Contract No. EP/SP/61/10 Organic Resources Recovery Centre (Phase 1)

One Hundred and Ninth Monthly EM&A Report (June 2024)

PREPARED FOR
OSCAR Bioenergy Joint Venture

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Meinhardt Infrastructure and Environment Limited

Organic Resources Recovery Centre, Phase I

Monthly EM&A Report

(1 June 2024 – 30 June 2024)

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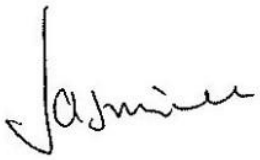

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EXECUTIVE SUMMARY

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 109th Monthly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 1 to 30 June 2024 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 MONTH

Works undertaken in the reporting month 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;
- CHP fine-tuning (will continue into next month);
- PT Line 1 overhaul (will continue into next month); and
- ASP overhaul.

ENVIRONMENTAL MONITORING AND AUDIT PROGRESS

AIR QUALITY MONITORING

Non-compliance of emission limits of NO_x and SO_2, from CHP1; NO_x from CHP2; NO_x from CHP3; and NO_x, SO_2, and NH_3, from the ASP were recorded during the reporting period.

WATER QUALITY

All analytes from the outlet chamber of the effluent storage tank were recorded to be in compliance with discharge limits during the reporting period.

All analytes of Petrol Interceptor 1 and 2 sampling were recorded to be in compliance with discharge limits during the reporting period. Petrol Interceptor 1 sample was collected on 26 June 2024, however the laboratory report and results were still pending as at the original date of this report submission. It is now updated in the current version.

WASTE MANAGEMENT

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

1,200L of chemical waste (spent lube oil) was disposed of at CWTC in June 2024.

1,199.51 tonnes of waste generated from pre-treatment process from the operation of the Project were disposed of at landfill. Among the waste generated from pre-treatment process from the operation of the Project, 0.000 tonnes of metals, 0.000 tonnes of papers/cardboard packing and 0.000 tonnes of plastics were sent to recyclers for recycling during the reporting period.

Around 4.080 tonnes of general refuse from the operation of the Project were disposed of at landfill. Among the general refuse from the operation of the Project, 0.002 tonnes of metals, 0.010 tonnes of papers/cardboard packing and 0.040 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 1 time

1 monthly joint environmental site inspection was carried out by the representatives of the Contractor and the MT. The IEC was also present at the joint inspections on 28 June 2024. 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, COMPLAINT, SUMMONS AND PROSECUTION

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

No complaint was received during the reporting period.

FUTURE KEY ISSUES

Activities to be undertaken in the next reporting month include:

- Operation of the Project;
- Completion of CHP fine-tuning;
- Completion of PT Line 1 overhaul; and
- Pretreatment maintenance.

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 109th EM&A report which summarises the monitoring results and audit findings for the EM&A programme during the reporting period from **1** to **30 June 2024**.

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

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

(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.

layout of the Project Site is illustrated in *Annex A*. The facility received an average of 171.70 tonnes and treated an average of 131.71 tonnes of source separated organic waste per day during the reporting month.

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 de-sulphurisation, the standby flare, the CHPs, the ASP, and the biological wastewater treatment plant (171.70t/d SSOW received); • CHP fine-tuning ongoing (will continue into next month); • PT Line 1 overhaul ongoing (will continue into next month); and • ASP overhaul.

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*.

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
Effluent Discharge Licence	WT00038391-2021	7 July 2021 – 30 June 2026	Approved on 7 July 2021
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 commissioning and 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 commissioning and 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 (CHPs) and the ammonia stripping plant (ASP) during the commissioning and operation phase. The most recent sensor calibration for the CAPCS system was carried out on 15 January 2024 for VOCs and 19 January 2024 for H_2S. The most recent span calibrations for the CEMS systems (CHP1, CHP2, CHP3, and ASP) were carried out on 28 May 2024. Annual CAPCS calibration was carried out from 10 to 12 October 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
Oxygen (O_2)	USEPA Method 3A	• CAPCS • CHP

Parameters	Method	Stacks to be Monitored
		• 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	• ASP
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/Nm^3) [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/Nm^3

TABLE 3.3 EMISSION LIMIT FOR CHP STACK

Parameter	Maximum Emission Level (mg/Nm^3) [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). The monitoring of NMVOCs ended in August 2021.
(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 [2]

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*

(2) A standby facility; only operates when the CHPs are not in operation or when the biogas generated exceeded the utilisation rate of the CHPs.

A [3].

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

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, 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 occurs, 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 by Person-in-charge of Odour Monitoring:	Action by 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

(3) The odour patrol route was changed during this reporting period to include sampling points that are frequently visited by visitors and eliminate sampling points that are not visited by visitors.

Event	Action by Person-in-charge of Odour Monitoring:	Action by Project Proponent: [(a)]
		exceedance is considered to be caused by the operation of the SHWSTW. 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. 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 weeks; 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; 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. The audit shall be conducted to ensure that the effluent quality is in compliance with the discharge

licence requirements. As stipulated in the operation phase discharge licence, effluent discharge is to be sampled monthly from the outlet chamber of the Effluent Storage Tank, while effluent discharge is to be sampled bi-monthly from the Petrol Interceptors. 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 OUTLET CHAMBER OF THE EFFLUENT STORAGE TANK

Parameter	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 INTERCEPTORS

Parameter	Discharge Limit (mg/L)
Flow Rate (m^3/day)	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 4.8* and *Table 4.9*.
(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. After the one-year maintenance period, the landscape maintenance and monitoring shall be carried out by the Contractor.

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, CHPs, ASP, and the Standby Flaring Gas Unit during the reporting period are monitored on-line by the continuous environmental monitoring system (CEMS). During the reporting period, the Standby Flaring Gas Unit was not operated.

With reference to the emission limits shown in *Tables 3.2, 3.3*, *3.4,* and *3.5*, the hourly average concentrations and the number of exceedances of the concerned air emissions monitored for the CAPCS, CHPs, ASP and the Standby Flaring Gas Unit during this reporting period are presented in *Tables 4.1* to *4.6*.

It should be noted that measurements recorded under abnormal operating conditions, e.g. start up and stopping of stacks, unstable operation, 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) [a]	0 – 579	680	Nil	Nil
Dust (or TSP)	0 – 0	6	Nil	Nil
Odour (including NH_3 & H_2S) [b]	0 – 216	220	Nil	Nil

Notes:
(a) The VOCs emission limit includes methane as biogas is adopted, as fuel in the combustion process.
(b) The odour unit is ou/Nm^3.

TABLE 4.2 HOURLY AVERAGE OF PARAMETERS RECORDED FOR CHP 1

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 2	15	Nil	Nil
Carbon Monoxide	0 – 35	650	Nil	Nil
NO_x	0 – 484	300	Identified [c]	System unstable (e.g. low efficiency)
SO_2	0 – 54	50	Identified [d]	System unstable (e.g. low efficiency)
VOCs (including methane) [b]	0 – 629	1,500	Nil	Nil
HCl	0 – 1	10	Nil	Nil
HF	0 – 0	1	Nil	Nil

Notes:

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks

(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.
(b) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.
(c) Dates with NO_x exceedances (number of exceedances on that day) were identified on 1(24), 2(24), 3(13), 4(14), 5(20), 6(14), 7(18), 8(24), 9(24), 10(24), 11(24), 12(24), 13(24), 14(12), 15(12), 16(24), 17(2), 18(8), 19(21), 20(24), 21(24), 22(24), 23(24), 24(15), 25(24), 26(24), 27(23), 28(23), 29(24), and 30(23) June 2024.
(d) Date with SO_2 exceedances (number of exceedances on that day) was identified on 28(11) June 2024.

TABLE 4.3 HOURLY AVERAGE OF PARAMETERS RECORDED FOR CHP 2

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 4	15	Nil	Nil
Carbon Monoxide	0 – 490	650	Nil	Nil
NO_x	0 – 459	300	Identified [c]	System unstable (e.g. low efficiency)
SO_2	0 – 32	50	Nil	Nil
VOCs (including methane) [b]	0 – 525	1,500	Nil	Nil
HCl	0 – 10	10	Nil	Nil
HF	0 – 0	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 include methane as biogas is adopted as fuel in the combustion process.
(c) Dates with NO_x exceedances (number of exceedances on that day) were identified on 1(9), 2(3), 3(10), 4(11), 5(10), 6(10), 7(9), 8(15), 9(8), 10(5), 11(4), 12(3), 13(11), 14(1), 15(4), 16(2), 17(1), 18(8), 19(1), 20(5), 21(3), 22(6), 23(7), 24(9), 25(12), 26(6), and 27(12) June 2024.

TABLE 4.4 HOURLY AVERAGE OF PARAMETERS RECORDED FOR CHP 3

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 13	15	Nil	Nil
Carbon Monoxide	0 – 245	650	Nil	Nil
NO_x	0 – 463	300	Identified [c]	System unstable (e.g. low efficiency)
SO_2	0 – 50	50	Nil	Nil
VOCs (including methane) [b]	0 – 525	1,500	Nil	Nil
HCl	0 – 1	10	Nil	Nil

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [(a)]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
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 include methane as biogas is adopted as fuel in the combustion process.
(c) Dates with NO_x exceedances (number of exceedances on that day) were identified on 20(1), 21(4), 22(14), 24(3), 25(2), 27(4), 28(14), 29(16), and 30(24) June 2024.

TABLE 4.5 HOURLY AVERAGE OF PARAMETERS RECORDED FOR ASP

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [(a)]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 3	5	Nil	Nil
Carbon Monoxide	0 – 95	100	Nil	Nil
NO_x	0 – 892	200	Identified [(c)]	System unstable (e.g. low efficiency)
SO_2	0 – 200	50	Identified [(d)]	System unstable (e.g. low efficiency)
VOCs (including methane) [(b)]	0 – 20	20	Nil	Nil
NH_3	0 – 219	35	Identified [(e)]	System unstable (e.g. low efficiency)
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 include methane as biogas is adopted as fuel in the combustion process.
(c) Dates with NO_x exceedances (number of exceedances on that day) were identified on 1(5), 2(7), 3(8), 4(4), 5(5), 6(18), 7(12), 8(13), 9(22), 10(8), 11(22), 12(12), 13(3), 14(9), 15(15), 16(14), 17(7), 19(5), 21(3), 22(2), 23(1), 24(3), 25(1), 26(11), 27(3), 28(12), 29(7), and 30(6) June 2024.
(d) Dates with SO_2 exceedances (number of exceedances on that day) were identified on 1(1), 3(2), 4(1), 5(1), 7(1), 8(3), 15(9), 23(1), 28(14), 29(13), and 30(16) June 2024.
(e) Dates with NH_3 exceedances (number of exceedances on that day) were identified on 1(11), 3(3), 4(12), 5(6), 6(1), 7(2), 8(3), 10(7), 11(2), 14(3), 15(2), 18(14), 19(1), 20(1), 23(4), 24(5), 25(22), 26(11), 27(12), 28(8), 29(4), and 30(8) June 2024.

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)]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 0	5	Nil	Nil
Carbon Monoxide	0 – 0	100	Nil	Nil
NO_x	0 – 0	200	Nil	Nil
SO_2	0 – 0	50	Nil	Nil

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a] [c]	Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
VOCs (including methane) [b]	0 – 0	20	Nil	Nil
HCl	0 – 0	10	Nil	Nil
HF	0 – 0	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 include methane as biogas is adopted as fuel in the combustion process.

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 is sampled from the outlet chamber of the Effluent Storage Tank monthly and from the Petrol Interceptor(s) bi-monthly 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 4.7* and the results from the Petrol Interceptors are recorded in *Tables 4.8 – 4.9*.

TABLE 4.7 RESULTS OF THE DISCHARGE SAMPLE FROM THE OUTLET CHAMBER OF THE EFFLUENT STORAGE TANK

Parameter	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Flow Rate (m^3/day) [a]	0 – 316 [e]	645	Yes
pH (pH units) [b]	7.90 – 8.30 [e]	6 - 10 [c]	Yes
Suspended Solids [b] [d]	160 [d]	800	Yes
Biochemical Oxygen Demand (5 days, 20°) [b] [d]	16 [d]	800	Yes
Chemical Oxygen Demand [b] [d]	580 [d]	2,000	Yes
Oil & Grease [b] [d]	<5 [d]	40	Yes
Total Nitrogen [b] [d]	55.4 [d]	200	Yes
Total Phosphorus [b] [d]	29.2 [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 12 June 2024.

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

(e) Data collected daily.

TABLE 4.8 RESULTS OF THE DISCHARGE SAMPLE FROM THE PETROL INTERCEPTOR 1

Parameter	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Suspended Solids [b]	17 [a]	30	Yes
Chemical Oxygen Demand [c]	33 [a]	80	Yes
Oil & Grease [c]	<5 [a]	20	Yes
Surfactants (total) [b]	<1.0 [a]	15	Yes

Notes:
(a) Petrol Interceptor 1 sample collected on 26 June 2024.
(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 4.9 RESULTS OF THE DISCHARGE SAMPLE FROM THE PETROL INTERCEPTOR 2

Parameter	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Suspended Solids [b]	19 [a]	30	Yes
Chemical Oxygen Demand [c]	53 [a]	80	Yes
Oil & Grease [c]	<5 [a]	20	Yes
Surfactants (total) [b]	<1.0 [a]	15	Yes

Notes:
(a) Petrol Interceptor 2 sample collected on 12 June 2024.
(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 [4]. Reference has been made to the Monthly Summary Waste Flow Table 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 month are summarised in *Table 4.10*.

[4] Public fill and construction waste may only be generated during maintenance works when there are civil or structural works.

TABLE 4.10 QUANTITIES OF WASTE GENERATED FROM THE OPERATION OF THE PROJECT

Month / Year	Chemical Waste	Waste Generated from Pre-treatment Process		General Refuse	
	Disposed of at CWTC	Disposed of at Landfill [a]	Recycled [b]	Disposed of at Landfill [a]	Recycled [c]
June 2024	1,200 L [d]	1,199.51 tonnes	0.000 tonnes	4.080 tonnes [e] [f]	0.052 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, 0.000 tonnes of metals, 0.000 tonnes of papers/cardboard packing and 0.000 tonnes of plastics were sent to recyclers for recycling during the reporting period.

(c) Among general refuse, 0.002 tonnes of metals, 0.010 tonnes of papers/cardboard packing and 0.040 tonnes of plastics were sent to recyclers for recycling during the reporting period.

(d) 1,200L of chemical waste (spent lube oil) was disposed of at CWTC in June 2024.

(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.

(f) June 2024 general refuse also includes ad-hoc disposal of 1.2 tonnes, in addition to 2.880 tonnes collected during regularly scheduled disposals, for a total of 4.080 tonnes.

5. SITE AUDIT

5.1 ENVIRONMENTAL SITE AUDIT

5.1.1 OPERATION PHASE

The monthly inspection for the operation phase of the Project on 28 June 2024 covered the operation phase environmental site audit. Joint site inspection was conducted by representatives of the Contractor, IEC, and the MT as required for the operation of the Project.

The audits 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*).

Key observations during the reporting period are summarised as follows:

28 June 2024

- No particular observation during this inspection.

Other than the above observations, the Contractor has implemented environmental mitigation measures recommended in the approved EIA Report and EM&A Manual.

5.2 LANDSCAPE AND AUDIT

Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 28 June 2024.

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 specific observation was found during the joint site inspection on 28 June 2024. 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.

6. ENVIRONMENTAL NON-CONFORMANCE AND DEFICIENCIES

6.1 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE AND DEFICIENCIES

Non-compliance of emission limits of NO_x and SO_2, from CHP1; NO_x from CHP2; NO_x from CHP3; and NO_x, SO_2, and NH_3, from the ASP 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 de-sulphurisation system, CHPs, and the ASP; the potential causes for the exceedances were identified.

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

An overview of the various measures/ actions to be taken by the Contractor to address any exceedances is summarised in *Table 6.1*.

TABLE 6.1 IMPLEMENTATION OF MEASURES/ ACTIONS TO ADDRESS ANY EXCEEDANCES

Monitoring Location	Measures/ Actions to Address any Exceedances	Implementation Timeline & Status
Centralised Air Pollution Unit (CAPCS)	• To address the exceedances for Total Odour (ou/Nm^3) recorded in January 2024 and February 2024, the Contractor ordered a new H_2S / ORP sensor to replace the faulty one which was installed on 23 May 2024. • The cleaning of the ventilation pumps was conducted in April 2024.	• All measures have been implemented.
Cogeneration Unit 1 (CHP 1)	• To address the ongoing NO_x exceedances recorded from October 2023 – June 2024, the Contractor ordered 3 new cylinder heads from the supplier to replace the old ones and improve performance which were installed in May 2024. • To address the SO_2 exceedances recorded from October 2023 – June 2024, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • To address the HCl exceedances recorded from October 2023 – April 2024, the Contractor implemented in May 2024 fine tuning measures such as reviewing the ignition temperature curve, spark plug condition check and adjusting the intake & exhaust valves on the cylinder to reduce the fluctuations in HCl emissions and keep within the permissible limit. • A CHP expert from Europe visited the ORRC1 facility from 20-24 May to review the performance of the CHPs.	• The new cylinder heads were installed in May 2024, and further works are ongoing. • The updated SO_2 correction factor was implemented on 17 May 2024. • The fine-tuning measures were implemented during May 2024. • The CHP expert visited in from 20-24 May 2024 and report submitted in June 2024; Contractor will begin reviewing the report in July 2024. • The Contractor will receive additional training in December 2024.

Monitoring Location	Measures/ Actions to Address any Exceedances	Implementation Timeline & Status
	• The Contractor will receive additional advanced training from the manufacturer for the operation and maintenance of the equipment.	
Cogeneration Unit 2 (CHP 2)	• To address the ongoing NO_x exceedances recorded from October 2023 – June 2024, fine tuning of CHP 2 such as reviewing the ignition temperature curve, spark plug condition check and adjusting the intake & exhaust valves on the cylinder was conducted to reduce the fluctuations in NO_x emissions and to keep within the permissible limit. • To address the SO_2 exceedances recorded from October 2023 – April 2024, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • To address the HCl exceedances recorded from November 2023 and April 2024, the Contractor implemented fine tuning measures such as reviewing the ignition temperature curve, spark plug condition check and adjusting the intake & exhaust valves on the cylinder to reduce the fluctuations in HCl emissions and keep within the permissible limit. • A CHP expert from Europe visited the ORRC1 facility in May 2024 to review the performance of the CHPs. • The Contractor will receive additional advanced training from the manufacturer for the operation and maintenance of the equipment.	• The fine-tuning measures were implemented in May 2024, and further works are ongoing. • The updated SO_2 correction factor was implemented on 17 May 2024. • The CHP expert visited in from 20-24 May 2024 and report submitted in June 2024; Contractor will begin reviewing the report in July 2024. • The Contractor will receive additional training in December 2024.
Cogeneration Unit 3 (CHP 3)	• To address the ongoing NO_x exceedances, fine tuning measures of CHP 3 were implemented such as reviewing the ignition temperature curve, spark plug condition check and adjusting the intake & exhaust valves on the cylinder is being conducted to reduce the fluctuations in NO_x emissions and to keep within the permissible limit. • To address the SO_2 exceedances recorded from October 2023 – April 2024, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • A CHP expert from Europe visited the ORRC1 facility in May 2024 to review the performance of the CHPs. • The Contractor will receive additional advanced training from the manufacturer for the operation and maintenance of the equipment.	• The fine-tuning measures were implemented in May 2024, and further works are ongoing. • The updated SO_2 correction factor was implemented on 17 May 2024. • The CHP expert visited in from 20-24 May 2024 and report submitted in June 2024; Contractor will begin reviewing the report in July 2024. • The Contractor will receive additional training in December 2024.

Monitoring Location	Measures/ Actions to Address any Exceedances	Implementation Timeline & Status
Ammonia Stripping Plant (ASP)	• To address the ongoing NO_x exceedances recorded from October 2023 – June 2024, the Contractor conducted an overhaul of the ASP and arranged for a visit by the supplier to improve the reliability and performance of the system. • To address the ongoing SO_2 exceedances recorded from October 2023 – June 2024, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • To address the ongoing NH_3 exceedances recorded from October 2023 – June 2024, the Contractor conducted an overhaul of the ASP and arranged for a visit by the supplier. • To address the HCl exceedances recorded from October 2023 – May 2024, the Contractor conducted an overhaul of the ASP and arranged for a visit by the supplier.	• The overhaul of the ASP was completed 6 May 2024 • The supplier could not visit in June 2024 as planned and will be rescheduled. • The updated SO_2 correction factor was implemented on 17 May 2024.

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 MONTH

Activities to be undertaken for the coming reporting period are:

- Operation of the Project;
- Completion of CHP fine-tuning;
- Completion of PT Line 1 overhaul; and
- Pretreatment maintenance.

8. CONCLUSIONS

This EM&A Report presents the EM&A programme undertaken during the reporting period from **1 to 30 June 2024** in accordance with the EM&A Manual (Version F) and requirements of EP (FEP-01/395/2010/C).

For the operation phase, exceedances of the emission limits for the CHPs and the ASP 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
Cogeneration Unit 1 (CHP 1)	• 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, and 30 June 2024. • Exceeded emission limit of SO_2 on 28 June 2024.
Cogeneration Unit 2 (CHP 2)	• 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, and 27 June 2024.
Cogeneration Unit 3 (CHP 3)	• Exceeded emission limit of NO_x on 20, 21, 22, 24, 25, 27, 28, 29, and 30 June 2024.
Ammonia Stripping Plant (ASP)	• Exceeded emission limit of NO_x on 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30 June 2024. • Exceeded emission limit of SO_2 on 1, 3, 4, 5, 7, 8, 15, 23, 28, 29, and 30 June 2024. • Exceeded emission limit of NH_3 on 1, 3, 4, 5, 6, 7, 8, 10, 11, 14, 15, 18, 19, 20, 23, 24, 25, 26, 27, 28, 29, and 30 June 2024.

Non-compliance of emission limits of NO_x and SO_2, from CHP1; NO_x from CHP2; NO_x from CHP3; and NO_x, SO_2, and NH_3, from the ASP were recorded during the reporting period. The exceedances of NO_x and SO_2 from the CHPs; and NO_x, SO_2, and NH_3, from the ASP, occurred due to system instability.

All analytes from the outlet chamber of the effluent storage tank were recorded to be in compliance with discharge limits during the reporting period.

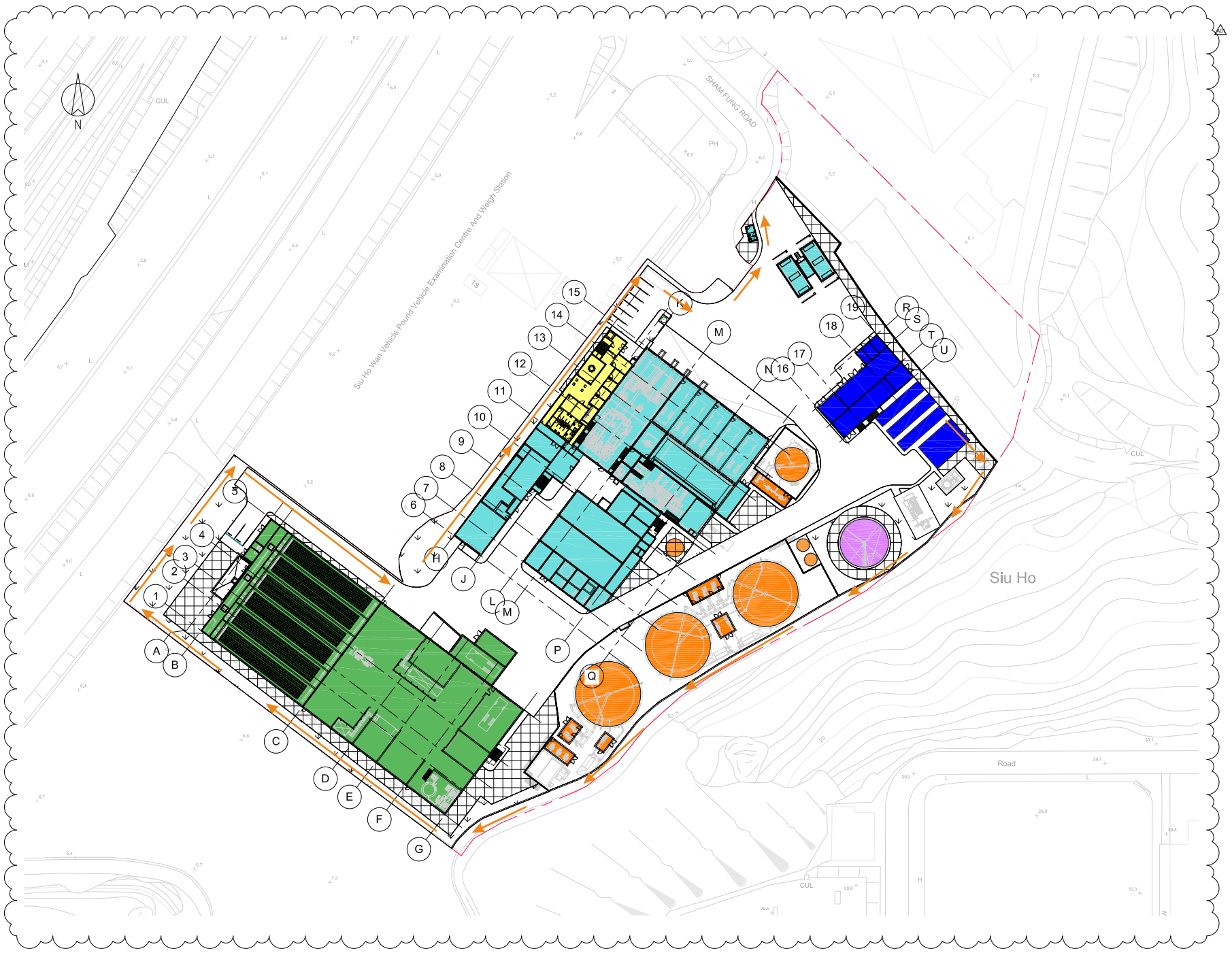
All analytes of Petrol Interceptor 1 and 2 sampling were recorded to be in compliance with discharge limits during the reporting period. Petrol Interceptor 1 sample was collected on 26 June 2024, however the laboratory report and results were still pending as at the original date of this report submission. It is now updated in the current version.

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 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.

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.

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
滙techn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

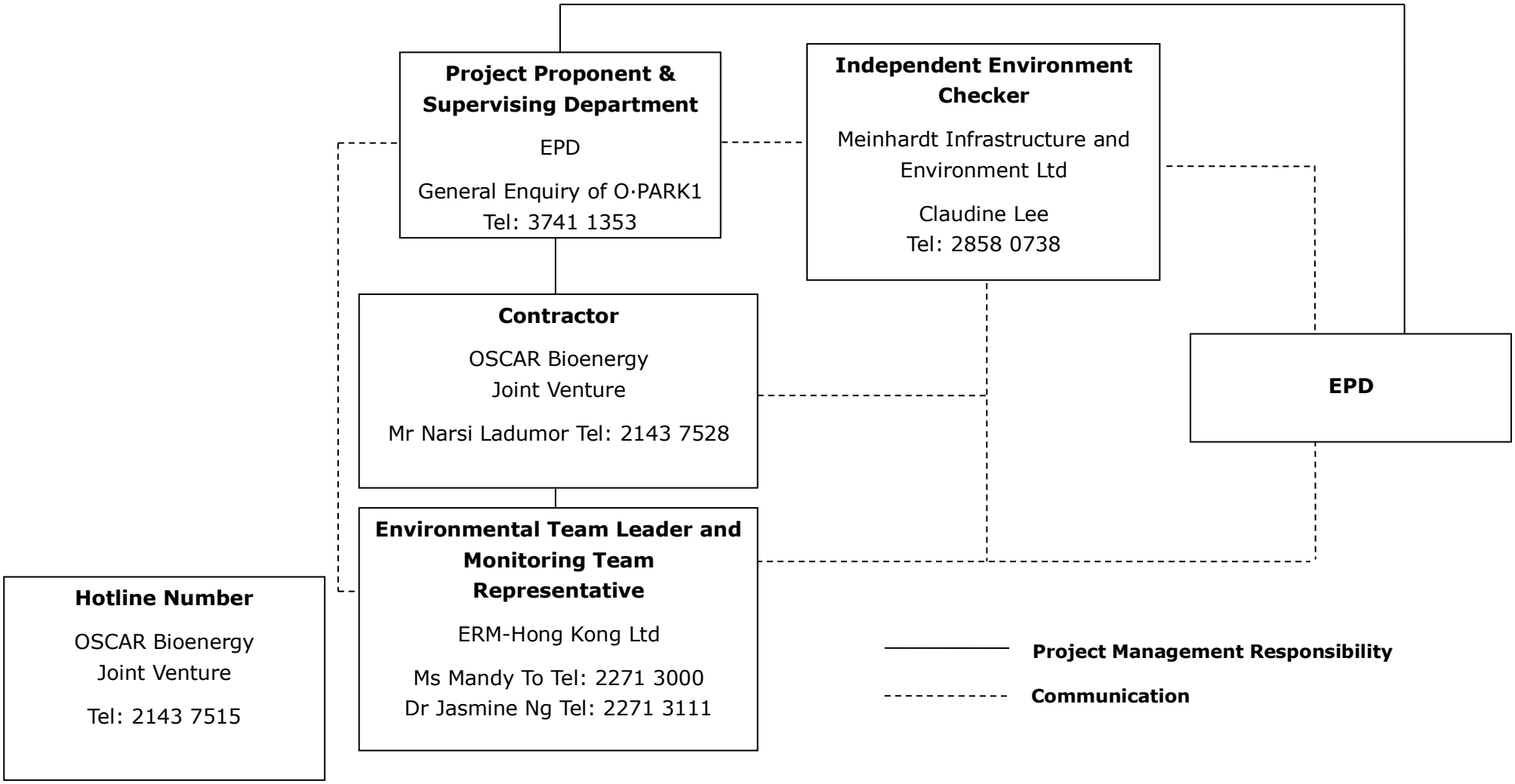
SCALE 1:500@A1 / 1:1000@A3

DATE 12/02/15

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

ANNEX B PROJECT ORGANISATION CHART WITH CONTACT DETAILS

PROJECT ORGANISATION (WITH CONTACT DETAILS)



ANNEX C IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

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	<u>Air Pollution Control (Construction Dust) Regulation & Good Site Practices</u> • 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	<u>Air Pollution Control and Stack Monitoring</u> • 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				

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
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. • 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.	Work Site / During Operation Period	√
		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	Work Site / During Design & Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		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.		
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	Work Site / During Design & Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		processes areas should be properly collected and diverted to the on-site wastewater treatment plant as described in Section 5.54.		
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 hauler 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;	During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		• 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 disposed of (including the disposal sites).		
6.51	5.13	<u>Waste Reduction Measures</u> 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	<u>Wastes Generated from Pre-Treatment Process</u> 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	Pre-Treatment Process/ During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		waste should be removed from the site on a daily basis to minimize odour, pest and litter impacts. Open burning must be strictly prohibited.		
6.53-6.56	5.15-5.18	<u>Chemical Wastes</u> • 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	<u>General Refuse</u> • 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.	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		E. Proposed Land Contamination Preventive Measures		
6.65	5.21 (i)	Fuel Oil Containers • 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)	Storage Area • Distance between the fuel oil refueling 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)	Fuel Oil Spillage Response 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. • Training 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. • Communication Establish communication channel with the Fire Services Department (FSD) and EPD to report any oil spillage incident so that necessary	Whole Site / During Operation Phase	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		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 refueling, the refueling 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	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		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. • 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	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		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.		
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 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*.	Whole Site / During Operation Period	√
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.	Fuel Oil Storage Containers /During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/Timing	Status
		• Drip trays should be provided for all containers.		
		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	√

Remarks:

√ Compliance of Mitigation Measures

<> Compliance of Mitigation but needs improvement

x Non-compliance of Mitigation Measures

▲ Non-compliance of Mitigation Measures but rectified by OSCAR Bioenergy JV

☐ Deficiency of Mitigation Measures but rectified by OSCAR Bioenergy JV

N/A Not Applicable in Reporting Period

ANNEX D WASTE FLOW TABLE

MONTHLY SUMMARY WASTE FLOW TABLE

Month	Chemical Waste	Waste Generated from Pre-treatment Process				General Refuse							
		Disposed of at Landfill [1]	Metals [2]	Paper / cardboard packaging [2]	Plastics [3]	Disposed of at Landfill [1, 4]		Metals [2]		Paper / cardboard packaging [2]		Plastics [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

Month	Chemical Waste	Waste Generated from Pre-treatment Process				General Refuse							
		Disposed of at Landfill [1]	Metals [2]	Paper / cardboard packaging [2]	Plastics [3]	Disposed of at Landfill [1, 4]		Metals [2]		Paper / cardboard packaging [2]		Plastics [3]	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
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

Month	Chemical Waste	Waste Generated from Pre-treatment Process				General Refuse							
		Disposed of at Landfill [1]	Metals [2]	Paper / cardboard packaging [2]	Plastics [3]	Disposed of at Landfill [1, 4]		Metals [2]		Paper / cardboard packaging [2]		Plastics [3]	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
March 2021	6,000	325.21	0	0	0	27	3.11	0	0	0	0	0	0
April 2021	9,700	651.29	0	0	0	22	2.53	0	0	0	0	0	0.00
May 2021	4,000	671.03	0	0	0	24	2.76	0	0	0	0	0	0.00
June 2021	0	558.72	0	0	0	25	2.88	0	0	0	0	0	0.00
July 2021	0	382.74	0	0	0	26	3.00	0	0	0	0	0	0.00
August 2021	3,420	687.05	0	0	0	26	3.00	0	0	0	0	0	0.00
September 2021	2,400	304.01	0	0	0	25	2.88	0	0	0	0	0	0.00
October 2021	0	342.38	0	0	0	23	2.65	0	0	0	0	0	0.00
November 2021	2,000	394.26	0	0	0	26	3.00	0	0	0	0	0	0.00
December 2021	0	392.44	0	0.67	0	22	2.53	0	0	0	0	0	0.00
January 2022	0	359.27	0	0	0	23	2.65	0	0	0	0	0	0.00
February 2022	0	260.57	0	0	0.00	21	2.42	0	0	0	0	0	0.00
March 2022	0	253.75	0	0	0.00	23	2.65	0	0	0	0	0	0.00

Month	Chemical Waste	Waste Generated from Pre-treatment Process				General Refuse							
		Disposed of at Landfill [1]	Metals [2]	Paper / cardboard packaging [2]	Plastics [3]	Disposed of at Landfill [1, 4]		Metals [2]		Paper / cardboard packaging [2]		Plastics [3]	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
April 2022	1,240	253.45	0	0	0.00	22	2.53	0	0	0	0	0	0.00
May 2022	0	354.94	0	0	0.00	24	2.76	0	0	0	0	0	0.00
June 2022	0	383.41	1.73	0.08	0.00	25	2.88	0	0	0	0	0	0.00
July 2022	0	430.90	4.87	1.15	0.00	24	2.76	0	0	0	0	0	0.00
August 2022	1,000	427.52	0	0	0.00	23	2.65	0	0	0	0	0	0.00
September 2022	0	476.92	0	0	0.00	21	2.419	0	0	0	0	0	0.000
October 2022	0	615.87	0	0	0.00	24	2.765	0	0	0	0	0	0.000
November 2022	0	585.38	0	0	0.00	26	2.995	1	0.020	1	0.035	1	0.020
December 2022	0	666.42	0	0	0.00	31	3.571	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	579.34	0.260	0.000	0.000	21	2.419	0	0.000	1	0.015	1	0.012

Month	Chemical Waste	Waste Generated from Pre-treatment Process				General Refuse							
		Disposed of at Landfill [1]	Metals [2]	Paper / cardboard packaging [2]	Plastics [3]	Disposed of at Landfill [1, 4]		Metals [2]		Paper / cardboard packaging [2]		Plastics [3]	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
May 2023	0	682.27	0.000	0.000	0.000	25	2.88	0	0.000	0	0.000	2	0.130
June 2023	1,000	653.92	0.000	0.040	0.000	25	2.880	1	0.015	1	0.060	1	0.035
July 2023	0	713.68	0.000	0.000	0.000	24	2.765	0	0.000	2	0.080	1	0.005
August 2023	0	677.43	0.000	0.000	0.000	27	3.110	2	0.015	2	0.090	2	0.025
September 2023	4,459	721.42	0.000	1.250	0.000	23	2.650	2	0.010	0	0.000	2	0.006
October 2023	0	919.56	0.000	0.000	0.000	23	2.650	2	0.006	2	0.022	2	0.020
November 2023	1,440	1,016.43	0.000	0.000	0.000	26	2.995	0	0.000	1	0.100	0	0.000
December 2023	0	1,006.03	0.000	0.000	0.000	24	2.765	1	0.001	2	0.009	2	0.006
January 2024	1,200	830.42	0.000	0.000	0.000	26	2.995	1	0.006	2	0.100	1	0.020
February 2024	400	901.23	0.000	0.000	0.000	22	2.534	1	0.005	2	0.090	1	0.010
March 2024	0	1,037.81	0.000	0.000	0.000	24	2.765	1	0.001	2	0.045	1	0.005
April 2024	0	946.15	0.000	0.000	0.000	20	2.304	1	0.001	2	0.030	1	0.003
May 2024	1,700	1300.62	0.000	0.000	0.000	25	2.880	0	0.000	2	0.070	2	0.007

Month	Chemical Waste	Waste Generated from Pre-treatment Process				General Refuse							
		Disposed of at Landfill [1]	Metals [2]	Paper / cardboard packaging [2]	Plastics [3]	Disposed of at Landfill [1, 4]		Metals [2]		Paper / cardboard packaging [2]		Plastics [3]	
	Litre	tonne	tonne	tonne	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne	No. of collection	tonne
June 2024	1,200	1,199.51	0.000	0.000	0.000	25	4.080	1	0.002	1	0.010	2	0.040
Total	**70,359.00**	**37,166.23**	**7.83**	**16.69**	**0.02**	**1558**	**177.92**	**18**	**0.097**	**27**	**0.865**	**27**	**0.811**

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.
5. June 2024 general refuse also includes ad-hoc disposal of 1.2 tonnes, in addition to 2.880 tonnes collected during regularly scheduled disposals, for a total of 4.080 tonnes.

ANNEX E ENVIRONMENTAL COMPLAINT, ENVIRONMENTAL SUMMONS AND PROSECUTION LOG

CUMULATIVE ENVIRONMENTAL COMPLAINT, ENVIRONMENTAL SUMMONS AND PROSECUTION 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

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
June 2016	0	0
July 2016	0	0
August 2016	0	0
September 2016	0	0
October 2016	0	0
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

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
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
July 2018	0	0
August 2018	0	0
September 2018	1	0
October 2018	0	0
November 2018	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
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

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
June 2021	0	0
July 2021	0	0
August 2021	0	0
September 2021	0	0
October 2021	0	0
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

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
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
June 2023	0	0
July 2023	0	0
August 2023	0	0
September 2023	0	0
October 2023	0	0
November 2023	0	0

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
December 2023	0	0
January 2024	0	0
February 2024	5	0
March 2024	0	0
April 2024	0	0
May 2024	1	0
June 2024	0	0
Overall Total	**7**	**0**

ANNEX F INVESTIGATION REPORT

Investigation Report of CEMS Exceedances	
Date	1 – 30 June 2024
Time	Continuous Monitoring throughout June 2024
Monitoring Location	Continuous Environmental Monitoring Systems (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHPs) and Ammonia Stripping Plant (ASP)
Exceedance Description	• Continuous monitoring was carried out at the CAPCS, CHPs, and ASP throughout the reporting period using the CEMS. According to the EM&A Manual, an 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 the CAPCS, CHPs, Standby Flare, and ASP respectively. The concentrations of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: ○ NO_x and SO_2 from CHP1; ○ NO_x from CHP2; ○ NO_x from CHP3; ○ NO_x, SO_2, and NH_3, from the ASP. • The Contractor has investigated the cause of the exceedances and identified that: • The exceedances of NO_x and SO_2 and from the CHPs; NO_x, SO_2, and NH_3 from the ASP occurred due to system instability. • Regarding the NO_x exceedances from CHP1, the Contractor has identified that the exceedances may be attributed to the frequent stopping/ starting of the system. • Regarding the NO_x exceedances from CHP2, the Contractor has identified that the exceedances may be attributed to the frequent stopping/ starting of the system. • Regarding the NO_x exceedances from CHP3, the Contractor has identified that the exceedances may be reduced by various fine-tuning measures. • Regarding the SO_2 exceedances from the CHPs, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented on 17 May 2024.

Investigation Report of CEMS Exceedances	
	• The various exceedances from the ASP can be attributed to the frequent starting and stopping of the system which has been causing unstable process conditions during operation.
Action Taken / Action to be Taken	The Contractor investigated the reason for the exceedances and arranged Remedial Works and Follow-up Actions (see below).
Remedial Works and Follow-up Actions	The Remedial Works and Follow-up Actions to be implemented by the Contractor to address the above exceedances (as well as updates on any exceedances from recent months) are detailed in the following table below.

Monitoring Location	Measures/ Actions to Address any Exceedances	Implementation Timeline & Status
Centralised Air Pollution Unit (CAPCS)	• To address the exceedances for Total Odour (ou/Nm^3) recorded in January 2024 and February 2024, the Contractor ordered a new H_2S / ORP sensor to replace the faulty one which was installed on 23 May 2024. • The cleaning of the ventilation pumps was conducted in April 2024.	• All measures have been implemented.
Cogeneration Unit 1 (CHP 1)	• To address the ongoing NO_x exceedances recorded from October 2023 – June 2024, the Contractor ordered 3 new cylinder heads from the supplier to replace the old ones and improve performance which were installed in May 2024. • To address the SO_2 exceedances recorded from October 2023 – June 2024, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • To address the HCl exceedances recorded from October 2023 – April 2024, the Contractor implemented in May 2024 fine tuning measures such as reviewing the ignition temperature curve, spark plug condition check and adjusting the intake & exhaust valves on the cylinder to reduce the fluctuations in HCl emissions and keep within the permissible limit. • A CHP expert from Europe visited the ORRC1 facility from 20-24 May to review the performance of the CHPs. • The Contractor will receive additional advanced training from the manufacturer for the operation and maintenance of the equipment.	• The new cylinder heads were installed in May 2024, and further works are ongoing. • The updated SO_2 correction factor was implemented on 17 May 2024. • The fine-tuning measures were implemented during May 2024. • The CHP expert visited in from 20-24 May 2024 and report submitted in June; Contractor will begin reviewing the report in July. • The Contractor will receive additional training in December 2024.
Cogeneration Unit 2 (CHP 2)	• To address the ongoing NO_x exceedances recorded from October 2023 – June 2024, fine tuning of CHP 2 such as reviewing the ignition temperature curve, spark plug condition check and adjusting	• The fine-tuning measures were implemented in May 2024, and further works are ongoing.

Monitoring Location	Measures/ Actions to Address any Exceedances	Implementation Timeline & Status
	the intake & exhaust valves on the cylinder was conducted to reduce the fluctuations in NO_x emissions and to keep within the permissible limit. • To address the SO_2 exceedances recorded from October 2023 – April 2024, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • To address the HCl exceedances recorded from November 2023 and April 2024, the Contractor implemented fine tuning measures such as reviewing the ignition temperature curve, spark plug condition check and adjusting the intake & exhaust valves on the cylinder to reduce the fluctuations in HCl emissions and keep within the permissible limit. • A CHP expert from Europe visited the ORRC1 facility in May 2024 to review the performance of the CHPs. • The Contractor will receive additional advanced training from the manufacturer for the operation and maintenance of the equipment.	• The updated SO_2 correction factor was implemented on 17 May 2024. • The CHP expert visited in from 20-24 May 2024 and report submitted in June; Contractor will begin reviewing the report in July. • The Contractor will receive additional training in December 2024.
Cogeneration Unit 3 (CHP 3)	• To address the ongoing NO_x exceedances, fine tuning measures of CHP 3 were implemented such as reviewing the ignition temperature curve, spark plug condition check and adjusting the intake & exhaust valves on the cylinder is being conducted to reduce the fluctuations in NO_x emissions and to keep within the permissible limit. • To address the SO_2 exceedances recorded from October 2023 – April 2024, SO_2 sampling and testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • A CHP expert from Europe visited the ORRC1 facility in May 2024 to review the performance of the CHPs. • The Contractor will receive additional advanced training from the manufacturer for the operation and maintenance of the equipment.	• The fine-tuning measures were implemented in May 2024, and further works are ongoing. • The updated SO_2 correction factor was implemented on 17 May 2024. • The CHP expert visited in from 20-24 May 2024 and report submitted in June; Contractor will begin reviewing the report in July. • The Contractor will receive additional training in December 2024.
Ammonia Stripping Plant (ASP)	• To address the ongoing NO_x exceedances recorded from October 2023 – June 2024, the Contractor conducted an overhaul of the ASP and arranged for a visit by the supplier to improve the reliability and performance of the system. • To address the ongoing SO_2 exceedances recorded from October 2023 – June 2024, SO_2 sampling and	• The overhaul of the ASP was completed 6 May 2024 • The supplier could not visit in June 2024 as planned and will be rescheduled.

Monitoring Location	Measures/ Actions to Address any Exceedances	Implementation Timeline & Status
	testing was completed by a third-party laboratory that showed lower SO_2 values than those reported by the CEMS. The lower values measured by the laboratory was attributed to methane gas interference. Based on this study, it was proposed to implement a correction factor in the CEMS to adjust for the methane gas interference. After review by MT and IEC, the correction factor was implemented in May 2024. • To address the ongoing NH_3 exceedances recorded from October 2023 – June 2024, the Contractor conducted an overhaul of the ASP and arranged for a visit by the supplier. • To address the HCl exceedances recorded from October 2023 – May 2024, the Contractor conducted an overhaul of the ASP and arranged for a visit by the supplier.	• The updated SO_2 correction factor was implemented on 17 May 2024.

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