South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.23

PREPARED FOR

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

Green Valley Landfill Ltd.

DATE
7 February 2025

REFERENCE
0465169

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

1. South East New Territories (SENT) Landfill Extension

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

Reference Document/Plan

Document/Plan to be Certified/Verified:	Quarterly Environmental Monitoring & Audit Report No. 23 for South East New Territories (SENT) Landfill Extension
Date of Report:	7 February 2025

Reference EP Condition

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 February 2025

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 February 2025

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South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.23

0465169

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CONTENTS

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) and operation of the Project commenced on 2 January 2019 and 21 November 2021, respectively.

This Quarterly EM&A report presents the EM&A works carried out during the period from 1 July 2024 to 30 September 2024 for the Project in accordance with the updated EM&A Manual.

EXCEEDANCE OF ACTION AND LIMIT LEVELS FOR AIR QUALITY

No exceedance of Action and Limit Levels for operation/restoration phase for air quality monitoring in the reporting period.

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

One exceedance of the Limit Levels for groundwater groundwater (Ammoniacal-nitrogen) and three exceedances of the Limit Levels for groundwater (Chemical Oxygen Demand (COD)) were recorded for water quality monitoring in the reporting period. The groundwater (Ammoniacal-nitrogen) exceedances at MWX-7 on 5 August 2024 were considered non Project related upon further investigation. The groundwater (COD) exceedances at MWX-7 on 5 July 2024 and 5 August 2024, and at MWX-9 on 5 July 2024 were considered non Project related upon further investigation.

EXCEEDANCE OF ACTION AND LIMIT LEVELS FOR LANDFILL GAS

One exceedance of the Limit Level for landfill gas (carbon dioxide) was recorded for landfill gas monitoring in the reporting period. The landfill gas (carbon dioxide) exceedance at LFG17 on 13 August 2024 was considered non Project related upon further investigation.

ENVIRONMENTAL COMPLAINTS, SUMMONS AND PROSECUTIONS

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

REPORTING CHANGE

There was no reporting change in the reporting period.

1. INTRODUCTION

1.1 BACKGROUND

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

Since then, applications for Variation of an Environmental Permit (No. VEP-531/2017) were submitted to EPD and the Variation of Environmental Permits (EP-308/2008/A and EP-308/2008/B) were granted on 6 January 2012 and 20 January 2017, respectively, as the Hong Kong SAR Government has decided to reduce the scale of the design scheme of SENTX assessed in the approved EIA Report and SENTX will only receive construction waste. In May 2018, a Further Environmental Permit (FEP) (FEP-01/308/2008/B) was granted to the SENTX's contractor, Green Valley Landfill, Limited (GVL). In February 2024, VEPs (EP-308/2008/C and FEP-01/308/2008/C) were granted to the Environmental Infrastructure Division of EPD and GVL, regarding updates on alternative measures to minimise surface odour emission.

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 Mm^3 and provides an additional lifespan of about 6 years, commencing operation upon exhaustion of the SENT Landfill. The SENTX will receive construction waste only.

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.

(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

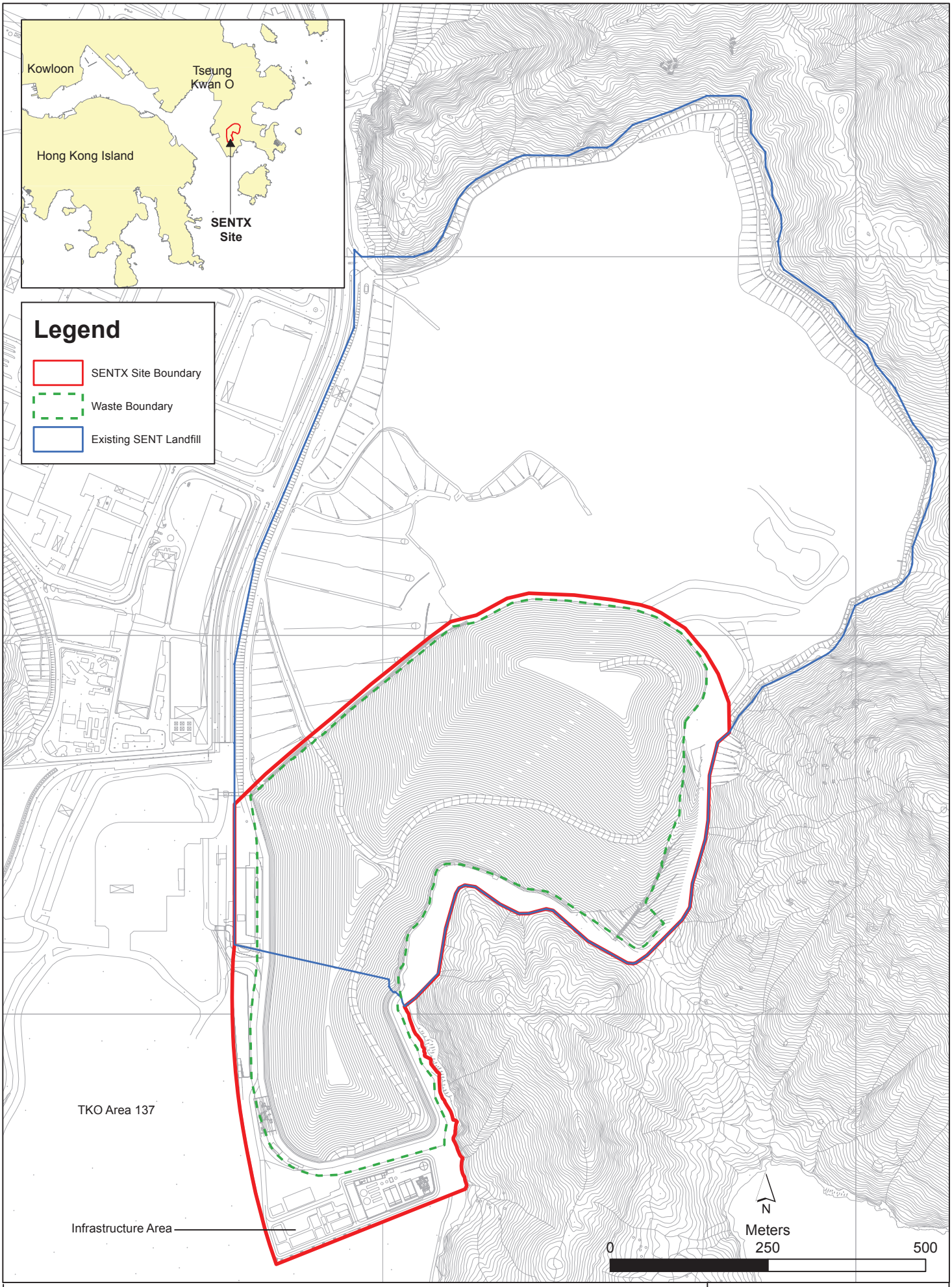

Figure 1.1

Layout Plan of SENTX

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Date: 5/9/2018

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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	2059

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.

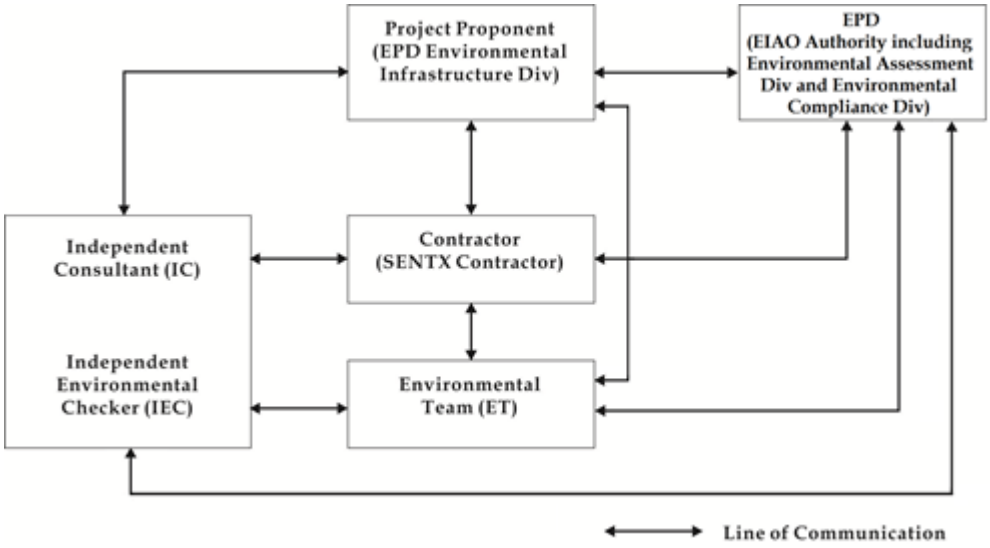
1.3 SCOPE OF THE EM&A REPORT

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 July 2024 to 30 September 2024 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 summarised 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:

July 2024

- Maintenance and improvement of temporary surface water drainage; and
- Restoration of Phase 1 Cell 1X, 2X and Phase 2 Cell 3X west slopes.

August 2024

- Maintenance and improvement of temporary surface water drainage; and
- Restoration of Phase 1 Cell 1X, 2X and Phase 2 Cell 3X west slopes.

September 2024

- Maintenance and improvement of temporary surface water drainage; and
- Restoration of Phase 1 and Phase 2 slopes.

The implementation schedule of the mitigation measured 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
Operation 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 summarized as below:

- Three environmental management meeting was held with the Contractor, ET, IEC and EPD on 18 July 2024, 15 August 2024 and 26 September 2024; and
- Environmental toolbox trainings on the following topics were provided by the Contractor to the workers:
    - Good Vehicle Maintenance Practices on 11 July 2024;
    - Air Pollution Dark Smoke on 30 July 2024;
    - Coverage of Regulated Electrical Equipment (REE) Expanded on 8 August 2024;
    - Mosquito Nuisance on 22 August 2024;
    - Wastewater Handling, Discharge and Treatment Facility on 12 September 2024; and
    - Tree Protection Zone on 26 September 2024.

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 mitigation measures are presented in **Table 1.4**.

TABLE 1.4 STATUS OF SUBMISSIONS REQUIRED UNDER THE EP AND IMPLEMENTATION STATUS OF 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
	EP-308/2008/C	Granted on 29 February 2024
Further Environmental Permit	FEP-01/308/2008/B	Granted on 16 May 2018
	FEP-01/308/2008/C	Granted on 29 February 2024
Water Discharge License under WPCO (Permit Holder: GVL)	Licence No.: WT10003277-2024	Validity from 23 August 2024 to 30 June 2026
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-RE0307-24	Validity from 22 March 2024 to 14 September 2024
	GW-RE1103-24	Validity from 15 September 2024 to 14 March 2025

2. EM&A RESULTS

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

2.1.1.1 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 dust 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)	260 μg m-³	260 μg m-³
AM2 - SENTX Site Boundary (West, near DP3)		
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 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 dust monitoring programme and monitoring locations are summarised in **Table 2.2** and illustrated in **Figure 2.1**, respectively.

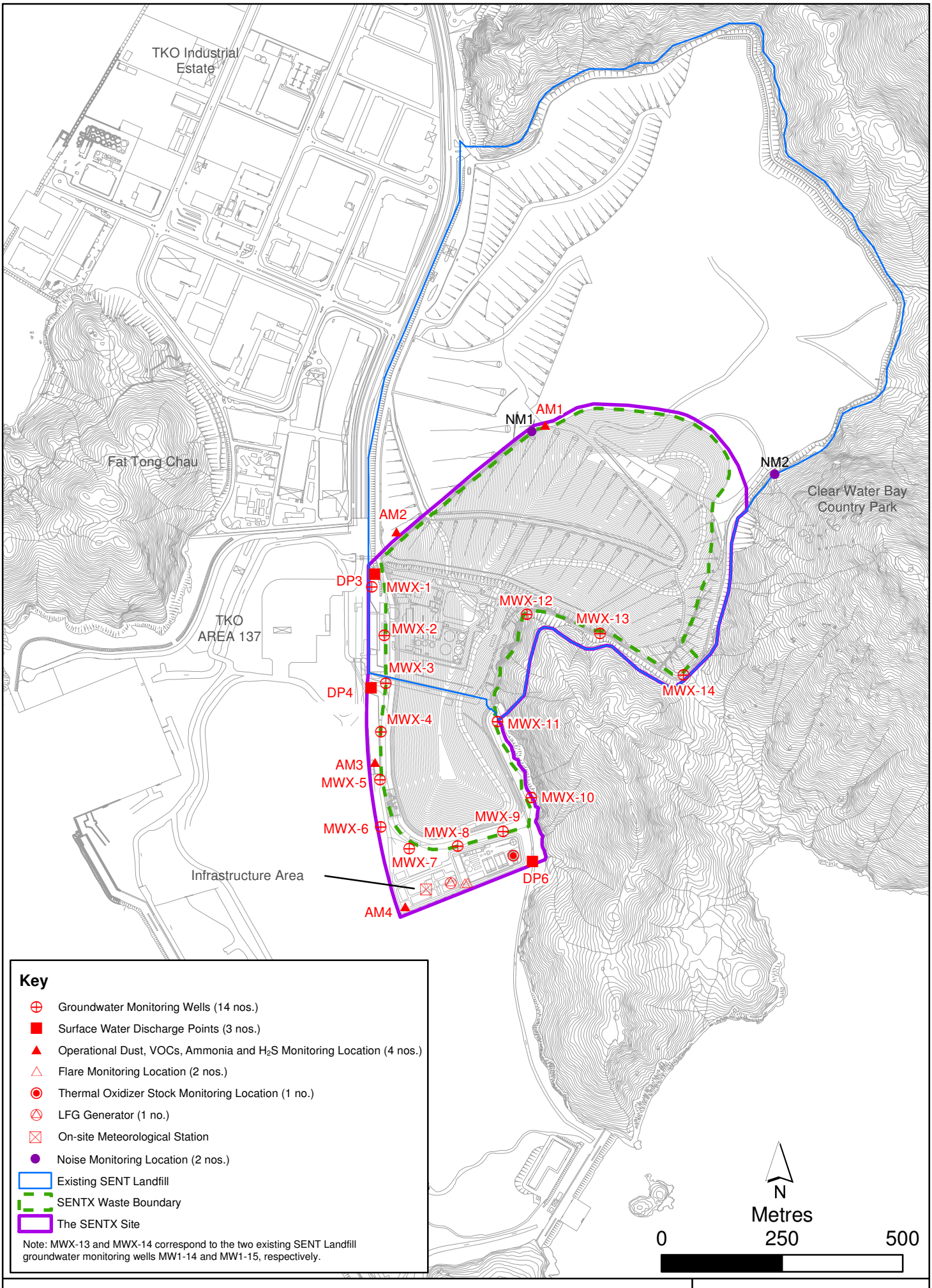


Figure 2.1

Environmental Monitoring Locations

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Date: 19/11/2019

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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	6, 12, 18, 24, 30 Jul 2024 5, 11, 17, 23, 29 Aug 2024 4, 10, 16, 22, 28 Sep 2024	Tisch TE-5170 (S/N: 3976)
AM2	SENTX Site Boundary (West, near DP3)				Tisch TE-5170 (S/N: 3573)
AM3	SENTX Site Boundary (West, near RC15)				Tisch TE-5170 (S/N: 3572)
AM4	SENTX Site Boundary (West, near EPD building)				Tisch TE-5170 (S/N: 3957)

2.1.1.2 MONITORING SCHEDULE FOR THE REPORTING MONTH

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

2.1.1.3 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	Average 24-hr TSP Concentration (μg m^{-3})		Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
		Average	Range		
July 2024	AM1	72	20 – 143	260	260
	AM2	60	42 – 98	260	260
	AM3	125	55 – 235	260	260
	AM4	83	29 – 172	260	260
August 2024	AM1	75	23 – 107	260	260
	AM2	85	27 – 151	260	260
	AM3	114	30 – 225	260	260
	AM4	55	20 – 74	260	260
September 2024	AM1	85	42 – 146	260	260
	AM2	57	45 – 95	260	260
	AM3	96	38 – 211	260	260
	AM4	79	22 – 113	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 TKO Area 137 Fill Bank.

No Action and Limit Levels exceedance was recorded for TSP monitoring in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in **Annex D2**.

2.1.1.4 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

2.1.2.1 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 10 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. Furthermore, the odour patrol route has been reviewed against the latest construction/ operation programme and approved by EPD on 17 June 2024.

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	• Odour intensity ≥ Class 2 recorded; or • One documented complaint received	• Odour intensity ≥ 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.

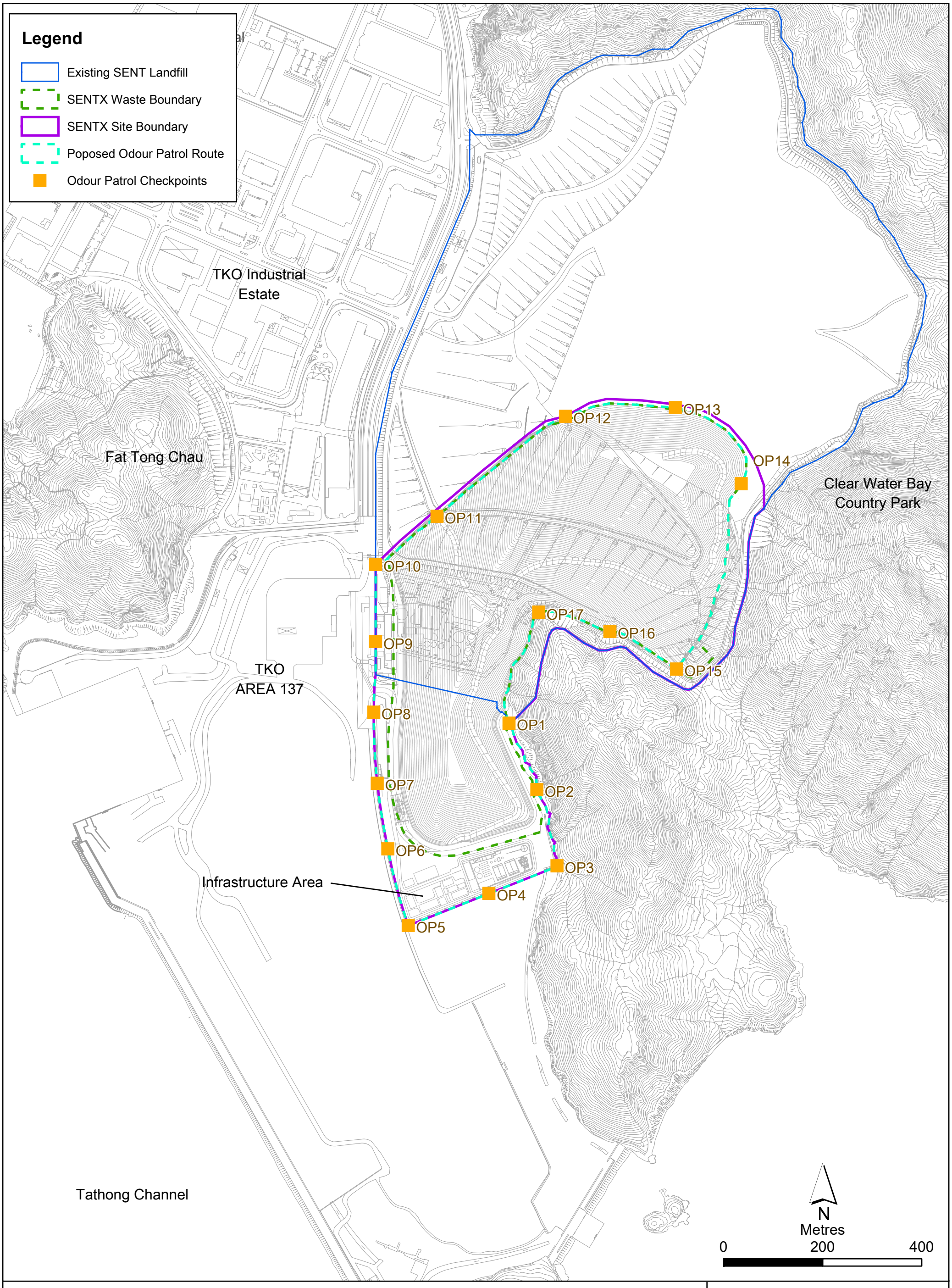

Figure 2.2

Odour Patrol Route for
Operation/ Restoration Phase Odour Monitoring

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Date: 25/3/2024

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TABLE 2.5 ODOUR MONITORING DETAILS

Patrol Locations	Parameters	Patrol Frequency [a]	Monitoring Dates
Patrol along the SENTX Site Boundary (Checkpoints OP1 – OP17)	Odour Intensity (see *Table 2.6*)	Period 1 - First month of operation 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 Three times per week on different days conducted by an independent third party together with the ET and IEC [b] Period 2 - Three months following period 1 [c] 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] Period 3 - Throughout operation following period 2 [c] Monthly conducted by the ET and the IEC Quarterly conducted by an independent third party together with the ET and IEC [b]	Conducted by ET & IEC: 26 Jul 2024, 1 Aug 2024 Conducted by an independent third party, ET & IEC: 20 Sep 2024

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

Class	Odour Intensity	Description
2	Moderate	Identified odour, moderate
3	Strong	Identified odour, strong
4	Extreme	Severe odour

2.1.2.2 MONITORING SCHEDULE FOR THE REPORTING MONTH

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

2.1.2.3 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	Action Level	Limit Level
OP1	0	Odour intensity ≥ Class 2 recorded	Odour intensity ≥ Class 3 recorded on 2 consecutive patrol
OP2	0 - 1		
OP3	0		
OP4	0		
OP5	0		
OP6	0		
OP7	0		
OP8	0		
OP9	0		
OP10	0		
OP11	0 - 1		
OP12	0 - 1		
OP13	0		
OP14	0 - 1		
OP15	0		
OP16	0		
OP17	0		

(a) OP15 - OP17 are not accessible due to safety considerations (after heavy rainstorm).

The potential odour source in the reporting period included the Cell 4X tipping area at SENTX, and the restoration work at SENT and the nearby vegetation. 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

2.1.3.1 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 NO_2, CO, SO_2, 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	3.01×10^{-2} gs^{-1}
Vinyl chloride	2.23×10^{-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 oxidize 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 • NO_2 • CO • SO_2 • Benzene • Vinyl chloride In-situ analysis for • Exhaust gas velocity	Monthly for the first 12 months of operation and thereafter at quarterly intervals	23 Jul 2024, 21 Aug 2024, 23 Sep 2024
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	21 Aug 2024
	Laboratory analysis for • Ammonia • Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Quarterly	21 Aug 2024
	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Jul – 30 Sep 2024
Stack of Landfill Gas Flare	Laboratory analysis for • NO_2 • CO • SO_2 • Benzene • Vinyl chloride In-situ analysis for • Exhaust gas velocity	Monthly for the first 12 months of operation and thereafter at quarterly intervals	22 Jul 2024, 20 Aug 2024, 24 Sep 2024
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	20 Aug 2024

Monitoring Location	Parameter	Frequency	Monitoring Date
Stack of Landfill Gas Flare	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Jul – 30 Sep 2024
Stack of Landfill Gas Generator	Laboratory analysis for • NO_2 • CO • SO_2 • Benzene • Vinyl chloride In-situ analysis for • Exhaust gas velocity	Monthly for the first 12 months of operation and thereafter at quarterly intervals	22 Jul 2024, 20 Aug 2024, 23 Sep 2024
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	20 Aug 2024
	• Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Jul – 30 Sep 2024

Notes:
(a) The exhaust gas velocity is calculated based on the cross-section area of the stack and continuous monitored gas flow and combustion temperature data.
(b) The monitoring results are being reviewed to determine if monitoring of this parameter can be terminated upon agreement by the EIAO Authority, IEC and Project Proponent.

2.1.3.2 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**.

2.1.3.3 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
July 2024		
NO_2	1.12 gs^{-1}	1.58 gs^{-1}
CO	0.02 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	<1.4 x 10^{-4} gs^{-1}	2.23 x 10^{-3} gs^{-1}
Gas combustion temperature	901°C (895°C – 913°C)	850°C (minimum)
Exhaust gas exit temperature	1,212K (1,202K – 1,219K)	443K (minimum) [a]
Exhaust gas velocity	11.0 ms^{-1} [b]	7.5 ms^{-1} (minimum) [a]
August 2024		
NO_2	0.57 gs^{-1}	1.58 gs^{-1}
CO	0.03 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	<1.3 x 10^{-4} gs^{-1}	2.23 x 10^{-3} gs^{-1}
Non-Methane Organic Carbon	<0.003 gs^{-1}	-
Ammonia	0.0315 gs^{-1}	- [c]
Gas combustion temperature	900°C (895°C – 904°C)	850°C (minimum)
Exhaust gas exit temperature	1,206K (1,200K – 1,214K)	443K (minimum) [a]
Exhaust gas velocity	9.4 ms^{-1} [b]	7.5 ms^{-1} (minimum) [a]
September 2024		
NO_2	0.67 gs^{-1}	1.58 gs^{-1}
CO	0.02 gs^{-1}	0.53 gs^{-1}
SO_2	<0.01 gs^{-1}	0.07 gs^{-1}
Benzene	3.0 x 10^{-4} gs^{-1}	3.01 x 10^{-2} gs^{-1}

Parameters	Monitoring Results (Range in Bracket)	Limit Level
Vinyl chloride	<1.2 x 10^{-4} gs^{-1}	2.23 x 10^{-3} gs^{-1}
Gas combustion temperature	899°C (893°C – 908°C)	850°C (minimum)
Exhaust gas exit temperature	1,198K (1,188K – 1,205K)	443K (minimum) (a)
Exhaust gas velocity	9.6 ms^{-1} (b)	7.5 ms^{-1} (minimum) (a)

Notes:
(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.
(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
July 2024		
NO_2	0.01 gs^{-1}	0.97 gs^{-1}
CO	0.04 gs^{-1}	2.43 gs^{-1}
SO_2	0.02 gs^{-1}	0.22 gs^{-1}
Benzene	<6.0 x 10^{-5} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<4.8 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	Flare 1: 876°C (831°C – 916°C) Flare 2: 901°C (853°C – 951°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,140K (1,099K – 1,171K) Flare 2: 1,164K (1,115K – 1,222K)	923 K (minimum) (a)
Exhaust gas velocity	4.3 ms^{-1} (b)	9.0 m s^{-1} (minimum) (a)
August 2024		
NO_2	<0.02 gs^{-1}	0.97 gs^{-1}
CO	0.02 gs^{-1}	2.43 gs^{-1}
SO_2	0.01 gs^{-1}	0.22 gs^{-1}
Benzene	<1.17 x 10^{-4} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<9.4 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}

Parameters	Monitoring Results (Range in Bracket)	Limit Level
Non-Methane Organic Carbon	<0.002 gs^{-1}	-
Gas combustion temperature	Flare 1: 866°C (840°C – 890°C) Flare 2: 896°C (865°C – 928°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,124K (1,096K – 1,151K) Flare 2: 1,154K (1,126K – 1,190K)	923 K (minimum) (a)
Exhaust gas velocity	9.0 ms^{-1} (b)	9.0 m s^{-1} (minimum) (a)
September 2024		
NO_2	0.01 gs^{-1}	0.97 gs^{-1}
CO	0.04 gs^{-1}	2.43 gs^{-1}
SO_2	<0.01 gs^{-1}	0.22 gs^{-1}
Benzene	<0.94 x 10^{-5} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<7.5 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	Flare 1: 852°C (824°C – 887°C) Flare 2: 890°C (857°C – 929°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,114K (1,090K – 1,151K) Flare 2: 1,153K (1,122K – 1,195K)	923 K (minimum) (a)
Exhaust gas velocity	5.9 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.

TABLE 2.14 SUMMARY OF LANDFILL GAS GENERATOR STACK EMISSION MONITORING IN THE REPORTING PERIOD

Parameters	Monitoring Results (Range in Bracket)	Limit Level
July 2024		
NO_2	0.074 gs^{-1}	1.91 gs^{-1}
CO	0.742 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	<1.03 x 10^{-5} gs^{-1}	1.88 x 10^{-5} gs^{-1}

Parameters	Monitoring Results (Range in Bracket)	Limit Level
Exhaust gas exit temperature	ENGA: 855K (841K – 891K) ENGB: 868K (850K – 874K)	723K (minimum) [(a)]
Exhaust gas velocity	10.2 ms^{-1} [(b)]	30.0 ms^{-1} (minimum) [(a)]
August 2024		
NO_2	0.018 gs^{-1}	1.91 gs^{-1}
CO	0.715 gs^{-1}	2.48 gs^{-1}
SO_2	0.002 gs^{-1}	0.528 gs^{-1}
Benzene	3.7×10^{-5} gs^{-1}	2.47×10^{-4} gs^{-1}
Vinyl chloride	$<8.9 \times 10^{-6}$ gs^{-1}	1.88×10^{-5} gs^{-1}
Non-Methane Organic Carbons	0.0023 gs^{-1}	-
Exhaust gas exit temperature	ENGA: 868K (844K – 886K) ENGB: 866K (837K – 875K)	723K (minimum) [(a)]
Exhaust gas velocity	8.8 ms^{-1} [(b)]	30.0 ms^{-1} (minimum) [(a)]
September 2024		
NO_2	0.039 gs^{-1}	1.91 gs^{-1}
CO	0.740 gs^{-1}	2.48 gs^{-1}
SO_2	<0.001 gs^{-1}	0.528 gs^{-1}
Benzene	5.9×10^{-5} gs^{-1}	2.47×10^{-4} gs^{-1}
Vinyl chloride	$<8.2 \times 10^{-6}$ gs^{-1}	1.88×10^{-5} gs^{-1}
Exhaust gas exit temperature	ENGA: 849K (838K – 884K) ENGB: 845K (838K – 884K)	723K (minimum) [(a)]
Exhaust gas velocity	9.0 ms^{-1} [(b)]	30.0 ms^{-1} (minimum) [(a)]

Notes:
(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.

No Action and Limit Level exceedance was recorded for thermal oxidizer, landfill gas flare and landfill gas generator stack emission monitoring in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in **Annex D2**.

2.1.4 AMBIENT VOCS, AMMONIA AND H2S MONITORING

2.1.4.1 MONITORING REQUIREMENTS AND EQUIPMENT

According to the updated EM&A Manual of the Project, ambient VOCs, ammonia and H_2S 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 H_2S monitoring is provided in **Table 2.15** below.

TABLE 2.15 LIMIT LEVELS FOR AMBIENT VOCS, AMMONIA AND H2S MONITOIRNG

Parameters	**Limit Level (μg m^{-3})**
Methane	NA [(a)]
Ammonia	180
H_2S	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

Parameters	Limit Level (μg m^{-3})
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
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.

2.1.4.2 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.

2.1.4.3 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.

2.1.4.4 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.

2.1.4.5 H_2S

H_2S 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 H_2S 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 MONITOIRNG DETAILS

Monitoring Station	Location	Parameter	Frequency	Monitoring Date
AM1	SENTX Site Boundary (North)	• Methane • Ammonia • A suite of VOCs [(a)] • H_2S	Quarterly	22 Aug 2024
AM2	SENTX Site Boundary (West, near DP3)			
AM3	SENTX Site Boundary (West, near RC15)			
AM4	SENTX Site Boundary (West, near EPD building)			

Notes:

(a) A suite of VOCs includes:

- Trichloroethylene
- Vinyl chloride
- Methylene chloride
- Chloroform
- 1,2-dichloroethane
- 1,1,1-trichloroethane
- Carbon tetrachloride
- Tetrachloroethylene
- Butyl benzene
- Xylenes
- Decanes
- Undecane
- Limonene
- Terpenes
- Ethanol
- Butan-2-ol
- Dichlorobenzene
- Methyl butanoate
- Dipropyl ether
- Methanethiol
- Ethanethiol
- Butanethiol
- Methanol

- 1,2-dibromoethane
- Benzene
- Toluene
- Carbon disulphide
- Propyl benzene
- Ethyl benzene
- Dimethylsulphide
- Methyl propionate
- Ethyl propionate
- Propyl propionate
- Butyl acetate
- Ethyl butanoate
- Heptanes
- Octanes
- Nonanes
- Dichlorodifluoro-methane
- Methane

2.1.4.6 MONITOIRNG SCHEDULE FOR THE REPORTING MONTH

The schedule for ambient VOCs, ammonia and H_2S monitoring during the reporting period is provided in **Annex C**.

2.1.4.7 RESULTS AND OBSERVATIONS

The ambient VOCs, ammonia and H_2S 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 (µg m^{-3})**	**Monitoring Results (µg m^{-3})**			
		AM1	**AM2**	**AM3**	**AM4**
Ammonia	180	<10	<10	<10	<10
H_2S	42	<15	<15	<15	<15
Methane	NA [a]	0.00018 %(v/v)	0.00018 %(v/v)	0.00018 %(v/v)	0.00018 %(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	<0.3	<0.3	<0.3	<0.3
Benzene	33	1.2	<0.5	<0.5	<0.5
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	0.7	1	0.5
Carbon Tetrachloride	64	<0.6	0.6	0.6	0.6
Chloroform	99	<0.8	<0.8	<0.8	<0.8
Decanes	3,608	<0.7	<0.7	<0.7	<0.7
Dichlorobenzene	120	<1.0	<1.0	<1.0	<1.0

Parameters	Limit Level (µg m^{-3})	Monitoring Results (µg m^{-3})			
		AM1	AM2	AM3	AM4
Dichlorodifluoro-methane	NA [a]	1.5	1.8	1.9	1.7
Dimethylsulphide	8	<0.2	<0.2	<0.2	<0.2
Dipropyl ether	NA [a]	<0.8	<0.8	<0.8	<0.8
Limonene	212	0.6	0.5	0.6	0.5
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	<3.8	4.1	10.7
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	<0.5	<0.5	<0.5
Heptane	2,746	<0.8	<0.8	<0.8	1.5
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	17.5	19.2	34.7	35.1
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	1.2	1.8	1	0.7
Butyl acetate	76	<1.0	<1.0	<1.0	<1.0
Butyl benzene	47	<1.0	<1.0	<1.0	<1.0
Nonane	11,540	<0.9	<0.9	<0.9	<0.9
Propyl benzene	19	<0.8	<0.8	<0.8	<0.8
Octane	7,942	<0.9	<0.9	<0.9	<0.9
Propyl propionate	276	<1.0	<1.0	<1.0	<1.0
Terpenes	NA [a]	0.9	<0.8	1.2	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	1	1.1	0.9	0.7
Trichloroethylene	5,500	<1.1	<1.1	<1.1	<1.1
Undecane	5,562	<1.2	<1.2	<1.2	<1.2

Parameters	Limit Level (µg m^{-3})	Monitoring Results (µg m^{-3})			
		AM1	AM2	AM3	AM4
Vinyl Chloride	26	<0.3	<0.3	<0.3	<0.3
Xylenes	534	1.1	1	0.8	0.8

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

All ambient VOCs, ammonia and H_2S 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) or 75 dB(A) recorded at the monitoring station	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		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 sound level meter 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 operation of the Project	2, 8, 15, 25, 31 Jul 2024 6, 12, 19, 26 Aug 2024 5, 11, 17, 23, 30 Sep 2024	Sound Level Meter: Rion NL-52 (S/N: 01010406) Acoustic Calibrator: CAL200 (S/N: 16878) CAL200 (S/N: 11333)

2.2.2 MONITORING SCHEDULE FOR THE REPORTING MONTH

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. Results for noise monitoring are summarised in **Table 2.20**. The monitoring results and the graphical presentation of the data are provided in **Annex E1**.

TABLE 2.20 SUMMARY OF OPERATION 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
July 2024	NM1	56.3	54.1 – 58.0	75
August 2024	NM1	54.0	51.6 – 56.3	75
September 2024	NM1	54.1	51.8 – 57.3	75

Major noise sources identified during the noise monitoring included noise from operations of the SENTX 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

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

TABLE 2.21 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 *Table 10a of the Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* shall also be followed.

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

TABLE 2.22 IMPACT SURFACE WATER QUALITY MONITORING DETAILS

Monitoring Station	Location	Frequency	Monitoring Dates	Parameter	Equipment
DP3	Surface water discharge point DP3	Monthly	9 Jul 2024, 7 Aug 2024, 11 Sep 2024	• pH • Electrical conductivity (EC) • DO • SS • COD • BOD_5 • TOC • Ammoniacal–nitrogen • Nitrate-nitrogen • Nitrite–nitrogen • TKN • TN • Phosphate • Sulphate • Sulphide • Carbonate • Oil & Grease • Bicarbonate • Chloride • Sodium • Potassium • Calcium • Magnesium • Nickel • Manganese • Chromium • Cadmium • Copper • Lead • Iron • Zinc • Mercury • Boron	Horiba U-52G (S/N: NVAE08GT) Horiba U-52G (S/N: AWE7D2V4)
DP4	Surface water discharge point DP4				
DP6	Surface water discharge point DP6				

2.3.1.2 MONITORING SCHEDULE FOR THE REPORTING MONTH

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

2.3.1.3 RESULTS AND OBSERVATIONS

Three regular monitoring events for impact surface water quality monitoring were scheduled at all designated monitoring stations during the reporting period. However, sampling could not be carried out at all monitoring stations from July 2024 to September 2024 due to insufficient flow. Details of impact water quality monitoring event are provided in **Annex F1**.

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

2.3.2 LEACHATE MONITORING

2.3.2.1 MONITORING REQUIREMENTS AND EQUIPMENT

According to the updated EM&A Manual, continuous monitoring of leachate level and monthly 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 2.24** 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 m³
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 Jul – 30 Sep 2024	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)]	*On-site Measurements*: • Volume • pH • Temperature *Laboratory analysis:* • Suspended Solids • COD • BOD_5 • 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	11 Jul 2024, 15 Aug 2024, 4 Sep 2024	TOA-DKK HM-30P (S/N: 790332) YSI Pro Quatro (S/N: 23C105530)

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

2.3.2.2 MONITORING SCHEDULE FOR THE REPORTING MONTH

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

2.3.2.3 RESULTS AND OBSERVATIONS

The leachate levels and effluent quality monitoring results are summarised 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)
July 2024		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	105 (102 – 119)	> 178
Meter No. X-2 [(a)]	113 (97 – 119)	
Average	109 (101 – 118)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	108 (105 – 130)	> 180
Meter No. X-4	119 (95 – 139)	
Average	114 (108 – 125)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	111 (99 – 119)	> 175
Meter No. X-6	111 (99 – 119)	
Average	111 (99 – 119)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	114 (103 – 125)	> 186
Meter No. X-8	111 (92 – 120)	
Average	112 (98 – 121)	
August 2024		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	120 (102 – 144)	> 178
Meter No. X-2	112 (99 – 119)	
Average	116 (104 – 132)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	106 (106 – 106)	> 180
Meter No. X-4	119 (104 – 119)	
Average	112 (105 – 113)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	111 (99 – 119)	> 175
Meter No. X-6	110 (99 – 119)	
Average	111 (99 – 119)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	114 (107 – 120)	> 186

Monitoring Location	Average Leachate Head Levels (cm) (Range in Bracket)	Limit Level (cm)
Meter No. X-8	113 (105 – 120)	
Average	113 (106 – 120)	
September 2024		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	114 (95 – 134)	> 178
Meter No. X-2 [(a)]	112 (91 – 121)	
Average	113 (102 – 125)	
Pump Station No. 2X (Cell 2X		
Meter No. X-3	110 (96 – 120)	> 180
Meter No. X-4	121 (106 – 135)	
Average	116 (104 – 128)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	112 (102 – 119)	> 175
Meter No. X-6	112 (102 – 119)	
Average	112 (102 – 119)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	111 (100 – 120)	> 186
Meter No. X-8	110 (98 – 120)	
Average	110 (99 – 120)	

TABLE 2.26 SUMMARY OF EFFLUENT QUALITY MONITORING RESULTS IN THE REPORTING PERIOD

Parameters		Monitoring Results	Limit Level
July 2024			
Temperature	°C	36.1	> 43 °C
pH Value	pH unit	8.4	6 – 10
Volume Discharged	m^3	262	>2,000 m^3
Suspended Solids (SS)	mg/L	15.9	> 800 mg/L
Phosphate	mg/L	5.86	> 25 mg/L
Sulphate	mg/L	132	> 800 mg/L
Total Inorganic Nitrogen [(a)]	mg/L	28.76	> 100 mg/L
BOD	mg/L	7	> 800 mg/L

Parameters		Monitoring Results	Limit Level
COD	mg/L	972	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	5200	> 7,000 µg/L
Iron	mg/L	2.06	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	127	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	177	> 700 µg/L
Zinc	µg/L	50	> 700 µg/L
Parameters		**Monitoring Results**	**Limit Level**
August 2024			
Temperature	°C	29.7	> 43 °C
pH Value	pH unit	8.5	6 – 10
Volume Discharged	m^3	1293	>2,000 m^3
Suspended Solids (SS)	mg/L	23	> 800 mg/L
Phosphate	mg/L	26.5	> 25 mg/L
Sulphate	mg/L	7.2	> 800 mg/L
Total Inorganic Nitrogen [(a)]	mg/L	36.54	> 100 mg/L
BOD	mg/L	7	> 800 mg/L
COD	mg/L	872	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	5120	> 7,000 µg/L
Iron	mg/L	1.33	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	97	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	117	> 700 µg/L
Zinc	µg/L	62	> 700 µg/L

Parameters		Monitoring Results	Limit Level
Parameters		**Monitoring Results**	**Limit Level**
September 2024			
Temperature	°C	35.3	> 43 °C
pH Value	pH unit	8.5	6 – 10
Volume Discharged	m³	1041	>2,000 m³
Suspended Solids (SS)	mg/L	20.7	> 800 mg/L
Phosphate	mg/L	4.75	> 25 mg/L
Sulphate	mg/L	216	> 800 mg/L
Total Inorganic Nitrogen (a)	mg/L	41.91	> 100 mg/L
BOD	mg/L	8	> 800 mg/L
COD	mg/L	693	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	5620	> 7,000 µg/L
Iron	mg/L	21.6	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	113	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	110	> 700 µg/L
Zinc	µg/L	54	> 700 µg/L

Note:
(a) Total Inorganic Nitrogen include Ammoniacal-nitrogen, Nitrite-nitrogen and Nitrate-nitrogen.

All leachate levels and 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

2.3.3.1 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 MONITOIRNG DETAILS

Location	Frequency	Parameter		Monitoring Dates	Equipment
All groundwater monitoring wells (MWX-1 to MWX-14)	Monthly	• Water level • pH • EC • COD • BOD5 • TOC • Ammoniacal–nitrogen • Nitrate-nitrogen • Nitrite–nitrogen • TKN • TN • Sulphate • Sulphide • Carbonate • Bicarbonate • Phosphate	• Chloride • Sodium • Potassium • Calcium • Magnesium • Nickel • Manganese • Chromium • Cadmium • Copper • Lead • Iron • Zinc • Mercury • Boron	5 Jul 2024, 8 Aug 2024, 12 Sep 2024	Horiba U-52G (S/N: NVAE08GT) Horiba U-52G (S/N: AWE7D2V4)

2.3.3.2 MONITORING SCHEDULE FOR THE REPORTING MONTH

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

2.3.3.3 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

	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	0.04	0.01	0.10	5.00	7	4	9	30
MWX-2	0.24	0.03	0.59	5.00	6	3	8	30
MWX-3	0.67	0.36	0.84	5.00	14	9	18	30
MWX-4	0.94	0.30	2.02	7.63	13	8	18	36
MWX-5	0.48	0.23	0.82	5.00	16	11	24	30
MWX-6	3.28	3.15	3.38	5.00	40	40	41	46
MWX-7	4.38	0.14	6.92	6.55	33	6	49	36
MWX-8	4.17	3.56	4.99	15.85	29	28	30	50
MWX-9	0.46	0.43	0.51	7.30	64	<20	108	71

MWX-10	<0.01	<0.01	<0.01	5.00	5	5	5	30
MWX-11	<0.01	<0.01	<0.01	5.00	4	4	4	30
MWX-12	<0.01	<0.01	<0.01	5.00	4	3	5	30
MWX-13	0.12	0.03	0.20	5.00	5	2	7	30
MWX-14	0.01	0.01	0.01	5.00	6	4	7	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 event with potential Limit Levels exceedance with the Contractor and the IEC, the groundwater (Ammoniacal-nitrogen) exceedances at MWX-7 on 5 August 2024 were considered non Project related. The groundwater (COD) exceedances at MWX-7 on 5 July 2024 and 5 August 2024, and at MWX-9 on 5 July 2024 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	3.2
	LFG2	1.0	4.3
	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	12.6	2.4

Parameters	Monitoring Location	Limit Level (% (v/v))	
	LFG9	2.5	1.7
	LFG10	3.5	1.6
	LFG11	3.0	2.0
	LFG12	13.2	1.5
	LFG13	22.5	2.7
	LFG14	5.2	1.8
	LFG15	18.2	2.0
	LFG16	1.0	2.0
	LFG17	17.8	2.4
	LFG18	2.3	2.1
	LFG19	6.3	3.1
	LFG20	1.0	4.6
	LFG21	1.0	4.8
	LFG22	1.0	4.0
	LFG23	1.0	10.3
	LFG24	1.0	4.7
	GP1	1.0	10.6
	GP2 (shallow)	1.0	11.4
	GP2 (deep)	1.0	10.4
	GP3 (shallow)	1.0	6.9
	GP3 (deep)	1.0	5.6
	GP4 (shallow)	1.0	11.6
	GP4 (deep)	1.0	7.7
	GP5 (shallow)	1.0	10.8
	GP5 (deep)	1.0	7.5
	GP6	1.0	8.4
	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			

Parameters	Monitoring Location	Limit Level (% (v/v))
Methane (or flammable gas)	Service voids, utilities pits and manholes	1% by volume
Permanent Gas Monitoring System		
Methane (or flammable gas)	Permanent Gas Monitoring System	1% by volume (20% LEL)
Area Between the SENTX Site Boundary and Waste Boundary (Surface Emission)		
Flammable gas	Area between SENTX site boundary and waste boundary	30 ppm

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

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

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

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

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

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

TABLE 2.31 LANDFILL GAS MONITORING DETAILS

Monitoring Location	Frequency	Parameter	Monitoring Dates	Equipment
Perimeter landfill gas monitoring wells (LFG1 to LFG24, P7 to P9, GP1 to GP7, GP12 and GP15)	Monthly	• Methane • Carbon dioxide • Oxygen	9 Jul 2024, 13 Aug 2024, 9 Sep 2024	GA5000 (S/N: G507306)

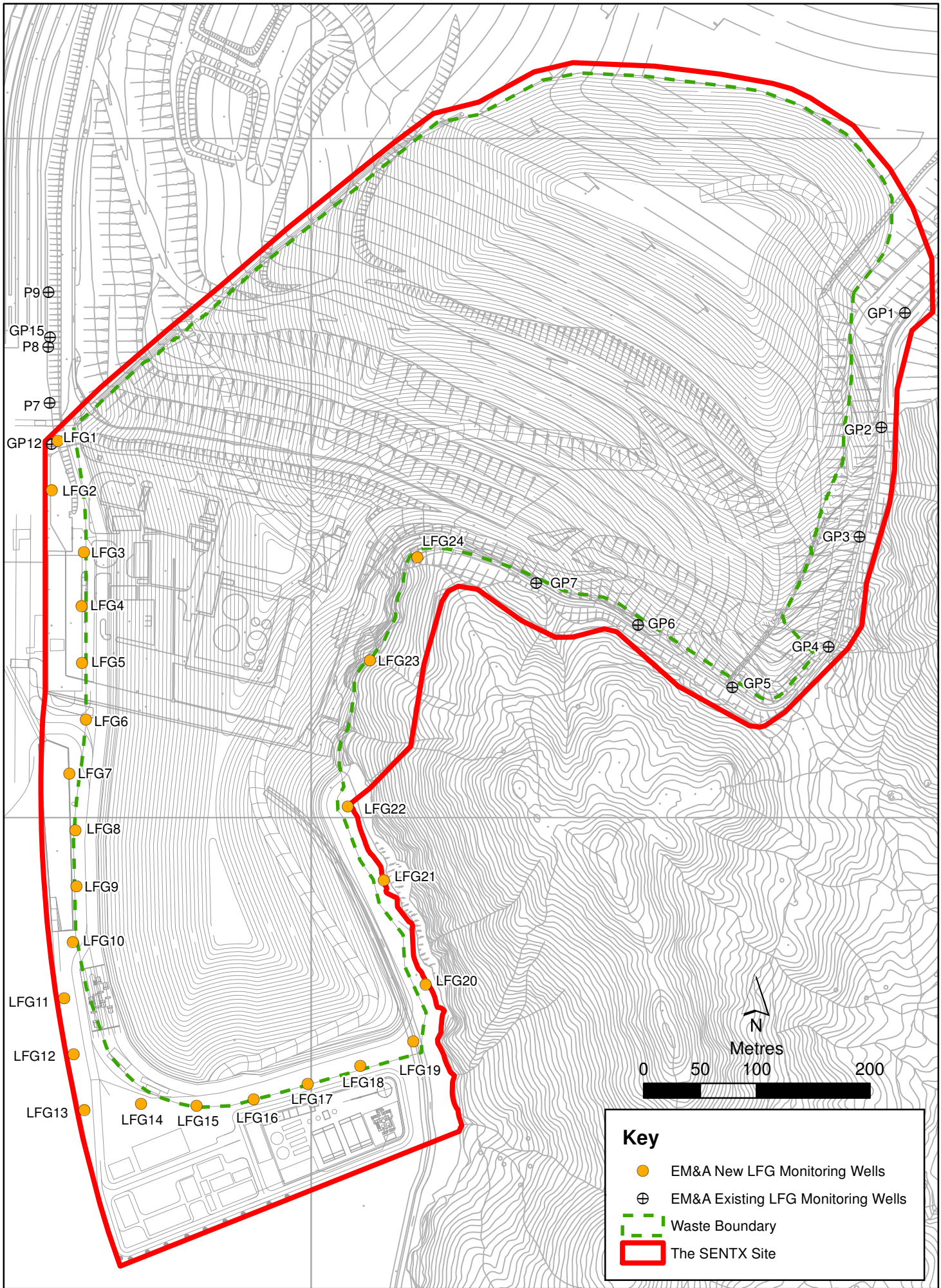


Figure 2.3

Location of Landfill Gas Monitoring Wells

File: T:\GIS\CONTRACT\0465169\mxd\0465169_Landfill_Gas_Monitoring_Wells.mxd
Date: 20/11/2019

ERM

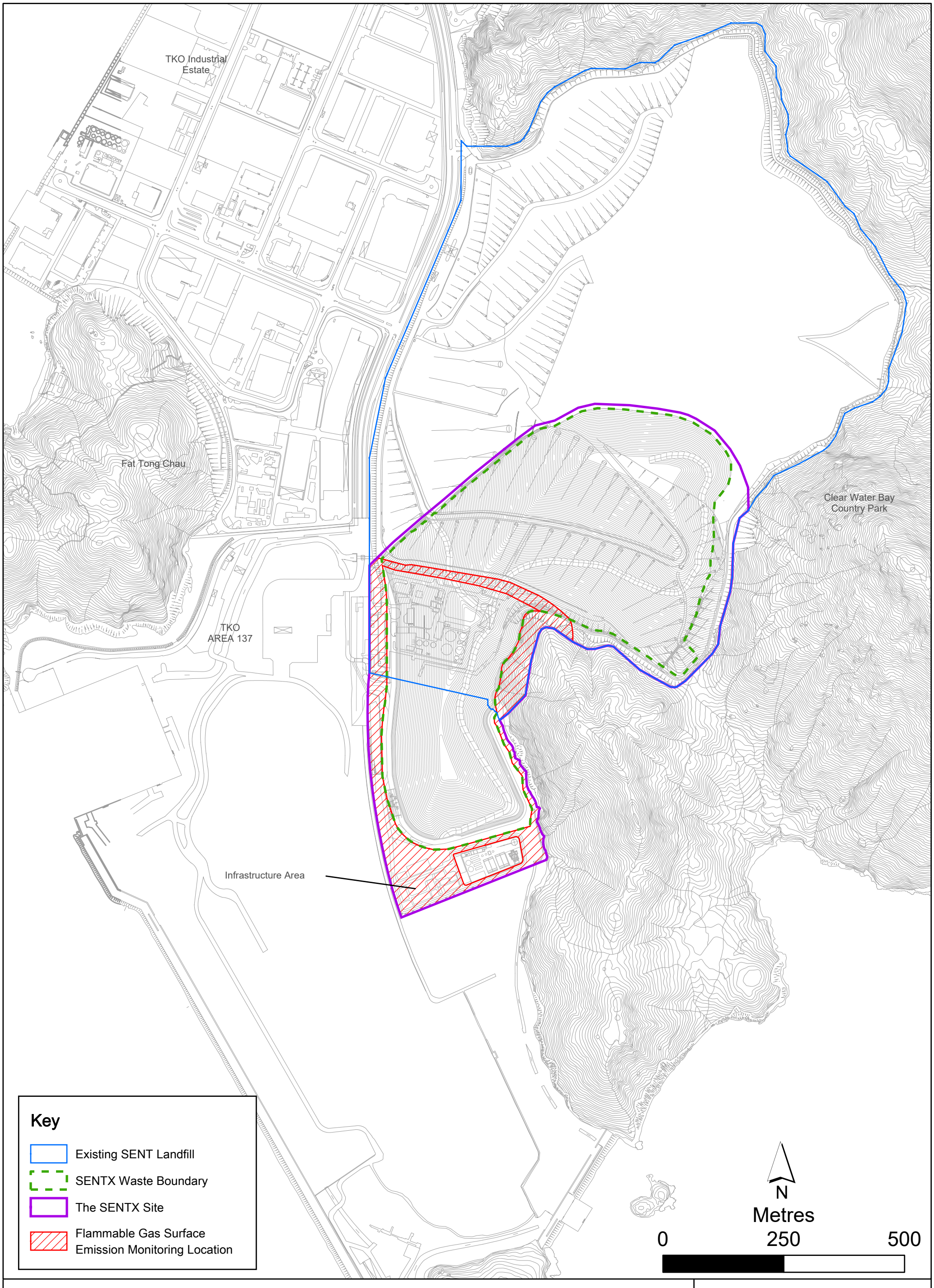


Figure 2.4

Flammable Gas Surface Emission Monitoring Locations

ERM

Monitoring Location	Frequency	Parameter	Monitoring Dates	Equipment
		• Atmospheric pressure		
Service voids, utilities and manholes along the Site boundary and within the SENTX Site (UU1 to UU28)	Monthly	• Methane • Carbon dioxide • Oxygen	9 Jul 2024, 7 Aug 2024, 9 Sep 2024	GA5000 (S/N: G507306)
Permanent gas monitoring system in all occupied on-site buildings	Continuous	Methane (or flammable gas) by permanent gas monitoring system	1 Jul – 30 Sep 2024	Permanent gas monitoring system
Areas between the SENTX Site boundary and the waste boundary and location of vegetation stress	Quarterly	Flammable gas emitted from the ground surface	22 Aug 2024	GMI Leak Surveyor (S/N: 554846)
Bulk gas sampling at least 2 of the perimeters LFG monitoring wells	Quarterly	• Methane • Carbon dioxide • Oxygen • Nitrogen • Carbon monoxide • Other flammable gas	13 Aug 2024	Gas sampling pump and Tedlar bags

2.4.2 MONITORING SCHEDULE FOR THE REPORTING MONTH

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

2.4.3 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	0.2	0.0	0.3	1	1.6	1.5	1.7	3.2
LFG2	0.2	0.0	0.4	1	0.8	0.0	1.3	4.3
LFG3	0.1	0.0	0.2	1	0.1	0.0	0.3	6.3
LFG4	0.1	0.0	0.1	1	0.0	0.0	0.0	7.0
LFG5	0.2	0.0	0.4	1	0.1	0.1	0.1	3.4
LFG6	0.1	0.0	0.1	1	0.2	0.0	0.5	9.1

Location	Methane (% (v/v))				Carbon Dioxide (% (v/v))			
	Monitoring Results			Limit Level (a)	Monitoring Results			Limit Level (a)
	Average	Min	Max		Average	Min	Max	
LFG7	0.0	0.0	0.0	1	0.0	0.0	0.1	1.5
LFG8	0.0	0.0	0.0	12.6	0.1	0.0	0.1	2.4
LFG9	0.0	0.0	0.0	2.5	0.1	0.0	0.2	1.7
LFG10	0.0	0.0	0.0	3.5	0.1	0.0	0.2	1.6
LFG11	0.0	0.0	0.0	3	0.1	0.0	0.2	2.0
LFG12	0.0	0.0	0.0	13.2	0.0	0.0	0.0	1.5
LFG13	3.4	0.0	10.1	22.5	0.0	0.0	0.0	2.7
LFG14	0.1	0.0	0.3	5.2	0.0	0.0	0.1	1.8
LFG15	0.1	0.0	0.3	18.2	0.6	0.0	1.2	2.0
LFG16	0.0	0.0	0.0	1	0.3	0.0	0.5	2.0
LFG17	0.4	0.0	1.1	17.8	1.0	0.0	2.8	2.4
LFG18	0.0	0.0	0.0	2.3	0.2	0.1	0.3	2.1
LFG19	0.0	0.0	0.0	6.3	0.2	0.0	0.5	3.1
LFG20	0.0	0.0	0.0	1	0.1	0.0	0.4	4.6
LFG21	0.0	0.0	0.0	1	0.1	0.0	0.2	4.8
LFG22	0.0	0.0	0.0	1	0.0	0.0	0.0	4.0
LFG23	0.0	0.0	0.0	1	0.0	0.0	0.0	10.3
LFG24	0.0	0.0	0.0	1	0.0	0.0	0.0	4.7
GP1	0.0	0.0	0.1	1	5.3	1.0	7.7	10.6
GP2 (shallow)	0.0	0.0	0.0	1	0.5	0.2	0.6	11.4
GP2 (deep)	0.0	0.0	0.0	1	0.4	0.1	0.9	10.4
GP3 (shallow)	0.0	0.0	0.0	1	0.7	0.2	1.3	6.9
GP3 (deep)	0.0	0.0	0.0	1	0.2	0.1	0.3	5.6
GP4 (shallow)	0.0	0.0	0.0	1	0.5	0.1	0.9	11.6
GP4 (deep)	0.0	0.0	0.0	1	0.7	0.4	1.1	7.7
GP5 (shallow)	0.0	0.0	0.0	1	6.2	0.0	10.1	10.8
GP5 (deep)	0.0	0.0	0.0	1	0.2	0.1	0.5	7.5

Location	Methane (% (v/v))				Carbon Dioxide (% (v/v))			
	Monitoring Results			Limit Level (a)	Monitoring Results			Limit Level (a)
	Average	Min	Max		Average	Min	Max	
GP6	0.0	0.0	0.0	1	1.6	1.5	1.6	8.4
GP7	0.0	0.0	0.0	1	0.9	0.3	1.5	4.5
GP12	0.1	0.0	0.3	1	0.2	0.0	0.3	2.3
GP15	0.1	0.0	0.2	1	0.0	0.0	0.1	2.2
P7	0.1	0.0	0.2	1	0.1	0.0	0.2	2.5
P8	0.1	0.0	0.2	1	0.1	0.1	0.1	1.7
P9	0.1	0.0	0.2	1	0.0	0.0	0.0	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	Voided due to latest site programme and on-going operation work			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	0.1	1.0
UU10	0.0	0.0	0.1	1.0
UU11	0.0	0.0	0.1	1.0
UU12	Voided due to latest site programme and on-going operation work			1.0
UU13	0.0	0.0	0.1	1.0
UU14	0.0	0.0	0.1	1.0
UU15	0.0	0.0	0.1	1.0
UU16	0.0	0.0	0.1	1.0

Location	Methane (% (v/v))			
	Monitoring Results			Limit Levels
	Average	Min	Max	
UU17	Voided due to latest site programme and on-going operation work			1.0
UU18	Voided due to latest site programme and on-going operation work			1.0
UU19	Voided due to latest site programme and on-going operation work			1.0
UU20	0.0	0.0	0.1	1.0
UU21	0.0	0.0	0.1	1.0
UU22	0.0	0.0	0.1	1.0
UU23	0.0	0.0	0.1	1.0
UU24	0.0	0.0	0.1	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 SAMPLING MONITORING RESULTS IN THE REPORTING PERIOD

Parameters	Limit Level (LFG2) [a]	LFG2	Limit Level (LFG8) [a]	LFG8
Methane (% (v/v))	1.0	<0.020	12.6	<0.020
Carbon Dioxide (% (v/v))	4.3	1.14	2.4	0.16
Oxygen (% (v/v))	-	19.2	-	20.1
Nitrogen (% (v/v))	-	79.5	-	76.9
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 Latitude (N)	Longitude (E)	Monitoring Results (ppm)	Limit Level (ppm)
22°16'34"	114°16'27"	23	30
22°16'32"	114°16'44"	28	
22°16'32"	114°16'42"	23	
22°16'33"	114°16'41"	21	
22°16'34"	114°16'37"	16	
22°16'30"	114°16'36"	7	
22°16'26"	114°16'35"	7	
22°16'26"	114°16'26"	7	
22°16'21"	114°16'26"	8	
22°16'17"	114°16'37"	13	
22°16'16"	114°16'30"	25	

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 July 2024 to September 2024.

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 (carbon dioxide) exceedance at LFG17 on 13 August 2024 was 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 3 July 2024, 29 August 2024 and 19 September 2024 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 summarized 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.

2.6 EM&A SITE INSPECTION

Site inspections were carried out on a weekly basis with the Contractor, IEC and EPD to monitor the implementation of proper environmental pollution control and mitigation measures under the Project. In the reporting period, 13 site inspections were carried out on 3, 11, 18 and 25 July 2024, 1, 8, 15, 22 and 29 August 2024 and 5, 12, 19 and 26 September 2024.

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

TABLE 2.36 KEY OBSERVATIONS IDENTIFIED DURING THE SITE INSPECTION IN THIS REPORTING MONTH

Inspection Date	Environmental Observations and Recommendations
3 July 2024	• The Contractor shall remove the general refuse, deposited silt and grit accumulated at DP3 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall remove the deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.
11 July 2024	• The Contractor shall remove the deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.
18 July 2024	• The Contractor shall remove the deposited silt and grit accumulated at X10 channel regularly to ensure it is functioning properly at all times. • The Contractor shall remove the general refuse, deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall review Wetsep treatment efficiency at DP4 to prevent non-compliance with the WPCO standard and EM&A requirement. • The Contractor shall remove the stagnant water and chemicals in the drip trays of Wetsep 1 near DP4 and handle the clean-up materials as chemical waste.
25 July 2024	• The Contractor shall remove the general refuse, deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.
1 August 2024	• The Contractor shall remove the stagnant water and chemicals in the drip trays of Wetseps near DP4 and handle the clean-up materials as chemical waste.
8 August 2024	• The Contractor shall remove the general refuse, deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.

Inspection Date	Environmental Observations and Recommendations
15 August 2024	• The Contractor shall remove the deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.. • The Contractor shall remove the stagnant water and chemicals in the drip trays of Wetsep 1 near DP4 and handle the clean-up materials as chemical waste.
22 August 2024	• The Contractor shall remove the deposited silt and grit accumulated near the road of DP3 regularly to minimize SS runoff to the DP3 sediment pit. • The Contractor shall repair the silt fencing along X10 channel to minimize SS runoff to the channel. • The Contractor shall remove the deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall review Wetsep treatment efficiency at DP4 to prevent non-compliance with the WPCO standard and EM&A requirement.
29 August 2024	• The Contractor shall remove the deposited silt and grit accumulated near the road of DP3 regularly to minimize SS runoff to the DP3 sediment pit. • The Contractor shall remove the deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.
5 September 2024	• The Contractor shall remove the general refuse accumulated at DP3 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall arrange regular cleaning and removal of deposits along access road near DP3 to minimise SS runoff to the DP3 sediment pit. • The Contractor shall remove the deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.
12 September 2024	• The Contractor shall remove the general refuse, deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.
19 September 2024	• The Contractor shall remove the general refuse at DP3 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall remove the general refuse, deposited silt and grit accumulated at DP4 sediment pit regularly to ensure it is functioning properly at all times.
26 September 2024	• The Contractor shall remove the general refuse, the deposited silt and grit at DP4 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall review the treatment efficiency of Wetsep at DP6 to ensure compliance with the WPCO and EM&A requirement.

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 RECTIFICATION ACTIONS

Deficiencies	Rectifications Implemented	Proposed Additional Control Measures
Surface Water		
Intercepting channels & drainage system	• Reviewed drainage plan.	• Addition of channels. • Expedite the construction of permanent sediment trap and discharge culverts.
DP channels (design & regular silt removal)	• Carried out regular maintenance and cleaning of channels. • DP4 channel: Area near the channel was paved with concrete and a bund was built. • DP6 channel: Gravel piles on the channel were covered with concrete which serve as blocks for running water and to divide the channel into several sections. A pump was placed in the water zone in the upstream section to pump water to the Wetsep for treatment prior to the discharge to the last section before the weir plate. • DP6: Pipes through the gravel piles between different channel sections were covered with geotextiles to block debris and silt.	N.A.
Stockpiles & exposed soil	• Installed silt fencing near surface water channel along DP6 channel.	• Improve soil covering. • Compaction and cover for stockpiles and soil slopes.
Wetsep (treatment capacity & number)	• Reviewed Wetsep capacity. • Chemicals dosage of the Wetsep was increased to enhance the efficiency.	• Install additional Wetsep.
Backflow / ponding during heavy rainfall	• Raised with EPD (LDG) and CEDD.	N.A.

2.7 WASTE MANAGEMENT STATUS

The Contractor has registered as 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 chemical waste. 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 summarized in **Table 2.38**.

TABLE 2.38 QUANTITIES OF DIFFERENT WASTE GENERATED AND IMPORTED FILL MATERIALS

Month /Year	Inert C&D Materials [a] (in '000m³)	Imported Fill (in '000kg) [b]		Inert Construction Waste Re-used (in '000m³)	Non-inert Construction Waste [c] (in '000m³)	Recyclable Materials [d] (in '000kg)	Yard Waste (in '000kg)		Chemical Wastes (in '000kg)
		Rock	Soil				Y Park	SENT	
1 – 31 Jul 24	0	0	0	0	0	0	0	0	0.91
1 – 31 Aug 24	0	0	0	0	0	0	0	0	0.80
1 – 30 Sep 24	0	0	0	0	0	0	6.68	0	0.80

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 and landfill gas monitoring results complied with the Action and Limit Levels in the reporting period.

One exceedance of the Limit Levels for groundwater (ammoniacal-nitrogen) and three exceedances of the Limit Levels for groundwater (COD) were recorded for water quality impact monitoring in the reporting period. The groundwater (Ammoniacal-nitrogen) exceedances at MWX-7 on 5 August 2024 were considered non Project related upon further investigation. The groundwater (COD) exceedances at MWX-7 on 5 July 2024 and 5 August 2024, and at MWX-9 on 5 July 2024 were considered non Project related upon further investigation.

One exceedance of the Limit Level for landfill gas (carbon dioxide) was recorded for landfill gas monitoring in the reporting period. The landfill gas (carbon dioxide) exceedance at LFG17 on 13 August 2024 was considered non Project related upon further investigation.

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

2.10 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

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

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

3. CONCLUSION AND RECOMMENDATIONS

This Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 July 2024 to 30 September 2024 in accordance with the updated EM&A Manual and the requirements of the Environmental Permit (*EP-308/2008/C)*.

Air quality (24-hour TSP, odour, thermal oxidiser, landfill gas flare and landfill gas generator stack emission, ambient VOCs, ammonia and H_2S), 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.

One exceedance of the Limit Levels for groundwater (ammoniacal-nitrogen), three exceedances of the Limit Levels for groundwater (COD) and one exceedance of the Limit Level 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.

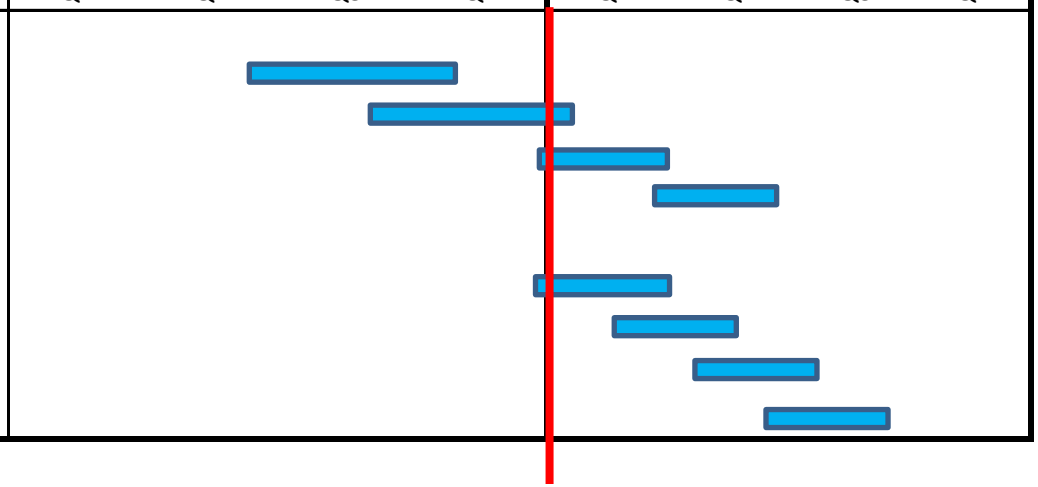
It is noted that most environmental pollution control and mitigation measures were properly implemented and the construction and operation activities of the Project did not introduce any adverse impact to the sensitive receivers in the reporting period. Yet, some environmental deficiencies were identified 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

SENTX - Construction Programme

Update 1st January 2024

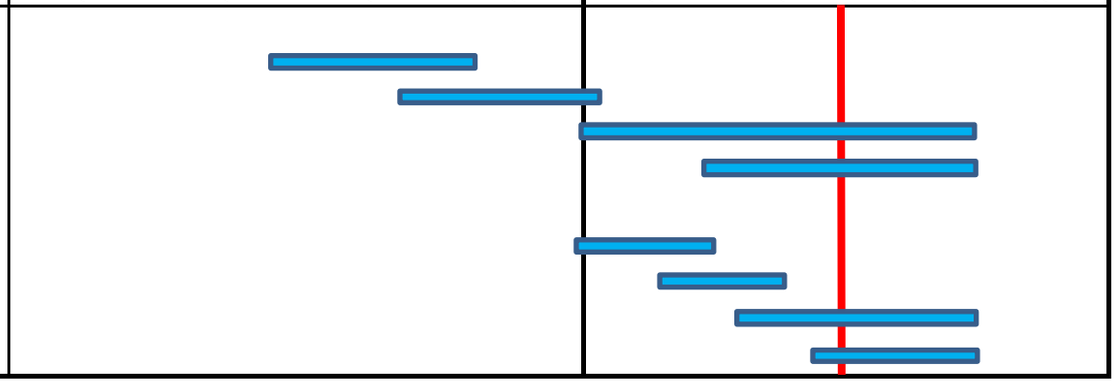
Task Name	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4
Phase 1 Restoration								
Subgrade soil + Liner								
Cover Soil								
Above Cap Gas pipe + Drainage								
Landscape								
Phase 2 Restoration								
Subgrade soil + Liner								
Cover Soil								
Above Cap Gas pipe + Drainage								
Landscape								



SENTX - Construction Programme

Update 31st May 2024

Task Name	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4
Phase 1 Restoration								
Subgrade soil + Liner								
Cover Soil								
Above Cap Gas pipe + Drainage								
Landscape								
Phase 2 Restoration								
Subgrade soil + Liner								
Cover Soil								
Above Cap Gas pipe + Drainage								
Landscape								



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		
Air Quality – Construction Phase											
4.8.1	AQ1	<u>Blasting</u> • 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	To minimise potential dust nuisance	Blasting area and 30m of blasting area	SENTX Contractor		✓			*Air Pollution Control (Construction Dust) Regulations*	Not applicable. Blasting is not required in the latest landfill design

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

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		
		fragments and material resulting from blasting									
4.8.1	AQ2	<u>Rock Drilling</u> 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		✓			*Air Pollution Control (Construction Dust) Regulations*	Not applicable. Rock drilling is not required in the latest landfill design
4.8.1	AQ3	<u>Site Access Road</u> • 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		✓			*Air Pollution Control (Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	Implemented
4.8.1	AQ4	<u>Stockpiling of Dusty Materials</u> • 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	To minimise potential dust nuisance	All construction works area	SENTX Contractor		✓			*Air Pollution Control (Construction Dust) Regulations*	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		
		with water so as to ensure that the entire surface is wet.								*HKAQO and EIAO-TM Annex 4*	
4.8.1	AQ5	<u>Loading, unloading or transfer of dusty materials</u> • 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		✓			*Air Pollution Control (Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	Implemented
4.8.1	AQ6	<u>Site Boundary and Entrance</u> • 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		✓			*Air Pollution Control (Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	Not applicable

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
4.8.1	AQ7	<u>Excavation Works</u> • 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		✓			*Air Pollution Control (Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	Implemented
4.8.1	AQ8	<u>Building Demolition</u> • 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		✓			*Air Pollution Control (Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	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		
4.8.1	AQ9	<u>Construction of the Superstructure of Building</u> • 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		✓			*Air Pollution Control (Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	Implemented
4.8.1	AQ10	Should a stone crushing plant be needed on site, the control measures recommended in the *Best Practicable Means Requirement for Mineral Works (Stone Crushing Plants) BPM 11/1* should be implemented.	To minimise potential dust nuisance	Stone crushing plant/ construction phase	SENTX Contractor		✓			*Best Practicable Means Requirement for Mineral Works (Stone Crushing Plants) BPM 11/1*	Not applicable. Stone crushing plant is not required in the latest landfill design
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	To minimise potential dust nuisance	All construction works area	SENTX Contractor		✓			*HKAQO and EIAO-TM Annex 4*	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		
		gaseous emissions.									
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 *Figure 3.2a*	SENTX Contractor		✓			*HKAQO and EIAO-TM Annex 4*	Implemented
Air Quality – Operation, Restoration and Aftercare Phases											
4.8.2	AQ13	<u>Odour</u> • Enclosing the weighbridge area	To minimise odour nuisance	Weighbridge area	SENTX Contractor	✓		✓		*EIAO-TM Annex 4*	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	✓		✓		*EIAO-TM Annex 4*	Implemented
4.8.2	AQ15	• Reminding the RCV drivers to empty the liquor collection sump and close the valve before leaving	To minimise odour nuisance	Tipping face	SENTX Contractor			✓		*EIAO-TM Annex 4*	Not Applicable. As SENTX will receive construction waste only, which

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		the tipping face									is relatively dry, the amount of liquor generated is expected to minimal
4.8.2	AQ16	• Washing down the area where spillage of RCV liquor is discovered promptly	To minimise odour nuisance	SENTX Site	SENTX Contractor			✓		*EIAO-TM Annex 4*	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	• 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			✓		*EIAO-TM Annex 4*	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	• 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	✓		✓	✓	*EIAO-TM Annex 4*	Implemented

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						D	C	O/R	A		
4.8.2	AQ19	• 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	• 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	• 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	• Maintaining the size of the active tipping face not greater than 1,200 m^2	To minimise odour nuisance	Active tipping face	SENTX Contractor			✓		*EIAO-TM Annex 4*	Implemented

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						D	C	O/R	A		
4.8.2	AQ23	• Promptly covering the MSW with soil or selected inert materials to control odour emissions	To minimise odour nuisance	Active tipping face	SENTX Contractor			✓		*EIAO-TM Annex 4*	Not Applicable. SENTX will not receive MSW.
4.8.2	AQ24	• 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	• 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	• 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	• 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

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						D	C	O/R	A		
4.8.2	AQ28	• 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, SENTX will not have any special waste trench.
4.8.2	AQ29	• 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			✓		*EIAO-TM Annex 4*	Not Applicable. SENTX will not have any special waste trench.

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						D	C	O/R	A		
4.8.2 and SENTX latest design	AQ30	• 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	✓		✓	✓	*EIAO-TM Annex 4*	Implemented
4.8.2 and SENTX latest design	AQ31	• 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	✓		✓	✓	*EIAO-TM Annex 4*	Implemented
4.8.2	AQ32	• Rescheduling of waste filling activities on-site by avoiding waste filling activities carrying out at the northern area of the site in the summer months between July to November	To minimise odour nuisance	SENTX Site	SENTX Contractor			✓		*EIAO-TM Annex 4*	Not Applicable. As SENTX will receive construction waste only which is significantly less odorous, rescheduling of waste filling activities is not necessary.
4.8.2 and SENTX latest design	AQ33	Dust, Gaseous Emission and LFG including Volatile Organic Compounds (VOCs)	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		*HKAQO and EIAO-TM Annex 4*	Implemented

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						D	C	O/R	A		
		• Keeping the main haul road to the waste filling area wet by regular watering;									
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			✓		*HKAQO and EIAO-TM Annex 4*	Implemented
4.8.2	AQ35	• Limiting the vehicle speed within SENTX site boundary;	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		*HKAQO and EIAO-TM Annex 4*	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			✓		*HKAQO and EIAO-TM Annex 4*	Implemented
4.8.2	AQ37	• Switching off the engine when the diesel-driven equipment is idling;	To minimise gaseous emissions	SENTX Site	SENTX Contractor			✓	✓	-	Implemented
4.8.2	AQ38	• Maintaining the construction equipment properly to avoid any black smoke emissions;	To minimise gaseous emissions	SENTX Site	SENTX Contractor			✓	✓	-	Implemented
4.8.2	AQ39	• Providing sufficient underground landfill gas collection system to capture the landfill gas	To minimise gaseous emissions,	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 4*	Implemented

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						D	C	O/R	A		
		generated as much as possible; and	including LFG and VOCs								
4.8.2	AQ40	• Periodic inspections of the final cover should be undertaken to ensure that the capping layer is in good conditions at all times.	To minimise gaseous emissions, including LFG and VOCs	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 4*	Implemented
4.10.2	AQ41	• Monitoring of ambient TSP once every 6 days	Ensure the dust emission from the project meets the dust requirement	At monitoring locations shown in *Figure 11.3a*	SENTX Contractor		✓	✓		*HKAQO* and *EIAO-TM Annex 4*	Implemented
4.10.2	AQ42	• Monitoring of ambient VOCs, ammonia and H_2S, 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			✓	✓ (2)	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	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

(2) For LFG flare and LFG generator only.

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						D	C	O/R	A		
		of the thermal oxidiser could be discontinued.									
4.10.2 and SENTX latest design	AQ45	• Odour patrol in accordance with requirements stated in Table 3.7a of the EM&A Manual.	Ensure the odour emission from the project meets the odour requirement	Along SENTX Site boundary	SENTX Contractor			✓		*EIAO-TM Annex 4*	Implemented
4.10.2	AQ46	• Monitoring of meteorological station, continuously	Collect site specific meteorological data	At meteorological station shown in *Figure 11.3a*	SENTX Contractor		✓	✓	✓	-	Implemented
Noise – Construction Phase											
5.7.1	N1	Adopt good site practice listed below: • 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	To minimise potential construction noise nuisance.	All construction works area	SENTX Contractor		✓			*Noise Control Ordinance (NCO) and EIAO-TM Annex 5*	Implemented

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						D	C	O/R	A		
		possible; • Machines and plant (such as trucks) that may be in intermittent use will be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction will, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures will be effectively utilised, wherever practicable, in screening noise from on-site construction activities.									
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

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						D	C	O/R	A		
Noise – Operation/Restoration Phase											
5.7.2	N3	Adopt good site practice listed below: • Choose quieter PME;	To minimise potential operational noise nuisance.	Within the SENTX Site	SENTX Contractor			✓		*Noise Control Ordinance (NCO) and EIAO-TM Annex 5*	Implemented
		• Include noise levels specification when ordering new plant items;								-	Implemented
		• Locate fixed plant items or noise emission points away from the NSRs as far as practicable;								-	Implemented
		• Locate noisy machines in completely enclosed plant rooms or buildings; and								-	Implemented
		• 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.								-	Implemented
5.8	N4	Weekly noise monitoring	Ensure noise generated from the project	At monitoring locations	SENTX Contractor			✓		*Noise Control Ordinance (NCO) and*	Implemented

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						D	C	O/R	A		
			meets the criteria	shown in *Figure 6.4a*						*EIAO-TM Annex 5*	
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 works	All construction works area	SENTX Contractor		✓			*ProPECC PN 1/94* *WPCO* *EIAO-TM Annex 6*	Deficiency of mitigation measures but rectified by the Contractor
6.8.1	WQ4	• Temporary covers such as tarpaulin will also be provided to minimise the	To minimise potential water quality impacts arising from the	All construction works area	SENTX Contractor		✓			*ProPECC PN 1/94* *WPCO*	Implemented

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						D	C	O/R	A		
		generation of high SS runoff.	construction works								
6.8.1	WQ5	• 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		✓			*ProPECC PN 1/94 WPCO EIAO-TM Annex 6*	Implemented
6.8.1	WQ6	• All sewer and drains will be sealed to prevent building debris, soil etc from entering public sewers/drains before commencing any demolition works	To minimise potential water quality impacts arising from the demolition works	Infrastructure area at existing SENT Landfill	SENTX Contractor		✓			*ProPECC PN 1/94 WPCO EIAO-TM Annex 6*	Not applicable
6.8.1	WQ7	• During the excavation works for the twin drainage tunnels, the recycle water for cooling the cutter head of the TBM will be conveyed to the sedimentation tanks for treatment and most of the treated water will be reused, where applicable and as much as possible, in the boring operations.	To minimise potential water quality impacts arising from the tunnel works	Tunnel boring sites	SENTX Contractor		✓			*ProPECC PN 1/94 WPCO EIAO-TM Annex 6*	Not applicable. Excavation of drainage tunnels is not required in the latest landfill design.
6.8.1	WQ8	• The fuel and waste lubricant oil from the on-	To minimise potential water	SENTX Site	SENTX Contractor		✓			*ProPECC PN 1/94*	Implemented

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						D	C	O/R	A		
		site maintenance of machinery and equipment will be collected by a licensed chemical waste collector.	quality impacts arising from improper handling of fuel and oil							*WPCO* *Waste Disposal Ordinance (WDO)*	
6.8.1	WQ9	• Implementation of excavation schedules, lining and covering of excavated stockpiles	To minimise contaminated stormwater run-off from the SENTX Site	All construction works	SENTX Contractor		✓			*ProPECC PN 1/94* *WPCO* *EIAO-TM Annex 6*	Implemented
6.13	WQ10	• Monitoring of surface water quality will be conducted on a regular basis as stated in the EM&A Manual.	To minimise potential water quality impacts on surface water arising from the construction works	SENTX Site	SENTX Contractor		✓			*WPCO* *Water-TM*	Implemented
6.8.2	WQ11	<u>Sewage Effluents</u> • Sufficient chemical toilets will be provided for the construction workforce.	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor		✓			*WPCO*	Implemented
6.8.2	WQ12	• Untreated sewage will not be allowed to discharge into the surrounding water body.	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor		✓			*WPCO* *WDO*	Implemented
6.8.2	WQ13	• A licensed waste collector	To minimise potential water	SENTX Site	SENTX Contractor		✓			*WPCO*	Implemented

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						D	C	O/R	A		
		will be employed to clean the chemical toilets on a regular basis.	quality impacts arising from the sewage effluents							*WDO*	
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 Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Inshore Waters (Water-TM)* *EIAO-TM Annex 6*	Deficiency of mitigation measures but rectified by the Contractor
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 Water-TM* *EIAO-TM Annex 6*	Implemented
6.9.1	WQ16	• Monitoring of surface water quality will be conducted on a regular	To minimise potential water quality impacts on surface water	SENTX Site	SENTX Contractor			✓	✓	*WPCO Water-TM*	Implemented

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						D	C	O/R	A		
		basis as stated in the EM&A Manual.	arising from the landfill operations.								
6.9.2 and SENTX latest design	WQ17	<u>Groundwater Management</u> • 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	• 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> • 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> • The leachate pump houses and related ancillary	To minimise potential water quality impacts on surrounding	Leachate pump houses and related	SENTX Contractor			✓	✓	*WPCO Water-TM EIAO-TM Annex 6*	Implemented

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						D	C	O/R	A		
		equipment will be inspected regularly and repairs, if necessary.	water bodies arising from the landfill operations.	ancillary equipment							
6.9.3	WQ21	• For equipment such as pumps that require routine scheduled maintenance, the maintenance will be performed following manufacturer's recommended frequency.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate pumps	SENTX Contractor			✓	✓	*WPCO Water-TM*	Implemented
6.9.3	WQ22	• Preventive maintenance will be implemented so that the possibility for forced shutdown during wet season will be kept to minimal.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	*WPCO Water-TM EIAO-TM Annex 6*	Implemented
6.9.3	WQ23	• Emergency procedures or a contingency plan will be established when the LTP is malfunctioned.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	*WPCO Water-TM EIAO-TM Annex 6*	Implemented

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						D	C	O/R	A		
6.9.3 and SENTX latest design	WQ24	• There will be sufficient redundancy in the system to handle the leachate flow even if one treatment train is down for maintenance. The leachate may be required to temporarily store within the landfill if the leachate storage lagoon are full and leachate cannot be transported to the LTP for treatment.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	*WPCO Water-TM EIAO-TM Annex 6*	Implemented
6.13	WQ25	• Monitor the quality of effluent discharged from the LTP	To ensure discharge quality comply with WPCO requirement	Leachate treatment plant discharge point	SENTX Contractor			✓	✓	*WPCO Water-TM*	Implemented
6.10.1	WQ26	<u>Potential Leakage of Leachate</u> • Regular groundwater quality monitoring will be carried out to monitor the performance of the leachate containment system.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	SENTX Site	SENTX Contractor			✓	✓	*WPCO Water-TM*	Implemented
6.10.1	WQ27	• Maintenance and replacement of the capping system should be	To minimise potential water quality impacts on surrounding	SENTX Site	SENTX Contractor			✓	✓	*WPCO Water-TM*	Implemented

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						D	C	O/R	A		
		carried out, if necessary, to prevent control infiltration and leachate seepage from any damaged cap.	water bodies arising from the leachate leakage.							*EIAO-TM Annex 6*	
6.10.1	WQ28	• Maintaining control of the leachate level through extraction	To minimise potential water quality impacts on surrounding water bodies arising from surface breakout of leachate.	SENTX Site	SENTX Contractor			✓	✓	*WPCO Water-TM EIAO-TM Annex 6*	Implemented
Waste Management – Construction Phase											
7.6.1	WM1	All the necessary waste disposal permits are obtained prior to the commencement of construction work.	To ensure compliance with relevant statutory 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	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓			*WDO Waste Disposal (Charges for Disposal of Construction Waste) Regulation; Works Bureau Technical Circular*	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		
		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 established.								*No.31/2004; and Annex 5 and Annex 6 of Appendix G of ETWBTC No. 19/2005)*	

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	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 EIAO-TM Annex 7*	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 *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.*	To ensure proper handling of chemical waste	SENTX Site	SENTX Contractor		✓			*WDO Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*	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	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 EIAO-TM Annex 7*	Implemented
7.6.1 and SENTX latest design	WM6	<u>General Refuse</u> General refuse will be stored in enclosed bins separately from construction and chemical wastes. The general refuse will be delivered to a transfer station or other landfill, separately from construction and chemical wastes, on a daily basis to reduce odour, pest and litter impacts. Recycling bins will be provided at strategic	To ensure proper handling of general refuse	SENTX Site	SENTX Contractor		✓			*WDO EIAO-TM Annex 7*	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		
		locations to facilitate recovery of aluminium can and waste paper from the SENTX Site. Materials recovered will be sold for recycling.									
7.6.1	WM7	<u>Staff Training</u> At the commencement of the construction works, training will be provided to workers on the concepts of site cleanliness and on appropriate waste management procedures, including waste reduction, reuse and recycling.	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓				Implemented
7.8	WM8	<u>Environmental Monitoring & Audit Requirements</u> Weekly audits of the waste management practices will be carried out during the construction phase. The audits examine all aspects of waste management including	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		
		waste generation, storage, recycling, transport and disposal.									
Waste Management – Operation/Restoration Phase											
7.6.2 and SENTX latest design	WM9	Sludge 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	Chemical Waste The construction contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.*	To ensure proper handling of chemical waste	SENTX Site	SENTX Contractor			✓		*WDO EIAO-TM Annex 7* *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*	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		
7.6.2	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.
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 EIAO-TM Annex 7*	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		
Landfill Gas Hazards – Design and Construction Phase											
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 *Landfill Gas Hazard Assessment Guidance Notes (the Guidance Note*). 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		✓			*Paragraphs 8.3 to 8.49 of EPD's Landfill Gas Hazards Assessment Guidance Note EIAO-TM Annex 7*	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	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		
		Paragraphs 8.23 to 8.28 of EPD's *Guidance Note* will be followed. In the event of the trigger levels being exceeded, it is recommended that a person, such as the Safety Officer, is nominated, with deputies, to be responsible for dealing with any emergency which may occur due to landfill gas. In an emergency situation, the nominated person, or his deputies, shall have the necessary authority and shall ensure that the confined space is evacuated and the necessary works implemented for reducing the concentrations of gas. The appropriate organisations shall be contact.									
8.6.3	LFG4	Implementation of engineering measures	To protect workers from landfill gas risk	SENTX Site	SENTX Contractor	✓	✓	✓	✓	*EIAO-TM Annex 7*	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		
		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.									
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 *Guidance Notes*). Landfill gas monitoring boreholes will be installed at the edge of the waste slope between the waste and the new infrastructure area to	To protect workers from landfill gas risk	Infrastructure Area	SENTX Contractor	✓	✓			*EPD's Landfill Gas Hazards Assessment Guidance Note EIAO-TM Annex 7*	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		
		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			✓	✓	*Landfill Gas Hazards Assessment Guidance Note*	Implemented
8.7 and SENTX latest design	LFG8	<u>Environmental Monitoring & Audit Requirements</u> Undertake regular monitoring of landfill gas within the	To protect workers from landfill gas risk	Within the SENTX and along the SENTX boundary	SENTX Contractor			✓	✓	*Landfill Gas Hazards Assessment Guidance Note*	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		
		SENTX and along the SENTX boundary as required by the Contract Specification.									
Ecology – Construction Phase											
9.10.2	EC1	Measures to control construction runoff: • Exposed soil areas will be minimised to reduce the contamination of runoff and erosion;	To minimise potential water quality impacts affecting ecological resources	All construction works area	SENTX Contractor		✓			*EIAO-TM Annex 16* *ProPECC PN 1/94 Water Pollution Control Ordinance (WPCO)* *EIAO-TM Annex 6*	Implemented
		• 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;								-	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		
		• 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;								-	Deficiency of mitigation measures but rectified by the Contractor
		• Temporary covers such as tarpaulin will also be provided to minimise the generation of high suspended solids runoff;								-	Implemented
		• The surface runoff contained any oil and grease will pass through the oil interceptors; and,								-	Implemented
		• 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

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 and SENTX latest design	EC2	<u>Good Construction Practice</u>: • Fences along the boundary of the SENTX Site will be erected before the commencement of works to prevent vehicle movements, and encroachment of personnel, onto adjacent areas. • The work site boundaries will be regularly checked to ensure that they are not breached and that damage does not occur to surrounding areas.	To minimise potential ecological impacts arising from the Project	SENTX Site	SENTX Contractor		✓			*EIAO-TM Annex 16*	Implemented
Ecology – Operation, Restoration and Aftercare Phases											
9.10.2	EC3	<u>Measures for Controlling Leakage of Landfill Leachate</u> 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	To minimise potential water quality impact affecting the ecological resources	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16* *WPCO Water-TM* *EIAO-TM Annex 6*	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		
		migration of leachate to habitats in the vicinity.									
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: • Provision of 6 ha of mixed woodland planting	Compensation of habitat loss due to the Project	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16*	Not applicable

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		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.									
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*	Not applicable
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	To enhance ecological value of the habitats	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16*	Not applicable

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		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									

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		
		recorded within the CWBCP).									
9.10.3	EC8	It is also recommended that a trial nursery for native plant species be set up to fine tone 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 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	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		
		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	To minimise the landscape and visual impacts	All construction works area	SENTX Contractor		✓			*EIAO-TM Annex 18*	Not applicable

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		landscape works, where practical. The Contract Specification will include storage and reuse of topsoil as appropriate.									
10.6.5	LV3	CM3 - All existing trees at the edges of the landfill will be carefully protected during construction. Detailed Tree Protection Specification will be provided in the Contract Specification. Under this Specification, the Contractor will be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas.	To minimise the landscape and visual impacts	Potential impacted area	SENTX Contractor		✓			*EIAO-TM Annex 18 and ETWBC 3/2006*	Implemented
10.6.5	LV4	CM4 - Trees unavoidably affected by the works will be transplanted, where	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		
		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.									
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		✓			*EIAO-TM Annex 18*	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
10.6.5	LV6	CM6 - The Contractor's office, leachate treatment plant and laboratory will be given an aesthetic treatment in earth tones to reduce their visual impact and albedo and blend them into the surrounding landscape.	To minimise the landscape and visual impacts	Infrastructure area	SENTX Contractor	✓	✓			*EIAO-TM Annex 18*	Implemented
10.6.5	LV7	CM7 - The Contractor's office, leachate treatment plant and laboratory will be surrounded by a minimum of 5m wide and 0.75m high earth bund on the west and south sides planted with a dense screen of tree and shrub vegetation. Additional tree planting will be provided in unused spaces with thin infrastructure site, along access roads and in and around car parks. This will be supplemented with shrub planting, where appropriate.	To minimise the landscape and visual impacts	Infrastructure area	SENTX Contractor	✓	✓			*EIAO-TM Annex 18 and ETWBC 7/2002*	Not applicable

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	LV8	CM8 - Planting trials will be carried out in an on-site nursery prior to implementation of the first phase of restoration to establish the best planting matrix and management intensity of the recommended plant materials for the restoration.	To minimise the landscape and visual impacts	SENTX Site	SENTX Contractor		✓			*EIAO-TM Annex 18*	Implemented
11.4.1 and SENTX latest design	LV9	During the preparation of the detailed landscape design plan, the design submission will be audited against the recommendation proposed in the *ER Report* by the Registered Landscape Architect from the ET.	To ensure the implementation of mitigation measures proposed in this EIA Report	SENTX Site	SENTX Contractor/ET	✓	✓			*EIAO-TM Annex 18*	Implemented
Landscape and Visual – Operation/Restoration Phase											
10.6.5 and SENTX latest design	LV10	OM1 - Landfill materials will be covered with general fill material or tarpaulin sheet on a daily basis to reduce visual impact.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		*EIAO-TM Annex 18*	Implemented

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 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	To check the restoration plantation	SENTX Site	SENTX Contractor/ET			✓		*EIAO-TM Annex 18*	Not applicable

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
		Landscape Architect from the ET.									

ANNEX C MONITORING SCHEDULE FOR THIS REPORTING PERIOD

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

July 2024

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

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

August 2024

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

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

September 2024

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

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 ($\mu g/m^3$)
6 Jul 24	8:00	7 Jul 24	8:00	Sunny	143
12 Jul 24	8:00	13 Jul 24	8:00	Fine	55
18 Jul 24	8:00	19 Jul 24	8:00	Fine	75
24 Jul 24	8:00	25 Jul 24	8:00	Fine	65
30 Jul 24	8:00	31 Jul 24	8:00	Fine	20
5 Aug 24	8:00	6 Aug 24	8:00	Sunny	107
11 Aug 24	8:00	12 Aug 24	8:00	Sunny	89
17 Aug 24	8:00	18 Aug 24	8:00	Cloudy	23
23 Aug 24	8:00	24 Aug 24	8:00	Sunny	53
29 Aug 24	8:00	30 Aug 24	8:00	Sunny	101
4 Sep 24	8:00	5 Sep 24	8:00	Sunny	146
10 Sep 24	8:00	11 Sep 24	8:00	Sunny	85
16 Sep 24	8:00	17 Sep 24	8:00	Fine	107
22 Sep 24	8:00	23 Sep 24	8:00	Cloudy	44
28 Sep 24	8:00	29 Sep 24	8:00	Sunny	42
				Average	77
				Min	20
				Max	146

FIGURE D1.1 GRAPHICAL PRESENTATION FOR 24-HR TSP MONITORING AT AM1

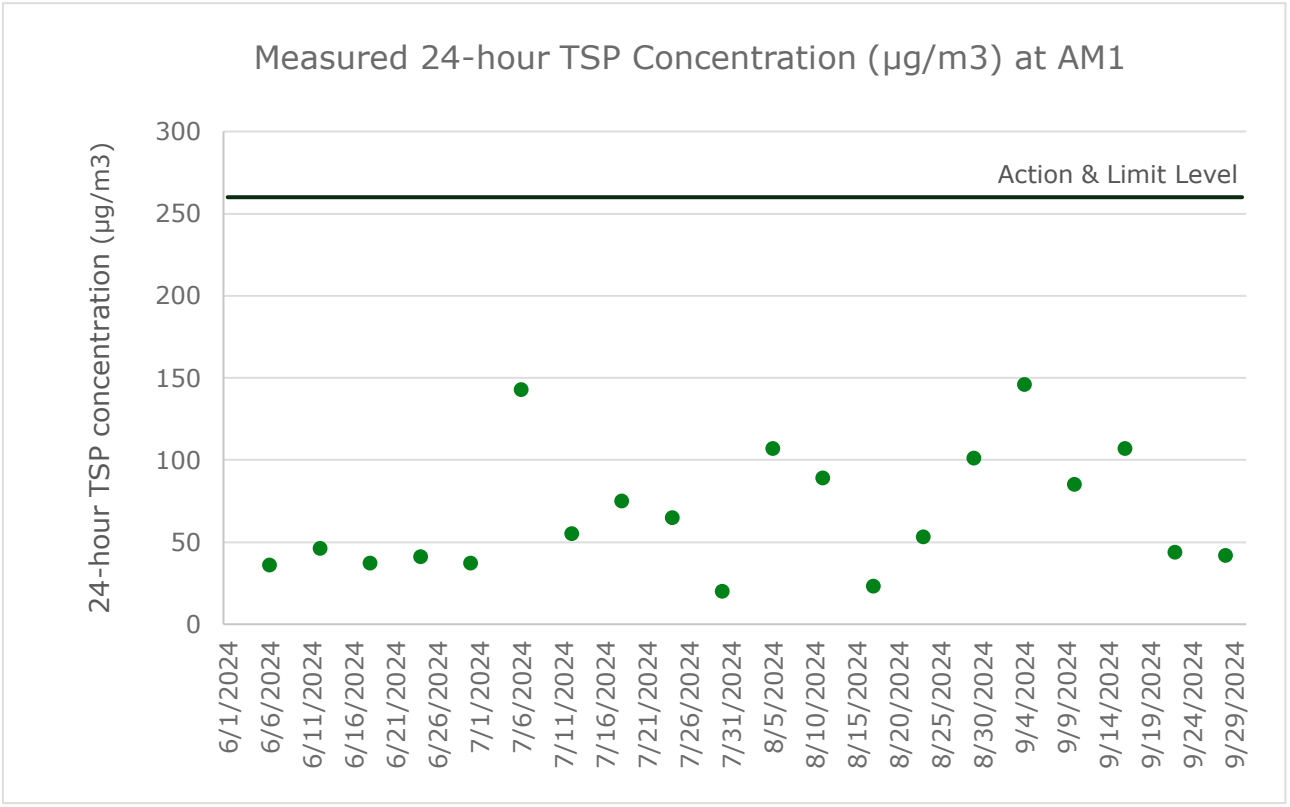


TABLE D1.2 24-HOUR TSP MONITORING RESULTS AT AM2

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu g/m^3$)
6 Jul 24	8:00	7 Jul 24	8:00	Sunny	53
12 Jul 24	8:00	13 Jul 24	8:00	Fine	55
18 Jul 24	8:00	19 Jul 24	8:00	Fine	42
24 Jul 24	8:00	25 Jul 24	8:00	Fine	98
30 Jul 24	8:00	31 Jul 24	8:00	Fine	54
5 Aug 24	8:00	6 Aug 24	8:00	Sunny	151
11 Aug 24	8:00	12 Aug 24	8:00	Sunny	54
17 Aug 24	8:00	18 Aug 24	8:00	Cloudy	27
23 Aug 24	8:00	24 Aug 24	8:00	Sunny	102
29 Aug 24	8:00	30 Aug 24	8:00	Sunny	90
4 Sep 24	8:00	5 Sep 24	8:00	Sunny	95
10 Sep 24	8:00	11 Sep 24	8:00	Sunny	50
16 Sep 24	8:00	17 Sep 24	8:00	Fine	51
22 Sep 24	8:00	23 Sep 24	8:00	Cloudy	45
28 Sep 24	8:00	29 Sep 24	8:00	Sunny	46
				Average	68
				Min	27
				Max	151

FIGURE D1.2 GRAPHICAL PRESENTATION FOR 24-HR TSP MONITORING AT AM2

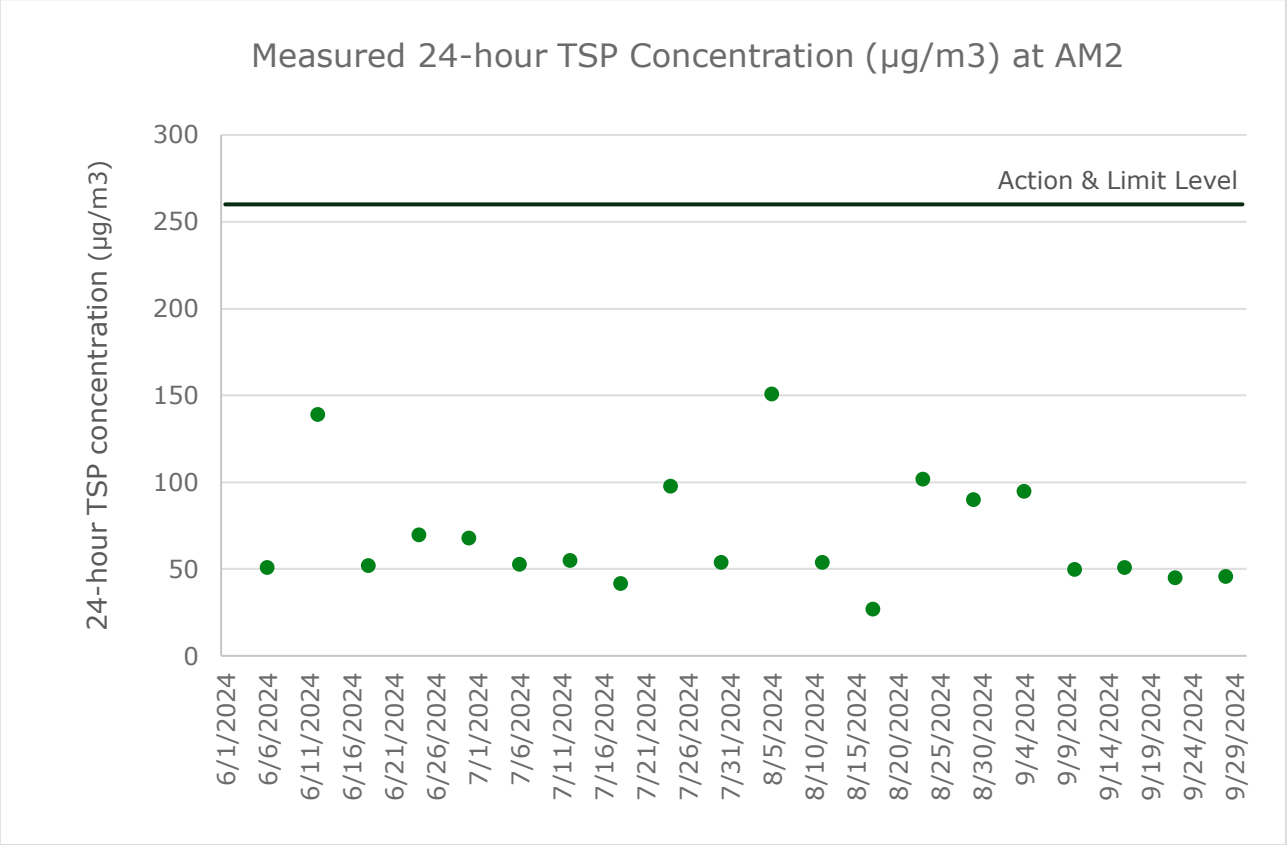


TABLE D1.3 24-HOUR TSP MONITORING RESULTS AT AM3

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (μg/m^3)
6 Jul 24	8:00	7 Jul 24	8:00	Sunny	129
12 Jul 24	8:00	13 Jul 24	8:00	Fine	102
18 Jul 24	8:00	19 Jul 24	8:00	Fine	102
24 Jul 24	8:00	25 Jul 24	8:00	Fine	235
30 Jul 24	8:00	31 Jul 24	8:00	Fine	55
5 Aug 24	8:00	6 Aug 24	8:00	Sunny	104
11 Aug 24	8:00	12 Aug 24	8:00	Sunny	128
17 Aug 24	8:00	18 Aug 24	8:00	Cloudy	30
23 Aug 24	8:00	24 Aug 24	8:00	Sunny	82
29 Aug 24	8:00	30 Aug 24	8:00	Sunny	225
4 Sep 24	8:00	5 Sep 24	8:00	Sunny	211
10 Sep 24	8:00	11 Sep 24	8:00	Sunny	60
16 Sep 24	8:00	17 Sep 24	8:00	Fine	92
22 Sep 24	8:00	23 Sep 24	8:00	Cloudy	38
28 Sep 24	8:00	29 Sep 24	8:00	Sunny	78
				Average	111
				Min	30
				Max	235

FIGURE D1.3 GRAPHICAL PRESENTATION FOR 24-HR TSP MONITORING AT AM3

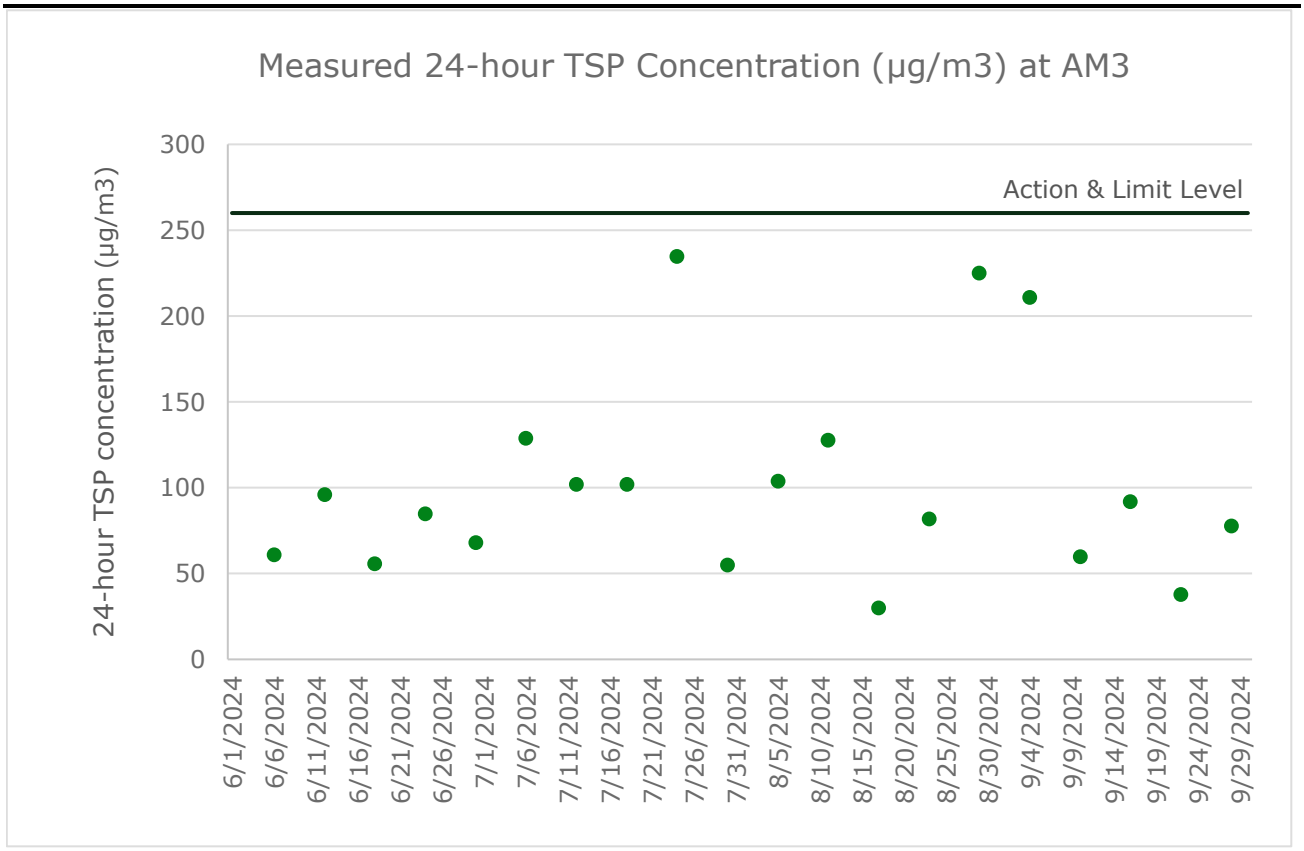
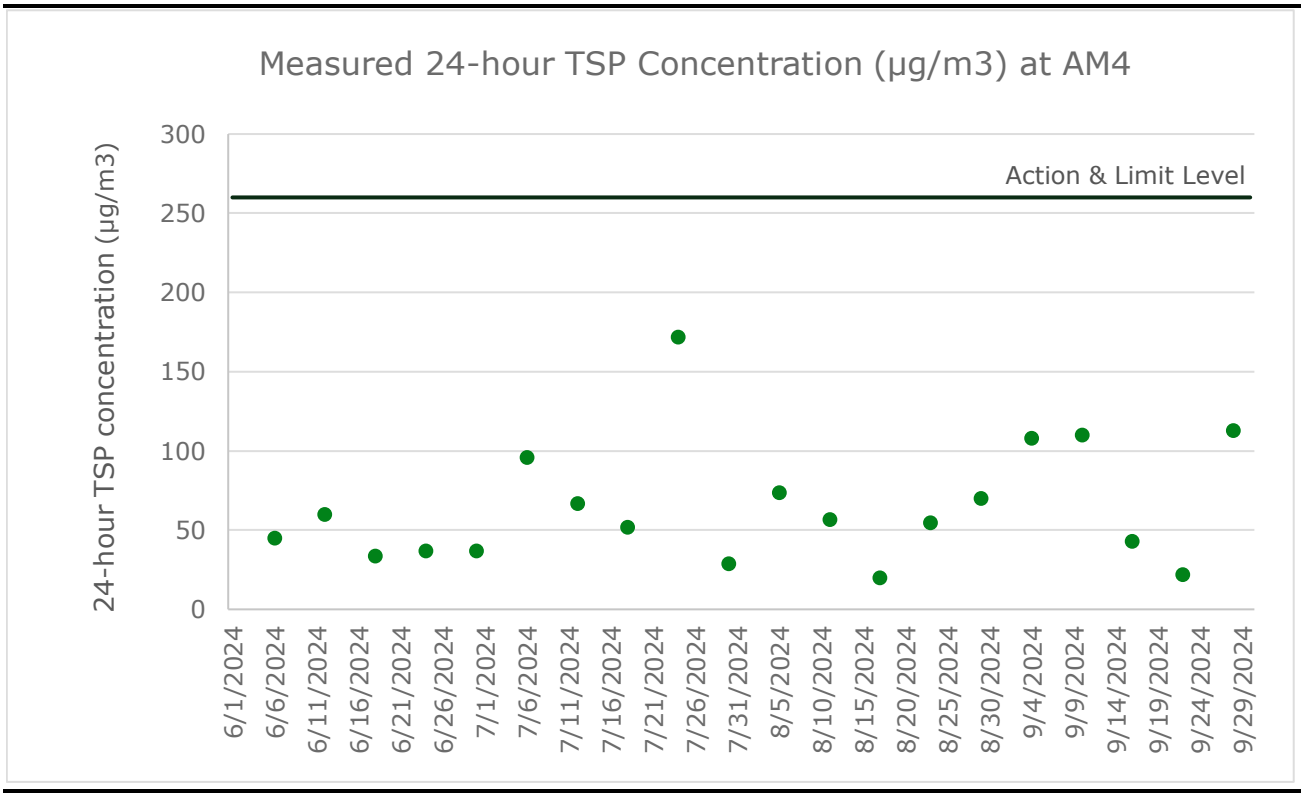


TABLE D1.4 24-HOUR TSP MONITORING RESULTS AT AM4

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu g/m^3$)
6 Jul 24	8:00	7 Jul 24	8:00	Sunny	96
12 Jul 24	8:00	13 Jul 24	8:00	Fine	67
18 Jul 24	8:00	19 Jul 24	8:00	Fine	52
24 Jul 24	8:00	25 Jul 24	8:00	Fine	172
30 Jul 24	8:00	31 Jul 24	8:00	Fine	29
5 Aug 24	8:00	6 Aug 24	8:00	Sunny	74
11 Aug 24	8:00	12 Aug 24	8:00	Sunny	57
17 Aug 24	8:00	18 Aug 24	8:00	Cloudy	20
23 Aug 24	8:00	24 Aug 24	8:00	Sunny	55
29 Aug 24	8:00	30 Aug 24	8:00	Sunny	70
4 Sep 24	8:00	5 Sep 24	8:00	Sunny	108
10 Sep 24	8:00	11 Sep 24	8:00	Sunny	110
16 Sep 24	8:00	17 Sep 24	8:00	Fine	43
22 Sep 24	8:00	23 Sep 24	8:00	Cloudy	22
28 Sep 24	8:00	29 Sep 24	8:00	Sunny	113
				Average	73
				Min	20
				Max	172

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

Action			
Event	**ET**	**IEC**	**Contractor**
Exceedance of Action/Limit Level for dust monitoring	• 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	• 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	• 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	• 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	• 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	• Rectify any unacceptable practice • Amend working methods as required • Implement amended working methods, if necessary

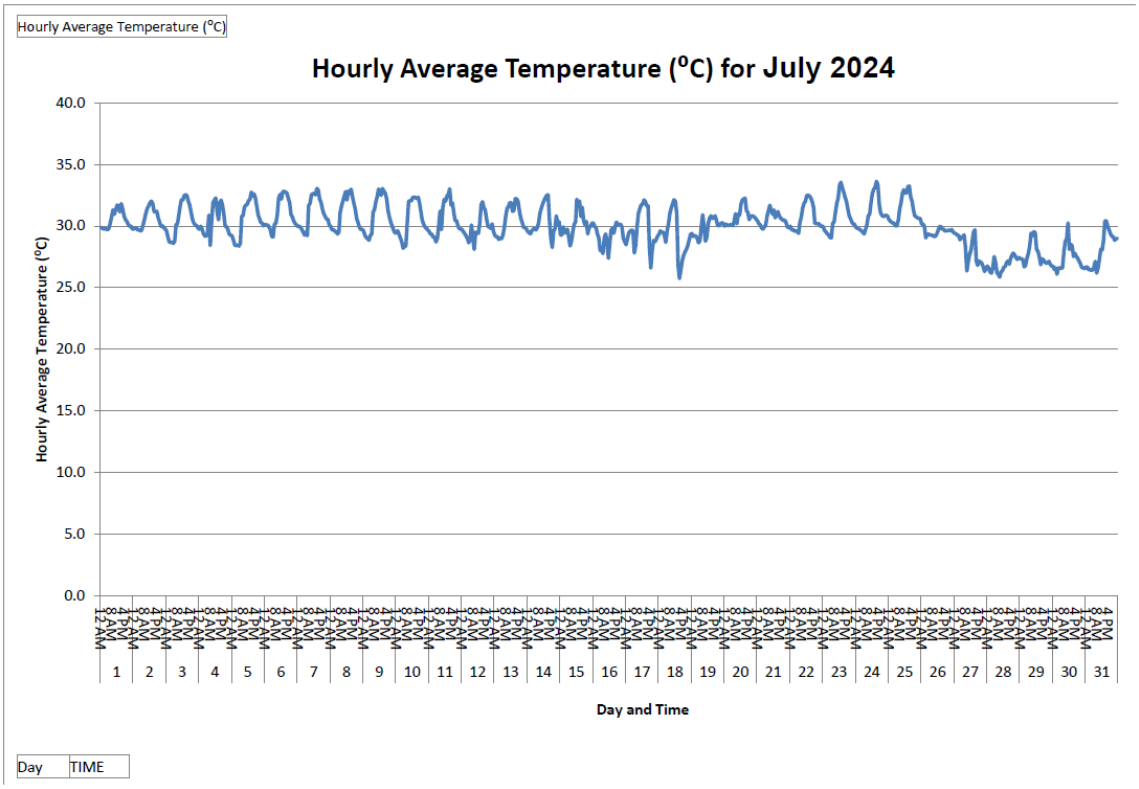
Action			
Event	**ET**	**IEC**	**Contractor**
	until odour not being detected for three consecutive days		
Exceedance of Limit Level for odour	• Identify source(s) and investigate the cause(s) of exceedance or complaint • Prepare the odour complaint form or the Notification of Exceedance within 24 hours • 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	• 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	• 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_2S at the monitoring locations	• 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	• 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	• Rectify any unacceptable practice • Amend working methods as required • Implement amended working methods, if necessary

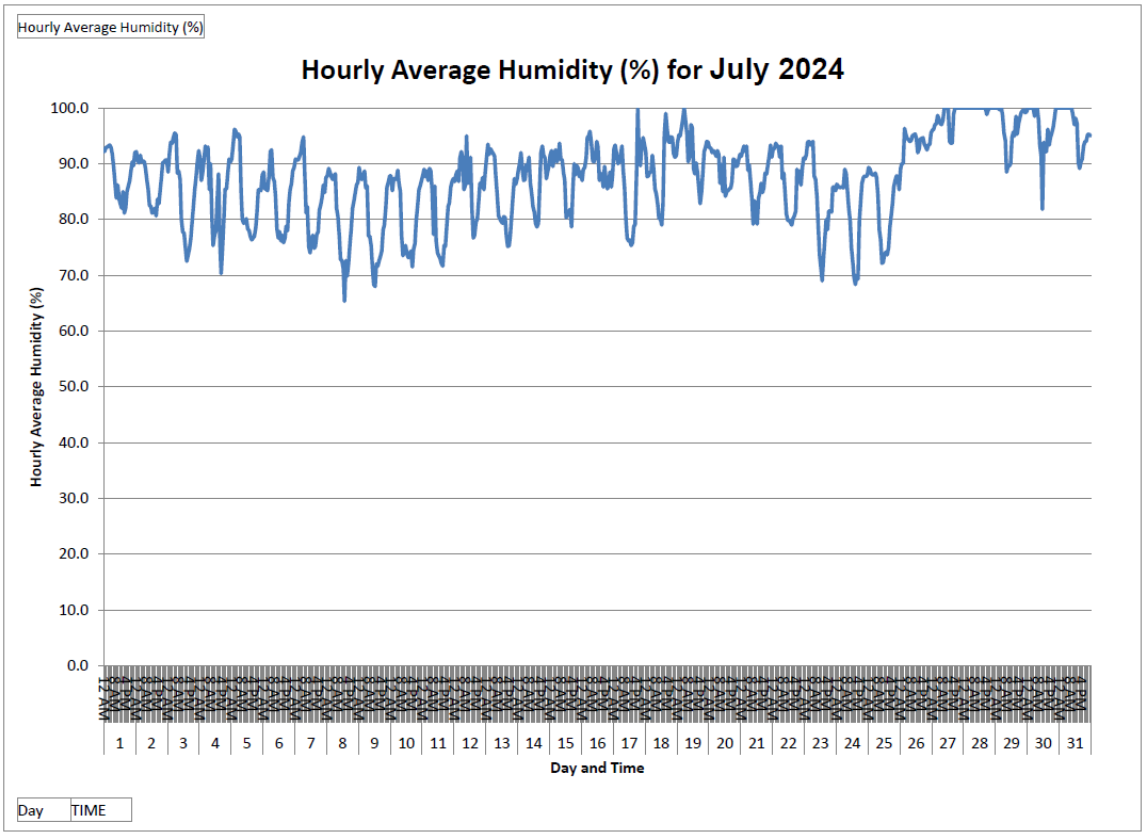
Action			
Event	**ET**	**IEC**	**Contractor**
	results • Repeat measurement to confirm finding if exceedance is due to the Project • Increase monitoring frequency to monthly and continue until the monitoring results reduce to below limit level		
Exceedance of Limit Level of stack emission of the thermal oxidizer, flares and generator	• 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	• 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	• Rectify any unacceptable performance • Amend design as required • Implement amended design, if necessary

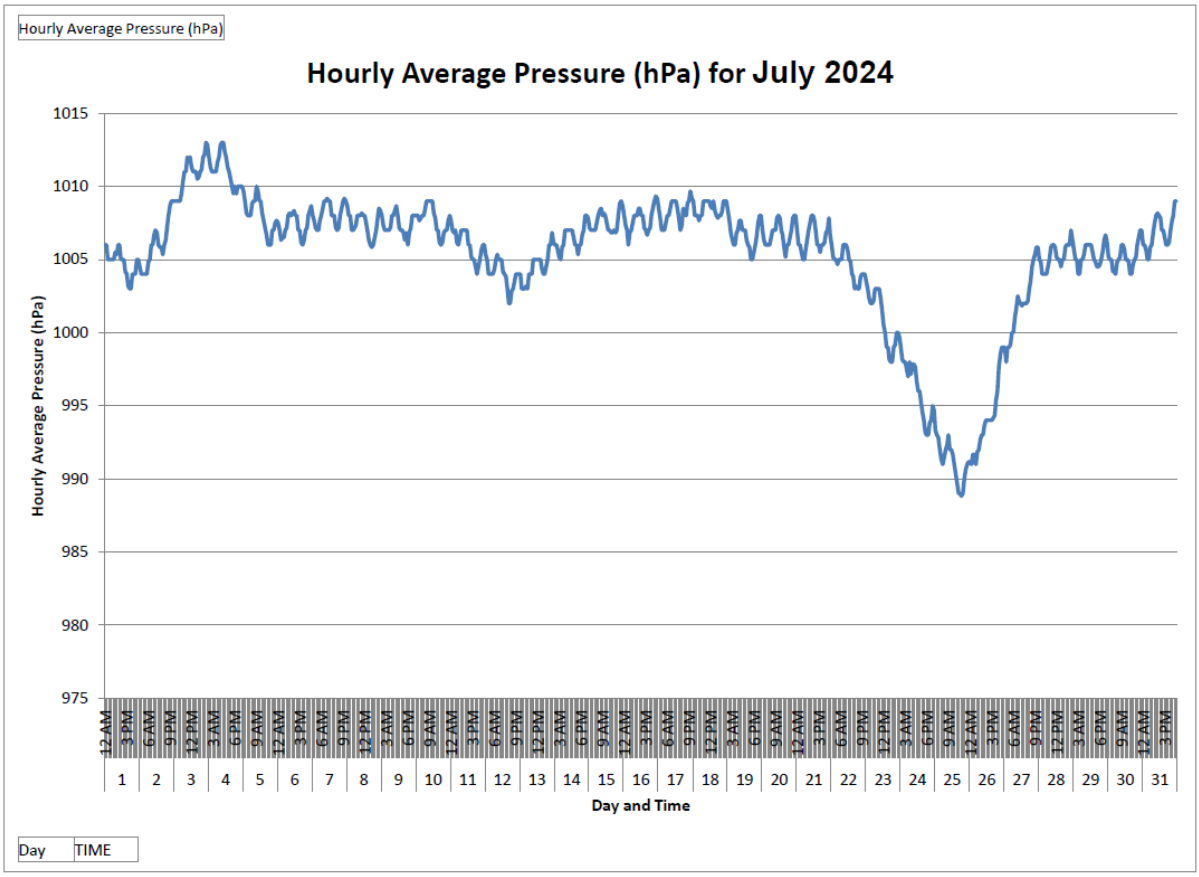
ANNEX D3 METEOROLOGICAL DATA

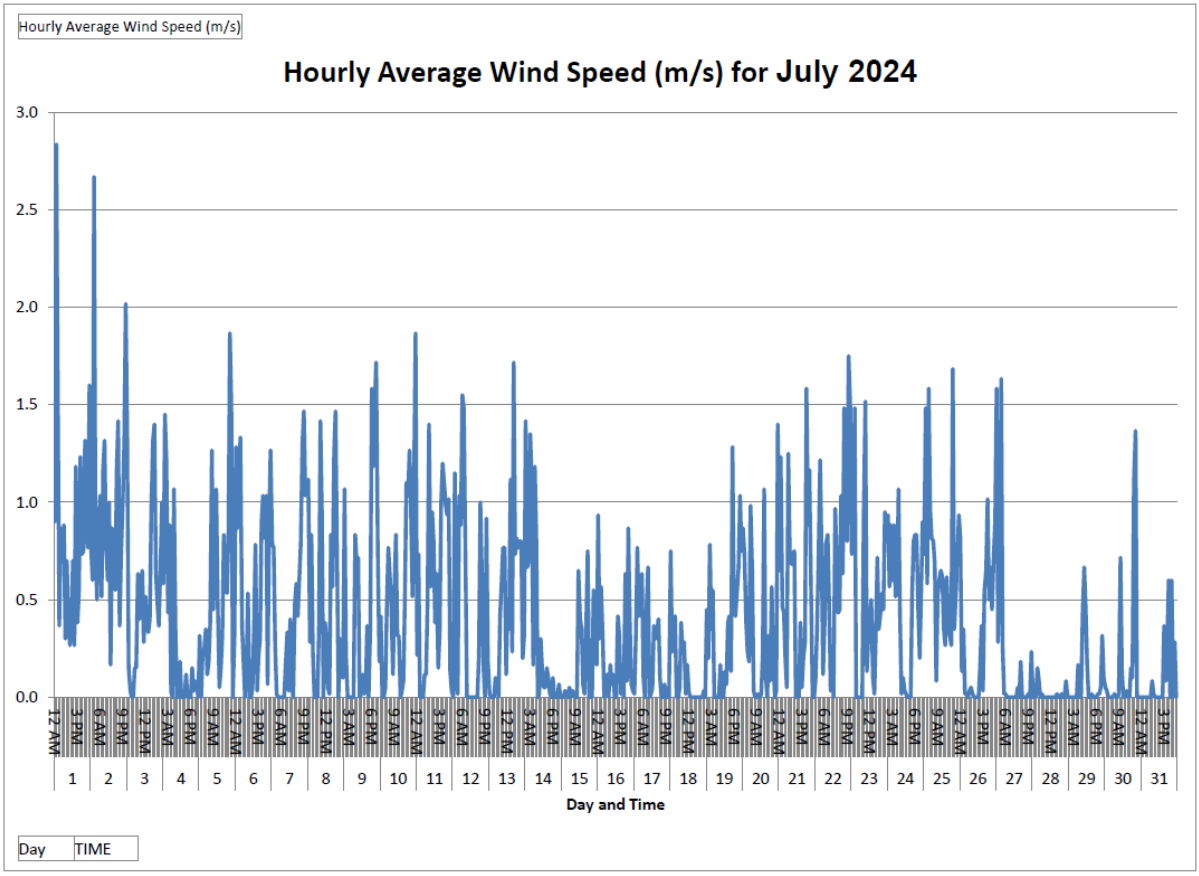
ANNEX D3 METEOROLOGICAL DATA

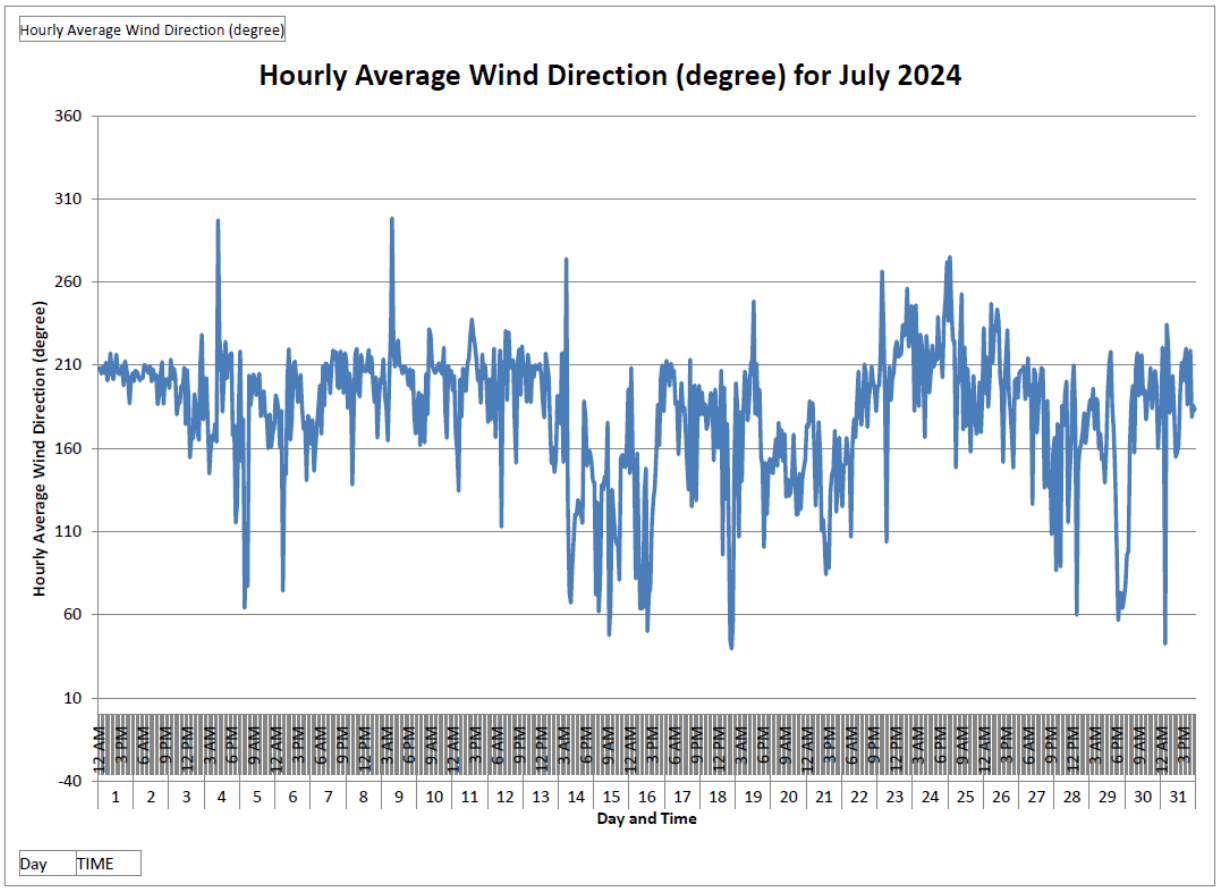
July 2024

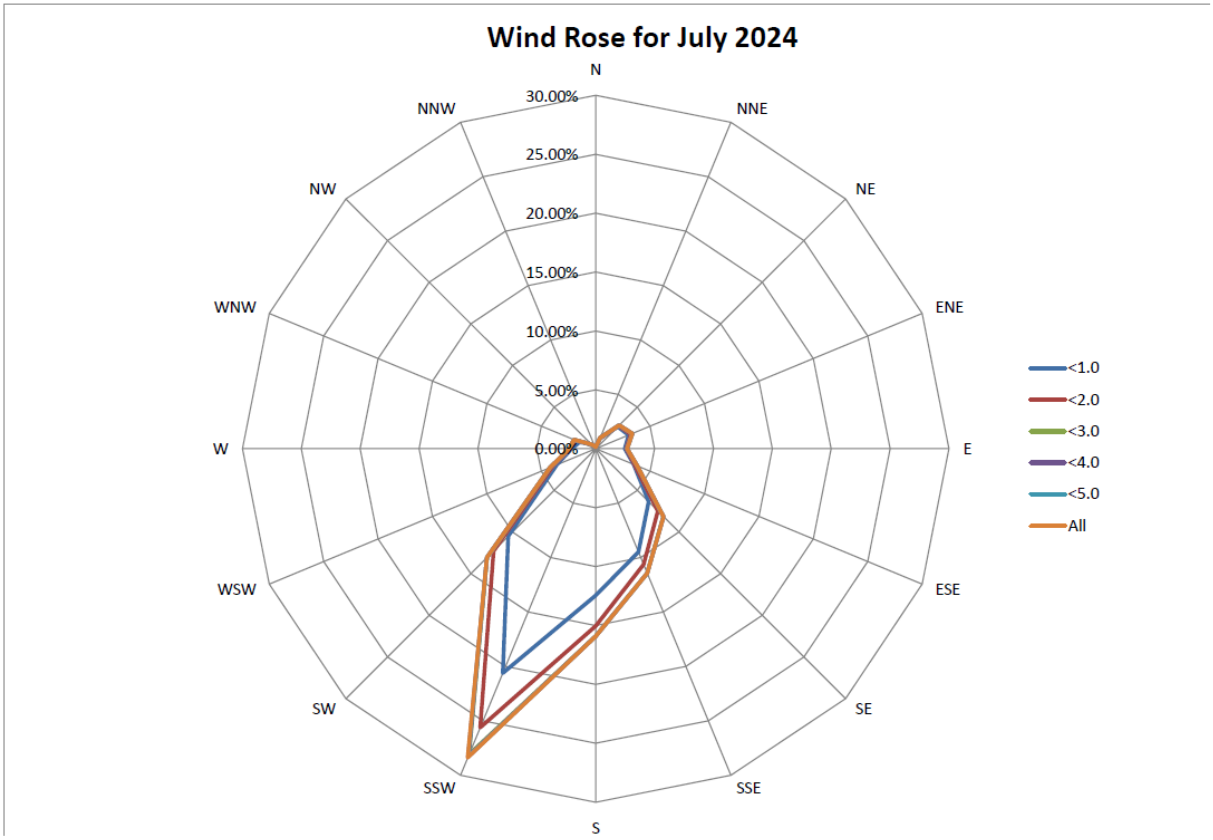


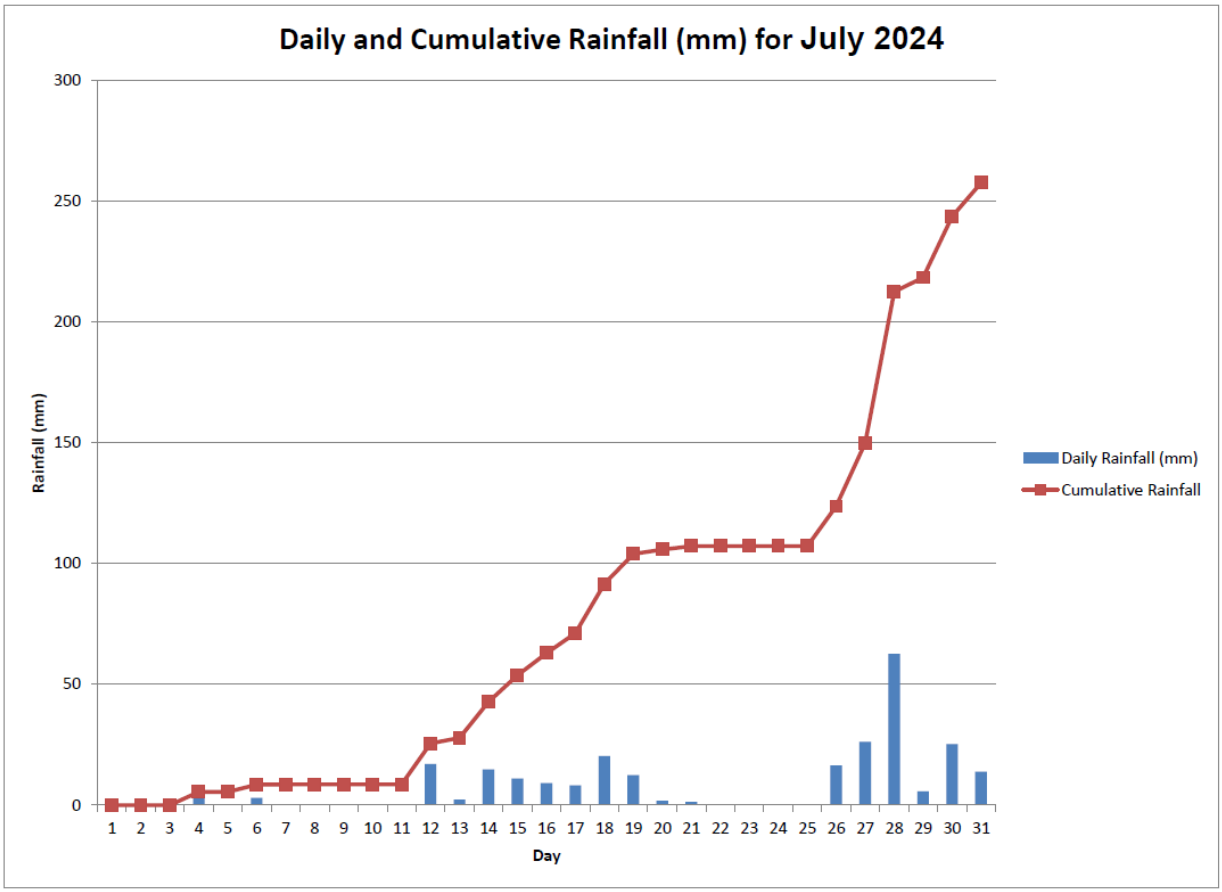



Hourly Average Pressure (hPa)
Hourly Average Pressure (hPa) for July 2024
Hourly Average Pressure (hPa)
Day and Time
Day
TIME

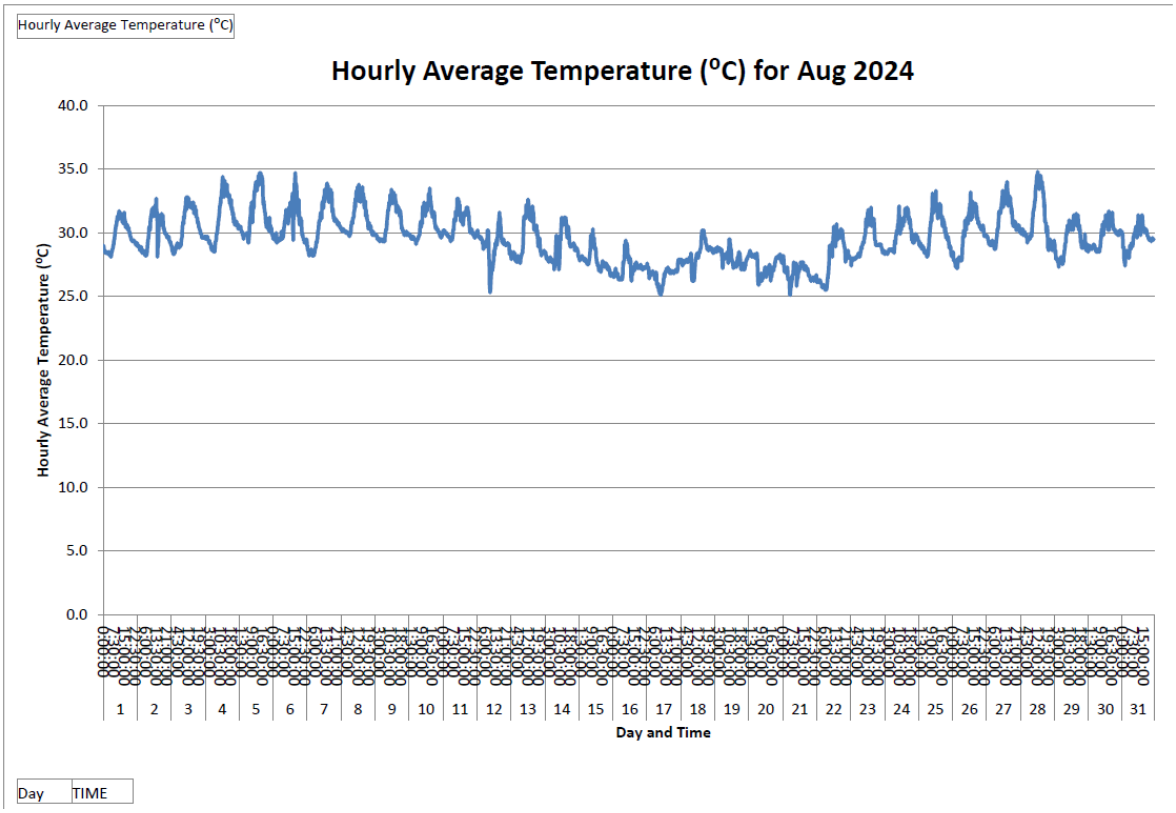

Hourly Average Wind Speed (m/s)
Hourly Average Wind Speed (m/s) for July 2024
Day and Time
Day
TIME

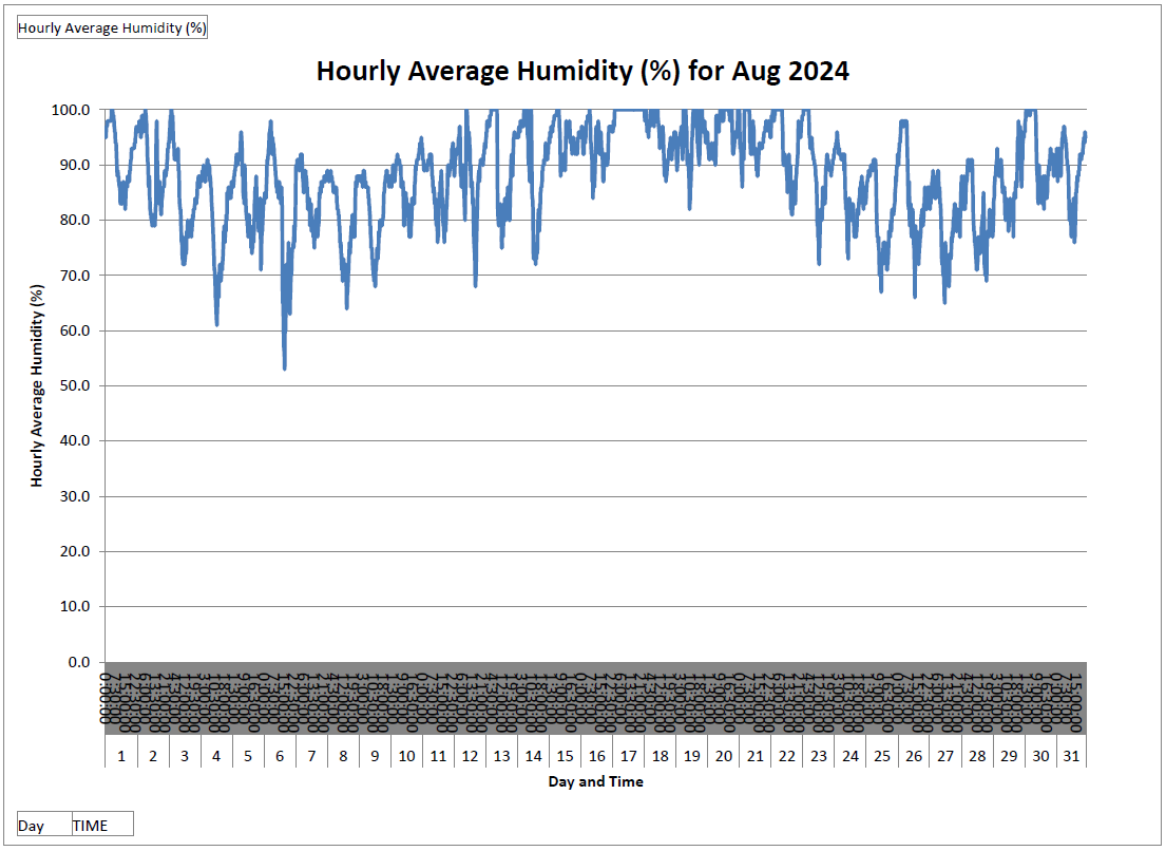

Hourly Average Wind Direction (degree)
Hourly Average Wind Direction (degree) for July 2024
Hourly Average Wind Direction (degree)
360
310
260
210
160
110
60
10
-40
12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day and Time
Day
TIME

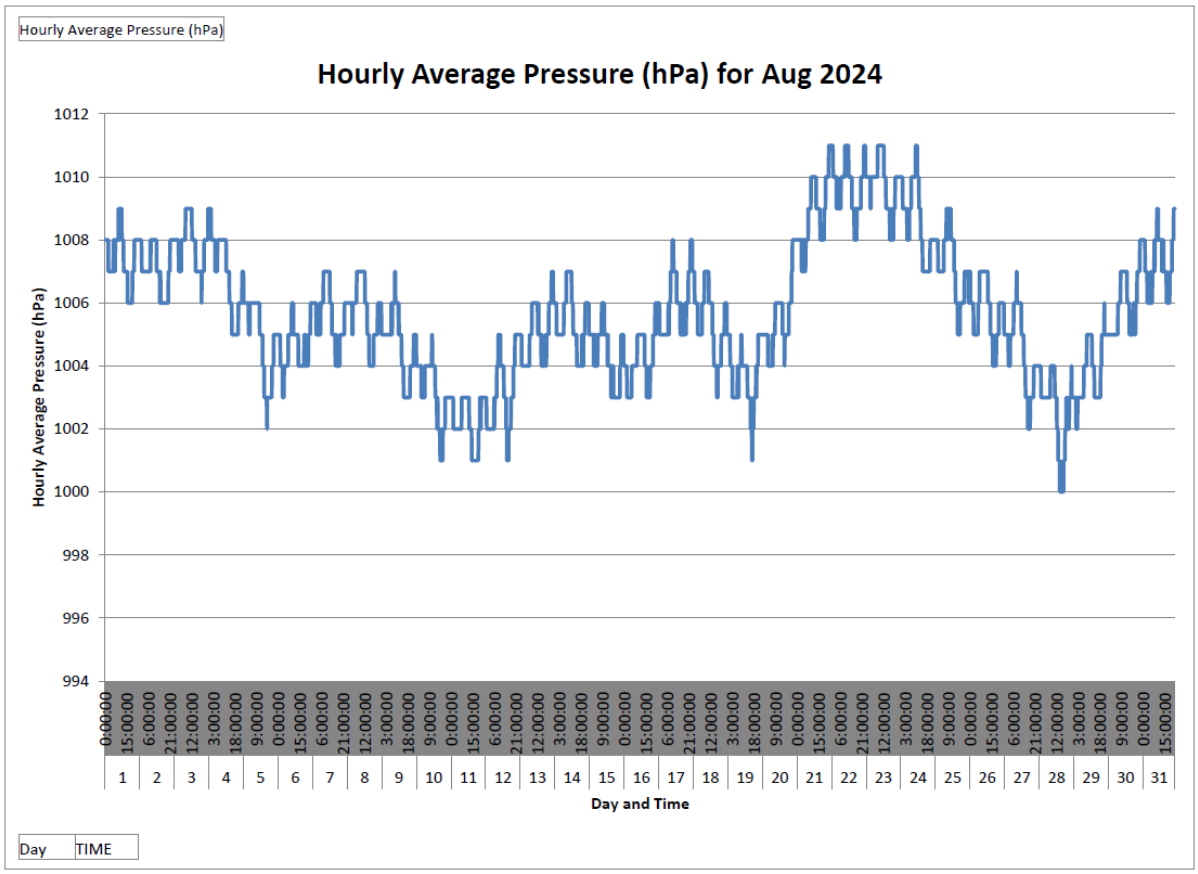

Wind Rose for July 2024
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
<1.0
<2.0
<3.0
<4.0
<5.0
All

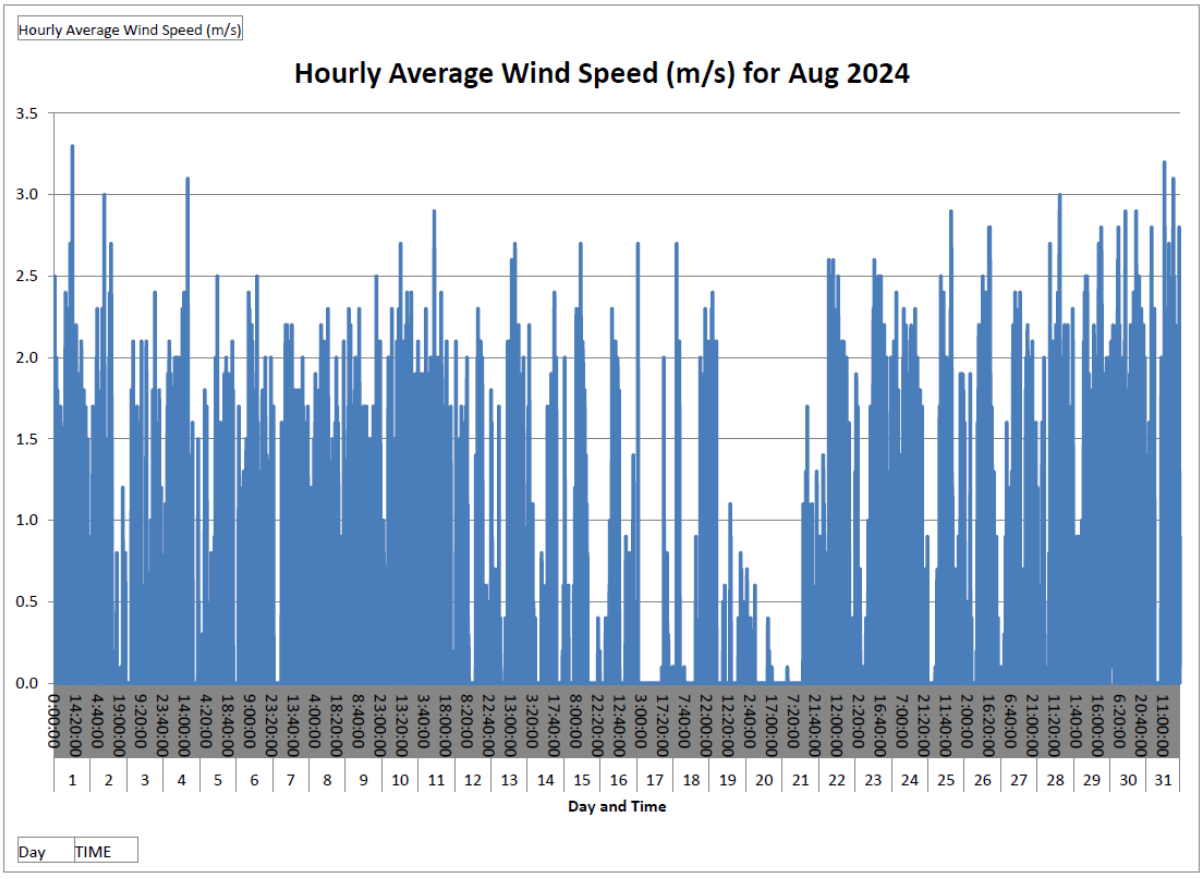

Daily and Cumulative Rainfall (mm) for July 2024
Rainfall (mm)
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day
Daily Rainfall (mm)
Cumulative Rainfall

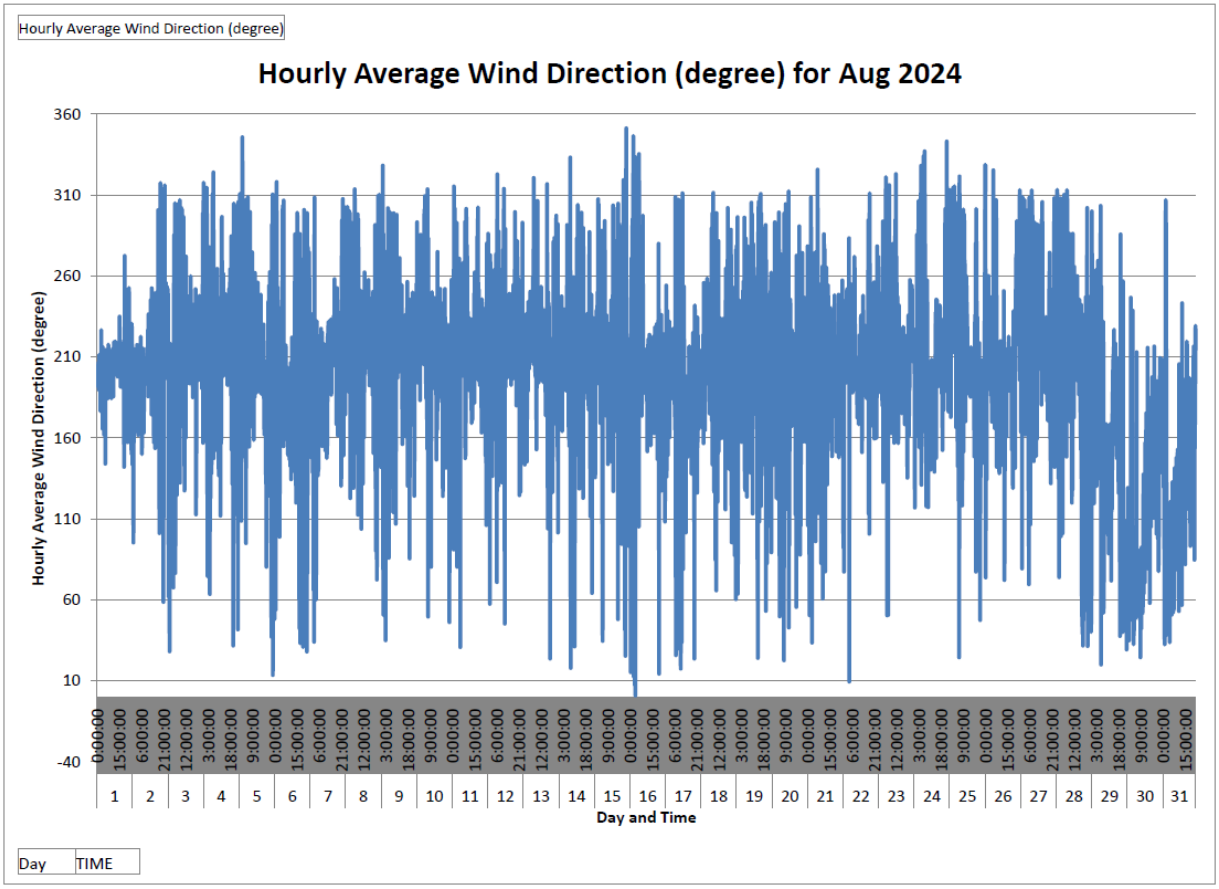
August 2024

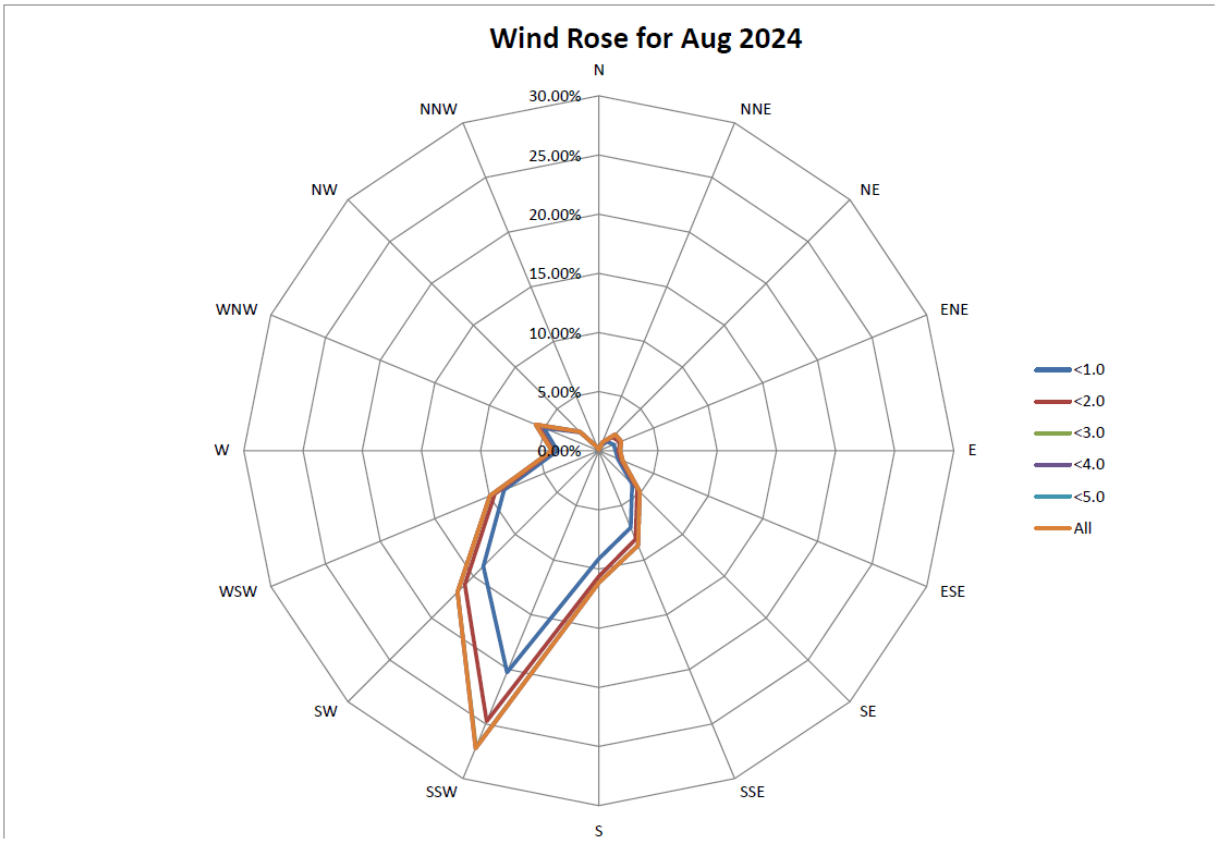

Hourly Average Temperature (°C)
Hourly Average Temperature (°C) for Aug 2024
Hourly Average Temperature (°C)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day and Time
Day
TIME

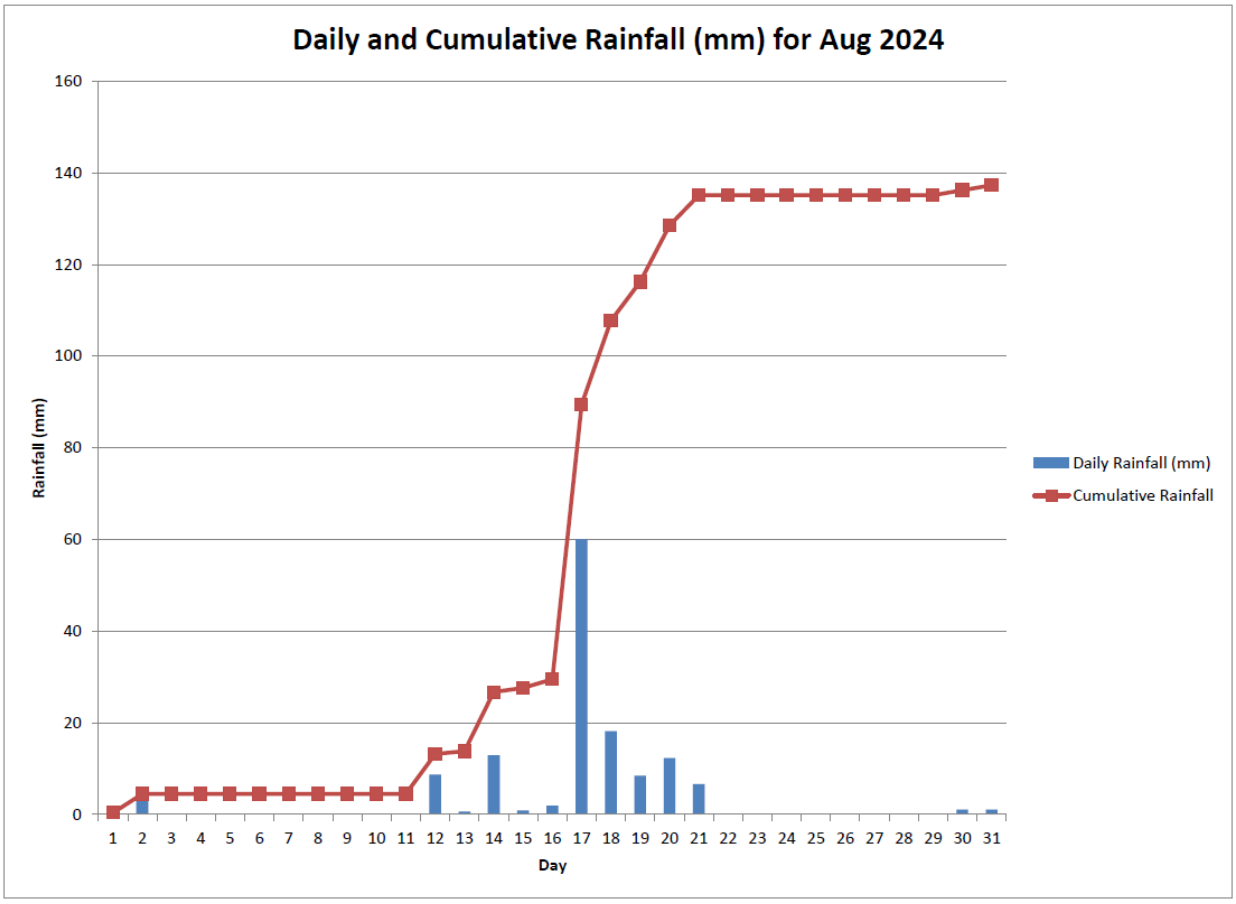

Hourly Average Humidity (%)
Hourly Average Humidity (%) for Aug 2024
Hourly Average Humidity (%)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day and Time
Day
TIME


Hourly Average Pressure (hPa)
Hourly Average Pressure (hPa) for Aug 2024
Hourly Average Pressure (hPa)
Day and Time
Day
TIME

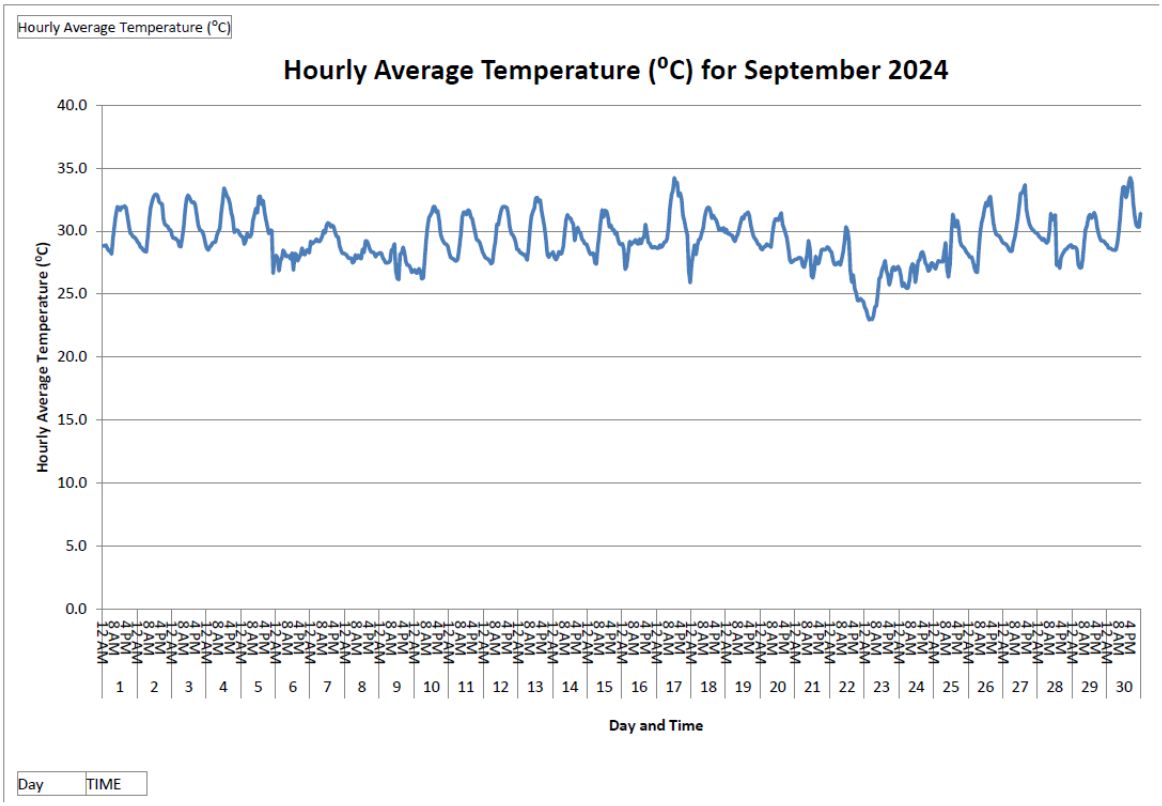

Hourly Average Wind Speed (m/s)
Hourly Average Wind Speed (m/s) for Aug 2024
Day and Time
Day
TIME

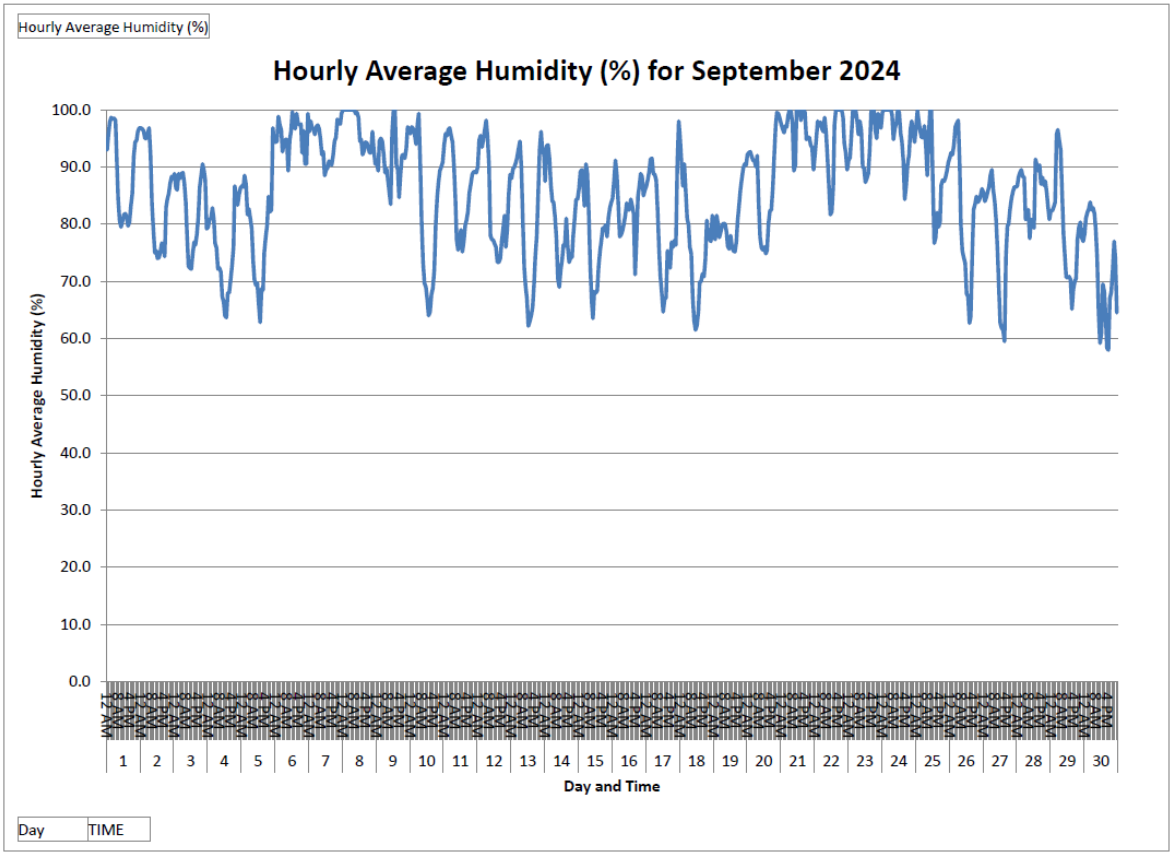

Hourly Average Wind Direction (degree)
Hourly Average Wind Direction (degree) for Aug 2024
Hourly Average Wind Direction (degree)
360
310
260
210
160
110
60
10
-40
0:00:00
15:00:00
6:00:00
21:00:00
12:00:00
3:00:00
18:00:00
9:00:00
0:00:00
15:00:00
6:00:00
21:00:00
12:00:00
3:00:00
18:00:00
9:00:00
0:00:00
15:00:00
6:00:00
21:00:00
12:00:00
3:00:00
18:00:00
9:00:00
0:00:00
15:00:00
6:00:00
21:00:00
12:00:00
3:00:00
18:00:00
9:00:00
0:00:00
15:00:00
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day and Time
Day
TIME

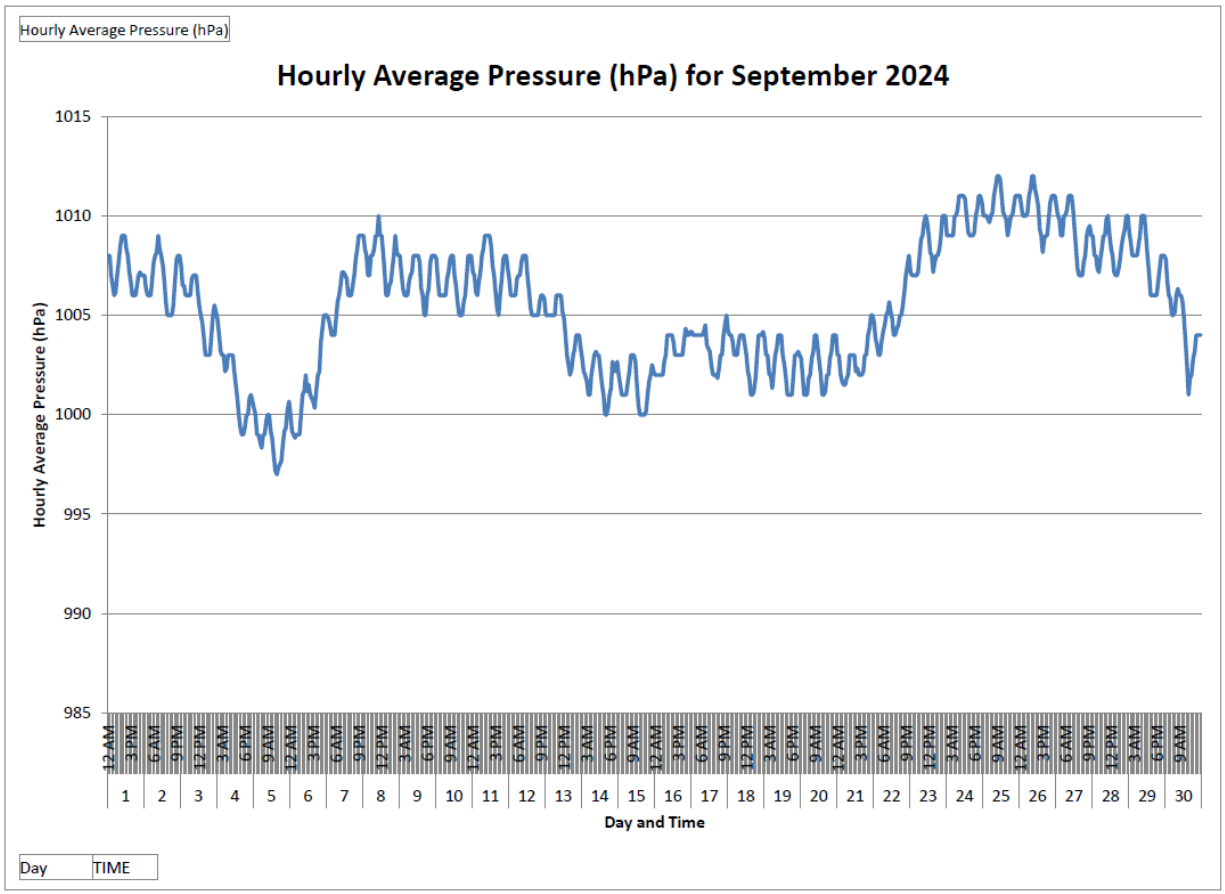

Wind Rose for Aug 2024
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
<1.0
<2.0
<3.0
<4.0
<5.0
All

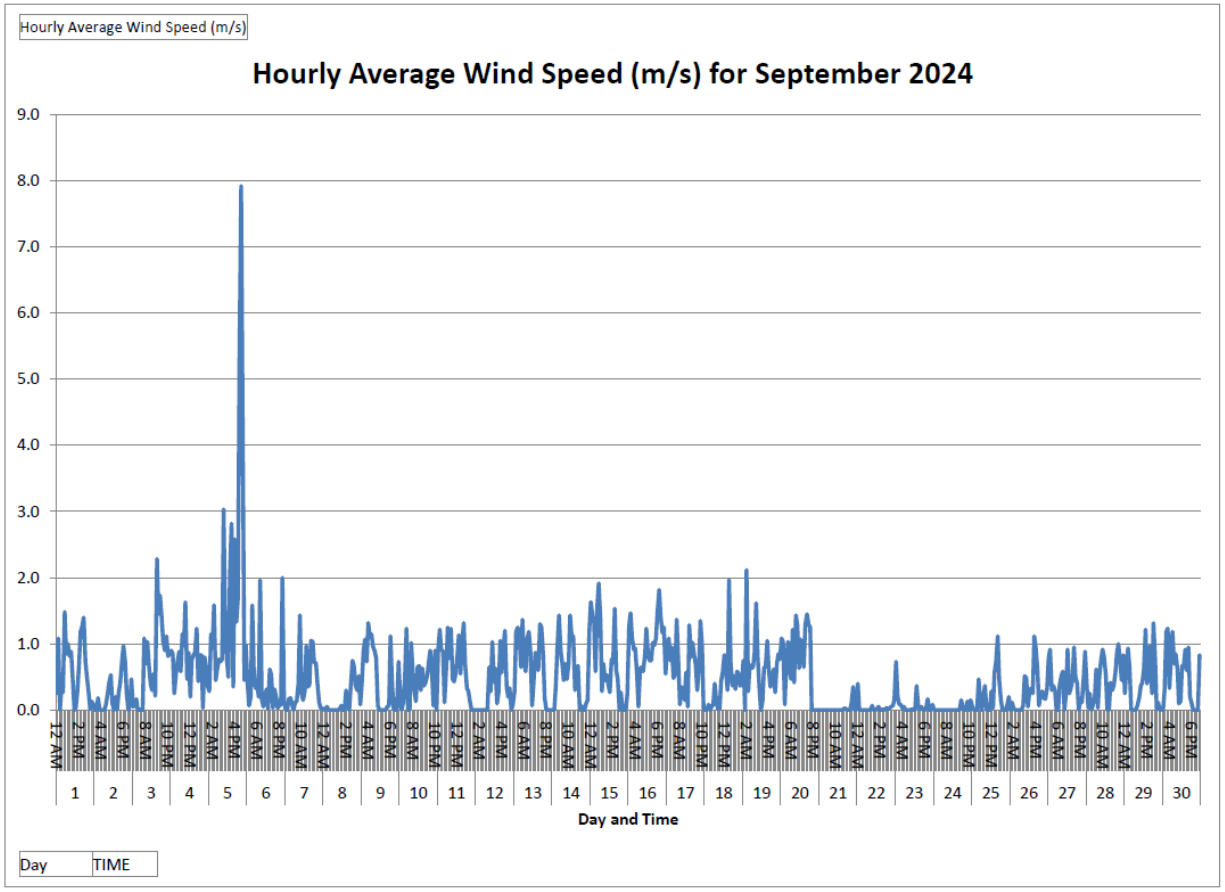

Daily and Cumulative Rainfall (mm) for Aug 2024
Rainfall (mm)
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day
Daily Rainfall (mm)
Cumulative Rainfall

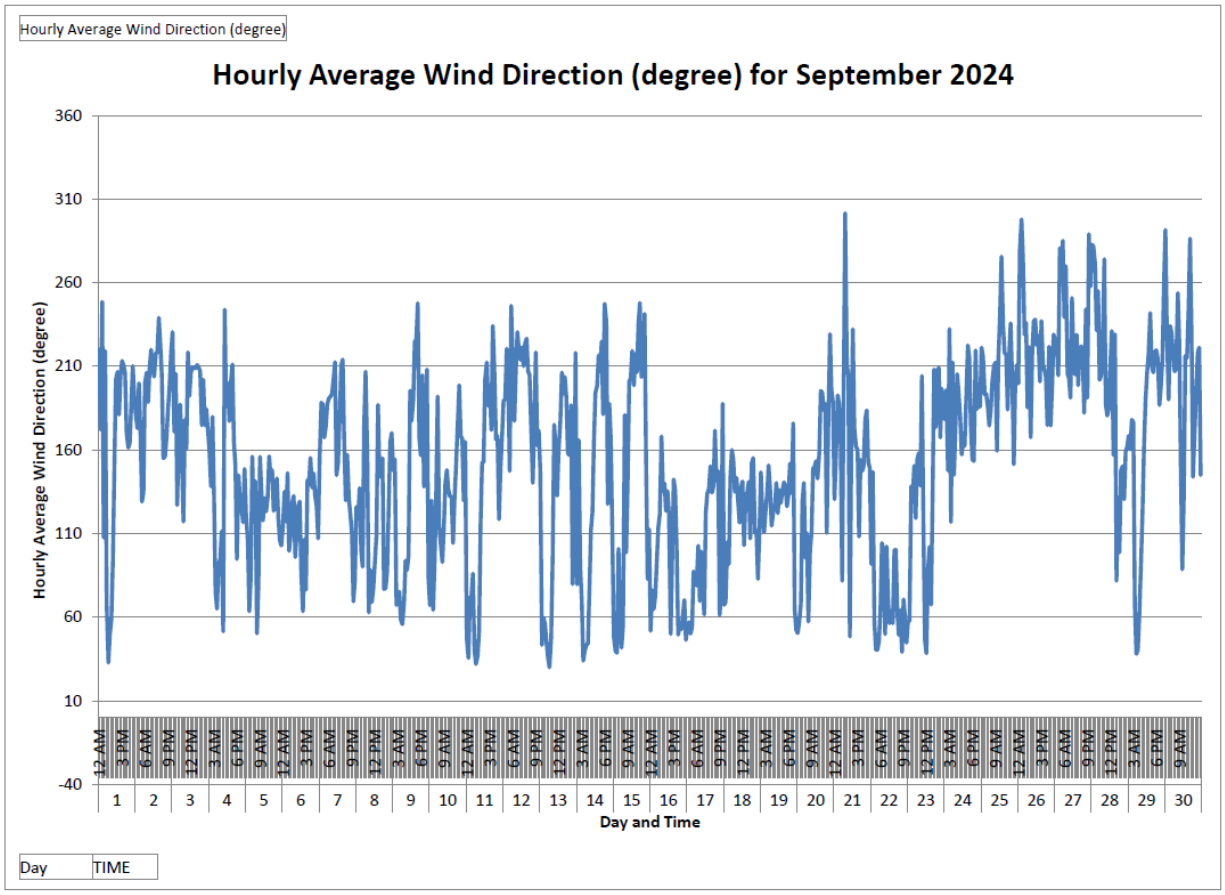
September 2024

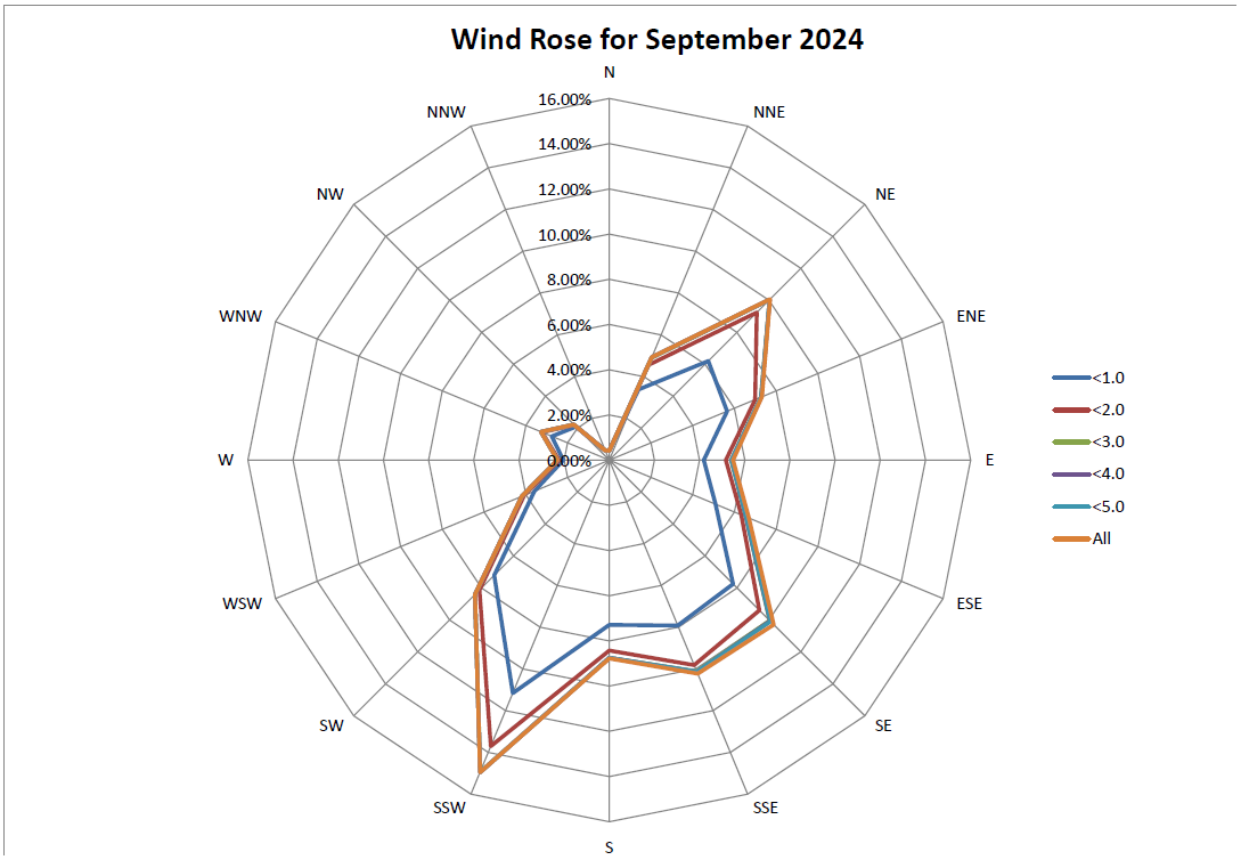


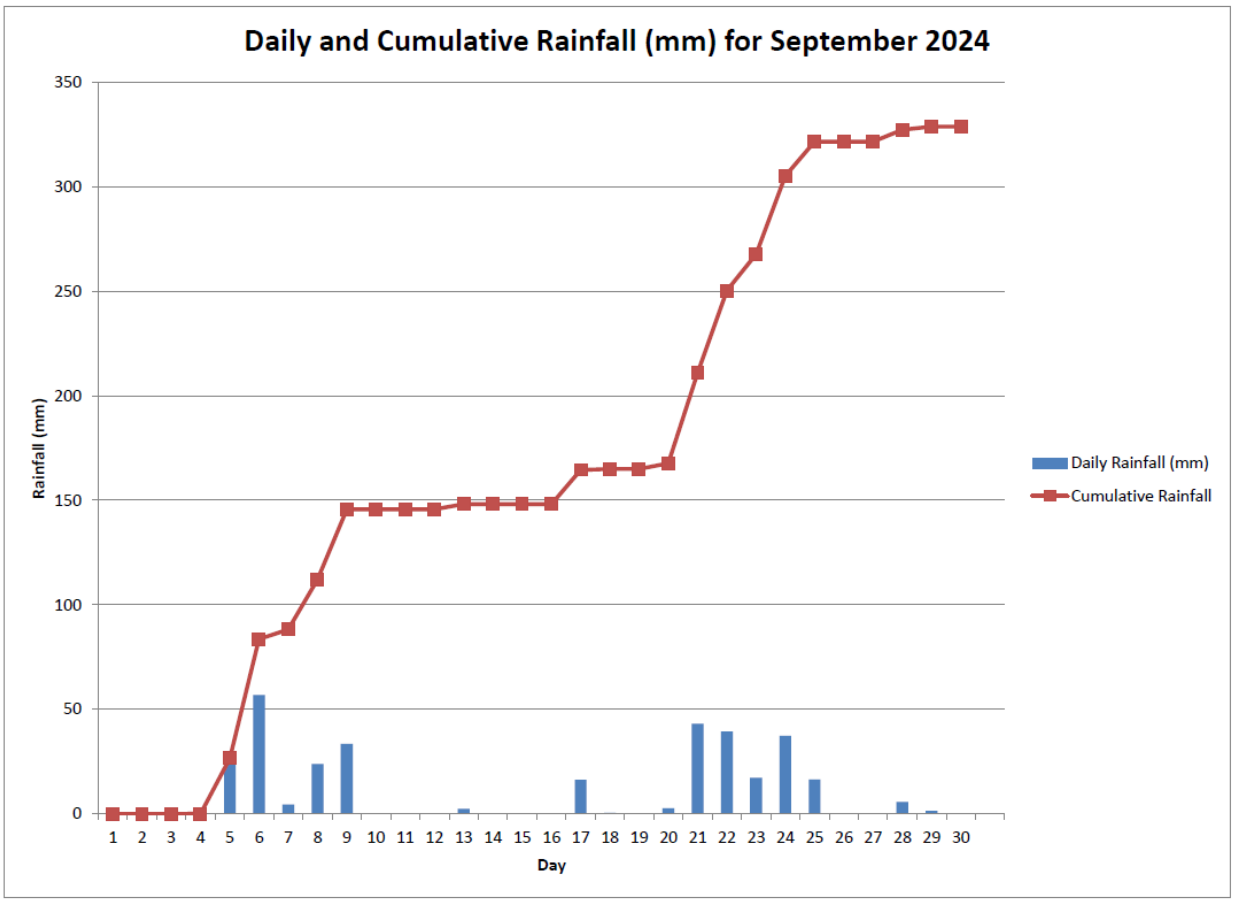



Hourly Average Pressure (hPa)
Hourly Average Pressure (hPa) for September 2024
1015
1010
1005
1000
995
990
985
Hourly Average Pressure (hPa)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day and Time
Day
TIME


Hourly Average Wind Speed (m/s)
Hourly Average Wind Speed (m/s) for September 2024
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day and Time
Day
TIME


Hourly Average Wind Direction (degree)
Hourly Average Wind Direction (degree) for September 2024
Hourly Average Wind Direction (degree)
360
310
260
210
160
110
60
10
-40
12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day and Time
Day
TIME


Wind Rose for September 2024
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
16.00%
14.00%
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
<1.0
<2.0
<3.0
<4.0
<5.0
All


Daily and Cumulative Rainfall (mm) for September 2024
Rainfall (mm)
350
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day
Daily Rainfall (mm)
Cumulative Rainfall

ANNEX D4 ODOUR MONITORING RESULTS

ANNEX D4 ODOUR MONITORING RESULTS

Date	Weather	Location	Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
26 Jul 24	Rainy	OP1	14:06	28.6	1.9	NW	Yes	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP2	14:09	28.7	1.8	SW	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP3	14:11	29.6	1.3	S	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP4	14:13	29.1	1.1	W	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP5	14:15	30.2	1.3	NW	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP6	14:17	30.3	0.8	N	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP7	14:18	30.6	1.0	NW	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP8	14:23	30.0	2.5	W	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP9	14:26	29.9	1.0	SE	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP10	14:28	30.4	1.3	SE	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP11	14:33	29.6	2.2	NE	No	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP12	14:50	29.0	6.4	S	Yes	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP13	14:48	28.9	6.0	SW	Yes	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP14	14:43	28.7	9.9	S	Yes	0	N/A	N/A	N/A
26 Jul 24	Rainy	OP15 [(a)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible
26 Jul 24	Rainy	OP16 [(a)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible

Date	Weather	Location	Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
26 Jul 24	Rainy	OP17 [(a)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible
1 Aug 24	Sunny	OP1	13:38	29.8	1.4	SW	Yes	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP2	13:42	29.3	1.5	SW	Yes	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP3	13:44	30.9	0.6	SW	No	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP4	13:46	30.4	1.4	SE	No	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP5	13:48	32.0	1.5	E	No	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP6	13:49	31.0	0.5	N	No	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP7	13:52	31.7	1.0	N	No	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP8	13:55	32.7	2.1	NW	No	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP9	13:59	32.1	0.0	N/A	No	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP10	14:01	32.8	0.8	E	Yes	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP11	14:06	31.3	2.5	S	Yes	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP12	14:24	30.1	4.1	S	Yes	1	Waste smell	Cell 4X Tipping area	SENTx
1 Aug 24	Sunny	OP13	14:21	30.3	5.4	S	Yes	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP14	14:16	29.3	7.7	S	Yes	0	N/A	N/A	N/A
1 Aug 24	Sunny	OP15 [(a)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible

Date	Weather	Location	Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
1 Aug 24	Sunny	OP16 [a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible
1 Aug 24	Sunny	OP17 [a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible
20 Sep 24	Cloudy	OP1 [b]	13:58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible
20 Sep 24	Cloudy	OP2	14:00	31.7	2.4	S	No	1	Grassy	Vegtation	N/A
20 Sep 24	Cloudy	OP3	14:06	32.1	1.3	S	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP4	14:09	32.2	3.0	E	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP5	14:12	32.2	1.6	E	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP6	14:15	32.4	0.7	SE	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP7	14:18	33.5	1.5	S	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP8	14:19	33.9	0.9	S	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP9	14:22	33.7	1.2	SE	Yes	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP10	14:28	33.1	1.7	E	Yes	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP11	14:33	32.3	2.1	SE	Yes	1	Waste smell	Cell 4X Tipping area	SENTx
20 Sep 24	Cloudy	OP12	14:42	31.7	1.8	SE	Yes	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP13 [b]	14:46	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not accessible

Date	Weather	Location	Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
20 Sep 24	Cloudy	OP14	14:46	30.8	3.9	SE	No	1	Soil smell	Restoration work	SENT
20 Sep 24	Cloudy	OP15	15:13	31.6	1.2	E	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP16	15:10	31.0	1.2	SE	No	0	N/A	N/A	N/A
20 Sep 24	Cloudy	OP17	15:07	31.1	2.1	SW	Yes	0	N/A	N/A	N/A

Note:
(a) OP15 – OP17 were not accessible due to safety considerations in July and August 2024.
(b) OP1 and OP13 are not accessible due to the landscape reparation work and construction work respectively in September 2024.

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 (July 2024)**
NO_2	1.12 gs^{-1}
CO	0.02 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}
Vinyl chloride	<1.4 x 10^{-4} gs^{-1}
Exhaust gas velocity	11.0 ms^{-1}
Parameters	**Monitoring Results (August 2024)**
NO_2	0.57 gs^{-1}
CO	0.03 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}
Vinyl chloride	<1.3 x 10^{-4} gs^{-1}
Non-Methane Organic Carbons	<0.003 gs^{-1}
Ammonia	0.0315 gs^{-1}
Exhaust gas velocity	9.4 ms^{-1}
Parameters	**Monitoring Results (September 2024)**
NO_2	0.67 gs^{-1}
CO	0.02 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	3.0 x 10^{-4} gs^{-1}
Vinyl chloride	<1.2 x 10^{-4} gs^{-1}
Exhaust gas velocity	9.6 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 Jul 24	902	1215	11.0
2 Jul 24	903	1218	
3 Jul 24	901	1216	
4 Jul 24	901	1214	
5 Jul 24	895	1216	
6 Jul 24	907	1219	
7 Jul 24	904	1219	
8 Jul 24	898	1218	
9 Jul 24	897	1217	
10 Jul 24	897	1215	
11 Jul 24	Under Maintenance		
12 Jul 24	900	1210	
13 Jul 24	902	1212	
14 Jul 24	900	1209	
15 Jul 24	913	1203	
16 Jul 24	897	1202	
17 Jul 24	898	1208	
18 Jul 24	898	1208	
19 Jul 24	899	1209	
20 Jul 24	900	1210	
21 Jul 24	901	1209	
22 Jul 24	906	1213	
23 Jul 24	898	1211	
24 Jul 24	902	1211	
25 Jul 24	905	1212	
26 Jul 24	900	1210	
27 Jul 24	902	1211	
28 Jul 24	901	1204	
29 Jul 24	Under Maintenance		
30 Jul 24	Under Maintenance		
31 Jul 24	Under Maintenance		
1 Aug 24	Under Maintenance		
2 Aug 24	Under Maintenance		
3 Aug 24	Under Maintenance		
4 Aug 24	Under Maintenance		
5 Aug 24	Under Maintenance		

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)
6 Aug 24	Under Maintenance		
7 Aug 24	901	1201	
8 Aug 24	898	1204	
9 Aug 24	901	1211	
10 Aug 24	895	1212	
11 Aug 24	899	1214	
12 Aug 24	898	1211	
13 Aug 24	902	1212	
14 Aug 24	899	1205	
15 Aug 24	900	1205	
16 Aug 24	899	1204	
17 Aug 24	902	1203	
18 Aug 24	901	1204	
19 Aug 24	902	1202	9.4
20 Aug 24	897	1200	
21 Aug 24	897	1200	
22 Aug 24	897	1205	
23 Aug 24	896	1206	
24 Aug 24	900	1207	
25 Aug 24	901	1207	
26 Aug 24	902	1207	
27 Aug 24	902	1205	
28 Aug 24	902	1208	
29 Aug 24	904	1206	
30 Aug 24	903	1206	
31 Aug 24	901	1205	
1 Sep 24	908	1201	
2 Sep 24	895	1198	
3 Sep 24	895	1197	
4 Sep 24	898	1196	
5 Sep 24	902	1198	
6 Sep 24	898	1194	
7 Sep 24	897	1193	
8 Sep 24	900	1194	
9 Sep 24	897	1192	
10 Sep 24	903	1198	
11 Sep 24	903	1194	

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)
12 Sep 24	900	1196	9.6
13 Sep 24	893	1194	
14 Sep 24	901	1197	
15 Sep 24	904	1199	
16 Sep 24	899	1196	
17 Sep 24	Under maintenance		
18 Sep 24	915	1188	
19 Sep 24	932	1205	
20 Sep 24	931	1204	
21 Sep 24	928	1201	
22 Sep 24	929	1202	
23 Sep 24	923	1196	
24 Sep 24	929	1202	
25 Sep 24	931	1204	
26 Sep 24	928	1201	
27 Sep 24	931	1204	
28 Sep 24	929	1202	
29 Sep 24	929	1202	
30 Sep 24	929	1202	
Average	905	1205	10.0
Min	893	1188	9.4
Max	932	1219	11.0

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 (July 2024)**
	Flare 1 – F601
NO_2	0.01 gs^{-1}
CO	0.04 gs^{-1}
SO_2	0.02 gs^{-1}
Benzene	<6.0 x 10^{-5} gs^{-1}
Vinyl chloride	<4.8 x 10^{-5} gs^{-1}
Exhaust gas velocity	4.3 ms^{-1}
Parameters	**Monitoring Results (August 2024)**
	Flare 1 – F601
NO_2	<0.02 gs^{-1}
CO	0.02 gs^{-1}
SO_2	0.01 gs^{-1}
Benzene	<1.17 x 10^{-4} gs^{-1}
Vinyl chloride	<9.4 x 10^{-5} gs^{-1}
Non-Methane Organic Carbons	<0.002 gs^{-1}
Exhaust gas velocity	9.0 ms^{-1}
Parameters	**Monitoring Results (September 2024)**
	Flare 1 – F601
NO_2	0.01 gs^{-1}
CO	0.04 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<0.94 x 10^{-5} gs^{-1}
Vinyl chloride	<7.5 x 10^{-5} gs^{-1}
Exhaust gas velocity	5.9 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 Jul 24	871	1140		In Operation
2 Jul 24	903	1166		In Operation
3 Jul 24	893	1146		In Operation
4 Jul 24	868	1135		In Operation
5 Jul 24	904	1168		In Operation
6 Jul 24	874	1134		In Operation
7 Jul 24	865	1136		In Operation
8 Jul 24	879	1126		In Operation
9 Jul 24	856	1126		In Operation
10 Jul 24	862	1120		In Operation
11 Jul 24	885	1155		In Operation
12 Jul 24	916	1171		In Operation
13 Jul 24	871	1143		In Operation
14 Jul 24	881	1141		In Operation
15 Jul 24	907	1161		In Operation
16 Jul 24	836	1105	4.3	In Operation
17 Jul 24	876	1147		In Operation
18 Jul 24	867	1132		In Operation
19 Jul 24	900	1164		In Operation
20 Jul 24	846	1107		In Operation
21 Jul 24	901	1160		In Operation
22 Jul 24	864	1133		In Operation
23 Jul 24	890	1151		In Operation
24 Jul 24	880	1129		In Operation
25 Jul 24	831	1099		In Operation
26 Jul 24	855	1122		In Operation
27 Jul 24	869	1133		In Operation
28 Jul 24	865	1135		In Operation
29 Jul 24	871	1133		In Operation
30 Jul 24	889	1155		In Operation
31 Jul 24	886	1151		In Operation
1 Aug 24	866	1127		In Operation
2 Aug 24	840	1096		In Operation
3 Aug 24	872	1125		In Operation
4 Aug 24	881	1137		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
5 Aug 24	866	1128		In Operation
6 Aug 24	885	1148		In Operation
7 Aug 24	874	1129		In Operation
8 Aug 24	867	1122		In Operation
9 Aug 24	862	1116		In Operation
10 Aug 24	889	1147		In Operation
11 Aug 24	862	1122		In Operation
12 Aug 24	863	1118		In Operation
13 Aug 24	869	1129		In Operation
14 Aug 24	851	1104		In Operation
15 Aug 24	889	1147	9.0	In Operation
16 Aug 24	888	1149		In Operation
17 Aug 24	856	1109		In Operation
18 Aug 24	866	1124		In Operation
19 Aug 24	888	1146		In Operation
20 Aug 24	845	1108		In Operation
21 Aug 24	846	1105		In Operation
22 Aug 24	840	1096		In Operation
23 Aug 24	848	1107		In Operation
24 Aug 24	861	1124		In Operation
25 Aug 24	850	1106		In Operation
26 Aug 24	847	1101		In Operation
27 Aug 24	868	1126		In Operation
28 Aug 24	878	1141		In Operation
29 Aug 24	844	1100		In Operation
30 Aug 24	890	1151		In Operation
31 Aug 24	884	1142		In Operation
1 Sep 24	887	1151		In Operation
2 Sep 24	838	1103		In Operation
3 Sep 24	858	1119		In Operation
4 Sep 24	882	1147		In Operation
5 Sep 24	829	1094		In Operation
6 Sep 24	826	1091		In Operation
7 Sep 24	829	1096		In Operation
8 Sep 24	824	1090		In Operation
9 Sep 24	859	1126		In Operation
10 Sep 24	844	1105	5.9	In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
11 Sep 24	847	1111		In Operation
12 Sep 24	878	1143		In Operation
13 Sep 24	877	1139		In Operation
14 Sep 24	837	1101		In Operation
15 Sep 24	872	1139		In Operation
16 Sep 24	874	1136		In Operation
17 Sep 24	828	1092		In Operation
18 Sep 24	846	1111		In Operation
19 Sep 24	874	1135		In Operation
20 Sep 24	853	1115		In Operation
21 Sep 24	860	1116		In Operation
22 Sep 24	840	1091		In Operation
23 Sep 24	855	1099		In Operation
24 Sep 24	844	1108		In Operation
25 Sep 24	833	1092		In Operation
26 Sep 24	835	1101		In Operation
27 Sep 24	872	1131		In Operation
28 Sep 24	862	1120		In Operation
29 Sep 24	830	1098		In Operation
30 Sep 24	858	1125		In Operation
Average	865	1126	6.4	
Min	824	1090	4.3	
Max	916	1171	9.0	
Flare 2 – F602				
1 Jul 24	920	1173		In Operation
2 Jul 24	931	1202		In Operation
3 Jul 24	920	1180		In Operation
4 Jul 24	920	1187		In Operation
5 Jul 24	887	1141		In Operation
6 Jul 24	859	1125		In Operation
7 Jul 24	886	1154		In Operation
8 Jul 24	885	1157		In Operation
9 Jul 24	910	1178		In Operation
10 Jul 24	913	1164		In Operation
11 Jul 24	922	1189		In Operation
12 Jul 24	913	1181		In Operation
13 Jul 24	925	1194	4.3	In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) [a]	Operation Status
14 Jul 24	919	1180		In Operation
15 Jul 24	865	1128		In Operation
16 Jul 24	869	1139		In Operation
17 Jul 24	895	1161		In Operation
18 Jul 24	899	1155		In Operation
19 Jul 24	951	1222		In Operation
20 Jul 24	867	1130		In Operation
21 Jul 24	932	1193		In Operation
22 Jul 24	886	1134		In Operation
23 Jul 24	942	1208		In Operation
24 Jul 24	884	1152		In Operation
25 Jul 24	853	1115		In Operation
26 Jul 24	886	1142		In Operation
27 Jul 24	870	1133		In Operation
28 Jul 24	897	1169		In Operation
29 Jul 24	895	1162		In Operation
30 Jul 24	923	1179		In Operation
31 Jul 24	906	1162		In Operation
1 Aug 24	893	1151		In Operation
2 Aug 24	871	1126		In Operation
3 Aug 24	892	1150		In Operation
4 Aug 24	910	1164		In Operation
5 Aug 24	904	1160		In Operation
6 Aug 24	907	1168		In Operation
7 Aug 24	913	1171		In Operation
8 Aug 24	887	1145		In Operation
9 Aug 24	902	1162		In Operation
10 Aug 24	922	1179		In Operation
11 Aug 24	887	1143		In Operation
12 Aug 24	887	1142		In Operation
13 Aug 24	897	1151		In Operation
14 Aug 24	885	1142		In Operation
15 Aug 24	928	1190		In Operation
16 Aug 24	910	1166		In Operation
17 Aug 24	881	1135		In Operation
18 Aug 24	896	1158		In Operation
19 Aug 24	926	1188	9.0	In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) [a]	Operation Status
20 Aug 24	870	1128		In Operation
21 Aug 24	886	1144		In Operation
22 Aug 24	870	1132		In Operation
23 Aug 24	883	1145		In Operation
24 Aug 24	881	1143		In Operation
25 Aug 24	888	1146		In Operation
26 Aug 24	882	1145		In Operation
27 Aug 24	889	1144		In Operation
28 Aug 24	916	1178		In Operation
29 Aug 24	865	1128		In Operation
30 Aug 24	912	1174		In Operation
31 Aug 24	923	1180		In Operation
1 Sep 24	901	1162		In Operation
2 Sep 24	887	1148		In Operation
3 Sep 24	893	1151		In Operation
4 Sep 24	929	1195		In Operation
5 Sep 24	870	1129		In Operation
6 Sep 24	878	1146		In Operation
7 Sep 24	876	1143		In Operation
8 Sep 24	885	1143		In Operation
9 Sep 24	878	1143	5.9	In Operation
10 Sep 24	887	1148		In Operation
11 Sep 24	877	1137		In Operation
12 Sep 24	899	1159		In Operation
13 Sep 24	907	1173		In Operation
14 Sep 24	857	1122		In Operation
15 Sep 24	919	1181		In Operation
16 Sep 24	915	1178		In Operation
17 Sep 24	892	1157		In Operation
18 Sep 24	884	1152		In Operation
19 Sep 24	927	1194		In Operation
20 Sep 24	873	1135		In Operation
21 Sep 24	873	1133		In Operation
22 Sep 24	882	1145		In Operation
23 Sep 24	891	1158		In Operation
24 Sep 24	878	1136		In Operation
25 Sep 24	885	1151		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
26 Sep 24	879	1140		In Operation
27 Sep 24	908	1174		In Operation
28 Sep 24	903	1165		In Operation
29 Sep 24	866	1127		In Operation
30 Sep 24	913	1171		In Operation
Average	896	1157	6.4	
Min	853	1115	4.3	
Max	951	1222	9.0	

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 (July 2024)**
NO_2	0.074 gs^{-1}
CO	0.742 gs^{-1}
SO_2	<0.001 gs^{-1}
Benzene	3.0 x 10^{-5} gs^{-1}
Vinyl chloride	<1.03 x 10^{-5} gs^{-1}
Exhaust gas velocity	10.2 ms^{-1}
Parameters	**Monitoring Results (August 2024)**
NO_2	0.018 gs^{-1}
CO	0.715 gs^{-1}
SO_2	0.002 gs^{-1}
Benzene	3.7 x 10^{-5} gs^{-1}
Vinyl chloride	<8.9 x 10^{-6} gs^{-1}
Non-Methane Organic Carbons	0.0023 gs^{-1}
Exhaust gas velocity	8.8 ms^{-1}
Parameters	**Monitoring Results (September 2024)**
NO_2	0.039 gs^{-1}
CO	0.740 gs^{-1}
SO_2	<0.001 gs^{-1}
Benzene	5.9 x 10^{-5} gs^{-1}
Vinyl chloride	<8.2 x 10^{-6} gs^{-1}
Non-Methane Organic Carbons	9.0 ms^{-1}
(a) The Landfill Gas Generator was under maintenance in the reporting period	

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 Jul 24	-		Under Maintenance
2 Jul 24	850		In Operation
3 Jul 24	-		Under Maintenance
4 Jul 24	850		In Operation
5 Jul 24	850		In Operation
6 Jul 24	841		In Operation
7 Jul 24	-		Under Maintenance
8 Jul 24	891		In Operation
9 Jul 24	-		Under Maintenance
10 Jul 24	846		In Operation
11 Jul 24	-		Under Maintenance
12 Jul 24	846		In Operation
13 Jul 24	850		In Operation
14 Jul 24	-		Under Maintenance
15 Jul 24	848		In Operation
16 Jul 24	-		Under Maintenance
17 Jul 24	848		In Operation
18 Jul 24	848		In Operation
19 Jul 24	847		In Operation
20 Jul 24	846	10.2	In Operation
21 Jul 24	-		Under Maintenance
22 Jul 24	885		In Operation
23 Jul 24	855		In Operation
24 Jul 24	853		In Operation
25 Jul 24	884		In Operation
26 Jul 24	848		In Operation
27 Jul 24	848		In Operation
28 Jul 24	-		Under Maintenance
29 Jul 24	-		Under Maintenance
30 Jul 24	-		Under Maintenance
31 Jul 24	-		Under Maintenance
1 Aug 24	-		Under Maintenance
2 Aug 24	-		Under Maintenance

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
3 Aug 24	-	8.8	Under Maintenance
4 Aug 24	-		Under Maintenance
5 Aug 24	-		Under Maintenance
6 Aug 24	-		Under Maintenance
7 Aug 24	-		Under Maintenance
8 Aug 24	848		In Operation
9 Aug 24	-		Under Maintenance
10 Aug 24	885		In Operation
11 Aug 24	-		Under Maintenance
12 Aug 24	882		In Operation
13 Aug 24	882		In Operation
14 Aug 24	882		In Operation
15 Aug 24	886		In Operation
16 Aug 24	845		In Operation
17 Aug 24	-		Under Maintenance
18 Aug 24	-		Under Maintenance
19 Aug 24	851		In Operation
20 Aug 24	-		Under Maintenance
21 Aug 24	844		In Operation
22 Aug 24	-		Under Maintenance
23 Aug 24	848		In Operation
24 Aug 24	-		Under Maintenance
25 Aug 24	-		Under Maintenance
26 Aug 24	849		In Operation
27 Aug 24	884		In Operation
28 Aug 24	-		Under Maintenance
29 Aug 24	879		In Operation
30 Aug 24	882		In Operation
31 Aug 24	-		Under Maintenance
1 Sep 24	-		Under Maintenance
2 Sep 24	847		In Operation
3 Sep 24	845		In Operation
4 Sep 24	845		In Operation
5 Sep 24	843		In Operation
6 Sep 24	842		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
7 Sep 24	844	9.0	In Operation
8 Sep 24	842		In Operation
9 Sep 24	838		In Operation
10 Sep 24	849		In Operation
11 Sep 24	842		In Operation
12 Sep 24	884		In Operation
13 Sep 24	846		In Operation
14 Sep 24	847		In Operation
15 Sep 24	848		In Operation
16 Sep 24	862		In Operation
17 Sep 24	854		In Operation
18 Sep 24	845		In Operation
19 Sep 24	847		In Operation
20 Sep 24	845		In Operation
21 Sep 24	848		In Operation
22 Sep 24	853		In Operation
23 Sep 24	854		In Operation
24 Sep 24	856		In Operation
25 Sep 24	847		In Operation
26 Sep 24	847		In Operation
27 Sep 24	848		In Operation
28 Sep 24	860		In Operation
29 Sep 24	841		In Operation
30 Sep 24	841		In Operation
Average	855	9.3	
Min	838	8.8	
Max	891	10.2	
ENGB			
1 Jul 24	873		In Operation
2 Jul 24	873		In Operation
3 Jul 24	868		In Operation
4 Jul 24	867		In Operation
5 Jul 24	869		In Operation
6 Jul 24	869		In Operation
7 Jul 24	868		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
8 Jul 24	874	10.2	In Operation
9 Jul 24	873		In Operation
10 Jul 24	873		In Operation
11 Jul 24	867		In Operation
12 Jul 24	873		In Operation
13 Jul 24	867		In Operation
14 Jul 24	868		In Operation
15 Jul 24	866		In Operation
16 Jul 24	866		In Operation
17 Jul 24	867		In Operation
18 Jul 24	867		In Operation
19 Jul 24	869		In Operation
20 Jul 24	874		In Operation
21 Jul 24	874		In Operation
22 Jul 24	874		In Operation
23 Jul 24	873		In Operation
24 Jul 24	873		In Operation
25 Jul 24	872		In Operation
26 Jul 24	873		In Operation
27 Jul 24	871		In Operation
28 Jul 24	852		In Operation
29 Jul 24	854		In Operation
30 Jul 24	851		In Operation
31 Jul 24	850		In Operation
1 Aug 24	850	8.8	In Operation
2 Aug 24	851		In Operation
3 Aug 24	850		In Operation
4 Aug 24	851		In Operation
5 Aug 24	849		In Operation
6 Aug 24	850		In Operation
7 Aug 24	874		In Operation
8 Aug 24	873		In Operation
9 Aug 24	874		In Operation
10 Aug 24	875		In Operation
11 Aug 24	874		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
12 Aug 24	875		In Operation
13 Aug 24	-		Under Maintenance
14 Aug 24	837		In Operation
15 Aug 24	867		In Operation
16 Aug 24	869		In Operation
17 Aug 24	869		In Operation
18 Aug 24	870		In Operation
19 Aug 24	869		In Operation
20 Aug 24	869		In Operation
21 Aug 24	868		In Operation
22 Aug 24	872		In Operation
23 Aug 24	871		In Operation
24 Aug 24	871		In Operation
25 Aug 24	871		In Operation
26 Aug 24	872		In Operation
27 Aug 24	872		In Operation
28 Aug 24	869		In Operation
29 Aug 24	872		In Operation
30 Aug 24	873		In Operation
31 Aug 24	871		In Operation
1 Sep 24	871		In Operation
2 Sep 24	839		In Operation
3 Sep 24	835		In Operation
4 Sep 24	836		In Operation
5 Sep 24	834		In Operation
6 Sep 24	833		In Operation
7 Sep 24	835		In Operation
8 Sep 24	833		In Operation
9 Sep 24	830		In Operation
10 Sep 24	841		In Operation
11 Sep 24	834		In Operation
12 Sep 24	868		In Operation
13 Sep 24	837		In Operation
14 Sep 24	838		In Operation
15 Sep 24	839	9.0	In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
16 Sep 24	864		In Operation
17 Sep 24	869		In Operation
18 Sep 24	836		In Operation
19 Sep 24	838		In Operation
20 Sep 24	836		In Operation
21 Sep 24	839		In Operation
22 Sep 24	864		In Operation
23 Sep 24	868		In Operation
24 Sep 24	869		In Operation
25 Sep 24	839		In Operation
26 Sep 24	838		In Operation
27 Sep 24	840		In Operation
28 Sep 24	867		In Operation
29 Sep 24	833		In Operation
30 Sep 24	833		In Operation
Average	860	9.3	
Min	830	8.8	
Max	875	10.2	

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 H_2S MONITORING RESULTS

Parameters	Limit Level	Monitoring Results (µg m^{-3})			
		AM1	AM2	AM3	AM4
Ammonia	180	<10	<10	<10	<10
H_2S	42	<15	<15	<15	<15
Methane	NA [a]	0.00018 %(v/v)	0.00018 %(v/v)	0.00018 %(v/v)	0.00018 %(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	<0.3	<0.3	<0.3	<0.3
Benzene	33	1.2	<0.5	<0.5	<0.5
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	0.7	1	0.5
Carbon Tetrachloride	64	<0.6	0.6	0.6	0.6
Chloroform	99	<0.8	<0.8	<0.8	<0.8
Decanes	3,608	<0.7	<0.7	<0.7	<0.7
Dichlorobenzene	120	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoro-methane	NA [a]	1.5	1.8	1.9	1.7
Dimethylsulphide	8	<0.2	<0.2	<0.2	<0.2
Dipropyl ether	NA [a]	<0.8	<0.8	<0.8	<0.8
Limonene	212	0.6	0.5	0.6	0.5
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	<3.8	4.1	10.7
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	<0.5	<0.5	<0.5
Heptane	2,746	<0.8	<0.8	<0.8	1.5

Parameters	Limit Level	Monitoring Results (μg m^{-3})			
		AM1	AM2	AM3	AM4
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	17.5	19.2	34.7	35.1
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	1.2	1.8	1	0.7
Butyl acetate	76	<1.0	<1.0	<1.0	<1.0
Butyl benzene	47	<1.0	<1.0	<1.0	<1.0
Nonane	11,540	<0.9	<0.9	<0.9	<0.9
Propyl benzene	19	<0.8	<0.8	<0.8	<0.8
Octane	7,942	<0.9	<0.9	<0.9	<0.9
Propyl propionate	276	<1.0	<1.0	<1.0	<1.0
Terpenes	NA [(a)]	0.9	<0.8	1.2	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	1	1.1	0.9	0.7
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	1.1	1	0.8	0.8

Notes:

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

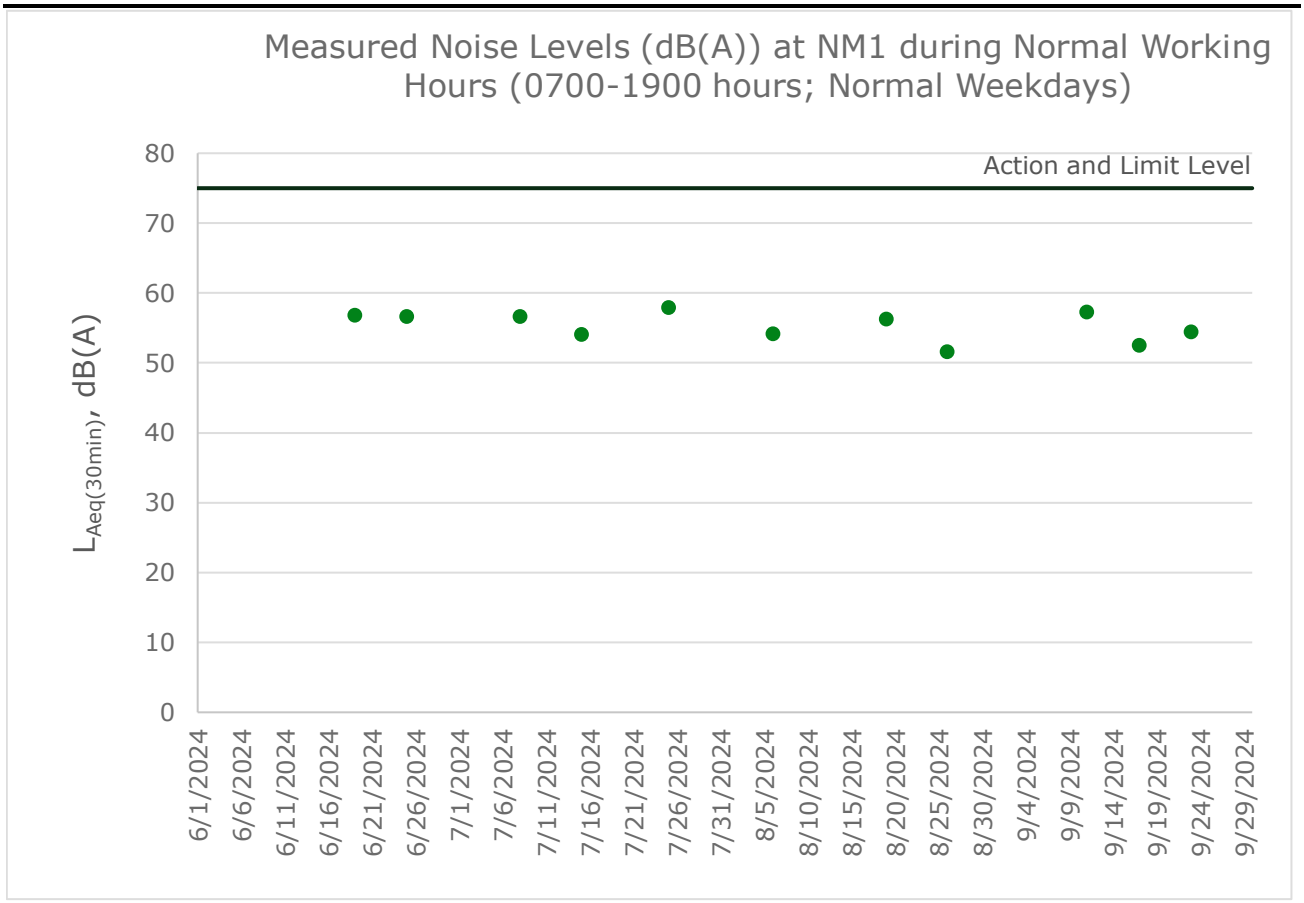
ANNEX E NOISE

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	$L_{10\ (30min)}$	$L_{90\ (30min)}$	$L_{eq\ (30min)}$
2 Jul 24	10:50	11:20	Rainy	Monitoring was cancelled due to adverse weather.		
8 Jul 24	10:47	11:17	Sunny	59.9	53.1	56.7
15 Jul 24	14:51	15:21	Sunny	55.2	51.7	54.1
25 Jul 24	11:03	11:33	Sunny	59.7	55.1	58
31 Jul 24	11:13	11:43	Rainy	Monitoring was cancelled due to adverse weather.		
6 Aug 24	14:45	15:15	Sunny	56.0	51.8	54.2
12 Aug 24	10:31	11:01	Rainy	Monitoring was cancelled due to adverse weather.		
19 Aug 24	10:44	11:14	Cloudy	57.9	53.9	56.3
26 Aug 24	10:52	11:22	Sunny	55.8	54.2	51.6
5 Sep 24	11:21	11:51	Rainy	Monitoring was cancelled due to adverse weather.		
11 Sep 24	13:36	14:06	Sunny	59.9	53.7	57.3
17 Sep 24	10:08	10:38	Sunny	54.4	50.6	52.6
23 Sep 24	14:21	14:51	Cloudy	56.5	51.6	54.5
30 Sep 24	10:45	11:15	Sunny	53.1	50	51.8
					Average	55.0
					Min	51.6
					Max	58.0

FIGURE E1.1 GRAPHICAL PRESENTATION FOR NOISE MONITORING AT NM1



ANNEX E2 EVENT AND ACTION PLAN FOR NOISE MONITORING

ANNEX E2 EVENT AND ACTION PLAN FOR OPERATIONAL NOISE MONITORING

Action			
Event	**ET**	**IEC**	**Contractor**
Action Level	• 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	• 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	• Submit proposals for remedial measures to IEC • Implement the agreed proposals

Action			
Event	**ET**	**IEC**	**Contractor**
Limit Level	• 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 Contactor, IEC, Project Proponent and EPD • Have additional monitoring if exceedance is due to the Project. If exceedance stops, cease additional monitoring	• 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	• 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 (mg/L)	Suspended Solids (SS) (mg/L)	Remarks
9 Jul 2024	09:50	Sunny	Unable to collect water sample due to insufficient flow						
7 Aug 2024	10:20	Sunny	Unable to collect water sample due to insufficient flow						
11 Sep 2024	11:19	Sunny	Colourless	Clear	29.3	0.07	9	3.1	
					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 (mg/L)	Suspended Solids (SS) (mg/L)	Remarks
9 Jul 2024	09:55	Sunny	Unable to collect water sample due to insufficient flow						
7 Aug 2024	10:23	Sunny	Unable to collect water sample due to insufficient flow						
11 Sep 2024	10:47	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 (mg/L)	Suspended Solids (SS) (mg/L)	Remarks
9 Jul 2024	10:01	Sunny	Unable to collect water sample due to insufficient flow						
7 Aug 2024	10:30	Sunny	Unable to collect water sample due to insufficient flow						
11 Sep 2024	10:54	Sunny	Unable to collect water sample due to insufficient flow						
					Average	-	-	-	-
					Min	-	-	-	-
					Max	-	-	-	-

TABLE F1.4 SURFACE WATER MONITORING RESULTS

Date			**11 Sep 24**	**11 Sep 24**
		Limit Level (DP3)	**DP3**	**DP3 (Duplicate)**
pH Value	pH Unit	6 - 9	8.3	8.3
Electrical Conductivity	µS/cm	-	913	911
Dissolved Oxygen	mg/L	-	7.2	7.6
Volume Discharge	m^3	-	104	104
Bicarbonate	mg/L	-	236	235
Carbonate	mg/L	-	<1	<1
Suspended Solids (SS)	mg/L	30	3.1	3.9
Ammonia-nitrogen	mg/L	0.5	0.07	0.11
Chloride	mg/L	-	68	66
Nitrite-nitrogen	mg/L	-	0.01	0.02
Phosphate	mg/L	5	<0.01	<0.01
Sulphate	mg/L	-	143	140
Sulphide	mg/L	2.5	<0.1	<0.1
Total Kjeldahl Nitrogen (TKN)	mg/L	-	0.3	0.4
Nitrate-nitrogen	mg/L	-	0.44	0.43
Total Nitrogen (TN)	mg/L	50	0.8	0.8

Biochemical Oxygen Demand	mg/L	20	<2	<2
Chemical Oxygen Demand	mg/L	80	9	8
Oil & Grease	mg/L	20	<5	<5
Total Organic Carbon	mg/L	-	5	4
Boron	µg/L	1100	280	290
Calcium	mg/L	-	97.7	99.3
Mercury	µg/L	1	<0.20	<0.20
Magnesium	mg/L	-	12.1	11.9
Sodium	mg/L	-	63.7	64.6
Iron	mg/L	3	<0.04	<0.04
Potassium	mg/L	-	14.4	14.4
Cadmium	µg/L	1	<0.2	<0.2
Chromium	µg/L	300	<1	<1
Copper	µg/L	300	1	1
Lead	µg/L	300	<1	<1
Manganese	µg/L	-	15	15
Nickel	µg/L	300	<1	<1
Zinc	µg/L	-	<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

Action			
Event	**ET**	**IEC**	**Contractor**
Exceedance of Limit Level for surface water monitoring	• 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	• 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	• 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	• 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	• 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	• 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

Action			
Event	**ET**	**IEC**	**Contractor**
	• 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		
Exceedance of Limit Level for leachate level	• 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	• 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	• 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	• 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	• 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	• Rectify any unacceptable practice; • Carry out remedial measures or amend design as required • Implement amended design, if necessary

Action			
Event	**ET**	**IEC**	**Contractor**
	• Increase monitoring frequency to weekly until no exceedance of Limit Level		

ANNEX F3 LEACHATE LEVELS MONITORING RESULTS

TABLE F3.1 LEACHATE LEVEL 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 Jul 24	102	115	109
2 Jul 24	102	119	111
3 Jul 24	102	119	111
4 Jul 24	102	119	111
5 Jul 24	102	119	111
6 Jul 24	102	102	102
7 Jul 24	102	110	106
8 Jul 24	102	117	110
9 Jul 24	102	119	111
10 Jul 24	102	99	101
11 Jul 24	102	119	111
12 Jul 24	102	119	111
13 Jul 24	102	119	111
14 Jul 24	103	114	109
15 Jul 24	104	108	106
16 Jul 24	104	111	108
17 Jul 24	104	108	106
18 Jul 24	104	108	106
19 Jul 24	106	99	103
20 Jul 24	106	119	113
21 Jul 24	106	97	102
22 Jul 24	106	105	106
23 Jul 24	106	113	110
24 Jul 24	102	119	111
25 Jul 24	102	119	111
26 Jul 24	102	106	104
27 Jul 24	104	111	108
28 Jul 24	109	112	111
29 Jul 24	113	113	113
30 Jul 24	115	117	116
31 Jul 24	119	117	118
1 Aug 24	119	115	117
2 Aug 24	122	102	112
3 Aug 24	122	115	119
4 Aug 24	119	111	115

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
5 Aug 24	115	106	111
6 Aug 24	111	99	105
7 Aug 24	108	99	104
8 Aug 24	108	99	104
9 Aug 24	102	119	111
10 Aug 24	104	119	112
11 Aug 24	104	119	112
12 Aug 24	104	119	112
13 Aug 24	108	117	113
14 Aug 24	111	106	109
15 Aug 24	113	108	111
16 Aug 24	111	111	111
17 Aug 24	113	119	116
18 Aug 24	115	111	113
19 Aug 24	117	102	110
20 Aug 24	119	117	118
21 Aug 24	122	111	117
22 Aug 24	126	115	121
23 Aug 24	128	111	120
24 Aug 24	131	111	121
25 Aug 24	134	111	123
26 Aug 24	137	111	124
27 Aug 24	139	111	125
28 Aug 24	142	111	127
29 Aug 24	144	119	132
30 Aug 24	142	119	131
31 Aug 24	139	119	129
1 Sep 24	134	116	125
2 Sep 24	128	113	121
3 Sep 24	104	111	108
4 Sep 24	115	117	116
5 Sep 24	103	113	108
6 Sep 24	111	115	113
7 Sep 24	117	117	117
8 Sep 24	116	118	117
9 Sep 24	115	119	117
10 Sep 24	119	108	114

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
11 Sep 24	111	117	114
12 Sep 24	113	117	115
13 Sep 24	115	119	117
14 Sep 24	117	111	114
15 Sep 24	118	115	117
16 Sep 24	119	119	119
17 Sep 24	106	119	113
18 Sep 24	109	113	111
19 Sep 24	111	106	109
20 Sep 24	113	91	102
21 Sep 24	113	115	114
22 Sep 24	112	112	112
23 Sep 24	111	108	110
24 Sep 24	119	121	120
25 Sep 24	95	117	106
26 Sep 24	119	113	116
27 Sep 24	119	111	115
28 Sep 24	115	104	110
29 Sep 24	117	100	108
30 Sep 24	119	95	107
Average	113	112	113
Min	95	91	101
Max	144	121	132

TABLE F3.2 LEACHATE LEVEL 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 Jul 24	112	107	110
2 Jul 24	120	95	108
3 Jul 24	122	119	121
4 Jul 24	130	119	125
5 Jul 24	124	119	122
6 Jul 24	105	139	122
7 Jul 24	106	129	118
8 Jul 24	106	119	113
9 Jul 24	106	119	113
10 Jul 24	106	119	113
11 Jul 24	106	119	113
12 Jul 24	106	119	113
13 Jul 24	106	119	113
14 Jul 24	106	119	113
15 Jul 24	106	119	113
16 Jul 24	106	119	113
17 Jul 24	106	119	113
18 Jul 24	106	119	113
19 Jul 24	106	119	113
20 Jul 24	106	119	113
21 Jul 24	106	119	113
22 Jul 24	106	119	113
23 Jul 24	106	119	113
24 Jul 24	106	119	113
25 Jul 24	106	119	113
26 Jul 24	106	119	113
27 Jul 24	106	119	113
28 Jul 24	106	119	113
29 Jul 24	106	119	113
30 Jul 24	106	119	113
31 Jul 24	106	119	113
1 Aug 24	106	119	113
2 Aug 24	106	119	113
3 Aug 24	106	119	113
4 Aug 24	106	119	113

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
5 Aug 24	106	119	113
6 Aug 24	106	119	113
7 Aug 24	106	119	113
8 Aug 24	106	119	113
9 Aug 24	106	119	113
10 Aug 24	106	119	113
11 Aug 24	106	119	113
12 Aug 24	106	119	113
13 Aug 24	106	119	113
14 Aug 24	106	104	105
15 Aug 24	106	119	113
16 Aug 24	106	119	113
17 Aug 24	106	119	113
18 Aug 24	106	119	113
19 Aug 24	106	119	113
20 Aug 24	106	119	113
21 Aug 24	106	119	113
22 Aug 24	106	119	113
23 Aug 24	106	119	113
24 Aug 24	106	119	113
25 Aug 24	106	119	113
26 Aug 24	106	119	113
27 Aug 24	106	119	113
28 Aug 24	106	119	113
29 Aug 24	106	119	113
30 Aug 24	106	119	113
31 Aug 24	106	119	113
1 Sep 24	106	119	113
2 Sep 24	106	119	113
3 Sep 24	109	122	116
4 Sep 24	111	124	118
5 Sep 24	113	126	120
6 Sep 24	113	128	121
7 Sep 24	115	128	122
8 Sep 24	116	123	120
9 Sep 24	117	117	117
10 Sep 24	117	133	125

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
11 Sep 24	117	133	125
12 Sep 24	120	135	128
13 Sep 24	120	135	128
14 Sep 24	117	131	124
15 Sep 24	119	119	119
16 Sep 24	120	106	113
17 Sep 24	119	106	113
18 Sep 24	113	113	113
19 Sep 24	106	119	113
20 Sep 24	106	117	112
21 Sep 24	106	119	113
22 Sep 24	106	119	113
23 Sep 24	106	119	113
24 Sep 24	106	119	113
25 Sep 24	106	119	113
26 Sep 24	106	119	113
27 Sep 24	107	119	113
28 Sep 24	98	113	106
29 Sep 24	97	112	105
30 Sep 24	96	111	104
Average	108	119	114
Min	96	95	104
Max	130	139	128

TABLE F3.3 LEACHATE LEVEL 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 Jul 24	105	105	105
2 Jul 24	99	99	99
3 Jul 24	108	108	108
4 Jul 24	113	113	113
5 Jul 24	117	117	117
6 Jul 24	117	115	116
7 Jul 24	114	113	114
8 Jul 24	111	111	111
9 Jul 24	115	115	115
10 Jul 24	117	117	117
11 Jul 24	119	119	119
12 Jul 24	102	102	102
13 Jul 24	108	108	108
14 Jul 24	112	112	112
15 Jul 24	115	115	115
16 Jul 24	119	119	119
17 Jul 24	104	104	104
18 Jul 24	111	111	111
19 Jul 24	115	115	115
20 Jul 24	117	117	117
21 Jul 24	99	99	99
22 Jul 24	105	105	105
23 Jul 24	111	111	111
24 Jul 24	115	115	115
25 Jul 24	117	117	117
26 Jul 24	99	99	99
27 Jul 24	106	106	106
28 Jul 24	112	112	112
29 Jul 24	117	117	117
30 Jul 24	104	104	104
31 Jul 24	115	115	115
1 Aug 24	99	99	99
2 Aug 24	113	113	113
3 Aug 24	113	111	112
4 Aug 24	115	114	115

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
5 Aug 24	117	117	117
6 Aug 24	99	99	99
7 Aug 24	111	111	111
8 Aug 24	115	115	115
9 Aug 24	119	119	119
10 Aug 24	106	106	106
11 Aug 24	111	111	111
12 Aug 24	115	115	115
13 Aug 24	117	119	118
14 Aug 24	99	99	99
15 Aug 24	108	108	108
16 Aug 24	113	113	113
17 Aug 24	117	117	117
18 Aug 24	112	112	112
19 Aug 24	106	106	106
20 Aug 24	113	113	113
21 Aug 24	117	117	117
22 Aug 24	102	102	102
23 Aug 24	111	111	111
24 Aug 24	115	115	115
25 Aug 24	109	109	109
26 Aug 24	104	104	104
27 Aug 24	111	111	111
28 Aug 24	115	115	115
29 Aug 24	119	117	118
30 Aug 24	99	99	99
31 Aug 24	108	106	107
1 Sep 24	111	111	111
2 Sep 24	113	115	114
3 Sep 24	104	104	104
4 Sep 24	111	108	110
5 Sep 24	113	113	113
6 Sep 24	115	117	116
7 Sep 24	119	117	118
8 Sep 24	115	113	114
9 Sep 24	111	108	110
10 Sep 24	115	115	115

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
11 Sep 24	119	119	119
12 Sep 24	106	106	106
13 Sep 24	113	113	113
14 Sep 24	117	117	117
15 Sep 24	113	113	113
16 Sep 24	108	108	108
17 Sep 24	113	113	113
18 Sep 24	116	116	116
19 Sep 24	119	119	119
20 Sep 24	102	104	103
21 Sep 24	111	108	110
22 Sep 24	115	109	112
23 Sep 24	119	109	114
24 Sep 24	118	111	115
25 Sep 24	102	102	102
26 Sep 24	119	117	118
27 Sep 24	111	111	111
28 Sep 24	102	113	108
29 Sep 24	107	112	109
30 Sep 24	111	111	111
Average	111	111	111
Min	99	99	99
Max	119	119	119

TABLE F3.4 LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.4X (CELL 4X))

Date	Meter No.X7 (cm)	Meter No.X8 (cm)	Average (cm)
Pump Station No. 4X (Cell 4X)			
1 Jul 24	108	108	108
2 Jul 24	116	116	116
3 Jul 24	109	109	109
4 Jul 24	122	120	121
5 Jul 24	118	116	117
6 Jul 24	109	109	109
7 Jul 24	112	112	112
8 Jul 24	114	114	114
9 Jul 24	114	111	113
10 Jul 24	109	100	105
11 Jul 24	114	114	114
12 Jul 24	103	103	103
13 Jul 24	116	116	116
14 Jul 24	118	117	118
15 Jul 24	120	118	119
16 Jul 24	114	114	114
17 Jul 24	105	105	105
18 Jul 24	120	118	119
19 Jul 24	114	114	114
20 Jul 24	107	107	107
21 Jul 24	118	118	118
22 Jul 24	116	116	116
23 Jul 24	118	118	118
24 Jul 24	107	105	106
25 Jul 24	116	116	116
26 Jul 24	125	114	120
27 Jul 24	114	111	113
28 Jul 24	109	102	106
29 Jul 24	103	92	98
30 Jul 24	111	100	106
31 Jul 24	120	120	120
1 Aug 24	109	109	109
2 Aug 24	109	109	109
3 Aug 24	114	114	114
4 Aug 24	116	110	113

Date	Meter No.X7 (cm)	Meter No.X8 (cm)	Average (cm)
5 Aug 24	118	105	112
6 Aug 24	118	118	118
7 Aug 24	114	114	114
8 Aug 24	109	107	108
9 Aug 24	120	120	120
10 Aug 24	114	114	114
11 Aug 24	116	116	116
12 Aug 24	118	118	118
13 Aug 24	114	114	114
14 Aug 24	107	105	106
15 Aug 24	107	107	107
16 Aug 24	118	118	118
17 Aug 24	114	114	114
18 Aug 24	116	116	116
19 Aug 24	118	118	118
20 Aug 24	109	109	109
21 Aug 24	116	116	116
22 Aug 24	114	114	114
23 Aug 24	120	120	120
24 Aug 24	107	107	107
25 Aug 24	107	107	107
26 Aug 24	116	114	115
27 Aug 24	114	114	114
28 Aug 24	111	111	111
29 Aug 24	107	107	107
30 Aug 24	120	120	120
31 Aug 24	116	114	115
1 Sep 24	115	116	116
2 Sep 24	114	118	116
3 Sep 24	111	111	111
4 Sep 24	120	118	119
5 Sep 24	107	107	107
6 Sep 24	118	118	118
7 Sep 24	101	107	104
8 Sep 24	101	103	102
9 Sep 24	100	98	99
10 Sep 24	118	116	117

Date	Meter No.X7 (cm)	Meter No.X8 (cm)	Average (cm)
11 Sep 24	114	114	114
12 Sep 24	114	111	113
13 Sep 24	105	105	105
14 Sep 24	120	120	120
15 Sep 24	119	119	119
16 Sep 24	118	118	118
17 Sep 24	103	103	103
18 Sep 24	110	110	110
19 Sep 24	116	116	116
20 Sep 24	120	120	120
21 Sep 24	105	105	105
22 Sep 24	105	106	106
23 Sep 24	105	107	106
24 Sep 24	114	114	114
25 Sep 24	109	109	109
26 Sep 24	109	109	109
27 Sep 24	103	103	103
28 Sep 24	107	103	105
29 Sep 24	107	103	105
30 Sep 24	107	103	105
Average	113	112	112
Min	100	92	98
Max	125	120	121

FIGURE F3.1 GRAPHICAL PRESENTATION FOR LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.1X (CELL 1X))

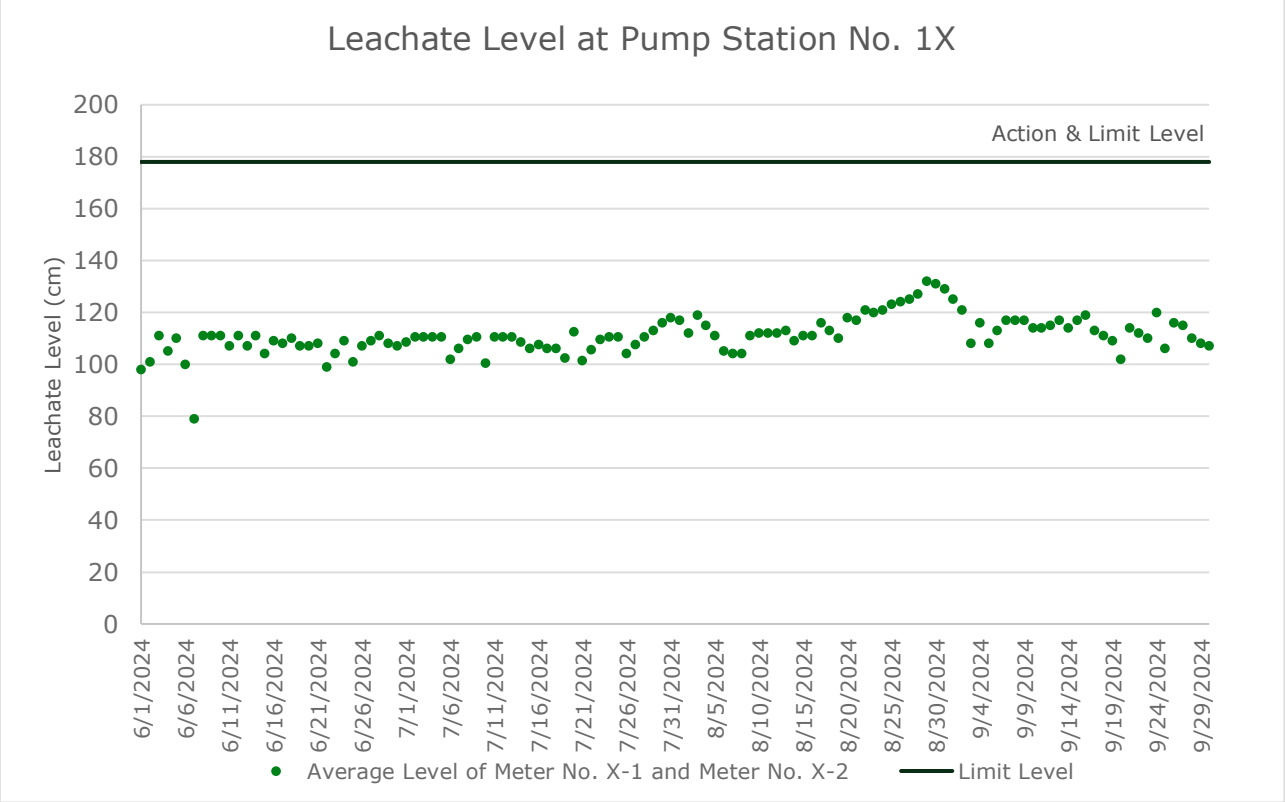


FIGURE F3.2 GRAPHICAL PRESENTATION FOR LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.2X (CELL 2X))

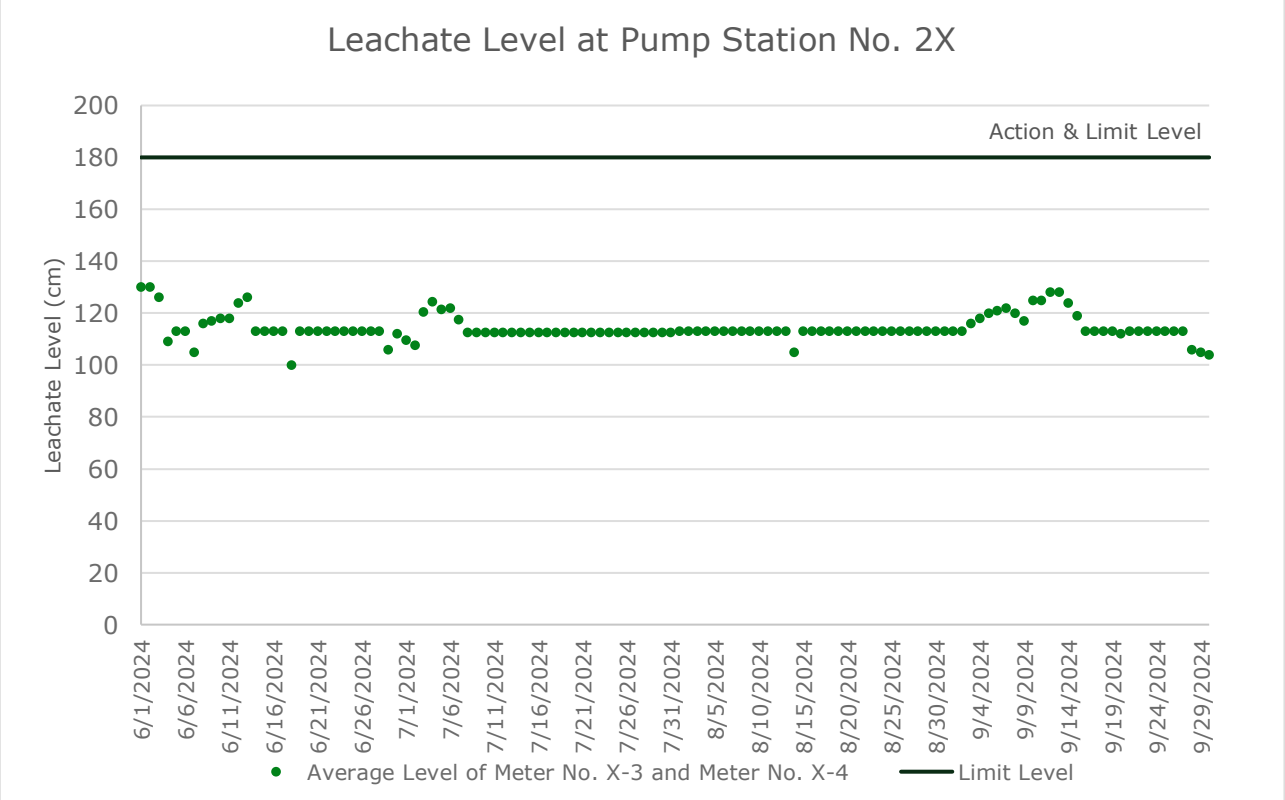


FIGURE F3.3 GRAPHICAL PRESENTATION FOR LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.3X (CELL 3X))

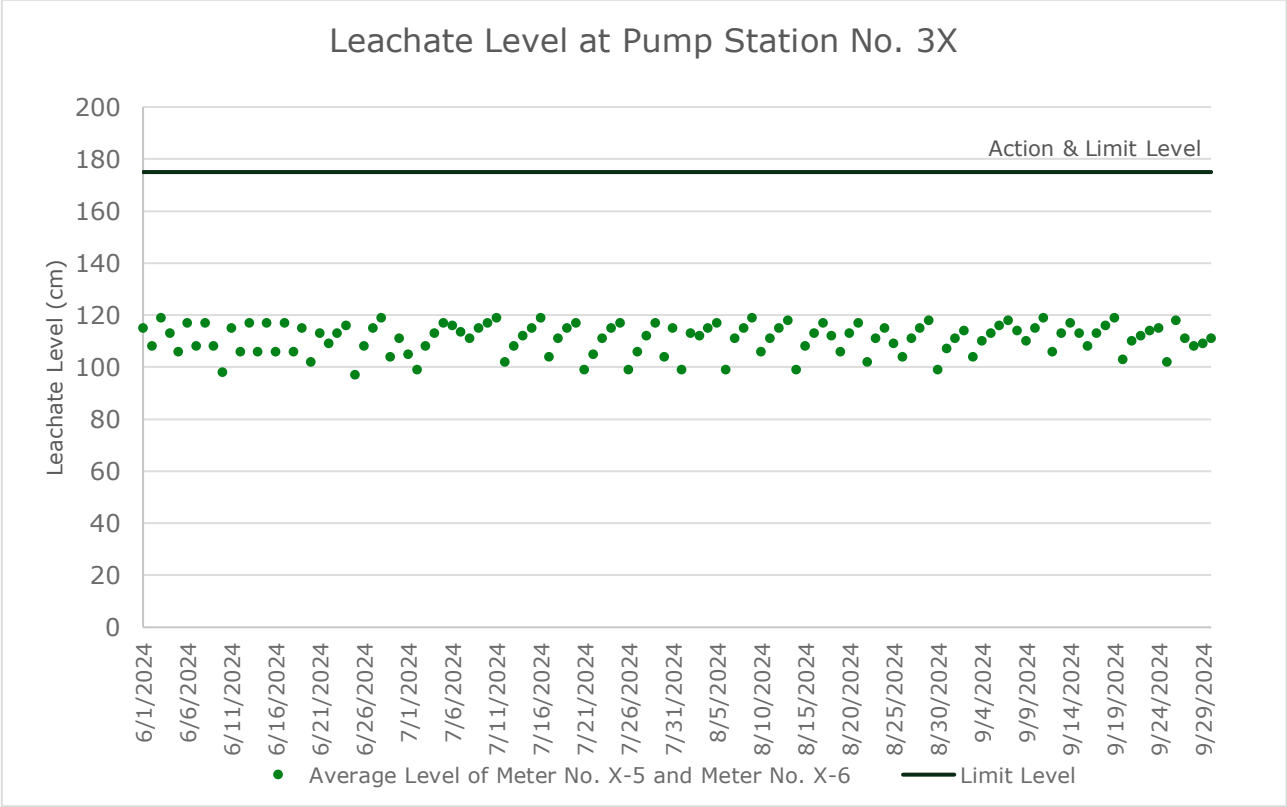
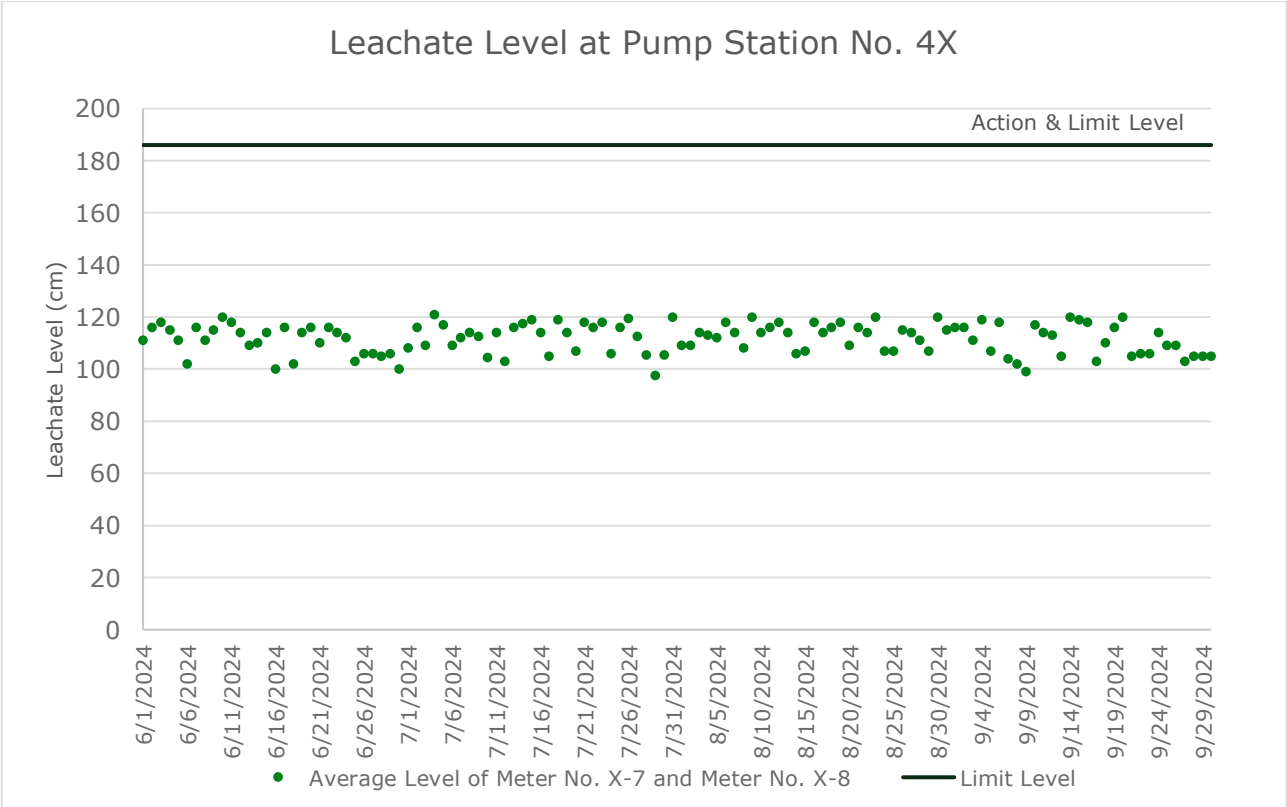


FIGURE F3.4 GRAPHICAL PRESENTATION FOR LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.4X (CELL 4X))



ANNEX F4 EFFLUENT QUALITY MONITORING RESULTS

TABLE F4.1 EFFLUENT MONITORING RESULTS

Date		11 Jul 24	15 Aug 24	4 Sep 24
On-site Measurements				
Temperature	°C	36.1	29.7	35.3
pH Value	pH Unit	8.4	8.5	8.3
Volume Discharged	m^3	262	1,293	1,041
Laboratory Analysis				
Suspended Solids (SS)	mg/L	15.9	26.5	20.7
Alkalinity	mg/L	2170	2000	2060
Ammoniacal-nitrogen	mg/L	0.2	0.24	1.28
Chloride	mg/L	1880	1830	2090
Nitrite-nitrogen	mg/L	0.86	0.5	0.13
Phosphate	mg/L	5.86	7.2	4.75
Sulphate	mg/L	132	164	216
Total Nitrogen	mg/L	88	80.3	84.7
Nitrate-nitrogen	mg/L	27.7	35.8	40.5
Total Inorganic Nitrogen	mg/L	28.76	36.54	41.91
Biochemical Oxygen Demand (BOD)	mg/L	7	7	8
Chemical Oxygen Demand (COD)	mg/L	972	872	693
Oil & Grease	mg/L	<5	<5	<5
Total Organic Carbon (TOC)	mg/L	284	330	266
Boron	µg/L	5200	5120	5620
Calcium	mg/L	29.7	24.2	38.1
Iron	mg/L	2.06	1.33	1.6
Magnesium	mg/L	35.2	29.9	40.4
Potassium	mg/L	886	641	806
Cadmium	µg/L	<1.0	<1.0	<1.0
Chromium	µg/L	127	97	113
Copper	µg/L	18	<10	<10
Nickel	µg/L	177	117	110
Zinc	µg/L	50	62	54

ANNEX F5 GROUNDWATER MONITORING RESULTS

TABLE F5.1 GROUNDWATER MONITORING RESULTS (JULY 2024)

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	3.46	3.55	3.35	3.33	3.48	3.16	3.23	3.38	3.58	4.33	4.19	7.09	37.85	N/A (a)
Bicarbonate Alkalinity as CaCO3	mg/L	153	254	217	35	56	<1	<1	<1	160	192	145	57	21	N/A
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	27	8	143	110	79	<1	<1	<1	<1	<1	N/A
Total Alkalinity as CaCO3	mg/L	153	254	217	62	64	172	127	79	160	192	145	57	21	N/A
pH Value	pH Unit	7.7	8.1	8	9.5	9	11.2	11	10.6	8	7.9	8	7.2	5.8	N/A
Electrical Conductivity	µS/cm	1110	1680	1190	656	945	1180	1310	1830	18300	1020	414	311	101	N/A
Ammonia	mg/L	0.01	0.1	0.84	2.02	0.82	3.38	6.08	4.99	0.51	<0.01	<0.01	<0.01	0.2	N/A
Chloride	mg/L	209	241	186	113	157	188	243	392	6000	159	25	19	14	N/A
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A
Phosphorus	mg/L	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	0.03	<0.01	0.03	<0.01	N/A
Sulphate	mg/L	57	242	88	66	101	86	110	200	829	79	22	57	3	N/A
Sulphide	mg/L	<0.1	<0.1	<0.1	4.8	0.6	2.5	5.7	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	N/A
Total Kjeldahl Nitrogen	mg/L	0.2	0.1	1.4	2.2	1.4	4.4	6.8	5.6	0.7	0.1	<0.1	0.2	0.2	N/A
Nitrate	mg/L	0.67	2.89	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	0.03	<0.01	0.11	N/A
Total Nitrogen	mg/L	0.9	3	1.4	2.2	1.4	4.4	6.8	5.6	0.7	0.1	0.1	0.2	0.4	N/A
Boron	µg/L	200	350	190	190	220	210	240	210	2960	170	70	20	20	N/A
Calcium	mg/L	50.4	87.6	99.1	22.1	21.3	26.5	23.9	40.7	170	83.1	50	26.6	1.11	N/A

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
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	N/A
Magnesium	mg/L	11.8	58.2	7.71	1.4	0.57	<0.05	0.18	0.21	359	8.96	1.13	4.39	1.31	N/A
Sodium	mg/L	131	159	112	83.5	129	161	196	274	3200	105	25.3	24.9	12.8	N/A
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	0.21	0.14	N/A
Potassium	mg/L	20.1	22.7	26.4	21.9	47.4	57.1	57.1	66.8	164	10.8	7.03	3.18	3.76	N/A
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	N/A
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/A
Copper	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	1	<1	2	N/A
Lead	µg/L	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	N/A
Manganese	µg/L	194	130	982	6	6	<1	<1	<1	362	2020	102	679	254	N/A
Nickel	µg/L	<1	<1	<1	<1	<1	1	2	2	<1	<1	<1	<1	<1	N/A
Zinc	µg/L	<10	<10	28	<10	<10	<10	<10	<10	<10	<10	<10	14	16	N/A
Biochemical Oxygen Demand	mg/L	<2	<2	<2	2	<2	5	4	<2	<2	<2	<2	<2	<2	N/A
Chemical Oxygen Demand	mg/L	9	6	18	18	24	41	49	29	108	5	4	4	<2	N/A
Total Organic Carbon	mg/L	3	2	7	4	7	10	11	8	<5	3	2	1	1	N/A

Note:
Monitoring well MWX-14 is not accessible due to safety considerations.

TABLE F5.2 GROUNDWATER MONITORING RESULTS (AUGUST 2024)

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	3.42	3.53	3.53	3.94	3.65	3.63	3.32	3.82	4.6	N/A (a)	4.73	7.22	38.24	46.07
Bicarbonate Alkalinity as CaCO3	mg/L	153	225	237	102	104	<1	4	<1	162	N/A	151	56	16	11
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	6	130	108	73	<1	N/A	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	153	225	237	102	110	180	113	74	162	N/A	151	56	16	11
pH Value	pH Unit	7.7	7.9	7.6	8.1	8.6	11.1	10.1	10.2	7.9	N/A	7.7	6.9	5.6	5.4
Electrical Conductivity	µS/cm	991	3550	1120	860	657	1260	1210	1690	17800	N/A	447	309	92	125
Ammonia	mg/L	0.1	0.59	0.8	0.51	0.23	3.15	6.92	3.97	0.45	N/A	<0.01	<0.01	0.03	0.01
Chloride	mg/L	195	879	161	131	74	182	288	368	5710	N/A	29	20	15	24
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/A	<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	0.06	N/A	<0.01	0.02	<0.01	<0.01
Sulphate	mg/L	50	182	93	122	89	85	70	198	870	N/A	27	59	3	6
Sulphide	mg/L	<0.1	<0.1	<0.1	0.7	0.2	14	9.9	1.8	<0.1	N/A	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.3	0.8	1.3	0.9	0.6	4	8.2	4.6	0.7	N/A	0.2	<0.1	0.2	<0.1
Nitrate	mg/L	0.2	0.6	0.02	<0.01	<0.01	0.02	<0.01	<0.01	0.03	N/A	0.11	<0.01	0.13	0.16
Total Nitrogen	mg/L	0.5	1.4	1.3	0.9	0.6	4.1	8.2	4.6	0.7	N/A	0.3	<0.1	0.4	0.2

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
Boron	µg/L	180	520	200	220	250	220	300	210	2940	N/A	130	30	20	20
Calcium	mg/L	45.8	83.8	105	55.8	18.5	19.7	14	32.2	160	N/A	54	25.9	0.82	1.58
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	N/A	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	11.2	67.3	7.76	3.25	0.64	<0.05	1.34	0.32	341	N/A	3.11	4.25	0.86	1.49
Sodium	mg/L	118	468	104	96.2	87.8	162	188	261	3160	N/A	25.9	23.6	13.1	17.9
Iron	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	N/A	<0.04	<0.04	<0.04	<0.04
Potassium	mg/L	18.8	30.6	26	20.2	41.4	57.4	44.6	66.4	165	N/A	7.55	3	3.7	4.66
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	N/A	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/A	<1	<1	<1	<1
Copper	µg/L	<1	1	<1	<1	<1	<1	<1	<1	<1	N/A	2	<1	4	5
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/A	<1	<1	<1	<1
Manganese	µg/L	178	96	974	24	8	<1	26	2	351	N/A	2	708	83	12
Nickel	µg/L	<1	<1	<1	<1	1	2	2	2	<1	N/A	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	21	<10	<10	<10	N/A	46	11	15	26
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	<2	5	7	<2	<2	N/A	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	7	8	15	14	11	40	45	30	<20	N/A	4	3	2	4
Total Organic Carbon	mg/L	3	2	8	4	5	11	12	10	<5	N/A	1	<1	<1	2

Note:
(a) Monitoring well MWX-10 is under maintenance.

TABLE F5.3 GROUNDWATER MONITORING RESULTS (SEPTEMBER 2024)

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	3.27	3.2	3.44	3.44	3.62	3.47	4.52	4.23	3.2	N/A (a)	N/A (b)	25.37	6.28	8.32
Bicarbonate Alkalinity as CaCO3	mg/L	150	267	218	134	97	<1	190	17	161	N/A	N/A	55	16	11
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	11	148	<1	58	<1	N/A	N/A	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	150	267	218	134	108	196	190	76	161	N/A	N/A	55	16	11
pH Value	pH Unit	7.6	7.9	7.8	8.2	8.8	11.2	7.9	9.9	7.7	N/A	N/A	6.9	5.7	5.4
Electrical Conductivity	µS/cm	895	1060	725	594	661	1140	587	1550	18100	N/A	N/A	326	91	122
Ammonia	mg/L	0.02	0.03	0.36	0.3	0.4	3.3	0.14	3.56	0.43	N/A	N/A	<0.01	<0.01	0.01
Chloride	mg/L	153	44	71	64	65	168	41	319	5350	N/A	N/A	20	14	25
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	N/A	N/A	<0.01	<0.01	<0.01
Phosphorus	mg/L	<0.01	0.01	0.02	0.02	0.01	<0.01	<0.01	<0.01	0.05	N/A	N/A	0.04	0.01	<0.01
Sulphate	mg/L	44	220	49	65	88	83	37	182	920	N/A	N/A	63	3	4
Sulphide	mg/L	<0.1	<0.1	<0.1	0.2	0.5	11.6	0.1	2.3	<0.1	N/A	N/A	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.2	<1.0	0.7	0.5	0.8	4	0.4	4.9	0.6	N/A	N/A	<0.1	0.1	<0.1
Nitrate	mg/L	0.43	3.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	N/A	N/A	<0.01	0.1	0.17
Total Nitrogen	mg/L	0.6	3.8	0.7	0.5	0.8	4	0.4	4.9	0.6	N/A	N/A	<0.1	0.2	0.2
Boron	µg/L	180	340	150	150	280	220	200	240	2850	N/A	N/A	30	20	20

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
Calcium	mg/L	46.7	90.9	82.6	57.3	16.4	21.5	65.6	30	173	N/A	N/A	26.8	0.85	1.21
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	N/A	N/A	<0.20	<0.20	<0.20
Magnesium	mg/L	11.5	48.5	5.81	3.73	0.57	<0.05	5.19	0.53	335	N/A	N/A	4.52	1	1.31
Sodium	mg/L	104	56.1	48.7	49.2	91.5	155	41.5	231	3050	N/A	N/A	25.1	14.5	17.2
Iron	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.04	<0.04	<0.04	N/A	N/A	0.42	<0.04	<0.04
Potassium	mg/L	18	19.7	17.6	14.6	42.2	56.5	14.9	58.8	156	N/A	N/A	3.13	4.06	4.58
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	N/A	N/A	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/A	N/A	<1	<1	<1
Copper	µg/L	1	<1	<1	<1	<1	2	<1	<1	2	N/A	N/A	<1	2	4
Lead	µg/L	<1	<1	<1	<1	<1	2	<1	<1	<1	N/A	N/A	<1	<1	<1
Manganese	µg/L	42	81	412	29	6	<1	41	2	416	N/A	N/A	728	38	13
Nickel	µg/L	<1	<1	<1	<1	<1	1	<1	3	<1	N/A	N/A	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	N/A	N/A	10	13	<10
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2	N/A	N/A	<2	<2	<2
Chemical Oxygen Demand	mg/L	4	3	9	8	12	40	6	28	<20	N/A	N/A	5	7	7
Total Organic Carbon	mg/L	3	2	5	4	5	10	4	9	<5	N/A	N/A	2	2	3

Note:

(a) Monitoring well MWX-10 is under maintenance.

(b) Monitoring well MWX-11 is not accessible due to the landscape reparation work.

FIGURE F5.1 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-1)

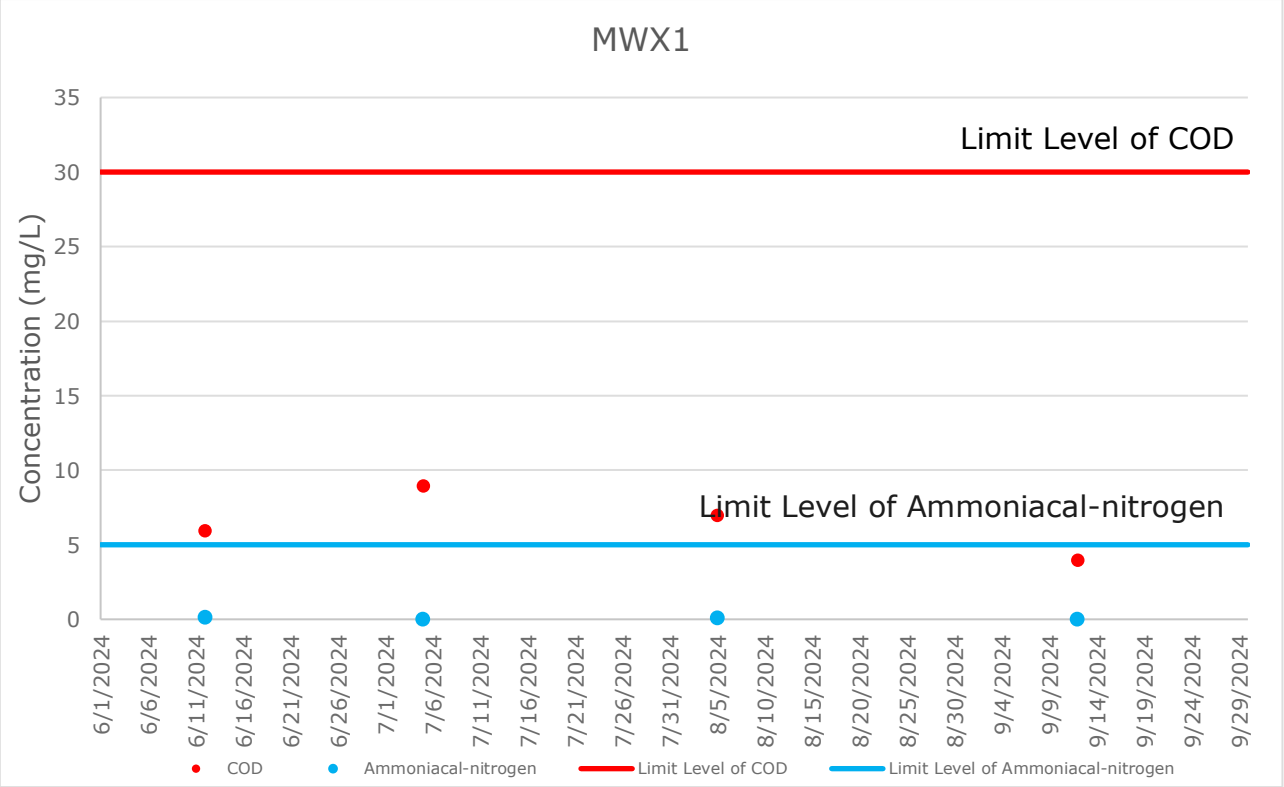


FIGURE F5.2 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-2)

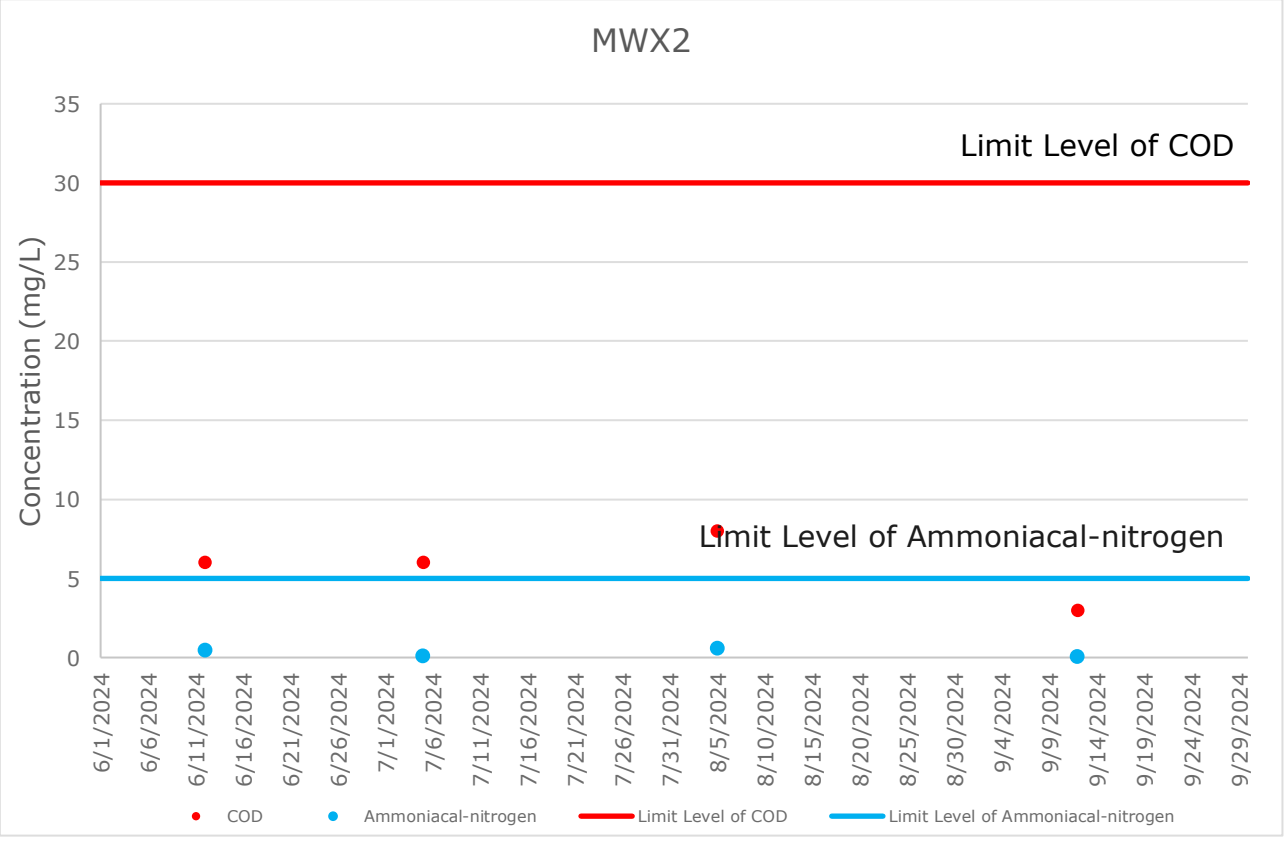


FIGURE F5.3 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-3)

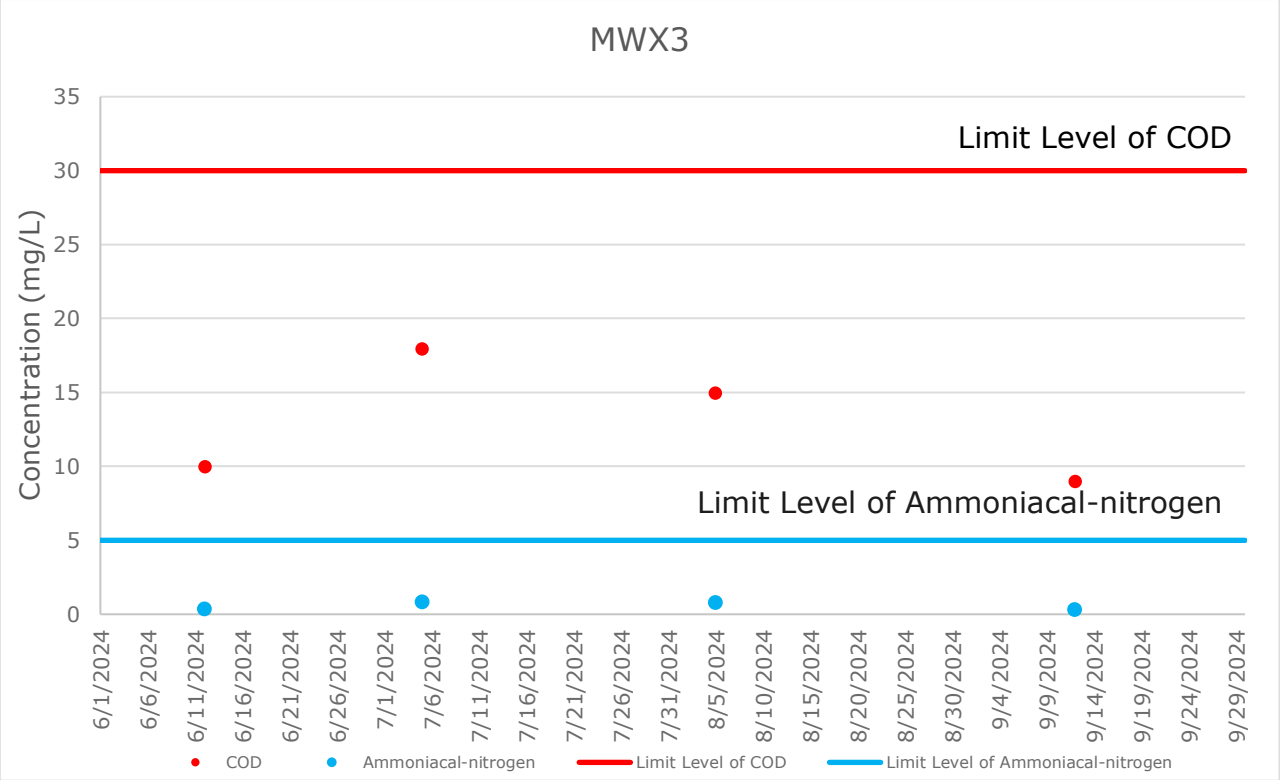


FIGURE F5.4 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-4)

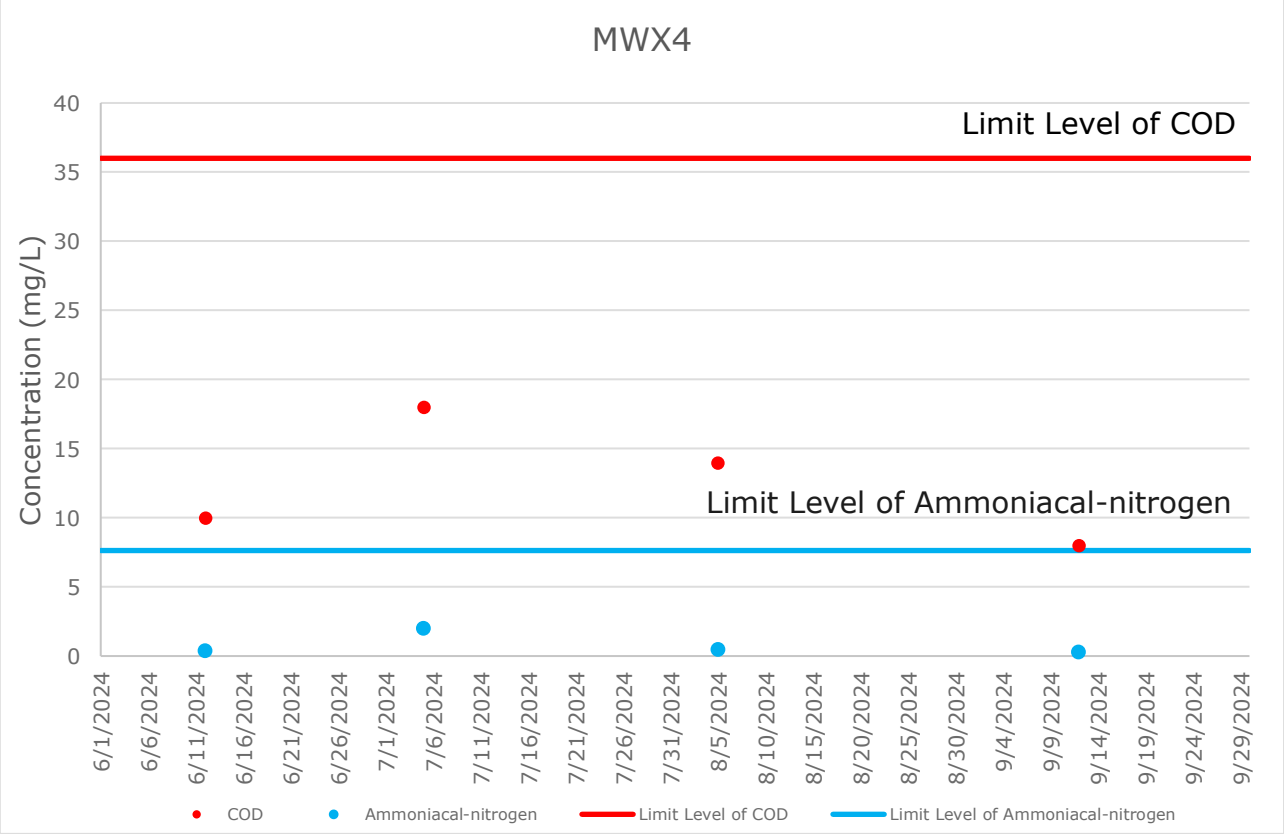


FIGURE F5.5 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-5)

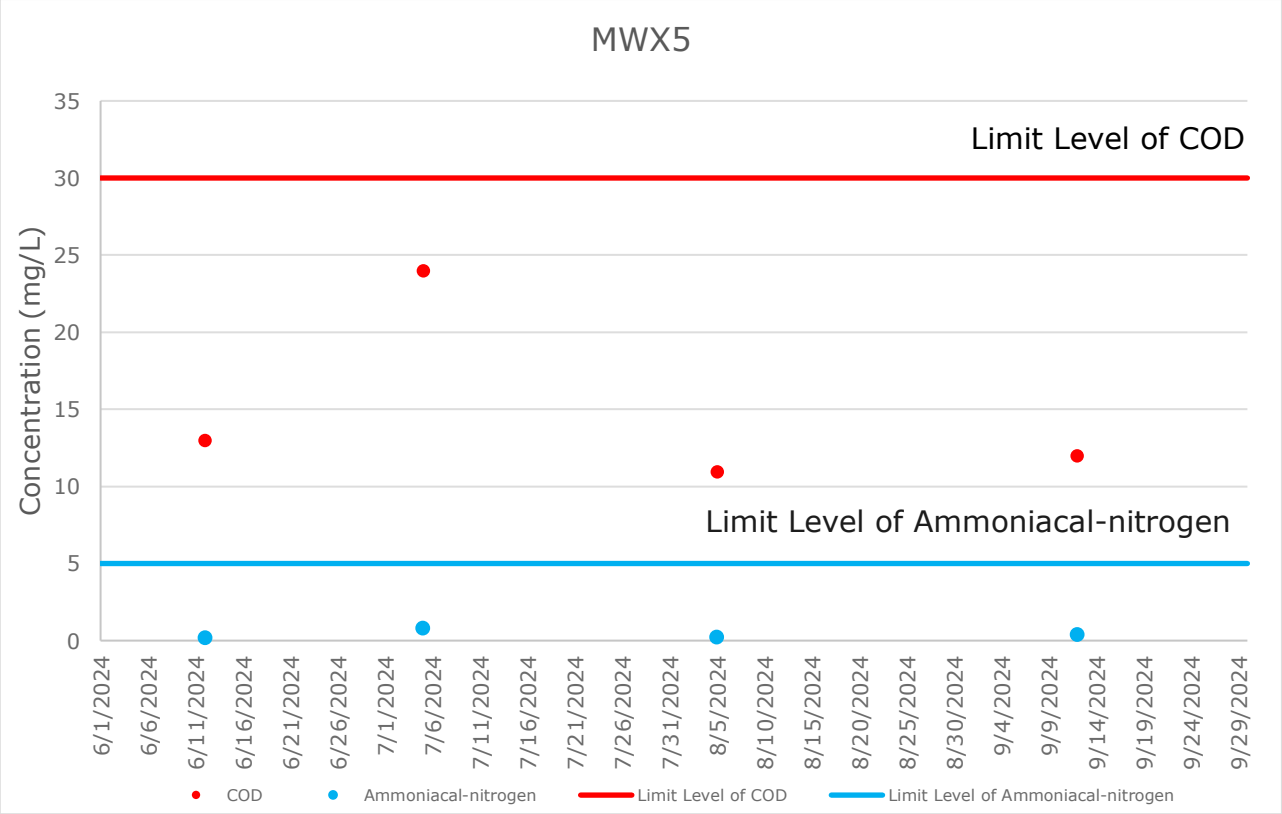


FIGURE F5.6 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-6)

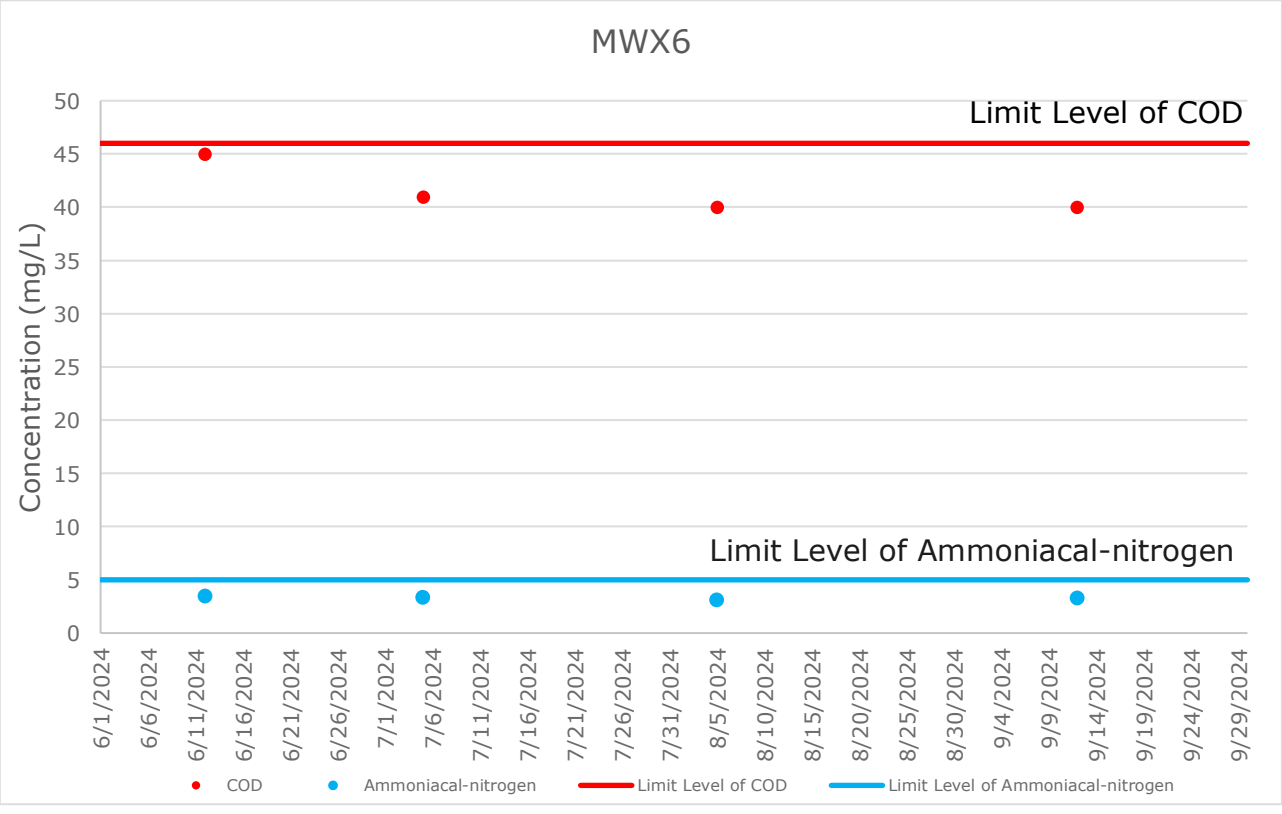


FIGURE F5.7 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-7)

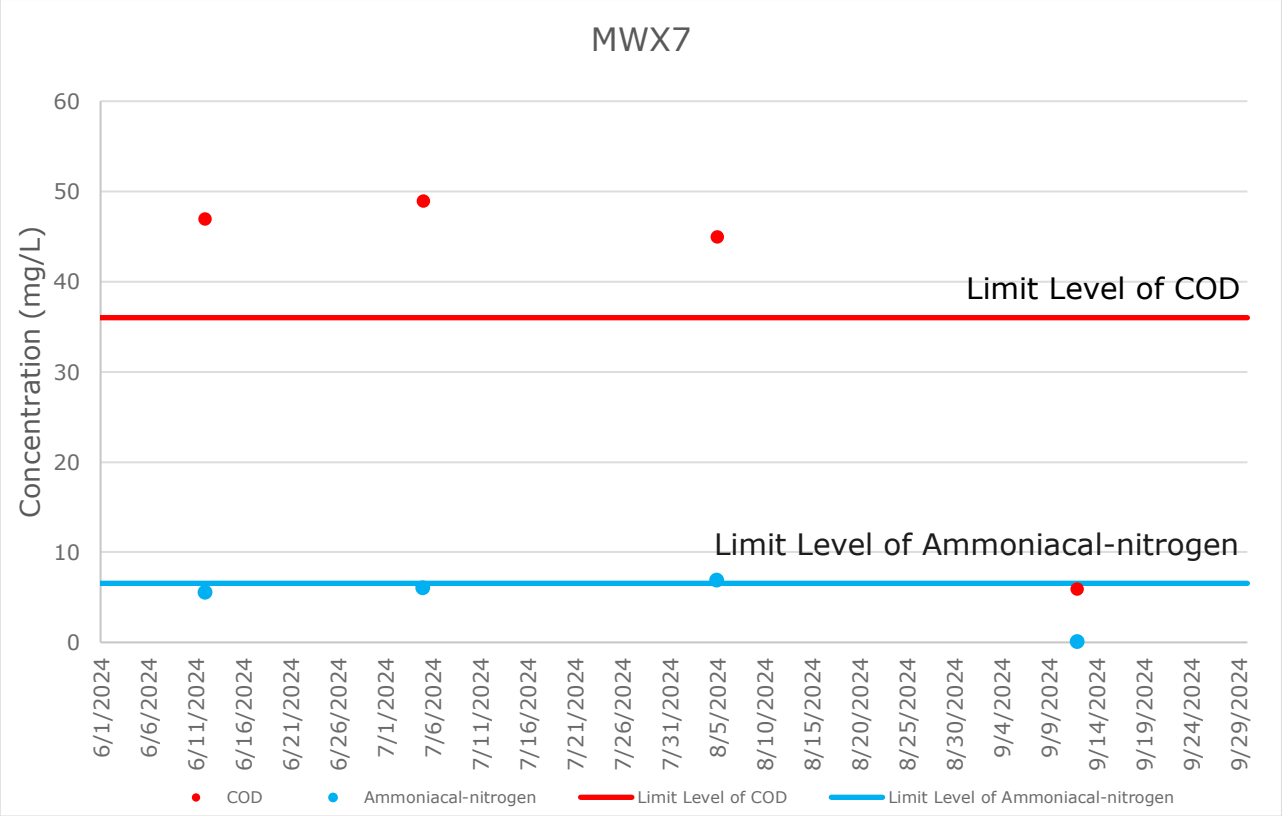


FIGURE F5.8 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-8)

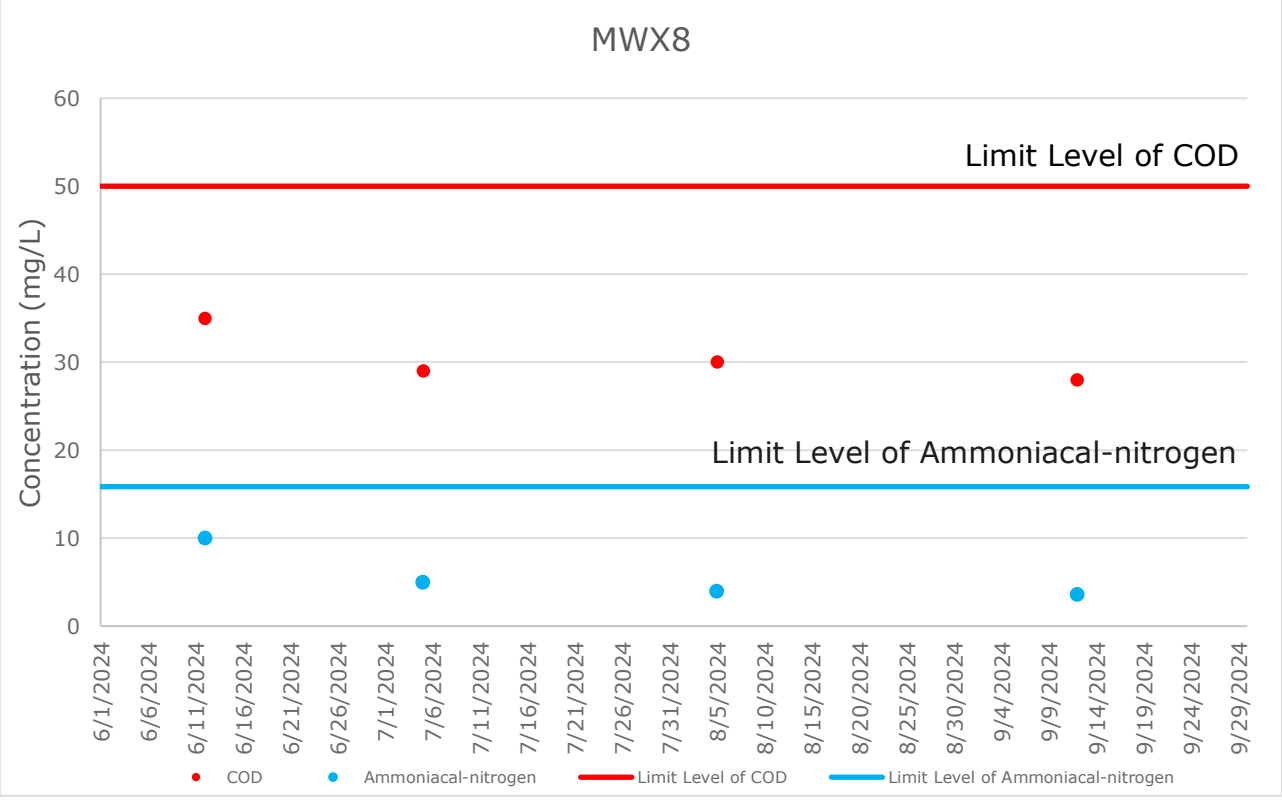


FIGURE F5.9 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-9)

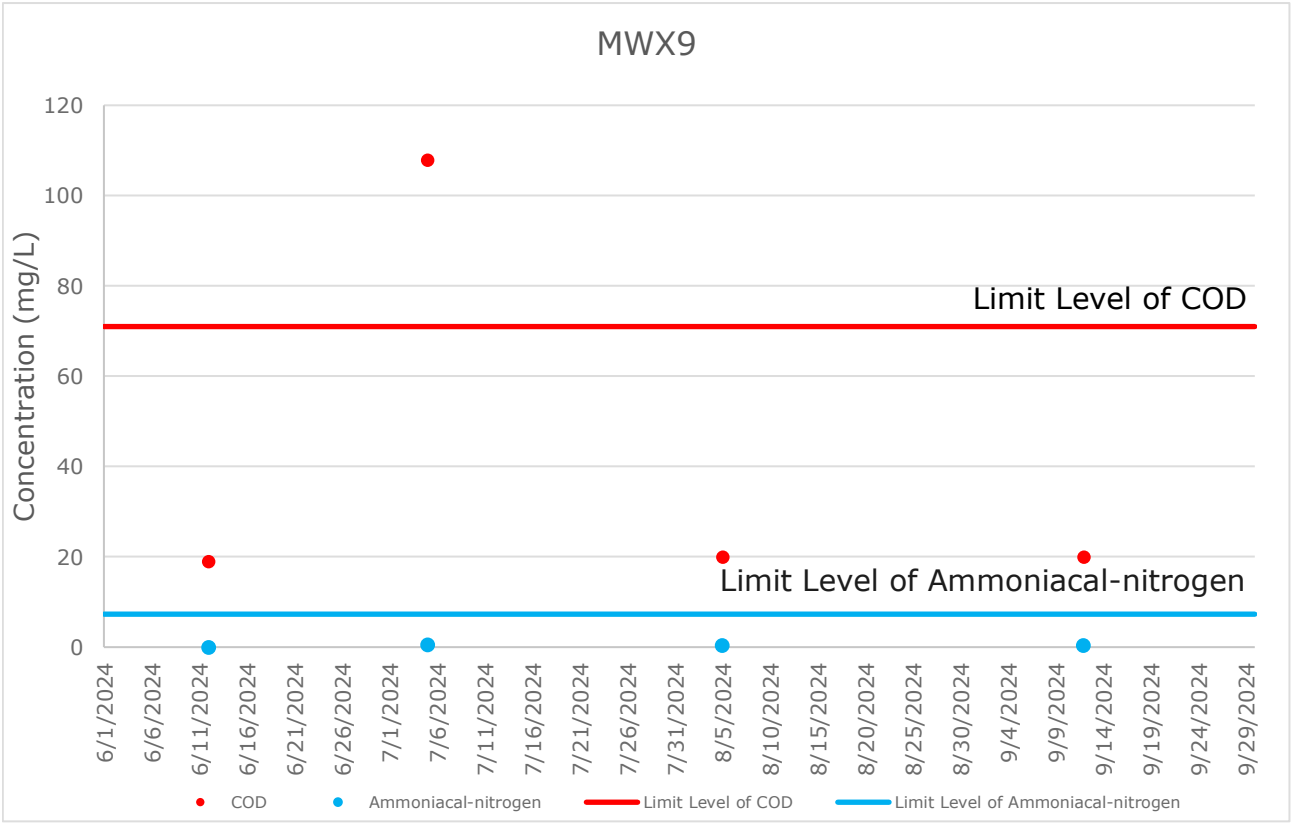


FIGURE F5.10 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-10)

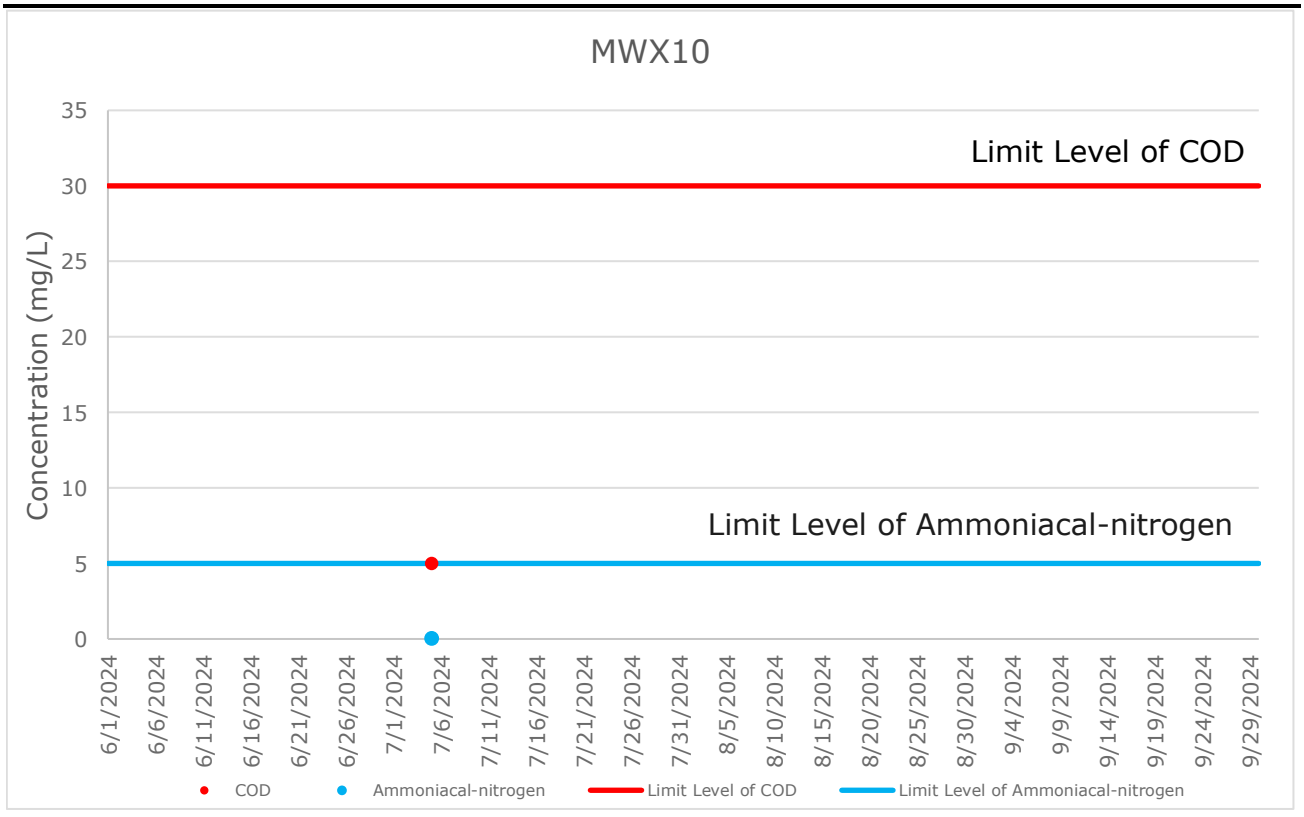


FIGURE F5.11 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-11)

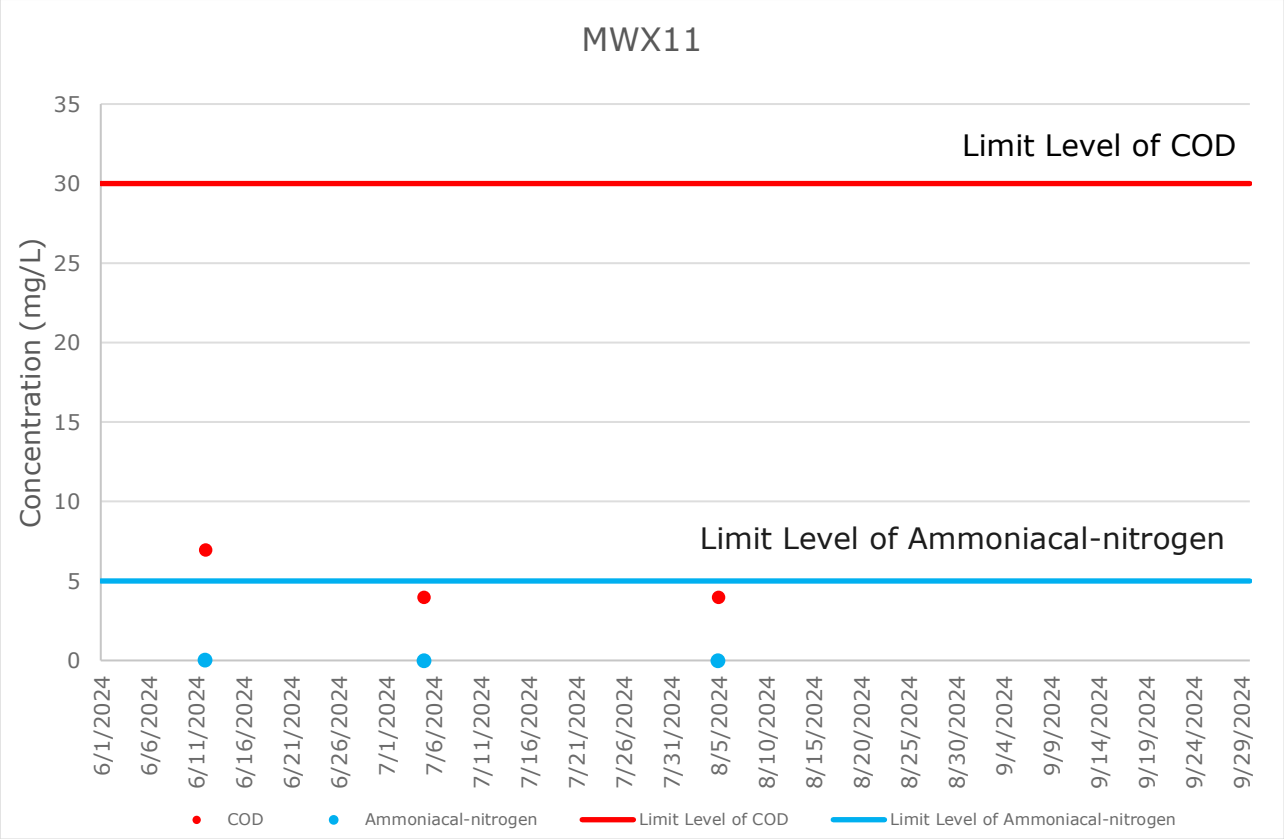


FIGURE F5.12 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-12)

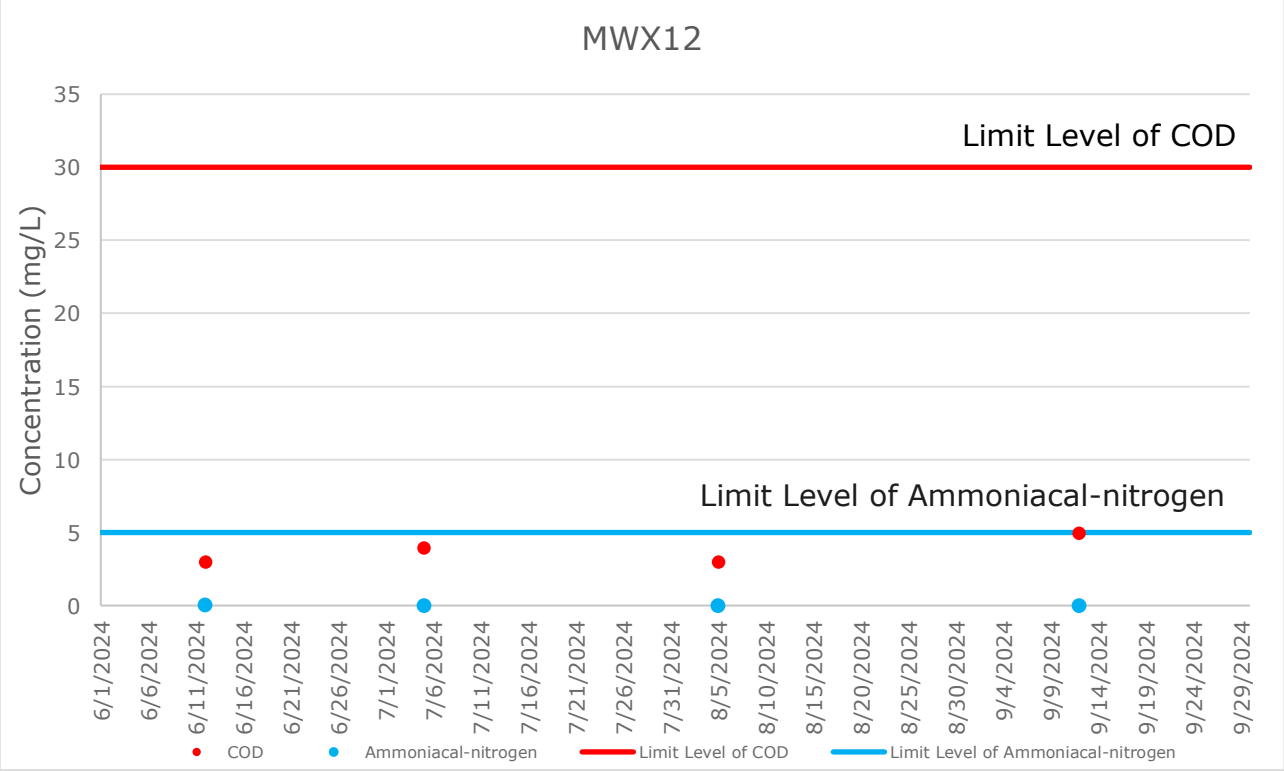


FIGURE F5.13 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-13)

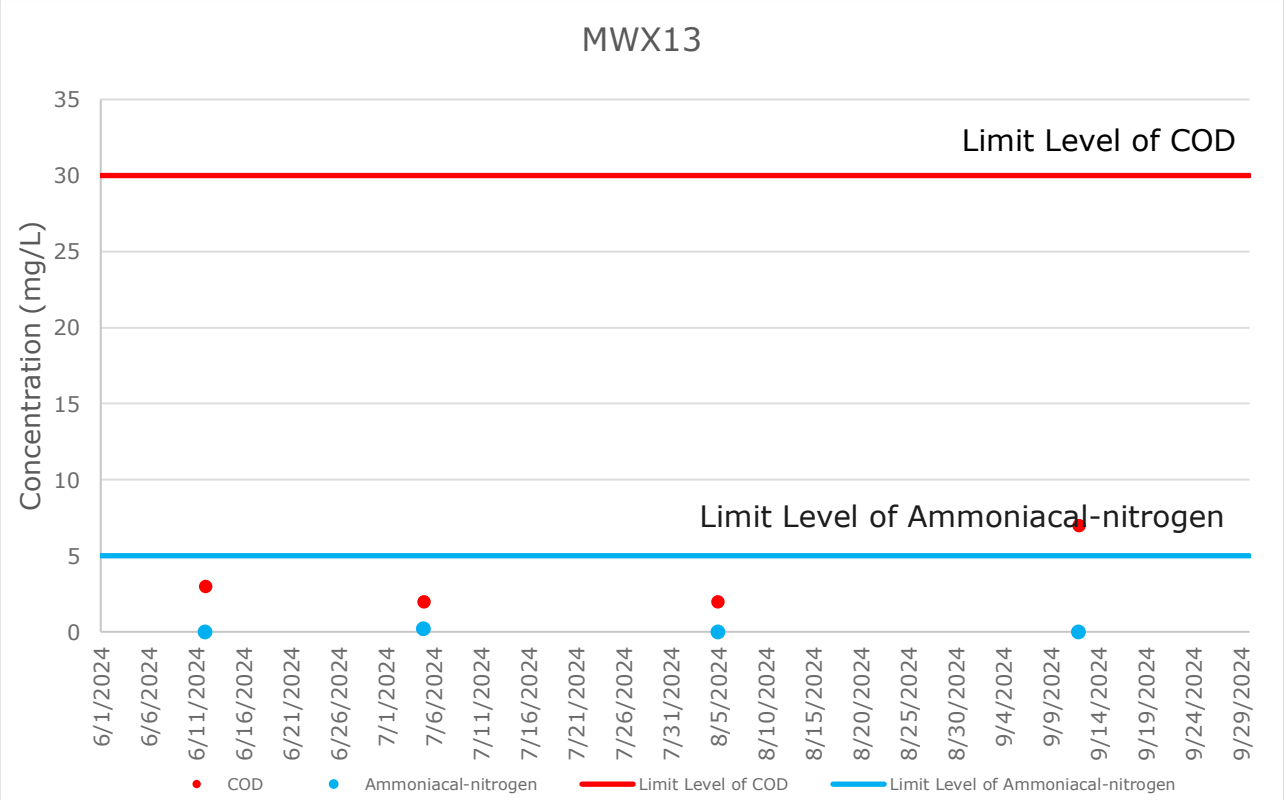
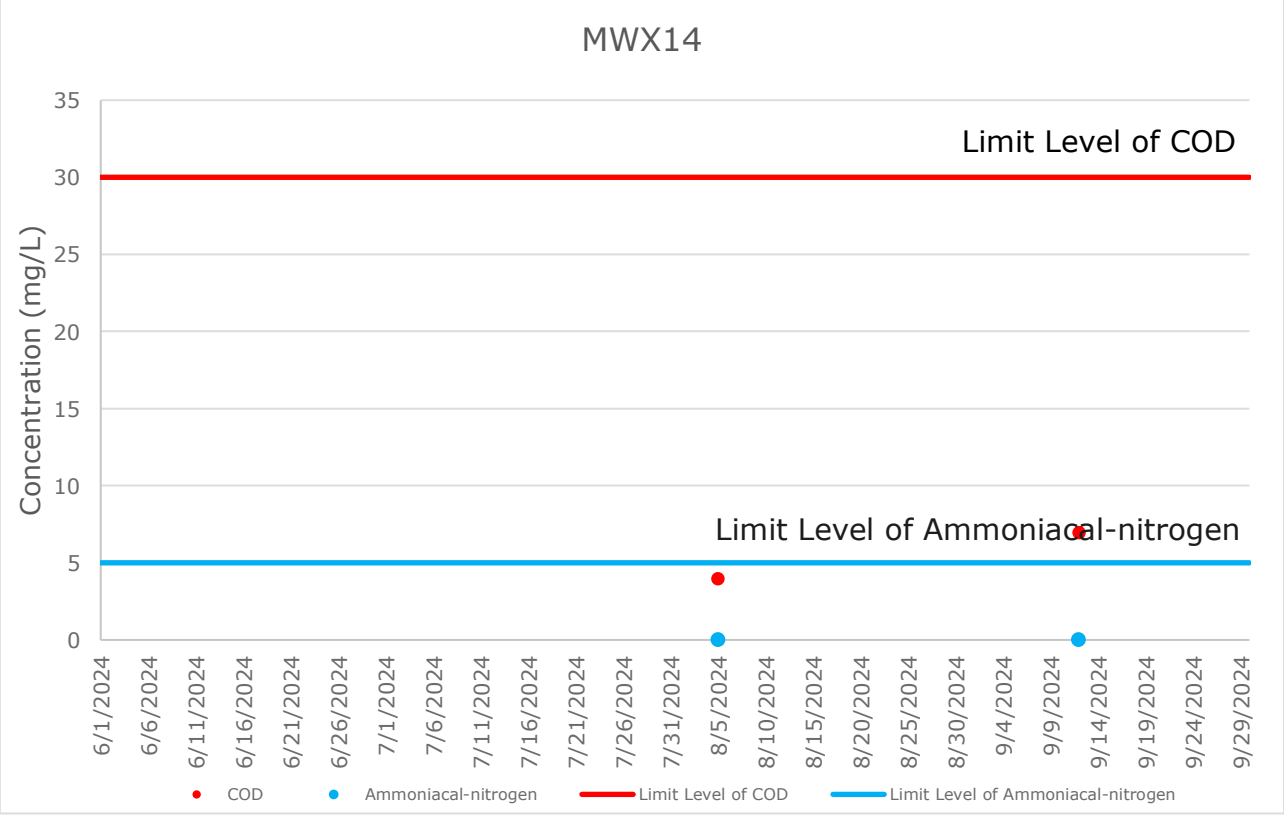


FIGURE F5.14 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-14)



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	5 July 2024
Time	MWX-7: 10:07 MWX-9: 09:19
Monitoring Location	MWX-7, MWX-9
Parameter	Chemical Oxygen Demand (COD)
Limit Level	MWX-7: >36 mg/L MWX-9: >71 mg/L
Measured Level	MWX-7: 49 mg/L MWX-9: 108 mg/L
Possible reason	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-7 (6.08 mg/L) and MWX-9 (0.51 mg/L), and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-7 and MWX-9 (MWX-6: 41 mg/L; MWX-8: 29 mg/L and MWX-10: 5 mg/L) are well within the respective limit levels. Hence, there is a low possibility of the elevation of COD level at MWX-7 and MWX-9 are due to leachate contamination from SENTX operation or at least it is not conclusive to base on these results to demonstrate exceedances were due to leachate contamination. In accordance with Table 4.5b of the updated EM&A Manual, repeat measurement was conducted on 5 August 2024 to confirm findings. COD concentration of <20 mg/L (below the Limit Level) was measured at MWX-9 during the sampling event. However, COD concentration of 45 mg/L was measured at MWX-7 during the sampling event, which shown consecutive exceedance of the groundwater quality limit. 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-7 and MWX-9 on 5 August 2024 could be due to localised organic matters within or around the monitoring wells and background fluctuation. Due to the presence of influencing factor from non-project source, there is no adequate evidence showing that the COD level exceedances measured at MWX-7 and MWX-9 on 5 August 2024 were deemed to Project-related activities.

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 groundwater quality monitoring results and collect additional data for investigation and further review, if necessary.
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 27 August 2024

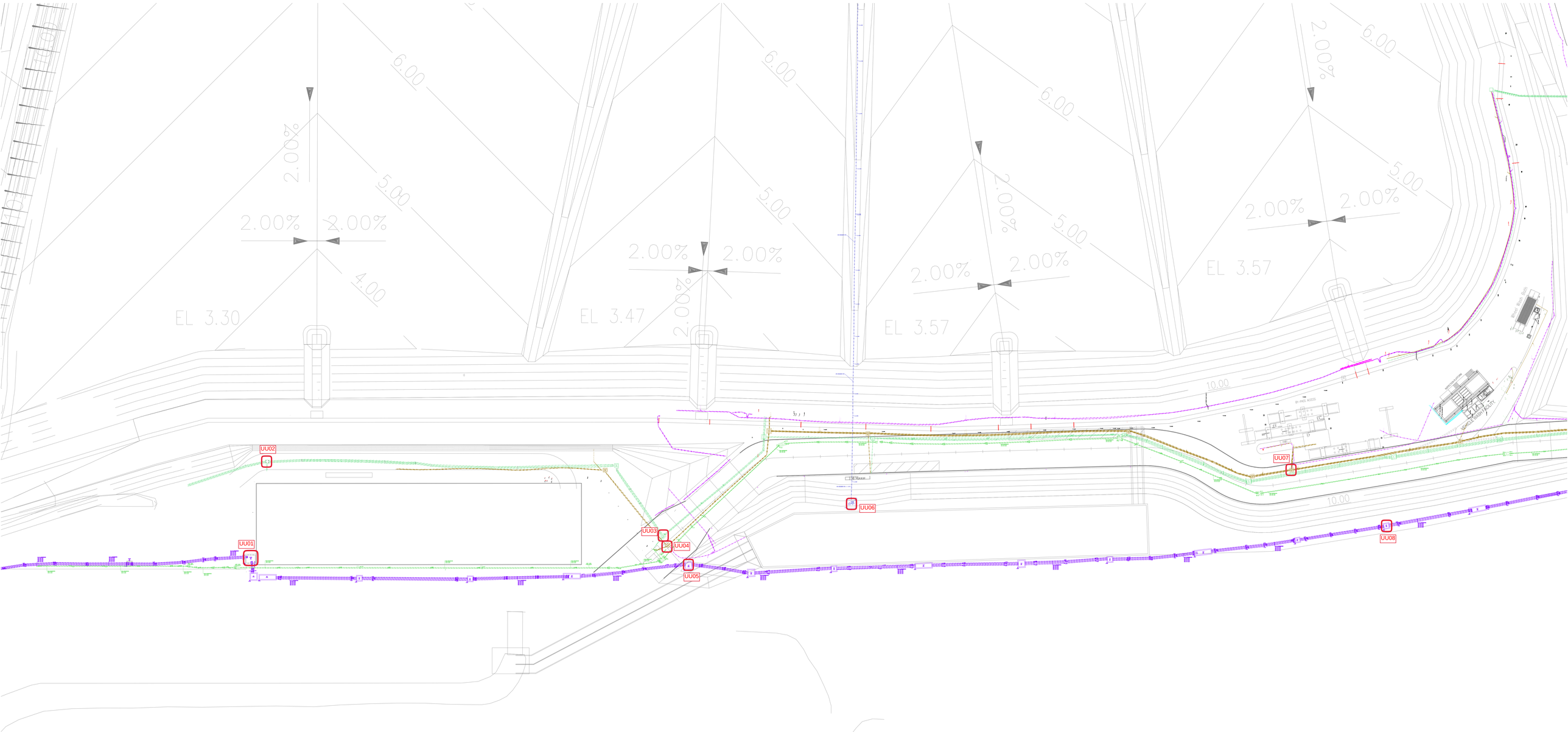
Investigation Report of Environmental Quality Limit Exceedance	
Project	South East New Territories (SENT) Landfill Extension
Date	5 August 2024
Time	10:12
Monitoring Location	MWX-7
Parameter	Ammoniacal-nitrogen and Chemical Oxygen Demand (COD)
Limit Level	Ammoniacal-nitrogen: >6.55 mg /L COD: >36 mg /L
Measured Level	Ammoniacal-nitrogen: 6.92 mg /L COD: 45 mg /L
Possible reason	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 adjacent to MWX-7 (MWX-6: 3.15 mg/L and MWX-8: 3.97 mg/L) and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-7 (MWX-6: 40 mg/L and MWX-8: 30 mg/L) are well within the respective limit levels. Hence, there is a low possibility of the elevation of ammoniacal-nitrogen and COD level at MWX-7 are due to leachate contamination from SENTX operation or at least it is not conclusive to base on these results to demonstrate exceedances were due to leachate contamination. In accordance with Table 4.5b of the updated EM&A Manual, repeat measurement was conducted on 12 September 2024 to confirm findings. COD concentration of 6 mg/L (below the Limit Level) and ammoniacal-nitrogen of 0.14 mg/L (below the Limit Level) were measured at MWX-7 during the sampling event, which demonstrate no consecutive groundwater quality impact at the monitoring locations. 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 ammoniacal-nitrogen and COD concentration measured at MWX-7 on 5 August 2024 could be due to localised organic matters within or around the monitoring well and background fluctuation. Due to the presence of influencing factor from non-project source, there is no adequate evidence showing that the ammoniacal-nitrogen and COD level exceedances measured at MWX-7 on 5 August 2024 were deemed to Project-related activities.

Investigation Report of Environmental Quality Limit Exceedance	
	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-7 on 5 August 2024 will not cause adverse water quality impact to the Junk Bay Water Control Zone.
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 groundwater quality monitoring results and collect additional data for investigation and further review, if necessary.
Remarks	-

Prepared by:	Abbey Lau
Designation:	Environmental Team
Date	3 October 2024

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


6.00
5.00
4.00
2.00%
EL 3.30
EL 3.47
EL 3.57
EL 3.57
10.00
10.00
UU01
UU02
UU03
UU04
UU05
UU06
UU07
UU08

UU08
UU28
UU27
UU10
UU11
UU09
UU12
UU13
UU14
UU15
UU26
UU25
UU24
UU16
UU17
UU18
UU19
UU20
UU21
UU22
UU23
HARD STANDING
EPD BUILDING
CIVIL BUILDING
CAR PARK
LABORATORY BUILDING
MAINTENANCE BUILDING
EQUIPMENT STORAGE AREA (SOFT STANDING)
VEHICLE WASH FACILITY
INSPECTION PLATFORM
Wheel Wash Bath
LANDFILL GAS CONTROL ROOM & SWITCHROOM
DIESEL FUEL TANKS
PETROLEUM STORE
BIOPLANT BUILDING
EPD CONFERENCE ROOM
CAR PARK SHELTER
WATER TANK

ANNEX G2 LANDFILL GAS MONITORING RESULTS

TABLE G2.1 LANDFILL GAS MONITORING RESULTS AT PERIMETER LFG MONITORING WELLS (JULY 2024)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.93	0.3	1.5	17.5
LFG2	2.9	0.4	0.0	20.7
LFG3	2.83	0.1	0.0	19.5
LFG4	3.07	0.1	0.0	19.6
LFG5	3.29	0.4	0.1	13.1
LFG6	2.63	0.1	0.0	19.7
LFG7	2.81	0.0	0.0	19.4
LFG8	2.84	0.0	0.0	19.7
LFG9	2.91	0.0	0.0	19.9
LFG10	2.49	0.0	0.0	18.8
LFG11	3.29	0.0	0.0	19.7
LFG12	2.78	0.0	0.0	19.6
LFG13	2.68	0.0	0.0	19.6
LFG14	2.99	0.0	0.0	19.3
LFG15	2.89	0.0	0.0	19.4
LFG16	3.69	0.0	0.3	18.5
LFG17	2.98	0.0	0.0	19.3
LFG18	4.24	0.0	0.1	19.1
LFG19	4.23	0.0	0.0	19.3
LFG20	4.50	0.0	0.0	19.1
LFG21	4.16	0.0	0.0	19.3
LFG22	3.70	0.0	0.0	19.2
LFG23	12.88	0.0	0.0	18.9
LFG24	6.81	0.0	0.0	18.9
GP1	Probe Bent	0.0	7.7	6.2
GP2 (shallow)	Probe Bent	0.0	0.2	19.6
GP2 (deep)	Probe Bent	0.0	0.1	19.8
GP3 (shallow)	Probe Bent	0.0	0.6	19.1
GP3 (deep)	Probe Bent	0.0	0.3	19.2
GP4 (shallow)	Probe Bent	0.0	0.1	16.8
GP4 (deep)	Probe Bent	0.0	0.4	18.0
GP5 (shallow)	Probe Bent	0.0	0.0	18.0
GP5 (deep)	40.47	0.0	0.1	18.9
GP6	39.34	0.0	1.5	16.9

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
GP7	36.72	0.0	0.9	17.7
GP12	2.35	0.3	0.0	20.1
GP15	2.68	0.2	0.1	19.5
P7	2.72	0.2	0.0	19.8
P8 [(a)]	N/A	N/A	N/A	N/A
P9	2.6	0.2	0.0	19.3

Note:

(a) The Monitoring well P8 was under maintenance.

TABLE G2.2 LANDFILL GAS MONITORING RESULTS AT PERIMETER LFG MONITORING WELLS (AUGUST 2024)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	3.07	0.2	1.7	16.2
LFG2	2.83	0.2	1.0	18.8
LFG3	3.14	0.2	0.1	18.0
LFG4	3.24	0.1	0.0	19.8
LFG5	2.91	0.1	0.1	18.9
LFG6	2.86	0.1	0.2	18.3
LFG7	3.61	0.0	0.0	18.6
LFG8	3.01	0.0	0.1	19.5
LFG9	3.24	0.0	0.0	19.8
LFG10	3.41	0.0	0.0	20.0
LFG11	4.03	0.0	0.0	20.0
LFG12	3.03	0.0	0.0	20.0
LFG13	2.65	0.0	0.0	20.2
LFG14	2.86	0.3	0.0	20.3
LFG15	2.61	0.3	0.5	17.8
LFG16	3.1	0.0	0.5	17.6
LFG17	3.22	1.1	2.8	2.7
LFG18	5.41	0.0	0.2	19.2
LFG19	4.31	0.0	0.0	19.3
LFG20	4.36	0.0	0.0	19.0
LFG21	4.14	0.0	0.0	19.6
LFG22	3.82	0.0	0.0	19.5
LFG23	12.94	0.0	0.0	19.4
LFG24	6.91	0.0	0.0	19.5
GP1	Probe Bent	0.1	7.3	4.4
GP2 (shallow)	Probe Bent	0.0	0.6	18.9
GP2 (deep)	Probe Bent	0.0	0.1	19.7
GP3 (shallow)	Probe Bent	0.0	0.2	19.6
GP3 (deep)	Probe Bent	0.0	0.2	19.5
GP4 (shallow)	Probe Bent	0.0	0.9	18.8
GP4 (deep)	Probe Bent	0.0	0.5	19.4
GP5 (shallow)	Probe Bent	0.0	8.4	18.6
GP5 (deep)	42.57	0.0	0.1	19.5
GP6	40.32	0.0	1.6	17.1

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
GP7	36.88	0.0	0.3	18.5
GP12	2.49	0.0	0.2	18.8
GP15	3.43	0.1	0.0	19.5
P7	2.9	0.0	0.2	18.7
P8	3.17	0.2	0.1	19.4
P9	3.02	0.1	0.0	19.4

TABLE G2.3 LANDFILL GAS MONITORING RESULTS AT PERIMETER LFG MONITORING WELLS (SEPTEMBER 2024)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	3.21	0.0	1.5	14.3
LFG2	2.97	0.0	1.3	18.0
LFG3	3.14	0.0	0.3	19.4
LFG4	2.84	0.0	0.0	19.7
LFG5	2.17	0.0	0.1	19.9
LFG6	2.92	0.0	0.5	15.9
LFG7	3.31	0.0	0.1	17.9
LFG8	3.36	0.0	0.1	18.1
LFG9	3.12	0.0	0.2	8.7
LFG10	3.04	0.0	0.2	10.1
LFG11	3.57	0.0	0.2	11.5
LFG12	3.06	0.0	0.0	19.4
LFG13	2.96	10.1	0.0	19.1
LFG14	2.69	0.0	0.1	18.2
LFG15	2.91	0.0	1.2	7.6
LFG16	3.15	0.0	0.0	19.1
LFG17	3.43	0.0	0.1	19.1
LFG18	4.75	0.0	0.3	16.6
LFG19	5.16	0.0	0.5	10.4
LFG20	5.63	0.0	0.4	18.5
LFG21	4.83	0.0	0.2	19.6
LFG22 [(a)]	N/A	N/A	N/A	N/A
LFG23	12.93	0.0	0.0	19.6
LFG24	6.96	0.0	0.0	19.4
GP1	Probe Bent	0.0	1.0	17.4
GP2 (shallow)	Probe Bent	0.0	0.6	19.1
GP2 (deep)	Probe Bent	0.0	0.9	18.5
GP3 (shallow)	Probe Bent	0.0	1.3	16.5
GP3 (deep)	Probe Bent	0.0	0.1	19.4
GP4 (shallow)	Probe Bent	0.0	0.4	19.2
GP4 (deep)	Probe Bent	0.0	1.1	18.4
GP5 (shallow)	Probe Bent	0.0	10.1	19.5
GP5 (deep)	41.85	0.0	0.5	18.9
GP6 [(b)]	N/A	N/A	N/A	N/A

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
GP7	37.27	0.0	1.5	17.4
GP12	2.56	0.0	0.3	19.8
GP15	2.88	0.0	0.0	20.1
P7	2.94	0.0	0.0	19.9
P8	3.16	0.0	0.1	19.9
P9	2.64	0.0	0.0	20.0

Note:

(a) Monitoring well LFG22 is not accessible due to the landscape reparation work.

(b) Monitoring well GP6 is under maintenance.

TABLE G2.4 LANDFILL GAS MONITORING AT SERVICE VOIDS, UTILITIES PITS AND MANHOLE (JULY 2024)

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

TABLE G2.5 LANDFILL GAS MONITORING AT SERVICE VOIDS, UTILITIES PITS AND MANHOLE (AUGUST 2024)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	19.8
UU02	0.0	0.0	19.8
UU03	Voided due to latest site programme and on-going operation work		
UU04	0.0	0.0	19.7
UU05	0.0	0.0	19.7
UU06	0.0	0.0	19.7
UU07	0.0	0.0	19.7
UU08	0.0	0.0	19.6
UU09	0.1	0.0	19.7
UU10	0.1	0.0	19.7
UU11	0.1	0.0	19.7
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.1	0.1	19.7
UU14	0.1	0.1	19.8
UU15	0.1	0.0	19.7
UU16	0.1	0.0	19.6
UU17	Voided due to latest site programme and on-going operation work		
UU18	Voided due to latest site programme and on-going operation work		
UU19	Voided due to latest site programme and on-going operation work		
UU20	0.1	0.0	19.5
UU21	0.1	0.0	19.4
UU22	0.1	0.0	19.4
UU23	0.1	0.0	19.3
UU24	0.1	0.0	19.2
UU25	0.0	0.0	19.2
UU26	0.0	0.0	19.1
UU27	0.0	0.0	19.0
UU28	0.0	0.0	18.9

TABLE G2.6 LANDFILL GAS MONITORING AT SERVICE VOIDS, UTILITIES PITS AND MANHOLE (SEPTEMBER 2024)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	19.4
UU02	0.0	0.0	19.9
UU03	Voided due to latest site programme and on-going operation work		
UU04	Voided due to latest site programme and on-going operation work		
UU05	0.0	0.0	19.7
UU06	Not accessible due to the safety consideration		
UU07	0.0	0.1	19.3
UU08	0.0	0.1	18
UU09	0.0	0.0	19.6
UU10	0.0	0.0	19.5
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	19.6
UU15	0.0	0.0	19.6
UU16	0.0	0.0	19.7
UU17	Voided due to latest site programme and on-going operation work		
UU18	Voided due to latest site programme and on-going operation work		
UU19	Voided due to latest site programme and on-going operation work		
UU20	0.0	0.0	19.7
UU21	0.0	0.0	19.7
UU22	0.0	0.0	19.7
UU23	0.0	0.0	19.7
UU24	0.0	0.0	19.7
UU25	0.0	0.0	19.7
UU26	0.0	0.0	19.7
UU27	0.0	0.0	19.7
UU28	0.0	0.0	19.8

TABLE G2.7 LANDFILL GAS BULK GAS SAMPLING MONITORING RESULTS

Parameters	LFG2	LFG8
Methane (% (v/v))	<0.020	<0.020
Carbon Dioxide (% (v/v))	1.14	0.16
Oxygen (% (v/v))	19.2	20.1
Nitrogen (% (v/v))	79.5	76.9
Carbon Monoxide (% (v/v))	<0.020	<0.020
Hydrogen (% (v/v))	<0.020	<0.020
Ethane (ppmv)	<1.0	<1.0
Propane (ppmv)	<1.0	<1.0
Butane (ppmv)	<1.0	<1.0

TABLE G2.8 FLAMMABLE GAS SURFACE EMISSION MONITORING RESULTS

Time	GPS Coordinates Latitude (N)	Longitude (E)	Weather Condition	Temperature (°C)	Wind Direction (Deg)	Wind Speed (m/s)	Monitoring Results (ppm)
13:47	22°16'34"	114°16'27"	Sunny	31.9	139	1.6	23
14:04	22°16'32"	114°16'44"	Sunny	33.2	122	0.6	28
14:08	22o16'32"	114°16'42"	Sunny	33.0	101	0.8	23
14:10	22°16'33"	114°16'41"	Sunny	32.9	124	2.5	21
14:15	22°16'34"	114°16'37"	Sunny	32.8	297	0.5	16
14:18	22°16'30"	114°16'36"	Sunny	32.2	233	2.6	7
14:23	22°16'26"	114°16'35"	Sunny	32.7	168	1.9	7
14:32	22°16'26"	114°16'26"	Sunny	32.2	173	1.9	7
14:36	22°16'21"	114°16'26"	Sunny	31.2	138	2.0	8
14:54	22°16'17"	114°16'37"	Sunny	31.9	245	1.2	13
15:07	22°16'16"	114°16'30"	Sunny	31.3	072	1.9	25

ANNEX G3 EVENT AND ACTION PLAN FOR LANDFILL GAS MONITORING

ANNEX G3 EVENT AND ACTION PLAN FOR LANDFILL GAS MONITORING

Action			
Event	**ET**	**IEC**	**Contractor**
Limit Level being exceeded for field monitoring at the perimeter monitoring wells	• 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	• 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	• 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	• 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	• Verify the findings by ET	• Nil

Action			
Event	**ET**	**IEC**	**Contractor**
	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		
Limit Level being exceeded at the permanent gas monitoring system	• 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	• 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	• 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	• 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	• 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	• 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

Action			
Event	**ET**	**IEC**	**Contractor**
	• 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		
Limit Level being exceeded at the service voids, utilities pits, manholes and location of vegetation stress	• 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	• 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	• 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 August 2024
Time	11:33
Monitoring Location	LFG17
Parameter	Carbon Dioxide
Limit Level	2.4%
Measured Level	2.8%
Possible reason	During the landfill gas monitoring event, the carbon dioxide monitoring results of the landfill gas wells adjacent to LFG17 (LFG16: 0.5% and LFG18: 0.2%) are well within the respective limit levels. 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 7 August 2024) was recorded in the reporting period. Hence, there is a low possibility that the elevation of carbon dioxide level at LFG17 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. Repeat measurement was conducted on 14 August 2024 to confirm findings. Carbon dioxide level of 2.3% (below the Limit Level) was detected at LFG17 during the additional 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 LFG17 on 13 August 2024 could be due to background fluctuation. Due to the background influencing factor and the subsequent monitoring result at LFG17 did not show any exceedance, there is no adequate evidence showing that the carbon dioxide exceedance measured at LFG17 on 13 August 2024 was deemed to Project-related activities.
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	21 August 2024

ANNEX H

CUMULATIVE STATISTICS ON EXCEEDANCES, ENVIRONMENTAL COMPLAINTS, NOTIFICATION OF SUMMONS AND STATUS OF PROSECUTION

TABLE H1 CUMULATIVE STATISTICS ON EXCEEDANCES

		Total No. recorded in this reporting period	Total No. recorded since project commencement
Air Quality (Dust)	Action	0	0
	Limit	0	21
Air Quality (Odour)	Action	0	0
	Limit	0	0
Air Quality (Emissions of Thermal Oxidiser)	Limit	0	4
Air Quality (Emissions of Landfill Gas Flare)	Limit	3	8
Air Quality (Emissions of Landfill Gas Generator)	Limit	0	0
Noise	Action	0	0
	Limit	0	0
Water Quality (Surface Water)	Limit	0	64
Water Quality (Leachate)	Limit	0	1
Water Quality (Leachate Level)	Limit	0	194
Water Quality (Groundwater)	Limit	4	32
Landfill Gas (Perimeter Landfill Gas Monitoring Wells)	Limit	1	5
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 (1 Jul – 30 Sep 2024)	0	0	0
Total no. received since project commencement	1	0	0

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