South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.20

PREPARED FOR

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

Green Valley Landfill Ltd.

DATE
8 March 2024

REFERENCE
0465169

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

South East New Territories (SENT) Landfill Extension

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

Reference Document/Plan

Document/Plan to be Certified/Verified:	Quarterly Environmental Monitoring & Audit Report No. 20 for South East New Territories (SENT) Landfill Extension
Date of Report:	8 March 2024

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: 8 March 2024

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: 12 March 2024

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South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.20

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 October 2023 to 31 December 2023 for the Project in accordance with the updated EM&A Manual.

EXCEEDANCE OF ACTION AND LIMIT LEVELS FOR AIR QUALITY

One exceedance of Action and Limit Levels for Total Suspended Particulates (TSP) and two exceedances of Limit Level for thermal oxidizer stack emission (SO_2) were recorded for air quality monitoring in the reporting period.

The TSP exceedance at AM3 on 21 November 2023 was considered non Project-related upon further investigation, while the thermal oxidizer stack emission (SO_2) exceedances on 16 October and 16 November 2023 were considered Project related upon further investigation.

EXCEEDANCE OF ACTION AND LIMIT LEVELS FOR NOISE

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

EXCEEDANCE OF ACTION AND LIMIT LEVELS FOR WATER QUALITY

Two exceedances of the Limit Level for groundwater (Chemical Oxygen Demand (COD)) and one hundred thirty-seven exceedances of the Limit Level for Leachate Level were recorded for water quality impact monitoring in the reporting period.

The groundwater (COD) exceedance at MWX-7 on 7 November 2023 and at MWX-6 on 14 December 2023 were considered non Project-related upon further investigation. The leachate level exceedances at Pump Station No. 1X from 9 October to 17 October 2023, Pump Station No. 2X from 11 October to 23 November 2023, Pump Station No. 3X from 9 October to 24 November 2023 and Pump Station No. 4X from 9 October to 14 November 2023 were considered Project related upon further investigation.

EXCEEDANCE OF ACTION AND LIMIT LEVELS FOR LANDFILL GAS

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

ENVIRONMENTAL COMPLAINTS, SUMMONS AND PROSECUTIONS

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

REPORTING CHANGE

There was no reporting change in the reporting period.

1. INTRODUCTION

1.1 BACKGROUND

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

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

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

1.2 PROJECT DESCRIPTION

The SENTX is a piggyback landfill, occupying the southern part of the existing SENT Landfill (including its infrastructure area) and 13 ha of Tseung Kwan O (TKO) Area 137. A layout plan of the SENTX is shown in **Figure 1.1**. Under the latest design, the SENTX has a net void capacity of about 6.5 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

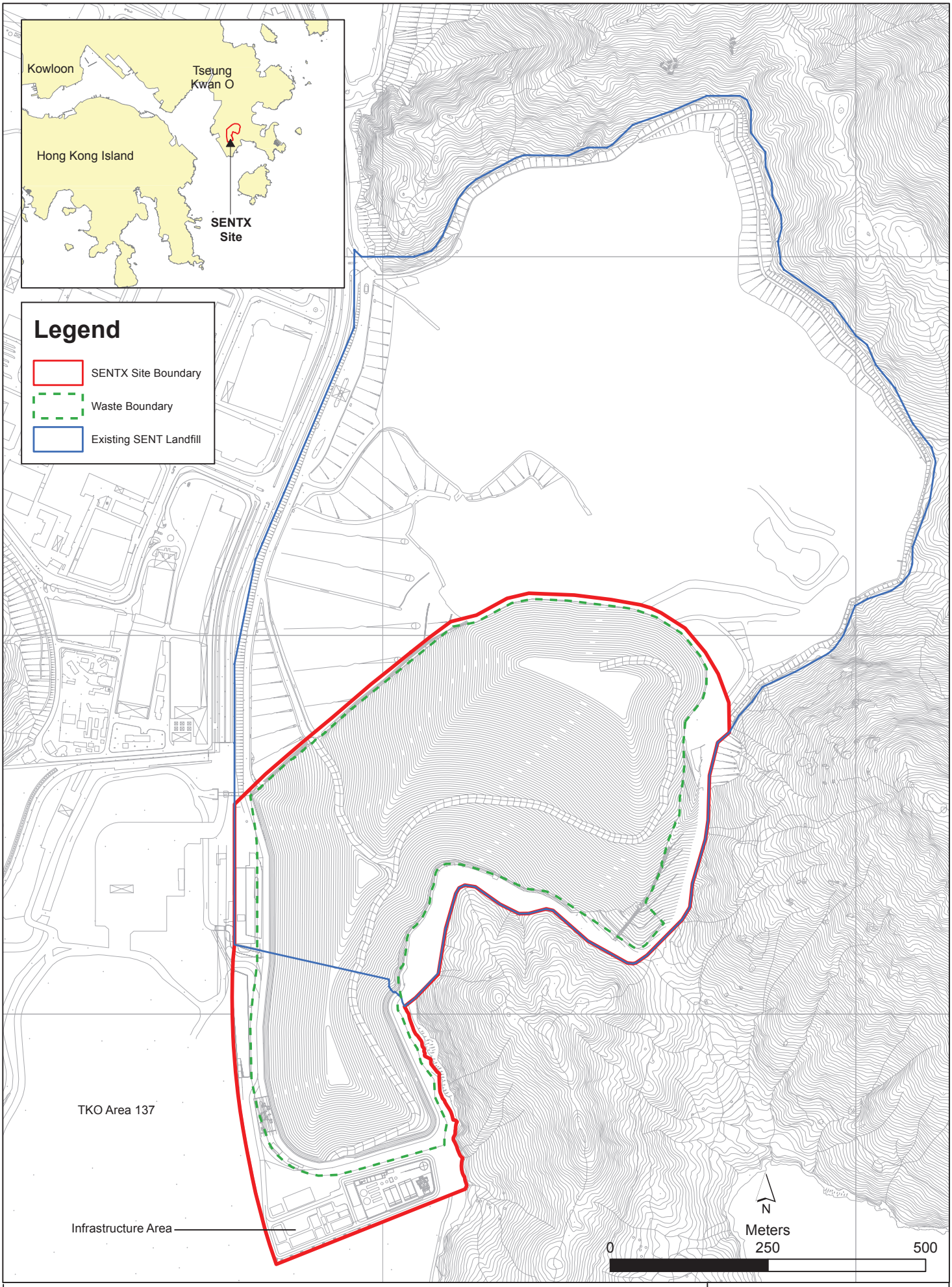

Figure 1.1

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	2057

The major construction works of the SENTX includes:

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

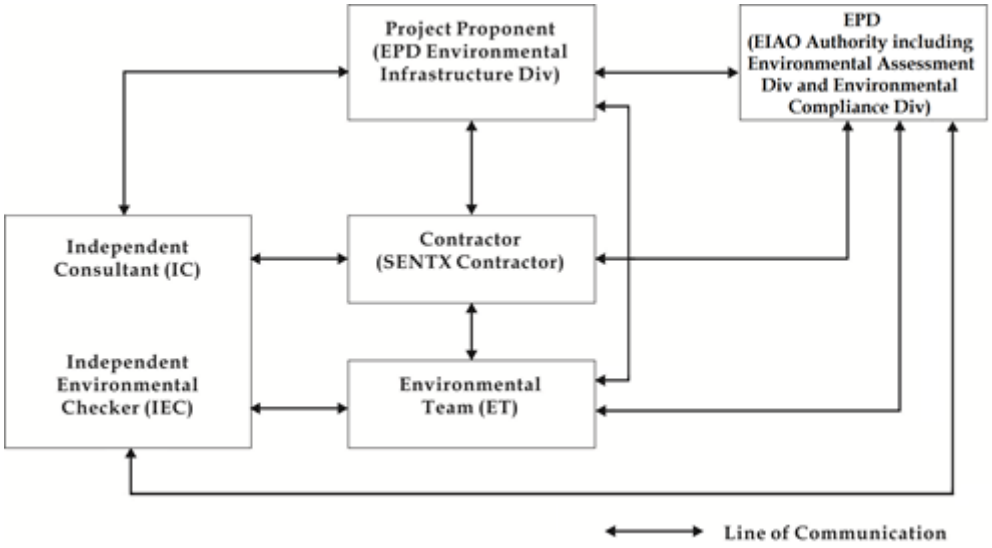
1.3 SCOPE OF THE EM&A REPORT

This is the Quarterly EM&A Report for the Project which summarises the key findings of the EM&A programme during the reporting period from 1 October 2023 to 31 December 2023 for the construction and operation works.

1.4 PROJECT ORGANISATION

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

FIGURE 1.2 ORGANISATION CHART



Contact details of the key personnel are 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:

October 2023

- Testing and commissioning of CCTV system at infrastructure area;
- Maintenance and improvement of temporary surface water drainage;
- Weighbridge enhancement with C-easy; and
- Restoration of Phase 1 Cell 1X.

November 2023

- Maintenance and improvement of temporary surface water drainage;
- Weighbridge enhancement with C-easy; and
- Restoration of Phase 1 Cell 1X and 2X west slopes.

December 2023

- Maintenance and improvement of temporary surface water drainage;
- Weighbridge enhancement with C-easy; and

- Restoration of Phase 1 Cell 1X, 2X and Phase 2 Cell 3X west 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, ER, ET, IEC and EPD on 19 October 2023, 16 November 2023 and 14 December 2023; and
- Environmental toolbox trainings on the following topics were provided by the Contractor to the workers:
    - Wastewater Management in Construction Site on 20 October 2023;
    - Volatile Organic Compounds (VOC) and Smog on 25 October 2023;
    - Tree Protection Zone on 14 November 2023;
    - Chemical Waste Handling on 23 November 2023;
    - Air Pollution and Dark Smoke on 13 December 2023; and
    - Illegal Dumping on 20 December 2023.

1.7 STATUS OF STATUTORY ENVIRONMENTAL COMPLIANCE WITH THE ENVIRONMENTAL PERMIT

The status of statutory environmental compliance with the EP conditions under the EIAO, submission status under the EP and implementation status of 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
Further Environmental Permit	FEP-01/308/2008/B	Granted on 16 May 2018
Water Discharge License under WPCO (Permit Holder: GVL)	Licence No.: WT00041447-2022	Validity from 17 June 2022 to 30 June 2024
Billing Account for Disposal of Construction Waste	Chit Account Number: 5001692	Approved on 28 December 2005
Registration as a Chemical Waste Producer (Permit Holder: GVL)	5296-839-G2228-01	Issued on 31 December 2015
Construction Noise Permit (Permit Holder: GVL)	GW-RE1146-23	Validity from 15 September 2023 to 14 March 2024

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.

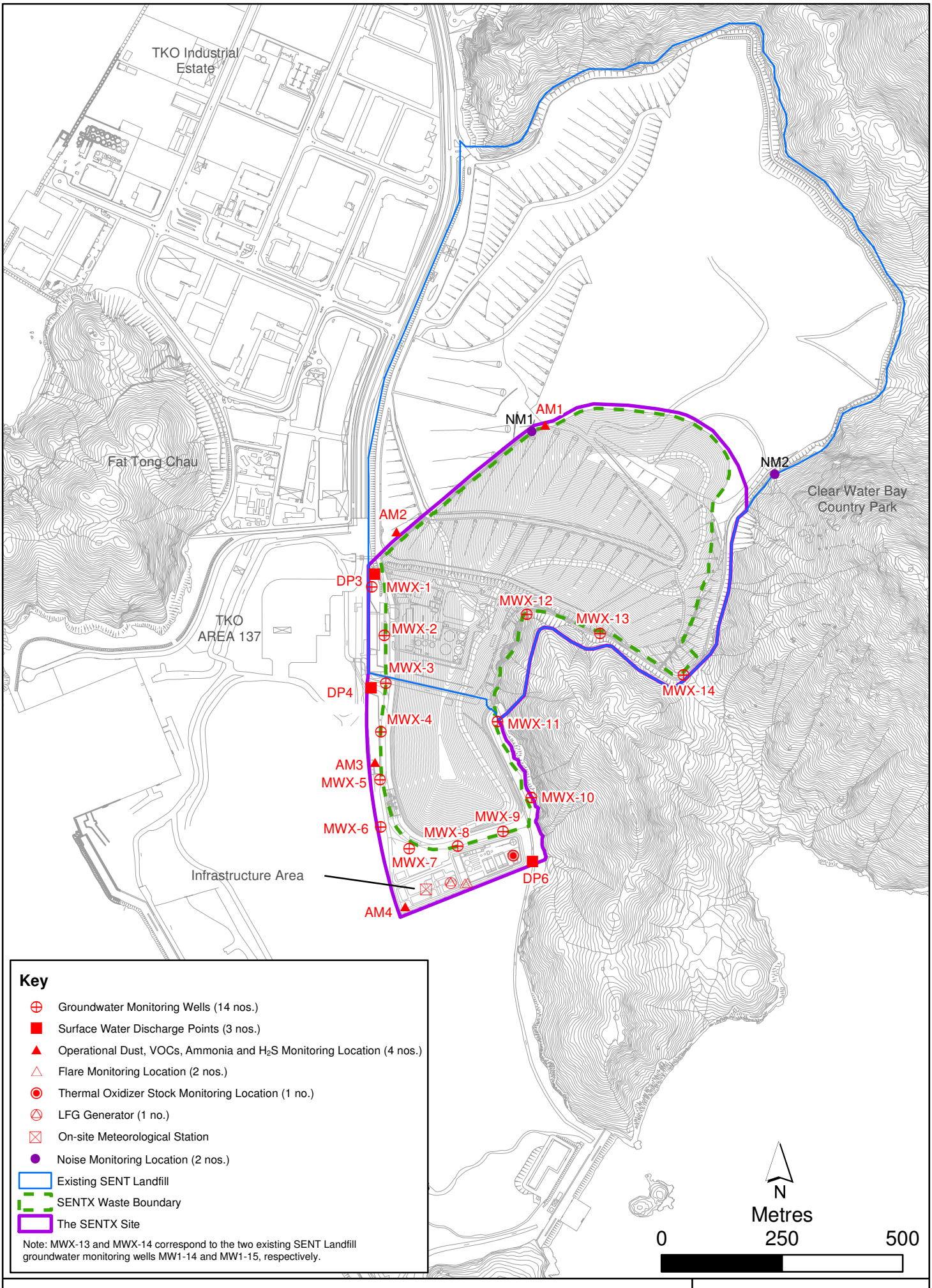


Figure 2.1

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	4, 10, 16, 22, 28 Oct 2023 3, 9, 15, 21, 27 Nov 2023 3, 9, 15, 21, 27 Dec 2023	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 (μg/m^3)	Limit Level (μg/m^3)
		Average	Range		
October 2023	AM1	97	54 - 177	260	260
	AM2	100	45 - 163	260	260
	AM3	151	80 - 233	260	260
	AM4	106	72 - 158	260	260
November 2023	AM1	158	127 - 186	260	260
	AM2	134	91 - 192	260	260
	AM3	240	212 - 272	260	260
	AM4	119	86 - 141	260	260
December 2023	AM1	133	68 - 186	260	260
	AM2	122	85 - 154	260	260
	AM3	148	109 - 178	260	260
	AM4	151	93 -252	260	260

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

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

Based on the investigation conducted for the monitoring event with potential Limit Levels exceedance with the Contractor and the IEC, the TSP exceedance at AM3 on 21 November 2023 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.

2.1.1.4 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.

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.

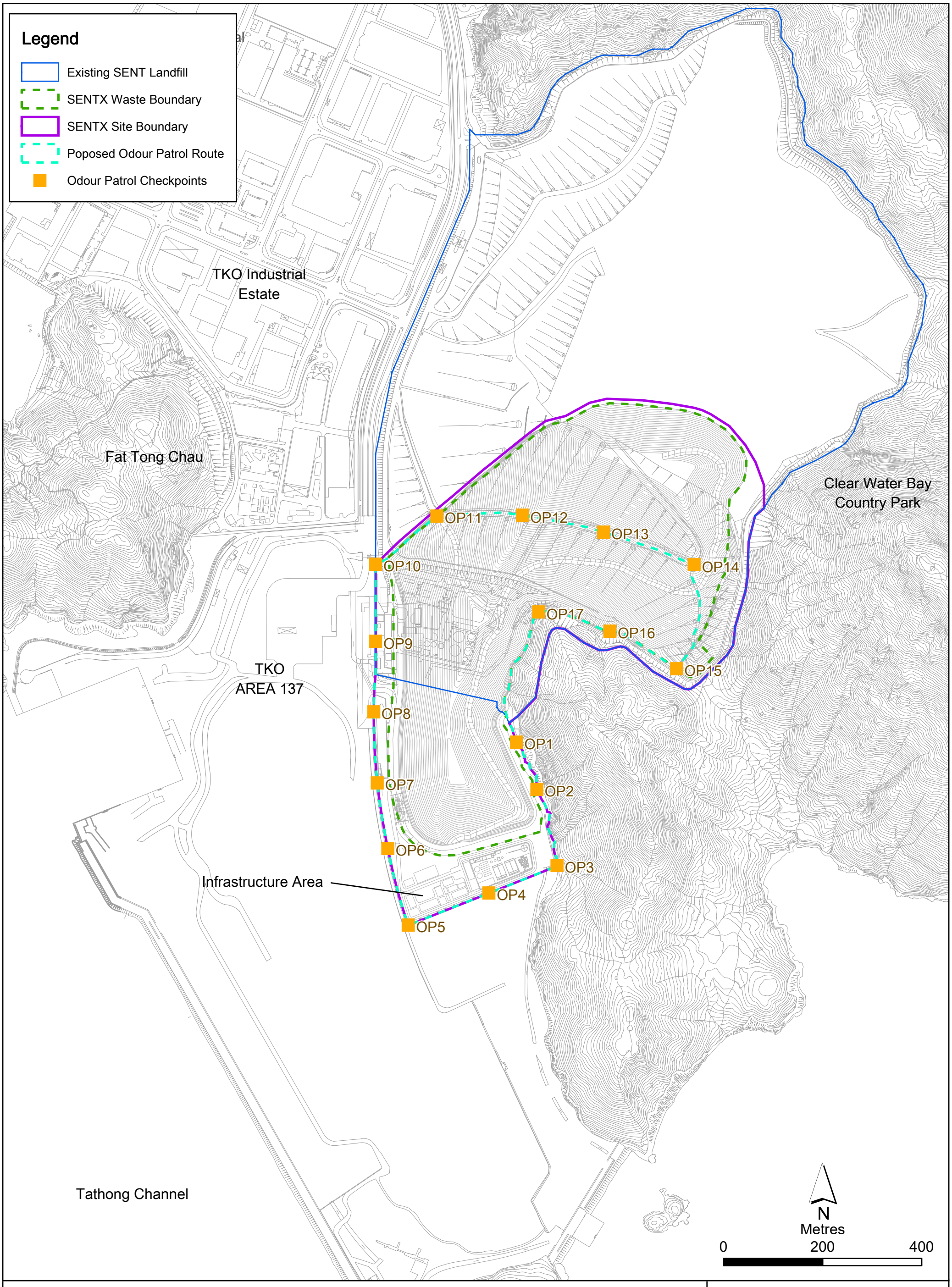

Figure 2.2

Odour Patrol Route for
Operation/ Restoration Phase Odour Monitoring

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Date: 18/8/2022

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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: 19 Oct 2023, 9 Nov 2023 Conducted by an independent third party, ET & IEC: 15 Dec 2023

Notes:

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

(b) Patrol shall be scheduled so that they are carried out together with the patrols to be carried out jointly by the ET and the IEC.

(c) Commencement of each period will be justified by the ET Leader and verified by the IEC and will be subject to agreement with the EPD (EIAO Authority) and Project Proponent.

TABLE 2.6 ODOUR INTENSITY LEVEL

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

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		
OP3	0 - 1		
OP4	0 - 1		
OP5	0		
OP6	0		
OP7	0 - 1		
OP8	0		
OP9	0 - 1		
OP10	0 - 1		
OP11	0		
OP12	0		
OP13	0		
OP14	0		

Odour Checkpoints	Odour Intensity Class	Action Level	Limit Level
OP15	0 - 1		
OP16	0 - 1		
OP17	0		

The potential odour source in the reporting period included Leachate Treatment Plant, Cell 4X tipping area and planting area at SENTX, and the nearby Towngas plant and WSD trench. All the odour monitoring results were below the Action and Limit Levels in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in **Annex D2**.

2.1.3 THERMAL OXIDISER, LANDFILL GAS FLARE AND LANDFILL GAS GENERATOR STACK EMISSION MONITORING

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 x 10^{-2} gs^{-1}
Vinyl chloride	2.23 x 10^{-3} gs^{-1}
Gas combustion temperature	850°C (minimum)
Exhaust gas exit temperature	443K (minimum) [a]
Exhaust gas velocity	7.5 ms^{-1} (minimum) [a]

Note:
(a) Level under full load condition.

TABLE 2.9 LIMIT LEVELS FOR STACK EMISSION OF THE LANDFILL GAS FLARE

Parameters	Limit Level
NO_2	0.97 gs^{-1}
CO	2.43 gs^{-1}
SO_2	0.22 gs^{-1}
Benzene	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	815°C (minimum)
Exhaust gas exit temperature	923 K (minimum) (a)
Exhaust gas velocity	9.0 m s^{-1} (minimum) (a)

Note:
(a) Level under full load condition.

TABLE 2.10 LIMIT LEVELS FOR STACK EMISSION OF THE LANDFILL GAS GENERATOR

Parameters	Limit Level
NO_2	1.91 gs^{-1}
CO	2.48 gs^{-1}
SO_2	0.528 gs^{-1}
Benzene	2.47 x 10^{-4} gs^{-1}
Vinyl chloride	1.88 x 10^{-5} gs^{-1}
Gas combustion temperature	450°C (minimum)
Exhaust gas exit temperature	723K (minimum) (a)
Exhaust gas velocity	30.0 ms^{-1} (minimum) (a)

Note:
(a) Level under full load condition.

Gas samples were collected from the centroid of the stack with stainless steel sampling probe, into inert sample containers (i.e. Canister and Tedlar Bag) and transferred to ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066) laboratory within 24 hours of collection for direct analysis on a gas chromatography within 48 hours after collection. The flue gas velocity of the gas stream at the exhaust of thermal 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	16 Oct 2023, 16 Nov 2023, 15 Dec 2023
	Laboratory analysis for • Non-methane organic compounds CO	Quarterly for the 1st year of operation (b)	16 Nov 2023
	Laboratory analysis for • Ammonia • Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Quarterly	16 Nov 2023
	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Oct – 31 Dec 2023
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	17 Oct 2023, 15 Nov 2023, 14 Dec 2023
	Laboratory analysis for • Non-methane organic compounds CO	Quarterly for the 1st year of operation (b)	15 Nov 2023

Monitoring Location	Parameter	Frequency	Monitoring Date
Stack of Landfill Gas Flare	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Oct – 31 Dec 2023
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	17 Oct 2023, 15 Nov 2023, 14 Dec 2023
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	15 Nov 2023
	• Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Oct – 31 Dec 2023

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
October 2023		
NO_2	0.17 gs^{-1}	1.58 gs^{-1}
CO	0.03 gs^{-1}	0.53 gs^{-1}
SO_2	0.79 gs^{-1}	0.07 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	<1.2 x 10^{-4} gs^{-1}	2.23 x 10^{-3} gs^{-1}
Gas combustion temperature	924°C (900°C – 943°C)	850°C (minimum)
Exhaust gas exit temperature	1,201K (1,192K – 1,210K)	443K (minimum) (a)
Exhaust gas velocity	10.5 ms^{-1} (b)	7.5 ms^{-1} (minimum) (a)
November 2023		
NO_2	0.55 gs^{-1}	1.58 gs^{-1}
CO	0.03 gs^{-1}	0.53 gs^{-1}
SO_2	0.45 gs^{-1}	0.07 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	<1.1 x 10^{-4} gs^{-1}	2.23 x 10^{-3} gs^{-1}
Non-Methane Organic Carbon	0.003 gs^{-1}	-
Ammonia	0.0287 gs^{-1}	- (c)
Gas combustion temperature	925°C (922°C – 930°C)	850°C (minimum)
Exhaust gas exit temperature	1,201K (1,196K – 1,212K)	443K (minimum) (a)
Exhaust gas velocity	9.0 ms^{-1} (b)	7.5 ms^{-1} (minimum) (a)
December 2023		
NO_2	0.68 gs^{-1}	1.58 gs^{-1}
CO	0.03 gs^{-1}	0.53 gs^{-1}
SO_2	<0.005 gs^{-1}	0.07 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	<1.0 x 10^{-4} gs^{-1}	2.23 x 10^{-3} gs^{-1}

Parameters	Monitoring Results (Range in Bracket)	Limit Level
Gas combustion temperature	926°C (923°C – 935°C)	850°C (minimum)
Exhaust gas exit temperature	1,212K (1,204K – 1,221K)	443K (minimum) (a)
Exhaust gas velocity	7.7 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
October 2023		
NO_2	0.02 gs^{-1}	0.97 gs^{-1}
CO	0.38 gs^{-1}	2.43 gs^{-1}
SO_2	<0.01 gs^{-1}	0.22 gs^{-1}
Benzene	<3.03 x 10^{-4} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<7.9 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	Flare 1: 852°C (824°C – 959°C) Flare 2: 909°C (842°C – 936°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,096K (1,013K – 1,199K) Flare 2: 1,125K (1,060K – 1,159K)	923 K (minimum) (a)
Exhaust gas velocity	5.8 ms^{-1} (b)	9.0 m s^{-1} (minimum) (a)
November 2023		
NO_2	0.02 gs^{-1}	0.97 gs^{-1}
CO	0.032 gs^{-1}	2.43 gs^{-1}
SO_2	0.05 gs^{-1}	0.22 gs^{-1}
Benzene	<8.9 x 10^{-5} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<7.1 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Non-Methane Organic Carbon	0.004 gs^{-1}	-
Gas combustion temperature	Flare 1: 909°C (836°C – 993°C)	815°C (minimum)

Parameters	Monitoring Results (Range in Bracket)	Limit Level
	Flare 2: 868°C (828°C – 973°C)	
Exhaust gas exit temperature	Flare 1: 1,159K (1,100K – 1,258K) Flare 2: 1,089K (1,023K – 1,147K)	923 K (minimum) (a)
Exhaust gas velocity	6.3 ms^{-1} (b)	9.0 m s^{-1} (minimum) (a)
December 2023		
NO_2	0.03 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	<1.26 x 10^{-4} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<1.01 x 10^{-4} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	Flare 1: 918°C (830°C – 990°C) Flare 2: 858°C (750°C – 960°C)	815°C (minimum)
Exhaust gas exit temperature	Flare 1: 1,117K (1,033K – 1,253K) Flare 2: 1,044K (923K – 1,143K)	923 K (minimum) (a)
Exhaust gas velocity	9.0 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
October 2023		
NO_2	0.06 gs^{-1}	1.91 gs^{-1}
CO	1.08 gs^{-1}	2.48 gs^{-1}
SO_2	<0.001 gs^{-1}	0.528 gs^{-1}
Benzene	4.0 x 10^{-5} gs^{-1}	2.47 x 10^{-4} gs^{-1}
Vinyl chloride	<1.06 x 10^{-5} gs^{-1}	1.88 x 10^{-5} gs^{-1}
Exhaust gas exit temperature	ENGA: 857K (837K – 882K) ENGB : 853K (836K – 872K)	723K (minimum) (a)
Exhaust gas velocity	11.6 ms^{-1} (b)	30.0 ms^{-1} (minimum) (a)

November 2023		
NO_2	0.095 gs^{-1}	1.91 gs^{-1}
CO	1.082 gs^{-1}	2.48 gs^{-1}
SO_2	<0.001 gs^{-1}	0.528 gs^{-1}
Benzene	1.01 x 10^{-4} gs^{-1}	2.47 x 10^{-4} gs^{-1}
Vinyl chloride	<1.02 x 10^{-5} gs^{-1}	1.88 x 10^{-5} gs^{-1}
Non-Methane Organic Carbons	0.0064 gs^{-1}	-
Exhaust gas exit temperature	ENGA: 875K (858K – 885K) ENGB : 868K (868K – 868K)	723K (minimum) (a)
Exhaust gas velocity	11.8 ms^{-1} (b)	30.0 ms^{-1} (minimum) (a)
December 2023		
NO_2	0.075 gs^{-1}	1.91 gs^{-1}
CO	0.994 gs^{-1}	2.48 gs^{-1}
SO_2	<4.00 x 10^{-4} gs^{-1}	0.528 gs^{-1}
Benzene	1.86 x 10^{-4} gs^{-1}	2.47 x 10^{-4} gs^{-1}
Vinyl chloride	<9.5 x 10^{-6} gs^{-1}	1.88 x 10^{-5} gs^{-1}
Exhaust gas exit temperature	ENGA: 877K (869K – 884K) ENGB : 869K (868K – 869K)	723K (minimum) (a)
Exhaust gas velocity	10.5 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.

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

Based on the investigation conducted for the monitoring event with potential Limit Levels exceedances with the Contractor and the IEC, thermal oxidizer stack emission (SO_2) exceedances on 16 October 2023 and 16 November 2023 were considered Project related.

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

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
Methyl butanoate	30

Parameters	Limit Level (μg m^{-3})
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 H2S

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	15 Nov 2023
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
- 1,2-dibromoethane
- Benzene
- Toluene
- Carbon disulphide
- Propyl benzene
- Ethyl benzene
- Butyl benzene
- Xylenes
- Decanes
- Undecane
- Limonene
- Terpenes
- Ethanol
- Butan-2-ol
- Dimethylsulphide
- Methyl propionate
- Ethyl propionate
- Propyl propionate
- Butyl acetate
- Ethyl butanoate
- Dichlorobenzene
- Methyl butanoate
- Dipropyl ether
- Methanethiol
- Ethanethiol
- Butanethiol
- Methanol
- 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	34	25	23	30
H_2S	42	<15	<15	<15	<15

Parameters	Limit Level (µg m^{-3})	Monitoring Results (µg m^{-3})			
		AM1	AM2	AM3	AM4
Methane	NA [a]	0.00016 %(v/v)	0.00017 %(v/v)	0.00035 %(v/v)	0.00032 %(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	0.9	1.2	1.5	1
Benzene	33	0.8	1	1.5	1.4
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	8.6	0.8	<0.5
Carbon Tetrachloride	64	0.6	0.7	0.9	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]	0.8	1.4	1.4	0.9
Dimethylsulphide	8	<0.2	<0.2	<0.2	<0.2
Dipropyl ether	NA [a]	<0.8	<0.8	<0.8	<0.8
Limonene	212	<0.4	0.5	0.6	0.5
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	4.5	<3.8	5.5	<3.8
Ethyl butanoate	71	<1.0	<1.0	<1.0	<1.0
Ethyl propionate	29	<0.8	<0.8	<0.8	<0.8
Ethyl benzene	738	<0.5	0.6	1	0.7
Heptane	2,746	<0.8	<0.8	<0.8	<0.8
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	22.1	9.5	79.6	29.7

Parameters	Limit Level (µg m^{-3})	Monitoring Results (µg m^{-3})			
		AM1	AM2	AM3	AM4
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	3	4.3	6.3	3.6
Butyl acetate	76	<1.0	<1.0	<1.0	<1.0
Butyl benzene	47	<1.0	<1.0	<1.0	<1.0
Nonane	11,540	<0.9	<0.9	<0.9	<0.9
Propyl benzene	19	<0.8	<0.8	<0.8	<0.8
Octane	7,942	<0.9	<0.9	<0.9	<0.9
Propyl propionate	276	<1.0	<1.0	<1.0	<1.0
Terpenes	NA [(a)]	<0.8	<0.8	1.4	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	1.4	2.4	3.2	1.8
Trichloroethylene	5,500	<1.1	<1.1	<1.1	<1.1
Undecane	5,562	<1.2	<1.2	<1.2	<1.2
Vinyl Chloride	26	<0.3	<0.3	<0.3	<0.3
Xylenes	534	<0.5	1.1	2.4	1.6

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	5, 11, 17, 24, 30 Oct 2023 6, 16, 22, 28 Nov 2023 4, 11, 18, 28 Dec 2023	Sound Level Meter: Rion NL-52 (S/N: 00643049) Acoustic Calibrator: CAL200 (S/N: 15678) CAL200 (S/N: 16878)

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 12 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
October 2023	NM1	51.4	49.5 – 54.0	75
November 2023	NM1	51.7	48.4 – 53.9	75
December 2023	NM1	54.4	53.9 – 54.7	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

Parameters	Limit Level
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	20 Oct 2023, 3 Nov 2023, 15 Dec 2023	• 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: NVAE080GT)
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 in November and December 2023 due to insufficient flow. Details of impact water quality monitoring event are provided in **Annex F1**.

All the surface water monitoring results were below the Limit Level in the reporting period. 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 2.23** were determined by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066).

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

TABLE 2.23 LIMIT LEVELS FOR LEACHATE LEVELS AND EFFLUENT QUALITY

Parameters	Limit Level
Leachate Levels	
Leachate levels above the basal liner	1 m above the primary liner of the leachate containment system
Effluent Quality	
Temperature	> 43 °C
pH Value	6 – 10
Volume Discharged	>2,000 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

Parameters	Limit Level
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 Oct – 31 Dec 2023	Pairs of pressure transducers
Effluent discharged from LTP	Daily for the first 3 months upon full operation of the LTP at wet season (Apr to Sep) and dry season (Oct to Mar), respectively and reduce to monthly thereafter subject to the monitoring results of the first 3 months for each season and agreement with the EIAO Authority, IEC and IC. [(a)]	*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	5 Oct 2023, 2 Nov 2023, 6 Dec 2023	Lutron PH-208 (S/N: TF30605)

Location	Frequency	Parameter	Monitoring Dates	Equipment
		• Boron		

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)
October 2023		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	160 (77 – 251)	> 178
Meter No. X-2	86 (77 – 88)	
Average	161 (78 – 251)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	245 (76 – 366)	> 180
Meter No. X-4	216 (75 – 324)	
Average	231 (77 – 332)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	75 (75 – 76)	> 175
Meter No. X-6	274 (55 – 366)	
Average	274 (55 – 366)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	287 (54 – 417)	> 186
Meter No. X-8	287 (63 – 404)	
Average	287 (59 – 411)	
November 2023		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	151 (131 – 171)	> 178
Meter No. X-2 [(a)]	-	

Average	151 (131 – 171)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	260 (141 – 318)	> 180
Meter No. X-4	253 (62 – 324)	
Average	257 (102 – 320)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	197 (66 – 331)	> 175
Meter No. X-6	264 (64 – 351)	
Average	264 (65 – 351)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	202 (61 – 362)	> 186
Meter No. X-8	212 (70 – 375)	
Average	207 (66 – 369)	
December 2023		
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	124 (99 – 159)	> 178
Meter No. X-2 [(a)]	-	
Average	124 (99 – 159)	
Pump Station No. 2X (Cell 2X		
Meter No. X-3	134 (124 – 163)	> 180
Meter No. X-4	128 (115 – 157)	
Average	131 (120 – 160)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	113 (99 – 122)	> 175
Meter No. X-6	112 (99 – 119)	
Average	112 (99 – 121)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	107 (72 – 129)	> 186
Meter No. X-8	119 (83 – 131)	
Average	113 (96 – 128)	

Note:
(a) Meter No. X-2 at Pump Station No. 1X and Meter No. X-5 at Pump Station No. 3X are on standby from 8 October to 31 December 2023 and from 4 October to 14 November 2023, respectively.

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

Parameters		**Monitoring Results**	**Limit Level**
October 2023			
Temperature	°C	35.4	> 43 °C
pH Value	pH unit	8.3	6 – 10
Volume Discharged	m³	1080	>2,000 m³
Suspended Solids (SS)	mg/L	31.1	> 800 mg/L
Phosphate	mg/L	2.82	> 25 mg/L
Sulphate	mg/L	252	> 800 mg/L
Total Inorganic Nitrogen [a]	mg/L	79.22	> 100 mg/L
BOD	mg/L	20	> 800 mg/L
COD	mg/L	885	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	4610	> 7,000 µg/L
Iron	mg/L	1.6	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	105	> 300 µg/L
Copper	µg/L	12	> 1,000 µg/L
Nickel	µg/L	97	> 700 µg/L
Zinc	µg/L	98	> 700 µg/L
Parameters		**Monitoring Results**	**Limit Level**
November 2023			
Temperature	°C	33.1	> 43 °C
pH Value	pH unit	8.4	6 – 10
Volume Discharged	m³	1164	>2,000 m³
Suspended Solids (SS)	mg/L	19.4	> 800 mg/L
Phosphate	mg/L	0.11	> 25 mg/L
Sulphate	mg/L	165	> 800 mg/L
Total Inorganic Nitrogen [a]	mg/L	54.62	> 100 mg/L

BOD	mg/L	18	> 800 mg/L
COD	mg/L	701	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	3880	> 7,000 µg/L
Iron	mg/L	1.38	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	93	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	78	> 700 µg/L
Zinc	µg/L	73	> 700 µg/L
Parameters		**Limit Level**	**Monitoring Results**
December 2023			
Temperature	°C	23	> 43 °C
pH Value	pH unit	8.2	6 – 10
Volume Discharged	m^3	698	>2,000 m^3
Suspended Solids (SS)	mg/L	55.1	> 800 mg/L
Phosphate	mg/L	1.94	> 25 mg/L
Sulphate	mg/L	279	> 800 mg/L
Total Inorganic Nitrogen [(a)]	mg/L	24.89	> 100 mg/L
BOD	mg/L	22	> 800 mg/L
COD	mg/L	1070	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	5080	> 7,000 µg/L
Iron	mg/L	1.78	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	197	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	65	> 700 µg/L
Zinc	µg/L	69	> 700 µg/L

Limit Levels exceedances were recorded for leachate level monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in **Annex F2** were undertaken. Investigation of the Limit Levels exceedances was conducted and the investigation report is presented in **Annex F6**.

Based on the investigation conducted for the monitoring event with potential Limit Levels exceedance with the Contractor and the IEC, the leachate level exceedances at Pump Station No. 1X from 9 October to 17 October 2023, Pump Station No. 2X from 11 October to 23 November 2023, Pump Station No. 3X from 9 October to 24 November 2023 and Pump Station No. 4X from 9 October to 14 November 2023 were considered Project related.

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

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

2.3.3 GROUNDWATER MONITORING

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	12 Oct 2023, 7, 8 Nov 2023, 14 Dec 2023	Horiba U-52G (S/N: NVAE080GT)

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	0.20	0.04	0.3	5.00	7	3	10	30
MWX-2	0.42	0.02	1.2	5.00	4	2	5	30
MWX-3	1.55	1.43	1.7	5.00	15	12	19	30
MWX-4	1.63	0.18	2.9	7.63	15	13	19	36
MWX-5	1.62	0.64	2.2	5.00	21	14	28	30
MWX-6	3.46	2.23	4.4	5.00	41	35	54	46
MWX-7	6.12	5.8	6.5	6.55	29	18	38	36
MWX-8	7.51	4.76	13.0	15.85	30	24	40	50
MWX-9	0.81	0.5	1.4	7.30	28	24	32	71
MWX-10	<0.01	0.02	0.02	5.00	6	5	7	30
MWX-11	<0.01	0.03	0.03	5.00	7	<2	7	30
MWX-12	<0.01	0.05	0.05	5.00	3	<2	4	30
MWX-13	<0.01	0.02	0.02	5.00	3	<2	3	30
MWX-14	<0.01	0.06	0.06	5.00	3	<2	3	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 (COD) exceedances at MWX-7 on 7 November 2023 and at MWX-6 on 14 December 2023 were considered non Project-related.

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

2.4 LANDFILL GAS MONITORING

2.4.1 MONITORING REQUIREMENTS

According to the updated EM&A Manual of the Project, landfill gas monitoring was carried out at the perimeter of the waste boundary (monitoring wells), area between the SENTX Site

boundary and the waste boundary (surface emission), occupied on-site building, service voids, utilities pit and manholes in the vicinity of the SENTX (build-up of landfill gas) during the operation/restoration phase.

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

TABLE 2.30 LIMIT LEVELS FOR LANDFILL GAS CONSTITUENTS

Parameters	Monitoring Location	Limit Level (% (v/v))	
Perimeter Landfill Gas Monitoring Wells [a]			
Methane & Carbon Dioxide		Methane	Carbon Dioxide
	LFG1	1.0	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
	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

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

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

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

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

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

few centimeters above ground surface to detect flammable gas emitted from the ground surface.

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

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

TABLE 2.31 LANDFILL GAS MONITORING DETAILS

Monitoring Location	Frequency	Parameter	Monitoring Dates	Equipment
Perimeter landfill gas monitoring wells (LFG1 to LFG24, P7 to P9, GP1 to GP7, GP12 and GP15)	Monthly	• Methane • Carbon dioxide • Oxygen • Atmospheric pressure	3 Oct 2023, 9 Nov 2023, 12 Dec 2023	GA5000 (S/N: G507306)
Service voids, utilities and manholes along the Site boundary and within the SENTX Site (UU1 to UU28)	Monthly	• Methane • Carbon dioxide • Oxygen	3 Oct 2023, 3 Nov 2023 12 Dec 2023	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 Oct – 31 Dec 2023	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	17 Nov 2023	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	9 Nov 2023	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.

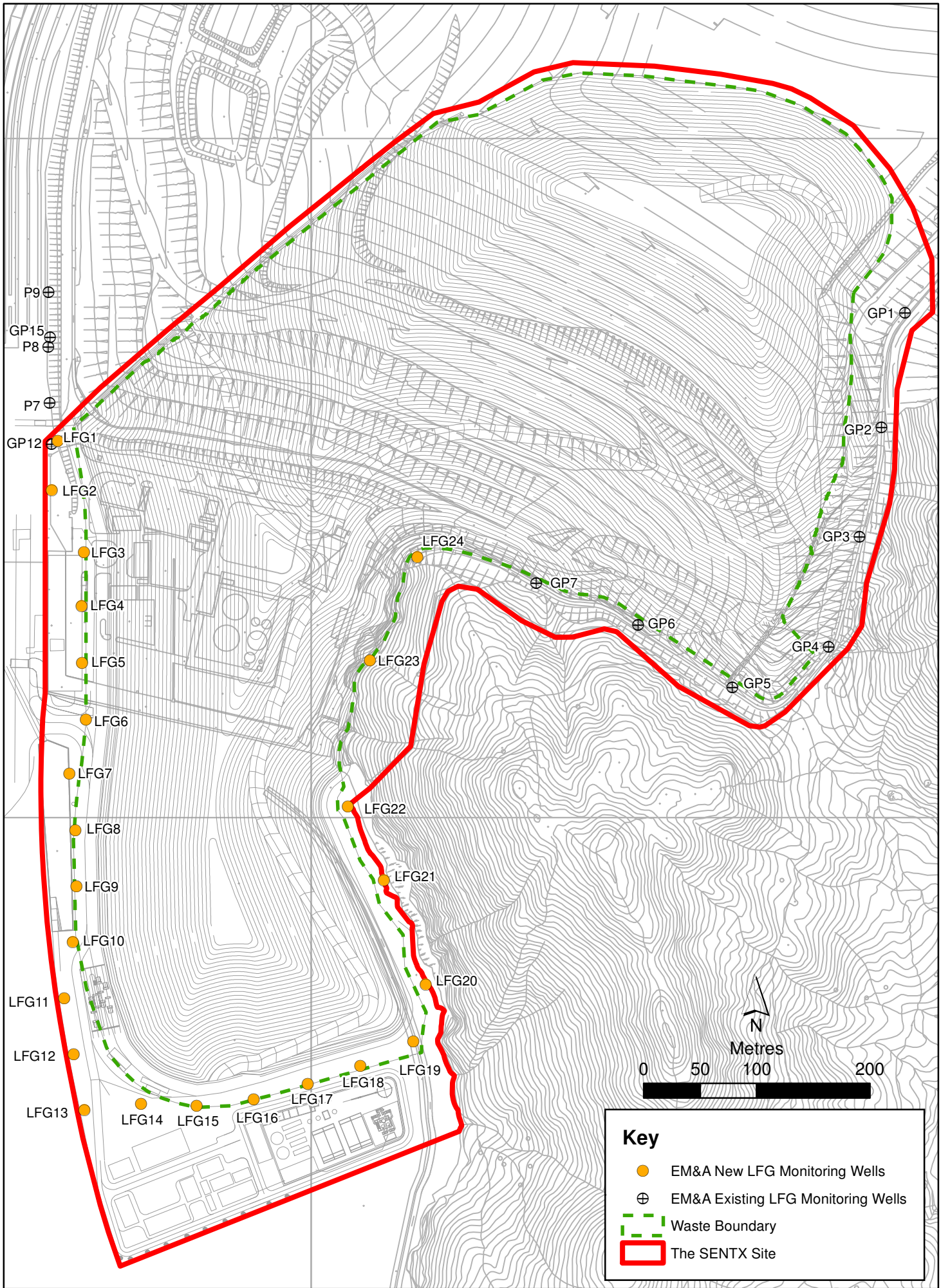


Figure 2.3

Location of Landfill Gas Monitoring Wells

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

ERM

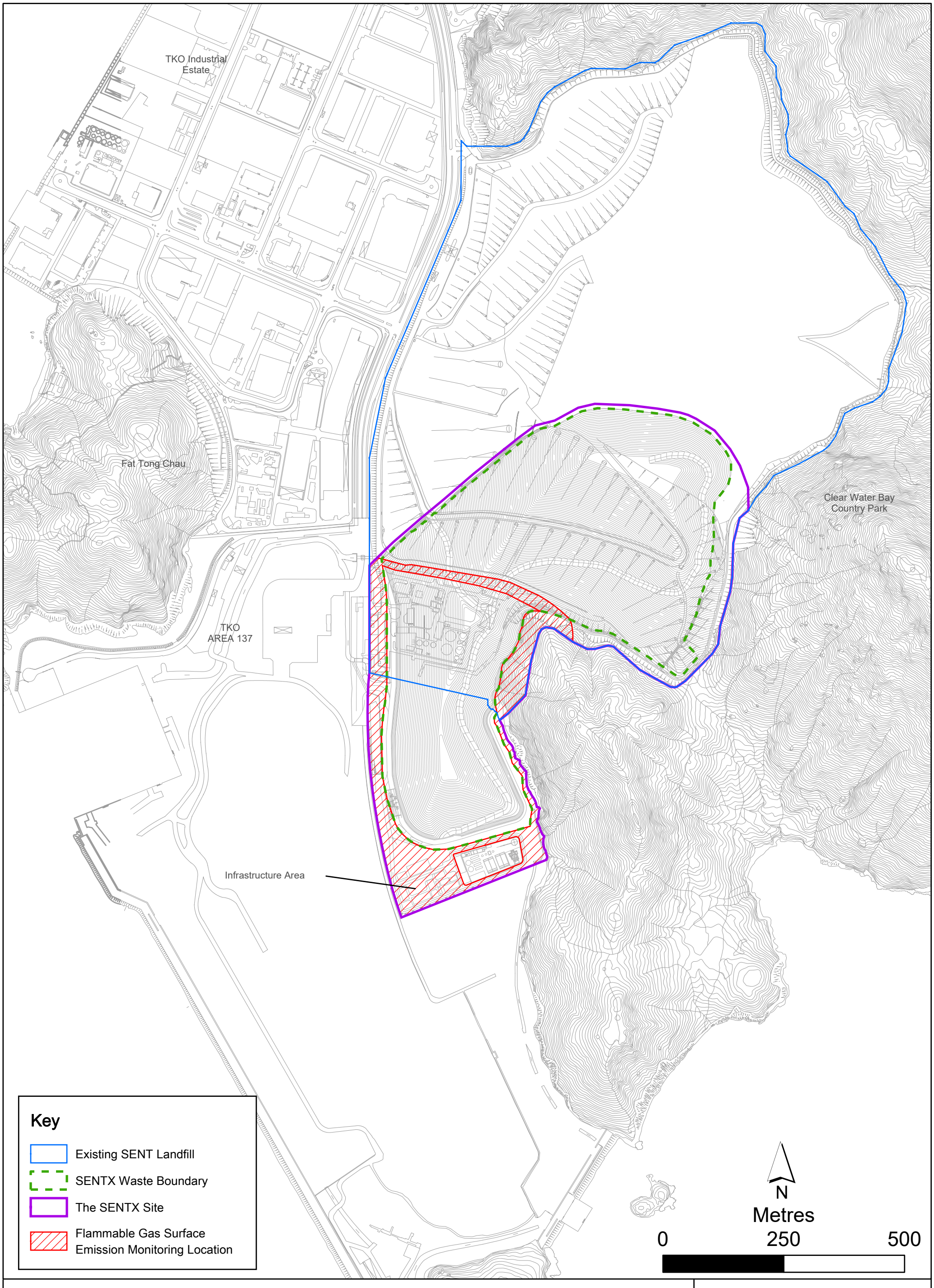


Figure 2.4

Flammable Gas Surface Emission Monitoring Locations

ERM

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	0.1	0.2	1	0.9	0.2	1.6	3.2
LFG2	0.2	0.1	0.2	1	1.2	0.5	2.2	4.3
LFG3	0.1	0	0.1	1	0.9	0	1.4	6.3
LFG4	0.0	0	0	1	0.1	0	0.1	7.0
LFG5	0.0	0	0	1	0.1	0	0.1	3.4
LFG6	0.0	0	0	1	0.1	0	0.1	9.1
LFG7	0.0	0	0	1	0.0	0	0	1.5
LFG8	0.0	0	0	12.6	0.0	0	0.1	2.4
LFG9	0.0	0	0	2.5	0.1	0	0.2	1.7
LFG10	0.0	0	0	3.5	0.0	0	0	1.6
LFG11	0.0	0	0	3	0.0	0	0.1	2.0
LFG12	0.0	0	0	13.2	0.0	0	0	1.5
LFG13	5.3	0	15.9	22.5	0.1	0	0.3	2.7
LFG14	0.0	0	0	5.2	0.0	0	0	1.8
LFG15	0.0	0	0	18.2	0.0	0	0	2.0
LFG16	0.0	0	0	1	0.0	0	0.1	2.0
LFG17	0.0	0	0	17.8	0.0	0	0.1	2.4
LFG18	0.0	0	0	2.3	0.4	0	1.1	2.1
LFG19	0.0	0	0	6.3	0.2	0.1	0.3	3.1
LFG20	0.0	0	0.1	1	0.4	0	1.1	4.6
LFG21	0.0	0	0.1	1	0.1	0	0.3	4.8
LFG22	0.1	0	0.2	1	0.0	0	0.1	4.0
LFG23	0.0	0	0	1	0.0	0	0	10.3
LFG24	0.0	0	0	1	0.0	0	0	4.7
GP1	0.0	0	0	1	4.7	0.1	7.2	10.6
GP2 (shallow)	0.0	0	0	1	0.8	0.8	0.9	11.4
GP2 (deep)	0.0	0	0	1	1.8	0	5.2	10.4
GP3 (shallow)	0.0	0	0	1	0.4	0.1	0.9	6.9

Location	Methane (% (v/v))				Carbon Dioxide (% (v/v))			
	Monitoring Results			Limit Level (a)	Monitoring Results			Limit Level (a)
	Average	Min	Max		Average	Min	Max	
GP3 (deep)	0.0	0	0	1	0.1	0.1	0.2	5.6
GP4 (shallow)	0.0	0	0	1	0.8	0.5	1.3	11.6
GP4 (deep)	0.0	0	0	1	0.3	0.2	0.4	7.7
GP5 (shallow)	0.0	0	0	1	3.9	0.1	9.9	10.8
GP5 (deep)	0.0	0	0	1	0.1	0	0.1	7.5
GP6	0.0	0	0	1	1.9	0.1	4.4	8.4
GP7	0.0	0	0	1	0.3	0.1	0.6	4.5
GP12	0.1	0.1	0.2	1	0.0	0	0	2.3
GP15	0.1	0	0.1	1	0.0	0	0.1	2.2
P7	0.1	0.1	0.1	1	0.2	0	0.4	2.5
P8	0.1	0	0.1	1	0.0	0	0.1	1.7
P9	0.1	0.1	0.2	1	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	0.0	0.0	0.0	1.0
UU04	0.0	0.0	0.0	1.0
UU05	0.0	0.0	0.0	1.0
UU06	0.0	0.0	0.0	1.0
UU07	0.0	0.0	0.0	1.0
UU08	0.0	0.0	0.0	1.0
UU09	0.0	0.0	0.0	1.0

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

TABLE 2.34 SUMMARY OF LANDFILL GAS BULK SAMPLING MONITORING RESULTS IN THE REPORTING PERIOD

Parameters	Limit Level (LFG2) [a]	LFG2	Limit Level (LFG8) [a]	LFG8
Methane (% (v/v))	1.0	0.750	12.6	0.096
Carbon Dioxide (% (v/v))	4.3	<0.020	2.4	<0.020
Oxygen (% (v/v))	-	19.3	-	20.3
Nitrogen (% (v/v))	-	77	-	76.6
Carbon Monoxide (% (v/v))	-	<0.020	-	<0.020
Hydrogen (% (v/v))	-	<0.020	-	<0.020
Ethane (ppmv)	-	<1.0	-	<1.0

Parameters	Limit Level (LFG2) [a]	LFG2	Limit Level (LFG8) [a]	LFG8
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°16'29"	114°16'10"	12	30
22°16'26"	114°16'34"	15	
22°16'19"	114°16'35"	15	
22°16'17"	114°16'33"	17	
22°16'50"	114°16'21"	17	
22°16'20"	114°16'27"	17	
22°16'29"	114°16'27"	5	

The alarm of the permanent gas monitoring systems with pre-set levels for methane at 20% lower explosive limit (LEL, equivalent to 1% methane gas (v/v)) was not triggered at all occupied on-site buildings at SENTX from October 2023 to December 2023.

All the landfill gas 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 G3**.

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 18 October 2023, 23 November 2023 and 7 December 2023 to monitor the implementation of the landscape and visual mitigation measures during operation/ restoration phase.

All relevant environmental mitigation measures listed in the approved EIA Report and the updated EM&A Manual and their implementation status are 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 ER 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 5, 12, 19 and 26 October 2023, 2, 9, 16, 23 and 30 November 2023 and 7, 14, 21 and 28 December 2023.

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
5 October 2023	• The Contractor shall remove the general refuse accumulated at DP3, X10 channel and DP4 outlet regularly to ensure they are functioning properly at all times. • The Contractor shall clean up the algae accumulated at DP6 Wetsep to ensure it is functioning properly at all times. • The Contractor shall remove the general refuse and chemical waste accumulated near Towngas plant and dispose of the chemical waste separately.
12 October 2023	• The Contractor shall cover the stockpile of dusty materials near Towngas plant by impervious sheeting to minimise dust impact. • The Contractor shall remove the deposited silt and grit accumulated at X10 channel and maintain the silt fencing along X10 channel to minimise SS runoff to the channel.
19 October 2023	• The Contractor shall remove the deposited silt, grit and general refuse accumulated at X10 channel and channel near site entrance regularly to ensure they are functioning properly at all times. • The Contractor shall review the treatment capacity of the Wetseps at DP3 and DP4 to ensure all surface water is treated properly before discharge. • The Contractor shall arrange regular cleaning and removal of deposits along the main haul road, especially near site entrance to minimise mud to be carried on the public road.
26 October 2023	• The Contractor shall remove the deposited silt and grit accumulated at X10 channel regularly and maintain the silt fencing along the channel to minimise SS runoff to the channel.
2 November 2023	• The Contractor shall remove the general refuse, deposited silt and grit accumulated at X10 channel and the drain near site entrance regularly to ensure they are functioning properly at all times.
9 November 2023	• The Contractor shall remove the general refuse and deposited silt and grit accumulated at X10 channel to ensure it is functioning properly at all times and minimise odour and pest impact. • The Contractor shall remove the general refuse accumulated near Towngas plant and dispose of the waste regularly.
16 November 2023	• The Contractor shall enhance watering at tipping area to minimise dust impact.

Inspection Date	Environmental Observations and Recommendations
	• The Contractor shall continue the silt removal work at X10 channel and remove the general refuse accumulated at DP4 outlet to ensure they are functioning properly at all times. • The Contractor shall clean up the oil spillage at DP6 and handle the cleanup material as chemical waste. • The Contractor shall arrange regular cleaning and removal of deposits along the main haul road, especially near the site entrance to minimise mud to be carried on the public road. • The Contractor shall remove the general refuse accumulated at the drain near Towngas plant and at the planting area, and dispose of the waste regularly.
23 November 2023	• The Contractor shall remove the general refuse accumulated at X10 channel and DP4 outlet regularly to ensure they are functioning properly at all times.
30 November 2023	• The Contractor shall arrange regular cleaning and removal of deposits along the main haul road, especially near weighbridge, to minimise mud to be carried on the public road.
7 December 2023	• No observations during the site inspection.
14 December 2023	• The Contractor shall replace the faded NRMM label displayed on the grabber at sorting area.
21 December 2023	• The Contractor shall place the NRMM label on the sorting machine at sorting area.
28 December 2023	• The Contractor shall display NRMM labels on the sorting machine and generator at sorting area or display the label "Not in use". • The Contractor shall remove the deposited silt, grit and general refuse accumulated at X10 channel regularly to ensure it is functioning properly at all times.

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	N.A.

Deficiencies	Rectifications Implemented	Proposed Additional Control Measures
	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.	
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 yard 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 Oct 23	0	0	0	0	0	0	0	0	1.180
1 – 30 Nov 23	0	0	0	0	0	0	10.61	0	1.040
1 – 31 Dec 23	235.53	0	0	0	0	0	3.95	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 Action and Limit Levels for TSP and two exceedances of Limit Level for thermal oxidizer stack emission (SO_2) were recorded for air quality monitoring in the reporting period. The TSP exceedance at AM3 on 21 November 2023 was considered non Project-related, while the thermal oxidizer stack emission (SO_2) exceedances on 16 October and 16 November 2023 were considered Project related upon further investigation.

Two exceedances of the Limit Level for groundwater (COD) and one hundred thirty-seven exceedances of the Limit Level for Leachate Level were recorded for water quality impact monitoring in the reporting period. The groundwater (COD) exceedances at MWX-7 on 7 November 2023 and at MWX-6 on 14 December 2023 were considered non Project-related upon further investigation. The leachate level exceedances at Pump Station No. 1X from 9 October to 17 October 2023, Pump Station No. 2X from 11 October to 23 November 2023, Pump Station No. 3X from 9 October to 24 November 2023 and Pump Station No. 4X from 9 October to 14 November 2023 were considered 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 October 2023 to 31 December 2023 in accordance with the updated EM&A Manual and the requirements of the Environmental Permit (*EP-308/2008/B)*.

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

One exceedance of Action and Limit Levels for TSP, two exceedances of Limit Level for thermal oxidizer stack emission (SO_2), two exceedances of the Limit Level for groundwater (COD) and one hundred thirty-seven exceedances of the Limit Level for Leachate Level were recorded in the reporting period.

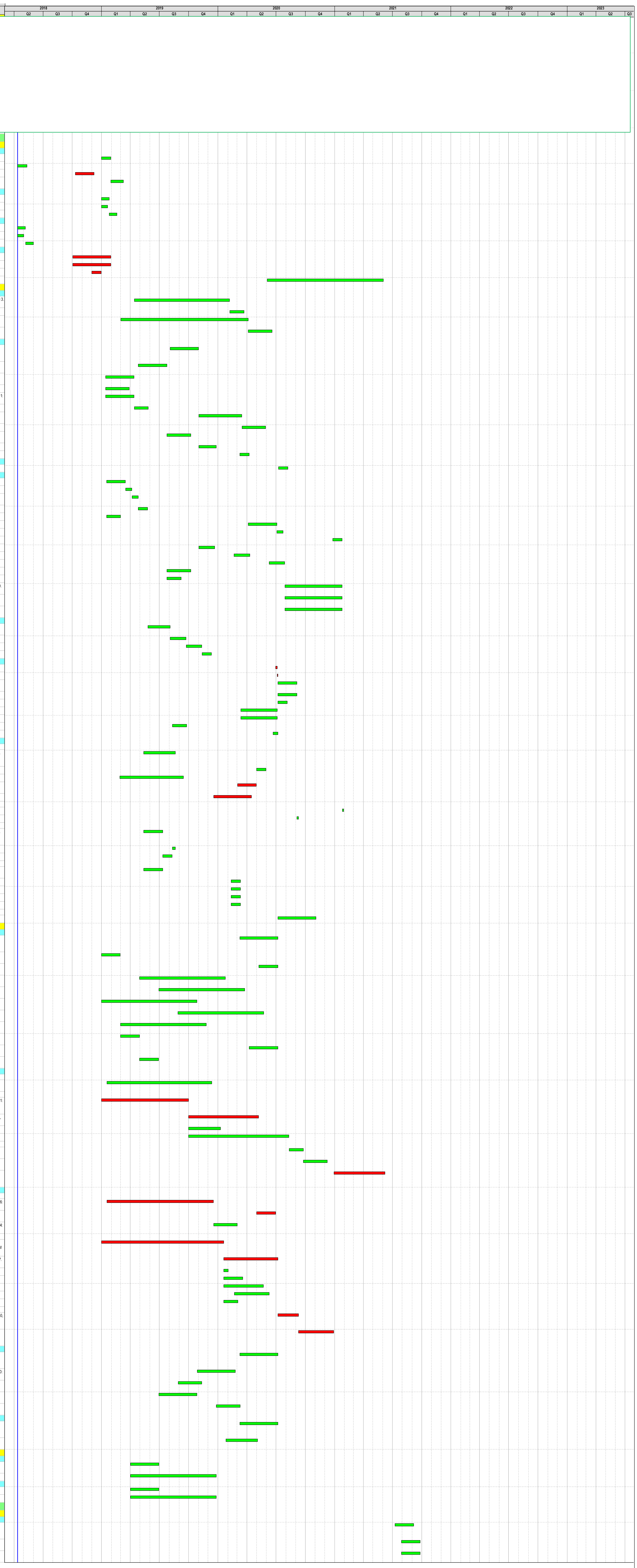
Thirteen environmental site inspections were carried out during the reporting period. Environmental deficiencies were identified during the site inspection and the Contractor has proposed additional control measures to rectify the deficiencies.

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

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

ANNEX A WORK PROGRAMME

#	WBS Path	Activity ID	Activity Name	Dur	Start	Finish	Total Float	Predecessor Details	Successor Details
336									
337									
338									
339									
340									
341									
342									
343									
344									
345									
346									
347									
348									
349									
350									
351									
352	**SA2.5 Construction (Initial Works)**			1153	12-Apr-18	07-Jun-21	705		
353	**SA2.5.02 Advance Works & Site Establishment**			1148	12-Apr-18	02-Jun-21	35		
354	**SA2.5.02.01 Site Establishment & Mobilization**			333	12-Apr-18	10-Mar-19	820		
355	5.02.01	52-1000	Site Mobilization for Parts X1 & X2	30	31-Dec-18	29-Jan-19	820	11-1100: FS, 11-1200: FS	52-1300: FS, M 3. 1: FS, M 3. 2: FS
356	5.02.01	52-1100	Site Mobilization for Parts X3, X4 & X5	30	12-Apr-18	11-May-18	1083	11-1300: FS, 11-1400: FS, 11-1500: FS	52-1300: FS, M 3. 1: FF
357	5.02.01	52-1200	Temporary Office for Employer / ER / IC	60	10-Oct-18	08-Dec-18	0	23-1300: FS	11-1700: SS, M 3. 1: FS
358	5.02.01	52-1300	Hoarding and Fencing Works	40	30-Jan-19	10-Mar-19	820	52-1000: FS, 52-1100: FS	32-1500: FS, M10. 1: FS -26, M10. 2: FS -13, M10. 3: FS
359	**SA2.5.02.02 Site Survey & Investigation Works for Parts X1 & X2**			50	31-Dec-18	18-Feb-19	840		
360	5.02.02	52-1400	Condition Survey	25	31-Dec-18	24-Jan-19	840	11-1100: FS, 11-1200: FS	52-1600: FS
361	5.02.02	52-1500	Topographic Survey	20	31-Dec-18	19-Jan-19	845	11-1100: FS, 11-1200: FS	52-1600: FS
362	5.02.02	52-1600	Site inspection, Review of Condition Survey Report	25	25-Jan-19	18-Feb-19	840	52-1500: FS, 52-1400: FS	32-1500: FS
363	**SA2.5.02.03 Site Survey & Investigation Works for Parts X3, X4 & X5**			50	12-Apr-18	31-May-18	1103		
364	5.02.03	52-1700	Condition Survey	25	12-Apr-18	06-May-18	1103	11-1300: FS, 11-1400: FS, 11-1500: FS	52-1900: FS
365	5.02.03	52-1800	Topographic Survey	20	12-Apr-18	01-May-18	1108	11-1300: FS, 11-1400: FS, 11-1500: FS	52-1900: FS
366	5.02.03	52-1900	Site inspection, Review of Condition Survey Report	25	07-May-18	31-May-18	1103	52-1700: FS, 52-1800: FS	32-1500: FS
367	**SA2.5.02.04 Environmental Monitoring**			975	02-Oct-18	02-Jun-21	35		
368	5.02.04	52-2000	Installation of Monitoring Stations & Wells (GP & GW)	120	02-Oct-18	29-Jan-19	0	23-1600: FS	52-2200: SS 60
369	5.02.04	52-2100	Installation of Monitoring Stations & Wells (GP & GW) on Buttress Wall	120	02-Oct-18	29-Jan-19	0	23-1600: FS	52-2200: SS 60
370	5.02.04	52-2200	Conduct Baseline Monitoring for Construction (one month)	30	01-Dec-18	30-Dec-18	0	52-2000: SS 60, 52-2100: SS 60	11-1100: FS
371	5.02.04	52-2300	Conduct Baseline Monitoring for Operation (one year)	365	03-Jun-20	02-Jun-21	35	32-1500: FS -400, 53-4500: FS	12-1400: FS
372	**SA2.5.03 Civil Engineering Works**			748	13-Jan-19	29-Jan-21	834		
373	**SA2.5.03.0 Buttress Wall**			475	02-Mar-19	18-Jun-20	83		
374	5.03.0	53-1000	Section adj. SENT	300	13-Apr-19	06-Feb-20	96	11-1300: FS, 23-2500: FS, 53-3000: FS, 31-1200: FS, 11-1400: FS	53-1100: FS, 53-1300: FS, 53-3100: FS, M 3. 5: FS -150, M 3. 7: FS
375	5.03.0	53-1100	Diversion of SENT Landfill Gas Pipe	45	07-Feb-20	22-Mar-20	96	23-2500: FS, 53-1000: FS	53-1300: FS, 54-4000: FS, M 3. 3: FS
376	5.03.0	53-1200	Section at Cell 4	400	02-Mar-19	04-Apr-20	83	11-1300: FS, 23-2500: FS, 53-3000: FS, 11-1400: FS	53-1300: FS, 53-3100: FS, M 3. 7: FS, M 3. 6: FS -200
377	5.03.0	53-1300	Install Landfill Gas Pipe on Buttress Wall	75	05-Apr-20	18-Jun-20	83	41-1500: FS, 53-1100: FS, 53-1200: FS, 53-1000: FS	54-4000: FS
378	**SA2.5.03.1 Landfill Cell 1**			503	13-Jan-19	29-May-20	214		
379	5.03.1	53-1400	Earth bund (Eastern)	90	04-Aug-19	01-Nov-19	9	11-1100: FS, 23-2500: FS, 53-4200: FS, 53-2800: FS	53-2000: FS, 53-2300: FS, 53-3400: FS, 63-1000: FS, 63-1100: FS, 63-1200: FS, 63-1300: FS, M 4. 2: FS
380	5.03.1	53-1500	Earth bund (Southern)	90	26-Apr-19	24-Jul-19	314	11-1100: FS, 23-2500: FS, 53-2800: FS	53-2000: FS, 53-2200: FS, 53-2300: FS, 53-3400: FS, 53-3700: FS, 53-3800: FS
381	5.03.1	53-1600	Earth bund (Western)	90	13-Jan-19	12-Apr-19	417	11-1100: FS, 23-2500: FS	53-1900: FS, 53-2000: FS, 53-2200: FS, 53-3800: FS
382	5.03.1	53-1700	Intercell bund (Cell 1/2)	75	13-Jan-19	28-Mar-19	432	11-1100: FS, 23-2500: FS	53-2000: FS
383	5.03.1	53-1800	Site Formation	90	13-Jan-19	12-Apr-19	217	11-1100: FS, 23-2500: FS, 31-1300: FS	53-1900: FS, 63-1100: FS, 63-1200: FS, 63-1300: FS, M 4. 1: FS -45
384	5.03.1	53-1900	Pump Station (PS#1X)	45	13-Apr-19	27-May-19	507	53-1800: FS, 53-1600: FS	53-2100: FS, 53-2200: FS
385	5.03.1	53-2000	Lining Works	135	02-Nov-19*	15-Mar-20	214	41-1500: FS, 53-1400: FS, 53-1500: FS, 53-1600: FS, 53-1700: FS	53-2100: FS
386	5.03.1	53-2100	Protective Stone Laying & Leachate Collection Pipe	75	16-Mar-20	29-May-20	214	53-2000: FS, 41-1500: FS, 53-1900: FS	32-1500: FS, 54-2800: FS, M 4. 3: FS
387	5.03.1	53-2200	Install Leachate Force Main	75	25-Jul-19	07-Oct-19	449	53-1500: FS, 53-1600: FS, 41-1500: FS, 53-1900: FS	54-2800: FS
388	5.03.1	53-2300	Install Landfill Gas Pipe on earth bund	55	02-Nov-19	26-Dec-19	258	41-1500: FS, 53-1400: FS, 53-1500: FS	54-4000: FS
389	5.03.1	53-2400	Leachate Pipe Connection (Cell 1 to LTP)	30	09-Mar-20	07-Apr-20	266	23-2500: FS, 54-1000: SS	54-2800: FS
390	**SA2.5.03.4 Landfill Cell 4**			30	09-Jul-20	07-Aug-20	144		
391	5.03.4	53-2500	Provide Temporary Leachate Pipe on Cell 4 Area	30	09-Jul-20	07-Aug-20	144	23-2500: FS, 63-2600: SS -90	54-2800: FS, M 3. 3: FS
392	**SA2.5.03.5 Drainage - Surface Run-Off**			740	16-Jan-19	24-Jan-21	839		
393	5.03.5	53-2600	Construct Cut-Off Channel 12A	60	16-Jan-19	16-Mar-19	9	11-1100: FS, 23-2800: FS	53-2700: FS
394	5.03.5	53-2700	Connect Cut-Off Channel 12A to DP6	20	17-Mar-19	05-Apr-19	9	53-2600: FS, 31-1400: FS, 23-1900: FS	53-2800: FS
395	5.03.5	53-2800	Diversion from Existing Trapezoidal Channel into Channel 12A	20	06-Apr-19	25-Apr-19	9	53-2700: FS	53-1400: FS, 53-1500: FS, 53-2900: FS, 63-1000: FS, 63-1900: FS, M 3. 3: FS
396	5.03.5	53-2900	Removal of Existing Trapezoidal Channel along Eastern Bund	30	26-Apr-19	25-May-19	9	53-2800: FS	53-4200: FS
397	5.03.5	53-3000	Cut-Off Channel C4 Diversion to Cut-Off Channel 17-2	45	16-Jan-19	01-Mar-19	83	11-1300: FS, 23-2800: FS	53-1000: FS, 53-1200: FS
398	5.03.5	53-3100	Cut-Off Channel X5 on Buttress Wall, Cell 4, Cell 3	90	05-Apr-20	03-Jul-20	289	53-1000: FS, 53-1200: FS	53-3200: FS
399	5.03.5	53-3200	Temporary Diversion Cut-Off Channel X5 to 12A	20	04-Jul-20	23-Jul-20	289	53-3100: FS, 23-1900: FS	53-3300: FS, M 3. 4: FS
400	5.03.5	53-3300	Culvert X5 (5m long) & Perm Connection of Cut-Off Channel X5	30	26-Dec-20	24-Jan-21	134	53-4100: FF, 63-1900: FS, 53-3200: FS	32-1500: FS
401	5.03.5	53-3400	Construct Perimeter Channel X6 on Eastern Bund & Southern Bund of Cell 1	50	02-Nov-19	21-Dec-19	249	53-1400: FS, 53-1500: FS	53-3500: FS
402	5.03.5	53-3500	Construct Perimeter Channel X6 on Eastern Bund of Cell 2	50	20-Feb-20	09-Apr-20	189	63-1000: FS, 53-3400: FS	53-3600: FS
403	5.03.5	53-3600	Construct Perimeter Channel X6 Eastern Bund of Cell 3	50	09-Jun-20	28-Jul-20	129	63-1900: FS, 53-3500: FS	53-3900: FS
404	5.03.5	53-3700	Culvert X6 (25m long) at Cell 1 Southern Bund	75	25-Jul-19	07-Oct-19	1314	53-1500: FS	
405	5.03.5	53-3800	Perimeter Channel (X9B) at Cell 1 Southern & Western Bund	45	25-Jul-19	07-Sep-19	1344	53-1500: FS, 53-1600: FS	
406	5.03.5	53-3900	Drop Inlet & Culvert (X9) - 21m long	180	29-Jul-20	24-Jan-21	129	11-1100: FS, 23-1900: FS, 53-3600: FS	53-4000: FF, 53-4100: FF, 53-6000: FS, M 9. 1: FS -90, M 9. 2: FS
407	5.03.5	53-4000	Sediment Trap (ST)	180	29-Jul-20	24-Jan-21	129	11-1100: FS, 23-1900: FS, 11-1200: FS, 53-3900: FF	53-6000: FS, M 9. 3: FS -90, M 9. 4: FS
408	5.03.5	53-4100	Dual Culvert 74m long (connect to DP4)	180	29-Jul-20	24-Jan-21	129	11-1100: FS, 11-1200: FS, 23-1900: FS, 53-3900: FF	53-3300: FF, 53-6000: FS, M 9. 1: FS -90, M 9. 2: FS
409	**SA2.5.03.6 Drainage - Ground Water**			200	26-May-19	11-Dec-19	209		
410	5.03.6	53-4200	Construct Groundwater Collection Pipe along Cells X1 & X2 Eastern Bund	70	26-May-19	03-Aug-19	9	11-1100: FS, 23-1600: FS, 53-2900: FS	53-1400: FS, 53-4300: FS, 63-1000: FS, 63-1900: FS
411	5.03.6	53-4300	Construct Groundwater Collection Pipe along Cell X3 Eastern Bund	50	04-Aug-19	22-Sep-19	159	53-4200: FS	53-4400: FS, 63-1900: FS
412	5.03.6	53-4400	Construct Groundwater Collection Pipe along Intercell Bund X2/X3	50	23-Sep-19	11-Nov-19	209	53-4300: FS	53-4500: FS, 63-1200: FS
413	5.03.6	53-4500	Construct Manhole MH-X1	30	12-Nov-19	11-Dec-19	209	53-4400: FS	52-2300: FS, M 9. 5: FS
414	**SA2.5.03.7 Utilities - Distribution within New Infrastructure Area**			391	11-Aug-19	04-Sep-20	276		
415	5.03.7	53-4600	Power Supply HV Works (Transformer & HV switchgear)	5	30-Jun-20	04-Jul-20	0	54-3000: FS	12-1200: FS
416	5.03.7	53-4700	Power Distribution, LV Power Supply Works	2	05-Jul-20	06-Jul-20	0	54-3100: FS, 12-1200: FS	12-1000: FS
417	5.03.7	53-4800	Sewerage (Collection to LTP)	60	07-Jul-20	04-Sep-20	271	54-1000: FS, 54-3100: FS, 54-3300: FS, 54-4100: FS	12-1100: FS, 53-6100: FS
418	5.03.7	53-4900	Sewerage (Discharge to Site Boundary)	60	07-Jul-20	04-Sep-20	271	54-1000: FS, 54-4100: FS, 54-4600: FS	12-1100: FS, 53-6100: FS
419	5.03.7	53-5000	Lighting Provision	30	07-Jul-20	05-Aug-20	6	54-1000: FS, 54-4100: FS, 54-4600: FS	12-1100: FS, 32-2100: FS
420	5.03.7	53-5100	Fire Services	115	12-Mar-20	04-Jul-20	2	53-6800: FS	12-1000: FS
421	5.03.7	53-5200	Water Supply (Fresh & Salt)	115	12-Mar-20	04-Jul-20	338	53-6600: FS, 53-6700: FS	12-1100: FS
422	5.03.7	53-5300	Telecom & Network	45	11-Aug-19	24-Sep-19	622	53-6400: FS	12-1100: FS
423	5.03.7	53-5400	Gas Network (LFG to LTP)	15	22-Jun-20	06-Jul-20	176	54-1000: FF	54-2800: FS
424	**SA2.5.03.8 Utilities - Works Associated with Utilities Undertakers**			703	27-Feb-19	29-Jan-21	129		
425	SA2.5.03.8.U1 CLP			459	27-Feb-19	30-May-20	43		
426	5.03.8.U1	53-5500	Excavate Trench for CLP Cable	100	13-May-19	20-Aug-19	194	23-2900: FS	53-5800: FS, 54-1000: SS, 54-4100: SS, 54-4600: SS, M10. 1: FS -60, M10. 2: FS -30, M10. 3: FS
427	5.03.8.U1	53-5600	Backfill Trench after CLP Cable Laying	30	01-May-20	30-May-20	43	53-5800: FS	54-1000: FF, 54-4100: FF, 54-4600: FF
428	5.03.8.U1	53-5700	CLP Cable Laying (from CLP Substation to Site Boundary)	200	27-Feb-19	14-Sep-19	229	32-2400: FS	54-3000: FS
429	5.03.8.U1	53-5800	CLP Cable Laying (from Site Boundary to HV Switchroom)	60	02-Mar-20	30-Apr-20	0	53-5500: FS, 54-2900: FS, 32-2400: FS, 53-5900: FF 15	53-5600: FS, 54-3000: FS
430	5.03.8.U1	53-5900	CLP HV associated equipment installation	120	18-Dec-19	15-Apr-20	0	54-2900: FS, 32-2400: FS	53-5800: FF 15
431	SA2.5.03.8.U2 DSD			147	05-Sep-20	29-Jan-21	129		
432	5.03.8.U2	53-6000	Connection to Storm Drain System	5	25-Jan-21	29-Jan-21	129	53-4100: FS, 53-4000: FS, 53-3900: FS	32-1500: FS
433	5.03.8.U2	53-6100	Connection to Foul Drain System	5	05-Sep-20	09-Sep-20	271	53-4800: FS, 53-4900: FS	32-1500: FS
434	SA2.5.03.8.U3 Telecom			100	13-May-19	20-Aug-19	327		
435	5.03.8.U3	53-6200	Excavate Trench for PCCW	60	13-May-19	11-Jul-19	307	23-2900: FS	53-6400: FS, 54-1000: SS, 54-4100: SS, 54-4600: SS, M10. 1: FS -40, M10. 2: FS -20, M10. 3: FS
436	5.03.8.U3	53-6300	Backfill Trench after PCCW Cable Laying	10	11-Aug-19	20-Aug-19	327	53-6400: FS	54-1000: FF, 54-4100: FF, 54-4600: FF
437	5.03.8.U3	53-6400	Laying Cables & Connection	30	12-Jul-19	10-Aug-19	327	53-6200: FS	53-5300: FS, 53-6300: FS
438	SA2.5.03.8.U4 WSD			304	13-May-19	11-Mar-20	338		
439	5.03.8.U4	53-6500	Install Watermain & Piping for Water Supplies	60	13-May-19	11-Jul-19	216	23-2900: FS	53-6600: FS, 53-6700: FS, 53-6800: FS, 53-6900: FS
440	5.03.8.U4	53-6600	Connection for Fresh Water & Meter Installation	30	11-Feb-20	11-Mar-20	338	53-6500: FS, 32-2300: FS	53-5200: FS
441	5.03.8.U4	53-6700	Connection for Salt Water	30	11-Feb-20	11-Mar-20	338	53-6500: FS, 32-2300: FS	53-5200: FS
442	5.03.8.U4	53-6800	Connection for Fire Services	30	11-Feb-20	11-Mar-20	2	53-6500: FS, 32-2300: FS	53-5100: FS
443	5.03.8.U4	53-6900	Connection for Cooling Tower & Meter Installation	30	11-Feb-20	11-Mar-20	117	53-6500: FS, 32-2300: FS	54-2700: FS, 54-3900: FS
444	SA2.5.03.8.U5 HyD Lighting			120	07-Jul-20	03-Nov-20	216		
445	5.03.8.U5	53-7000	Installation of Public Street Lighting / Handover	120	07-Jul-20	03-Nov-20	216	54-4100: FS, 54-4600: FS, 54-1000: FS	32-1500: FS
446	**SA2.5.04 Building Construction, incl. E&M and System Installation, and T&C**			890	31-Dec-18	07-Jun-21	0		
447	**SA2.5.04.A Part X1 Area A**			554	31-Dec-18	06-Jul-20	36		
448	5.04.A	54-1000	General Area & Access Road	120	09-Mar-20	06-Jul-20	6	23-1300: FS, 53-5500: SS, 53-5600: FF, 53-6200: SS, 53-6300: FF, 12-1000: FF, 11-1100: FS, 54-1100: FF, 54-1800: FF	32-2100: FS, 53-2400: SS, 53-4800: FS, 53-4900: FS, 53-5000: FS, 53-5400: FF, 53-7000: FS, 68-1700: FS
449	5.04.A	54-1100	Carpark & Supporting Area	60	31-Dec-18	28-Feb-19	64	23-1300: FS, 11-1100: FS	32-1500: FS, M 5.11: FS -30, M 5.12: FS, 54-1000: FF, 54-1800: FS
450	5.04.A	54-1200	Diesel Fuel Tanks	60	08-May-20	06-Jul-20	36	23-1300: FS, 23-5200: FS, 12-1000: FF, 11-1100: FS	32-2200: FS
451	5.04.A	54-1300	EPD Building	270	30-Apr-19	24-Jan-20	44	23-1300: FS, 23-5200: FS, 11-1100: FS, 54-1700: SS 60	32-2100: FS, M 5. 4: FS -135, M 5. 5: FS, 12-1000: FS, 54-1400: SS 60
452	5.04.A	54-1400	Fire Service Tank	270	29-Jun-19	24-Mar-20	44	23-1300: FS, 23-5200: FS, 11-1100: FS, 54-1300: SS 60	32-2100: FS, M 5.10: FS, 12-1000: FS, 54-1600: SS 60
453	5.04.A	54-1500	GVL Building	300	31-Dec-18	26-Oct-19	44	23-1300: FS, 23-5200: FS, 11-1100: FS	32-2100: FS, M 5. 1: SF 30, M 5. 2: SF 150, M 5. 3: FS, 54-1700: SS 60
454	5.04.A	54-1600	Laboratory Building	270	28-Aug-19	23-May-20	44	23-1300: FS, 23-5200: FS, 11-1100: FS, 54-1400: SS 60	32-2100: FS, M 5. 6: FS -135, M 5. 7: FS, 12-1000: FS, 32-2200: FS
455	5.04.A	54-1700	Maintenance Building & Area	270	01-Mar-19	25-Nov-19	44	23-1300: FS, 23-5200: FS, 11-1100: FS, 54-1500: SS 60	32-2100: FS, M 5. 8: FS -135, M 5. 9: FS, 12-1000: FS, 54-1300: SS 60
456	5.04.A	54-1800	Storage Facility & Area	60	01-Mar-19	29-Apr-19	64	23-1300: FS, 11-1100: FS, 54-1100: FS	32-1500: FS, M 5.11: FS -30, M 5.12: FS, 54-1000: FF, 54-2000: FS
457	5.04.A	54-1900	Waste Oil Tanks	90	08-Apr-20	06-Jul-20	36	23-1300: FS, 23-5200: FS, 12-1000: FF, 11-1100: FS	32-2200: FS
458	5.04.A	54-2000	Water Service House	60	30-Apr-19	28-Jun-19	64	23-1300: FS, 23-5200: FS, 11-1100: FS, 54-1800: FS	32-2100: FS, M 5.10: FS, 12-1000: FS, 54-4400: FS
459	**SA2.5.04.B Part X1 Area B**			890	31-Dec-18	07-Jun-21	0		
460	SA2.5.04.B.1 BioPlant Building			330	17-Jan-19	12-Dec-19	243		
461	5.04.B.1	54-2100	LTP BioPlant Building	330	17-Jan-19	12-Dec-19	243	23-1300: FS, 23-5200: FS, 23-3200: FS, 11-1100: FS, 31-1000: FS	32-2100: FS, 32-2200: FS, M 6. 2: FS -165, M 6. 3: FS
462	SA2.5.04.B.2 Leachate Treatment Plant			589	31-Dec-18	10-Aug-20	21		
463	5.04.B.2	54-2200	Main Plant Area included Civil works	274	31-Dec-18	30-Sep-19	0	23-1300: FS, 23-3200: FS, 11-1100: FS	54-2300: FS, 54-2400: FS, 54-2500: FS, 64-1100: FS, M 6. 1: SF 30, M 6. 4: FS -137, M 6. 5: FS
464	5.04.B.2	54-2300	MEP Installation	220	01-Oct-19	07-May-20	0	41-2100: FS, 41-1800: FS, 22-2100: FS, 54-2200: FS, 11-1100: FS	12-1000: FS 60, 32-1900: FS, 54-2600: FS, M 6. 8: FS -110, M 6. 9: FS, 32-2200: FS
465	5.04.B.2	54-2400	SBR Tanks	100	01-Oct-19	08-Jan-20	236	41-2400: FS, 54-2200: FS	54-2600: FS, M 6. 6: FS
466	5.04.B.2	54-2500	Ammonia Stripper	315	01-Oct-19	10-Aug-20	21	41-3000: FS, 54-2200: FS	54-2600: FS, M 6. 8: FS -150, M 6. 9: FS
467	SA2.5.04.B.3 LTP - Test & Commission			301	11-Aug-20	07-Jun-21	0		
468	5.04.B.3	54-2600	Dry testing	45	11-Aug-20	24-Sep-20	21	54-2300: FS, 54-2400: FS, 54-2500: FS	23-6600: FS -150, 23-6900: SS, 54-2700: FS, M11. 1: FS
469	5.04.B.3	54-2700	Wet testing	75	25-Sep-20	08-Dec-20	21	54-2600: FS, 12-1200: FS, 53-6900: FS, 31-2200: FS, 23-6800: FS	54-2800: FS, M11. 2: FS
470	5.04.B.3	54-2800	Operational testing	160	30-Dec-20	07-Jun-21	0	54-2700: FS, 53-2400: FS, 53-2500: FS, 53-2100: FS, 53-2200: FS, 63-1700: FS, 63-2600: FS, 53-5400: FS, 54-4000: FS	32-1500: FS, M11. 3: FS, M11. 4: FS
471	**SA2.5.04.C Part X1 Area C**			730	31-Dec-18	29-Dec-20	0		
472	SA2.5.04.C.1 LFG - Power Supply Building			530	17-Jan-19	29-Jun-20	5		
473	5.04.C.1	54-2900	LFG Building (with Transformer Room)	335	17-Jan-19	17-Dec-19	0	23-1300: FS, 23-3500: FS, 11-1100: FS, 31-1000: FS	53-5800: FS, 53-5900: FS, 54-3000: FS, 54-3100: FS, M 7. 6: FS
474	5.04.C.1	54-3000	Transformer & HV Swtichgear Installation	60	01-May-20	29-Jun-20	0	54-2900: FS, 41-1200: FS, 53-5800: FS, 53-5700: FS	53-4600: FS, M 7. 4: FS -30, M 7. 5: FS, M 7. 5: FF
475	5.04.C.1	54-3100	MEP Installation, with T&C	75	18-Dec-19	01-Mar-20	125	54-2900: FS	32-1400: FS, 32-2100: FS, 53-4700: FS, 53-4800: FS, M 7. 4: FS -30, M 7. 5: FS
476	SA2.5.04.C.2 LFG Treatment Plant			554	31-Dec-18	06-Jul-20	0		
477	5.04.C.2	54-3200	Main Plant Area included Civil Works	384	31-Dec-18	18-Jan-20	0	23-3500: FS, 11-1100: FS	54-3300: FS, 54-3400: FS, 54-3500: FS, 54-3600: FS, 54-3700: FS, 54-3800: FS, M 7. 1: SF 30, M 7. 2: FS -200, M 7. 3: FS
478	5.04.C.2	54-3300	MEP Installation	170	19-Jan-20	06-Jul-20	0	54-3200: FS, 12-1000: FF	32-2000: FS, 53-4800: FS, 54-3900: FS, M 7. 4: FS -80, M 7. 5: FS
479	5.04.C.2	54-3400	GHS600 Blower 601 A&B Relocation	15	19-Jan-20	02-Feb-20	155	23-5800: FS, 54-3200: FS	54-3900: FS, M 7. 4: FS -8, M 7. 5: FS
480	5.04.C.2	54-3500	Pre-treatment	60	19-Jan-20	18-Mar-20	110	41-3900: FS, 54-3200: FS	54-3900: FS, M 7. 4: FS -30, M 7. 5: FS
481	5.04.C.2	54-3600	Flares (incl. PLC control, interlink to Towngas PF & LTP)	125	19-Jan-20	22-May-20	45	41-3300: FS, 54-3200: FS	54-3900: FS, M 7. 4: FS -60, M 7. 5: FS
482	5.04.C.2	54-3700	LFG Engine (incl. on-grid protection, PLC control, turning)	110	21-Feb-20	09-Jun-20	27	41-3600: FS, 54-3200: FS	54-3900: FS, M 7. 4: FS -60
483	5.04.C.2	54-3800	Cooling System	45	19-Jan-20	03-Mar-20	125	22-1500: FS, 54-3200: FS	54-3900: FS, M 7. 4: FS -25, M 7. 5: FS
484	SA2.5.04.C.3 LFG - Test & Commission			176	07-Jul-20	29-Dec-20	0		
485	5.04.C.3	54-3900	MEP Testing	65	07-Jul-20	09-Sep-20	0	54-3400: FS, 54-3500: FS, 54-3600: FS, 54-3700: FS, 54-3800: FS, 12-1200: FS, 53-6900: FS, 31-2200: FS, 54-3300: FS	23-7000: SS -150, 23-7300: SS, 54-4000: FS, M11. 1: FS -30, M11. 2: FS
486	5.04.C.3	54-4000	Operational Testing	111	10-Sep-20	29-Dec-20	0	53-1300: FS, 63-2700: FS, 63-1800: FS, 53-2300: FS, 53-1100: FS, 54-3900: FS, 23-7200: FS	32-1500: FS, 54-2800: FS, 63-4800: FF, 63-4900: FS, 63-4600: FS, M11. 3: FS, M11. 4: FS
487	**SA2.5.04.D Part X1 Area D**			374	29-Jun-19	06-Jul-20	6		
488	5.04.D	54-4100	General Area & Access Road	120	09-Mar-20	06-Jul-20	6	23-1300: FS, 53-5500: SS, 53-5600: FF, 53-6200: SS, 53-6300: FF, 12-1000: FF, 11-1100: FS	32-2100: FS, 53-4800: FS, 53-4900: FS, 53-5000: FS, 53-7000: FS, M 8. 5: FS
489	5.04.D	54-4200	VWF Building	120	28-Oct-19	24-Feb-20	63	23-1300: FS, 23-5200: FS, 41-4500: FS, 11-1100: FS, 54-4300: SS 60	32-2100: FS, M 8. 4: FS, M 8. 6: FS -60, M 8. 7: FS, 12-1000: FS, 54-4500: SS 60
490	5.04.D	54-4300	Weighbridge	75	29-Aug-19	11-Nov-19	63	41-4200: FS, 23-1300: FS, 23-5200: FS, 11-1100: FS, 54-4400: SS 60	32-2100: FS, M 8. 6: FS -40, M 8. 7: FS, 54-4200: SS 60
491	5.04.D	54-4400	Weighmaster House	120	29-Jun-19	26-Oct-19	64	23-1300: FS, 23-5200: FS, 11-1100: FS, 54-2000: FS	32-2100: FS, M 8. 1: FS, 12-1000: FS, 54-4300: SS 60
492	5.04.D	54-4500	Wheel Wash Bath	75	27-Dec-19	10-Mar-20	63	23-1300: FS, 23-5200: FS, 41-4500: FS, 11-1100: FS, 54-4200: SS 60	32-2100: FS, M 8. 3: FS, 12-1000: FS, 54-4700: SS 30
493	**SA2.5.04.E Part X1 Area E & Part X2**			163	26-Jan-20	06-Jul-20	6		
494	5.04.E	54-4600	General Area & Access Road	120	09-Mar-20	06-Jul-20	6	53-5500: SS, 53-5600: FF, 53-6200: SS, 53-6300: FF, 12-1000: FF, 11-1100: FS, 11-1200: FS	32-2100: FS, 53-4900: FS, 53-5000: FS, 53-7000: FS
495	5.04.E	54-4700	Guard House & Entrance Gate	100	26-Jan-20	04-May-20	63	23-1300: FS, 23-5200: FS, 11-1100: FS, 11-1200: FS, 54-4500: SS 30	32-2100: FS, M 8. 2: FS, 12-1000: FS
496	**SA2.5.08 Landscape Works - Advance Screen Planting in CWB Country Park**			270	01-Apr-19	26-Dec-19	529		
497	**SA2.5.08.N Area N**			270	01-Apr-19	26-Dec-19	529		
498	5.08.N	58-1000	Advance Screen Planting	90	01-Apr-19*	29-Jun-19	529	23-7900: FS, 31-1100: FS, 11-1500: FS	14-1800: SS -60, 58-1100: SS, 68-1600: SS 30, M 3. 2: FS
499	5.08.N	58-1100	Establishment of Screen Planting	270	01-Apr-19*	26-Dec-19	529	58-1000: SS, 14-1800: FS	32-1500: FS
500	**SA2.5.08.S Area S**			270	01-Apr-19	26-Dec-19	529		
501	5.08.S	58-1200	Advance Screen Planting	90	01-Apr-19*	29-Jun-19	529	23-7900: FS, 31-1100: FS, 11-1500: FS	58-1300: SS, M 3. 2: FS
502	5.08.S	58-1300	Establishment of Screen Planting	270	01-Apr-19*	26-Dec-19	529	58-1200: SS	32-1500: FS
503	**SA2.6 Construction (Remaining Works)**			1474	01-Apr-19	13-Apr-23	30		
504	**SA2.6.02 Advance Works**			80	09-Jul-21	26-Sep-21	339		
505	**SA2.6.02.9 Demolition of SENT Infrastructure Area**			80	09-Jul-21	26-Sep-21	339		
506	6.02.9	62-1000	Existing SENT General Infrastructure Facility & Building	60	09-Jul-21	06-Sep-21	239	32-2100: FS, 12-1300: FS	23-2000: SS -90, 63-2800: FS, 63-2900: FS, 63-3000: FS, 63-4300: FS, M12. 4: FS -30, M12. 5: FS
507	6.02.9	62-1100	Existing SENT LTP	60	29-Jul-21	26-Sep-21	339	32-1500: FS, 12-1300: FS, 23-2200: FS	63-3000: FS, 63-4500: FS, M12. 4: FS -30, M12. 5: FS
508	6.02.9	62-1200	Existing SENT LFG	60	29-Jul-21	26-Sep-21	339	32-1500: FS, 12-1300: FS, 23-2200: FS	63-3000: FS, 63-4500: FS, M12. 4: FS -30, M12. 5: FS



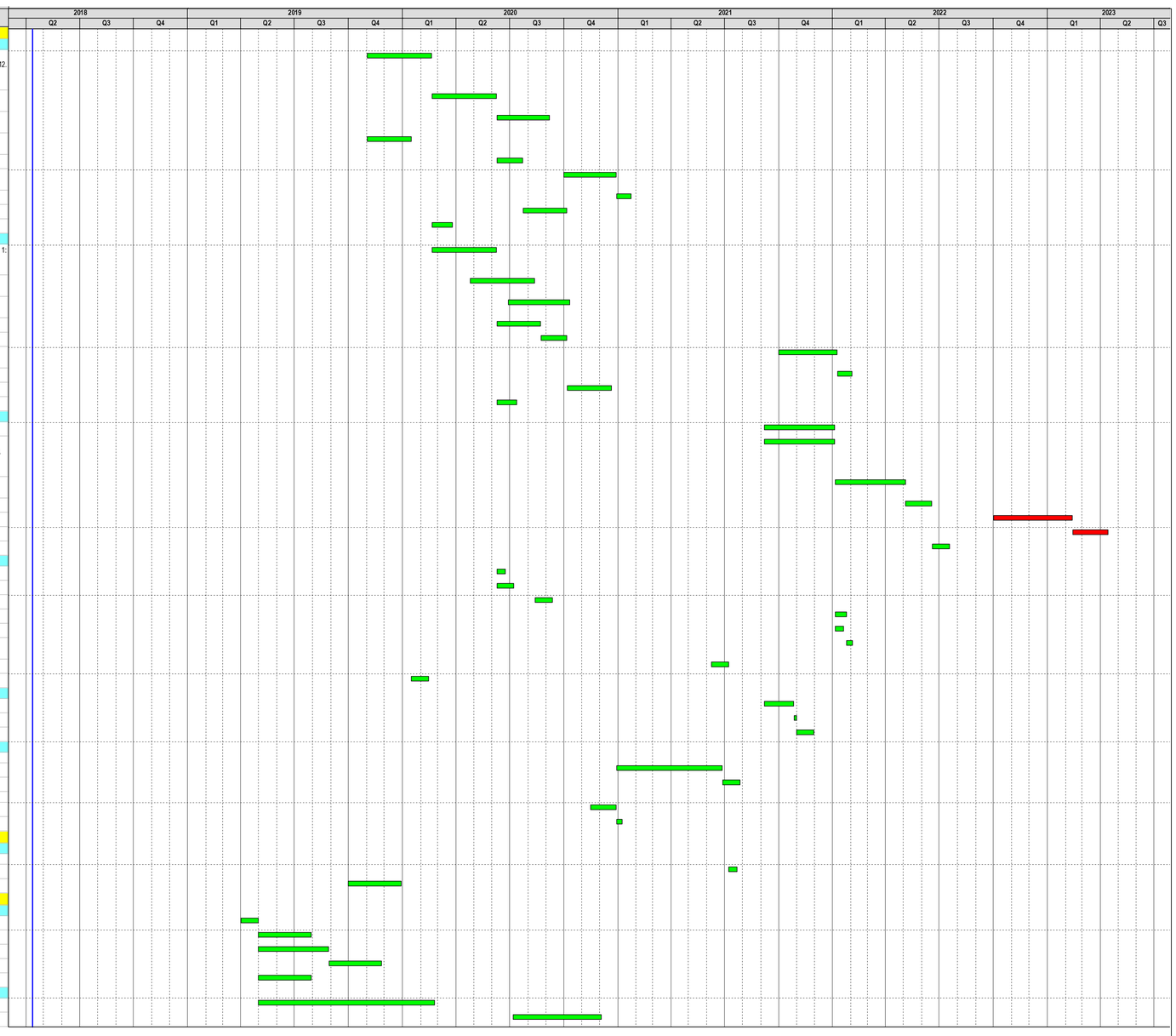
Remaining Work
Critical Remaining Work
Milestone

South-East New Territories Land Fill Extension (SA2-SENTX)
Baseline Programme

GREEN VALLEY LANDFILL, LIMITED

Date	Revision	Checked	Approved
11-May-18	SENTX-GVL-W-PB-ZZ-0001 Rev. I01		
20-Jul-18	SENTX-GVL-W-PB-ZZ-0001 Rev. I02 (Detailed)		

#	WBS Path	Activity ID	Activity Name	Dur	Start	Finish	Total Float	Predecessor Details	Successor Details
509			**SA2.6.03 Civil Engineering Works**	1259	02-Nov-19	13-Apr-23	30		
510			**SA2.6.03.2 Landfill Cell 2**	449	02-Nov-19	23-Jan-21	810		
511	6.03.2	63-1000	Earth bund (Eastern)	110	02-Nov-19	19-Feb-20	9	11-1100: FS, 23-2500: FS, 53-4200: FS, 53-1400: FS, 53-2800: FS	53-3500: FS, 63-1500: FS, 63-1800: FS, 63-1900: FS, 63-2000: FS, 63-2100: FS, 63-2200: FS, M12. 1: FS -50, M12. 2: FS, 63-1100: FS
512	6.03.2	63-1100	Earth bund (Western)	110	20-Feb-20	08-Jun-20	84	11-1100: FS, 23-2500: FS, 53-1800: FS, 53-1400: FS, 63-1000: FS	63-1400: FS, 63-1500: FS, 63-1700: FS, 63-3500: FS, 63-3600: FS, 63-1200: FS
513	6.03.2	63-1200	Intercell bund (Cell 2/3)	90	09-Jun-20	06-Sep-20	734	11-1100: FS, 23-2500: FS, 53-1800: FS, 53-1400: FS, 53-4400: FS, 63-1100: FS	63-1500: FS
514	6.03.2	63-1300	Site Formation	75	02-Nov-19	15-Jan-20	14	11-1100: FS, 23-2500: FS, 53-1800: FS, 53-1400: FS	63-1400: FS, 63-4200: FS
515	6.03.2	63-1400	Pump Station (PS#2X)	45	09-Jun-20	23-Jul-20	84	63-1300: FS, 63-1100: FS	63-1600: FS, 63-1700: FS
516	6.03.2	63-1500	Lining Works	90	01-Oct-20*	29-Dec-20	710	41-1500: FS, 63-1000: FS, 63-1100: FS, 63-1200: FS	63-1600: FS, M12. 3: FS, 63-2400: FS
517	6.03.2	63-1600	Protective Stone Laying & Leachate Collection Pipe	25	30-Dec-20	23-Jan-21	810	63-1500: FS, 41-1500: FS, 63-1400: FS	32-1600: FS, M12. 3: FS
518	6.03.2	63-1700	Install Leachate Force Main	75	24-Jul-20	06-Oct-20	84	63-1100: FS, 41-1500: FS, 63-1400: FS	54-2800: FS, M12. 3: FS
519	6.03.2	63-1800	Install Landfill Gas Pipe on earth bund	35	20-Feb-20	25-Mar-20	168	41-1500: FS, 63-1000: FS	54-4000: FS, M12. 3: FS
520			**SA2.6.03.3 Landfill Cell 3**	714	20-Feb-20	02-Feb-22	435		
521	6.03.3	63-1900	Earth bund (Eastern)	110	20-Feb-20	08-Jun-20	9	11-1100: FS, 53-4200: FS, 63-1000: FS, 53-4300: FS, 53-2800: FS, 63-4200: FS	53-3300: FS, 53-3600: FS, 63-2400: FS, 63-2700: FS, M12. 1: FS -50, M12. 2: FS, 63-2000: FS -45, 63-2200: FS
522	6.03.3	63-2000	Earth bund (Western)	110	25-Apr-20	12-Aug-20	19	11-1100: FS, 63-1000: FS, 63-1900: FS -45	63-2300: FS, 63-2400: FS, 63-2600: FS, 63-3700: FS, 63-2100: FS -45
523	6.03.3	63-2100	Intercell bund (Cell 3/4)	105	29-Jun-20	11-Oct-20	789	11-1100: FS, 63-1000: FS, 63-4200: FS, 63-2000: FS -45	63-2400: FS
524	6.03.3	63-2200	Site Formation	75	09-Jun-20	22-Aug-20	9	11-1100: FS, 63-1000: FS, 63-1900: FS	63-2300: FS
525	6.03.3	63-2300	Pump Station (PS#3X)	45	23-Aug-20	06-Oct-20	9	63-2200: FS, 63-2000: FS	63-2500: FS, 63-2600: FS
526	6.03.3	63-2400	Lining Works	100	01-Oct-21*	08-Jan-22	435	41-1500: FS, 63-1900: FS, 63-2000: FS, 63-2100: FS, 63-1500: FS	63-2500: FS, M12. 3: FS
527	6.03.3	63-2500	Protective Stone Laying & Leachate Collection Pipe	25	09-Jan-22	02-Feb-22	435	63-2400: FS, 41-1500: FS, 63-2300: FS	32-1700: FS, M12. 3: FS
528	6.03.3	63-2600	Install Leachate Force Main	75	07-Oct-20	20-Dec-20	9	63-2000: FS, 41-1500: FS, 63-2300: FS	53-2500: SS -90, 54-2800: FS, M12.3: FS
529	6.03.3	63-2700	Install Landfill Gas Pipe on earth bund	35	09-Jun-20	13-Jul-20	58	41-1500: FS, 63-1900: FS	54-4000: FS, M12. 3: FS
530			**SA2.6.03.4 Landfill Cell 4**	584	07-Sep-21	13-Apr-23	30		
531	6.03.4	63-2800	Remaining Portion of Buttress Wall	120	07-Sep-21	04-Jan-22	494	62-1000: FS	
532	6.03.4	63-2900	Earth bund (Western) incl. MSE Wall	120	07-Sep-21	04-Jan-22	239	62-1000: FS	63-3000: FS, 63-3100: FS, 63-3200: FS, 63-3400: FS, 63-3800: FS, 63-3900: FS, 63-4100: SS -90, M 9. 6: FS -60, M 9. 7: FS -30, M 9. 8: FS
533	6.03.4	63-3000	Site Formation	120	05-Jan-22	04-May-22	239	62-1000: FS, 62-1100: FS, 62-1200: FS, 63-2900: FS, 63-4100: FS	63-3100: FS
534	6.03.4	63-3100	Pump Station (PS#4X)	45	05-May-22	18-Jun-22	239	63-3000: FS, 63-2900: FS	63-3300: FS, 63-3400: FS
535	6.03.4	63-3200	Lining Works	135	01-Oct-22*	12-Feb-23	0	41-1500: FS, 63-2900: FS	63-3300: FS, M12. 6: FS
536	6.03.4	63-3300	Protective Stone Laying & Leachate Collection Pipe	60	13-Feb-23	13-Apr-23	0	41-1500: FS, 63-3200: FS, 63-3100: FS	12-1900: FS, 32-1800: FS, M12. 6: FS
537	6.03.4	63-3400	Install Leachate Force Main & Remove Temporary Leachate Pipe	30	19-Jun-22	18-Jul-22	269	41-1500: FS, 63-2900: FS, 63-3100: FS	12-1900: FS, 32-1800: FS, M12. 6: FS
538			**SA2.6.03.5 Drainage - Surface Run-Off**	750	16-Jan-20	03-Feb-22	464		
539	6.03.5	63-3500	Perimeter Channel (X9A) at Cell 2 Western Bund	15	09-Jun-20	23-Jun-20	1054	63-1100: FS	12-1900: FS
540	6.03.5	63-3600	Perimeter Channel (X10A) at Cell 2 Western Bund	30	09-Jun-20	08-Jul-20	1029	63-1100: FS	63-4000: FS
541	6.03.5	63-3700	Perimeter Channel (X10A) at Cell 3 Western Bund	30	13-Aug-20	11-Sep-20	964	63-2000: FS	63-4000: FS
542	6.03.5	63-3800	Perimeter Channel (X10A) at Cell 4 Western Bund	20	05-Jan-22	24-Jan-22	464	63-2900: FS	63-4000: FS
543	6.03.5	63-3900	Perimeter Channel (X10C) at Cell 4 Western Bund	15	05-Jan-22	19-Jan-22	469	63-2900: FS	63-4000: FS
544	6.03.5	63-4000	Connection to Existing DP3	10	25-Jan-22	03-Feb-22	464	63-3900: FS, 63-3600: FS, 63-3700: FS, 63-3800: FS	12-1900: FS
545	6.03.5	63-4100	Remove Cut-Off Channel C-7 at bottom of Buttress Wall	30	09-Jun-21	08-Jul-21	419	63-2900: SS -90	63-3000: FS
546	6.03.5	63-4200	Temporary Channel (X7T) at SENT Infrastructure Area	30	16-Jan-20	14-Feb-20	14	63-1300: FS	63-1900: FS, 63-2100: FS
547			**SA2.6.03.6 Drainage - Ground Water**	85	07-Sep-21	30-Nov-21	529		
548	6.03.6	63-4300	Construct Temporary Channel (TC-1), from MH-1 to Existing UC-825	50	07-Sep-21	26-Oct-21	529	23-1900: FS, 11-1300: FS, 62-1000: FS	63-4400: FS
549	6.03.6	63-4400	Divert GW at MH-1 to TC-1	5	27-Oct-21	31-Oct-21	529	63-4300: FS	63-4500: FS, M 9. 9: FS
550	6.03.6	63-4500	Reconnection of GWCP across Cell 4	30	01-Nov-21	30-Nov-21	529	62-1100: FS, 62-1200: FS, 63-4400: FS	12-1900: FS
551			**SA2.6.03.8 Utilities - Works Associated with Utilities Undertakes**	255	15-Nov-20	27-Jul-21	655		
552			SA2.6.03.8.U1 CLP	210	30-Dec-20	27-Jul-21	655		
553	6.03.8.U1	63-4600	LFG Generator On-grid Testing	180	30-Dec-20	27-Jun-21	655	32-2500: FS, 12-1200: FS, 54-4000: FS	63-4700: FS
554	6.03.8.U1	63-4700	LFG Generator On-grid Inspection & Verify	30	28-Jun-21	27-Jul-21	655	63-4600: FS	12-1900: FS
555			SA2.6.03.8.U6 TownGas	55	15-Nov-20	08-Jan-21	855		
556	6.03.8.U6	63-4800	Laying Gas Mains (from LFG to Town Gas PF)	45	15-Nov-20	29-Dec-20	855	54-4000: FF	63-4900: FS
557	6.03.8.U6	63-4900	Gas Meter Relocation & Connection at LFG	10	30-Dec-20	08-Jan-21	855	63-4800: FS, 54-4000: FS	12-1900: FS
558			**SA2.6.04 Building & E&M Works**	661	01-Oct-19	22-Jul-21	660		
559			**SA2.6.04.C Part X1 Area C**	661	01-Oct-19	22-Jul-21	660		
560			SA2.6.04.C.02 LFG Treatment Plant	661	01-Oct-19	22-Jul-21	660		
561	6.04.C.02	64-1000	GHS600 Blower 601 C Relocation	15	08-Jul-21	22-Jul-21	660	32-1500: FS	12-1900: FS
562	6.04.C.02	64-1100	Absorption Chiller (Optional)	90	01-Oct-19	29-Dec-19	1231	54-2200: FS	12-1900: FS
563			**SA2.6.08 Landscape Works**	613	01-Apr-19	03-Dec-20	891		
564			**SA2.6.08.1 SENT Area - Tree Removal & Transplanting**	240	01-Apr-19	26-Nov-19	1264		
565	6.08.1	68-1000	Access trees condition and select for transplanting	30	01-Apr-19*	30-Apr-19	1264	14-1300: FS	68-1100: FS, 68-1200: FS, 68-1400: FS
566	6.08.1	68-1100	Prepare new site to receive trees	90	01-May-19	29-Jul-19	1264	68-1000: FS	68-1200: SS
567	6.08.1	68-1200	Transplant selected trees	120	01-May-19	28-Aug-19	1264	68-1000: FS, 68-1100: SS	68-1300: FS
568	6.08.1	68-1300	Prune trees prior to removal from Cell 4	90	29-Aug-19	26-Nov-19	1264	68-1200: FS	12-1900: FS
569	6.08.1	68-1400	Tree Felling - Part X3	90	01-May-19	29-Jul-19	1384	23-8200: FS, 31-1600: FS, 68-1000: FS	12-1900: FS
570			**SA2.6.08.2 SENTX Area - Trial Nursery & Tree Planting**	583	01-May-19	03-Dec-20	891		
571	6.08.2	68-1600	Trial Nursery	300	01-May-19	24-Feb-20	1174	14-1800: FS, 58-1000: SS 30	12-1900: FS, M 3. 2: FS
572	6.08.2	68-1700	Landscaping in New Infrastructure Area	150	07-Jul-20	03-Dec-20	891	54-1000: FS, 23-7600: FS	12-1900: FS



Remaining Work
Critical Remaining Work
Milestone

South-East New Territories Land Fill Extension (SA2-SENTX)
Baseline Programme

GREEN VALLEY LANDFILL LIMITED

Date	Revision	Checked	Approved
11-May-18	SENTX-GVL-W-PB-ZZ-0001 Rev. I01		
20-Jul-18	SENTX-GVL-W-PB-ZZ-0001 Rev. I02 (Detailed)		

ANNEX B ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

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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

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						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*	Deficiency of mitigation measures but rectified by the Contractor

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

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						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

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
4.8.2	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

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
4.8.2	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.

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1)				What requirements or standards for the measure to achieve?	Implementation Status and Remarks
						D	C	O/R	A		
4.8.2 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

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		
		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*	Deficiency of mitigation measures but rectified by the Contractor
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

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						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)*	

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						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

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						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*	Deficiency of mitigation measures but rectified by the Contractor

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

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						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*	Reminder was given to the Contractor
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

October 2023

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

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

November 2023

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

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

December 2023

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

ANNEX D AIR QUALITY

ANNEX D1 24-HOUR TSP MONITORING RESULTS

TABLE D1.1 24-HOUR TSP MONITORING RESULTS AT AM1

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu g/m^3$)
4 Oct 23	8:00	5 Oct 23	8:00	Sunny	76
10 Oct 23	8:00	11 Oct 23	8:00	Cloudy	54
16 Oct 23	8:00	17 Oct 23	8:00	Fine	177
22 Oct 23	8:00	23 Oct 23	8:00	Fine	70
28 Oct 23	8:00	29 Oct 23	8:00	Cloudy	107
3 Nov 23	8:00	4 Nov 23	8:00	Sunny	211
9 Nov 23	8:00	10 Nov 23	8:00	Fine	139
15 Nov 23	8:00	16 Nov 23	8:00	Fine	127
21 Nov 23	8:00	22 Nov 23	8:00	Sunny	186
27 Nov 23	8:00	28 Nov 23	8:00	Sunny	181
3 Dec 23	8:00	4 Dec 23	8:00	Fine	102
9 Dec 23	8:00	10 Dec 23	8:00	Sunny	143
15 Dec 23	8:00	16 Dec 23	8:00	Sunny	164
21 Dec 23	8:00	22 Dec 23	8:00	Cloudy	68
27 Dec 23	8:00	28 Dec 23	8:00	Cloudy	186
				Average	133
				Min	54
				Max	211

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

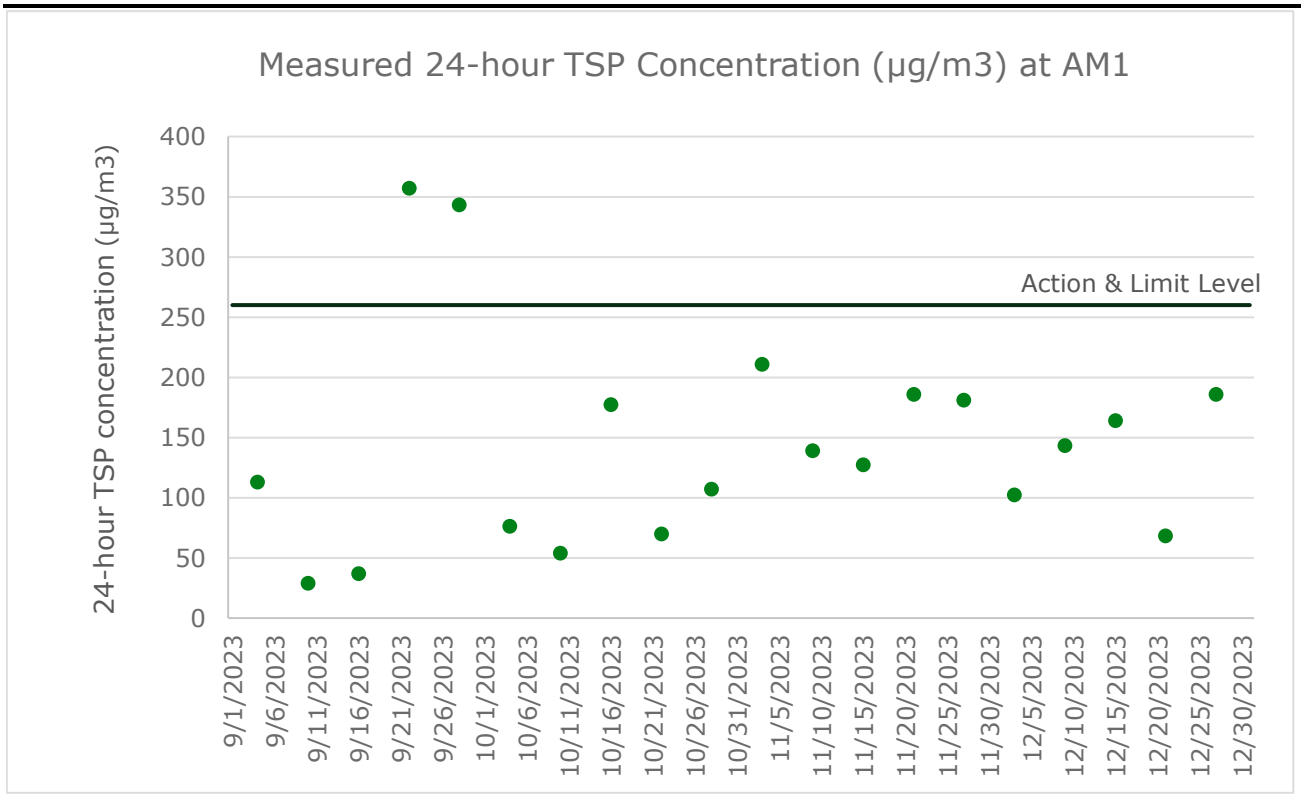


TABLE D1.2 24-HOUR TSP MONITORING RESULTS AT AM2

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu g/m^3$)
4 Oct 23	8:00	5 Oct 23	8:00	Sunny	163
10 Oct 23	8:00	11 Oct 23	8:00	Cloudy	45
16 Oct 23	8:00	17 Oct 23	8:00	Fine	85
22 Oct 23	8:00	23 Oct 23	8:00	Fine	62
28 Oct 23	8:00	29 Oct 23	8:00	Cloudy	146
3 Nov 23	8:00	4 Nov 23	8:00	Sunny	104
9 Nov 23	8:00	10 Nov 23	8:00	Fine	105
15 Nov 23	8:00	16 Nov 23	8:00	Fine	91
21 Nov 23	8:00	22 Nov 23	8:00	Sunny	192
27 Nov 23	8:00	28 Nov 23	8:00	Sunny	180
3 Dec 23	8:00	4 Dec 23	8:00	Fine	128
9 Dec 23	8:00	10 Dec 23	8:00	Sunny	85
15 Dec 23	8:00	16 Dec 23	8:00	Sunny	154
21 Dec 23	8:00	22 Dec 23	8:00	Cloudy	108
27 Dec 23	8:00	28 Dec 23	8:00	Cloudy	137
				Average	119
				Min	45
				Max	192

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

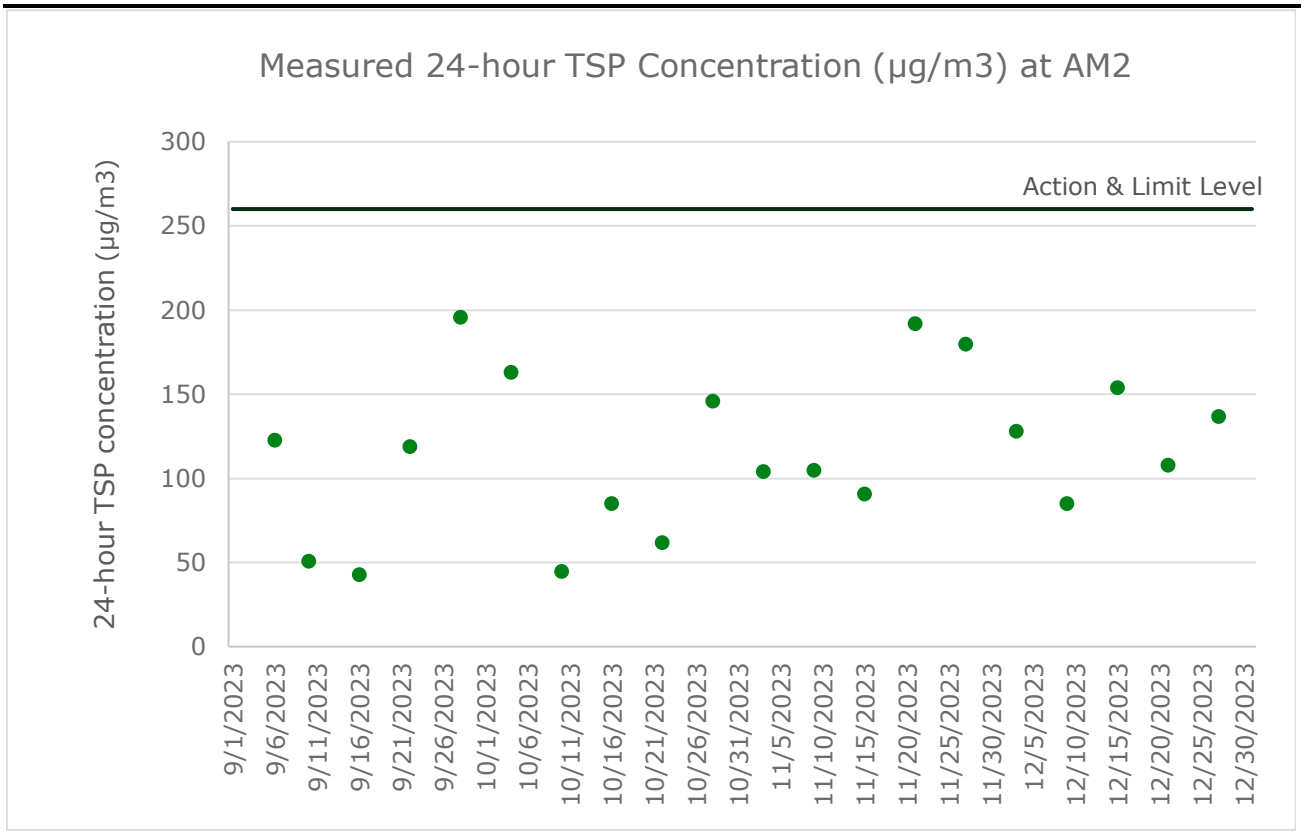


TABLE D1.3 24-HOUR TSP MONITORING RESULTS AT AM3

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu g/m^3$)
4 Oct 23	8:00	5 Oct 23	8:00	Sunny	183
10 Oct 23	8:00	11 Oct 23	8:00	Cloudy	80
16 Oct 23	8:00	17 Oct 23	8:00	Fine	233
22 Oct 23	8:00	23 Oct 23	8:00	Fine	120
28 Oct 23	8:00	29 Oct 23	8:00	Cloudy	139
3 Nov 23	8:00	4 Nov 23	8:00	Sunny	260
9 Nov 23	8:00	10 Nov 23	8:00	Fine	212
15 Nov 23	8:00	16 Nov 23	8:00	Fine	232
21 Nov 23	8:00	22 Nov 23	8:00	Sunny	272
27 Nov 23	8:00	28 Nov 23	8:00	Sunny	223
3 Dec 23	8:00	4 Dec 23	8:00	Fine	138
9 Dec 23	8:00	10 Dec 23	8:00	Sunny	164
15 Dec 23	8:00	16 Dec 23	8:00	Sunny	150
21 Dec 23	8:00	22 Dec 23	8:00	Cloudy	109
27 Dec 23	8:00	28 Dec 23	8:00	Cloudy	178
				Average	180
				Min	80
				Max	272

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

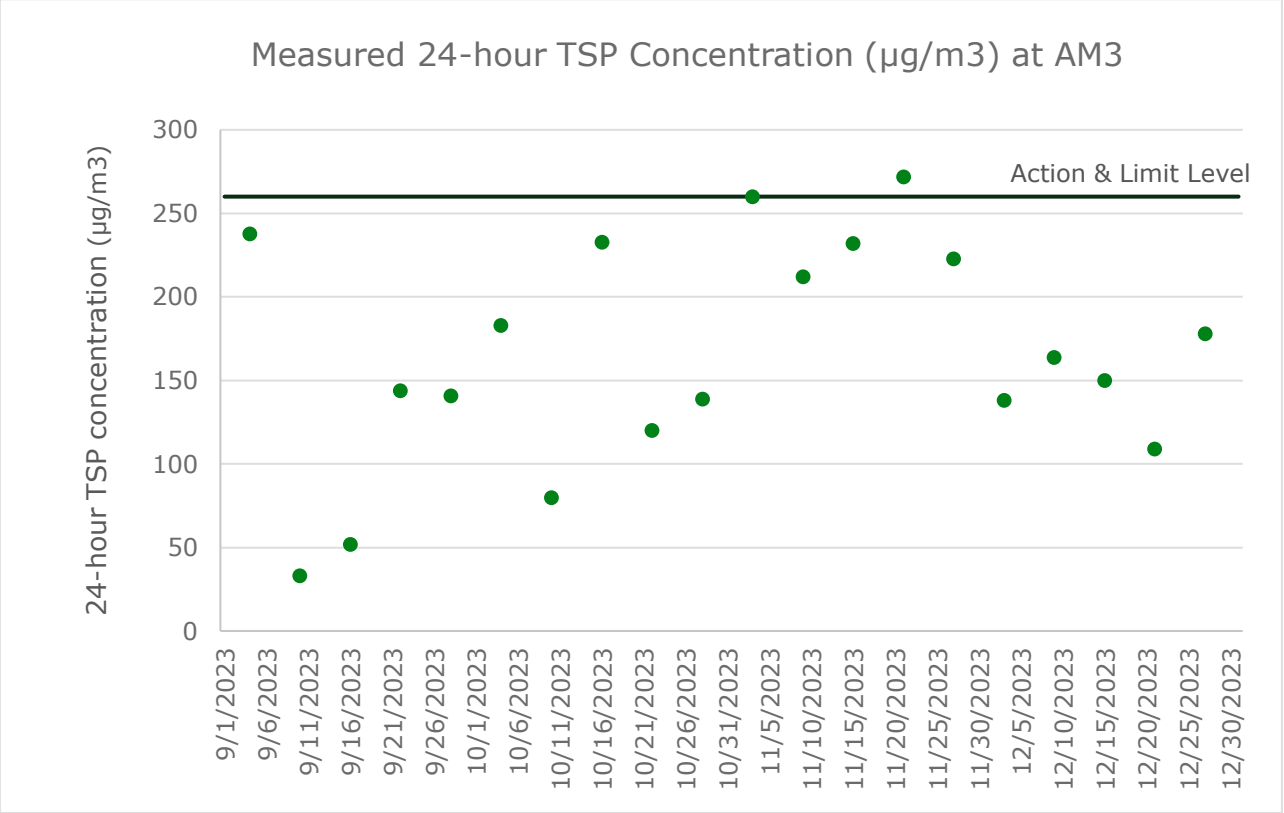
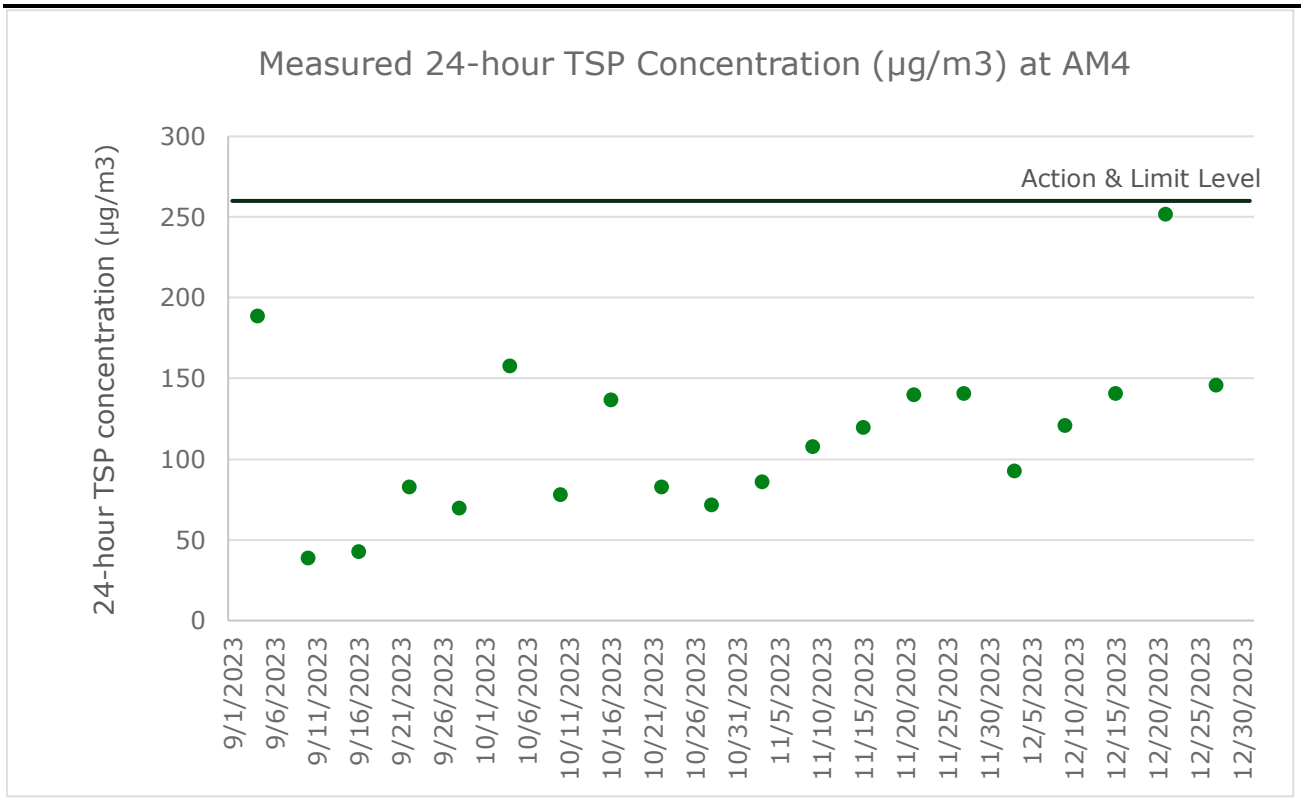


TABLE D1.4 24-HOUR TSP MONITORING RESULTS AT AM4

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP ($\mu g/m^3$)
4 Oct 23	8:00	5 Oct 23	8:00	Sunny	158
10 Oct 23	8:00	11 Oct 23	8:00	Cloudy	78
16 Oct 23	8:00	17 Oct 23	8:00	Fine	137
22 Oct 23	8:00	23 Oct 23	8:00	Fine	83
28 Oct 23	8:00	29 Oct 23	8:00	Cloudy	72
3 Nov 23	8:00	4 Nov 23	8:00	Sunny	86
9 Nov 23	8:00	10 Nov 23	8:00	Fine	108
15 Nov 23	8:00	16 Nov 23	8:00	Fine	120
21 Nov 23	8:00	22 Nov 23	8:00	Sunny	140
27 Nov 23	8:00	28 Nov 23	8:00	Sunny	141
3 Dec 23	8:00	4 Dec 23	8:00	Fine	93
9 Dec 23	8:00	10 Dec 23	8:00	Sunny	121
15 Dec 23	8:00	16 Dec 23	8:00	Sunny	141
21 Dec 23	8:00	22 Dec 23	8:00	Cloudy	252
27 Dec 23	8:00	28 Dec 23	8:00	Cloudy	146
				Average	125
				Min	72
				Max	252

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

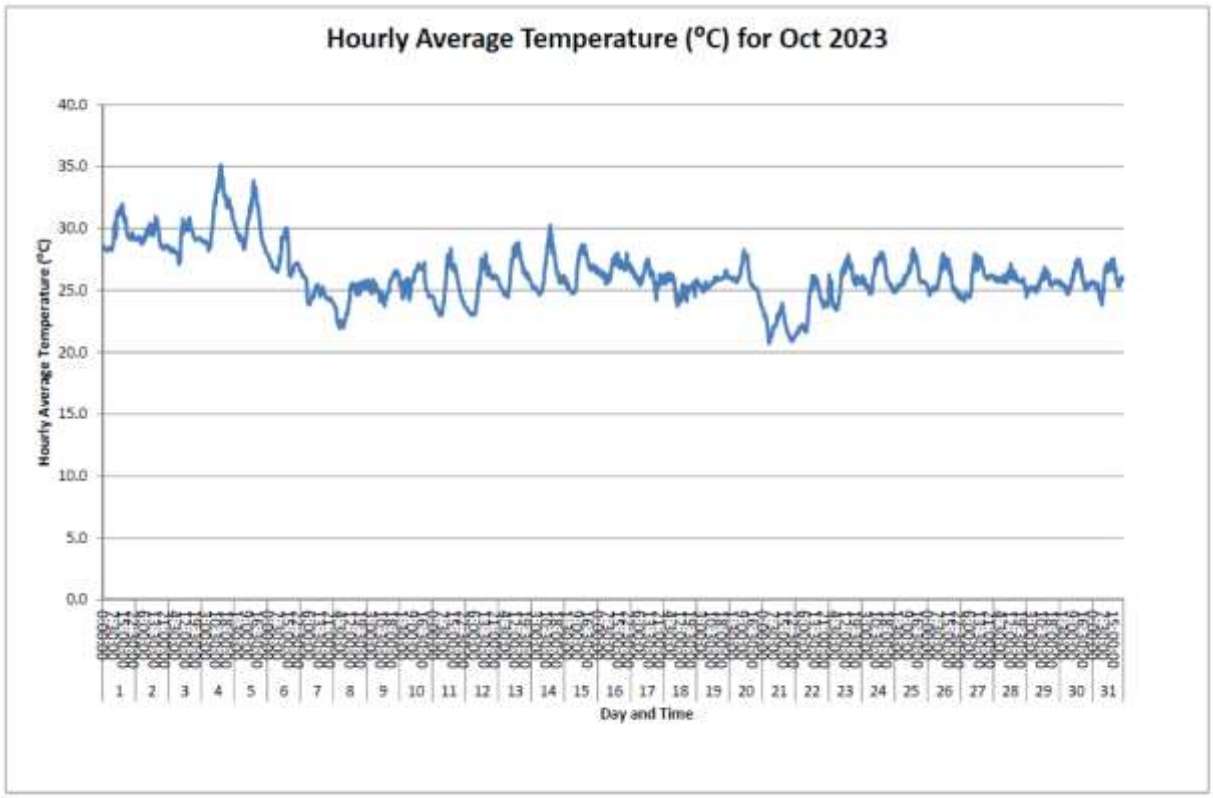
Action			
Event	**ET**	**IEC**	**Contractor**
	until odour not being detected for three consecutive days		
Exceedance of Limit Level for odour	• Identify source(s) and investigate the cause(s) of exceedance or complaint • Prepare the odour complaint form or the Notification of Exceedance within 24 hours • 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

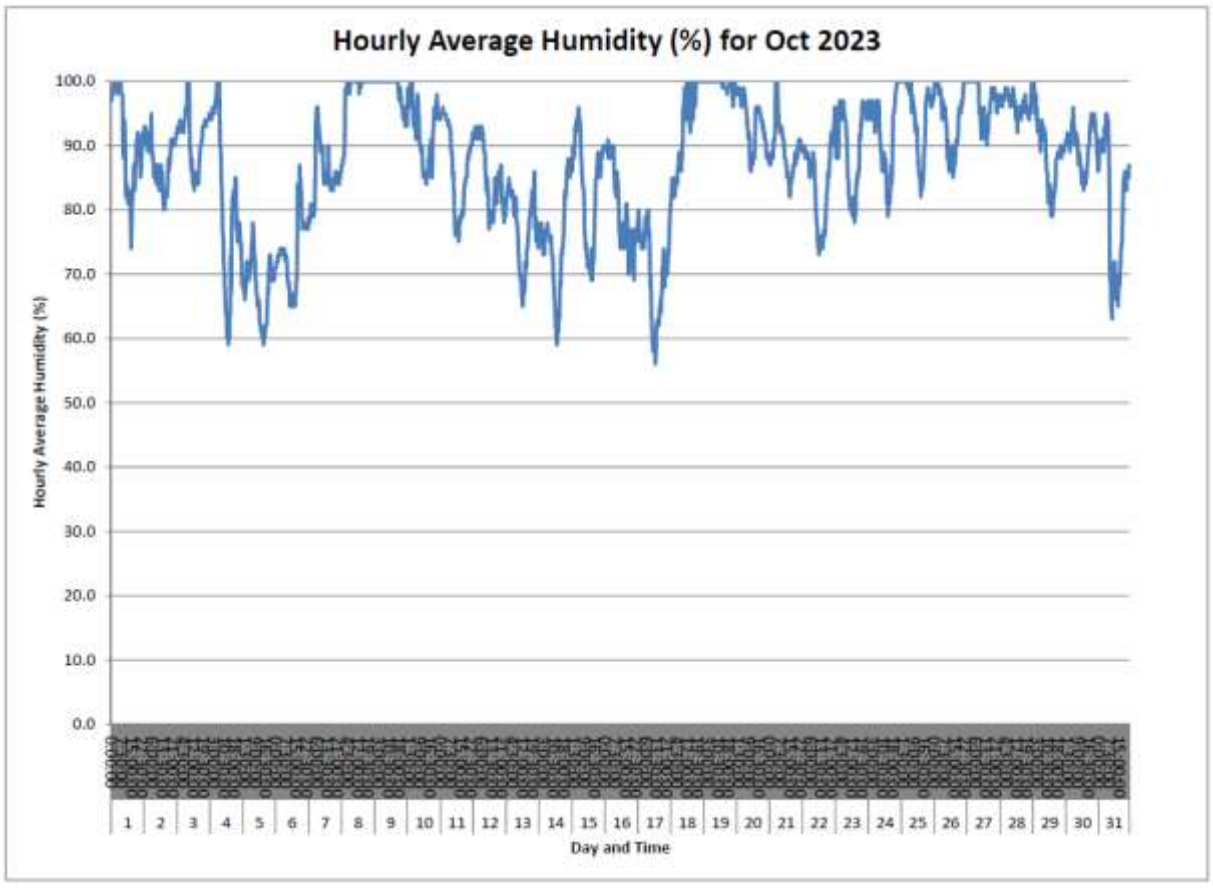
Action			
Event	**ET**	**IEC**	**Contractor**
	results • Repeat measurement to confirm finding if exceedance is due to the Project • Increase monitoring frequency to monthly and continue until the monitoring results reduce to below limit level		
Exceedance of Limit Level of stack emission of the thermal 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

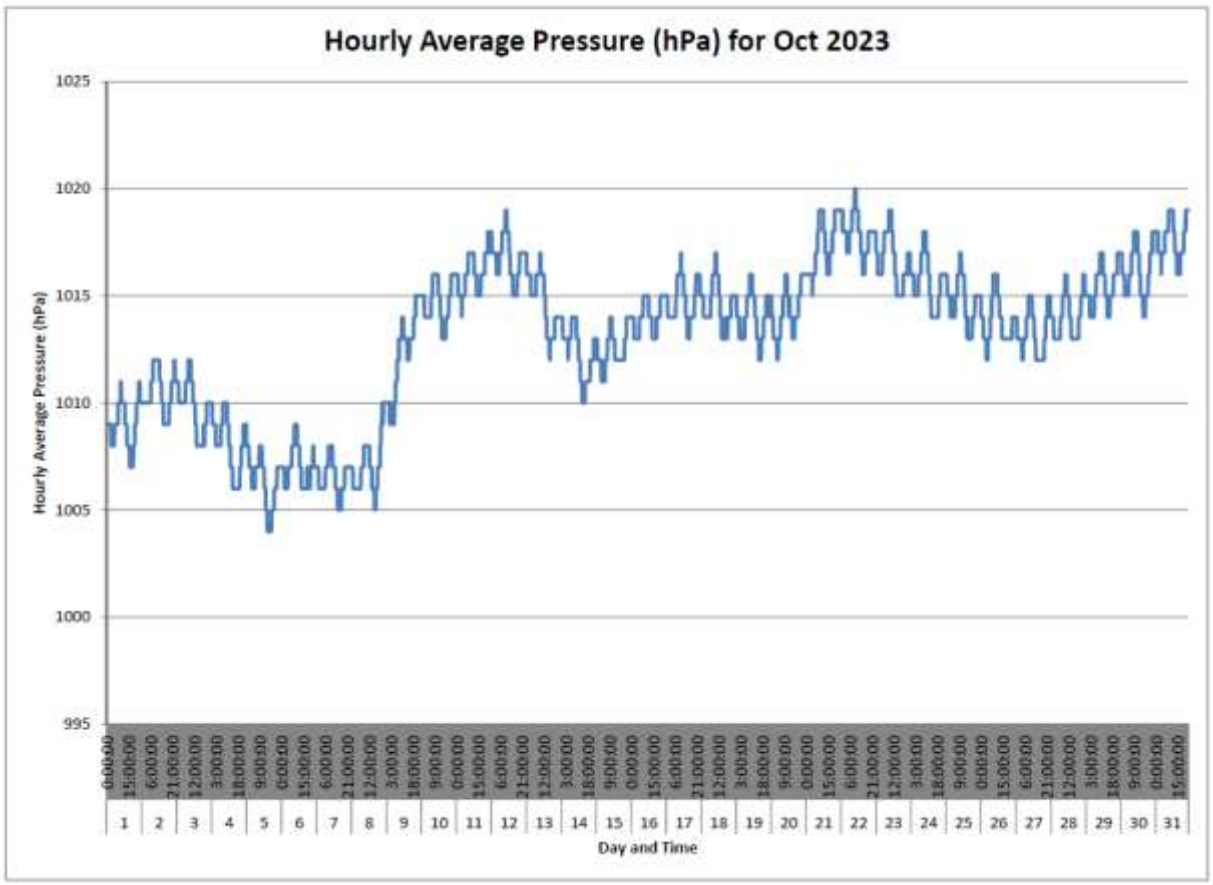
ANNEX D3 METEOROLOGICAL DATA

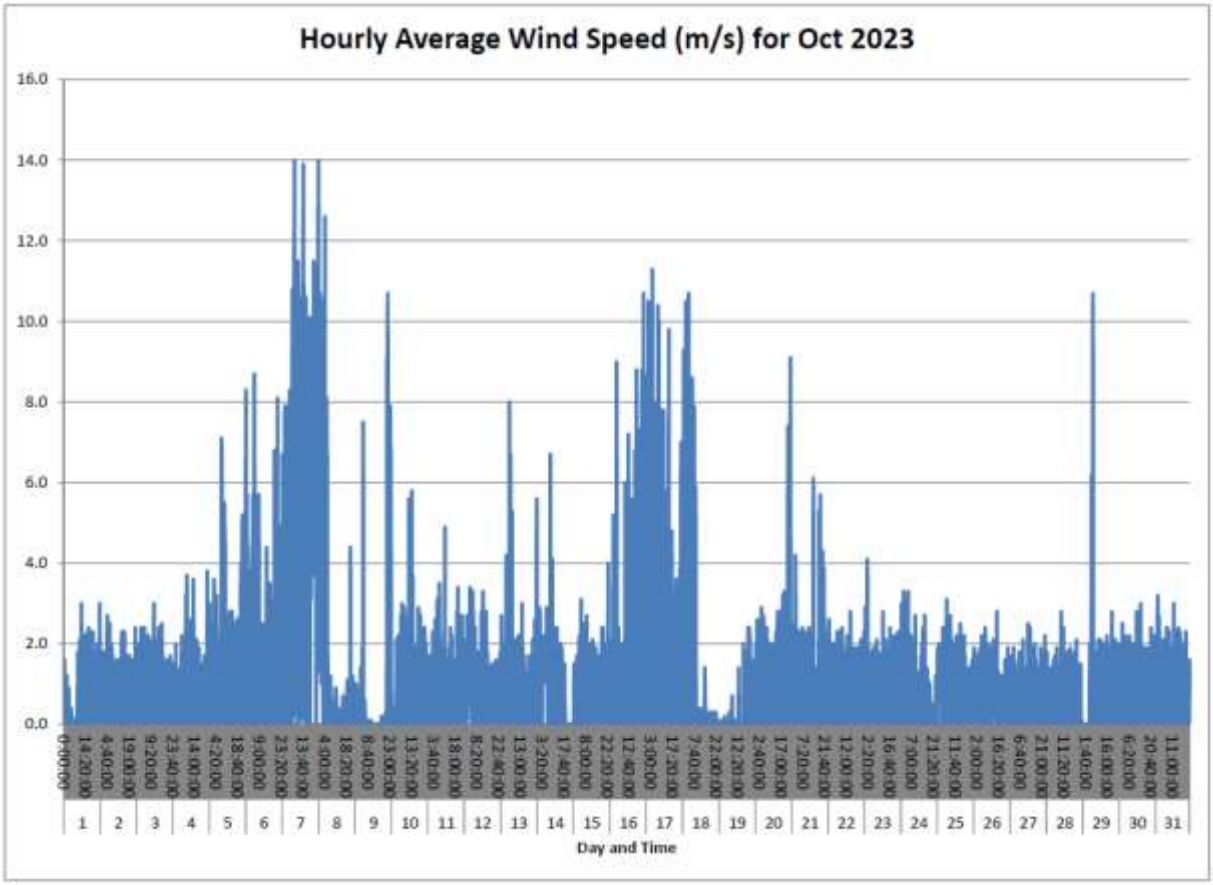
ANNEX D3 METEOROLOGICAL DATA

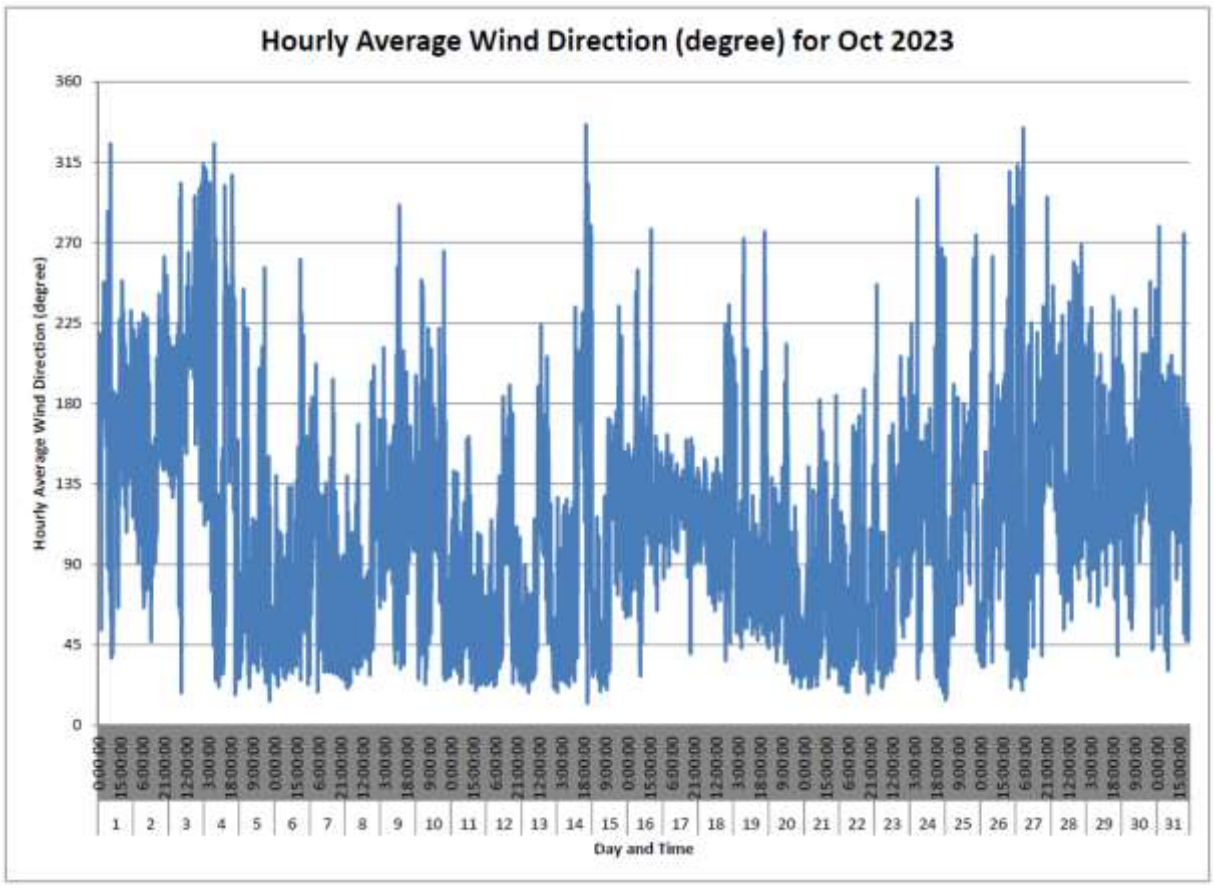
OCTOBER 2023

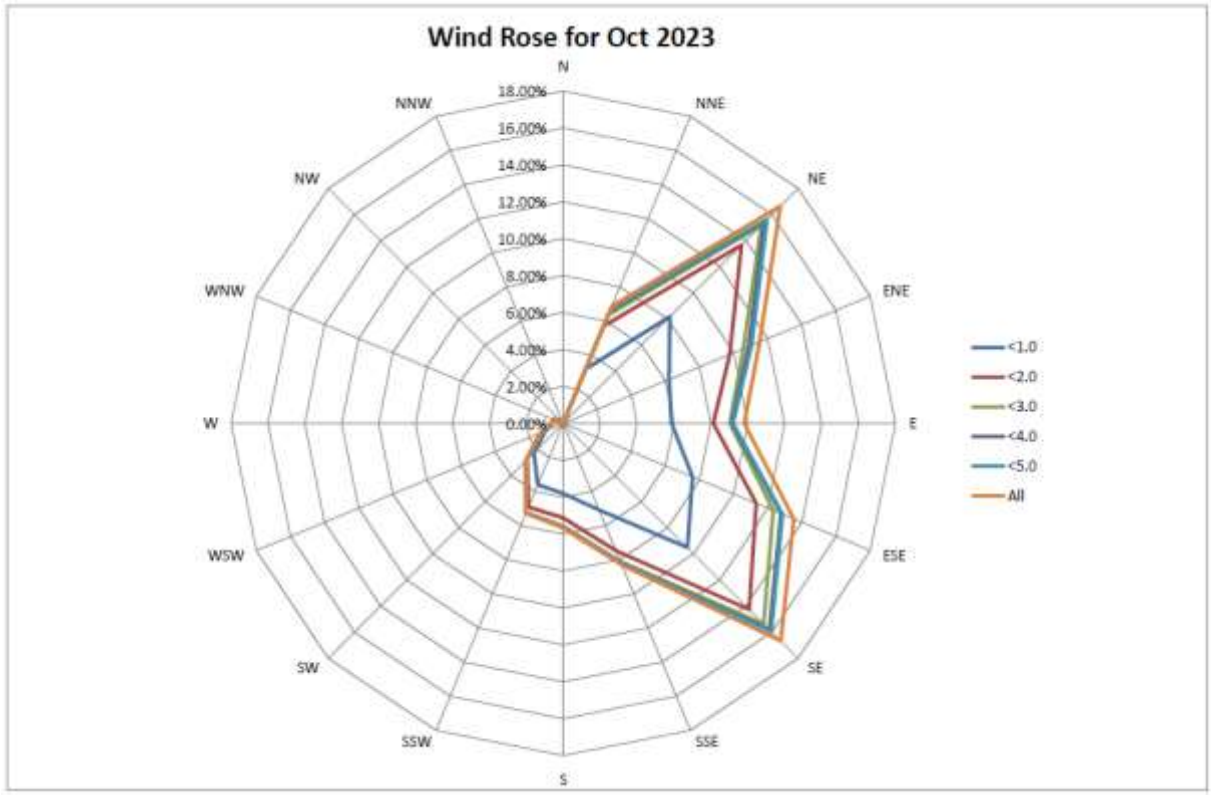


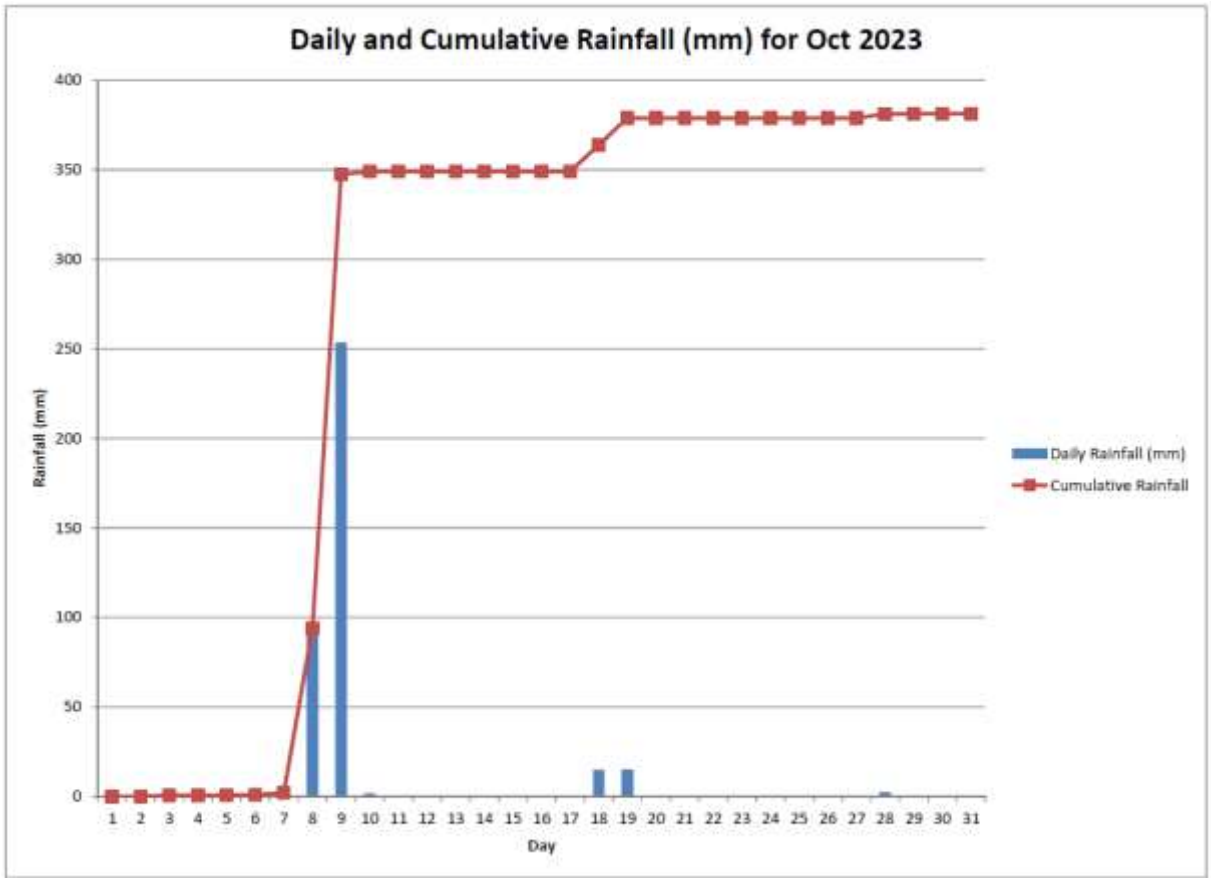



Hourly Average Pressure (hPa) for Oct 2023
Hourly Average Pressure (hPa)
1025
1020
1015
1010
1005
1000
995
Day and Time
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

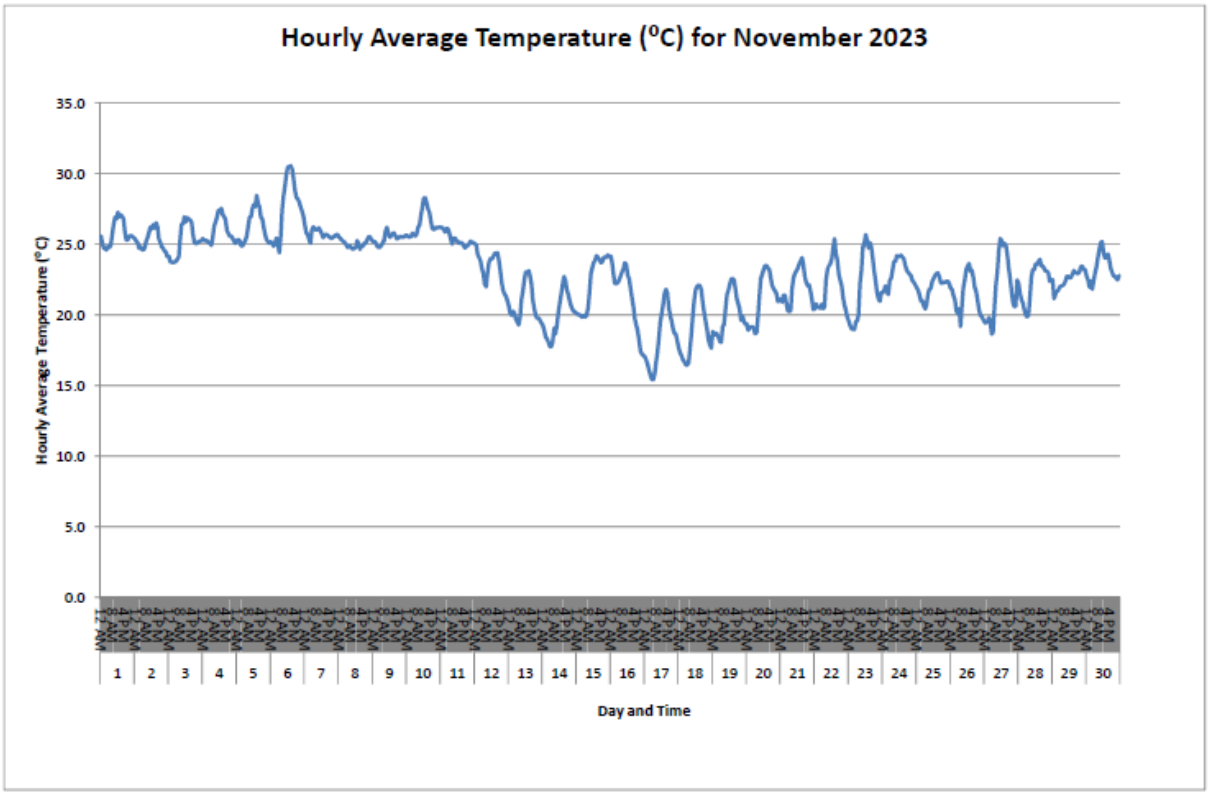

Hourly Average Wind Speed (m/s) for Oct 2023
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Day and Time
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

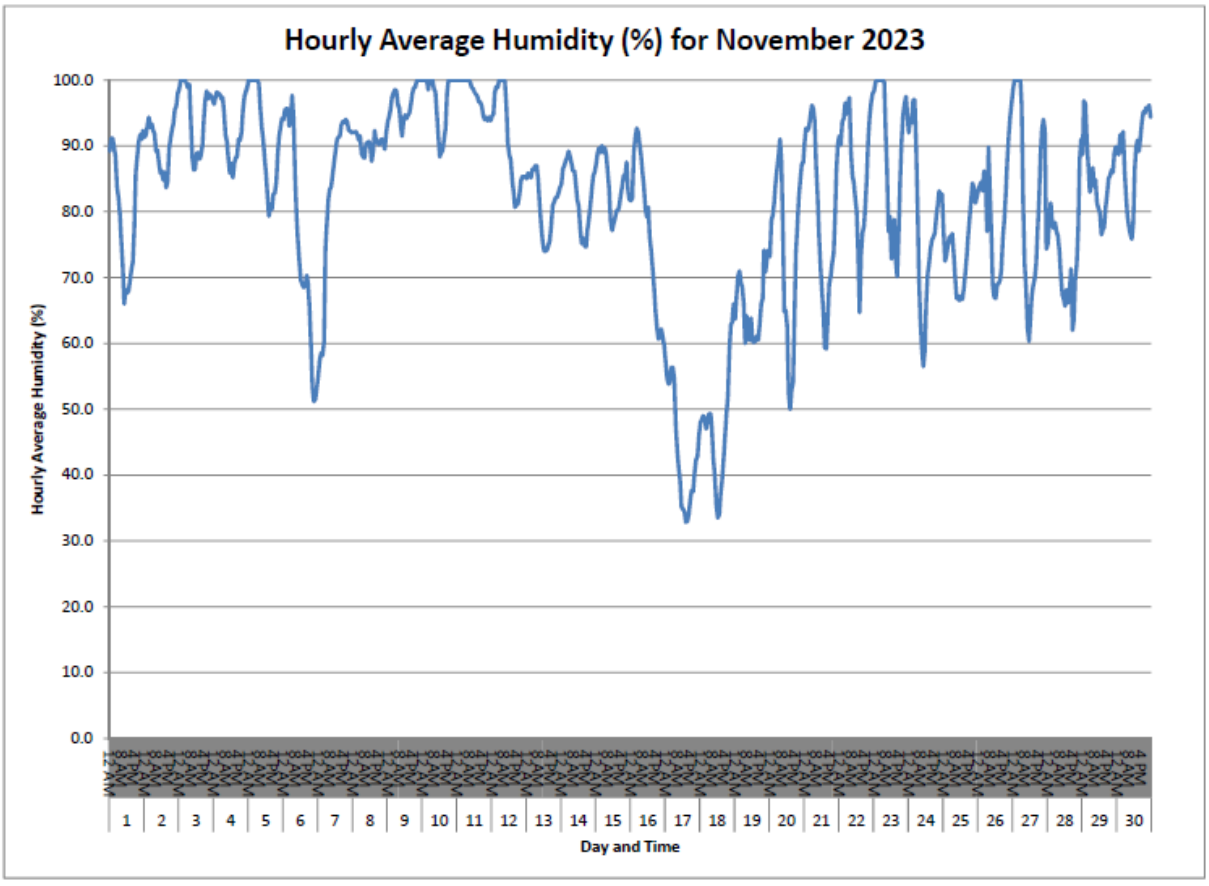

Hourly Average Wind Direction (degree) for Oct 2023
Hourly Average Wind Direction (degree)
360
315
270
225
180
135
90
45
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day and Time

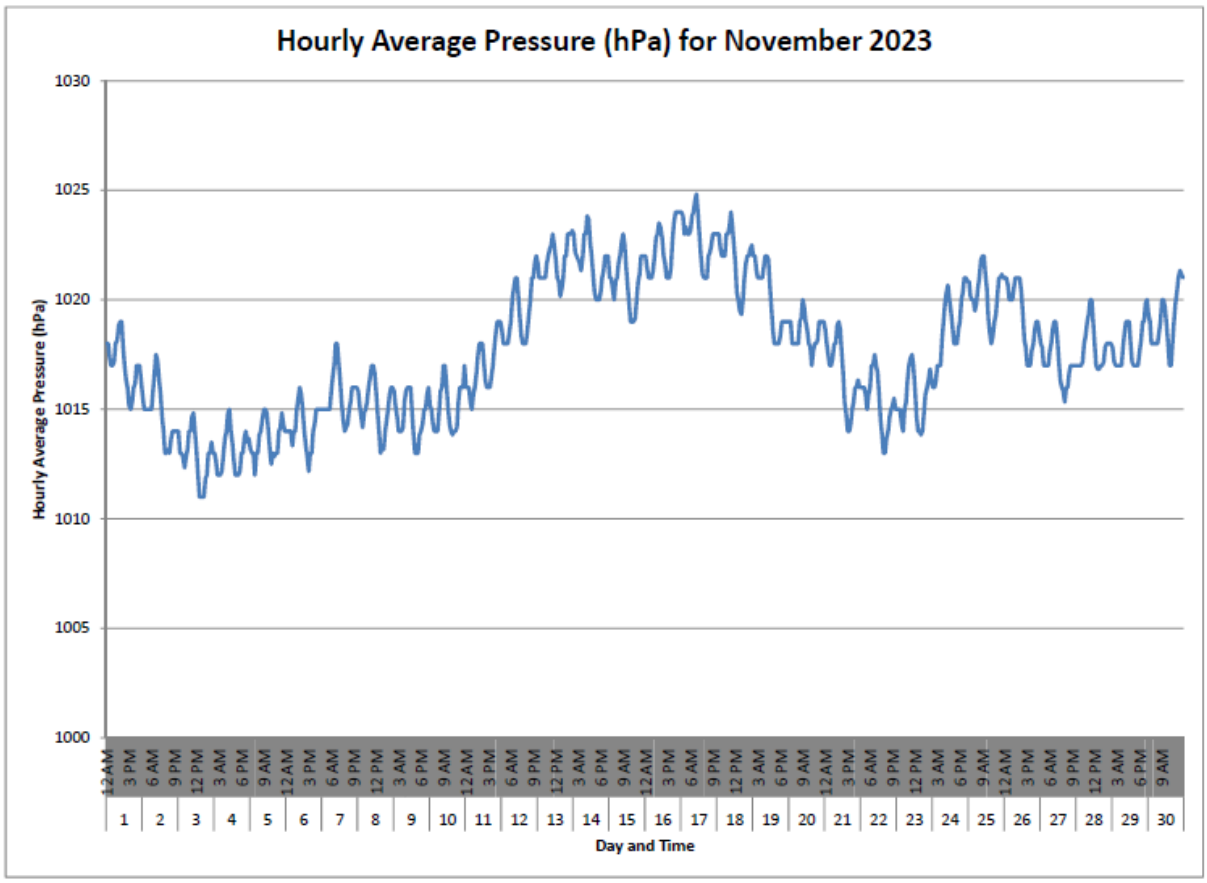

Wind Rose for Oct 2023
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
18.00%
16.00%
14.00%
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
<1.0
<2.0
<3.0
<4.0
<5.0
All

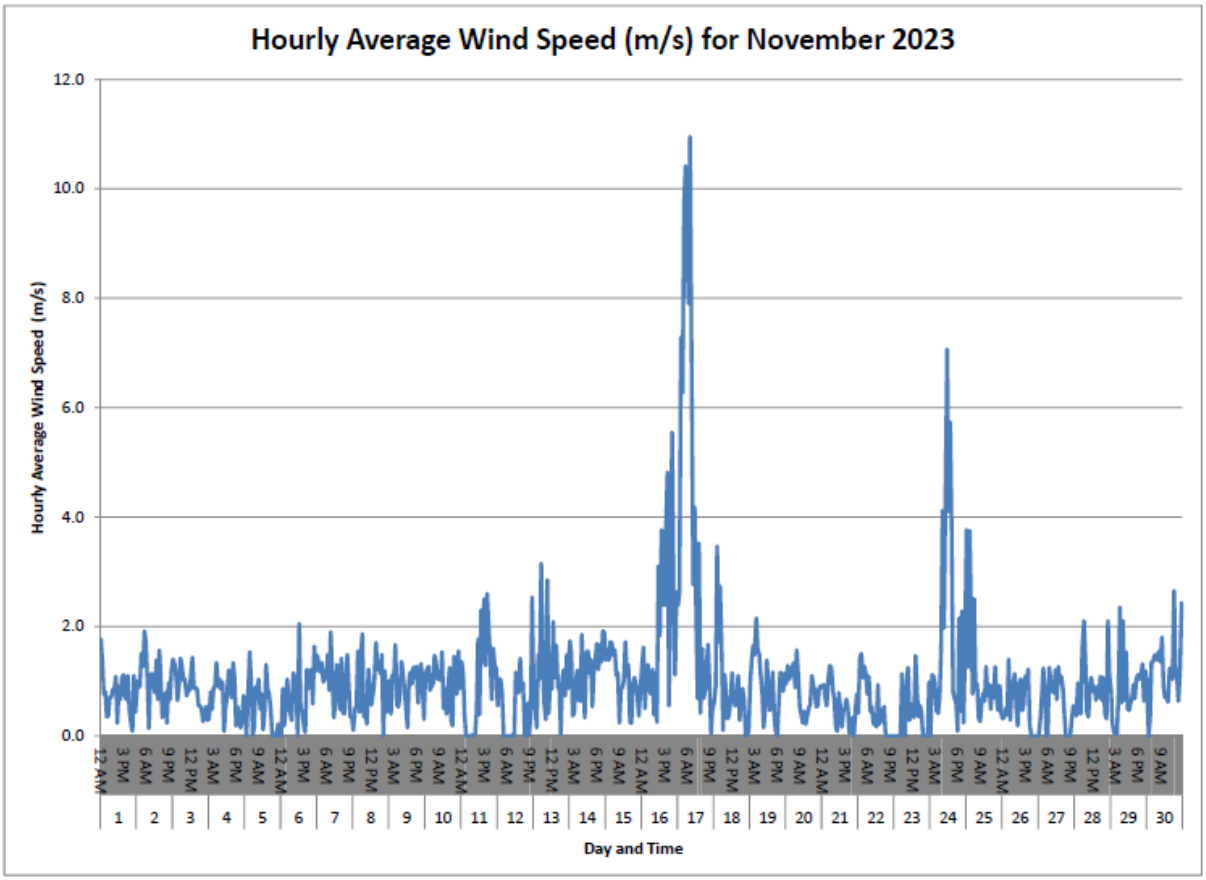

Daily and Cumulative Rainfall (mm) for Oct 2023
Rainfall (mm)
400
350
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day
Daily Rainfall (mm)
Cumulative Rainfall

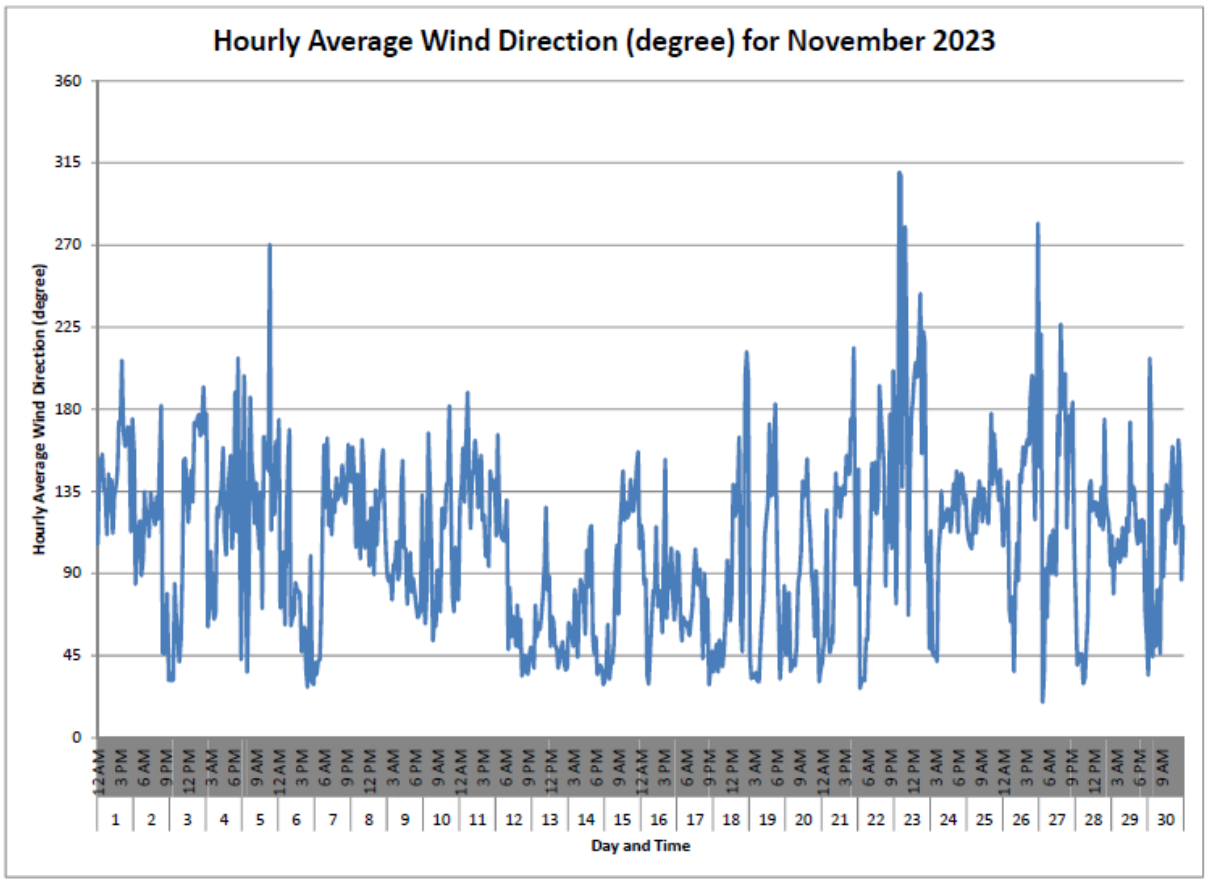
NOVEMBER 2023

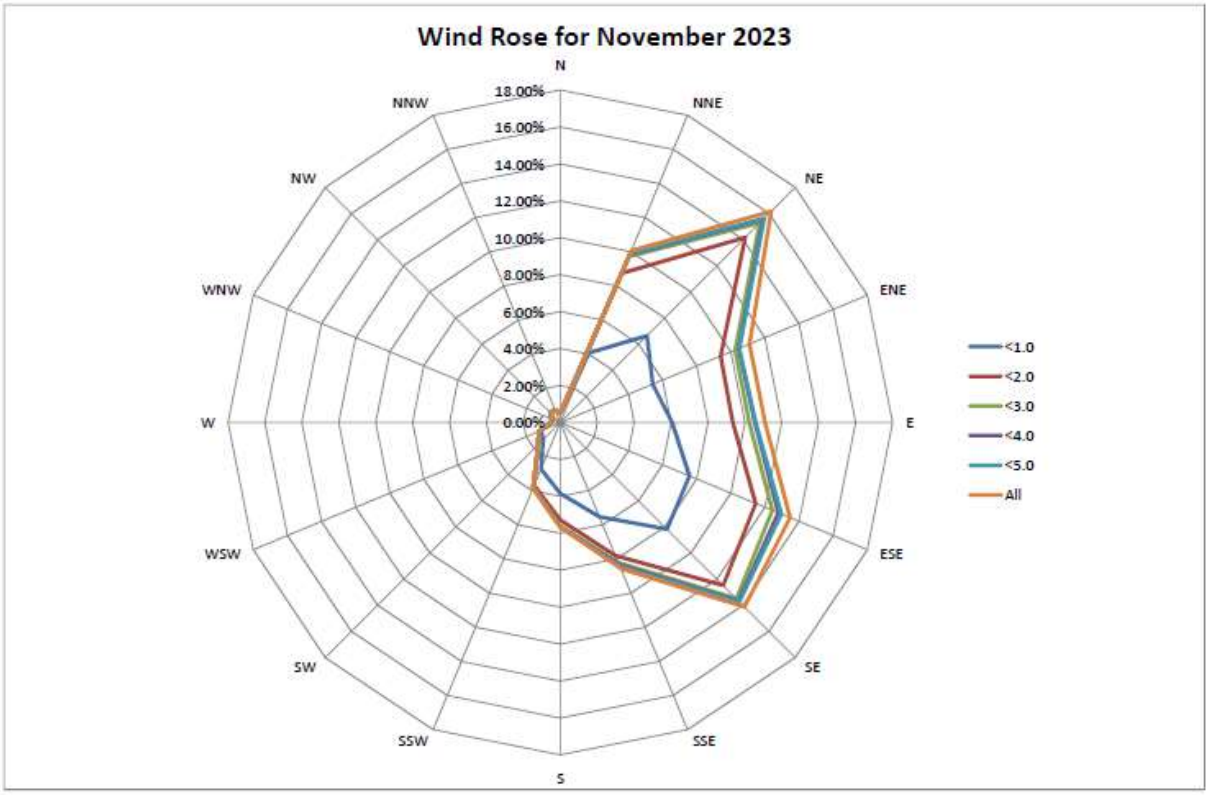


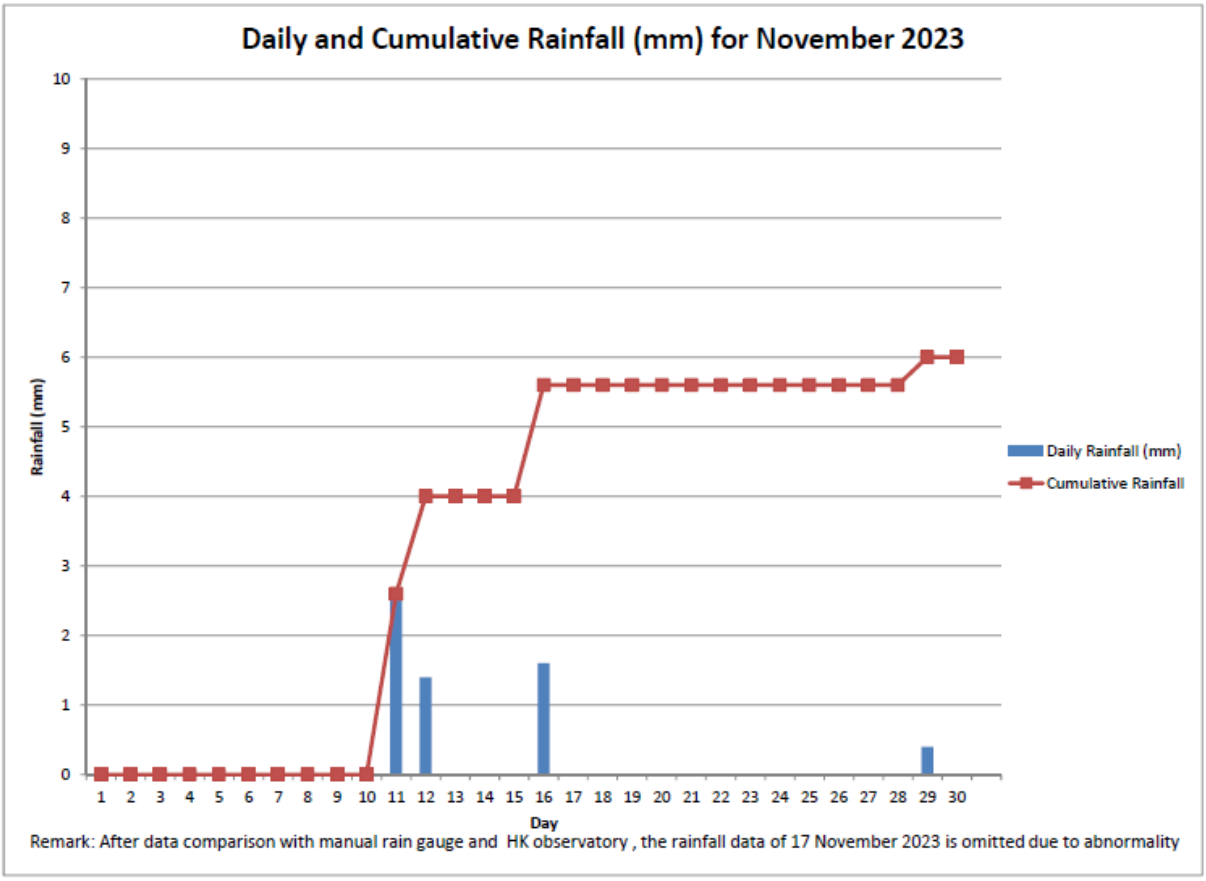



Hourly Average Pressure (hPa) for November 2023
Hourly Average Pressure (hPa)
1030
1025
1020
1015
1010
1005
1000
Day and Time

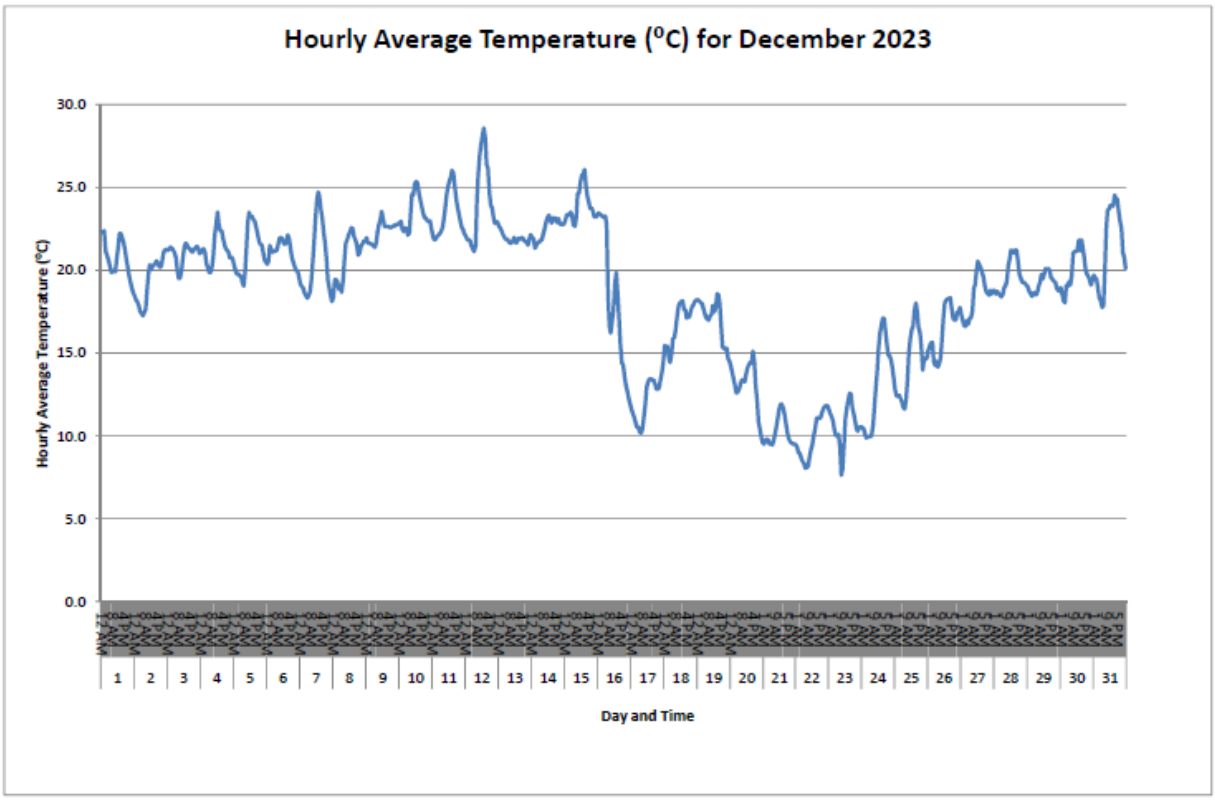

Hourly Average Wind Speed (m/s) for November 2023
Hourly Average Wind Speed (m/s)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Day and Time

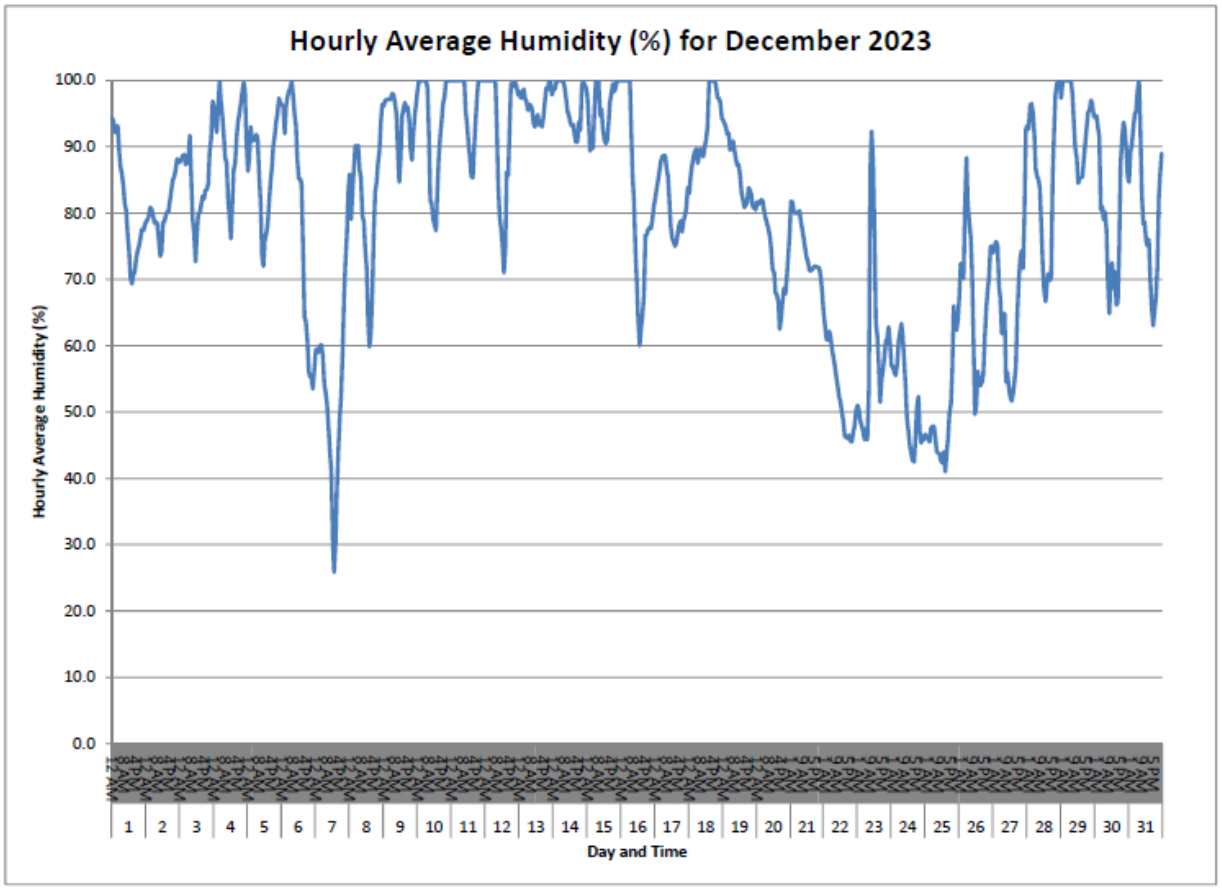

Hourly Average Wind Direction (degree) for November 2023
Hourly Average Wind Direction (degree)
360
315
270
225
180
135
90
45
0
12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 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

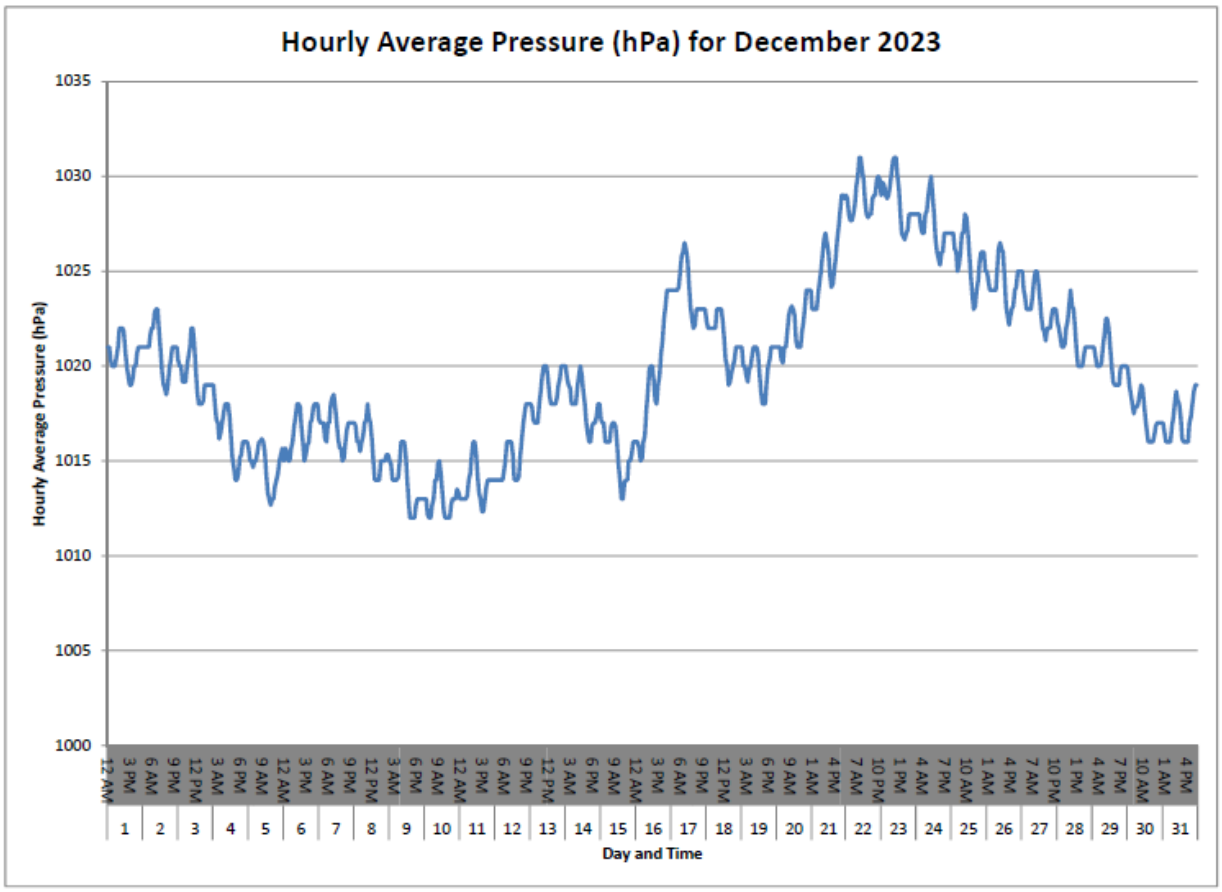

Wind Rose for November 2023
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
18.00%
16.00%
14.00%
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
<1.0
<2.0
<3.0
<4.0
<5.0
All

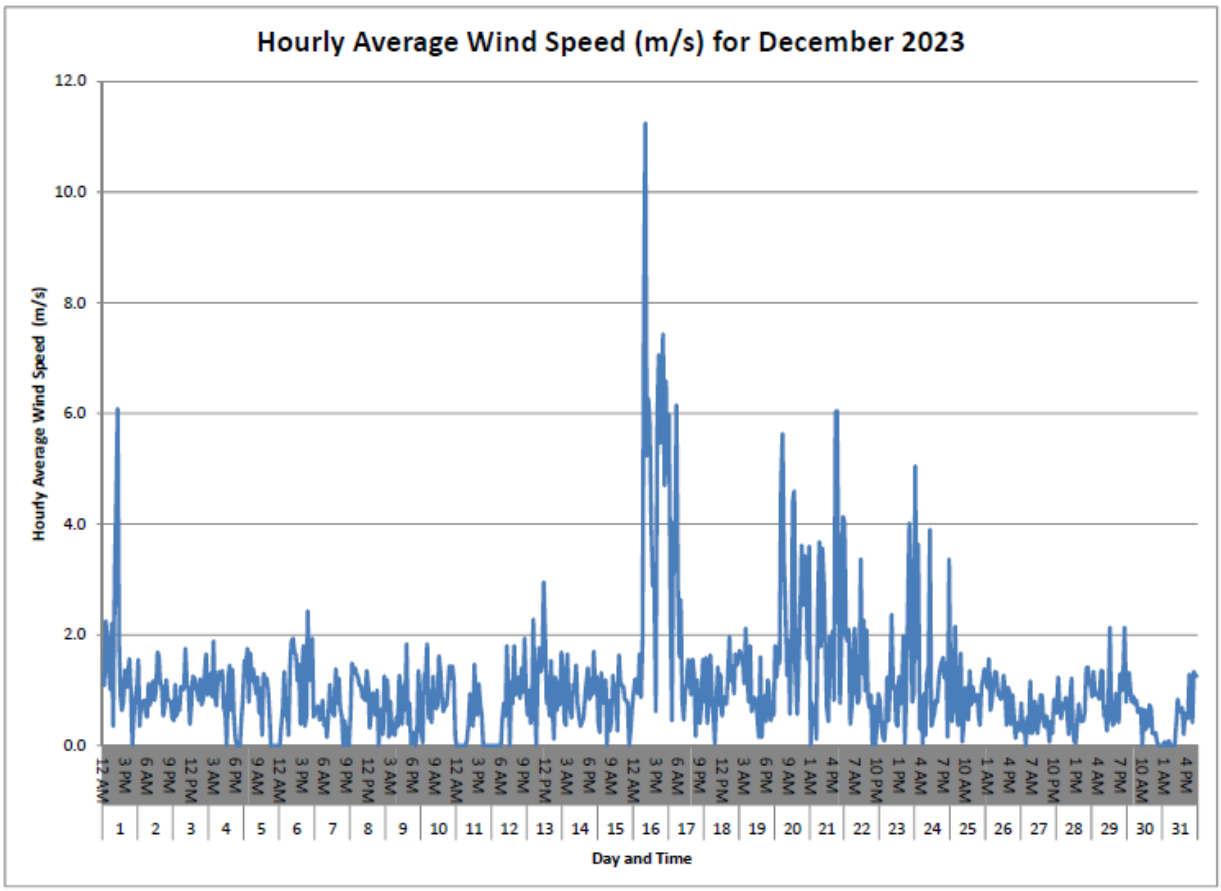

Daily and Cumulative Rainfall (mm) for November 2023
Rainfall (mm)
Day
Daily Rainfall (mm)
Cumulative Rainfall
Remark: After data comparison with manual rain gauge and HK observatory , the rainfall data of 17 November 2023 is omitted due to abnormality

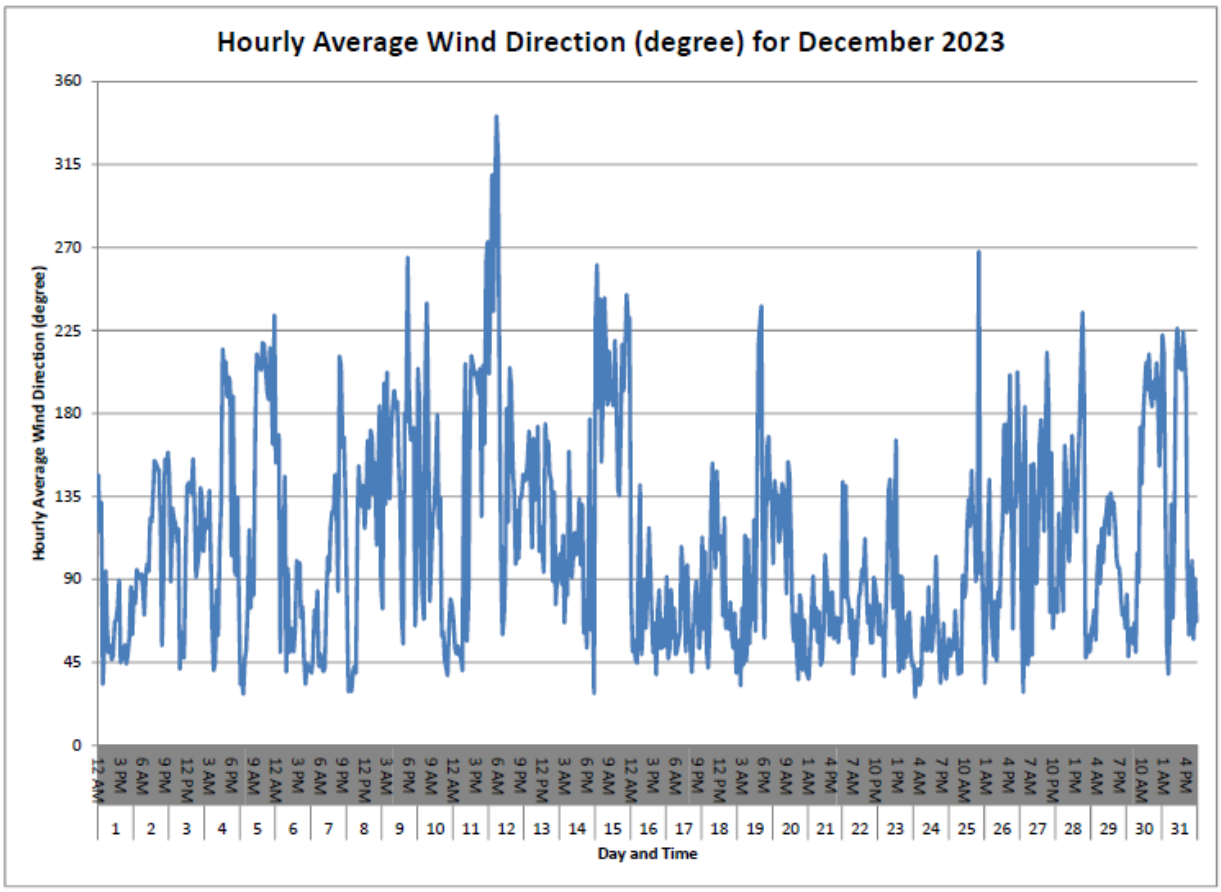
DECEMBER 2023

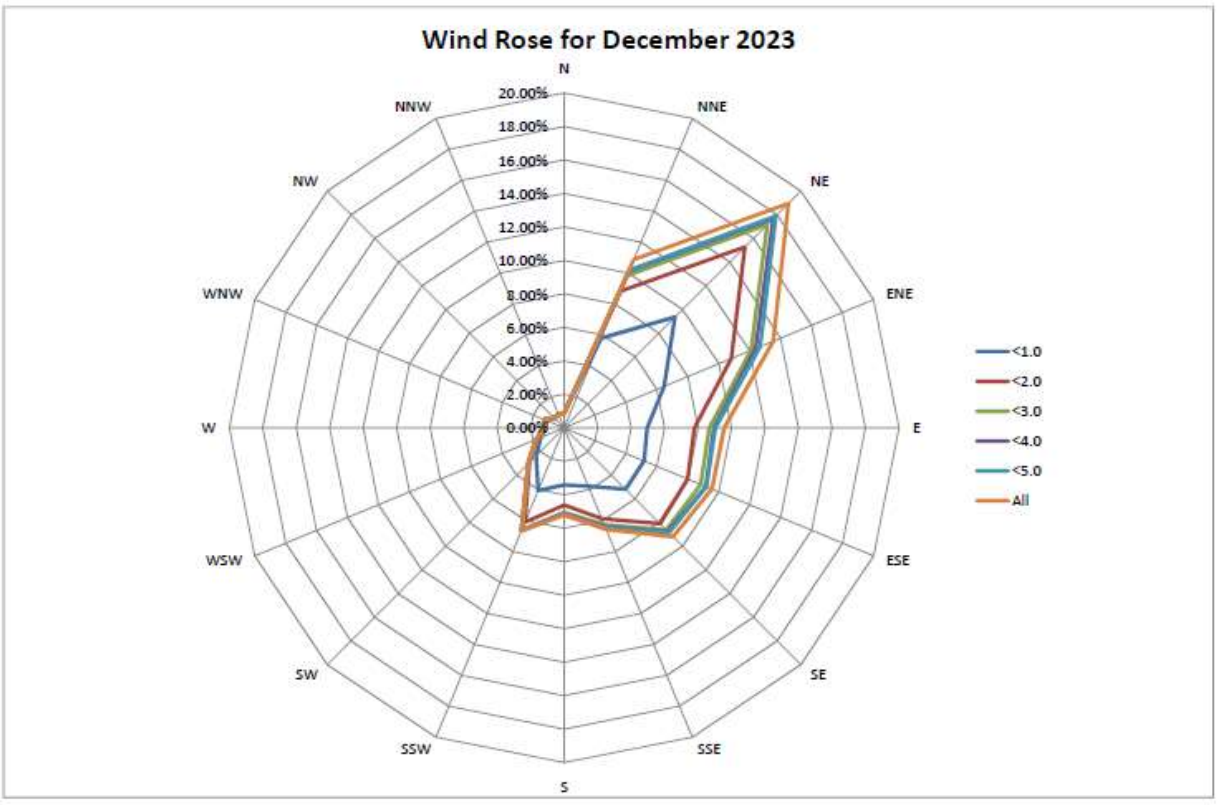


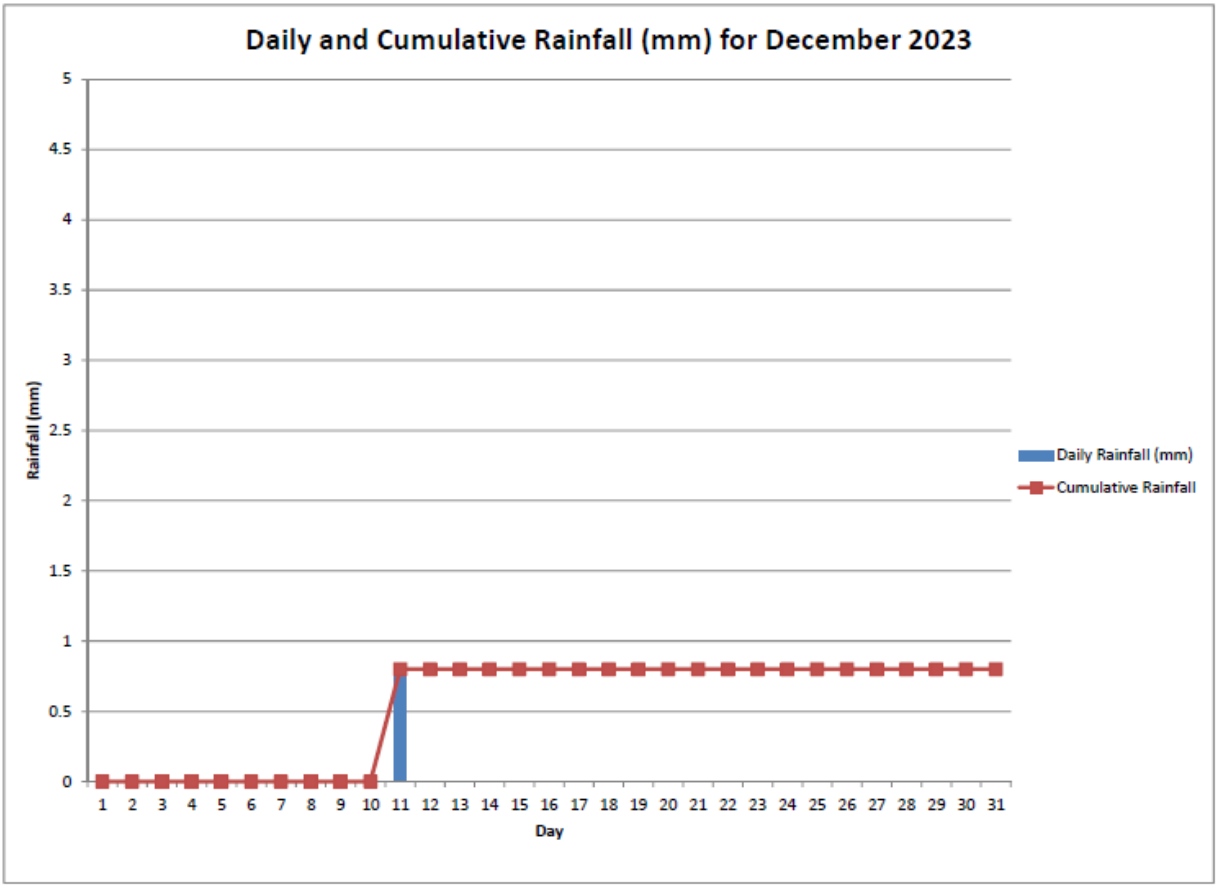



Hourly Average Pressure (hPa) for December 2023
Hourly Average Pressure (hPa)
1035
1030
1025
1020
1015
1010
1005
1000
Day and Time


Hourly Average Wind Speed (m/s) for December 2023
Hourly Average Wind Speed (m/s)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Day and Time


Hourly Average Wind Direction (degree) for December 2023
Hourly Average Wind Direction (degree)
360
315
270
225
180
135
90
45
0
Day and Time
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


Wind Rose for December 2023
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
20.00%
18.00%
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 December 2023
Rainfall (mm)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
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

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
19 Oct 23	Rainy	OP1	13:38	26.1	3.9	SW	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP2	13:42	26.3	4.4	N	Yes	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP3	13:45	27.5	4.4	N	No	1	Leachate	LTP	N/A
19 Oct 23	Rainy	OP4	13:47	27.8	1.3	NE	Yes	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP5	13:49	27.5	3.8	NE	Yes	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP6	13:51	27.6	4.8	N	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP7	13:52	26.8	3.3	N	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP8	13:56	27.5	4.4	E	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP9	13:59	28.3	2.1	N	No	1	Towngas	Towngas plant	N/A
19 Oct 23	Rainy	OP10	14:02	26.8	3.1	E	Yes	1	Towngas	Towngas plant	N/A
19 Oct 23	Rainy	OP11	14:18	26.6	2.8	E	Yes	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP12	14:16	26.9	3.3	NW	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP13	14:13	27.8	2.4	NW	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP14	14:10	27.7	4.4	SW	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP15	14:25	27.4	1.5	E	No	0	N/A	N/A	N/A

Date	Weather	Location	Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
19 Oct 23	Rainy	OP16	14:36	27.9	0.0	NA	No	0	N/A	N/A	N/A
19 Oct 23	Rainy	OP17	14:32	26.1	5.4	SW	Yes	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP1	13:43	26.7	1.9	SW	Yes	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP2	13:47	27.5	1.1	SW	Yes	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP3	13:49	27.9	5.6	W	Yes	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP4	13:51	26.9	2.8	N	Yes	1	Leachate smell	LTP	N/A
9 Nov 23	Rainy	OP5	13:53	26.7	4.0	NE	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP6	13:57	26.9	2.9	N	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP7	13:58	26.3	2.3	S	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP8	14:02	27.7	2.8	NE	Yes	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP9	14:05	29.4	0.0	N/A	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP10	14:01	27.6	1.3	SE	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP11	14:18	26.8	2.2	E	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP12	14:15	27.9	2.2	E	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP13	14:14	26.8	1.4	E	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP14	14:12	26.4	0.0	N/A	No	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP15	14:28	26.8	2.2	W	No	0	N/A	N/A	N/A

Date	Weather	Location	Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
9 Nov 23	Rainy	OP16	14:29	25.9	6.2	N	Yes	0	N/A	N/A	N/A
9 Nov 23	Rainy	OP17	14:30	27.5	4.4	S	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP1	14:05	30.9	1.1	SW	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP2	14:09	27.6	3.4	S	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP3	14:11	28.0	1.3	SW	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP4	14:13	28.3	3.8	NE	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP5	14:15	28.3	1.1	E	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP6	14:17	27.8	1.2	SE	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP7	14:18	28.2	1.6	SW	No	1	Soil	WSD Trench	N/A
15 Dec 23	Sunny	OP8	14:22	28.6	2.5	S	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP9	14:26	28.7	0.6	SE	Yes	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP10	14:28	27.4	1.3	SE	Yes	1	Faeces	Planting area	SENTx
15 Dec 23	Sunny	OP11	14:50	25.7	4.6	E	Yes	1	Soil	Cell 4X Tipping area	SENTx
15 Dec 23	Sunny	OP12	14:47	26.3	2.3	E	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP13	14:45	26.0	2.6	NE	No	0	N/A	N/A	N/A

Date	Weather	Location	Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
15 Dec 23	Sunny	OP14	14:42	26.1	1.8	NE	No	0	N/A	N/A	N/A
15 Dec 23	Sunny	OP15	14:58	26.1	2.2	SE	Yes	1	Musty	Cell 4X Tipping area	SENTx
15 Dec 23	Sunny	OP16	15:04	26.0	3.3	NE	Yes	1	Musty	Cell 4X Tipping area	SENTx
15 Dec 23	Sunny	OP17	15:07	27.4	0.0	N/A	No	0	N/A	N/A	N/A

ANNEX D5 THERMAL OXIDIZER, LANDFILL GAS FLARE AND LANDFILL GAS GENERATOR STACK EMISSION MONITORING RESULTS

TABLE D5.1 THERMAL OXIDISER STACK EMISSION MONITORING RESULTS

Parameters	**Monitoring Results (October 2023)**
NO_2	0.17 gs^{-1}
CO	0.03 gs^{-1}
SO_2	0.79 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}
Vinyl chloride	<1.2 x 10^{-4} gs^{-1}
Exhaust gas velocity	10.5 ms^{-1} (b)
Parameters	**Monitoring Results (November 2023)**
NO_2	0.55 gs^{-1}
CO	0.03 gs^{-1}
SO_2	0.45 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}
Vinyl chloride	<1.1 x 10^{-4} gs^{-1}
Non-Methane Organic Carbons	0.003 gs^{-1}
Ammonia	0.0287 gs^{-1}
Exhaust gas velocity	9.0 ms^{-1}
Parameters	**Monitoring Results (December 2023)**
NO_2	0.68 gs^{-1}
CO	0.03 gs^{-1}
SO_2	<0.005 gs^{-1}
Benzene	<2.0 x 10^{-4} gs^{-1}
Vinyl chloride	<1.0 x 10^{-4} gs^{-1}
Exhaust gas velocity	7.7 ms^{-1}

TABLE D5.2 THERMAL OXIDISER STACK CONTINUOUS MONITORING RESULTS

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)
1 Oct 23	909	1204	10.5
2 Oct 23	900	1203	
3 Oct 23	909	1207	
4 Oct 23	943	1209	
5 Oct 23	924	1207	
6 Oct 23	924	1203	
7 Oct 23	924	1199	
8 Oct 23	926	1197	
9 Oct 23	926	1194	
10 Oct 23	926	1196	
11 Oct 23	927	1209	
12 Oct 23	926	1210	
13 Oct 23	926	1206	
14 Oct 23	927	1204	
15 Oct 23	925	1202	
16 Oct 23	923	1197	
17 Oct 23	926	1195	
18 Oct 23	924	1197	
19 Oct 23	923	1200	
20 Oct 23	924	1200	
21 Oct 23	927	1209	
22 Oct 23	925	1200	
23 Oct 23	926	1202	
24 Oct 23	928	1201	
25 Oct 23	927	1203	
26 Oct 23	Under Maintenance		
27 Oct 23	Under Maintenance		
28 Oct 23	Under Maintenance		
29 Oct 23	925	1192	
30 Oct 23	924	1197	
31 Oct 23	925	1200	
1 Nov 23	924	1196	
2 Nov 23	925	1197	
3 Nov 23	927	1201	
4 Nov 23	924	1201	
5 Nov 23	923	1199	

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)
6 Nov 23	926	1197	
7 Nov 23	925	1196	
8 Nov 23	926	1198	
9 Nov 23	925	1196	
10 Nov 23	924	1199	
11 Nov 23	923	1203	
12 Nov 23	925	1204	
13 Nov 23	924	1201	
14 Nov 23	927	1204	
15 Nov 23	925	1203	
16 Nov 23	922	1197	
17 Nov 23	925	1198	
18 Nov 23	925	1199	
19 Nov 23	925	1200	
20 Nov 23	925	1204	
21 Nov 23	924	1201	
22 Nov 23	924	1202	
23 Nov 23	923	1198	
24 Nov 23	930	1212	
25 Nov 23	926	1206	9.0
26 Nov 23	926	1204	
27 Nov 23	926	1204	
28 Nov 23	Under Maintenance		
29 Nov 23	925	1197	
30 Nov 23	926	1206	
1 Dec 23	923	1207	
2 Dec 23	927	1210	
3 Dec 23	927	1211	
4 Dec 23	924	1211	
5 Dec 23	925	1212	
6 Dec 23	926	1212	
7 Dec 23	927	1215	
8 Dec 23	925	1214	
9 Dec 23	926	1218	
10 Dec 23	924	1217	
11 Dec 23	928	1221	
12 Dec 23	926	1206	

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)
13 Dec 23	928	1218	7.7
14 Dec 23	926	1215	
15 Dec 23	926	1214	
16 Dec 23	927	1204	
17 Dec 23	925	1204	
18 Dec 23	928	1208	
19 Dec 23	935	1207	
20 Dec 23	924	1215	
21 Dec 23	927	1209	
22 Dec 23	925	1209	
23 Dec 23	923	1212	
24 Dec 23	927	1214	
25 Dec 23	927	1211	
26 Dec 23	925	1211	
27 Dec 23	925	1213	
28 Dec 23	924	1211	
29 Dec 23	927	1213	
30 Dec 23	925	1212	
31 Dec 23	926	1212	
Average	925	1205	9.1
Min	900	1192	7.7
Max	943	1221	10.5

Notes:

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

TABLE D5.3 LANDFILL GAS FLARE STACK EMISSION MONITORING RESULTS

Parameters	**Monitoring Results (October 2023)**
	Flare 1 – F601
NO_2	0.02 gs^{-1}
CO	0.38 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<3.03 x 10^{-4} gs^{-1}
Vinyl chloride	<7.9 x 10^{-5} gs^{-1}
Exhaust gas velocity	5.8 ms^{-1}
Parameters	**Monitoring Results (November 2023)**
	Flare 1 – F601
NO_2	0.02 gs^{-1}
CO	0.032 gs^{-1}
SO_2	0.05 gs^{-1}
Benzene	<8.9 x 10^{-5} gs^{-1}
Vinyl chloride	<7.1 x 10^{-5} gs^{-1}
Non-Methane Organic Carbons	0.004 gs^{-1}
Exhaust gas velocity	6.3 ms^{-1}
Parameters	**Monitoring Results (December 2023)**
	Flare 1 – F601
NO_2	0.03 gs^{-1}
CO	0.02 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<1.26 x 10^{-4} gs^{-1}
Vinyl chloride	<1.01 x 10^{-4} gs^{-1}
Exhaust gas velocity	9.0 ms^{-1}

TABLE D5.4 LANDFILL GAS FLARE STACK CONTINUOUS MONITORING RESULTS

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) [a]	Operation Status
Flare 1 – F601				
1 Oct 23	824	1041		In Operation
2 Oct 23	827	1063		In Operation
3 Oct 23	830	1067		In Operation
4 Oct 23	832	1070		In Operation
5 Oct 23	834	1073		In Operation
6 Oct 23	836	1076		In Operation
7 Oct 23	838	1079		In Operation
8 Oct 23	840	1083		In Operation
9 Oct 23	843	1087		In Operation
10 Oct 23	845	1091		In Operation
11 Oct 23	848	1095		In Operation
12 Oct 23	852	1100		In Operation
13 Oct 23	856	1107		In Operation
14 Oct 23	860	1113		In Operation
15 Oct 23	868	1102		In Operation
16 Oct 23	860	1125	5.8	In Operation
17 Oct 23	861	1113		In Operation
18 Oct 23	859	1124		In Operation
19 Oct 23	857	1116		In Operation
20 Oct 23	868	1100		In Operation
21 Oct 23	854	1115		In Operation
22 Oct 23	864	1013		In Operation
23 Oct 23	868	1112		In Operation
24 Oct 23	850	1109		In Operation
25 Oct 23	854	1086		In Operation
26 Oct 23	850	1106		In Operation
27 Oct 23	833	1075		In Operation
28 Oct 23	959	1199		In Operation
29 Oct 23	837	1093		In Operation
30 Oct 23	857	1120		In Operation
31 Oct 23	848	1116		In Operation
1 Nov 23	992	1258		In Operation
2 Nov 23	900	1141		In Operation
3 Nov 23	952	1206		In Operation
4 Nov 23	838	1100		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
5 Nov 23	889	1155		In Operation
6 Nov 23	836	1103		In Operation
7 Nov 23	860	1118		In Operation
8 Nov 23	862	1121		In Operation
9 Nov 23	858	1121		In Operation
10 Nov 23	993	1246		In Operation
11 Nov 23	869	1129		In Operation
12 Nov 23	855	1115		In Operation
13 Nov 23	870	1128		In Operation
14 Nov 23	981	1229		In Operation
15 Nov 23	863	1123	6.3	In Operation
16 Nov 23	973	1239		In Operation
17 Nov 23	970	1209		In Operation
18 Nov 23	901	1137		In Operation
19 Nov 23	867	1105		In Operation
20 Nov 23	885	1129		In Operation
21 Nov 23	985	1229		In Operation
22 Nov 23	956	1212		In Operation
23 Nov 23	913	1148		In Operation
24 Nov 23	911	1161		In Operation
25 Nov 23	890	1144		In Operation
26 Nov 23	849	1107		In Operation
27 Nov 23	916	1164		In Operation
28 Nov 23	941	1170		In Operation
29 Nov 23	907	1148		In Operation
30 Nov 23	978	1170		In Operation
1 Dec 23	990	1143		In Operation
2 Dec 23	880	1123		In Operation
3 Dec 23	990	1143		In Operation
4 Dec 23	960	1153		In Operation
5 Dec 23	990	1143		In Operation
6 Dec 23	990	1233		In Operation
7 Dec 23	860	1103		In Operation
8 Dec 23	990	1123		In Operation
9 Dec 23	860	1113		In Operation
10 Dec 23	980	1153		In Operation
11 Dec 23	980	1123	9.0	In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
12 Dec 23	990	1253		In Operation
13 Dec 23	890	1083		In Operation
14 Dec 23	940	1113		In Operation
15 Dec 23	990	1123		In Operation
16 Dec 23	990	1253		In Operation
17 Dec 23	850	1083		In Operation
18 Dec 23	860	1093		In Operation
19 Dec 23	850	1053		In Operation
20 Dec 23	850	1063		In Operation
21 Dec 23	890	1093		In Operation
22 Dec 23	910	1093		In Operation
23 Dec 23	920	1133		In Operation
24 Dec 23	950	1143		In Operation
25 Dec 23	850	1083		In Operation
26 Dec 23	890	1093		In Operation
27 Dec 23	830	1033		In Operation
28 Dec 23	980	1143		In Operation
29 Dec 23	840	1043		In Operation
30 Dec 23	830	1053		In Operation
31 Dec 23	890	1053		In Operation
Average	893	1124	7.0	
Min	824	1013	9.0	
Max	993	1258	5.8	
Flare 2 – F602				
1 Oct 23	936	1061		In Operation
2 Oct 23	845	1089		In Operation
3 Oct 23	899	1120		In Operation
4 Oct 23	908	1115		In Operation
5 Oct 23	913	1117		In Operation
6 Oct 23	917	1122		In Operation
7 Oct 23	913	1137		In Operation
8 Oct 23	894	1116		In Operation
9 Oct 23	921	1140		In Operation
10 Oct 23	920	1150		In Operation
11 Oct 23	923	1152		In Operation
12 Oct 23	909	1140		In Operation
13 Oct 23	921	1143	8.5	In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
14 Oct 23	914	1159		In Operation
15 Oct 23	904	1123		In Operation
16 Oct 23	935	1060		In Operation
17 Oct 23	842	1086		In Operation
18 Oct 23	900	1121		In Operation
19 Oct 23	911	1118		In Operation
20 Oct 23	912	1116		In Operation
21 Oct 23	914	1119		In Operation
22 Oct 23	914	1138		In Operation
23 Oct 23	897	1119		In Operation
24 Oct 23	920	1139		In Operation
25 Oct 23	917	1147		In Operation
26 Oct 23	924	1153		In Operation
27 Oct 23	912	1143		In Operation
28 Oct 23	920	1142		In Operation
29 Oct 23	911	1156		In Operation
30 Oct 23	905	1124		In Operation
31 Oct 23	903	1112		In Operation
1 Nov 23	882	1101		In Operation
2 Nov 23	855	1045		In Operation
3 Nov 23	869	1023		In Operation
4 Nov 23	853	1063		In Operation
5 Nov 23	890	1107		In Operation
6 Nov 23	973	1106		In Operation
7 Nov 23	840	1058		In Operation
8 Nov 23	863	1087		In Operation
9 Nov 23	876	1093		In Operation
10 Nov 23	828	1090		In Operation
11 Nov 23	841	1037		In Operation
12 Nov 23	855	1075		In Operation
13 Nov 23	860	1073		In Operation
14 Nov 23	900	1120		In Operation
15 Nov 23	889	1099		In Operation
16 Nov 23	843	1106		In Operation
17 Nov 23	885	1123		In Operation
18 Nov 23	862	1084		In Operation
19 Nov 23	864	1093	8.9	In Operation

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
20 Nov 23	851	1081		In Operation
21 Nov 23	859	1090		In Operation
22 Nov 23	860	1073		In Operation
23 Nov 23	862	1095		In Operation
24 Nov 23	868	1087		In Operation
25 Nov 23	-	-		Under maintenance
26 Nov 23	-	-		Under maintenance
27 Nov 23	854	1110		In Operation
28 Nov 23	882	1147		In Operation
29 Nov 23	865	1098		In Operation
30 Nov 23	865	1119		In Operation
1 Dec 23	860	1053		In Operation
2 Dec 23	830	1043		In Operation
3 Dec 23	860	1043		In Operation
4 Dec 23	840	993		In Operation
5 Dec 23	850	1013		In Operation
6 Dec 23	960	1143		In Operation
7 Dec 23	910	1093		In Operation
8 Dec 23	840	1063		In Operation
9 Dec 23	850	1023		In Operation
10 Dec 23	840	1013	9.1	In Operation
11 Dec 23	840	993		In Operation
12 Dec 23	860	1023		In Operation
13 Dec 23	880	1043		In Operation
14 Dec 23	880	1093		In Operation
15 Dec 23	860	1013		In Operation
16 Dec 23	850	993		In Operation
17 Dec 23	-	-		Under maintenance
18 Dec 23	-	-		Under maintenance
19 Dec 23	-	-		Under maintenance
20 Dec 23	-	-		Under maintenance
21 Dec 23	860	1093		In Operation
22 Dec 23	840	1053		In Operation
23 Dec 23	860	1043		In Operation
24 Dec 23	880	1063		In Operation
25 Dec 23	880	1063		In Operation
26 Dec 23	-	-		Under maintenance

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
27 Dec 23	880	1083		In Operation
28 Dec 23	870	1053		In Operation
29 Dec 23	830	1053		In Operation
30 Dec 23	840	1063		In Operation
31 Dec 23	750	923		In Operation
Average	880	1088	7.0	
Min	750	923	5.8	
Max	973	1159	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 (October 2023)**
NO_2	0.06 gs^{-1}
CO	1.08 gs^{-1}
SO_2	<0.001 gs^{-1}
Benzene	4.0×10^{-5} gs^{-1}
Vinyl chloride	$<1.06 \times 10^{-5}$ gs^{-1}
Exhaust gas velocity	11.6 ms^{-1}
Parameters	**Monitoring Results (November 2023)**
NO_2	0.095 gs^{-1}
CO	1.082 gs^{-1}
SO_2	<0.001 gs^{-1}
Benzene	1.01×10^{-4} gs^{-1}
Vinyl chloride	$<1.02 \times 10^{-5}$ gs^{-1}
Non-Methane Organic Carbons	0.0064 gs^{-1}
Exhaust gas velocity	11.8 ms^{-1}
Parameters	**Monitoring Results (December 2023)**
NO_2	0.075 gs^{-1}
CO	0.994 gs^{-1}
SO_2	$<4.00 \times 10^{-4}$ gs^{-1}
Benzene	1.86×10^{-4} gs^{-1}
Vinyl chloride	$<9.5 \times 10^{-6}$ gs^{-1}
Non-Methane Organic Carbons	10.5 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 Oct 23	843		In Operation
2 Oct 23	843		In Operation
3 Oct 23	844		In Operation
4 Oct 23	841		In Operation
5 Oct 23	841		In Operation
6 Oct 23	840		In Operation
7 Oct 23	837		In Operation
8 Oct 23	841		In Operation
9 Oct 23	-		Under Maintenance
10 Oct 23	-		Under Maintenance
11 Oct 23	-		Under Maintenance
12 Oct 23	-		Under Maintenance
13 Oct 23	-		Under Maintenance
14 Oct 23	-		Under Maintenance
15 Oct 23	-		Under Maintenance
16 Oct 23	-		Under Maintenance
17 Oct 23	-		Under Maintenance
18 Oct 23	-		Under Maintenance
19 Oct 23	843		In Operation
20 Oct 23	841	11.6	In Operation
21 Oct 23	842		In Operation
22 Oct 23	838		In Operation
23 Oct 23	875		In Operation
24 Oct 23	877		In Operation
25 Oct 23	879		In Operation
26 Oct 23	879		In Operation
27 Oct 23	879		In Operation
28 Oct 23	879		In Operation
29 Oct 23	879		In Operation
30 Oct 23	880		In Operation
31 Oct 23	882		In Operation
1 Nov 23	883		In Operation
2 Nov 23	884		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
3 Nov 23	885	11.8	In Operation
4 Nov 23	-		Under Maintenance
5 Nov 23	873		In Operation
6 Nov 23	868		In Operation
7 Nov 23	874		In Operation
8 Nov 23	875		In Operation
9 Nov 23	876		In Operation
10 Nov 23	878		In Operation
11 Nov 23	877		In Operation
12 Nov 23	871		In Operation
13 Nov 23	872		In Operation
14 Nov 23	873		In Operation
15 Nov 23	876		In Operation
16 Nov 23	872		In Operation
17 Nov 23	872		In Operation
18 Nov 23	875		In Operation
19 Nov 23	877		In Operation
20 Nov 23	876		In Operation
21 Nov 23	878		In Operation
22 Nov 23	879		In Operation
23 Nov 23	875		In Operation
24 Nov 23	874		In Operation
25 Nov 23	875		In Operation
26 Nov 23	876		In Operation
27 Nov 23	858		In Operation
28 Nov 23	-		Under Maintenance
29 Nov 23	-		Under Maintenance
30 Nov 23	-		Under Maintenance
1 Dec 23	-		Under Maintenance
2 Dec 23	-		Under Maintenance
3 Dec 23	-		Under Maintenance
4 Dec 23	873		In Operation
5 Dec 23	873		In Operation
6 Dec 23	873		In Operation
7 Dec 23	869		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
8 Dec 23	873	10.5	In Operation
9 Dec 23	876		In Operation
10 Dec 23	879		In Operation
11 Dec 23	880		In Operation
12 Dec 23	882		In Operation
13 Dec 23	880		In Operation
14 Dec 23	882		In Operation
15 Dec 23	884		In Operation
16 Dec 23	883		In Operation
17 Dec 23	875		In Operation
18 Dec 23	880		In Operation
19 Dec 23	877		In Operation
20 Dec 23	873		In Operation
21 Dec 23	872		In Operation
22 Dec 23	869		In Operation
23 Dec 23	871		In Operation
24 Dec 23	871		In Operation
25 Dec 23	871		In Operation
26 Dec 23	872		In Operation
27 Dec 23	875		In Operation
28 Dec 23	876		In Operation
29 Dec 23	884		In Operation
30 Dec 23	882		In Operation
31 Dec 23	884		In Operation
Average	871	11.3	
Min	837	10.5	
Max	885	11.8	
ENGB			
1 Oct 23	840		In Operation
2 Oct 23	840		In Operation
3 Oct 23	842		In Operation
4 Oct 23	839		In Operation
5 Oct 23	838		In Operation
6 Oct 23	838		In Operation
7 Oct 23	836		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
8 Oct 23	840	11.6	In Operation
9 Oct 23	866		In Operation
10 Oct 23	854		In Operation
11 Oct 23	864		In Operation
12 Oct 23	864		In Operation
13 Oct 23	863		In Operation
14 Oct 23	866		In Operation
15 Oct 23	867		In Operation
16 Oct 23	867		In Operation
17 Oct 23	868		In Operation
18 Oct 23	872		In Operation
19 Oct 23	844		In Operation
20 Oct 23	843		In Operation
21 Oct 23	870		In Operation
22 Oct 23	840		In Operation
23 Oct 23	-		Under Maintenance
24 Oct 23	-		Under Maintenance
25 Oct 23	-		Under Maintenance
26 Oct 23	-		Under Maintenance
27 Oct 23	-		Under Maintenance
28 Oct 23	-		Under Maintenance
29 Oct 23	-		Under Maintenance
30 Oct 23	-		Under Maintenance
31 Oct 23	-		Under Maintenance
1 Nov 23	-	11.8	Under Maintenance
2 Nov 23	-		Under Maintenance
3 Nov 23	-		Under Maintenance
4 Nov 23	-		Under Maintenance
5 Nov 23	-		Under Maintenance
6 Nov 23	-		Under Maintenance
7 Nov 23	-		Under Maintenance
8 Nov 23	-		Under Maintenance
9 Nov 23	-		Under Maintenance
10 Nov 23	-		Under Maintenance
11 Nov 23	-		Under Maintenance

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
12 Nov 23	-		Under Maintenance
13 Nov 23	-		Under Maintenance
14 Nov 23	-		Under Maintenance
15 Nov 23	-		Under Maintenance
16 Nov 23	-		Under Maintenance
17 Nov 23	-		Under Maintenance
18 Nov 23	-		Under Maintenance
19 Nov 23	-		Under Maintenance
20 Nov 23	-		Under Maintenance
21 Nov 23	-		Under Maintenance
22 Nov 23	-		Under Maintenance
23 Nov 23	-		Under Maintenance
24 Nov 23	-		Under Maintenance
25 Nov 23	-		Under Maintenance
26 Nov 23	-		Under Maintenance
27 Nov 23	-		Under Maintenance
28 Nov 23	-		Under Maintenance
29 Nov 23	868		In Operation
30 Nov 23	868		In Operation
1 Dec 23	869		In Operation
2 Dec 23	868		In Operation
3 Dec 23	869		In Operation
4 Dec 23	869		In Operation
5 Dec 23	-		Under Maintenance
6 Dec 23	-		Under Maintenance
7 Dec 23	-		Under Maintenance
8 Dec 23	-		Under Maintenance
9 Dec 23	-		Under Maintenance
10 Dec 23	-		Under Maintenance
11 Dec 23	-		Under Maintenance
12 Dec 23	-		Under Maintenance
13 Dec 23	-		Under Maintenance
14 Dec 23	-		Under Maintenance
15 Dec 23	-	10.5	Under Maintenance
16 Dec 23	-		Under Maintenance

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
17 Dec 23	-		Under Maintenance
18 Dec 23	-		Under Maintenance
19 Dec 23	-		Under Maintenance
20 Dec 23	-		Under Maintenance
21 Dec 23	-		Under Maintenance
22 Dec 23	-		Under Maintenance
23 Dec 23	-		Under Maintenance
24 Dec 23	-		Under Maintenance
25 Dec 23	-		Under Maintenance
26 Dec 23	-		Under Maintenance
27 Dec 23	-		Under Maintenance
28 Dec 23	-		Under Maintenance
29 Dec 23	-		Under Maintenance
30 Dec 23	-		Under Maintenance
31 Dec 23	-		Under Maintenance
Average	856	11.3	
Min	836	10.5	
Max	872	11.8	

Notes:

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

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	34	25	23	30
H_2S	42	<15	<15	<15	<15
Methane	NA [(a)]	0.00016 %(v/v)	0.00017 %(v/v)	0.00035 %(v/v)	0.00032 %(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	0.9	1.2	1.5	1
Benzene	33	0.8	1	1.5	1.4
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	8.6	0.8	<0.5
Carbon Tetrachloride	64	0.6	0.7	0.9	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)]	0.8	1.4	1.4	0.9
Dimethylsulphide	8	<0.2	<0.2	<0.2	<0.2
Dipropyl ether	NA [(a)]	<0.8	<0.8	<0.8	<0.8
Limonene	212	<0.4	0.5	0.6	0.5
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	4.5	<3.8	5.5	<3.8
Ethyl butanoate	71	<1.0	<1.0	<1.0	<1.0
Ethyl propionate	29	<0.8	<0.8	<0.8	<0.8
Ethyl benzene	738	<0.5	0.6	1	0.7
Heptane	2,746	<0.8	<0.8	<0.8	<0.8

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	22.1	9.5	79.6	29.7
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	3	4.3	6.3	3.6
Butyl acetate	76	<1.0	<1.0	<1.0	<1.0
Butyl benzene	47	<1.0	<1.0	<1.0	<1.0
Nonane	11,540	<0.9	<0.9	<0.9	<0.9
Propyl benzene	19	<0.8	<0.8	<0.8	<0.8
Octane	7,942	<0.9	<0.9	<0.9	<0.9
Propyl propionate	276	<1.0	<1.0	<1.0	<1.0
Terpenes	NA [(a)]	<0.8	<0.8	1.4	<0.8
Tetrachloroethylene	1,380	<0.7	<0.7	<0.7	<0.7
Toluene	1,244	1.4	2.4	3.2	1.8
Trichloroethylene	5,500	<1.1	<1.1	<1.1	<1.1
Undecane	5,562	<1.2	<1.2	<1.2	<1.2
Vinyl Chloride	26	<0.3	<0.3	<0.3	<0.3
Xylenes	534	<0.5	1.1	2.4	1.6

Notes:

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

ANNEX D7 INVESTIGATION REPORTS OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCE

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	16 October 2023
Time	11:41 – 12:11
Monitoring Location	Thermal Oxidiser
Parameter	Sulphur Dioxide (SO_2)
Limit Levels	>0.07 g/s
Measured Level	0.79 g/s
Possible reason	As confirmed by the Contractor, the thermal oxidiser was under normal operating conditions during the sampling event. The thermal oxidizer stack emission monitoring results (NO_2, CO, Benzene, Vinyl chloride, gas combustion temperature, exhaust temperature and exhaust gas velocity) on 16 October 2023 were well within the respective limit levels. It is possible that the slight exceedance of SO_2 limit level measured on 16 October 2023 could be due to the low desulfurization efficiency of the desulfurization tanks. Hence, the SO_2 exceedance at the thermal oxidizer on 16 October 2023 is considered to be Project related. In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 16 November 2023 (it should be noted that the turnaround time of the laboratory analysis of the flue gas sample is 3 weeks and the results were available on 29 November 2023) to confirm findings. Exceedance of SO_2 Limit Level was recorded at the thermal oxidiser (0.45 g/s) during the sampling event. The thermal oxidiser showed consecutive exceedance of the stack emission limit (SO_2). It should be noted that although the measured SO_2 level exceeded the limit level of the EM&A programme (which was set based on the stack design parameters), the slight exceedance of SO_2 on 16 October 2023 will not cause adverse air quality impact to the identified ASRs as the anticipated SO_2 concentrations at the identified ASRs will still be well below the respective AQO criteria with reference to the findings of the operational air quality impact assessment of the SENTX Environmental Review Report.
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitoring the operating conditions of the thermal oxidiser to avoid any exceedance of the Limit Levels. The Contractor has arranged inspection and maintenance at the desulfurization tanks in December 2023 to enhance the desulfurization efficiency.

Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 12 December 2023

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	16 November 2023
Time	12:19 – 12:49
Monitoring Location	Thermal Oxidiser
Parameter	Sulphur Dioxide (SO_2)
Limit Levels	>0.07 g/s
Measured Level	0.45 g/s
Possible reason	As confirmed by the Contractor, the thermal oxidiser was under normal operating conditions during the sampling event. The thermal oxidizer stack emission monitoring results (NO_2, CO, Benzene, Vinyl chloride, gas combustion temperature, exhaust temperature and exhaust gas velocity) on 16 November 2023 were well within the respective limit levels. It is possible that the slight exceedance of SO_2 limit level measured on 16 November 2023 was due to low desulfurization efficiency of the desulfurization tanks. Hence, the SO_2 exceedance at the thermal oxidizer on 16 November 2023 is considered Project-related. In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 15 December 2023 (it should be noted that the turnaround time of the laboratory analysis of the flue gas sample is 3 weeks and the results were available on 3 January 2024) to confirm findings. The SO_2 concentration (<0.005 g/s) measured on 15 December 2023 is well below Limit Level. There is no consecutive exceedance of SO_2 concentrations in the flue gas emission of the thermal oxidiser. It should be noted that although the measured SO_2 level exceeded the limit level of the EM&A programme (which was set based on the stack design parameters), the slight exceedance of SO_2 on 16 November 2023 will not cause adverse air quality impact to the identified ASRs as the anticipated SO_2 concentrations at the identified ASRs will still be well below the respective AQO criteria with reference to the findings of the operational air quality impact assessment of the SENTX Environmental Review Report.
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitoring the operating conditions of the thermal oxidiser to avoid any exceedance of the Limit Levels. The Contractor has arranged inspection and maintenance at the desulfurization tanks in December 2023 to enhance the desulfurization efficiency.

Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 4 January 2024

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	21 November 2023
Time	8:00 (21 November 2023) – 8:00 (22 November 2023)
Monitoring Location	AM3
Parameter	24-hour Total Suspended Particulates (TSP)
Action / Limit Levels	Action level: >260 µg/ m^3 Limit level: >260 µg/m^3
Measured Level	272 µg /m^3
Possible reason	From the meteorological data obtained from the SENTX on-site meteorological monitoring station, a predominantly northeasterly to southeasterly wind with highest wind speed 1.5 m/s was recorded on 21 and 22 November 2023 during the sampling event. On 21 November 2023, dust emission from the public fill stockpiling areas and active earthworks in vicinity of dust monitoring station AM3 were observed. The sample taken at AM3 on the day might not represent the operation dust emission from SENTX. In addition, no works from SENTX which may lead to potential dust emission was conducted in the vicinity of AM3 on the sampling day based on ET site representative's on-site observations and construction and operation activities as described by the Contractor. Environmental deficiency was not observed during the weekly site inspection on 23 November 2023. The Contractor has implemented the dust control and mitigation measures recommended in the updated EM&A Manual. In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted on 27 November 2023 to confirm findings. 24-hour TSP level of 223 µg/m^3 (below Action and Limit Levels) was measured during the sampling event, which demonstrate no consecutive dust impact at AM3. Due to presence of the influencing factor from other project site and no potential source from the Project-related activities in the vicinity of AM3 which may lead to the high TSP level was identified, there is no adequate evidence showing that the TSP exceedance at AM3 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/Limit Level.

	In addition, the Contractor was reminded to discuss the dust control measures with CEDD, to minimize the dust impact from the other project sites to proximity to the SENTX boundary.
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 12 December 2023

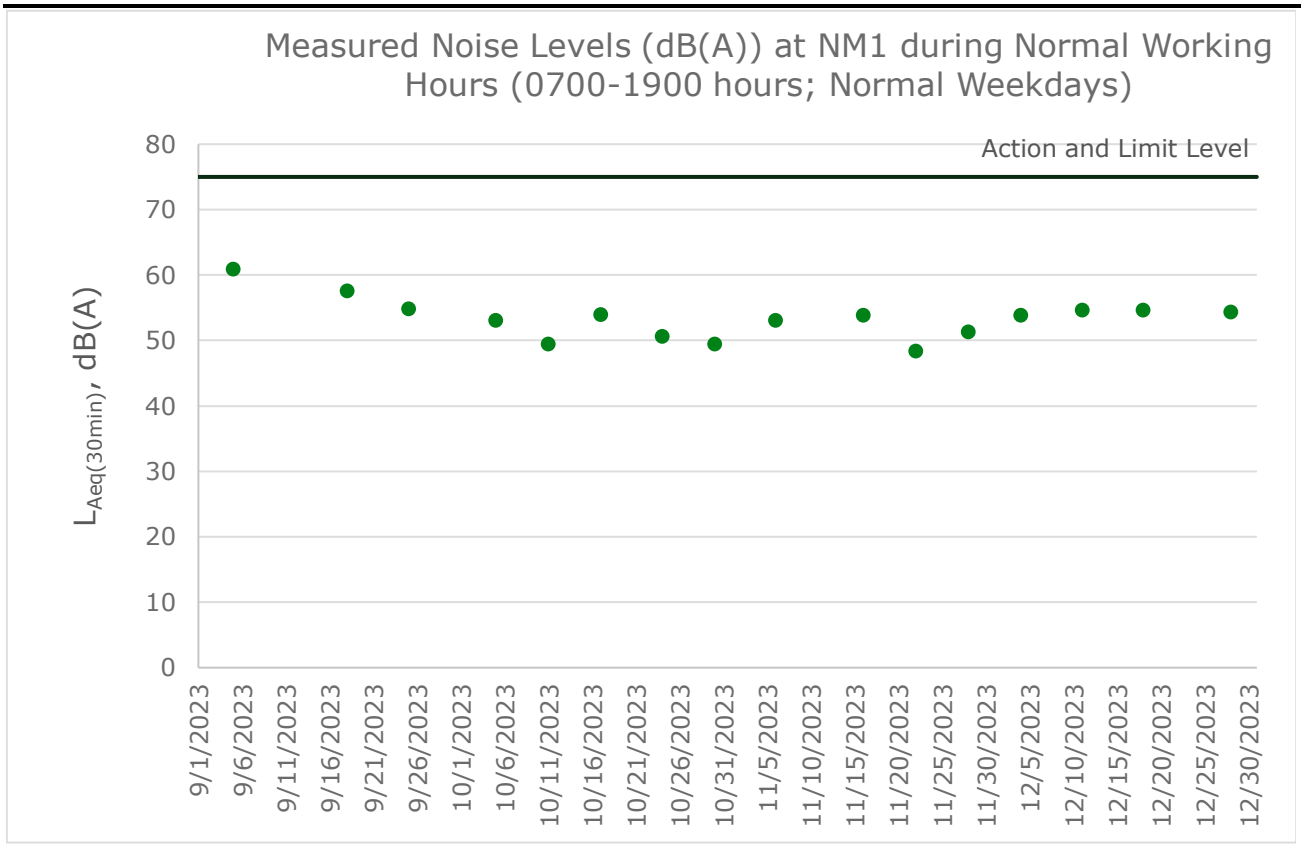
ANNEX E NOISE

ANNEX E1 NOISE MONITORING RESULTS

TABLE E1.1 MEASURED NOISE LEVELS (DB(A)) AT NM1 DURING NORMAL WORKING HOURS (0700-1900 HOURS; NORMAL WEEKDAYS)

Date	Start Time	Finish Time	Weather	$L_{10\ (30min)}$	$L_{90\ (30min)}$	$L_{eq\ (30min)}$
5 Oct 23	10:26	10:56	Sunny	54.2	50.6	53.1
11 Oct 23	10:35	11:05	Sunny	51.2	47.2	49.5
17 Oct 23	9:35	10:05	Fine	56.4	50.8	54.0
24 Oct 23	10:00	10:30	Sunny	52.9	48.1	50.7
30 Oct 23	10:47	11:17	Sunny	51.7	46.6	49.5
6 Nov 23	10:44	11:14	Sunny	54.8	50.6	53.1
16 Nov 23	13:55	14:25	Sunny	55.6	52.0	53.9
22 Nov 23	10:48	11:18	Sunny	50.8	44.9	48.4
28 Nov 23	10:35	11:05	Sunny	53.4	48.2	51.4
4 Dec 23	9:49	10:19	Sunny	56.2	50.9	53.9
11 Dec 23	10:50	11:20	Fine	57.2	50.5	54.7
18 Dec 23	10:51	11:21	Cloudy	56.5	52.0	54.7
28 Dec 23	14:21	14:51	Sunny	56.2	51.8	54.4
					Average	52.4
					Min	48.4
					Max	54.7

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	Suspended Solids (SS) (mg/L)	Remarks
3 Nov 2023	10:14	Sunny	Unable to collect water sample due to insufficient flow						
15 Dec 2023	09:44	Sunny	Unable to collect water sample due to insufficient flow						
					Average	-	-	-	-
					Min	-	-	-	-
					Max	-	-	-	-

TABLE F1.2 SURFACE WATER QUALITY MONITORING RESULTS AT DP4

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (°C)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks
3 Nov 2023	10:08	Sunny	Unable to collect water sample due to insufficient flow						
15 Dec 2023	09:49	Sunny	Unable to collect water sample due to insufficient flow						
					Average	-	-	-	-
					Min	-	-	-	-
					Max	-	-	-	-

TABLE F1.3 SURFACE WATER QUALITY MONITORING RESULTS AT DP6

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (°C)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks
3 Nov 2023	09:55	Sunny	Unable to collect water sample due to insufficient flow						
15 Dec 2023	09:53	Sunny	Unable to collect water sample due to insufficient flow						
					Average	-	-	-	-
					Min	-	-	-	-
					Max	-	-	-	-

TABLE F1.4 SURFACE WATER MONITORING RESULTS

Date				20 Oct 23	20 Oct 23	20 Oct 23	20 Oct 23
		Limit Level (DP3)	Limit Level (DP4 & 6)	DP3	DP4	DP6	DP4 (Duplicate)
pH Value	pH Unit	6 - 9	6 - 9	8.1	7.7	7.9	7.8
Electrical Conductivity	µS/cm	-	-	531	198	282	199
Dissolved Oxygen	mg/L	-	-	8.3	7.7	7.8	8
Volume Discharge	m^3	-	-	- [(a)]	290	64	290
Bicarbonate	mg/L	-	-	103	35	84	35
Carbonate	mg/L	-	-	<1	<1	<1	<1
Suspended Solids (SS)	mg/L	30	20	10.5	6.1	1.8	6
Ammonia-nitrogen	mg/L	0.5	7.1	0.09	0.02	0.03	0.02
Chloride	mg/L	-	-	62	29	23	28
Nitrite-nitrogen	mg/L	-	-	0.06	0.02	<0.01	0.02
Phosphate	mg/L	5	5	<0.01	<0.01	0.01	<0.01
Sulphate	mg/L	-	-	95	21	29	22
Sulphide	mg/L	2.5	2.5	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen(TKN)	mg/L	-	-	1.5	0.2	0.2	0.2
Nitrate-nitrogen	mg/L	-	-	1.92	0.29	0.4	0.28
Total Nitrogen(TN)	mg/L	50	50	3.5	0.5	0.6	0.5

Biochemical Oxygen Demand	mg/L	20	20	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	80	30	6	3	4	2
Oil & Grease	mg/L	20	20	<5	<5	<5	<5
Total Organic Carbon	mg/L	-	-	4	2	2	1
Boron	µg/L	1100	1100	100	20	40	20
Calcium	mg/L	-	-	59.7	24	33.1	23.7
Mercury	µg/L	1	1	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	-	-	4.55	0.98	1.87	0.98
Sodium	mg/L	-	-	34.4	11.5	10.6	10.6
Iron	mg/L	3	3	<0.04	<0.04	<0.04	<0.04
Potassium	mg/L	-	-	8.8	2.75	6.51	2.71
Cadmium	µg/L	1	1	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	300	300	2	<1	<1	<1
Copper	µg/L	300	300	2	<1	<1	<1
Lead	µg/L	300	300	<1	<1	<1	<1
Manganese	µg/L	-	-	7	4	4	4
Nickel	µg/L	300	300	<1	<1	<1	<1
Zinc	µg/L	-	-	<10	<10	<10	<10

(a) The flow meter of DP3 is under maintenance.

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 Oct 23	78	77	78
2 Oct 23	79	88	84
3 Oct 23	79	88	84
4 Oct 23	79	88	84
5 Oct 23	77	88	83
6 Oct 23	79	88	84
7 Oct 23	79	88	84
8 Oct 23	88	Standby	88
9 Oct 23	233	Standby	233
10 Oct 23	233	Standby	233
11 Oct 23	224	Standby	224
12 Oct 23	244	Standby	244
13 Oct 23	251	Standby	251
14 Oct 23	240	Standby	240
15 Oct 23	224	Standby	224
16 Oct 23	208	Standby	208
17 Oct 23	188	Standby	188
18 Oct 23	162	Standby	162
19 Oct 23	162	Standby	162
20 Oct 23	163	Standby	163
21 Oct 23	164	Standby	164
22 Oct 23	162	Standby	162
23 Oct 23	162	Standby	162
24 Oct 23	161	Standby	161
25 Oct 23	166	Standby	166
26 Oct 23	168	Standby	168
27 Oct 23	171	Standby	171
28 Oct 23	159	Standby	159
29 Oct 23	160	Standby	160
30 Oct 23	162	Standby	162
31 Oct 23	164	Standby	164
1 Nov 23	164	Standby	164
2 Nov 23	166	Standby	166
3 Nov 23	168	Standby	168
4 Nov 23	168	Standby	168

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
5 Nov 23	168	Standby	168
6 Nov 23	171	Standby	171
7 Nov 23	162	Standby	162
8 Nov 23	131	Standby	131
9 Nov 23	133	Standby	133
10 Nov 23	135	Standby	135
11 Nov 23	137	Standby	137
12 Nov 23	139	Standby	139
13 Nov 23	142	Standby	142
14 Nov 23	142	Standby	142
15 Nov 23	144	Standby	144
16 Nov 23	146	Standby	146
17 Nov 23	146	Standby	146
18 Nov 23	148	Standby	148
19 Nov 23	148	Standby	148
20 Nov 23	148	Standby	148
21 Nov 23	151	Standby	151
22 Nov 23	151	Standby	151
23 Nov 23	151	Standby	151
24 Nov 23	151	Standby	151
25 Nov 23	153	Standby	153
26 Nov 23	153	Standby	153
27 Nov 23	155	Standby	155
28 Nov 23	155	Standby	155
29 Nov 23	155	Standby	155
30 Nov 23	155	Standby	155
1 Dec 23	157	Standby	157
2 Dec 23	157	Standby	157
3 Dec 23	157	Standby	157
4 Dec 23	157	Standby	157
5 Dec 23	159	Standby	159
6 Dec 23	155	Standby	155
7 Dec 23	159	Standby	159
8 Dec 23	155	Standby	155
9 Dec 23	99	Standby	99
10 Dec 23	106	Standby	106
11 Dec 23	108	Standby	108

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
12 Dec 23	108	Standby	108
13 Dec 23	113	Standby	113
14 Dec 23	115	Standby	115
15 Dec 23	115	Standby	115
16 Dec 23	117	Standby	117
17 Dec 23	118	Standby	118
18 Dec 23	119	Standby	119
19 Dec 23	102	Standby	102
20 Dec 23	106	Standby	106
21 Dec 23	108	Standby	108
22 Dec 23	111	Standby	111
23 Dec 23	111	Standby	111
24 Dec 23	113	Standby	113
25 Dec 23	115	Standby	115
26 Dec 23	115	Standby	115
27 Dec 23	117	Standby	117
28 Dec 23	117	Standby	117
29 Dec 23	119	Standby	119
30 Dec 23	119	Standby	119
31 Dec 23	111	Standby	111
Average	92	92	92
Min	66	66	66
Max	249	249	249

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 Oct 23	84	85	85
2 Oct 23	87	84	86
3 Oct 23	87	84	86
4 Oct 23	89	86	88
5 Oct 23	78	84	81
6 Oct 23	76	84	80
7 Oct 23	87	84	86
8 Oct 23	84	89	87
9 Oct 23	78	75	77
10 Oct 23	78	75	77
11 Oct 23	329	239	284
12 Oct 23	329	239	284
13 Oct 23	366	297	332
14 Oct 23	361	284	323
15 Oct 23	357	271	314
16 Oct 23	348	257	303
17 Oct 23	346	249	298
18 Oct 23	322	257	290
19 Oct 23	298	257	278
20 Oct 23	318	258	288
21 Oct 23	318	260	289
22 Oct 23	296	261	279
23 Oct 23	296	260	278
24 Oct 23	302	262	282
25 Oct 23	307	286	297
26 Oct 23	311	320	316
27 Oct 23	315	324	320
28 Oct 23	313	318	316
29 Oct 23	312	320	316
30 Oct 23	313	324	319
31 Oct 23	313	324	319
1 Nov 23	315	324	320
2 Nov 23	315	324	320
3 Nov 23	318	320	319
4 Nov 23	315	318	317

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
5 Nov 23	313	318	316
6 Nov 23	307	315	311
7 Nov 23	311	318	315
8 Nov 23	311	318	315
9 Nov 23	311	318	315
10 Nov 23	311	318	315
11 Nov 23	311	318	315
12 Nov 23	311	318	315
13 Nov 23	311	318	315
14 Nov 23	311	318	315
15 Nov 23	311	318	315
16 Nov 23	302	304	303
17 Nov 23	287	291	289
18 Nov 23	274	277	276
19 Nov 23	261	264	263
20 Nov 23	246	249	248
21 Nov 23	259	246	253
22 Nov 23	246	142	194
23 Nov 23	209	99	154
24 Nov 23	141	62	102
25 Nov 23	146	137	142
26 Nov 23	148	142	145
27 Nov 23	150	144	147
28 Nov 23	152	146	149
29 Nov 23	154	148	151
30 Nov 23	154	148	151
1 Dec 23	157	151	154
2 Dec 23	157	151	154
3 Dec 23	157	153	155
4 Dec 23	159	153	156
5 Dec 23	161	155	158
6 Dec 23	161	155	158
7 Dec 23	161	155	158
8 Dec 23	163	157	160
9 Dec 23	126	119	123
10 Dec 23	126	119	123
11 Dec 23	126	119	123

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
12 Dec 23	126	119	123
13 Dec 23	126	119	123
14 Dec 23	126	119	123
15 Dec 23	126	119	123
16 Dec 23	126	119	123
17 Dec 23	125	119	122
18 Dec 23	124	119	122
19 Dec 23	126	119	123
20 Dec 23	126	119	123
21 Dec 23	124	115	120
22 Dec 23	126	119	123
23 Dec 23	126	119	123
24 Dec 23	126	119	123
25 Dec 23	124	119	122
26 Dec 23	126	119	123
27 Dec 23	124	119	122
28 Dec 23	124	119	122
29 Dec 23	124	119	122
30 Dec 23	126	119	123
31 Dec 23	125	119	122
Average	80	81	81
Min	61	66	66
Max	90	93	92

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 Oct 23	76	77	77
2 Oct 23	75	75	75
3 Oct 23	75	75	75
4 Oct 23	Standby	70	70
5 Oct 23	Standby	62	62
6 Oct 23	Standby	55	55
7 Oct 23	Standby	70	70
8 Oct 23	Standby	59	59
9 Oct 23	Standby	358	358
10 Oct 23	Standby	358	358
11 Oct 23	Standby	366	366
12 Oct 23	Standby	366	366
13 Oct 23	Standby	358	358
14 Oct 23	Standby	353	353
15 Oct 23	Standby	346	346
16 Oct 23	Standby	338	338
17 Oct 23	Standby	331	331
18 Oct 23	Standby	324	324
19 Oct 23	Standby	324	324
20 Oct 23	Standby	335	335
21 Oct 23	Standby	335	335
22 Oct 23	Standby	338	338
23 Oct 23	Standby	342	342
24 Oct 23	Standby	344	344
25 Oct 23	Standby	344	344
26 Oct 23	Standby	346	346
27 Oct 23	Standby	349	349
28 Oct 23	Standby	346	346
29 Oct 23	Standby	345	345
30 Oct 23	Standby	349	349
31 Oct 23	Standby	349	349
1 Nov 23	Standby	349	349
2 Nov 23	Standby	351	351
3 Nov 23	Standby	346	346
4 Nov 23	Standby	340	340

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
5 Nov 23	Standby	340	340
6 Nov 23	Standby	338	338
7 Nov 23	Standby	338	338
8 Nov 23	Standby	338	338
9 Nov 23	Standby	338	338
10 Nov 23	Standby	338	338
11 Nov 23	Standby	338	338
12 Nov 23	Standby	340	340
13 Nov 23	Standby	340	340
14 Nov 23	Standby	340	340
15 Nov 23	331	340	336
16 Nov 23	304	309	307
17 Nov 23	297	297	297
18 Nov 23	284	282	283
19 Nov 23	269	266	268
20 Nov 23	255	253	254
21 Nov 23	240	237	239
22 Nov 23	224	222	223
23 Nov 23	208	206	207
24 Nov 23	191	186	189
25 Nov 23	93	95	94
26 Nov 23	66	64	65
27 Nov 23	70	68	69
28 Nov 23	97	97	97
29 Nov 23	106	106	106
30 Nov 23	111	111	111
1 Dec 23	115	115	115
2 Dec 23	119	117	118
3 Dec 23	102	99	101
4 Dec 23	106	106	106
5 Dec 23	111	111	111
6 Dec 23	111	115	113
7 Dec 23	117	117	117
8 Dec 23	119	119	119
9 Dec 23	99	99	99
10 Dec 23	106	106	106
11 Dec 23	111	111	111

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
12 Dec 23	113	113	113
13 Dec 23	117	115	116
14 Dec 23	119	117	118
15 Dec 23	119	119	119
16 Dec 23	102	102	102
17 Dec 23	107	107	107
18 Dec 23	111	111	111
19 Dec 23	113	113	113
20 Dec 23	115	115	115
21 Dec 23	119	117	118
22 Dec 23	122	119	121
23 Dec 23	102	102	102
24 Dec 23	106	106	106
25 Dec 23	111	111	111
26 Dec 23	113	111	112
27 Dec 23	115	115	115
28 Dec 23	117	117	117
29 Dec 23	119	119	119
30 Dec 23	122	119	121
31 Dec 23	114	112	113
Average	84	88	86
Min	48	50	49
Max	213	222	218

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 Oct 23	62	67	65
2 Oct 23	63	70	67
3 Oct 23	63	70	67
4 Oct 23	70	75	73
5 Oct 23	54	65	60
6 Oct 23	54	63	59
7 Oct 23	59	67	63
8 Oct 23	61	67	64
9 Oct 23	417	404	411
10 Oct 23	417	404	411
11 Oct 23	399	369	384
12 Oct 23	399	369	384
13 Oct 23	373	342	358
14 Oct 23	366	340	353
15 Oct 23	360	331	346
16 Oct 23	351	325	338
17 Oct 23	347	307	327
18 Oct 23	347	362	355
19 Oct 23	351	364	358
20 Oct 23	352	365	359
21 Oct 23	353	366	360
22 Oct 23	355	366	361
23 Oct 23	355	369	362
24 Oct 23	358	371	365
25 Oct 23	358	369	364
26 Oct 23	358	373	366
27 Oct 23	360	375	368
28 Oct 23	358	371	365
29 Oct 23	359	370	365
30 Oct 23	360	373	367
31 Oct 23	360	373	367
1 Nov 23	362	375	369
2 Nov 23	362	375	369
3 Nov 23	351	364	358
4 Nov 23	344	358	351

Date	Meter No.X7 (cm)	Meter No.X8 (cm)	Average (cm)
5 Nov 23	338	349	344
6 Nov 23	325	338	332
7 Nov 23	329	340	335
8 Nov 23	316	325	321
9 Nov 23	300	311	306
10 Nov 23	285	296	291
11 Nov 23	267	281	274
12 Nov 23	248	259	254
13 Nov 23	224	234	229
14 Nov 23	186	199	193
15 Nov 23	63	72	68
16 Nov 23	116	125	121
17 Nov 23	127	136	132
18 Nov 23	133	142	138
19 Nov 23	140	147	144
20 Nov 23	144	151	148
21 Nov 23	147	155	151
22 Nov 23	151	158	155
23 Nov 23	153	162	158
24 Nov 23	155	164	160
25 Nov 23	61	70	66
26 Nov 23	63	72	68
27 Nov 23	65	72	69
28 Nov 23	103	111	107
29 Nov 23	114	122	118
30 Nov 23	94	103	99
1 Dec 23	109	118	114
2 Dec 23	118	127	123
3 Dec 23	105	114	110
4 Dec 23	114	122	118
5 Dec 23	114	122	118
6 Dec 23	109	83	96
7 Dec 23	118	125	122
8 Dec 23	100	109	105
9 Dec 23	111	120	116
10 Dec 23	118	127	123
11 Dec 23	125	131	128

Date	Meter No.X7 (cm)	Meter No.X8 (cm)	Average (cm)
12 Dec 23	129	105	117
13 Dec 23	114	120	117
14 Dec 23	114	120	117
15 Dec 23	114	120	117
16 Dec 23	109	118	114
17 Dec 23	110	119	115
18 Dec 23	111	120	116
19 Dec 23	114	120	117
20 Dec 23	114	120	117
21 Dec 23	111	120	116
22 Dec 23	111	120	116
23 Dec 23	111	120	116
24 Dec 23	111	120	116
25 Dec 23	111	120	116
26 Dec 23	105	120	113
27 Dec 23	89	116	103
28 Dec 23	74	120	97
29 Dec 23	74	120	97
30 Dec 23	72	120	96
31 Dec 23	72	120	96
Average	88	92	90
Min	50	41	49
Max	287	278	283

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

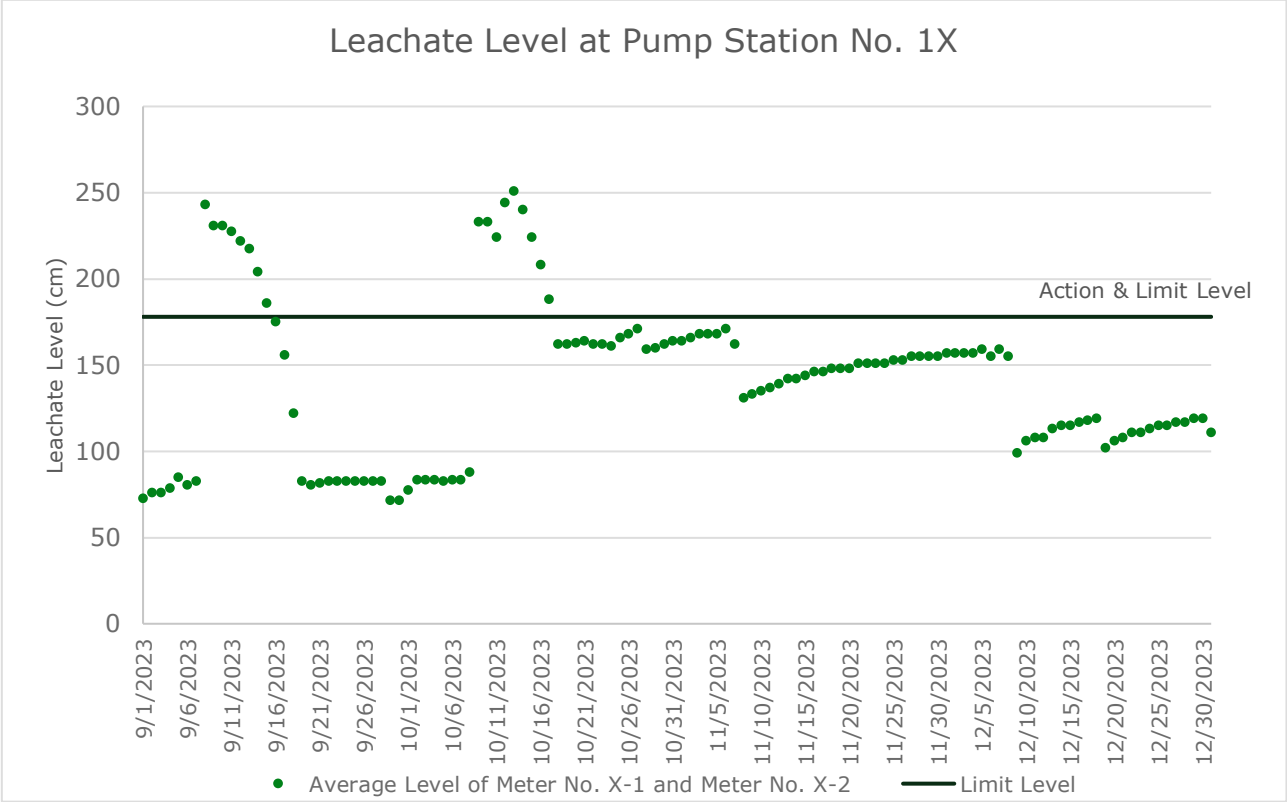


FIGURE F3.2 GRAPHICAL PRESENTATION FOR LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.2X (CELL 2X))

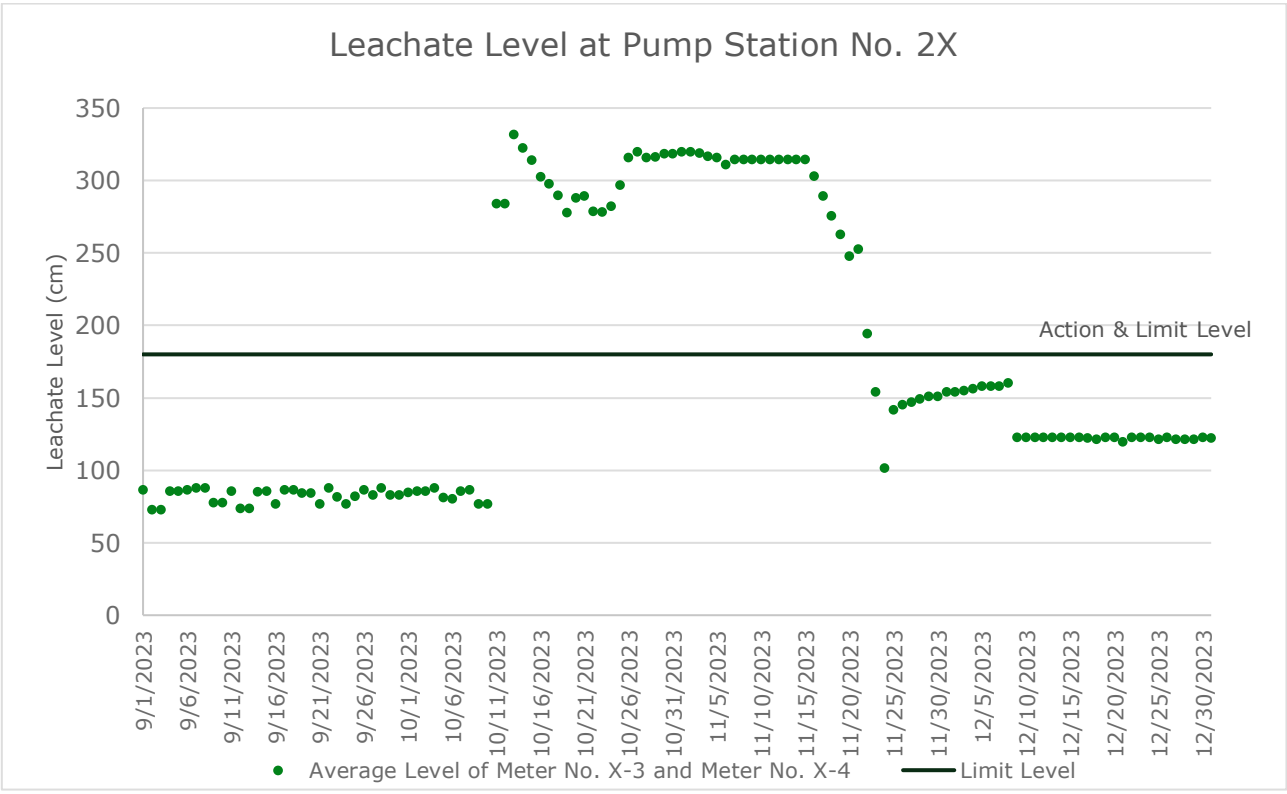


FIGURE F3.3 GRAPHICAL PRESENTATION FOR LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.3X (CELL 3X))

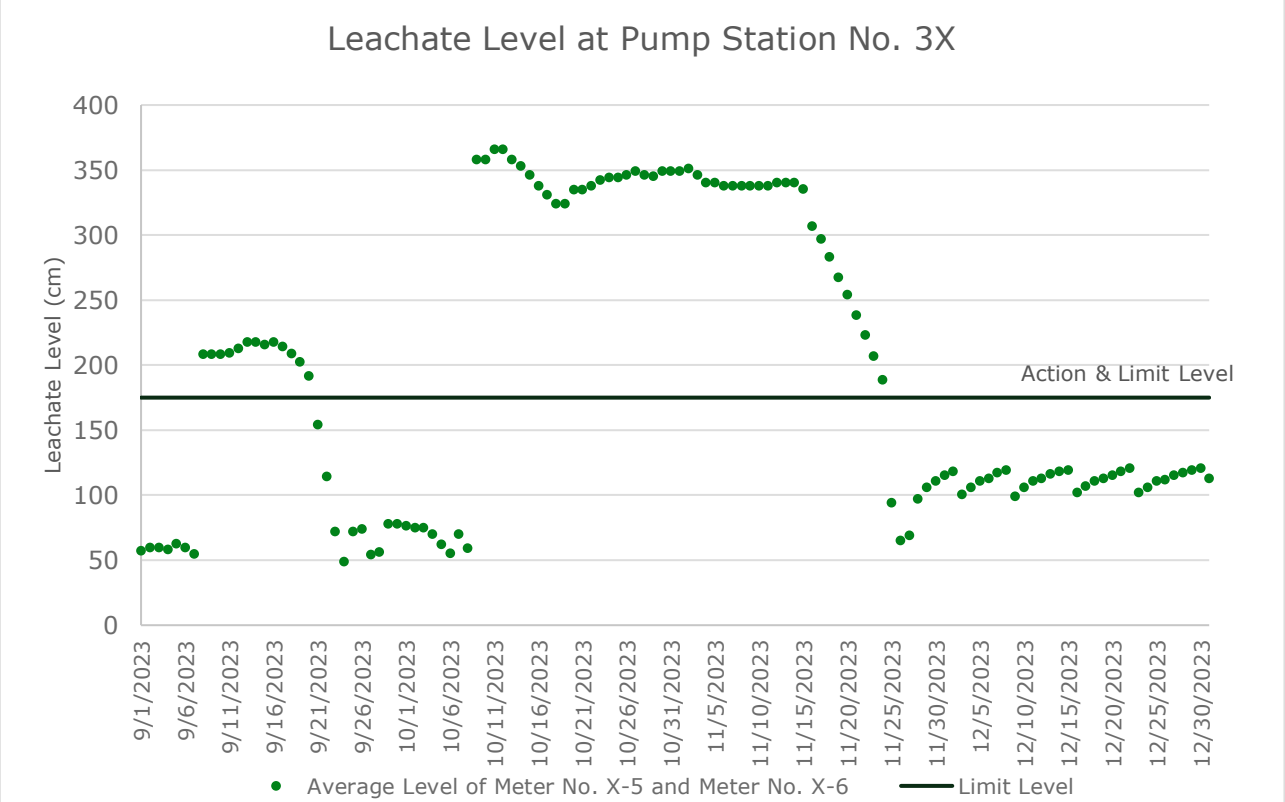
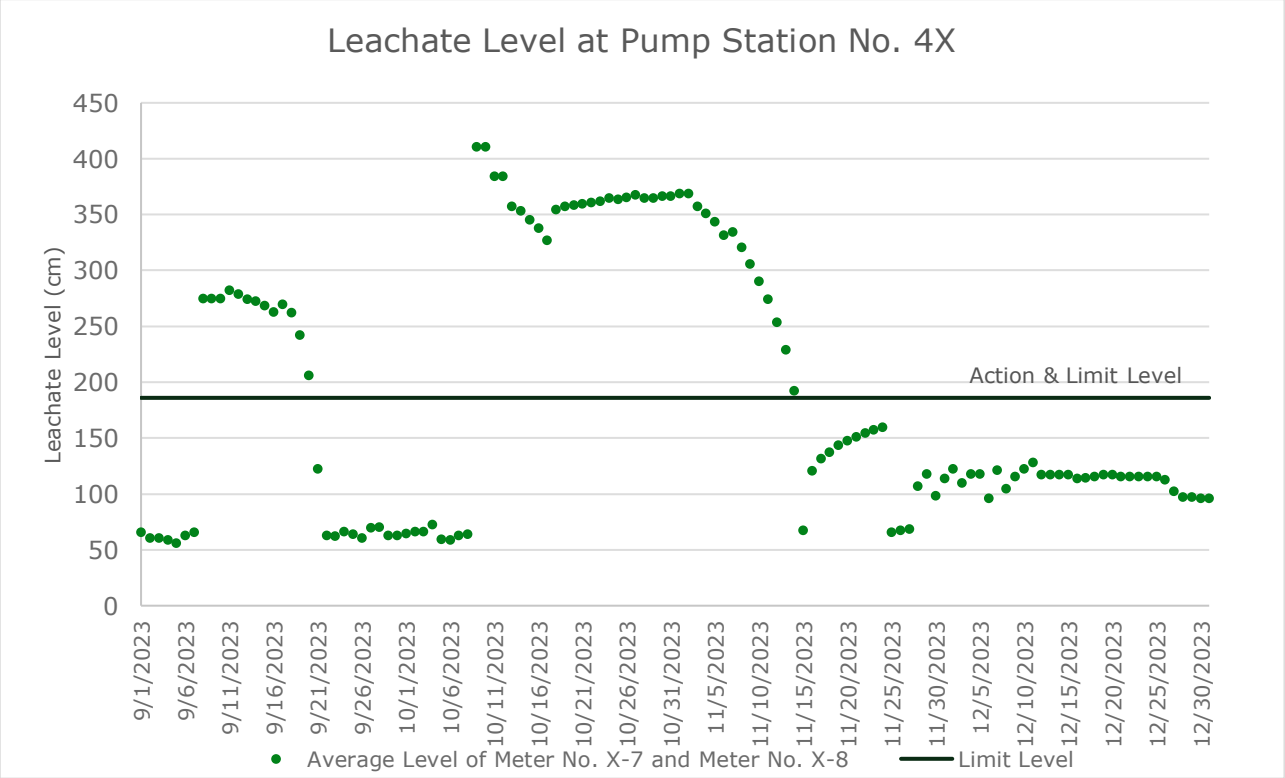


FIGURE F3.4 GRAPHICAL PRESENTATION FOR LEACHATE LEVEL MONITORING RESULTS (PUMP STATION NO.4X (CELL 4X))



ANNEX F4 EFFLUENT QUALITY MONITORING RESULTS

TABLE F4.1 EFFLUENT MONITORING RESULTS

Date		5 Oct 23	2 Nov 23	6 Dec 23
On-site Measurements				
Temperature	°C	35.4	33.1	23
pH Value	pH Unit	8.3	8.4	8.2
Volume Discharged	m^3	1,080	1,164	698
Laboratory Analysis				
Suspended Solids (SS)	mg/L	31.1	19.4	55.1
Alkalinity	mg/L	1580	1420	1460
Ammoniacal-nitrogen	mg/L	0.22	0.2	0.94
Chloride	mg/L	1910	1770	1520
Nitrite-nitrogen	mg/L	<0.10	0.02	0.55
Phosphate	mg/L	2.82	0.11	1.94
Sulphate	mg/L	252	165	279
Total Nitrogen	mg/L	132	95	100
Nitrate-nitrogen	mg/L	79	54.4	23.4
Total Inorganic Nitrogen	mg/L	79.22	54.62	24.89
Biochemical Oxygen Demand (BOD)	mg/L	20	18	22
Chemical Oxygen Demand (COD)	mg/L	885	701	1070
Oil & Grease	mg/L	<5	<5	<5
Total Organic Carbon (TOC)	mg/L	270	260	403
Boron	µg/L	4610	3880	5080
Calcium	mg/L	34.6	50.8	45.7
Iron	mg/L	1.6	1.38	1.78
Magnesium	mg/L	34.2	53.4	54.8
Potassium	mg/L	712	550	593
Cadmium	µg/L	<1.0	<1.0	<1.0
Chromium	µg/L	105	93	197
Copper	µg/L	12	<10	<10
Nickel	µg/L	97	78	65
Zinc	µg/L	98	73	69

ANNEX F5 GROUNDWATER MONITORING RESULTS

TABLE F5.1 GROUNDWATER MONITORING RESULTS (OCTOBER 2023)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.81	3.91	4.04	4.77	4.72	4.71	4.14	4.76	5.64	5.33	5.47	7.49	39.42	46.01
Bicarbonate Alkalinity as CaCO3	mg/L	106	191	184	135	47	2	<1	<1	171	200	118	52	17	13
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	24	138	68	74	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	106	191	184	135	71	141	82	108	171	200	118	52	17	13
pH Value	pH Unit	8	7.9	7.6	8	9.3	10.4	10.4	10.9	8	7.7	7.6	6.8	5.7	5.5
Electrical Conductivity	µS/cm	837	5580	1060	964	732	934	1610	2650	14000	834	353	331	94	125
Ammonia	mg/L	0.26	1.2	1.43	0.18	0.64	2.23	6.03	4.76	0.5	<0.01	<0.01	<0.01	<0.01	0.06
Chloride	mg/L	158	1710	165	144	106	139	400	636	4400	92	23	20	15	24
Nitrite	mg/L	<0.01	<0.01	<0.01	<0.01	0.11	<0.01	<0.01	0.09	<0.01	<0.01	<0.01	0.04	<0.01	<0.01
Phosphorus	mg/L	0.01	0.01	0.01	0.03	<0.01	<0.01	0.01	<0.01	0.06	0.02	<0.01	0.01	<0.01	<0.01
Sulphate	mg/L	100	334	151	176	138	95	138	248	768	131	34	79	4	6
Sulphide	mg/L	<0.1	<0.1	0.2	<0.1	<0.1	4.3	4.1	2.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.4	1.2	1.5	0.4	1	2.5	6.4	4.9	0.5	<0.1	<0.1	0.2	<0.1	<0.1
Nitrate	mg/L	0.04	0.23	<0.01	<0.01	0.02	0.01	<0.01	0.07	<0.01	0.04	0.52	0.7	0.13	0.18
Total Nitrogen	mg/L	0.5	1.5	1.5	0.4	1.1	2.6	6.4	5.1	0.5	0.1	0.6	0.9	0.2	0.2
Boron	µg/L	130	720	220	230	260	260	380	210	2790	260	80	30	20	20
Calcium	mg/L	40.7	101	90.8	77	8.12	8.12	22.9	104	99.8	81.6	44.7	29.1	0.89	1.56
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

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
Magnesium	mg/L	4.66	99.6	6.28	4.43	0.26	<0.05	0.06	0.07	222	6.69	2.61	4.83	1.03	1.34
Sodium	mg/L	104	850	102	100	103	140	252	362	2380	79.2	23.3	26.4	14	17.2
Iron	mg/L	<0.04	<0.04	0.08	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Potassium	mg/L	19.1	46	26.1	20.3	42.9	55.6	53.7	89.4	107	12.4	6.09	5.67	4.04	4.58
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	0.6	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1	2	10	<1	<1	<1	2	<1	<1	2	<1
Lead	µg/L	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	1	<1	<1
Manganese	µg/L	304	193	903	42	2	<1	<1	<1	224	548	6	531	10	9
Nickel	µg/L	<1	<1	<1	<1	<1	2	1	2	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	419	<10	<10	<10	33	<10	<10	11	773	<10	49	33	13
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	9	5	12	13	14	35	31	26	32	7	7	4	3	2
Total Organic Carbon	mg/L	6	2	7	5	3	7	7	6	5	4	5	1	1	2

TABLE F5.2 GROUNDWATER MONITORING RESULTS (NOVEMBER 2023)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.11	3.51	3.24	3.27	3.32	3.51	3.64	4.46	4.34	4.33	3.87	7.29	37.52	45.81
Bicarbonate Alkalinity as CaCO3	mg/L	119	253	154	26	10	<1	<1	<1	168	231	133	54	16	13
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	23	55	139	110	82	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	119	253	154	49	65	181	149	102	168	231	133	54	16	13
pH Value	pH Unit	8	7.9	7.9	9.3	9.9	11.1	11	11	8	7.8	7.8	7	5.8	5.6
Electrical Conductivity	µS/cm	1070	1100	1190	736	1020	1160	1240	2350	15100	1150	343	311	91	117
Ammonia	mg/L	0.3	0.03	1.68	1.81	2.06	3.79	6.53	4.76	0.54	0.02	0.02	0.05	<0.01	<0.01
Chloride	mg/L	204	40	216	142	197	188	222	570	4780	160	19	20	14	24
Nitrite	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phosphorus	mg/L	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	0.03	0.01	0.03	<0.01	<0.01
Sulphate	mg/L	130	330	148	109	154	35	172	256	862	153	16	69	3	4
Sulphide	mg/L	<0.1	<0.1	0.2	3.1	2.9	11.2	7.3	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.6	<0.1	1.8	1.9	2.5	4.4	7.2	4.9	0.6	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate	mg/L	<0.01	4.57	0.01	<0.01	<0.01	0.01	<0.01	0.08	0.01	<0.01	0.06	0.01	0.13	0.17
Total Nitrogen	mg/L	0.6	4.6	1.8	1.9	2.5	4.4	7.2	5	0.6	<0.1	<0.1	<0.1	0.2	0.2
Boron	µg/L	160	230	220	210	210	220	260	190	2550	280	40	20	10	10
Calcium	mg/L	49.8	79.3	80	22	15.4	26.3	26	86.6	111	92.6	45.1	27.1	0.85	1.46
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

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
Magnesium	mg/L	6.04	55.1	6.09	0.82	0.12	<0.05	<0.05	<0.05	246	9.87	2.72	4.51	1.07	1.3
Sodium	mg/L	124	55.6	112	95.2	139	144	167	321	2420	118	19.3	24	13.2	16.5
Iron	mg/L	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.29	<0.04	<0.04
Potassium	mg/L	21.8	15.9	26	20.8	47.4	53	49.8	83.8	109	11.6	6.07	3.19	3.96	4.36
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	2	3
Lead	µg/L	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	366	133	1040	6	<1	<1	<1	<1	263	1970	15	776	11	9
Nickel	µg/L	<1	<1	<1	<1	1	2	2	3	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	20	61	611
Biochemical Oxygen Demand	mg/L	<2	<2	3	2	<2	7	5	2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	10	2	15	14	22	35	38	24	28	5	<2	2	<2	3
Total Organic Carbon	mg/L	6	1	9	6	7	11	12	9	<5	2	<1	1	<1	1

TABLE F5.3 GROUNDWATER MONITORING RESULTS (DECEMBER 2023)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.01	2.95	2.89	2.62	3.36	3.18	2.46	2.78	3.12	3.34	3.15	8.63	36.16	44.99
Bicarbonate Alkalinity as CaCO3	mg/L	171	260	154	9	<1	<1	4	<1	101	198	170	54	17	13
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	42	96	137	66	78	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	171	260	154	50	133	189	71	114	101	198	170	54	17	13
pH Value	pH Unit	8	8	8.1	9.8	11.1	11.3	10.2	10.9	8	8	8.2	7.1	5.9	5.8
Electrical Conductivity	µS/cm	1070	1000	1140	786	1110	1190	2040	3330	2010	722	430	303	91	99
Ammonia	mg/L	0.04	0.02	1.54	2.9	2.17	4.36	5.8	13	1.39	0.02	0.03	<0.01	0.02	<0.01
Chloride	mg/L	185	40	218	156	187	189	552	819	448	73	26	20	15	20
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	<0.01
Phosphorus	mg/L	0.01	0.02	0.01	0.01	<0.01	0.01	0.02	<0.01	0.02	0.02	0.01	0.04	0.01	<0.01
Sulphate	mg/L	69	227	98	87	108	88	74	105	222	48	18	61	3	2
Sulphide	mg/L	<0.1	<0.1	0.1	2.7	7.1	10.1	4.1	12.4	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.1	<1.0	1.8	3	2.2	5.1	6	13.2	1.8	0.1	0.1	<0.1	<0.1	<0.1
Nitrate	mg/L	<0.01	5.38	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.12
Total Nitrogen	mg/L	0.1	5.4	1.8	3	2.2	5.1	6	13.2	1.8	0.1	0.1	<0.1	0.2	0.2
Boron	µg/L	180	230	230	230	210	210	520	430	340	130	70	20	10	10
Calcium	mg/L	60.3	73.5	78.8	19.9	29.7	27.6	26.4	107	119	69.8	57.6	24	0.89	0.92
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

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
Magnesium	mg/L	8.85	51.9	5.48	0.29	<0.05	<0.05	0.36	<0.05	5.11	5.83	3.1	4.09	0.99	0.97
Sodium	mg/L	116	51.9	119	107	147	154	323	486	252	58.9	24.1	22.6	12.4	13.6
Iron	mg/L	<0.04	<0.04	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.41	<0.04	<0.04
Potassium	mg/L	21.2	14.4	27.6	23	53.4	54	58.4	83.6	35.9	9.74	6.31	2.6	3.46	3.41
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	1
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	444	139	919	2	<1	<1	<1	<1	278	580	460	691	14	7
Nickel	µg/L	<1	<1	<1	<1	1	2	<1	1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	267	<10	<10	61	<10	<10	<10	<10	12	<10	20	26	15
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	4	10	<2	9	2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	3	<2	19	19	28	54	18	40	24	6	<2	<2	<2	<2
Total Organic Carbon	mg/L	1	<1	8	6	6	10	4	11	11	<1	<1	<1	<1	<1

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

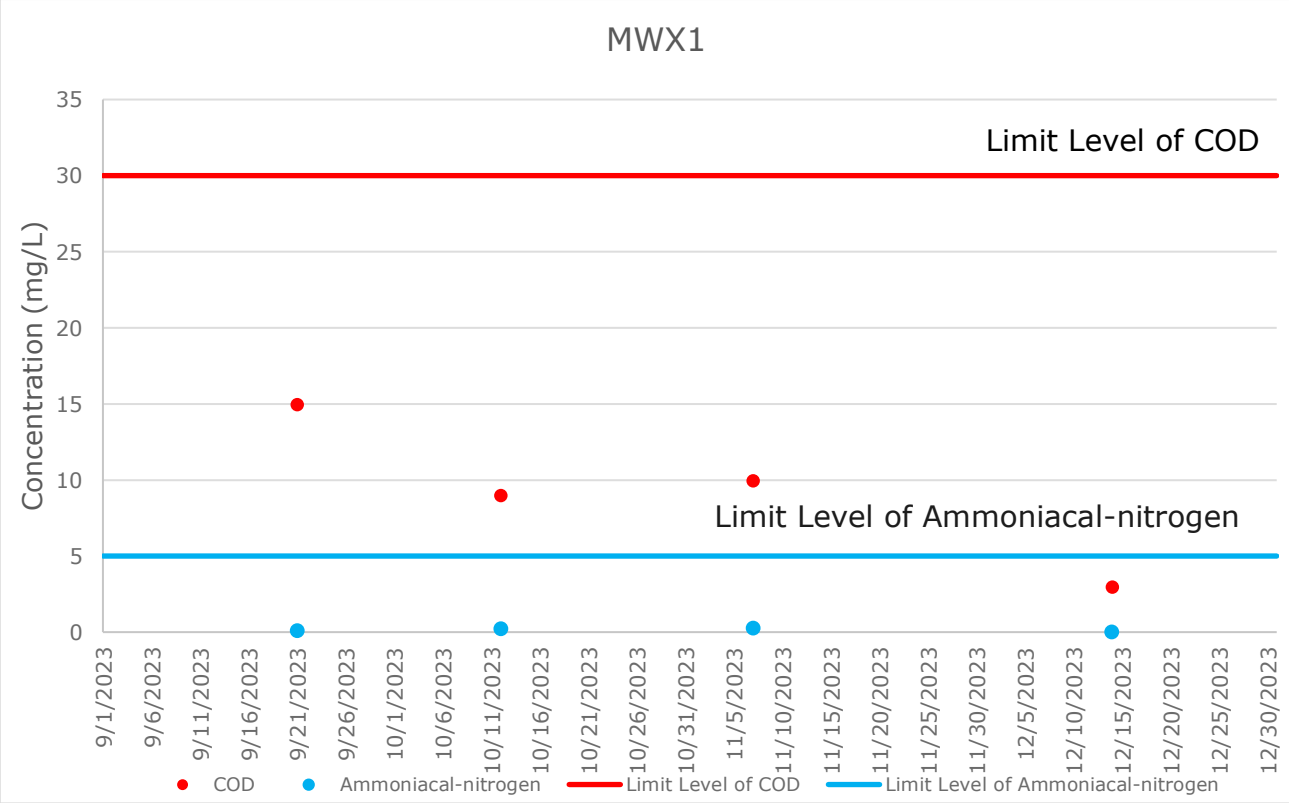


FIGURE F5.2 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-2)

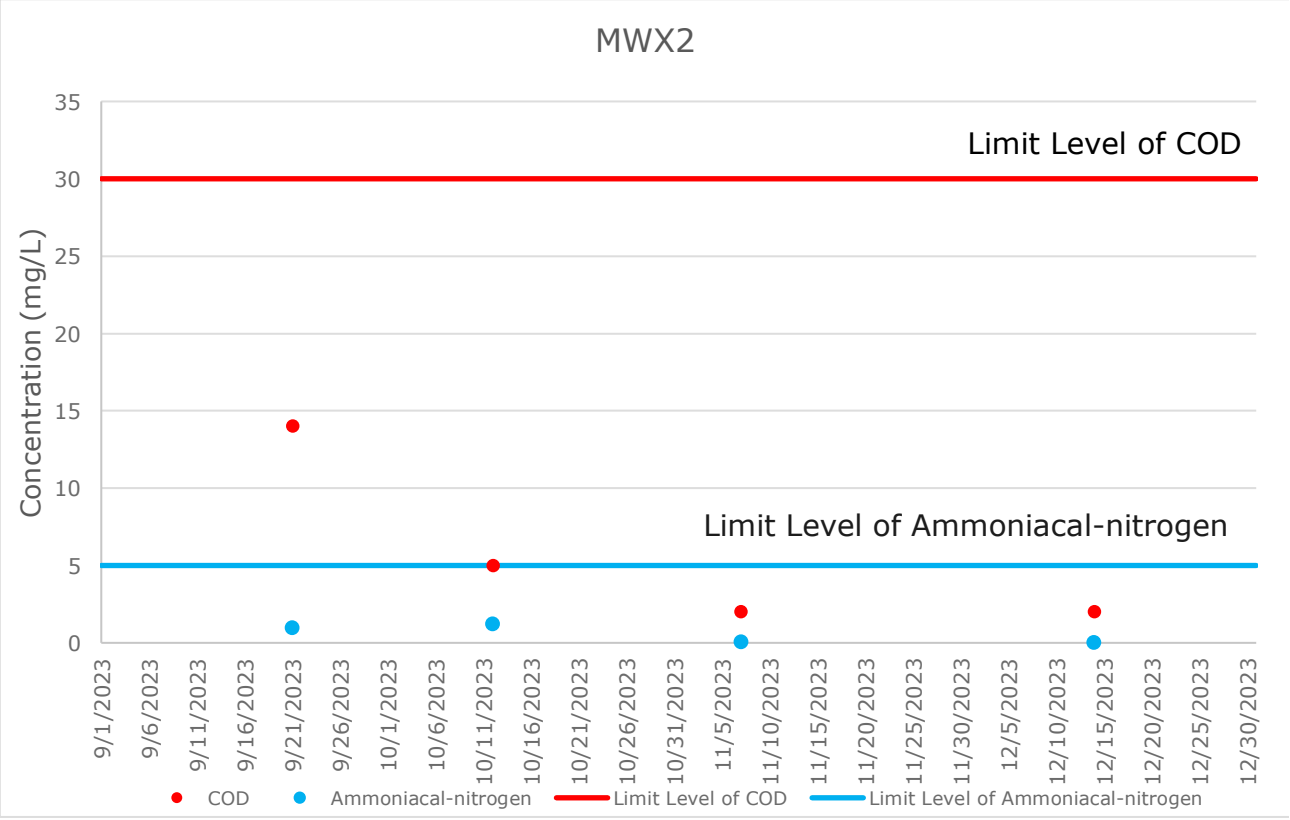


FIGURE F5.3 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-3)

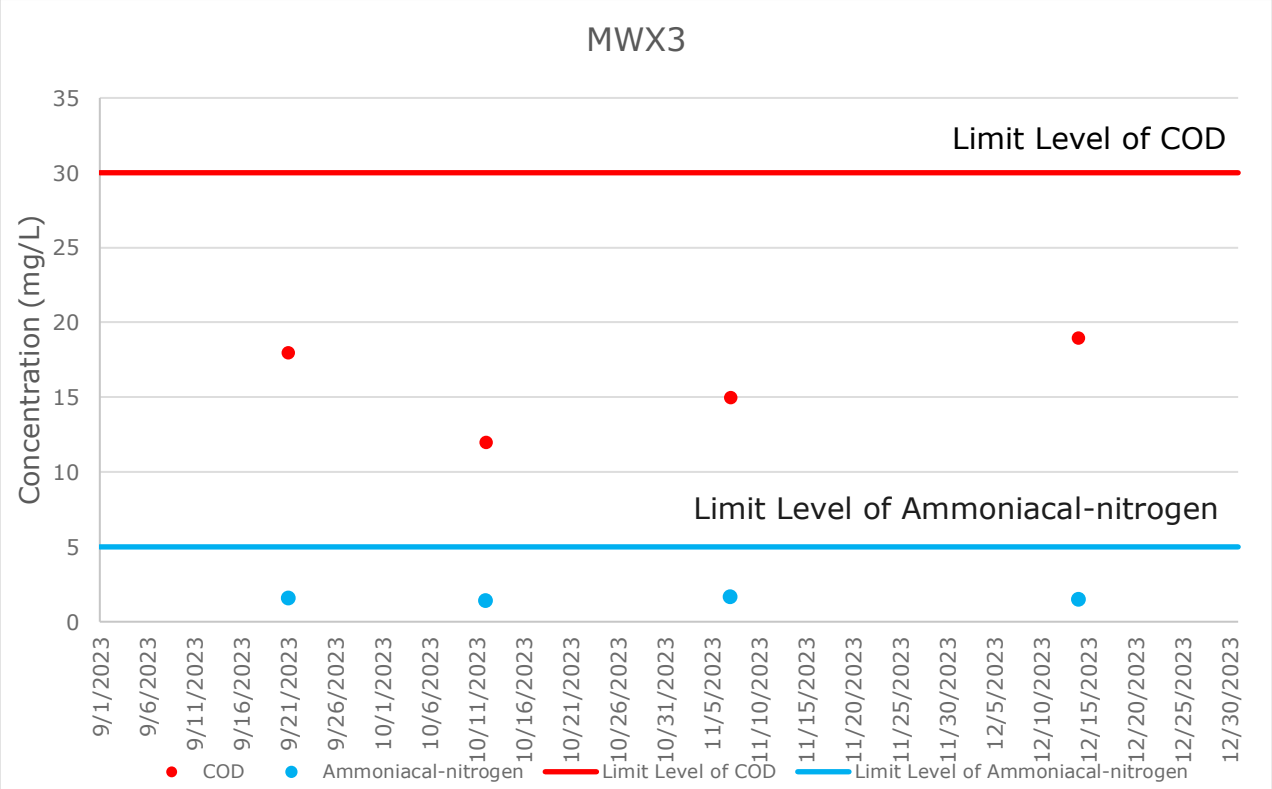


FIGURE F5.4 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-4)

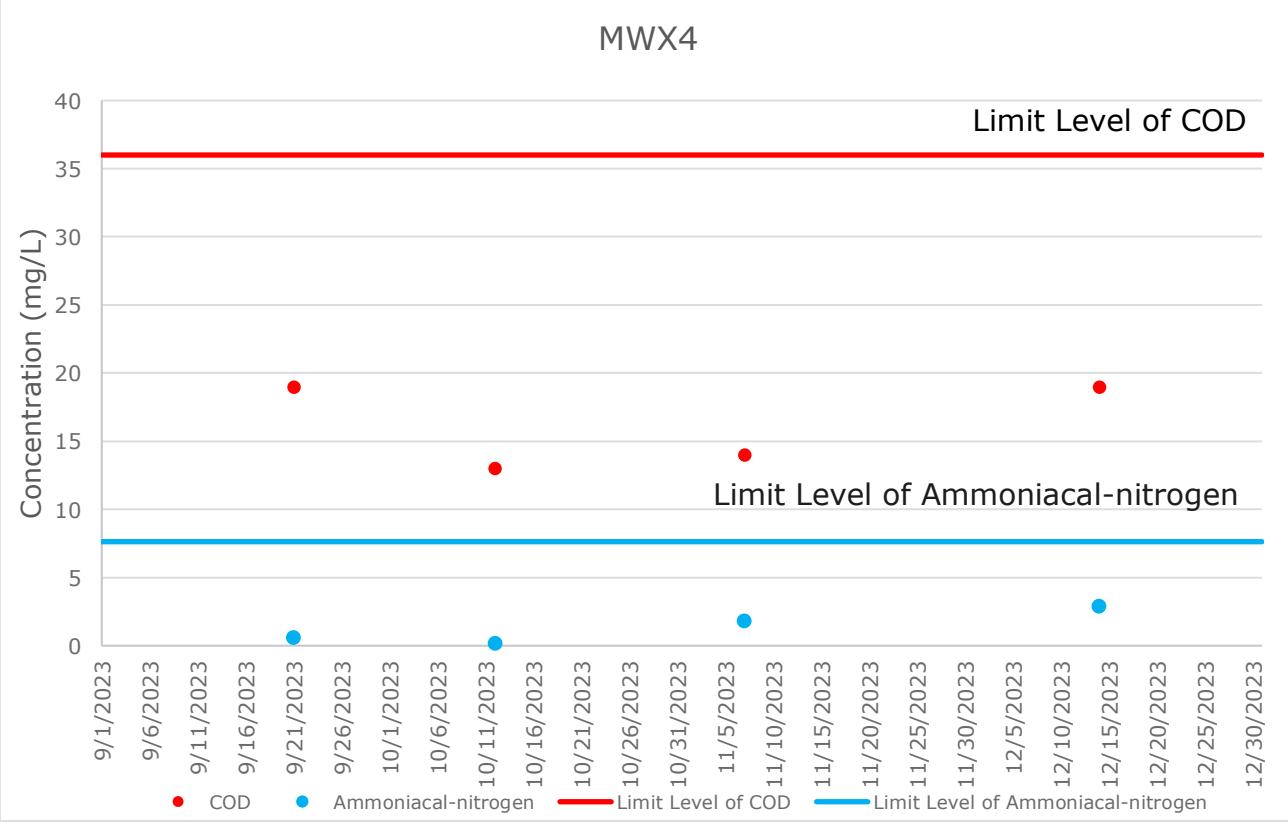


FIGURE F5.5 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-5)

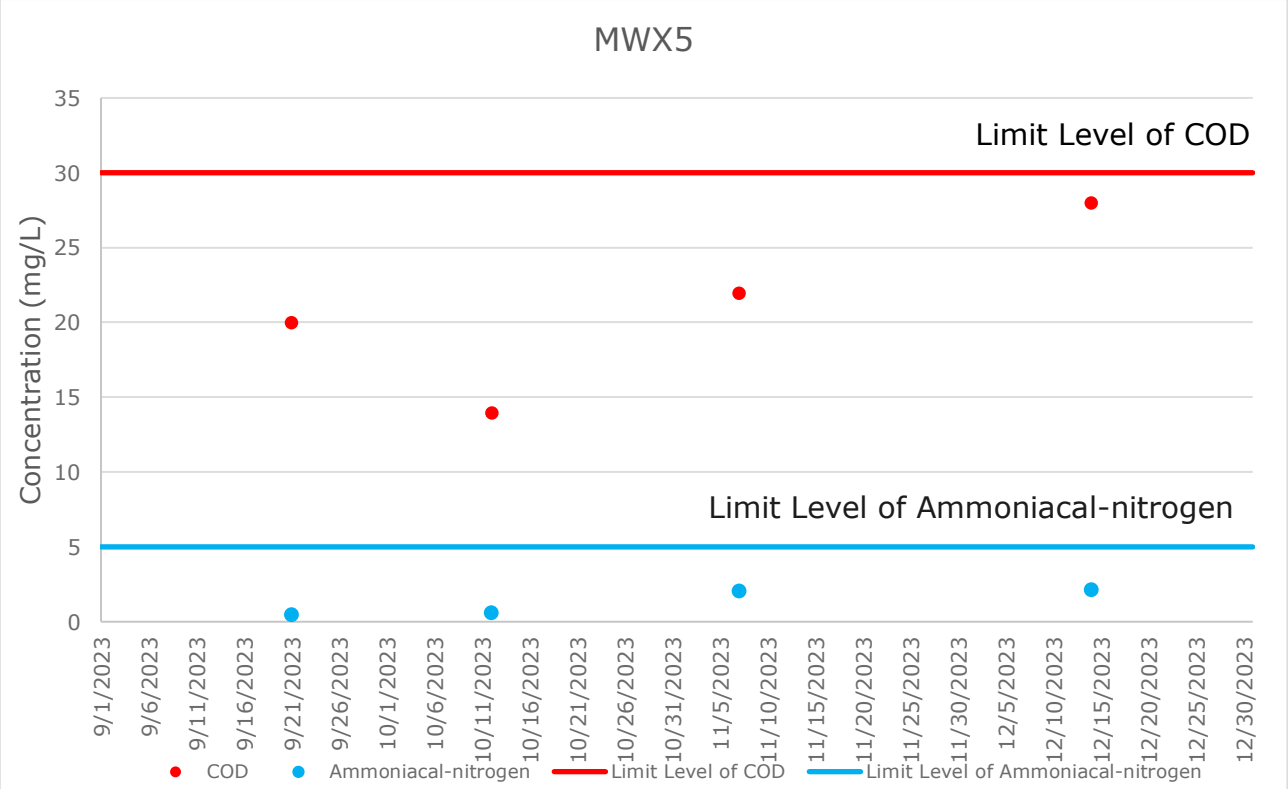


FIGURE F5.6 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-6)

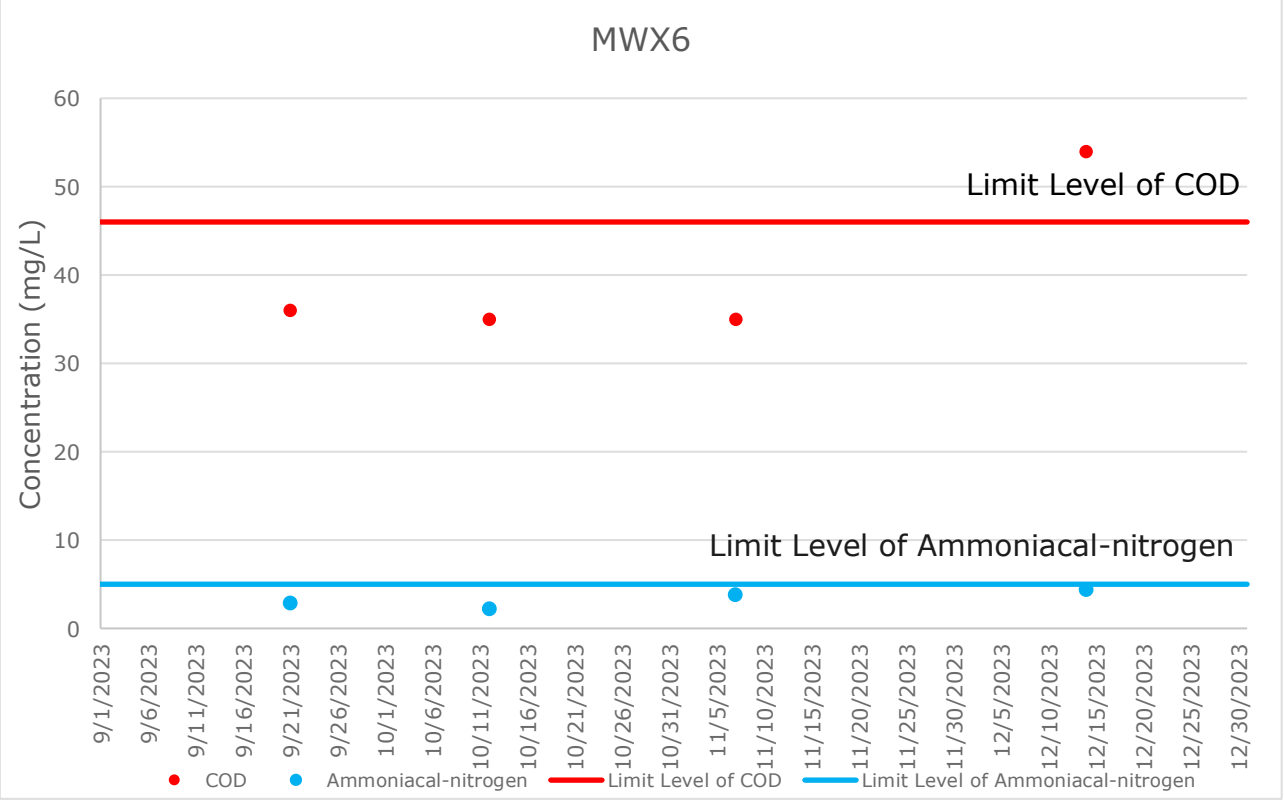


FIGURE F5.7 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-7)

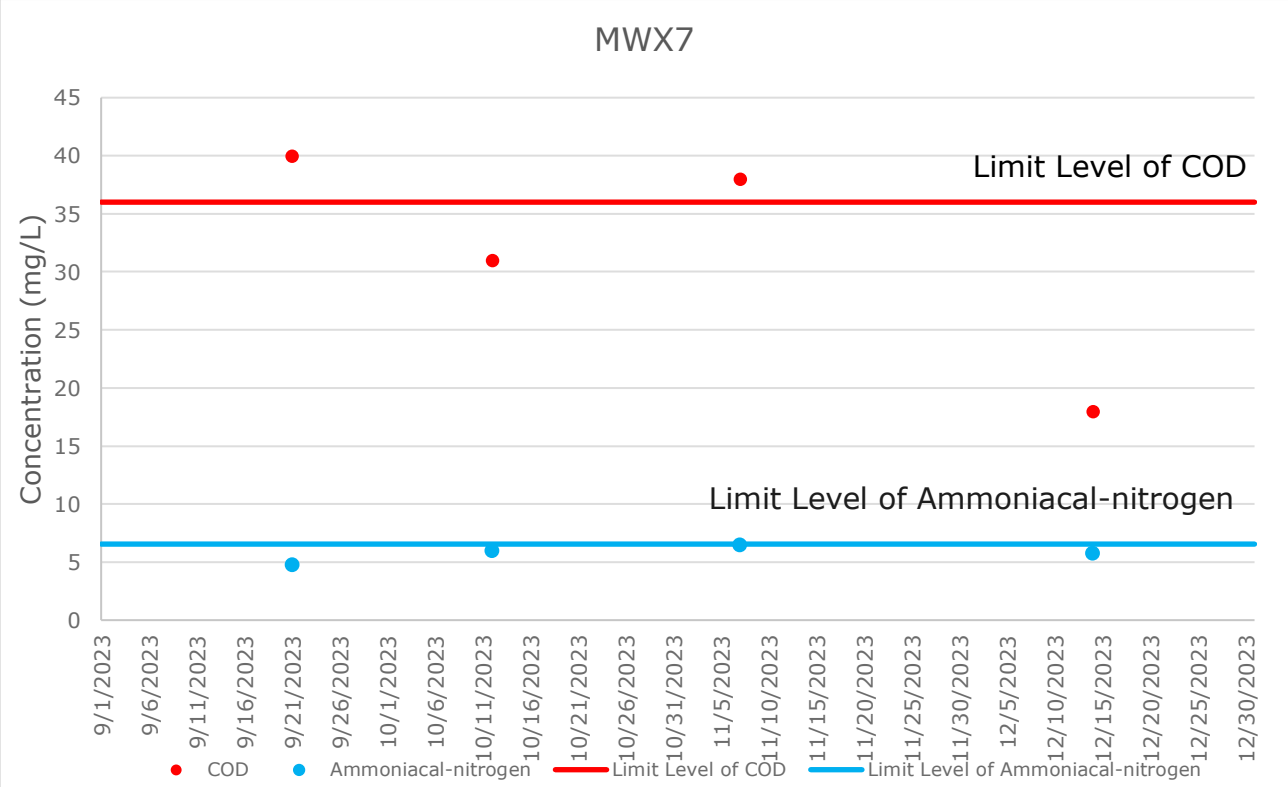


FIGURE F5.8 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-8)

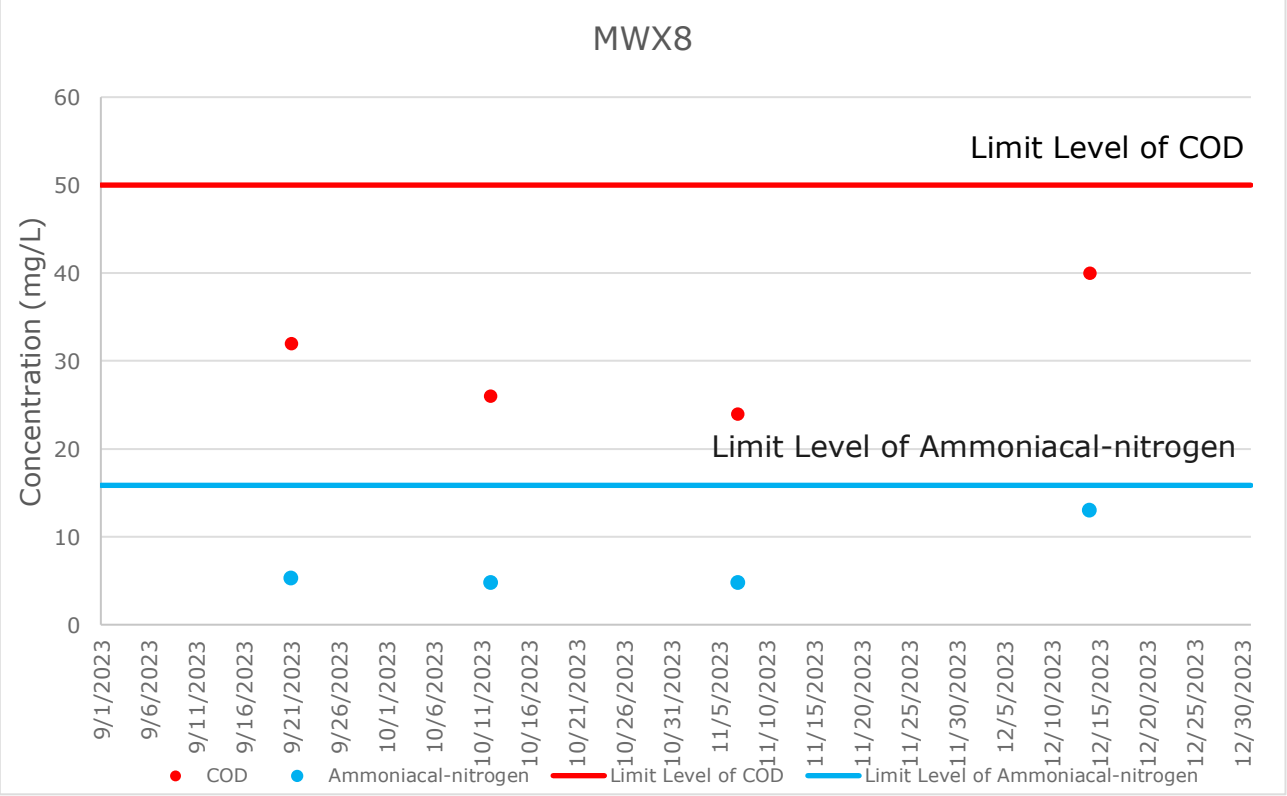


FIGURE F5.9 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-9)

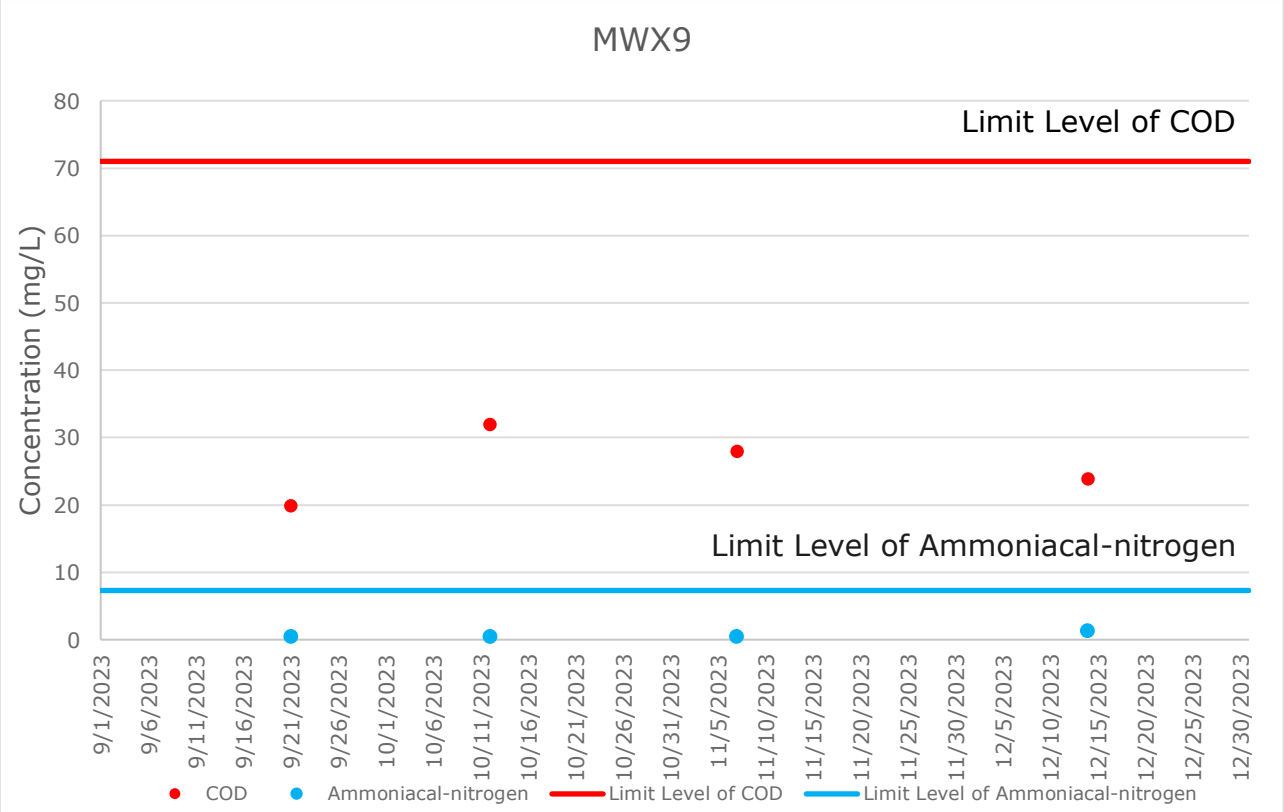


FIGURE F5.10 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-10)

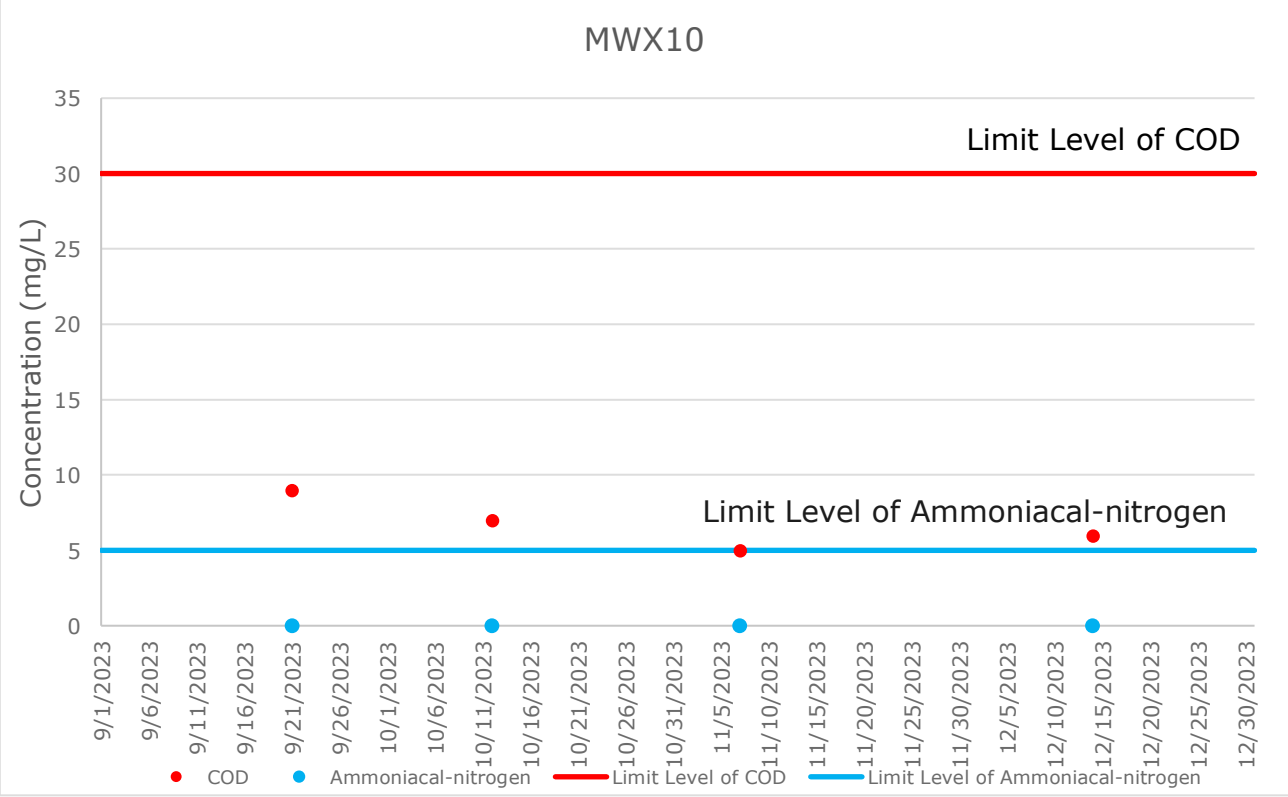


FIGURE F5.11 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-11)

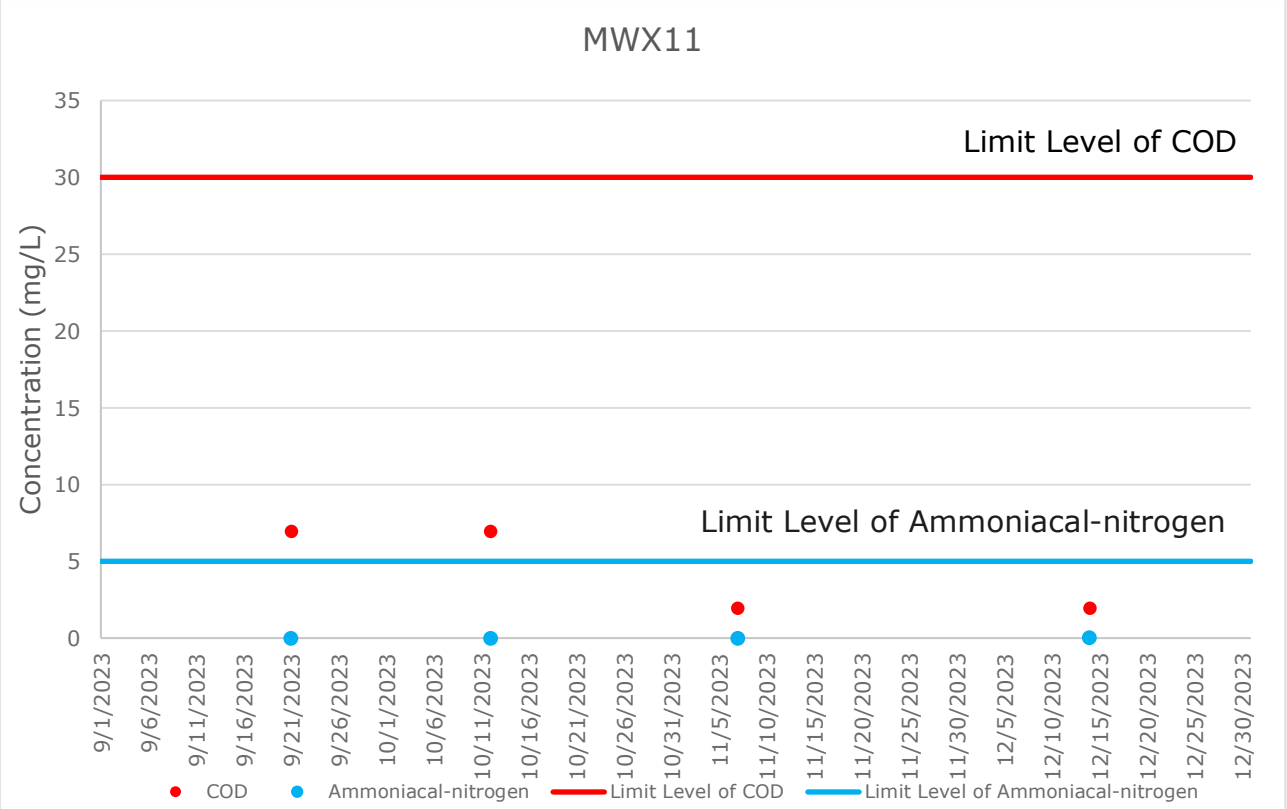


FIGURE F5.12 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-12)

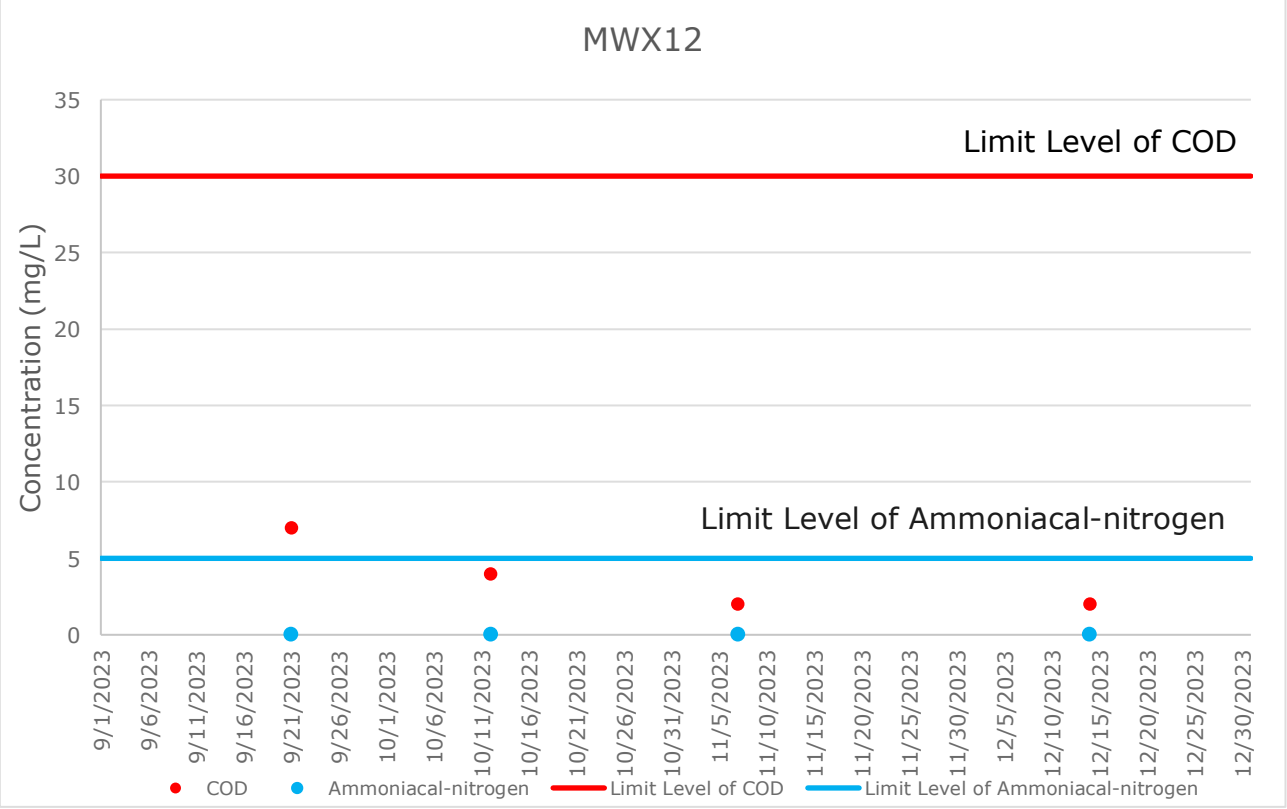


FIGURE F5.13 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-13)

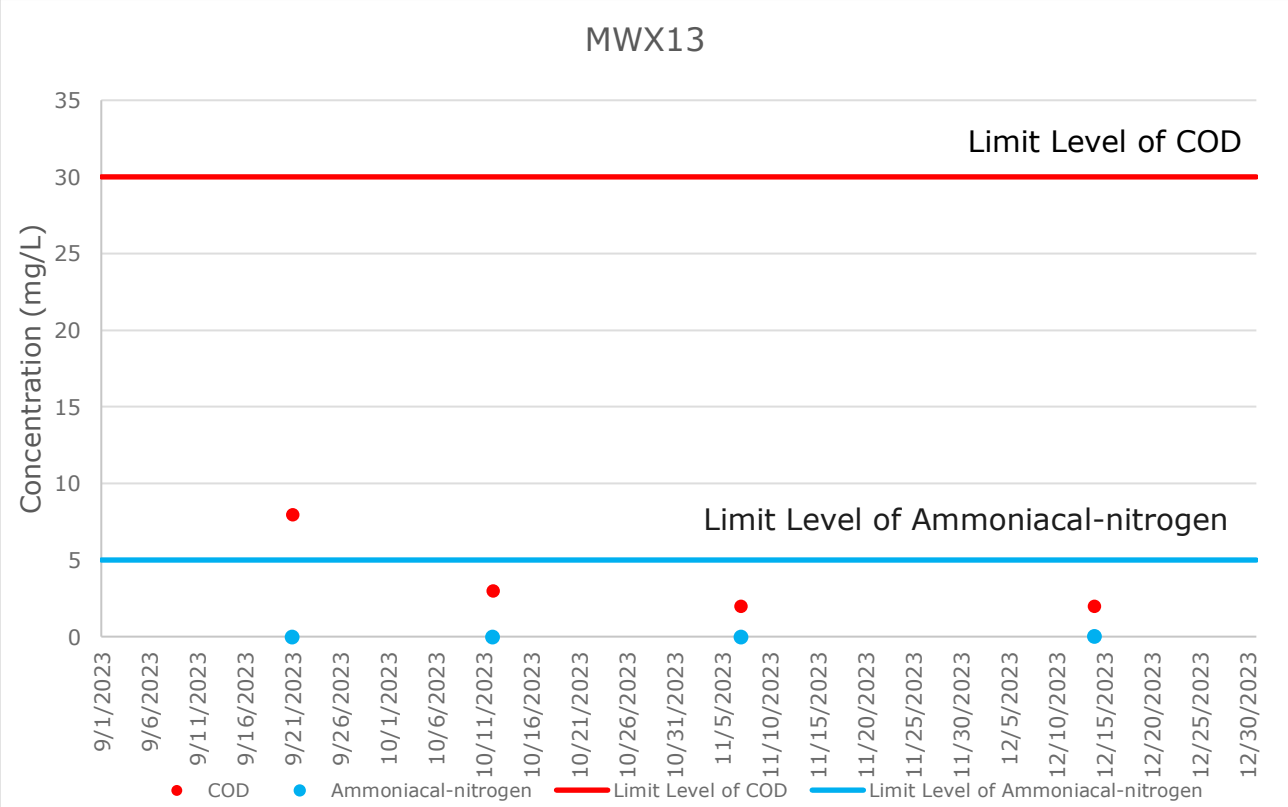
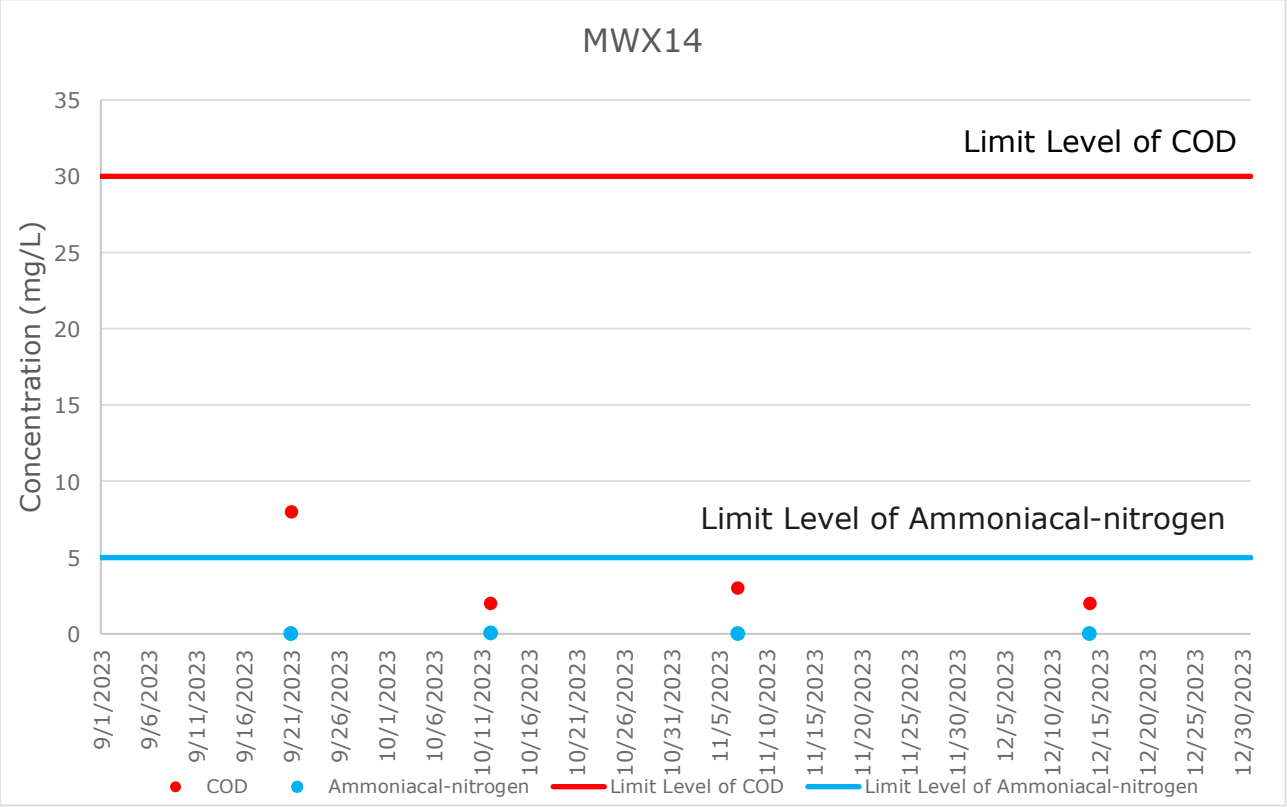


FIGURE F5.14 GRAPHICAL PRESENTATION FOR GROUNDWATER MONITORING (MWX-14)



ANNEX F6 INVESTIGATION REPORTS OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCE

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	7 November 2023
Time	14:40
Monitoring Location	MWX-7
Parameter	Chemical Oxygen Demand (COD)
Limit Level	>36 mg /L
Measured Level	38 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 (6.53 mg/L) and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-7 (MWX-6: 35 mg/L and MWX-8: 24 mg/L) are well within the respective limit levels. Hence, there is a low possibility of the elevation of COD level at MWX-7 is due to leachate contamination from SENTX operation or at least it is not conclusive to base on these results to demonstrate exceedance was due to leachate contamination. In accordance with Table 4.5b of the updated EM&A Manual, repeat measurement was conducted on 14 December 2023 to confirm findings. COD concentration of 18 mg/L (below the Limit Level) was measured at MWX-7 during the sampling event, which demonstrate no consecutive groundwater quality impact at the monitoring location. 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 on 7 November 2023 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 and the subsequent month monitoring results at MWX-7 did not show any exceedance, there is no adequate evidence showing that the COD level exceedance measured at MWX-7 on 7 November 2023 was deemed to Project-related activities. 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 7 November 2023 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: 4 January 2024

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	14 December 2023
Time	11:21
Monitoring Location	MWX-6
Parameter	Chemical Oxygen Demand (COD)
Limit Level	>46 mg /L
Measured Level	54 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-6 (4.36 mg/L) and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-6 (MWX-5: 28 mg/L and MWX-7: 18 mg/L) are well within the respective limit levels. Hence, there is a low possibility of the elevation of COD level at MWX-6 is due to leachate contamination from SENTX operation or at least it is not conclusive to base on these results to demonstrate exceedance was due to leachate contamination. In accordance with Table 4.5b of the updated EM&A Manual, repeat measurement was conducted on 8 January 2024 to confirm findings. COD concentration of 49 mg/L was measured at MWX-6 during the sampling event. MWX-6 showed consecutive exceedance of 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-6 on 14 December 2023 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 COD level exceedance measured at MWX-6 on 14 December 2023 was deemed to Project-related activities. It should also be noted that although the COD level exceeded the limit level of the EM&A programme, it is still well within the WPCO effluent discharge limit of COD (80 mg/L) and the standard for effluents discharged into the inshore waters of the Junk Bay

	Water Control Zone as stipulated under Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (80 mg/L). The slight exceedance of COD at MWX-6 on 14 December 2023 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: 29 January 2024

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	Pump Station No. 1X: 9 – 17 October 2023 Pump Station No. 2X: 11 October 2023 – 23 November 2023 Pump Station No. 3X: 9 October 2023 – 24 November 2023 Pump Station No. 4X: 9 October 2023 – 14 November 2023
Monitoring Location	Pump Station No. 1X (Cell 1X), Pump Station No. 2X (Cell 2X), Pump Station No. 3X (Cell 3X) and Pump Station No. 4X (Cell 4X)
Parameter	Leachate level
Limit Levels	Pump Station No. 1X: > 178 cm Pump Station No. 2X: > 180 cm Pump Station No. 3X: > 175 cm Pump Station No. 4X: > 186 cm
Measured Level	<u>Pump Station No. 1X (Meter No. X-1*)</u> 9 October 2023: 231 cm 10 October 2023: 233 cm 11 October 2023: 224 cm 12 October 2023: 244 cm 13 October 2023: 251 cm 14 October 2023: 240 cm 15 October 2023: 224 cm 16 October 2023: 208 cm 17 October 2023: 188 cm <u>Pump Station No. 2X (Average of Meter No. X-3 and No. X-4)</u> 11 October 2023: 284 cm 12 October 2023: 336 cm 13 October 2023: 332 cm 14 October 2023: 323 cm 15 October 2023: 314 cm 16 October 2023: 303 cm 17 October 2023: 298 cm 18 October 2023: 290 cm 19 October 2023: 278 cm 20 October 2023: 288 cm 21 October 2023: 289 cm 22 October 2023: 279 cm 23 October 2023: 278 cm 24 October 2023: 282 cm 25 October 2023: 297 cm 26 October 2023: 316 cm

	27 October 2023: 320 cm 28 October 2023: 316 cm 29 October 2023: 316 cm 30 October 2023: 319 cm 31 October 2023: 319 cm 1 November 2023: 320 cm 2 November 2023: 320 cm 3 November 2023: 319 cm 4 November 2023: 317 cm 5 November 2023: 316 cm 6 November 2023: 311 cm 7 November 2023: 315 cm 8 November 2023: 315 cm 9 November 2023: 315 cm 10 November 2023: 315 cm 11 November 2023: 315 cm 12 November 2023: 315 cm 13 November 2023: 315 cm 14 November 2023: 315 cm 15 November 2023: 315 cm 16 November 2023: 303 cm 17 November 2023: 289 cm 18 November 2023: 276 cm 19 November 2023: 263 cm 20 November 2023: 248 cm 21 November 2023: 253 cm 22 November 2023: 194 cm 23 November 2023: 154 cm (Please note that the leachate level recorded at Meter No. X-3 for Pump Station No. 2X on 23 November 2023 was 209 cm, which exceeded the Limit Level.) <u>Pump Station No. 3X (Average of Meter No. X-5 and No. X-6*)</u> 9 October 2023: 211 cm 10 October 2023: 358 cm 11 October 2023: 366 cm 12 October 2023: 364 cm 13 October 2023: 358 cm 14 October 2023: 353 cm 15 October 2023: 346 cm 16 October 2023: 338 cm 17 October 2023: 331 cm

	18 October 2023: 324 cm 19 October 2023: 324 cm 20 October 2023: 335 cm 21 October 2023: 335 cm 22 October 2023: 338 cm 23 October 2023: 342 cm 24 October 2023: 344 cm 25 October 2023: 344 cm 26 October 2023: 346 cm 27 October 2023: 349 cm 28 October 2023: 346 cm 29 October 2023: 345 cm 30 October 2023: 349 cm 31 October 2023: 349 cm 1 November 2023: 349 cm 2 November 2023: 351 cm 3 November 2023: 346 cm 4 November 2023: 340 cm 5 November 2023: 340 cm 6 November 2023: 338 cm 7 November 2023: 338 cm 8 November 2023: 338 cm 9 November 2023: 338 cm 10 November 2023: 338 cm 11 November 2023: 338 cm 12 November 2023: 340 cm 13 November 2023: 340 cm 14 November 2023: 340 cm 15 November 2023: 336 cm 16 November 2023: 307 cm 17 November 2023: 297 cm 18 November 2023: 283 cm 19 November 2023: 268 cm 20 November 2023: 254 cm 21 November 2023: 239 cm 22 November 2023: 223 cm 23 November 2023: 207 cm 24 November 2023: 189 cm <u>Pump Station No. 4X (Average of Meter No. X-7 and No. X-8)</u> 9 October 2023: 312 cm

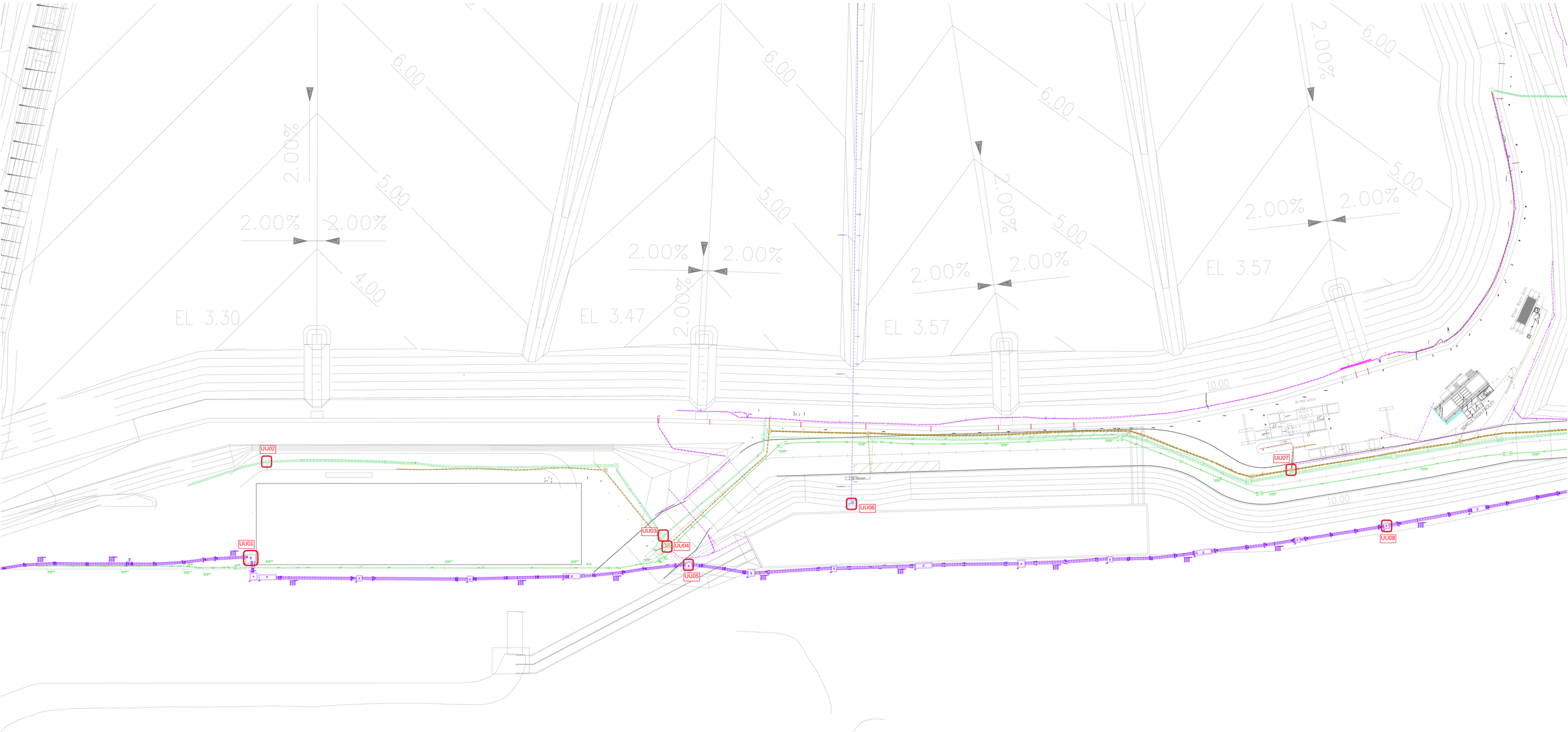
	10 October 2023: 411 cm 11 October 2023: 384 cm 12 October 2023: 369 cm 13 October 2023: 358 cm 14 October 2023: 353 cm 15 October 2023: 346 cm 16 October 2023: 338 cm 17 October 2023: 327 cm 18 October 2023: 355 cm 19 October 2023: 358 cm 20 October 2023: 359 cm 21 October 2023: 360 cm 22 October 2023: 361 cm 23 October 2023: 362 cm 24 October 2023: 365 cm 25 October 2023: 364 cm 26 October 2023: 366 cm 27 October 2023: 368 cm 28 October 2023: 365 cm 29 October 2023: 365 cm 30 October 2023: 367 cm 31 October 2023: 367 cm 1 November 2023: 375 cm 2 November 2023: 375 cm 3 November 2023: 364 cm 4 November 2023: 358 cm 5 November 2023: 349 cm 6 November 2023: 338 cm 7 November 2023: 340 cm 8 November 2023: 325 cm 9 November 2023: 311 cm 10 November 2023: 296 cm 11 November 2023: 281 cm 12 November 2023: 259 cm 13 November 2023: 234 cm 14 November 2023: 199 cm (*Meter No. X-2 for Pump Station No. 1X and Meter No. X-5 for Pump Station No. 3X are on standby from 9 October 2023 to 14 November 2023.)

Possible reason	From the on-site rainfall record of October and November 2023, heavy rainfall events (up to 210 mm per day) were recorded from 9 October to 24 November 2023. Amber, red and black rainstorm warning signals were also issued by the Hong Kong Observatory on 8 and 9 October 2023. As confirmed by the Contractor, the leachate collection system and leachate treatment plant were under normal operating conditions and routine maintenance during the reporting period. Accumulation of surface water at Cell 1X, 2X, 3X and 4X was observed during the reporting period, which could contribute to the leachate level exceedances. Based on this observation, the leachate level exceedances at Pump Station No. 1X, 2X, 3X and 4X were deemed to Project-related activities. It is understood that the large volume of leachate (contaminated surface runoff) accumulated at Cell 1X, 2X, 3X and 4X has exceeded the leachate treatment capacity (daily maximum effluent discharge volume of 1,776 m^3 recorded from 9 October to 24 November 2023, with daily effluent discharge limit of 2,000 m^3 as stipulated in the WPCO license).
Action Taken / Action to be Taken	Examination of environmental performance of the Project will be continued during the weekly inspections. The Contractor is reminded to closely monitor the operating conditions of the leachate collection system (e.g. set alarm when the leachate level reach about 80% of the Limit Level) and pump out the leachate for treatment to avoid any exceedance of the Limit Level.
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 12 December 2023

ANNEX G LANDFILL GAS

ANNEX G1 LANDFILL GAS MONITORING LOCATIONS FOR SERVICE VOIDS, UTILITIES AND MANHOLES ALONG THE SITE BOUNDARY AND WITHIN THE SENTX SITE


6.00
5.00
4.00
2.00%
EL 3.30
EL 3.47
EL 3.57
EL 3.57
10.00
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UU01
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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 (OCTOBER 2023)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	3.4	0.1	1.6	16.1
LFG2	3.35	0.1	2.2	16.3
LFG3	3.2	0.1	0.0	19.4
LFG4	3.04	0.0	0.1	18.6
LFG5	2.84	0.0	0.1	13.7
LFG6	3.48	0.0	0.0	19.5
LFG7	2.84	0.0	0.0	18.9
LFG8	3.11	0.0	0.0	18.6
LFG9	3.31	0.0	0.0	19.4
LFG10	2.97	0.0	0.0	19.4
LFG11	2.44	0.0	0.0	16.5
LFG12	2.94	0.0	0.0	19.5
LFG13	3.2	0.0	0.0	19.7
LFG14	4.74	0.0	0.0	16.9
LFG15	4.34	0.0	0.0	19.6
LFG16	3.59	0.0	0.0	19.7
LFG17	3.94	0.0	0.0	19.6
LFG18	3.42	0.0	0.0	18.7
LFG19	3.41	0.0	0.1	18.5
LFG20	2.46	0.0	0.1	18.4
LFG21	4.92	0.0	0.3	18.6
LFG22	6.05	0.0	0.0	19.7
LFG23	14.4	0.0	0.0	19.7
LFG24	25.5	0.0	0.0	19.7
GP1	Probe Bent	0.0	6.8	9.7
GP2 (shallow)	Probe Bent	0.0	0.9	18.9
GP2 (deep)	Probe Bent	0.0	0.0	20.0
GP3 (shallow)	Probe Bent	0.0	0.2	19.7
GP3 (deep)	Probe Bent	0.0	0.1	19.8
GP4 (shallow)	Probe Bent	0.0	1.3	18.0
GP4 (deep)	Probe Bent	0.0	0.4	19.4
GP5 (shallow)	Probe Bent	0.0	1.7	10.7
GP5 (deep)	10.03	0.0	0.1	19.7
GP6	8.33	0.0	4.4	14.8

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
GP7	2.06	0.0	0.1	19.6
GP12	2.06	0.1	0.0	19.6
GP15	3.3	0.1	0.0	20.3
P7	2.75	0.1	0.1	19.7
P8	2.68	0.1	0.0	20.7
P9	2.45	0.2	0.0	18.4

TABLE G2.2 LANDFILL GAS MONITORING RESULTS AT PERIMETER LFG MONITORING WELLS (NOVEMBER 2023)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.88	0.2	0.8	18.5
LFG2	2.69	0.2	0.9	18.9
LFG3	3.71	0.1	1.4	17.9
LFG4	3.25	0.0	0.1	19.2
LFG5	3.93	0.0	0.1	15.0
LFG6	3.74	0.0	0.1	19.4
LFG7	3.1	0.0	0.0	19.9
LFG8	2.98	0.0	0.0	19.9
LFG9	3.16	0.0	0.0	19.9
LFG10	2.89	0.0	0.0	19.7
LFG11	3.16	0.0	0.0	11.4
LFG12	2.82	0.0	0.0	19.7
LFG13	2.58	0.0	0.0	19.7
LFG14	2.64	0.0	0.0	19.7
LFG15	2.59	0.0	0.0	19.5
LFG16	3.14	0.0	0.1	19.5
LFG17	3.27	0.0	0.1	19.5
LFG18	3.91	0.0	0.2	19.4
LFG19	4.05	0.0	0.1	19.4
LFG20	3.95	0.1	1.1	17.5
LFG21	3.87	0.1	0.1	19.8
LFG22	3.52	0.2	0.1	19.9
LFG23	12.95	0.0	0.0	20.2
LFG24	6.52	0.0	0.0	20.1
GP1	Probe Bent	0.0	7.2	8.3
GP2 (shallow)	Probe Bent	0.0	0.8	18.7
GP2 (deep)	Probe Bent	0.0	5.2	14.7
GP3 (shallow)	Probe Bent	0.0	0.9	19.2
GP3 (deep)	Probe Bent	0.0	0.1	20.1
GP4 (shallow)	Probe Bent	0.0	0.5	19.6
GP4 (deep)	Probe Bent	0.0	0.2	20.2
GP5 (shallow)	Probe Bent	0.0	9.9	12.4
GP5 (deep)	40.2	0.0	0.0	20.0
GP6	38.43	0.0	1.2	18.1

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
GP7	36.65	0.0	0.6	19.4
GP12	2.77	0.1	0.0	18.9
GP15	2.76	0.0	0.1	20.0
P7	2.81	0.1	0.0	14.9
P8	2.82	0.0	0.1	20.1
P9	2.98	0.1	0.0	20.0

TABLE G2.3 LANDFILL GAS MONITORING RESULTS AT PERIMETER LFG MONITORING WELLS (DECEMBER 2023)

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.96	0.2	0.2	20.2
LFG2	2.51	0.2	0.5	20.2
LFG3	2.77	0.0	1.4	20.0
LFG4	2.81	0.0	0.0	19.4
LFG5	4.01	0.0	0.0	17.5
LFG6	3.4	0.0	0.1	19.1
LFG7	2.71	0.0	0.0	19.4
LFG8	2.64	0.0	0.1	19.5
LFG9	2.56	0.0	0.2	17.1
LFG10	2.57	0.0	0.0	16.8
LFG11	2.41	0.0	0.1	10.3
LFG12	2.48	0.0	0.0	20.1
LFG13	2.34	15.9	0.3	5.9
LFG14	2.01	0.0	0.0	19.8
LFG15	2.16	0.0	0.0	19.8
LFG16	2.91	0.0	0.0	19.9
LFG17	3.05	0.0	0.0	19.9
LFG18	3.69	0.0	1.1	17.3
LFG19	4.36	0.0	0.3	19.1
LFG20	3.64	0.0	0.0	19.9
LFG21	3.79	0.0	0.0	19.9
LFG22	3.64	0.0	0.0	19.9
LFG23	12.76	0.0	0.0	19.8
LFG24	6.54	0.0	0.0	19.8
GP1	Probe Bent	0.0	0.1	20.1
GP2 (shallow)	Probe Bent	0.0	0.8	18.8
GP2 (deep)	Probe Bent	0.0	0.1	20.1
GP3 (shallow)	Probe Bent	0.0	0.1	20.1
GP3 (deep)	Probe Bent	0.0	0.2	19.9
GP4 (shallow)	Probe Bent	0.0	0.5	19.6
GP4 (deep)	Probe Bent	0.0	0.2	19.8
GP5 (shallow)	Probe Bent	0.0	0.1	19.8
GP5 (deep)	39.15	0.0	0.1	19.8
GP6	37.67	0.0	0.1	19.7

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
GP7	36.70	0.0	0.1	19.7
GP12	2.43	0.2	0.0	20.7
GP15	3.53	0.1	0.0	20.1
P7	3.28	0.1	0.4	19.1
P8	2.97	0.1	0.0	20.3
P9	2.82	0.1	0.0	20.1

TABLE G2.4 LANDFILL GAS MONITORING AT SERVICE VOIDS, UTILITIES PITS AND MANHOLE (OCTOBER 2023)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.1	0.0	19.4
UU02	0.1	0.0	19.6
UU03	0.0	0.0	19.5
UU04	0.0	0.0	19.5
UU05	0.0	0.0	19.6
UU06	0.0	0.0	19.6
UU07	0.0	0.0	19.5
UU08	0.0	0.0	19.5
UU09	0.0	0.0	19.6
UU10	0.0	0.0	19.7
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	19.8
UU15	0.0	0.0	19.8
UU16	0.0	0.0	19.8
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	0.0	0.0	19.5
UU20	0.0	0.0	19.7
UU21	0.0	0.0	19.7
UU22	0.0	0.0	19.8
UU23	0.0	0.0	19.9
UU24	0.0	0.0	19.8
UU25	0.0	0.0	19.8
UU26	0.0	0.0	19.8
UU27	0.0	0.0	19.8
UU28	0.0	0.0	19.8

TABLE G2.5 LANDFILL GAS MONITORING AT SERVICE VOIDS, UTILITIES PITS AND MANHOLE (NOVEMBER 2023)

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	0.0	0.0	19.7
UU04	0.0	0.0	19.7
UU05	0.0	0.0	19.6
UU06	0.0	0.0	19.6
UU07	0.0	0.0	19.7
UU08	0.0	0.0	19.4
UU09	0.0	0.0	19.2
UU10	0.0	0.0	19.1
UU11	0.0	0.0	19.2
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	19.2
UU14	0.0	0.0	19.2
UU15	0.0	0.0	19.2
UU16	0.0	0.0	19.3
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	0.0	0.0	19.7
UU20	0.0	0.0	19.3
UU21	0.0	0.0	19.2
UU22	0.0	0.0	19.2
UU23	0.0	0.0	19.3
UU24	0.0	0.0	19.2
UU25	0.0	0.0	19.1
UU26	0.0	0.0	19.2
UU27	0.0	0.0	19.2
UU28	0.0	0.0	19.2

TABLE G2.6 LANDFILL GAS MONITORING AT SERVICE VOIDS, UTILITIES PITS AND MANHOLE (DECEMBER 2023)

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	20.0
UU02	0.0	0.0	19.8
UU03	0.0	0.0	19.9
UU04	0.0	0.0	20.0
UU05	0.0	0.0	20.2
UU06	0.0	0.0	20.2
UU07	0.0	0.0	19.9
UU08	0.0	0.0	20.0
UU09	0.0	0.0	20.3
UU10	0.0	0.0	20.3
UU11	0.0	0.0	20.2
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	20.2
UU14	0.0	0.0	20.2
UU15	0.0	0.0	20.1
UU16	0.0	0.0	20.1
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	0.0	0.0	20.0
UU20	0.0	0.0	20.0
UU21	0.0	0.0	20.2
UU22	0.0	0.0	20.2
UU23	0.0	0.0	20.1
UU24	0.0	0.0	20.1
UU25	0.0	0.0	20.1
UU26	0.0	0.0	20.1
UU27	0.0	0.0	20.3
UU28	0.0	0.0	20.3

TABLE G2.7 LANDFILL GAS BULK GAS SAMPLING MONITORING RESULTS

Parameters	LFG2	LFG8
Methane (% (v/v))	0.750	0.096
Carbon Dioxide (% (v/v))	<0.020	<0.020
Oxygen (% (v/v))	19.3	20.3
Nitrogen (% (v/v))	77	76.6
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)
10:46	22°16'29"	114°16'10"	Sunny	22.1	313	2.7	12
10:50	22°16'26"	114°16'34"	Sunny	23.2	311	3.2	15
10:57	22°16'19"	114°16'35"	Sunny	22.3	331	5.0	15
11:03	22°16'17"	114°16'33"	Sunny	22.7	88	3.2	17
11:09	22°16'50"	114°16'21"	Sunny	23.0	124	3.0	17
11:11	22°16'20"	114°16'27"	Sunny	23.4	335	2.9	17
11:30	22°16'29"	114°16'27"	Sunny	23.2	9	3.0	5

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 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	1	17
Air Quality (Odour)	Action	0	0
	Limit	0	0
Air Quality (Emissions of Thermal Oxidiser)	Limit	2	4
Air Quality (Emissions of Landfill Gas Flare)	Limit	0	5
Air Quality (Emissions of Landfill Gas Generator)	Limit	0	0
Noise	Action	0	0
	Limit	0	0
Water Quality (Surface Water)	Limit	0	61
Water Quality (Leachate)	Limit	0	1
Water Quality (Leachate Level)	Limit	137	194
Water Quality (Groundwater)	Limit	2	18
Landfill Gas (Perimeter Landfill Gas Monitoring Wells)	Limit	0	4
Landfill Gas (Service Void, Utilities and Manholes)	Limit	0	0
Landfill Gas (Permanent Gas Monitoring System)	Limit	0	0

TABLE H2 CUMULATIVE STATISTICS ON COMPLAINTS, NOTIFICATIONS OF SUMMONS AND SUCCESSFUL PROSECUTIONS

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Prosecutions
This Reporting Period (1 Oct – 31 Dec 2023)	0	0	0
Total no. received since project commencement	1	0	0

ERM HAS OVER 160 OFFICES ACROSS THE FOLLOWING COUNTRIES AND TERRITORIES WORLDWIDE

Argentina
Australia
Belgium
Brazil
Canada
China
Colombia
France
Germany
Ghana
Guyana
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
Mozambique
The Netherlands
New Zealand
Peru
Poland
Portugal
Puerto Rico
Romania
Senegal
Singapore
South Africa
South Korea
Spain
Switzerland
Taiwan
Tanzania
Thailand
UAE
UK
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Vietnam

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