



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.18

November 2023

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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. 18 for South East New Territories (SENT) Landfill Extension
Date of Report:	7 November 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: 7 November 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: 10 November 2023

South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.18

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.18 for <i>South East New Territories (SENT) Landfill Extension</i>		Date: 7 November 2023			
		Approved by:  Terence Fong Partner			
0	Quarterly EM&A Report No.18	AL	TF	TF	7 Nov 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 April 2023 to 30 June 2023 for the Project in accordance with the updated EM&A Manual.

Exceedance of Action and Limit Levels for Air Quality

Three exceedances of Action and Limit Levels for Total Suspended Particulates (TSP) and one exceedance of Limit Level for landfill gas flare stack emission (Benzene) were recorded for air quality monitoring in the reporting period.

The TSP exceedance at AM1 on 13 April 2023 was considered non Project-related upon further investigation, while the TSP exceedance at AM2 on 1 May 2023 and 6 June 2023 were considered Project-related upon further investigation. The landfill gas flare stack emission (Benzene) exceedance on 12 May 2023 was 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

Three exceedances of the Limit Level for groundwater (Chemical Oxygen Demand (COD)) and six exceedances of the Limit Level for leachate levels were recorded for water quality impact monitoring in the reporting period.

The groundwater (COD) exceedances at MWX-6 on 13 April 2023 and at MWX-5 and MWX-8 on 4 May 2023 were considered non Project-related upon further investigation. The leachate levels exceedances at Pump Station No. 4X from 17 June to 22 June 2023 were considered Project-related upon further investigation.

Exceedance of Action and Limit Levels for Landfill Gas

One exceedance of Limit Levels for landfill gas (methane) and one exceedance of Limit Levels for landfill gas (carbon dioxide) were recorded for landfill gas monitoring in the reporting period.

The landfill gas (methane) exceedance at LFG13 on 13 April 2023 and landfill gas (carbon dioxide) exceedance at LFG24 on 5 June 2023 were 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.

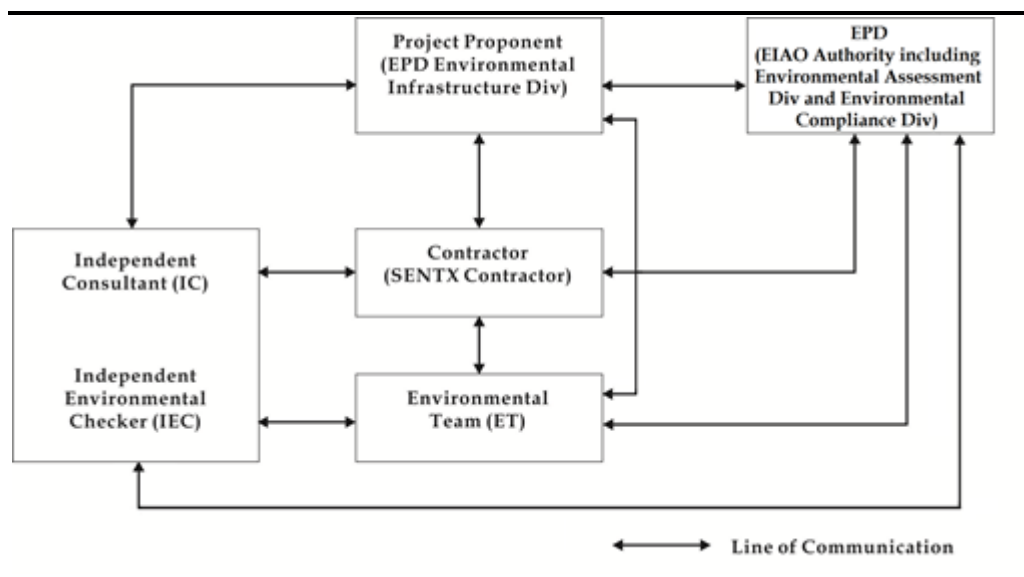
1.3 *SCOPE OF THE EM&A REPORT*

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 April 2023 to 30 June 2023 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:

April 2023

- Rectification of latent defects at Landfill Gas (LFG) Plant and Leachate Treatment Plant (LTP);
- Construction of rockwall bench 2;
- Deployment of liner system at rockwall buttress bench 2;
- Maintenance and improvement of temporary surface water drainage; and

- Rectification of outstanding minor items for weighmaster house and guard house.

May 2023

- Rectification of latent defects at Landfill Gas (LFG) Plant and Leachate Treatment Plant (LTP);
- Construction of SENT soil bench tie in;
- Deployment of liner system at rockwall buttress bench 2;
- Maintenance and improvement of temporary surface water drainage;
- Civil and E&M works for Diesel Fuel Tank, such as canopy, pumps and equipment installation; and
- Rectification of outstanding minor items for weighmaster house and guard house.

June 2023

- Rectification of latent defects at Landfill Gas (LFG) Plant and Leachate Treatment Plant (LTP);
- Construction of SENT soil bench tie in;
- Maintenance and improvement of temporary surface water drainage;
- Civil and E&M works for Diesel Fuel Tank, such as canopy, pumps and equipment installation; and
- Rectification of outstanding minor items for weighmaster house and guard house.

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 19 April 2023, 18 May 2023 and 15 June 2023; and
- Environmental toolbox trainings on the following topics were provided by the Contractor to the workers:
 - Trip Ticket System on 14 April 2023;

- Noise Control Ordinance on 25 April 2023;
- Air Pollution (Dark Smoke) on 16 May 2023;
- Waste Reduction in Construction Industry on 23 May 2023;
- Mosquito Prevention in Construction Site on 14 June 2023; and
- Non-road Mobile Machinery (NRMM) on 28 June 2023.

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-RE0245-23	Validity from 15 March 2023 to 14 September 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.

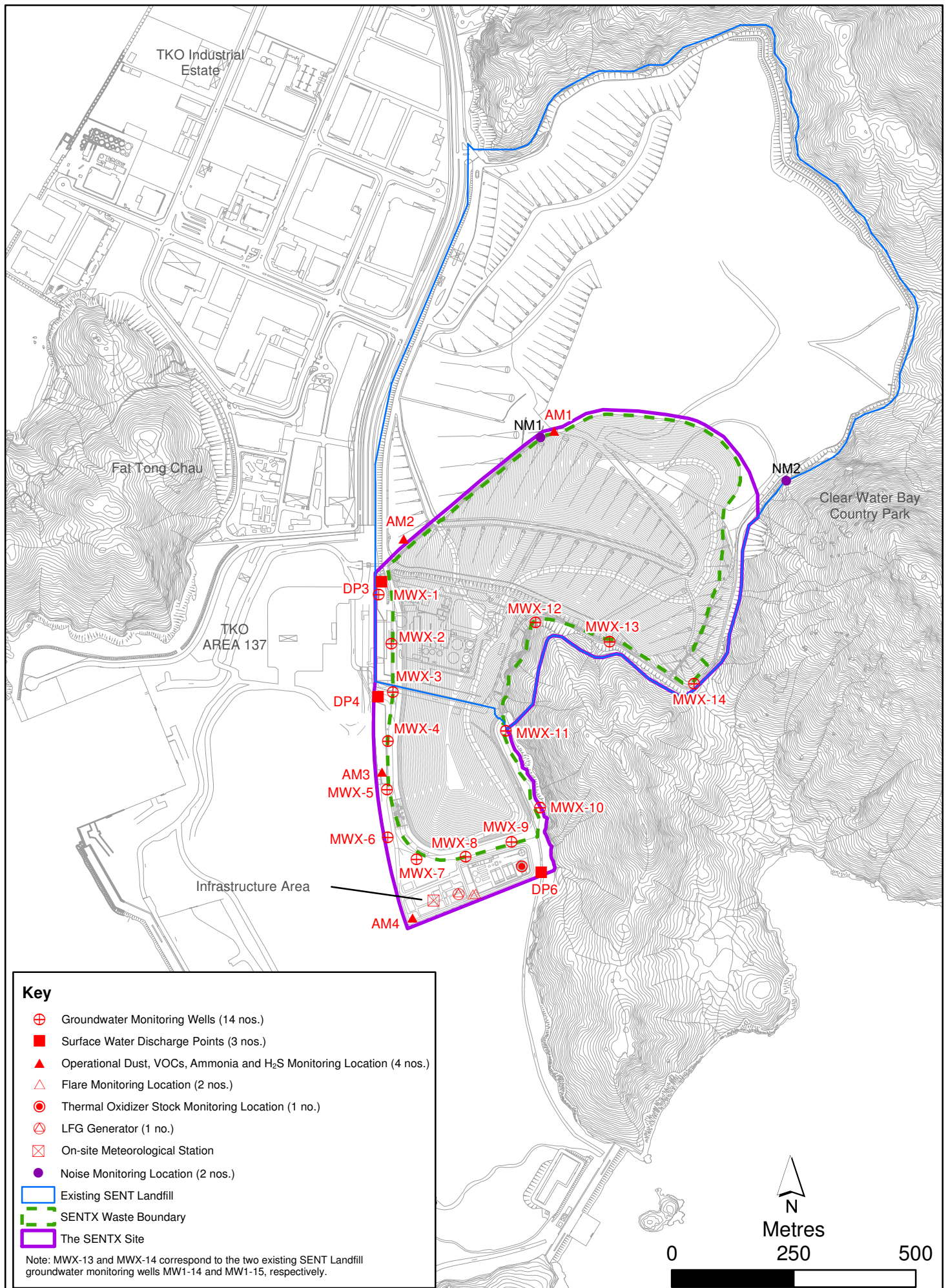


Figure 2.1

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	1, 7, 13, 19, 25 April 2023	Tisch TE-5170 (S/N: 3976)
AM2	SENTX Site Boundary (West, near DP3)			1, 7, 13, 19, 25, 31 May 2023	Tisch TE-5170 (S/N: 3573)
AM3	SENTX Site Boundary (West, near RC15)			6, 12, 18, 20	Tisch TE-5170 (S/N: 3572)
AM4	SENTX Site Boundary (West, near EPD building)			(Re-measurement at AM2), 24, 30 June 2023	Tisch TE-5170 (S/N: 3957)

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		
April 2023	AM1	146	44 - 365	260	260
	AM2	129	65 - 252	260	260
	AM3	97	29 - 213	260	260
	AM4	98	67 - 168	260	260
May 2023	AM1	150	113 - 221	260	260
	AM2	157	57 - 356	260	260
	AM3	112	59 - 173	260	260
	AM4	97	65 - 119	260	260
June 2023	AM1	77	38 - 155	260	260
	AM2	154	88 - 340	260	260
	AM3	61	31 - 86	260	260
	AM4	57	36 - 72	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.

Action and Limit Levels exceedances were recorded for TSP monitoring 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 TSP exceedances at AM1 on 13 April 2023 was considered non Project-related, while the TSP exceedance at AM2 on 1 May 2023 and 6 June 2023 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.

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.

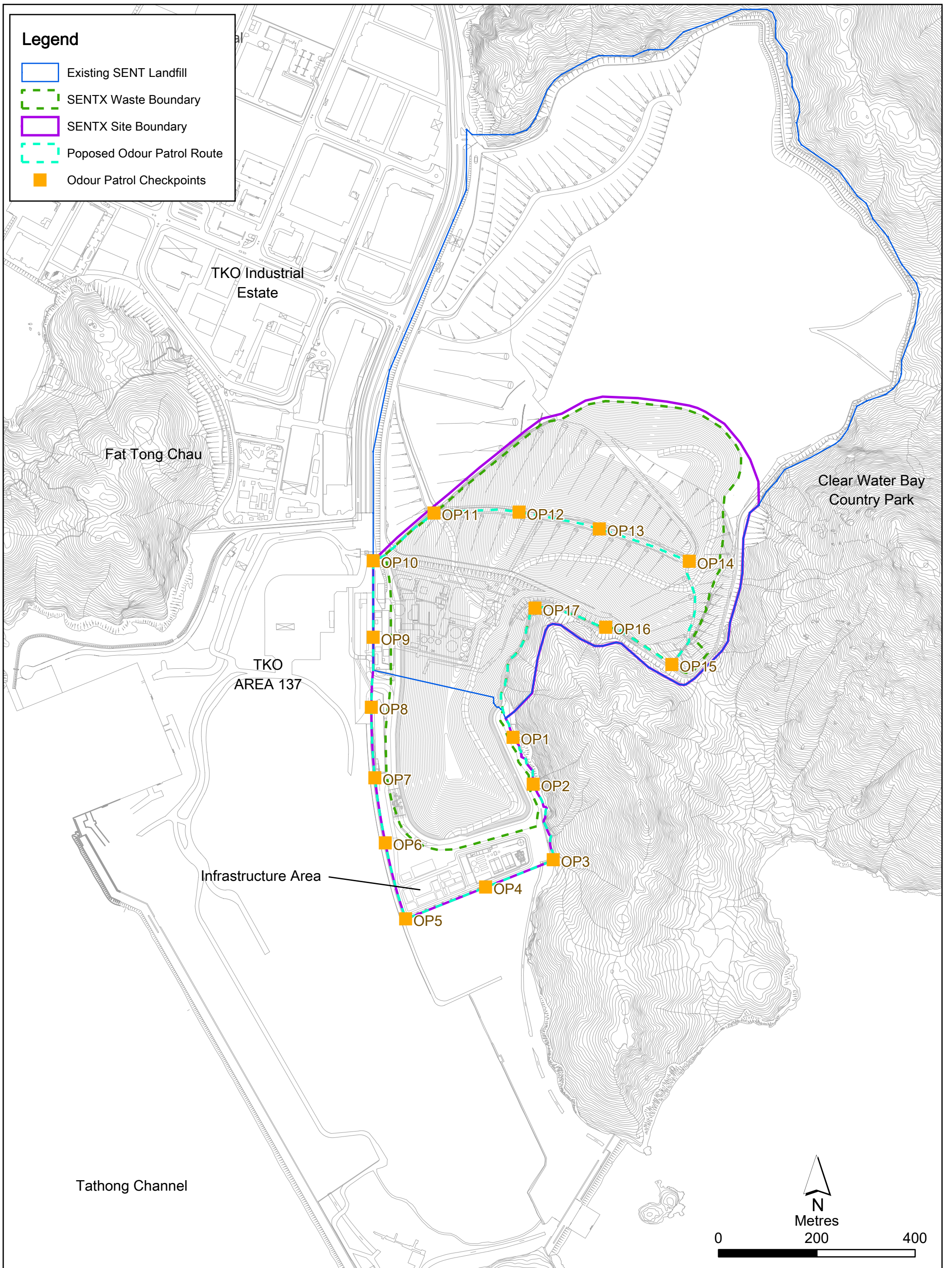


Figure 2.2

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	18 April 2023, 22 May 2023
		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> 15 June 2023
		<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 - 1		
OP6	0		
OP7	0		
OP8	0		
OP9	0		
OP10	0		
OP11	0 - 1		
OP12	0 - 1		
OP13	0 - 1		
OP14	0 - 1		
OP15	1		
OP16	0 - 1		
OP17	0		

The potential odour source in the reporting period included the tipping area at SENTX and the nearby vegetation. 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	19 April 2023, 11 May 2023, 15 June 2023
	<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 		
Stack of Landfill Gas Flare	Laboratory analysis for	Quarterly for the 1 st year of operation ^(b)	11 May 2023
	<ul style="list-style-type: none"> • Non-methane organic compounds 		
	Laboratory analysis for	Quarterly	11 May 2023
Stack of Landfill Gas Generator	<ul style="list-style-type: none"> • Ammonia 		
	<ul style="list-style-type: none"> • Gas combustion temperature • Exhaust temperature • Exhaust gas velocity ^(a) 	Continuously	1 April - 30 June 2023
	Laboratory analysis for	Quarterly for the 1 st year of operation ^(b)	12 May 2023
	<ul style="list-style-type: none"> • Non-methane organic compounds • Gas combustion temperature • Exhaust temperature • Exhaust gas velocity ^(a) 	Continuously	1 April - 30 June 2023
Stack of Landfill Gas Flare	Laboratory analysis for	Monthly for the first 12 months of operation and thereafter at quarterly intervals	20 April 2023, 12 May 2023, 16 June 2023
	<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 		
Stack of Landfill Gas Generator	Laboratory analysis for	Quarterly for the 1 st year of operation ^(b)	12 May 2023
	<ul style="list-style-type: none"> • Non-methane organic compounds 		
	Laboratory analysis for	Quarterly	12 May 2023
Stack of Landfill Gas Generator	<ul style="list-style-type: none"> • Ammonia 		
	<ul style="list-style-type: none"> • Gas combustion temperature • Exhaust temperature • Exhaust gas velocity ^(a) 	Continuously	1 April - 30 June 2023
	Laboratory analysis for	Quarterly for the 1 st year of operation ^(b)	12 May 2023
	<ul style="list-style-type: none"> • Non-methane organic compounds • Gas combustion temperature • Exhaust temperature • Exhaust gas velocity ^(a) 	Continuously	1 April - 30 June 2023

Monitoring Location	Parameter	Frequency	Monitoring Date
	Laboratory analysis for <ul style="list-style-type: none"> Non-methane organic compounds 	Quarterly for the 1 st year of operation ^(b)	12 May 2023
	<ul style="list-style-type: none"> Exhaust temperature Exhaust gas velocity ^(a) 	Continuously	1 April - 30 June 2023

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.

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*.

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
April 2023		
NO ₂	0.98 gs ⁻¹	1.58 gs ⁻¹
CO	<0.01 gs ⁻¹	0.53 gs ⁻¹
SO ₂	<0.01 gs ⁻¹	0.07 gs ⁻¹
Benzene	<2.0 x 10 ⁻⁴ gs ⁻¹	3.01 x 10 ⁻² gs ⁻¹
Vinyl chloride	<1.2 x 10 ⁻⁴ gs ⁻¹	2.23 x 10 ⁻³ gs ⁻¹
Gas combustion temperature	925°C (919°C - 937°C)	850°C (minimum)
Exhaust gas exit temperature	1,236K (1,198K - 1,281K)	443K (minimum) ^(a)
Exhaust gas velocity	10.4 ms ⁻¹ ^(b)	7.5 ms ⁻¹ (minimum) ^(a)
May 2023		
NO ₂	0.35 gs ⁻¹	1.58 gs ⁻¹
CO	<0.01 gs ⁻¹	0.53 gs ⁻¹
SO ₂	<0.01 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
Non-Methane Organic Carbons	<3.0 x 10 ⁻³ gs ⁻¹	-
Ammonia	0.0227 gs ⁻¹	-(c)
Gas combustion temperature	874°C (855°C - 922°C)	850°C (minimum)
Exhaust gas exit temperature	1,265K (1,246K - 1,282K)	443K (minimum) ^(a)
Exhaust gas velocity	9.3 ms ⁻¹ ^(b)	7.5 ms ⁻¹ (minimum) ^(a)
June 2023		
NO ₂	0.95 gs ⁻¹	1.58 gs ⁻¹
CO	<0.01 gs ⁻¹	0.53 gs ⁻¹
SO ₂	<0.01 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	904°C (853°C - 940°C)	850°C (minimum)
Exhaust gas exit temperature	1,221K (1,189K - 1,283K)	443K (minimum) ^(a)
Exhaust gas velocity	8.2 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
April 2023		
NO ₂	0.02 gs ⁻¹	0.97 gs ⁻¹
CO	2.16 gs ⁻¹	2.43 gs ⁻¹
SO ₂	0.02 gs ⁻¹	0.22 gs ⁻¹
Benzene	<1.6 x 10 ⁻⁴ gs ⁻¹	4.14 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.3 x 10 ⁻⁴ gs ⁻¹	2.60 x 10 ⁻⁴ gs ⁻¹
Gas combustion temperature	Flare 1: 885°C (830°C - 942°C) Flare 2: 857°C (830°C - 890°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,070K (1,020K - 1,153K) Flare 2: 1,08K (983K - 1,123K)	923 K (minimum) ^(a)
Exhaust gas velocity	11.6 ms ⁻¹ ^(b)	9.0 m s ⁻¹ (minimum) ^(a)
May 2023		
NO ₂	0.03 gs ⁻¹	0.97 gs ⁻¹
CO	0.33 gs ⁻¹	2.43 gs ⁻¹
SO ₂	<0.01 gs ⁻¹	0.22 gs ⁻¹
Benzene	<4.47 x 10 ⁻⁴ gs ⁻¹	4.14 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.07 x 10 ⁻⁴ gs ⁻¹	2.60 x 10 ⁻⁴ gs ⁻¹
Non-Methane Organic Carbons	0.003 gs ⁻¹	-
Gas combustion temperature	Flare 1: 879°C (820°C - 990°C) Flare 2: 878°C (830°C - 920°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,059K (1,003K - 1,163K) Flare 2: 1,078K (1,003K - 1,123K)	923 K (minimum) ^(a)
Exhaust gas velocity	8.7 ms ⁻¹ ^(b)	9.0 m s ⁻¹ (minimum) ^(a)
June 2023		
NO ₂	0.02 gs ⁻¹	0.97 gs ⁻¹
CO	0.64 gs ⁻¹	2.43 gs ⁻¹
SO ₂	<0.06 gs ⁻¹	0.22 gs ⁻¹
Benzene	3.30 x 10 ⁻⁴ gs ⁻¹	4.14 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.01 x 10 ⁻⁴ gs ⁻¹	2.60 x 10 ⁻⁴ gs ⁻¹
Gas combustion temperature	Flare 1: 869°C (820°C - 920°C) Flare 2: 871°C (830°C - 920°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,051K (1,003K - 1,133K) Flare 2: 1,094K (1,063K - 1,163K)	923 K (minimum) ^(a)
Exhaust gas velocity	8.9 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
April 2023		
NO ₂	0.018 gs ⁻¹	1.91 gs ⁻¹
CO	0.694 gs ⁻¹	2.48 gs ⁻¹
SO ₂	0.001 gs ⁻¹	0.528 gs ⁻¹
Benzene	3.0 x 10 ⁻⁵ gs ⁻¹	2.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<0.8 x 10 ⁻⁵ gs ⁻¹	1.88 x 10 ⁻⁵ gs ⁻¹
Exhaust gas exit temperature	ENGA: 862K (858K - 865K) ENGB : 866K (847K - 874K)	723K (minimum) ^(a)
Exhaust gas velocity	9.1 ms ⁻¹ ^(b)	30.0 ms ⁻¹ (minimum) ^(a)
May 2023		
NO ₂	0.030 gs ⁻¹	1.91 gs ⁻¹
CO	0.853 gs ⁻¹	2.48 gs ⁻¹
SO ₂	<0.001 gs ⁻¹	0.528 gs ⁻¹
Benzene	5.9 x 10 ⁻⁵ gs ⁻¹	2.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.2 x 10 ⁻⁵ gs ⁻¹	1.88 x 10 ⁻⁵ gs ⁻¹
Non-Methane Organic Carbons	1.9 x 10 ⁻³ gs ⁻¹	-
Exhaust gas exit temperature	ENGA: 873K (862K - 879K) ENGB : 865K (860K - 870K)	723K (minimum) ^(a)
Exhaust gas velocity	12.9 ms ⁻¹ ^(b)	30.0 ms ⁻¹ (minimum) ^(a)
June 2023		
NO ₂	0.034 gs ⁻¹	1.91 gs ⁻¹
CO	1.012 gs ⁻¹	2.48 gs ⁻¹
SO ₂	0.002 gs ⁻¹	0.528 gs ⁻¹
Benzene	6.6 x 10 ⁻⁵ gs ⁻¹	2.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.3 x 10 ⁻⁵ gs ⁻¹	1.88 x 10 ⁻⁵ gs ⁻¹
Exhaust gas exit temperature	ENGA: 865K (845K - 880K) ENGB : 849K (841K - 877K)	723K (minimum) ^(a)
Exhaust gas velocity	13.6 ms ⁻¹ ^(b)	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.

Limit Level exceedance was recorded for landfill gas flare stack emission monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex D2* were undertaken. Investigation of the Limit Levels exceedance was conducted and the investigation report is presented in *Annex D7*.

Based on the investigation conducted for the monitoring events with potential Limit Levels exceedances with the Contractor and the IEC, the landfill gas flare stack emission (Benzene) exceedance on 12 May 2023 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.

2.1.4 *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
Octane	7,942
Propyl propionate	276
1.2-Dibromoethane (EDB)	39

Parameters	Limit Level ($\mu\text{g m}^{-3}$)
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-get 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	11 May 2023
AM2	SENTX Site Boundary (West, near DP3)	• Ammonia		
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	64	55	82	66
H ₂ S	42	<15	<15	<15	<15
Methane	NA ^(a)	0.00021 % (v/v)	0.00016 % (v/v)	0.00021 % (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	0.4	0.4	0.5	0.4
Benzene	33	0.6	1	0.6	0.7
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	0.8	0.7	1.2
Carbon Tetrachloride	64	0.7	0.8	0.8	0.8
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)	1.9	2.2	2.1	2.3
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	0.5	<0.4
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	5.7	7	15
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	0.5	0.6	1.9	<0.5
Heptane	2,746	<0.8	<0.8	<0.8	<0.8
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	<2.6	31.1	37.7	41.5
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	1.4	1.5	3.8	7.9
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)	<0.8	0.8	1.1	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	1.5	1.4	1.9	7
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	0.8	1	3	0.9

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	3, 11, 20, 26 April 2023 2, 8, 15, 22, 29 May 2023 7, 13, 19, 26 June 2023	Sound Level Meter: Rion NL-52 (S/N: 00131627) Rion NL-52 (S/N: 00643049) Acoustic Calibrator: CAL200 (S/N: 15678)

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
April 2023	NM1	50.5	47.8 - 51.9	75
May 2023	NM1	55.4	52.0 - 61.3	75
June 2023	NM1	57.8	54.9 - 61.0	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.

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
DP3	
Ammoniacal-nitrogen	> 0.5 mg/L
COD	> 80 mg/L
SS	> 30 mg/L
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 <i>Table 10a of the Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters</i> 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	
DP3	Surface water discharge point DP3	Monthly	11 April 2023, 5 May 2023, 9 June 2023	<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: 15G100349)
DP4	Surface water discharge point DP4				<ul style="list-style-type: none"> Horiba U-52G (S/N: RSV50V1T) 	
DP6	Surface water discharge point DP6					

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 DP3 and DP6 in April 2023, all monitoring stations in May 2023, and DP3 and DP6 in June 2023 due to insufficient flow. Details of impact water quality monitoring event are provided in *Annex F1*.

No Limit Levels exceedance was recorded for operation surface water quality monitoring in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex F2*.

2.3.2 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 April – 30 June 2023	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 	4 April 2023, 4 May 2023, 1 June 2023	HORIBA U-52G (S/N: RSV50V1T) Lutron PH-208 (S/N: TF30605)

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)
April 2023		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	72 (64 – 77)	> 178
Meter No. X-2	83 (73 – 88)	
Average	78 (70 – 83)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	77 (64 – 88)	> 180
Meter No. X-4	74 (59 – 86)	
Average	76 (62 – 87)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	67 (48 – 70)	> 175
Meter No. X-6	67 (64 – 73)	
Average	67 (57 – 72)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	59 (48 – 65)	> 186
Meter No. X-8	63 (52 – 70)	
Average	61 (50 – 68)	
May 2023		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	73 (66 – 86)	> 178
Meter No. X-2	83 (70 – 88)	
Average	78 (72 – 83)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	80 (66 – 88)	> 180
Meter No. X-4	76 (62 – 88)	
Average	78 (64 – 87)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	67 (62 – 71)	> 175
Meter No. X-6	67 (62 – 73)	
Average	67 (62 – 72)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	59 (50 – 67)	> 186
Meter No. X-8	62 (48 – 70)	
Average	60 (50 – 69)	
June 2023		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	72 (68 – 77)	> 178
Meter No. X-2	81 (54 – 88)	
Average	77 (62 – 83)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	82 (66 – 88)	> 180
Meter No. X-4	80 (64 – 88)	
Average	81 (65 – 88)	

Monitoring Location	Average Leachate Head Levels (cm) (Range in Bracket)	Limit Level (cm)
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	66 (46 – 151)	> 175
Meter No. X-6	71 (55 – 166)	
Average	68 (53 – 159)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	105 (50 – 292)	> 186
Meter No. X-8	106 (41 – 305)	
Average	105 (49 – 299)	

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

April 2023		Monitoring Results	Limit Level
Parameters			
Temperature	°C	30.8	> 43 °C
pH Value	pH unit	8.7	6 – 10
Volume Discharged	m ³	438	>2,000 m ³
Suspended Solids (SS)	mg/L	40.0	> 800 mg/L
Phosphate	mg/L	9.50	> 25 mg/L
Sulphate	mg/L	104	> 800 mg/L
Total Inorganic Nitrogen ^(a)	mg/L	21.05	> 100 mg/L
BOD	mg/L	12	> 800 mg/L
COD	mg/L	1120	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	5930	> 7,000 µg/L
Iron	mg/L	2	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	167	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	134	> 700 µg/L
Zinc	µg/L	102	> 700 µg/L
May 2023		Monitoring Results	Limit Level
Parameters			
Temperature	°C	35.6	> 43 °C
pH Value	pH unit	8.5	6 – 10
Volume Discharged	m ³	1,182	>2,000 m ³
Suspended Solids (SS)	mg/L	38.7	> 800 mg/L
Phosphate	mg/L	8.94	> 25 mg/L
Sulphate	mg/L	122	> 800 mg/L
Total Inorganic Nitrogen ^(a)	mg/L	26.92	> 100 mg/L
BOD	mg/L	9	> 800 mg/L
COD	mg/L	941	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	5570	> 7,000 µg/L
Iron	mg/L	2	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	178	> 300 µg/L

Copper	µg/L	10	> 1,000 µg/L
Nickel	µg/L	139	> 700 µg/L
Zinc	µg/L	109	> 700 µg/L
June 2023		Monitoring Results	Limit Level
Parameters			
Temperature	°C	36.6	> 43 °C
pH Value	pH unit	8.5	6 - 10
Volume Discharged	m ³	799	>2,000 m ³
Suspended Solids (SS)	mg/L	158	> 800 mg/L
Phosphate	mg/L	5.76	> 25 mg/L
Sulphate	mg/L	142	> 800 mg/L
Total Inorganic Nitrogen (a)	mg/L	36.22	> 100 mg/L
BOD	mg/L	21	> 800 mg/L
COD	mg/L	809	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	5710	> 7,000 µg/L
Iron	mg/L	2	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	123	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	125	> 700 µg/L
Zinc	µg/L	72	> 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 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 17 June to 22 June 2023 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.

All effluent quality 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*.

2.3.3

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	• Water level	• Chloride	12, 13 April 2023, 4 May 2023, 8 June 2023	YSI Professional DSS (S/N: 15G100349) Horiba U-52G (S/N: RSV50V1T)
		• pH	• Sodium		
		• EC	• Potassium		
		• COD	• Calcium		
		• BOD5	• Magnesium		
		• TOC	• Nickel		
		• Ammoniacal-nitrogen	• Manganese		
		• Nitrate-nitrogen	• Chromium		
		• Nitrite-nitrogen	• Cadmium		
		• Nitrite-nitrogen	• Copper		
		• TKN	• Lead		
		• TN	• Iron		
		• Sulphate	• Zinc		
		• Sulphide	• Mercury		
		• Carbonate	• Boron		
		• Bicarbonate			
		• Phosphate			

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	0.22	0.17	0.32	5.00	5	4	7	30
MWX-2	0.01	<0.01	0.01	5.00	4	3	4	30
MWX-3	1.00	0.91	1.05	5.00	16	14	17	30
MWX-4	3.94	3.02	4.90	7.63	23	18	29	36
MWX-5	2.42	2.24	2.58	5.00	30	26	38	30
MWX-6	3.56	3.44	3.74	5.00	45	36	54	46
MWX-7	0.42	0.29	0.48	6.55	28	27	29	36
MWX-8	7.66	7.07	8.63	15.85	44	25	70	50
MWX-9	0.96	0.24	1.60	7.30	14	6	22	71
MWX-10	0.03	<0.01	0.03	5.00	6	3	9	30
MWX-11	0.15	0.14	0.17	5.00	6	5	7	30
MWX-12	0.02	<0.01	0.02	5.00	5	<2	7	30
MWX-13	0.04	<0.01	0.04	5.00	5	<2	5	30
MWX-14	<0.01	<0.01	<0.01	5.00	5	<2	5	30

Limit Level exceedances were recorded for groundwater monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex F2* were undertaken. Investigation of the Limit Levels exceedances was conducted and the investigation reports are presented in *Annex F6*.

Based on the investigation conducted for the monitoring events with potential Limit Levels exceedance with the Contractor and the IEC, the groundwater (COD) exceedances at MWX-6 on 13 April 2023 and at MWX-5 and MWX-8 on 4 May 2023 were 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.

2.4 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
	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	

Parameters	Monitoring Location	Limit Level (% (v/v))
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.

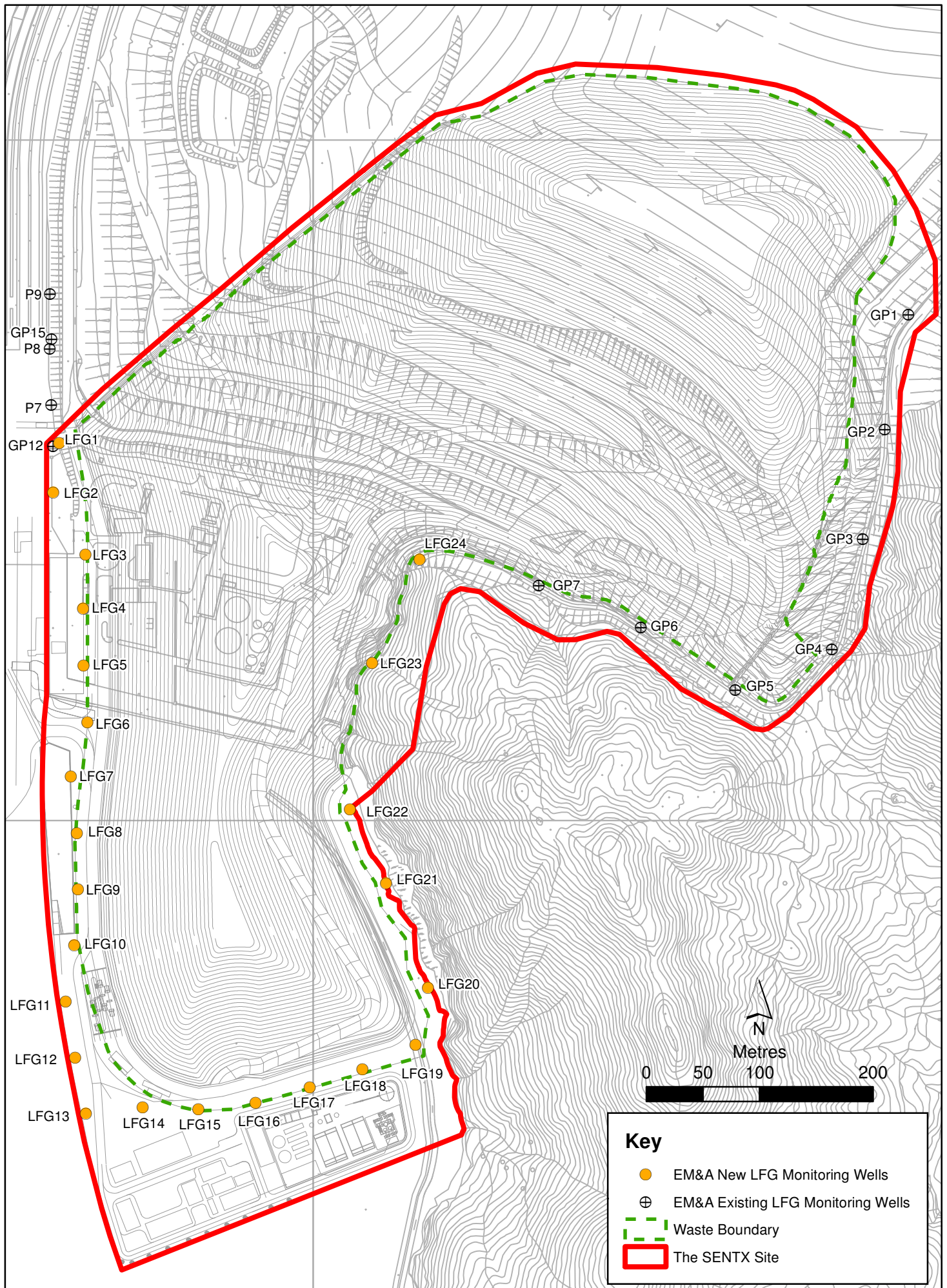


Figure 2.3

Location of Landfill Gas Monitoring Wells

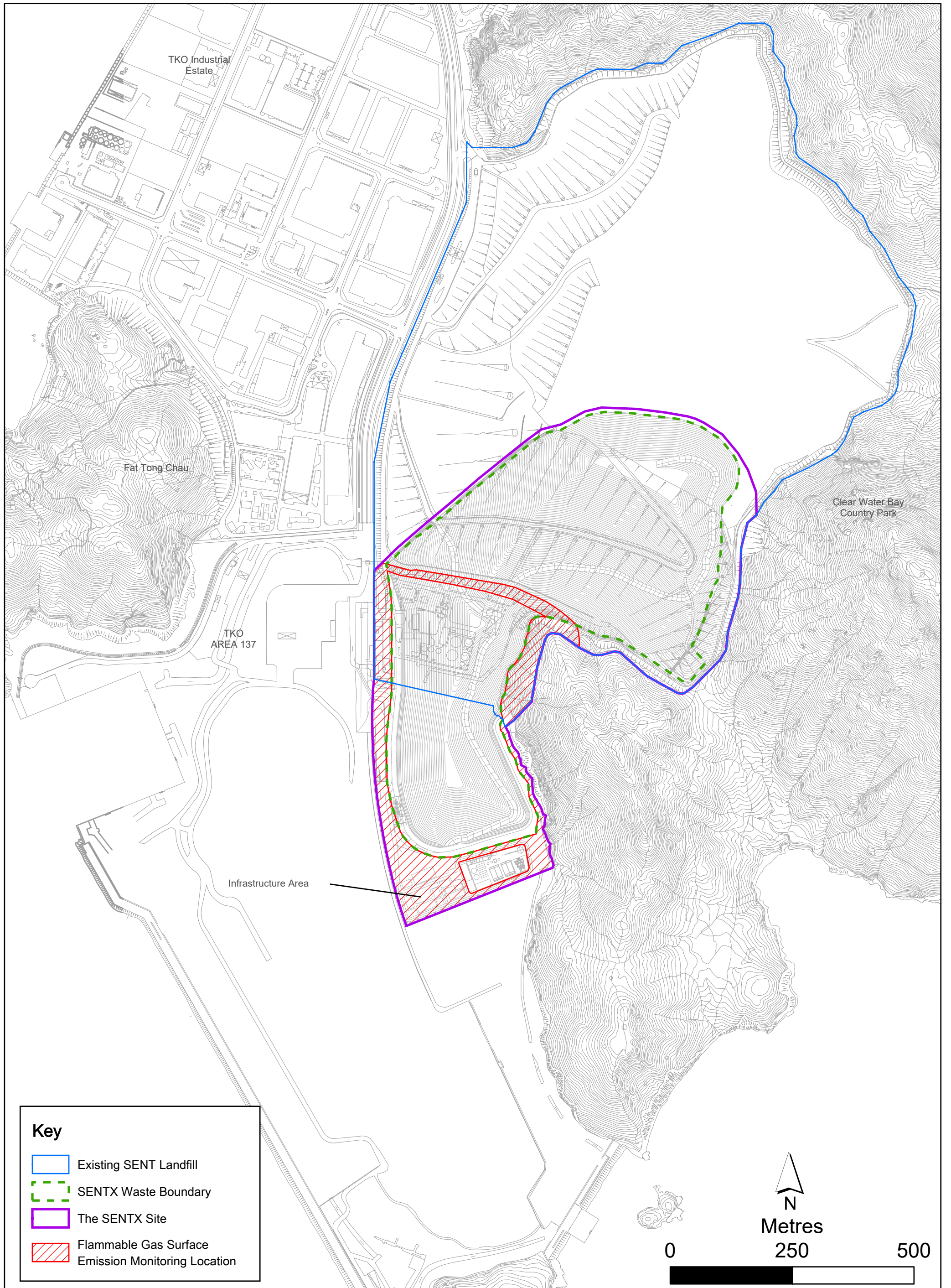


Figure 2.4

Flammable Gas Surface Emission Monitoring Locations

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 	13 April 2023, 8, 9 May 2023, 5 June 2023	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 	11 April 2023, 9 May 2023, 5 June 2023	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 April – 30 June 2023	Permanent gas monitoring system
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 	12 May 2023	GMI Leak Surveyor (S/N: 554846)
Bulk gas sampling at least 2 of the perimeters LFG monitoring wells	Quarterly	<ul style="list-style-type: none"> • Methane • Carbon dioxide • Oxygen • Nitrogen • Carbon monoxide • Other flammable gas 	8, 9 May 2023	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	0.8	0.4	1.2	3.2
LFG2	0.0	0.0	0.0	1.0	1.0	0.6	1.5	4.3
LFG3	0.0	0.0	0.0	1.0	3.3	2.8	3.8	6.3
LFG4	0.0	0.0	0.0	1.0	0.0	0.0	0.1	7.0
LFG5	0.0	0.0	0.0	1.0	0.5	0.3	0.9	3.4
LFG6	0.0	0.0	0.0	1.0	0.1	0.0	0.1	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	0.0	0.0	0.1	2.4
LFG9	0.0	0.0	0.0	2.5	0.2	0.0	0.3	1.7
LFG10	0.0	0.0	0.0	3.5	0.2	0.1	0.2	1.6
LFG11	0.0	0.0	0.0	3.0	0.2	0.2	0.3	2.0
LFG12	0.0	0.0	0.0	13.2	0.0	0.0	0.0	1.5
LFG13	8.9	0.4	25.8	22.5	0.0	0.0	0.1	2.7
LFG14	0.0	0.0	0.0	5.2	0.2	0.1	0.3	1.8
LFG15	0.2	0.0	0.6	18.2	0.7	0.5	0.9	2.0
LFG16	0.0	0.0	0.0	1.0	0.1	0.0	0.2	2.0
LFG17	1.3	0.0	2.6	17.8	0.9	0.1	1.5	2.4
LFG18	0.0	0.0	0.0	2.3	0.1	0.0	0.2	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	1.7	0.0	4.5	4.6
LFG21	0.0	0.0	0.0	1.0	1.5	0.9	2.2	4.8
LFG22	0.0	0.0	0.0	1.0	0.8	0.0	1.3	4.0
LFG23	0.0	0.0	0.0	1.0	0.2	0.0	0.4	10.3
LFG24	0.0	0.0	0.0	1.0	2.8	0.0	8.4	4.7
GP1	0.0	0.0	0.0	1.0	4.0	0.1	7.5	10.6
GP2 (shallow)	0.0	0.0	0.0	1.0	0.9	0.2	1.3	11.4
GP2 (deep)	0.0	0.0	0.0	1.0	1.9	0.3	4.9	10.4
GP3 (shallow)	0.0	0.0	0.0	1.0	0.4	0.0	1.0	6.9
GP3 (deep)	0.0	0.0	0.0	1.0	0.0	0.0	0.0	5.6
GP4 (shallow)	0.0	0.0	0.0	1.0	0.2	0.0	0.5	11.6
GP4 (deep)	0.0	0.0	0.0	1.0	0.1	0.1	0.2	7.7
GP5 (shallow)	0.0	0.0	0.0	1.0	0.5	0.2	0.8	10.8
GP5 (deep)	0.0	0.0	0.0	1.0	0.1	0.0	0.2	7.5
GP6	0.0	0.0	0.0	1.0	4.9	4.3	5.6	8.4
GP7	0.0	0.0	0.0	1.0	0.2	0.1	0.2	4.5
GP12	0.0	0.0	0.0	1.0	0.1	0.1	0.2	2.3
GP15	0.0	0.0	0.0	1.0	0.0	0.0	0.1	2.2
P7	0.0	0.0	0.0	1.0	0.1	0.1	0.1	2.5
P8	0.0	0.0	0.0	1.0	0.2	0.0	0.4	1.7
P9	0.0	0.0	0.0	1.0	0.1	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	0.1	1.0
UU02	0.0	0.0	0.1	1.0
UU03	0.0	0.0	0.0	1.0
UU04	0.0	0.0	0.0	1.0
UU05	0.0	0.0	0.0	1.0
UU06	0.0	0.0	0.0	1.0
UU07	0.0	0.0	0.0	1.0
UU08	0.0	0.0	0.0	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	0.0	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	0.0	1.0
UU25	0.0	0.0	0.0	1.0
UU26	0.0	0.0	0.0	1.0
UU27	0.0	0.0	0.0	1.0
UU28	0.0	0.0	0.0	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	<0.020	12.6	<0.020
Carbon Dioxide (% (v/v))	3.2	0.549	2.4	0.066
Oxygen (% (v/v))	-	16.1	-	20.0
Nitrogen (% (v/v))	-	81.3	-	77.5
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°16'30"	114°16'36"	6	30
22°16'28"	114°16'26"	6	

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 April 2023 to June 2023.

Limit Levels exceedances were recorded for 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 Limit Levels exceedances was conducted and the investigation reports are presented in *Annex G4*.

Based on the investigation conducted for the monitoring events with potential Limit Levels exceedance with the Contractor and the IEC, the landfill gas (methane) exceedance at LFG13 on 13 April 2023 and landfill gas (carbon dioxide) exceedance at LFG24 on 5 June 2023 were 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 17 April 2023, 17 May 2023 and 26 June 2023 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 6, 13, 19 and 27 April 2023, 4, 11, 18 and 25 May 2023 and 1, 8, 15, 21 and 29 June 2023.

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 April 2023	<ul style="list-style-type: none"> The Contractor shall remove the deposited silt and grit accumulated at the channel near guard house regularly to ensure it is functioning properly at all times.
13 April 2023	<ul style="list-style-type: none"> The Contractor shall remove the stagnant water accumulated in the drip trap at DP3 Wetsep and handle the clean-up materials as chemical waste.
19 April 2023	<ul style="list-style-type: none"> The Contractor shall enhance watering around the site, especially near piggyback and tipping area to minimise dust impact. The Contractor shall remove the deposited silt and grit accumulated at the channel near guard house regularly to ensure it is functioning properly at all times. The Contractor shall remove the general refuse accumulated at DP4 outlet and dispose of the waste regularly.
27 April 2023	<ul style="list-style-type: none"> The Contractor shall remove the stagnant water accumulated in the drip trays at DP3 and DP4 Wetseps and handle the clean-up materials as chemical waste. The Contractor shall remove the general refuse accumulated at DP4 outlet and near welfare facilities and dispose of the waste regularly.
4 May 2023	<ul style="list-style-type: none"> The Contractor shall remove the deposited silt and grit accumulated at the channel near guardhouse and the general refuse at the channel near weighbridge regularly to ensure they are functioning properly at all times. The Contractor shall remove the general refuse accumulated near welfare facilities and dispose of the waste regularly.
11 May 2023	<ul style="list-style-type: none"> The Contractor shall arrange cleaning and removal of deposits near site entrance and along the main haul road more frequently to minimise mud to be carried on the public road.
18 May 2023	<ul style="list-style-type: none"> The Contractor shall remove the stagnant water accumulated in the drip trays at DP3 and DP4 Wetseps and handle the clean-up materials as chemical waste. The Contractor shall arrange regular cleaning and removal of deposits near site entrance to minimise mud to be carried on the public road.
25 May 2023	<ul style="list-style-type: none"> The Contractor shall replace the faded NRMM label displayed on the excavator near buttress area.
1 June 2023	<ul style="list-style-type: none"> The Contractor shall arrange regular cleaning and removal of deposits at the main haul road, especially near site entrance to minimise mud to be carried on the public road.
8 June 2023	<ul style="list-style-type: none"> The Contractor shall remove the deposited silt and grit and refuse accumulated at X10 channel, especially near weighbridge and DP3 regularly, to ensure it is functioning properly at all times.

Inspection Date	Environmental Observations and Recommendations
15 June 2023	<ul style="list-style-type: none"> The Contractor shall remove the branches and general refuse accumulated at DP3 sediment pit regularly to ensure it is functioning properly at all times. The Contractor shall review the treatment capacity and efficiency of DP4 Wetseps, and ensure all surface water is treated before discharge.
21 June 2023	<ul style="list-style-type: none"> The Contractor shall enhance watering around the site, especially near site entrance to minimise dust impact. The Contractor shall remove the general refuse accumulated at X10 channel near weighbridge regularly to ensure it is functioning properly at all times. The Contractor shall remove the stagnant water accumulated in the drip trays at DP4 Wetseps and handle the clean-up materials as chemical waste.
29 June 2023	<ul style="list-style-type: none"> The Contractor shall arrange regular cleaning and removal of deposits along the main haul road and near site entrance to minimise mud to be carried on the public road.

The Contractor has rectified all 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	<ul style="list-style-type: none"> Installed silt fencing near surface 	<ul style="list-style-type: none"> Improve soil covering.

Deficiencies	Rectifications Implemented	Proposed Additional Control Measures
soil	water channel along DP6 channel.	<ul style="list-style-type: none"> • 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 yard 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 (^(a) 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 - 30 Apr 23	0	0	0	0	0	0	0	0	0.800
1 - 31 May 23	0	0	0	0	0	0	20.550	0	0.800
1 - 30 Jun 23	0	0	0	0	0	0	12.460	0	0.800

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.

Three exceedances of Action and Limit Levels for TSP and one exceedance of Limit Level for landfill gas flare stack emission (Benzene) were recorded for air quality monitoring in the reporting period. The TSP exceedance at AM1 on 13 April 2023 was considered non Project-related upon further investigation, while the TSP exceedance at AM2 on 1 May 2023 and 6 June 2023 were considered Project-related upon further investigation. The landfill gas flare stack emission (Benzene) exceedance on 12 May 2023 was considered Project-related upon further investigation.

Three exceedance of the Limit Level for groundwater (COD) and six exceedances of the Limit Level for leachate levels were recorded for water quality impact monitoring in the reporting period. The groundwater (COD) exceedances at MWX-6 on 13 April 2023 and at MWX-5 and MWX-8 on 4 May 2023 were considered non Project-related upon further investigation. The leachate levels exceedances at Pump Station No. 4X from 17 June to 22 June 2023 were considered Project-related upon further investigation.

One exceedance of Limit Levels for landfill gas (methane) and one exceedance of Limit Levels for landfill gas (carbon dioxide) were recorded for landfill gas monitoring in the reporting period. The landfill gas (methane) exceedance at LFG13 on 13 April 2023 and landfill gas (carbon dioxide) exceedance at LFG24 on 5 June 2023 were 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 April 2023 to 30 June 2023 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.

Three exceedances of Action and Limit Levels for TSP, one exceedance of Limit Level for landfill gas flare stack emission (Benzene), three exceedances of the Limit Level for groundwater (COD), six exceedances of the Limit Level for leachate levels, one exceedance of Limit Levels for landfill gas (methane) and one exceedance of Limit Levels for landfill gas (carbon dioxide) 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	Start	Finish	Resource Details	Success Details	2018		2019		2020		2021		2022		2023	
							Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
332	SA2.5	Construction (Initial Works)	1163	12-Apr-18	07-Jun-21	756												
333	SA2.5.02	Advance Works & Site Establishment	1148	12-Apr-18	02-Jun-21	35												
334	SA2.5.02.01	Site Establishment & Mobilization	333	12-Apr-18	15-May-19	820												
335	5.02.01	52-1200 Site Mobilization for Plans X1 & X2	30	31-Dec-18	20-Jan-19	820												
336	5.02.01	52-1100 Site Mobilization for Plans X3, X4 & X5	30	12-Apr-18	11-May-18	1063												
337	5.02.01	52-1200 Temporary Office for Employer / E/R / C	60	10-Oct-18	08-Dec-18	0												
338	5.02.01	52-1300 Hoarding and Fencing Works	40	30-Jan-19	10-Mar-19	820												
339	SA2.5.02.02	Site Survey & Investigation Works for Plans X1 & X2	50	31-Dec-18	18-Feb-19	840												
340	5.02.02	52-1400 Condition Survey	25	31-Dec-18	24-Jan-19	840												
341	5.02.02	52-1500 Topographic Survey	20	31-Dec-18	19-Jan-19	845												
342	5.02.02	52-1600 Site Inspection, Review of Condition Survey Report	25	25-Jan-19	18-Feb-19	840												
343	SA2.5.02.03	Site Survey & Investigation Works for Plans X3, X4 & X5	58	12-Apr-18	31-May-18	1103												
344	5.02.03	52-1700 Condition Survey	25	12-Apr-18	06-May-18	1103												
345	5.02.03	52-1800 Topographic Survey	20	12-Apr-18	01-May-18	1108												
346	5.02.03	52-1900 Site Inspection, Review of Condition Survey Report	25	07-May-18	31-May-18	1103												
347	SA2.5.02.04	Environmental Monitoring	975	02-Oct-18	02-Jun-21	35												
348	5.02.04	52-2000 Installation of Monitoring Stations & Waits (SP & DDI)	120	02-Oct-18	20-Jan-19	0												
349	5.02.04	52-2100 Installation of Monitoring Stations & Waits (SP & DDI) on Butress Wall	120	02-Oct-18	20-Jan-19	0												
350	5.02.04	52-2200 Conduct Baseline Monitoring for Construction (one month)	30	01-Dec-18	30-Dec-18	0												
351	5.02.04	52-2300 Conduct Baseline Monitoring for Operation (one year)	365	03-Jun-20	02-Jun-21	35												
352	SA2.5.03	Civil Engineering Works	748	13-Jan-19	29-Jan-21	834												
353	SA2.5.03.01	Butress Wall	478	08-Apr-19	15-Jun-20	83												
354	5.03.01	53-1000 Section adj. SENT	300	13-Apr-19	06-Feb-20	95												
355	5.03.01	53-1100 Characterise SENT Landfill Gas Pipe	45	07-Feb-20	23-Mar-20	96												
356	5.03.01	53-1200 Section at Cell 4	400	02-Mar-19	04-Apr-20	83												
357	5.03.01	53-1300 Install Landfill Gas Pipe on Butress Wall	75	05-Apr-20	18-Jun-20	83												
358	SA2.5.03.01	Landfill Cell 1	503	13-Jan-19	29-May-20	214												
359	5.03.01	53-1400 Earth bund (Eastern)	90	04-Aug-19	01-Nov-19	9												
360	5.03.01	53-1500 Earth bund (Southern)	90	26-Apr-19	24-Jul-19	314												
361	5.03.01	53-1600 Earth bund (Western)	90	13-Jan-19	12-Apr-19	417												
362	5.03.01	53-1700 Interfill bund (Cell 1G)	75	13-Jan-19	28-Mar-19	432												
363	5.03.01	53-1800 Site Formation	90	13-Jan-19	12-Apr-19	217												
364	5.03.01	53-1900 Pump Station (PS#1X)	45	13-Apr-19	27-May-19	507												
365	5.03.01	53-2000 Lining Works	135	02-Nov-19	15-Mar-20	214												
366	5.03.01	53-2100 Protective Stone Laying & Leachate Collection Pipe	75	16-Mar-20	29-May-20	214												
367	5.03.01	53-2200 Install Leachate Force Main	75	25-Jul-19	07-Oct-19	449												
368	5.03.01	53-2300 Install Landfill Gas Pipe on earth bund	55	03-Nov-19	26-Dec-19	258												
369	5.03.01	53-2400 Leachate Pipe Connection (Cell 1 to LTP)	30	09-Mar-20	07-Apr-20	265												
370	SA2.5.03.01	Landfill Cell 4	30	09-Jul-20	07-Aug-20	144												
371	5.03.01	53-2500 Provide Temporary Leachate Pipe on Cell 4 Area	30	09-Jul-20	07-Aug-20	144												
372	SA2.5.03.02	Drainage - Surface Run-Off	740	16-Jan-19	24-Jun-21	859												
373	5.03.02	53-2600 Construct Cut-Off Channel 12A	60	16-Jan-19	13-Mar-19	9												
374	5.03.02	53-2700 Construct Cut-Off Channel 12A to DP6	20	17-Mar-19	05-Apr-19	9												
375	5.03.02	53-2800 Diversion from Existing Trapezoidal Channel into Channel 12A	20	06-Apr-19	25-Apr-19	9												
376	5.03.02	53-2900 Removal of Existing Trapezoidal Channel along Eastern Bund	30	26-Apr-19	25-May-19	9												
377	5.03.02	53-3000 Cut-Off Channel O4 Diversion to Cut-Off Channel 11-2	45	16-Jan-19	01-Mar-19	83												
378	5.03.02	53-3100 Cut-Off Channel X3 on Butress Wall, Cell 4, Cell 3	90	05-Apr-20	03-Jul-20	289												
379	5.03.02	53-3200 Temporary Diversion Cut-Off Channel X5 to 12A	20	04-Jul-20	23-Jul-20	289												
380	5.03.02	53-3300 Culvert X5 (5m long) & Perm Connection of Cut-Off Channel X5	30	26-Dec-20	24-Jan-21	134												
381	5.03.02	53-3400 Construct Perimeter Channel X6 on Eastern Bund & Southern Bund of Cell 1	50	02-Nov-19	21-Dec-19	249												
382	5.03.02	53-3500 Construct Perimeter Channel X6 on Eastern Bund of Cell 2	50	20-Feb-20	08-Apr-20	189												
383	5.03.02	53-3600 Construct Perimeter Channel X6 Eastern Bund of Cell 3	50	06-Jun-20	26-Jul-20	129												
384	5.03.02	53-3700 Culvert X6 (25m long) at Cell 1 Southern Bund	75	25-Jul-19	07-Oct-19	1314												
385	5.03.02	53-3800 Perimeter Channel (O8) at Cell 1 Southern & Western Bund	45	25-Jul-19	07-Sep-19	1344												
386	5.03.02	53-3900 Drop Inlet & Culvert (O5) - 21m long	180	29-Jul-20	24-Jan-21	129												
387	5.03.02	53-4000 Sediment Trap (ST)	180	29-Jul-20	24-Jan-21	129												
388	5.03.02	53-4100 Dual Culvert 14m long (connect to DP4)	180	29-Jul-20	24-Jan-21	129												
389	SA2.5.03.03	Drainage - Groundwater	200	26-May-19	11-Dec-19	269												
390	5.03.03	53-4200 Construct Groundwater Collection Pipe along Cells X1 & X2 Eastern Bund	70	26-May-19	02-Aug-19	9												
391	5.03.03	53-4300 Construct Groundwater Collection Pipe along Cell X3 Eastern Bund	50	04-Aug-19	22-Sep-19	159												
392	5.03.03	53-4400 Construct Groundwater Collection Pipe along Interfill Bund X2X3	50	25-Sep-19	11-Oct-19	269												
393	5.03.03	53-4500 Construct Manholes MH-X1	30	13-Nov-19	11-Dec-19	209												
394	SA2.5.03.04	Utilities - Distribution within New Infrastructure Area	391	11-Aug-19	04-Sep-20	276												
395	5.03.04	53-4600 Power Supply HV Works (Transformer & HV switchgear)	5	30-Jun-20	04-Jul-20	0												
396	5.03.04	53-4700 Power Distribution, LV Power Supply works	2	05-Jul-20	06-Jul-20	0												
397	5.03.04	53-4800 Sewerage (Collection to LTP)	60	07-Jul-20	04-Sep-20	271												
398	5.03.04	53-4900 Sewerage (Discharge to Site Boundary)	60	07-Jul-20	04-Sep-20	271												
399	5.03.04	53-5000 Lighting Provision	30	07-Jul-20	05-Aug-20	6												
400	5.03.04	53-5100 Fire Services	115	12-Mar-20	04-Jul-20	2												
401	5.03.04	53-5200 Construct Firewater (Fresh & Salt)	110	13-Mar-20	04-Jul-20	338												
402	5.03.04	53-5300 Telecom & Network	45	11-Aug-19	24-Sep-19	622												
403	5.03.04	53-5400 Gas Network (LFG to LTP)	15	22-Jun-20	06-Jul-20	176												
404	SA2.5.03.05	Utilities - Works Associated with Utilities Undertakes	703	27-Feb-19	29-Jan-21	129												
405	SA2.5.03.05.01	CLP	459	27-Feb-19	30-May-20	43												
406	5.03.05.01	53-5500 Excavate Trench for CLP Cable	100	13-May-19	20-Aug-19	144												
407	5.03.05.01	53-5600 Backfill Trench after CLP Cable Laying	30	01-May-20	30-May-20	43												
408	5.03.05.01	53-5700 CLP Cable Laying from CLP Substation to Site Boundary	200	27-Feb-19	14-Sep-19	229												
409	5.03.05.01	53-5800 CLP Cable Laying from Site Boundary to HV Switchroom	60	02-Mar-20	20-Apr-20	0												
410	5.03.05.01	53-5900 CLP HV associated equipment installation	120	18-Dec-19	15-Apr-20	0												
411	SA2.5.03.05.02	DB	147	05-Sep-20	29-Jan-21	129												

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>	Implemented
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

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						D	C	O/R	A		
4.8.2	AQ19	<ul style="list-style-type: none"> Progressive restoration of the areas which 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 	To minimise odour nuisance	SENTX Site	SENTX Contractor	✓	✓	✓	EIAO-TM Annex 4	Implemented	
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.	

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						D	C	O/R	A		
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 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			✓		EIAO-TM Annex 4	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			✓		EIAO-TM Annex 4	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			✓		EIAO-TM Annex 4	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			✓		EIAO-TM Annex 4	Not Applicable. As SENTX will receive construction waste only which is significantly less odorous, installation of deodorizers is not necessary. Moreover,

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		
											SENTX will not have any special waste 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 	To minimise odour nuisance	SENTX Site	SENTX Contractor			✓		<i>EIAO-TM Annex 4</i>	Not Applicable. As SENTX will receive construction 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		
		in the summer months between July to November									only which is significantly less 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

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		
4.8.2	AQ39	Providing sufficient underground landfill gas collection system to capture the landfill gas generated as much as possible; and	To minimise gaseous emissions, including LFG and VOCs	SENTX Site	SENTX Contractor			✓	✓	EIAO-TM Annex 4	Implemented
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 Figure 11.3a	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 Figure 11.3a	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

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						D	C	O/R	A		
4.10.2 and SENTX latest design	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 quality requirement	At the flares and thermal oxidizer stacks when they are in operation	SENTX Contractor			✓	✓ (1)	Emission Limits specified in Contract	Implemented
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	At meteorological	SENTX Contractor	✓	✓	✓	-		Implemented

(1) For LFG flare and LFG generator only.

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		
			meteorological data	station shown in <i>Figure 11.3a</i>							
Noise – Construction Phase											
5.7.1	N1	<p>Adopt good site practice listed below:</p> <ul style="list-style-type: none"> Only well-maintained plant will be operated on-site and plant should be serviced regularly during the construction program; 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 	To minimise potential construction noise nuisance.	All construction works area	SENTX Contractor			✓		<i>Noise Control Ordinance (NCO) and EIAO-TM Annex 5</i>	Implemented

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						D	C	O/R	A		
		construction activities.									
5.8	N2	Weekly noise monitoring	Ensure noise generated from the project meets the criteria	At monitoring locations shown in Figure 6.4a	SENTX Contractor		✓			Noise Control Ordinance (NCO) and EIAO-TM Annex 5	Implemented
Noise - Operation/Restoration Phase											
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		✓		Noise Control Ordinance (NCO) and EIAO-TM Annex 5	Implemented	
									-		Implemented
									-		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		
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			✓		Noise Control Ordinance (NCO) and EIAO-TM Annex 5	Implemented
Water Quality – Construction Phase											
6.8.1	WQ1	<u>Construction Runoff</u> • 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			✓		ProPECC PN 1/94 EIAO-TM Annex 6	Implemented
6.8.1	WQ2	• 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	✓	✓			ProPECC PN 1/94 Water Pollution Control Ordinance (WPCO) EIAO-TM Annex 6	Implemented
6.8.1	WQ3	• 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	All construction works area	SENTX Contractor			✓		ProPECC PN 1/94 WPCO EIAO-TM Annex 6	Deficiency of mitigation measures but rectified by the Contractor

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		
			works								
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 grease will pass through the oil interceptors. 	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>	Implemented
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		✓			<i>ProPECC PN 1/94</i> <i>WPCO</i> <i>EIAO-TM Annex 6</i>	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		✓			<i>ProPECC PN 1/94</i> <i>WPCO</i> <i>EIAO-TM Annex 6</i>	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	SENTX Site	SENTX Contractor		✓			<i>ProPECC PN 1/94</i> <i>WPCO</i> <i>Waste Disposal</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		
			improper handling of fuel and oil							<i>Ordinance (WDO)</i>	
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				✓	<i>ProPECC PN 1/94</i> <i>WPCO</i> <i>EIAO-TM Annex 6</i>	Implemented
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				✓	<i>WPCO</i> <i>Water-TM</i>	Implemented
6.8.2	WQ11	<p><u>Sewage Effluents</u></p> <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				✓	<i>WPCO</i>	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				✓	<i>WPCO</i> <i>WDO</i>	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 	To minimise potential water	SENTX Site	SENTX Contractor				✓	<i>WPCO</i> <i>WDO</i>	Implemented

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						D	C	O/R	A		
		regular basis.	quality impacts arising from the sewage effluents								
Water Quality – Operation/Restoration and Aftercare Phases											
6.9.1	WQ14	<u>Surface Water Management</u> • Inspections of the drainage system, sand traps, settlement ponds and surface water channels will be performed regularly to identify areas necessary for maintenance, cleaning or repair.	To minimise potential water quality impacts on surface water arising from the landfill operations.	SENTX Site	SENTX Contractor			✓		WPCO <i>Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Inshore Waters (Water-TM)</i> <i>EIAO-TM Annex 6</i>	Implemented
6.9.1	WQ15	• 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	• 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

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						D	C	O/R	A		
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 Water-TM EIAO-TM Annex 6	Implemented
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

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						D	C	O/R	A		
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 <i>Water-TM</i>	Implemented
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 <i>Water-TM</i> <i>EIAO-TM Annex 6</i>	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 <i>Water-TM</i> <i>EIAO-TM Annex 6</i>	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 	To minimise potential water quality impacts on surrounding water bodies	Leachate treatment plant	SENTX Contractor			✓	✓	WPCO <i>Water-TM</i> <i>EIAO-TM Annex 6</i>	Implemented

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						D	C	O/R	A		
6.13	WQ25	landfill if the leachate storage lagoon are full and leachate cannot be transported to the LTP for treatment. • Monitor the quality of effluent discharged from the LTP	arising from the landfill operations. To ensure discharge quality comply with WPCO requirement	Leachate treatment plant discharge point	SENTX Contractor		✓	✓	WPCO <i>Water-TM</i>	Implemented	
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 <i>Water-TM</i>	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 <i>Water-TM</i> <i>EIAO-TM Annex 6</i>	Implemented	
6.10.1	WQ28	• Maintaining control of the leachate level through extraction	To minimise potential water quality impacts on surrounding water bodies	SENTX Site	SENTX Contractor		✓	✓	WPCO <i>Water-TM</i> <i>EIAO-TM Annex 6</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		
			arising from surface breakout of leachate.								
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 requirements	Before construction works commence	SENTX Contractor	✓	✓			WDO	Implemented
7.6.1	WM2	<u>Management of Waste Disposal</u> 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. A recording system for the amount of waste generated, recycled and disposed of (including the disposal sites) will be	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓			WDO <i>Waste Disposal (Charges for Disposal of Construction Waste) Regulation;</i> <i>Works Bureau Technical Circular No.31/2004; and</i> <i>Annex 5 and Annex 6 of Appendix G of ETWBTC No. 19/2005)</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		
		established.									
7.6.1	WM3	<u>Measures for the Reduction of Construction Waste Generation</u> 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-inert construction waste. Specific areas of the work site will be designated for such segregation and storage if immediate use is not practicable.	To reduce construction waste generation	SENTX Site	SENTX Contractor		✓			WDO <i>EIAO-TM Annex 7</i>	Implemented
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

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		
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 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>	Deficiency of mitigation measures but rectified by the Contractor
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,	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓			WDO	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		

transport and disposal.

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	Not applicable
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 EIAO-TM Annex 7 <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 EIAO-TM Annex 7	Moved to mitigation measure under water quality WQ19. It is a measure for water quality rather than waste management.

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		
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
<i>Landfill Gas Hazards - Design and Construction Phase</i>											
8.6.2 and SENTX latest design	LFG1	Precautionary measures to be adopted by the contractors at the Project site and the adjacent 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.	To protect workers from landfill gas risk	All construction works area	SENTX Contractor			✓		<i>Paragraphs 8.3 to 8.49 of EPD's Landfill Gas Hazards Assessment Guidance Note</i> <i>EIAO-TM Annex 7</i>	Implemented
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</i>	To protect workers from landfill gas risk	Confined space within the construction works area	SENTX Contractor			✓			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><i>Note</i> will be followed.</p> <p>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.</p>									
8.6.3	LFG4	Implementation of engineering measures according to Contract Specification requirements. These measures will include the placement of liner and installation of landfill gas management system to contain, manage and control landfill gas.	To protect workers from landfill gas risk	SENTX Site	SENTX Contractor	✓	✓	✓	✓	<i>EIAO-TM Annex 7</i>	Implemented
8.6.3	LFG5	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>). Landfill gas monitoring boreholes will be installed at the edge of the waste slope between the waste and the new infrastructure	To protect workers from landfill gas risk	Infrastructure Area	SENTX Contractor	✓	✓			<i>EPD's Landfill Gas Hazards Assessment Guidance Note</i> <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		

area to monitor the migration of landfill gas, if any.

Landfill Gas Hazards – Operation, Restoration and Aftercare Phases

8.6.4	LFG7	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. A permanent gas monitoring system with alarm will be installed and operated in all occupied on-site buildings.	To protect workers from landfill gas risk	SENTX Site	SENTX Contractor	✓	✓		<i>Landfill Gas Hazards Assessment Guidance Note</i>	Implemented
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	✓	✓		<i>Landfill Gas Hazards Assessment Guidance Note</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		

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; 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 	To minimise potential water quality impacts affecting ecological resources	All construction works area	SENTX Contractor	✓			<i>EIAO-TM Annex 16</i> <i>ProPECC PN 1/94</i> <i>Water Pollution Control Ordinance (WPCO)</i> <i>EIAO-TM Annex 6</i>	Implemented
									-	Implemented
									-	Deficiency of mitigation measures but rectified by the Contractor
									-	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			
		interceptors; and, <ul style="list-style-type: none"> 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
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		✓			<i>EIAO-TM Annex 16</i>		Implemented
Ecology – Operation, Restoration and Aftercare Phases												
9.10.2	EC3	<u>Measures for Controlling Leakage of Landfill Leachate</u> 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

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	<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			✓	✓	EIAO-TM Annex 16	Implemented
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			✓	✓	EIAO-TM Annex 16	Implemented
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

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	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 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	To select the most suitable indigenous tree species for the SENTX	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		
		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.									
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 will include storage and reuse of topsoil as appropriate.	To minimise the landscape and visual impacts	All construction works area	SENTX Contractor	✓			EIAO-TM Annex 18		Not applicable
10.6.5	LV3	CM3 - All existing trees at the edges of the landfill will be carefully protected during construction. Detailed Tree Protection	To minimise the landscape and visual impacts	Potential impacted area	SENTX Contractor	✓			EIAO-TM Annex 18 and ETWBC 3/2006		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		
		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.									
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
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	✓	✓			<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	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	✓	✓			<i>EIAO-TM Annex 18 and ETWBC 7/2002</i>	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		✓			<i>EIAO-TM Annex 18</i>	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/E T	✓	✓			<i>EIAO-TM Annex 18</i>	Implemented
<i>Landscape and Visual - Operation/Restoration Phase</i>											
10.6.5 and SENTX latest	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			✓		<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		
design											
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	Not applicable

Annex C

Monitoring Schedule for This Reporting Period

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

April 2023

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

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

May 2023

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

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

June 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				Leachate Monitoring 1	2	3
4	Perimeter LFG Monitoring Service voids LFG Monitoring 5	Dust Monitoring 6	Noise Monitoring 7	Groundwater Monitoring 8	Groundwater Monitoring Surface Water Monitoring 9	10
11	Dust Monitoring 12	Noise Monitoring 13	14	Stack Monitoring Odour Monitoring 15	Stack Monitoring 16	17
Dust Monitoring (AM2 - AM4) 18	Noise Monitoring Dust Monitoring (AM1) 19	Dust Monitoring (AM2 Re-measurement) 20	21	22	23	Dust Monitoring 24
25	Noise Monitoring 26	27	28	29	Dust Monitoring 30	

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)
1 Apr 23	8:00	2 Apr 23	8:00	Cloudy	68
7 Apr 23	8:00	8 Apr 23	8:00	Cloudy	111
13 Apr 23	8:00	14 Apr 23	8:00	Sunny	365
19 Apr 23	8:00	20 Apr 23	8:00	Cloudy	142
25 Apr 23	8:00	26 Apr 23	8:00	Cloudy	44
1 May 23	8:00	2 May 23	8:00	Cloudy	153
7 May 23	8:00	8 May 23	8:00	Cloudy	145
13 May 23	8:00	14 May 23	8:00	Cloudy	221
19 May 23	8:00	20 May 23	8:00	Sunny	113
25 May 23	8:00	26 May 23	8:00	Sunny	141
31 May 23	8:00	1 Jun 23	8:00	Sunny	128
6 Jun 23	8:00	7 Jun 23	8:00	Cloudy	155
12 Jun 23	8:00	13 Jun 23	8:00	Cloudy	64
19 Jun 23	8:00	20 Jun 23	8:00	Fine	57
24 Jun 23	8:00	25 Jun 23	8:00	Cloudy	38
30 Jun 23	8:00	1 Jul 23	8:00	Fine	71
				Average	126
				Min	38
				Max	365

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

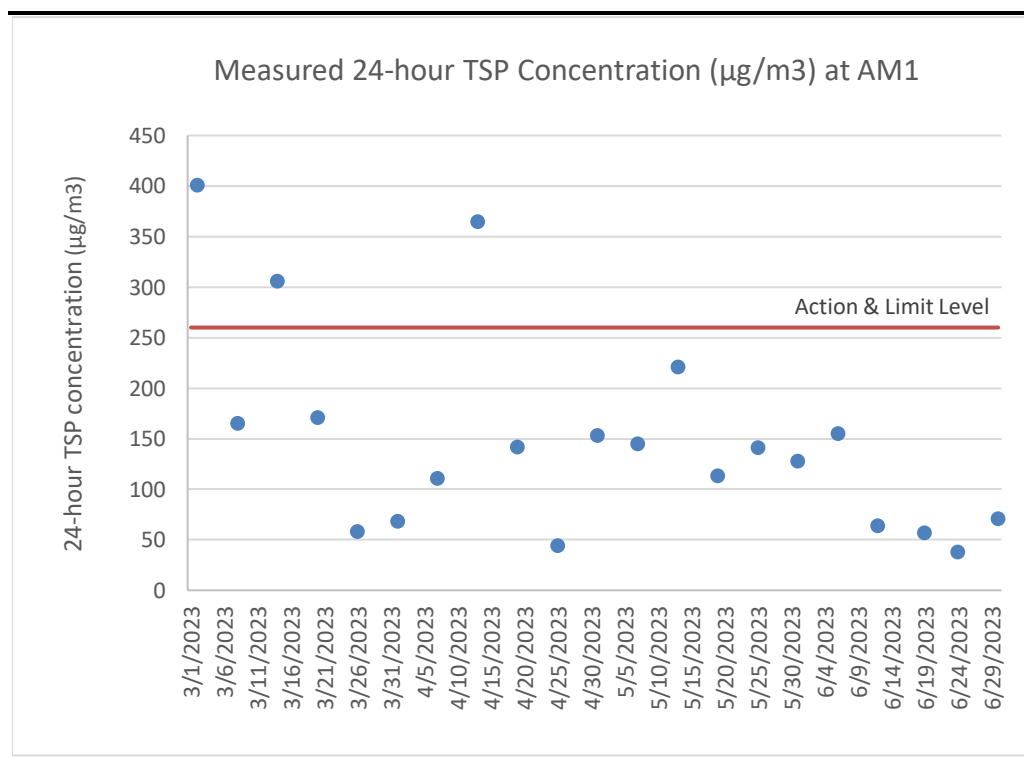


Table D1.2 24-hour TSP Monitoring Results at AM2

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu\text{g}/\text{m}^3$)
1 Apr 23	8:00	2 Apr 23	7:53	Cloudy	76
7 Apr 23	8:00	8 Apr 23	8:13	Cloudy	97
13 Apr 23	8:00	14 Apr 23	7:39	Sunny	252
19 Apr 23	8:00	20 Apr 23	7:48	Cloudy	154
25 Apr 23	8:00	26 Apr 23	8:25	Cloudy	65
1 May 23	8:00	2 May 23	8:00	Cloudy	356
7 May 23	8:00	8 May 23	8:00	Cloudy	103
13 May 23	8:00	14 May 23	8:00	Cloudy	57
19 May 23	8:00	20 May 23	8:00	Sunny	83
25 May 23	8:00	26 May 23	8:00	Sunny	126
31 May 23	8:00	1 Jun 23	8:00	Sunny	219
6 Jun 23	8:00	7 Jun 23	8:00	Cloudy	340
12 Jun 23	8:00	13 Jun 23	8:00	Cloudy	Discarded due to abnormal condition of the filter paper
20 Jun 23	8:00	21 Jun 23	8:00	Fine	94
24 Jun 23	8:00	25 Jun 23	8:00	Cloudy	92
30 Jun 23	8:00	1 Jul 23	8:00	Fine	88
Average					147
Min					57
Max					356

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

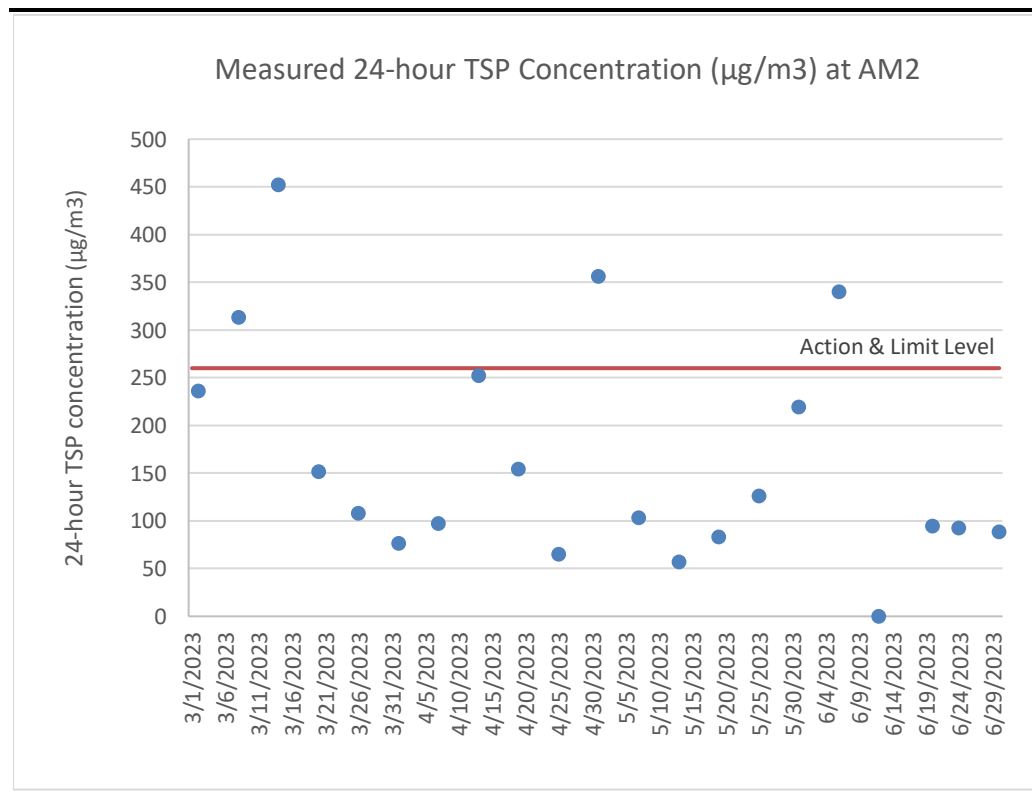


Table D1.3 24-hour TSP Monitoring Results at AM3

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu\text{g}/\text{m}^3$)
1 Apr 23	8:00	2 Apr 23	8:05	Cloudy	73
7 Apr 23	8:00	8 Apr 23	8:04	Cloudy	94
13 Apr 23	8:00	14 Apr 23	7:50	Sunny	213
19 Apr 23	8:00	20 Apr 23	8:02	Cloudy	74
25 Apr 23	8:00	26 Apr 23	8:07	Cloudy	29
1 May 23	8:00	2 May 23	8:00	Cloudy	99
7 May 23	8:00	8 May 23	8:00	Cloudy	73
13 May 23	8:00	14 May 23	8:00	Cloudy	59
19 May 23	8:00	20 May 23	8:00	Sunny	135
25 May 23	8:00	26 May 23	8:00	Sunny	130
31 May 23	8:00	1 Jun 23	8:00	Sunny	173
6 Jun 23	8:00	7 Jun 23	8:00	Cloudy	84
12 Jun 23	8:00	13 Jun 23	8:00	Cloudy	86
18 Jun 23	8:00	19 Jun 23	8:00	Fine	31
24 Jun 23	8:00	25 Jun 23	8:00	Cloudy	35
30 Jun 23	8:00	1 Jul 23	8:00	Fine	68
Average					91
Min					29
Max					213

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

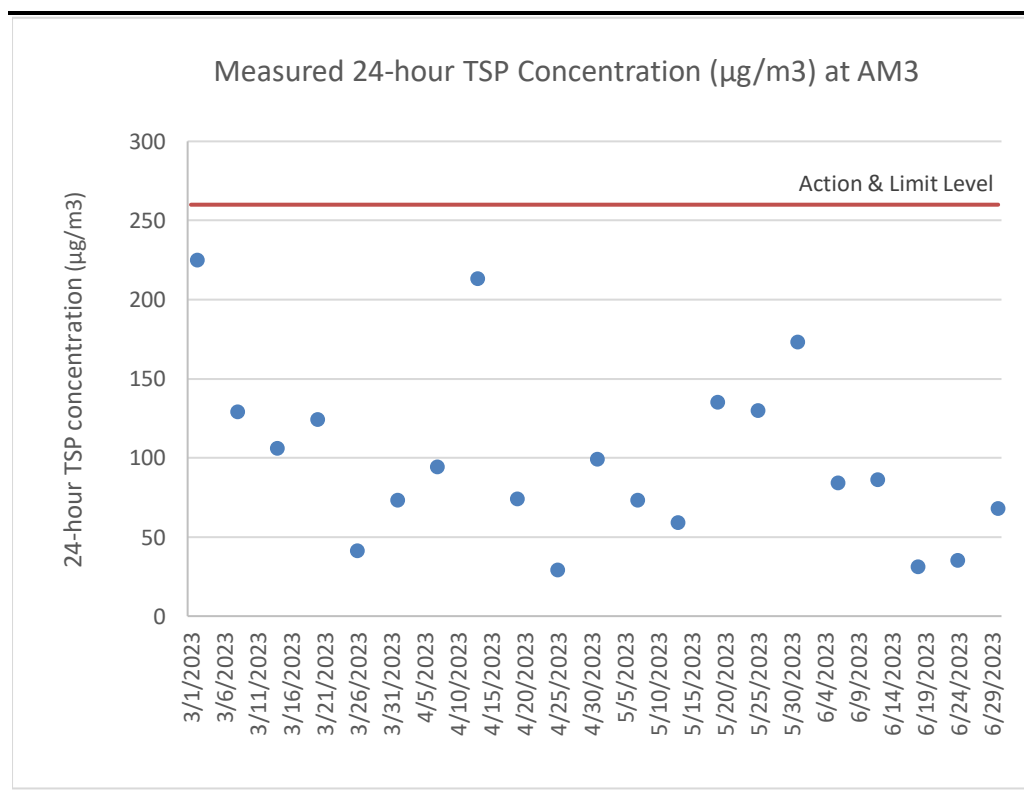
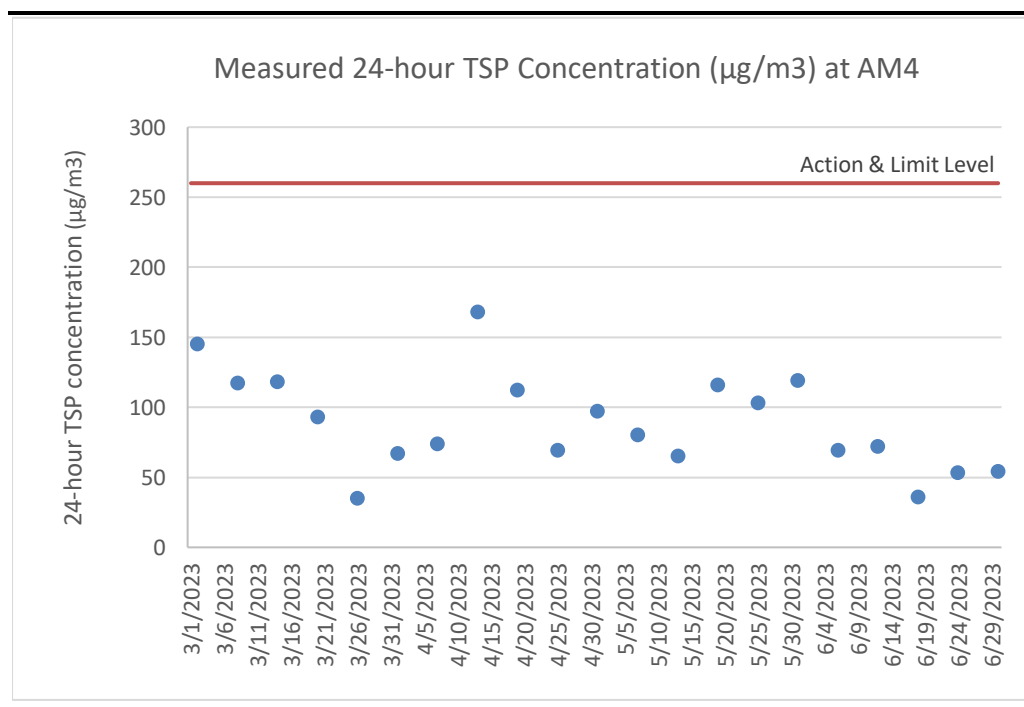


Table D1.4 24-hour TSP Monitoring Results at AM4

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu\text{g}/\text{m}^3$)
1 Apr 23	8:00	2 Apr 23	7:38	Cloudy	67
7 Apr 23	8:00	8 Apr 23	8:16	Cloudy	74
13 Apr 23	8:00	14 Apr 23	7:32	Sunny	168
19 Apr 23	8:00	20 Apr 23	7:41	Cloudy	112
25 Apr 23	8:00	26 Apr 23	8:19	Cloudy	69
1 May 23	8:00	2 May 23	8:00	Cloudy	97
7 May 23	8:00	8 May 23	8:00	Cloudy	80
13 May 23	8:00	14 May 23	8:00	Cloudy	65
19 May 23	8:00	20 May 23	8:00	Sunny	116
25 May 23	8:00	26 May 23	8:00	Sunny	103
31 May 23	8:00	1 Jun 23	8:00	Sunny	119
6 Jun 23	8:00	7 Jun 23	8:00	Cloudy	69
12 Jun 23	8:00	13 Jun 23	8:00	Cloudy	72
18 Jun 23	8:00	19 Jun 23	8:00	Fine	36
24 Jun 23	8:00	25 Jun 23	8:00	Cloudy	53
30 Jun 23	8:00	1 Jul 23	8:00	Fine	54
Average					85
Min					36
Max					168

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

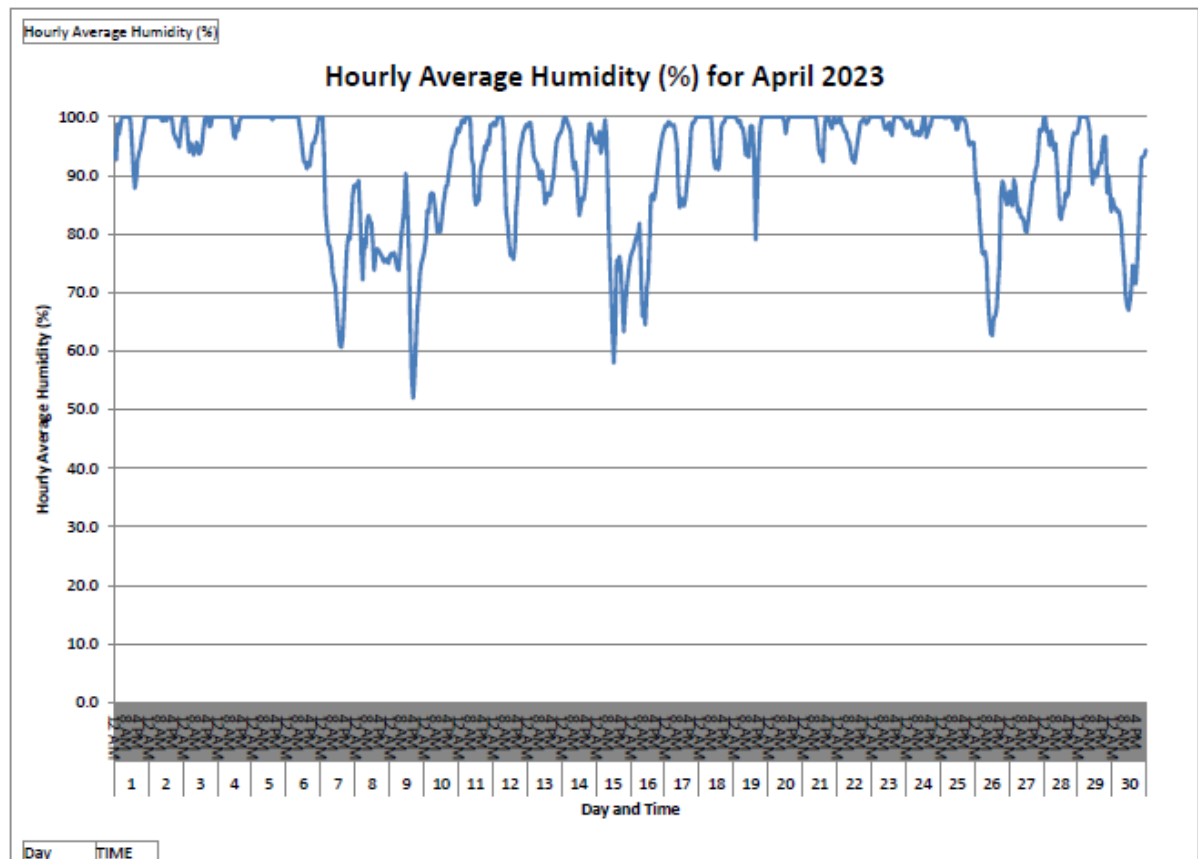
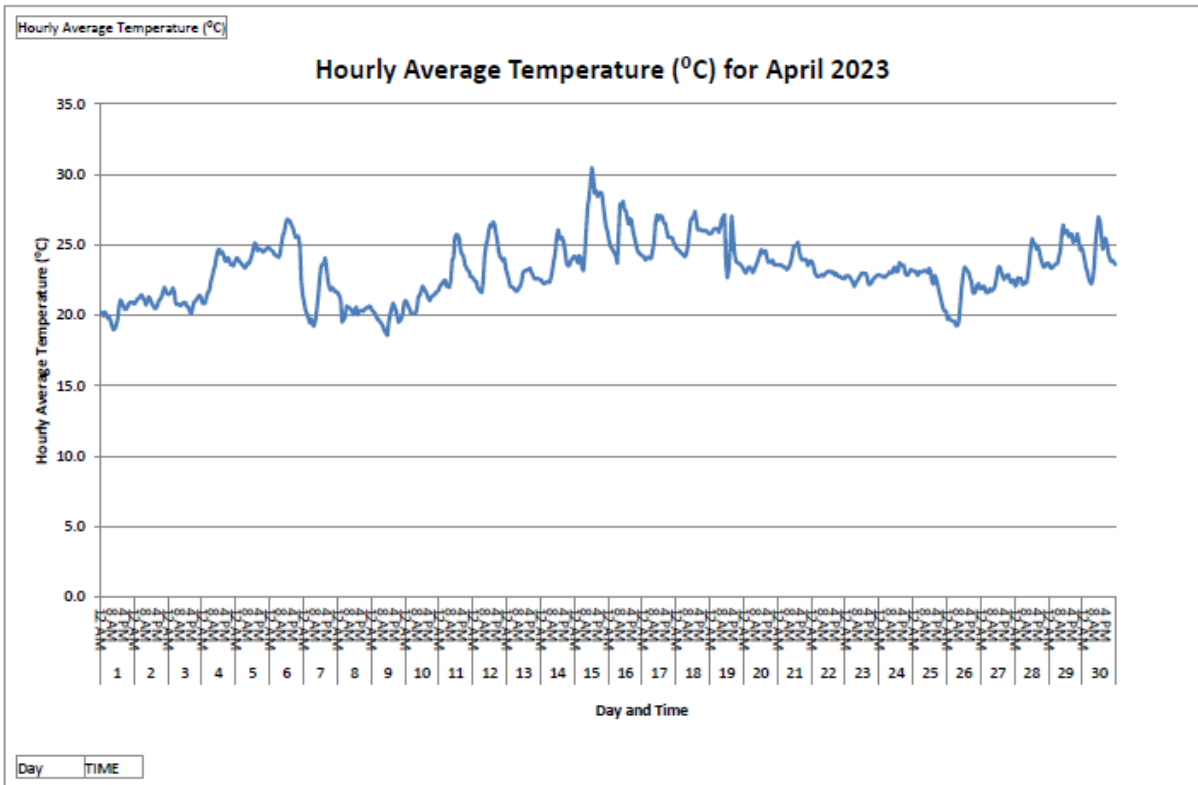
Event	Action		
	ET	IEC	Contractor
Exceedance of Limit Level of stack emission of the thermal oxidizer, flares and generator	<ul style="list-style-type: none"> Identify source(s) and investigate the cause(s) of exceedance Prepare the Notification of Exceedance within 24 hours Inform Contractor, IEC, Project 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

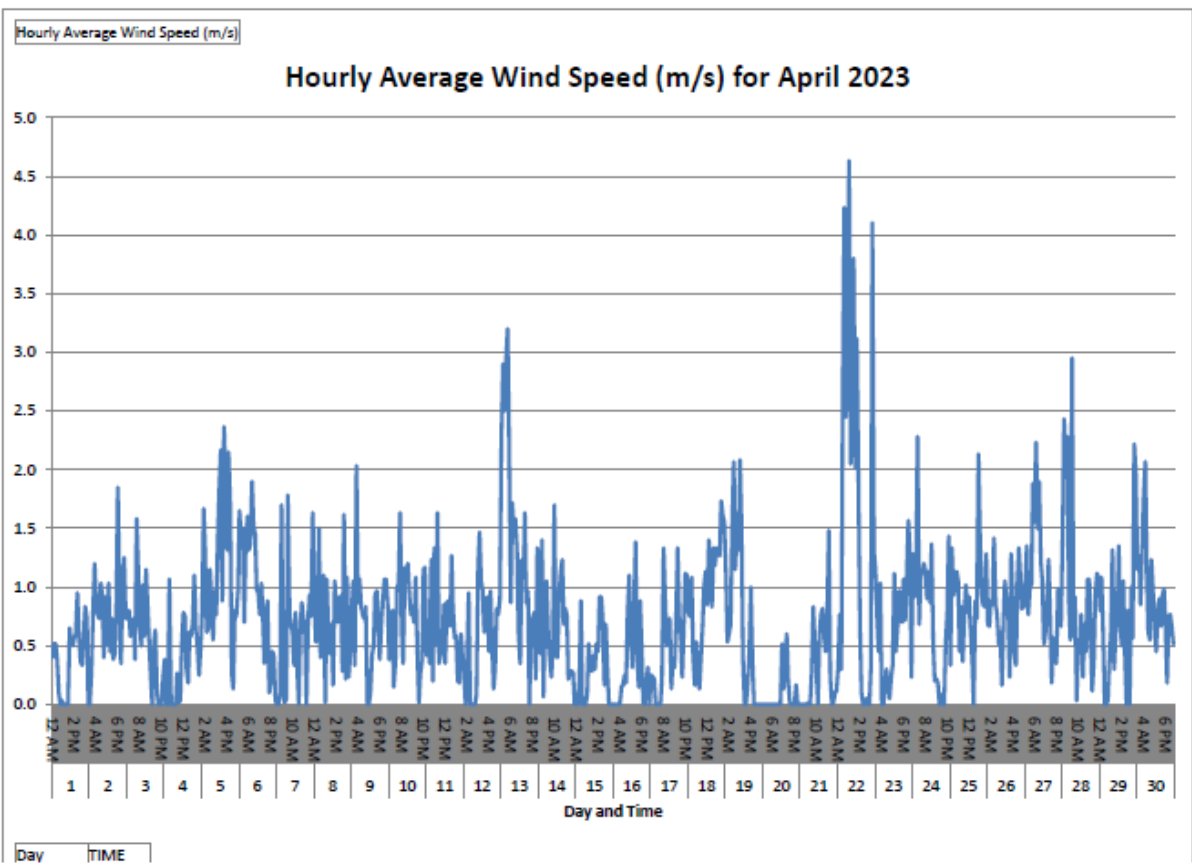
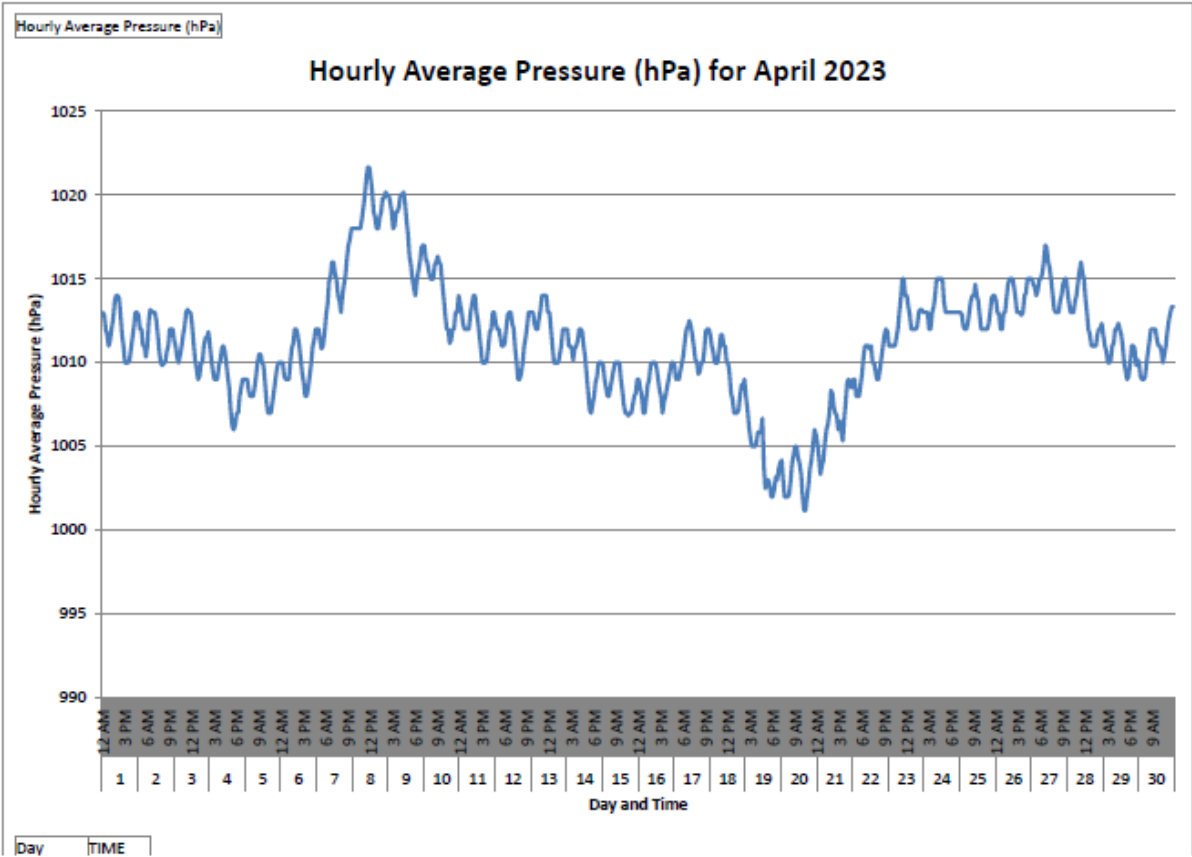
Annex D3

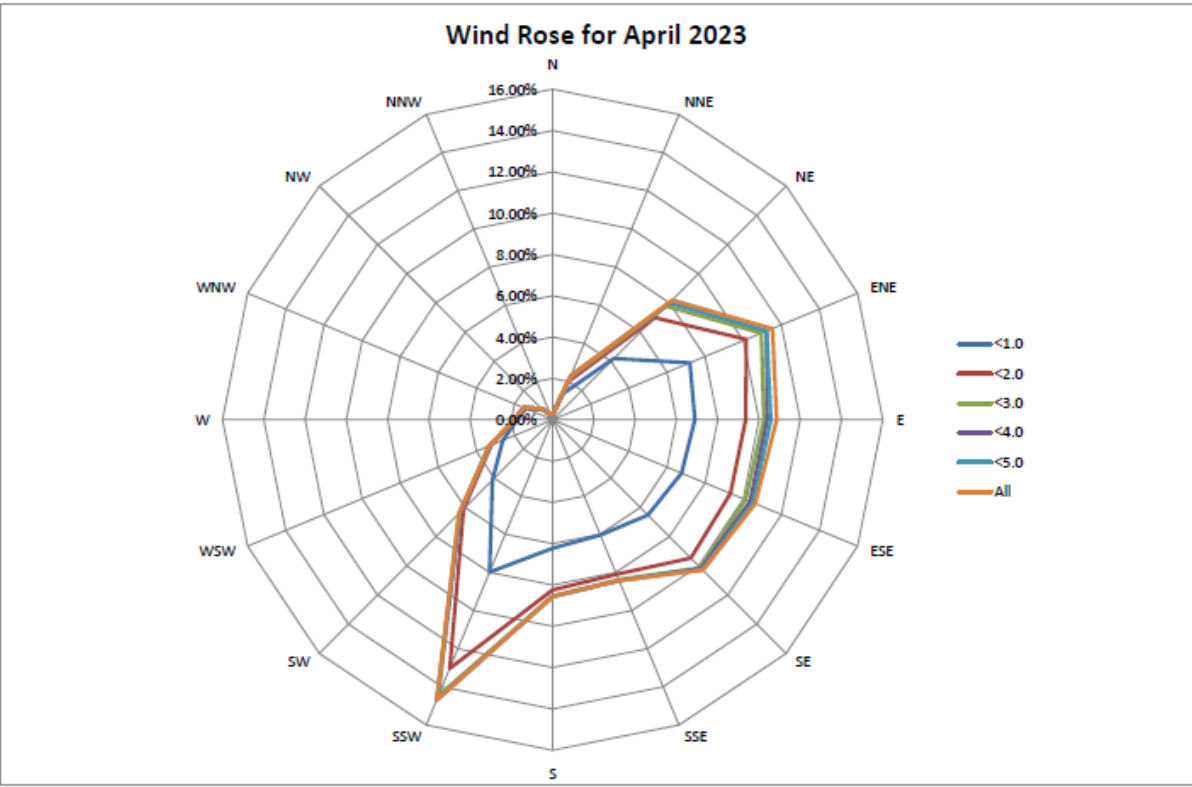
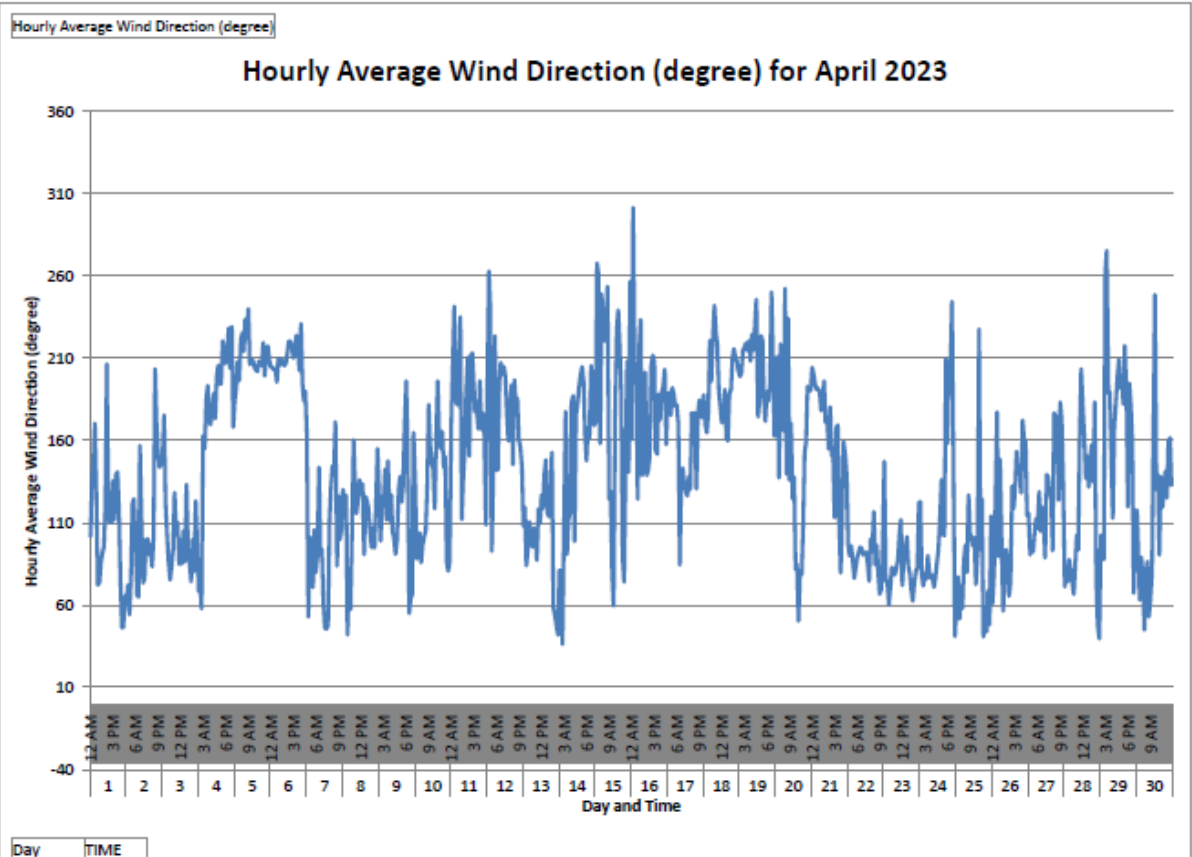
Meteorological Data

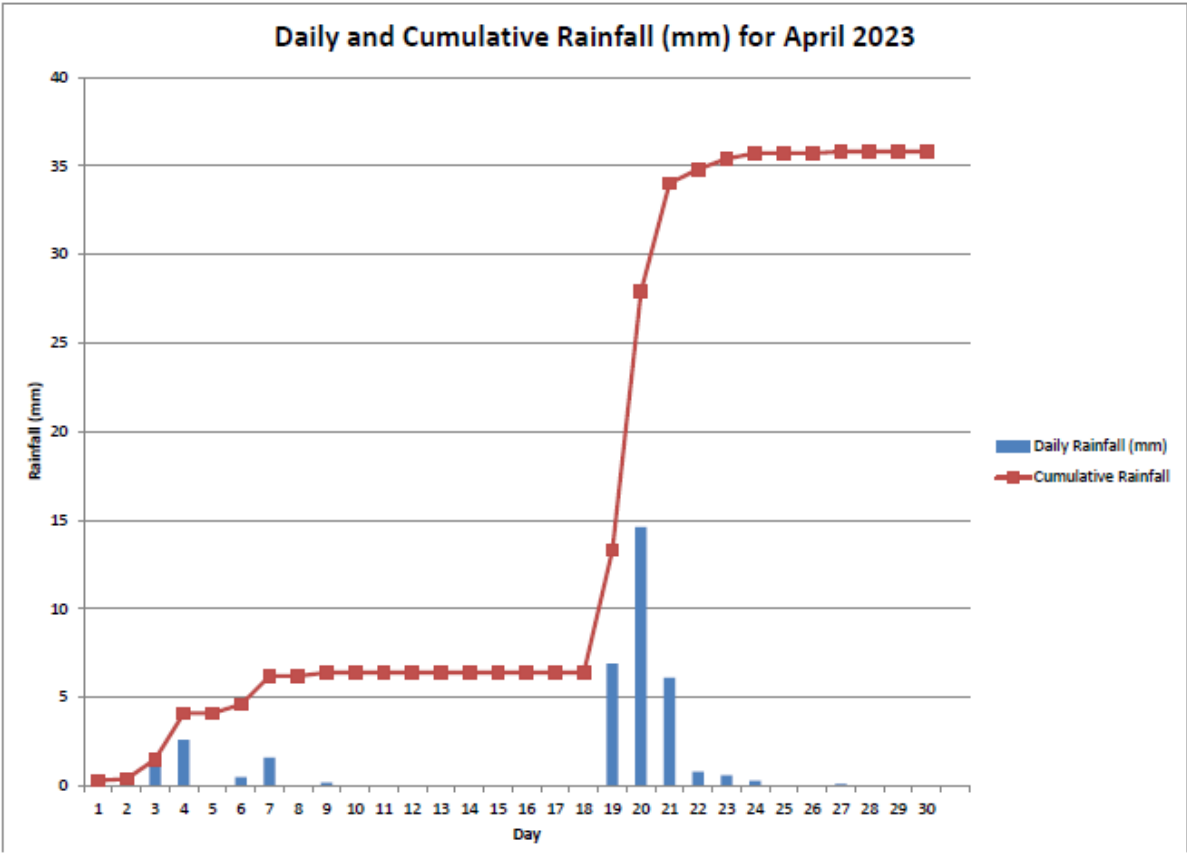
Annex D3 Meteorological Data

April 2023

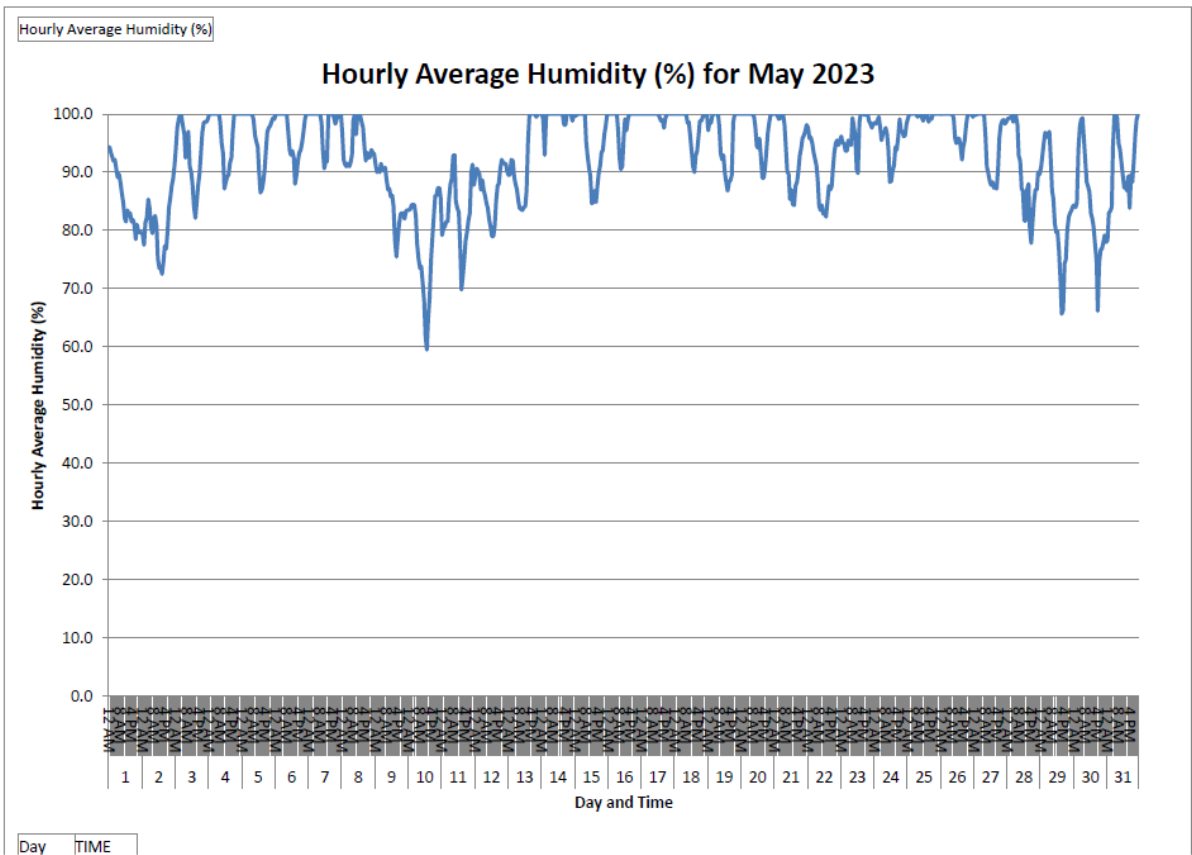
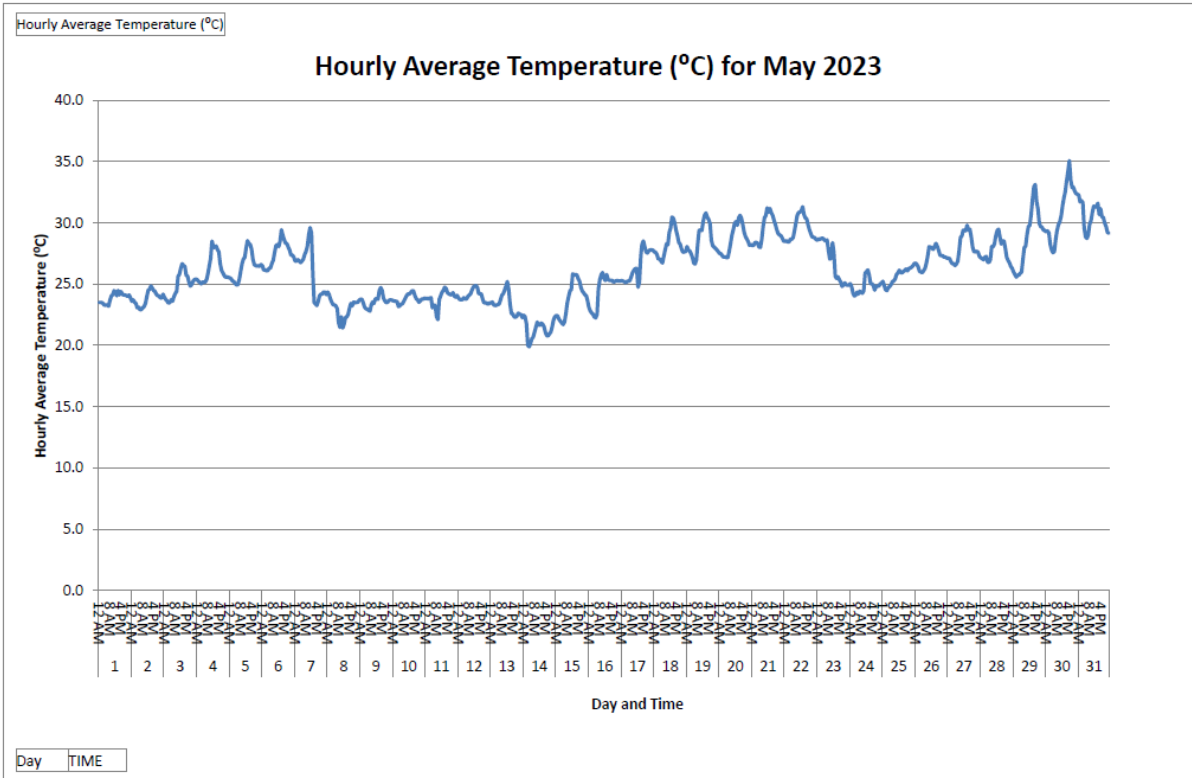






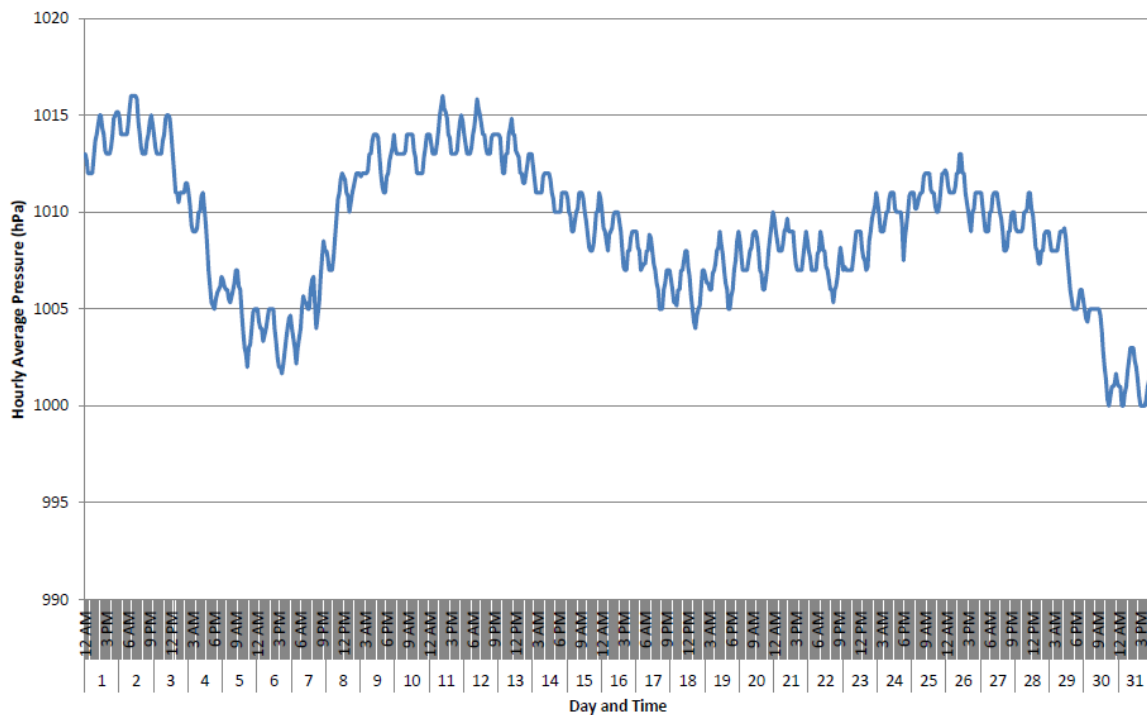


May 2023



Hourly Average Pressure (hPa)

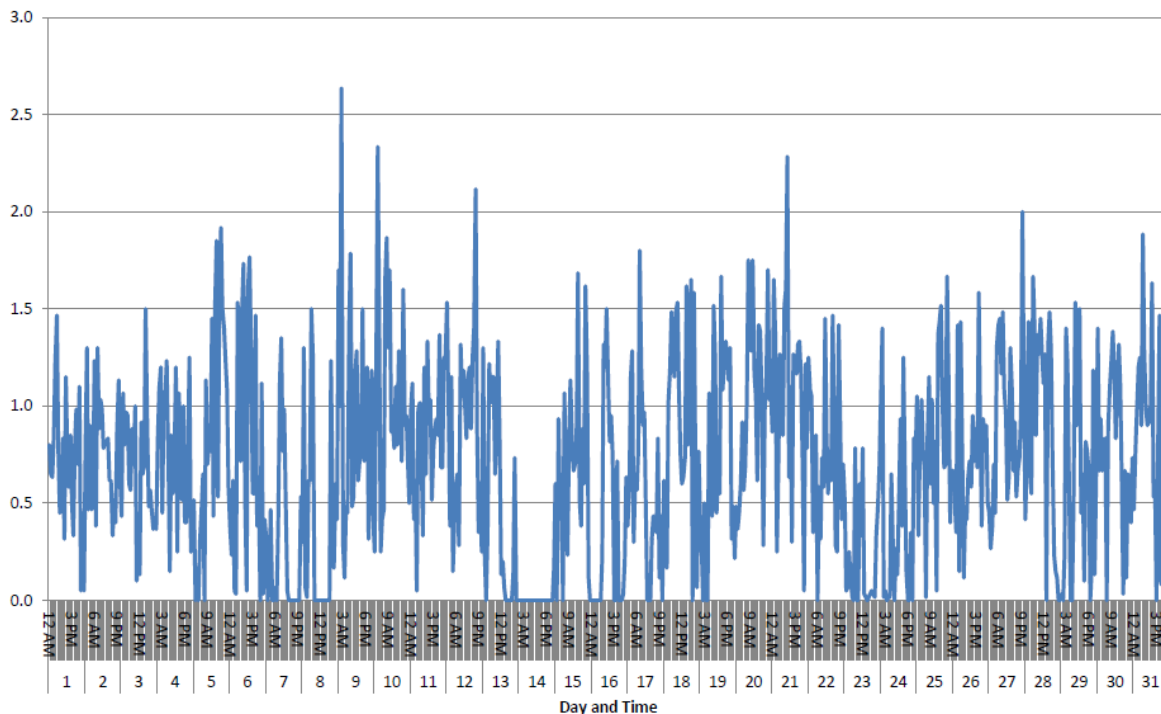
Hourly Average Pressure (hPa) for May 2023



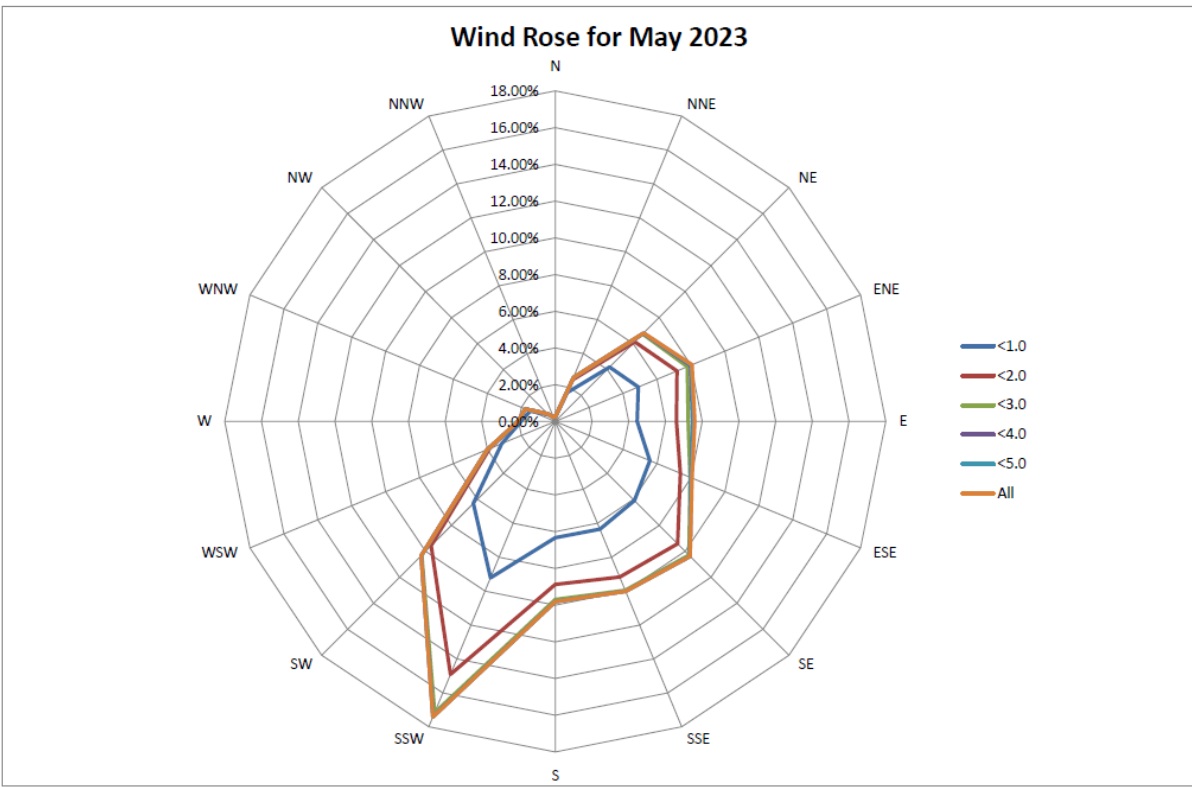
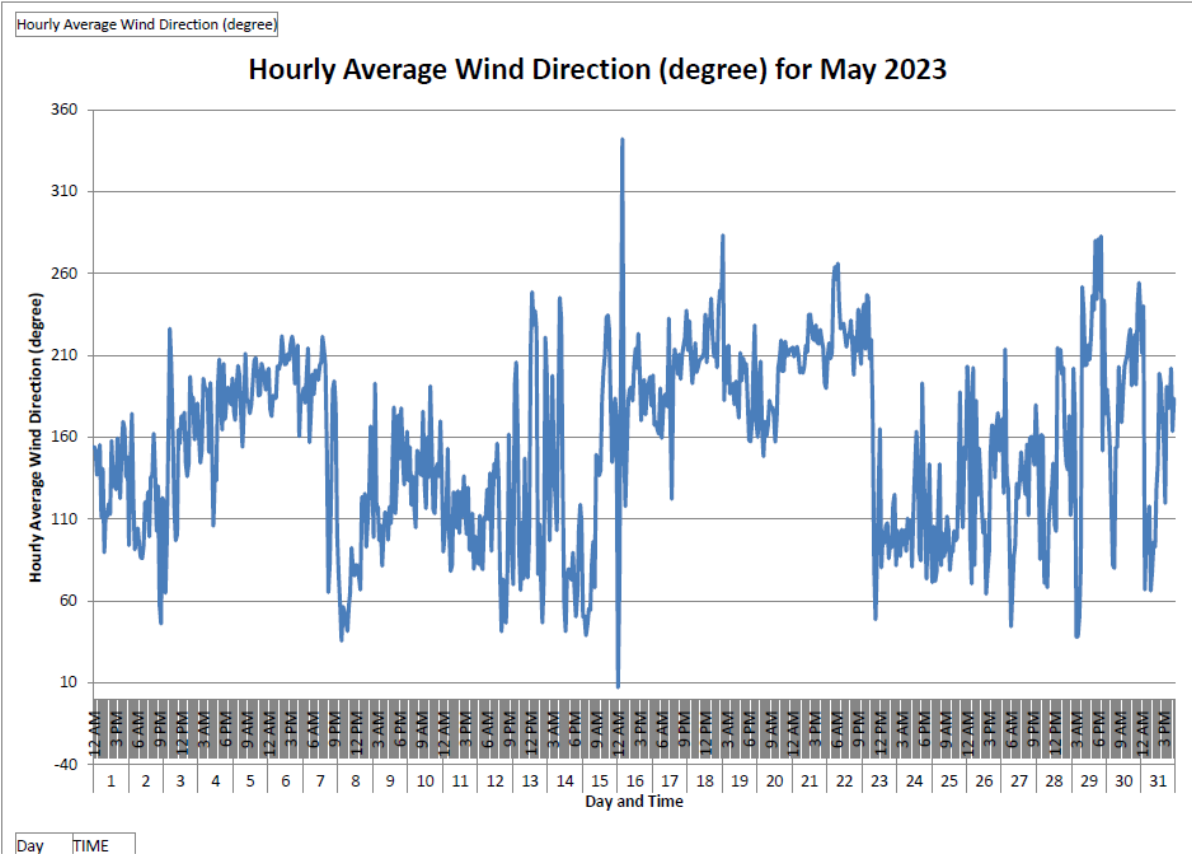
Day TIME

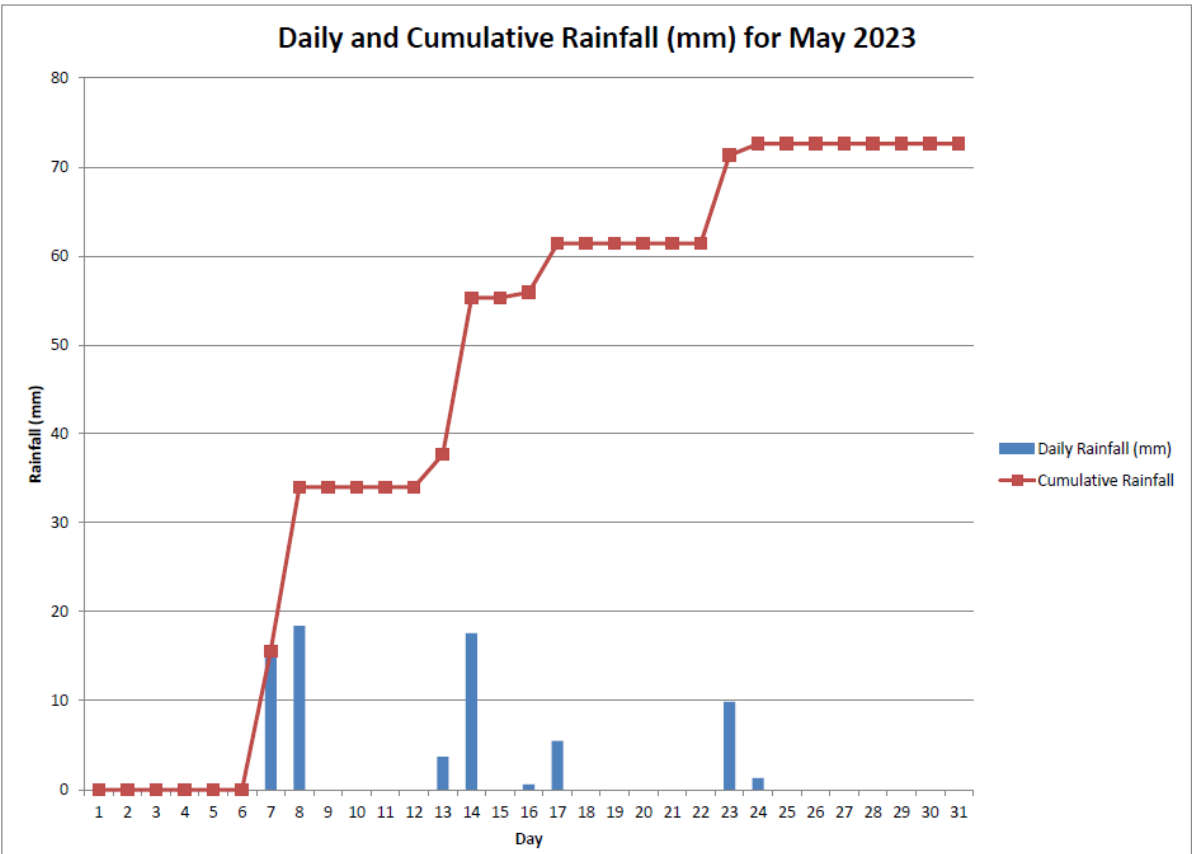
Hourly Average Wind Speed (m/s)

Hourly Average Wind Speed (m/s) for May 2023

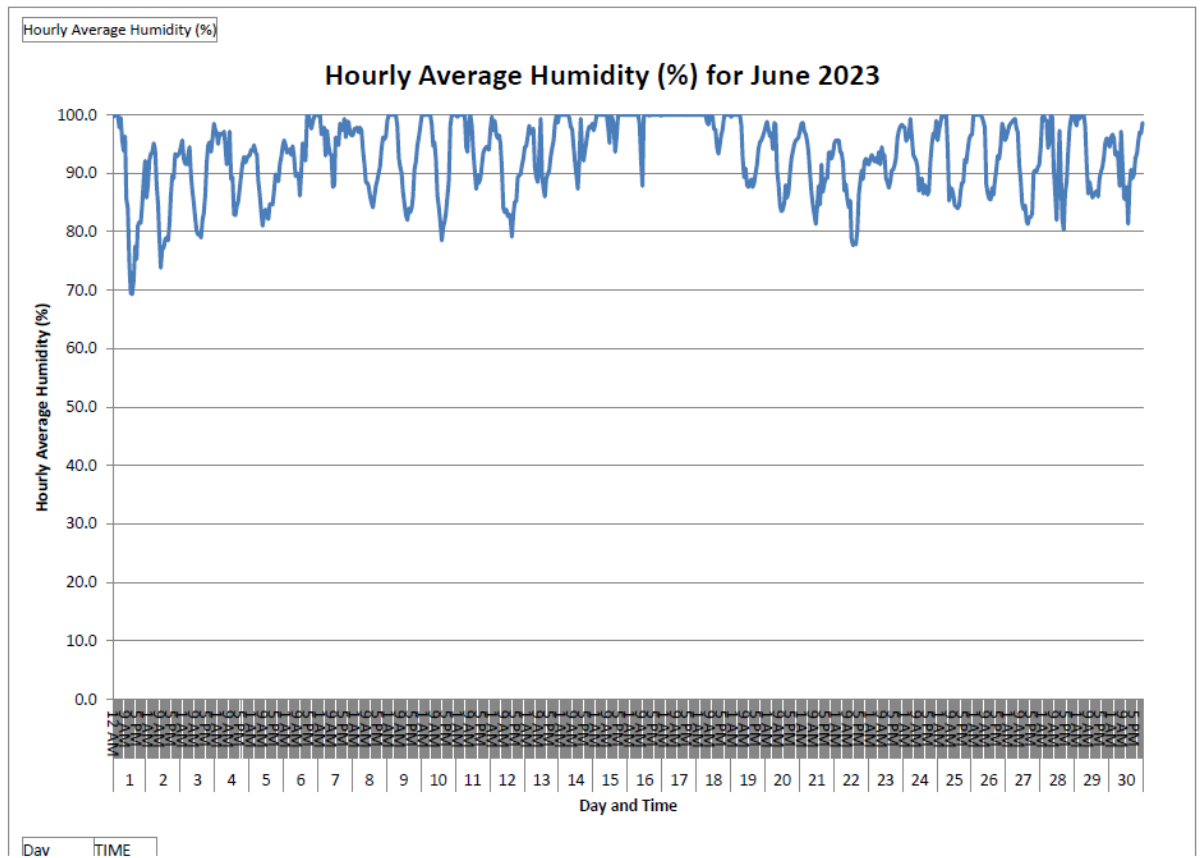
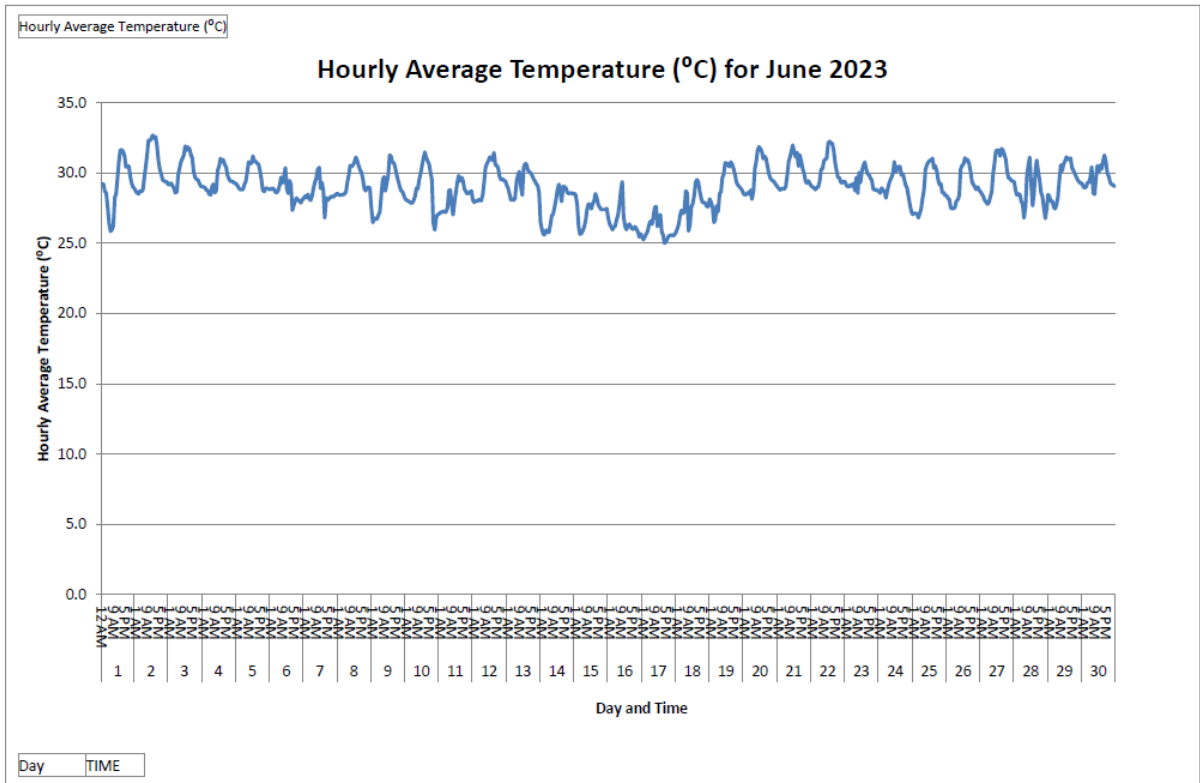


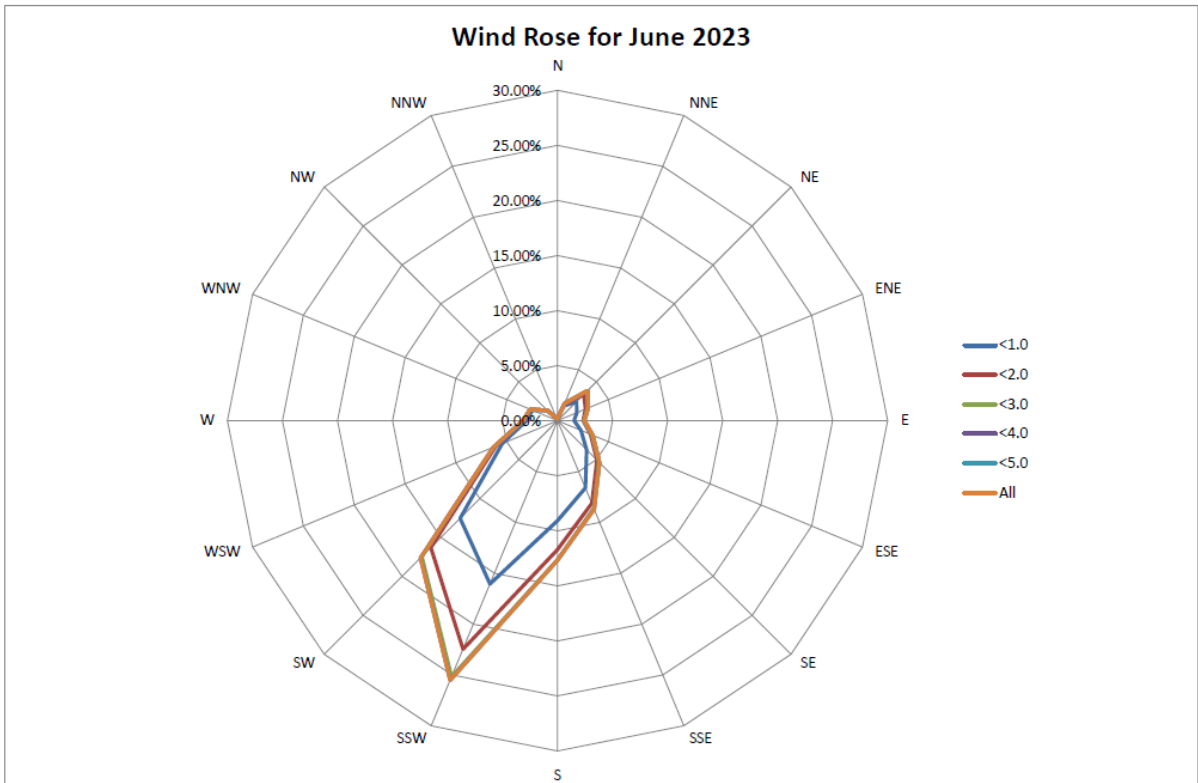
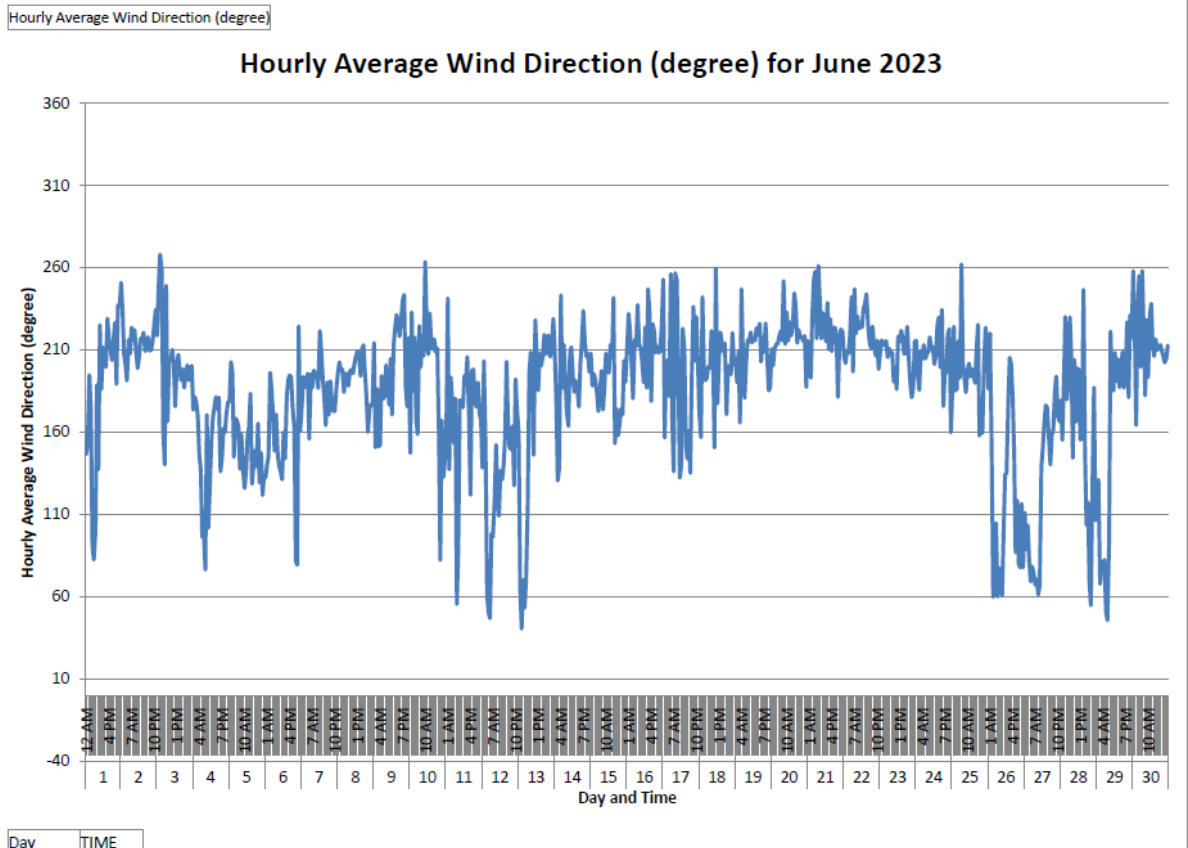
Day TIME

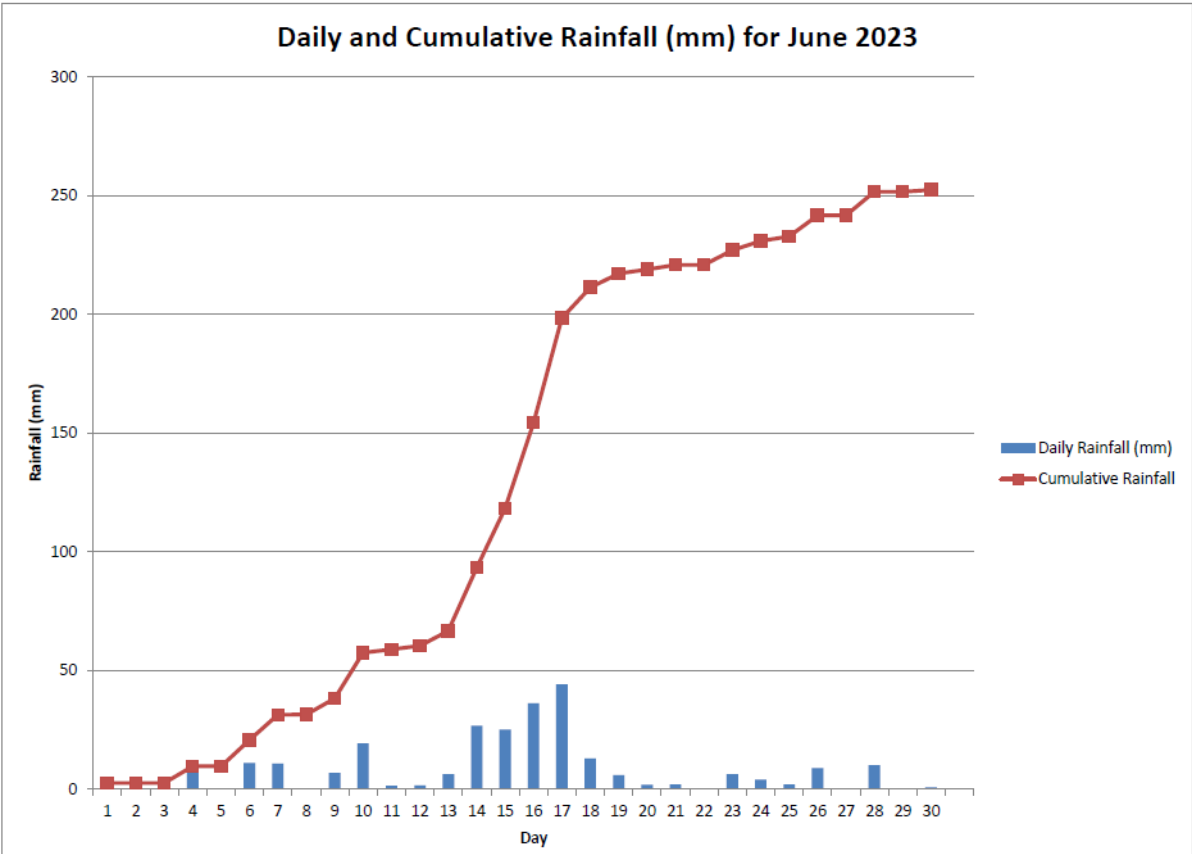




June 2023







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
18 Apr 23	Fine	OP1	14:38	27.0	0.0	N/A	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP2	14:41	26.9	1.5	SW	Yes	0	N/A	N/A	N/A
18 Apr 23	Fine	OP3	14:43	26.8	3.5	SW	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP4	14:45	26.2	3.6	E	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP5	14:47	27.6	4.1	E	No	1	Grassy	Vegetation	N/A
18 Apr 23	Fine	OP6	14:49	28.0	1.6	S	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP7	14:51	27.8	2.0	N/A	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP8	14:54	28.1	2.0	E	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP9	14:58	27.2	3.6	SE	Yes	0	N/A	N/A	N/A
18 Apr 23	Fine	OP10	15:02	28.1	1.7	E	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP11	15:18	27.8	1.5	W	No	1	Grassy	Vegetation	N/A
18 Apr 23	Fine	OP12	15:16	27.1	2.0	S	Yes	1	Grassy	Vegetation	N/A
18 Apr 23	Fine	OP13	15:14	28.1	1.0	SW	Yes	1	Grassy	Vegetation	N/A
18 Apr 23	Fine	OP14	15:11	30.3	0.0	N/A	No	1	Grassy	Vegetation	N/A
18 Apr 23	Fine	OP15	15:38	26.1	3.0	SW	Yes	1	Waste	Cell 4X	N/A
18 Apr 23	Fine	OP16	15:35	27.6	0.0	N/A	No	0	N/A	N/A	N/A
18 Apr 23	Fine	OP17	15:32	26.8	2.0	W	Yes	0	N/A	N/A	N/A
22 May 23	Fine	OP1	14:46	30.4	3.4	N	Yes	0	N/A	N/A	N/A
22 May 23	Fine	OP2	14:49	30.6	4.6	SE	No	0	N/A	N/A	N/A
22 May 23	Fine	OP3	14:51	31.7	1.4	W	No	0	N/A	N/A	N/A
22 May 23	Fine	OP4	14:54	32.2	0.8	E	No	0	N/A	N/A	N/A
22 May 23	Fine	OP5	14:56	32.2	1.4	E	No	0	N/A	N/A	N/A
22 May 23	Fine	OP6	14:58	31.5	3.4	NE	Yes	0	N/A	N/A	N/A
22 May 23	Fine	OP7	14:59	31.7	6.3	S	No	0	N/A	N/A	N/A
22 May 23	Fine	OP8	15:01	32.5	4.4	S	No	0	N/A	N/A	N/A
22 May 23	Fine	OP9	15:05	32.2	2.2	SW	No	0	N/A	N/A	N/A
22 May 23	Fine	OP10	15:07	33.9	2.3	NE	Yes	0	N/A	N/A	N/A
22 May 23	Fine	OP11	15:19	33.1	2.5	NW	No	0	N/A	N/A	N/A
22 May 23	Fine	OP12	15:16	33.6	1.5	SE	Yes	1	Grassy smell	Vegetation	N/A
22 May 23	Fine	OP13	15:14	34.3	0.0	N/A	No	0	N/A	N/A	N/A
22 May 23	Fine	OP14	15:12	32.7	2.5	NW	No	1	Grassy smell	Vegetation	N/A
22 May 23	Fine	OP15	15:33	30.8	7.8	W	Yes	1	Waste	Cell 4X	N/A
22 May 23	Fine	OP16	15:31	35.9	3.0	S	Yes	1	Waste	Cell 4X	N/A
22 May 23	Fine	OP17	15:28	32.8	3.2	N	No	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP1	14:18	26.3	1.6	N	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
15 Jun 23	Overcast	OP2	14:22	26.8	1.5	N	Yes	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP3	14:25	27.6	0.0	N/A	N/A	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP4	14:27	27.0	1.2	SW	No	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP5	14:29	27.1	1.2	NW	No	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP6	14:31	27.3	3.5	NE	Yes	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP7	14:33	27.6	3.3	N	No	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP8	14:36	29.2	1.3	W	No	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP9	14:43	28.4	0.0	N/A	N/A	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP10	14:44	28.1	2.7	N	No	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP11	14:56	28.4	0.0	N/A	N/A	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP12	14:54	28.5	2.0	NW	No	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP13	14:52	26.5	0.0	N/A	N/A	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP14	14:50	26.5	0.0	N/A	N/A	0	N/A	N/A	N/A
15 Jun 23	Overcast	OP15	15:15	28.0	1.6	SW	Yes	1	Waste	Tipping area	N/A
15 Jun 23	Overcast	OP16	15:12	27.3	2.3	W	Yes	1	Waste	Tipping area	N/A
15 Jun 23	Overcast	OP17	15:09	27.9	1.0	NW	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 (April 2023)
NO ₂	0.98 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	<0.01 gs ⁻¹
Benzene	<2.0 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.2 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	10.4 ms ⁻¹
Parameters	Monitoring Results (May 2023)
NO ₂	0.35 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	<0.01 gs ⁻¹
Benzene	1.0 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.0 x 10 ⁻⁴ gs ⁻¹
Non-Methane Organic Carbons	<3.0 x 10 ⁻³ gs ⁻¹
Ammonia	0.0227 gs ⁻¹
Exhaust gas velocity	9.3 ms ⁻¹
Parameters	Monitoring Results (June 2023)
NO ₂	0.95 gs ⁻¹
CO	<0.01 gs ⁻¹
SO ₂	<0.01 gs ⁻¹
Benzene	<1.0 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.0 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	8.2 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 Apr 23	926	1214	
2 Apr 23	923	1216	
3 Apr 23	922	1212	
4 Apr 23	937	1218	
5 Apr 23	926	1221	
6 Apr 23	Under Maintenance		
7 Apr 23	932	1215	
8 Apr 23	924	1217	
9 Apr 23	924	1217	
10 Apr 23	919	1198	
11 Apr 23	923	1218	
12 Apr 23	928	1217	10.4
13 Apr 23	927	1219	
14 Apr 23	925	1218	
15 Apr 23	927	1230	
16 Apr 23	925	1228	
17 Apr 23	920	1235	
18 Apr 23	922	1236	
19 Apr 23	923	1239	
20 Apr 23	924	1240	
21 Apr 23	921	1246	
22 Apr 23	928	1253	
23 Apr 23	925	1254	

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)
24 Apr 23	923	1254	
25 Apr 23	923	1261	
26 Apr 23	925	1267	
27 Apr 23	922	1272	
28 Apr 23	926	1274	
29 Apr 23	925	1275	
30 Apr 23	924	1281	
1 May 23	922	1281	
2 May 23	914	1269	
3 May 23	909	1272	
4 May 23	895	1264	
5 May 23	880	1254	
6 May 23	880	1260	
7 May 23	880	1262	
8 May 23	906	1246	
9 May 23	882	1267	
10 May 23	893	1282	
11 May 23	883	1271	
12 May 23	893	1263	
13 May 23	871	1266	
14 May 23	871	1269	
15 May 23	869	1270	
16 May 23	869	1271	9.3
17 May 23	867	1275	
18 May 23	858	1250	
19 May 23	859	1255	
20 May 23	860	1257	
21 May 23	863	1263	
22 May 23	860	1268	
23 May 23	858	1260	
24 May 23	855	1260	
25 May 23	855	1262	
26 May 23	861	1271	
27 May 23	856	1265	
28 May 23	858	1254	
29 May 23	865	1270	
30 May 23	860	1268	
31 May 23	857	1262	
1 Jun 23	862	1270	
2 Jun 23	858	1283	
3 Jun 23	859	1273	
4 Jun 23	853	1268	
5 Jun 23	Under Maintenance		
6 Jun 23	861	1278	
7 Jun 23	864	1275	
8 Jun 23	926	1189	
9 Jun 23	891	1210	
10 Jun 23	925	1212	
11 Jun 23	918	1214	
12 Jun 23	862	1208	
13 Jun 23	938	1221	
14 Jun 23	885	1208	8.2
15 Jun 23	907	1206	
16 Jun 23	904	1198	
17 Jun 23	894	1199	
18 Jun 23	930	1215	
19 Jun 23	930	1191	
20 Jun 23	931	1218	

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)
21 Jun 23	922	1212	
22 Jun 23	934	1215	
23 Jun 23	940	1216	
24 Jun 23	920	1202	
25 Jun 23	912	1202	
26 Jun 23	868	1192	
27 Jun 23	933	1214	
28 Jun 23	916	1193	
29 Jun 23	933	1218	
30 Jun 23	932	1223	
Average	900	1241	9.3
Min	853	1189	8.2
Max	940	1283	10.4

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 (April 2023)
	Flare 1 - F601
NO ₂	0.02 gs ⁻¹
CO	2.16 gs ⁻¹
SO ₂	0.02 gs ⁻¹
Benzene	<1.6 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.3 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	11.6 ms ⁻¹
Parameters	Monitoring Results (May 2023)
	Flare 1 - F601
NO ₂	0.03 gs ⁻¹
CO	0.33 gs ⁻¹
SO ₂	<0.01 gs ⁻¹
Benzene	<4.47 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.07 x 10 ⁻⁴ gs ⁻¹
Non-Methane Organic Carbons	0.003 gs ⁻¹
Exhaust gas velocity	8.7 ms ⁻¹
Parameters	Monitoring Results (June 2023)
	Flare 1 - F601
NO ₂	0.02 gs ⁻¹
CO	0.64 gs ⁻¹
SO ₂	<0.06 gs ⁻¹
Benzene	3.30 x 10 ⁻⁴ gs ⁻¹
Vinyl chloride	<1.01 x 10 ⁻⁴ gs ⁻¹
Exhaust gas velocity	8.9 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 Apr 23	872	1049		In Operation
2 Apr 23	875	1093		In Operation
3 Apr 23	895	1063		In Operation
4 Apr 23	900	1020		In Operation
5 Apr 23	942	1068		In Operation
6 Apr 23	880	1063		In Operation
7 Apr 23	860	1053		In Operation
8 Apr 23	860	1063		In Operation
9 Apr 23	850	1033		In Operation
10 Apr 23	890	1073		In Operation
11 Apr 23	880	1063		In Operation
12 Apr 23	880	1093		In Operation
13 Apr 23	890	1063		In Operation
14 Apr 23	860	1053		In Operation
15 Apr 23	920	1073		In Operation
16 Apr 23	880	1093	11.6	In Operation
17 Apr 23	840	1093		In Operation
18 Apr 23	870	1093		In Operation
19 Apr 23	880	1033		In Operation
20 Apr 23	890	1043		In Operation
21 Apr 23	870	1093		In Operation
22 Apr 23	870	1063		In Operation
23 Apr 23	880	1093		In Operation
24 Apr 23	890	1083		In Operation
25 Apr 23	830	1023		In Operation
26 Apr 23	930	1133		In Operation
27 Apr 23	940	1153		In Operation
28 Apr 23	890	1063		In Operation
29 Apr 23	900	1083		In Operation
30 Apr 23	930	1033		In Operation
1 May 23	954	1053		In Operation
2 May 23	820	1063		In Operation
3 May 23	860	1003		In Operation
4 May 23	930	1093		In Operation
5 May 23	940	1033		In Operation
6 May 23	990	1053		In Operation
7 May 23	870	1053		In Operation
8 May 23	840	1053		In Operation
9 May 23	870	1073		In Operation
10 May 23	900	1043		In Operation
11 May 23	900	1093		In Operation
12 May 23	840	1043	8.7	In Operation
13 May 23	920	1143		In Operation
14 May 23	830	1053		In Operation
15 May 23	870	1093		In Operation
16 May 23	850	1093		In Operation
17 May 23	930	1043		In Operation
18 May 23	860	1003		In Operation
19 May 23	920	1163		In Operation
20 May 23	840	1023		In Operation
21 May 23	940	1033		In Operation
22 May 23	850	1083		In Operation
23 May 23	890	1103		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status
24 May 23	880	1083		In Operation
25 May 23	880	1103		In Operation
26 May 23	855	1023		In Operation
27 May 23	860	1003		In Operation
28 May 23	830	1053		In Operation
29 May 23	840	1013		In Operation
30 May 23	850	1023		In Operation
31 May 23	840	1023		In Operation
1 Jun 23	868	1017		In Operation
2 Jun 23	870	1038		In Operation
3 Jun 23	884	1053		In Operation
4 Jun 23	860	1053		In Operation
5 Jun 23	880	1033		In Operation
6 Jun 23	890	1033		In Operation
7 Jun 23	890	1043		In Operation
8 Jun 23	820	1043		In Operation
9 Jun 23	890	1053		In Operation
10 Jun 23	890	1083		In Operation
11 Jun 23	900	1073		In Operation
12 Jun 23	850	1063		In Operation
13 Jun 23	880	1053		In Operation
14 Jun 23	890	1003		In Operation
15 Jun 23	850	1083	8.9	In Operation
16 Jun 23	920	1133		In Operation
17 Jun 23	850	1023		In Operation
18 Jun 23	830	1033		In Operation
19 Jun 23	880	1053		In Operation
20 Jun 23	850	1053		In Operation
21 Jun 23	820	1043		In Operation
22 Jun 23	880	1033		In Operation
23 Jun 23	830	1043		In Operation
24 Jun 23	880	1063		In Operation
25 Jun 23	840	1053		In Operation
26 Jun 23	880	1023		In Operation
27 Jun 23	870	1023		In Operation
28 Jun 23	900	1123		In Operation
29 Jun 23	-	-		Under Maintenance
30 Jun 23	-	-		Under Maintenance
Average	878	1060	9.7	
Min	820	1003	8.7	
Max	990	1163	11.6	
Flare 2 - F602				
1 Apr 23	-	-		Under Maintenance
2 Apr 23	-	-		Under Maintenance
3 Apr 23	840	1083		In Operation
4 Apr 23	-	-		Under Maintenance
5 Apr 23	840	983		In Operation
6 Apr 23	880	1103		In Operation
7 Apr 23	890	1123		In Operation
8 Apr 23	-	-		Under Maintenance
9 Apr 23	-	-	11.6	Under Maintenance
10 Apr 23	840	1093		In Operation
11 Apr 23	-	-		Under Maintenance
12 Apr 23	-	-		Under Maintenance
13 Apr 23	-	-		Under Maintenance
14 Apr 23	-	-		Under Maintenance
15 Apr 23	-	-		Under Maintenance

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status
16 Apr 23	860	1103		In Operation
17 Apr 23	860	1073		In Operation
18 Apr 23	830	1083		In Operation
19 Apr 23	840	1078		In Operation
20 Apr 23	880	1103		In Operation
21 Apr 23	840	1088		In Operation
22 Apr 23	-	-		Under Maintenance
23 Apr 23	-	-		Under Maintenance
24 Apr 23	880	1113		In Operation
25 Apr 23	-	-		Under Maintenance
26 Apr 23	-	-		Under Maintenance
27 Apr 23	-	-		Under Maintenance
28 Apr 23	-	-		Under Maintenance
29 Apr 23	-	-		Under Maintenance
30 Apr 23	860	1113		In Operation
1 May 23	890	1113		In Operation
2 May 23	920	1033		In Operation
3 May 23	890	1083		In Operation
4 May 23	850	1003		In Operation
5 May 23	830	1073		In Operation
6 May 23	910	1033		In Operation
7 May 23	860	1043		In Operation
8 May 23	880	1123		In Operation
9 May 23	890	1013		In Operation
10 May 23	830	1073		In Operation
11 May 23	880	1033		In Operation
12 May 23	890	1053		In Operation
13 May 23	890	1093		In Operation
14 May 23	860	1083	8.7	In Operation
15 May 23	880	1123		In Operation
16 May 23	840	1073		In Operation
17 May 23	890	1043		In Operation
18 May 23	870	1083		In Operation
19 May 23	900	1113		In Operation
20 May 23	890	1113		In Operation
21 May 23	900	1123		In Operation
22 May 23	900	1113		In Operation
23 May 23	880	1073		In Operation
24 May 23	890	1093		In Operation
25 May 23	880	1083		In Operation
26 May 23	860	1073		In Operation
27 May 23	890	1103		In Operation
28 May 23	880	1103		In Operation
29 May 23	870	1093		In Operation
30 May 23	830	1033		In Operation
31 May 23	900	1113		In Operation
1 Jun 23	880	1113		In Operation
2 Jun 23	830	1063		In Operation
3 Jun 23	880	1113		In Operation
4 Jun 23	920	1113		In Operation
5 Jun 23	910	1153		In Operation
6 Jun 23	910	1163		In Operation
7 Jun 23	870	1083		In Operation
8 Jun 23	860	1093		In Operation
9 Jun 23	880	1103		In Operation
10 Jun 23	830	1063		In Operation
11 Jun 23	880	1103		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status
12 Jun 23	900	1113		In Operation
13 Jun 23	835	1063		In Operation
14 Jun 23	870	1093	8.9	In Operation
15 Jun 23	-	-		Under Maintenance
16 Jun 23	-	-		Under Maintenance
17 Jun 23	840	1063		In Operation
18 Jun 23	850	1073		In Operation
19 Jun 23	-	-		Under Maintenance
20 Jun 23	-	-		Under Maintenance
21 Jun 23	-	-		Under Maintenance
22 Jun 23	-	-		Under Maintenance
23 Jun 23	-	-		Under Maintenance
24 Jun 23	-	-		Under Maintenance
25 Jun 23	-	-		Under Maintenance
26 Jun 23	-	-		Under Maintenance
27 Jun 23	-	-		Under Maintenance
28 Jun 23	880	1063		In Operation
29 Jun 23	870	1083		In Operation
30 Jun 23	850	1063		In Operation
Average	872	1084	9.7	
Min	830	983	8.7	
Max	920	1163	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.

Table D5.5 Landfill Gas Generator Stack Emission Monitoring Results

Parameters	Monitoring Results (April 2023)
NO ₂	0.018 gs ⁻¹
CO	0.694 gs ⁻¹
SO ₂	0.001 gs ⁻¹
Benzene	3.0 x 10 ⁻⁵ gs ⁻¹
Vinyl chloride	<0.8 x 10 ⁻⁵ gs ⁻¹
Exhaust gas velocity	9.1 ms ⁻¹
Parameters	Monitoring Results (May 2023)
NO ₂	0.030 gs ⁻¹
CO	0.853 gs ⁻¹
SO ₂	<0.001 gs ⁻¹
Benzene	5.9 x 10 ⁻⁵ gs ⁻¹
Vinyl chloride	<1.2 x 10 ⁻⁵ gs ⁻¹
Non-Methane Organic Carbons	1.9 x 10 ⁻³ gs ⁻¹
Exhaust gas velocity	12.9 ms ⁻¹
Parameters	Monitoring Results (June 2023)
NO ₂	0.034 gs ⁻¹
CO	1.012 gs ⁻¹
SO ₂	0.002 gs ⁻¹
Benzene	6.6 x 10 ⁻⁵ gs ⁻¹
Vinyl chloride	<1.3 x 10 ⁻⁵ gs ⁻¹
Non-Methane Organic Carbons	13.6 ms ⁻¹

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 Apr 23	865		In Operation
2 Apr 23	864		In Operation
3 Apr 23	862		In Operation
4 Apr 23	-		Under Maintenance
5 Apr 23	-		Under Maintenance
6 Apr 23	-		Under Maintenance
7 Apr 23	-		Under Maintenance
8 Apr 23	-		Under Maintenance
9 Apr 23	-		Under Maintenance
10 Apr 23	-		Under Maintenance
11 Apr 23	-		Under Maintenance
12 Apr 23	-	9.1	Under Maintenance
13 Apr 23	-		Under Maintenance
14 Apr 23	-		Under Maintenance
15 Apr 23	-		Under Maintenance
16 Apr 23	-		Under Maintenance
17 Apr 23	-		Under Maintenance
18 Apr 23	-		Under Maintenance
19 Apr 23	-		Under Maintenance
20 Apr 23	-		Under Maintenance
21 Apr 23	-		Under Maintenance
22 Apr 23	-		Under Maintenance
23 Apr 23	-		Under Maintenance
24 Apr 23	-		Under Maintenance

Date	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status (Landfill Gas Generator in Operation)
25 Apr 23	861		In Operation
26 Apr 23	858		In Operation
27 Apr 23	-		Under Maintenance
28 Apr 23	-		Under Maintenance
29 Apr 23	-		Under Maintenance
30 Apr 23	-		Under Maintenance
1 May 23	-		Under Maintenance
2 May 23	-		Under Maintenance
3 May 23	-		Under Maintenance
4 May 23	-		Under Maintenance
5 May 23	-		Under Maintenance
6 May 23	876		In Operation
7 May 23	872		In Operation
8 May 23	871		In Operation
9 May 23	-		Under Maintenance
10 May 23	869		In Operation
11 May 23	872		In Operation
12 May 23	-		Under Maintenance
13 May 23	-		Under Maintenance
14 May 23	-		Under Maintenance
15 May 23	872	12.9	In Operation
16 May 23	870		In Operation
17 May 23	876		In Operation
18 May 23	877		In Operation
19 May 23	878		In Operation
20 May 23	879		In Operation
21 May 23	877		In Operation
22 May 23	877		In Operation
23 May 23	873		In Operation
24 May 23	873		In Operation
25 May 23	875		In Operation
26 May 23	875		In Operation
27 May 23	864		In Operation
28 May 23	862		In Operation
29 May 23	875		In Operation
30 May 23	877		In Operation
31 May 23	873		In Operation
1 Jun 23	876		In Operation
2 Jun 23	878		In Operation
3 Jun 23	877		In Operation
4 Jun 23	876		In Operation
5 Jun 23	876		In Operation
6 Jun 23	875		In Operation
7 Jun 23	877		In Operation
8 Jun 23	879		In Operation
9 Jun 23	878		In Operation
10 Jun 23	878		In Operation
11 Jun 23	879	13.6	In Operation
12 Jun 23	880		In Operation
13 Jun 23	-		Under Maintenance
14 Jun 23	-		Under Maintenance
15 Jun 23	879		In Operation
16 Jun 23	876		In Operation
17 Jun 23	877		In Operation
18 Jun 23	876		In Operation
19 Jun 23	855		In Operation
20 Jun 23	850		In Operation
21 Jun 23	847		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) (a)	Operation Status (Landfill Gas Generator in Operation)
22 Jun 23	845		In Operation
23 Jun 23	847		In Operation
24 Jun 23	846		In Operation
25 Jun 23	847		In Operation
26 Jun 23	847		In Operation
27 Jun 23	847		In Operation
28 Jun 23	848		In Operation
29 Jun 23	847		In Operation
30 Jun 23	848		In Operation
Average	868	11.9	
Min	845	9.1	
Max	880	13.6	
ENGB			
1 Apr 23	863		In Operation
2 Apr 23	-		Under Maintenance
3 Apr 23	858		In Operation
4 Apr 23	867		In Operation
5 Apr 23	867		In Operation
6 Apr 23	847		In Operation
7 Apr 23	858		In Operation
8 Apr 23	858		In Operation
9 Apr 23	858		In Operation
10 Apr 23	859		In Operation
11 Apr 23	868		In Operation
12 Apr 23	873	9.1	In Operation
13 Apr 23	871		In Operation
14 Apr 23	870		In Operation
15 Apr 23	871		In Operation
16 Apr 23	856		In Operation
17 Apr 23	873		In Operation
18 Apr 23	873		In Operation
19 Apr 23	872		In Operation
20 Apr 23	874		In Operation
21 Apr 23	872		In Operation
22 Apr 23	871		In Operation
23 Apr 23	870		In Operation
24 Apr 23	868		In Operation
25 Apr 23	864		In Operation
26 Apr 23	868		In Operation
27 Apr 23	866		In Operation
28 Apr 23	869		In Operation
29 Apr 23	869		In Operation
30 Apr 23	863		In Operation
1 May 23	860		In Operation
2 May 23	862		In Operation
3 May 23	864		In Operation
4 May 23	865		In Operation
5 May 23	870		In Operation
6 May 23	-		Under Maintenance
7 May 23	-		Under Maintenance
8 May 23	-		Under Maintenance
9 May 23	861		In Operation
10 May 23	-		Under Maintenance
11 May 23	868		In Operation
12 May 23	868	12.9	In Operation
13 May 23	868		In Operation
14 May 23	867		In Operation
15 May 23	-		Under Maintenance

Date	Exhaust temperature (K)	Exhaust gas velocity (ms ⁻¹) ^(a)	Operation Status (Landfill Gas Generator in Operation)
16 May 23	-		Under Maintenance
17 May 23	-		Under Maintenance
18 May 23	-		Under Maintenance
19 May 23	-		Under Maintenance
20 May 23	-		Under Maintenance
21 May 23	-		Under Maintenance
22 May 23	-		Under Maintenance
23 May 23	-		Under Maintenance
24 May 23	-		Under Maintenance
25 May 23	-		Under Maintenance
26 May 23	-		Under Maintenance
27 May 23	-		Under Maintenance
28 May 23	-		Under Maintenance
29 May 23	-		Under Maintenance
30 May 23	-		Under Maintenance
31 May 23	-		Under Maintenance
1 Jun 23	-		Under Maintenance
2 Jun 23	-		Under Maintenance
3 Jun 23	-		Under Maintenance
4 Jun 23	-		Under Maintenance
5 Jun 23	-		Under Maintenance
6 Jun 23	-		Under Maintenance
7 Jun 23	-		Under Maintenance
8 Jun 23	-		Under Maintenance
9 Jun 23	-		Under Maintenance
10 Jun 23	-		Under Maintenance
11 Jun 23	-		Under Maintenance
12 Jun 23	-	13.6	Under Maintenance
13 Jun 23	876		In Operation
14 Jun 23	877		In Operation
15 Jun 23	-		Under Maintenance
16 Jun 23	-		Under Maintenance
17 Jun 23	-		Under Maintenance
18 Jun 23	-		Under Maintenance
19 Jun 23	851		In Operation
20 Jun 23	846		In Operation
21 Jun 23	843		In Operation
22 Jun 23	841		In Operation
23 Jun 23	843		In Operation
24 Jun 23	842		In Operation
25 Jun 23	843		In Operation
26 Jun 23	842		In Operation
27 Jun 23	843		In Operation
28 Jun 23	844		In Operation
29 Jun 23	843		In Operation
30 Jun 23	843		In Operation
Average	861	11.9	
Min	841	9.1	
Max	877	13.6	

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	64	55	82	66
H ₂ S	42	<15	<15	<15	<15
Methane	NA ^(a)	0.00021 %(v/v)	0.00016 %(v/v)	0.00021 %(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	0.4	0.4	0.5	0.4
Benzene	33	0.6	1	0.6	0.7
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	0.8	0.7	1.2
Carbon Tetrachloride	64	0.7	0.8	0.8	0.8
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)	1.9	2.2	2.1	2.3
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	0.5	<0.4
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	5.7	7	15
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	0.5	0.6	1.9	<0.5
Heptane	2,746	<0.8	<0.8	<0.8	<0.8
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	<2.6	31.1	37.7	41.5
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	1.4	1.5	3.8	7.9
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)	<0.8	0.8	1.1	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	1.5	1.4	1.9	7
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	0.8	1	3	0.9

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	13 April 2023
Time	8:00 (13 April 2023) – 8:00 (14 April 2023)
Monitoring Location	AM1
Parameter	24-hour Total Suspended Particulates (TSP)
Action / Limit Levels	Action level: >260 µg/ m ³ Limit level: >260 µg/ m ³
Measured Level	365 µg / m ³
Possible reason	<p>From the meteorological data obtained from the SENTX on-site meteorological monitoring station, a predominantly east-southeasterly to easterly wind with highest wind speed 3.2 m/s was recorded on 13 and 14 April 2023 during the sampling event.</p> <p>On 13 April 2023, dust and traffic emission from the SENT landfill in vicinity and located at the east of dust monitoring location AM1 were observed. The sample taken at AM1 on the day might not represent the operation dust emission from SENTX.</p> <p>In addition, no SENTX works which may lead to potential dust emission was conducted in the vicinity of dust monitoring location AM1 on the sampling day based on on-site observations and construction and operation activities as described by the Contractor. Environmental deficiency was not observed during the weekly site inspection on 13 April 2023. The Contractor has implemented the dust control and mitigation measures recommended in the updated EM&A Manual.</p> <p>In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 19 April 2023 to confirm findings. 24-hour TSP level of 142 µg/ m³ (below Action and Limit Levels) was measured during the sampling event, which demonstrate no consecutive dust impact at AM1.</p> <p>Due to presence of the influencing factor from the SENT landfill and no potential source from the Project-related activities in the vicinity of AM1 which may lead to the high TSP level was identified, there is no adequate evidence showing that the TSP exceedance at AM1 was deemed to Project-related activities.</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/Limit Level.</p> <p>The Contractor is also reminded to implement additional dust</p>

	control measures to minimize the dust impact from SENT Landfill to the SENTX boundary.
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 28 April 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	1 May 2023
Time	8:00 (1 May 2023) – 8:00 (2 May 2023)
Monitoring Location	AM2
Parameter	24-hour Total Suspended Particulates (TSP)
Action / Limit Levels	Action level: >260 µg/ m ³ Limit level: >260 µg/ m ³
Measured Level	356 µg / m ³
Possible reason	<p>From the meteorological data obtained from the SENTX on-site meteorological monitoring station, a predominantly south-easterly to east-southeasterly wind with highest wind speed 4.8 m/s was recorded on 1 and 2 May 2023 during the sampling event.</p> <p>On 1 May 2023, the ET site representative observed tipping activities at Cell 4X and SENT Landfill tie-in area and unpaved areas in the vicinity dust monitoring station AM2. This could be the potential cause for the exceedance. Based on this observation, the TSP exceedance at AM2 was deemed to Project-related activities.</p> <p>In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 7 May 2023 to confirm findings. 24-hour TSP level of 103 µg/ m³ (below Action and Limit Levels) was measured during the sampling event, which demonstrate no consecutive dust impact at AM2.</p>
Action Taken / Action to be Taken	<p>In accordance with Table 3.8b of the updated EM&A Manual, the monitoring frequency at AM2 shall be increased to daily, until no exceedance of the Action/Limit Level. It should be noted that the turnaround time for the laboratory analysis of the dust filter paper is 5 working days and the preliminary results for the monitoring event conducted on 1 to 2 May 2023 were available on 9 May 2023. Repeat measurement was conducted on 7 May 2023 and the TSP monitoring results at AM2 is well below the Action/Limit Level. Hence, the daily TSP monitoring at AM2 shall not be triggered.</p> <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/Limit Level.</p> <p>ET will continue to closely monitor the dust monitoring results and collect additional data for investigation and further review, if necessary.</p>

Remarks	-
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Prepared by: Abbey Lau

Designation: Environmental Team

Date: 18 May 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	12 May 2023
Time	12:01 – 12:31
Monitoring Location	Landfill Gas Flare 1 (F601)
Parameter	Benzene
Limit Levels	>0.000414 g/s
Measured Level	0.000447 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 12 May 2023 were well within the respective limit levels. It is possible that the slight exceedance of benzene limit level measured on 12 May 2023 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 12 May 2023 is considered Project related.</p> <p>In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 16 June 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 3 July 2023) to confirm findings. The benzene concentration (<0.000330 g/s) measured on 16 June 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: 4 July 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	6 June 2023
Time	8:00 (6 June 2023) – 8:00 (7 June 2023)
Monitoring Location	AM2
Parameter	24-hour Total Suspended Particulates (TSP)
Action / Limit Levels	Action level: >260 µg/ m ³ Limit level: >260 µg/m ³
Measured Level	340 µg /m ³
Possible reason	<p>From the meteorological data obtained from the SENTX on-site meteorological monitoring station, a predominantly south-southwesterly to southerly wind with highest wind speed 2.6 m/s was recorded on 6 and 7 June 2023 during the sampling event.</p> <p>On 6 June 2023, the ET site representative observed tipping activities at Cell 4X and SENT Landfill tie-in area and traffic emission in the vicinity dust monitoring station AM2. This could be the potential cause for the exceedance. Based on this observation, the TSP exceedance at AM2 was deemed to Project-related activities.</p> <p>In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 12 June and 18 June 2023 to confirm findings. However, the TSP monitoring results at AM2 on 12 June and 18 June 2023 were discarded due to the abnormally wet condition of the filter paper (suspected to be under the influence of sprinkler operation and adverse weather condition). Repeat measurement at AM2 was arranged on 20 June 2023. 24-hour TSP level of 94 µg/m³ (below Action and Limit Levels) was measured during the sampling event, which demonstrate no consecutive dust impact at AM2.</p>
Action Taken / Action to be Taken	<p>In accordance with Table 3.8b of the updated EM&A Manual, the monitoring frequency at AM2 shall be increased to daily, until no exceedance of the Action/Limit Level. It should be noted that the turnaround time for the laboratory analysis of the dust filter paper is 5 working days and the preliminary results for the monitoring event conducted on 6 to 7 June 2023 were available on 14 June 2023. Repeat measurement was conducted on 12 June (results discarded due to the abnormally wet condition of the filter paper), 18 June (results discarded due to the abnormally wet condition of the filter paper) and 20 June 2023, and the TSP monitoring results at AM2 is well below the Action/Limit Level. Hence, the daily TSP monitoring at AM2 shall not be triggered.</p> <p>Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is</p>

	<p>reminded to implement relevant and appropriate mitigation measures according to the updated EM&A Manual to avoid any exceedance of the Action/Limit Level.</p> <p>ET will continue to closely monitor the dust monitoring results and collect additional data for investigation and further review, if necessary.</p>
Remarks	-

Prepared by: Abbey Lau
 Designation: Environmental Team
 Date: 4 July 2023

Annex E

Noise

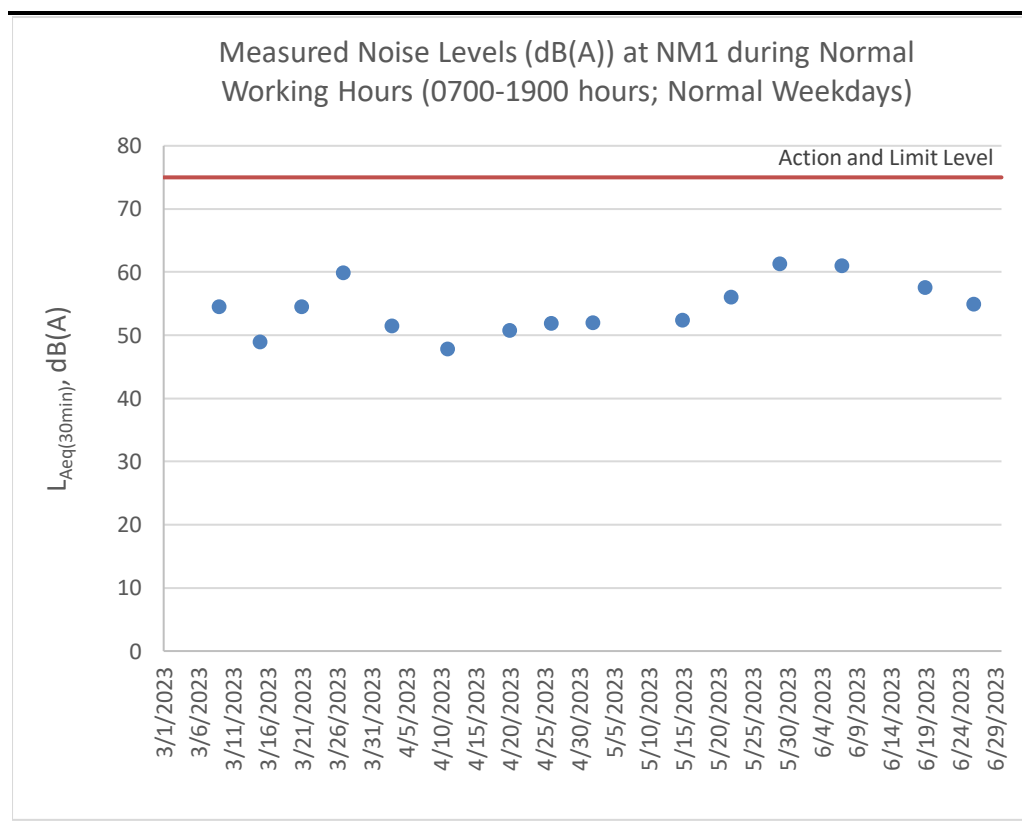
Annex E1

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)
3 Apr 23	9:53	10:23	Cloudy	53.2	48.5	51.5
11 Apr 23	10:46	11:16	Sunny	49.8	45.0	47.8
20 Apr 23	10:26	10:56	Cloudy	52.6	48.3	50.8
26 Apr 23	10:39	11:09	Sunny	53.8	48.9	51.9
2 May 23	10:21	10:51	Cloudy	53.7	48.7	52.0
8 May 23	9:01	9:31	Rainy	Monitoring was cancelled due to adverse weather.		
15 May 23	11:15	11:45	Cloudy	54.5	49.4	52.4
22 May 23	9:50	10:20	Sunny	58.1	53.4	56.0
29 May 23	14:30	15:00	Sunny	60.0	54.5	61.3
7 Jun 23	10:15	10:45	Sunny	61.9	59.9	61.0
13 Jun 23	11:00	11:30	Rainy	Monitoring was cancelled due to adverse weather.		
19 Jun 23	11:00	11:30	Sunny	59.5	53.1	57.6
26 Jun 23	10:35	11:05	Sunny	57.3	51.3	54.9
Average						54.3
Min						47.8
Max						61.3

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 DP3

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (°C)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks
11 Apr 23	16:00	Sunny		Unable to collect water sample due to insufficient flow					-
5 May 23	10:40	Sunny		Unable to collect water sample due to insufficient flow					-
9 Jun 23	10:55	Sunny		Unable to collect water sample due to insufficient flow					-
Average						-	-	-	-
Min						-	-	-	-
Max						-	-	-	-

Table F1.2 Surface Water Quality Monitoring Results at DP4

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (°C)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks
5 May 23	10:30	Sunny		Unable to collect water sample due to insufficient flow					-
Average						-	-	-	-
Min						-	-	-	-
Max						-	-	-	-

Table F1.3 Surface Water Quality Monitoring Results at DP6

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (°C)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks
11 Apr 23	15:46	Sunny		Unable to collect water sample due to insufficient flow					-
5 May 23	10:15	Sunny		Unable to collect water sample due to insufficient flow					-
9 Jun 23	10:50	Sunny		Unable to collect water sample due to insufficient flow					-
Average						-	-	-	-
Min						-	-	-	-
Max						-	-	-	-

Table F1.4 Surface Water Monitoring Results

		Date	11 Apr 23	11 Apr 23	9 Jun 23	9 Jun 23
		Limit Level	DP4	DP4(Duplicate)	DP4	DP4(Duplicate)
On-site Measurement						
pH Value	pH Unit	6 - 9	7.57	7.6	7.8	7.4
Electrical Conductivity	µS/cm	-	2140	2160	643	649
Dissolved Oxygen	mg/L	-	6.96	6.43	4.8	4.4
Volume Discharge	m ³	-	18	18	3,180	3,180
Laboratory Analysis						
Bicarbonate	mg/L	-	34	34	36	36
Carbonate	mg/L	-	<1	<1	<1	<1
Suspended Solids (SS)	mg/L	20	4.7	7.6	11.4	11.4
Ammonia-nitrogen	mg/L	7.1	0.03	0.05	0.02	0.03
Chloride	mg/L	-	410	400	124	123
Nitrite-nitrogen	mg/L	-	0.03	0.03	0.02	0.02
Phosphate	mg/L	5	<0.01	<0.01	<0.01	<0.01
Sulphate	mg/L	-	125	112	42	46
Sulphide	mg/L	2.5	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen(TKN)	mg/L	-	0.5	0.5	0.2	0.2
Nitrate-nitrogen	mg/L	-	0.79	0.77	0.2	0.2
Total Nitrogen(TN)	mg/L	50	1.3	1.3	0.4	0.4
Biochemical Oxygen Demand	mg/L	20	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	30	22	18	8	8
Oil & Grease	mg/L	20	<5	<5	<5	<5
Total Organic Carbon	mg/L	-	5	4	3	3
Boron	µg/L	1100	150	150	50	50
Calcium	mg/L	-	106	104	33.2	33.2
Mercury	µg/L	1	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	-	23.5	23	3.7	3.71
Sodium	mg/L	-	253	246	58.6	53.7
Iron	mg/L	3	<0.04	<0.04	<0.04	<0.04
Potassium	mg/L	-	19.5	18.8	9.64	9.65
Cadmium	µg/L	1	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	300	<1	<1	1	1
Copper	µg/L	300	3	2	2	1
Lead	µg/L	300	<1	<1	<1	<1

		Date	11 Apr 23	11 Apr 23	9 Jun 23	9 Jun 23
		Limit Level	DP4	DP4(Duplicate)	DP4	DP4(Duplicate)
Manganese	µg/L	-	17	16	6	7
Nickel	µg/L	300	<1	<1	<1	<1
Zinc	µg/L	-	<10	<10	<10	<10

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 Apr 23	73	84	79
2 Apr 23	70	82	76
3 Apr 23	73	84	79
4 Apr 23	70	82	76
5 Apr 23	75	86	81
6 Apr 23	75	86	81
7 Apr 23	73	84	79
8 Apr 23	73	86	80
9 Apr 23	70	82	76
10 Apr 23	70	82	76
11 Apr 23	75	86	81
12 Apr 23	77	88	83
13 Apr 23	75	88	82
14 Apr 23	73	86	80
15 Apr 23	70	82	76
16 Apr 23	77	88	83
17 Apr 23	77	88	83
18 Apr 23	73	84	79
19 Apr 23	68	79	74
20 Apr 23	77	73	75
21 Apr 23	66	79	73
22 Apr 23	75	86	81
23 Apr 23	70	82	76
24 Apr 23	70	82	76
25 Apr 23	73	84	79
26 Apr 23	70	82	76
27 Apr 23	64	75	70
28 Apr 23	70	82	76
29 Apr 23	75	86	81
30 Apr 23	66	77	72
1 May 23	66	77	72
2 May 23	66	77	72
3 May 23	66	77	72
4 May 23	66	77	72
5 May 23	77	88	83
6 May 23	75	86	81
7 May 23	73	84	79
8 May 23	75	88	82
9 May 23	75	88	82
10 May 23	73	84	79
11 May 23	70	82	76
12 May 23	66	77	72
13 May 23	75	88	82
14 May 23	70	84	77
15 May 23	73	84	79
16 May 23	73	84	79
17 May 23	86	73	80
18 May 23	70	82	76
19 May 23	77	88	83
20 May 23	73	84	79
21 May 23	73	84	79
22 May 23	70	82	76
23 May 23	70	82	76
24 May 23	70	82	76
25 May 23	73	86	80

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
26 May 23	82	70	76
27 May 23	73	84	79
28 May 23	73	84	79
29 May 23	75	88	82
30 May 23	73	84	79
31 May 23	66	79	73
1 Jun 23	73	84	79
2 Jun 23	68	79	74
3 Jun 23	73	84	79
4 Jun 23	70	82	76
5 Jun 23	77	88	83
6 Jun 23	77	88	83
7 Jun 23	77	88	83
8 Jun 23	70	82	76
9 Jun 23	70	82	76
10 Jun 23	70	82	76
11 Jun 23	75	88	82
12 Jun 23	70	54	62
13 Jun 23	75	88	82
14 Jun 23	73	84	79
15 Jun 23	73	66	70
16 Jun 23	70	82	76
17 Jun 23	75	88	82
18 Jun 23	70	64	67
19 Jun 23	70	64	67
20 Jun 23	68	62	65
21 Jun 23	70	82	76
22 Jun 23	73	86	80
23 Jun 23	73	84	79
24 Jun 23	73	84	79
25 Jun 23	73	86	80
26 Jun 23	70	84	77
27 Jun 23	70	84	77
28 Jun 23	75	88	82
29 Jun 23	73	84	79
30 Jun 23	75	88	82
Average	72	82	77
Min	64	54	62
Max	86	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 Apr 23	75	70	73
2 Apr 23	88	84	86
3 Apr 23	70	68	69
4 Apr 23	88	84	86
5 Apr 23	88	84	86
6 Apr 23	88	84	86
7 Apr 23	82	79	81
8 Apr 23	68	64	66
9 Apr 23	86	82	84
10 Apr 23	86	82	84
11 Apr 23	68	66	67
12 Apr 23	77	73	75
13 Apr 23	84	79	82
14 Apr 23	88	86	87
15 Apr 23	73	68	71
16 Apr 23	73	68	71
17 Apr 23	84	82	83
18 Apr 23	64	59	62
19 Apr 23	70	68	69
20 Apr 23	64	62	63
21 Apr 23	84	82	83
22 Apr 23	84	79	82
23 Apr 23	66	64	65
24 Apr 23	66	64	65
25 Apr 23	82	77	80
26 Apr 23	64	62	63
27 Apr 23	75	73	74
28 Apr 23	84	79	82
29 Apr 23	64	62	63
30 Apr 23	88	84	86
1 May 23	88	84	86
2 May 23	88	84	86
3 May 23	68	64	66
4 May 23	75	70	73
5 May 23	79	77	78
6 May 23	86	82	84
7 May 23	82	79	81
8 May 23	82	79	81
9 May 23	79	75	77
10 May 23	77	73	75
11 May 23	78	78	78
12 May 23	79	75	77
13 May 23	88	84	86
14 May 23	82	77	80
15 May 23	82	77	80
16 May 23	75	70	73
17 May 23	75	70	73
18 May 23	70	66	68
19 May 23	86	82	84
20 May 23	86	82	84
21 May 23	88	86	87
22 May 23	88	86	87
23 May 23	77	75	76
24 May 23	66	62	64
25 May 23	84	88	86
26 May 23	73	70	72

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
27 May 23	84	79	82
28 May 23	70	66	68
29 May 23	79	77	78
30 May 23	88	84	86
31 May 23	75	70	73
1 Jun 23	82	79	81
2 Jun 23	68	66	67
3 Jun 23	75	79	77
4 Jun 23	73	70	72
5 Jun 23	73	70	72
6 Jun 23	82	79	81
7 Jun 23	75	70	73
8 Jun 23	82	77	80
9 Jun 23	77	75	76
10 Jun 23	73	68	71
11 Jun 23	88	81	85
12 Jun 23	66	64	65
13 Jun 23	88	84	86
14 Jun 23	82	84	83
15 Jun 23	86	82	84
16 Jun 23	70	68	69
17 Jun 23	82	84	83
18 Jun 23	79	88	84
19 Jun 23	86	82	84
20 Jun 23	84	84	84
21 Jun 23	88	84	86
22 Jun 23	86	86	86
23 Jun 23	86	86	86
24 Jun 23	88	86	87
25 Jun 23	88	88	88
26 Jun 23	88	88	88
27 Jun 23	88	86	87
28 Jun 23	88	86	87
29 Jun 23	88	86	87
30 Jun 23	88	86	87
Average	80	77	78
Min	64	59	62
Max	88	88	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 Apr 23	66	66	66
2 Apr 23	64	64	64
3 Apr 23	64	64	64
4 Apr 23	68	68	68
5 Apr 23	70	70	70
6 Apr 23	70	70	70
7 Apr 23	68	68	68
8 Apr 23	64	64	64
9 Apr 23	66	66	66
10 Apr 23	66	66	66
11 Apr 23	68	68	68
12 Apr 23	68	68	68
13 Apr 23	68	68	68
14 Apr 23	68	68	68
15 Apr 23	68	68	68
16 Apr 23	66	68	67
17 Apr 23	66	68	67
18 Apr 23	66	66	66
19 Apr 23	66	66	66
20 Apr 23	64	64	64
21 Apr 23	70	73	72
22 Apr 23	48	66	57
23 Apr 23	70	70	70
24 Apr 23	70	70	70
25 Apr 23	70	70	70
26 Apr 23	66	66	66
27 Apr 23	66	66	66
28 Apr 23	70	70	70
29 Apr 23	64	64	64
30 Apr 23	68	70	69
31 Jan 23	66	66	66
1 May 23	68	70	69
2 May 23	68	70	69
3 May 23	70	70	70
4 May 23	64	64	64
5 May 23	64	64	64
6 May 23	64	64	64
7 May 23	70	73	72
8 May 23	70	73	72
9 May 23	68	68	68
10 May 23	70	70	70
11 May 23	71	72	72
12 May 23	62	62	62
13 May 23	62	62	62
14 May 23	62	62	62
15 May 23	62	62	62
16 May 23	68	68	68
17 May 23	68	70	69
18 May 23	64	64	64
19 May 23	68	68	68
20 May 23	68	68	68
21 May 23	68	68	68
22 May 23	68	68	68
23 May 23	68	68	68
24 May 23	66	64	65
25 May 23	66	66	66

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
26 May 23	70	70	70
27 May 23	68	68	68
28 May 23	68	68	68
29 May 23	64	64	64
30 May 23	70	68	69
31 May 23	62	64	63
1 Jun 23	55	55	55
2 Jun 23	66	66	66
3 Jun 23	66	66	66
4 Jun 23	66	68	67
5 Jun 23	66	68	67
6 Jun 23	64	64	64
7 Jun 23	70	70	70
8 Jun 23	62	62	62
9 Jun 23	66	66	66
10 Jun 23	68	68	68
11 Jun 23	68	68	68
12 Jun 23	68	68	68
13 Jun 23	66	66	66
14 Jun 23	46	59	53
15 Jun 23	53	66	60
16 Jun 23	55	68	62
17 Jun 23	57	59	58
18 Jun 23	151	166	159
19 Jun 23	122	128	125
20 Jun 23	66	57	62
21 Jun 23	55	68	62
22 Jun 23	48	64	56
23 Jun 23	48	64	56
24 Jun 23	66	68	67
25 Jun 23	57	59	58
26 Jun 23	57	59	58
27 Jun 23	68	73	71
28 Jun 23	55	68	62
29 Jun 23	64	66	65
30 Jun 23	64	68	66
Average	66	68	67
Min	46	55	53
Max	151	166	159

Table F3.4 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 Apr 23	63	67	65
2 Apr 23	61	65	63
3 Apr 23	63	67	65
4 Apr 23	65	70	68
5 Apr 23	65	70	68
6 Apr 23	65	70	68
7 Apr 23	50	54	52
8 Apr 23	50	54	52
9 Apr 23	61	65	63
10 Apr 23	61	65	63
11 Apr 23	61	65	63
12 Apr 23	65	70	68
13 Apr 23	56	61	59
14 Apr 23	54	59	57
15 Apr 23	50	54	52
16 Apr 23	50	54	52
17 Apr 23	63	67	65
18 Apr 23	59	63	61
19 Apr 23	54	59	57
20 Apr 23	63	67	65
21 Apr 23	54	61	58
22 Apr 23	50	56	53
23 Apr 23	63	67	65
24 Apr 23	63	67	65
25 Apr 23	48	52	50
26 Apr 23	65	70	68
27 Apr 23	59	63	61
28 Apr 23	65	70	68
29 Apr 23	52	56	54
30 Apr 23	61	65	63
1 May 23	61	65	63
2 May 23	61	65	63
3 May 23	61	65	63
4 May 23	61	65	63
5 May 23	59	63	61
6 May 23	56	61	59
7 May 23	59	63	61
8 May 23	59	63	61
9 May 23	61	67	64
10 May 23	59	63	61
11 May 23	59	63	61
12 May 23	59	63	61
13 May 23	59	63	61
14 May 23	50	56	53
15 May 23	50	56	53
16 May 23	63	67	65
17 May 23	56	59	58
18 May 23	61	65	63
19 May 23	56	59	58
20 May 23	56	59	58
21 May 23	67	70	69
22 May 23	67	70	69
23 May 23	65	67	66
24 May 23	52	56	54
25 May 23	52	56	54
26 May 23	52	48	50

Date	Meter No.X6 (cm)	Meter No.X7 (cm)	Average (cm)
27 May 23	65	67	66
28 May 23	65	70	68
29 May 23	56	61	59
30 May 23	50	54	52
31 May 23	59	63	61
1 Jun 23	55	54	55
2 Jun 23	59	63	61
3 Jun 23	65	70	68
4 Jun 23	59	63	61
5 Jun 23	59	63	61
6 Jun 23	63	65	64
7 Jun 23	61	63	62
8 Jun 23	50	52	51
9 Jun 23	59	61	60
10 Jun 23	54	52	53
11 Jun 23	56	63	60
12 Jun 23	54	54	54
13 Jun 23	67	67	67
14 Jun 23	114	120	117
15 Jun 23	129	136	133
16 Jun 23	59	59	59
17 Jun 23	241	226	234
18 Jun 23	285	272	279
19 Jun 23	292	305	299
20 Jun 23	281	292	287
21 Jun 23	252	267	260
22 Jun 23	208	224	216
23 Jun 23	92	107	100
24 Jun 23	56	41	49
25 Jun 23	63	52	58
26 Jun 23	63	52	58
27 Jun 23	65	63	64
28 Jun 23	61	52	57
29 Jun 23	65	70	68
30 Jun 23	52	48	50
Average	74	77	75
Min	48	41	49
Max	292	305	299

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

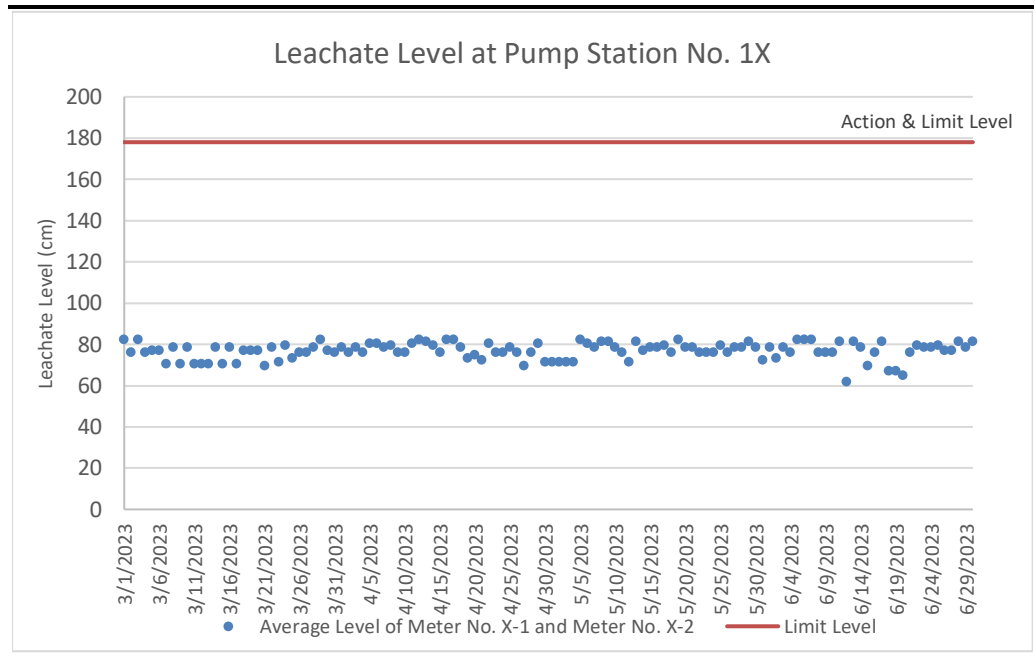


Figure F3.2 Graphical Presentation for Leachate Levels Monitoring (Pump Station No.2X (Cell 2X))

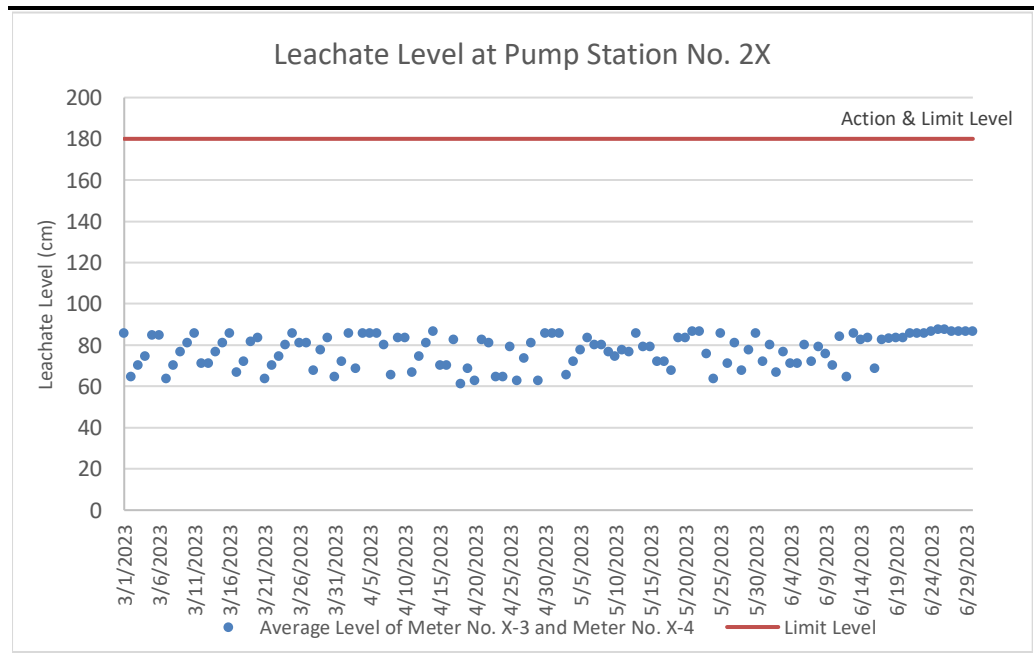


Figure F3.3 Graphical Presentation for Leachate Levels Monitoring (Pump Station No.3X (Cell 3X))

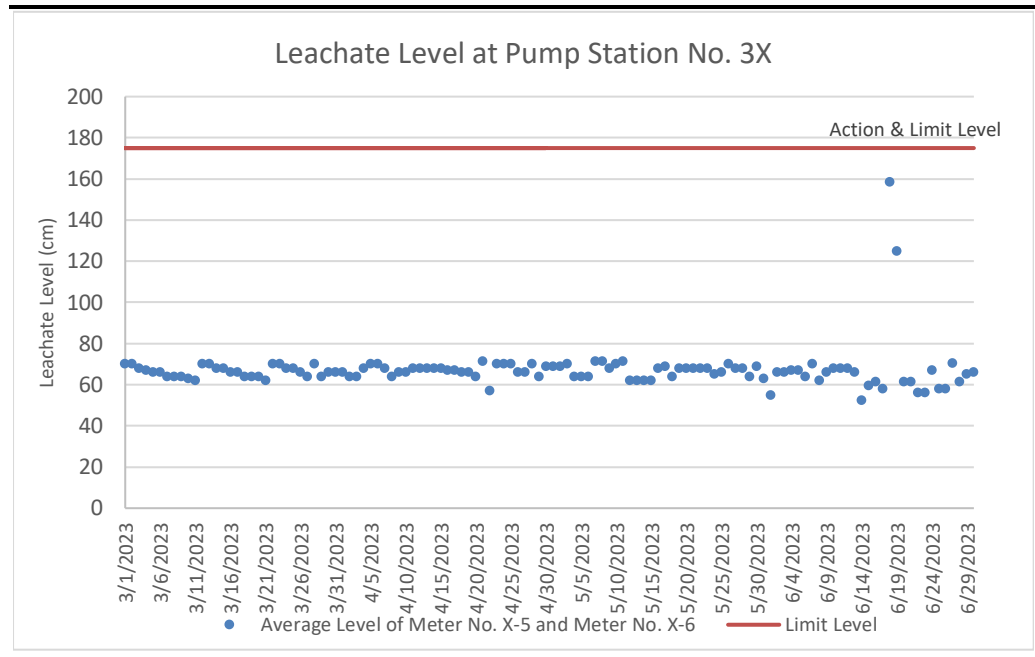
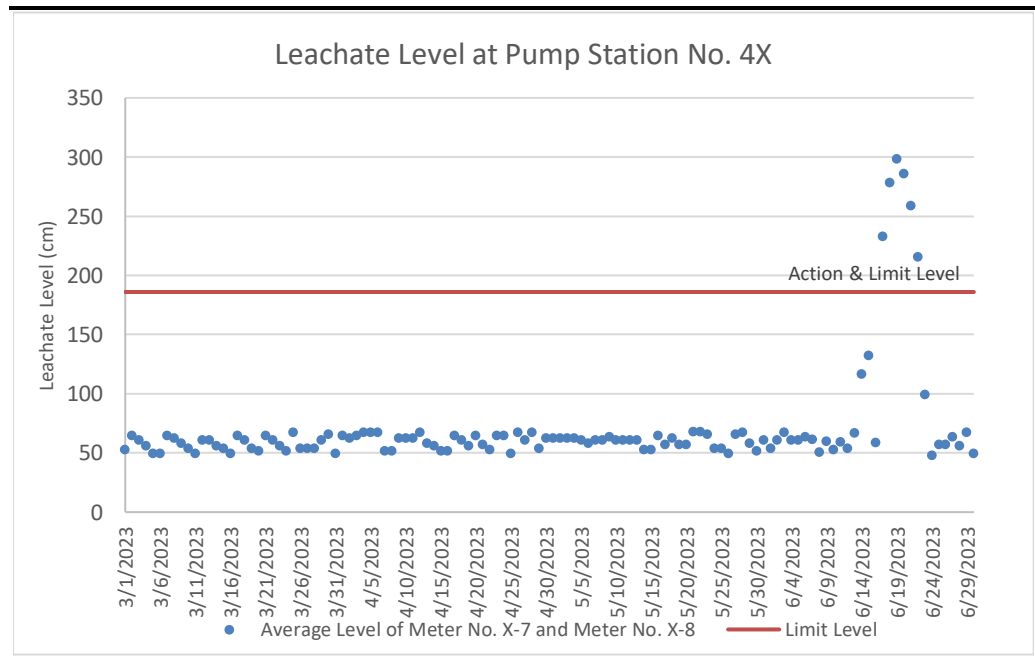


Figure F3.4 Graphical Presentation for Leachate Levels Monitoring (Pump Station No.4X (Cell 4X))



Annex F4

Effluent Quality Monitoring Results

Table F4.1 Effluent Monitoring Results

		4 Apr 23	4 May 23	1 Jun 23
On-site Measurements				
Temperature	°C	30.8	35.6	36.6
pH Value	pH Unit	8.7	8.4	8.5
Volume Discharged	m ³	1,268	1,182	799
Laboratory Analysis				
Suspended Solids (SS)	mg/L	40.0	38.7	158
Alkalinity	mg/L	2270	2170	2280
Ammoniacal-nitrogen	mg/L	0.24	0.11	0.38
Chloride	mg/L	1660	1680	1980
Nitrite-nitrogen	mg/L	0.11	0.11	0.14
Phosphate	mg/L	9.5	8.94	5.76
Sulphate	mg/L	104	122	142
Total Nitrogen	mg/L	73	79.7	85.9
Nitrate-nitrogen	mg/L	20.7	26.7	35.7
Total Inorganic Nitrogen	mg/L	21.05	26.92	36.22
Biochemical Oxygen Demand (BOD)	mg/L	12	9	21
Chemical Oxygen Demand (COD)	mg/L	1120	941	809
Oil & Grease	mg/L	<5	<5	<5
Total Organic Carbon (TOC)	mg/L	406	389	314
Boron	µg/L	5930	5570	5710
Calcium	mg/L	18.0	19.9	18.7
Iron	mg/L	2.0	2.23	1.63
Magnesium	mg/L	29.0	29.9	27.8
Potassium	mg/L	908	908	820
Cadmium	µg/L	<1.0	<1.0	<1.0
Chromium	µg/L	167	178	123
Copper	µg/L	<10	10	<10
Nickel	µg/L	134	139	125
Zinc	µg/L	102	109	72

Annex F5

Groundwater Monitoring Results

Table F5.1 Groundwater Monitoring Results (April 2023)

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	3.51	2.91	2.84	2.97	2.52	2.41	2.44	2.46	2.34	3.23	2.77	6.39	35.42	42.11
Bicarbonate Alkalinity as CaCO ₃	mg/L	180	265	175	41	47	126	38	17	126	199	232	54	17	13
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1	<1	<1	<1	<1	30	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	mg/L	180	265	175	46	66	196	38	48	126	199	232	54	17	13
pH Value	pH Unit	7.7	8	8	10	10.6	11.4	8.2	9.4	8.3	7.9	7.9	7.2	5.9	5.6
Electrical Conductivity	µS/cm	978	843	1080	1140	1670	1290	1810	1780	890	818	676	297	91	98
Ammonia as N	mg/L	0.18	0.01	1.04	3.91	2.24	3.74	0.48	7.07	1.6	<0.01	0.14	0.02	<0.01	<0.01
Chloride	mg/L	177	42	145	251	407	218	359	410	175	114	50	23	15	18
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.95	<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	0.1	0.02	0.01	0.04	0.01	0.01
Sulphate as SO ₄ - Turbidimetric	mg/L	56	122	91	140	118	78	290	160	57	51	54	50	3	4
Sulphide as S ₂	mg/L	<0.1	<0.1	<0.1	4.1	5.3	19.4	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/L	0.3	<0.1	1.2	4.5	2.7	4.6	<1.0	7.8	1.7	<0.1	0.2	0.4	<0.1	<0.1
Nitrate as N	mg/L	0.06	0.21	<0.01	<0.01	<0.01	<0.01	2.98	<0.01	<0.01	<0.01	<0.01	0.02	0.09	0.06
Total Nitrogen as N	mg/L	0.3	0.2	1.2	4.5	2.7	4.6	4.4	7.8	1.7	<0.1	0.2	0.4	0.2	0.1
Boron	µg/L	150	190	220	210	180	180	280	250	340	100	80	30	20	20
Calcium	mg/L	59.1	55	81.3	44.6	46.9	37.4	61.7	23.4	42.4	73.9	65.5	26.3	0.82	1.03
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	9.65	47.8	4.7	1.44	0.17	<0.05	2.6	0.32	5.48	7.4	6.23	4.09	1.03	0.91
Sodium	mg/L	101	40.7	102	140	229	150	240	263	104	71.6	52.3	25.1	14.1	15
Iron	mg/L	<0.04	<0.04	0.11	<0.04	<0.04	<0.04	<0.04	<0.04	0.07	<0.04	0.11	0.19	<0.04	<0.04
Potassium	mg/L	18.2	9.69	26.1	33.4	58.6	54.4	63.1	59.3	16.9	7.15	8.62	2.93	4.06	3.86
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	2	<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	1560	47	659	<1	<1	<1	2	1	116	1360	544	414	5	5
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	17	<10	<10	<10	<10	<10	<10
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	<2	8	<2	3	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	5	4	17	22	27	54	27	25	13	7	7	7	<2	4
Total Organic Carbon	mg/L	4	2	7	8	7	10	9	11	5	4	5	4	<1	2

Table F5.2 Groundwater Monitoring Results (May 2023)

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	2.81	3.21	2.74	2.87	3.12	3.01	2.54	2.46	3.04	2.43	2.77	5.89	34.82	41.51
Bicarbonate Alkalinity as CaCO ₃	mg/L	187	258	183	<1	<1	<1	25	<1	124	226	190	56	17	14
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1	62	62	126	9	84	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	mg/L	187	258	183	111	76	172	35	96	124	226	190	56	17	14
pH Value	pH Unit	7.7	8	8	10.9	10.7	11.3	9.2	10.5	8.2	7.9	8	7	5.8	5.7
Electrical Conductivity	µS/cm	1020	955	1090	1060	1570	1230	1630	1740	1090	1120	597	293	92	100
Ammonia	mg/L	0.32	<0.01	0.91	4.9	2.44	3.51	0.29	8.63	1.05	<0.01	0.14	<0.01	<0.01	<0.01
Chloride	mg/L	123	50	158	191	350	192	266	343	151	124	44	21	14	17
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.29	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphorus	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01
Sulphate	mg/L	43	148	100	58	109	85	164	151	81	111	47	44	3	5
Sulphide	mg/L	<0.1	<0.1	<0.1	7.9	5.5	13.7	<0.1	4.4	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.4	<0.1	1.2	5.4	2.8	4.4	1.6	9.7	1.3	0.1	0.2	<0.1	<0.1	<0.1
Nitrate	mg/L	<0.01	0.41	<0.01	<0.01	<0.01	<0.01	3.96	0.01	<0.01	<0.01	<0.01	<0.01	0.08	0.07
Total Nitrogen	mg/L	0.4	0.4	1.2	5.4	2.8	4.4	5.8	9.7	1.3	0.1	0.2	<0.1	<0.1	<0.1
Boron	µg/L	140	180	190	170	170	160	240	170	300	250	70	20	20	10
Calcium	mg/L	64.2	61.7	84.6	45.3	44.6	41	28.5	33	59.7	96	65.9	24.7	1.07	1.1
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	11.9	54.7	5.55	0.14	0.08	<0.05	0.59	<0.05	5.14	7.11	5.22	4	1	0.87
Sodium	mg/L	103	52.7	98.8	117	212	147	241	236	121	118	42.4	23.9	13.2	14.1
Iron	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Potassium	mg/L	18.7	11	24.8	31.8	57.7	55.8	63.5	61.9	20.4	11.9	8.17	2.86	3.84	3.68
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	2	<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	2070	102	773	<1	<1	<1	<1	<1	127	495	577	133	14	9
Nickel	µg/L	<1	<1	<1	1	<1	2	1	5	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	11	11	<10	17	12
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	<2	4	<2	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	4	3	16	29	38	36	29	70	6	9	5	<2	5	<2
Total Organic Carbon	mg/L	3	<1	5	9	8	10	11	14	5	2	3	<1	3	<1

Table F5.3 Groundwater Monitoring Results (June 2023)

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	2.91	3.31	3.04	4.07	3.12	2.01	2.74	3.06	2.84	2.43	3.67	6.19	35.02	40.61
Bicarbonate Alkalinity as CaCO ₃	mg/L	165	259	162	35	<1	<1	29	<1	126	250	215	55	17	14
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1	29	52	129	18	101	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO ₃	mg/L	165	259	162	64	98	161	48	112	126	250	215	55	17	14
pH Value	pH Unit	7.7	8.1	8	9.5	10.8	11.3	9.6	10.9	7.9	7.9	8.1	7.1	5.8	5.7
Electrical Conductivity	µS/cm	1210	1060	1100	863	1450	1170	1590	1860	1640	1010	774	294	93	100
Ammonia	mg/L	0.17	<0.01	1.05	3.02	2.58	3.44	0.48	7.28	0.24	0.03	0.17	0.02	0.04	<0.01
Chloride	mg/L	237	44	148	172	285	133	258	403	275	122	51	23	15	18
Nitrite	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	0.01	0.57	0.01	0.05	<0.01	<0.01	0.01	<0.01	0.01
Phosphorus	mg/L	<0.01	0.02	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	mg/L	64	150	74	96	127	72	165	173	316	90	71	44	3	4
Sulphide	mg/L	<0.1	<0.1	<0.1	4.7	7.9	15.1	<0.1	5.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.2	<0.1	1.4	3.8	3.2	4.4	2.1	8.6	0.9	0.2	0.3	0.2	0.2	<0.1
Nitrate	mg/L	<0.01	0.64	<0.01	<0.01	<0.01	<0.01	3.23	<0.01	0.83	0.01	<0.01	<0.01	0.09	0.06
Total Nitrogen	mg/L	0.2	0.7	1.4	3.8	3.2	4.4	5.9	8.6	1.7	0.2	0.3	0.2	0.2	0.2
Boron	µg/L	170	210	230	240	220	190	280	200	410	220	110	30	20	20
Calcium	mg/L	76	61.3	65.8	18.4	33.6	39.6	17.8	50.1	98.4	88.6	86.2	24	0.83	1.07
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	13	55.7	5.73	2.03	<0.05	<0.05	0.93	<0.05	4.64	8.11	6.91	3.79	0.96	0.84
Sodium	mg/L	122	51.9	94.4	104	154	135	215	248	161	91.6	50	24	13.1	14
Iron	mg/L	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	0.48	<0.04	<0.04
Potassium	mg/L	19.9	12.1	31.2	26.2	44.5	48.3	52.8	62.9	28.6	11.4	8	2.9	3.89	3.73
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	4	<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	1400	4	961	<1	<1	<1	<1	<1	48	278	768	710	18	8
Nickel	µg/L	<1	<1	<1	<1	<1	2	2	5	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	34	<10	<10	<10	<10	<10	<10	<10	11	19	12
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	3	3	<2	3	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	7	<2	14	18	26	44	28	36	22	3	5	2	<2	5
Total Organic Carbon	mg/L	2	<1	6	7	8	9	11	12	9	2	<1	<1	<1	1

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

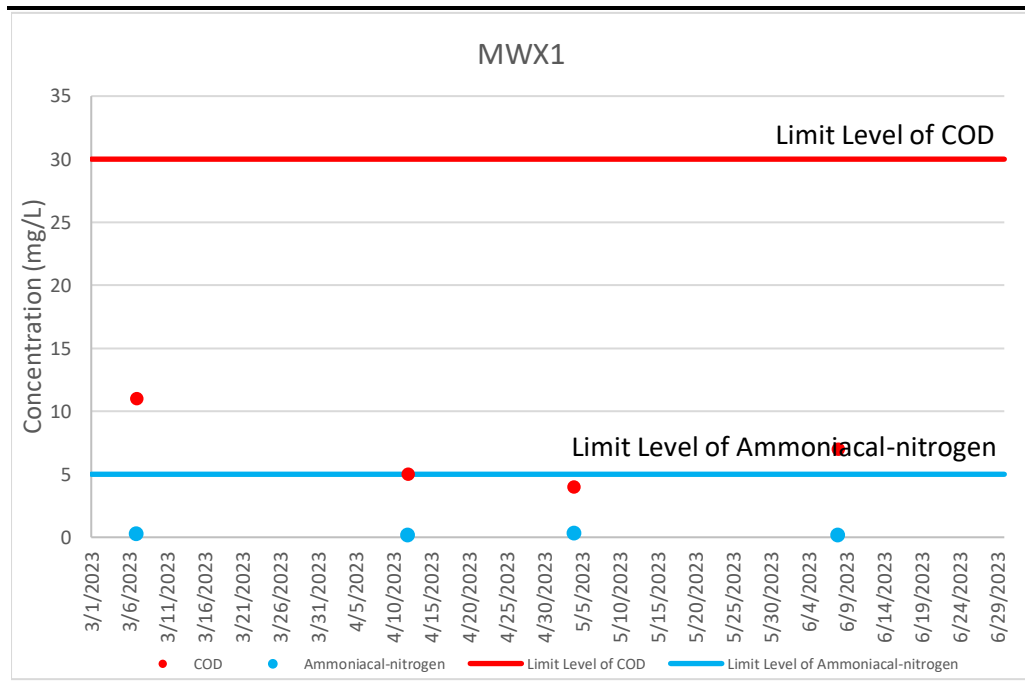


Figure F5.2 Graphical Presentation for Groundwater Monitoring (MWX-2)

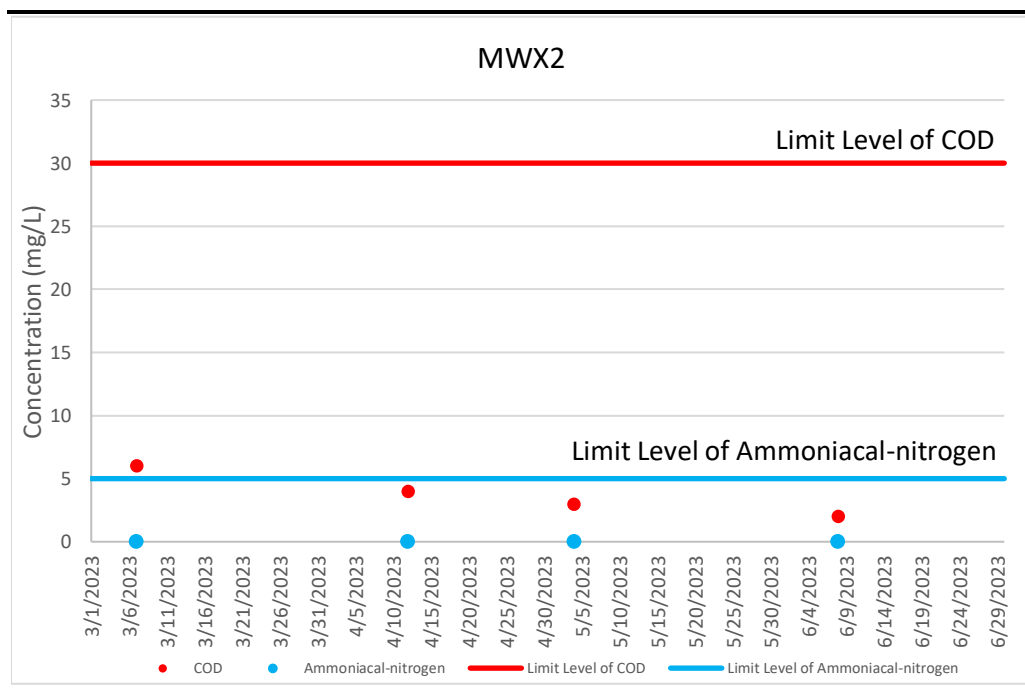


Figure F5.3 Graphical Presentation for Groundwater Monitoring (MWX-3)

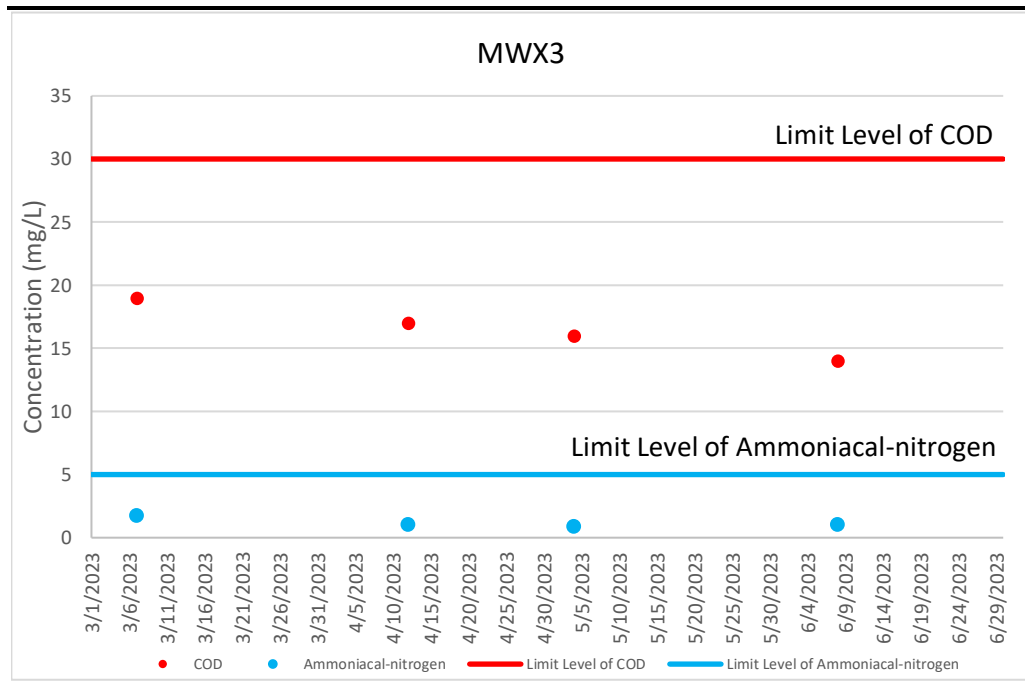


Figure F5.4 Graphical Presentation for Groundwater Monitoring (MWX-4)

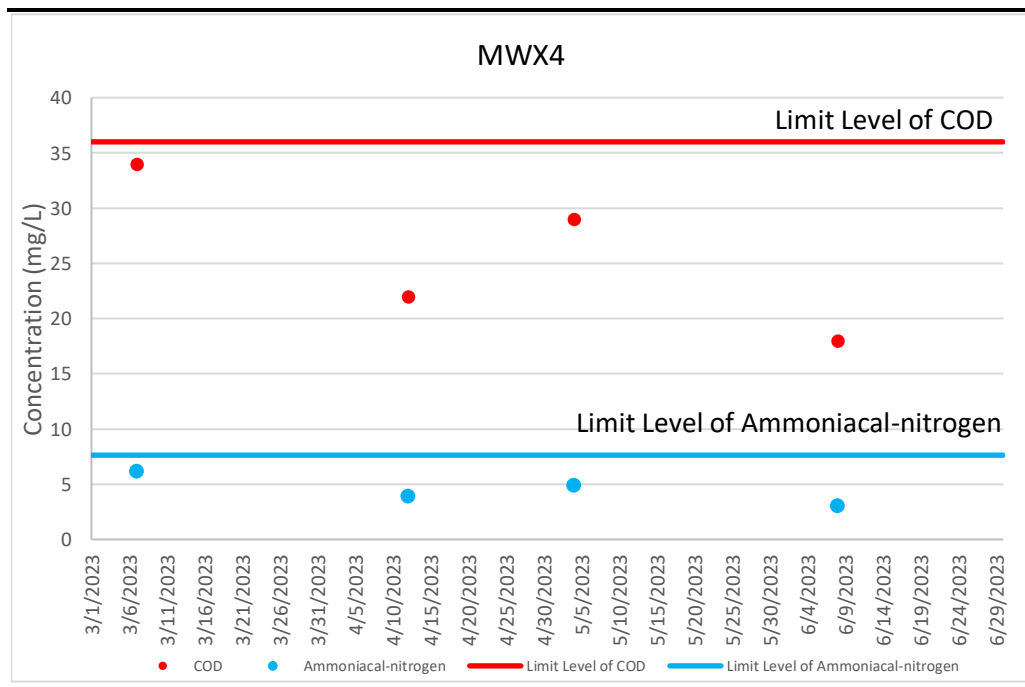


Figure F5.5 Graphical Presentation for Groundwater Monitoring (MWX-5)

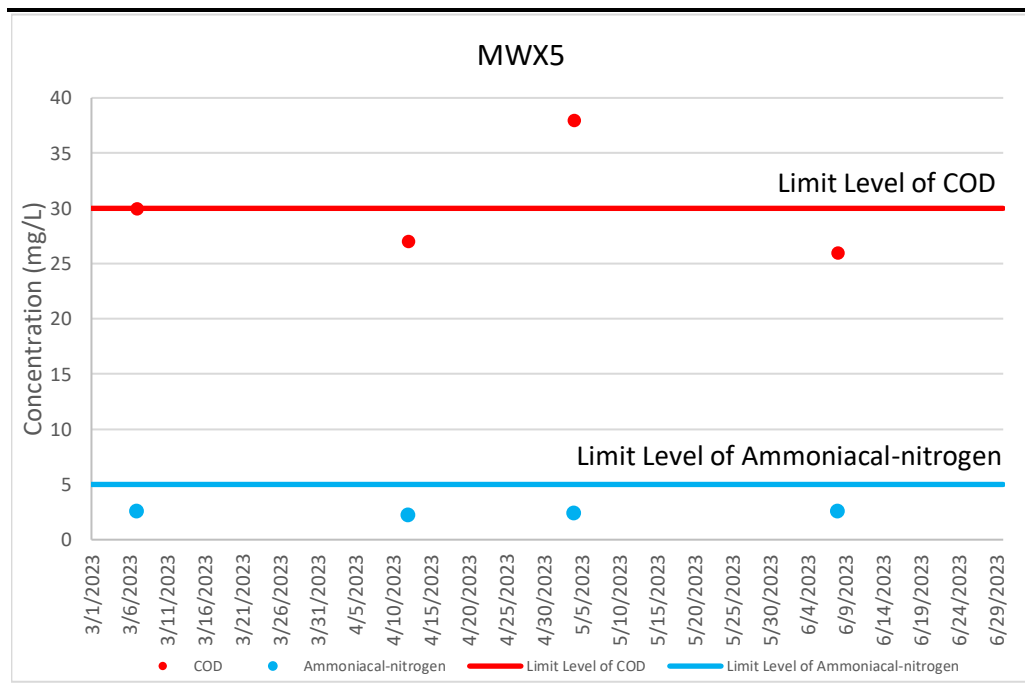


Figure F5.6 Graphical Presentation for Groundwater Monitoring (MWX-6)

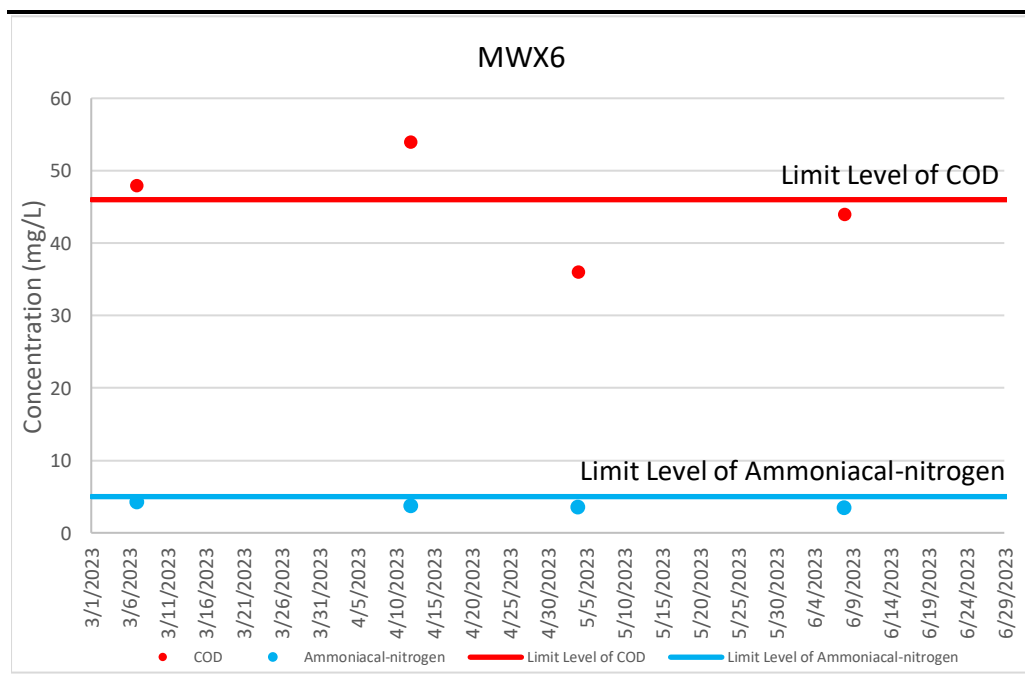


Figure F5.7 Graphical Presentation for Groundwater Monitoring (MWX-7)

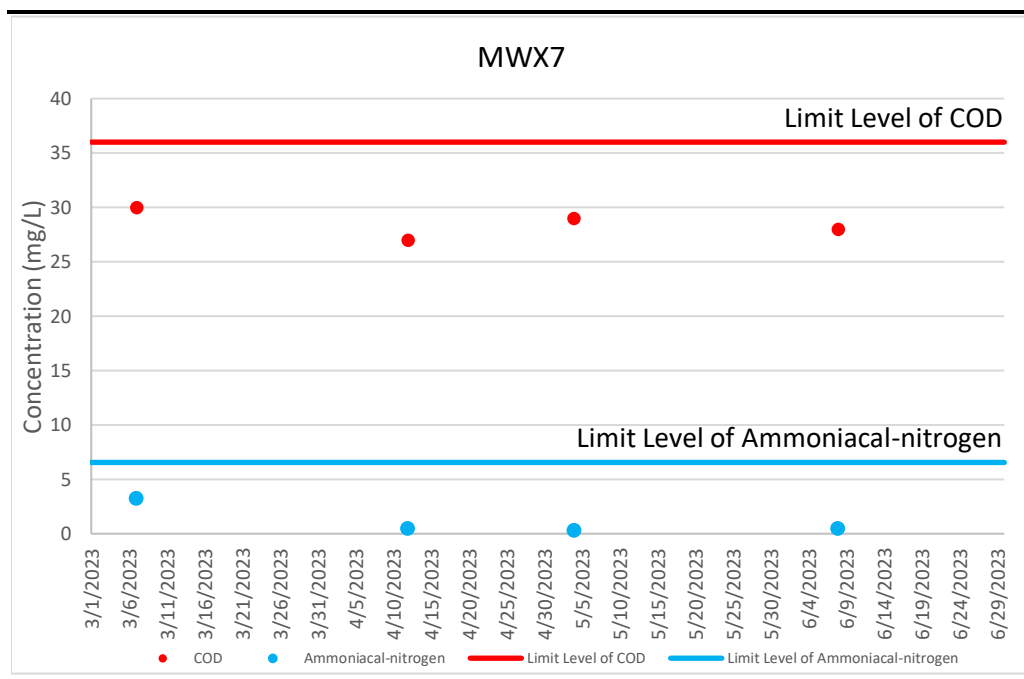


Figure F5.8 Graphical Presentation for Groundwater Monitoring (MWX-8)

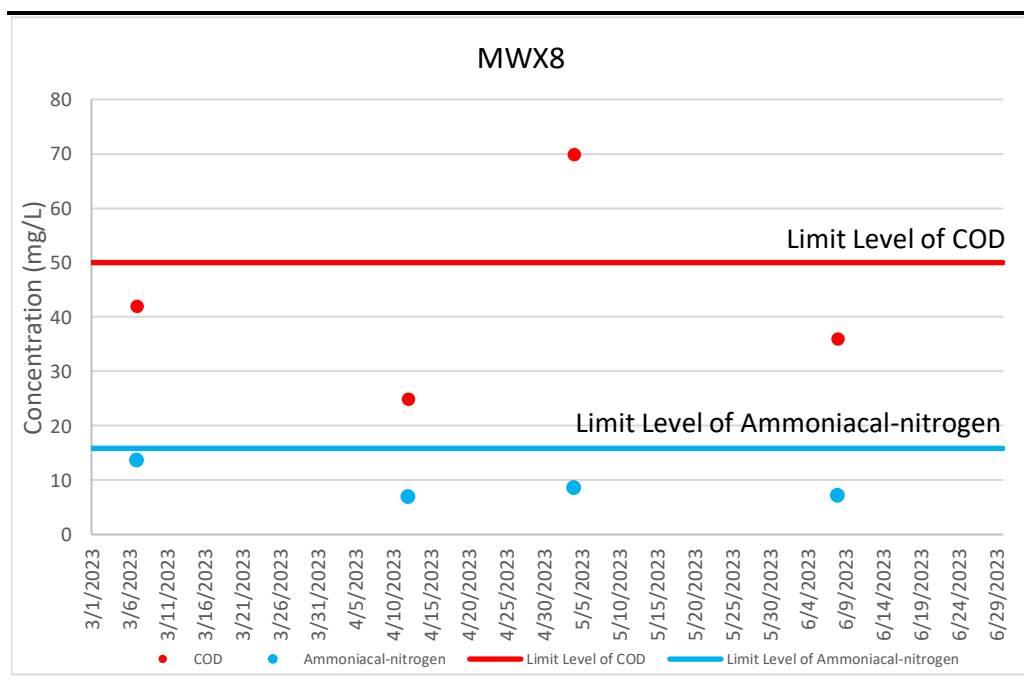


Figure F5.9 Graphical Presentation for Groundwater Monitoring (MWX-9)

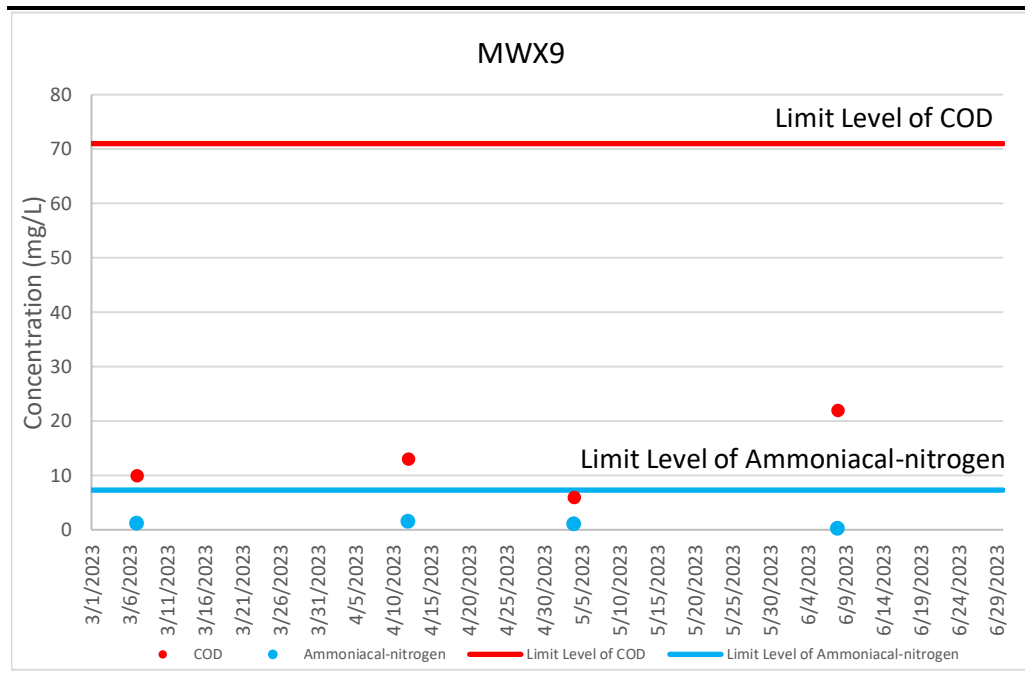


Figure F5.10 Graphical Presentation for Groundwater Monitoring (MWX-10)

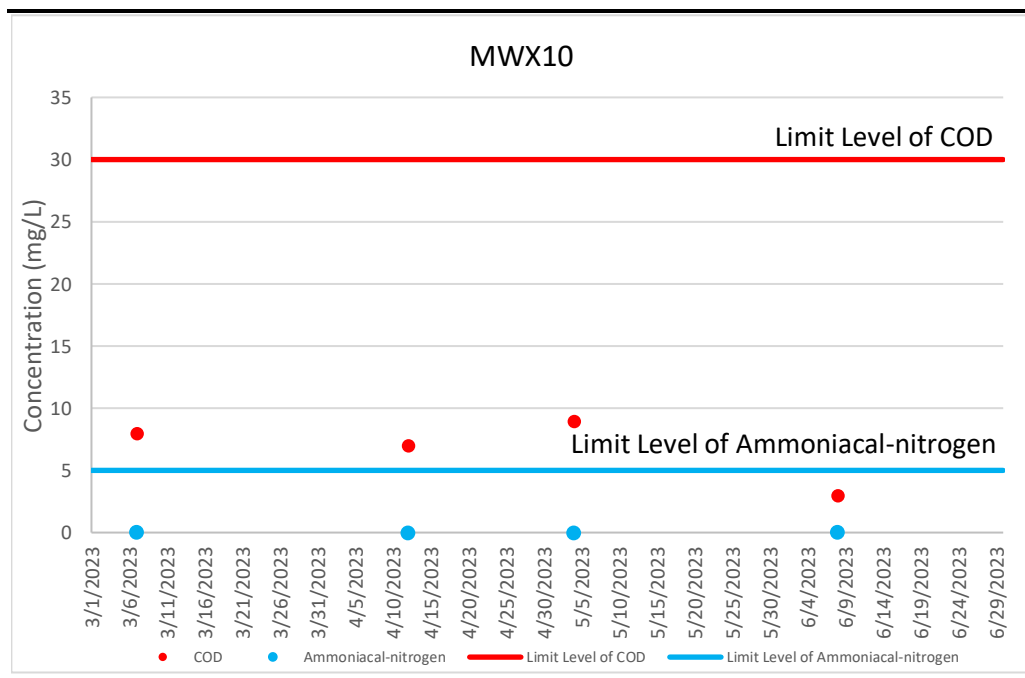


Figure F5.11 Graphical Presentation for Groundwater Monitoring (MWX-11)

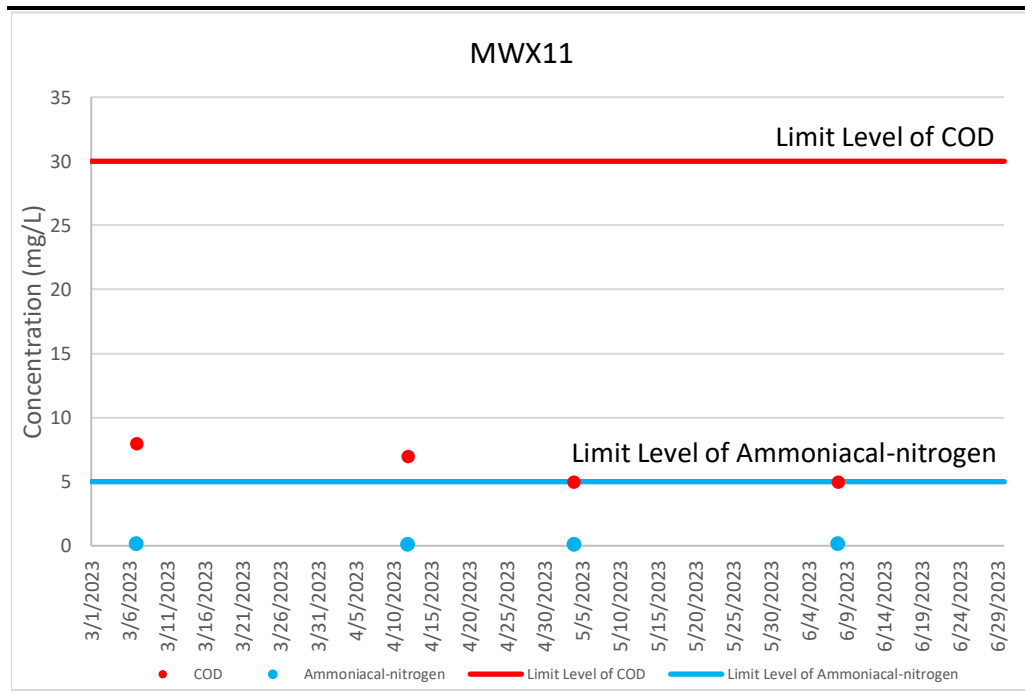


Figure F5.12 Graphical Presentation for Groundwater Monitoring (MWX-12)

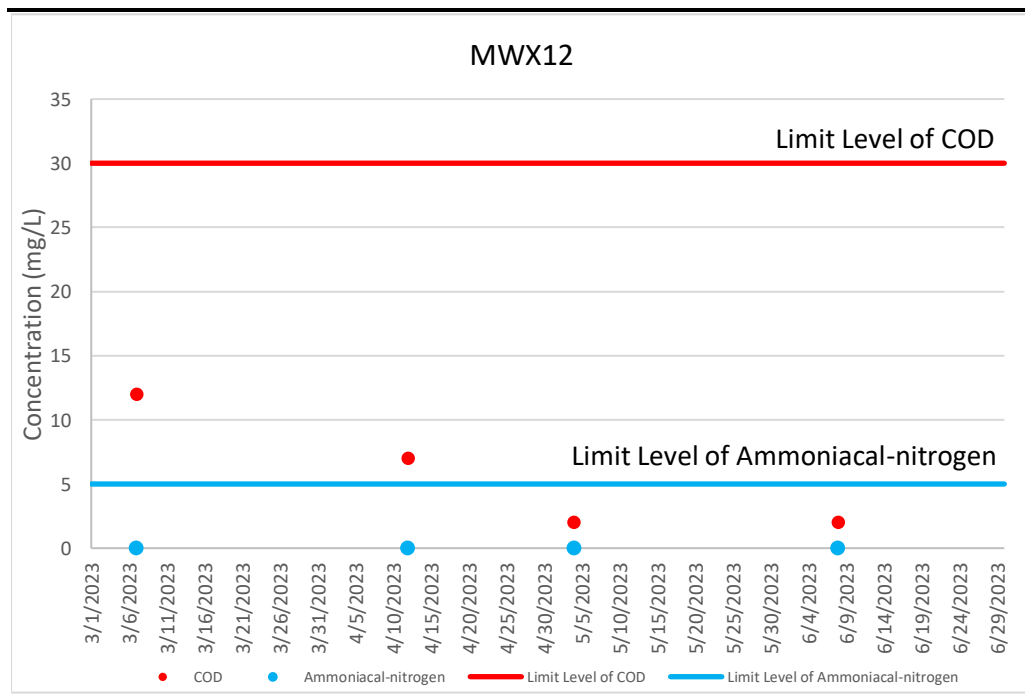


Figure F5.13 Graphical Presentation for Groundwater Monitoring (MWX-13)

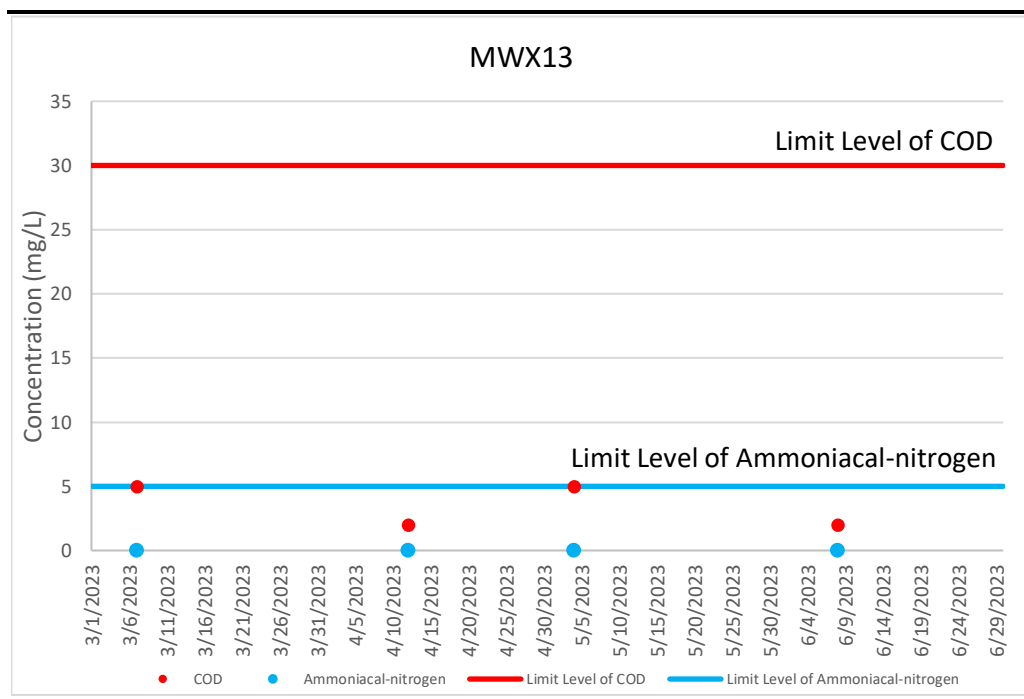
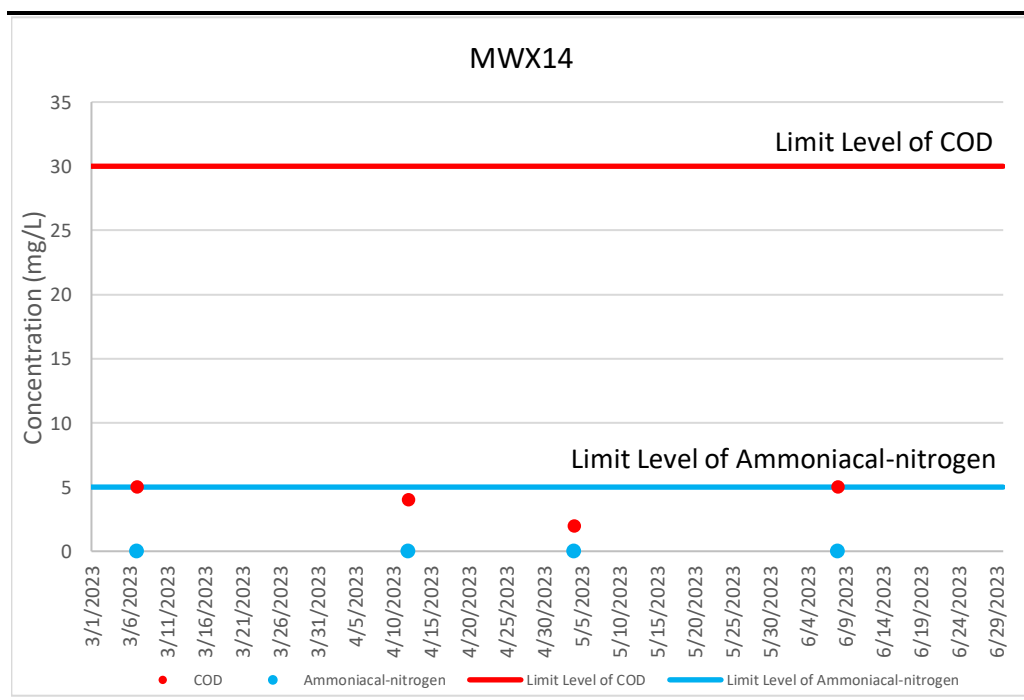


Figure F5.14 Graphical Presentation for Groundwater Monitoring (MWX-14)



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	13 April 2023
Time	11:49
Monitoring Location	MWX-6
Parameter	Chemical Oxygen Demand (COD)
Limit Levels	>46 mg /L
Measured Level	54 mg /L
Possible reason	<p>Groundwater contaminated with leachate is commonly characterized by high COD and ammoniacal-nitrogen levels as a result of degradation of organic matters in the waste. The ammoniacal-nitrogen monitoring result at groundwater monitoring well MWX-6 (3.74 mg/L) and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-6 (MWX-5: 27 mg/L and MWX-7: 27 mg/L) are well within the respective limit levels. Hence, there is a low possibility of the elevation of COD level at MWX-6 is due to leachate contamination from SENTX operation or at least it is not conclusive to base on these results to demonstrate exceedance was due to leachate contamination.</p> <p>In accordance with Table 4.5b of the updated EM&A Manual, repeat measurement was conducted on 4 May 2023 to confirm findings. COD concentration of 36 mg/L (below the Limit Level) was measured at MWX-6 during the sampling event, which demonstrate no consecutive groundwater quality impact at the monitoring location.</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 COD concentration measured at MWX-6 (with detection of elevated levels of methane (up to 12.2% v/v) and in close proximity to LFG13, which shows elevated methane levels continuously) on 13 April 2023 could be due to localised organic matters within or around the monitoring wells and background fluctuation.</p> <p>Due to the presence of influencing factor from non-project source and the subsequent month monitoring results at MWX-6 did not show any exceedance, there is no adequate evidence showing that the COD level exceedance measured at MWX-6 on 13 April 2023 was deemed to Project-related activities.</p>

	<p>It should also be noted that although the COD level exceeded the limit level of the EM&A programme, it is still well within the WPCO effluent discharge limit of COD (80 mg/L) and the standard for effluents discharged into the inshore waters of the Junk Bay Water Control Zone as stipulated under Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (80 mg/L). The slight exceedance of COD at MWX-6 on 13 April 2023 will not cause adverse water quality impact to the Junk Bay Water Control Zone.</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 groundwater quality monitoring results and collect additional data for investigation and further review, if necessary.</p>
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 22 May 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	4 May 2023
Time	MWX-5: 11:16 MWX-8: 10:32
Monitoring Location	MWX-5, MWX-8
Parameter	Chemical Oxygen Demand (COD)
Limit Levels	MWX-5: >30 mg /L MWX-8: >50 mg /L
Measured Level	MWX-5: 38 mg /L MWX-8: 70 mg /L
Possible reason	<p>Groundwater contaminated with leachate is commonly characterized by high COD and ammoniacal-nitrogen levels as a result of degradation of organic matters in the waste. The ammoniacal-nitrogen monitoring result at groundwater monitoring wells MWX-5 (2.44 mg/L) and MWX-8 (8.63 mg/L), and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-5 (MWX-4: 29 mg/L and MWX-6: 36 mg/L) and MWX-8 (MWX-7: 29 mg/L and MWX-9: 6 mg/L) are well within the respective limit levels. Hence, there is a low possibility of the elevation of COD level at MWX-5 and MWX-8 is due to leachate contamination from SENTX operation or at least it is not conclusive to base on these results to demonstrate exceedance was due to leachate contamination.</p> <p>In accordance with Table 4.5b of the updated EM&A Manual, repeat measurement was conducted on 8 June 2023 to confirm findings. COD concentration of 26 mg/L and 36 mg/L (below the Limit Level) was measured at MWX-5 and MWX-8, respectively during the sampling event, which demonstrate no consecutive groundwater quality impact at the monitoring locations.</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 COD concentration measured at MWX-5 and MWX-8 on 4 May 2023 could be due to localised organic matters within or around the monitoring wells and background fluctuation.</p> <p>Due to the presence of influencing factor from non-project source and the subsequent month monitoring results at MWX-5 and MWX-8 did not show any exceedance, there is no adequate</p>

	<p>evidence showing that the COD level exceedances measured at MWX-5 and MWX-8 on 4 May 2023 were deemed to Project-related activities.</p> <p>It should also be noted that although the COD level exceeded the limit level of the EM&A programme, it is still well within the WPCO effluent discharge limit of COD (80 mg/L) and the standard for effluents discharged into the inshore waters of the Junk Bay Water Control Zone as stipulated under Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (80 mg/L). The slight exceedance of COD at MWX-5 and MWX-8 on 4 May 2023 will not cause adverse water quality impact to the Junk Bay Water Control Zone.</p>
<p>Action Taken / Action to be Taken</p>	<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 groundwater quality monitoring results and collect additional data for investigation and further review, if necessary.</p>
<p>Remarks</p>	<p>-</p>

Prepared by: Abbey Lau

Designation: Environmental Team

Date: 29 June 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	17 - 22 June 2023
Monitoring Location	Pump Station No. 4X (Cell 4X)
Parameter	Leachate level
Limit Levels	> 186 cm
Measured Level	<u>Pump Station No. 4X (Average of Meter No. X-7 and No. X-8)</u> 17 June 2023: 234 cm 18 June 2023: 279 cm 19 June 2023: 299 cm 20 June 2023: 287 cm 21 June 2023: 260 cm 22 June 2023: 216 cm
Possible reason	<p>From the on-site rainfall record of June 2023, heavy rainfall events (up to 90 mm per day) were recorded from 17 to 22 June 2023. Amber and red rainstorm warning signals were also issued by the Hong Kong Observatory on 17 and 18 June 2023. As confirmed by the Contractor, the leachate collection system and leachate treatment plant were under normal operating conditions during the reporting period.</p> <p>Accumulation of surface water at Cell 4X 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 1,633 m³ recorded from 17 to 22 June 2023, 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	-

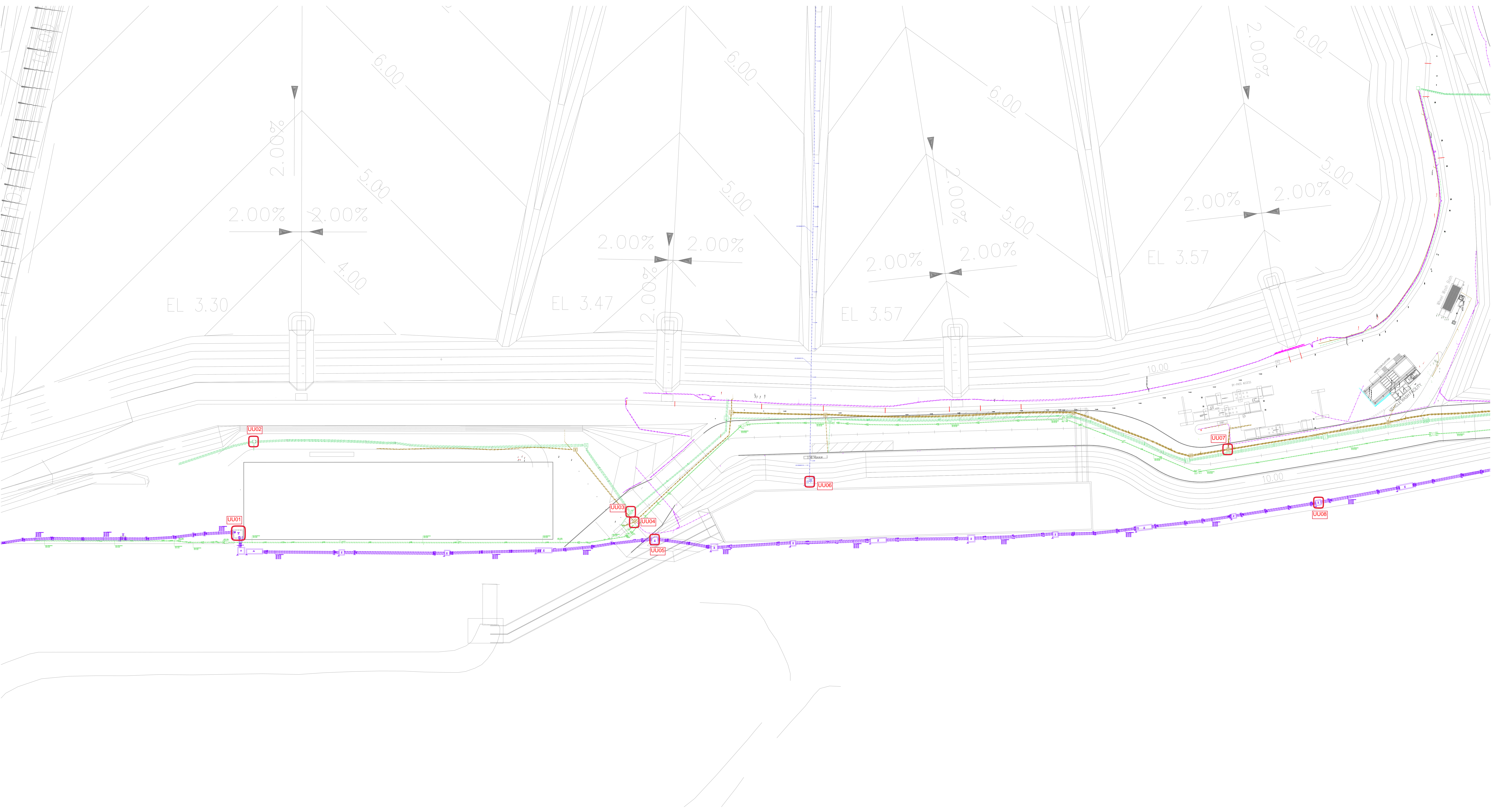
Prepared by: Abbey Lau
Designation: Environmental Team
Date: 29 June 2023

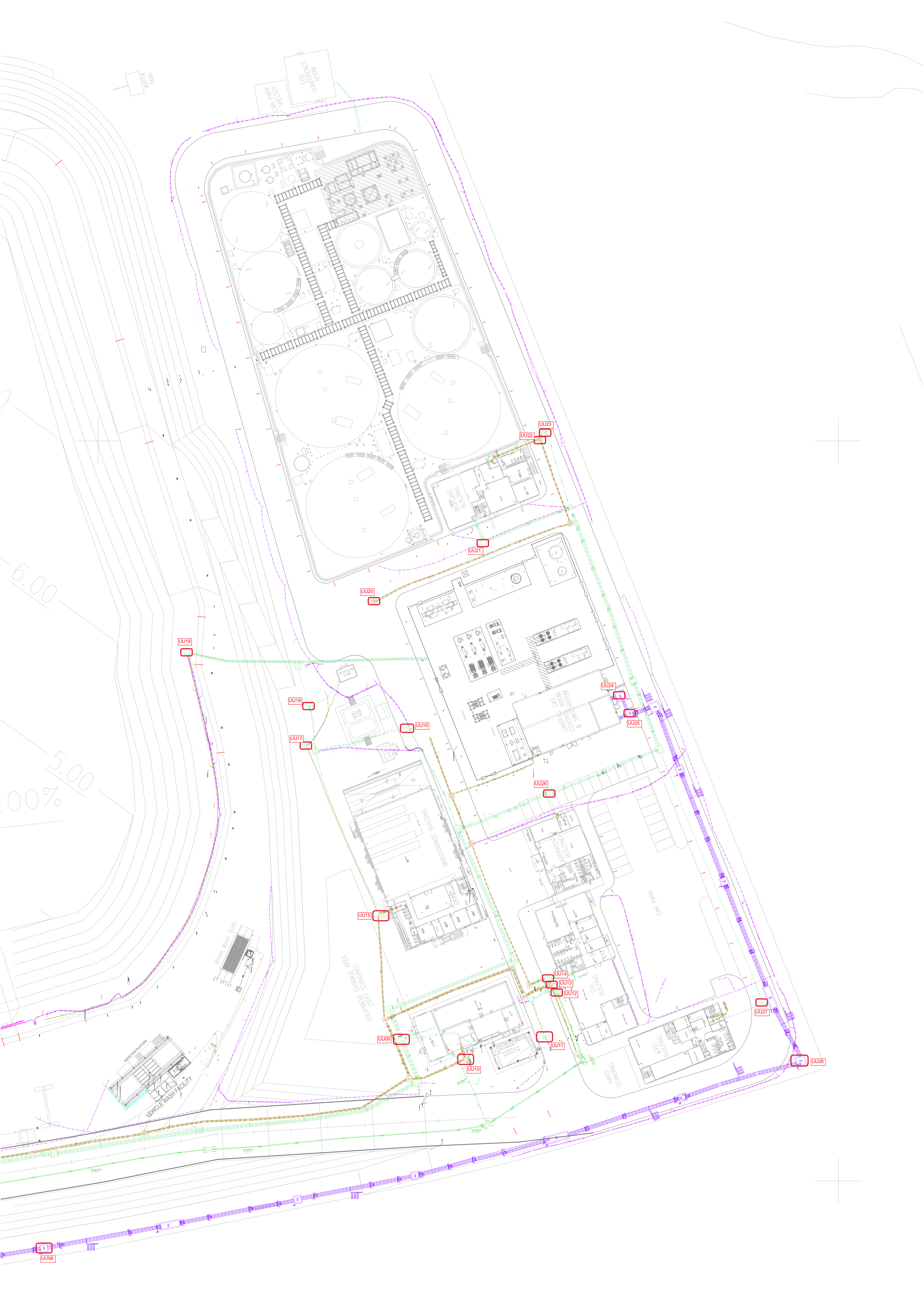
Annex G

Landfill Gas

Annex G1

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





WATER TANK

CAR PARK
CONFERENCE ROOM

LABORATORY GAS ROOM
CONTROL ROOM

MAINTENANCE BUILDING

VEHICLE WASH FACILITY

Wheel Wash Bath

COILS LOGS EQUIPMENT STORAGE AREA

STORAGE BUILDING

UU08

UU19

UU18

UU17

UU15

UU16

UU09

UU10

UU26

UU21

UU20

UU22

UU23

UU24

UU25

UU14

UU13

UU12

UU11

UU27

UU28

6.00

5.00
0.00%

Annex G2

Landfill Gas Monitoring Results

Table G2.1 Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells (April 2023)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.56	0.0	0.4	16.8
LFG2	2.69	0.0	0.6	17.2
LFG3	2.61	0.0	2.8	15.4
LFG4	2.45	0.0	0.1	19.5
LFG5	3.07	0.0	0.3	8.4
LFG6	2.73	0.0	0.1	19.5
LFG7	2.64	0.0	0.0	19.2
LFG8	2.27	0.0	0.0	19.8
LFG9	2.30	0.0	0.0	9.8
LFG10	1.98	0.0	0.2	10.3
LFG11	2.22	0.0	0.2	5.0
LFG12	1.97	0.0	0.0	19.4
LFG13	2.17	25.8	0.0	2.1
LFG14	2.53	0.0	0.1	9.0
LFG15	1.93	0.1	0.9	11.9
LFG16	2.51	0.0	0.1	20.1
LFG17	2.54	1.3	1.5	2.5
LFG18	2.47	0.0	0.2	19.3
LFG19	2.17	0.0	0.2	5.8
LFG20	3.03	0.0	0.7	17.3
LFG21	2.26	0.0	1.3	15.2
LFG22	2.77	0.0	1.3	10.4
LFG23	12.53	0.0	0.4	19.5
LFG24	5.81	0.0	0.0	20.3
GP1	Probe bent	0.0	4.3	15.2
GP2 (shallow)	Probe bent	0.0	1.3	10.4
GP2 (deep)	Probe bent	0.0	4.9	19.5
GP3 (shallow)	Probe bent	0.0	0.0	20.4
GP3 (deep)	Probe bent	0.0	0.0	20.4
GP4 (shallow)	Probe bent	0.0	0.0	20.3
GP4 (deep)	Probe bent	0.0	0.1	20.2
GP5 (shallow)	Probe bent	0.0	0.8	18.8
GP5 (deep)	37.99	0.0	0.1	20.2
GP6	36.07	0.0	5.6	13.6
GP7	35.84	0.0	0.2	19.8
GP12	2.25	0.0	0.2	19.7
GP15	2.59	0.0	0.0	20.2
P7	2.47	0.0	0.1	20.1
P8	2.45	0.0	0.0	20.2
P9	2.64	0.0	0.3	19.6

Table G2.2 Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells (May 2023)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.51	0.0	0.7	15.6
LFG2	2.80	0.0	0.8	18.0
LFG3	2.61	0.0	3.2	15.1
LFG4	2.50	0.0	0.0	16.9
LFG5	2.66	0.0	0.9	15.3
LFG6	2.25	0.0	0.1	20.1
LFG7	2.98	0.0	0.0	18.0
LFG8	2.71	0.0	0.1	20.4
LFG9	4.20	0.0	0.3	10.2
LFG10	2.12	0.0	0.2	7.6
LFG11	3.00	0.0	0.2	4.6
LFG12	2.36	0.0	0.0	20.3
LFG13	2.28	0.4	0.0	19.7
LFG14	4.18	0.0	0.1	17.4
LFG15	2.38	0.0	0.6	15.6
LFG16	2.94	0.0	0.2	20.3
LFG17	4.45	0.0	0.1	19.7
LFG18	2.28	0.0	0.1	20.4
LFG19	3.00	0.0	0.0	6.9
LFG20	3.40	0.0	0.0	18.1
LFG21	5.38	0.0	0.9	11.7
LFG22	4.53	0.0	1.2	11.5
LFG23	12.49	0.0	0.1	20.0
LFG24	5.76	0.0	0.0	20.0
GP1	Probe bent	0.0	7.5	0.6
GP2 (shallow)	Probe bent	0.0	1.2	16.9
GP2 (deep)	Probe bent	0.0	0.4	19.1
GP3 (shallow)	Probe bent	0.0	0.1	19.7
GP3 (deep)	Probe bent	0.0	0.0	19.7
GP4 (shallow)	Probe bent	0.0	0.5	19.5
GP4 (deep)	Probe bent	0.0	0.2	19.4
GP5 (shallow)	Probe bent	0.0	0.2	19.3
GP5 (deep)	37.55	0.0	0.2	19.5
GP6	31.15	0.0	4.8	14.5
GP7	36.06	0.0	0.2	19.5
GP12	2.15	0.0	0.1	20.8
GP15	1.81	0.0	0.1	20.9
P7	2.34	0.0	0.1	20.1
P8	2.76	0.0	0.1	20.3
P9	2.34	0.0	0.0	20.2

Table G2.3 Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells (June 2023)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.83	0.0	1.2	16.8
LFG2	2.56	0.0	1.5	18.9
LFG3	3.70	0.0	3.8	13.7
LFG4	2.46	0.0	0.0	19.7
LFG5	2.55	0.0	0.3	7.9
LFG6	2.50	0.0	0.0	20.0
LFG7	2.42	0.0	0.0	17.7
LFG8	2.54	0.0	0.0	20.0
LFG9	2.15	0.0	0.3	8.8
LFG10	2.44	0.0	0.1	13.3
LFG11	2.31	0.0	0.3	3.7
LFG12	2.43	0.0	0.0	20.1
LFG13	2.25	0.5	0.1	6.4
LFG14	1.97	0.0	0.3	8.4
LFG15	2.41	0.6	0.5	13.8
LFG16	3.90	0.0	0.0	20.3
LFG17	2.41	2.6	1.1	0.2
LFG18	3.66	0.0	0.0	20.3
LFG19	2.41	0.0	0.1	19.8
LFG20	2.64	0.0	4.5	5.8
LFG21	2.41	0.0	2.2	9.8
LFG22	3.40	0.0	0.0	20.2
LFG23	12.93	0.0	0.0	20.1
LFG24	7.54	0.0	8.4	19.0
GP1	Probe bent	0.0	0.1	20.3
GP2 (shallow)	Probe bent	0.0	0.2	19.7
GP2 (deep)	Probe bent	0.0	0.3	19.9
GP3 (shallow)	Probe bent	0.0	1.0	18.9
GP3 (deep)	Probe bent	0.0	0.0	20.2
GP4 (shallow)	Probe bent	0.0	0.1	20.1
GP4 (deep)	Probe bent	0.0	0.1	20.0
GP5 (shallow)	Probe bent	0.0	0.4	19.3
GP5 (deep)	38.00	0.0	0.0	20.0
GP6	36.00	0.0	4.3	14.8
GP7	34.95	0.0	0.1	19.7
GP12	1.91	0.0	0.1	19.9
GP15	2.65	0.0	0.0	20.1
P7	3.16	0.0	0.1	20.1
P8	2.50	0.0	0.4	19.6
P9	2.18	0.0	0.1	20.0

Table G2.4 Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes (April 2023)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	19.7
UU02	0.0	0.0	19.7
UU03	0.0	0.0	19.8
UU04	0.0	0.0	19.9
UU05	0.0	0.0	19.6
UU06	0.0	0.0	19.6
UU07	0.0	0.0	19.9
UU08	0.0	0.0	19.6
UU09	0.0	0.0	19.6
UU10	0.0	0.0	19.6
UU11	0.0	0.0	19.6
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	19.6
UU14	0.0	0.0	19.7
UU15	0.0	0.0	19.7
UU16	0.0	0.0	19.8
UU17	Voided due to latest site programme and on-going operation work		
UU18	0.0	0.0	19.7
UU19	0.0	0.0	20.0
UU20	0.0	0.0	19.8
UU21	0.0	0.0	19.8
UU22	0.0	0.0	19.9
UU23	0.0	0.0	19.8
UU24	0.0	0.0	19.9
UU25	0.0	0.0	20.0
UU26	0.0	0.0	20.0
UU27	0.0	0.0	19.6
UU28	0.0	0.0	19.7

Table G2.5 Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes (May 2023)

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

Table G2.6 Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes (June 2023)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	20.0
UU02	0.0	0.0	20.9
UU03	0.0	0.0	20.1
UU04	0.0	0.0	20.1
UU05	0.0	0.0	20.1
UU06	0.0	0.0	20.0
UU07	0.0	0.0	20.0
UU08	0.0	0.0	20.1
UU09	0.0	0.0	20.1
UU10	0.0	0.0	19.6
UU11	0.0	0.0	20.3
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	20.2
UU14	0.0	0.0	20.2
UU15	0.0	0.0	20.0
UU16	0.0	0.0	20.2
UU17	Voided due to latest site programme and on-going operation work		
UU18	0.0	0.0	20.0
UU19	0.0	0.0	20.1
UU20	0.0	0.0	20.2
UU21	0.0	0.0	20.1
UU22	0.0	0.0	20.1
UU23	0.0	0.0	20.1
UU24	0.0	0.0	20.1
UU25	0.0	0.0	20.1
UU26	0.0	0.0	20.1
UU27	0.0	0.0	20.2
UU28	0.0	0.0	20.2

Table G2.7 Landfill Gas Bulk Gas Sampling Monitoring Results

Parameters	LFG1	LFG8
Methane (% (v/v))	<0.020	<0.020
Carbon Dioxide (% (v/v))	0.549	0.066
Oxygen (% (v/v))	16.1	20.0
Nitrogen (% (v/v))	81.3	77.5
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		Weather Condition	Temperature (°C)	Wind Direction (Deg)	Wind Speed (m/s)	Monitoring Results (ppm)
	Latitude (N)	Longitude (E)					
13:54	22°16'30"	114°16'36"	Cloudy	26.9	004	2.2	6
14:20	22°16'28"	114°16'26"	Cloudy	28.3	174	1.2	6

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	13 April 2023
Time	11:59
Monitoring Location	LFG13
Parameter	Methane
Limit Levels	22.5%
Measured Level	25.8%
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 11 April 2023) 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 on 17 and 18 April 2023 to confirm findings. Methane (ranged from 21.0% to 21.4% %) 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 13 April 2023 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 13 April 2023 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: 25 April 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	5 June 2023
Time	11:00
Monitoring Location	LFG24
Parameter	Carbon Dioxide
Limit Levels	4.7%
Measured Level	8.4%
Possible reason	<p>During the landfill gas monitoring event, carbon dioxide was not detected at the landfill gas monitoring wells adjacent to LFG24 (LFG23: 0.0% and GP7: 0.1%). All landfill gas (methane) monitoring results are well within the respective Limit Levels. In addition, no exceedance of Limit Levels for landfill gas monitoring at service voids, utilities pits and manholes (conducted on 5 June 2023) was recorded in the reporting period. Hence, there is a low possibility that the elevation of carbon dioxide level at LFG24 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 on 11 July 2023 to confirm findings. No carbon dioxide was detected at LFG24 during the sampling event, which demonstrate no consecutive landfill gas impact at the monitoring well. It is possible that the elevated level of carbon dioxide detected at LFG24 on 5 June 2023 could be due to background fluctuation.</p> <p>Due to the background influencing factor and the subsequent monitoring result at LFG24 did not show any exceedance, there is no adequate evidence showing that the carbon dioxide exceedance measured at LFG24 on 5 June 2023 was deemed to Project-related activities.</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 landfill gas monitoring results and collect additional data for investigation and further review, if necessary.</p>
Remarks	-

Prepared by: Abbey Lau
 Designation: Environmental Team
 Date: 11 July 2023

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	3	14
Air Quality (Odour)	Action	0	0
	Limit	0	0
Air Quality (Emissions of Thermal Oxidiser)	Limit	0	1
Air Quality (Emissions of Landfill Gas Flare)	Limit	1	5
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	0	1
Water Quality (Leachate Level)	Limit	6	22
Water Quality (Groundwater)	Limit	3	13
Landfill Gas (Perimeter Landfill Gas Monitoring Wells)	Limit	2	4
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 (Apr-Jun 2023)	0	0	0
Total no. received since project commencement	1	0	0