2 (deep)	Probe bent	0.0	5.3	13.6
GP3 (shallow)	Probe bent	0.0	0.3	20.5
GP3 (deep)	Probe bent	0.0	0.2	20.6
GP4 (shallow)	Probe bent	0.0	0.2	20.6
GP4 (deep)	Probe bent	0.0	0.1	20.6
GP5 (shallow)	Probe bent	0.0	7.1	16.2
GP5 (deep)	38.81	0.0	0.0	20.7
GP6	36.18	0.0	2.8	17.5
GP7	36.24	0.0	0.0	20.8
GP12	2.01	0.0	0.1	21.1
GP15	2.55	0.0	0.1	21.0
P7	2.51	0.0	0.1	20.8
P8	2.64	0.0	0.1	21.0
P9	2.5	0.0	0.3	20.8

**Table G2.3 Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells
(December 2022)**

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.58	0.0	0.0	20.6
LFG2	2.47	0.0	0.0	20.6
LFG3	2.54	0.0	0.0	20.7
LFG4	2.5	0.0	0.0	20.6
LFG5	3.44	0.0	0.2	13.6
LFG6	2.49	0.0	0.0	20.6
LFG7	2.77	0.0	0.0	20.6
LFG8	2.7	0.0	0.0	20.6
LFG9	2.75	0.0	0.0	20.5
LFG10	2.41	0.0	0.0	20.4
LFG11	2.11	0.0	0.1	10.6
LFG12	2.56	0.0	0.0	20.4
LFG13	2.27	1.6	0.1	16.6
LFG14	2.06	0.0	0.0	20.1
LFG15	4.46	0.0	0.1	19.7
LFG16	2.62	0.0	0.1	20.3
LFG17	2.96	0.0	0.1	20.3
LFG18	2.95	0.0	0.1	20.4
LFG19	3.07	0.0	0.1	20.2
LFG20	2.99	0.0	0.1	20.4
LFG21	3.1	0.0	0.1	20.4
LFG22	2.77	0.0	0.1	20.6
LFG23	12.52	0.0	4.7	15.1
LFG24	6.36	0.0	0.2	20.3
GP1	Probe bent	0.2	6.0	14.6
GP2 (shallow)	Probe bent	0.1	1.2	17.8
GP2 (deep)	Probe bent	0.1	8.0	9.6
GP3 (shallow)	Probe bent	0.1	0.6	19.7
GP3 (deep)	Probe bent	0.0	0.3	20.3
GP4 (shallow)	Probe bent	0.0	1.1	19.5
GP4 (deep)	Probe bent	0.1	0.1	20.5
GP5 (shallow)	Probe bent	0.0	5.5	16.8
GP5 (deep)	38.81	0.0	0.1	20.6
GP6	36.18	0.0	6.5	13.1
GP7	36.24	0.0	0.1	20.7
GP12	2.01	0.0	0.0	20.6
GP15	2.55	0.0	0.1	20.7
P7	2.51	0.0	0.0	20.6
P8	2.64	0.0	0.0	20.6
P9	2.5	0.0	0.1	20.6

Table G2.4 Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes (October 2022)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	19.6
UU02	0.0	0.0	19.6
UU03	0.0	0.0	19.6
UU04	0.0	0.0	19.5
UU05	0.0	0.0	19.4
UU06	0.0	0.0	19.4
UU07	0.1	0.0	19.9
UU08	0.0	0.0	19.8
UU09	0.0	0.0	19.6
UU10	0.0	0.0	19.4
UU11	0.0	0.0	18.3
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	19.8
UU14	0.0	0.0	19.8
UU15	0.0	0.0	19.8
UU16	0.0	0.0	19.9
UU17	Voided due to latest site programme and on-going operation work		
UU18	0.0	0.0	20.1
UU19	0.1	0.0	19.4
UU20	0.0	0.0	18.6
UU21	0.0	0.0	18.8
UU22	0.0	0.0	19.3
UU23	0.0	0.0	19.7
UU24	0.0	0.0	19.1
UU25	0.0	0.0	19.2
UU26	0.0	0.0	19.4
UU27	0.0	0.0	18.7
UU28	0.0	0.0	19.1

Table G2.5 Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes (November 2022)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	20.9
UU02	0.0	0.0	20.9
UU03	0.1	0.0	20.8
UU04	0.1	0.0	20.8
UU05	Unmeasurable due to overflow of water		
UU06	0.2	0.0	20.6
UU07	0.1	0.0	20.9
UU08	0.2	0.0	20.6
UU09	Inaccessible due to on-going construction work		
UU10	0.0	0.0	20.3
UU11	0.0	0.0	20.6
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	20.3	79.7
UU14	0.0	20.4	79.5
UU15	0.0	20.4	79.6
UU16	0.0	20.3	79.7
UU17	Voided due to latest site programme and on-going operation work		
UU18	0.0	20.3	79.6
UU19	0.0	20.9	79.0
UU20	0.0	20.6	79.4
UU21	0.0	20.6	79.4
UU22	0.0	20.5	79.5
UU23	0.0	20.5	79.5
UU24	0.0	20.1	79.8
UU25	0.0	20.1	79.8
UU26	Inaccessible due to on-going construction work		
UU27	0.0	20.6	79.4
UU28	0.0	20.5	79.4

Table G2.6 Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes (December 2022)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	20.2
UU02	0.0	0.0	20.2
UU03	0.0	0.0	20.1
UU04	0.0	0.0	20.2
UU05	0.0	0.0	20.4
UU06	0.0	0.0	20.3
UU07	0.0	0.0	20.0
UU08	0.0	0.0	20.2
UU09	0.0	0.0	19.9
UU10	0.0	0.0	19.9
UU11	0.0	0.0	20.0
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	20.0
UU14	0.0	0.0	19.9
UU15	0.0	0.0	19.9
UU16	0.0	0.1	20.2
UU17	Voided due to latest site programme and on-going operation work		
UU18	Inaccessible due to on-going construction work		
UU19	0.0	0.0	20.0
UU20	0.0	0.1	20.2
UU21	0.0	0.1	20.1
UU22	0.0	0.1	20.1
UU23	0.0	0.1	20.1
UU24	0.1	0.1	20.4
UU25	0.1	0.1	20.5
UU26	0.1	0.1	20.3
UU27	0.2	0.1	20.6
UU28	0.1	0.1	20.5

Table G2.7 Landfill Gas Bulk Gas Sampling Monitoring Results

Parameters	LFG1	LFG8
Methane (% (v/v))	<0.0200	<0.020
Carbon Dioxide (% (v/v))	0.419	0.138
Oxygen (% (v/v))	15.6	17.2
Nitrogen (% (v/v))	80.6	79.2
Carbon Monoxide (% (v/v))	<0.020	<0.020
Hydrogen (% (v/v))	<0.020	<0.020
Ethane (ppmv)	<1.0	<1.0
Propane (ppmv)	<1.0	<1.0
Butane (ppmv)	<1.0	<1.0

Table G2.8 Flammable Gas Surface Emission Monitoring Results

Time	GPS Coordinates Latitude (N) Longitude (E)	Weather Condition	Temperature (°C)	Wind Direction (Deg)	Wind Speed (m/s)	Monitoring Results (ppm)	
14:54	22°16'26"	114°16'35"	Sunny	26.4	146	0.9	25
16:01	22°16'26"	114°16'34"	Sunny	25.8	185	1.7	11

Annex G3

Event and Action Plan for Landfill Gas Monitoring

Annex G3 *Event and Action Plan for Landfill Gas Monitoring*

Event	Action		
	ET	IEC	Contractor
Limit Level being exceeded for field monitoring at the perimeter monitoring wells	<ul style="list-style-type: none"> Investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Check monitoring data, all plant, equipment and the Contractor’s working methods Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Increase the monitoring frequency to daily if exceedance is due to the Project for monitoring wells in the areas where there is development within 250m of the SENTX Site Boundary and to weekly for other monitoring wells, until no exceedance of limit level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Repeat field measurement to confirm findings Check the performance of landfill gas management system Rectify unacceptable practice Discuss with the ET and IEC and submit proposals for remedial measures to IEC Implement the agreed proposals Amend proposal if appropriate
Limit Level being exceeded for the bulk gas sampling at the perimeter monitoring wells	<ul style="list-style-type: none"> Check and compare the results of field monitoring and laboratory analyse of bulk samples If the results of field monitoring also show exceedance, the action(s) for limit level being exceeded for field monitoring would have been triggered If the results of field monitoring does not show exceedance, the sampling procedures should be checked and if deems necessary, to repeat the monitoring and recalibrate the portable monitoring instruments Notify the above findings to Contractor and IEC 	<ul style="list-style-type: none"> Verify the findings by ET 	<ul style="list-style-type: none"> Nil

Event	Action		
	ET	IEC	Contractor
Limit Level being exceeded at the permanent gas monitoring system	<ul style="list-style-type: none"> Investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Check the methane gas level at the perimeter monitoring wells, manholes or utilities duct Check monitoring data, all plant, equipment and the Contractor's working methods Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Evacuate all staff in the concerned building Open the doors and window of all rooms on the ground floor Do not allow staff to go back to the room if methane level is higher than 1% gas Check the performance of the landfill gas management system Rectify unacceptable practice Consider changes of working methods Discuss with the ET and IEC and submit proposals for remedial measures to IEC Implement the agreed proposals Amend proposal if appropriate
Limit Level being exceeded during surface emission monitoring	<ul style="list-style-type: none"> Repeat the measurement to confirm findings Investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Check monitoring data, all plant, equipment and the Contractor's working methods Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Increase the monitoring frequency to monthly if exceedance is due to the Project until no exceedance of limit level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures Audit the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Check landfill gas management system Rectify unacceptable practice Consider changes of working methods Discuss with the ET and IEC and submit proposals for remedial measures to IEC Implement the agreed proposals Amend proposal if appropriate

Event	Action		
	ET	IEC	Contractor
Limit Level being exceeded at the service voids, utilities pits, manholes and location of vegetation stress	<ul style="list-style-type: none"> Repeat the measurement to confirm findings Investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Check monitoring data, all plant, equipment and the Contractor's working methods Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project Discuss with Contractor and IEC for remedial measures required Ensure remedial measures are properly implemented Increase the monitoring frequency to weekly if exceedance is due to the Project until no exceedance of limit level 	<ul style="list-style-type: none"> Verify the Notification of Exceedance Discuss with ET and Contractor on proposed remedial measures Review proposals on remedial measures Audit the implementation of the remedial measures the effectiveness of the implemented remedial measures 	<ul style="list-style-type: none"> Check landfill gas management system Rectify unacceptable practice Discuss with the ET and IEC and submit proposals for remedial measures to IEC Implement the agreed proposals Amend proposal if appropriate

Annex G4

Investigation Reports of
Environmental Quality
Limit Exceedance

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	3 October 2022
Time	14:51
Monitoring Location	LFG13
Parameter	Methane
Limit Levels	22.5 %
Measured Level	24.1 %
Possible reason	<p>During the landfill gas monitoring event, methane was not detected at the landfill gas monitoring wells adjacent to LFG13 (LFG12 and LFG14: 0%). In addition, no exceedance of Limit Levels for landfill gas monitoring at service voids, utilities pits and manholes (conducted on 5 October 2022) was recorded in the reporting period. Hence, there is a low possibility that the elevation of methane level at LFG13 is due to landfill gas migration from SENTX operation or at least it is not conclusive to base on these results to demonstrate that the exceedance was due to landfill gas migration.</p> <p>Repeat measurement was conducted from 4 to 7 October 2022 to confirm findings. Methane (ranged from 10.7% to 19.3%) was detected at LFG13 on these additional daily sampling events, but the measured levels were below the limit level.</p> <p>According to the findings of the desktop review commissioned by GVL and EPD (the Employer) in May 2021 to investigate the potential sources of the elevated methane levels at the perimeter landfill gas monitoring wells at SENTX, pockets of organic matters are identified in the fill materials of the SENTX site upon review of the historical site investigation borehole logs at the Project Site area. It is possible that the elevated level of methane detected at LFG13 on 3 October 2022 could be due to localised organic matters within or around the monitoring wells and background fluctuation with relevance to the installation of liner system at Cell 4X which avoid the escape of methane gas into the atmosphere.</p> <p>Due to the presence of influencing factor from non-project source, there is no adequate evidence showing that the methane exceedance measured at LFG13 on 3 October 2022 was deemed to Project-related activities.</p>
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to implement relevant and appropriate mitigation measures according to the updated EM&A Manual to avoid any exceedance of the Action and Limit Levels.

	ET will continue to closely monitor the landfill gas monitoring results and collect additional data for investigation and further review, if necessary.
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 23 November 2022

Annex H

Cumulative Statistics on
Exceedances,
Environmental Complaints,
Notification of Summons
and Status of Prosecutions

Table H1 *Cumulative Statistics on Exceedances*

		Total No. recorded in this reporting period	Total No. recorded since project commencement
Air Quality (Dust)	Action	0	0
	Limit	0	3
Air Quality (Odour)	Action	0	0
	Limit	0	0
Air Quality (Emissions of Thermal Oxidiser)	Limit	0	0
Air Quality (Emissions of Landfill Gas Flare)	Limit	3	4
Air Quality (Emissions of Landfill Gas Generator)	Limit	0	0
Noise	Action	0	0
	Limit	0	0
Water Quality (Surface Water)	Limit	0	60
Water Quality (Leachate)	Limit	1	1
Water Quality (Leachate Level)	Limit	6	16
Water Quality (Groundwater)	Limit	0	9
Landfill Gas (Perimeter Landfill Gas Monitoring Wells)	Limit	1	2
Landfill Gas (Service Void, Utilities and Manholes)	Limit	0	0
Landfill Gas (Permanent Gas Monitoring System)	Limit	0	0

Table H2 *Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions*

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Prosecutions
This Reporting Period (Oct-Dec 2022)	0	0	0
Total no. received since project commencement	1	0	0