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

South East New Territories (SENT) Landfill Extension

Monthly Environmental Monitoring & Audit Report No.45

for September 2022

October 2022

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:	Monthly Environmental Monitoring & Audit Report No.45 for September 2022 for South East New Territories (SENT) Landfill Extension
Date of Report:	12 October 2022

Reference EP Condition

EP Condition: Condition No. 3.4

Four hard copies and one electronic copy of monthly EM&A Report shall be submitted to the Director within 10 working days after the end of the reporting month. The EM&A Reports shall include a summary of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels). The submissions shall be verified by the IEC. Additional copies of the submission shall be provided to the Director upon request by the Director.

ET Certification

I hereby certify that the above referenced document/plan complies with the above referenced condition of EP-308/2008/B and FEP-01/308/2008/B.

Frank Wan,
Environmental Team Leader:
(ERM Hong-Kong, Limited)

Date: 12 October 2022

IEC Verification

I hereby verify that the above referenced document/plan complies with the above referenced condition of EP-308/2008/B and FEP-01/308/2008/B.

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

Date: 13 October 2022

South East New Territories (SENT) Landfill Extension

Monthly Environmental Monitoring & Audit Report for September 2022

Environmental Resources Management

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Client:	Project No:
Green Valley Landfill Ltd.	0465169
Summary:	Date: 12 October 2022
This document presents the Monthly EM&A Report No.45 for September 2022 for *South East New Territories (SENT) Landfill Extension*	Approved by:  Frank Wan *Partner*

0	Monthly EM&A Report No.45 (for September 2022)	AL	FW	FW	12 Oct 2022
Revision	Description	By	Checked	Approved	Date

Distribution

☐ Internal

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The SENT Landfill Extension (SENTX) forms an integral part in the Strategic Plan in maintaining the continuity of landfill capacity in the Hong Kong for the cost-effective and environmentally satisfactory disposal of waste. ERM-Hong Kong, Limited (ERM) is commissioned to undertake the role of Environmental Team (ET) for the construction, operation/restoration and aftercare of SENTX Project ("the Project") in accordance with the requirements specified in the Environmental Permit (EP), updated Environmental Monitoring and Audit (EM&A) Manual, the approved Environmental Impact Assessment (EIA) Report of the Project taking account of the latest design and other relevant statutory requirements. The construction (not including works related to site clearance and preparation) and operation of the Project commenced on 2 January 2019 and 21 November 2021, respectively.

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

Exceedance of Action and Limit Levels for Air Quality

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

Exceedance of Action and Limit Levels for Noise

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

Exceedance of Action and Limit Levels for Water Quality

One exceedance of the Limit Level for Leachate Level and one exceedance of the Limit Level for groundwater (Chemical Oxygen Demand (COD)) were recorded for water quality impact monitoring in the reporting period. The leachate level exceedance at Pump Station No. 4X on 30 September 2022 and groundwater (COD) exceedance at MWX-7 on 6 September 2022 are under 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.

Future Key Issues

Potential environmental impacts arising from the upcoming construction/ operational activities in the next reporting period of October 2022 are mainly associated with potential surface water impact in the rainy season.

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

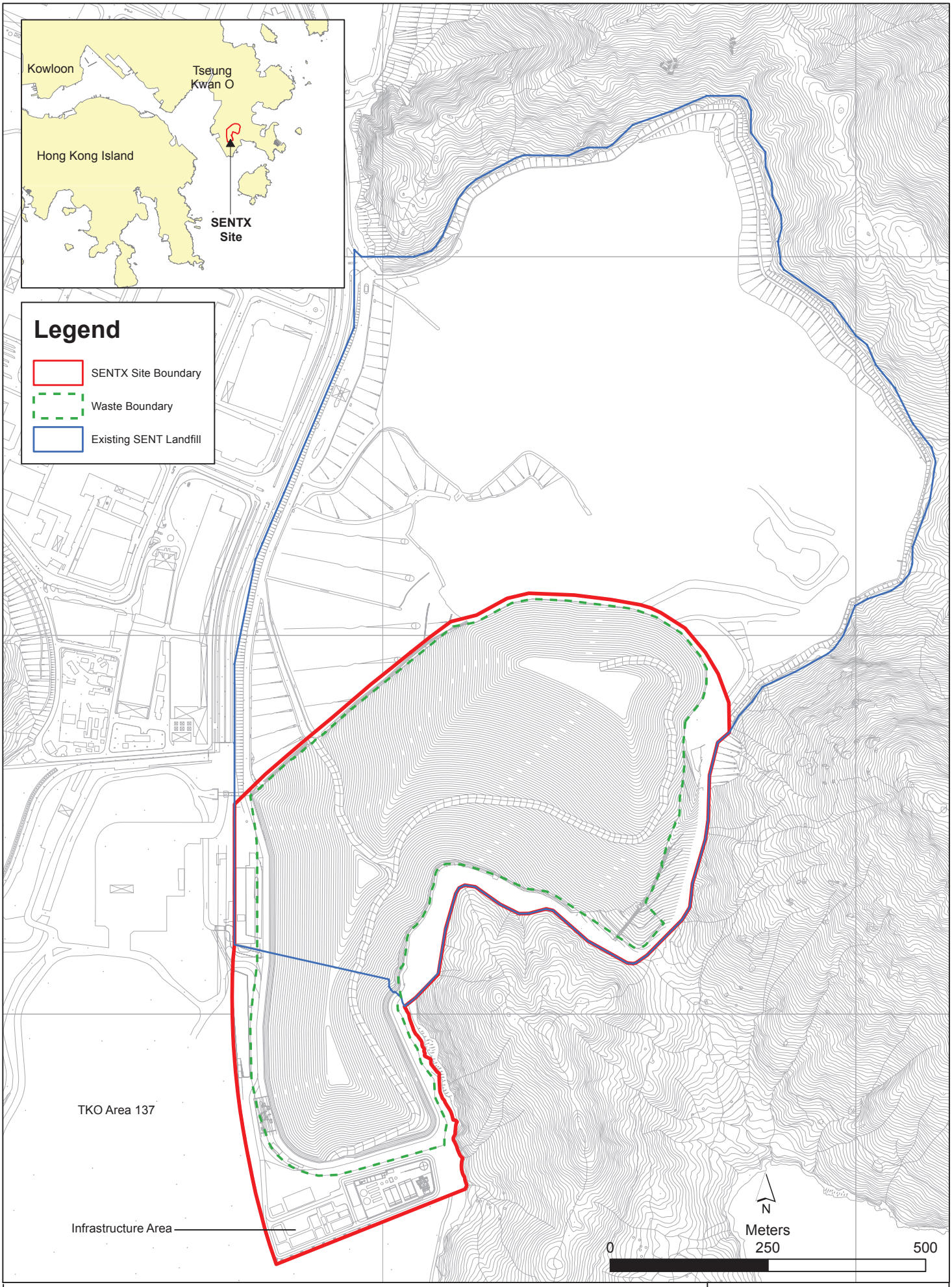

Figure 1.1

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.

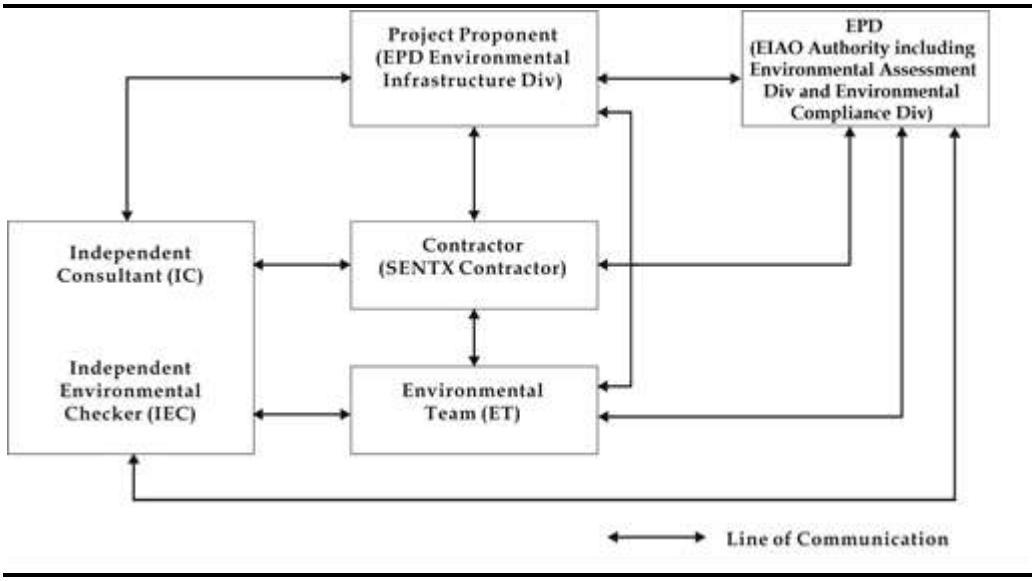
1.3 SCOPE OF THE EM&A REPORT

This is the Monthly EM&A Report for the Project which summarises the key findings of the EM&A programme during the reporting period from 1 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 summarised in *Table 1.2* below.

Table 1.2 Contact Information of Key Personnel

Party	Position	Name	Telephone
Contractor (Green Valley Landfill Limited)	Project Manager	Carl Lai	2706 8829
Environmental Team (ET) (ERM-Hong Kong, Limited)	ET Leader	Frank Wan	2271 3152
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:

- 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 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 measured recommended in the Updated EM&A Manual is presented in *Annex B*.

1.6 SUMMARY OF EM&A PROGRAMME REQUIREMENTS

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

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

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

Taking into account the operation works, impact monitoring of air quality, noise, water quality, landfill gas and waste management were carried out in

the reporting period. The impact monitoring schedule of air quality, noise, water quality and landfill gas monitoring are provided in *Annex C*.

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

- One environmental management meeting was held with the Contractor, ER, ET, IEC and EPD on 15 September 2022; and
- Environmental toolbox trainings on Waste Reduction on Construction Industry and Renewable Energy were provided on 7 September and 27 September 2022 respectively by the Contractor to the workers.

1.7 STATUS OF STATUTORY ENVIRONMENTAL COMPLIANCE WITH THE ENVIRONMENTAL PERMIT

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

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

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

1.8 STATUS OF OTHER STATUTORY ENVIRONMENTAL REQUIREMENTS

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

Table 1.5 Status of Statutory Environmental Requirements

Description	Ref No.	Status
Environmental Permit	EP-308/2008	Granted on 5 August 2008
Variation of Environmental Permit	EP-308/2008/A	Granted on 6 January 2012
	EP-308/2008/B	Granted on 20 January 2017
Further Environmental Permit	FEP-01/308/2008/B	Granted on 16 May 2018
Water Discharge License under WPCO (Permit Holder: GVL)	Licence No.: WT00041447-2022	Validity from 17 June 2022 to 30 June 2024
Billing Account for Disposal of Construction Waste	Chit Account Number: 5001692	Approved on 28 December 2005
Registration as a Chemical Waste Producer (Permit Holder: GVL)	5296-839-G2228-01	Issued on 31 December 2015
Construction Noise Permit (Permit Holder: GVL)	GW-RE0565-22	Validity from 15 June 2022 to 22 September 2022
Construction Noise Permit (Permit Holder: GVL)	GW-RE0956-22	Validity from 23 September 2022 to 14 March 2023

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 dust monitoring is provided in *Table 2.1* below.

Table 2.1 Action and Limit Levels for 24-hour TSP

Monitoring Station	Action Level	Limit Level
AM1 - SENTX Site Boundary (North) 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 dust monitoring stations. The HVSs were calibrated upon installation and thereafter at bi-monthly intervals to check the validity and accuracy of the results.

The equipment used in the impact dust monitoring programme and monitoring locations are summarised in *Table 2.2* and illustrated in *Figure 2.1,* respectively. Copies of the calibration certificates for the equipment are presented in *Annex D1*.

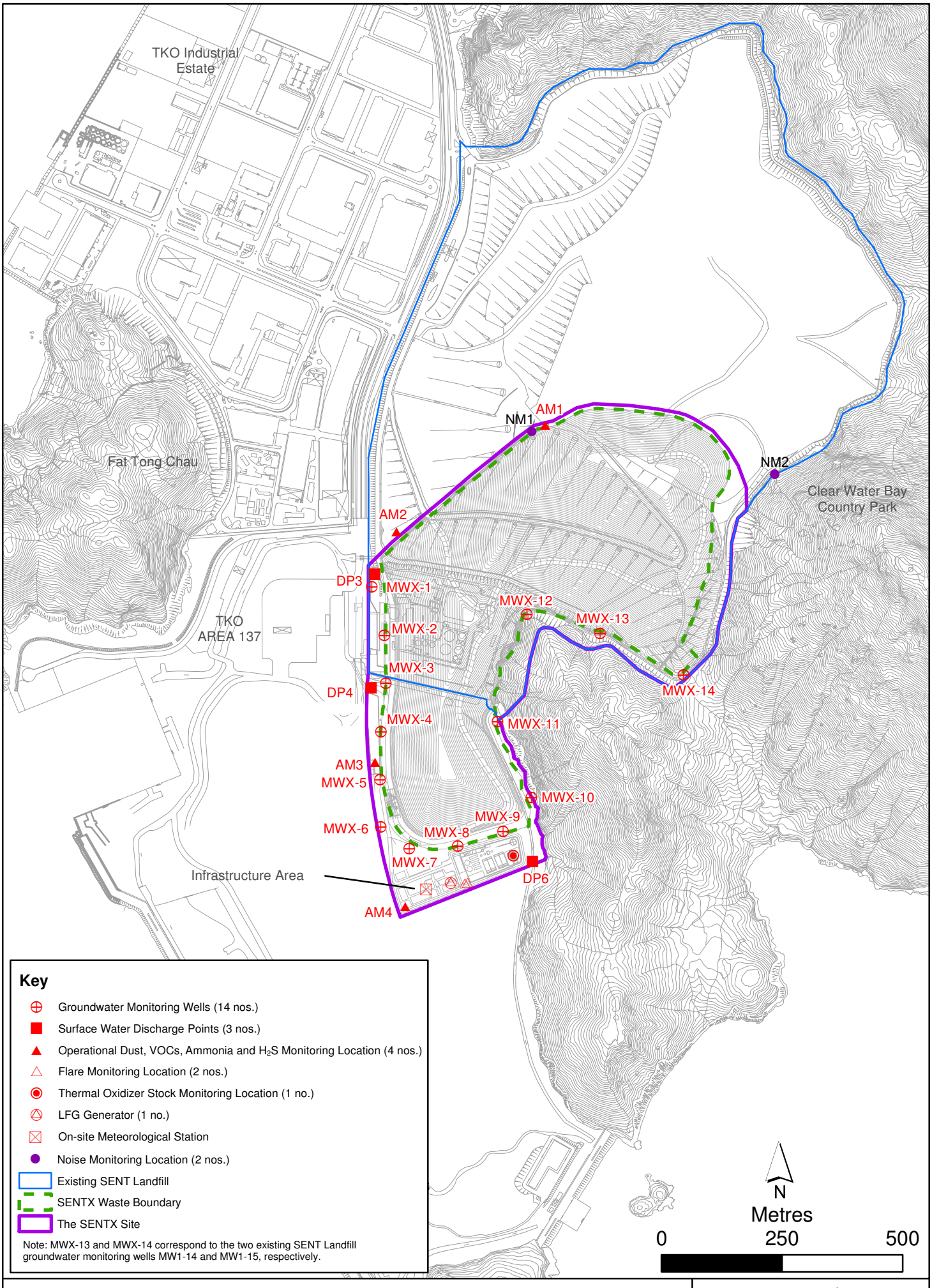


Figure 2.1

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	3, 9, 15, 21, 27 September 2022	Tisch TE-5170 (S/N: 1190)
AM2	SENTX Site Boundary (West, near DP3)				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)				Tisch TE-5170 (S/N: 1101)

Monitoring Schedule for the Reporting Month

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

Results and Observations

The monitoring results for 24-hour TSP are summarised in *Table 2.3*. The detailed monitoring results and the graphical presentation of the 24-hour TSP results at each monitoring location are provided in *Annex D2.*

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

Monitoring Station	Average 24-hr TSP Concentration (μg m^{-3}) (Range in bracket)	Action Level (μg/m^3)	Limit Level (μg/m^3)
AM1 - SENTX Site Boundary (North)	135 (58 – 174)	260	260
AM2 - SENTX Site Boundary (West, near DP3)	133 (69 – 190)	260	260
AM3 - SENTX Site Boundary (West, near RC15)	195 (118 – 252)	260	260
AM4 - SENTX Site Boundary (West, near EPD building)	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 SENTX and the TKO Area 137 Fill Bank.

All the 24-hour TSP results were below the Action and Limit Levels at the monitoring locations in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex D3*.

Meteorological Data

Meteorological data obtained from the SENTX on-site meteorological monitoring station was used for the dust monitoring and is shown in *Annex D4*. 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 10 February 2022. In addition, an independent party (ALS Technichem (HK) Pty Ltd.) was appointed to undertake odour patrol together with the ET and IEC once every two weeks.

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

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

Table 2.4 Action and Limit Levels for Odour Patrol

Parameter	Action Level	Limit Level
Perceived odour intensity and odour complaints	• Odour intensity ≥ Class 2 recorded; or • One documented complaint received	• Odour intensity ≥ Class 3 recorded on 2 consecutive patrol [(a) (b)]

Notes:
(a) i.e. either Class 3-strong or Class 4-extreme odour intensity.
(b) The exceedances of the odour intensity do not need to be recorded at the same location.

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

The odour monitoring programme and patrol route are summarised in *Table 2.5* and illustrated in *Figure 2.2* respectively. Copies of the certificates of the qualified odour panelist are presented in *Annex D5*.

Table 2.5 Odour Monitoring Details

Patrol Locations	Parameters	Patrol Frequency [a]	Monitoring Dates
Patrol along the SENTX Site Boundary (Checkpoints OP1 – OP11)	Odour Intensity (see *Table 2.6*)	Period 1 - First month of operation Daily, three times a day in the morning, afternoon and evening/night (between 18:00 and 22:00 hrs) conducted by the ET and the IEC Three times per week on different days conducted by an independent third party together with the ET and IEC [b] Period 2 - Three months following period 1 [c] Weekly conducted by the ET and the IEC Once every two weeks conducted by an independent third party together with the ET and IEC [b] Period 3 - Throughout operation following period 2 [c] Monthly conducted by the ET and the IEC Quarterly conducted by an independent third party together with the ET and IEC [b]	Conducted by ET & IEC: - Conducted by an independent third party, ET & IEC: 15 September 2022

Notes:

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

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

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

Table 2.6 Odour Intensity Level

Class	Odour Intensity	Description
0	Not Detected	No odour perceived or an odour so weak that it cannot be easily characterised or described.
1	Slight	Identified odour, slight

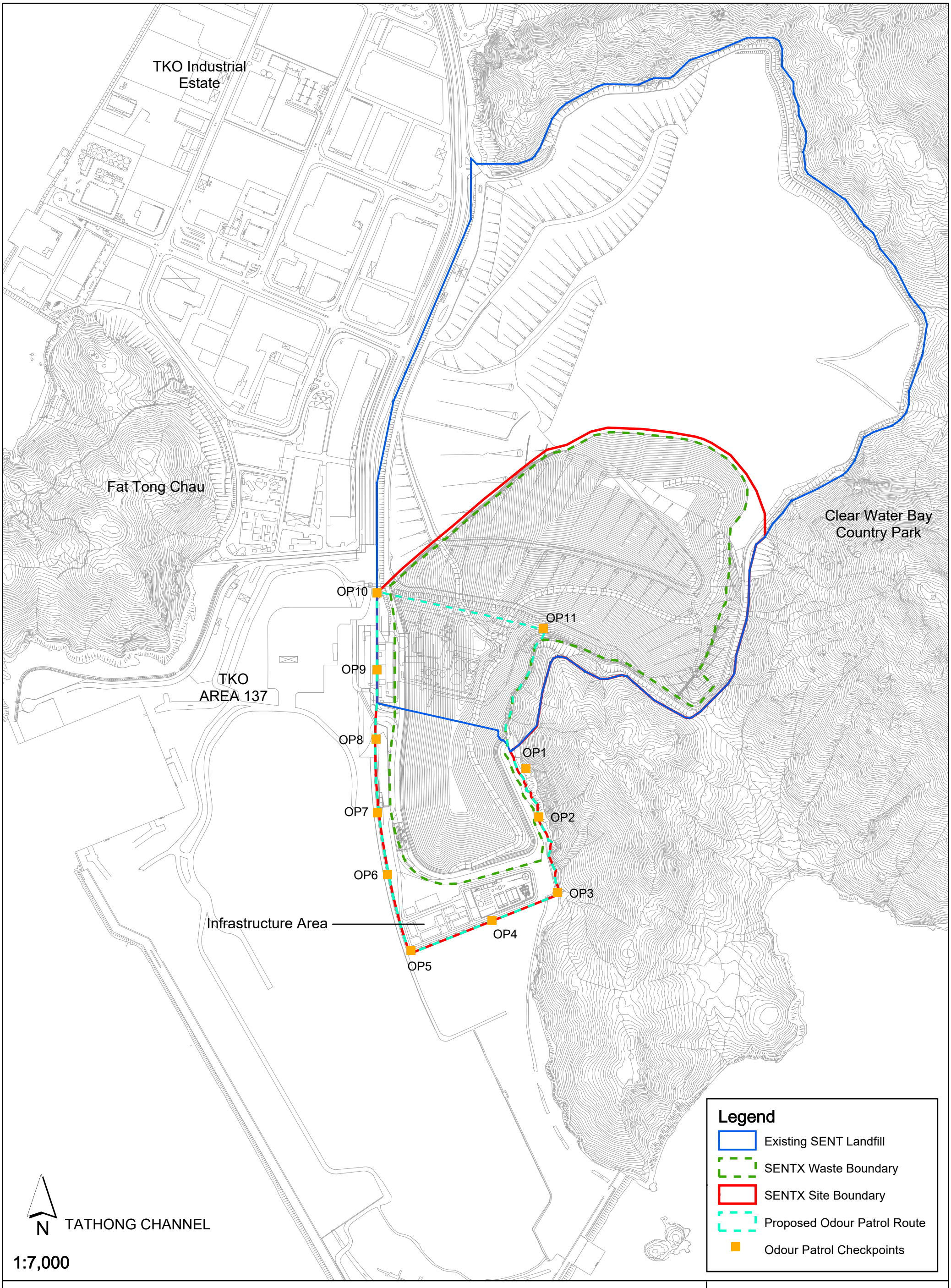

Figure 2.2

Odour Patrol Route for Operation/ Restoration Phase Odour Monitoring

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Date: 28/9/2021

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Class	Odour Intensity	Description
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 D6*, 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		
OP6	0		
OP7	0		
OP8	0		
OP9	0		
OP10	0		
OP11	1		

The potential odour source in the reporting period included 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 D3*.

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 ammonia (for thermal oxidizer only) for September 2022. The operating conditions of the thermal oxidiser, landfill gas flare and landfill gas generator were also monitored continuously.

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

Table 2.8 Limit Levels for Stack Emission of the Thermal Oxidiser

Parameters	Limit Level
NO_2	1.58 gs^{-1}
CO	0.53 gs^{-1}
SO_2	0.07 gs^{-1}
Benzene	3.01 x 10^{-2} gs^{-1}
Vinyl chloride	2.23 x 10^{-3} gs^{-1}
Gas combustion temperature	850^{o}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^{o}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^{o}C (minimum)
Exhaust gas exit temperature	723K (minimum) (a)
Exhaust gas velocity	30.0 ms^{-1} (minimum) (a)

Note:
(a) Level under full load condition.

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

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

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

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

Monitoring Location	Parameter	Frequency	Monitoring Date
Stack of Thermal Oxidiser	Laboratory analysis for • NO_2 • CO • SO_2 • Benzene • Vinyl chloride In-situ analysis for • Exhaust gas velocity	Monthly for the first 12 months of operation and thereafter at quarterly intervals	15 September 2022
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	-
	Laboratory analysis for • Ammonia	Quarterly	15 September 2022
	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 – 30 September 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	16 September 2022
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	-
	• Gas combustion temperature • Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 – 30 September 2022

Monitoring Location	Parameter	Frequency	Monitoring Date
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	15 September 2022
	Laboratory analysis for • Non-methane organic compounds	Quarterly for the 1st year of operation (b)	-
	• Exhaust temperature • Exhaust gas velocity (a)	Continuously	1 – 30 September 2022

Notes:

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

(b) The monitoring results 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 D7,* respectively.

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

Parameters	Monitoring Results (Range in Bracket)	Limit Level
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)

Parameters	Monitoring Results (Range in Bracket)	Limit Level

Notes:

(a) Level under full load condition.

(b) The exhaust gas velocity was calculated based on the cross-section area of the stack and the gas flow and combustion temperature data measured during the stack emission monitoring. 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
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
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 x 10^{-4} gs^{-1}	2.47 x 10^{-4} gs^{-1}
Vinyl chloride	<9.6 x 10^{-6} gs^{-1}	1.88 x 10^{-5} gs^{-1}
Exhaust gas exit temperature	ENGA: 860K (852K – 880K)	723K (minimum) (a)
	ENGB : 857K (845K – 879K)	
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 D3*.

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 2.15* below.

Table 2.15 Action and Limit Levels for Operational Noise

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

Notes:

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

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

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

Noise monitoring was performed by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066) using sound level meter at the designated monitoring station NM1 (see *Figure 2.1*) in accordance with the requirements stipulated in the updated EM&A Manual. Acoustic calibrator was deployed to check the sound level meter at a known sound pressure level. Details of the deployed equipment are provided in *Table 2.16*. Copies of the calibration certificates for the equipment are presented in *Annex E1*.

Table 2.16 Noise Monitoring Details

Monitoring Station (1)	Location	Parameter	Frequency and Duration	Monitoring Dates	Equipment
NM1	SENTX Site Boundary (North)	$L_{eq\ (30\ min)}$ measurement between 07:00 and 19:00 hours on normal weekdays (Monday to Saturday)	Once per week for 30 mins during operation of the Project	5, 13, 22, 28 September 2022	Sound Level Meter: 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 Month*

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

2.2.3 *Results and Observations*

A total of 4 impact noise monitoring events were scheduled during the reporting period. Results for noise monitoring are summarised in *Table 2.17*. The monitoring results and the graphical presentation of the data are provided in *Annex E2*.

Table 2.17 Summary of Operation Noise Monitoring Results in the Reporting Period

Monitoring Station	Measured Noise Level $L_{eq\ (30\ min)}$, dB(A)		
	Average	Range	Action and Limit Level
NM1	51.0	48.1 – 54.5	75

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

No Action and Limit Levels exceedance was recorded for operation noise monitoring in the reporting period. No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex E3*.

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 2.19* were determined by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066).

The Limit Levels of the surface water quality impact monitoring are provided in *Table 2.18*.

Table 2.18 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 2.19*. Copies of the calibration certificates for the equipment are presented in *Annex F1*.

Table 2.19 Impact Surface Water Quality Monitoring Details

Monitoring Station	Location	Frequency	Monitoring Dates	Parameter		Equipment
DP4	Surface water discharge point DP4	Monthly	22 September 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					

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 Month

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

Results and Observations

One regular monitoring event for impact surface water quality monitoring was scheduled at all designated monitoring stations during the reporting period. However, sampling could not be carried out on 22 September 2022 due to insufficient flow. Details of impact water quality monitoring event are provided in *Annex F2*.

No action is thus required to be undertaken in accordance with the Event and Action Plan presented in *Annex F3*.

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 2.20* were determined by ALS Technichem (HK) Pty Ltd. (HOKLAS Registration No. 066).

The Limit Levels of the leachate monitoring are provided in *Table 2.20*.

Table 2.20 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 2.21*. Copies of the calibration certificates for the equipment are presented in *Annex F4*.

Table 2.21 Leachate Levels and Effluent Quality Monitoring Details

Location	Frequency	Parameter	Monitoring Dates	Equipment
Leachate levels above the basal liner	Continuous	Leachate Levels	1 – 30 September 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	7 September 2022	TOA HM-30P (S/N: 790332)

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

Monitoring Schedule for the Reporting Month

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

Results and Observations

The leachate levels and effluent quality monitoring results are summarised in *Table 2.22* and *Table 2.23*, respectively. The detailed monitoring results are provided in *Annex F5* and *Annex F6,* respectively.

Table 2.22 Summary of Leachate Levels in the Reporting Period

Monitoring Location	Average Leachate Head Levels (cm) (Range in Bracket)	Limit Level (cm)
Pump Station No. 1X (Cell 1X)		
Meter No. X-1	69.0 (62.0 – 75.0)	> 178
Meter No. X-2	81.0 (64.0 – 89.0)	
Average	75.0 (64.0 – 82.0)	
Pump Station No. 2X (Cell 2X)		
Meter No. X-3	73.0 (46.0 – 90.0)	> 180
Meter No. X-4	77.0 (50.0 – 90.0)	
Average	75.0 (48.0 – 88.0)	
Pump Station No. 3X (Cell 3X)		
Meter No. X-5	69.0 (62.0 – 75.0)	> 175
Meter No. X-6	69.0 (62.0 – 75.0)	
Average	69.0 (62.0 – 75.0)	
Pump Station No. 4X (Cell 4X)		
Meter No. X-7	65.0 (50.0 – 246.0)	> 186
Meter No. X-8	68.0 (52.0 – 246.0)	
Average	67.0 (51.0 – 246.0)	

Table 2.23 Summary of Effluent Quality Monitoring Results in the Reporting Period

Parameters		Monitoring Results	Limit Level
Effluent Discharged from LTP			
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

Note:

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

Limit Levels exceedance was recorded for leachate level monitoring in the reporting period and actions in accordance with the Event and Action Plan

presented in *Annex F3* were undertaken. The leachate level exceedance at Pump Station No. 4X on 30 September 2022 is under investigation.

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 F3*.

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 2.24* below.

Table 2.24 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 2.25* and illustrated in *Figure 2.1,* respectively. Copies of the calibration certificates for the equipment are presented in *Annex F7*.

Table 2.25 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	5, 6 September 2022	YSI Professional DSS (S/N: 15H103928)

Monitoring Schedule for the Reporting Month

The schedule for surface water 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 2.26* and provided in *Annex F8,* respectively.

Table 2.26 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
MWX-1	0.59	5.00	15	30
MWX-2	0.04	5.00	5	30
MWX-3	1.78	5.00	21	30
MWX-4	2.88	7.63	26	36
MWX-5	1.48	5.00	24	30
MWX-6	3.54	5.00	44	46
MWX-7	5.04	6.55	42	36
MWX-8	5.74	15.85	27	50
MWX-9	1.68	7.30	29	71
MWX-10	<0.01	5.00	5	30
MWX-11	<0.01	5.00	3	30
MWX-12	<0.01	5.00	<2	30
MWX-13	0.03	5.00	<2	30
MWX-14	<0.01	5.00	<2	30

Limit Level exceedance was recorded for groundwater monitoring in the reporting period and actions in accordance with the Event and Action Plan presented in *Annex F3* were undertaken. The groundwater (COD) exceedance at MWX-7 on 6 September 2022 is under investigation.

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 2.27* below.

Table 2.27 Limit Levels for Landfill Gas Constituents

Parameters	Monitoring Location	Limit Level (% (v/v))	
Perimeter Landfill Gas Monitoring Wells [a]			
Methane & Carbon Dioxide		Methane	Carbon Dioxide
	LFG1	1.0	3.2
	LFG2	1.0	4.3
	LFG3	1.0	6.3
	LFG4	1.0	7.0

Parameters	Monitoring Location	Limit Level (% (v/v))	
	LFG5	1.0	3.4
	LFG6	1.0	9.1
	LFG7	1.0	1.5
	LFG8	12.6	2.4
	LFG9	2.5	1.7
	LFG10	3.5	1.6
	LFG11	3.0	2.0
	LFG12	13.2	1.5
	LFG13	22.5	2.7
	LFG14	5.2	1.8
	LFG15	18.2	2.0
	LFG16	1.0	2.0
	LFG17	17.8	2.4
	LFG18	2.3	2.1
	LFG19	6.3	3.1
	LFG20	1.0	4.6
	LFG21	1.0	4.8
	LFG22	1.0	4.0
	LFG23	1.0	10.3
	LFG24	1.0	4.7
	GP1	1.0	10.6
	GP2 (shallow)	1.0	11.4
	GP2 (deep)	1.0	10.4
	GP3 (shallow)	1.0	6.9
	GP3 (deep)	1.0	5.6
	GP4 (shallow)	1.0	11.6
	GP4 (deep)	1.0	7.7
	GP5 (shallow)	1.0	10.8
	GP5 (deep)	1.0	7.5
	GP6	1.0	8.4
	GP7	1.0	4.5
	GP12	1.0	2.3
	GP15	1.0	2.2
	P7	1.0	2.5
	P8	1.0	1.7
	P9	1.0	2.7
Service Voids, Utilities Pits and Manholes			
Methane (or flammable gas)	Service voids, utilities pits and manholes	1% by volume	
Permanent Gas Monitoring System			
Methane (or flammable gas)	Permanent Gas Monitoring System	1% by volume (20% LEL)	

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.

The equipment used in the landfill gas monitoring programme is summarised in *Table 2.28.* The landfill gas monitoring locations for perimeter landfill gas monitoring wells and service voids, utilities and manholes along the Site boundary are illustrated in *Figure 2.3,* and *Annex G1*, respectively. Copies of the calibration certificates for the equipment are presented in *Annex G2.*

Table 2.28 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	16 September 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 September 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 – 30 September 2022	Permanent gas monitoring system

2.4.2 Monitoring Schedule for the Reporting Month

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

2.4.3 Results and Observations

The landfill gas monitoring results are summarised and provided in *Tables 2.29 - 2.30 and Annex G3,* respectively.

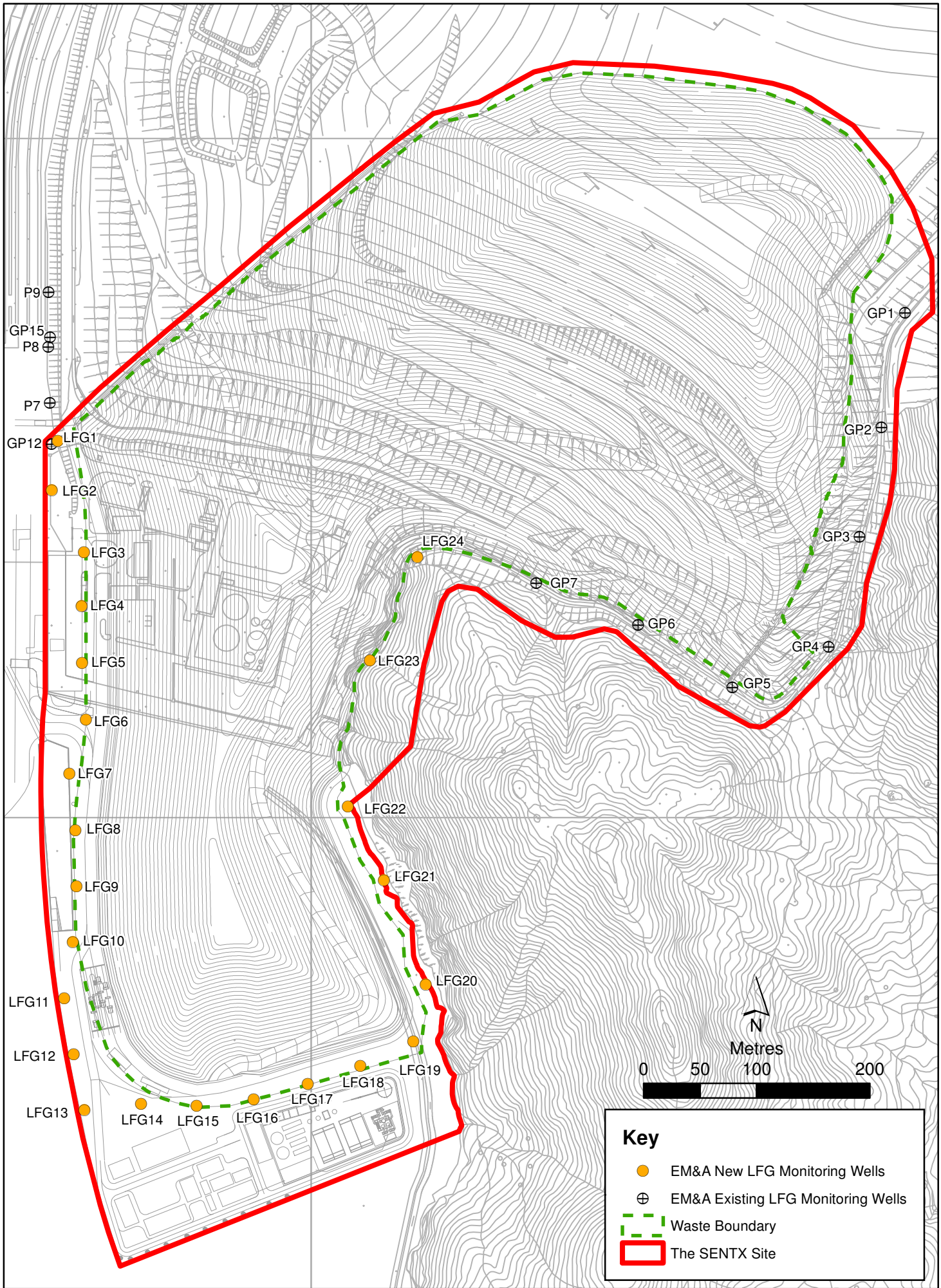


Figure 2.3

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

Table 2.29 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 Levels [(a)]	Monitoring Results	Limit Levels [(a)]
LFG1	0.0	1.0	1.5	3.2
LFG2	0.0	1.0	2.4	4.3
LFG3	0.0	1.0	1.0	6.3
LFG4	0.0	1.0	0.0	7.0
LFG5	0.0	1.0	0.0	3.4
LFG6	0.0	1.0	0.0	9.1
LFG7	0.0	1.0	0.0	1.5
LFG8	0.0	12.6	0.0	2.4
LFG9	0.0	2.5	0.0	1.7
LFG10	0.0	3.5	0.0	1.6
LFG11	0.0	3.0	0.0	2.0
LFG12	0.0	13.2	0.0	1.5
LFG13	0.0	22.5	0.0	2.7
LFG14	0.0	5.2	0.0	1.8
LFG15	0.0	18.2	0.0	2.0
LFG16	0.0	1.0	0.0	2.0
LFG17	0.0	17.8	0.0	2.4
LFG18	0.0	2.3	0.0	2.1
LFG19	0.0	6.3	0.1	3.1
LFG20	0.0	1.0	0.2	4.6
LFG21	0.0	1.0	0.0	4.8
LFG22	0.0	1.0	0.0	4.0
LFG23	0.0	1.0	0.6	10.3
LFG24	0.0	1.0	0.0	4.7
GP1	0.1	1.0	8.5	10.6
GP2 (shallow)	Unmeasurable due to broken probe			
GP2 (deep)	Unmeasurable due to broken probe			
GP3 (shallow)	0.0	1.0	0.4	6.9
GP3 (deep)	0.0	1.0	0.1	5.6
GP4 (shallow)	0.0	1.0	0.1	11.6
GP4 (deep)	0.0	1.0	0.4	7.7
GP5 (shallow)	0.0	1.0	8.4	10.8
GP5 (deep)	0.0	1.0	0.0	7.5
GP6	0.0	1.0	6.1	8.4
GP7	0.0	1.0	0.0	4.5
GP12	0.0	1.0	0.0	2.3
GP15	0.0	1.0	0.0	2.2
P7	0.0	1.0	0.0	2.5
P8	0.0	1.0	0.0	1.7
P9	0.0	1.0	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 2.30 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**
UU01	0.0	1.0
UU02	0.0	1.0
UU03	0.0	1.0
UU04	0.0	1.0
UU05	0.0	1.0
UU06	0.0	1.0
UU07	0.0	1.0
UU08	0.0	1.0
UU09	0.0	1.0
UU10	0.0	1.0
UU11	0.0	1.0
UU12	Voided due to latest site programme and on-going operation work	1.0
UU13	0.0	1.0
UU14	0.0	1.0
UU15	0.0	1.0
UU16	0.0	1.0
UU17	Voided due to latest site programme and on-going operation work	1.0
UU18	0.0	1.0
UU19	0.0	1.0
UU20	0.0	1.0
UU21	0.0	1.0
UU22	0.0	1.0
UU23	0.0	1.0
UU24	0.0	1.0
UU25	0.0	1.0
UU26	0.0	1.0
UU27	0.0	1.0
UU28	0.0	1.0

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 in 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 G4*.

2.5 LANDSCAPE AND VISUAL MONITORING

2.5.1 Monitoring Requirements

According to the updated EM&A Manual of the Project, the monthly landscape and visual audit was conducted on 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*.

2.5.2 Results and Observations

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

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

2.6 EM&A SITE INSPECTION

Site inspections were carried out on a weekly basis with the Contractor, IEC and ER to monitor the implementation of proper environmental pollution control and mitigation measures under the Project. In the reporting period, 5 site inspections were carried out on 1, 8, 15, 22 and 29 September 2022.

Key observations during the site inspections are summarised in *Table 2.31*.

Table 2.31 Key Observations Identified during the Site Inspection in this Reporting Month

Inspection Date	Environmental Observations and Recommendations
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 observations identified during environmental site inspections in the reporting period. Key environmental deficiencies identified and the corresponding rectification actions are presented in *Table 2.32*.

Table 2.32 Summary of Environmental Deficiencies Identified and Corresponding Rectification Actions

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

Deficiencies	Rectifications Implemented	Proposed Additional Control Measures
Wetsep (treatment capacity & number)	• Reviewed Wetsep capacity. • Chemicals dosage of the Wetsep was increased to enhance the efficiency.	• Install additional Wetsep.
Backflow / ponding during heavy rainfall	• Raised with EPD (LDG) and CEDD.	N.A.

2.7 *WASTE MANAGEMENT STATUS*

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

As informed by the Contractor, waste generated during this reporting period include mainly Yard waste and Chemical waste. Reference has been made to the waste flow table prepared by the Contractor. The quantities of different types of wastes and imported fill materials are summarised in *Table 2.33*.

Table 2.33 Quantities of Different Waste Generated and Imported Fill Materials

Month/ Year	Inert C&D Materials [a] (in '000m³)	Imported Fill (in '000kg) [b]		Inert Construction Waste Re-used (in '000m³)	Non-inert Construction Waste [c] (in '000m³)	Recyclable Materials [d] (in '000kg)	Yard Waste (in '000kg)		Chemical Wastes (in '000kg)
		Rock	Soil				Y Park	SENT	
1 – 30 Sep 22	0	0	0	0	0	0	1.7	38.730	0.800

Notes:

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

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

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

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

2.8 *IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES*

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

2.9 *SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT*

The operation/ restoration phase air quality, noise and landfill gas monitoring results complied with the Action and Limit Levels in the reporting period. One exceedance of the Limit Level for leachate level monitoring and one exceedance of the Limit Level for groundwater quality monitoring (COD) were recorded in the reporting period. The leachate level exceedances at

Pump Station No. 4 on 30 September 2022 and groundwater (COD) exceedance at MWX7 on 6 September 2022 are under investigation.

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

2.10 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

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

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

3 FUTURE KEY ISSUES

3.1 CONSTRUCTION PROGRAMME FOR THE COMING MONTH

As informed by the Contractor, the major works for the Project in October 2022 will be:

- E&M defects rectification for waste reception area, including weighbridge, vehicle washing facilities, wheel wash bay and guard house;
- E&M defects rectification for infrastructure buildings;
- Remaining civil work for Diesel Fuel Tank such as concrete staircase, handrails, pedestrian pavement in the proximity and canopy installation; and
- Landscaping work.

3.2 KEY ISSUES FOR THE COMING MONTH

Potential environmental impacts arising from the above upcoming construction activities in the next reporting period of October 2022 are mainly associated with potential surface water impact in the rainy season. The ET will keep track on the construction and operation works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

3.3 MONITORING SCHEDULE FOR THE COMING MONTH

The tentative schedule for environmental monitoring in October 2022 are provided in *Annex I*.

4 CONCLUSION AND RECOMMENDATION

This EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 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 (24-hour TSP, odour, thermal oxidiser, landfill gas flare, landfill gas generator stack emission), noise, water quality (surface water, leachate and groundwater) and landfill gas monitoring were carried out in the reporting period. Results for air quality (24-hour TSP, odour, thermal oxidiser, landfill gas flare and landfill gas generator stack emission), noise, water quality (surface water) and landfill gas monitoring complied with the Action and Limit Levels in the reporting period. One exceedance of the Limit Level for leachate level and one exceedance of the Limit Level for groundwater quality (COD) were recorded in the reporting period.

Environmental site inspections were carried out during the reporting period. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site inspections.

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

The ET will keep track on the construction and operation/restoration works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Annex A

Work Programme

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

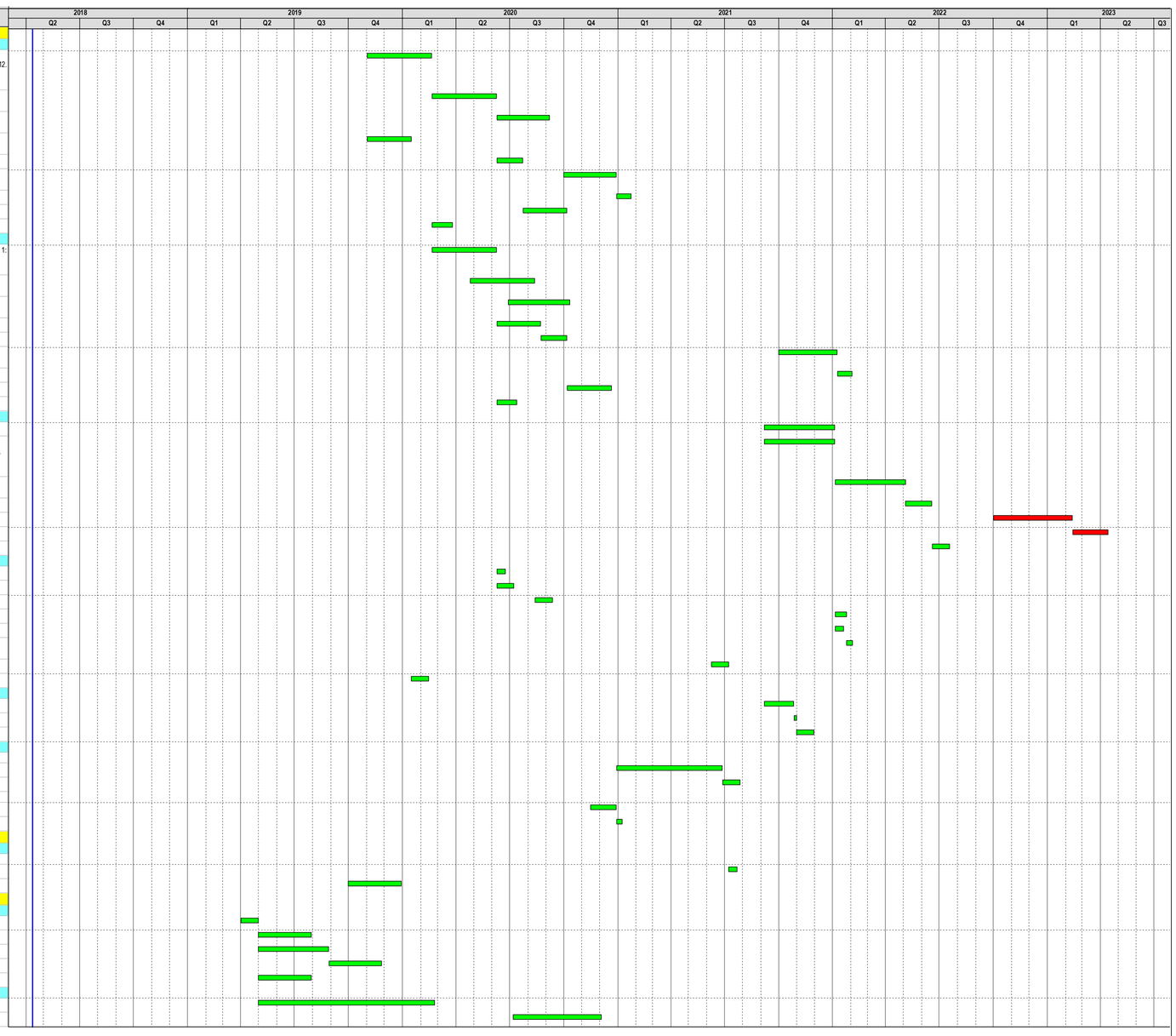
Remaining Work
Critical Remaining Work
◆ Milestone

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

GREEN VALLEY LANDFILL, LIMITED

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

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



Remaining Work
Critical Remaining Work
Milestone

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

GREEN VALLEY LANDFILL LIMITED

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

Annex B

Environmental Mitigation Implementation Schedule

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*	Implemented

(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*	
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

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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

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4.8.2	AQ19	• Progressive restoration of the areas which reach the finished profile (a final capping system including an impermeable liner will be put in place) and installation of a permanent landfill gas extraction system	To minimise odour nuisance	SENTX Site	SENTX Contractor	✓		✓	✓	*EIAO-TM Annex 4*	Implemented
4.8.2	AQ20	• Installing deodorizers along the site boundary adjacent to the ASRs	To minimise odour nuisance	SENTX Site boundary	SENTX Contractor			✓	✓	*EIAO-TM Annex 4*	Not Applicable. As SENTX will receive construction waste only which is significantly less odorous, installation of deodorizers is not necessary.
4.8.2	AQ21	• Erecting a vertical barrier, wall or structure softened by planting rows of trees/shrubs or landscape feature along the site boundary, particularly in the areas near the ASRs	To minimise odour nuisance	SENTX Site boundary	SENTX Contractor	✓		✓	✓	*EIAO-TM Annex 4*	Implemented
4.8.2 and SENTX latest design	AQ22	• Maintaining the size of the active tipping face not greater than 1,200 m^2	To minimise odour nuisance	Active tipping face	SENTX Contractor			✓		*EIAO-TM Annex 4*	Implemented
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.

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4.8.2	AQ24	• Maintaining the size of the special waste trench not greater than 6m (l) × 2.5m (w)	To minimise odour nuisance	Special waste trench	SENTX Contractor	✓	*EIAO-TM Annex 4*	Not Applicable. SENTX will not have any special waste trench.
4.8.2 and SENTX latest design	AQ25	• Covering daily covered area with a tarpaulin sheet or 300mm of soil after the landfill operating hours	To minimise odour nuisance	Daily covered area	SENTX Contractor	✓	*EIAO-TM Annex 4*	Implemented
4.8.2	AQ26	• Covering special waste trench with 600 mm of soil and an impervious liner after 5 pm	To minimise odour nuisance	Special waste trench	SENTX Contractor	✓	*EIAO-TM Annex 4*	Not Applicable. SENTX will not have any special waste trench.
4.8.2	AQ27	• Covering the non-active tipping face with 600mm of soil and an impermeable liner (on top of the intermediate cover), which will not only control odour emissions from landfilled waste but also enhance landfill gas extraction by the landfill gas extraction system	To minimise odour nuisance	Intermediate cover	SENTX Contractor	✓	*EIAO-TM Annex 4*	Implemented
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.

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
											Moreover, SENTX will not have any special waste trench.
4.8.2	AQ29	• Providing a mobile cover with retractable or suitable opening to cover up the opening of the special waste trench except during waste deposition and a suitable odour removal unit. The mobile cover should be equipped with powered extraction and suitable odour removal unit for purifying the trapped gas inside the trench before release into the atmosphere	To minimise odour nuisance	Special waste trench	SENTX Contractor			✓		*EIAO-TM Annex 4*	Not Applicable. SENTX will not have any special waste trench.
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	To minimise odour nuisance	SENTX Site	SENTX Contractor			✓		*EIAO-TM Annex 4*	Not Applicable. As SENTX will receive

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
		carrying out at the northern area of the site in the summer months between July to November						construction waste only which is significantly less odorous, rescheduling of waste filling activities is not necessary.
4.8.2 and SENTX latest design	AQ33	<u>Dust, Gaseous Emission and LFG including Volatile Organic Compounds (VOCs)</u> • Keeping the main haul road to the waste filling area wet by regular watering ;	To minimise dust nuisance	SENTX Site	SENTX Contractor	✓	*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	To minimise gaseous	SENTX Site	SENTX Contractor	✓ ✓	-	Implemented

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		emissions;	emissions								
4.8.2	AQ39	Providing sufficient underground landfill gas collection system to capture the landfill gas generated as much as possible; and	To minimise gaseous emissions, including LFG and VOCs	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 4*	Implemented
4.8.2	AQ40	Periodic inspections of the final cover should be undertaken to ensure that the capping layer is in good conditions at all times.	To minimise gaseous emissions, including LFG and VOCs	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 4*	Implemented
4.10.2	AQ41	Monitoring of ambient TSP once every 6 days	Ensure the dust emission from the project meets the dust requirement	At monitoring locations shown in *Figure 11.3a*	SENTX Contractor		✓	✓		*HKAQO* and *EIAO-TM Annex 4*	Implemented
4.10.2	AQ42	Monitoring of ambient VOCs, ammonia and H_2S, quarterly	Ensure the gaseous emission from the project meets the air quality requirement	At monitoring locations shown in *Figure 11.3a*	SENTX Contractor			✓	✓	Odour thresholds or 1% of Occupational Exposure Limit (OEL) as stipulated in the "*UK Health and Safety Executive (HSE) EH 40/05 Occupational Exposure Limits*", whichever is lower.	Implemented

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4.10.2 and SENTX latest design	AQ43	Monitoring of parameters for thermal oxidizer, flares and generator in accordance with requirements stated in Tables 3.4a, 3.5a and 3.6a of the EM&A Manual respectively.	Ensure the gaseous emission from the project meets the air quality requirement	At the flares and thermal oxidizer stacks when they are in operation	SENTX Contractor			✓	✓ (1)	Emission Limits specified in Contract	Implemented
4.10.2	AQ44	To confirm design assumption of ammonia, it is recommended that the ammonia concentration in the flue gas of the thermal oxidiser be monitored during the commissioning stage of the thermal oxidiser. If required, an emission standard will be set for ammonia for the thermal oxidiser based on the monitoring results. If no ammonia is detected in the flue gas during the decommissioning stage, the monitoring of ammonia in the flue gas of the thermal oxidiser could be discontinued.	Ensure the gaseous emission from the project meets the air quality requirement	At the thermal oxidizer stack during commissioning. If ammonia is detected during commissioning stage, the monitoring will continue.	SENTX Contractor			✓		Emission Limits determined during commissioning stage	Implemented
4.10.2 and SENTX latest design	AQ45	Odour patrol in accordance with requirements stated in Table 3.7a of the EM&A Manual.	Ensure the odour emission from the project meets the odour requirement	Along SENTX Site boundary	SENTX Contractor			✓		*EIAO-TM Annex 4*	Implemented
4.10.2	AQ46	Monitoring of meteorological station, continuously	Collect site specific	At meteorological	SENTX Contractor		✓	✓	✓	-	Implemented

(1) For LFG flare and LFG generator only.

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			meteorological data	station shown in *Figure 11.3a*				
Noise – Construction Phase								
5.7.1	N1	Adopt good site practice listed below: • Only well-maintained plant will be operated on-site and plant should be serviced regularly during the construction program; • Silencers or mufflers on construction equipment should be utilized and will be properly maintained during the construction program; • Mobile plant, if any, will be sited as far from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use will be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction will, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures will be effectively utilised, wherever practicable, in screening noise from on-site	To minimise potential construction noise nuisance.	All construction works area	SENTX Contractor	✓	*Noise Control Ordinance (NCO) and EIAO-TM Annex 5*	Implemented

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		construction activities.						
5.8	N2	Weekly noise monitoring	Ensure noise generated from the project meets the criteria	At monitoring locations shown in *Figure 6.4a*	SENTX Contractor	✓	*Noise Control Ordinance (NCO) and EIAO-TM Annex 5*	Implemented
Noise – Operation/Restoration Phase								
5.7.2	N3	Adopt good site practice listed below: • 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	At monitoring locations	SENTX Contractor	✓	*Noise Control Ordinance (NCO) and EIAO-TM*	Implemented

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			the project meets the criteria	shown in *Figure 6.4a*			*Annex 5*	
Water Quality – Construction Phase								
6.8.1	WQ1	<u>Construction Runoff</u> • Exposed soil areas will be minimised to reduce the contamination of runoff and erosion.	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor	✓	*ProPECC PN 1/94* *EIAO-TM Annex 6*	Implemented
6.8.1	WQ2	• Perimeter channels will be constructed in advance of site formation works and earthworks and intercepting channels will be provided for example along the edge of excavation.	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor	✓ ✓	*ProPECC PN 1/94* *Water Pollution Control Ordinance (WPCO)* *EIAO-TM Annex 6*	Implemented
6.8.1	WQ3	• Silt removal facilities, channels and manholes will be maintained and the deposited silt and grit should be removed regularly to ensure they are functioning properly at all times.	To minimise potential water quality impacts arising from the construction works	All construction works area	SENTX Contractor	✓	*ProPECC PN 1/94* *WPCO* *EIAO-TM Annex 6*	Deficiency of mitigation measures but rectified by the Contractor
6.8.1	WQ4	• Temporary covers such as tarpaulin will also be provided to minimise the 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

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

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			SENTX Site					
6.13	WQ10	• Monitoring of surface water quality will be conducted on a regular basis as stated in the EM&A Manual.	To minimise potential water quality impacts on surface water arising from the construction works	SENTX Site	SENTX Contractor	✓	*WPCO* *Water-TM*	Implemented
6.8.2	WQ11	<u>Sewage Effluents</u>						
		• Sufficient chemical toilets will be provided for the construction workforce.	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor	✓	*WPCO*	Implemented
6.8.2	WQ12	• Untreated sewage will not be allowed to discharge into the surrounding water body.	To minimise potential water quality impacts arising from the sewage effluents	SENTX Site	SENTX Contractor	✓	*WPCO* *WDO*	Implemented
6.8.2	WQ13	• A licensed waste collector 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	To minimise	SENTX Site	SENTX	✓	*Technical Memorandum*	

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		traps, settlement ponds and surface water channels will be performed regularly to identify areas necessary for maintenance, cleaning or repair.	potential water quality impacts on surface water arising from the landfill operations.		Contractor					*Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Inshore Waters (Water-TM)* *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

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6.9.2	WQ18	• Monitoring of groundwater water quality will be conducted on a regular basis as stated in the EM&A Manual.	To minimise potential water quality impacts on groundwater arising from the landfill operations.	SENTX Site	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented
SENTX latest design	WQ19	<u>Sewage</u> • All sewage from the operation staff will be diverted to the LTP for treatment or public sewer, if available.	To ensure proper handling of sewage	SENTX Site	SENTX Contractor			✓	✓	-	Implemented
6.9.3	WQ20	<u>Leachate Management</u> • The leachate pump houses and related ancillary 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

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6.9.3	WQ22	• Preventive maintenance will be implemented so that the possibility for forced shutdown during wet season will be kept to minimal.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented
6.9.3	WQ23	• Emergency procedures or a contingency plan will be established when the LTP is malfunctioned.	To minimise potential water quality impacts on surrounding water bodies arising from the landfill operations.	Leachate treatment plant	SENTX Contractor			✓	✓	*WPCO* *Water-TM* *EIAO-TM Annex 6*	Implemented
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

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

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

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		inert construction waste. Specific areas of the work site will be designated for such segregation and storage if immediate use is not practicable.						
7.6.1	WM4	<u>Chemical Waste</u>						
		The construction contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.*	To ensure proper handling of chemical waste	SENTX Site	SENTX Contractor	✓	*WDO* *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*	Implemented
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	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

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

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7.6.2	WM10	<u>Chemical Waste</u> The construction contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.*	To ensure proper handling of chemical waste	SENTX Site	SENTX Contractor	✓	*WDO* *EIAO-TM Annex 7* *Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*	Implemented
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	LFG1	Precautionary measures to be adopted by the	To protect	All	SENTX	✓	*Paragraphs 8.3 to 8.49 of*	Implemented

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SENTX latest design		contractors at the Project site and the adjacent development site within the landfill consultation zone are outlined in Paragraphs 8.3 to 8.49 of EPD's *Landfill Gas Hazard Assessment Guidance Notes (the Guidance Note*). Those precautionary measures applicable to the SENTX will be confirmed in the detailed Qualitative Landfill Gas Hazard Assessment to be submitted by the contractor.	workers from landfill gas risk	construction works area	Contractor		*EPD's Landfill Gas Hazards Assessment Guidance Note* *EIAO-TM Annex 7*	
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	To protect workers from	SENTX Site	SENTX Contractor	✓ ✓ ✓ ✓	*EIAO-TM Annex 7*	Implemented

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		requirements. These measures will include the placement of liner and installation of landfill gas management system to contain, manage and control landfill gas.	landfill gas risk					
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

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
8.7 and SENTX latest design	LFG8	<u>Environmental Monitoring & Audit Requirements</u> Undertake regular monitoring of landfill gas within the SENTX and along the SENTX boundary as required by the Contract Specification.	To protect workers from landfill gas risk	Within the SENTX and along the SENTX boundary	SENTX Contractor			✓	✓	*Landfill Gas Hazards Assessment Guidance Note*	Implemented
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;								-	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
		• Temporary covers such as tarpaulin will also be provided to minimise the generation of high suspended solids runoff;					-	Implemented
		• The surface runoff contained any oil and grease will pass through the oil interceptors; and,					-	Implemented
		• Control measures, including implementation of excavation schedules, lining and covering of excavated stockpiles will be implemented to minimise contaminated stormwater run-off from the SENTX site.					-	Implemented
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>						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
		Leachate will be contained within the SENTX Site by the proposed impermeable leachate containment system and collected by the installation of drainage system to prevent potential migration of leachate to habitats in the vicinity.	To minimise potential water quality impact affecting the ecological resources	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16* *WPCO* *Water-TM* *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

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
9.10.3	EC6	The mixture of grassland, shrubland and woodland habitats are recommended to diversify the habitats for supporting various wildlife in particular butterflies, birds and herpetofauna and blend into the existing undisturbed ecological environment.	To diversify habitats	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16*	Implemented
9.10.3	EC7	Indigenous plant species of shallow root system, softwood in nature and adaptive to sea shore habitat are recommended to be used in the restoration plan, which can establish well in coastal area with exposure to strong wind and salt spray, with sand soil base. Taking consideration of the relative poor substrate and the difficulties of establishment of some native trees in Hong Kong, it is recommended to include approximately 20% of non-native tree species in the compensatory woodland. The non-native tree species can serve as a nurse species to facilitate the establishment of the native tree species, especially the shading, and it can be replaced by established native tree species progressively. Plant species can also make reference to food plants of butterfly species (in particularly butterfly species of conservation interests recorded within the CWBCP).	To enhance ecological value of the habitats	SENTX Site	SENTX Contractor			✓	✓	*EIAO-TM Annex 16*	Implemented
9.10.3	EC8	It is also recommended that a trial nursery for native plant species be set up to fine tone the planting matrix and management intensity of the recommended indigenous tree species for	To select the most suitable indigenous tree species for the	SENTX Site	SENTX Contractor	✓		✓	✓	*EIAO-TM Annex 16*	Implemented

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

EIA Ref.	EM&A Ref	Environmental Protection Measures/ Mitigation Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? (1) D C O/R A	What requirements or standards for the measure to achieve?	Implementation Status and Remarks
		will include storage and reuse of topsoil as appropriate.						
10.6.5	LV3	CM3 - All existing trees at the edges of the landfill will be carefully protected during construction. Detailed Tree Protection Specification will be provided in the Contract Specification. Under this Specification, the Contractor will be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas.	To minimise the landscape and visual impacts	Potential impacted area	SENTX Contractor	✓	*EIAO-TM Annex 18 and ETWBC 3/2006*	Not applicable
10.6.5	LV4	CM4 - Trees unavoidably affected by the works will be transplanted, where necessary and practical. A detailed Tree Transplanting Specification will be provided in the Contract Specification, if applicable. Sufficient time for necessary tree root and crown preparation periods will be allowed in the project programme.	To minimise the landscape and visual impacts	Potential impacted area	SENTX Contractor	✓ ✓	*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

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
10.6.5	LV6	CM6 - The Contractor's office, leachate treatment plant and laboratory will be given an aesthetic treatment in earth tones to reduce their visual impact and albedo and blend them into the surrounding landscape.	To minimise the landscape and visual impacts	Infrastructure area	SENTX Contractor	✓ ✓	*EIAO-TM Annex 18*	Implemented
10.6.5	LV7	CM7 - The Contractor's office, leachate treatment plant and laboratory will be surrounded by a minimum of 5m wide and 0.75m high earth bund on the west and south sides planted with a dense screen of tree and shrub vegetation. Additional tree planting will be provided in unused spaces with thin infrastructure site, along access roads and in and around car parks. This will be supplemented with shrub planting, where appropriate.	To minimise the landscape and visual impacts	Infrastructure area	SENTX Contractor	✓ ✓	*EIAO-TM Annex 18 and ETWBC 7/2002*	Not applicable
10.6.5	LV8	CM8 - Planting trials will be carried out in an on-site nursery prior to implementation of the first phase of restoration to establish the best planting matrix and management intensity of the recommended plant materials for the restoration.	To minimise the landscape and visual impacts	SENTX Site	SENTX Contractor	✓	*EIAO-TM Annex 18*	Implemented
11.4.1 and SENTX latest design	LV9	During the preparation of the detailed landscape design plan, the design submission will be audited against the recommendation proposed in the *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

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
Landscape and Visual – Operation/Restoration Phase								
10.6.5 and SENTX latest design	LV10	OM1 - Landfill materials will be covered with general fill material or tarpaulin sheet on a daily basis to reduce visual impact.	To minimise the landscape and visual impacts	Tipping area	SENTX Contractor	✓	*EIAO-TM Annex 18*	Implemented
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

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

Calibration Certificates for Dust Monitoring Equipment

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM1
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 18-Jul-22
Next Calibration Date: 18-Sep-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1004.9	Corrected Pressure (mm Hg)	753.675
Temperature (°C)	30.4	Temperature (K)	303

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected
18	5.70	5.70	11.4	1.672	59	57.71
13	4.40	4.40	8.8	1.470	52	50.86
10	3.50	3.50	7.0	1.311	43	42.06
7	2.30	2.30	4.6	1.064	34	33.26
5	1.50	1.50	3.0	0.860	24	23.47

LINEAR REGRESSION
Slope = 42.3021
Intercept = -12.4750
Corr. coeff. = 0.9978

Calculations :

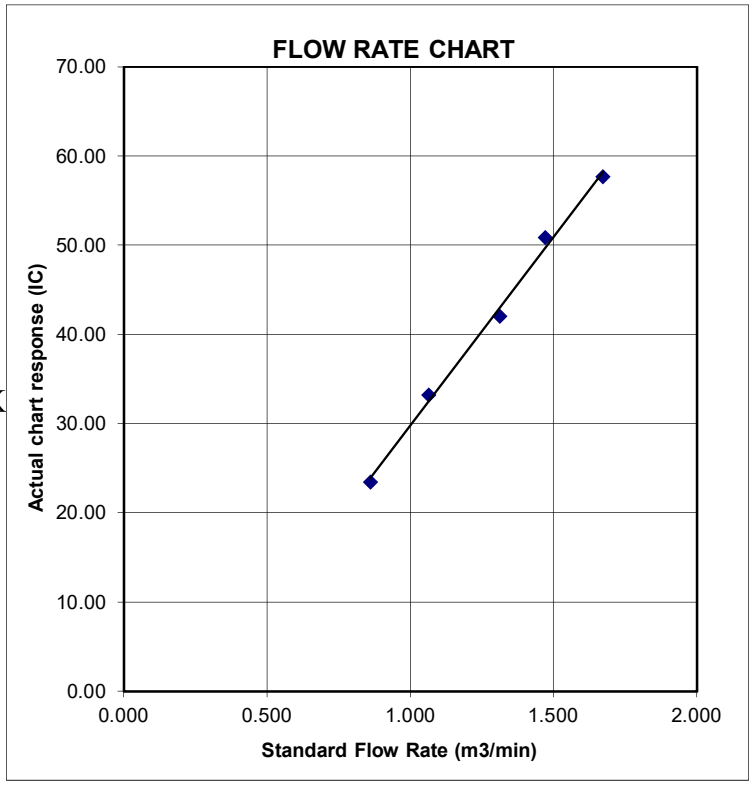
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM2
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 18-Jul-22
Next Calibration Date: 18-Sep-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1004.9	Corrected Pressure (mm Hg)	753.675
Temperature (°C)	30.4	Temperature (K)	303

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected
18	6.00	6.00	12.0	1.715	52	50.86
13	4.80	4.80	9.6	1.535	46	44.99
10	3.70	3.70	7.4	1.348	39	38.15
7	2.30	2.30	4.6	1.064	31	30.32
5	1.30	1.30	2.6	0.801	23	22.50

LINEAR REGRESSION

Slope = 30.9016
Intercept = -2.5771
Corr. coeff. = 0.9988

Calculations :

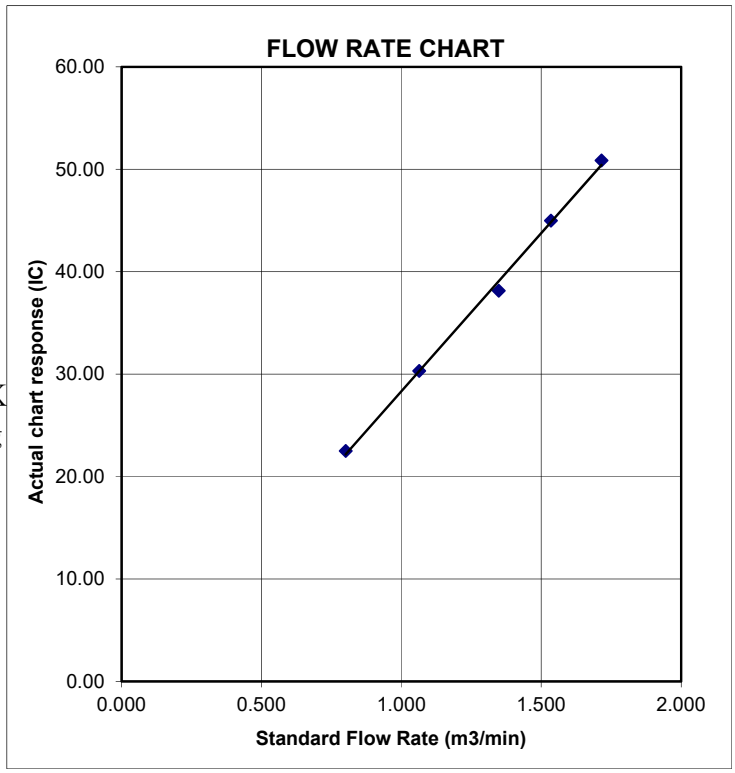
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM3
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 18-Jul-22
Next Calibration Date: 18-Sep-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1004.9	Corrected Pressure (mm Hg)	753.675
Temperature (°C)	30.4	Temperature (K)	303

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.70	5.70	11.4	1.672	58	56.73	Slope = 36.7741
13	4.50	4.50	9.0	1.486	52	50.86	Intercept = -4.2418
10	3.40	3.40	6.8	1.292	44	43.04	Corr. coeff. = 0.9978
7	2.20	2.20	4.4	1.040	36	35.21	
5	1.40	1.40	2.8	0.831	26	25.43	

Calculations :

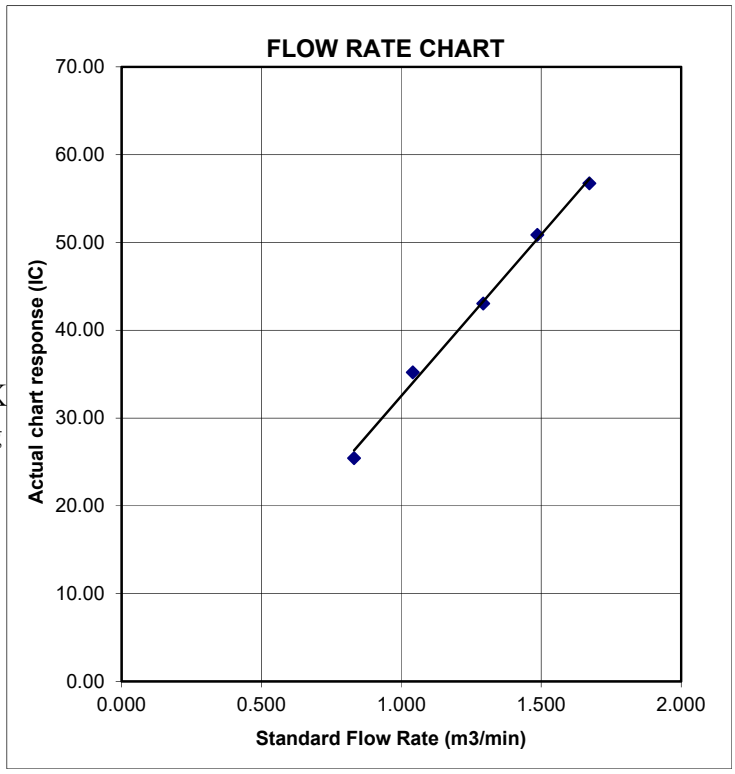
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM4
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 18-Jul-22
Next Calibration Date: 18-Sep-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1004.9	Corrected Pressure (mm Hg)	753.675
Temperature (°C)	30.4	Temperature (K)	303

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.90	5.90	11.8	1.701	53	51.84	Slope = 30.9549
13	4.60	4.60	9.2	1.502	48	46.95	Intercept = -0.3923
10	3.70	3.70	7.4	1.348	42	41.08	Corr. coeff. = 0.9989
7	2.30	2.30	4.6	1.064	33	32.28	
5	1.40	1.40	2.8	0.831	26	25.43	

Calculations :

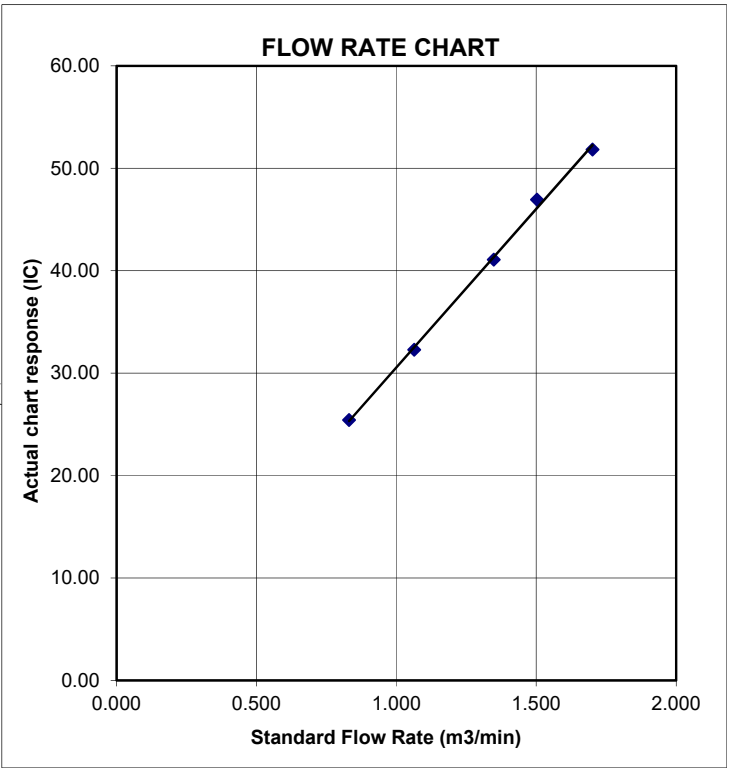
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM1
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 17-Sep-22
Next Calibration Date: 17-Nov-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1006	Corrected Pressure (mm Hg)	754.5
Temperature (°C)	31.1	Temperature (K)	304

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.50	5.50	11.0	1.641	57	55.65	Slope = 41.4005
13	4.30	4.30	8.6	1.452	51	49.80	Intercept = -11.1763
10	3.40	3.40	6.8	1.292	44	42.96	Corr. coeff. = 0.9978
7	2.20	2.20	4.4	1.040	33	32.22	
5	1.40	1.40	2.8	0.830	23	22.46	

Calculations :

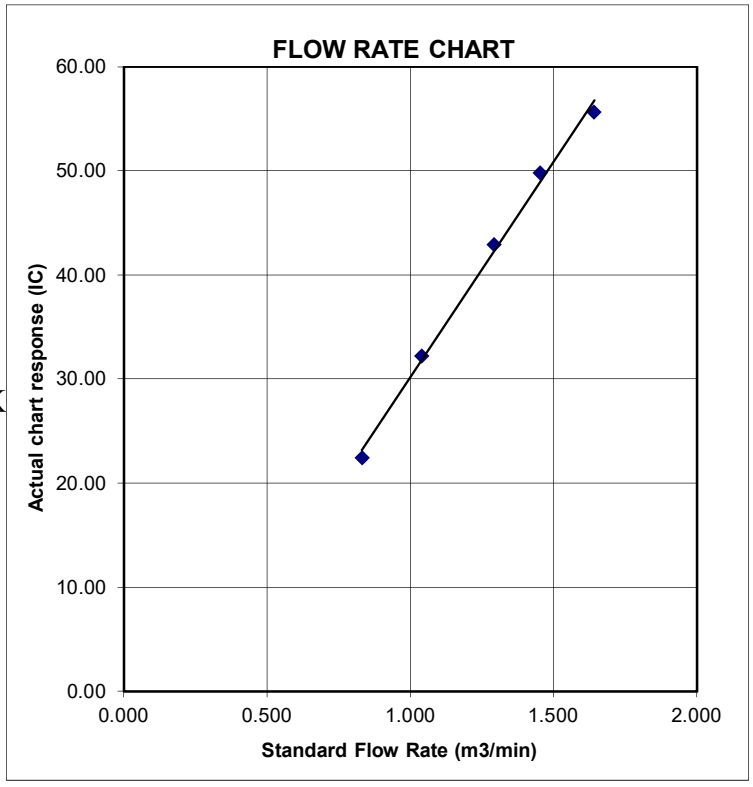
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM2
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 17-Sep-22
Next Calibration Date: 17-Nov-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1006	Corrected Pressure (mm Hg)	754.5
Temperature (°C)	31.1	Temperature (K)	304

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	6.00	6.00	12.0	1.714	54	52.72	Slope = 31.6608
13	5.00	5.00	10.0	1.565	47	45.89	Intercept = -2.0650
10	3.60	3.60	7.2	1.329	42	41.01	Corr. coeff. = 0.9949
7	2.40	2.40	4.8	1.086	34	33.20	
5	1.40	1.40	2.8	0.830	24	23.43	

Calculations :

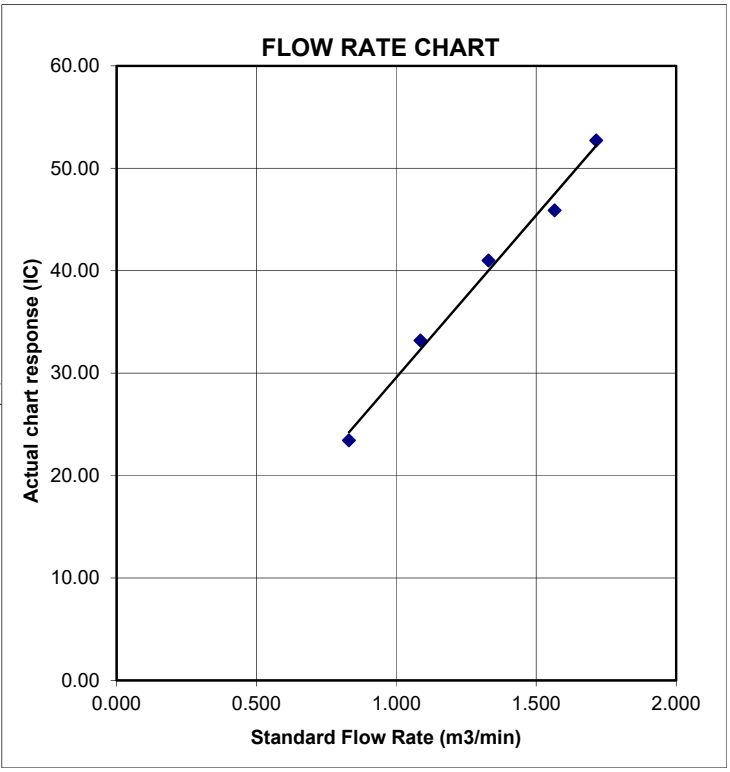
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM3
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 17-Sep-22
Next Calibration Date: 17-Nov-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1006	Corrected Pressure (mm Hg)	754.5
Temperature (°C)	31.1	Temperature (K)	304

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.50	5.50	11.0	1.641	50	48.82	Slope = 36.0371
13	4.30	4.30	8.6	1.452	43	41.98	Intercept = -10.4602
10	3.50	3.50	7.0	1.310	38	37.10	Corr. coeff. = 0.9965
7	2.20	2.20	4.4	1.040	26	25.39	
5	1.40	1.40	2.8	0.830	21	20.50	

Calculations :

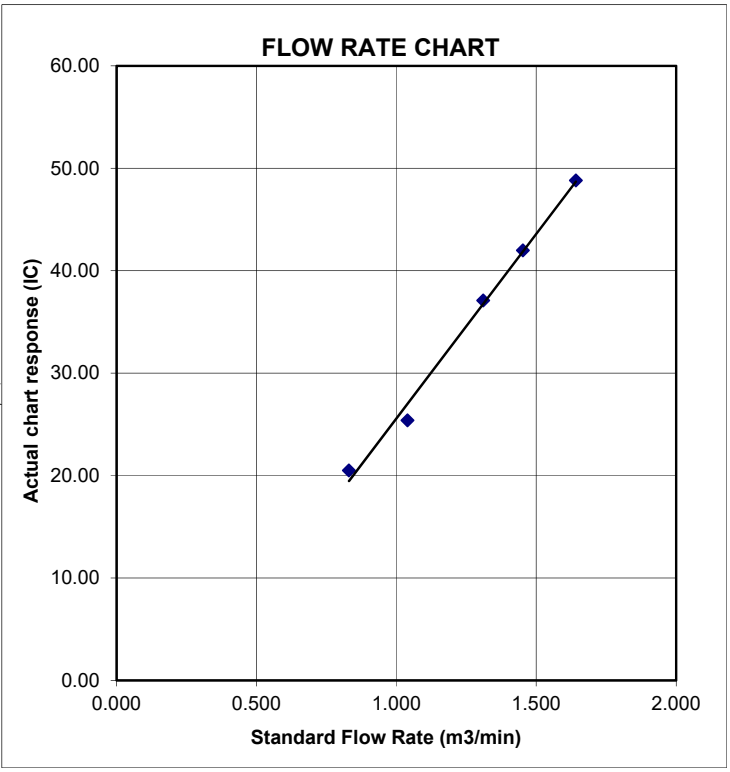
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM4
Name and Model: TISCH HVS Model TE-5170

Date of Calibration: 17-Sep-22
Next Calibration Date: 17-Nov-22
Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1006	Corrected Pressure (mm Hg)	754.5
Temperature (°C)	31.1	Temperature (K)	304

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Serial # ->	1612		

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.60	5.60	11.2	1.656	51	49.80	Slope = 28.7101
13	4.60	4.60	9.2	1.502	46	44.91	Intercept = 2.2328
10	3.30	3.30	6.6	1.273	40	39.06	Corr. coeff. = 0.9981
7	2.10	2.10	4.2	1.016	33	32.22	
5	1.40	1.40	2.8	0.830	26	25.39	

Calculations :

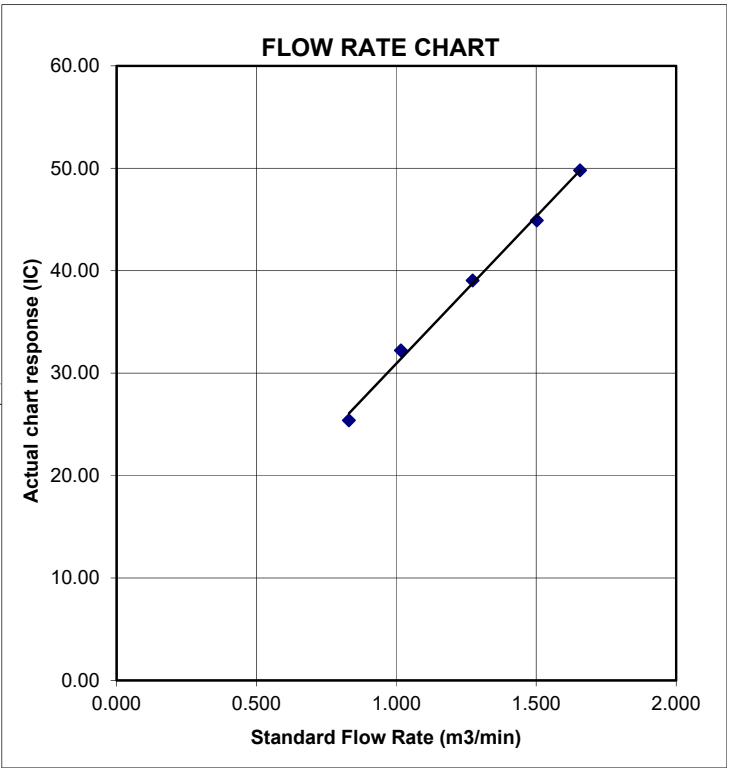
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K
Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



Annex D2

24-hour TSP Monitoring Results

Table D2.1 24-hour TSP Monitoring Results at AM1

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
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	135
				Min	58
				Max	174

Figure D2.1 Graphical Presentation for 24-hr TSP Monitoring at AM1

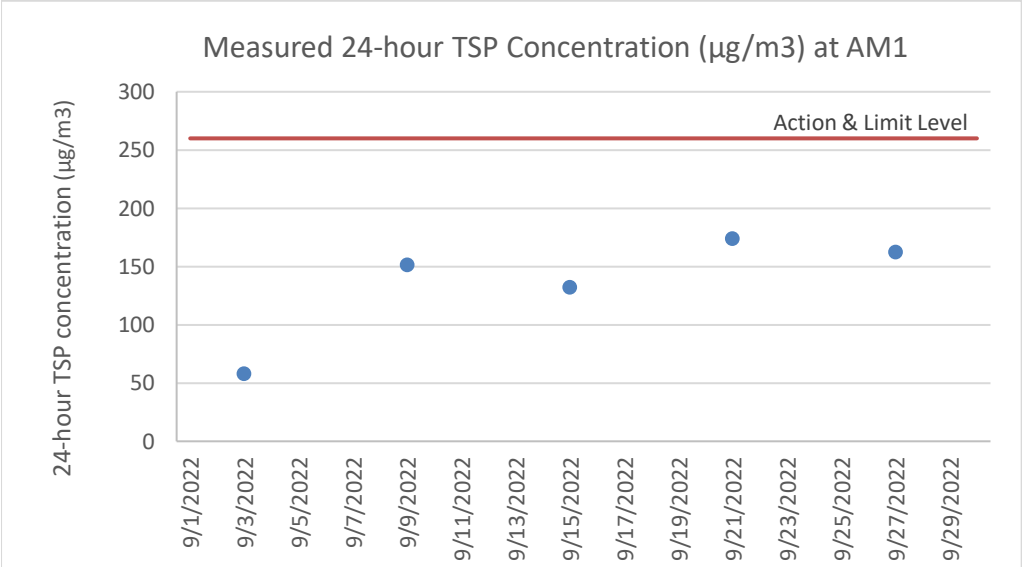


Table D2.2 24-hour TSP Monitoring Results at AM2

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
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	133
				Min	69
				Max	190

Figure D2.2 Graphical Presentation for 24-hr TSP Monitoring at AM2

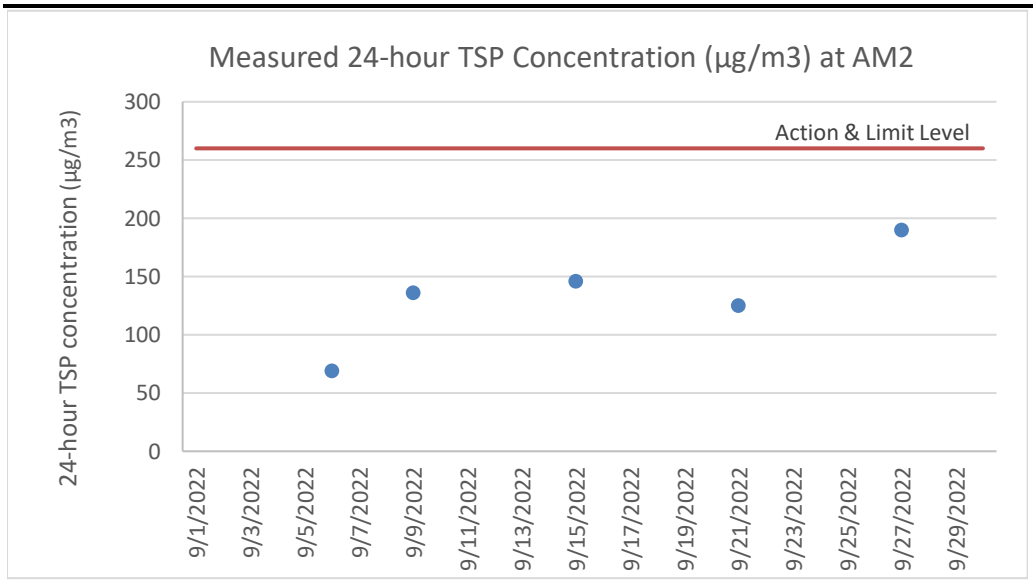


Table D2.3 24-hour TSP Monitoring Results at AM3

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
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	195
				Min	118
				Max	252

Figure D2.3 Graphical Presentation for 24-hr TSP Monitoring at AM3

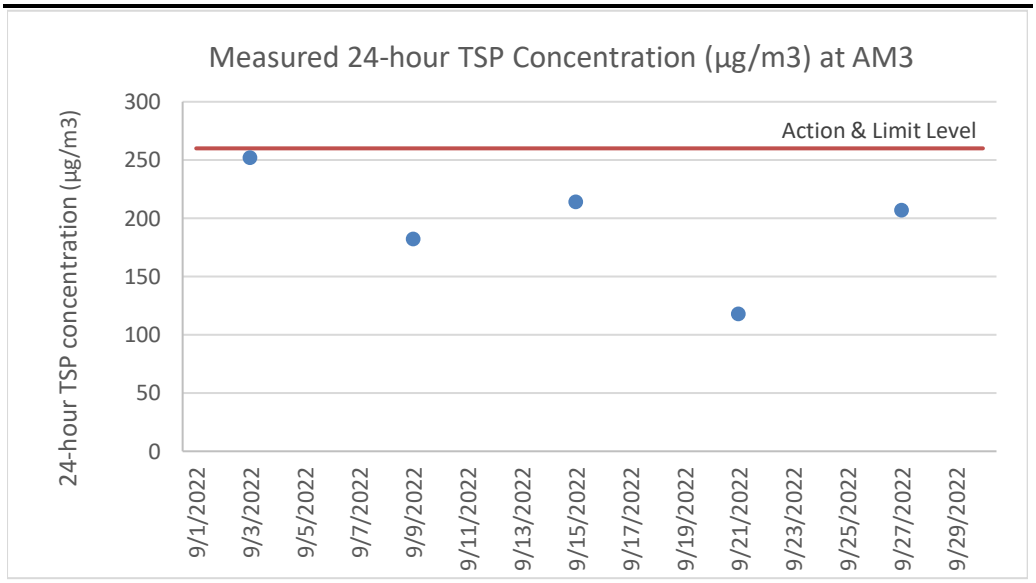
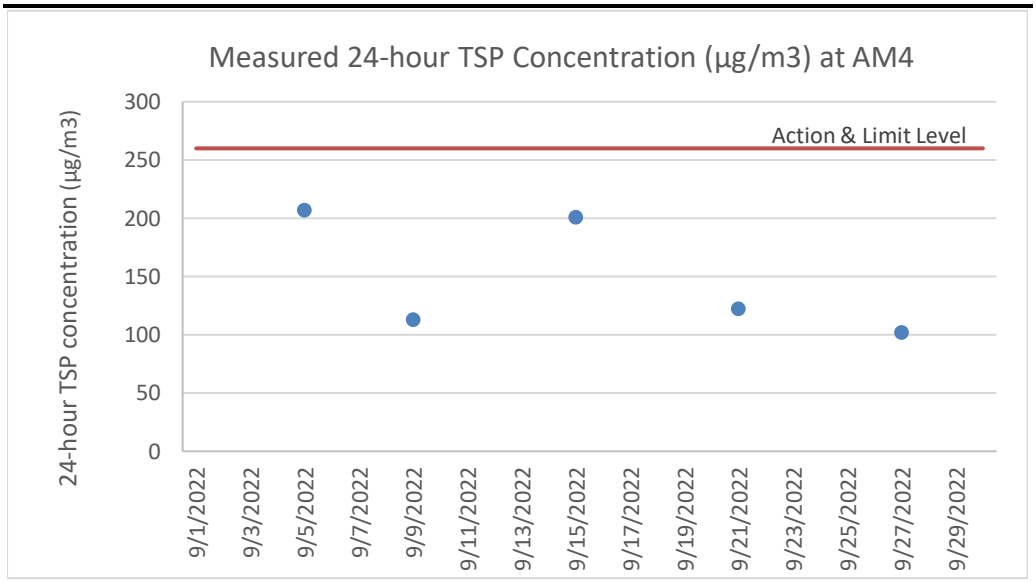


Table D2.4 24-hour TSP Monitoring Results at AM4

Start Date	Start Time	Finish Date	Finish Time	Weather	24-hour TSP (µg/m3)
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	149
				Min	102
				Max	207

Figure D2.4 Graphical Presentation for 24-hr TSP Monitoring at AM4



Annex D3

Event and Action Plan for Dust Monitoring

Annex D3 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

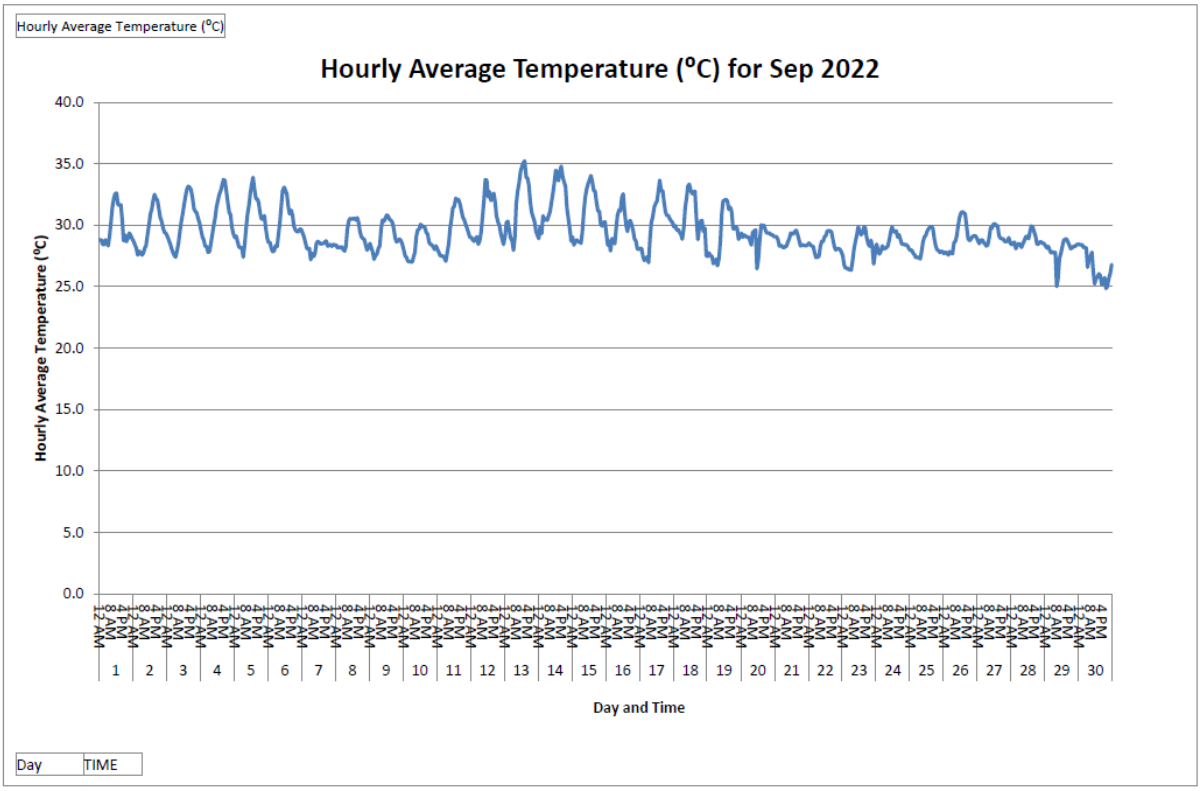
Event	Action		
	ET	IEC	Contractor
Exceedance of Limit Level for odour	• Identify source(s) and investigate the cause(s) of exceedance or complaint • Prepare the odour complaint form or the Notification of Exceedance within 24 hours • Inform Contractor, IEC, Project Proponent and EPD (EIAO Authority) 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

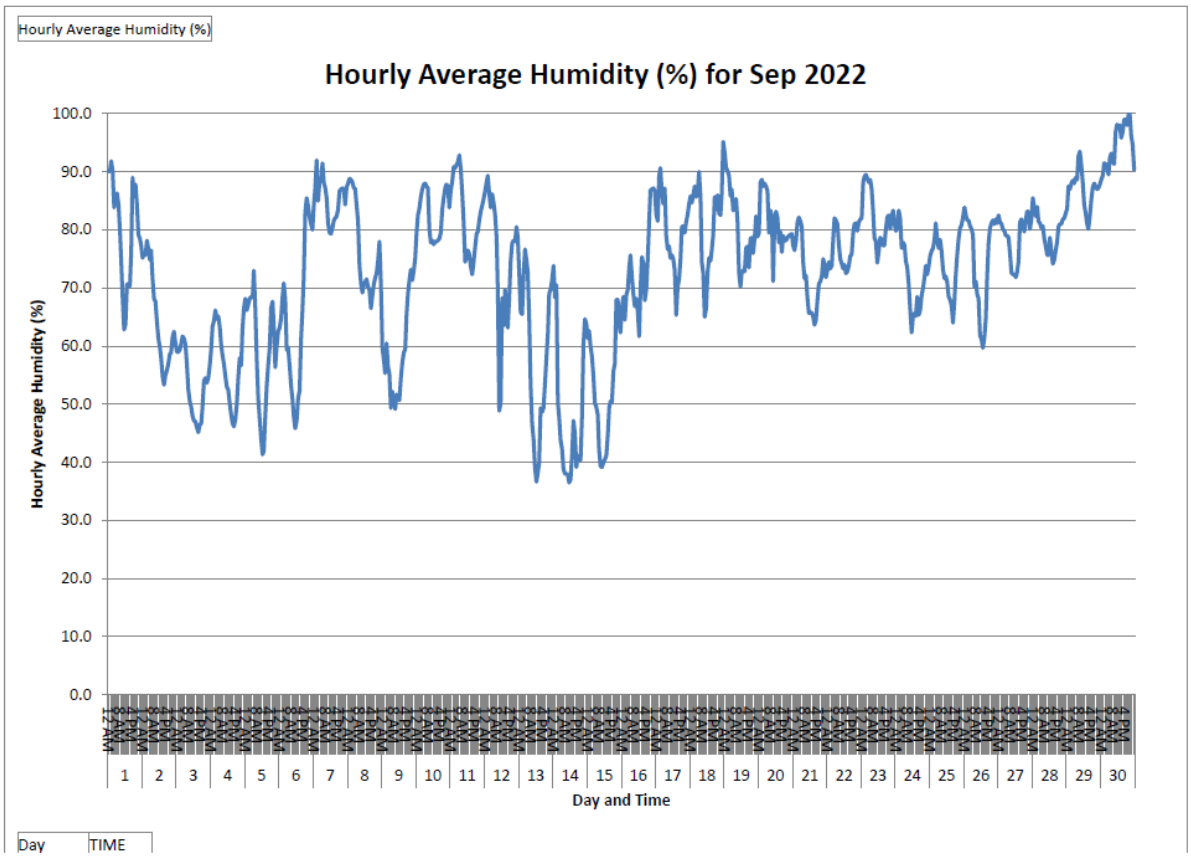
	Action		
Event	**ET**	**IEC**	**Contractor**
Exceedance of Limit Level of stack emission of the thermal oxidizer, flares and generator	• Identify source(s) and investigate the cause(s) of exceedance • Prepare the Notification of Exceedance within 24 hours • Inform Contractor, IEC, Project Proponent and 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

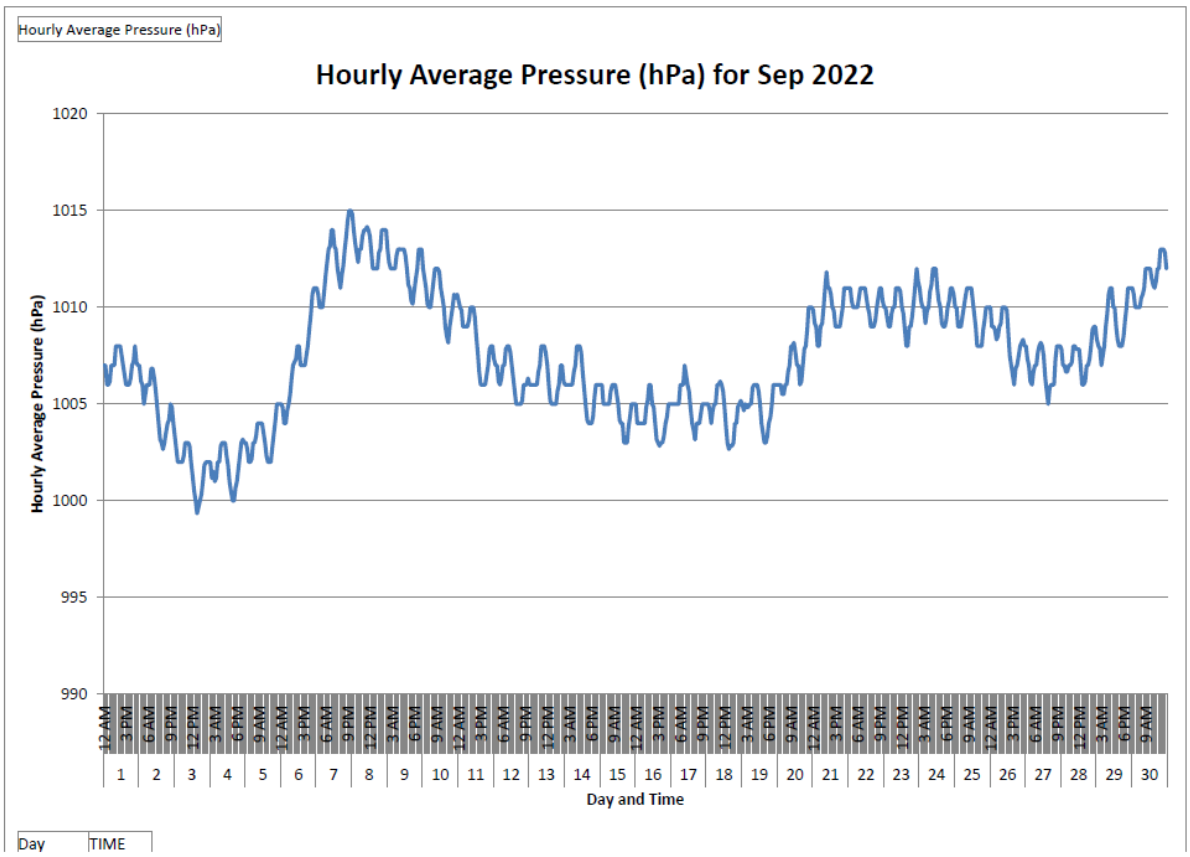
Annex D4

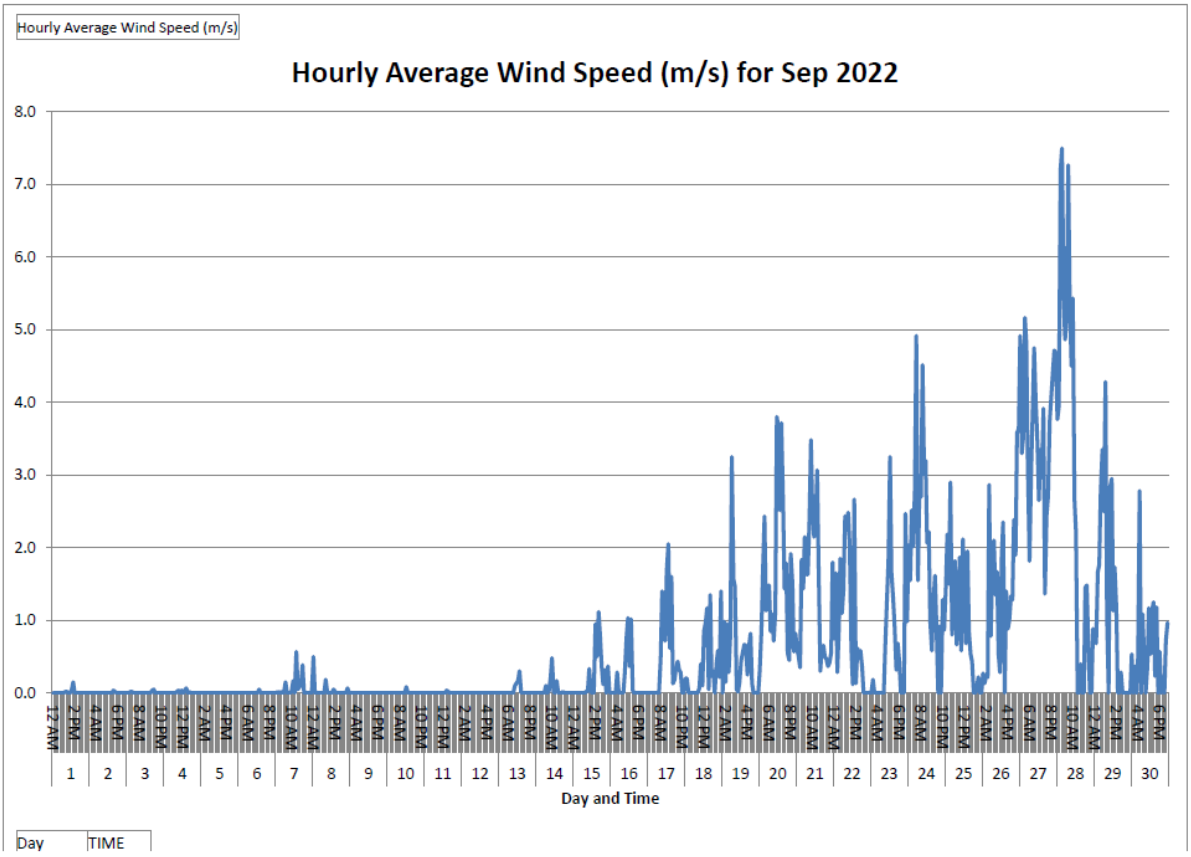
Meteorological Data

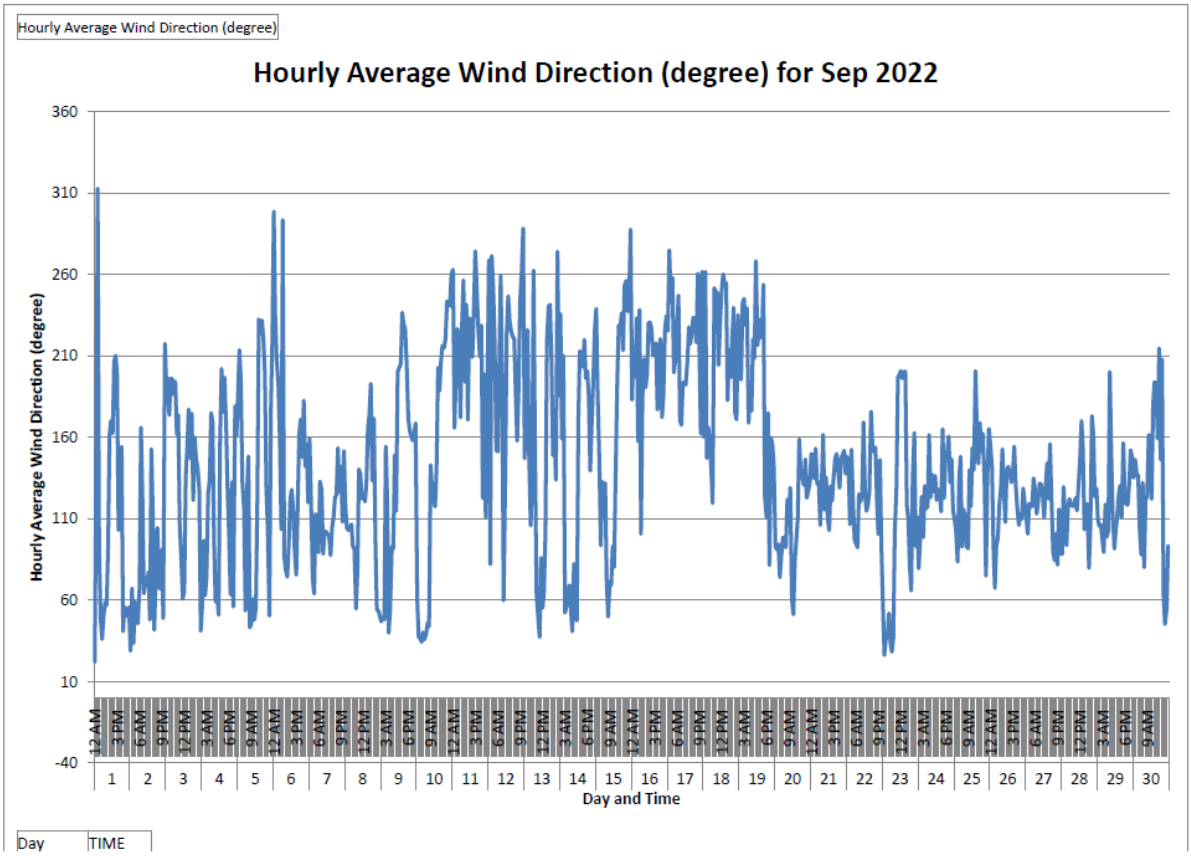
Annex D4 Meteorological Data

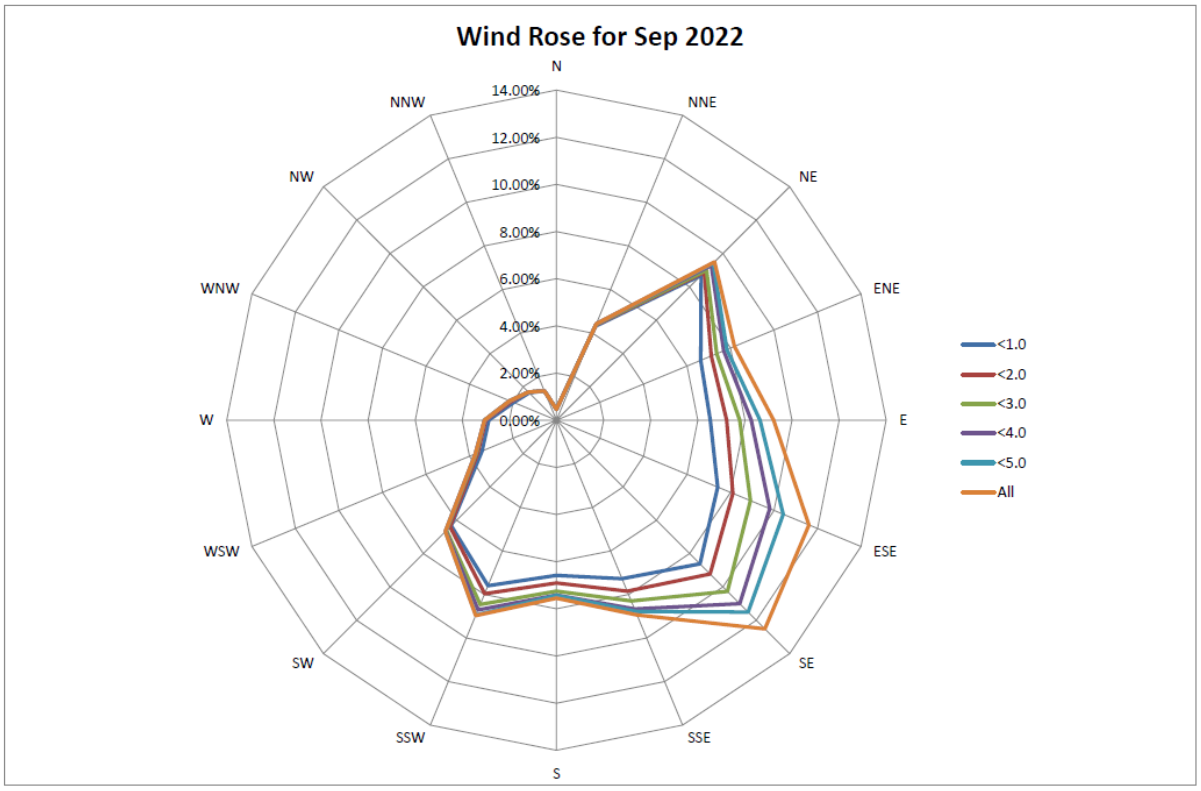


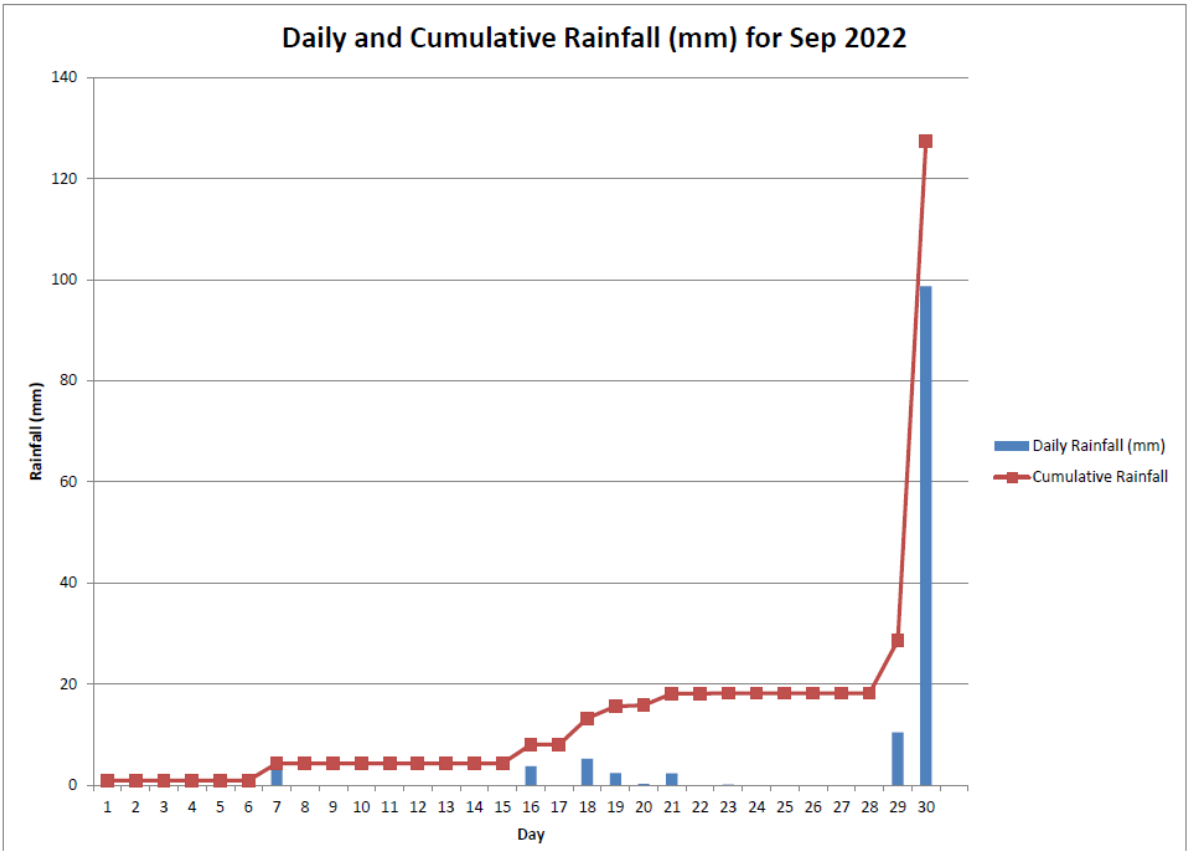



Hourly Average Pressure (hPa)
Hourly Average Pressure (hPa) for Sep 2022
1020
1015
1010
1005
1000
995
990
Hourly Average Pressure (hPa)
12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day and Time
Day
TIME


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
12 AM 2 PM 4 AM 6 PM 8 AM 10 PM 12 PM 2 AM 4 PM 6 AM 8 PM 10 AM 12 AM 2 PM 4 AM 6 PM 8 AM 10 PM 12 PM 2 AM 4 PM 6 AM 8 PM 10 AM 12 AM 2 PM 4 AM 6 PM 8 AM 10 PM 12 PM 2 AM 4 PM 6 AM 8 PM 10 AM 12 AM 2 PM 4 AM 6 PM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
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 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM 12 AM 3 PM 6 AM 9 PM 12 PM 3 AM 6 PM 9 AM
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Day and Time
Day
TIME


Wind Rose for 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 D5

Certificates of the Qualified Odour Panelist

ALS Life Sciences | Environmental

Certificate No.: C21084

Certificate for a Qualified Odour Panellist

This is to certify that

LAU MEI TUNG

has participated in Ten (10) sets of individual N-Butanol Screening Test
during 25 October 2021 - 03 November 2021

with Individual Threshold: 41 ppb/v

and

fulfill the Requirement of the European Standard Method of Air Quality -
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) -

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 - 80 ppb/v
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

03 November 2021	03 November 2022	Fung Lim Chee, Richard
Issue Date	**Valid Until**	

Certificate No.: C21085

Certificate for a Qualified Odour Panellist

This is to certify that

WONG KA HEI

has participated in Ten (10) sets of individual N-Butanol Screening Test
during 25 October 2021 - 03 November 2021

with Individual Threshold: 40 ppb/v

and

fulfill the Requirement of the European Standard Method of Air Quality -
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) -

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 - 80 ppb/v
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

03 November 2021	03 November 2022	
Issue Date	**Valid Until**	**Fung Lim Chee, Richard**

ALS Technichem (HK) Pty Ltd 11/F Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, NT, Hong Kong Tel: 852-2610 1044

ALS Life Sciences | Environmental

Certificate No.: C21086

Certificate for a Qualified Odour Panellist

This is to certify that

WONG HO YU

has participated in Ten (10) sets of individual N-Butanol Screening Test
during 25 October 2021 - 03 November 2021

with Individual Threshold: 56 ppb/v

and

fulfill the Requirement of the European Standard Method of Air Quality -
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) -

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 - 80 ppb/v
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

03 November 2021	03 November 2022	
Issue Date	**Valid Until**	**Fung Lim Chee, Richard**

ALS Technichem (HK) Pty Ltd 11/F Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, NT, Hong Kong Tel: 852-2610 1044

Certificate for a Qualified Odour Panellist

This is to certify that

LAO KA LEONG

has participated in Ten (10) sets of individual N-Butanol Screening Test
during 14 December 2021 - 20 December 2021

with Individual Threshold: 31 ppb/v

and

fulfill the Requirement of the European Standard Method of Air Quality -
Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003) -

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 - 80 ppb/v
with at least 10 sets of individual threshold estimates and standard deviation less than 2.3

20 December 2021	20 December 2022	
Issue Date	**Valid Until**	**Fung Lim Chee, Richard**

Certificate for a Qualified Odour Panellist

This is to certify that

Cheung Wai Hung

has participated in Ten (10) sets of individual n-Butanol Screening Tests

during 19 May 2022 to 6 September 2022

with Individual Threshold: 42 ppb/v; Standard Deviation: 1.27

and

fulfil the Requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003)

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v with at least 10 sets of Individual threshold estimates and standard deviation less than 2.3

6 September 2022	6 September 2023	Fung Lim Chee, Richard
Issue Date	Valid Until	

Certificate for a Qualified Odour Panellist

This is to certify that

Kwong Kin Wing

has participated in Ten (10) sets of individual n-Butanol Screening Tests

during 15 August 2022 – 30 August 2022

with Individual Threshold: 29 ppb/v; Standard Deviation: 1.31

and

fulfil the Requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003)

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v with at least 10 sets of Individual threshold estimates and standard deviation less than 2.3

30 August 2022	30 August 2023	Fung Lim Chee, Richard
Issue Date	Valid Until	

Certificate for a Qualified Odour Panellist

This is to certify that

Wong Hei Wang

has participated in Ten (10) sets of individual n-Butanol Screening Tests

during 28 April 2022 to 6 September 2022

with Individual Threshold: 43 ppb/v; Standard Deviation: 1.28

and

fulfil the Requirement of the European Standard Method of Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725:2003)

The Requirement of the Odour Threshold of n-Butanol in Nitrogen Gas in the Range of 20 – 80 ppb/v with at least 10 sets of Individual threshold estimates and standard deviation less than 2.3

6 September 2022	6 September 2023	
Issue Date	Valid Until	Fung Lim Chee, Richard

Annex D6

Odour Monitoring Results

Table D6.1 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
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 D7

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

Table D7.1 Thermal Oxidiser Stack Emission Monitoring Results

Parameters	Monitoring Results
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 D7.2 Thermal Oxidiser Stack Continuous Monitoring Results

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) [(a)]
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	
13-Sep-22	924	1236	
14-Sep-22	926	1231	
15-Sep-22	921	1235	11.2
16-Sep-22	926	1238	
17-Sep-22	924	1236	
18-Sep-22	922	1235	
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	924	1238	-
Min	912	1225	-
Max	932	1248	-

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 D7.3 Landfill Gas Flare Stack Emission Monitoring Results

Parameters	Monitoring Results (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 D7.4 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-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	866	1046	-	
Min	820	987	-	
Max	944	1127	-	
Flare 2 – F602				
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	8.9	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

Date	Gas Combustion Temperature (°C)	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) (a)	Operation Status
9-Sep-22	852	1069		In Operation
10-Sep-22	895	1111		In Operation
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	861	1080	-	
Min	821	1046	-	
Max	948	1127	-	

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 D7.5 Landfill Gas Generator Stack Emission Monitoring Results

Parameters	Monitoring Results
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 D7.6 Landfill Gas Generator Stack Continuous Monitoring Results

Date	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) [(a)]	Operation Status (Landfill Gas Generator in Operation)
1-Sep-22	865		In Operation (ENGA)
2-Sep-22	867		In Operation (ENGA)
3-Sep-22	858		In Operation (ENGA)
4-Sep-22	860		In Operation (ENGA)
5-Sep-22	860		In Operation (ENGA)
6-Sep-22	863		In Operation (ENGA)
7-Sep-22	864		In Operation (ENGA)
8-Sep-22	880		In Operation (ENGA)
9-Sep-22	861		In Operation (ENGA)
10-Sep-22	856		In Operation (ENGA)
11-Sep-22	856		In Operation (ENGA)
12-Sep-22	854		In Operation (ENGA)
13-Sep-22	Under Maintenance		-
14-Sep-22	856		In Operation (ENGA)
15-Sep-22	853	10.2	In Operation (ENGA)
16-Sep-22	859		In Operation (ENGA)
17-Sep-22	863		In Operation (ENGA)
18-Sep-22	855		In Operation (ENGA)
19-Sep-22	863		In Operation (ENGA)
20-Sep-22	862		In Operation (ENGA)
21-Sep-22	858		In Operation (ENGA)
22-Sep-22	862		In Operation (ENGA)
23-Sep-22	860		In Operation (ENGA)
24-Sep-22	859		In Operation (ENGA)
25-Sep-22	860		In Operation (ENGA)
26-Sep-22	861		In Operation (ENGA)
27-Sep-22	860		In Operation (ENGA)
28-Sep-22	863		In Operation (ENGA)
29-Sep-22	864		In Operation (ENGA)
30-Sep-22	852		In Operation (ENGA)
Average	860	-	
Min	852	-	
Max	880	-	
1-Sep-22	865		In Operation (ENGB)
2-Sep-22	867		In Operation (ENGB)
3-Sep-22	857		In Operation (ENGB)
4-Sep-22	856		In Operation (ENGB)
5-Sep-22	855		In Operation (ENGB)
6-Sep-22	857		In Operation (ENGB)
7-Sep-22	856		In Operation (ENGB)
8-Sep-22	Under Maintenance		-
9-Sep-22	845		In Operation (ENGB)
10-Sep-22	856		In Operation (ENGB)
11-Sep-22	857		In Operation (ENGB)

Date	Exhaust Temperature (K)	Exhaust Gas Velocity (ms^{-1}) [(a)]	Operation Status (Landfill Gas Generator in Operation)
12-Sep-22	854	10.2	In Operation (ENGB)
13-Sep-22	879		In Operation (ENGB)
14-Sep-22	855		In Operation (ENGB)
15-Sep-22	851		In Operation (ENGB)
16-Sep-22	856		In Operation (ENGB)
17-Sep-22	859		In Operation (ENGB)
18-Sep-22	851		In Operation (ENGB)
19-Sep-22	855		In Operation (ENGB)
20-Sep-22	851		In Operation (ENGB)
21-Sep-22	856		In Operation (ENGB)
22-Sep-22	860		In Operation (ENGB)
23-Sep-22	859		In Operation (ENGB)
24-Sep-22	857		In Operation (ENGB)
25-Sep-22	859		In Operation (ENGB)
26-Sep-22	862		In Operation (ENGB)
27-Sep-22	861		In Operation (ENGB)
28-Sep-22	860		In Operation (ENGB)
29-Sep-22	863		In Operation (ENGB)
30-Sep-22	848		In Operation (ENGB)
Average	857	-	
Min	845	-	
Max	879	-	

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 E

Noise

Annex E1

Calibration Certificates for Noise Monitoring Equipment

輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C221365
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC22-0258) Date of Receipt / 收件日期 : 14 February 2022

Description / 儀器名稱	:	Sound Level Meter (EQ018)
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NL-52
Serial No. / 編號	:	00809405
Supplied By / 委託者	:	Action-United Environmental Services and Consulting Unit A, 20/F., Gold King Industrial Building, 35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 12 March 2022

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Fluke Everett Service Center, USA
- Agilent Technologies / Keysight Technologies

Tested By 測試 : K C Lee, Engineer

Certified By 核證 : H C Chan, Engineer

Date of Issue 簽發日期 : 16 March 2022

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 - 校正及檢測實驗所
c/o 香港新界屯門興安里一號四樓
Tel/電話: (852) 2927 2606 Fax/傳真: (852) 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C221365
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration was performed before the test.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C220381
CL281	Multifunction Acoustic Calibrator	AV210017

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.0	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L_A	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.0	Ref.
			Slow			94.0	± 0.3

Certificate of Calibration
校正證書

Certificate No. : C221365
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_A	A	Fast	94.00	63 Hz	67.8	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.5
					250 Hz	85.4	-8.6 ± 1.4
					500 Hz	90.8	-3.2 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	95.0	+1.2 ± 1.6
					4 kHz	94.7	+1.0 ± 1.6
					8 kHz	92.9	-1.1 (+2.1 ; -3.1)
					16 kHz	85.5	-6.6 (+3.5 ; -17.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_C	C	Fast	94.00	63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.1	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.6	-0.2 ± 1.6
					4 kHz	92.9	-0.8 ± 1.6
					8 kHz	91.0	-3.0 (+2.1 ; -3.1)
					16 kHz	83.5	-8.5 (+3.5 ; -17.0)

Certificate of Calibration
校正證書

Certificate No. : C221365
證書編號

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 16463

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	: 63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	16 kHz	: ± 0.70 dB
104 dB	: 1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	: 1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C224780
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC22-1539) Date of Receipt / 收件日期 : 4 August 2022

Description / 儀器名稱 : Sound Calibrator (EQ082)
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 4231
Serial No. / 編號 : 2713428
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 20 August 2022

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By 測試 : H T Wong
Assistant Engineer

Certified By 核證 : K C Lee
Engineer

Date of Issue 簽發日期 : 23 August 2022

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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c/o 香港新界屯門興安里一號四樓
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Certificate of Calibration
校正證書

Certificate No. : C224780
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C223647
CL281	Multifunction Acoustic Calibrator	AV210017
TST150A	Measuring Amplifier	C221750

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.1	± 0.2	± 0.2
114 dB, 1 kHz	114.1		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 0	1 kHz ± 0.1 %	± 0.1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 - 校正及檢測實驗所
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輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C215418
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC21-1345) Date of Receipt / 收件日期 : 26 August 2021

Description / 儀器名稱 : Sound Calibrator (EQ083)
Manufacturer / 製造商 : Rion
Model No. / 型號 : NC-74
Serial No. / 編號 : 34246492
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 10 September 2021

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By 測試 : Cheuk
K P Cheuk
Project Engineer

Certified By 核證 :
K C Lee
Engineer

Date of Issue 簽發日期 : 13 September 2021

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C215418
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C213954
CL281	Multifunction Acoustic Calibrator	AV210017
TST150A	Measuring Amplifier	C201309

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.3	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.002	1 kHz ± 1 %	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 - 校正及檢測實驗所
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Tel/電話: (852) 2927 2606 Fax/傳真: (852) 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Annex E2

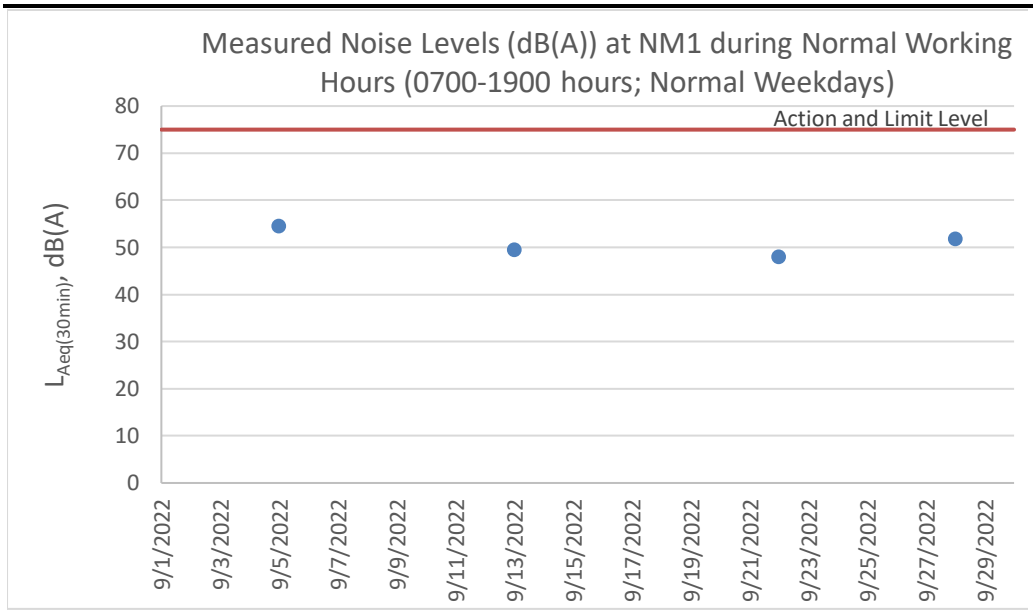
Noise Monitoring Results

Table E2.1 ***Measured Noise Levels (dB(A)) at NM1 during Normal Working Hours (0700-1900 hours; Normal Weekdays)***

Date	Start Time	Finish Time	Weather	$L_{10\ (30min)}$	$L_{90\ (30min)}$	$L_{eq\ (30min)}$
5 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	51.0
					Min	48.1
					Max	54.5

Note:
Correction of +3 dB(A) was made for free field measurements.

Figure E2.1 ***Graphical Presentation for Noise Monitoring at NM1***



Annex E3

Event and Action Plan for Noise Monitoring

Annex E3 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

Surface Water Quality

Annex F1

Calibration Certificates for Surface Water Quality Monitoring Equipment

ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
1-3 Wing Yip Street, Kwai Chung
N.T., Hong Kong
T: +852 2610 1044 | F: +852 2610 2021

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR BEN TAM	WORK ORDER:	HK2223600
CLIENT:	ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING		
ADDRESS:	RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T.	SUB-BATCH:	0
		LABORATORY:	HONG KONG
		DATE RECEIVED:	20-Jun-2022
		DATE OF ISSUE:	27-Jun-2022

SPECIFIC COMMENTS

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client.
The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the laboratory or quoted from relevant international standards.
The "Next Calibration Date" is recommended according to best practice principle as practised by the laboratory or quoted from relevant international standards.
The validity of equipment/ meter performance only applies to the result(s) stated in the report.

Equipment Type:	Multifunctional Meter
Service Nature:	Performance Check
Scope:	Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature
Brand Name/ Model No.:	[YSI]/ [Professional DSS]
Serial No./ Equipment No.:	[17B102764/17B100758]/ [EQW019]
Date of Calibration:	23-June-2022

GENERAL COMMENTS

This report superseded any previous report(s) with same work order number.

Ms. Lin Wai Yu, Iris
Assistant Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2223600

SUB-BATCH: 0
DATE OF ISSUE: 27-Jun-2022
CLIENT: ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [Professional DSS]
Serial No./ Equipment No.: [17B102764/17B100758]/ [EQW019]
Date of Calibration: 23-June-2022 Date of Next Calibration: 23-September-2022

PARAMETERS:

Conductivity

Method Ref: APHA (21st edition), 2510B

Expected Reading (µS/cm)	Displayed Reading (µS/cm)	Tolerance (%)
146.9	160.5	+9.3
6667	7197	+7.9
12890	14036	+8.9
58670	61677	+5.1
	Tolerance Limit (%)	±10.0

Dissolved Oxygen

Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.82	2.88	+0.06
5.03	5.13	+0.10
8.38	8.37	-0.01
	Tolerance Limit (mg/L)	±0.20

pH Value

Method Ref: APHA (21st edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.85	-0.15
7.0	7.10	+0.10
10.0	10.02	+0.02
	Tolerance Limit (pH unit)	±0.20

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Ms. Lin Wai Yu, Iris
Assistant Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2223600

SUB-BATCH: 0
DATE OF ISSUE: 27-Jun-2022
CLIENT: ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [Professional DSS]
Serial No./ Equipment No.: [17B102764/17B100758]/ [EQW019]
Date of Calibration: 23-June-2022 Date of Next Calibration: 23-September-2022

PARAMETERS:

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	-0.42	--
4	4.31	+7.7
40	38.64	-3.4
80	76.24	-4.7
400	387.03	-3.2
800	737.96	-7.8
	Tolerance Limit (%)	±10.0

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	10.10	+1.0
20	20.54	+2.7
30	30.74	+2.5
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Ms. Lin Wai Yu, Iris
Assistant Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2223600

SUB-BATCH: 0
DATE OF ISSUE: 27-Jun-2022
CLIENT: ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [Professional DSS]
Serial No./ Equipment No.: [17B102764/17B100758]/ [EQW019]
Date of Calibration: 23-June-2022 Date of Next Calibration: 23-September-2022

PARAMETERS:

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
12.0	12.8	+0.8
21.5	21.2	-0.3
38.0	37.0	-1.0
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Ms. Lin Wai Yu, Iris
Assistant Manager - Inorganics

Annex F2

Surface Water Quality Monitoring Results

Table F2.1 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
22 Sep 22	14:07	Sunny		Unable to collect water sample due to insufficient flow					-
					Average	-	-	-	-
					Min	-	-	-	-
					Max	-	-	-	-

Table F2.2 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
22 Sep 22	14:10	Sunny		Unable to collect water sample due to insufficient flow					-
					Average	-	-	-	-
					Min	-	-	-	-
					Max	-	-	-	-

Annex F3

Event and Action Plan for Surface Water Quality Monitoring

Annex F3 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 F4

Calibration Certificates for Effluent Quality Monitoring Equipment

ALS Technichem (HK) Pty Ltd
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1-3 Wing Yip Street, Kwai Chung
N.T., Hong Kong
T: +852 2610 1044 | F: +852 2610 2021

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR IVAN LEUNG	WORK ORDER:	HK2225127
CLIENT:	ALS TECHNICHEM (HK) PTY LTD		
ADDRESS:	11/F., CHUNG SHUN KNITTING CENTRE, 1-3 WING YIP STREET, KWAI CHUNG, N.T.	SUB-BATCH:	0
		LABORATORY:	HONG KONG
		DATE RECEIVED:	04-Jul-2022
		DATE OF ISSUE:	06-Jul-2022

SPECIFIC COMMENTS

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client.
The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the laboratory or quoted from relevant international standards.
The "Next Calibration Date" is recommended according to best practice principle as practised by the laboratory or quoted from relevant international standards.
The validity of equipment/ meter performance only applies to the result(s) stated in the report.

Equipment Type:	pH meter
Service Nature:	Performance Check
Scope:	pH Value and Temperature
Brand Name/ Model No.:	[TOA]/ [HM-30P]
Serial No./ Equipment No.:	[790332]/ [HK1383]
Date of Calibration:	05-July-2022

GENERAL COMMENTS

This report superseded any previous report(s) with same work order number.

Mr Chan Siu Ming, Vico
Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2225127

SUB-BATCH: 0
DATE OF ISSUE: 06-Jul-2022
CLIENT: ALS TECHNICHEM (HK) PTY LTD

Equipment Type: pH meter
Brand Name/ Model No.: [TOA]/ [HM-30P]
Serial No./ Equipment No.: [790332]/ [HK1383]
Date of Calibration: 05-July-2022 Date of Next Calibration: 05-October-2022

PARAMETERS:

pH Value

Method Ref: APHA (21st edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.03	+0.03
7.0	6.89	-0.11
10.0	10.04	+0.04
	Tolerance Limit (pH unit)	±0.20

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
7.5	7.5	+0.0
22.5	21.8	-0.7
38.0	37.8	-0.2
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganics

Annex F5

Leachate Levels Monitoring Results

Table F5.1 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-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	69	81	75
Min	62	64	64
Max	75	89	82

Table F5.2 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-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

Date	Meter No.X3 (cm)	Meter No.X4 (cm)	Average (cm)
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	73	77	75
Min	46	50	48
Max	90	90	88

Table F5.3 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-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	69	69	69
Min	62	62	62
Max	75	75	75

Table F5.4 Leachate Levels Monitoring Results (Pump Station No.4X (Cell 4X))

Date	Meter No.X7 (cm)	Meter No.X8 (cm)	Average (cm)
Pump Station No. 4X (Cell 4X)			
1-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	65	68	67
Min	50	52	51
Max	246	246	246

Annex F6

Effluent Quality Monitoring Results

Table F6.1 Effluent Monitoring Results

		7 Sep 22
On-site Measurements		
Temperature	°C	32.9
pH Value	pH Unit	8.4
Volume Discharged	m^3	1,251
Laboratory Analysis		
Suspended Solids (SS)	mg/L	25.4
Alkalinity	mg/L	1980
Ammoniacal-nitrogen	mg/L	0.29
Chloride	mg/L	1730
Nitrite-nitrogen	mg/L	0.11
Phosphate	mg/L	5.73
Sulphate	mg/L	149
Total Nitrogen	mg/L	86.5
Nitrate-nitrogen	mg/L	45.7
Total Inorganic Nitrogen	mg/L	46.10
Biochemical Oxygen Demand (BOD)	mg/L	8
Chemical Oxygen Demand (COD)	mg/L	1110
Oil & Grease	mg/L	<5
Total Organic Carbon (TOC)	mg/L	273
Boron	µg/L	4850
Calcium	mg/L	29.2
Iron	mg/L	1.38
Magnesium	mg/L	19.5
Potassium	mg/L	785
Cadmium	µg/L	<1.0
Chromium	µg/L	109
Copper	µg/L	<10
Nickel	µg/L	108
Zinc	µg/L	58

Annex F7

Calibration Certificates for Groundwater Monitoring Equipment

ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
1-3 Wing Yip Street, Kwai Chung
N.T., Hong Kong
T: +852 2610 1044 | F: +852 2610 2021

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR BEN TAM	WORK ORDER:	HK2228780
CLIENT:	ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING		
ADDRESS:	RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T.	SUB-BATCH:	0
		LABORATORY:	HONG KONG
		DATE RECEIVED:	25-Jul-2022
		DATE OF ISSUE:	29-Jul-2022

SPECIFIC COMMENTS

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client.
The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the laboratory or quoted from relevant international standards.
The "Next Calibration Date" is recommended according to best practice principle as practised by the laboratory or quoted from relevant international standards.
The validity of equipment/ meter performance only applies to the result(s) stated in the report.

Equipment Type:	Multifunctional Meter
Service Nature:	Performance Check
Scope:	Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature
Brand Name/ Model No.:	[YSI]/ [Professional DSS]
Serial No./ Equipment No.:	[20J101862/ 15H103928]/ [EQW018]
Date of Calibration:	28-July-2022

GENERAL COMMENTS

This report superseded any previous report(s) with same work order number.

Mr Chan Siu Ming, Vico
Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2228780

SUB-BATCH: 0
DATE OF ISSUE: 29-Jul-2022
CLIENT: ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [Professional DSS]
Serial No./ Equipment No.: [20J101862/ 15H103928]/ [EQW018]
Date of Calibration: 28-July-2022 Date of Next Calibration: 28-October-2022

PARAMETERS:

Conductivity

Method Ref: APHA (21st edition), 2510B

Expected Reading (µS/cm)	Displayed Reading (µS/cm)	Tolerance (%)
146.9	158.0	+7.6
6667	6884	+3.3
12890	13531	+5.0
58670	58656	-0.0
	Tolerance Limit (%)	±10.0

Dissolved Oxygen

Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.96	2.94	-0.02
5.08	5.05	-0.03
7.51	7.51	+0.00
	Tolerance Limit (mg/L)	±0.20

pH Value

Method Ref: APHA (21st edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.95	-0.05
7.0	7.12	+0.12
10.0	9.97	-0.03
	Tolerance Limit (pH unit)	±0.20

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2228780

SUB-BATCH: 0
DATE OF ISSUE: 29-Jul-2022
CLIENT: ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [Professional DSS]
Serial No./ Equipment No.: [20J101862/ 15H103928]/ [EQW018]
Date of Calibration: 28-July-2022 Date of Next Calibration: 28-October-2022

PARAMETERS:

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	-0.01	--
4	4.09	+2.3
40	38.89	-2.8
80	77.59	-3.0
400	422.82	+5.7
800	755.63	-5.5
	Tolerance Limit (%)	±10.0

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	10.34	+3.4
20	20.65	+3.2
30	30.62	+2.1
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK2228780

SUB-BATCH: 0
DATE OF ISSUE: 29-Jul-2022
CLIENT: ACTION-UNITED ENVIRONMENTAL SERVICES & CONSULTING

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [Professional DSS]
Serial No./ Equipment No.: [20J101862/ 15H103928]/ [EQW018]
Date of Calibration: 28-July-2022 Date of Next Calibration: 28-October-2022

PARAMETERS:

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
9.0	8.4	-0.6
21.5	20.3	-1.2
38.0	37.1	-0.9
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganics

Annex F8

Groundwater Monitoring Results

Table F8.1 Groundwater Monitoring Results

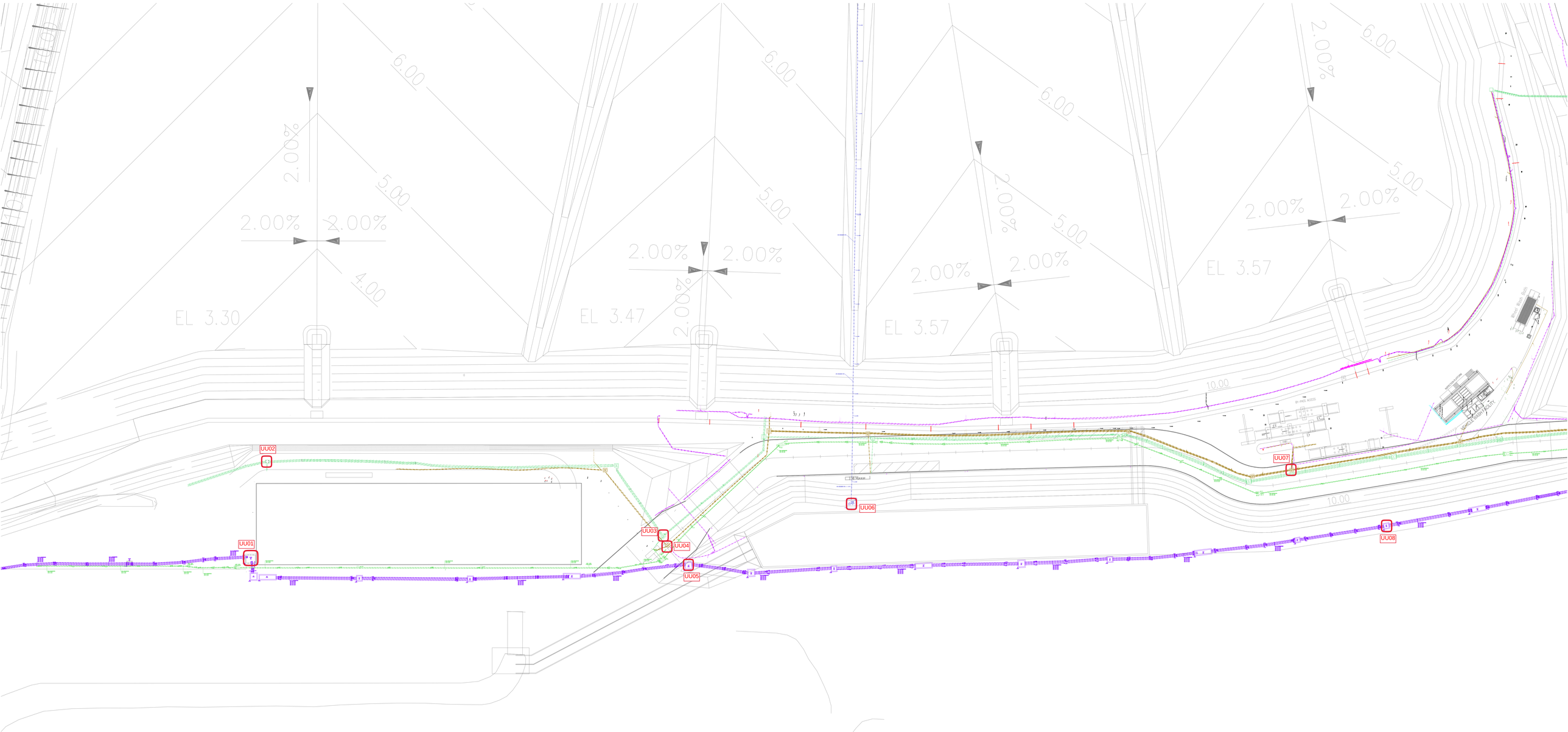
Parameters	Units	MWX-1	MWX-2	MWX-3	MWX-4	MWX-5	MWX-6	MWX-7	MWX-8	MWX-9	MWX-10	MWX-11	MWX-12	MWX-13	MWX-14
Water Level	mPD	3.09	3.30	3.21	3.32	3.38	3.30	2.88	3.14	3.65	3.81	4.01	6.99	37.41	45.70
Bicarbonate Alkalinity as CaCO3	mg/L	108	269	155	<1	20	<1	<1	<1	108	173	132	58	18	12
Carbonate Alkalinity as 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

Annex G

Landfill Gas

Annex G1

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


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

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

Annex G2

Calibration Certificates for Landfill Gas Monitoring Equipment

ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
1-3 Wing Yip Street, Kwai Chung
N.T., Hong Kong
T: +852 2610 1044 | F: +852 2610 2021

CERTIFICATE OF ANALYSIS

CONTACT:	MR IVAN LEUNG	WORK ORDER:	HK2233088
CLIENT:	ALS TECHNICHEM (HK) PTY LTD		
ADDRESS:	11/F., CHUNG SHUN KNITTING CENTRE, 1-3 WING YIP STREET, KWAI CHUNG, N.T.	SUB BATCH:	0
		LABORATORY:	HONG KONG
		DATE RECEIVED:	22-Aug-2022
		DATE OF ISSUE:	05-Sep-2022

SPECIFIC COMMENTS

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client.
The performance of the equipment stated in this report is checked with independent reference material and results are compared against a calibrated secondary source.
The "Instrument Specification" quoted is the acceptance criteria applicable for similar equipment used by the laboratory or quoted from relevant international standards.
The "Next Calibration Date" is recommended according to best practice principles as practised by the laboratory or quoted from relevant international standards.
The validity of equipment/ meter performance only applies to the result(s) stated in the report.

Equipment Type:	Landfill Gas Analyser
Service Nature:	Performance Check
Scope:	Carbon dioxide, Methane and Oxygen
Brand Name/ Model No.:	GA5000
Serial No./Equipment No.:	G507306 (HK1935)
Date of Calibration:	02 September, 2022

GENERAL COMMENTS

This report superseded any previous report(s) with same work order number.

Ms Chan Ka Yu, Karen
Manager - Organics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK2233088
Sub-Batch: 0
Client: ALS TECHNICHEM (HK) PTY LTD
Date of Issue: 05-Sep-2022

Equipment Type: Landfill Gas Analyser
Brand Name/ Model No.: GA5000
Serial No./ Equipment No.: G507306 (HK1935)
Date of Calibration: 02 September, 2022 Next Calibration Date: 02 October, 2022

Parameters:

Methane

Calibrated Gas Standard, %	Monitor Readout, %	% error	Instrument Specification, %
0.0 (Nitrogen)	0.0	0.0	± 0.3
1.0	1.0	0.0	± 0.3
10.0	10.0	0.0	± 0.5

Carbon Dioxide

Calibrated Gas Standard, %	Monitor Readout, %	% error	Instrument Specification, %
0.0 (Nitrogen)	0.0	0.0	± 0.3
1.0	1.0	0.0	± 0.3
10.0	10.0	0.0	± 0.5

Oxygen

Calibrated Gas Standard, %	Monitor Readout, %	% error	Instrument Specification, %
0.0 (Nitrogen)	0.0	0.0	± 1.0
23.5	24.0	0.5	± 1.0

Ms Chan Ka Yu, Karen
Manager - Organics

Annex G3

Landfill Gas Monitoring Results

Table G3.1 Landfill Gas Monitoring Results at Perimeter LFG Monitoring Wells

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 G3.2 Landfill Gas Monitoring Results at Service Voids, Utilities Pits and Manholes

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

Annex G4

Event and Action Plan for Landfill Gas Monitoring

Annex G4 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	0	3
Air Quality (Odour)	Action	0	0
	Limit	0	0
Air Quality (Emissions of Thermal Oxidiser)	Limit	0	0
Air Quality (Emissions of Landfill Gas Flare)	Limit	0	1
Air Quality (Emissions of Landfill Gas Generator)	Limit	0	0
Noise	Action	0	0
	Limit	0	0
Water Quality (Surface Water)	Limit	0	60
Water Quality (Leachate)	Limit	0	0
Water Quality (Leachate Level)	Limit	1	10
Water Quality (Groundwater)	Limit	1	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 (1 – 30 September 2022)	0	0	0
Total no. received since project commencement	1	0	0

Annex I

Monitoring Schedule for the Next Reporting Period

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

October 2022

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