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

South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.15

February 2023

ERM

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

South East New Territories (SENT) Landfill Extension

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

Reference Document/Plan

Document/Plan to be Certified/Verified:	Quarterly Environmental Monitoring & Audit Report No. 15 for South East New Territories (SENT) Landfill Extension
Date of Report:	9 February 2023

Reference EM&A Manual Requirement

EM&A Manual: Section 11.4

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

ET Certification

I hereby certify that the above referenced document/plan complies with the above referenced EM&A Manual requirement.

Terence Fong,
Environmental Team Leader:
(ERM Hong-Kong, Limited)

Date: 9 February 2023

IEC Verification

I hereby verify that the above referenced document/plan complies with the above referenced EM&A Manual requirement.

Claudine Lee,
Independent Environmental Checker:
(Meinhardt Infrastructure and Environment Limited)

Date: 15 February 2023

South East New Territories (SENT) Landfill Extension

Quarterly Environmental Monitoring & Audit Report No.15

Environmental Resources Management

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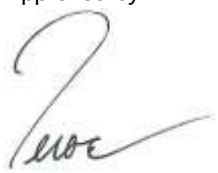
Client:	Project No:
Green Valley Landfill Ltd.	0465169
Summary: This document presents the Quarterly EM&A Report No.15 for *South East New Territories (SENT) Landfill Extension*	Date: 9 February 2023 Approved by:  Terence Fong *Partner*

Revision	Description	By	Checked	Approved	Date
0	Quarterly EM&A Report No.15	AL	TF	TF	9 Feb 23

Distribution

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ANNEXES

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

This Quarterly EM&A report presents the EM&A works carried out during the period from 1 July 2022 to 30 September 2022 for the Project in accordance with the updated EM&A Manual.

Exceedance of Action and Limit Levels for Air Quality

Two exceedances of the Action and Limit Levels for dust (TSP) were recorded for air quality impact monitoring in the reporting period. The TSP exceedance at AM2 on 29 July 2022 was considered Project-related while the exceedance at AM4 on 29 July 2022 was considered non 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

One exceedance of the Limit Level for surface water (suspended solid (SS)), two exceedances of the Limit Level for groundwater quality (Chemical Oxygen Demand (COD)), and ten exceedances of the Limit Level for leachate level were recorded for water quality impact monitoring in the reporting period.

The SS exceedance at DP4 on 8 July 2022 was considered Project-related upon further investigation. The additional surface water monitoring results (SS) at DP4 on 15 July 2022 complied with the Limit Level as stipulated in the updated EM&A Manual and the weekly surface water monitoring (SS) at DP4 was terminated.

The leachate level exceedances at Pump Station No. 4X from 12 August to 20 August 2022 and on 30 September 2022 were considered Project-related upon further investigation.

The groundwater quality (COD) exceedances at MWX-7 on 18 August 2022 and 6 September 2022 were considered non 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.

(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

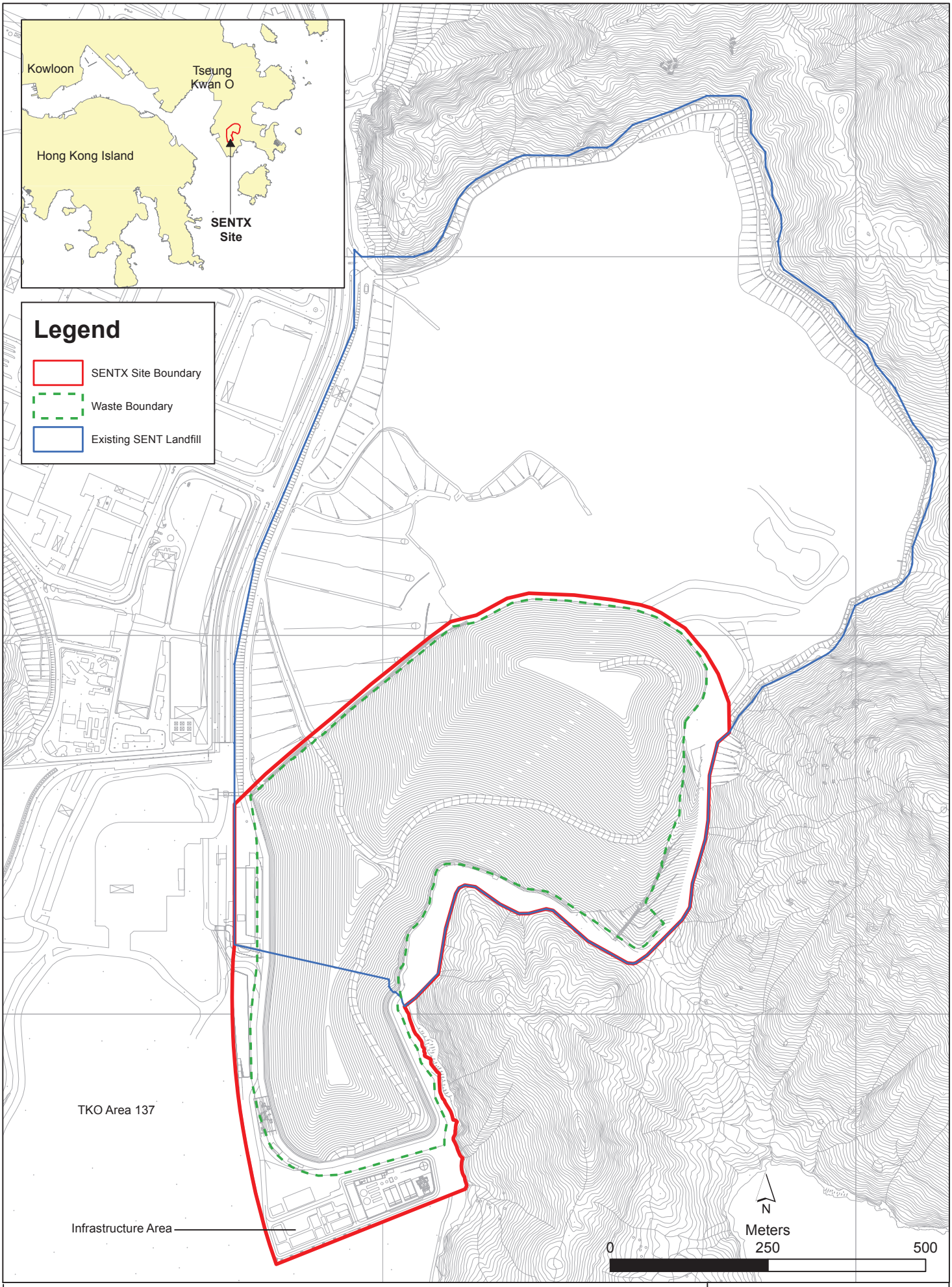

Figure 1.1

Layout Plan of SENTX

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Date: 5/9/2018

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

Table 1.1 Estimated Key Dates of Implementation Programme

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

The major construction works of the SENTX includes:

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

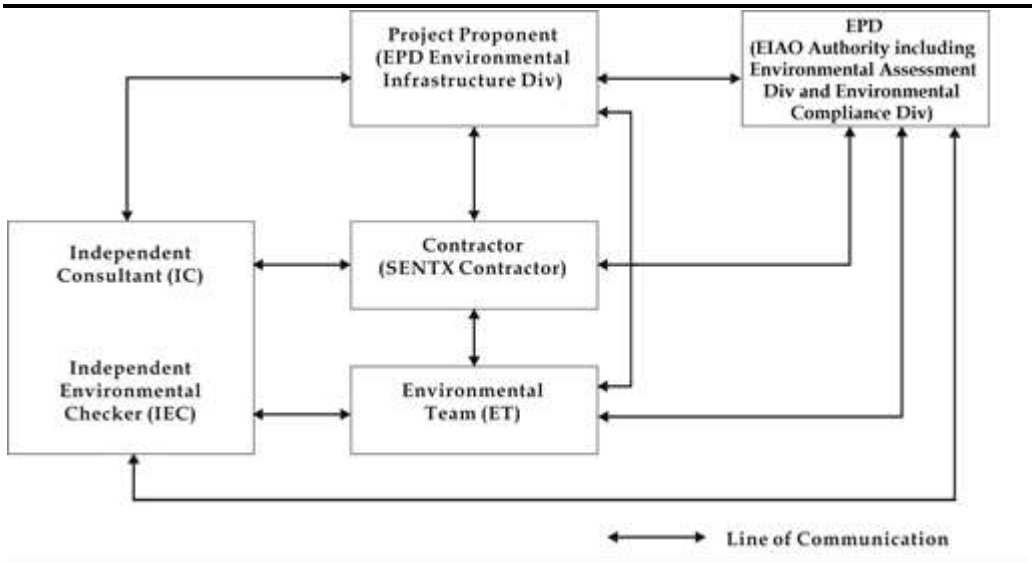
1.3 SCOPE OF THE EM&A REPORT

This is the Quarterly EM&A Report for the Project which summarises the key findings of the EM&A programme during the reporting period from 1 July 2022 to 30 September 2022 for the construction and operation works.

1.4 PROJECT ORGANISATION

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

Figure 1.2 Organisation Chart



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

Table 1.2 Contact Information of Key Personnel

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

1.5 SUMMARY OF CONSTRUCTION WORKS

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

July 2022

- Rectification of defects at Landfill Gas (LFG) Plant, Leachate Treatment Plant (LTP), infrastructure area and waste reception area;
- Landscaping works at infrastructure area;
- Rectification of defects for underground utilities and pipe;
- Construction of road pavement on top of the MSE wall;
- Construction of Cell 4X and SENT tie in area;

- Construction of perimeter channel X10A and X10C along Western bund of Cell 4X;
- Maintenance and improvement of temporary surface water drainage; and
- Rectification of utilities installation along Western bund of Cell 4X.

August 2022

- Rectification of defects at LFG Plant, LTP, infrastructure area and waste reception area;
- Landscaping works at infrastructure area;
- Rectification of defects for underground utilities and pipe;
- Construction of Cell 4X and SENT tie in area;
- Construction of road pavement at diesel fuel tank and installation of railing;
- Construction of road pavement at Western perimeter bund;
- Maintenance and improvement of temporary surface water drainage; and
- Rectification of utilities installation along Western bund of Cell 4X.

September 2022

- Rectification of defects at LFG Plant, LTP, infrastructure area and waste reception area;
- Landscaping works at infrastructure area;
- Rectification of defects for underground utilities and pipe;
- Construction of Cell 4X and SENT tie in area and rock wall;
- Deployment of liner at cell 4X and SENT tie in area;
- Installation of GMS frame for roof planter at roof floor of GVL , EPD and lab building;
- Construction of concrete plinth for pump and concrete kerb for inlet box at the top of diesel fuel tank;
- Maintenance and improvement of temporary surface water drainage; and
- Rectification of utilities installation along Western bund of Cell 4X.

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

1.6 SUMMARY OF EM&A PROGRAMME REQUIREMENTS

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

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

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

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

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

- Three environmental management meetings were held with the Contractor, ER, ET, IEC and EPD on 21 July 2022, 18 August 2022 and 15 September 2022; and

- Environmental toolbox trainings on the following topics were provided by the Contractor to the workers:
    - Illegal Dumping on 6 July 2022;
    - Air Pollution – Dark Smoke on 21 July 2022;
    - Noise Control Ordinance on 11 August 2022;
    - NRMM on 29 August 2022;
    - Waste Reduction on Construction Industry on 7 September 2022; and
    - Renewable Energy on 27 September 2022.

1.7 STATUS OF STATUTORY ENVIRONMENTAL COMPLIANCE WITH THE ENVIRONMENTAL PERMIT

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

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

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

1.8 STATUS OF OTHER STATUTORY ENVIRONMENTAL REQUIREMENTS

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

Table 1.5 Status of Statutory Environmental Requirements

Description	Ref No.	Status
Environmental Permit	EP-308/2008	Granted on 5 August 2008
Variation of Environmental Permit	EP-308/2008/A	Granted on 6 January 2012
	EP-308/2008/B	Granted on 20 January 2017
Further Environmental Permit	FEP-01/308/2008/B	Granted on 16 May 2018
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-RE0565-22	Validity from 15 June 2022 to 22 September 2022
	GW-RE0956-22	Validity from 23 September 2022 to 14 March 2023
Construction Noise Permit (Permit Holder: Paul Y.)	GW-RE0278-22	Validity from 31 March 2022 to 22 September 2022

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

Monitoring Requirements and Equipment

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

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

Table 2.1 Action and Limit Levels for 24-hour TSP

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

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

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

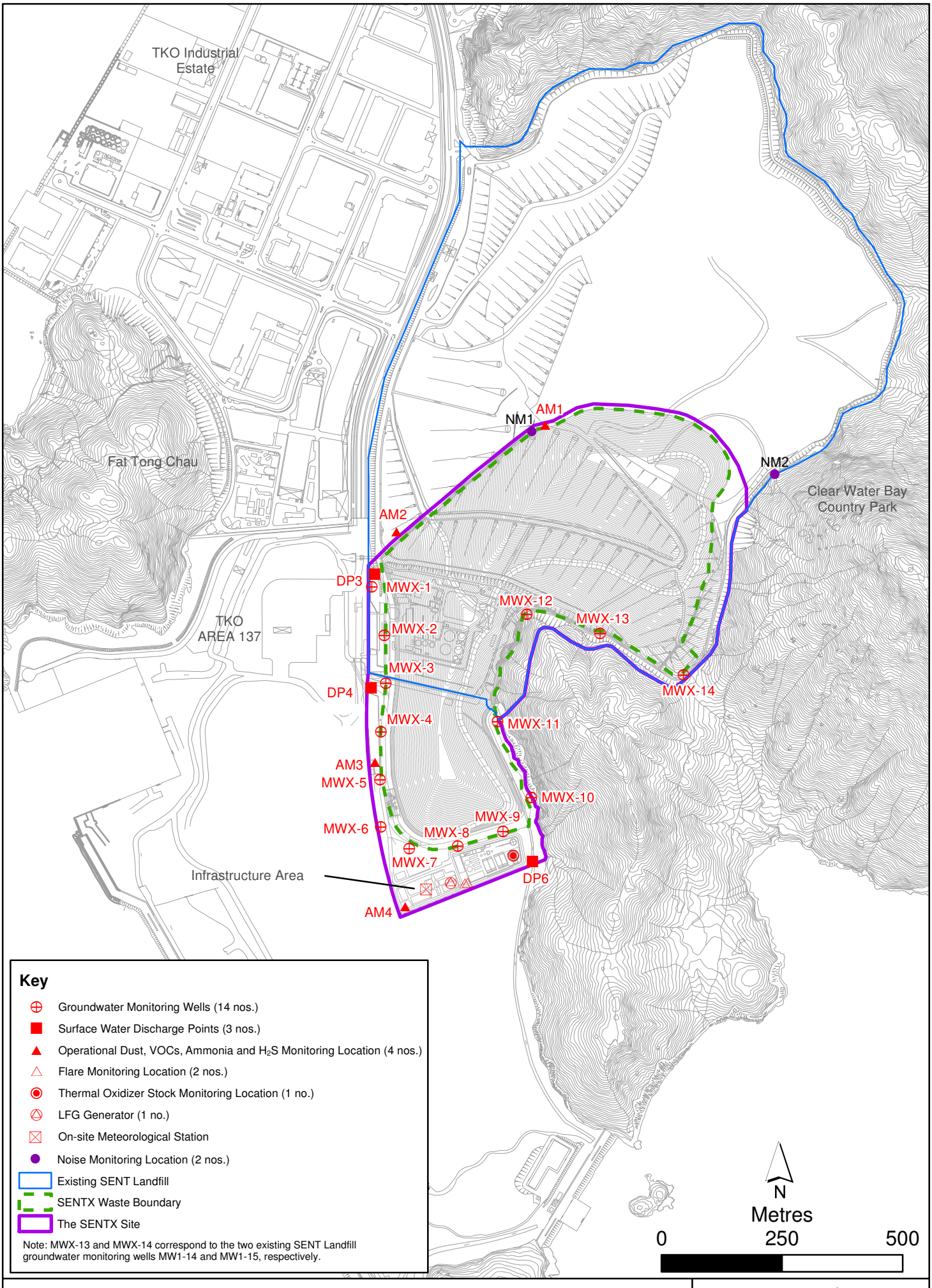


Figure 2.1

Environmental Monitoring Locations

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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	5, 11, 17, 23, 29 July 2022	Tisch TE-5170 (S/N: 1190)
AM2	SENTX Site Boundary (West, near DP3)			4, 10, 16, 22, 28 August 2022	Tisch TE-5170 (S/N: 1047)
AM3	SENTX Site Boundary (West, near RC15)				Tisch TE-5170 (S/N: 1258)
AM4	SENTX Site Boundary (West, near EPD building)			3, 9, 15, 21, 27 September 2022	Tisch TE-5170 (S/N: 1101)

Monitoring Schedule for the Reporting Period

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

Results and Observations

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

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

Month	Monitoring Station	24-hr TSP Concentration (μg m^{-3})		Action Level (μg/m^3)	Limit Level (μg/m^3)
		Average	Range		
July 2022	AM1	69	39 – 156	260	260
	AM2	127	43 – 312	260	260
	AM3	119	56 – 241	260	260
	AM4	144	42 – 364	260	260
August 2022	AM1	61	26 – 94	260	260
	AM2	67	36 – 111	260	260
	AM3	95	43 – 150	260	260
	AM4	67	35 – 134	260	260
September 2022	AM1	135	58 – 174	260	260
	AM2	133	69 – 190	260	260
	AM3	195	118 – 252	260	260
	AM4	149	102 – 207	260	260

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

Action and Limit Levels exceedances were recorded for TSP monitoring in the reporting period and actions in accordance with the Event and Action Plan in *Annex D2* were undertaken. Investigation of the Action and Limit Levels

exceedances was conducted and the investigation report is presented in *Annex D7*.

Based on the investigation conducted for the monitoring event with potential Action and Limit Levels exceedance with the Contractor and the IEC, the TSP exceedance at AM2 on 29 July 2022 was considered Project-related while the exceedance at AM4 on 29 July 2022 was considered non-Project-related. Repeat measurement had been scheduled on 4 August 2022 to confirm findings and no exceedance at AM2 and AM4 was recorded.

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

Meteorological Data

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

2.1.2 Odour Monitoring

Monitoring Requirements

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

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

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

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

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

Table 2.4 Action and Limit Levels for Odour Patrol

Parameter	Action Level	Limit Level
Perceived odour intensity and odour complaints	• 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.

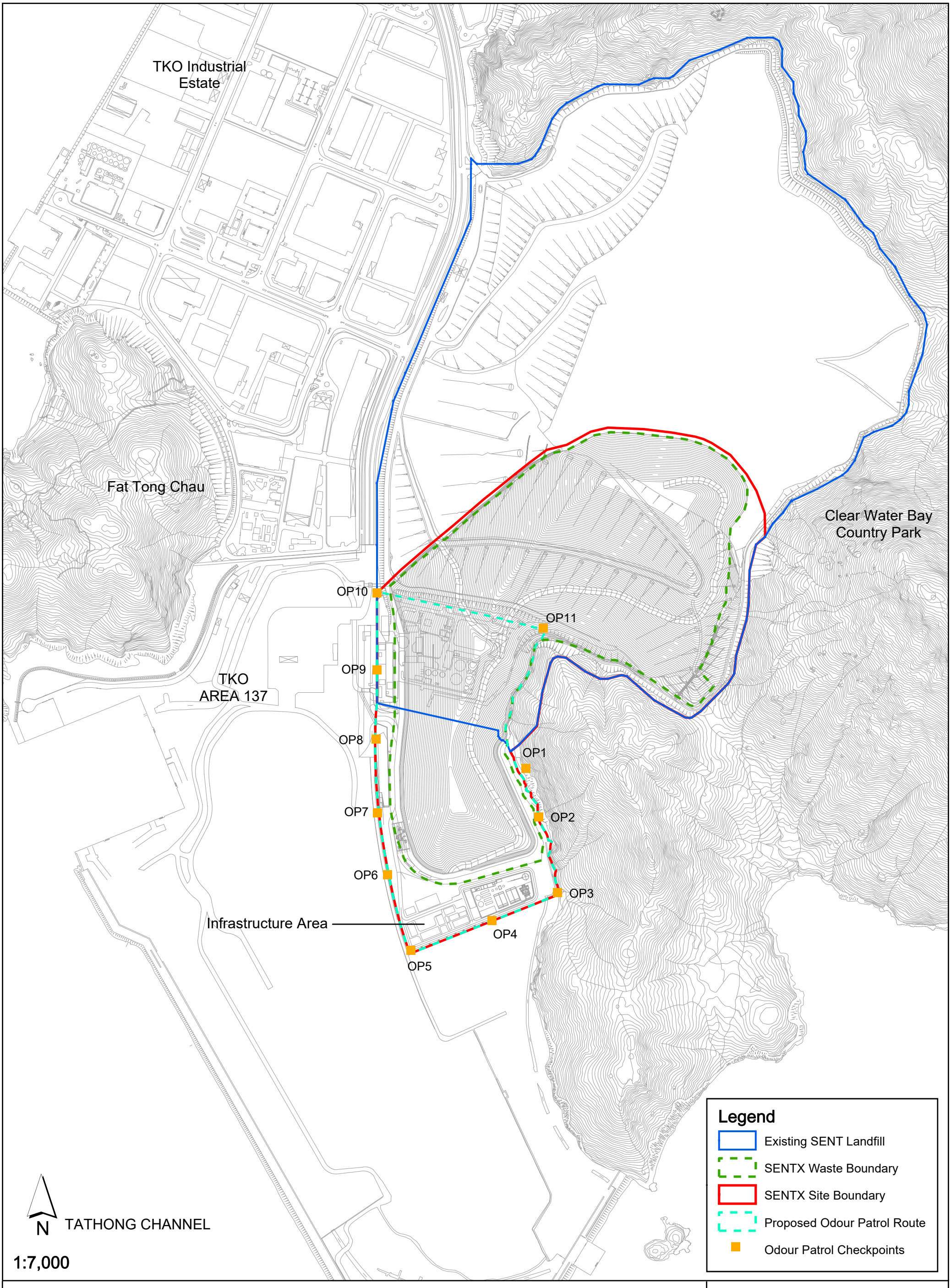

Figure 2.2

Odour Patrol Route for Operation/ Restoration Phase Odour Monitoring

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Date: 28/9/2021

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Table 2.5 ***Odour Monitoring Details***

Patrol Locations	Parameters	Patrol Frequency [(a)]	Monitoring Dates and Time
Patrol along the SENTX Site Boundary (Checkpoints OP1 – OP11 [(d)])	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	Conducted by ET & IEC: 22 July 2022, 22 August 2022
		Three times per week on different days conducted by an independent third party together with the ET and IEC [(b)]	Conducted by an independent third party, ET & IEC: 15 September 2022
		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)]	

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.

(d) The revised odour patrol route with the addition of checkpoint OP11 was applied from 10 December 2021.

Table 2.6 ***Odour Intensity Level***

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

Monitoring Schedule for the Reporting Month

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

Results and Observations

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

Table 2.7 Summary of Odour Monitoring Results in the Reporting Period

Odour Checkpoints	Odour Intensity Class (Range)	Action Level	Limit Level
OP1	0	Odour intensity ≥ Class 2 recorded	Odour intensity ≥ Class 3 recorded on 2 consecutive patrol
OP2	0		
OP3	0		
OP4	0		
OP5	0 – 1		
OP6	0		
OP7	0		
OP8	0		
OP9	0		
OP10	0 – 1		
OP11	0 – 1		

The potential odour source in the reporting period included the nearby operations of the Town Gas Plant, the excavator from Area 137 Fill Bank, waste from tipping area and site vehicle.

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

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

Monitoring Requirements and Equipment

According to the updated EM&A Manual of the Project, the performance of the thermal oxidiser, landfill gas flare and landfill gas generator was monitored when they are in operation. Gas samples were collected from the stack of the thermal oxidizer, landfill gas flare and landfill gas generator for laboratory analysis for 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}

Parameters	Limit Level
CO	0.53 gs^{-1}
SO_2	0.07 gs^{-1}
Benzene	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	2.23 x 10^{-3} gs^{-1}
Gas combustion temperature	850°C (minimum)
Exhaust gas exit temperature	443K (minimum) (a)
Exhaust gas velocity	7.5 ms^{-1} (minimum) (a)

Note:
(a) Level under full load condition.

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

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

Note:
(a) Level under full load condition.

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

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

Note:
(a) Level under full load condition.

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

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

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

Monitoring Location	Parameter	Frequency	Monitoring Date
Stack of Thermal Oxidiser	Laboratory analysis for • 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	18 Jul 2022, 8 Aug 2022, 15 Sep 2022
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	8 Aug 2022
	Laboratory analysis for • Ammonia	Quarterly	8 Aug 2022, 15 Sep 2022
	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Jul – 30 Sep 2022
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	12 Jul 2022, 9 Aug 2022, 16 Sep 2022
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	9 Aug 2022
	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 Jul – 30 Sep 2022
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	12 Jul 2022, 9 Aug 2022, 15 Sep 2022
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	9 Aug 2022

Monitoring Location	Parameter	Frequency	Monitoring Date
	• Exhaust temperature • Exhaust gas velocity [(a)]	Continuously	1 Jul – 30 Sep 2022

Note:

(a) The exhaust gas velocity will be calculated based on the cross-section area of the stack and continuous monitored gas flow and combustion temperature data.

(b) The monitoring results will be reviewed towards the end of the first year of operation to determine if monitoring of this parameter can be terminated upon agreement by the EIAO Authority, IEC and Project Proponent.

Monitoring Schedule for the Reporting Month

The schedule for thermal oxidizer, landfill gas flare and landfill gas generator stack emission monitoring during the reporting period is provided in *Annex C*.

Results and Observations

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

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

Parameters	Monitoring Results (Range in Bracket)	Limit Level
	July 2022	
NO_2	0.89 gs-1	1.58 gs^{-1}
CO	<0.01 gs-1	0.53 gs^{-1}
SO_2	<0.01 gs-1	0.07 gs^{-1}
Benzene	<2.1 x 10-4 gs-1	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	<2 x 10-5 gs-1	2.23 x 10^{-3} gs^{-1}
Gas combustion temperature	925°C (918°C – 934°C)	850°C (minimum)
Exhaust gas exit temperature	1,112K (1,162K – 1,175K)	443K (minimum) (a)
Exhaust gas velocity	9.7 ms^{-1} (b)	7.5 ms^{-1} (minimum) (a)
	August 2022	
NO_2	0.86 gs-1	1.58 gs^{-1}
CO	<0.01 gs-1	0.53 gs^{-1}
SO_2	<0.02 gs-1	0.07 gs^{-1}
Non-Methane Organic Carbons	0.0055 gs-1	-
Benzene	<3 x 10-5 gs-1	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	<2 x 10-5 gs-1 0.232 gs-1	2.23 x 10^{-3} gs^{-1}
Ammonia	0.86 gs-1	-(c)
Gas combustion temperature	923°C (880°C – 933°C)	850°C (minimum)
Exhaust gas exit temperature	1,231K (1,181K – 1,241K)	443K (minimum) (a)
Exhaust gas velocity	9.3 ms^{-1} (b)	7.5 ms^{-1} (minimum) (a)
	September 2022	
NO_2	0.38 gs^{-1}	1.58 gs^{-1}
CO	<0.01 gs^{-1}	0.53 gs^{-1}
SO_2	<0.01 gs^{-1}	0.07 gs^{-1}
Benzene	<2 x 10^{-4} gs^{-1}	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	<1.3 x 10^{-4} gs^{-1}	2.23 x 10^{-3} gs^{-1}
Ammonia	0.0414 gs^{-1}	-(c)
Gas combustion temperature	924°C (912°C – 932°C)	850°C (minimum)
Exhaust gas exit temperature	1,238K (1,225K – 1,248K)	443K (minimum) (a)
Exhaust gas velocity	11.2 ms^{-1} (b)	7.5 ms^{-1} (minimum) (a)

Note:

(a) Level under full load condition.

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

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

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

Parameters	Monitoring Results (Range in Bracket)	Limit Level
	July 2022	
NO_2	<0.01 gs^{-1}	0.97 gs^{-1}
CO	0.53 gs^{-1}	2.43 gs^{-1}
SO_2	0.01 gs^{-1}	0.22 gs^{-1}
Benzene	<1.8 x 10^{-5} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<1.4 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	Flare 1: 901°C (822°C – 955°C)	815°C (minimum)
	Flare 2: 858°C (824°C – 930°C)	
Exhaust gas exit temperature	Flare 1: 1,035K (963K – 1,083K)	923 K (minimum) (a)
	Flare 2: 1,093K (1,061K – 1,163K)	
Exhaust gas velocity	6.5 ms^{-1} (b)	9.0 m s^{-1} (minimum) (a)
	August 2022	
NO_2	<0.02 gs^{-1}	0.97 gs^{-1}
CO	0.83 gs^{-1}	2.43 gs^{-1}
SO_2	0.12 gs^{-1}	0.22 gs^{-1}
Non-Methane Organic Carbons	<0.002 gs^{-1}	-
Benzene	<2.5 x 10^{-5} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<2.0 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	Flare 1: 890°C (826°C – 966°C)	815°C (minimum)
	Flare 2: 846°C (820°C – 890°C)	
Exhaust gas exit temperature	Flare 1: 1,110K (993K – 1,248K)	923 K (minimum) (a)
	Flare 2: 1,061K (1,023K – 1,103K)	
Exhaust gas velocity	8.9 ms^{-1} (b)	9.0 m s^{-1} (minimum) (a)
	September 2022	
NO_2	<0.02 gs^{-1}	0.97 gs^{-1}
CO	<0.01 gs^{-1}	2.43 gs^{-1}
SO_2	<0.01 gs^{-1}	0.22 gs^{-1}
Benzene	<1.23 x 10^{-4} gs^{-1}	4.14 x 10^{-4} gs^{-1}
Vinyl chloride	<9.8 x 10^{-5} gs^{-1}	2.60 x 10^{-4} gs^{-1}
Gas combustion temperature	Flare 1: 866°C (820°C – 944°C)	815°C (minimum)
	Flare 2: 861°C (821°C – 948°C)	
Exhaust gas exit temperature	Flare 1: 1,046K (987K – 1,127K)	923 K (minimum) (a)
	Flare 2: 1,080K (1,046K – 1,127K)	
Exhaust gas velocity	8.9 ms^{-1} (b)	9.0 m s^{-1} (minimum) (a)

Note:

(a) Level under full load condition.

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

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

Parameters	Monitoring Results (Range in Bracket)	Limit Level
	July 2022	
NO_2	0.01 gs^{-1}	1.91 gs^{-1}
CO	0.28 gs^{-1}	2.48 gs^{-1}
SO_2	0.003 gs^{-1}	0.528 gs^{-1}
Benzene	$<8.0 \times 10^{-6}$ gs^{-1}	2.47×10^{-4} gs^{-1}
Vinyl chloride	$<1.8 \times 10^{-6}$ gs^{-1}	1.88×10^{-5} gs^{-1}
Exhaust gas exit temperature	864K (848K – 893K)	723K (minimum) (a)
Exhaust gas velocity	11.2 ms^{-1} (b)	30.0 ms^{-1} (minimum) (a)
	August 2022	
NO_2	0.04 gs^{-1}	1.91 gs^{-1}
CO	0.622 gs^{-1}	2.48 gs^{-1}
SO_2	0.015 gs^{-1}	0.528 gs^{-1}
Non-Methane Organic Carbons	0.0012 gs^{-1}	-
Benzene	$<8.7 \times 10^{-5}$ gs^{-1}	2.47×10^{-4} gs^{-1}
Vinyl chloride	$<2.1 \times 10^{-6}$ gs^{-1}	1.88×10^{-5} gs^{-1}
Exhaust gas exit temperature	861K (855K – 868K)	723K (minimum) (a)
Exhaust gas velocity	9.3 ms^{-1} (b)	30.0 ms^{-1} (minimum) (a)
	September 2022	
NO_2	0.07 gs^{-1}	1.91 gs^{-1}
CO	0.75 gs^{-1}	2.48 gs^{-1}
SO_2	0.008 gs^{-1}	0.528 gs^{-1}
Benzene	$<1.92 \times 10^{-4}$ gs^{-1}	2.47×10^{-4} gs^{-1}
Vinyl chloride	$<9.6 \times 10^{-6}$ gs^{-1}	1.88×10^{-5} gs^{-1}
Exhaust gas exit temperature	859K (845K – 880K)	723K (minimum) (a)
Exhaust gas velocity	10.2 ms^{-1} (b)	30.0 ms^{-1} (minimum) (a)

Note:

(a) Level under full load condition.

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

All thermal oxidizer, landfill gas flare and landfill gas generator stack emission 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*.

2.1.4 Ambient VOCs, Ammonia and H_2S Monitoring

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 H_2S Monitoring

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
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.

VOCs

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

Methane

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

Ammonia

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

H_2S

H_2S in air is collected in mid-get impingers by aspirating a measured volume of air through an alkaline suspension of cadmium hydroxide (as the absorbing solution). The sulphide is precipitated as cadmium sulphide to prevent air oxidation of the sulphide. Arabinogalactan is added to the cadmium hydroxide slurry prior to sampling to minimize photo-decomposition of the precipitated cadmium sulphide. The solution is transported back to laboratory for analysis.

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

The ambient VOCs, ammonia and H_2S monitoring programme and monitoring locations are summarised in *Table 2.16* and illustrated in *Figure 2.1,* respectively.

Table 2.16 Ambient VOCs, Ammonia and H_2S Monitoring Details

Monitoring Station	Location	Parameter	Frequency	Monitoring Date
AM1	SENTX Site Boundary (North)	• Methane • Ammonia • A suite of VOCs [(a)] • H_2S	Quarterly	8 August 2022
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

Monitoring Schedule for the Reporting Month

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

Results and Observations

The ambient VOCs, ammonia and H_2S monitoring results are summarised in *Tables 2.17* and provided in *Annex D6*.

Table 2.17 Summary of Ambient VOCs, Ammonia and H_2S Monitoring Results in the Reporting Period

Parameters	Limit Level (μg m^{-3})	Monitoring Results (μg m^{-3})			
		AM1	AM2	AM3	AM4
Ammonia	180	18	19	25	26
H2S	42	<15	<15	<15	<15
Methane	NA [a]	0.00023% (v/v)	0.00022% (v/v)	0.00036% (v/v)	0.00032% (v/v)
1.1.1-Trichloroethane	5,550	<0.9	<0.9	<0.9	<0.9
1.2-Dibromoethane (EDB)	39	<1.3	<1.3	<1.3	<1.3
1.2-Dichloroethane	210	<0.6	<0.6	<0.6	<0.6
Benzene	33	<0.5	<0.5	<0.5	<0.5
Butan-2-ol	667	<0.6	<0.6	<0.6	<0.6
Butanethiol	4	<1.2	<1.2	<1.2	<1.2
Carbon Disulphide	150	<0.5	<0.5	11.4	1.6
Carbon Tetrachloride	64	<1.0	<1.0	<1.0	<1.0
Chloroform	99	<0.8	<0.8	<0.8	<0.8
Decanes	3,608	1.3	<1.0	1.1	<1.0
Dichlorobenzene	120	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoro-methane	NA [a]	1.4	1.7	2.1	2
Dimethylsulphide	8	<0.4	<0.4	<0.4	<0.4
Dipropyl ether	NA [a]	<0.8	<0.8	<0.8	<0.8
Limonene	212	<0.9	<0.9	<0.9	<0.9
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	<3.8	<3.8	25.4
Ethyl butanoate	71	<1.0	<1.0	<1.0	<1.0
Ethyl propionate	29	<0.8	<0.8	<0.8	<0.8
Ethyl benzene	738	<0.8	<0.8	<0.8	1.3
Heptane	2,746	<0.8	<0.8	<0.8	<0.8
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	13	<2.6	7.6	29.5
Methyl butanoate	30	<0.8	<0.8	<0.8	<0.8
Methyl propionate	353	<0.7	<0.7	<0.7	<0.7
Methylene Chloride	3,530	<0.6	<0.6	2.7	4
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]	1	<0.8	1.1	1.4
Tetrachloroethylene	1,380	<1.2	<1.2	<1.2	<1.2
Toluene	1,244	<0.6	<0.6	0.7	2.7
Trichloroethylene	5,500	<1.1	<1.1	<1.1	<1.1
Undecane	5,562	<1.2	<1.2	<1.2	<1.2
Vinyl Chloride	26	<0.4	<0.4	<0.4	<0.4
Xylenes	534	<0.5	<0.5	<0.5	2.5

Notes:

(a) No relevant WHO/USEPA/CARB's ambient criteria, odour thresholds 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	65 dB(A) at NSRs [c]
19:00 – 23:00 hrs on all days		65 dB(A) at NSRs [c]
23:00 – 07:00 hrs on all days	75 dB(A) recorded at the monitoring station	55 dB(A) at NSRs [c]

Notes:

(a) 75dB(A) along and at about 100m from the SENTX site boundary was set as the Action Level.

(b) Limits specified in the GW-TM and IND-TM for construction and operational noise, respectively.

(c) Limit Level only apply to operational noise without road traffic and construction activities noise.

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

Table 2.19 Noise Monitoring Details

Monitoring Station (1)	Location	Parameter	Frequency and Duration	Monitoring Dates	Equipment
NM1	SENTX Site Boundary (North)	$L_{eq\ (30\ min)}$ measurement between 07:00 and 19:00 hours on normal weekdays (Monday to Saturday)	Once per week for 30 mins during the operation period of the Project	6, 12, 18, 25 Jul 2022 1, 11, 17, 23, 29 Aug 2022 5, 13, 22, 28 Sep 2022	Sound Level Meter: Rion NL-52 (S/N: 00921191) Rion NL-52 (S/N: 00809405) Acoustic Calibrator: Rion NC-74 (S/N: 34246492) B&K 4231 (S/N: 2713428)

2.2.2 Monitoring Schedule for the Reporting Period

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

2.2.3 Results and Observations

A total of 13 impact noise monitoring events were scheduled during the reporting period. However, noise monitoring on 11 August 2022 was cancelled due to adverse weather. The noise monitoring results are summarised in *Table 2.20* and graphically presented in *Annex E1*.

Table 2.20 Summary of Noise Monitoring Results in the Reporting Period

Month	Monitoring Station	Measured Noise Level $L_{eq\ (30\ min)}$, dB(A)		
		Average	Range	Action and Limit Level
July 2022	NM1	52.9	51.5 – 54.4	75
August 2022	NM1	52.3	51.1 – 53.0	75
September 2022	NM1	51.0	48.1 – 54.5	75

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

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

2.3 WATER QUALITY MONITORING

2.3.1 Surface Water Quality Monitoring

Monitoring Requirements and Equipment

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

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

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

Table 2.21 Action and Limit Levels for Surface Water Quality

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

Notes:

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

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

Table 2.22 Impact Surface Water Quality Monitoring Details

Monitoring Station	Location	Frequency	Monitoring Dates	Parameter		Equipment
DP4	Surface water discharge point DP4	Monthly	25 Jul 2022, 23 Aug 2022, 22 Sep 2022	• 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	YSI Professional DSS (S/N: 17B100758)
DP6	Surface water discharge point DP6					YSI Professional DSS (S/N: 15H103928)
DP4 (Additional Monitoring)	Surface water discharge point DP4	Weekly	8 July 2022, 15 July 2022	• SS		-

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

Monitoring Schedule for the Reporting Period

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

Results and Observations

Three regular monitoring events for impact surface water quality monitoring were scheduled at all designated monitoring stations and two additional surface water quality monitoring event was scheduled at DP4 during the reporting period. However, sampling could not be carried out at the monitoring events below due to insufficient flow.

- 25 July 2022 at all monitoring locations;
- 23 August 2022 at all monitoring location; and
- 22 September 2022 at all monitoring locations.

Details of impact water quality monitoring event are provided in *Annex F1*. Limit Level exceedance (SS) was recorded for surface water quality impact monitoring on 30 June 2022 and the exceedance was found to be project-related upon further investigation. Actions in accordance with the Event and Action Plan in *Annex F2* were undertaken. Subsequently, additional surface water monitoring (SS) at DP4 was conducted on 8 July 2022 and 15 July 2022. The additional surface water monitoring results are summarized in *Table 2.23* below.

Table 2.23 Details of Exceedances Recorded for Surface Water Quality Monitoring

Date	Monitoring Location	Parameter	Result	Limit Level	Remarks
8 July 2022	DP4	SS	26.3 mg/L	20 mg/L	Weekly monitoring was continued
15 July 2022	DP4	SS	7.1 mg/L	20 mg/L	Weekly monitoring was terminated

Limit Level exceedance was recorded for additional surface water quality monitoring at DP4 on 8 July 2022. Investigation of the exceedance 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 SS exceedance at DP4 on 8 July 2022 was found deemed to Project-related activities. Subsequently, the weekly monitoring was continued and the additional surface water monitoring results (SS) at DP4 on 15 July 2022 complied with the Limit Level as stipulated in the updated EM&A Manual and the weekly surface water monitoring (SS) at DP4 was terminated.

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

2.3.2 Leachate Monitoring

Monitoring Requirements and Equipment

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

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

Temperature, pH and volume of the effluent discharged from the leachate treatment plant were measured in-situ whereas the parameters as listed in

Table 2.24 were determined by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066).

The Limit Levels of the leachate monitoring are provided in *Table 2.24*

Table 2.24 Limit Levels for Leachate Levels and Effluent Quality

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

Note:

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

All *in situ* monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS or other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the leachate quality monitoring programme. Details of the equipment used are provided in *Table 2.25*.

Table 2.25 Leachate Levels and Effluent Quality Monitoring Details

Location	Frequency	Parameter	Monitoring Dates	Equipment
Leachate levels above the basal liner	Continuous	Leachate Levels	1 Jul – 30 Sep 2022	Pairs of pressure transducers
Effluent discharged from LTP	Daily for the first 3 months upon full operation of the LTP at wet season (Apr to Sep) and dry season (Oct to Mar), respectively and reduce to monthly thereafter subject to the monitoring results of the first 3 months for each season and agreement with the EIAO Authority, IEC and IC. (a)	*On-site Measurements*: • Volume • pH • Temperature *Laboratory analysis:* • Suspended Solids • COD • BOD_5 • TOC • Ammoniacal–nitrogen • Nitrate-nitrogen • Nitrite–nitrogen • Total Nitrogen • Sulphate • Phosphate • Oil & Grease • Alkalinity • Chloride • Calcium • Potassium • Magnesium • Iron • Zinc • Copper • Chromium • Nickel • Cadmium • Boron	1 Jul – 3 Aug 2022, 7 Sep 2022	TOA HM-30P (S/N: 790332) LUTRON WA-2017SD (S/N: T.016811)

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

Monitoring Schedule for the Reporting Month

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

Results and Observations

The leachate levels and effluent quality monitoring results are summarized in *Table 2.26* and *Table 2.27*, respectively. The detailed monitoring results are provided in *Annex F3* and *Annex F4*, respectively.

Table 2.26 Summary of Leachate Levels in the Reporting Period

Monitoring Location	Average Leachate Head Levels (cm) (Range in Bracket)	Limit Level (cm)
	July 2022	
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	58 (46 – 73)	> 178
Meter No. X-2	76 (66 – 88)	
Average	67 (56 – 80)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	73 (57 – 86)	> 180
Meter No. X-4	78 (64 – 90)	
Average	75 (61 – 88)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	68 (53 – 75)	> 175
Meter No. X-6	70 (62 – 75)	
Average	69 (62 – 75)	
	August 2022	
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	69 (53 – 86)	> 178
Meter No. X-2	80 (66 – 97)	
Average	75 (60 – 91)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	76 (62 – 98)	> 180
Meter No. X-4	80 (66 – 99)	
Average	78 (64 – 98)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	68 (48 – 97)	> 175
Meter No. X-6	71 (59 – 97)	
Average	69 (57 – 97)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	171 (48 – 329)	> 186
Meter No. X-8	173 (50 – 331)	
Average	172 (49 – 330)	
	September 2022	
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	69 (62 – 75)	> 178
Meter No. X-2	81 (64 – 89)	
Average	75 (64 – 82)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	73 (46 – 90)	> 180
Meter No. X-4	77 (50 – 90)	
Average	75 (48 – 88)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	69 (62 – 75)	> 175
Meter No. X-6	69 (62 – 75)	
Average	69 (62 – 75)	

Monitoring Location	Average Leachate Head Levels (cm) (Range in Bracket)	Limit Level (cm)
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	65 (50 – 246)	> 186
Meter No. X-8	68 (52 – 246)	
Average	67 (51 – 246)	

Table 2.27 Summary of Effluent Quality Monitoring Results in the Reporting Period

July 2022		**Monitoring Results**			**Limit Level**
Parameters		**Average**	**Min**	**Max**	
Temperature	°C	33.7	25.0	38.1	> 43 °C
pH Value	pH unit	8.4	8.2	8.6	6 – 10
Volume Discharged	m^3	983.9	41.0	1552.0	>2,000 m^3
Suspended Solids (SS)	mg/L	29.8	7.6	95.2	> 800 mg/L
Phosphate	mg/L	4.6	2.0	6.5	> 25 mg/L
Sulphate	mg/L	260.9	157.0	470.0	> 800 mg/L
Total Inorganic Nitrogen [(a)]	mg/L	52.8	43.7	68.9	> 100 mg/L
BOD	mg/L	8.1	3.0	13.0	> 800 mg/L
COD	mg/L	822.7	608.0	1040.0	> 2,000 mg/L
Oil & Grease	mg/L	<5.0	<5.0	<5.0	> 20 mg/L
Boron	µg/L	4796.2	3500.0	6020.0	> 7,000 µg/L
Iron	mg/L	1.5	1.0	1.9	> 5 mg/L
Cadmium	µg/L	<1.0	<1.0	1<.0	> 1 µg/L
Chromium	µg/L	102.7	67.0	133.0	> 300 µg/L
Copper	µg/L	14.9	10.0	64.0	> 1,000 µg/L
Nickel	µg/L	101.7	62.0	127.0	> 700 µg/L
Zinc	µg/L	78.6	62.0	108.0	> 700 µg/L
August 2022		**Monitoring Results**			**Limit Level**
Parameters		**Average**	**Min**	**Max**	
Temperature	°C	36.9	36.7	37.0	> 43 °C
pH Value	pH unit	8.3	8.3	8.4	6 – 10
Volume Discharged	m^3	983.7	831.0	1202.0	>2,000 m^3
Suspended Solids (SS)	mg/L	26.1	24.5	27.0	> 800 mg/L
Phosphate	mg/L	6.8	6.5	7.3	> 25 mg/L
Sulphate	mg/L	174.3	163.0	193.0	> 800 mg/L
Total Inorganic Nitrogen [(a)]	mg/L	41.3	37.2	48.6	> 100 mg/L
BOD	mg/L	9.3	8.0	10.0	> 800 mg/L
COD	mg/L	983.7	921.0	1030.0	> 2,000 mg/L
Oil & Grease	mg/L	<5.0	<5.0	<5.0	> 20 mg/L
Boron	µg/L	5760.0	5500.0	5900.0	> 7,000 µg/L
Iron	mg/L	1.9	1.8	2.0	> 5 mg/L
Cadmium	µg/L	<1.0	<1.0	<1.0	> 1 µg/L
Chromium	µg/L	126.0	115.0	134.0	> 300 µg/L
Copper	µg/L	<10.0	<10.0	<10.0	> 1,000 µg/L
Nickel	µg/L	116.0	106.0	124.0	> 700 µg/L
Zinc	µg/L	65.7	59.0	71.0	> 700 µg/L

September 2022		Monitoring Results	Limit Level
Parameters			
Temperature	°C	32.9	> 43 °C
pH Value	pH unit	8.4	6 – 10
Volume Discharged	m^3	1,251	>2,000 m^3
Suspended Solids (SS)	mg/L	25.4	> 800 mg/L
Phosphate	mg/L	5.73	> 25 mg/L
Sulphate	mg/L	149	> 800 mg/L
Total Inorganic Nitrogen (a)	mg/L	46.10	> 100 mg/L
BOD	mg/L	8	> 800 mg/L
COD	mg/L	1110	> 2,000 mg/L
Oil & Grease	mg/L	<5	> 20 mg/L
Boron	µg/L	4850	> 7,000 µg/L
Iron	mg/L	1.38	> 5 mg/L
Cadmium	µg/L	<1.0	> 1 µg/L
Chromium	µg/L	109	> 300 µg/L
Copper	µg/L	<10	> 1,000 µg/L
Nickel	µg/L	108	> 700 µg/L
Zinc	µg/L	58	> 700 µg/L

Limit Level exceedances were recorded for leachate level in the reporting period and actions in accordance with the Event and Action Plan 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 events with potential Limit Levels exceedances with the Contractor and the IEC, the leachate level exceedances at at Pump Station No. 4X from 12 August to 20 August 2022 and on 30 September 2022 and on 30 September 2022 were considered Project-related.

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*.

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

2.3.3 Groundwater Monitoring

Monitoring Requirements and Equipment

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

The Limit Levels for groundwater quality is provided in *Table 2.28* below.

Table 2.28 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 2.29* and illustrated in *Figure 2.1,* respectively.

Table 2.29 Groundwater Monitoring Details

Monitoring 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	4, 5 Jul 2022, 17, 18 Aug 2022, 5, 6 Sep 2022	YSI Professional DSS (S/N: 15H103928)

Monitoring Schedule for the Reporting Month

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

Results and Observations

The groundwater quality monitoring results and detailed monitoring results are summarised in *Table 2.30* and provided in *Annex F5,* respectively.

Table 2.30 Summary of Groundwater Monitoring Results in the Reporting Period

Location	Ammoniacal-nitrogen (mg L^{-1})				COD (mg L^{-1})			
	Monitoring Results			Limit Levels	Monitoring Results			Limit Levels
	Average	Min	Max		Average	Min	Max	
MWX-1	0.35	0.20	0.59	5.00	17	10	26	30
MWX-2	0.54	0.04	1.38	5.00	9	5	17	30
MWX-3	1.40	1.12	1.78	5.00	18	15	21	30
MWX-4	2.26	1.91	2.88	7.63	21	16	26	36
MWX-5	0.86	0.55	1.48	5.00	19	12	24	30
MWX-6	3.19	2.79	3.54	5.00	35	30	44	46
MWX-7	5.17	4.85	5.63	6.55	40	35	43	36
MWX-8	9.65	5.74	14.00	15.85	33	27	42	50
MWX-9	1.09	0.63	1.68	7.30	39	28	60	71
MWX-10	0.01	0.01	0.01	5.00	9	5	15	30
MWX-11	0.02	0.01	0.02	5.00	6	3	9	30
MWX-12	0.01	0.01	0.01	5.00	3	2	6	30
MWX-13	0.03	0.03	0.03	5.00	3	2	6	30
MWX-14	<0.01	<0.01	<0.01	5.00	4	2	6	30

Limit Level exceedances were recorded for groundwater quality monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex F2* were undertaken. Investigation of the Limit Levels exceedance 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 groundwater quality (COD) exceedances at MWX-7 on 18 August 2022 and 6 September 2022 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 2.31* below.

Table 2.31 Limit Levels for Landfill Gas Constituents

Parameters	Monitoring Location	Limit Level (% (v/v))	
Perimeter Landfill Gas Monitoring Wells [a]			
Methane & Carbon Dioxide		Methane	Carbon Dioxide
	LFG1	1.0	2.2
	LFG2	1.0	4.2
	LFG3	1.0	6.3
	LFG4	1.0	7.0
	LFG5	1.0	3.4
	LFG6	1.0	9.1
	LFG7	1.0	1.5
	LFG8	1.0	1.7
	LFG9	2.5	1.7
	LFG10	1.0	1.6
	LFG11	3.0	2.0
	LFG12	13.2	1.5
	LFG13	22.5	2.7
	LFG14	1.0	1.6
	LFG15	18.2	2.0
	LFG16	1.0	1.7
	LFG17	10.5	2.1
	LFG18	2.3	1.9
	LFG19	6.3	3.1
	LFG20	1.0	4.2
	LFG21	1.0	4.3
	LFG22	1.0	3.9
	LFG23	1.0	10.3
	LFG24	1.0	4.0
	GP1	1.0	8.5
	GP2 (shallow)	1.0	11.4
	GP2 (deep)	1.0	10.4
	GP3 (shallow)	1.0	3.9
	GP3 (deep)	1.0	1.9
	GP4 (shallow)	1.0	2.3
	GP4 (deep)	1.0	5.6
	GP5 (shallow)	1.0	9.5
	GP5 (deep)	1.0	7.5
	GP6	1.0	7.8
	GP7	1.0	4.5
	GP12	1.0	2.3
	GP15	1.0	2.2
	P7	1.0	2.5
	P8	1.0	1.7
	P9	1.0	2.7
Service Voids, Utilities Pits and Manholes			
Methane (or flammable gas)	Service voids, utilities pits and manholes	1% by volume	

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

Notes:

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

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

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

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

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

The equipment used in the landfill gas monitoring programme is summarised in *Table 2.32*. The landfill gas monitoring locations for perimeter landfill gas monitoring wells and service voids, utilities and manholes along the Site boundary and within the SENTX site are illustrated in *Figure 2.3 - 2.4* and *Annex G1*, respectively.

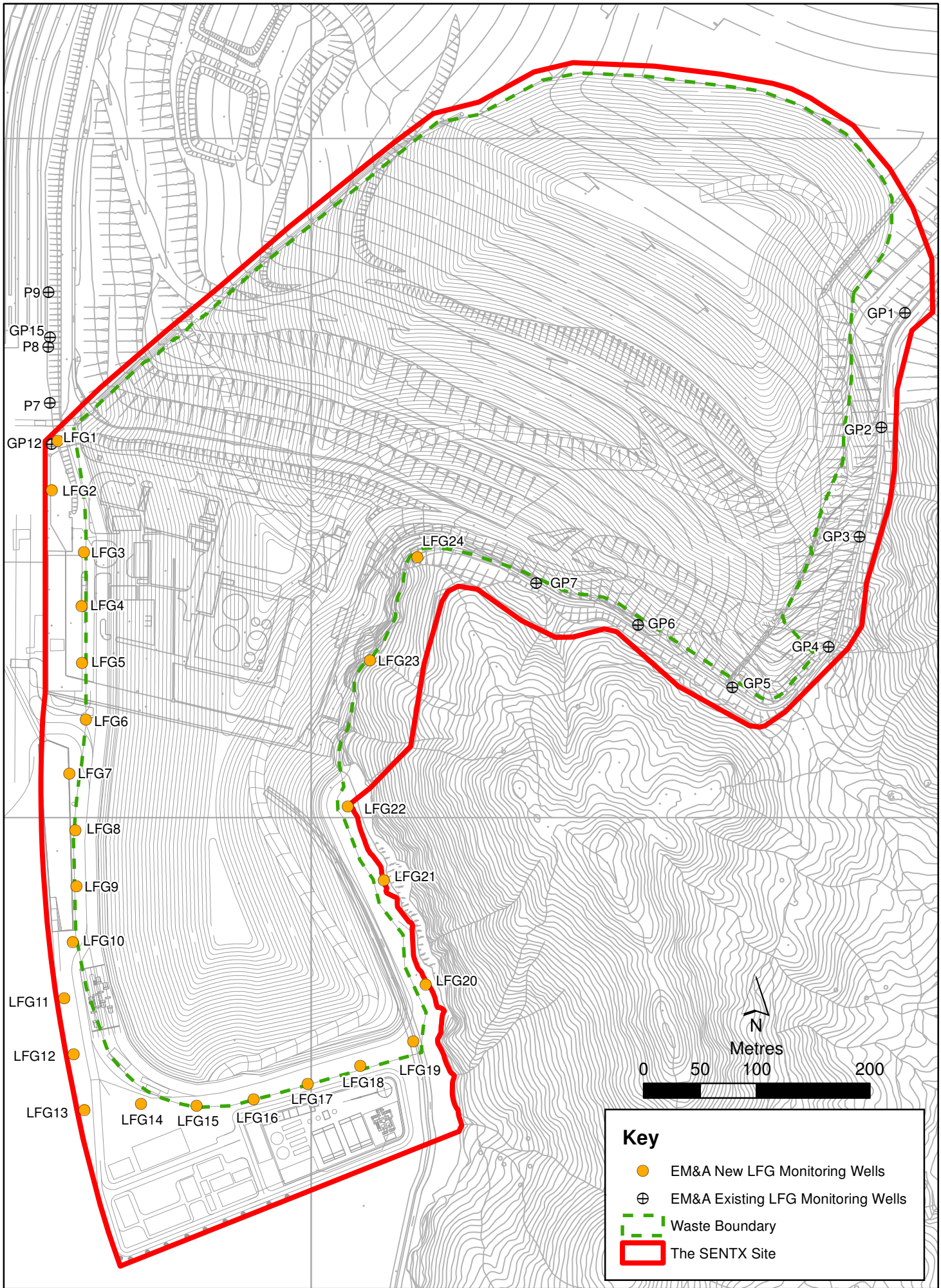


Figure 2.3

Location of Landfill Gas Monitoring Wells

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

Environmental Resources Management

ERM

TKO Industrial Estate

Fat Tong Chau

TKO AREA 137

Infrastructure Area

Clear Water Bay Country Park

Key

- Existing SENT Landfill
- SENTX Waste Boundary
- The SENTX Site
- Flammable Gas Surface Emission Monitoring Location

N

Metres

0 250 500

Figure 2.4

Flammable Gas Surface Emission Monitoring Locations

Environmental Resources Management

ERM

Table 2.32 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	12 Jul 2022, 15 Aug 2022, 16 Sep 2022	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	13 Jul 2022, 5 Aug 2022, 13 Sep 2022	GA5000 (S/N: G507306)
Permanent gas monitoring system in all occupied on-site buildings	Continuous	• Methane (or flammable gas) by permanent gas monitoring system	1 Jul – 30 Sep 2022	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	16 August 2022	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	15 August 2022	Gas sampling pump and Tedlar bags

Monitoring Schedule for the Reporting Month

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

Results and Observations

The landfill gas monitoring results are summarised and provided in *Tables 2.33 - 2.36 and Annex G2*, respectively.

Table 2.33 Summary of Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells in the Reporting Period

Location	Methane (% (v/v))				Carbon Dioxide (% (v/v))			
	Monitoring Results			Limit Level [(a)]	Monitoring Results			Limit Level [(a)]
	Average	Min	Max		Average	Min	Max	
LFG1	0.0	0.0	0.0	1.0	0.8	0.4	1.5	3.2
LFG2	0.0	0.0	0.0	1.0	1.3	0.6	2.4	4.3
LFG3	0.0	0.0	0.0	1.0	0.3	0.0	1.0	6.3
LFG4	0.0	0.0	0.0	1.0	0.2	0.0	0.5	7.0
LFG5	0.0	0.0	0.0	1.0	0.1	0.0	0.2	3.4
LFG6	0.0	0.0	0.0	1.0	0.7	0.0	2.1	9.1
LFG7	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.5
LFG8	0.0	0.0	0.0	12.6	0.0	0.0	0.0	2.4
LFG9	0.1	0.0	0.2	2.5	0.0	0.0	0.0	1.7
LFG10	0.4	0.0	1.3	3.5	0.0	0.0	0.1	1.6
LFG11	0.0	0.0	0.0	3.0	0.0	0.0	0.0	2.0
LFG12	0.0	0.0	0.0	13.2	0.0	0.0	0.0	1.5
LFG13	0.0	0.0	0.0	22.5	0.0	0.0	0.0	2.7
LFG14	0.1	0.0	0.2	5.2	0.0	0.0	0.0	1.8
LFG15	1.1	0.0	3.3	18.2	0.0	0.0	0.0	2.0
LFG16	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0
LFG17	0.0	0.0	0.0	17.8	0.0	0.0	0.0	2.4
LFG18	0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.1
LFG19	0.0	0.0	0.0	6.3	0.0	0.0	0.1	3.1
LFG20	0.0	0.0	0.0	1.0	0.1	0.0	0.2	4.6
LFG21	0.0	0.0	0.0	1.0	0.0	0.0	0.0	4.8
LFG22	0.0	0.0	0.0	1.0	0.0	0.0	0.0	4.0
LFG23	0.0	0.0	0.0	1.0	1.2	0.4	2.6	10.3
LFG24	0.0	0.0	0.0	1.0	0.0	0.0	0.0	4.7
GP1	0.1	0.0	0.2	1.0	6.3	3.4	8.5	10.6
GP2 (shallow)	0.1	0.0	0.1	1.0	0.1	0.0	0.1	11.4
GP2 (deep)	0.2	0.0	0.3	1.0	0.1	0.0	0.1	10.4
GP3 (shallow)	0.0	0.0	0.0	1.0	0.3	0.1	0.4	6.9
GP3 (deep)	0.0	0.0	0.0	1.0	0.3	0.1	0.5	5.6
GP4 (shallow)	0.0	0.0	0.0	1.0	0.3	0.1	0.5	11.6
GP4 (deep)	0.0	0.0	0.0	1.0	0.2	0.1	0.4	7.7
GP5 (shallow)	0.0	0.0	0.0	1.0	6.1	5.0	8.4	10.8
GP5 (deep)	0.0	0.0	0.0	1.0	0.1	0.0	0.1	7.5
GP6	0.0	0.0	0.0	1.0	4.5	1.5	6.1	8.4
GP7	0.0	0.0	0.0	1.0	0.5	0.0	1.4	4.5
GP12	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.3
GP15	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.2
P7	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.5
P8	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.7
P9	0.0	0.0	0.1	1.0	0.0	0.0	0.0	2.7

Notes:

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

Table 2.34 Summary of Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes in the Reporting Period

Location	Methane (% (v/v))			
	Monitoring Results			Limit Levels
	Average	Min	Max	
UU01	0.0	0.0	0.0	1.0
UU02	0.0	0.1	0.0	1.0
UU03	0.0	0.1	0.0	1.0
UU04	0.0	0.1	0.0	1.0
UU05	0.0	0.0	0.0	1.0
UU06	0.0	0.1	0.0	1.0
UU07	0.0	0.1	0.0	1.0
UU08	0.0	0.0	0.0	1.0
UU09	0.0	0.0	0.0	1.0
UU10	0.0	0.0	0.0	1.0
UU11	0.0	0.0	0.0	1.0
UU12	Voided due to latest site programme and on-going operation work			1.0
UU13	0.0	0.0	0.0	1.0
UU14	0.0	0.0	0.0	1.0
UU15	0.0	0.0	0.0	1.0
UU16	0.0	0.0	0.0	1.0
UU17	Voided due to latest site programme and on-going operation work			1.0
UU18	0.0	0.1	0.0	1.0
UU19	0.0	0.1	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 2.35 Summary of Landfill Gas Bulk Gas Sampling Monitoring Results in the Reporting Period

Parameters	Limit Level (LFG20) [(a)]	LFG20	Limit Level (LFG23) [(a)]	LFG23
Methane (% (v/v))	1.0	<0.020	1.0	<0.020
Carbon Dioxide (% (v/v))	4.6	0.059	10.3	0.062
Oxygen (% (v/v))	-	20.6	-	20.7
Nitrogen (% (v/v))	-	77.5	-	77.3
Carbon Monoxide (% (v/v))	-	<0.020	-	<0.020
Hydrogen (% (v/v))	-	<0.020	-	<0.020
Ethane (ppmv)	-	<1.0	-	<1.0
Propane (ppmv)	-	<1.0	-	<1.0
Butane (ppmv)	-	<1.0	-	<1.0

Notes:

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

Table 2.36 ***Summary of Flammable Gas Surface Emission Monitoring Results in the Reporting Period***

GPS Coordinates		Monitoring Results (ppm)	Limit Level (ppm)
Latitude (N)	Longitude (E)		
22°16′31″	114°16′17″	8	30
22°16′53″	114°16′17″	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 July to September 2022.

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*.

2.4.2 Monitoring Requirements

According to the updated EM&A Manual of the Project, the monthly landscape and visual audit was conducted on 15 July 2022, 2 August 2022 and 22 September 2022 to monitor the implementation of the landscape and visual mitigation measures during operation/ restoration phase.

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

2.4.3 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.

2.5 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 for air quality, noise, surface water quality and waste management under the Project. In the reporting period, 13 site inspections were carried out on 7, 14, 21 and 28 July 2022, 4, 11, 18 and 26 August 2022 and, 1, 8, 15, 22 and 29 September 2022.

Key observations during the site inspections are summarized in *Table 2.37*.

Table 2.37 Key Observations Identified during the Site Inspections in this Reporting Period

Inspection Date	Environmental Observations and Recommendations
7 July 2022	• The Contractor shall display NRMM labels on the excavator near X10c channel and generator near DP6 and replace the faded NRMM label on the excavator near DP3. • The Contractor shall remove the general refuse accumulated at X10a channel regularly to ensure it is functioning properly at all times. • The Contractor shall remove the stagnant water accumulated at the drip tray near LTP. • The Contractor shall provide surface water management at DP3 upstream to minimise SS runoff to the channel.
14 July 2022	• The Contractor shall display NRMM labels on the excavator at DP3 and roller near buttress wall. • The Contractor shall remove/ cover the stockpile of dusty materials near DP3 to minimise dust impact. • The Contractor shall provide surface water management at DP3 upstream to minimise SS runoff to the channel.
21 July 2022	• The Contractor shall remove the deposited silt and grit and stagnant water accumulated at DP3 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall remove the stagnant water accumulated in the manholes near channel X10C and spray larvicides for mosquito control, if necessary. • The Contractor shall provide surface water management at DP3 upstream and cover the exposed slope to minimise SS runoff to the channel. • The Contractor shall dispose of the empties chemical containers near DP3 as chemical waste in accordance with the COP.
28 July 2022	• The Contractor shall remove the deposited silt and grit and stagnant water accumulated at DP3 sediment pit regularly to ensure it is functioning properly at all times. • The Contractor shall remove the general refuse and stagnant water accumulated at the channel near sump house 3 to minimize odour and pest issues and spray larvicides for mosquito control, if necessary. • The Contractor shall provide surface water management at DP3 upstream to minimise SS runoff to the channel. • The Contractor shall remove the algae and scum in the Wetsep near DP4 to ensure it is functioning properly at all times.
4 August 2022	• The Contractor shall remove the general refuse accumulated near DP3 and dispose of the waste regularly. • The Contractor shall enhance the surface water management at DP3 upstream to minimise SS runoff to the channel. • The Contractor shall install pumps at DP3 to divert the surface water discharged from SENTX construction works to ensure all surface water is treated before discharge.

Inspection Date	Environmental Observations and Recommendations
11 August 2022	• The Contractor shall clear the dusty materials with road sweepers at the site entrance regularly to minimise dust impact. • The Contractor shall replace the faded NRMM label displayed on the excavator near western site boundary planting area. • The Contractor shall review the treatment capacity and efficiency of the Wetseps near DP4 to ensure all surface water is treated properly before discharge. • The Contractor shall remove the stagnant water accumulated in the drip trays of the Wetseps near DP4. • The Contractor shall remove the stagnant water and general refuse accumulated near sump house 3 and at X10a channel regularly.
18 August 2022	• The Contractor shall remove the stagnant water accumulated in X10a channel regularly, and spray larvicides for mosquito control, if necessary. • The Contractor shall remove the general refuse accumulated at DP3 channel and X10a channel regularly to ensure they are functioning properly at all times.
26 August 2022	• The Contractor shall provide drip trays for the chemicals stored near LTP. • The Contractor shall remove the general refuse and deposited silt accumulated at DP3 channel, X10c channel and surface water channels near town gas plant and LTP regularly to ensure they are functioning properly at all times. • The contractor shall remove the general refuse accumulated near town gas plant, DP4 and LTP and dispose of the waste regularly. • The contractor shall maintain the Wetsep near DP4 to ensure it is functioning properly at all times. • The contractor shall sweep the road near vehicle exit regularly to ensure it is clear of dusty materials. • The contractor shall improve the sewage drainage system to ensure that no untreated sewage is discharged to the surrounding water body.
1 September 2022	• The Contractor shall clean up the oil spillage near DP6 container area and handle the clean-up materials as chemical waste. • The Contractor shall remove the deposited silt and grit accumulated at DP3 sediment pit regularly. • The contractor shall remove the general refuse accumulated at X10a channel regularly to ensure it is functioning properly at all times.
8 September 2022	• The Contractor shall clean up the oil spillage in sediment trap and treat the clean-up materials as chemical waste. • The Contractor shall remove the deposited silt and grit accumulated at DP3 sediment pit regularly. • The contractor shall remove the stagnant water accumulated at the channel leading to DP6. • The contractor shall remove the general refuse around Paul Y area to maintain site cleanliness and tidiness. • The contractor shall cover the stockpiles of dusty materials near maintenance building with impervious sheeting or remove them to minimize dust impact.
15 September 2022	• The contractor shall remove the general refuse accumulated near DP3 and dispose of the waste regularly to maintain site cleanliness. • The Contractor shall remove the deposited silt and grit and general refuse accumulated at DP3 sediment pit, outlet of sediment trap and DP6 regularly.

Inspection Date	Environmental Observations and Recommendations
22 September 2022	• The contractor shall remove the general refuse accumulated at DP3 sediment pits regularly. • The Contractor shall enhance maintenance of the Wetsep at DP4 to ensure it is functioning properly at all times. • The contractor shall clean up the oil spillage near LTP and handle the clean-up materials as chemical waste.
29 September 2022	• The contractor shall remove the general refuse accumulated at DP3 sediment pits regularly.

The Contractor has rectified all of the observations identified during environmental site inspections in the reporting period. Key environmental deficiencies identified and the corresponding rectification actions are presented in *Table 2.38*.

Table 2.38 Summary of Environmental Deficiencies Identified and Corresponding Additional Control Measures

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

2.6 *WASTE MANAGEMENT STATUS*

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

As informed by the Contractor, waste generated during this reporting period include mainly non-inert Construction Waste and chemical wastes. Reference has been made to the waste flow table prepared by the Contractor. The quantities of different types of wastes and imported fill materials are summarised in *Table 2.39*.

Table 2.39 Quantities of Different Waste Disposed and Imported Fill Materials

Month/ Year	Inert C&D Materials [(a)] (in '000m³)	Imported Fill (in '000kg) [(b)]		Inert Construction Waste Re-used (in '000m³)	Non-inert Construction Waste [(c)] (in '000m³)	Recyclable Materials [(d)] (in '000kg)	Yard Waste (in '000kg)		Chemical Wastes (in '000kg)
		Rock	Soil				Y Park	SENT	
1 – 31 Jul 2022	0	0	0	0	0.012	0	28.44	0	0.800
1 – 31 Aug 2022	0	0	0	0	0	0	0	0	0.800
1 – 30 Sep 2022	0	0	0	0	0	0	1.70	38.73	0.800

Notes:

(a) Inert construction wastes include hard rock and large broken concrete, and materials disposed as public fill. Density assumption: 1.6 (kg/L) for public fill.

(b) Imported fill refers to materials generated from other project for on-site reuse.

(c) Non-inert construction wastes include general refuse disposed at landfill. Density assumption: 0.9 (kg/L) for general refuse.

(d) Recyclable materials include metals, paper, cardboard, plastics and others.

2.7 *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.

2.8 *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.

Two exceedances of the Action and Limit Levels for dust (TSP), one exceedance of the Limit Level for surface water (SS), two exceedances of the Limit Level for groundwater quality (COD) and ten exceedances of the Limit Level for leachate level were recorded in the reporting period.

The TSP exceedance at AM2 on 29 July 2022 was considered Project-related while the exceedance at AM4 on 29 July 2022 was considered non Project-related upon further investigation.

The SS exceedance at DP4 on 8 July 2022 was considered Project-related upon further investigation. The additional surface water monitoring results (SS) at DP4 on 15 July 2022 complied with the Limit Level as stipulated in the updated EM&A Manual and the weekly surface water monitoring (SS) at DP4 was terminated.

The leachate level exceedances at Pump Station No. 4X from 12 August to 20 August 2022 and on 30 September 2022 were considered Project-related upon further investigation.

The groundwater quality (COD) exceedances at MWX-7 on 18 August 2022 and 6 September 2022 were considered non Project-related upon further investigation.

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

2.9 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

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

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

This Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 July 2022 to 30 September 2022 in accordance with the updated EM&A Manual and the requirements of the Environmental Permit (*EP-308/2008/B)*.

Air quality quality (24-hour TSP, odour, thermal oxidiser, landfill gas flare and landfill gas generator stack emission, ambient VOCs , ammonia and 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. Two exceedances of the Action and Limit Levels for dust (TSP), one exceedance of the Limit Level for surface water (SS), two exceedances of the Limit Level for groundwater quality (COD) and ten 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.

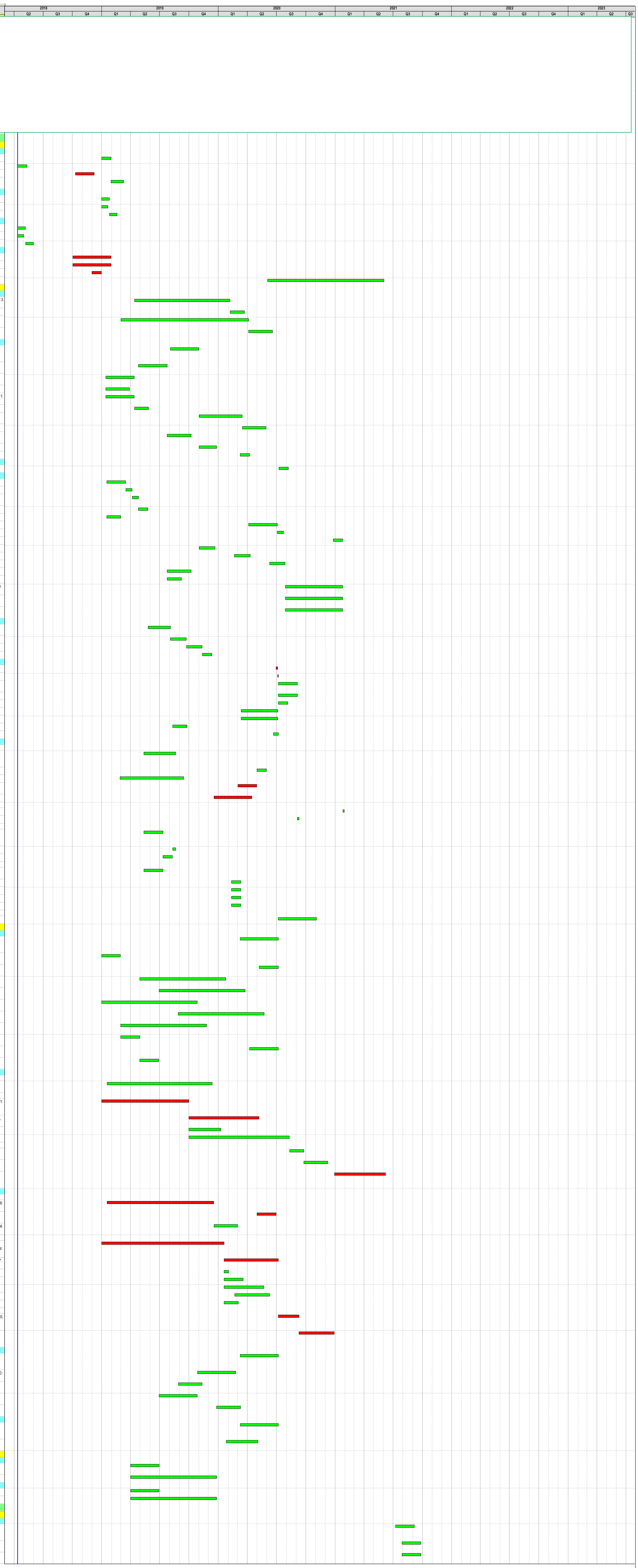
There were no complaints, notification of summons or prosecution recorded in the reporting period.

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



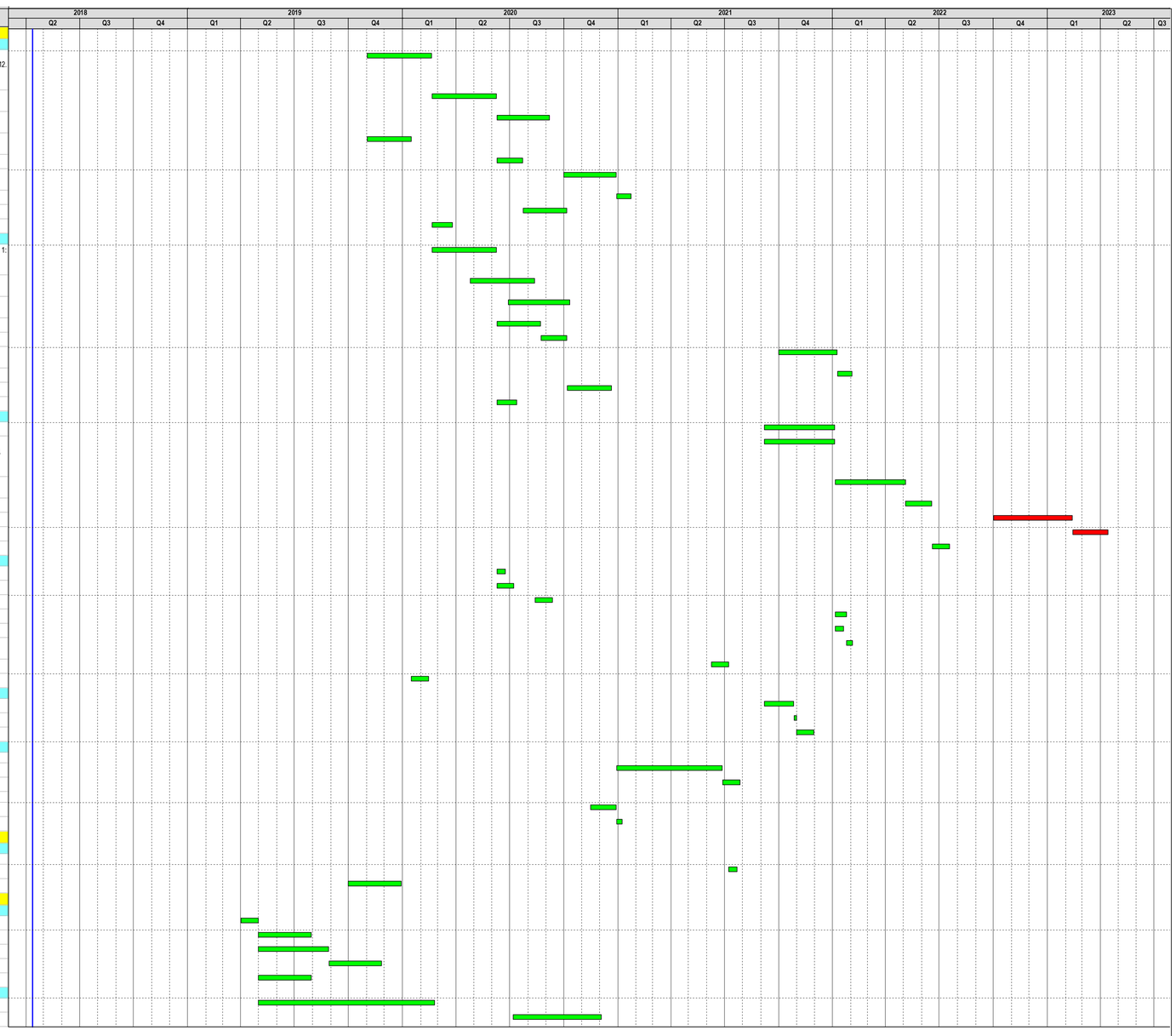
Remaining Work
Critical Remaining Work
Milestone

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



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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

Annex B Environmental Mitigation Implementation Schedule

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1) D C O/R A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
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 fragments and material resulting from blasting	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
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>	To minimise	Main haul	SENTX	✓	*Air Pollution Control*	

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

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		• 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.	potential dust nuisance	road	Contractor					*(Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	Deficiency of mitigation measures but rectified by the Contractor
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 with water 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*	Deficiency of mitigation measures but rectified by the Contractor
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
4.8.1	AQ7	<u>Excavation Works</u>	To minimise	All	SENTX		✓			*Air Pollution Control*	Implemented

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		• 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.	potential dust nuisance	construction works area	Contractor					*(Construction Dust) Regulations* *HKAQO and EIAO-TM Annex 4*	
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
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

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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
4.8.1	AQ11	Good site practices such as regular maintenance and checking of the diesel powered mechanical equipment will be adopted to avoid any black smoke emissions and to minimize gaseous emissions.	To minimise potential dust nuisance	All construction works area	SENTX Contractor		✓			*HKAQO and EIAO-TM Annex 4*	Implemented
4.10.1	AQ12	Dust monitoring once every 6 days	Ensure the dust generated from the project meets the air quality requirement	At monitoring locations shown in *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	To minimise odour nuisance	Tipping face	SENTX Contractor			✓		*EIAO-TM Annex 4*	Not Applicable. As SENTX will receive construction waste

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		before leaving the tipping face									only, which 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
4.8.2	AQ19	• Progressive restoration of the areas which	To minimise	SENTX Site	SENTX	✓		✓	✓	*EIAO-TM Annex 4*	Implemented

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		reach the finished profile (a final capping system including an impermeable liner will be put in place) and installation of a permanent landfill gas extraction system	odour nuisance		Contractor						
4.8.2	AQ20	• 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
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

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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
											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
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

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											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.
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

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											odorous, rescheduling of waste filling activities is not necessary.
4.8.2 and SENTX latest design	AQ33	<u>Dust, Gaseous Emission and LFG including Volatile Organic Compounds (VOCs)</u> • Keeping the main haul road to the waste filling area wet by regular watering ;	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		*HKAQO and EIAO-TM Annex 4*	Implemented
4.8.2	AQ34	• Compacting the exposed daily and intermediate covered areas well to avoid fugitive dust emission;	To minimise dust nuisance	SENTX Site	SENTX Contractor			✓		*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	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 4*	Implemented

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		generated as much as possible; and	emissions, including LFG and VOCs								
4.8.2	AQ40	Periodic inspections of the final cover should be undertaken to ensure that the capping layer is in good conditions at all times.	To minimise gaseous emissions, including LFG and VOCs	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 4*	Implemented
4.10.2	AQ41	Monitoring of ambient TSP once every 6 days	Ensure the dust emission from the project meets the dust requirement	At monitoring locations shown in *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
4.10.2 and SENTX latest	AQ43	Monitoring of parameters for thermal oxidizer, flares and generator in accordance with requirements stated in Tables 3.4a, 3.5a and 3.6a of the EM&A Manual respectively.	Ensure the gaseous emission from the project meets the air	At the flares and thermal oxidizer stacks when they are	SENTX Contractor			✓	✓ (1)	Emission Limits specified in Contract	Implemented

(1) For LFG flare and LFG generator only.

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design			quality requirement	in operation							
4.10.2	AQ44	To confirm design assumption of ammonia, it is recommended that the ammonia concentration in the flue gas of the thermal oxidiser be monitored during the commissioning stage of the thermal oxidiser. If required, an emission standard will be set for ammonia for the thermal oxidiser based on the monitoring results. If no ammonia is detected in the flue gas during the decommissioning stage, the monitoring of ammonia in the flue gas of the thermal oxidiser could be discontinued.	Ensure the gaseous emission from the project meets the air quality requirement	At the thermal oxidizer stack during commissioning. If ammonia is detected during commissioning stage, the monitoring will continue.	SENTX Contractor			✓		Emission Limits determined during commissioning stage	Implemented
4.10.2 and SENTX latest design	AQ45	Odour patrol in accordance with requirements stated in Table 3.7a of the EM&A Manual.	Ensure the odour emission from the project meets the odour requirement	Along SENTX Site boundary	SENTX Contractor			✓		*EIAO-TM Annex 4*	Implemented
4.10.2	AQ46	Monitoring of meteorological station, continuously	Collect site specific meteorological data	At meteorological station shown in *Figure 11.3a*	SENTX Contractor		✓	✓	✓	-	Implemented
Noise – Construction Phase											
5.7.1	N1	Adopt good site practice listed below: • Only well-maintained plant will be	To minimise potential construction	All construction	SENTX Contractor		✓			*Noise Control Ordinance (NCO) and*	Implemented

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		operated on-site and plant should be serviced regularly during the construction program; • Silencers or mufflers on construction equipment should be utilized and will be properly maintained during the construction program; • Mobile plant, if any, will be sited as far from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use will be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction will, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures will be effectively utilised, wherever practicable, in screening noise from on-site construction activities.	noise nuisance.	works area					*EIAO-TM Annex 5*	
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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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 meets the criteria	At monitoring locations shown in *Figure 6.4a*	SENTX Contractor			✓		*Noise Control Ordinance (NCO) and EIAO-TM Annex 5*	Implemented
Water Quality – Construction Phase											
6.8.1	WQ1	<u>Construction Runoff</u> • Exposed soil areas will be minimised to	To minimise	All	SENTX		✓			*ProPECC PN 1/94*	Implemented

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		reduce the contamination of runoff and erosion.	potential water quality impacts arising from the construction works	construction works area	Contractor					*EIAO-TM Annex 6*	
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 generation of high SS runoff.	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor		✓			*ProPECC PN 1/94* *WPCO*	Implemented
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

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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-site maintenance of machinery and equipment will be collected by a licensed chemical waste collector.	To minimise potential water quality impacts arising from improper handling of fuel and oil	SENTX Site	SENTX Contractor		✓			*ProPECC PN 1/94* *WPCO* *Waste Disposal Ordinance (WDO)*	Implemented
6.8.1	WQ9	• 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	SENTX Site	SENTX Contractor		✓			*WPCO* *Water-TM*	Implemented

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			construction works								
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 will be employed to clean the chemical toilets on a regular basis.	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor		✓			*WPCO* *WDO*	Implemented
Water Quality – Operation/Restoration and Aftercare Phases											
6.9.1	WQ14	<u>Surface Water Management</u>								*WPCO*	Implemented
		• 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			✓		*Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Inshore Waters (Water-TM)*	

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										EIAO-TM Annex 6	
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 basis as stated in the EM&A Manual.	To minimise potential water quality impacts on surface water arising from the landfill operations.	SENTX Site	SENTX Contractor			✓	✓	*WPCO* *Water-TM*	Implemented
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	SENTX Site	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented

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			landfill operations.								
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 equipment will be inspected regularly and repairs, if necessary.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate pump houses and related ancillary equipment	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented
6.9.3	WQ21	• 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	Leachate treatment plant	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented

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			arising from the landfill operations.								
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
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>									Implemented
		• 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	SENTX Site	SENTX Contractor			✓	✓	*WPCO* *Water-TM*	

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			water bodies arising from the landfill operations.								
6.10.1	WQ27	• Maintenance and replacement of the capping system should be carried out, if necessary, to prevent control infiltration and leachate seepage from any damaged cap.	To minimise potential water quality impacts on surrounding water bodies arising from the leachate leakage.	SENTX Site	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented
6.10.1	WQ28	• Maintaining control of the leachate level through extraction	To minimise potential water quality impacts on surrounding water bodies arising from surface breakout of leachate.	SENTX Site	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented
Waste Management – Construction Phase											
7.6.1	WM1	All the necessary waste disposal permits are obtained prior to the commencement of construction work.	To ensure compliance with relevant statutory 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	To ensure that adverse environmental	SENTX Site	SENTX Contractor		✓			*WDO* *Waste Disposal (Charges for Disposal*	Implemented

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		transferred to the Government waste disposal facilities such as public fill reception facilities, sorting facilities, landfills will required a valid "chit" which contains the information of the account holder to facilitate waste transaction recording and billing to the waste producer. A trip-ticket system will also be established to monitor the disposal of construction waste at the SENT Landfill and to control fly-tipping. The trip-ticket system will be included as one of the contractual requirements and implemented by the contractor. A recording system for the amount of waste generated, recycled and disposed of (including the disposal sites) will be established.	impacts are prevented							*of Construction Waste) Regulation;* *Works Bureau Technical Circular No.31/2004; and* *Annex 5 and Annex 6 of Appendix G of ETWBTC No. 19/2005)*	
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>									
							✓			*WDO*	

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		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					*Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*	Deficiency of mitigation measures but rectified by the Contractor
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 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*	Deficiency of mitigation measures but rectified by the Contractor
7.6.1	WM7	<u>Staff Training</u>									
		At the commencement of the construction	To ensure that	SENTX Site	SENTX		✓				Implemented

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		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.	adverse environmental impacts are prevented		Contractor						
7.8	WM8	<u>Environmental Monitoring & Audit Requirements</u> Weekly audits of the waste management practices will be carried out during the construction phase. The audits examine all aspects of waste management including waste generation, storage, recycling, transport and disposal.	To ensure that adverse environmental impacts are prevented	SENTX Site	SENTX Contractor		✓			*WDO*	Implemented
Waste Management – Operation/Restoration Phase											
7.6.2 and SENTX latest design	WM9	<u>Sludge</u> In case off-site disposal is required, the Contractor will ensure that sludge generated from the LTP will be delivered in closed container to other waste disposal facility e.g. other landfills or a sludge treatment facility, for proper disposal on a daily basis.	To ensure proper handling of sludge	SENTX Site	SENTX Contractor			✓		*WDO* *EIAO-TM Annex 7*	Implemented
7.6.2	WM10	<u>Chemical Waste</u> The construction contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in	To ensure proper handling of chemical waste	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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.*								*Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*	
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
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*).	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

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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		Those precautionary measures applicable to the SENTX will be confirmed in the detailed Qualitative Landfill Gas Hazard Assessment to be submitted by the contractor.									
8.6.2	LFG2	Monitoring will be undertaken when construction works are carried out in confined space within the consultation zone with reference to the monitoring requirements and procedures specified in Paragraphs 8.23 to 8.28 of EPD's *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.	To protect workers from landfill gas risk	Confined space within the construction works area	SENTX Contractor		✓				Implemented
8.6.3	LFG4	Implementation of engineering measures according to Contract Specification requirements. These measures will include the placement of liner and installation of landfill gas management system to contain, manage and control landfill gas.	To protect workers from landfill gas risk	SENTX Site	SENTX Contractor	✓	✓	✓	✓	*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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
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 monitor the migration of landfill gas, if any.	To protect workers from landfill gas risk	Infrastructure Area	SENTX Contractor	✓	✓			*EPD's Landfill Gas Hazards Assessment Guidance Note* *EIAO-TM Annex 7*	Implemented
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	To protect workers from landfill gas risk	Within the SENTX and along the SENTX	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] D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		within the SENTX and along the SENTX boundary as required by the Contract Specification.		boundary						*Landfill Gas Hazards Assessment Guidance Note*	
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
		• 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								-	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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		runoff;									
		• 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
9.10.2 and SENTX latest design	EC2	<u>Good Construction Practice</u>: • Fences along the boundary of the SENTX Site will be erected before the commencement of works to prevent vehicle movements, and encroachment of personnel, onto adjacent areas. • The work site boundaries will be regularly checked to ensure that they are not breached and that damage does not occur to surrounding areas.	To minimise potential ecological impacts arising from the Project	SENTX Site	SENTX Contractor		✓			*EIAO-TM Annex 16*	Implemented
Ecology – Operation, Restoration and Aftercare Phases											
9.10.2	EC3	<u>Measures for Controlling Leakage of Landfill Leachate</u> Leachate will be contained within the SENTX Site by the proposed impermeable leachate containment system and collected by the	To minimise potential water quality impact affecting the	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16* *WPCO* *Water-TM*	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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		installation of drainage system to prevent potential migration of leachate to habitats in the vicinity.	ecological resources							*EIAO-TM Annex 6*	
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 to compensate the loss of shrubland; and • Provision of a mosaic of grassland and shrubland in the remaining areas of the SENTX Site. Compensatory planting and restoration of the SENTX can be implemented progressively according to the filling plan of SENTX.	Compensation of habitat loss due to the Project	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16*	Implemented
9.10.3	EC6	The mixture of grassland, shrubland and woodland habitats are recommended to diversify the habitats for supporting various wildlife in particular butterflies, birds and	To diversify habitats	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16*	Implemented

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		herpetofauna and blend into the existing undisturbed ecological environment.									
9.10.3	EC7	Indigenous plant species of shallow root system, softwood in nature and adaptive to sea shore habitat are recommended to be used in the restoration plan, which can establish well in coastal area with exposure to strong wind and salt spray, with sand soil base. Taking consideration of the relative poor substrate and the difficulties of establishment of some native trees in Hong Kong, it is recommended to include approximately 20% of non-native tree species in the compensatory woodland. The non-native tree species can serve as a nurse species to facilitate the establishment of the native tree species, especially the shading, and it can be replaced by established native tree species progressively. Plant species can also make reference to food plants of butterfly species (in particularly butterfly species of conservation interests recorded within the CWBCP).	To enhance ecological value of the habitats	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16*	Implemented
9.10.3	EC8	It is also recommended that a trial nursery for native plant species be set up to fine 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	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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		successfully be established on the existing SENT Landfill should be reviewed before the preparation of the compensatory planting list. Special care and intensive management of native plant should be implemented in order to ensure proper establishment of the native plants.									
9.12.1	EC9	<u>Environmental Monitoring & Audit Requirements</u> The implementation of the ecological mitigation measures should be checked as part of the environmental monitoring and audit procedures during the construction period.	To ensure that adverse ecological impacts are prevented	SENTX	SENTX Contractor		✓	✓	✓	*EIAO-TM Annex 16*	Implemented
Landscape and Visual – Construction Phase											
10.6.5	LV1	CM1 - The construction area and area allowed for the contractor's office, leachate treatment plant and laboratory areas will be minimised to a practical minimum, to avoid impacts on adjacent landscape.	To minimise the landscape and visual impacts	SENTX Site	SENTX Contractor		✓			*EIAO-TM Annex 18 and ETWBC 3/2006*	Implemented
10.6.5	LV2	CM2 - Topsoil, where identified, will be stripped and stored for re-use in the construction of the soft landscape works, where practical. The Contract Specification will include storage and reuse of topsoil as appropriate.	To minimise the landscape and visual impacts	All construction works area	SENTX Contractor		✓			*EIAO-TM Annex 18*	Not applicable
10.6.5	LV3	CM3 - All existing trees at the edges of the landfill will be carefully protected during	To minimise the landscape and	Potential impacted area	SENTX Contractor		✓			*EIAO-TM Annex 18 and ETWBC 3/2006*	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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		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.	visual impacts								
10.6.5	LV4	CM4 - Trees unavoidably affected by the works will be transplanted, where necessary and practical. A detailed Tree Transplanting Specification will be provided in the Contract Specification, if applicable. Sufficient time for necessary tree root and crown preparation periods will be allowed in the project programme.	To minimise the landscape and visual impacts	Potential impacted area	SENTX Contractor	✓	✓			*EIAO-TM Annex 18 and ETWBC 3/2006*	Implemented
10.6.5 and SENTX latest design	LV5	CM5 - Within 3 months of taking possession of the SENTX Site, the Contractor will plant advance screen planting of native species at Light Standard size at 1.5m centres along the High Junk Peak Trail so as to screen views of the Works from the trail. Tree planting locations will be agreed with AFCD. Works will be completed within 9 months of taking possession of the SENTX Site.	To minimise the landscape and visual impacts	At High Junk Peak Hiking Trail	SENTX Contractor		✓			*EIAO-TM Annex 18*	Implemented
10.6.5	LV6	CM6 - The Contractor's office, leachate treatment plant and laboratory will be given an aesthetic treatment in earth tones to reduce their visual impact and albedo and blend	To minimise the landscape and visual impacts	Infrastructure 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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		them into the surrounding landscape.									
10.6.5	LV7	CM7 - The Contractor's office, leachate treatment plant and laboratory will be surrounded by a minimum of 5m wide and 0.75m high earth bund on the west and south sides planted with a dense screen of tree and shrub vegetation. Additional tree planting will be provided in unused spaces with thin infrastructure site, along access roads and in and around car parks. This will be supplemented with shrub planting, where appropriate.	To minimise the landscape and visual impacts	Infrastructure area	SENTX Contractor	✓	✓			*EIAO-TM Annex 18 and ETWBC 7/2002*	Not applicable
10.6.5	LV8	CM8 - Planting trials will be carried out in an on-site nursery prior to implementation of the first phase of restoration to establish the best planting matrix and management intensity of the recommended plant materials for the restoration.	To minimise the landscape and visual impacts	SENTX Site	SENTX Contractor		✓			*EIAO-TM Annex 18*	Implemented
11.4.1 and SENTX latest design	LV9	During the preparation of the detailed landscape design plan, the design submission will be audited against the recommendation proposed in the *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	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) D	C	O/R	A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
latest design											
10.6.5 and SENTX latest design	LV11	OM2 - Filling and restoration will be phased during the course of operations in a minimum of 4 phases, the restoration of each phase to commence immediately on the completion of filling in that phase.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		*EIAO-TM Annex 18*	Implemented
10.6.5	LV12	OM3 - Catch fences will be erected at the perimeter of the waste boundary, to ensure that all waste stays within the site and is not blown into surrounding areas.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		*EIAO-TM Annex 18*	Implemented
10.6.5	LV13	OM4 - All night-time lighting will be reduced to a practical minimum both in terms of number of units and lux level and will be hooded and directional.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor			✓		*EIAO-TM Annex 18*	Implemented
11.4.2 and SENTX latest design	LV14	The condition of the restoration plantation will be audited at monthly intervals by a Registered Landscape Architect from the ET.	To check the restoration plantation	SENTX Site	SENTX Contractor/ET			✓		*EIAO-TM Annex 18*	Implemented

Annex C

Monitoring Schedule for This Reporting Period

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

July 2022

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

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

August 2022

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

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

September 2022

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

Annex D

Air Quality

Annex D1

24-hour TSP Monitoring Results

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

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
5 Jul 22	9:00	6 Jul 22	8:21	Fine	42
11 Jul 22	9:00	12 Jul 22	8:47	Fine	52
17 Jul 22	9:00	18 Jul 22	8:41	Fine	39
23 Jul 22	9:00	24 Jul 22	9:09	Sunny	58
29 Jul 22	9:00	30 Jul 22	9:12	Sunny	156
4 Aug 22	9:00	5 Aug 22	9:13	Fine	26
10 Aug 22	9:00	11 Aug 22	9:12	Overcast	47
16 Aug 22	9:00	17 Aug 22	9:13	Fine	49
22 Aug 22	9:00	23 Aug 22	8:41	Sunny	94
28 Aug 22	9:00	29 Aug 22	9:10	Sunny	90
3 Sep 22	9:00	4 Sep 22	9:09	Sunny	58
9 Sep 22	9:00	10 Sep 22	9:10	Sunny	151
15 Sep 22	9:00	16 Sep 22	9:13	Sunny	132
21 Sep 22	9:00	22 Sep 22	9:19	Sunny	174
27 Sep 22	9:00	28 Sep 22	9:12	Sunny	162
				Average	89
				Min	26
				Max	174

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

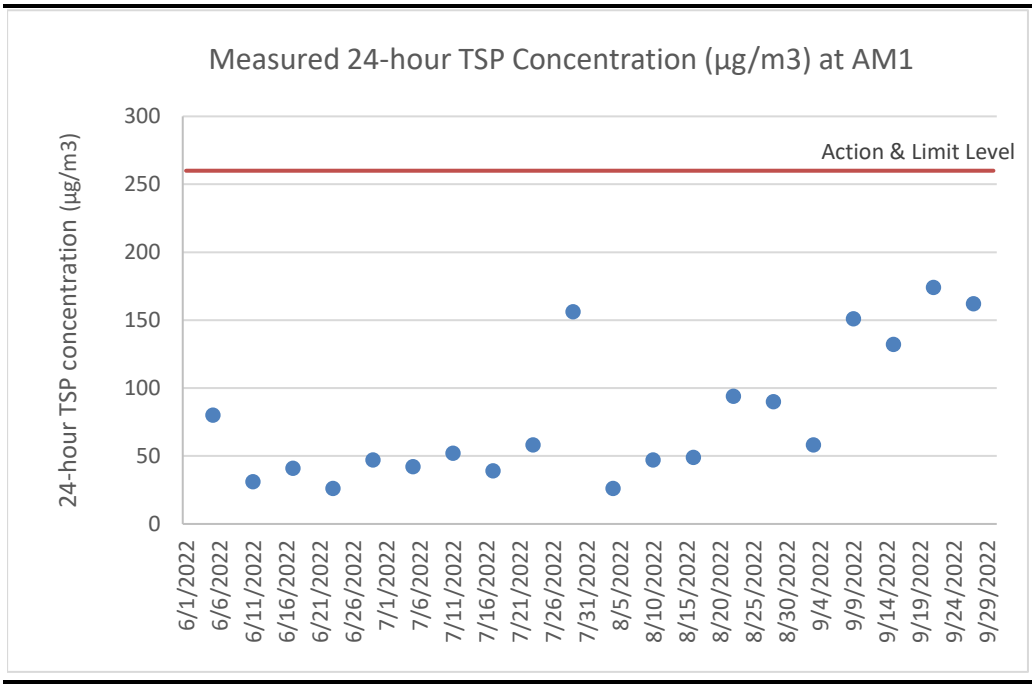


Table D1.2 24-hour TSP Monitoring Results at AM2

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
5 Jul 22	9:00	6 Jul 22	9:03	Fine	43
11 Jul 22	9:00	12 Jul 22	9:01	Fine	96
17 Jul 22	9:00	18 Jul 22	9:00	Fine	64
23 Jul 22	9:00	24 Jul 22	8:59	Sunny	118
29 Jul 22	9:00	30 Jul 22	9:00	Sunny	312
4 Aug 22	9:00	5 Aug 22	9:00	Sunny	36
10 Aug 22	9:00	11 Aug 22	9:02	Overcast	41
16 Aug 22	9:00	17 Aug 22	9:02	Fine	43
22 Aug 22	9:00	23 Aug 22	9:35	Sunny	111
28 Aug 22	9:00	29 Aug 22	9:00	Sunny	102
6 Sep 22	9:00	7 Sep 22	8:59	Sunny	69
9 Sep 22	9:00	10 Sep 22	8:58	Sunny	136
15 Sep 22	9:00	16 Sep 22	9:01	Sunny	146
21 Sep 22	9:00	22 Sep 22	9:04	Sunny	125
27 Sep 22	9:00	28 Sep 22	8:59	Sunny	190
				Average	109
				Min	36
				Max	312

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

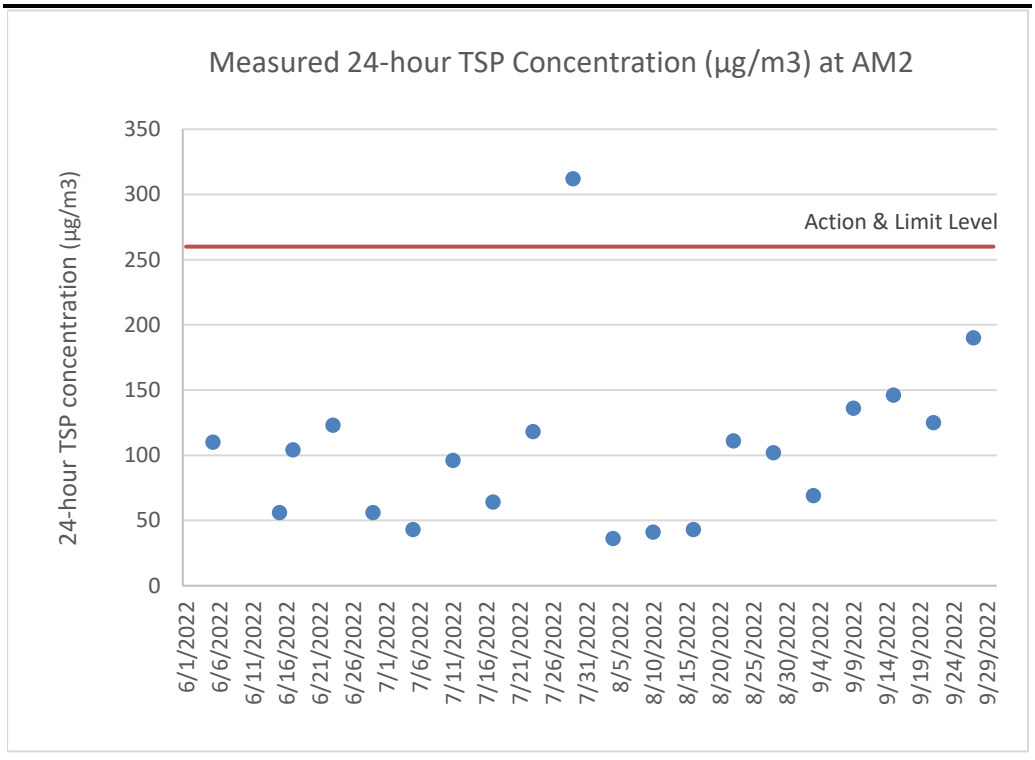


Table D1.3 24-hour TSP Monitoring Results at AM3

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
5 Jul 22	9:00	6 Jul 22	8:43	Fine	56
11 Jul 22	9:00	12 Jul 22	8:14	Fine	93
17 Jul 22	9:00	18 Jul 22	9:32	Fine	72
23 Jul 22	9:00	24 Jul 22	8:33	Sunny	132
29 Jul 22	9:00	30 Jul 22	9:34	Sunny	241
4 Aug 22	9:00	5 Aug 22	9:38	Sunny	43
10 Aug 22	9:00	11 Aug 22	9:36	Overcast	65
16 Aug 22	9:00	17 Aug 22	9:36	Fine	104
22 Aug 22	9:00	23 Aug 22	9:33	Sunny	114
28 Aug 22	9:00	29 Aug 22	9:34	Sunny	150
3 Sep 22	9:00	4 Sep 22	9:34	Sunny	252
9 Sep 22	9:00	10 Sep 22	9:34	Sunny	182
15 Sep 22	9:00	16 Sep 22	9:37	Sunny	214
21 Sep 22	9:00	22 Sep 22	9:41	Sunny	118
27 Sep 22	9:00	28 Sep 22	9:37	Sunny	207
				Average	136
				Min	43
				Max	252

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

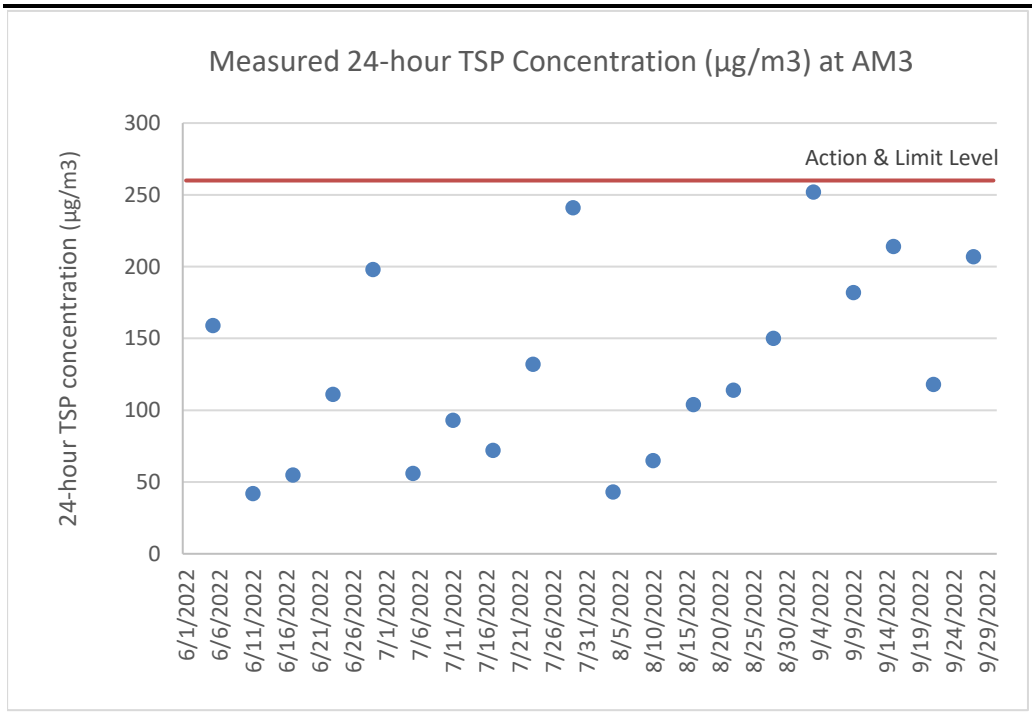
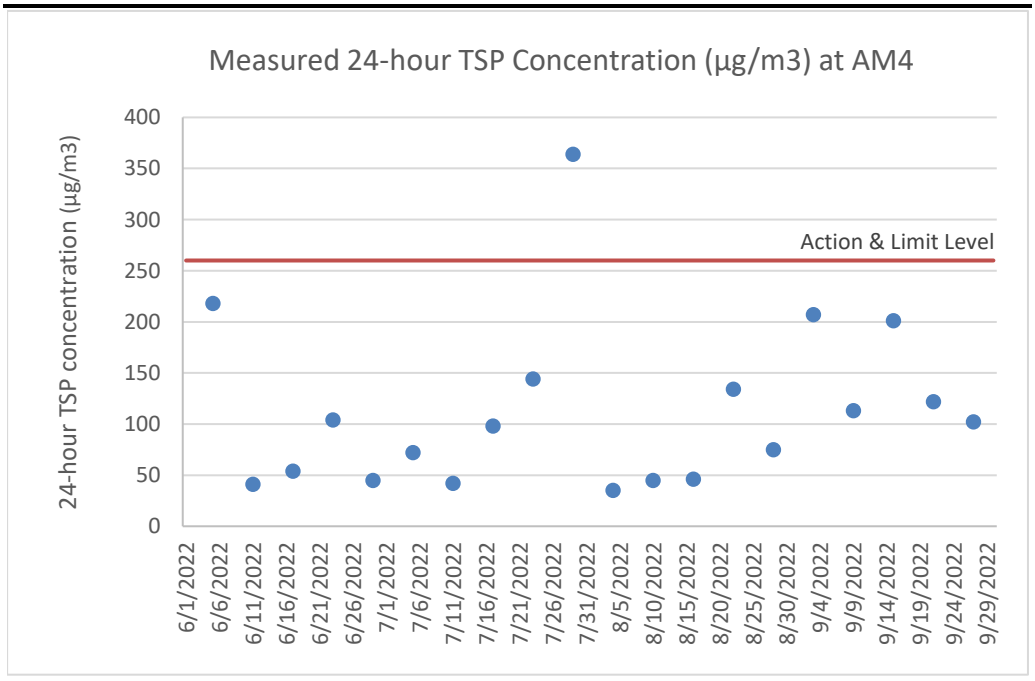


Table D1.4 24-hour TSP Monitoring Results at AM4

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
5 Jul 22	9:00	6 Jul 22	8:36	Fine	72
11 Jul 22	9:00	12 Jul 22	8:33	Fine	42
17 Jul 22	9:00	18 Jul 22	9:11	Fine	98
23 Jul 22	9:00	24 Jul 22	9:15	Sunny	144
29 Jul 22	9:00	30 Jul 22	9:17	Sunny	364
4 Aug 22	9:00	5 Aug 22	9:17	Sunny	35
10 Aug 22	9:00	11 Aug 22	9:15	Overcast	45
16 Aug 22	9:00	17 Aug 22	9:12	Fine	46
22 Aug 22	9:00	23 Aug 22	9:34	Sunny	134
28 Aug 22	9:00	29 Aug 22	9:17	Sunny	75
5 Sep 22	9:00	6 Sep 22	9:19	Sunny	207
9 Sep 22	9:00	10 Sep 22	9:12	Sunny	113
15 Sep 22	9:00	16 Sep 22	8:54	Sunny	201
21 Sep 22	9:00	22 Sep 22	9:15	Sunny	122
27 Sep 22	9:00	28 Sep 22	9:12	Sunny	102
				Average	120
				Min	35
				Max	364

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 until odour not being detected for three consecutive days	• 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

Event	Action		
	ET	IEC	Contractor
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 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	• 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

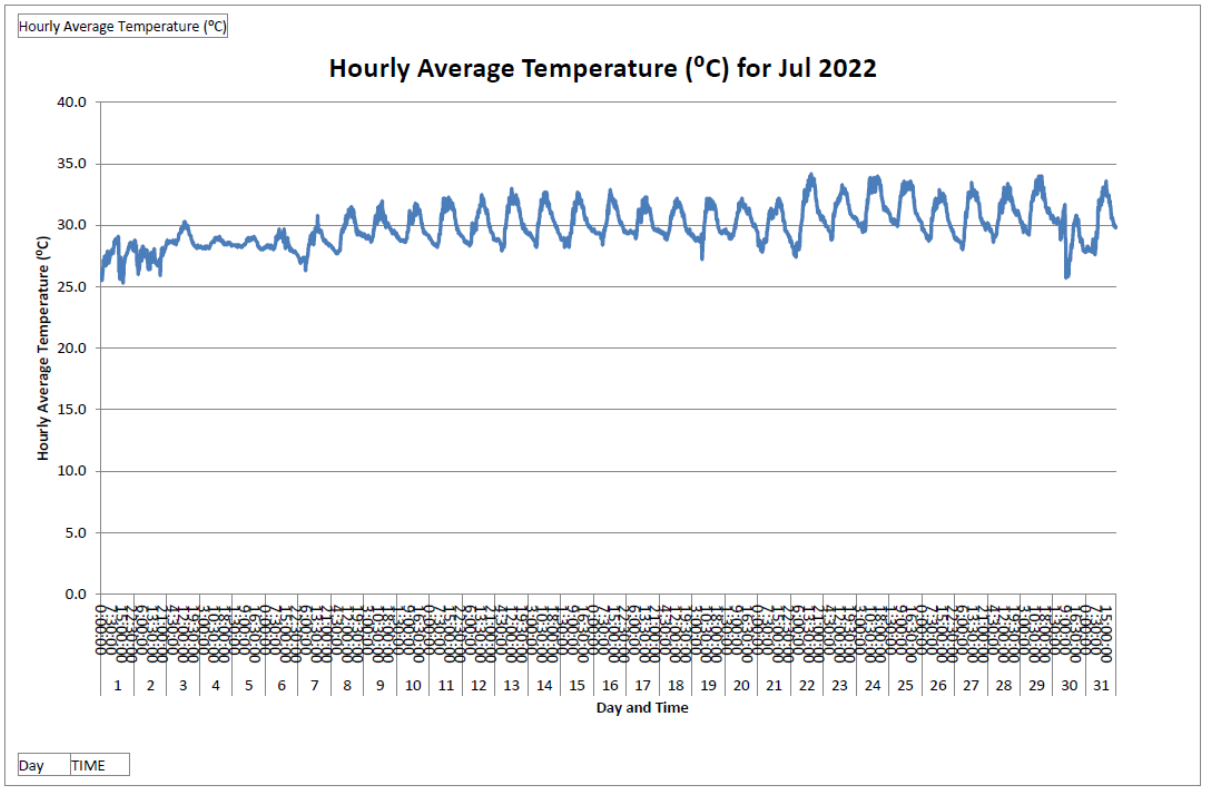
	Action		
Event	**ET**	**IEC**	**Contractor**
Exceedance of Limit Level of stack emission of the thermal oxidizer, flares and generator	• Identify source(s) and investigate the cause(s) of exceedance • Prepare the Notification of Exceedance within 24 hours • Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) whether the cause of exceedance is due to the Project • Discuss with Contractor and IEC for remedial measures • Ensure remedial measures are properly implemented • Assess effectiveness of Contractor's remedial measures and keep the Project Proponent and IEC informed of the results • Repeat measurement to confirm finding if exceedance is due to the Project • Increase monitoring frequency to monthly when there are two consecutive exceedances and continue until the monitoring results reduce to below limit level	• Verify the Notification of Exceedance • Check with Contractor on the operating performance of the stack • Discuss with ET and Contractor on proposed remedial measures • Review proposals on remedial measures • Audit the implementation of the remedial measures • Audit the effectiveness of the implemented remedial measures	• Rectify any unacceptable performance • Amend design as required • Implement amended design, if necessary

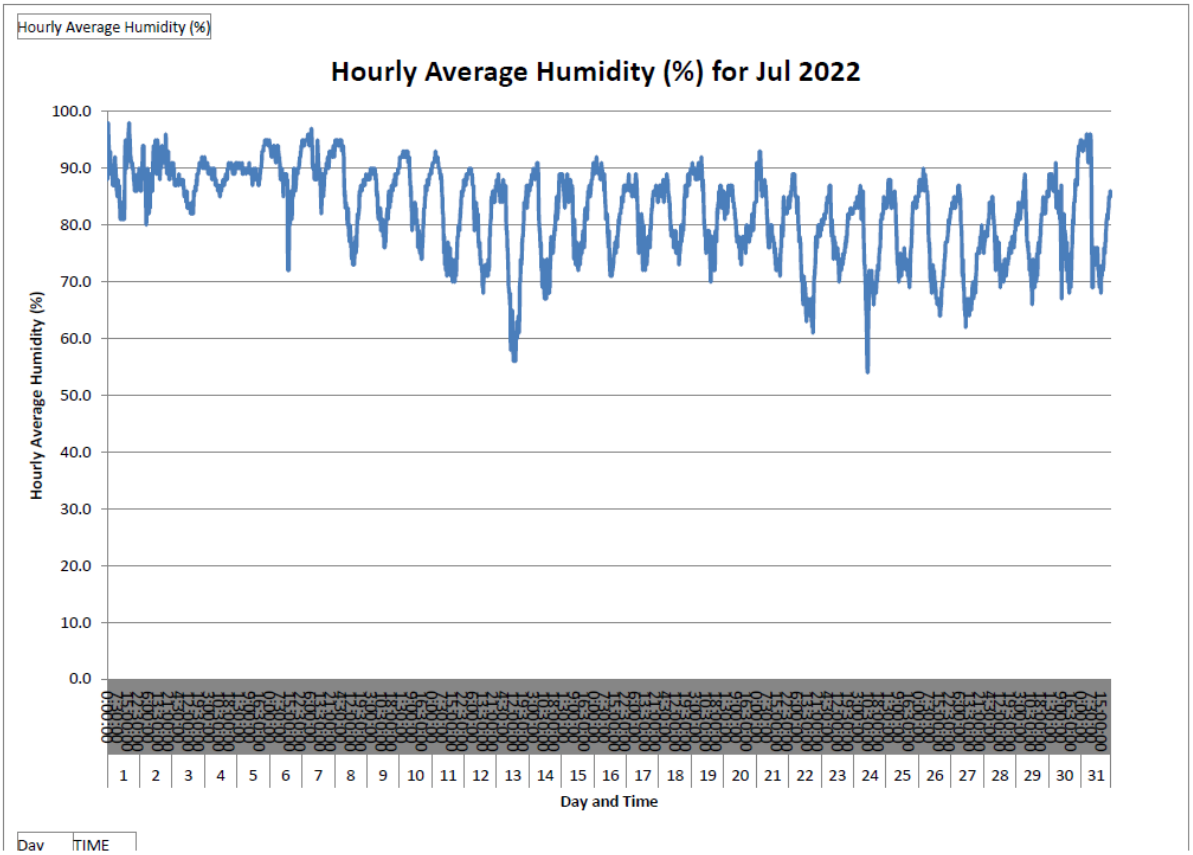
Annex D3

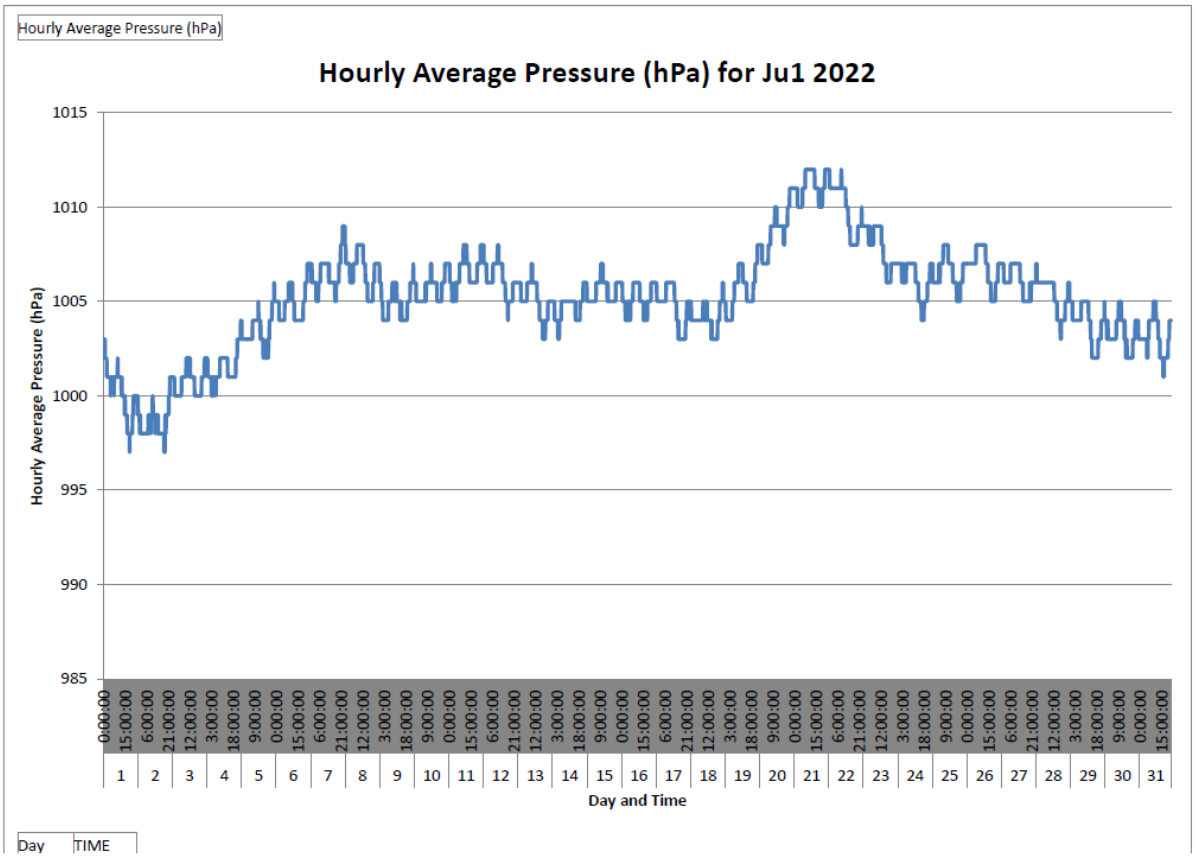
Meteorological Data

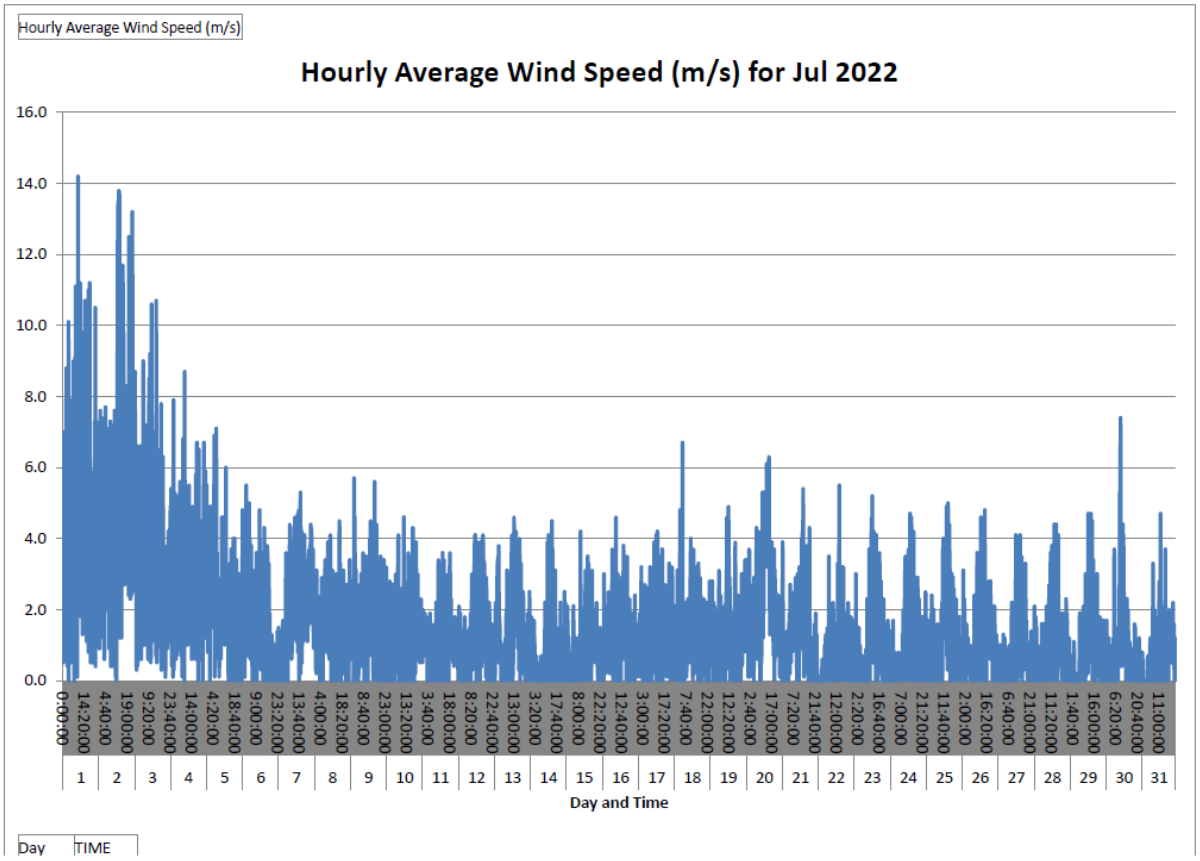
Annex D3 Meteorological Data

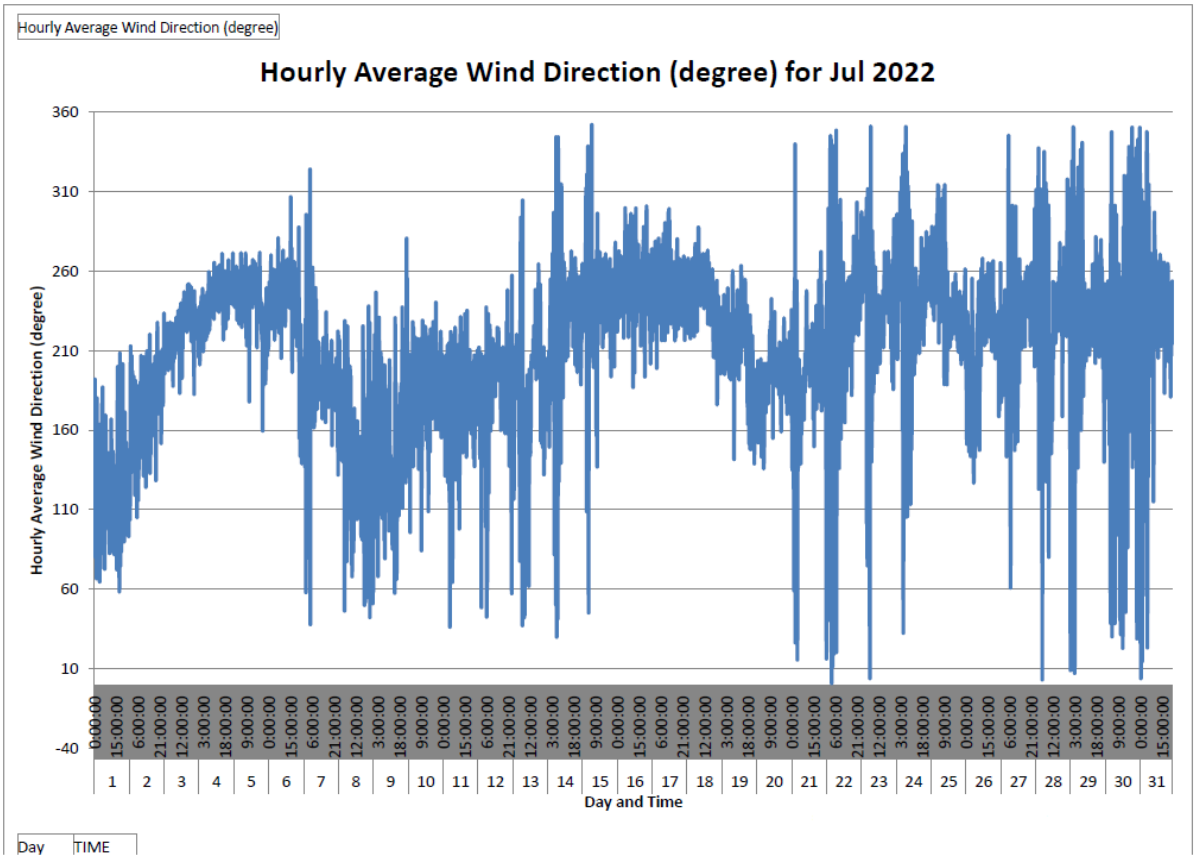
July 2022

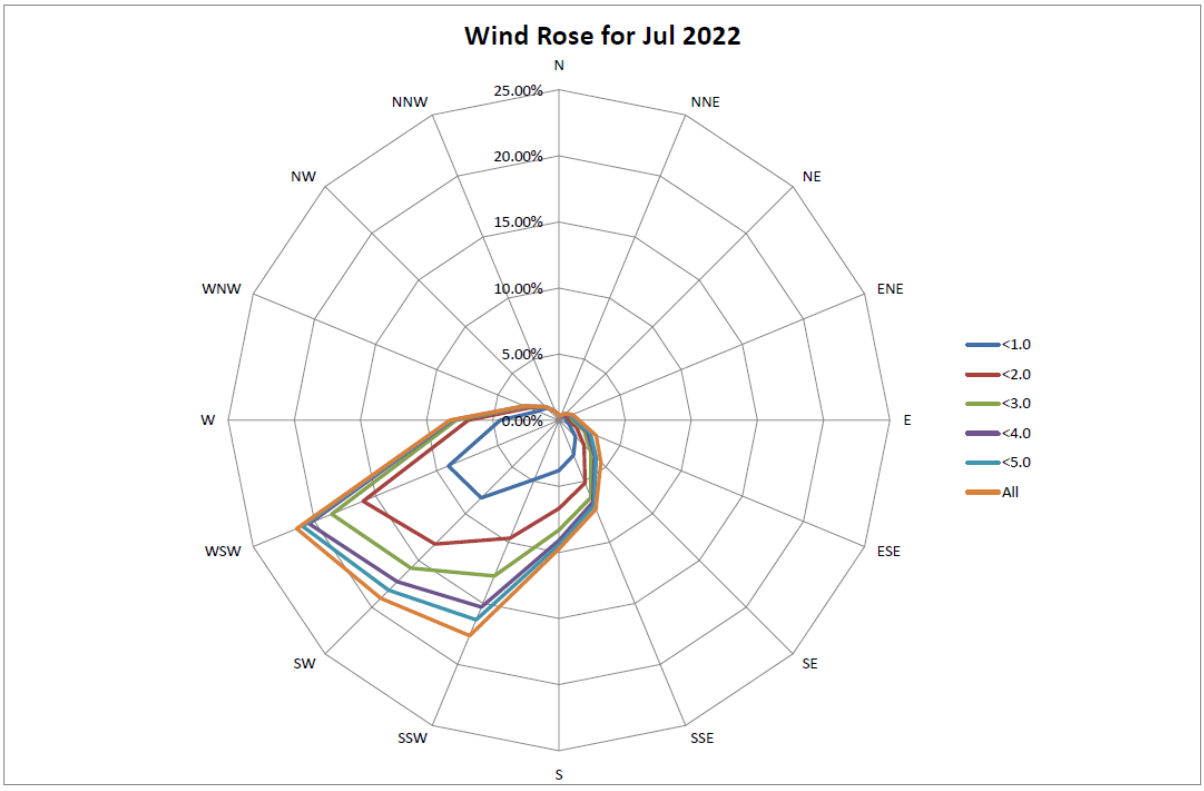


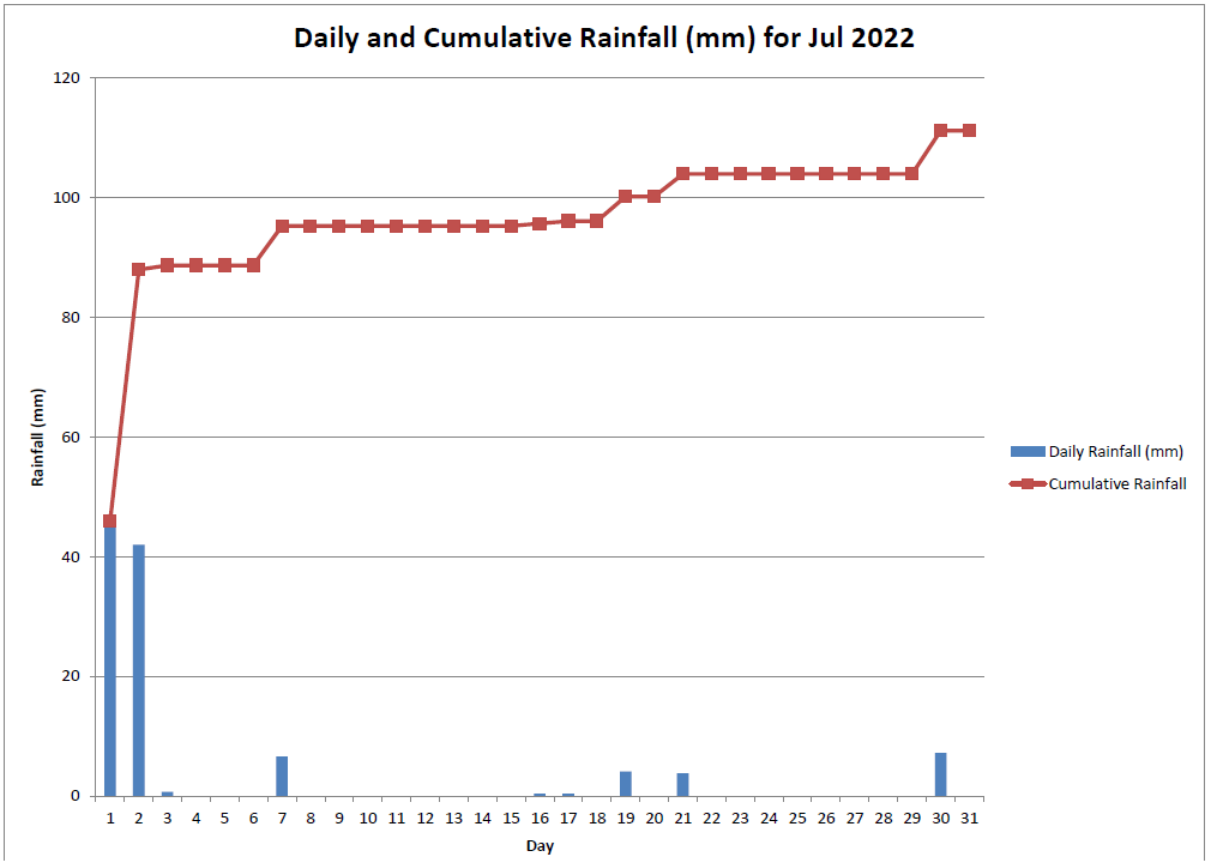



Hourly Average Pressure (hPa)
Hourly Average Pressure (hPa) for Ju1 2022
Hourly Average Pressure (hPa)
1015
1010
1005
1000
995
990
985
Day and Time
Day
TIME

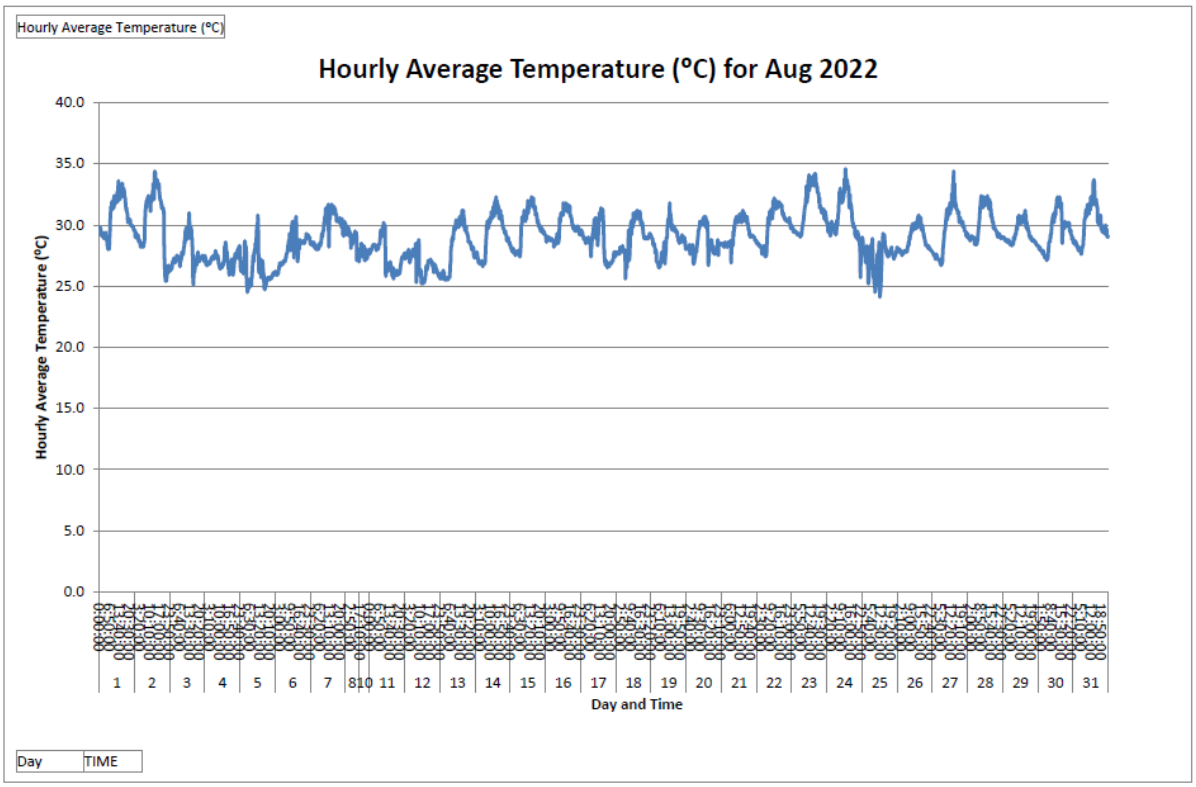

Hourly Average Wind Speed (m/s)
Hourly Average Wind Speed (m/s) for Jul 2022
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Day and Time
Day
TIME


Hourly Average Wind Direction (degree)
Hourly Average Wind Direction (degree) for Jul 2022
Hourly Average Wind Direction (degree)
360
310
260
210
160
110
60
10
-40
Day and Time
Day
TIME

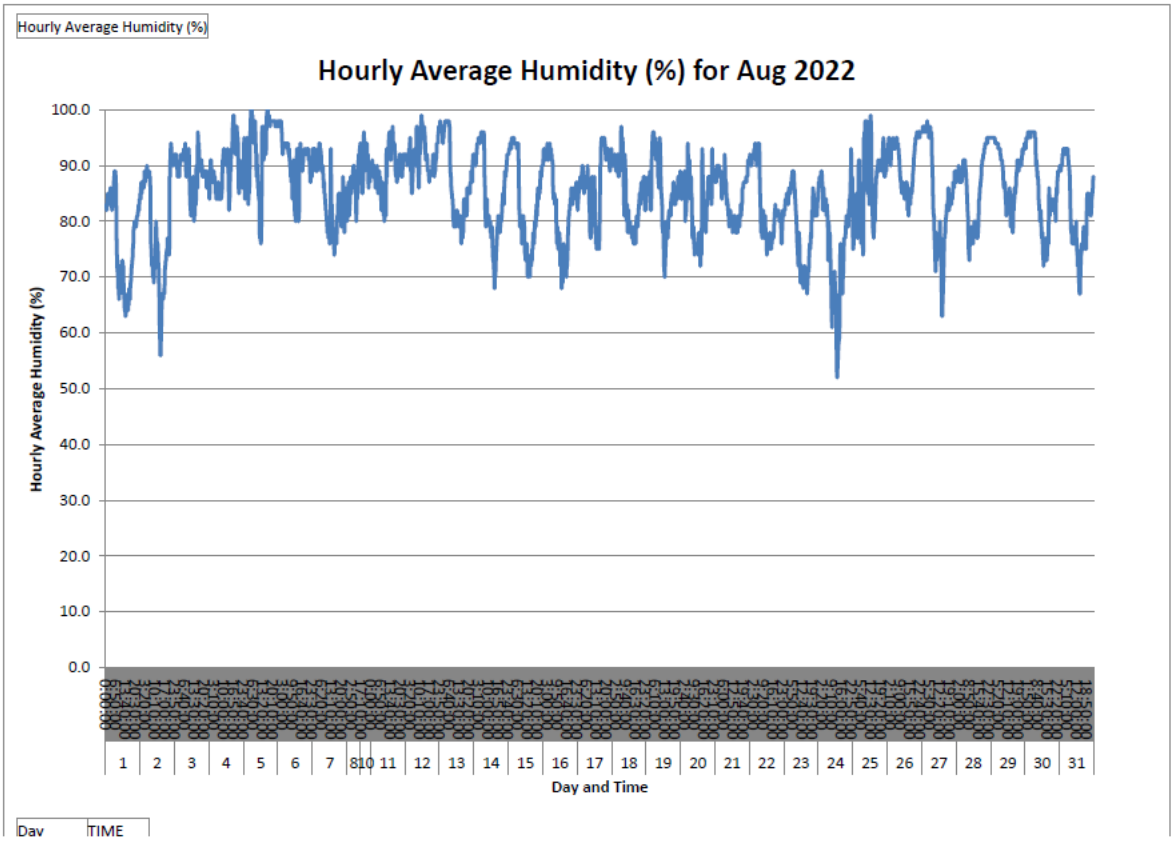

Wind Rose for Jul 2022
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
<1.0
<2.0
<3.0
<4.0
<5.0
All


Daily and Cumulative Rainfall (mm) for Jul 2022
Rainfall (mm)
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Day
Daily Rainfall (mm)
Cumulative Rainfall

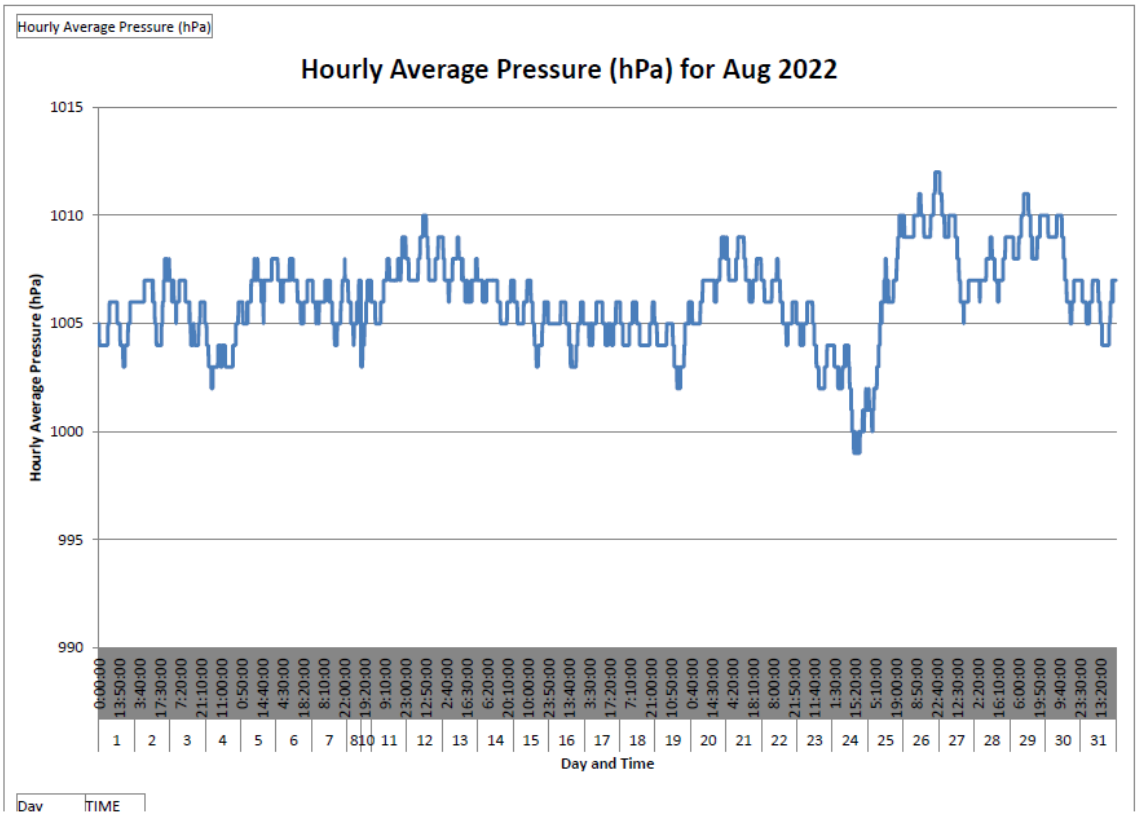
August 2022



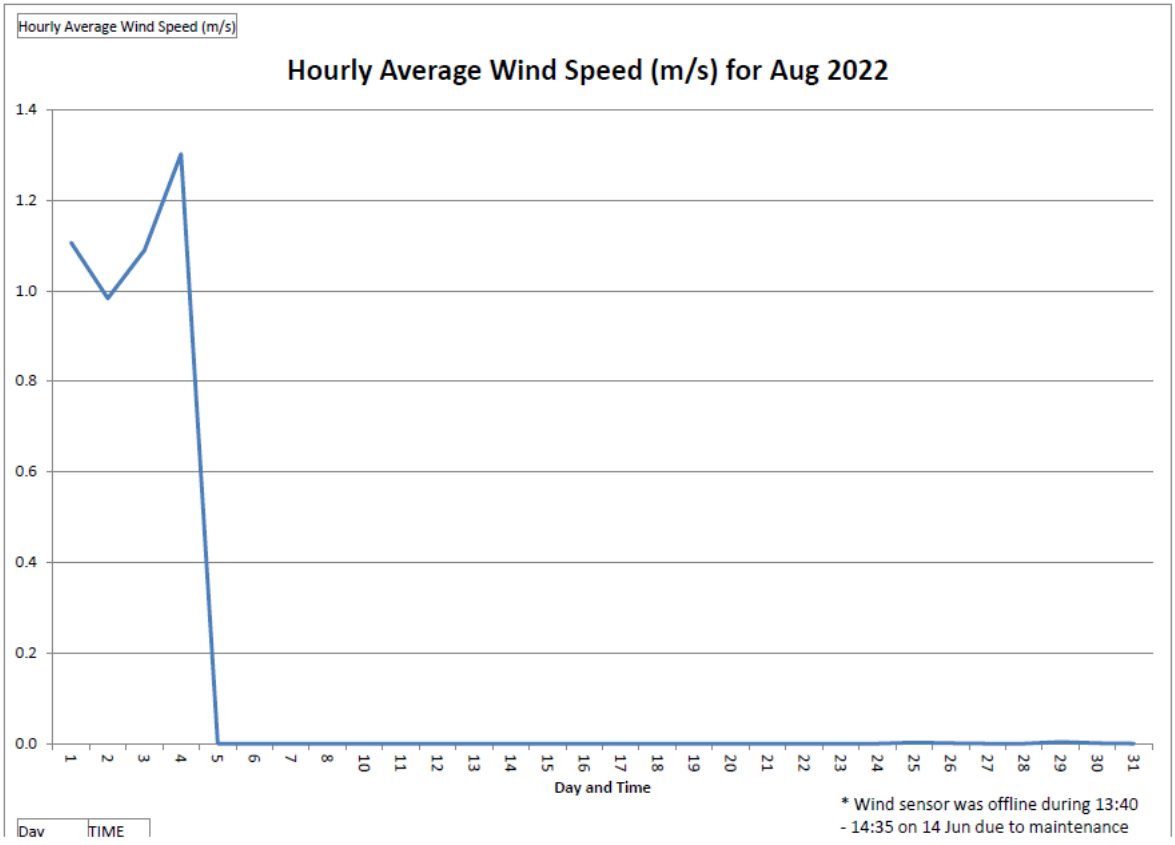
*Remark: Due to the met station system failure on 8 Aug 2022, the data from 8 Aug 2022 - 09:20 to 10 Aug 2022 - 17:00 has been lost.



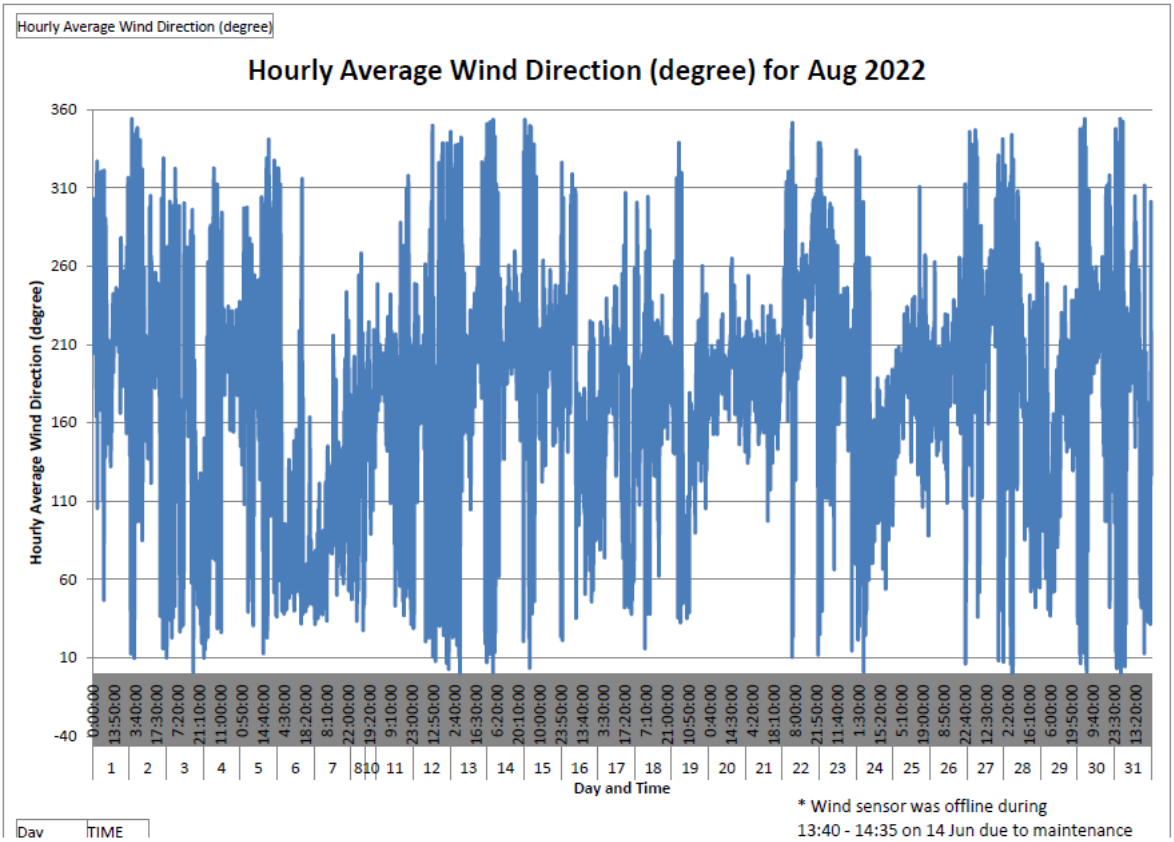
*Remark: Due to the met station system failure on 8 Aug 2022, the data from 8 Aug 2022 - 09:20 to 10 Aug 2022 - 17:00 has been lost.



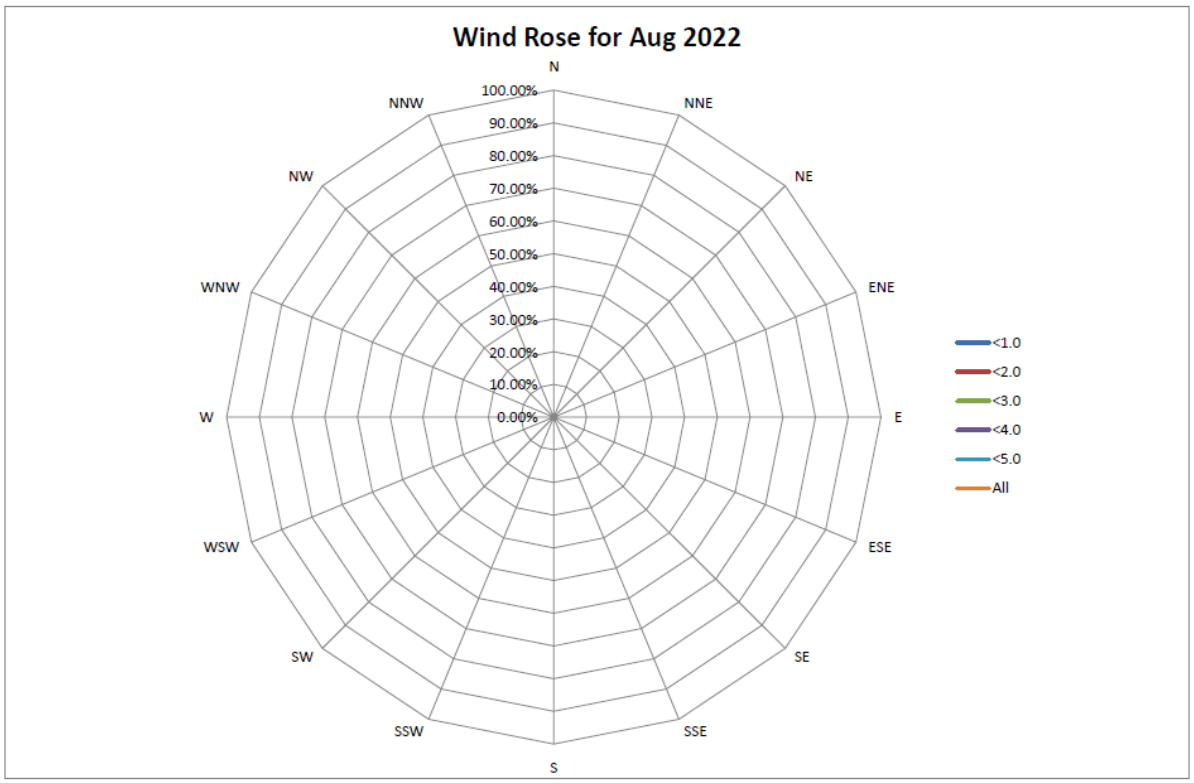
*Remark: Due to the met station system failure on 8 Aug 2022, the data from 8 Aug 2022 - 09:20 to 10 Aug 2022 - 17:00 has been lost.



*Remark: Due to the Wind Speed Sensor has been disconnected on 4 Aug 2022, data loss in Aug 2022.
Due to the met station system failure on 8 Aug 2022, the data from 8 Aug 2022 - 09:20 to 10 Aug 2022 - 17:00 has been lost.
- Data from 5 Aug 2022 to 31 Aug 2022 is pending from Hong Kong Observatory and to be supplemented in subsequent version.

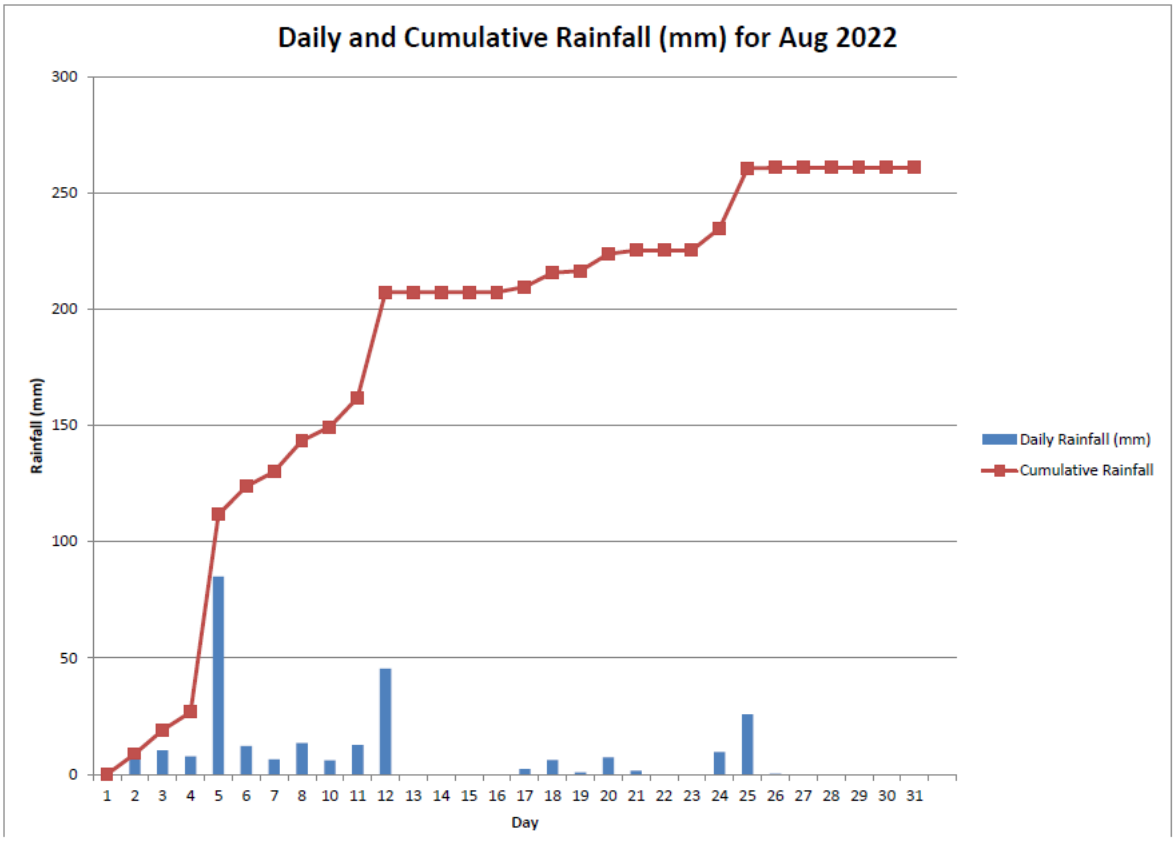


*Remark: Due to the met station system failure on 8 Aug 2022, the data from 8 Aug 2022 - 09:20 to 10 Aug 2022 - 17:00 has been lost.



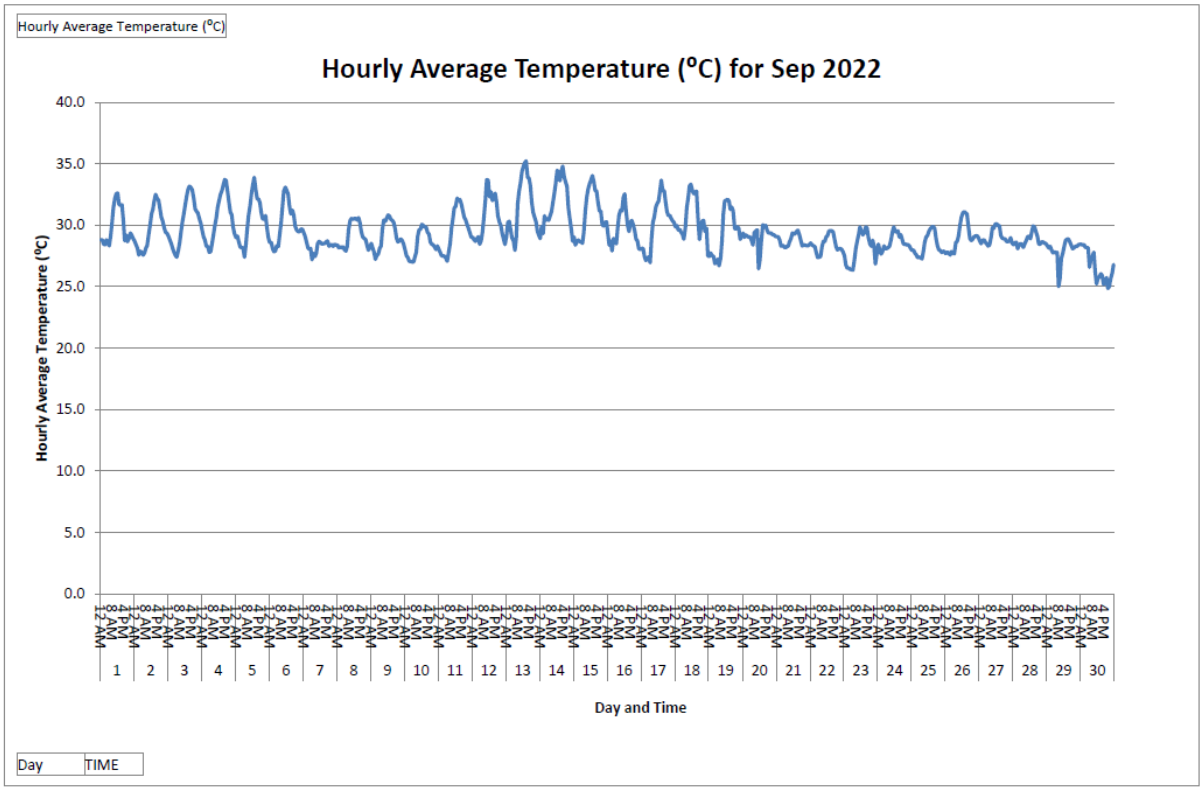
*Remark: Due to the Wind Speed Sensor has been disconnected on 4 Aug 2022, data loss in Aug 2022.

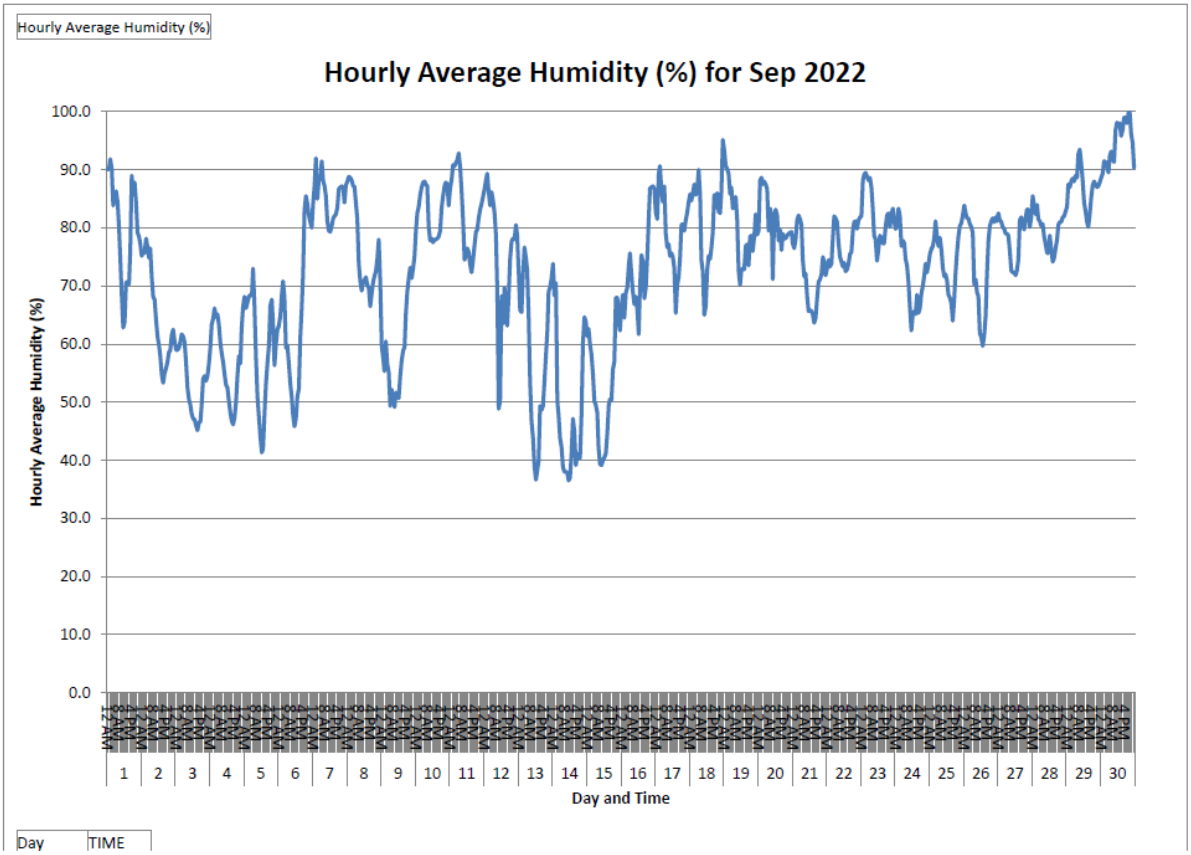
- Data from 5 Aug 2022 to 31 Aug 2022 is pending from Hong Kong Observatory and to be supplemented in subsequent version.

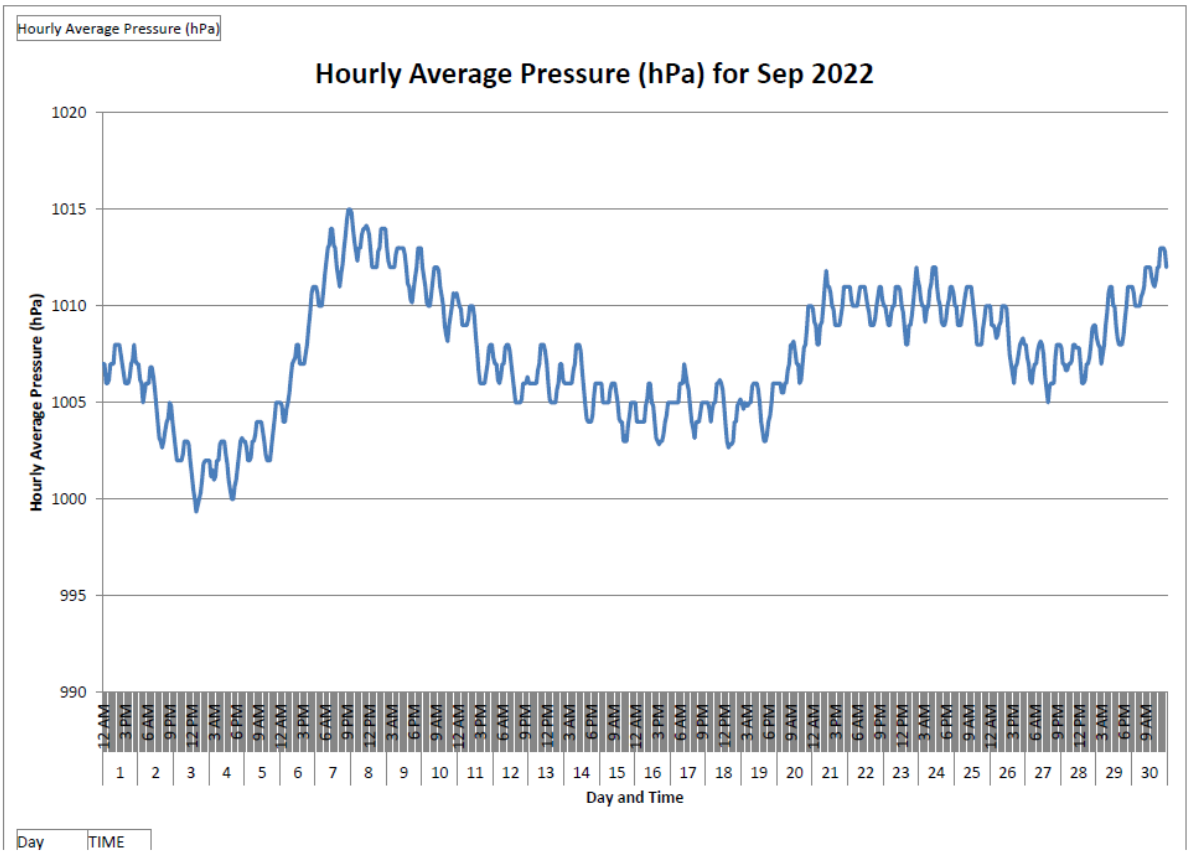


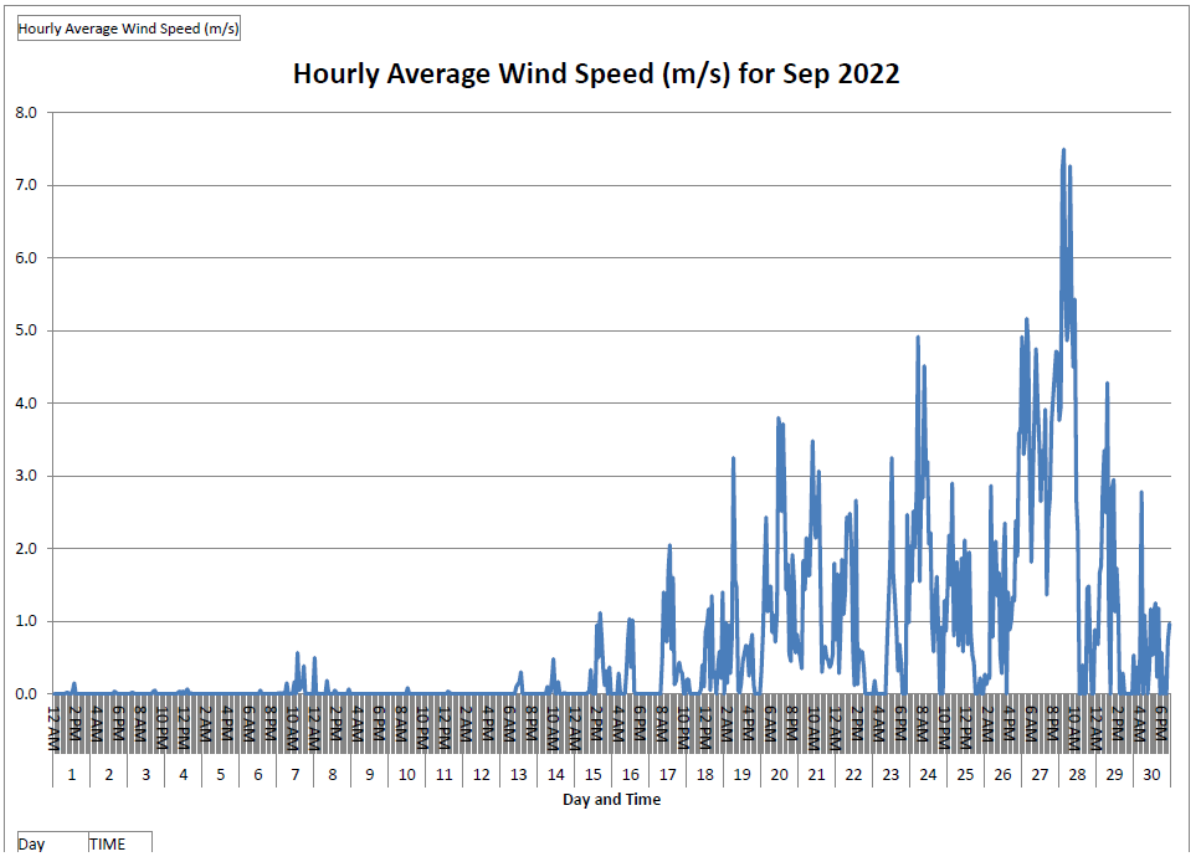
*Remark: Due to the met station system failure on 8 Aug 2022, the data from 8 Aug 2022 - 09:20 to 10 Aug 2022 - 17:00 has been lost.

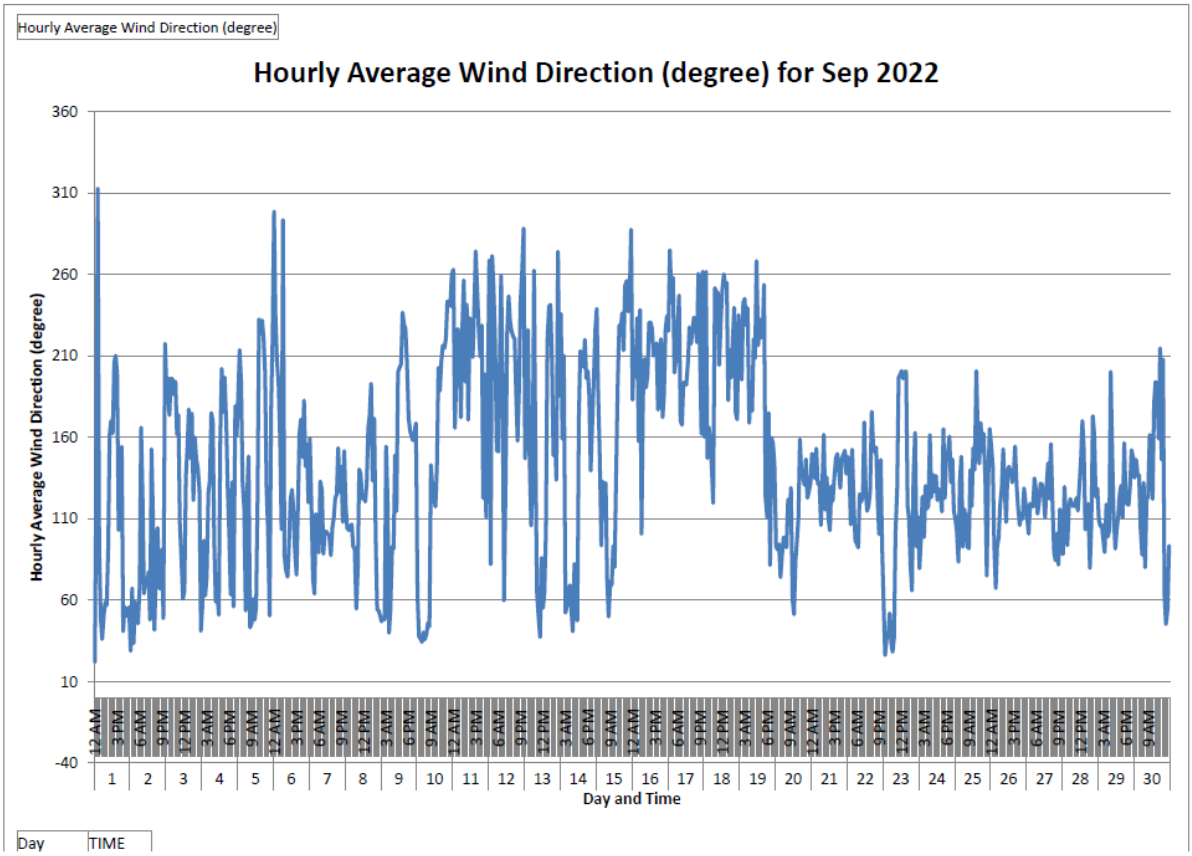
September 2022

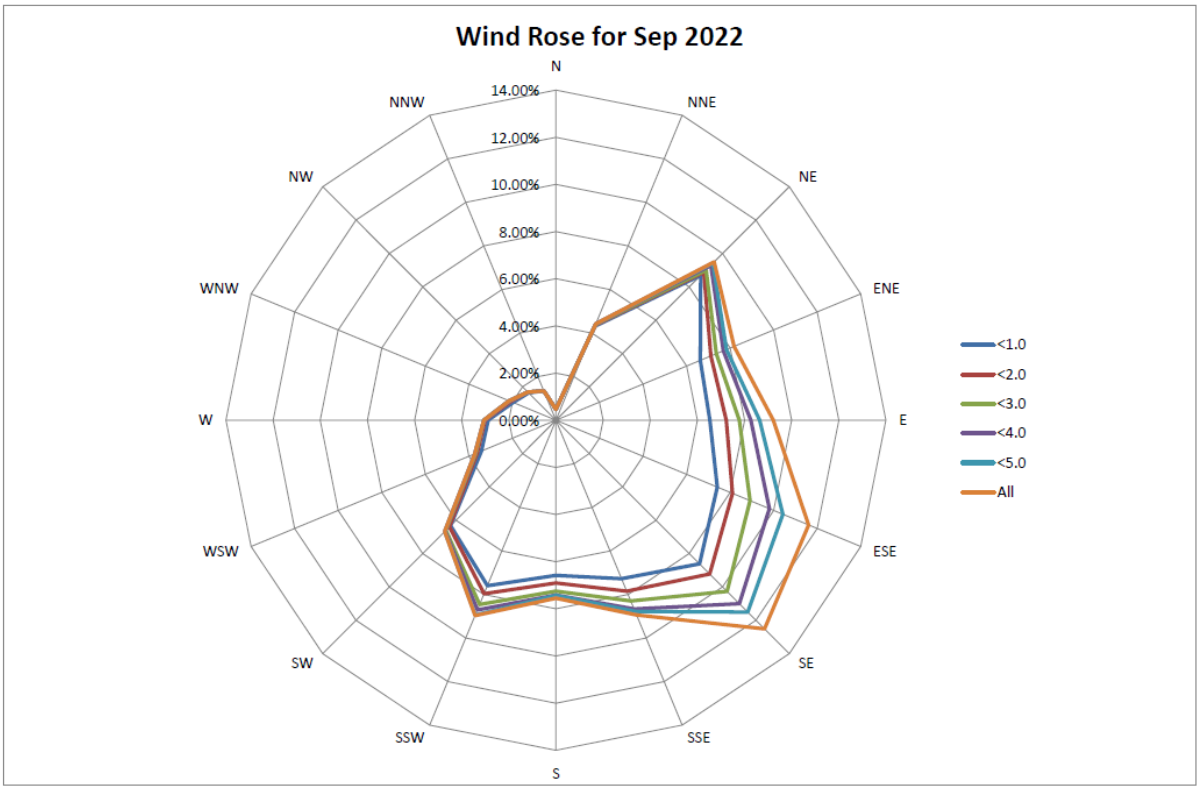


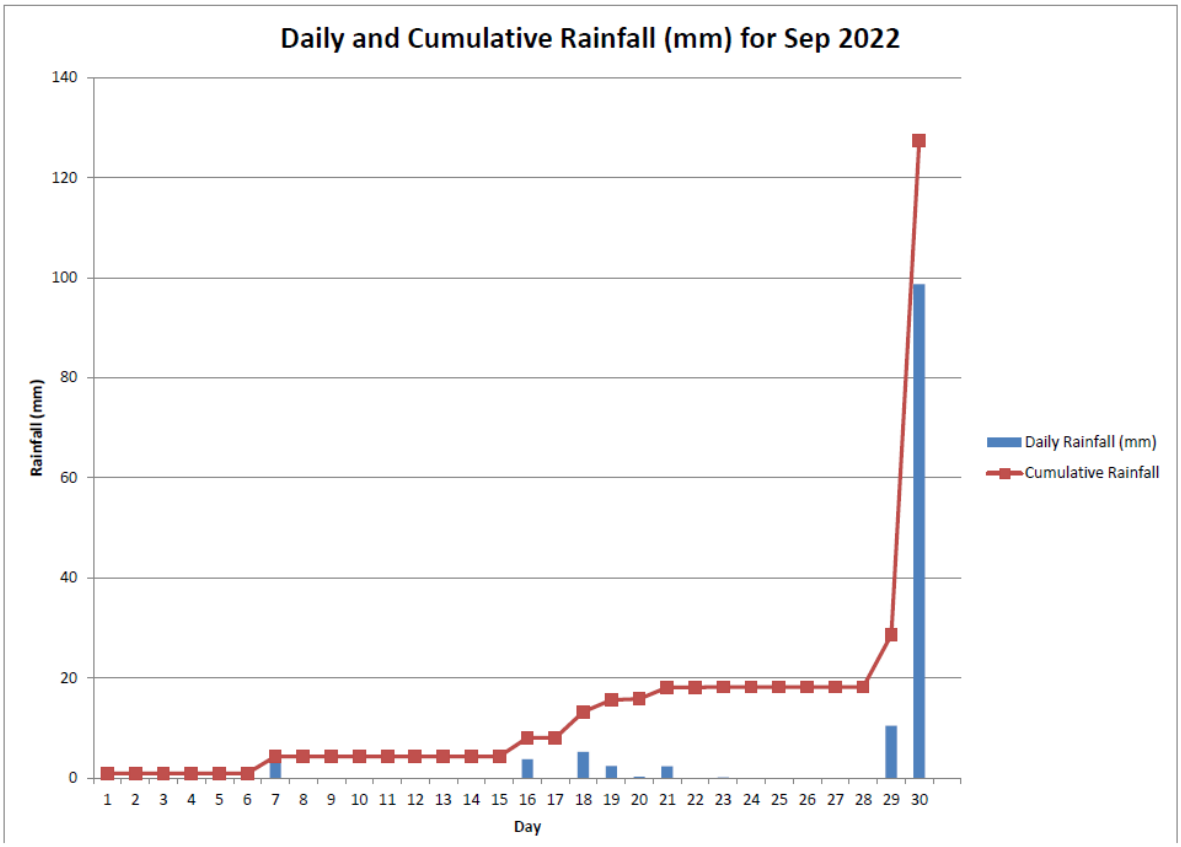



Hourly Average Pressure (hPa)
Hourly Average Pressure (hPa) for Sep 2022
Hourly Average Pressure (hPa)
1020
1015
1010
1005
1000
995
990
Day and Time
Day
TIME


Hourly Average Wind Speed (m/s)
Hourly Average Wind Speed (m/s) for Sep 2022
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Day and Time
Day
TIME


Hourly Average Wind Direction (degree)
Hourly Average Wind Direction (degree) for Sep 2022
Hourly Average Wind Direction (degree)
360
310
260
210
160
110
60
10
-40
12 AM 3PM 6AM 9PM 12PM 3AM 6PM 9AM 12AM 3PM 6AM 9PM 12PM 3AM 6PM 9AM 12AM 3PM 6AM 9PM 12PM 3AM 6PM 9AM 12AM 3PM 6AM 9PM 12PM 3AM 6PM 9AM 12AM 3PM 6AM 9PM 12PM 3AM 6PM 9AM 12AM 3PM 6AM 9PM 12PM 3AM 6PM 9AM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day and Time
Day
TIME


Wind Rose for Sep 2022
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
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 Sep 2022
Rainfall (mm)
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day
Daily Rainfall (mm)
Cumulative Rainfall

Annex D4

Odour Monitoring Results

Table D4.1 Odour Monitoring Results

Date	Weather	Location	Time	Temperature (oC)	Wind Speed (m/s)	Wind Direction	From Project Site	Odour Intensity	Odour Characteristic	Possible Source	Remarks
22-Jul-22	Sunny	OP1	14:13	33.5	5.1	S	No	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP2	14:16	33.5	5.1	S	No	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP3	14:18	35.6	3.5	SW	No	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP4	14:21	36.4	0.0	NA	NA	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP5	14:24	36.8	1.1	W	No	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP6	14:27	35.1	5.0	S	No	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP7	14:30	34.3	5.4	S	No	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP8	14:33	34.9	4.7	S	No	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP9	14:36	35.4	4.0	SE	Yes	0	N/A	N/A	N/A
22-Jul-22	Sunny	OP10	14:39	38.0	2.3	E	Yes	1	Town gas	Town gas plant	N/A
22-Jul-22	Sunny	OP11	14:48	36.1	1.8	S	Yes	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP1	13:21	34.2	2.8	S	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP2	13:24	33.1	1.0	S	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP3	13:26	33.3	2.1	SW	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP4	13:29	33.4	1.7	W	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP5	13:33	32.3	4.0	SW	No	1	Exhaust gas	Area 137 Excavator	N/A
22-Aug-22	Sunny	OP6	13:35	32.9	5.7	S	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP7	13:38	32.6	8.5	S	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP8	13:41	33.4	1.5	S	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP9	13:44	35.0	1.6	E	Yes	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP10	13:47	34.0	1.5	W	No	0	N/A	N/A	N/A
22-Aug-22	Sunny	OP11	13:56	32.7	2.4	S	Yes	1	Waste	Tipping Area	N/A
15-Sep-22	Sunny	OP1	14:28	35.3	3.3	S	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP2	14:31	33.9	2.8	S	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP3	14:34	33.7	1.2	SW	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP4	14:36	35.9	0.6	SW	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP5	14:40	37.5	0.9	SW	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP6	14:42	35.2	2.0	S	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP7	14:45	35.6	0.6	S	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP8	14:49	36.7	1.1	SW	No	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP9	14:56	35.8	0.4	SW	Yes	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP10	14:58	34.9	1.5	SE	Yes	0	N/A	N/A	N/A
15-Sep-22	Sunny	OP11	15:05	36.1	0.8	SE	Yes	1	Exhaust gas	Vehicle	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 (July 2022)**
NO_2	0.89 gs^{-1}
CO	<0.01 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<2.1 x 10^{-4} gs^{-1}
Vinyl chloride	<2 x 10^{-5} gs^{-1}
Exhaust gas velocity	9.7 ms^{-1}
Parameters	**Monitoring Results (August 2022)**
NO_2	0.86 gs-1
CO	<0.01 gs-1
SO_2	<0.02 gs-1
Non-Methane Organic Carbon	0.0055 gs-1
Benzene	<3 x 10-5 gs-1
Vinyl chloride	<2 x 10-5 gs-1
Ammonia	0.232 gs-1
Exhaust gas velocity	9.3 ms^{-1}
Parameters	**Monitoring Results (September 2022)**
NO_2	0.38 gs^{-1}
CO	<0.01 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<2 x 10^{-4} gs^{-1}
Vinyl chloride	<1.3 x 10^{-4} gs^{-1}
Ammonia	0.0414 gs^{-1}
Exhaust gas velocity	11.2 ms^{-1}

Table D5.2 Thermal Oxidiser Stack Continuous Monitoring Results

Date	**Gas Combustion Temperature (°C)**	**Exhaust temperature (K)**	**Exhaust gas velocity (ms^{-1}) [a]**
1 Jul 22	928	1168	
2 Jul 22	924	1167	
3 Jul 22	923	1165	
4 Jul 22	924	1171	
5 Jul 22	923	1172	
6 Jul 22	928	1171	
7 Jul 22	923	1170	
8 Jul 22	929	1171	
9 Jul 22	920	1169	
10 Jul 22	924	1172	
11 Jul 22	930	1172	
12 Jul 22	Under Maintenance	-	
13 Jul 22	Under Maintenance	-	
14 Jul 22	934	1169	
15 Jul 22	926	1170	
16 Jul 22	920	1168	9.7
17 Jul 22	928	1171	
18 Jul 22	929	1162	
19 Jul 22	918	1167	
20 Jul 22	932	1175	
21 Jul 22	924	1172	
22 Jul 22	918	1169	

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]
23 Jul 22	924	1173	
24 Jul 22	927	1173	
25 Jul 22	925	1170	
26 Jul 22	924	1168	
27 Jul 22	925	1170	
28 Jul 22	930	1172	
29 Jul 22	922	1168	
30 Jul 22	924	1168	
31 Jul 22	927	1167	
1 Aug 22	924	1181	
2 Aug 22	933	1229	
3 Aug 22	928	1227	
4 Aug 22	930	1230	
5 Aug 22	926	1227	
6 Aug 22	929	1228	
7 Aug 22	926	1227	
8 Aug 22	917	1224	
9 Aug 22	880	1230	
10 Aug 22	924	1231	
11 Aug 22	923	1227	
12 Aug 22	923	1225	
13 Aug 22	920	1226	
14 Aug 22	921	1229	
15 Aug 22	928	1234	
16 Aug 22	925	1233	
17 Aug 22	921	1232	9.3
18 Aug 22	927	1231	
19 Aug 22	927	1232	
20 Aug 22	928	1233	
21 Aug 22	924	1234	
22 Aug 22	924	1239	
23 Aug 22	921	1235	
24 Aug 22	924	1236	
25 Aug 22	928	1236	
26 Aug 22	926	1237	
27 Aug 22	929	1241	
28 Aug 22	921	1237	
29 Aug 22	921	1239	
30 Aug 22	920	1238	
31 Aug 22	948	1216	
1-Sep-22	923	1236	
2-Sep-22	925	1225	
3-Sep-22	930	1239	
4-Sep-22	921	1235	
5-Sep-22	917	1235	
6-Sep-22	925	1233	
7-Sep-22	926	1234	
8-Sep-22	932	1240	
9-Sep-22	912	1234	
10-Sep-22	923	1236	
11-Sep-22	925	1237	
12-Sep-22	928	1237	11.2
13-Sep-22	924	1236	
14-Sep-22	926	1231	
15-Sep-22	921	1235	
16-Sep-22	926	1238	
17-Sep-22	924	1236	
18-Sep-22	922	1235	

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]
19-Sep-22	932	1242	
20-Sep-22	929	1248	
21-Sep-22	923	1242	
22-Sep-22	925	1244	
23-Sep-22	922	1242	
24-Sep-22	920	1239	
25-Sep-22	921	1241	
26-Sep-22	924	1244	
27-Sep-22	922	1242	
28-Sep-22	925	1244	
29-Sep-22	920	1243	
30-Sep-22	917	1239	
Average	939	1204	10.1
Min	901	1148	9.3
Max	980	1325	11.2

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

Table D5.3 Landfill Gas Flare Stack Emission Monitoring Results

Parameters	Monitoring Results (July 2022) Flare 2 – F602
NO_2	<0.01 gs^{-1}
CO	0.53 gs^{-1}
SO_2	0.01 gs^{-1}
Benzene	<1.8 x 10^{-5} gs^{-1}
Vinyl chloride	<1.4 x 10^{-5} gs^{-1}
Exhaust gas velocity	6.5 ms^{-1}
Parameters	**Monitoring Results (August 2022) Flare 1 – F601**
NO_2	<0.02 gs^{-1}
CO	0.83 gs^{-1}
SO_2	0.12 gs^{-1}
Non-Methane Organic Carbon	<0.002 gs^{-1}
Benzene	<2.5 x 10^{-5} gs^{-1}
Vinyl chloride	<2.0 x 10^{-5} gs^{-1}
Exhaust gas velocity	8.9 ms^{-1}
Parameters	**Monitoring Results (September 2022) Flare 1 – F601**
NO_2	<0.02 gs^{-1}
CO	<0.01 gs^{-1}
SO_2	<0.01 gs^{-1}
Benzene	<1.23 x 10^{-4} gs^{-1}
Vinyl chloride	<9.8 x 10^{-5} gs^{-1}
Exhaust gas velocity	8.9 ms^{-1}

Table D5.4 Landfill Gas Flare Stack Continuous Monitoring Results

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [(a)]	Operation Status
Flare 1 – F601				
1 Jul 22	923	1029		In Operation
2 Jul 22	911	999		In Operation
3 Jul 22	891	1068		In Operation
4 Jul 22	899	1073		In Operation
5 Jul 22	902	1072		In Operation
6 Jul 22	822	1070		In Operation
7 Jul 22	947	1045		In Operation
8 Jul 22	894	990		In Operation
9 Jul 22	915	1037		In Operation
10 Jul 22	901	1057		In Operation
11 Jul 22	895	1025		In Operation
12 Jul 22	940	1063		In Operation
13 Jul 22	836	1060		In Operation
14 Jul 22	950	1033		In Operation
15 Jul 22	880	973		In Operation
16 Jul 22	900	1013	6.5	In Operation
17 Jul 22	885	1028		In Operation
18 Jul 22	920	1033		In Operation
19 Jul 22	950	1083		In Operation
20 Jul 22	920	1073		In Operation
21 Jul 22	890	1033		In Operation
22 Jul 22	880	1053		In Operation
23 Jul 22	920	1053		In Operation
24 Jul 22	900	1053		In Operation
25 Jul 22	890	1003		In Operation
26 Jul 22	955	998		In Operation
27 Jul 22	860	1033		In Operation
28 Jul 22	880	1013		In Operation
29 Jul 22	900	963		In Operation
30 Jul 22	860	993		In Operation
31 Jul 22	920	1063		In Operation
1 Aug 22	874	1139		In Operation
2 Aug 22	858	1129		In Operation
3 Aug 22	841	1096		In Operation
4 Aug 22	828	1040		In Operation
5 Aug 22	943	1203		In Operation
6 Aug 22	897	1163		In Operation
7 Aug 22	920	1183		In Operation
8 Aug 22	920	1153		In Operation
9 Aug 22	863	1123		In Operation
10 Aug 22	865	1093		In Operation
11 Aug 22	848	1023		In Operation
12 Aug 22	899	1141		In Operation
13 Aug 22	940	1203		In Operation
14 Aug 22	910	1001	8.9	In Operation
15 Aug 22	875	1043		In Operation
16 Aug 22	930	1083		In Operation
17 Aug 22	913	1170		In Operation
18 Aug 22	826	1073		In Operation
19 Aug 22	872	1118		In Operation
20 Aug 22	880	1023		In Operation
21 Aug 22	865	1095		In Operation
22 Aug 22	864	1013		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [(a)]	Operation Status
23 Aug 22	950	1150		In Operation
24 Aug 22	966	1248		In Operation
25 Aug 22	873	993		In Operation
26 Aug 22	910	1163		In Operation
27 Aug 22	860	1123		In Operation
28 Aug 22	863	1028		In Operation
29 Aug 22	920	1133		In Operation
30 Aug 22	930	1183		In Operation
31 Aug 22	884	1073		In Operation
1-Sep-22	828	991		In Operation
2-Sep-22	839	1035		In Operation
3-Sep-22	901	1036		In Operation
4-Sep-22	840	1091		In Operation
5-Sep-22	869	1127		In Operation
6-Sep-22	875	1003		In Operation
7-Sep-22	892	1033		In Operation
8-Sep-22	875	996		In Operation
9-Sep-22	877	1004		In Operation
10-Sep-22	865	1027		In Operation
11-Sep-22	-	-		Under Maintenance
12-Sep-22	-	-		Under Maintenance
13-Sep-22	838	1073		In Operation
14-Sep-22	883	1056		In Operation
15-Sep-22	894	1020	8.9	In Operation
16-Sep-22	881	1003		In Operation
17-Sep-22	859	1103		In Operation
18-Sep-22	944	1077		In Operation
19-Sep-22	890	1113		In Operation
20-Sep-22	868	1005		In Operation
21-Sep-22	873	987		In Operation
22-Sep-22	890	987		In Operation
23-Sep-22	820	1067		In Operation
24-Sep-22	824	1073		In Operation
25-Sep-22	-	-		Under Maintenance
26-Sep-22	848	1099		In Operation
27-Sep-22	-	-		Under Maintenance
28-Sep-22	840	1047		In Operation
29-Sep-22	868	1113		In Operation
30-Sep-22	822	1033		In Operation
Average	887	1048	8.1	
Min	820	963	6.5	
Max	966	1127	8.9	
Flare 2 – F602				
1 Jul 22	830	1073		In Operation
2 Jul 22	860	1073		In Operation
3 Jul 22	890	1113		In Operation
4 Jul 22	930	1153		In Operation
5 Jul 22	860	1103		In Operation
6 Jul 22	884	1109		In Operation
7 Jul 22	834	1068		In Operation
8 Jul 22	830	1083		In Operation
9 Jul 22	870	1093		In Operation
10 Jul 22	830	1063		In Operation
11 Jul 22	905	1163		In Operation
12 Jul 22	840	1093		In Operation
13 Jul 22	870	1113		In Operation
14 Jul 22	840	1083		In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) (a)	Operation Status
15 Jul 22	824	1067		In Operation
16 Jul 22	834	1093	6.5	In Operation
17 Jul 22	904	1143		In Operation
18 Jul 22	865	1096		In Operation
19 Jul 22	845	1083		In Operation
20 Jul 22	880	1118		In Operation
21 Jul 22	854	1089		In Operation
22 Jul 22	830	1078		In Operation
23 Jul 22	880	1083		In Operation
24 Jul 22	830	1063		In Operation
25 Jul 22	842	1077		In Operation
26 Jul 22	844	1097		In Operation
27 Jul 22	854	1061		In Operation
28 Jul 22	875	1063		In Operation
29 Jul 22	835	1091		In Operation
30 Jul 22	874	1101		In Operation
1 Aug 22	855	1093		In Operation
2 Aug 22	870	1063		In Operation
3 Aug 22	860	1073		In Operation
4 Aug 22	840	1053		In Operation
5 Aug 22	840	1053		In Operation
6 Aug 22	840	1043		In Operation
7 Aug 22	825	1033		In Operation
8 Aug 22	890	1053		In Operation
9 Aug 22	880	1053		In Operation
10 Aug 22	835	1043		In Operation
11 Aug 22	860	1084		In Operation
12 Aug 22	830	1033		In Operation
13 Aug 22	826	1023		In Operation
14 Aug 22	860	1073		In Operation
15 Aug 22	870	1093		In Operation
16 Aug 22	850	1043	8.9	In Operation
17 Aug 22	820	1063		In Operation
18 Aug 22	830	1073		In Operation
19 Aug 22	830	1063		In Operation
20 Aug 22	820	1053		In Operation
21 Aug 22	870	1083		In Operation
22 Aug 22	820	1053		In Operation
23 Aug 22	890	1103		In Operation
24 Aug 22	890	1093		In Operation
25 Aug 22	850	1065		In Operation
26 Aug 22	820	1023		In Operation
27 Aug 22	820	1083		In Operation
28 Aug 22	830	1053		In Operation
29 Aug 22	820	1043		In Operation
30 Aug 22	840	1063		In Operation
31 Aug 22	850	1073		In Operation
1-Sep-22	876	1061		In Operation
2-Sep-22	821	1049		In Operation
3-Sep-22	826	1056		In Operation
4-Sep-22	948	1127		In Operation
5-Sep-22	847	1047		In Operation
6-Sep-22	830	1071		In Operation
7-Sep-22	833	1047		In Operation
8-Sep-22	860	1103		In Operation
9-Sep-22	852	1069		In Operation
10-Sep-22	895	1111	8.9	In Operation

Date	Gas Combustion Temperature (°C)	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) (a)	Operation Status
11-Sep-22	-	-		Under Maintenance
12-Sep-22	-	-		Under Maintenance
13-Sep-22	832	1088		In Operation
14-Sep-22	828	1055		In Operation
15-Sep-22	876	1058		In Operation
16-Sep-22	877	1093		In Operation
17-Sep-22	850	1083		In Operation
18-Sep-22	899	1119		In Operation
19-Sep-22	870	1096		In Operation
20-Sep-22	890	1108		In Operation
21-Sep-22	880	1097		In Operation
22-Sep-22	854	1051		In Operation
23-Sep-22	880	1098		In Operation
24-Sep-22	834	1088		In Operation
25-Sep-22	844	1096		In Operation
26-Sep-22	830	1057		In Operation
27-Sep-22	912	1125		In Operation
28-Sep-22	825	1046		In Operation
29-Sep-22	850	1068		In Operation
30-Sep-22	883	1083		In Operation
Average	855	1078	8.1	
Min	820	1023	6.5	
Max	948	1163	8.9	

Notes:

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

Table D5.5 Landfill Gas Generator Stack Emission Monitoring Results

Parameters	Monitoring Results (July 2022)
NO_2	0.01 gs^{-1}
CO	0.28 gs^{-1}
SO_2	0.003 gs^{-1}
Benzene	<8.0 x 10^{-6} gs^{-1}
Vinyl chloride	<1.8 x 10^{-6} gs^{-1}
Exhaust gas velocity	11.2 ms^{-1}
Parameters	**Monitoring Results (August 2022)**
NO_2	0.04 gs^{-1}
CO	0.622 gs^{-1}
SO_2	0.015 gs^{-1}
Non-Methane Organic Carbon	0.0012 gs^{-1}
Benzene	<8.7 x 10^{-5} gs^{-1}
Vinyl chloride	<2.1 x 10^{-6} gs^{-1}
Exhaust gas velocity	9.3 ms^{-1}
Parameters	**Monitoring Results (September 2022)**
NO_2	0.07 gs^{-1}
CO	0.75 gs^{-1}
SO_2	0.008 gs^{-1}
Benzene	<1.92 x 10^{-4} gs^{-1}
Vinyl chloride	<9.6 x 10^{-6} gs^{-1}
Exhaust gas velocity	10.2 ms^{-1}

Table D5.6 Landfill Gas Generator Stack Continuous Monitoring Results

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [(a)]	Operation Status (Landfill Gas Generator in Operation)
ENGA			
1 Jul 22	867		Under Maintenance
2 Jul 22	865		Under Maintenance
3 Jul 22	869		Under Maintenance
4 Jul 22	848		In Operation
5 Jul 22	852		In Operation
6 Jul 22	851		In Operation
7 Jul 22	884		Under Maintenance
8 Jul 22	886		Under Maintenance
9 Jul 22	887		Under Maintenance
10 Jul 22	888		Under Maintenance
11 Jul 22	889		Under Maintenance
12 Jul 22	880		Under Maintenance
13 Jul 22	880		Under Maintenance
14 Jul 22	893		Under Maintenance
15 Jul 22	-		In Operation
16 Jul 22	885	11.2	Under Maintenance
17 Jul 22	886		Under Maintenance
18 Jul 22	859		In Operation
19 Jul 22	866		In Operation
20 Jul 22	857		In Operation
21 Jul 22	857		In Operation
22 Jul 22	859		In Operation
23 Jul 22	860		In Operation
24 Jul 22	861		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
25 Jul 22	863		In Operation
26 Jul 22	866		In Operation
27 Jul 22	859		In Operation
28 Jul 22	861		In Operation
29 Jul 22	859		In Operation
30 Jul 22	857		In Operation
31 Jul 22	860		In Operation
1 Aug 22	859		In Operation
2 Aug 22	857		In Operation
3 Aug 22	862		In Operation
4 Aug 22	858		In Operation
5 Aug 22	860		In Operation
6 Aug 22	863		In Operation
7 Aug 22	861		In Operation
8 Aug 22	859		In Operation
9 Aug 22	858		In Operation
10 Aug 22	857		In Operation
11 Aug 22	858		In Operation
12 Aug 22	856		In Operation
13 Aug 22	860		In Operation
14 Aug 22	858		In Operation
15 Aug 22	858		In Operation
16 Aug 22	862	9.3	In Operation
17 Aug 22	860		In Operation
18 Aug 22	859		In Operation
19 Aug 22	859		In Operation
20 Aug 22	865		In Operation
21 Aug 22	865		In Operation
22 Aug 22	865		In Operation
23 Aug 22	864		In Operation
24 Aug 22	863		In Operation
25 Aug 22	866		In Operation
26 Aug 22	865		In Operation
27 Aug 22	865		In Operation
28 Aug 22	864		In Operation
29 Aug 22	868		In Operation
30 Aug 22	865		In Operation
31 Aug 22	862		In Operation
1-Sep-22	865		In Operation
2-Sep-22	867		In Operation
3-Sep-22	858		In Operation
4-Sep-22	860		In Operation
5-Sep-22	860		In Operation
6-Sep-22	863		In Operation
7-Sep-22	864		In Operation
8-Sep-22	880		In Operation
9-Sep-22	861		In Operation
10-Sep-22	856	10.2	In Operation
11-Sep-22	856		In Operation
12-Sep-22	854		In Operation
13-Sep-22	-		Under Maintenance
14-Sep-22	856		In Operation
15-Sep-22	853		In Operation
16-Sep-22	859		In Operation
17-Sep-22	863		In Operation
18-Sep-22	855		In Operation
19-Sep-22	863		In Operation
20-Sep-22	862		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
21-Sep-22	858		In Operation
22-Sep-22	862		In Operation
23-Sep-22	860		In Operation
24-Sep-22	859		In Operation
25-Sep-22	860		In Operation
26-Sep-22	861		In Operation
27-Sep-22	860		In Operation
28-Sep-22	863		In Operation
29-Sep-22	864		In Operation
30-Sep-22	852		In Operation
Average	860	10.2	
Min	848	9.3	
Max	880	11.2	
ENGB			
1 Jul 22	-		Under Maintenance
2 Jul 22	-		Under Maintenance
3 Jul 22	-		Under Maintenance
4 Jul 22	848		In Operation
5 Jul 22	851		In Operation
6 Jul 22	850		In Operation
7 Jul 22	-		Under Maintenance
8 Jul 22	-		Under Maintenance
9 Jul 22	-		Under Maintenance
10 Jul 22	-		Under Maintenance
11 Jul 22	-		Under Maintenance
12 Jul 22	-		Under Maintenance
13 Jul 22	-		Under Maintenance
14 Jul 22	-		Under Maintenance
15 Jul 22	871		In Operation
16 Jul 22	-		Under Maintenance
17 Jul 22	-	11.2	Under Maintenance
18 Jul 22	854		In Operation
19 Jul 22	860		In Operation
20 Jul 22	852		In Operation
21 Jul 22	852		In Operation
22 Jul 22	854		In Operation
23 Jul 22	855		In Operation
24 Jul 22	856		In Operation
25 Jul 22	856		In Operation
26 Jul 22	864		In Operation
27 Jul 22	854		In Operation
28 Jul 22	858		In Operation
29 Jul 22	855		In Operation
30 Jul 22	861		In Operation
31 Jul 22	856		In Operation
1 Aug 22	1181		In Operation
2 Aug 22	1229		In Operation
3 Aug 22	1227		In Operation
4 Aug 22	1230		In Operation
5 Aug 22	1227		In Operation
6 Aug 22	1228		In Operation
7 Aug 22	1227		In Operation
8 Aug 22	1224		In Operation
9 Aug 22	1230		In Operation
10 Aug 22	1231		In Operation
11 Aug 22	1227		In Operation
12 Aug 22	1225	9.3	In Operation
13 Aug 22	1226		In Operation

Date	Exhaust temperature (K)	Exhaust gas velocity (ms^{-1}) [a]	Operation Status (Landfill Gas Generator in Operation)
14 Aug 22	1229		In Operation
15 Aug 22	1234		In Operation
16 Aug 22	1233		In Operation
17 Aug 22	1232		In Operation
18 Aug 22	1231		In Operation
19 Aug 22	1232		In Operation
20 Aug 22	1233		In Operation
21 Aug 22	1234		In Operation
22 Aug 22	1239		In Operation
23 Aug 22	1235		In Operation
24 Aug 22	1236		In Operation
25 Aug 22	1236		In Operation
26 Aug 22	1237		In Operation
27 Aug 22	1241		In Operation
28 Aug 22	1237		In Operation
29 Aug 22	1239		In Operation
30 Aug 22	1238		In Operation
31 Aug 22	1241		In Operation
1-Sep-22	1236		In Operation
2-Sep-22	1225		In Operation
3-Sep-22	1239		In Operation
4-Sep-22	1235		In Operation
5-Sep-22	1235		In Operation
6-Sep-22	1233		In Operation
7-Sep-22	1234		In Operation
8-Sep-22	1240		Under Maintenance
9-Sep-22	1234		In Operation
10-Sep-22	1236		In Operation
11-Sep-22	1237		In Operation
12-Sep-22	1237		In Operation
13-Sep-22	1236	10.2	In Operation
14-Sep-22	1231		In Operation
15-Sep-22	1235		In Operation
16-Sep-22	1238		In Operation
17-Sep-22	1236		In Operation
18-Sep-22	1235		In Operation
19-Sep-22	1242		In Operation
20-Sep-22	1248		In Operation
21-Sep-22	1242		In Operation
22-Sep-22	1244		In Operation
23-Sep-22	1242		In Operation
24-Sep-22	1239		In Operation
25-Sep-22	1241		In Operation
26-Sep-22	1244		In Operation
27-Sep-22	1242		In Operation
28-Sep-22	1244		In Operation
29-Sep-22	1243		In Operation
30-Sep-22	1239		In Operation
Average	858	10.2	
Min	845	9.3	
Max	879	11.2	

Notes:

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

Annex D6

Ambient VOCs, Ammonia and H_2S 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	18	19	25	26
H2S	42	<15	<15	<15	<15
Methane	NA [a]	0.00023% (v/v)	0.00022% (v/v)	0.00036% (v/v)	0.00032% (v/v)
1.1.1-Trichloroethane	5,550	<0.9	<0.9	<0.9	<0.9
1.2-Dibromoethane (EDB)	39	<1.3	<1.3	<1.3	<1.3
1.2-Dichloroethane	210	<0.6	<0.6	<0.6	<0.6
Benzene	33	<0.5	<0.5	<0.5	<0.5
Butan-2-ol	667	<0.6	<0.6	<0.6	<0.6
Butanethiol	4	<1.2	<1.2	<1.2	<1.2
Carbon Disulphide	150	<0.5	<0.5	11.4	1.6
Carbon Tetrachloride	64	<1.0	<1.0	<1.0	<1.0
Chloroform	99	<0.8	<0.8	<0.8	<0.8
Decanes	3,608	1.3	<1.0	1.1	<1.0
Dichlorobenzene	120	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoro-methane	NA [a]	1.4	1.7	2.1	2
Dimethylsulphide	8	<0.4	<0.4	<0.4	<0.4
Dipropyl ether	NA [a]	<0.8	<0.8	<0.8	<0.8
Limonene	212	<0.9	<0.9	<0.9	<0.9
Ethanethiol	13	<0.6	<0.6	<0.6	<0.6
Ethanol	19,200	<3.8	<3.8	<3.8	25.4
Ethyl butanoate	71	<1.0	<1.0	<1.0	<1.0
Ethyl propionate	29	<0.8	<0.8	<0.8	<0.8
Ethyl benzene	738	<0.8	<0.8	<0.8	1.3
Heptane	2,746	<0.8	<0.8	<0.8	<0.8
Methanethiol	10	<0.4	<0.4	<0.4	<0.4
Methanol	2,660	13	<2.6	7.6	29.5
Methyl butanoate	30	<0.8	<0.8	<0.8	<0.8
Methyl propionate	353	<0.7	<0.7	<0.7	<0.7
Methylene Chloride	3,530	<0.6	<0.6	2.7	4
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)]	1	<0.8	1.1	1.4
Tetrachloroethylene	1,380	<1.2	<1.2	<1.2	<1.2
Toluene	1,244	<0.6	<0.6	0.7	2.7
Trichloroethylene	5,500	<1.1	<1.1	<1.1	<1.1
Undecane	5,562	<1.2	<1.2	<1.2	<1.2
Vinyl Chloride	26	<0.4	<0.4	<0.4	<0.4
Xylenes	534	<0.5	<0.5	<0.5	2.5

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	29 July 2022
Time	9:00 (29 July 2022) – 9:00 (30 July 2022)
Monitoring Location	AM2, AM4
Parameter	24-hour Total Suspended Particulates (TSP)
Action / Limit Levels	Action level: >260 µg/ m^3 Limit level: >260 µg/m^3
Measured Level	AM2: 312 µg /m^3 AM4: 364 µg /m^3
Possible reason	From the meteorological data obtained from the SENTX on-site meteorological monitoring station, a predominantly southwesterly to west-southwesterly wind with highest wind speed 7.5 m/s was recorded on 29 and 30 July 2022 during the sampling event. <u>AM2</u> On 29 July 2022, the ET site representative observed that dust emitted from Cell 4X and the unpaved areas in the vicinity was blown toward dust monitoring station AM2. This could be the potential cause for the exceedance. Based on this observation, the TSP exceedance at AM2 was deemed to Project-related activities. In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted at AM2 on 4 August 2022 to confirm findings. The 24-hour TSP level was 36 µg/m^3, which is well below Action/Limit Level. There is no consecutive exceedance at this dust monitoring location. <u>AM4</u> On 29 July 2022, the ET site representative observed that dust emitted from the public fill stockpiling areas and active earthworks from another project site in close vicinity of dust monitoring station AM4. No works from SENTX which may generate dust emission were conducted in the vicinity of AM4 on the sampling day based on the ET site representative on-site observations and the Contractor's record of the construction and operation activities carried out on that day. Due to presence of the influencing factor from another project site and no Project-related dust emission source was identified in the vicinity of AM4, there is no adequate evidence showing that the exceedance at AM4 was due to Project-related activities. In accordance with Table 3.8b of the updated EM&A Manual, repeat measurement was conducted at AM4 on 4 August 2022 to confirm findings. The 24-hour TSP level was 35 µg/m^3, which is

	well below the Action/Limit Level. There is no consecutive exceedance at this dust monitoring location.
Action Taken / Action to be Taken	In accordance with Table 3.8b of the updated EM&A Manual, the monitoring frequency at AM2 shall be increased to daily, until no exceedance of the Action/Limit Level. It should be noted that the turnaround time for the laboratory analysis of the dust filter paper is 5 working days and the preliminary results for the monitoring event conducted on 29 to 30 July 2022 were available on 4 August 2022. Repeat measurement was conducted on 4 August 2022 and the TSP monitoring result at AM2 is well below the Action/Limit Level. Hence, the daily TSP monitoring at AM2 shall not be triggered. 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 site to proximity to the SENTX boundary.
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 17 August 2022

Annex E

Noise

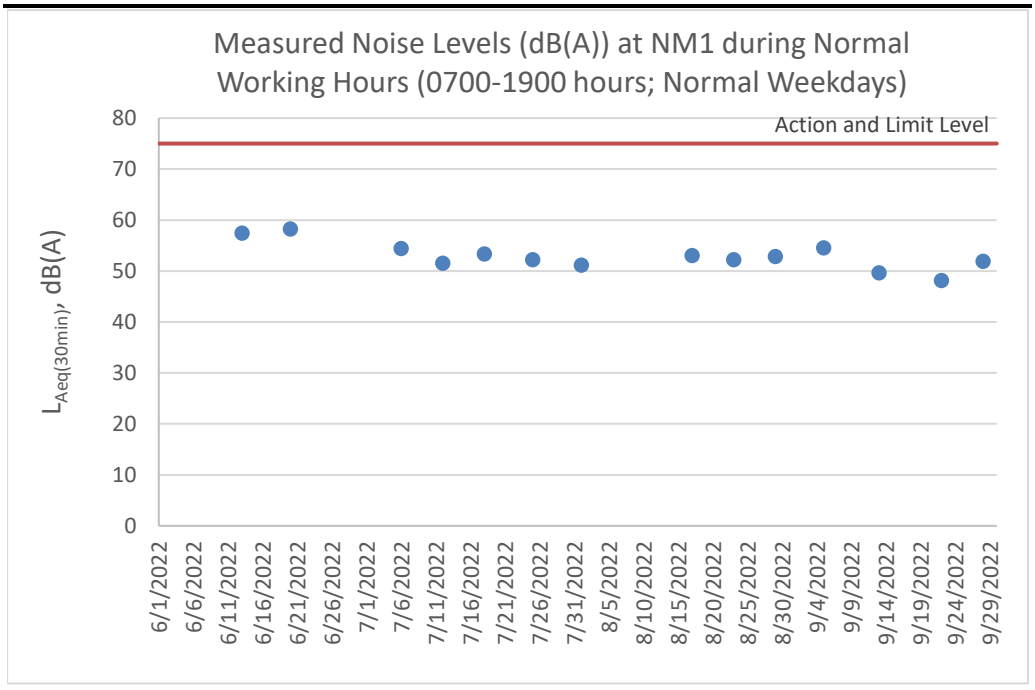
Annex E1

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	$L_{10\ (30min)}$	$L_{90\ (30min)}$	$L_{eq\ (30min)}$
6 Jul 22	14:02	14:32	Cloudy	55.8	52.7	54.4
12 Jul 22	14:36	15:06	Sunny	53.2	48.1	51.5
18 Jul 22	9:48	10:18	Sunny	54.5	51.2	53.3
25 Jul 22	10:32	11:02	Sunny	53.9	49.9	52.2
1 Aug 22	9:46	10:16	Sunny	52.4	49.5	51.1
11 Aug 22	14:34	15:04	Pouring	Monitoring was cancelled due to adverse weather.		
17 Aug 22	14:31	15:01	Cloudy	54.9	49.8	53.0
23 Aug 22	9:52	10:22	Sunny	53.3	50.6	52.2
29 Aug 22	14:33	15:03	Sunny	53.8	50.5	52.8
5 Sep 22	14:13	14:43	Sunny	57.6	50.4	54.5
13 Sep 22	13:46	14:16	Sunny	50.9	47.6	49.6
22 Sep 22	15:06	15:36	Sunny	49.3	46.1	48.1
28 Sep 22	9:57	10:27	Sunny	54.2	48.4	51.9
					Average	52.1
					Min	48.1
					Max	54.5

Figure E1.1 Graphical Presentation for Noise Monitoring at NM1



Annex E2

Event and Action Plan for Noise Monitoring

Annex E2 Event and Action Plan for Operational Noise Monitoring

Event	Action		
	ET	**IEC**	**Contractor**
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
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 DP4

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (oC)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks
8 Jul 22	10:45	Sunny	Light Yellow	Semi-clear	-	-	-	26.3	-
15 Jul 22	10:30	Sunny	Light Yellow	Semi-clear	-	-	-	7.1	-
25 Jul 22	9:30	Sunny	Unable to collect water sample due to insufficient flow						-
23 Aug 22	10:55	Sunny	Unable to collect water sample due to insufficient flow						-
22 Sep 22	14:07	Sunny	Unable to collect water sample due to insufficient flow						-
					Average	-	-	16.7	
					Min	-	-	26.3	
					Max	-	-	7.1	

Table F1.2 Surface Water Quality Monitoring Results at DP6

Date	Time	Weather Condition	Water Appearance	Water Condition	Water Temperature (oC)	Ammoniacal-nitrogen (mg/L)	COD	Suspended Solids (SS) (mg/L)	Remarks
25 Jul 22	9:39	Sunny	Unable to collect water sample due to insufficient flow						-
23 Aug 22	10:43	Sunny	Unable to collect water sample due to insufficient flow						-
22 Sep 22	14:10	Sunny	Unable to collect water sample due to insufficient flow						-
					Average	-	-	-	
					Min	-	-	-	
					Max	-	-	-	

Annex F2

Event and Action Plan for Water Quality Monitoring

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

Event	Action		
	ET	**IEC**	**Contractor**
Exceedance of Limit Level for surface water monitoring	• 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 • 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	• Divert groundwater collected at the collection sumps to the leachate treatment plant • Submit proposals for remedial measures to IEC • Rectify any unacceptable practice or design • Amend working methods as required • Implement amended working methods, if necessary

Event	Action		
	ET	IEC	Contractor
Exceedance of Limit Level for leachate level	• 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 • Increase monitoring frequency to weekly until no exceedance of Limit Level	• 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

Annex F3

Leachate Levels Monitoring Results

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

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
Pump Station No. 1X (Cell 1X)			
1-Jul-22	55	75	65
2-Jul-22	55	75	65
3-Jul-22	55	75	65
4-Jul-22	55	75	65
5-Jul-22	68	88	78
6-Jul-22	57	77	67
7-Jul-22	62	82	72
8-Jul-22	68	88	78
9-Jul-22	59	77	68
10-Jul-22	46	66	56
11-Jul-22	46	66	56
12-Jul-22	53	75	64
13-Jul-22	57	79	68
14-Jul-22	59	79	69
15-Jul-22	59	79	69
16-Jul-22	57	77	67
17-Jul-22	48	68	58
18-Jul-22	48	68	58
19-Jul-22	68	88	78
20-Jul-22	68	88	78
21-Jul-22	46	66	56
22-Jul-22	46	66	56
23-Jul-22	55	75	65
24-Jul-22	48	68	58
25-Jul-22	48	68	58
26-Jul-22	73	86	80
27-Jul-22	66	79	73
28-Jul-22	57	70	64
29-Jul-22	73	86	80
30-Jul-22	64	77	71
31-Jul-22	64	73	69
1-Aug-22	64	73	69
2-Aug-22	75	88	82
3-Aug-22	73	84	79
4-Aug-22	53	66	60
5-Aug-22	84	97	91
6-Aug-22	64	70	67
7-Aug-22	62	75	69
8-Aug-22	62	75	69
9-Aug-22	73	79	76
10-Aug-22	59	73	66
11-Aug-22	73	86	80
12-Aug-22	77	88	83
13-Aug-22	62	75	69
14-Aug-22	73	86	80
15-Aug-22	73	86	80
16-Aug-22	66	79	73
17-Aug-22	66	77	72
18-Aug-22	73	86	80
19-Aug-22	66	79	73
20-Aug-22	70	82	76
21-Aug-22	86	73	80
22-Aug-22	73	86	80
23-Aug-22	68	79	74
24-Aug-22	66	77	72

Date	Meter No.X1 (cm)	Meter No.X2 (cm)	Average (cm)
25-Aug-22	62	66	64
26-Aug-22	66	79	73
27-Aug-22	68	79	74
28-Aug-22	75	88	82
29-Aug-22	75	88	82
30-Aug-22	73	86	80
31-Aug-22	66	79	73
1-Sep-22	73	86	80
2-Sep-22	70	82	76
3-Sep-22	73	84	79
4-Sep-22	64	75	70
5-Sep-22	64	75	70
6-Sep-22	64	77	71
7-Sep-22	66	77	72
8-Sep-22	70	82	76
9-Sep-22	73	84	79
10-Sep-22	64	77	71
11-Sep-22	68	79	74
12-Sep-22	68	79	74
13-Sep-22	68	79	74
14-Sep-22	64	64	64
15-Sep-22	64	75	70
16-Sep-22	75	88	82
17-Sep-22	62	75	69
18-Sep-22	75	86	81
19-Sep-22	75	86	81
20-Sep-22	64	75	70
21-Sep-22	68	79	74
22-Sep-22	64	77	71
23-Sep-22	66	77	72
24-Sep-22	73	84	79
25-Sep-22	75	86	81
26-Sep-22	75	86	81
27-Sep-22	73	86	80
28-Sep-22	70	84	77
29-Sep-22	68	82	75
30-Sep-22	73	89	81
Average	65	79	72
Min	46	64	56
Max	46	64	56

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

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
Pump Station No. 2X (Cell 2X)			
1-Jul-22	64	66	65
2-Jul-22	64	66	65
3-Jul-22	64	66	65
4-Jul-22	64	66	65
5-Jul-22	62	66	64
6-Jul-22	82	88	85
7-Jul-22	82	88	85
8-Jul-22	73	77	75
9-Jul-22	64	70	67
10-Jul-22	79	85	82
11-Jul-22	79	85	82
12-Jul-22	79	84	82
13-Jul-22	75	79	77
14-Jul-22	68	73	71
15-Jul-22	59	64	62
16-Jul-22	79	86	83
17-Jul-22	84	90	87
18-Jul-22	84	90	87
19-Jul-22	73	77	75
20-Jul-22	86	90	88
21-Jul-22	73	79	76
22-Jul-22	86	90	88
23-Jul-22	70	77	74
24-Jul-22	66	73	70
25-Jul-22	66	73	70
26-Jul-22	77	84	81
27-Jul-22	57	64	61
28-Jul-22	70	77	74
29-Jul-22	79	86	83
30-Jul-22	59	64	62
31-Jul-22	86	90	88
1-Aug-22	86	90	88
2-Aug-22	68	73	71
3-Aug-22	73	77	75
4-Aug-22	84	88	86
5-Aug-22	98	99	99
6-Aug-22	89	88	89
7-Aug-22	79	84	82
8-Aug-22	79	84	82
9-Aug-22	62	66	64
10-Aug-22	84	88	86
11-Aug-22	66	70	68
12-Aug-22	66	70	68
13-Aug-22	62	66	64
14-Aug-22	86	90	88
15-Aug-22	86	90	88
16-Aug-22	84	88	86
17-Aug-22	77	82	80
18-Aug-22	66	70	68
19-Aug-22	86	90	88
20-Aug-22	75	79	77
21-Aug-22	79	84	82
22-Aug-22	79	84	82
23-Aug-22	64	68	66
24-Aug-22	77	82	80
25-Aug-22	62	66	64

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
26-Aug-22	82	86	84
27-Aug-22	68	73	71
28-Aug-22	62	66	64
29-Aug-22	62	66	64
30-Aug-22	73	77	75
31-Aug-22	82	86	84
1-Sep-22	62	66	64
2-Sep-22	46	50	48
3-Sep-22	55	59	57
4-Sep-22	73	77	75
5-Sep-22	73	77	75
6-Sep-22	79	84	82
7-Sep-22	84	88	86
8-Sep-22	64	68	66
9-Sep-22	73	77	75
10-Sep-22	77	82	80
11-Sep-22	68	75	72
12-Sep-22	68	75	72
13-Sep-22	68	75	72
14-Sep-22	75	79	77
15-Sep-22	79	84	82
16-Sep-22	90	84	87
17-Sep-22	64	68	66
18-Sep-22	79	84	82
19-Sep-22	79	84	82
20-Sep-22	59	66	63
21-Sep-22	70	75	73
22-Sep-22	75	82	79
23-Sep-22	82	86	84
24-Sep-22	86	90	88
25-Sep-22	70	75	73
26-Sep-22	70	75	73
27-Sep-22	75	82	79
28-Sep-22	79	84	82
29-Sep-22	84	88	86
30-Sep-22	70	77	74
Average	74	78	76
Min	46	50	48
Max	98	99	99

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

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
Pump Station No. 3X (Cell 3X)			
1-Jul-22	53	73	63
2-Jul-22	53	73	63
3-Jul-22	53	73	63
4-Jul-22	53	73	63
5-Jul-22	75	75	75
6-Jul-22	75	75	75
7-Jul-22	73	73	73
8-Jul-22	70	70	70
9-Jul-22	70	70	70
10-Jul-22	73	73	73
11-Jul-22	73	73	73
12-Jul-22	70	70	70
13-Jul-22	75	75	75
14-Jul-22	75	75	75
15-Jul-22	68	68	68
16-Jul-22	68	68	68
17-Jul-22	66	66	66
18-Jul-22	66	66	66
19-Jul-22	68	68	68
20-Jul-22	70	70	70
21-Jul-22	70	70	70
22-Jul-22	68	68	68
23-Jul-22	62	62	62
24-Jul-22	75	75	75
25-Jul-22	75	75	75
26-Jul-22	64	64	64
27-Jul-22	68	68	68
28-Jul-22	70	70	70
29-Jul-22	70	70	70
30-Jul-22	70	70	70
31-Jul-22	64	64	64
1-Aug-22	64	64	64
2-Aug-22	70	70	70
3-Aug-22	66	66	66
4-Aug-22	59	59	59
5-Aug-22	97	97	97
6-Aug-22	59	59	59
7-Aug-22	70	70	70
8-Aug-22	70	70	70
9-Aug-22	64	64	64
10-Aug-22	62	62	62
11-Aug-22	48	66	57
12-Aug-22	57	75	66
13-Aug-22	48	70	59
14-Aug-22	73	73	73
15-Aug-22	73	73	73
16-Aug-22	70	70	70
17-Aug-22	73	73	73
18-Aug-22	66	66	66
19-Aug-22	75	75	75
20-Aug-22	66	66	66
21-Aug-22	73	73	73
22-Aug-22	73	73	73
23-Aug-22	73	73	73
24-Aug-22	73	73	73
25-Aug-22	50	70	60

Date	Meter No.X5 (cm)	Meter No.X6 (cm)	Average (cm)
26-Aug-22	53	75	64
27-Aug-22	73	73	73
28-Aug-22	73	73	73
29-Aug-22	73	73	73
30-Aug-22	75	75	75
31-Aug-22	75	75	75
1-Sep-22	70	70	70
2-Sep-22	73	75	74
3-Sep-22	75	75	75
4-Sep-22	66	66	66
5-Sep-22	66	66	66
6-Sep-22	73	73	73
7-Sep-22	68	68	68
8-Sep-22	73	73	73
9-Sep-22	68	68	68
10-Sep-22	68	68	68
11-Sep-22	75	75	75
12-Sep-22	75	75	75
13-Sep-22	75	75	75
14-Sep-22	64	64	64
15-Sep-22	68	68	68
16-Sep-22	68	70	69
17-Sep-22	75	75	75
18-Sep-22	66	66	66
19-Sep-22	66	66	66
20-Sep-22	70	68	69
21-Sep-22	62	62	62
22-Sep-22	66	66	66
23-Sep-22	64	64	64
24-Sep-22	64	64	64
25-Sep-22	68	68	68
26-Sep-22	68	68	68
27-Sep-22	64	64	64
28-Sep-22	68	68	68
29-Sep-22	64	62	63
30-Sep-22	66	66	66
Average	68	70	69
Min	48	59	57
Max	97	97	97

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

Date	Meter No.X6 (cm)	Meter No.X7 (cm)	Average (cm)
Pump Station No. 4X (Cell 4X)			
13-Aug-22	307	309	308
14-Aug-22	329	331	330
15-Aug-22	307	307	307
16-Aug-22	307	307	307
17-Aug-22	294	294	294
18-Aug-22	278	278	278
19-Aug-22	261	263	262
20-Aug-22	243	245	244
21-Aug-22	215	217	216
22-Aug-22	100	100	100
23-Aug-22	59	63	61
24-Aug-22	54	56	55
25-Aug-22	48	50	49
26-Aug-22	184	184	184
27-Aug-22	162	166	164
28-Aug-22	59	61	60
29-Aug-22	50	52	51
30-Aug-22	50	52	51
31-Aug-22	65	67	66
1-Sep-22	52	56	54
2-Sep-22	56	59	58
3-Sep-22	56	59	58
4-Sep-22	67	70	69
5-Sep-22	67	70	69
6-Sep-22	59	61	60
7-Sep-22	67	70	69
8-Sep-22	59	61	60
9-Sep-22	54	56	55
10-Sep-22	67	65	66
11-Sep-22	63	67	65
12-Sep-22	63	67	65
13-Sep-22	63	67	65
14-Sep-22	67	70	69
15-Sep-22	50	52	51
16-Sep-22	52	56	54
17-Sep-22	61	65	63
18-Sep-22	54	56	55
19-Sep-22	54	56	55
20-Sep-22	61	63	62
21-Sep-22	50	52	51
22-Sep-22	55	57	56
23-Sep-22	56	59	58
24-Sep-22	50	54	52
25-Sep-22	61	65	63
26-Sep-22	61	65	63
27-Sep-22	63	67	65
28-Sep-22	65	67	66
29-Sep-22	65	67	66
30-Sep-22	246	246	246
Average	109	111	110
Min	48	50	49
Max	329	331	330

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

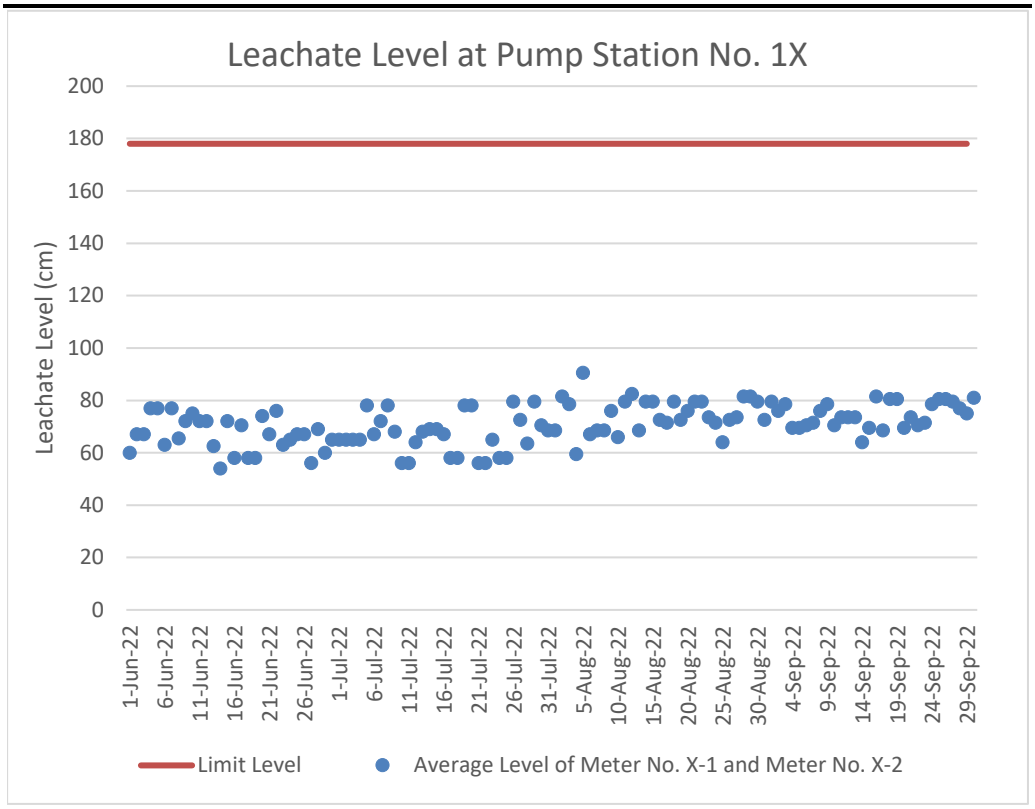


Figure F3.2 *Graphical Presentation for Leachate Levels Monitoring (Pump Station No.2X (Cell 2X))*

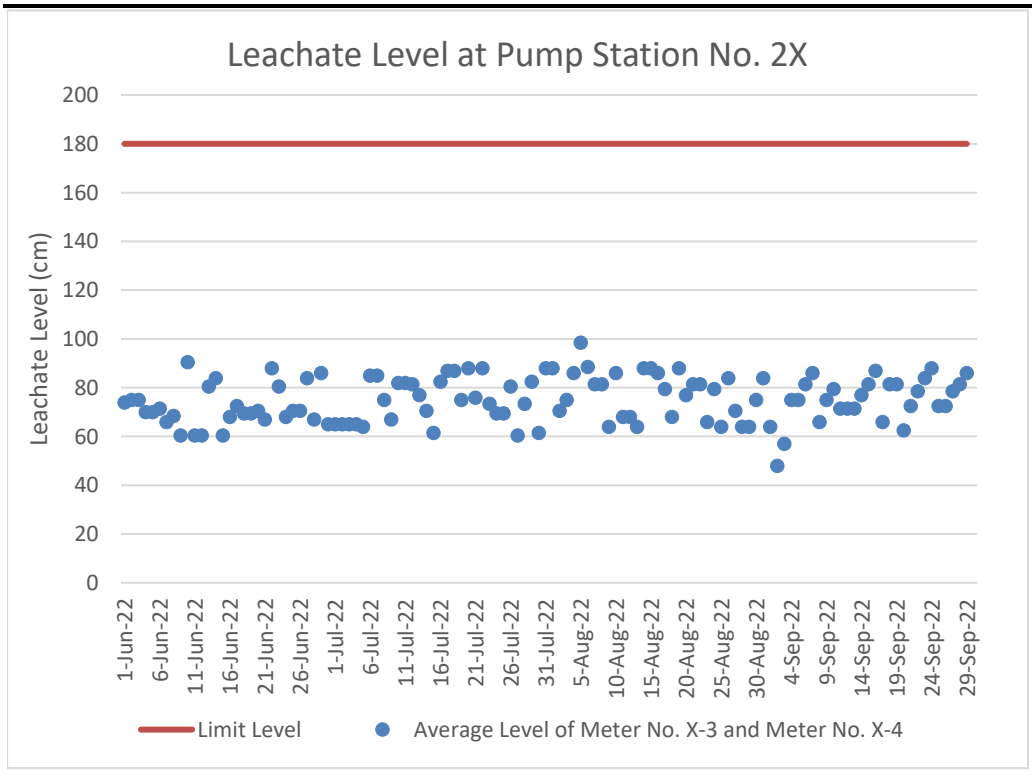


Figure F3.3 *Graphical Presentation for Leachate Levels Monitoring (Pump Station No.3X (Cell 3X))*

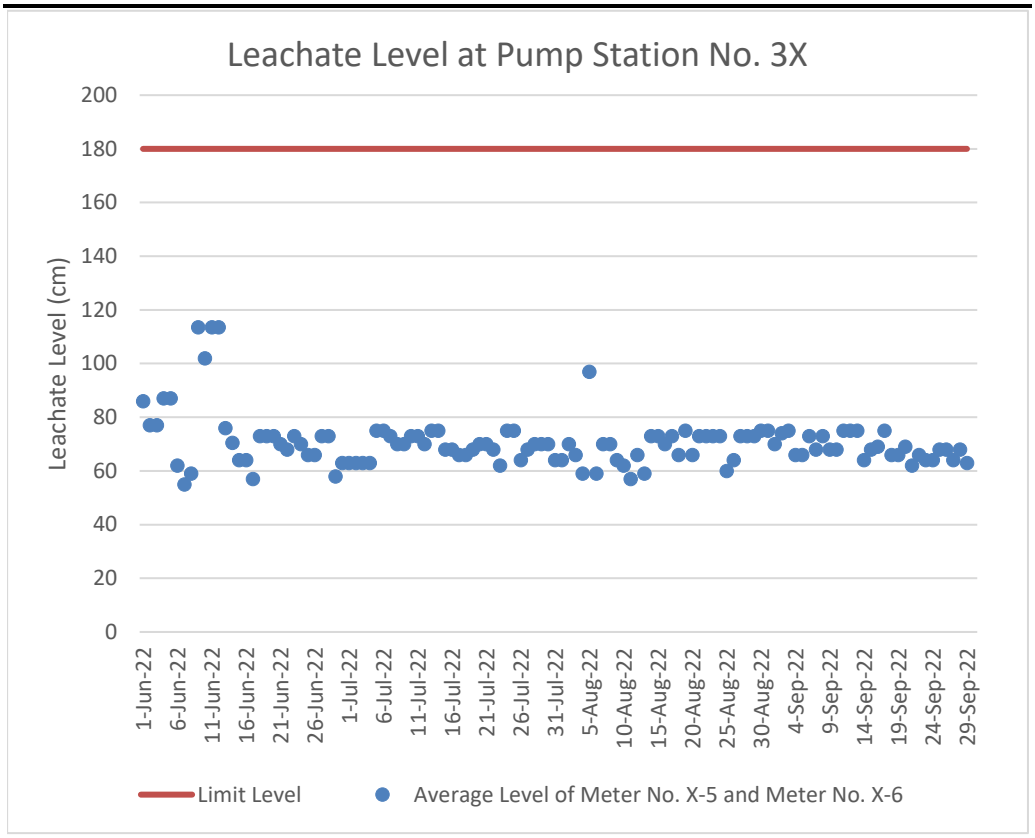
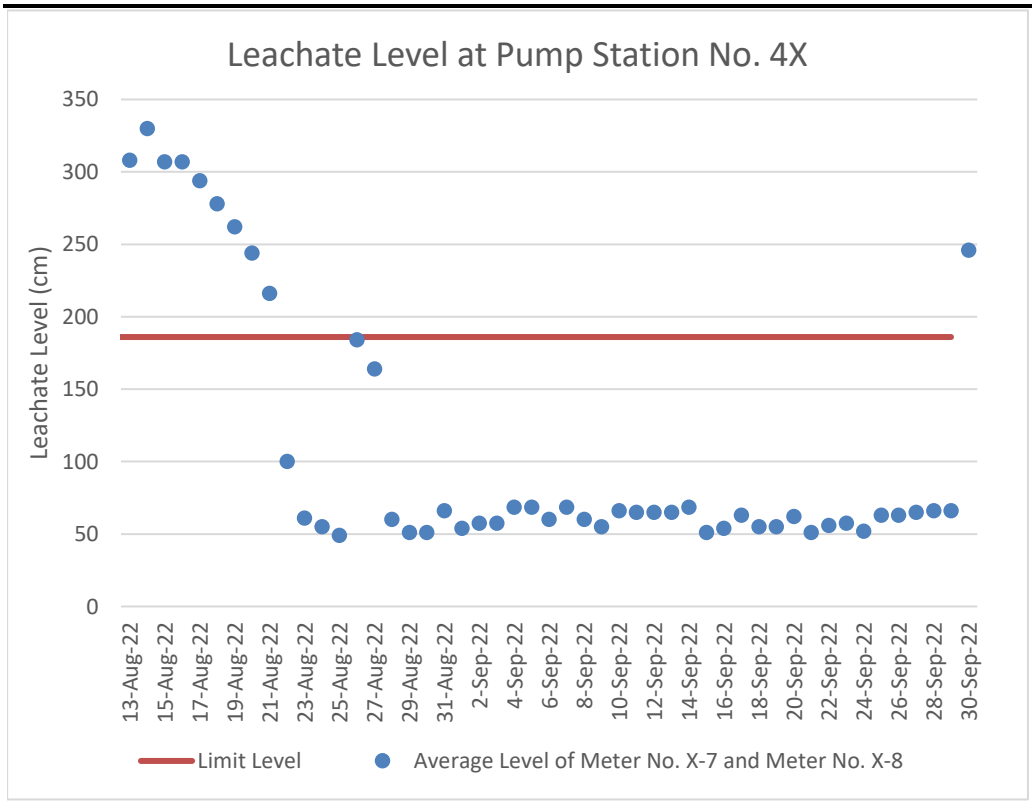


Figure F3.4 *Graphical Presentation for Leachate Levels Monitoring (Pump Station No.4X (Cell 4X))*



Annex F4

Effluent Quality Monitoring Results

Table F4.1 Effluent Monitoring Results

		1 Jul 22	3 Jul 22	4 Jul 22	5 Jul 22	6 Jul 22	7 Jul 22	8 Jul 22	9 Jul 22	11 Jul 22	12 Jul 22	13 Jul 22
On-site Measurements												
Temperature	°C	30.8	30.3	25.0	34.3	33.0	35.3	34.3	34.8	31.2	34.6	32.5
pH Value	pH Unit	8.4	8.3	8.4	8.4	8.4	8.4	8.4	8.4	8.6	8.4	8.2
Volume Discharged	m^3	1,227	1,552	1,051	905	1,059	1,073	926	793	364	41	46
Laboratory Analysis												
Suspended Solids (SS)	mg/L	17.9	61.8	15.6	20.8	21.4	27.1	20.3	38.9	7.6	17.0	15.2
Alkalinity	mg/L	1790	1260	1080	1300	1360	1470	1500	1600	1700	1720	1730
Ammoniacal-nitrogen	mg/L	1.05	0.31	0.42	0.45	0.37	0.16	0.26	0.29	0.29	0.33	0.53
Chloride	mg/L	1730	1450	1210	1490	1500	1580	1660	1740	1820	1620	1600
Nitrite-nitrogen	mg/L	1.23	0.08	0.16	0.08	0.10	0.08	0.09	0.15	0.28	0.34	0.32
Phosphate	mg/L	4.04	4.18	2.47	1.96	2.49	2.50	3.22	3.23	2.87	3.00	4.44
Sulphate	mg/L	290	281	340	470	459	458	390	339	315	276	282
Total Nitrogen	mg/L	101.0	110.0	103.0	88.0	90.7	93.0	105.0	91.1	95.1	105.0	108.0
Nitrate-nitrogen	mg/L	45.1	68.5	60.7	46.4	61.6	46.9	62.1	49.5	53.3	61.4	59.6
Total Inorganic Nitrogen	mg/L	47.38	68.89	61.28	46.93	62.07	47.14	62.45	49.94	53.87	62.07	60.45
Biochemical Oxygen Demand (BOD)	mg/L	5	10	9	7	6	9	5	7	8	8	11
Chemical Oxygen Demand (COD)	mg/L	861	739	608	671	639	702	709	674	758	779	739
Oil & Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Organic Carbon (TOC)	mg/L	344	280	252	186	284	290	286	317	309	254	260
Boron	µg/L	4820	3930	3500	3770	3880	3840	3860	4060	4440	4610	4580
Calcium	mg/L	39.6	46.0	64.0	60.8	57.6	53.9	49.6	47.1	43.4	43.0	43.1
Iron	mg/L	1.72	1.28	1.04	1.06	1.17	1.27	1.30	1.37	1.24	1.39	1.37
Magnesium	mg/L	25.0	25.8	24.6	25.3	26.3	26.9	26.8	26.3	25.1	26.2	26.2
Potassium	mg/L	782	624	524	589	634	639	665	682	714	737	737
Cadmium	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium	µg/L	103	79	67	75	80	86	88	91	93	90	89
Copper	µg/L	<10	<10	<10	<10	<10	<10	<10	21	<10	20	11
Nickel	µg/L	96	71	62	74	84	84	88	91	95	100	102
Zinc	µg/L	79	79	62	65	72	70	68	94	70	104	104

		14 Jul 22	15 Jul 22	16 Jul 22	17 Jul 22	18 Jul 22	19 Jul 22	20 Jul 22	21 Jul 22	22 Jul 22	23 Jul 22	24 Jul 22	25 Jul 22
On-site Measurements													
Temperature	°C	33.8	33.7	35.0	35.0	34.0	32.0	36.5	36.9	30.8	30.4	30.4	38.1
pH Value	pH Unit	8.3	8.3	8.2	8.2	8.3	8.3	8.3	8.3	8.5	8.6	8.6	8.5
Volume Discharged	m^3	108	1,197	1,176	1,126	830	789	1,077	1,303	1,309	1,312	1,316	1,192
Laboratory Analysis													
Suspended Solids (SS)	mg/L	7.8	26.0	26.8	95.2	18.3	24.1	24.4	18.8	25.8	14.5	61.0	19.5
Alkalinity	mg/L	1730	1700	1800	1820	1940	2000	2100	2050	2150	2120	2110	2230
Ammoniacal-nitrogen	mg/L	0.52	0.42	0.29	0.70	0.26	0.25	0.34	0.65	0.32	0.33	0.34	0.50
Chloride	mg/L	1640	1680	1800	1870	1870	1700	1760	1870	2000	2030	1950	2020
Nitrite-nitrogen	mg/L	0.47	0.12	0.12	0.13	0.14	0.11	0.11	0.12	0.14	0.16	0.12	0.16
Phosphate	mg/L	4.54	4.72	4.94	5.14	5.41	5.46	5.58	5.83	5.11	5.40	5.33	5.44
Sulphate	mg/L	303	283	258	274	220	162	172	202	186	198	176	182
Total Nitrogen	mg/L	97.2	90.6	92.2	99.4	98.0	92.1	95.0	97.4	109.0	106.0	111.0	111.0
Nitrate-nitrogen	mg/L	53.2	47.7	45.8	46.4	49.1	46.4	43.2	49.5	54.7	50.7	52.6	54.1
Total Inorganic Nitrogen	mg/L	54.19	48.24	46.21	47.23	49.50	46.76	43.65	50.27	55.16	51.19	53.06	54.76
Biochemical Oxygen Demand (BOD)	mg/L	11	11	12	8	6	9	8	3	6	4	13	7
Chemical Oxygen Demand (COD)	mg/L	641	739	770	746	840	832	899	837	887	940	953	997
Oil & Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Organic Carbon (TOC)	mg/L	304	309	320	359	354	348	380	374	366	380	394	401
Boron	µg/L	4620	4620	4680	4530	4920	4790	5040	5160	5570	5220	5970	6020
Calcium	mg/L	41.0	44.3	40.5	39.2	32.2	36.1	33.5	36.5	29.0	30.6	33.0	29.6
Iron	mg/L	1.24	1.46	1.39	1.60	1.40	1.57	1.55	1.52	1.56	1.67	1.74	1.79
Magnesium	mg/L	23.8	29.4	30.5	30.4	27.7	27.8	29.1	30.1	26.1	27.5	29.4	27.4
Potassium	mg/L	711	738	739	734	740	789	829	849	786	828	858	923
Cadmium	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium	µg/L	89	92	97	104	106	104	105	106	114	123	122	133
Copper	µg/L	<10	<10	11	<10	<10	<10	<10	<10	17	63	64	<10
Nickel	µg/L	98	96	104	103	108	104	105	107	114	120	119	127
Zinc	µg/L	70	72	82	88	73	76	69	74	81	105	108	78

		26 Jul 22	27 Jul 22	28 Jul 22	29 Jul 22	30 Jul 22	31 Jul 22	1 Aug 22	2 Aug 22	3 Aug 22	7 Sep 22
On-site Measurements											
Temperature	°C	38.1	37.8	35.7	35.5	34.9	32.5	37.0	37.0	36.7	32.9
pH Value	pH Unit	8.2	8.2	8.4	8.4	8.5	8.5	8.3	8.4	8.3	8.4
Volume Discharged	m^3	1,192	1,010	1,074	1,273	1,086	1,127	831	918	1,202	1,251
Laboratory Analysis											
Suspended Solids (SS)	mg/L	33.5	45.5	40.5	41.6	37.9	40.8	27.0	24.5	26.8	25.4
Alkalinity	mg/L	2220	2310	2320	2310	2270	2310	2460	2470	2280	1980
Ammoniacal-nitrogen	mg/L	0.54	0.49	0.35	0.59	0.49	0.55	0.30	0.44	0.32	0.29
Chloride	mg/L	1920	2070	2000	1990	2000	2000	2060	2090	2000	1730
Nitrite-nitrogen	mg/L	0.16	0.13	0.14	0.14	0.16	0.16	0.16	0.14	0.16	0.11
Phosphate	mg/L	5.7	5.41	5.74	6.4	6.53	5.72	6.47	6.55	7.28	5.73
Sulphate	mg/L	157	165	174	171	197	186	193	167	163	149
Total Nitrogen	mg/L	104.0	103	100.0	103.0	107.0	110.0	92.6	94.2	99.5	86.5
Nitrate-nitrogen	mg/L	55	56.8	47.5	48.1	49.2	48.9	37.8	36.6	48.1	45.7
Total Inorganic Nitrogen	mg/L	55.70	57.42	47.99	48.83	49.85	49.61	38.26	37.18	48.58	46.10
Biochemical Oxygen Demand (BOD)	mg/L	9	10	10	8	7	8	10	10	8	8
Chemical Oxygen Demand (COD)	mg/L	990	1040	963	973	978	953	921	1030	1000	1110
Oil & Grease	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Organic Carbon (TOC)	mg/L	382	434	424	395	394	412	426	410	340	273
Boron	µg/L	5570	5260	5100	5560	5550	5620	5900	5880	5500	4850
Calcium	mg/L	28.1	23.8	27.3	26.6	27.4	26.4	25.7	25.7	24.9	29.2
Iron	mg/L	1.93	1.7	1.77	1.85	1.82	1.83	1.92	1.95	1.80	1.38
Magnesium	mg/L	29.8	23.4	26.3	25.8	26.6	26.4	27.8	28.1	26.6	19.5
Potassium	mg/L	871	794	904	877	900	890	968	983	919	785
Cadmium	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium	µg/L	129	124	115	122	126	127	134	129	115	109
Copper	µg/L	<10	15	<10	<10	<10	<10	<10	<10	<10	<10
Nickel	µg/L	126	114	109	113	116	118	124	118	106	108
Zinc	µg/L	84	84	64	68	66	69	71	67	59	58

Annex F5

Groundwater Monitoring Results

Table F5.1 Groundwater Monitoring Results (July 2022)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.5	3.63	3.7	3.73	3.76	3.76	3.37	3.62	4.59	4.74	4.73	7.17	38.35	46.08
Bicarbonate Alkalinity as CaCO3	mg/L	107	276	163	<1	36	<1	<1	<1	171	173	122	56	16	11
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	61	22	103	91	82	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	107	276	163	68	58	170	141	116	171	173	122	56	16	11
pH Value	pH Unit	8	7.9	7.8	10.3	9.4	11.3	11.1	10.7	8.1	7.6	7.6	6.9	5.7	5.3
Electrical Conductivity	µS/cm	702	2060	1080	681	883	1300	1300	3140	14600	1380	433	319	92	120
Ammonia as N	mg/L	0.26	0.21	1.12	2	0.55	3.25	4.85	14	0.63	<0.01	0.02	0.01	<0.01	<0.01
Chloride	mg/L	101	338	154	108	127	169	195	1020	4130	228	36	18	14	22
Nitrite as N	mg/L	<0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Reactive Phosphorus as P	mg/L	<0.01	0.07	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.02	<0.01	0.03	<0.01	<0.01
Sulphate as SO4 - Turbidimetric	mg/L	70	209	132	81	135	132	138	42	795	154	45	68	3	4
Sulphide as S2	mg/L	0.1	<0.1	<0.1	3.4	<0.1	3.6	5.1	13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/L	0.4	0.4	1.3	2	0.9	3.7	5.1	14.2	0.9	0.1	0.1	<0.1	<0.1	<0.1
Nitrate as N	mg/L	<0.01	0.78	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	0.17	<0.01	0.13	0.18
Total Nitrogen as N	mg/L	0.4	1.2	1.4	2	0.9	3.7	5.1	14.2	1	0.1	0.3	<0.1	0.2	0.2
Boron	µg/L	110	290	190	220	220	200	220	540	2690	160	90	20	20	20
Calcium	mg/L	42.8	78.4	91.3	18.5	18.2	36.4	23.9	71.3	111	104	45.7	28.6	0.92	1.4
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	4.95	75.2	6.42	1.32	0.31	<0.05	<0.05	0.13	228	11.1	2.54	4.58	1	1.2
Sodium	mg/L	73	224	106	92.1	123	161	186	582	2460	156	33.2	24	13	16.2
Iron	mg/L	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.32	<0.04	<0.04
Potassium	mg/L	17.1	22.6	27.1	27.4	47.8	62.4	53.1	4.06	11.8	12.4	7.43	2.93	3.81	4.16
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	2	<1	<1	<1	<1	1	2	<1	<1	<1
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	517	366	936	2	3	<1	<1	<1	229	1490	9	738	17	16
Nickel	µg/L	<1	<1	<1	<1	<1	1	2	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	13	10	12
Biochemical Oxygen Demand	mg/L	<2	<2	2	<2	<2	3	<2	13	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	26	6	15	16	12	32	35	42	60	15	9	<2	<2	6
Total Organic Carbon	mg/L	6	2	9	7	8	11	14	12	6	6	5	1	1	4

Table F5.2 Groundwater Monitoring Results (August 2022)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.58	3.69	3.79	3.87	3.95	3.83	3.31	3.61	4.36	4.38	5.46	7.28	38.57	45.07
Bicarbonate Alkalinity as CaCO3	mg/L	95	210	178	<1	49	<1	<1	<1	60	182	143	59	18	12
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	76	22	134	111	82	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	95	210	178	100	71	200	152	109	60	182	143	59	18	12
pH Value	pH Unit	8.2	8	7.9	10.8	9.4	11.4	11	10.7	8.2	7.7	7.9	7	6.1	5.8
Electrical Conductivity	µS/cm	536	6390	1120	834	828	1360	1380	2480	2400	1280	408	325	96	122
Ammonia as N	mg/L	0.2	1.38	1.29	1.91	0.55	2.79	5.63	9.22	0.97	0.01	0.01	<0.01	0.03	<0.01
Chloride	mg/L	81	1950	176	133	117	197	274	636	520	221	28	21	15	24
Nitrite as N	mg/L	<0.01	0.34	0.01	0.01	<0.01	<0.01	<0.01	0.32	0.16	<0.01	<0.01	<0.01	<0.01	<0.01
Reactive Phosphorus as P	mg/L	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	0.04	<0.01	<0.01
Sulphate as SO4 - Turbidimetric	mg/L	42	310	123	91	135	112	97	116	388	151	30	65	3	5
Sulphide as S2	mg/L	0.1	<0.1	<0.1	5.6	0.4	11.3	14.2	9.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/L	0.4	1.5	1.6	2.3	1	3.6	6.5	10.2	1.6	0.2	<0.1	<0.1	<0.1	<0.1
Nitrate as N	mg/L	<0.01	0.17	<0.01	<0.01	<0.01	<0.01	0.01	0.07	2.3	<0.01	0.1	<0.01	0.13	0.17
Total Nitrogen as N	mg/L	0.4	2	1.6	2.3	1	3.6	6.6	10.6	4	0.2	0.2	<0.1	0.2	0.2
Boron	µg/L	100	970	220	210	240	180	250	410	640	230	80	30	20	20
Calcium	mg/L	28.1	90	85.3	32.1	14.1	39.7	22.2	42.1	82.6	90.8	46.9	28.5	0.84	1.19
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	4.49	106	5.64	0.28	0.19	<0.05	<0.05	0.09	25.5	9.43	2.58	4.33	0.96	1.2
Sodium	mg/L	53.9	1060	105	104	113	162	196	320	407	133	24.6	23.8	12.6	15.2
Iron	mg/L	0.05	<0.04	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.53	<0.04	<0.04
Potassium	mg/L	12.7	48.7	27.2	28.5	45.8	62.5	51.9	49.4	46.5	11.4	6.76	2.92	3.78	4.25
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	2	<1	<1	<1	2	<1	<1	<1	2	4
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	336	130	854	3	2	<1	<1	<1	50	986	13	778	35	11
Nickel	µg/L	<1	<1	<1	<1	<1	1	2	2	1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	12	<10	<10	<10	<10	<10	<10	<10	11	11	14
Biochemical Oxygen Demand	mg/L	<2	<2	2	<2	<2	6	3	<2	<2	<2	<2	2	<2	<2
Chemical Oxygen Demand	mg/L	10	17	19	21	20	30	43	29	28	8	7	6	6	5
Total Organic Carbon	mg/L	2	<1	6	6	7	9	12	11	8	1	2	1	1	<1

Table F5.3 Groundwater Monitoring Results (September 2022)

Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.09	3.3	3.21	3.32	3.38	3.3	2.88	3.14	3.65	3.81	4.01	6.99	37.41	45.7
Bicarbonate Alkalinity as CaCO3	mg/L	108	269	155	<1	20	<1	<1	<1	108	173	132	58	18	12
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	92	38	145	122	102	<1	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	mg/L	108	269	155	118	57	185	155	123	108	173	132	58	18	12
pH Value	pH Unit	8.2	8.2	8.2	11.2	9.8	11.3	11.2	11.1	8.2	7.9	7.3	7.2	6	5.6
Electrical Conductivity	µS/cm	1570	989	1240	833	1000	1250	1200	1620	8450	1220	335	315	91	117
Ammonia as N	mg/L	0.59	0.04	1.78	2.88	1.48	3.54	5.04	5.74	1.68	<0.01	<0.01	<0.01	0.03	<0.01
Chloride	mg/L	373	53	205	132	173	193	185	297	2510	214	20	21	14	25
Nitrite as N	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	0.15	<0.01	<0.01	<0.01	<0.01	<0.01
Reactive Phosphorus as P	mg/L	0.02	0.01	0.01	<0.01	<0.01	0.01	0.01	<0.01	0.03	0.03	0.01	0.04	0.01	<0.01
Sulphate as SO4 - Turbidimetric	mg/L	77	179	132	75	133	109	127	177	567	124	12	64	3	4
Sulphide as S2	mg/L	0.2	<0.1	0.1	5.4	2	9.2	7.5	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/L	0.7	0.2	1.9	3	1.7	3.9	5.4	6.1	1.8	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as N	mg/L	<0.01	0.71	<0.01	<0.01	<0.01	<0.01	0.01	0.02	1.6	<0.01	0.05	<0.01	0.12	0.17
Total Nitrogen as N	mg/L	0.7	0.9	1.9	3	1.7	3.9	5.4	6.2	3.5	<0.1	<0.1	<0.1	0.2	0.2
Boron	µg/L	200	190	210	190	210	190	200	180	560	150	40	20	20	10
Calcium	mg/L	57.4	62	80.6	36.2	16.2	32.9	27.1	40.8	141	93.4	41.9	29.2	0.97	1.12
Mercury	µg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Magnesium	mg/L	13.3	56.4	5.59	<0.05	0.17	<0.05	<0.05	0.06	31.5	10.2	2.38	4.53	1.08	1.25
Sodium	mg/L	185	61.3	117	90.8	145	152	153	209	525	140	21	25.3	13.8	16.7
Iron	mg/L	0.1	<0.04	0.15	<0.04	0.24	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.62	0.15	<0.04
Potassium	mg/L	19.8	13.6	28.2	28.3	50.1	57.1	47.8	64.9	63.2	11.4	6.25	3.35	4.28	4.75
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	2	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	1	2
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	806	174	1060	<1	1	<1	<1	<1	64	1690	15	797	32	12
Nickel	µg/L	<1	<1	<1	<1	1	1	2	3	1	<1	<1	<1	<1	<1
Zinc	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	11	10
Biochemical Oxygen Demand	mg/L	<2	<2	<2	<2	<2	<2	4	<2	<2	<2	<2	<2	<2	<2
Chemical Oxygen Demand	mg/L	15	5	21	26	24	44	42	27	29	5	3	<2	<2	<2
Total Organic Carbon	mg/L	3	<1	7	6	7	10	10	11	12	1	1	1	<1	<1

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

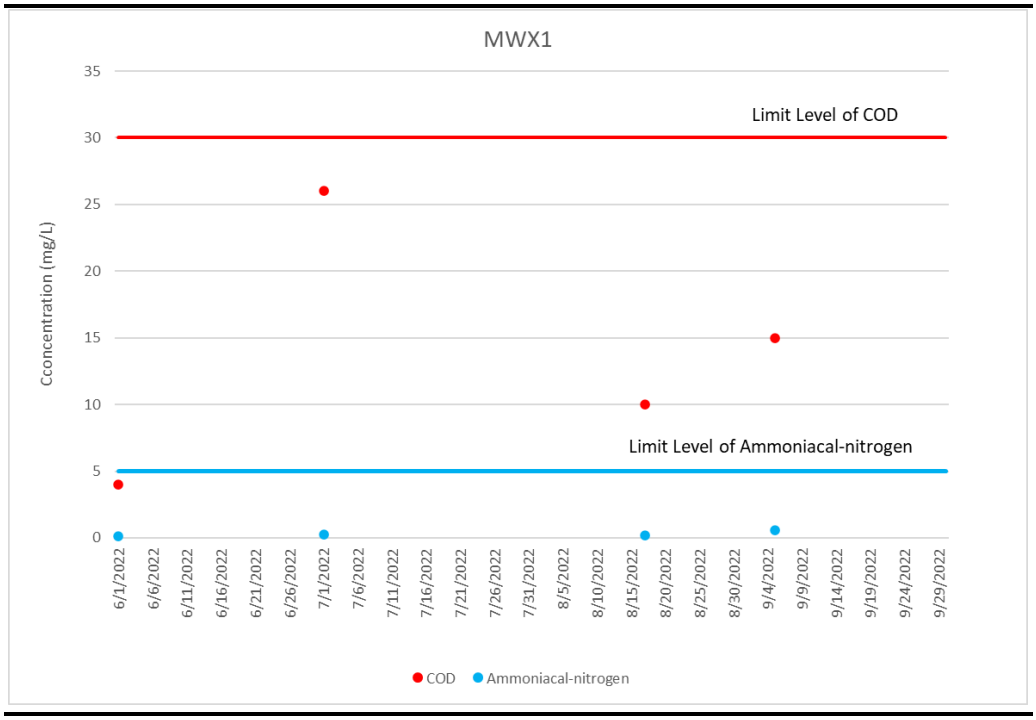


Figure F5.2 Graphical Presentation for Groundwater Monitoring (MWX-2)

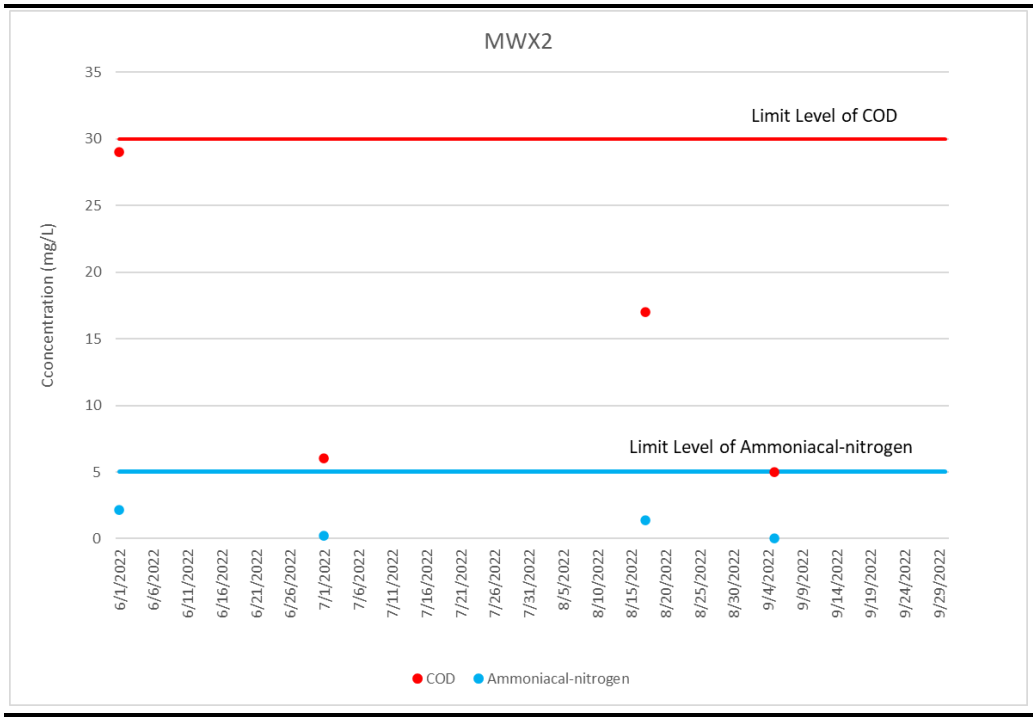


Figure F5.3 Graphical Presentation for Groundwater Monitoring (MWX-3)

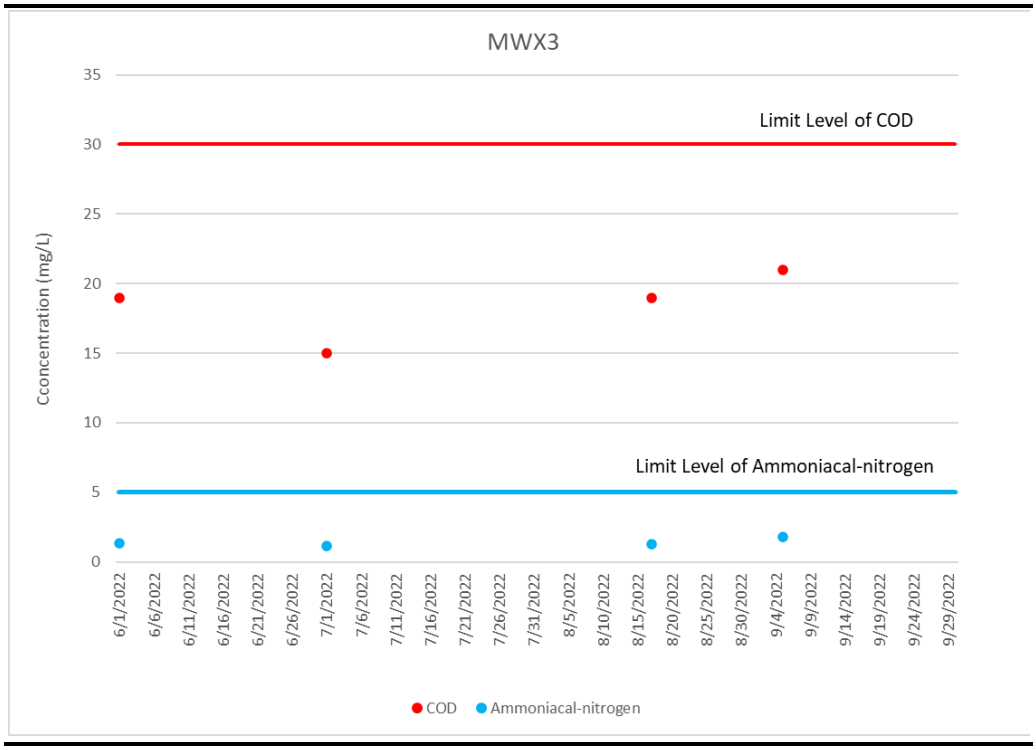


Figure F5.4 Graphical Presentation for Groundwater Monitoring (MWX-4)

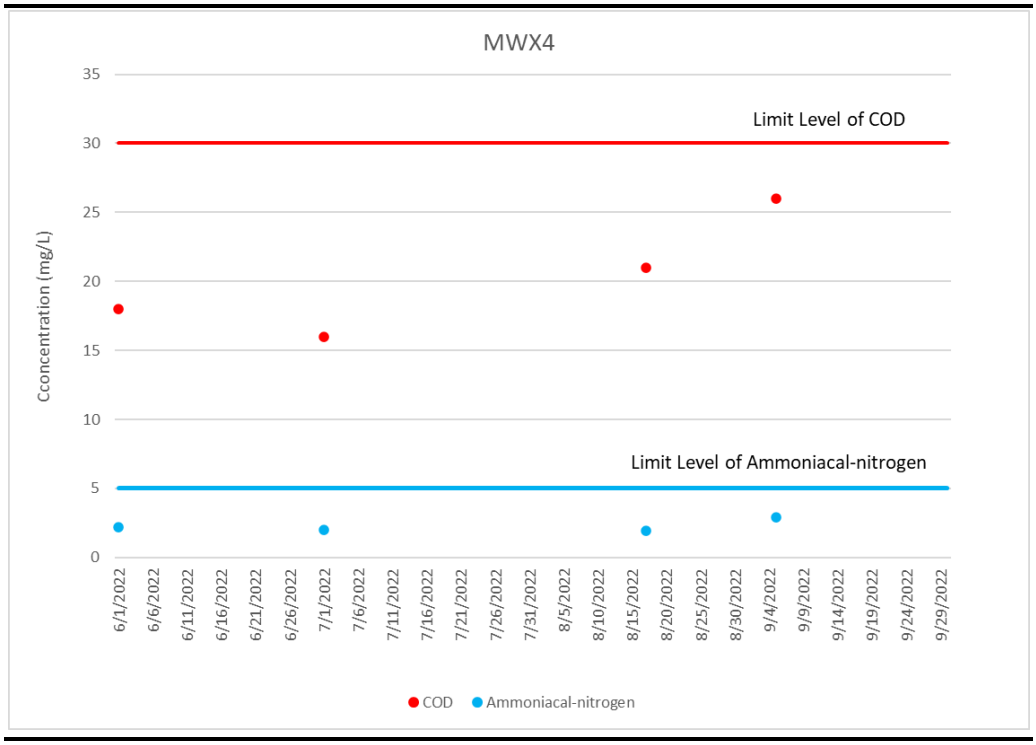


Figure F5.5 Graphical Presentation for Groundwater Monitoring (MWX-5)

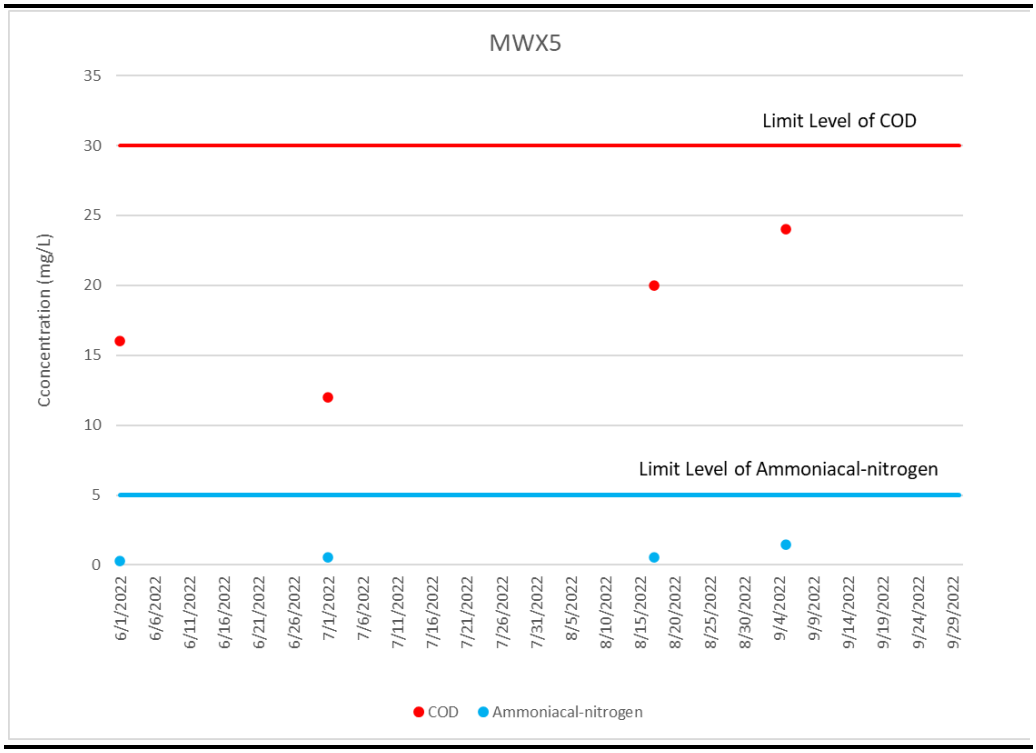


Figure F5.6 Graphical Presentation for Groundwater Monitoring (MWX-6)

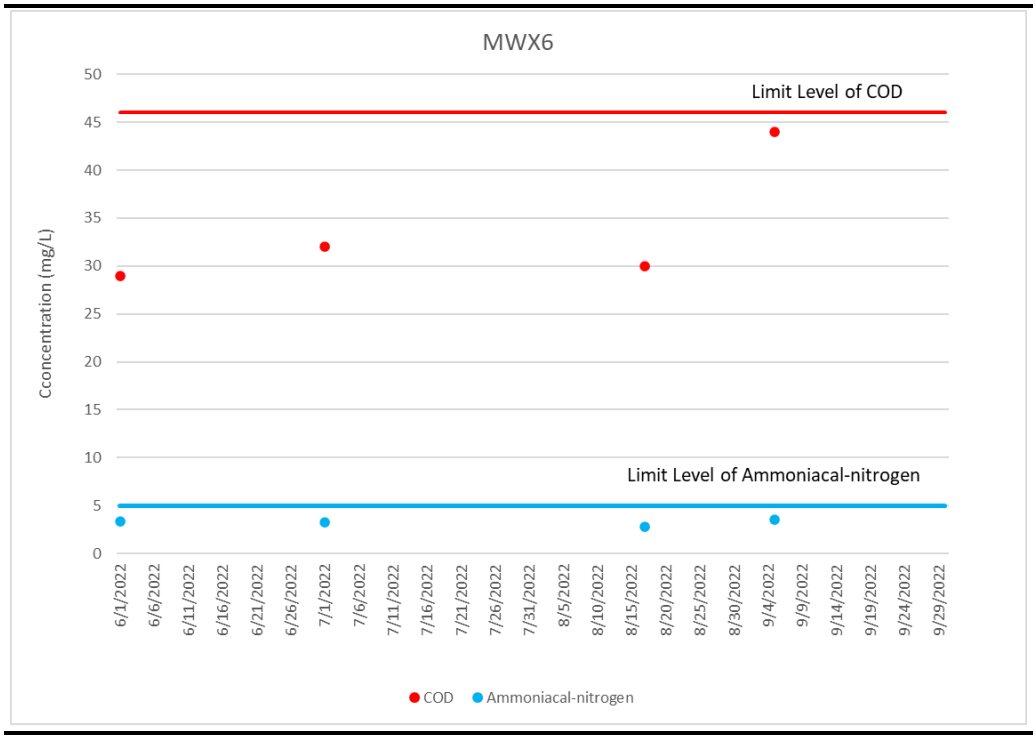


Figure F5.7 Graphical Presentation for Groundwater Monitoring (MWX-7)

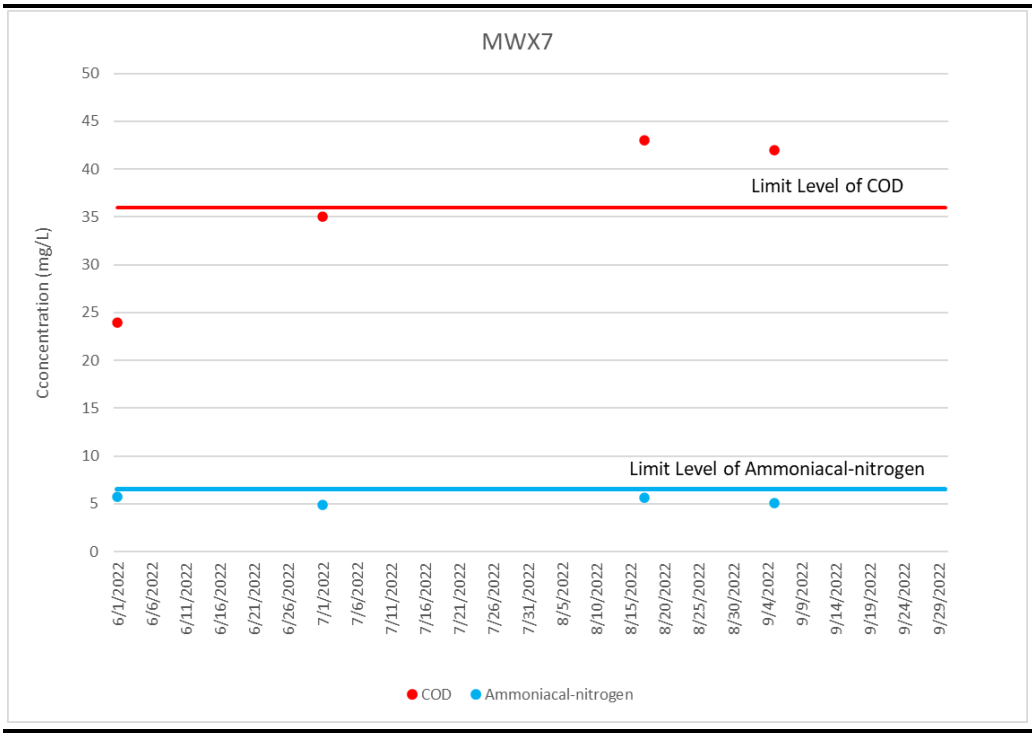


Figure F5.8 Graphical Presentation for Groundwater Monitoring (MWX-8)

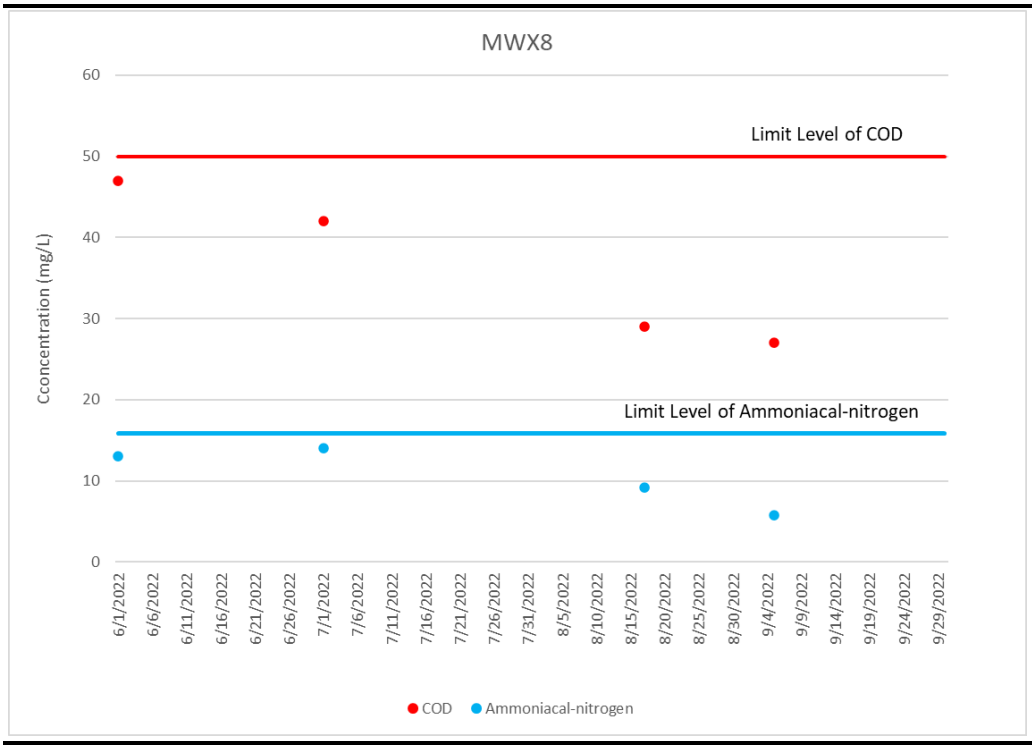


Figure F5.9 Graphical Presentation for Groundwater Monitoring (MWX-9)

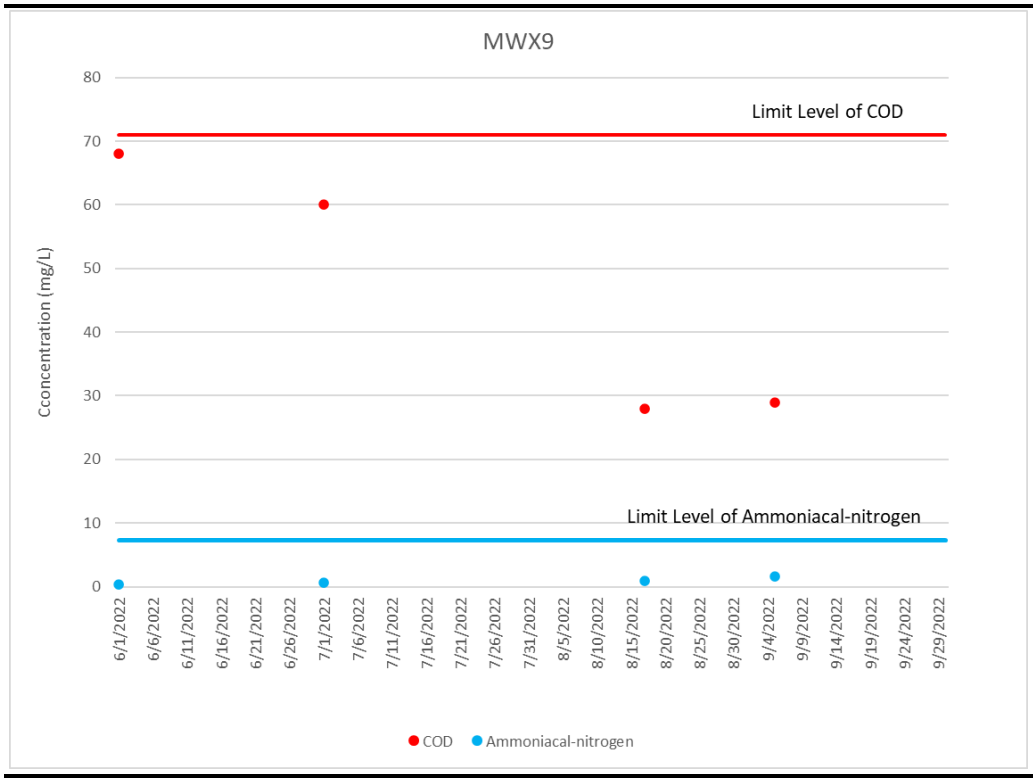


Figure F5.10 Graphical Presentation for Groundwater Monitoring (MWX-10)

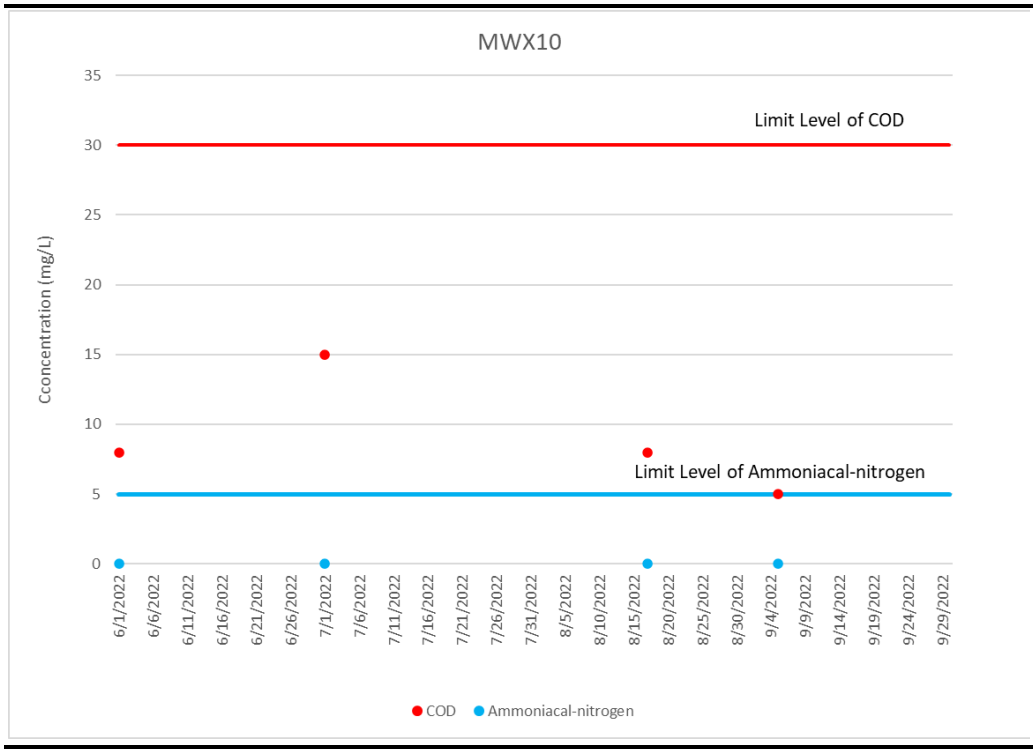


Figure F5.11 Graphical Presentation for Groundwater Monitoring (MWX-11)

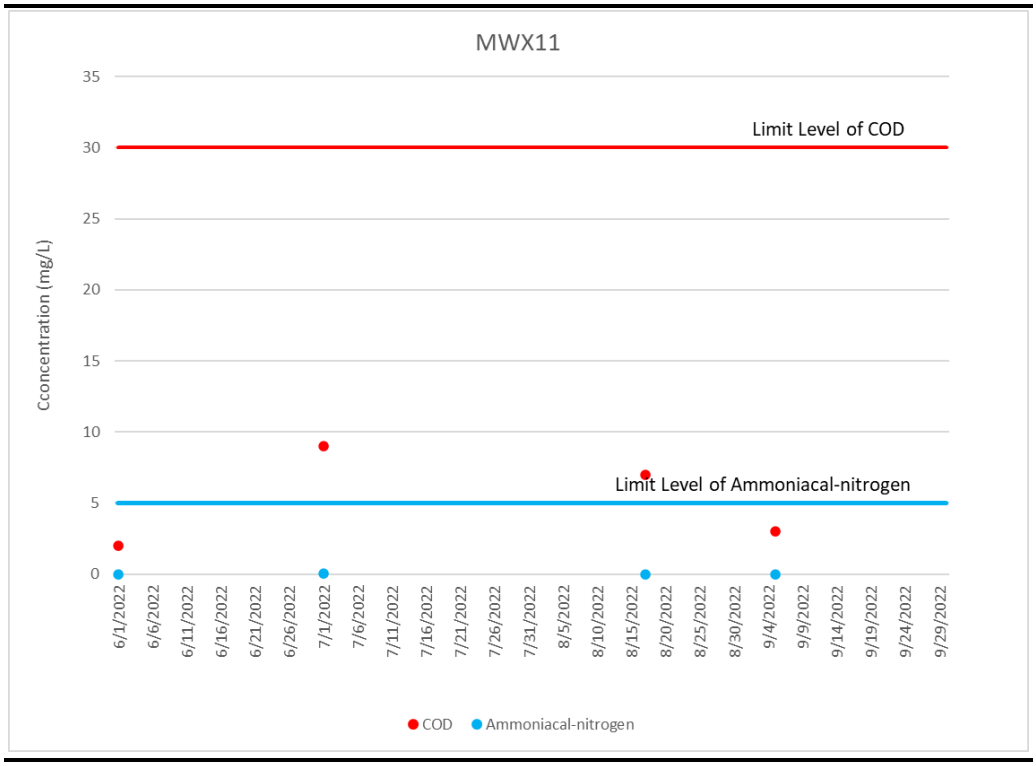


Figure F5.12 Graphical Presentation for Groundwater Monitoring (MWX-12)

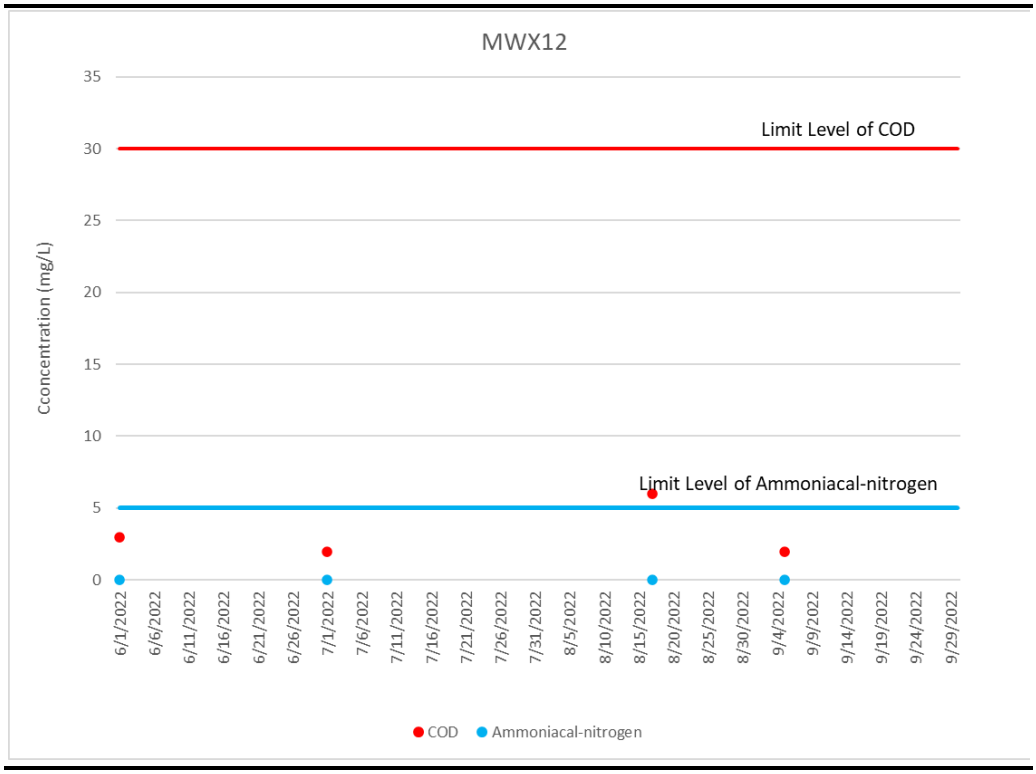


Figure F5.13 Graphical Presentation for Groundwater Monitoring (MWX-13)

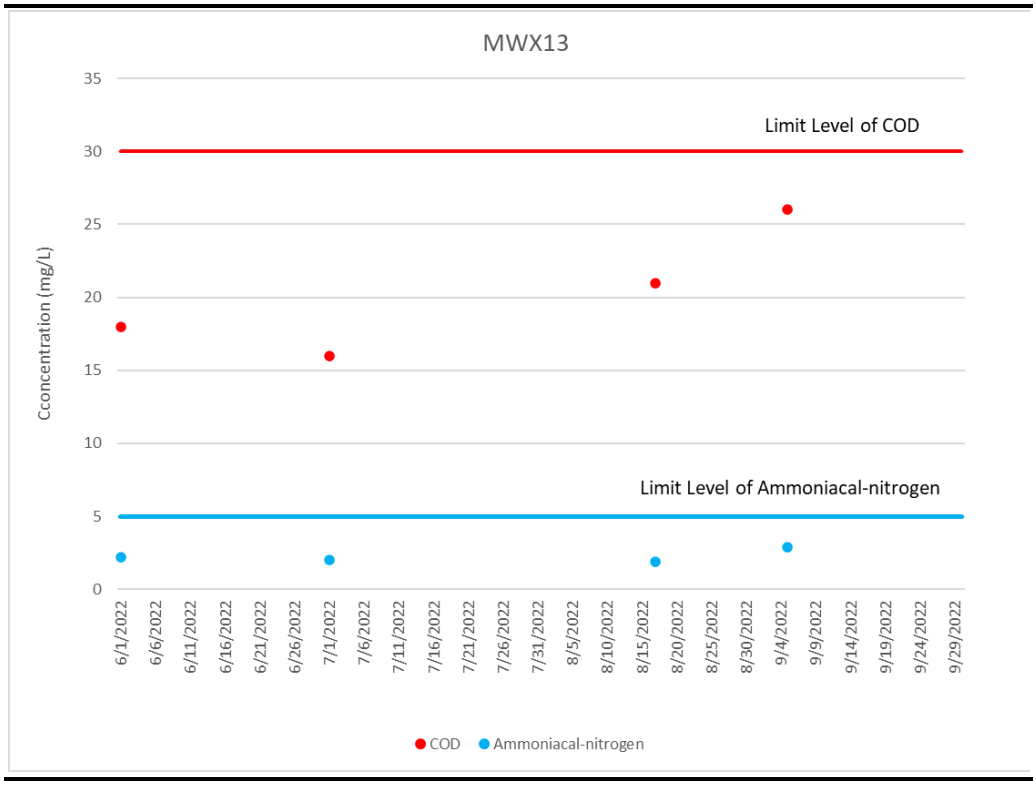
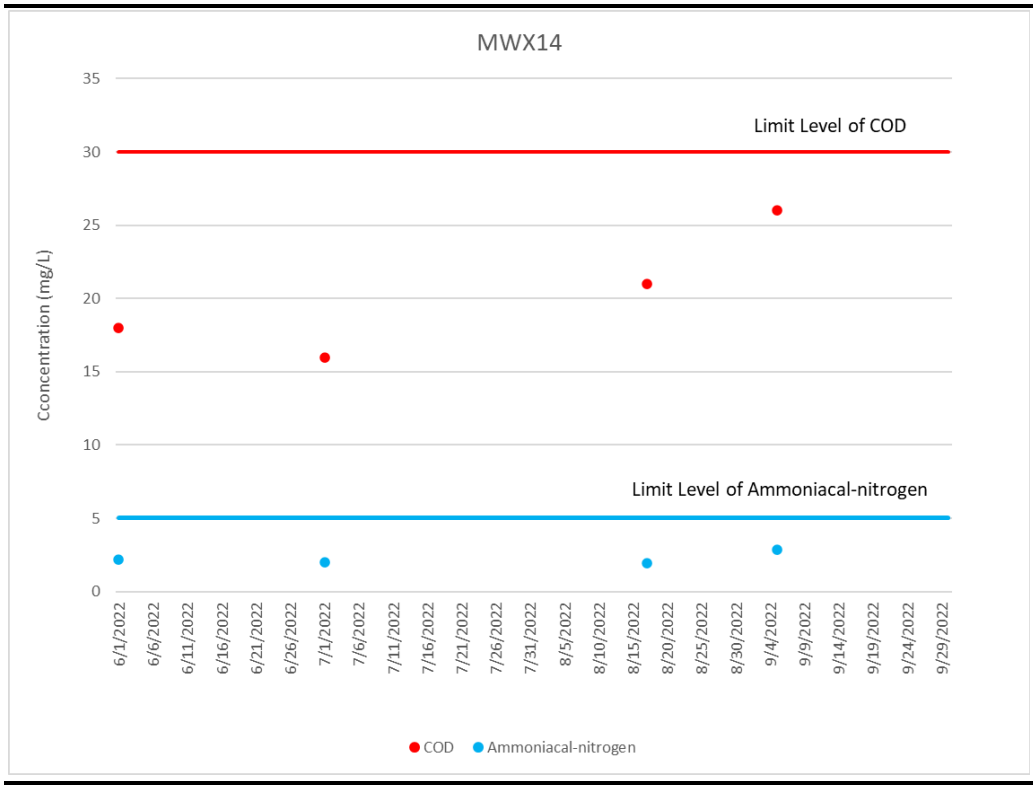


Figure F5.14 Graphical Presentation for Groundwater Monitoring (MWX-14)



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	8 July 2022
Time	10:45
Monitoring Location	DP4
Parameter	Surface Water (Suspended Solids (SS))
Limit Level	>20 mg/L
Measured Level	26.3 mg /L
Possible reason	From the on-site rainfall record of July 2022, heavy rainfall events were recorded on 1, 2 and 6 July 2022 before the sampling event. Amber rainstorm warning signal was also issued by the Hong Kong Observatory on 1 July 2022. No works which may lead to potential SS increase (e.g. active stockpiling and excavation works) was conducted in the vicinity of surface water channel leading to DP4 on the sampling day based on on-site observations and construction activities described by the Contractor. Site surface runoff at DP4 channel was treated by the Wetsep prior to discharge. During the sampling event, no raining was recorded and no other sources (e.g. other project sites) was identified in the vicinity of surface water channel leading to DP4 which might cause the SS exceedance at DP4. Contaminated runoff from the unpaved areas during the previous rainfall events could be the potential source of SS contributing to the exceedance. The SS exceedance at DP4 was therefore deemed to Project-related activities. It should be noted that although the measured SS level exceeded the limit level of the EM&A programme, it is still within the WPCO effluent discharge limit of SS for the Junk Bay Water Control Zone (30 mg/L). The discharge of surface water with this SS level from DP4 will not cause adverse water quality impact to the Junk Bay Water Control Zone.
Action Taken / Action to be Taken	Weekly surface water quality monitoring (SS) shall be continued at DP4 until no exceedance of Limit Level in accordance with Table 4.5b of the updated EM&A Manual. 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. In addition, the Contractor shall review the efficiency of the Wetsep near sediment trap and monitor the Wetsep operation regularly to

	ensure it is functioning properly at all times.
Remarks	-

Prepared by: Abbey Lau
Designation: Environmental Team
Date: 19 July 2022

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	12 August 2022 – 20 August 2022
Monitoring Location	Pump Station No. 4X (Cell 4X)
Parameter	Leachate level
Limit Levels	> 186 cm
Measured Level	<u>Average of Meter No. X-7 and No. X-8</u> 12 Aug 2022: 308 cm 13 Aug 2022: 330 cm 14 Aug 2022: 307 cm 15 Aug 2022: 307 cm 16 Aug 2022: 294 cm 17 Aug 2022: 278 cm 18 Aug 2022: 262 cm 19 Aug 2022: 244 cm 20 Aug 2022: 216 cm
Possible reason	As confirmed by the Contractor, the leachate collection system and leachate treatment plant were under normal operating conditions during the reporting period. From the on-site rainfall record of August 2022, heavy rainfall events (up to 63 mm per day) were recorded from 2 to 12 August 2022, before the commencement of Cell 4X operation. Amber rainstorm warning signal was also issued by the Hong Kong Observatory on 3, 5 and 12 August 2022. Light rainfall events (up to 7mm per day) were recorded from 13 August to 20 August 2022. Upon the commencement of Cell 4X operation (on 12 August 2022), the ET site representative observed the accumulation of surface water at Cell 4X basin, at a distance from the actual tipping area, which could contribute to the exceedances. Based on this observation, the leachate level exceedances at Pump Station No. 4X were deemed to Project-related activities. It is understood that the large volume of leachate (contaminated surface runoff) accumulated at Cell 4X has exceeded the leachate treatment capacity (average daily effluent discharge volume of 1,941 m^3 recorded from 12 to 20 August 2022, 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 ET requested the Contractor to notify the ET, IEC, IC and the Employer immediately if there is an exceedance of the leachate level. The ET site representative will conduct more frequently inspections of the

	leachate level meter during the routine inspection. 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: 19 September 2022

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	18 August 2022
Time	11:25
Monitoring Location	MWX-7
Parameter	Chemical Oxygen Demand (COD)
Limit Levels	>36 mg /L
Measured Level	43 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 well MWX-7 (5.63 mg/L) and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-7 (MWX-6: 30 mg/L and MWX-8: 29 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 6 September 2022 to confirm findings. Exceedance of COD Limit Level was recorded at MWX-7 (42 mg/L) during the sampling event. MWX-7 showed consecutive exceedance of the groundwater quality limit. According to the findings of the desktop review commissioned by GVL and EPD (the Employer) in May 2021 to investigate the potential sources of the elevated methane levels at the perimeter landfill gas monitoring wells at SENTX, pockets of organic matters are identified in the fill materials of the SENTX site upon review of the historical site investigation borehole logs at the Project Site area. It is possible that the elevated COD concentration measured at MWX-7 (with detection of elevated levels of methane (up to 4.2% v/v)) on 18 August 2022 could be due to localised organic matters within or around the monitoring wells and background fluctuation. Due to the presence of influencing factor from non-project source and the COD levels at all other groundwater monitoring wells are within the respective limit level, there is no adequate evidence showing that the COD level exceedance measured at MWX-7 on 18 August 2022 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 range

	of the groundwater baseline monitoring results (49 mg/L), 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 18 August 2022 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: 30 September 2022

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	6 September 2022
Time	13:32
Monitoring Location	MWX-7
Parameter	Chemical Oxygen Demand (COD)
Limit Levels	>36 mg /L
Measured Level	42 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 well MWX-7 (5.04 mg/L) and the COD monitoring results of the groundwater monitoring wells adjacent to MWX-7 (MWX-6: 44 mg/L and MWX-8: 27 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 11 October 2022 to confirm findings. COD concentration of 22 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 (with detection of elevated levels of methane (up to 4.2% v/v)) on 18 August 2022 could be due to localised organic matters within or around the monitoring wells and background fluctuation. Due to the presence of influencing factor from non-project source and the subsequent month monitoring result at MWX-7 did not show any exceedance, there is no adequate evidence showing that the COD level exceedance measured at MWX-7 on 6 September 2022 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 range of the groundwater baseline monitoring results (49 mg/L), 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 6 September 2022 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: 23 November 2022

Investigation Report of Environmental Quality Limit Exceedance

Project	South East New Territories (SENT) Landfill Extension
Date	30 September 2022 – 3 October 2022
Monitoring Location	Pump Station No. 4X (Cell 4X)
Parameter	Leachate level
Limit Levels	> 186 cm
Measured Level	Average of Meter No. X-7 and No. X-8 30 Sep 2022: 246 cm 1 Oct 2022: 254 cm 2 Oct 2022: 234 cm 3 Oct 2022: 212 cm
Possible reason	As confirmed by the Contractor, the leachate collection system and leachate treatment plant were under normal operating conditions during the reporting period. From the on-site rainfall record of September and October 2022, heavy rainfall events (up to 98 mm per day) were recorded from 30 September to 3 October 2022. Amber rainstorm warning signal was also issued by the Hong Kong Observatory on 30 September 2022. Accumulation of surface water at Cell 4X basin was observed during the reporting period, which could contribute to the leachate level exceedances. Based on this observation, the leachate level exceedances at Pump Station No. 4X were deemed to Project-related activities. It is understood that the large volume of leachate (contaminated surface runoff) accumulated at Cell 4X has exceeded the leachate treatment capacity (daily maximum effluent discharge volume of 1,964 m^3 recorded from 30 September to 3 October 2022, 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	-

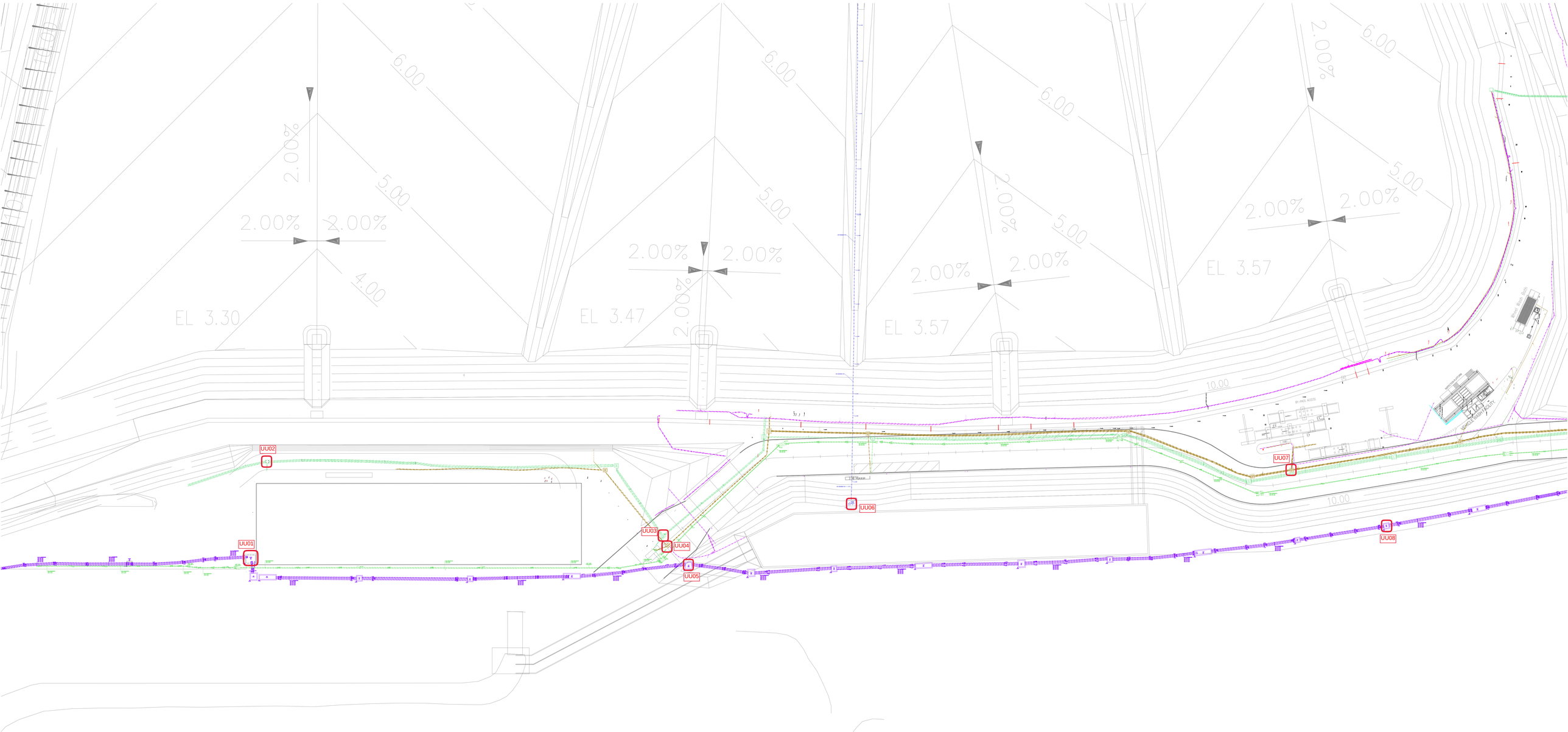
Prepared by: Abbey Lau
Designation: Environmental Team
Date: 23 November 2022

Annex G

Landfill Gas

Annex G1

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


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

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

Annex G2

Landfill Gas Monitoring Results

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

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.95	0.0	0.5	17.2
LFG2	2.86	0.0	0.6	17.9
LFG3	3.03	0.0	0.0	19.3
LFG4	2.97	0.0	0.2	18.7
LFG5	3.38	0.0	0.0	19.2
LFG6	2.9	0.0	0.0	19.3
LFG7	3.3	0.0	0.0	19.2
LFG8	3.19	0.0	0.0	19.4
LFG9	3.07	0.0	0.0	19.4
LFG10	2.99	0.0	0.0	19.4
LFG11	3.27	0.0	0.0	19.5
LFG12	3.16	0.0	0.0	19.5
LFG13	2.8	0.0	0.0	19.4
LFG14	2.64	0.0	0.0	19.3
LFG15	2.98	0.0	0.0	19.4
LFG16	3.07	0.0	0.0	19.3
LFG17	3.04	0.0	0.0	19.1
LFG18	3.82	0.0	0.0	19.1
LFG19	4.21	0.0	0.0	19.1
LFG20	4.03	0.0	0.0	19.0
LFG21	4.05	0.0	0.0	19.0
LFG22	3.65	0.0	0.0	19.0
LFG23	12.76	0.0	0.4	18.4
LFG24	6.65	0.0	0.0	18.8
GP1	Probe bent	0.2	3.4	12.5
GP2 (shallow)	Probe bent	0.1	0.0	19.6
GP2 (deep)	Probe bent	0.3	0.1	19.5
GP3 (shallow)	Probe bent	0.0	0.4	18.8
GP3 (deep)	Probe bent	0.0	0.5	19.5
GP4 (shallow)	Probe bent	0.0	0.5	18.7
GP4 (deep)	Probe bent	0.0	0.2	19.1
GP5 (shallow)	Probe bent	0.0	5.0	12.8
GP5 (deep)	42.78	0.0	0.1	18.9
GP6	39.99	0.0	1.5	17.3
GP7	36.95	0.0	1.4	15.7
GP12	2.38	0.0	0.0	19.4
GP15	2.97	0.0	0.0	19.6
P7	2.89	0.0	0.0	19.4
P8	3.01	0.0	0.0	19.5
P9	2.89	0.0	0.0	19.6

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

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	3.36	0.0	0.4	13.9
LFG2	3.27	0.0	1.0	17.4
LFG3	3.43	0.0	0.0	19.7
LFG4	3.22	0.0	0.5	6.0
LFG5	3.48	0.0	0.2	1.3
LFG6	3.4	0.0	2.1	9.4
LFG7	3.68	0.0	0.0	17.2
LFG8	3.66	0.0	0.0	20.1
LFG9	3.52	0.2	0.0	13.3
LFG10	3.36	1.3	0.1	2.4
LFG11	3.74	0.0	0.0	19.5
LFG12	3.50	0.0	0.0	20.6
LFG13	3.14	0.0	0.0	20.5
LFG14	2.89	0.2	0.0	19.8
LFG15	3.06	3.3	0.0	13.1
LFG16	3.45	0.0	0.0	20.4
LFG17	3.38	0.0	0.0	19.3
LFG18	4.48	0.0	0.0	19.5
LFG19	3.95	0.0	0.0	19.6
LFG20	4.71	0.0	0.0	19.5
LFG21	4.63	0.0	0.0	19.9
LFG22	5.27	0.0	0.0	19.4
LFG23	12.89	0.0	2.6	15.8
LFG24	7	0.0	0.0	19.9
GP1	Probe bent	0.0	6.9	7.7
GP2 (shallow)	Probe bent	0.0	0.1	19.5
GP2 (deep)	Probe bent	0.0	0.0	19.7
GP3 (shallow)	Probe bent	0.0	0.1	19.6
GP3 (deep)	Probe bent	0.0	0.2	19.4
GP4 (shallow)	Probe bent	0.0	0.2	19.5
GP4 (deep)	Probe bent	0.0	0.1	19.6
GP5 (shallow)	Probe bent	0.0	5.0	13.2
GP5 (deep)	45.07	0.0	0.1	19.8
GP6	42.63	0.0	5.8	12.9
GP7	37.05	0.0	0.0	19.8
GP12	2.79	0.0	0.0	19.7
GP15	3.34	0.0	0.0	19.9
P7	3.31	0.0	0.0	20.0
P8	3.42	0.0	0.0	19.9
P9	3.3	0.1	0.0	20.0

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

Location	Water Level (mPD)	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
LFG1	2.64	0.0	1.5	16.8
LFG2	2.54	0.0	2.4	16.2
LFG3	2.71	0.0	1.0	17.0
LFG4	2.65	0.0	0.0	20.4
LFG5	3.04	0.0	0.0	20.3
LFG6	2.56	0.0	0.0	20.2
LFG7	2.86	0.0	0.0	19.8
LFG8	2.76	0.0	0.0	19.5
LFG9	2.70	0.0	0.0	20.0
LFG10	2.5	0.0	0.0	20.1
LFG11	2.73	0.0	0.0	20.0
LFG12	2.64	0.0	0.0	20.0
LFG13	2.33	0.0	0.0	19.9
LFG14	2.22	0.0	0.0	19.9
LFG15	2.37	0.0	0.0	19.9
LFG16	2.66	0.0	0.0	19.8
LFG17	2.65	0.0	0.0	19.6
LFG18	3.2	0.0	0.0	19.5
LFG19	3.42	0.0	0.1	19.6
LFG20	3.52	0.0	0.2	19.1
LFG21	3.63	0.0	0.0	19.8
LFG22	3.19	0.0	0.0	19.8
LFG23	12.61	0.0	0.6	19.0
LFG24	6.58	0.0	0.0	19.7
GP1	Probe bent	0.1	8.5	7.3
GP2 (shallow)	Probe bent	Unmeasurable due to broken probe		
GP2 (deep)	Probe bent	Unmeasurable due to broken probe		
GP3 (shallow)	Probe bent	0.0	0.4	19.6
GP3 (deep)	Probe bent	0.0	0.1	20.0
GP4 (shallow)	Probe bent	0.0	0.1	19.9
GP4 (deep)	Probe bent	0.0	0.4	19.7
GP5 (shallow)	Probe bent	0.0	8.4	14.6
GP5 (deep)	39.73	0.0	0.0	20.0
GP6	38.29	0.0	6.1	12.6
GP7	36.53	0.0	0.0	19.8
GP12	2.07	0.0	0.0	20.3
GP15	2.61	0.0	0.0	20.1
P7	2.55	0.0	0.0	20.4
P8	2.70	0.0	0.0	20.2
P9	2.58	0.0	0.0	20.2

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

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	19.8
UU02	0.0	0.0	20.1
UU03	0.0	0.0	20.2
UU04	0.0	0.0	19.8
UU05	0.0	0.0	19.8
UU06	0.0	0.0	20.0
UU07	0.0	0.0	19.7
UU08	0.0	0.0	20.4
UU09	0.0	0.0	19.4
UU10	0.0	0.0	19.0
UU11	0.0	0.0	20.7
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	20.9
UU14	0.0	0.0	21.0
UU15	0.0	0.0	19.5
UU16	0.0	0.0	18.5
UU17	Voided due to latest site programme and on-going operation work		
UU18	0.1	0.0	20.9
UU19	0.0	0.0	19.8
UU20	0.0	0.0	18.2
UU21	0.0	0.0	18.4
UU22	0.0	0.0	19.0
UU23	0.0	0.0	19.5
UU24	0.0	0.0	20.1
UU25	0.0	0.0	20.3
UU26	0.0	0.0	18.6
UU27	0.0	0.0	20.4
UU28	0.0	0.0	20.8

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

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	Unmeasurable due to overflow of water		
UU02	0.1	0.0	20.8
UU03	0.1	0.0	19.0
UU04	0.1	0.0	20.6
UU05	Unmeasurable due to overflow of water		
UU06	0.1	0.0	20.6
UU07	0.1	0.0	20.9
UU08	Unmeasurable due to overflow of water		
UU09	0.0	0.0	19.6
UU10	0.0	0.0	19.6
UU11	0.0	0.0	19.2
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	19.1
UU14	0.0	0.0	19.2
UU15	0.0	0.0	19.9
UU16	0.0	0.0	19.8
UU17	Voided due to latest site programme and on-going operation work		
UU18	0.0	0.0	19.9
UU19	0.1	0.0	20.6
UU20	0.0	0.0	19.7

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU21	0.0	0.0	19.3
UU22	0.0	0.0	19.5
UU23	0.0	0.0	19.8
UU24	0.0	0.0	19.6
UU25	0.0	0.0	19.8
UU26	0.0	0.0	19.4
UU27	0.0	0.0	19.4
UU28	0.0	0.0	19.5

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

Location	Methane (% (v/v))	Carbon Dioxide (% (v/v))	Oxygen (% (v/v))
UU01	0.0	0.0	20.8
UU02	0.0	0.0	20.4
UU03	0.0	0.0	20.0
UU04	0.0	0.0	19.7
UU05	0.0	0.0	20.5
UU06	0.0	0.0	20.3
UU07	0.0	0.0	20.1
UU08	0.0	0.0	20.0
UU09	0.0	0.0	20.7
UU10	0.0	0.0	20.6
UU11	0.0	0.0	18.9
UU12	Voided due to latest site programme and on-going operation work		
UU13	0.0	0.0	20.4
UU14	0.0	0.0	20.1
UU15	0.0	0.0	20.6
UU16	0.0	0.0	18.7
UU17	Voided due to latest site programme and on-going operation work		
UU18	0.0	0.0	20.8
UU19	0.0	0.0	20.2
UU20	0.0	0.0	18.6
UU21	0.0	0.0	18.5
UU22	0.0	0.0	19.9
UU23	0.0	0.0	19.1
UU24	0.0	0.0	19.4
UU25	0.0	0.0	19.4
UU26	0.0	0.0	19.5
UU27	0.0	0.0	18.8
UU28	0.0	0.0	19.3

Table G2.7 Landfill Gas Bulk Gas Sampling Monitoring Results

Parameters	LFG20	LFG23
Methane (% (v/v))	<0.020	<0.020
Carbon Dioxide (% (v/v))	0.059	0.062
Oxygen (% (v/v))	20.6	20.7
Nitrogen (% (v/v))	77.5	77.3
Carbon Monoxide (% (v/v))	<0.020	<0.020
Hydrogen (% (v/v))	<0.020	<0.020
Ethane (ppmv)	<1.0	<1.0
Propane (ppmv)	<1.0	<1.0
Butane (ppmv)	<1.0	<1.0

Table G2.8 Flammable Gas Surface Emission Monitoring Results

Time	GPS Coordinates Latitude (N)	Longitude (E)	Weather Condition	Temperature (°C)	Wind Direction (Deg)	Wind Speed (m/s)	Monitoring Results (ppm)
14:51	22°16’31”	114°16’17”	Sunny	32.8	190	2.1	8
15:16	22°16’53”	114°16’17”	Sunny	33.6	143	0.8	5

Annex G3

Event and Action Plan for Landfill Gas Monitoring

Annex G3 Event and Action Plan for Landfill Gas Monitoring

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

Event	Action		
	ET	IEC	Contractor
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 • 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	• 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

Event	Action		
	ET	IEC	Contractor
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 Prosecutions

Table H1 Cumulative Statistics on Exceedances

		Total No. recorded in this reporting period	Total No. recorded since project commencement
Air Quality (Dust)	Action	0	0
	Limit	2	3
Air Quality (Odour)	Action	0	0
	Limit	0	0
Air Quality (Emissions of Thermal Oxidiser)	Limit	0	0
Air Quality (Emissions of Landfill Gas Flare)	Limit	0	1
Air Quality (Emissions of Landfill Gas Generator)	Limit	0	0
Noise	Action	0	0
	Limit	0	0
Water Quality (Surface Water)	Limit	1	60
Water Quality (Leachate)	Limit	0	0
Water Quality (Leachate Level)	Limit	10	10
Water Quality (Groundwater)	Limit	2	9
Landfill Gas (Perimeter Landfill Gas Monitoring Wells)	Limit	0	1
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 (Jul-Sep 2022)	0	0	0
Total no. received since project commencement	1	0	0