OSCAR Bioenergy Joint Venture

Contract No. EP/SP/61/10 Organic Resources Recovery Centre (Phase 1): *Thirty-second Quarterly EM&A Summary Report*

1 March 2023 – 31 May 2023

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Organic Resources Recovery Centre, Phase I

32nd Quarterly EM&A Report

(1 March 2023 – 31 May 2023)

(April 2024)

Verified by:	Claudine Lee
Position:	Independent Environmental Checker
Date:	5th April 2024

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Reference 0279222

For and on behalf of ERM-Hong Kong, Limited

Approved by: Jasmine Ng

Signed: 

Position: Managing Partner

Certified by: 

(Environmental Team Leader – Mandy To)

Date: 25 March 2024

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EXECUTIVE SUMMARY

The construction works of ***No. EP/SP/61/10 Organic Resources Recovery Centre Phase 1 (the Project)*** commenced on 21 May 2015. This is the 32nd quarterly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 1 March 2023 to 31 May 2023 in accordance with the EM&A Manual. Substantial completion of the construction works was confirmed on 3 December 2018. In the meantime, the operation phase EM&A programme had commenced in March 2019. Substantial Completion in respect of substantial part of the Works was confirmed on 24 February 2020. The construction phase EM&A programme was completed in the end of February 2020.

Summary of Works undertaken during the Reporting Period

Works undertaken in the reporting period included:

- Operation of the Project, including organic waste reception, and operation of the pre-treatment facilities, anaerobic digesters, composting facilities, air pollution control systems, on-line emission monitoring system for the Centralised Air Pollution Control Unit (CAPCS), Co-generation Units (CHP)s and Ammonia Stripping Plant (ASP), and the wastewater treatment plant;
- Adjustment of temperature curves on the CHP3;
- CHP2 was returned in operation instead of CHP3, by moving the throttle valve from CHP3 to CHP2;
- Back purging testing for CEMS;
- VOC calibration for CAPCS stack;
- Emergency repair of chemical scrubber fan;
- Preparation for QAL 2 on the CEMS system;
- SBR 3 and ASP plate heat exchanger cleaning (April 2023 – May 2023);
- Fire Services System annual inspection;
- CEMS maintenance;
- QAL 2 testing with 3rd Party Lab was conducted for MCS 1 and MCS 2; and
- Replacement of membrane diffusers for all of the SBR Tanks of the Wastewater Treatment Plant was completed.

Environmental Monitoring and Audit Progress

Air Quality Monitoring

Non-compliance of emission limits of VOCs (including methane) from CAPCS, NO_x and SO_2 from the CHPs, NO_x, SO_2, NH_3 and HCl from ASP, HF from the Standby Flaring Gas Unit were recorded in March 2023. The cause of the exceedances of VOCs (including methane) is due to faulty sensor. The exceedances of SO_2 from the CHPs and ASP occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. The exceedances of NO_x from CHPs, NO_x, NH_3 and HCl from ASP and HF from Standby Flaring Gas Unit occurred due to system instability caused by prolonged usage of the CHPs, ASP and Standby Flaring Gas Unit.

Non-compliance of emission limits of VOCs (including methane) from CAPCS, NO_x and SO_2 from CHP 1, Dust, NO_x, SO_2, HCl and HF from CHP 2; NO_x, SO_2 and NH_3 from ASP recorded in April 2023. The cause of the exceedances of VOCs (including methane) is due to faulty sensor. The exceedances of SO_2 from the CHPs occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. The exceedances of dust, NO_x, HCl and HF from CHPs occurred due to system instability caused by prolonged usage of the CHPs. The exceedances of NO_x, SO_2 and NH_3 from ASP occurred due to ASP pump failure which caused equipment trip.

Non-compliance of emission limits of Dust, VOCs, NO_x and SO_2 from CHP 1; Dust, NO_x and SO_2 from CHP 2; NO_x and SO_2 from CHP 3; CO, NO_x, SO_2, NH_3 and HF from ASP were recorded in May 2023. The exceedances of SO2 from the CHPs and ASP occurred due to tripping of the de-sulphurisation system. The potential cause of exceedances of Dust, VOCs and NOx from CHPs, as well as the exceedances of CO, NO_x, NH_3 and HF from ASP was system instability.

As similar issues have re-occurred in multiple reporting periods, the Contractor is advised to undertake a comprehensive review of the operation of the concerned systems and the effectiveness of the existing mitigation measures and proposed further measures to avoid the exceedance.

Odour

No odour patrols were required to be conducted during the reporting period.

Water Quality

Non-compliance of discharge limits of Total Nitrogen from the outlet chamber of the effluent storage tank from March to May 2023; and Non-compliance of discharge limits of Suspended Solids from Petrol Interceptor 1 were recorded on 20 April 2023.

The exceedances of Total Nitrogen from the effluent discharge from the outlet chamber of Effluent Storage Tank occurred due to an unexpected surge of Kjeldahl Nitrogen in Treated Effluent and leading to high Total Nitrogen in Treated Effluent sampled on 9 March 2023 and 13 April 2023. The exceedance of Total Nitrogen was potentially caused potentially caused by the poor

performance of the Sequential Batch Reactor (SBR), leading to an increased level of Nitrogen in the Treated Effluent sampled on 5 May 2023.

Waste Management

Waste generated from the operation of the Project includes chemical waste, waste generated from pre-treatment process and general refuse.

No Chemical waste were collected during the reporting period by licenced waste collector from the operation of the Project.

1,922.52 tonnes of waste generated from pre-treatment process from the operation of the Project was disposed of at landfill. Among the recyclable waste generated from pre-treatment process from the operation of the Project, 0 tonnes of metals, 0.26 tonnes of papers/cardboard packing, and 0 tonnes of plastics were sent to recyclers for recycling during the reporting period.

Around 8.41 tonnes of general refuse from the operation of the Project were disposed of at landfill. Among the recycled general refuse from the operation of the Project, 0.011 tonnes of metals, 0.08 tonnes of papers/cardboard packing and 0.037 tonnes of plastics were sent to recyclers for recycling during the reporting period.

Findings of Environmental Site Audit

A summary of the monitoring activities undertaken in this reporting period is listed below:

- Joint Environmental Site Inspections 3 times
- Landscape & Visual Inspections 3 times

Monthly joint environmental site inspections were carried out. The environmental control/mitigation measures (related to air quality, water quality, waste (including land contamination prevention), hazard-to-life, and landscape and visual) recommended in the approved EIA Report and the EM&A Manual were properly implemented by the Contractor during the reporting month.

Environmental Exceedance/Non-conformance/Compliant/Summons and Prosecution

Exceedances for the air emission limits for the CHP and ASP stacks were recorded during the reporting period.

No complaint/ summon/prosecution was received in this reporting period.

Future Key Issues

Activities to be undertaken in the next reporting period include:

- Operation of the Project; and
- Tuning of CHPs by the Supplier; and

- Repairing of the Chemical Scrubber 3.

1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) was appointed by OSCAR Bioenergy Joint Venture (the Contractor) as the Environmental Team (ET) to undertake the construction Environmental Monitoring and Audit (EM&A) programme for the ***Contract No. EP/SP/61/10 of Organic Waste Treatment Facilities Phase I,*** which the project name has been updated to ***Organic Resources Recovery Centre (Phase I) (the Project)*** since November 2017. ERM was also appointed by the Contractor to undertake the operation EM&A programme starting 1 March 2019.

1.1 PURPOSE OF THE REPORT

This is the 32nd Quarterly EM&A report which summarises the monitoring results and audit findings for the EM&A programme during the reporting period from **1 March 2023** to **31 May 2023**.

1.2 STRUCTURE OF THE REPORT

The structure of the report is as follows:

Section 1: Introduction
It details the scope and structure of the report.

Section 2: Project Information
It summarises the background and scope of the Project, site description, project organisation and status of the Environmental Permits (EP)/licences.

Section 3: Environmental Monitoring and Audit Requirements
It summarises the environmental monitoring requirements including monitoring parameters, programmes, methodologies, frequency, locations, Action and Limit Levels, Event/Action Plans, as well as environmental audit requirements as recommended in the EM&A Manual and approved EIA report.

Section 4: Monitoring Results
It summarises monitoring results of the reporting period.

Section 5: Site Audit
It summarises the audit findings of the environmental as well as landscape and visual site audits undertaken within the reporting period.

Section 6: Environmental Non-conformance
It summarises any exceedance of environmental performance standard, environmental complaints and summons received within the reporting period.

Section 7: Further Key Issues

It summarises the impact forecast for the next reporting month.

Section 8: Conclusions

2 PROJECT INFORMATION

2.1 BACKGROUND

The Organic Resources Recovery Centre (ORRC) Phase I development (hereinafter referred to as "the Project") is to design, construct and operate a biological treatment facility with a capacity of about 200 tonnes per day and convert source-separated organic waste from commercial and industrial sectors (mostly food waste) into compost and biogas through proven biological treatment technologies. The location of the Project site is shown in *Annex A*.

The environmental acceptability of the construction and operation of the Project had been confirmed by findings of the associated Environmental Impact Assessment (EIA) Study completed in 2009. The Director of Environmental Protection (DEP) approved this EIA Report under the *Environmental Impact Assessment Ordinance* (EIAO) (Cap. 499) in February 2010 (Register No.: AEIAR-149/2010) (hereafter referred to as the approved EIA Report). Subsequent Report on Re-assessment on Environmental Implications and Report on Re-assessment on Hazard to Life Implications were completed in 2013, respectively.

An Environmental Permit (EP) (No. EP-395/2010) was issued by the DEP to the EPD (Project Team), the Permit Holder, on 21 June 2010 and varied on 18 March 2013 (No. EP-395/2010/A) and 21 May 2013 (No. EP-395/2010/B), respectively. The Design Build and Operate Contract for the ORRC Phase 1 (Contract No. EP/SP/61/10 Organic Resources Recovery Centre (Phase 1) (the Contract)) was awarded to SITA Waste Services Limited, ATAL Engineering Limited and Ros-Roca, Sociedad Anonima jointly trading as the OSCAR Bioenergy Joint Venture (OSCAR or the Contractor). A Further EP (No. FEP-01/395/2010/B) was issued by the DEP to the OSCAR on 16 February 2015. Variation to both EPs (Nos. EP-395/2010/B and FEP-01/395/2010/B) were made in December 2015. The latest EPs, Nos. EP-395/2010/C and FEP-01/395/2010/C, were issued by the DEP on 21 December 2015.

Under the requirements of Condition 5 of the EP (No. FEP-01/395/2010/C), an Environmental Monitoring and Audit (EM&A) programme as set out in the approved EM&A Manual (hereinafter referred to as EM&A Manual) is required to be implemented during the construction and operation of the Project. ERM-Hong Kong, Ltd (ERM) has been appointed by OSCAR as the Environmental Team (ET) for the construction phase EM&A programme and the Monitoring Team (MT) for the operation phase EM&A programme for the implementation of the EM&A programme in accordance with the requirements of the EP and the approved EM&A Manual.

The construction works commenced on 21 May 2015. The operation phase of

the EM&A programme commenced on 1 March 2019 (1). The construction phase EM&A programme was completed in the end of February 2020.

2.2 GENERAL SITE DESCRIPTION

The Project Site is located at Siu Ho Wan in North Lantau with an area of about 2 hectares. The layout of the Project Site is illustrated in *Annex A*. The facility received an average of 127.97 to 155 tonnes and treated an average of 108.65 to 132.5 tonnes of source separated organic waste per day during the reporting period.

2.3 MAJOR ACTIVITIES UNDERTAKEN

A summary of the major activities undertaken in the reporting period is shown in *Table 2.1*.

Table 2.1 Summary of Activities Undertaken in the Reporting Period

Activities Undertaken in the Reporting Period
• Systems being operated – waste reception, pre-treatment, CAPCS extraction, the digesters, the centrifuge, the composting tunnels, the desulphurisation, the emergency flare, the CHPs, the ASP and the biological wastewater treatment plant (about 127.97 – 155 t/d SSOW input);
• Adjustment of temperature curves on the CHP3;
• CHP2 was returned in operation instead of CHP3, by moving the throttle valve from CHP3 to CHP2;
• Back purging testing for CEMS;
• VOC calibration for CAPCS stack;
• Emergency repair of chemical scrubber fan;
• Preparation for QAL 2 on the CEMS system (April 2023 – May 2023);
• SBR 3 and ASP plate heat exchanger cleaning;
• Fire Services System annual inspection;
• CEMS maintenance;
• QAL 2 testing with 3rd Party Lab was conducted for MCS 1 and MCS 2; and
• Replacement of membrane diffusers for all of the SBR Tanks of the Wastewater Treatment Plant was completed.

2.4 PROJECT ORGANISATION AND MANAGEMENT STRUCTURE

The project organisation chart and contact details are shown in *Annex B*.

2.5 STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS

A summary of the valid permits, licences, and/or notifications on environmental protection for this Project is presented in *Table 2.2*.

(1) As some of the minor items are yet to be closed out in March 2019, the construction phase EM&A programme and Operation Phase EM&A programme were undertaking in parallel in March 2019.

Table 2.2 Summary of Environmental Licensing, Notification and Permit Status

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Environmental Permit	FEP-01/395/2010/C	Throughout the Contract	Permit granted on 21 December 2015
Notification of Construction Works under the Air Pollution Control (Construction Dust) Regulation	Ref No. 386715	Throughout the Contract	-
Effluent Discharge License	WT00038391-2021	7 July 2021 – 30 June 2026	Approved on 7 July 2021
Chemical Waste Producer Registration	WPN 5213-961-O2231-01	Throughout the Contract	Approved on 29 April 2015
Chemical Waste Producer Registration	WPN 5213-961-O2231-02	Throughout the implementation of the Project	Approved on 10 November 2017
Waste Disposal Billing Account	Account number: 702310	Throughout the Contract	-

3 ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

3.1 ENVIRONMENTAL MONITORING

The air quality (including odour) monitoring to be carried out during the operation phase of the Project are described below. Although water quality monitoring is not required for the operation phase under the EM&A programme, there are water quality monitoring requirement under the Water Discharge Licence of the plant under the *Water Pollution Control Ordinance* (WPCO). As part of this EM&A programme, the monitoring results will be reviewed to check the compliance with the WPCO requirements.

3.1.1 Air Quality

According to the EM&A Manual and EP requirements, stack monitoring is required during the operation phase of the Project.

On-line monitoring (using continuous environmental monitoring system (CEMS) shall be carried out for the centralised air pollution unit (CAPCS), cogeneration units (CHP) and the ammonia stripping plant (ASP) during the operation phase. The last calibration was carried out from 24 to 26 April 2023; and the last maintenance was carried out from 1 to 4 May 2023.

The monitoring data is transmitted instantaneously to EPD (Regional Office) by telemetry system.

When the on-line monitoring for certain parameter cannot be undertaken, monitoring will be carried out using the following methodology approved by the EPD.

Table 3.1 Sampling and Laboratory Analysis Methodology

Parameters	Method	Stacks to be Monitored
Gaseous and vaporous organic substances (including methane)	USEPA Method 18	• CAPCS • CHP • ASP
Particulate	USEPA Method 5	• CAPCS • CHP • ASP
Carbon monoxide (CO)	USEPA Method 10	• CHP • ASP
Nitrogen oxides (NO_x)	USEPA Method 7E	• CHP • ASP
Sulphur dioxide (SO_2);	USEPA Method 6	• CHP • ASP
Hydrogen chloride (HCl)	USEPA Method 26A	• CHP • ASP
Hydrogen fluoride (HF)	USEPA Method 26A	• CHP • ASP

Parameters	Method	Stacks to be Monitored
Oxygen (O_2);	USEPA Method 3A	• CAPCS • CHP • ASP
Velocity and Volumetric Flow	USEPA Method 2	• CAPCS • CHP • ASP
Ammonia (NH_3)	USEPA CTM 027	• ASP
Odour (including NH_3 and H_2S)	EN 13725	• CAPCS
Water vapour content (continuous measurement of the water vapour content should not be required if the sample exhaust gas is dried before the emissions are analysed)	USEPA Method 4	• CAPCS • CHP • ASP
Temperature	USEPA Method 4	• CAPCS • CHP • ASP

With reference to the EM&A Manual, the air emission of the stacks shall meet the following emission limits as presented in *Tables 3.2* to *3.5*.

Table 3.2 Emission Limit for CAPCS Stack

Parameter	Emission Level (mg/Nm³) (a)
VOCs (including methane)	680
Dust (or Total Suspended Particulates (TSP))	6
Odour (including NH_3 & H_2S)	220 (b)

Notes:
(a) Hourly average concentration
(b) The odour unit is OU/Nm³

Table 3.3 Emission Limit for CHP Stack

Parameter	Maximum Emission Level (mg/Nm³) (a) (b)
Dust (or Total Suspended Particulates)	15
Carbon Monoxide	650
NO_x	300
SO_2	50
NMVOCs (c)	150
VOCs (including methane) (d)	1,500
HCl	10
HF	1

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.
(b) Hourly average concentration
(c) NMVOCs should be monitored by gas sampling and laboratory analysis at an agreed interval. For the first 12 months (starting from August 2019), monitoring should be carried out at quarterly intervals. The monitoring frequency should then be reduced to half-yearly for next 12 months (starting from August 2020).
(d) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

Table 3.4 Emission Limit for ASP Stack

Parameter	Maximum Emission Level (mg/Nm^3) [(a) (b)]
Dust (or Total Suspended Particulates)	5
Carbon Monoxide	100
NOx	200
SO_2	50
VOCs (including methane) [(c)]	20
NH_3	35
HCl	10
HF	1

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 11% and dry basis.
(b) Hourly average concentration
(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

Table 3.5 Emission Limit for Standby Flaring Gas Unit [(1)]

Parameter	Maximum Emission level (mg/Nm^3) [(a) (b)]
Dust (or Total Suspended Particulates)	5
Carbon Monoxide	100
NO_x	200
SO_2	50
VOCs (including methane) [(c)]	20
HCl	10
HF	1

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 11% and dry basis.
(b) Hourly average concentration
(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

3.1.2 Odour

To determine the effectiveness of the proposed odour mitigation measures and to ensure that the operation of the ORRC1 will not cause adverse odour impacts, odour monitoring of the CAPCS stack (see *Section 3.1.1*) and odour patrol will be carried out.

Odour patrol shall be conducted by independent trained personnel/ competent persons in summer months (i.e., from July to September) for the first two operational years of ORRC1 at monthly intervals along an odour patrol route at the Project Site boundary as shown in *Annex A*.

The perceived odour intensity is divided into 5 levels. *Table 3.6* describes the odour intensity for different levels.

(1) A standby facility. Only operate when the CHPs are not in operation or when the biogas generated exceeded the utilisation rate of the CHPs.

Table 3.6 Odour Intensity Level

Level	Odour Intensity
0	Not detected. No odour perceived or an odour so weak that it cannot be easily characterised or described
1	Slight identifiable odour, and slight chance to have odour nuisance
2	Moderate identifiable odour, and moderate chance to have odour nuisance
3	Strong identifiable odour, likely to have odour nuisance
4	Extreme severe odour, and unacceptable odour level

Table 3.7 shows the action level and limit level to be used for odour patrol. Should any exceedance of the action and limit levels occur, actions in accordance with the event and action plan in *Table 3.8* should be carried out.

Table 3.7 Action and Limit Levels for Odour Nuisance

Parameter	Action Level	Limit Level
Odour Nuisance (from odour patrol)	When one documented compliant is received [(a)], or Odour Intensity of 2 is measured from odour patrol.	Two or more documented complaints are received [(a)] within a week; or Odour intensity of 3 or above is measured from odour patrol.

Note:
(a) Once the complaint is received by the Project Proponent (EPD), the Project Proponent would investigate and verify the complaint whether it is related to the potential odour emission from the ORRC1 and its on-site wastewater treatment unit.

Table 3.8 Event and Action Plan for Odour Monitoring

Event	Action	
	Person-in-charge of Odour Monitoring	**Project Proponent [(a)]**
Action Level		
Exceedance of action level (Odour Patrol)	1. Identify source/reason of exceedance; 2. Repeat odour patrol to confirm finding.	1. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 weeks; 2. Rectify any unacceptable practice; 3. Implement more mitigation measures if necessary; 4. Inform Drainage Services Department (DSD) or the operator of the Siu Ho Wan Sewage Treatment Works (SHWSTW) if exceedance is considered to be caused by the operation of the SHWSTW; and 5. Inform North Lantau Refuse Transfer Station (NLTS) operator if exceedance is considered to be caused by the operation of NLTS.

Exceedance of action level (Odour Complaints)	1. Identify source/reason of exceedance; 2. Carry out odour patrol to determinate odour intensity.	1. Carry out investigation and verify the complaint whether it is related to potential odour emission from the nearby SHWSTW; 2. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 weeks; 3. Rectify any unacceptable practice; 4. Implement more mitigation measures if necessary; 5. Inform DSD or the operator of the SHWSTW if exceedance is considered to be caused by the operation of the SHWSTW; and 6. Inform NLTS operator if exceedance is considered to be caused by the operation of NLTS.
Limit Level		
Exceedance of limit level	1. Identify source/reason of exceedance; 2. Inform EPD; 3. Repeat odour patrol to confirm findings; 4. Increase odour patrol frequency to bi-weekly; 5. Assess effectiveness of remedial action and keep EPD informed of the results; 6. If exceedance stops, cease additional odour patrol.	1. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 week; 2. Rectify any unacceptable practice; 3. Formulate remedial actions; 4. Ensure remedial actions properly implemented; 5. If exceedance continues, consider what more/enhanced mitigation measures should be implemented; and 6. Inform DSD or the operator of the SHWSTW if exceedance is considered to be caused by the operation of the SHWSTW.

Note:
(a) Project Proponent shall identify an implementation agent.

3.2 *SITE AUDIT*

Environmental mitigation measures (related to air quality, water quality, waste, land contamination, hazard-to-life, and landscape and visual) to be implemented during the operation phase of the Project are recommended in the approved EIA Report and EM&A Manual and are summarised in *Annex C*. Monthly site audits for operation phase will be carried out to check the implementation of these measures.

3.2.1 *Water Quality*

Compliance audits are to be undertaken to ensure that a valid discharge licence has been issued by EPD prior to the discharge of effluent from the operation of the Project site. Under Effluent Discharge Licence WT00038391-2021 (effective from July 2021), the effluent quality shall meet the discharge limits as described in *Table 3.9* and *Table 3.10*.

Table 3.9 Discharge Limits for Effluent from the Effluent Storage Tank (as stipulated in WT00038391-2021)

Parameters	Discharge Limit (mg/L)
Flow Rate (m^3/day) [(a)]	645
pH (pH units) [(b)]	6-10 [(c)]
Suspended Solids [(b)]	800
Biochemical Oxygen Demand (5 days, 20°) [(b)]	800
Chemical Oxygen Demand [(b)]	2,000
Oil & Grease [(b)]	40
Total Nitrogen [(b)]	200
Total Phosphorus [(b)]	50
Surfactants (total) [(b)]	25

Notes:

(a) Flow rate is not a parameter required to be monitored and reported by the Contractor in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.

(b) Parameters required to be monitored and reported by the Contractor in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.

(c) Range.

Table 3.10 Discharge Limits for Effluent from the Petrol Interceptor(s) (as stipulated in TW00038391-2021)

Parameters	Discharge Limit (mg/L)
Flow Rate (m^3/day) [(a)]	245 [(a)]
Suspended Solids [(b)]	30
Chemical Oxygen Demand [(c)]	80
Oil & Grease [(c)]	20
Surfactants (total) [(b)]	15

Notes:

(a) The surface runoff flow rate limit was estimated by the overall yearly rainfall data. As the actual flowrate from the petrol interceptors depends on the weather condition instead of the performance of the petrol interceptor, monitoring and reporting of this parameter is not required. Hence this parameter is not reported in *Table 4.10* and *Table 4.11*.

(b) Parameter not required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.

(c) Parameters required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.

3.2.2 Landscape and Visual

In accordance with EM&A Manual, the landscape and visual mitigation measures shall be implemented.

For operation phase, site inspection shall be conducted once a month for the first year of operation of the Project. All measures as stated in the implementation schedule of the EM&A Manual (see *Annex C*), including compensatory planting, undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the first year of the operation phase shall be audited by a Registered Landscape Architect (RLA) to ensure compliance with

the intended aims of the measures and the effectiveness of the mitigation measures.

4 MONITORING RESULTS

4.1 AIR QUALITY

4.1.1 Operation Phase Monitoring

The concentrations of concerned air pollutants emitted from the stacks of the CAPCS, CHP, and ASP during the reporting period are monitored on-line by the continuous environmental monitoring system (CEMS). During the reporting period, the standby flare operated on 28 March 2023 and 3 May 2023. The standby flare did not operate during April 2023.

With reference to the emission limits shown in *Tables 3.2, 3.3* and *3.4*, the hourly average concentrations and the number of exceedances of the concerned air emissions monitored for the CAPCS, CHP and ASP during this reporting period are presented in *Tables 4.1* to *4.5*.

It should be noted that measurements recorded under abnormal operating conditions, e.g., start up and stopping of stacks and unstable operation, as well as test runs and interference of sensor, are disregarded.

Table 4.1 Hourly Average of Parameters Recorded for CAPCS

Parameter	Range of Hourly Average Conc. (mg/Nm^3)	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
VOCs (including methane)	0.00 – 1714.29	680	Identified [b]	Faulty sensor in March and April
Dust (or TSP)	0.00 – 0.22	6	Nil	Nil
Odour (including NH_3 & H_2S) [a]	0.00 – 154.07	220	Nil	Nil

Note:

(a) The odour unit is OU/Nm^3.

(b) Dates with exceedances on VOCs (including methane) (number of exceedance on the day) were identified on 2 (14), 3 (12), 4 (5), 5 (5), 6 (2), 7 (9), 8 (4), 9 (6), 17 (7), 18 (3), 19 (4), 20 (24), 21 (24), 22 (19), 23 (24), 24 (17), 25 (24), 26 (20), 27 (16), 28 (12), 29 (24), 30 (15) and 31 (15) March 2023; 1 (24), 2 (19), 3 (7), 4 (24), 5 (24), 6 (24), 7 (10), 10 (20), 11 (24), 12 (8), 13 (15), 14 (24), 15 (24), 16 (9), 17 (23), 18 (24), 19 (24), 20 (24), 21 (24), 22 (24), 23 (24), 24 (24), 25 (19), 26 (19), 27 (24), 28 (19), 29 (24) and 30 (8) April 2023.

Table 4.2 Hourly Average of Parameters Recorded for CHP 1

Parameter	Range of Hourly Average Conc. (mg/Nm³) [a]	Max. Emission Limit (mg/Nm³)	Exceedance Identified	Remarks
Dust (or TSP)	0 - 132	15	Identified [c]	System unstable (e.g., low efficiency, unstable column temperature)
Carbon Monoxide	0 - 628	650	Nil	Nil
NO_x	0 – 704	300	Identified [d]	System unstable (e.g., low efficiency, unstable column temperature)
SO_2	0 – 1848	50	Identified [e]	De-sulphurisation system tripped / Under Maintenance
VOCs (including methane) [b]	0 - 12,808	1,500	Identified [f]	System unstable (e.g., low efficiency, unstable column temperature)
HCl	0 - 9	10	Nil	Nil
HF	0 - 1	1	Nil	Nil

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.

(b) The VOCs emission limit includes methane as biogas is adopted as fuel in the combustion process.

(c) Date with exceedances on Dust (number of exceedances on that day) was identified on 8 (1) May 2023.

(d) Dates with NO_x exceedances (number of exceedances on the day) were identified on 1 (24), 2 (24), 3 (21), 4 (24), 5 (24), 6 (21), 7 (24), 8 (20), 9 (12), 10 (19), 11 (13), 12 (7), 13 (11), 14 (20), 15 (12), 16 (13), 17 (16), 18 (8), 19 (1), 20 (13), 21 (22), 22 (17), 23 (24), 24 (16), 25 (3), 26 (2), 27 (3), 28 (5), 29 (20), 30 (21) and 31 (20) March 2023; 1 (22), 2 (13), 3 (12), 4 (9), 5 (5), 6 (1), 7 (2), 8 (5), 9 (2), 12 (1), 13 (12), 14 (3), 15 (4), 17 (3), 18 (2), 19 (5), 20 (3), 21 (18), 22 (24), 23 (24), 24 (16), 25 (20), 26 (15), 27 (4), 28 (17), 29 (12) and 30 (23) April 2023; 1 (21), 2 (17), 3 (12), 4 (12), 5 (12), 6 (9), 7 (5), 8 (1), 10 (5), 11 (8), 13 (11), 14 (12), 15 (17), 16 (5), 17 (16), 18 (10), 19 (21), 20 (21), 21 (18), 22 (13), 23 (11), 24 (17), 25 (1), 30 (7) and 31 (1) May 2023.

(e) Dates with SO_2 exceedances (number of exceedances on the day) were identified on 1 (19), 2 (24), 3 (12), 4 (23), 5 (24), 6 (18), 7 (16), 8 (3), 9 (6), 12 (1), 21 (2), 29 (14), 30 (21) and 31 (17) March 2023; 1 (14), 2 (2), 9 (2), 12 (1), 13 (11), 14 (3), 15 (4), 17 (3), 18 (2), 19 (5), 20 (3), 21 (18), 22 (24), 23 (24), 24 (18), 25 (22), 26 (15), 27 (2) and 28 (9) April 2023 ;1 (1), 2 (1), 3 (4), 4 (3), 5 (5), 8 (1), 11 (6), 15 (1), 17 (2), 18 (1), 19 (7), 20 (13), 21 (1), 22 (9), 23 (9), 24 (17), 25 (1), 30 (2) and 31 (1) May 2023.

(f) Dates with exceedances on VOC (number of exceedances on the day) was identified on 8 (1) May 2023.

Table 4.3 Hourly Average of Parameters Recorded for CHP 2

Parameter	Range of Hourly Average Conc. (mg/Nm³) [a]	Max. Emission Limit (mg/Nm³)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 183	15	Identified[c]	System unstable (e.g., low efficiency, unstable column temperature)
Carbon Monoxide	0 – 328	650	Nil	Nil
NO_x	0 – 571	300	Identified [d]	System unstable (e.g., low efficiency, unstable column temperature)
SO_2	0 – 141	50	Identified [e]	De-sulphurisation system tripped / Under Maintenance
VOCs (including methane) [b]	0 – 1483	1,500	Nil	Nil
HCl	0 – 18	10	Identified [f]	System unstable (e.g., low efficiency, unstable column temperature)
HF	0 – 7	1	Identified[g]	System unstable (e.g., low efficiency, unstable column temperature)

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.

(b) The VOCs emission limit includes methane as biogas is adopted as fuel in the combustion process.

(c) Dates with exceedances on dust (number of exceedances on that day) were identified on 17 (1) and 18 (1) April 2023; 8 (1) May 2023.

(d) Dates with NOx exceedances (number of exceedances on the day) were identified on 24 (4), 25 (20), 26 (21), 27 (21), 28 (15), 29 (10), 30 (20) and 31 (17) March 2023; 1 (11), 2 (21), 3 (17), 4 (23), 5 (22), 6 (22), 7 (15), 8 (24), 9 (17), 10 (24), 11 (19), 12 (9), 13 (9), 14 (11), 15 (14), 16 (11), 17 (23), 18 (21), 19 (3), 20 (19), 21 (16), 22 (17), 23 (16), 24 (8), 25 (6), 26 (19), 27 (11), 28 (21), 29 (15) and 30 (1) April 2023; 1 (20), 2 (16), 3 (3), 4 (3), 5 (4), 6 (12), 7 (4), 8 (7), 9 (1), 10 (9), 11 (24), 12 (24), 13 (24), 14 (24), 15 (20), 16 (14), 17 (15), 18 (10), 19 (2), 20 (24), 21 (24), 22 (11), 23 (24), 24 (24), 25 (24), 26 (24), 27 (17), 28 (8), 29 (6), 30 (1) and 31 (5) May 2023.

(e) Dates with SO_2 exceedances (number of exceedance on the day) were identified on 24 (4), 25 (21), 26 (24), 27 (24), 28 (16), 29 (24), 30 (24) and 31 (18) March 2023; 1 (8), 2 (17), 3 (16), 4 (13), 5 (10), 6 (24), 7 (18), 8 (22), 9 (16), 10 (24), 11 (24), 12 (24), 13 (22), 14 (24), 15 (21), 16 (24), 17 (20), 18 (22), 19 (2), 20 (10), 21 (11), 22 (6), 23 (8), 24 (18), 25 (10), 26 (4), 27 (1), 28 (3), 29 (11) and 30 (17) April 2023; 1 (4), 2 (4), 4 (2), 5 (5), 6 (1), 8 (6), 9 (20), 10 (3), 12 (1), 16 (1), 18 (1), 28 (3), 29 (3), 30 (1) and 31 (6) May 2023.

(f) Date with HCl exceedance (number of exceedances on that day) was identified on 17 (1) and 18 (1) April 2023.

(g) Dates with exceedances on HF (number of exceedances on that day) were identified on 17 (1) April 2023.

Table 4.4 Hourly Average of Parameters Recorded for CHP 3

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [(a)]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks
Dust (or TSP)	0 – 4	15	Nil	Nil
Carbon Monoxide	0 – 88	650	Nil	Nil
NO_x	0 – 589	300	Identified [(c)]	System unstable (e.g., low efficiency, unstable column temperature)
SO_2	0 – 109	50	Identified [(d)]	Desulphurisation system tripped / Under Maintenance
VOCs (including methane) [(b)]	0 – 1,489	1,500	Nil	Nil
HCl	0 – 10	10	Nil	Nil
HF	0 – 1	1	Nil	Nil

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.

(b) The VOCs emission limit includes methane as biogas is adopted as fuel in the combustion process.

(c) Dates with NO_x exceedances (number of exceedances on the day) were identified on2 (4), 3 (18), 4 (9), 5 (23), 6 (19), 8 (23), 9 (23), 10 (24), 11 (24), 12 (24), 13 (23), 14 (23), 15 (24), 16 (19), 17 (21), 18 (18), 19 (24), 20 (10), 21 (22), 22 (21), 23 (24) and 24 (7) March 2023; 21 (4), 22 (12), 23 (4), 24 (1), 25 (14), 26 (6), 27 (4), 28 (4), 29 (2) and 30 (15) May 2023.

(d) Dates with SO_2 exceedances (number of exceedance on the day) was identified on 2 (4), 3 (18), 4 (9), 5 (20), 6 (19), 8 (13), 9 (6), 10 (10), 11 (11), 12 (2), 13 (4), 14 (2), 16 (2), 17 (2), 18 (4), 19 (4), 20 (3), 21 (6), 22 (3), 23 (20) and 24 (7) March 2023; 21 (4), 22 (6), 25 (1), 26 (2), 27 (2), 28 (3), 29 (2) and 30 (5) May 2023.

Table 4.5 Hourly Average of Parameters Recorded for ASP

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [(a)]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks
Dust (or TSP)	0 – 5	5	Nil	Nil
Carbon Monoxide	0 – 186	100	Identified [(c)]	System unstable (e.g., low efficiency, unstable column temperature)
NO_x	0 – 1129	200	Identified [(d)]	System unstable (e.g., low efficiency, unstable column temperature)
SO_2	0 – 417	50	Identified [(e)]	De-sulphurisation system tripped / Under Maintenance
VOCs (including methane) [(b)]	0 – 20	20	Nil	Nil
NH_3	0 – 797	35	Identified [(f)]	System unstable (e.g., low efficiency, unstable column temperature)

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks
HCl	0 – 27	10	Identified [g]	System unstable (e.g., low efficiency, unstable column temperature)
HF	0 – 2	1	Identified [h]	System unstable (e.g., low efficiency, unstable column temperature)

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 11% and dry basis.

(b) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

(c) Dates with exceedances on CO (number of exceedances on the day) were identified on 29 (2) May 2023.

(d) Dates with NO_x exceedances (number of exceedances on the day) were identified on 1 (1), 2 (4), 3 (5), 4 (3), 5 (10), 6 (14), 7 (12), 8 (7), 9 (1), 11 (1), 12 (3), 13 (1), 14 (4), 15 (2), 16 (4), 18 (9), 19 (2), 20 (6), 21 (4), 22 (5), 23 (14), 24 (16), 25 (5), 26 (5), 27 (7), 28 (7), 29 (9), 30 (6) and 31 (6) March 2023; 1 (13), 2 (3), 3 (5), 4 (8), 5 (3), 6 (11), 7 (17), 8 (14), 9 (9), 10 (8), 11 (12), 12 (13), 13 (6), 14 (15), 15 (11), 16 (2), 17 (1), 18 (9), 19 (2), 20 (4), 21 (2), 22 (2), 25 (2), 26 (1), 27 (2) and 28 (3) April 2023; 1 (4), 2 (7), 3 (9), 4 (20), 5 (18), 6 (24), 7 (23), 8 (6), 10 (5), 24 (1), 29 (3), 30 (4) and 31 (5) May 2023.

(e) Dates with SO_2 exceedances (number of exceedances on the day) were identified on 3 (14), 4 (23), 5 (10), 6 (7), 7 (1), 11 (4), 12 (3), 13 (2), 15 (4), 16 (3), 19 (1), 20 (4), 21 (5), 22 (5), 23 (18), 24 (10), 25 (1), 26 (2), 27 (1), 28 (1), 29 (8), 30 (12) and 31 (2) March 2023; 2 (6), 3 (1), 7 (2), 8 (2), 15 (2), 17 (2), 18 (2) and 27 (1) April 2023; 3 (1), 29 (1), 30 (1) and 31 (2) May 2023.

(f) Dates with NH_3 exceedances (number of exceedances on the day) were identified on 3 (5), 6 (1), 7 (2), 8 (2), 9 (9), 10 (6), 11 (3), 12 (10), 13 (2), 14 (5), 15 (10), 16 (12), 17 (4), 18 (3), 19 (22), 20 (22), 21 (14), 22 (15), 23 (22), 24 (20), 25 (22), 26 (17), 27 (17), 28 (14), 29 (10), 30 (9) and 31 (14) March 2023; 1 (12), 2 (9), 3 (17), 4 (1), 5 (3), 6 (16), 7 (19), 8 (15), 9 (17), 10 (18), 11 (17), 12 (13), 13 (5), 14 (1), 15 (10), 16 (16), 17 (22), 18 (22), 19 (6), 20 (16), 21 (12), 22 (14), 23 (24), 24 (17), 25 (7), 26 (5), 28 (3) and 29 (3) April 2023; 1 (1), 4 (1), 5 (1), 8 (9), 9 (24), 10 (16), 11 (23), 12 (19), 13 (18), 14 (22), 15 (9), 16 (22), 17 (14), 18 (18), 19 (14), 20 (22), 21 (1), 22 (8), 23 (16), 24 (14), 25 (9), 26 (9), 27 (1), 29 (6) and 30 (3) May 2023.

(g) Date with exceedances on HCl (number of exceedances on the day) was identified on 24 (1) March 2023

(h) Date with exceedances on HF (number of exceedances on the day) was identified on 19 (1) May 2023.

Table 4.6 Hourly Average of Parameters Recorded for the Standby Flaring Gas Unit

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a][c]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks [d]
Dust (or TSP)	0 – 0	5	Nil	Nil
Carbon Monoxide	0 – 0	100	Nil	Nil
NOx	0 – 30	200	Nil	Nil
SO_2	0 – 0	50	Nil	Nil
VOCs (including methane) [b]	0 – 0	20	Nil	Nil
HCl	0 – 0	10	Nil	Nil

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a][c]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks [d]
HF	0 – 4	1	Identified [d]	System unstable (e.g., low efficiency, unstable column temperature)

Notes:

(a) All values refer to an oxygen content in the exhaust gas of 11% and dry basis.

(b) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

(c) During the reporting period, the standby flare operated on 28 March 2023 and 3 May 2023. The standby flare did not operate in April.

(d) Date with HF exceedances (number of exceedances on the day) were identified on 28 (1) March 2023.

4.2 ODOUR

4.2.1 Operation Phase Monitoring

No odour patrol was required to be conducted for this reporting period.

4.3 WATER QUALITY

4.3.1 Operation Phase Monitoring

Effluent discharge was sampled monthly from the outlet chamber of the Effluent Storage Tank as stipulated in the operation phase discharge licence. Discharge from the Petrol Interceptors were sampled bi-monthly since July 2021 as stipulated in the operation phase discharge licence. The results of the discharge samples from the outlet chamber of the Effluent Storage Tank are recorded in *Table 4.6* to *4.8*. The results of the discharge samples from the Petrol Interceptors are recorded in *Table 4.9* to *4.12*.

Table 4.7 Results of the Discharge Sample Collected from the Outlet Chamber of the Effluent Storage Tank in March 2023

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Flow Rate (m^3/day) [a]	44 – 244 [e]	645	Yes
pH (pH units) [b]	8.01 – 8.4 [e]	6-10 [c]	Yes
Suspended Solids [b] [d]	113 [d]	800	Yes
Biochemical Oxygen Demand (5 days, 20°) [b] [d]	14 [d]	800	Yes
Chemical Oxygen Demand [b] [d]	984 [d]	2,000	Yes
Oil & Grease [b] [d]	<5 [d]	40	Yes
Total Nitrogen [b] [d]	430 [d]	200	No[f]
Total Phosphorus [b] [d]	21.1 [d]	50	Yes
Surfactants (total) [b] [d]	<1.0 [d]	25	Yes

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit

Notes:

(a) Parameter not required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(b) Parameters required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(c) Daily Range.
(d) Effluent sample collected on 9 March 2023.
(e) Data collected daily in the reporting month.
(f) An unexpected surge of Kjedahl Nitrogen in Treated Effluent was observed, leading to the high Total Nitrogen level in the Treated Effluent sampled on 9 March 2023.

Table 4.8 Results of the Discharge Sample Collected from the Outlet Chamber of the Effluent Storage Tank in April 2023

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Flow Rate (m^3/day) (a)	14 – 201 (e)	645	Yes
pH (pH units) (b)	7.41 – 9.00 (e)	6-10 (c)	Yes
Suspended Solids (b) (d)	77 (d)	800	Yes
Biochemical Oxygen Demand (5 days, 20°) (b) (d)	18 (d)	800	Yes
Chemical Oxygen Demand (b) (d)	668 (d)	2,000	Yes
Oil & Grease (b) (d)	<5 (d)	40	Yes
Total Nitrogen (b) (d)	486 (d)	200	No(f)
Total Phosphorus (b) (d)	25.5 (d)	50	Yes
Surfactants (total) (b) (d)	<1.0 (d)	25	Yes

Notes:

(a) Parameter not required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(b) Parameters required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(c) Daily Range.
(d) Effluent sample collected on 13 April 2023.
(e) Data collected daily in the reporting month.
(f) An unexpected surge of Kjedahl Nitrogen in Treated Effluent was observed, leading to the high Total Nitrogen level in the Treated Effluent sampled on 13 April 2023.

Table 4.9 Results of the Discharge Sample Collected from the Outlet Chamber of the Effluent Storage Tank in May 2023

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Flow Rate (m^3/day) (a)	0 - 161 (e)	645	Yes
pH (pH units) (b)	7.32 – 8.6 (e)	6-10 (c)	Yes
Suspended Solids (b) (d)	293 (d)	800	Yes
Biochemical Oxygen Demand (5 days, 20°) (b) (d)	70 (d)	800	Yes
Chemical Oxygen Demand (b) (d)	1,430 (d)	2,000	Yes

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Oil & Grease (b) (d)	<5 (d)	40	Yes
Total Nitrogen (b) (d)	218 (d)	200	No
Total Phosphorus (b) (d)	35.8 (d)	50	Yes
Surfactants (total) (b) (d)	<1.0 (d)	25	Yes

Notes:

(a) Parameter not required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(b) Parameters required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(c) Daily Range.
(d) Effluent sample collected on 5 May 2023.
(e) Data collected daily in the reporting month.

Table 4.10 Results of the Discharge Sample from the Petrol Interceptor 1 on 20 April 2023

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Suspended Solids (b)	35 (a)	30	No
Chemical Oxygen Demand (c)	70 (a)	80	Yes
Oil & Grease (c)	<5 (a)	20	Yes
Surfactants (total) (b)	<1.0 (a)	15	Yes

Notes:

(a) Effluent sample collected on 20 April 2023.
(b) Parameter not required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(c) Parameters required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.

Table 4.11 Results of the Discharge Sample from the Petrol Interceptor 2 on 20 April 2023

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Suspended Solids (b)	19 (a)	30	Yes
Chemical Oxygen Demand (c)	66 (a)	80	Yes
Oil & Grease (c)	<5 (a)	20	Yes
Surfactants (total) (b)	<1.0 (a)	15	Yes

Notes:

(a) Effluent sample collected on 20 April 2023.
(b) Parameter not required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.
(c) Parameters required to be reported in accordance with Section B2 of the Effluent Discharge Licence under the WPCO.

4.4 WASTE MANAGEMENT

4.4.1 Operation Phase Monitoring

Wastes generated from the operation of the Project include chemical waste, wastes generated from pre-treatment process and general refuse(1). Reference has been made to the Monthly Summary Waste Flow Tables prepared by the Contractor (see *Annex D*). With reference to the relevant handling records and trip tickets of this Project, the quantities of different types of waste generated from the operation of the Project in the reporting period are summarised in *Table 4.12*.

Table 4.12 Quantities of Waste Generated from the Operation of the Project

Month / Year	Chemical Waste	Waste Generated from Pre-treatment Process		General Refuse	
	Disposal of at CWTC	Disposed of at Landfill [a]	Recycled [b]	Disposed of at Landfill [a] [e]	Recycled [c]
March 2023	0 L [d]	682.0 tonnes	0 tonnes	3.11 tonnes [e]	0.088 tonnes
April 2023	0 L [d]	578.25 tonnes	0.26 tonnes	2.42 tonnes [e]	0.027 tonnes
May 2023	0 L [d]	662.27 tonnes	0 tonnes	2.88 tonnes [e]	0.130 tonnes

Notes:

(a) Waste generated from pre-treatment process and general refuse other than chemical waste and recyclables were disposed of at NENT landfill by sub-contractors.

(b) Among waste generated from pre-treatment process, 0 tonnes of metals, 0.26 tonnes of papers/ cardboard packing and 0 tonnes of plastics were sent to recyclers for recycling during the reporting period.

(c) Among general refuse, 0.011 tonnes of metals, 0.080 tonnes of papers/ cardboard packing and 0.037 tonnes of plastics were sent to recyclers for recycling during the reporting period.

(d) No chemical waste was disposed of at CWTC in from March to May 2023.

(e) It was assumed that four 240-litre bins filled with 80% of general refuse were collected at each collection. The general refuse density was assumed to be around 0.15 kg/L.

(1) Public fill and construction waste may only be generated during maintenance works when there are civil or structural works.

5 SITE AUDIT

5.1 ENVIRONMENTAL SITE AUDIT

5.1.1 Operation Phase

The monthly inspections of the operation phase of the Project covered the operation phase environmental site inspections. The inspections checked the implementation of the recommended mitigation measures for air quality, landscape and visual, water quality, waste (land contamination) and hazard-to-life stated in the Implementation Schedule (see *Annex C*).

Follow-up actions resulting from the site inspections were generally taken as reported by the Contractor. The Contractor has implemented environmental mitigation measures recommended in the approved EIA Report and EM&A Manual.

March 2023

The monthly inspection of the operation phase of the Project on 29 March 2023 covered the operation phase environmental site audit. Joint site inspections were conducted by representatives of the Contractor, IEC and the MT on 29 March 2023 as required for the operation of the Project.

April 2023

The monthly inspection of the operation phase of the Project on 21 April 2023 covered the operation phase environmental site audit. Joint site inspections were conducted by representatives of the Contractor, IEC and the MT on 21 April 2023 as required for the operation of the Project.

May 2023

The monthly inspection of the operation phase of the Project on 23 May 2023 covered the operation phase environmental site audit. Joint site inspections were conducted by representatives of the Contractor, IEC and the MT on 23 May 2023 as required for the operation of the Project.

5.2 LANDSCAPE AND VISUAL AUDIT

It was confirmed that the necessary landscape and visual mitigation measures during the operation phase as summarised in *Annex C* were generally implemented by the Contractor. No non-compliance in relation to the landscape and visual mitigation measures was identified during the site audits in this reporting period and therefore no further actions are required. The ET/MT will keep track of the EM&A programme to check compliance with environmental requirements and the proper implementation of all necessary mitigation measures.

March 2023

Monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 29 March 2023.

April 2023

Monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 21 April 2023.

May 2023

Monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 23 May 2023.

6 ENVIRONMENTAL NON-CONFORMANCE

6.1 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

March 2023

Non-compliance of emission limits of VOCs (including methane) from CAPCS, NO_x and SO_2 from the CHPs, NO_x, SO_2, NH_3 and HCl from ASP, HF from the Standby Flaring Gas Unit, and non-compliance of discharge limits of Total Nitrogen from the Outlet Chamber of the Effluent Storage Tank were recorded during the reporting period.

The Contractor has reviewed the organic waste treatment processes (i.e., waste reception, waste pre-treatment, anaerobic digesters, and composting processes) and found that they were operated normally during the reporting period. The Contractor has investigated the CHPs, the de-sulphurisation system, the ASP and the Standby Flaring Gas Unit, the potential causes for the exceedance were identified.

The Contractor has also carried out investigation on the Outlet Chamber of the Effluent Storage Tank, and found that an unexpected surge of Kjeldahl Nitrogen was observed in the Treated Effluent sampled on 9 March 2023, leading to the high Total Nitrogen level.

The investigation reports of the above exceedances are presented in *Annex F*.

April 2023

Non-compliance of emission limits of VOCs (including methane) from CAPCS, NO_x and SO_2 from CHP 1, Dust, NO_x, SO_2, HCl and HF from CHP 2; NO_x, SO_2 and NH_3 from ASP; and non-compliance of discharge limits of Total Nitrogen from the Outlet Chamber of the Effluent Storage Tank were recorded during the reporting period.

The Contractor has reviewed the organic waste treatment processes (i.e., waste reception, waste pre-treatment, anaerobic digesters, and composting processes) and found that they were operated normally during the reporting period. The Contractor has investigated the CHPs, the de-sulphurisation system and the ASP, the potential causes for the exceedance were identified.

The Contractor has also carried out investigation on the Outlet Chamber of the Effluent Storage Tank, and found that an unexpected surge of Kjeldahl Nitrogen was observed in the Treated Effluent sampled on 13 April 2023, leading to the high Total Nitrogen level.

The investigation reports of the above exceedances are presented in *Annex F*.

May 2023

Non-compliance of emission limits of Dust, VOCs, NO_x and SO_2 from CHP 1; Dust, NO_x and SO_2 from CHP 2; NO_x and SO_2 from CHP 3; CO, NO_x, SO_2,

NH_3 and HF from ASP and non-compliance of discharge limits of Total Nitrogen from the Outlet Chamber of the Effluent Storage Tank were recorded during the reporting period.

The Contractor investigated the cause of the exceedances and found that the exceedance of Total Nitrogen from the effluent discharge of the Effluent Storage Tank was potentially caused by the poor performance of the Sequential Batch Reactor (SBR), leading to an increased level of Total Nitrogen in the treated effluent sampled on 5 May 2023.

The Contractor has reviewed the organic waste treatment processes (i.e., waste reception, waste pre-treatment, anaerobic digesters, and composting processes) and found that they were operated normally during the reporting period. The Contractor has investigated the de-sulphurisation system, CHPs and the ASP, the potential causes for the exceedance were identified.

The investigation reports of the above exceedances are presented in *Annex F*.

6.2 SUMMARY OF ENVIRONMENTAL COMPLAINT

No complaint was received during the reporting period.

6.3 SUMMARY OF ENVIRONMENTAL SUMMON AND SUCCESSFUL PROSECUTION

No summon/prosecution was received during the reporting period. The cumulative summons/prosecution log is shown in *Annex E*.

7 FUTURE KEY ISSUES

7.1 KEY ISSUES FOR THE COMING REPORTING PERIOD

Activities to be undertaken for the coming reporting period are:

- Operation of the Project;
- CEMS maintenance;
- QAL 2 testing with 3rd Party Lab was conducted for MCS 1 and MCS 2; and
- Completing the replacement of membrane diffusers for all of the SBR Tanks of the Wastewater Treatment Plant.

CONCLUSIONS

This EM&A Report presents the EM&A programme undertaken during the reporting period from **1 March** to **31 May 2023** in accordance with EM&A Manual (Version F) and requirements of EP (FEP-01/395/2010/C).

For the operation phase, exceedances of the emission limits for stack monitoring (including CAPCS, CHP and ASP stacks) were recorded under normal operating conditions during the reporting period (see *Table 8.1*).

Table 8.1 Exceedances for Stack Emissions

Stack	Exceedances During the Reporting Period
Centralised Air Pollution Control Unit (CAPCS)	• Exceeded emission limit of VOCs (including methane) on 2, 3, 4, 6, 7, 8, 9, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31 March; 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 April 2023.
Cogeneration Unit (CHP) 1	• Exceeded emission limit of Dust on 8 May 2023. • Exceeded emission limit of NO_x on 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 and 31 March; 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 April; 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 30 and 31 May 2023. • Exceeded emission limit of SO_2 on 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 21, 29, 30 and 31 March; 1, 2, 9, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 and 28 April; 1, 2, 3, 4, 5, 8, 11, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 30 and 31 May 2023. • Exceeded emission limit of VOC on 8 May 2023.
Cogeneration Unit (CHP) 2	• Exceeded emission limit of Dust on 17 and 18 April; 8 May 2023. • Exceeded emission limit of NO_x on 24, 25, 26, 27, 28, 29, 30 and 31 March; 1 – 30 April; 1 – 31 May 2023. • Exceeded emission limit of SO_2 on 24, 25, 26, 27, 28, 29, 30 and 31 March; 1 – 30 April; 1, 2, 4, 5, 6, 8, 9, 10, 12, 16, 18, 28, 29, 30 and 31 May 2023. • Exceeded emission limit of HCl on 17 and 18 April 2023. • Exceeded emission limit of HF on 17 April 2023.
Cogeneration Unit (CHP) 3	• Exceeded emission limit of NO_x on 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 March; 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 May 2023. • Exceeded emission limit of SO_2 on 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23 and 24 March; 21, 22, 25, 26, 27, 28, 29 and 30 May 2023.

Stack	Exceedances During the Reporting Period
Ammonia Stripping Plant (ASP)	• Exceeded emission limit of CO on 29 May 2023. • Exceeded emission limit of NO_x on 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31 March; 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 25, 26, 27 and 28 April; 1, 2, 3, 4, 5, 6, 7, 8, 10, 24, 29, 30 and 31 May 2023. • Exceeded emission limit of SO_2 on 3, 4, 5, 6, 7, 11, 12, 13, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31 March; 2, 3, 7, 8, 15, 17, 18 and 27 April; 3, 29, 30 and 31 May 2023. • Exceeded emission limit of NH_3 (number of exceedances on the day) were identified on 3, 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 and 31 March; 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, 28 and 29 April; 1, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29 and 30 May 2023. • Exceeded emission limit of HF on 19 May 2023. • Exceeded emission limit of HCl on 24 March 2023.
Standby Flaring Gas Unit	• Exceeded emission limit of HF on 28 March 2023.

Non-compliance of emission limits of VOCs (including methane) from CAPCS, NO_x and SO_2 from the CHPs, HF from the Standby Flaring Gas Unit, and NO_x, SO_2, NH_3 and HCl from ASP were recorded in March 2023. The cause of the exceedances of VOCs (including methane) is due to faulty sensor. The exceedances of SO2 from CHPs and the ASP occurred due to tripping of the de-sulphurisation system caused by the failure of one of the columns of the system. The exceedance of NO_x of CHPs, NO_x, NH_3 and HCl from ASP and HF from the Standby Flaring Gas Unit occurred due to system instability caused by the ongoing performance optimisation of CHPs, ASP and Standby Flaring Gas Unit, resulting in a lowered temperature of the system and the incomplete combustion of biogas.

Non-compliance of emission limits of VOCs (including methane) from CAPCS, NO_x and SO_2 from CHP 1, Dust, NO_x, SO_2, HCl and HF from CHP 2 and NO_x, SO_2 and NH_3 from ASP were recorded in April 2023. The cause of the exceedances of VOCs (including methane) is due to faulty sensor. The exceedances of SO_2 from the CHPs occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. The exceedances of dust, NO_x, HCl and HF from CHPs occurred due to system instability caused by prolonged usage of the CHPs. The exceedances of NO_x, SO_2 and NH_3 from ASP occurred due to ASP pump failure which caused equipment trip.

Non-compliance of emission limits of Dust, VOCs, NO_x and SO_2 from CHP 1; Dust, NO_x and SO_2 from CHP 2; NO_x and SO_2 from CHP 3; and CO, NO_x, SO_2, NH_3 and HF from ASP were recorded in May 2023. The exceedances of SO_2 from the CHPs and ASP occurred due to tripping of the de-sulphurisation system. The exceedances of Dust, VOCs and NO_x from CHPs and the exceedances of CO, NO_x and HF from ASP occurred due to system instability.

Table 8.2 Exceedances for Petrol Interceptor 1 and 2

Effluent Discharge Point	Exceedances During the Reporting Period
Outlet Chamber of the Effluent Storage Tank	• Exceeded discharge limit of Total Nitrogen on 9 March 2023, 13 April 2023, and 5 May 2023
Petrol Interceptor 1	• Exceeded discharge limit of Suspended Solid on 20 April 2023.

Non-compliance of discharge limit of Total Nitrogen from the Outlet Chamber of the Effluent Storage Tank were recorded on 9 March, 13 April and 5 May 2023. The Contractor found that an unexpected surge of Kjedahl Nitrogen in Treated Effluent was observed, leading to the high Total Nitrogen level in the Treated Effluent sampled on 9 March and 13 April 2023. The contractor also found that poor performance of the Sequential Batch Reactor (SBR) leaded to an increased level of Nitrogen in the Treated Effluent sampled on 5 May 2023.

Non-compliance of discharge limit of Suspended Solids from Petrol Interceptor 1 was recorded during 20 April 2023. The Contractor suspected that the reason for the exceedances of the parameters was due to a lack of rainfall during the dry season, leading to an increase in the level of the exceeded parameters. The Contractor will further arrange a clean-up of the interceptors to make sure the discharge effluents comply with the discharge limit.

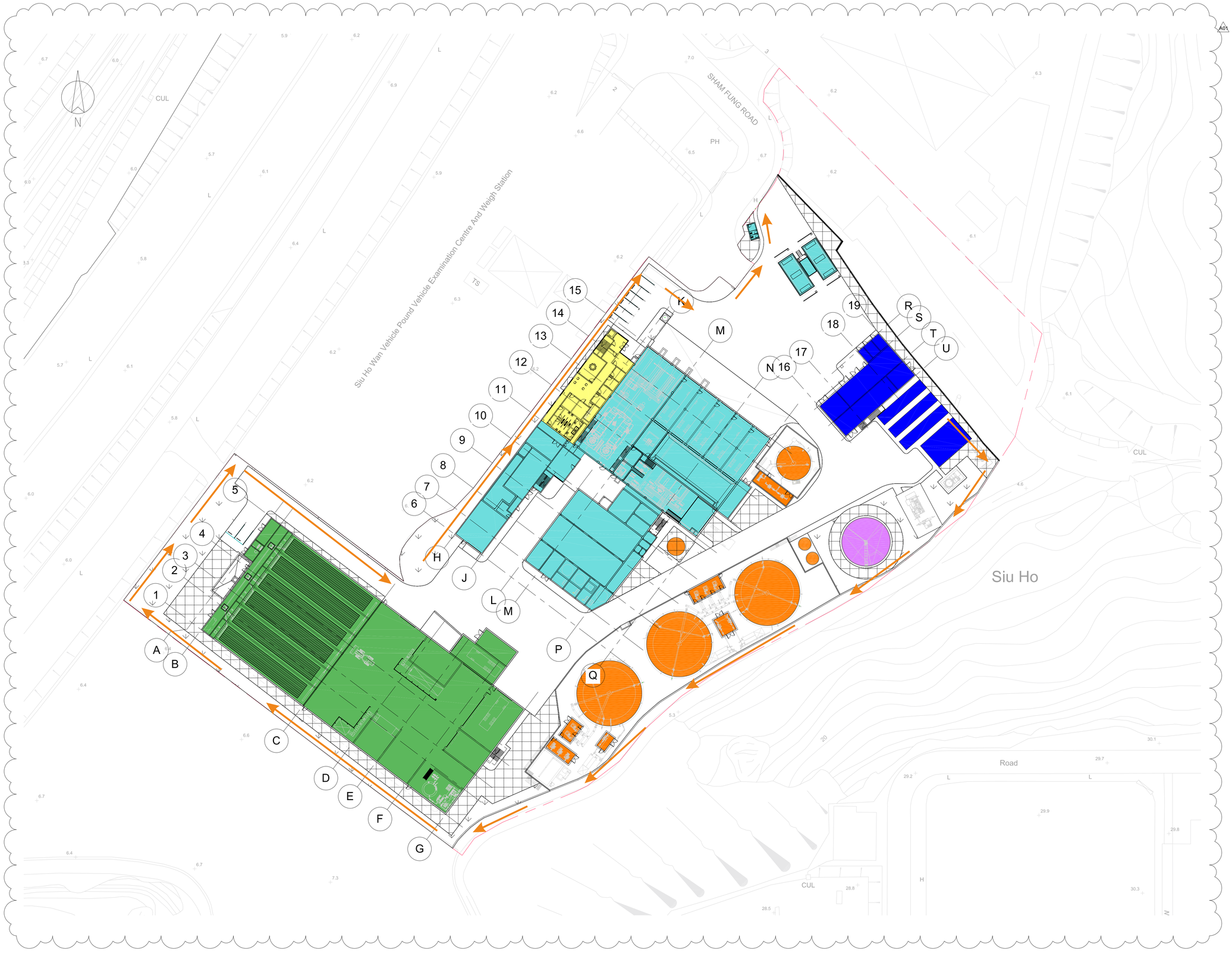
The environmental control /mitigation measures related to air quality, water quality, waste (including land contamination prevention), hazard-to-life and landscape and visual recommended in the approved EIA Report and the EM&A Manual were properly implemented by the Contractor during the reporting period.

Monthly landscape and visual monitoring were conducted in the reporting period. The necessary landscape and visual mitigation measures recommended in the approved EIA Report were generally implemented by the Contractor.

No complaint/summon/prosecution was received.

Annex A

Project Layout



Key

Patrol Route

REV	DATE	BY	APP	DESCRIPTION
A01	05/03/15	CW	MB	IMTECH BACKGROUNDS UPDATED
A00	18/02/15	CW	MB	DRAFT ISSUE

CLIENT

ENVIRONMENTAL PROTECTION DEPARTMENT
GOVERNMENT OF THE HKSAR

CLIENT'S CONSULTANT

AECOM ASIA CO. LTD.

CONTRACTOR

OSCAR BIOENERGY JV

LEAD DESIGNER

ARUP
Ove Arup & Partners Hong Kong Limited

ENVIRONMENTAL TEAM

ERM HONG KONG LIMITED

INDEPENDENT CONSULTANTS

Meinhardt Infrastructure and Environment Limited
邁進基建環保工程顧問有限公司

PROJECT

ORGANIC WASTE TREATMENT FACILITIES
PHASE 1
EP/SP/61/10

STATUS

DRAFT ISSUE

DRAWING TITLE

SITE LAYOUT

DRAWN	CHECKED	APPROVED
CW	RS	DP

SCALE	DATE
1:500@A1 / 1:1000@A3	12/02/15

JOB NO.	DRAWING NO.	REV.
239956	DR-OAP-20-0-CA-1001	A01

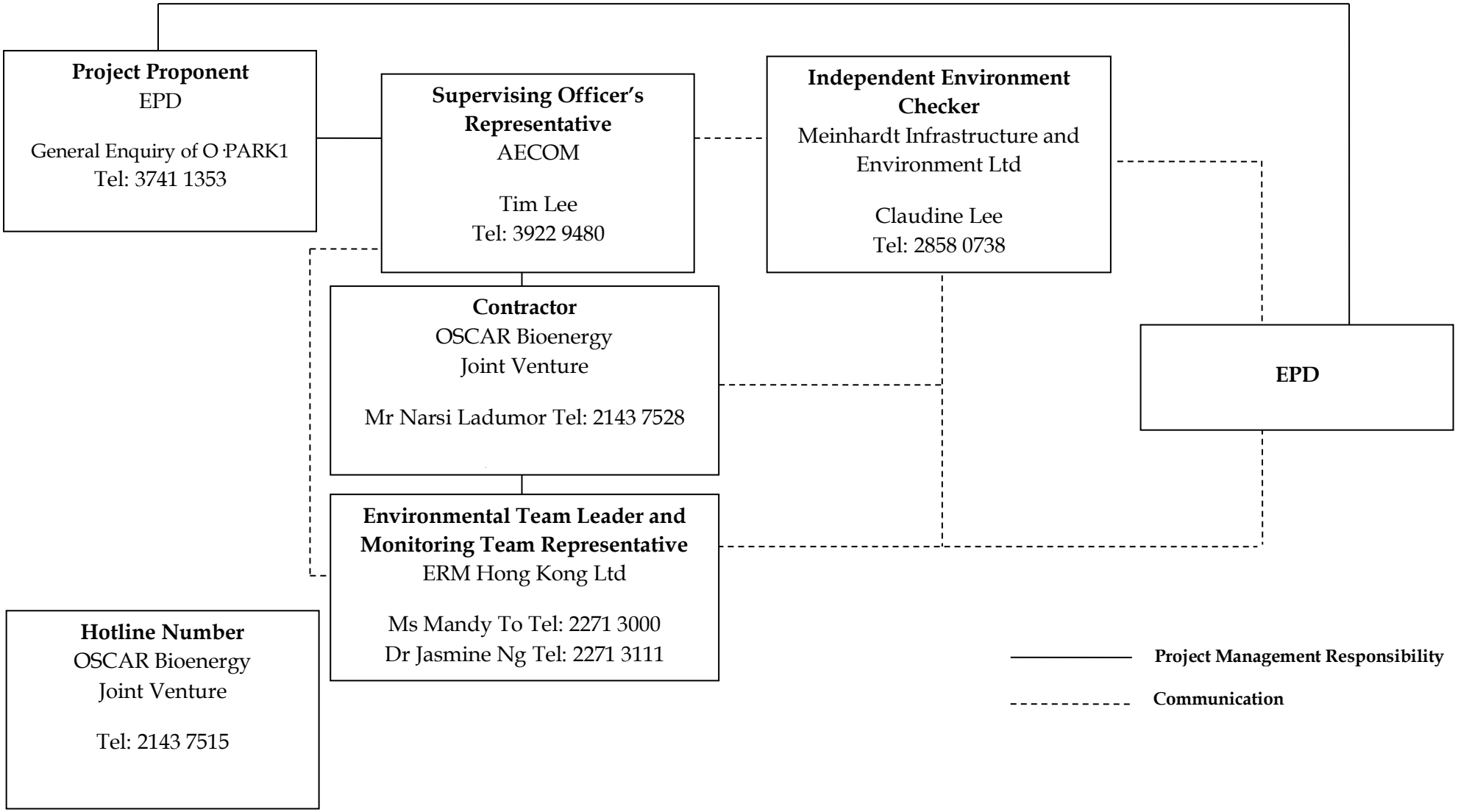
0279222v.cdr

Plot Time: 05/03/15 21:20:07
Plot Location: C:\Users\matthew.brown\Documents\OWTF_Architectural Working Model (Combined) CEN_matthew.brown.rvt

Annex B

Project Organisation Chart with Contact Details

Project Organization (with contact details)



Annex C

Implementation Schedule of Mitigation Measures

Annex C Summary of Mitigation Measures Implementation Schedule for Operation Phase

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
Summary of Environmental Mitigation Measures in the EIA and EM&A Manual				
A. Air Quality				
3.78	2.7 & 2.13 – 2.19	*Air Pollution Control (Construction Dust) Regulation & Good Site Practices* •Commissioning tests shall be conducted to confirm the centralized air pollution control unit, the cogen units, the standby flaring unit and ASP against the design emission levels as stated in Tables 2.2 - 2.5. •Odour monitoring shall be conducted at the stack exhaust of the centralized air pollution control unit weekly in the first month of the commissioning stage.	OWTF Stacks/ During Commissioning Stage	√
3.78	2.7-2.12	*Air Pollution Control and Stack Monitoring* •Stack monitoring shall be installed for the centralized air pollution control unit, cogen units and ASP of OWTF to ensure that the air emissions from OWTF would meet the design emission limits as well as EPD criteria.	During Operation	√
3.78	2.20- 2.28	•Odour Patrol at site boundary of OWTF	OWTF Site Boundary/During Operation (The need to continue the odour patrol after the end of the 2-year monitoring period would depend on the monitoring results and should be agreed with EPD)	N/A
B. Hazard to Life				
4.103	3.4	*Operation Phase* •3m high fence should be constructed along the boundary facing the SHWWTW •Emergency evacuation procedures should be formulated and the Contractor should ensure on site staff should be familiar with these procedures. Diagram showing the escape routes to a safe place should be posted in the site notice boards and at the entrance/exit of site. A copy of the latest version emergency procedures should be dispatched to Tung Chung Fire Station for reference once available. •The emergency procedures should specify means of providing a rapid and direct warning (e.g. Siren and Flashing Light) to personnel on site in the event of chlorine gas release in the SHWWTW.	Work Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•The Contractor should establish a communication channel with the SHWWTW operation personnel and FSD. In case of any hazardous incidents in the treatment works, operation personnel of SHWWTW should advise the Contractor to inform personnel on site to proceed with emergency procedure. The Contractor should appoint a Liaison Officer to communicate with FSD Incident Commander on site in case of emergency. •Periodic drills should be coordinated and conducted to ensure all on site personnel are familiar with the emergency procedures. Upon completion of the drills, a review on every step taken should be conducted to identify area of improvement. Prior notice of periodic drills should be given to Station Commander of Tung Chung Fire Station. Joint operational exercise with FSD and SHWWTW is recommended.		
C. Water Quality				
5.44	4.5	*Wastewater from Organic Waste Treatment Process* The Project site will be equipped with an adequately sized wastewater treatment plant. A high rate type of active sludge system specifically designed for the removal of nitrogen components from the wastewater in combination with conversion of residual BOD and COD would be deployed. The wastewater treatment plant would also be incorporated with SHARON or annamox technology or equivalent to achieve high total overall nitrogen removal. Wastewater generated from the OWTF (including wastewater from dewatering process, leachate from waste reception area, condensate from biogas handling, wastewater from scrubber of air treatment system and any surplus water from truck washing facility) will be diverted to the wastewater treatment plant. Treated effluent will then be stored temporarily in order to be used as process water within the plants. The storage volume would be around 20 m3. Overflow from the tank will be discharged to foul sewers. The polluting parameters in effluent shall be in compliance with the requirements specified in the TM- DSS. The design, installation and operation of the wastewater treatment plant shall be licensed under the Waste Disposal Ordinance and subject to the effluent monitoring as required under the WPCO which is under the ambit of regional office (RO) of EPD. To ensure that wastewater can be adequately treated and effluent from treatment plant can meet the standards listed in TM- DSS, the following mitigation measure should be conducted. • Cleaning and maintenance of treatment facilities should be conducted on a regular basis to ensure that removal rate of each treatment facility would not be reduced. • Cleaning and maintenance of pipelines should be carried out on a regular basis to prevent block of pipeline and leaching of wastewater, and therefore prevent overflowed or leached wastewater discharging into nearby drainages and water streams. • Regular site inspection should be conducted to ensure that no wastewater can be directly discharged into nearby water streams.	Work Site / During Design & Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
5.55	4.5	In the scrubber, spraying water should be re-circulated to minimize the need for external water. The spraying water would be collected at the bottom of the scrubber. Excess water would be discharged to the wastewater treatment plant as described in Section 5.54.	Work Site / During Design & Operation Period	√
5.56	4.5	The waste reception, treatment facilities and compost storages of OWTF should be located in enclosed buildings to prevent generation of contaminated rain runoff. All surface runoff such as washed water generated in the treatment processes areas should be properly collected and diverted to the on-site wastewater treatment plant as described in Section 5.54.	Work Site / During Design & Operation Period	√
5.57	4.5	All drainage system for collection and transferring wastewater generated in the OWTF to the on-site wastewater treatment plant as described in Section 5.54 should be capable of preventing clogging and easy maintenance and cleaning.	Work Site / During Design & Operation Period	√
D. Waste Management				
6.50	5.12	<u>*Good Site Practices*</u> Good operational practices should be adopted to Minimize waste management impacts: •Obtain the necessary waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Chemical Waste) (General) Regulation and the Land (Miscellaneous Provision) Ordinance (Cap. 28); •Nomination of an approved person to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site; •Use of a waste haulier licensed to collect specific category of waste; •A trip-ticket system should be included as one of the contractual requirements and implemented by the Environmental Team to monitor the disposal of solid wastes at public filling facilities and landfills, and to control fly tipping. Reference should be made to ETWB TCW No. 31/2004. •Training of site personnel in proper waste management and chemical waste handling procedures; •Separation of chemical wastes for special handling and appropriate treatment at a licensed facility; •Routine cleaning and maintenance programme for drainage systems, sumps and oil interceptors; •Provision of sufficient waste disposal points and regular collection for disposal; •Adoption of appropriate measures to minimize windblown litter and dust during transportation of waste, such as covering trucks or transporting wastes in enclosed containers; and •Implementation of a recording system for the amount of wastes generated, recycled and	During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		disposed of (including the disposal sites).		
6.51	5.13	*Waste Reduction Measures* Good management and control can prevent the generation of significant amounts of waste. It is recommended that the following good operational practices should be adopted to ensure waste reduction: •Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal; •Encourage collection of aluminum cans, plastic bottles and packaging material (e.g. carton boxes) and office paper by individual collectors. Separate labelled bins should be provided to help segregate this waste from other general refuse generated by the work force; and •Any unused chemicals or those with remaining functional capacity should be reused as far as practicable.	During Operation Period	√
6.52	5.14	*Wastes Generated from Pre-Treatment Process* Wastes generated from pre-treatment process should be recycled as far as possible. Wastes generated from pre- treatment process should also be separated from any chemical waste and stored in covered skips. The recyclables should be collected by licensed collectors, while the rest of the waste should be removed from the site on a daily basis to minimize odour, pest and litter impacts. Open burning must be strictly prohibited.	Pre-Treatment Process/ During Operation Period	√
6.53-6.56	5.15-5.18	*Chemical Wastes* •Chemical waste generated from machinery maintenance and servicing should be managed in accordance with Code of Practice on the Packaging, Labelling and storage of Chemical Wastes under the provisions of Waste Disposal (Chemical Waste) (General) Regulation. The chemical waste should be collected by drum-type containers and removed by licensed chemical waste contractors. •Plant / equipment maintenance schedules should be planned in order to minimize the generation of chemical waste. •Non-recyclable chemical wastes and lubricants should be disposed of at appropriate facilities, such as CWTC. Copies or counterfoils from collection receipts issued by the licensed waste collector should be kept for recording purpose. •Recyclable chemical waste will be transported off-site for treatment by a licensed collector. The Contractor will need to register with EPD as a chemical waste producer. Where possible, chemical wastes (e.g. waste lubricants) would be recycled at appropriate facilities, such as Dunwell's oil re-refinery.	Whole Site / During Operation Period	√
6.57-6.58	5.19-5.20	General Refuse	Whole Site / During Operation	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•Waste generated in offices should be reduced through segregation and collection of recyclables. To promote the recycling of wastes such as used paper, aluminum cans and plastic bottles, it is recommended that recycling bins should be clearly labelled and placed at locations with easy access. For the collection of recyclable materials, they should be collected by licensed collectors. •General refuse, other than segregated recyclable wastes, should be separated from any chemical waste and stored in covered skips. The general refuse should be removed from the site on a daily basis to minimize odour, pest and litter impacts. Also, open burning of refuse must be strictly prohibited.	Period	
E. Proposed Land Contamination Preventive Measures				
6.65	5.21 (i)	<u>Fuel Oil Containers</u> •Fuel oil should be stored in suitable containers. •All fuel oil containers should be securely closed. •Appropriate labels showing the name of fuel oil should be posted on the containers. •Drip trays should be provided for all containers.	Fuel Oil Storage Containers /During Operation Period	√
6.65	5.21 (ii)	<u>Storage Area</u> •Distance between the fuel oil refuelling points and the fuel oil containers should be minimized. •The storage area should be used for fuel oil storage only. •No surface water drains or foul sewers should be connected to the storage area. •The storage area should be enclosed by three sides by a wall and have an impermeable floor or surface.	Fuel Oil Storage Area /During Operation Period	√
6.65	5.21 (iii)	<u>Fuel Oil Spillage Response</u> An Oil Spill Response Plan should be prepared by the operator to document the appropriate response procedures for oil spillage incident in detail. General procedures to be taken in case of fuel oil spillage are presented below. • <u>Training</u> Training on oil spill response actions should be given to relevant staff. The training should cover the followings: - Tools & resources to combat oil spillage and fire, e.g. locations of oil spill handling equipment and firefighting equipment; - General methods to deal with oil spillage and fire incidents; - Procedures for emergency drills in the event of oil spills and fire; and - Regular drills should be carried out. • <u>Communication</u> Establish communication channel with the Fire Services Department (FSD) and EPD to	Whole Site / During Operation Phase	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		report any oil spillage incident so that necessary assistance from relevant department could be quickly sought. • <u>Response Procedure</u> Any fuel oil spillage within the Project Site should be immediately reported to the Site Manager with necessary details including location, source, possible cause and extent of the spillage Site Manager should immediately attend to the spillage and initiate any appropriate action to confine and clean up the spillage. The response procedures should include the following: - Identify and isolate the source of spillage as soon as possible. - Contain the oil spillage and avoid infiltration into soil / groundwater and discharge to storm water channels. - Remove the oil spillage. - Clean up the contaminated area. - If the oil spillage occurs during refuelling, the refuelling operation should immediately be stopped. - Recovered contaminated fuel oil and the associated material to remove the spilled oil should be considered as chemical waste. The handling and disposal procedures for chemical wastes are discussed in the following paragraphs.		
6.66	5.22 (i)	<u>Chemicals and Chemical Wastes Handling & Storage</u> • Chemicals and chemical wastes should only be stored in suitable containers in purpose-built areas. • The storage of chemical wastes should comply with the requirements of the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • The storage areas for chemicals and chemical wastes should have an impermeable floor or surface. The impermeable floor I surface should possess the following properties: - Not liable to chemically react with the materials and their containers to be stored. - Able to withstand normal loading and physical damage caused by container handling - The integrity and condition of the impermeable floor or surface should be inspected at regular intervals to ensure that it is satisfactorily maintained • For liquid chemicals and chemical wastes storage, the storage area should be bonded to contain at least 110% of the storage capacity of the largest containers or 20% of the total quantity of the chemicals/chemical wastes stored, whichever is the greater.	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		• Storage container should be checked at regular intervals for their structural integrity and to ensure that the caps or fill points are tightly closed. • Chemical handling should be conducted by trained workers under supervision.		
6.66	5.22 (ii)	<u>Chemicals and Chemical Wastes Spillage Response</u> A Chemicals and / or Chemical Wastes Spillage Response Plan should be prepared by the operator to document in detail the appropriate response procedures for chemicals or chemical wastes spillage incidents. General procedures to be undertaken in case of chemicals I chemical waste spillages are presented below • Training • Training on spill response actions should be given to relevant staff. The training should cover the followings: - Tools & resources to handle spillage, e.g. locations of spill handling equipment; - General methods to deal with spillage; and - Procedures for emergency drills in the event of spills. • Communication Establish communication channel with Fire Services Department (FSD) and EPD to report the spillage incident so that necessary assistance from relevant department could be quickly sought. • Response Procedures Any spillage within OWTF site should be reported to the Site Manager. Site Manager shall attend to the spillage and initiate any appropriate actions needed to confine and clean up the spillage. The response procedures should include the followings: - Identify and isolate the source of spillage as soon as possible; - Contain the spillage and avoid infiltration into soil / groundwater and discharge to storm water channels (in case the spillage occurs at locations out of the designated storage areas); - Remove the spillage; the removal method / procedures documented in the Material Safety Data Sheet (MSDS) of the chemicals spilled should be observed; - Clean up the contaminated area (in case the spillage occurs at locations out of the designated storage areas); and - The waste arising from the cleanup operation should be considered as chemical wastes.	Whole Site / During Operation Period	√
6.67 - 6.69	5.23- 5.25	<u>Incident Record</u> • After any spillage, an incident report should be prepared by the Site Manager. The incident report should contain details of the incident including the cause of the	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		incident, the material spilled and estimated spillage amount, and also the response actions undertaken. The incident record should be kept carefully and able to be retrieved when necessary. • The incident report should provide sufficient details for the evaluation of any environmental impacts due to the spillage and assessment of the effectiveness of measures taken. • In case any spillage or accidents results in significant land contamination, EPD should be informed immediately and the Project operator should be responsible for the cleanup of the affected area. The responses procedures described in Sections 6.65 - 6.66 of the EIA Report should be followed accordingly together with the land contamination assessment and remediation guidelines stipulated in the *Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management* and the *Guidance Note for Contaminated Land Assessment and Remediation*.		
F. Landscape and Visual				
7.98 & Table 7.8	Table 6.2	<u>Operation Phase</u> • Aesthetic design of the facade, including its colour theme, pattern, texture , materials, finishing and associated structures to harmonize with the surrounding settings • Grass / groundcover planting to soften the roof • Heavy standard tree planting to screen proposed associated structures • Grasscrete paving to soften the harshness of large paved surface areas wherever possible	Within Project Area / During Design & Operation Stages	√

Remark:
√ Compliance of Mitigation Measures
<> Compliance of Mitigation but need improvement
x Non-compliance of Mitigation Measures
▲ Non-compliance of Mitigation Measures but rectified by OSCAR Bioenergy JV
Δ Deficiency of Mitigation Measures but rectified by OSCAR Bioenergy JV
N/A Not Applicable in Reporting Period

Annex D

Waste Flow Table

No. EP/SP/61/10 of Organic Resources Recovery Centre (Phase 1)
Monthly Summary Waste Flow Table

Month	Chemical Waste	Waste Generated from Pretreatment Process				General Refuse							
		Disposed of at Landfill (see Note 1)	Metals (see Note 2)	Paper/ cardboard packaging (see Note 2)	Plastics (see Note 3)	Disposed of at Landfill (see Note 1 & 4)		Metals (see Note 2)		Paper/ cardboard packaging (see Note 2)		Plastics (see Note 3)	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
March 2019	1,200	477.08	0	0	0	26	1.50	0	0	0	0	0	0
April 2019	0	455.60	0	0	0	22	1.27	0	0	0	0	0	0
May 2019	1,000	528.22	0	0	0	25	2.88	0	0	0	0	1	0.39
June 2019	0	459.23	0	0	0	24	2.76	0	0	0	0	0	0
July 2019	0	521.79	0	0	0	26	3.00	0	0	0	0	0	0
August 2019	40	441.05	0	0	0	27	3.11	0	0	0	0	0	0
September 2019	1,800	576.28	0	0	0	24	2.76	0	0	0	0	0	0
October 2019	0	441.22	0	0	0	25	2.88	0	0	0	0	0	0
November 2019	1,600	451.57	0	0	0	26	3.00	0	0	0	0	0	0
December 2019	1,009	488.13	0	0	0	24	2.76	0	0	0	0	0	0
January 2020	0	388.20	0	0	0	23	2.65	0	0	0	0	0	0
February 2020	4,525	372.97	0	0	0	24	2.76	0	0	0	0	0	0
March 2020	1,200	351.71	0	0	0	27	3.11	0	0	0	0	0	0
April 2020	0	363.92	0	0	0	21	2.42	0	0	0	0	0	0
May 2020	800	294.36	0	0	0	25	2.88	0	0	0	0	0	0
June 2020	0	347.23	0	0	0	25	2.88	0	0	0	0	0	0
July 2020	200	852.07	0	0	0	26	3.00	0	0	0	0	0	0
August 2020	0	700.25	0	1.20	0	25	2.88	0	0	0	0	0	0
September 2020	400	579.64	0	5.31	0	26	3.00	0	0	0	0	0	0
October 2020	0	840.75	0	5.83	0	24	2.76	0	0	0	0	0	0
November 2020	0	688.20	0	0.80	0	25	2.88	0	0	0	0	0	0
December 2020	766	685.47	0	0	0	25	2.88	0	0	0	0	0	0
January 2021	1,800	634.00	0	0	0	25	2.88	0	0	0	0	0	0
February 2021	6,120	377.72	0	0	0	21	2.42	0	0	0	0	0	0
March 2021	6,000	325.21	0	0	0	27	3.11	0	0	0	0	0	0

Month	Chemical Waste	Waste Generated from Pretreatment Process				General Refuse							
		Disposed of at Landfill (see Note 1)	Metals (see Note 2)	Paper/ cardboard packaging (see Note 2)	Plastics (see Note 3)	Disposed of at Landfill (see Note 1 & 4)		Metals (see Note 2)		Paper/ cardboard packaging (see Note 2)		Plastics (see Note 3)	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
April 2021	9,700	651.29	0	0	0	22	2.53	0	0	0	0	0	0
May 2021	4,000	671.03	0	0	0	24	2.76	0	0	0	0	0	0
June 2021	0	558.72	0	0	0	25	2.88	0	0	0	0	0	0
July 2021	0	382.74	0	0	0	26	3.00	0	0	0	0	0	0
August 2021	3,420	687.05	0	0	0	26	3.00	0	0	0	0	0	0
September 2021	2,400	304.01	0	0	0	25	2.88	0	0	0	0	0	0
October 2021	0	342.38	0	0	0	23	2.65	0	0	0	0	0	0
November 2021	2,000	394.26	0	0	0	26	3.00	0	0	0	0	0	0
December 2021	0	392.44	0	0.67	0	22	2.53	0	0	0	0	0	0
January 2022	0	359.27	0	0	0	23	2.65	0	0	0	0	0	0
February 2022	0	260.57	0	0	0	21	2.42	0	0	0	0	0	0
March 2022	0	253.75	0	0	0	23	2.65	0	0	0	0	0	0
April 2022	1,240	253.45	0	0	0	22	2.53	0	0	0	0	0	0
May 2022	0	354.94	0	0	0	24	2.76	0	0	0	0	0	0
June 2022	0	383.41	1.73	0.08	0	25	2.88	0	0	0	0	0	0
July 2022	0	430.90	4.87	1.15	0	24	2.76	0	0	0	0	0	0
August 2022	1,000	427.52	0.00	0.00	0	23	2.65	0	0	0	0	0	0
September 2022	0	476.92	0	0	0	21	2.42	0	0	0	0	0	0
October 2022	0	615.87	0	0	0	24	2.76	0	0	0	0	0	0
November 2022	0	585.38	0	0	0	26	3.00	1	0.020	1	0.035	1	0.020
December 2022	0	666.42	0	0	0	31	3.57	1	0.001	1	0.040	1	0.050
January 2023	1,200	581.55	0.969	0.000	0.021	23	2.650	0	0.000	1	0.004	0	0.000
February 2023	5,540	643.75	0.000	0.360	0.000	24	2.765	1	0.003	0	0.000	1	0.015
March 2023	0	682.00	0.000	0.000	0.000	27	3.110	2	0.011	2	0.065	2	0.012
April 2023	0	578.25	0.260	0.000	0.000	21	2.419	0	0.000	1	0.015	1	0.012
May 2023	0	662.27	0.000	0.000	0.000	25	2.880	0	0.000	0	0.000	2	0.130

Total	58,960.00	25,242.02	7.83	15.40	0.02	1,244	140.54	5	0.035	6	0.159	9	0.629

Notes:

1. General refuse was disposed of at NENT by subcontractors.
2. Metal and paper/cardboard packaging were collected by recycler for recycling.
3. Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material collected by recycler for recycling.
4. It was assumed that four 240-litre bins filled with 80% of general refuse were collected at each collection. The general refuse density was assumed to be around 0.15 kg/L.

Annex E

Environmental Complaint, Environmental Summons and Prosecution Log

Annex E Cumulative Complaint and Summons/Prosecutions Log

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
May 2015	0	0
June 2015	0	0
July 2015	0	0
August 2015	0	0
September 2015	0	0
October 2015	0	0
November 2015	0	0
December 2015	0	0
January 2016	0	0
February 2016	0	0
March 2016	0	0
April 2016	0	0
May 2016	0	0
June 2016	0	0
July 2016	0	0
August 2016	0	0
September 2016	0	0
October 2016	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
November 2016	0	0
December 2016	0	0
January 2017	0	0
February 2017	0	0
March 2017	0	0
April 2017	0	0
May 2017	0	0
June 2017	0	0
July 2017	0	0
August 2017	0	0
September 2017	0	0
October 2017	0	0
November 2017	0	0
December 2017	0	0
January 2018	0	0
February 2018	0	0
March 2018	0	0
April 2018	0	0
May 2018	0	0
June 2018	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
July 2018	0	0
August 2018	0	0
September 2018	1	0
October 2018	0	0
November 2018	0	0
December 2018	0	0
January 2019	0	0
February 2019	0	0
March 2019	0	0
April 2019	0	0
May 2019	0	0
June 2019	0	0
July 2019	0	0
August 2019	0	0
September 2019	0	0
October 2019	0	0
November 2019	0	0
December 2019	0	0
January 2020	0	0
February 2020	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
March 2020	0	0
April 2020	0	0
May 2020	0	0
June 2020	0	0
July 2020	0	0
August 2020	0	0
September 2020	0	0
October 2020	0	0
November 2020	0	0
December 2020	0	0
January 2021	0	0
February 2021	0	0
March 2021	0	0
April 2021	0	0
May 2021	0	0
June 2021	0	0
July 2021	0	0
August 2021	0	0
September 2021	0	0
October 2021	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
November 2021	0	0
December 2021	0	0
January 2022	0	0
February 2022	0	0
March 2022	0	0
April 2022	0	0
May 2022	0	0
June 2022	0	0
July 2022	0	0
August 2022	0	0
September 2022	0	0
October 2022	0	0
November 2022	0	0
December 2022	0	0
January 2023	0	0
February 2023	0	0
March 2023	0	0
April 2023	0	0
May 2023	0	0
Overall Total	**1**	**0**

Annex F

Investigation Report

Annex F1

Investigation Result for March 2023

Investigation Report of CEMS Exceedances

Date	1 – 31 March 2023
Time	Continuous monitoring throughout March 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Centralised Air Pollution Unit (CAPCS), Cogeneration Units (CHP), Ammonia Stripping Plant (ASP) and Standby Flaring Gas Unit
Exceedance Description	1. Continuous monitoring was carried out at the CAPCS, CHP, ASP and Standby Flaring Gas Unit throughout the reporting period using the CEMS. According to the EM&A Manual, exceedance is considered if the emission concentration of the concerned pollutants is higher than the emission limits stated in Tables 2.2, 2.3, 2.4 and 2.5 of the EM&A Manual (Version F) for CAPCS, CHP, ASP and Standby Flaring Gas Unit respectively. The concentration of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: • VOCs (including methane) from CAPCS; • NOx and SO_2 from the CHPs; • NOx, SO_2, NH_3 and HCl from ASP; and • HF from Standby Flaring Gas Unit. 2. The Contractor is still investigating the cause of the exceedances of VOCs (including methane) from CAPCS 3. The Contractor has investigated the cause of the exceedance and identified that • The exceedances of SO_2 from the CHPs and ASP occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. • The exceedances of NO_x from CHPs, NO_x, NH_3 and HCl from ASP and HF from Standby Flaring Gas Unit occurred due to system instability caused by prolonged usage of the CHPs, ASP and Standby Flaring Gas Unit.
Action Taken / Action to be Taken	The sample on CAPCS stack for VOC testing was taken on 29 March 2023 for investigating the cause of the exceedances of VOCs (including methane) from CAPCS. The Contractor has arranged cleaning of the heat exchangers of all CHPs to remove potential sulphur residue from the exhaust gas system. The Contractor has also replaced all catalytic convertors with an aim to improve the CO removal efficiency of the system.
Remedial Works and Follow-up Actions	The Contractor has arranged a specialist to review the CEMS system performance and accuracy. The specialist will carry out in-depth investigation and propose any remediation needed. The reason for CAPCS exceedance is still under investigation by the Contractor. This investigation report will be updated once available.

Prepared by:	Chris Ng, MT Representative
Date	23 April 2023

Investigation Report of Discharged Sample Exceedances

Date	9 March 2023
Time	The monitoring of the discharge sample of the Outlet Chamber of the Effluent Storage Tank
Monitoring Location	Outlet Chamber of the Effluent Storage Tank
Parameter	Total Nitrogen
Exceedance Description	1. According to EM&A Manual, the monitoring of the effluent discharge from the outlet chamber of the Effluent Storage Tank shall be carried out monthly under Section 21 of the Water Pollution Control Ordinance (WPCO) license. Exceedance is considered if the concentration of discharged effluent sample from the Interceptors is higher than the discharge limits stated in Part B2 of the WPCO. Exceedances of discharge parameter was recorded on the monitoring of effluent discharge from the outlet chamber of the Effluent Storage Tank including: • Total Nitrogen 2. The Contractor has investigated the cause of the exceedance and found that • The exceedances of Total Nitrogen from the effluent discharge from the outlet chamber of Effluent Storage Tank occurred due to an unexpected surge of Kjeldahl Nitrogen in Treated Effluent and leading to high Total Nitrogen in Treated Effluent sampled on 9 March 2023.
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedance. It was found that the reason for the exceedances of Total Nitrogen was due to an unexpected surge of Kjeldahl Nitrogen in the Treated Effluent sample.
Remedial Works and Follow-up Actions	The Contractors will further arrange a longer aeration in SBR and a monitoring of settlement, to prevent further high nitrogen content entering Treated Effluent Tank and discharge to DSD, to make sure the discharge effluents complies with the discharge limit.

Prepared by: Chris Ng, MT Representative
Date 23 April 2023

Annex F2

Investigation Result for April 2023

Investigation Report of CEMS Exceedances

Date	1 – 30 April 2023
Time	Continuous monitoring throughout April 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Centralised Air Pollution Unit (CAPCS), Cogeneration Units (CHP) and Ammonia Stripping Plant (ASP)
Exceedance Description	1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&A Manual, exceedance is considered if the emission concentration of the concerned pollutants is higher than the emission limits stated in Tables 2.2, 2.3 and 2.5 of the EM&A Manual (Version F) for CAPCS, CHP and ASP respectively. The concentration of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: • VOCs (including methane) from CAPCS; • NOx and SO_2 from the CHP1; • Dust, NOx, SO_2, HCl and HF from the CHP2; and • NOx, SO_2 and NH_3 from ASP. 2. The Contractor is still investigating the cause of the exceedances of VOCs (including methane) from CAPCS 3. The Contractor has investigated the cause of the exceedance and identified that • The exceedances of SO_2 from the CHPs occurred due to tripping of the de-sulphurisation system resulted from the residue of sulphur accumulated at the exhaust heat exchangers. • The exceedances of dust, NO_x, HCl and HF from CHPs occurred due to system instability caused by prolonged usage of the CHPs. • The exceedances of NOx, SO_2 and NH_3 from ASP occurred due to ASP pump failure which caused equipment trip.
Action Taken / Action to be Taken	The sample on CAPCS stack for VOC testing was taken on 29 March 2023 for investigating the cause of the exceedances of VOCs (including methane) from CAPCS. The Contractor has arranged cleaning of the heat exchangers of all CHPs to remove potential sulphur residue from the exhaust gas system. The Contractor has also replaced all catalytic convertors with an aim to improve the CO removal efficiency of the system. The Contractor has replaced the ASP pump on 21 April 2023.
Remedial Works and Follow-up Actions	The Contractor has arranged a specialist to review the CEMS system performance and accuracy. The specialist will carry out in-depth investigation and propose any remediation needed.

	The reason for exceedance is still under investigation by the Contractor. This investigation report will be updated once available.

Prepared by:	Chris Ng, MT Representative
Date	22 May 2023

Investigation Report of Discharged Sample Exceedances

Date	Effluent Storage Tank: 13 April 2023 Petrol Interceptor 1: 20 April 2023
Monitoring Location	Outlet Chamber of the Effluent Storage Tank, Petrol Interceptor 1
Parameter	Effluent Storage Tank: Total Nitrogen Petrol Interceptor 1: Suspended Solids
Exceedance Description	1. According to EM&A Manual, the monitoring of the effluent discharge from the outlet chamber of the Effluent Storage Tank and Petrol Interceptors shall be carried out monthly and bi-monthly, respectively, under Section 21 of the Water Pollution Control Ordinance (WPCO) license. Exceedance is considered if the concentration of discharged effluent sample from the Effluent Storage Tank and Interceptors is higher than the discharge limits stated in Part B2 of the WPCO. Exceedances of discharge parameter was recorded during the monitoring of effluent discharge from the outlet chamber of the Effluent Storage Tank (Total Nitrogen) and Petrol Interceptor 1 (Suspended Solids). 2. The Contractor has investigated the cause of the exceedances and found that • The exceedance of Total Nitrogen from the effluent discharge from the outlet chamber of Effluent Storage Tank occurred due to an unexpected surge of Kjeldahl Nitrogen in Treated Effluent and leading to high Total Nitrogen in Treated Effluent sampled on 13 April 2023. • The exceedance of Suspended Solids from the effluent discharge from Petrol Interceptor 1 occurred due to small amount of leaves and branches in the sample, leading to high Suspended Solids in the sample taken on 20 April 2023.
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedance. New effluent sample has been taken on 28 April 2023.
Remedial Works and Follow-up Actions	The Contractors will further arrange a longer aeration in SBR and a monitoring of settlement, to prevent further high nitrogen content entering Treated Effluent Tank and discharge to DSD, to make sure the discharge effluents complies with the discharge limit.

Prepared by: Chris Ng, MT Representative
Date 22 May 2023

Annex F3

Investigation Result for May 2023

Investigation Report of CEMS Exceedances

Date	1 – 31 May 2023
Time	Continuous monitoring throughout May 2023
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP) and Ammonia Stripping Plant (ASP)
Exceedance Description	1. Continuous monitoring was carried out at the CAPCS, CHP and ASP throughout the reporting period using the CEMS. According to the EM&A Manual, exceedance is considered if the emission concentration of the concerned pollutants is higher than the emission limits stated in Tables 2.2, 2.3 and 2.5 of the EM&A Manual (Version F) for CAPCS, CHP and ASP respectively. The concentration of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: • Dust, VOCs, NOx and SO_2 from the CHP1; • Dust, NOx and SO_2 from the CHP2; • NOx and SO_2 from the CHP3; and • CO, NOx, SO_2, NH_3 and HF from ASP. 2. The Contractor has investigated the cause of the exceedance and identified that • The exceedances of SO_2 from the CHPs and ASP occurred due to tripping of the de-sulphurisation system. • The potential cause of exceedances of Dust, VOCs and NO_x from CHPs, as well as the exceedances of CO, NOx, NH_3 and HF from ASP was system instability. • The underlining reasons for the exceedances are still under investigation. This investigation report will be updated once more information is available.
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedance and arranged Remedial Works and Follow-up Actions (see below).
Remedial Works and Follow-up Actions	The Contractor has arranged the CHP supplier to inspect, analyse and improve CHP performance from the end of May to early June 2023. Improvement recommendation will be provided once the report is completed. The Contractor has also arranged cleaning of the ASP in early June 2023 to restore the treatment efficiency of the ASP.

Prepared by: Angela Yung, MT Representative
Date 23 June 2023

Investigation Report of Discharged Sample Exceedances

Date	5 May 2023
Monitoring Location	Outlet Chamber of the Effluent Storage Tank
Parameter	Total Nitrogen
Exceedance Description	1. According to EM&A Manual, the monitoring of the effluent discharge from the outlet chamber of the Effluent Storage Tank and Petrol Interceptors shall be carried out monthly and bi-monthly, respectively, under Section 21 of the Water Pollution Control Ordinance (WPCO) license. Exceedance is considered if the concentration of discharged effluent sample from the Effluent Storage Tank and Interceptors is higher than the discharge limits stated in Part B2 of the WPCO. Exceedances of discharge parameter was recorded during the monitoring of effluent discharge from the outlet chamber of the Effluent Storage Tank. 2. The Contractor has investigated the cause of the exceedances and found that the exceedance of Total Nitrogen from the effluent discharge from the outlet chamber of Effluent Storage Tank was potentially caused by the poor performance of the Sequential Batch Reactor (SBR), leading to an increased level of Nitrogen in the Treated Effluent sampled on 5 May 2023.
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedance. New effluent sample has been taken on 31 May 2023.
Remedial Works and Follow-up Actions	The Contractors has arranged thorough cleaning of all tanks and the replacement of diffusers of the SBR.

Prepared by: Angela Yung, MT Representative
Date 21 June 2023