OSCAR Bioenergy Joint Venture

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

1 June 2019 – 31 August 2019

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Meinhardt Infrastructure and Environment Limited

Organic Resources Recovery Centre, Phase I

17th Quarterly EM&A Summary Report

(1 June 2019 – 31 August 2019)

(June 2020)

Verified by: Helen Cochrane

Position: Independent Environmental Checker

Date: 30 June 2020

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Reference 0279222

For and on behalf of ERM-Hong Kong, Limited

Approved by: Frank Wan

Signed:

Position: Partner

Certified by:
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Date: 18 May 2020

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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 17th quarterly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 1 June 2019 to 31 August 2019 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.

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;

- Process fine-tune, including adjustment of the ASP with new treatment media, modification of Continuous Environmental Monitoring System (CEMS) and Supervisory Control and Data Acquisition System (SCADA) rectification and improvement works following equipment failures and the alteration of different operation modes and measures to adapt to the high variation of SSOW nature and sources; and

- Construction of the Visitor Centre.

Environmental Monitoring and Audit Progress

Air Quality Monitoring

Exceedances on Dust, NO_x, VOCs and NH_3 from ASP were recorded on the on-line monitoring system in June 2019. Exceedances on NO_x, SO_2 and VOCs (including methane) from CHP and on NO_x, SO_2 and NH_3 from ASP were recorded on the on-line monitoring system in July 2019. Exceedances on Dust (or TSP), NO_x, SO_2, HCl and HF from CHP and on Carbon Monoxide, NO_x, SO_2, VOCs (including methane) and NH_3 from ASP were recorded on the on-line monitoring system in August 2019. 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.

Exceedances in emission parameters of CHP and ASP were found to be a result of problems with the tripping of the circulation pump resulting in the incomplete desulphurisation of biogas which fed to the CHPs, continuous fine-tuning of CHP setting, incomplete desulphurisation of biogas which fed

to the CHPs, and tripping and stopping of ASP and the incomplete thermal combustion of the thermal combustion unit of the ASP.

The Contractor has implemented mitigation measures to control the exceedance (including the re-adjustment for NO_x control for CHP; continuous monitoring and routine maintenance of the desulphurisation column is carried out; and tuning the thermal combustion unit of the ASP to optimise combustion efficiency and overall performance).

The Contractor has implemented mitigation measures to control the exceedance by further fine-tuning the thermal combustion unit of the ASP to optimise combustion efficiency and overall performance.

The Contractor is recommended to closely monitor the processes, including the desulphurisation process, and combustion of biogas in the ASP to rectify any abnormal operating conditions.

Odour Patrol

Odour patrol was conducted by the independent odour patrol team of ALS Technichem (HK) Pty Ltd on 19 & 23 July 2019 and 6 August 2019. No Level 2 Odour Intensity was recorded during odour patrols.

Water Quality

No non-compliance to the effluent discharge limit stipulated in the discharge licence issued by the EPD under the *Water Pollution Control Ordinance* was recorded during this reporting period.

Waste Management

Waste generated from the construction of the Project includes inert construction and demolition (C&D) materials (public fill) and non-inert C&D materials (construction wastes).

Inert C&D materials (public fill) include bricks, concrete, building debris, rubble and excavated spoil. In total, 30.76 tonnes of inert C&D material were generated from the construction of the Project.

Non-inert C&D materials (construction wastes) from the construction of this Project include metals, paper/ cardboard packaging waste, plastics and other wastes such as general refuse. 0.00 kg of metals, 0.00 kg of papers/ cardboard packing and 0.00 kg of plastics were sent to recyclers for recycling during the reporting period. 21.18 tonnes of general refuse was disposed of at the landfill.

0.00 L of chemical waste was collected by licenced waste collector from the construction of the Project.

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

40 L of chemical waste was collected by licenced waste collector from the operation of the Project.

1,422.07 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, 0.00 kg of metals, 0.00 kg of papers/ cardboard packing and 0.00 kg of plastics were sent to recyclers for recycling during the reporting period.

Around 8.87 tonnes of general refuse from the operation of the Project was disposed of at landfill. Among the recycled general refuse from the operation of the Project, 0.00 kg of metals, 0.00 kg of papers/ cardboard packing and 0.00 kg 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 13 times
- Landscape & Visual Inspections 6 times

Weekly 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 CAPCS, CHP and ASP stacks were recorded during the reporting period.

Incidents related to the release of biogas occurred on 18 June 2019 and 25 August 2019. The incident has been resolved.

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

Future Key Issues

Activities to be undertaken in the next reporting month include:

- Operation of the Project.
- Implementation of further measures to control the air emission from the CHP and ASP.
- Continue construction of the Visitor Centre.

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 17th Quarterly EM&A report which summarises the monitoring results and audit findings for the EM&A programme during the reporting period from **1 June 2019** to **31 August 2019**.

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).

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 and treated an average of 100 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*. The site layout plan is shown in *Annex B*. The construction programme is shown in *Annex C*.

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 waste water treatment plant (about 100-130 t/d SSOW input); • Process fine-tune – adjustment of the ASP operational parameters with new treatment media, CEMS/SCADA modification and improvement work following equipment failures and the alteration of different operation modes and measures to adapt to the high variation of SSOW nature and sources; and • Construction of the Visitor Centre.

2.4 PROJECT ORGANISATION AND MANAGEMENT STRUCTURE

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

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
Notification of Construction Works under the Air Pollution Control	Ref No. 386715	Throughout the Contract	-

(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.

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
(Construction Dust) Regulation			
Effluent Discharge License	WT00024352-2016	3 June 2016 – 30 June 2021	Approved on 3 June 2016
Construction Noise Permit – P1&P2	GW-RW0538-18 (Superseded CNP GW-RW0229-18)	21 January 2019-20 July 2019	Approved on 31 December 2018
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 commissioning and operation phase of the Project are described below. No monitoring for noise, waste, land contamination, hazard-to-life and landscape and visual are required during construction and operation phases of the Project. Although water quality monitoring is not required for the construction and operation phases 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 are 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 (CHP) and the ammonia stripping plant (ASP) during the commissioning and operation phase. The calibration certificate for the on-line monitoring equipment is provided in *Annex E.*

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

Parameters	Method	Stacks to be Monitored
Hydrogen chloride (HCl)	USEPA Method 26A	• CHP • ASP
Hydrogen fluoride (HF)	USEPA Method 26A	• CHP • ASP
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/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

Parameter	Maximum Emission Level (mg/Nm^3) [(a) (b)]
(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

(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.

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.

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	
	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. 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 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; 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 construction and operation phase of the Project are recommended in the approved EIA Report and EM&A Manual and are summarised in *Annex F*. Weekly site audits for construction phase and 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. The effluent quality shall meet the discharge limits as described in *Table 3.9*.

Table 3.9 Discharge Limits for Effluent

Parameters	Discharge Limit (mg/L)
Flow Rate (m^3/day)	685
pH (pH units)	6-10 (a)
Suspended Solids	800
Biochemical Oxygen Demand (5 days, 20°)	800
Chemical Oxygen Demand	2,000
Oil & Grease	40
Total Nitrogen	200
Total Phosphorus	50
Surfactants (total)	25

Note:
(a) Range.

3.2.2 Landscape and Visual

In accordance with EM&A Manual, the landscape and visual mitigation measures shall be implemented. Bi-weekly landscape and visual audit during the construction phase is required to ensure that the design, implementation and maintenance of landscape and visual mitigation measures recommended in the approved EIA Report are fully achieved. The implementation status of the mitigation measures for construction phase is summarised in *Annex F*.

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 F*), 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 Commissioning Phase Monitoring

Monitoring results of air quality parameters from stack emissions of the centralised air pollution control system, the ammonia stripping plant and the cogeneration units will be provided once available to show compliance with the monitoring requirements stated in the EM&A Manual (Rev. E) to support the termination of the construction phase EM&A programme.

4.1.2 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, there is no need to operate the standby flare and therefore no monitoring of the flare stack was undertaken.

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, 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 – 378	680	Nil	Nil
Dust (or TSP)	0 - 2	6	Nil	Nil
Odour (including NH_3 & H_2S) [(b)]	0 – 184	220	Nil	Nil

Notes:

(a) Online monitoring was not available during the July and August 2019. Alternative monitoring method as specified in the EM&A manual was used to measure VOCs. The Contractor has arranged for replacement of the sensor immediately. The sensor is expected to be delivered near the end of September 2019.

(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]	Max. Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 11	15	Nil	Nil
Carbon Monoxide	0 – 642	650	Nil	Nil
NO_x	0 – 294	300	Nil	Nil
SO_2	0 – 50	50	Nil	Nil
NMVOCs [b]	Not Available	150	Nil	Nil
VOCs (including methane) [c]	0 – 1,267	1,500	Nil	Nil
HCl	0 – 7	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) No sampling was undertaken at CHP1 as biogas production rate could not sustain the operation of the CHP stack for the scheduled samplings.
(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.

Table 4.3 Hourly Average of Parameters Recorded for CHP 2

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a] [b]	Max. Emission Limit (mg/Nm^3)	Exceedance Identified	Remarks
Dust (or TSP)	0 – 7	15	Nil	Nil
Carbon Monoxide	0 – 543	650	Nil	Nil
NO_x	0 – 304	300	Identified [d]	Supplier had been arranged to check the performance of the CHP and maintenance will be arranged after detailed investigation.
SO_2	0 – 77	50	Identified [e]	Tripping of the desulphurisation column. Continuous monitoring to reduce the duration of tripping.
NMVOCs [b]	5.2 – 5.7	150	Nil	See *Annex G* for laboratory results
VOCs (including methane) [c]	0 – 1,539	1,500	Identified [f]	CHP setting was fine-tuned for performance optimisation.
HCl	0 – 6	10	Nil	Nil
HF	0 – 0.8	1	Nil	Nil

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.
(b) Technical issue related to monitoring range of methane sensors and the Contractor is solving the problem together with the equipment suppliers.

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

(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.
(d) One exceedance on NO_x was recorded on 15 July 2019.
(e) Two exceedances on SO_2 was recorded on 25 July 2019.
(f) One exceedances on VOC (including methane) was identified on 17 June 2019.

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 – 27	15	Identified [d]	Supplier had been arranged to check the performance of the CHP and maintenance will be arranged after detailed investigation.
Carbon Monoxide	0 – 621	650	Nil	Nil
NO_x	0 – 1,293	300	Identified [e]	Supplier had been arranged to check the performance of the CHP and maintenance will be arranged after detailed investigation.
SO_2	0 – 118	50	Identified [f]	Tripping of the desulphurisation column. Continuous monitoring to reduce the duration of tripping.
NMVOCs [b]	6.8 – 6.9	150	Nil	See *Annex G* for laboratory results
VOCs (including methane) [c]	0 – 1,727	1,500	Identified [g]	Supplier had been arranged to check the performance of the CHP and maintenance will be arranged after detailed investigation.
HCl	0 – 12	10	Identified [h]	Nil
HF	0 – 1.9	1	Identified [i]	Nil

Notes:
(a) All values refer to an oxygen content in the exhaust gas of 6% and dry basis.
(b) 2 sampling was conducted from CHP3 during the reporting period. Result from the sampling conducted on 23 July 2019 and 6 August 2019 are provided in *Annex G*.
(c) The VOCs emission limit include methane as biogas is adopted as fuel in the combustion process.
(d) One exceedance on Dust (or TSP) was recorded on 29 August 2019.
(e) Dates with exceedances on NO_x (number of exceedances on the day) were identified on 28 (1) June 2019, 5 (1), 20 (13) July 2019, 2 (2), 4 (4), 5 (1), 22 (1), 23 (7), 24 (2), 30 (2) and 31 (1) August 2019.
(f) Dates with exceedances on SO_2 (number of exceedances on the day) were identified on 25 (9), 26 (13) July 2019, 6 (4), 22 (2), 30 (4) and 31 (18) August 2019.

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [a]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks
(g) One exceedance on VOCs (including methane) was recorded on 24 July 2019.				
(h) One exceedance on HCl was recorded on 30 August2019.				
(i) One exceedance on HF was recorded on 30 August 2019.				

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 – 5.7	5	Identified [c]	Ongoing optimisation of ASP combustion efficiency has been carried out.
Carbon Monoxide	0 – 110	100	Identified [d]	Modification of the ASP is being arranged with the supplier. The supplier will be on-site to complete the modification and review the ASP operation.
NOx	0 – 703	200	Identified [e]	Ongoing optimisation of ASP combustion efficiency has been carried out.
SO_2	0 – 65	50	Identified [f]	Tripping of the desulphurisation column. Continuous monitoring to reduce the duration of tripping.
VOCs (including methane) [b]	0 – 3,195	20	Identified [g]	Ongoing optimisation of ASP combustion efficiency has been carried out.
NH_3	0 – 1,016	35	Identified [h]	Ongoing optimisation of ASP combustion efficiency has been carried out.
HCl	0 – 9	10	Nil	Nil
HF	0 – 1.0	1	Nil	Nil

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 Dust (number of exceedances on the day) were identified on 10 (1), 25 (14) and 26 (2) June 2019.

(d) 1 exceedance on CO (number of exceedances on the day) was identified on 20 August 2019.

(e) Dates with exceedances on NO_x (number of exceedances on the day) were identified on 2 (2), 5 (2), 6 (2), 12 (9), 13 (1), 14 (3), 15 (2), 20 (3), 21 (1), 24 (1), 25 (1) and 26 (1) June 2019, 3 (7), 4 (2), 6 (4), 14 (2), 15 (3) and 23 (3) July 2019, 1 (1), 2 (4), 3 (3), 4 (9), 5 (3), 6 (12), 7 (7), 8 (1), 11 (6), 16 (2) and 20 (1) August 2019.

(f) Dates with exceedances on SO_2 (number of exceedances on the day) were identified on 25 (2) July 2019, 6 (1) and 20 (2) August 2019.

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

(g) Dates with exceedances on VOCs (including methane) (number of exceedances on the day) were identified on 4 (1), 7 (1), 14 (1), 20 (2), 21 (4) and 29 (1) June 2019, 6 (3), 8 (2) and 20 (4) August 2019.

(h) Dates with exceedances on NH_3 (number of exceedances on the day) were identified on 2 (9), 5 (7), 6 (11), 9 (3), 10 (5), 11 (4), 12 (11), 13 (1), 14 (12), 15 (4), 17 (1), 20 (9), 24 (3), 25 (4), 26 (12) and 27 (1) June 2019, 2 (4), 3 (10), 4 (11), 6 (6), 15 (2), 16 (9), 17 (1) and 25 (3) July 2019, 5 (11), 6 (8), 8 (3), 9 (5), 10 (16), 11 (9), 13 (12), 16 (2) and 20 (2) August 2019.

4.2 ODOUR

4.2.1 Commissioning Phase Monitoring

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

4.2.2 Operation Phase Monitoring

Odour patrol was conducted by the independent odour patrol team of ALS Technichem (HK) Pty Ltd on 19 & 23 July 2019 and 6 August 2019. According to the EM&A Manual and EP requirements, it is considered an exceedance if the odour intensity recorded by the panellists is Level 2 or above. During this reporting period, no Level 2 Odour Intensity was recorded. The odour patrol result is shown in *Annex K*.

4.3 WATER QUALITY

4.3.1 Construction Phase Monitoring

No effluent was discharged from the construction activity in the reporting month, hence it was not necessary to carry out effluent discharge sampling for this reporting period.

4.3.2 Operation Phase Monitoring

Effluent discharge was sampled monthly from the Effluent Storage Tank as stipulated in the operation phase discharge licence. The results of the discharge sample is recorded in *Table 4.6* to *4.8*.

Table 4.6 Results of the Discharge Sample Collected on 27 June 2019

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
pH (pH units)	7.06 – 8.70	6-10 [a]	Yes
Suspended Solids	49	800	Yes
Biochemical Oxygen Demand (5 days, 20°)	12	800	Yes
Chemical Oxygen Demand	474	2,000	Yes
Oil & Grease	<5	40	Yes

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Total Nitrogen	155	200	Yes
Total Phosphorus	20.7	50	Yes
Surfactants (total)	<1.0	25	Yes

Notes:
(a) Daily Average.

Table 4.7 Results of the Discharge Sample Collected on 3 July 2019

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
pH (pH units)	7.41 – 8.01	6-10 (a)	Yes
Suspended Solids	240	800	Yes
Biochemical Oxygen Demand (5 days, 20°)	78	800	Yes
Chemical Oxygen Demand	754	2,000	Yes
Oil & Grease	<5	40	Yes
Total Nitrogen	157	200	Yes
Total Phosphorus	27.6	50	Yes
Surfactants (total)	3.1	25	Yes

Notes:
(a) Daily Average.

Table 4.8 Results of the Discharge Sample on 24 August 2019

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
pH (pH units)	6.05 – 9.51	6-10 (a)	Yes
Suspended Solids	201	800	Yes
Biochemical Oxygen Demand (5 days, 20°)	111	800	Yes
Chemical Oxygen Demand	816	2,000	Yes
Oil & Grease	<5	40	Yes
Total Nitrogen	49.4	200	Yes
Total Phosphorus	24.4	50	Yes
Surfactants (total)	<1.0	25	Yes

Notes:
(a) Daily Average.

No exceedance of discharge limit was recorded during the reporting period.

4.4 WASTE MANAGEMENT

4.4.1 Construction Phase Monitoring

Wastes generated from this Project include inert construction and demolition (C&D) materials (public fill) and non-inert C&D materials (construction waste). Construction waste comprises general refuse, metals and

paper/cardboard packaging materials. Metals generated from the construction of the Project are also grouped into construction waste as the materials were not disposed of with others at public fill. Reference has been made to the Monthly Summary Waste Flow Table prepared by the Contractor (see *Annex H*). With reference to the relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in *Table 4.9*.

Table 4.9 Quantities of Waste Generated from the Construction of the Project

Month / Year	Quantity			
	Total Inert C&D Materials Generated [a]	Non-inert C&D Materials [b]		
		C&D Materials Recycled [c]	C&D Waste Disposed of at Landfill [d]	Chemical Waste
June 2019	0.00 tonnes	0.00 kg	11.45 tonnes	0.00 L
July 2019	15.57 tonnes	0.00 kg	0.00 tonnes	0.00 L
August 2019	15.19 tonnes	0.00 kg	9.73 tonnes	0.00 L

Notes:

(a) Inert C&D materials (public fill) include bricks, concrete, building debris, rubble and excavated spoil. In total, 30.76 tonnes of inert C&D material were generated from the Project. The detailed waste flow is presented in *Annex H*.

(b) Non-inert C&D materials (construction wastes) include metals, paper / cardboard packaging waste, plastics and other wastes such as general refuse. Metals generated from the Project were grouped into construction wastes as the materials were not disposed of with others at the public fill.

(c) 0.00 kg of metals, 0.00 kg of papers/ cardboard packing and 0.00 kg of plastics were sent to recyclers for recycling during the reporting period.

(d) Construction wastes other than metals, paper/cardboard packaging, plastics and chemicals were disposed of at NENT Landfill by subcontractors.

4.4.2 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 Table prepared by the Contractor (see *Annex H*). 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*.

(1) 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	
	Disposal of at CWTC	Disposed of at Landfill [a]	Recycled [b]	Disposed of at Landfill [a] [d]	Recycled [c]
June 2019	0 L	459.23 tonnes	0.00 tonnes	2.76 tonnes [d]	0 kg
July 2019	0 L	521.79 tonnes	0.00 tonnes	3.00 tonnes [d]	0 kg
August 2019	40 L	441.05 tonnes	0.00 tonnes	3.11 tonnes [d]	0 kg

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, 0.00 kg of metals, 0.00 kg of papers/ cardboard packing and 0.00 kg of plastics were sent to recyclers for recycling during the reporting period.

(c) Among general refuse, 0.00 kg of metals, 0.00 kg of papers/ cardboard packing and 0 kg of plastics were sent to recyclers for recycling during the reporting period.

(d) 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 SITE AUDIT

5.1 ENVIRONMENTAL SITE AUDIT

5.1.1 Construction Phase

Ten construction phase site inspections were conducted during the reporting period. 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 F*).

Follow-up actions resulting from 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.

June 2019

Joint site inspections were conducted by representatives of the Contractor and the ET on 5, 14, 21 and 28 June 2019 as required for the construction of the Project. The IEC was present at the joint inspection on 28 June 2019.

July 2019

Joint site inspections were conducted by representatives of the Contractor and the ET on 3, 10, 18, 26 and 31 July 2019 as required for the construction of the Project. The IEC was present at the joint inspection on 26 July 2019.

August 2019

Joint site inspections were conducted by representatives of the Contractor and the ET on 9, 14, 21 and 29 August 2019 as required for the construction of the Project. The IEC and ER were present at the joint inspection on 14 August 2019.

5.1.2 Operation Phase

The monthly inspections of the landscape and visual mitigation measures for 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 F*).

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.

June 2019

The monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project on 28 June 2019 covered the operation phase environmental site audit. Joint site inspections was conducted by

representatives of the Contractor, IEC and the MT on 28 June 2019 as required for the operation of the Project.

July 2019

The monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project on 26 July 2019 covered the operation phase environmental site audit. Joint site inspections was conducted by representatives of the Contractor, ER, IEC and the MT on 26 July 2019 as required for the operation of the Project.

August 2019

The monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project on 14 August 2019 covered the operation phase environmental site audit. Joint site inspections was conducted by representatives of the Contractor, ER, IEC and the MT on 14 August 2019 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 construction and operation phase as summarised in *Annex F* 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.

June 2019

Inspection of the landscape and visual mitigation measures for the construction phase of the Project was performed on 14 and 28 June 2019. Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 28 June 2019.

July 2019

Inspection of the landscape and visual mitigation measures for the construction phase of the Project was performed on 10 and 26 July 2019. Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 26 July 2019.

August 2019

Inspection of the landscape and visual mitigation measures for the construction phase of the Project was performed on 14 and 29 August 2019. Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 14 August 2019.

6 ENVIRONMENTAL NON-CONFORMANCE

6.1 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

June 2019

Non-compliance of emission limits for CHP and 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 air pollution control systems combustion system for the CHP and the ASP and identified several potential causes for the exceedance. Remedial and follow-up actions had been completed by the Contractor. The Investigation Report is show in *Annex J*.

The Contractor reported that an incident related to the release of biogas occurred on 24 June 2019. The investigation report and the extract of the incident report provided by the Contractor are presented in *Annex J*.

July 2019

Non-compliance of emission limits for CHP and 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 air pollution control systems combustion system for the CHP and the ASP and identified several potential causes for the exceedance. Remedial and follow-up actions had been completed by the Contractor. The Investigation Report is show in *Annex J*.

August 2019

Non-compliance of emission limits for CHP and 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 air pollution control systems of the CHP and ASP and the combustion system for the CHP and the ASP and identified several potential causes for the exceedance. Remedial and follow-up actions had been completed by the Contractor. The Investigation Report is show in *Annex J*.

The Contractor reported that an incident related to the release of biogas occurred on 25 August 2019. The investigation report and the extract of the incident report provided by the Contractor are presented in *Annex J*.

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 I*.

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.
- Implementation of measures to further rectify the abnormal operating conditions for the CHP and ASP.
- Continue construction of the Visitor Centre.
- Visitor Centre BS works (MVAC, FS, P/D).

This EM&A Report presents the EM&A programme undertaken during the reporting period from **1 June 2019** to **31 August 2019** in accordance with EM&A Manual (Version E) and requirements of EP (FEP-01/395/2010/C).

No air quality, noise and water quality monitoring is required under the construction and commissioning EM&A requirements.

For the operation phase, exceedances of the emission limits for stack monitoring (including 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
Cogeneration Unit (CHP)	• Exceeded emission limit of Dust (or TSP) on 29 August 2019 • Exceeded emission limit of NO_x on 28 June 2019, 5, 20 and 15 July 2019, 2, 4, 5, 22, 23, 24, 30 and 31 August 2019 • Exceeded emission limit of SO_2 on 25 and 26 July 2019, 6, 22, 30 and 31 August 2019 • Exceeded emission limit of VOCs (including methane) on 17 June 2019, 24 July 2019 • Exceeded emission limit of HCl on 30 August 2019 • Exceeded emission limit of HF on 30 August 2019
Ammonia Stripping Plant (ASP)	• Exceeded emission limit of Dust on 10, 25 and 26 June 2019 • Exceeded emission limit of CO on 20 August 2019 • Exceeded emission limit of NO_x on 2, 5, 6, 12, 13, 14, 15, 20, 21, 24, 25 and 26 June 2019, 3, 4, 6, 14, 15 and 23 July 2019, 1, 2, 3, 4, 5, 6, 7, 8, 11, 16 and 20 August 2019 • Exceeded emission limit of SO_2 on 25 July 2019, 6 and 20 August 2019 • Exceeded emission limit of VOCs on 4, 7, 14, 20, 21 and 29 June 2019, 6, 8 and 20 August 2019 • Exceeded emission limit of NH_3 on 2, 5, 6, 9 to 15, 17, 20 and 24 to 27 June 2019, 2, 3, 4, 6, 15, 16, 17 and 25 July 2019, 5, 6, 8, 9, 10, 11, 13, 16 and 20 August 2019

Exceedances in emission parameters of CHP and ASP were found to be a result of problems with the incomplete desulphurisation of biogas which fed to the CHPs, and the incomplete thermal combustion of the thermal combustion unit of the ASP.

The Contractor has implemented mitigation measures to control the exceedance (including the adding additional activated carbon filters to the biogas desulphurisation system to control the H_2S level in the biogas which fed to the CHP and the ASP; and tuning the thermal combustion unit of the ASP to optimise combustion efficiency and overall performance).

Odour patrol was conducted in accordance to the EM&A requirements. No exceedance of odour intensity limit for the odour patrol.

No non-compliance to the effluent discharge limit was recorded during this reporting period.

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.

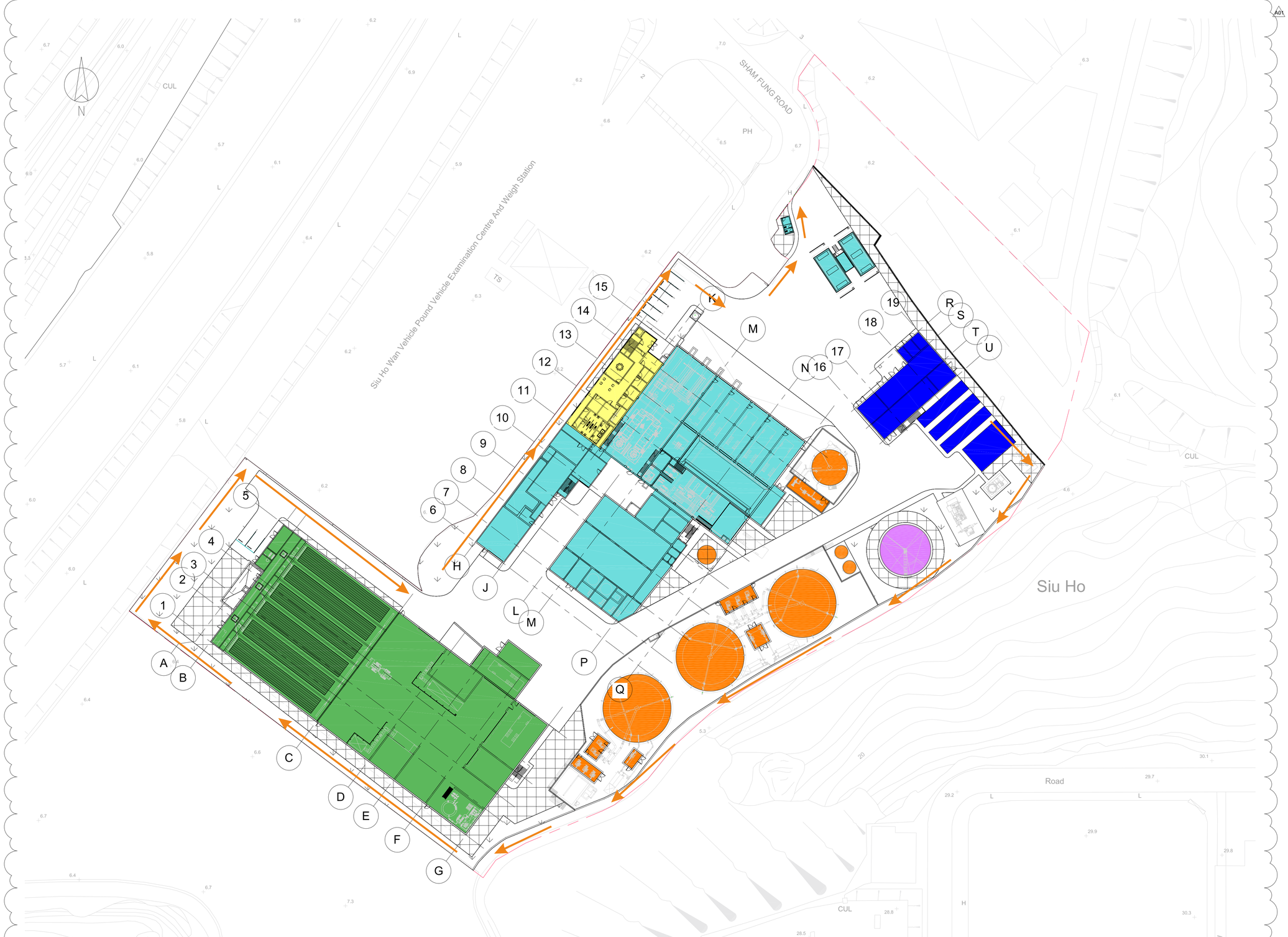
Bi-weekly landscape and visual monitoring were conducted in the reporting period. The necessary landscape and visual mitigation measures recommended in the approved EIA Report were generally implemented by the Contractor.

Incidents related to the release of biogas occurred on 18 June 2019 and 25 August 2019. The incidents have been resolved.

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.
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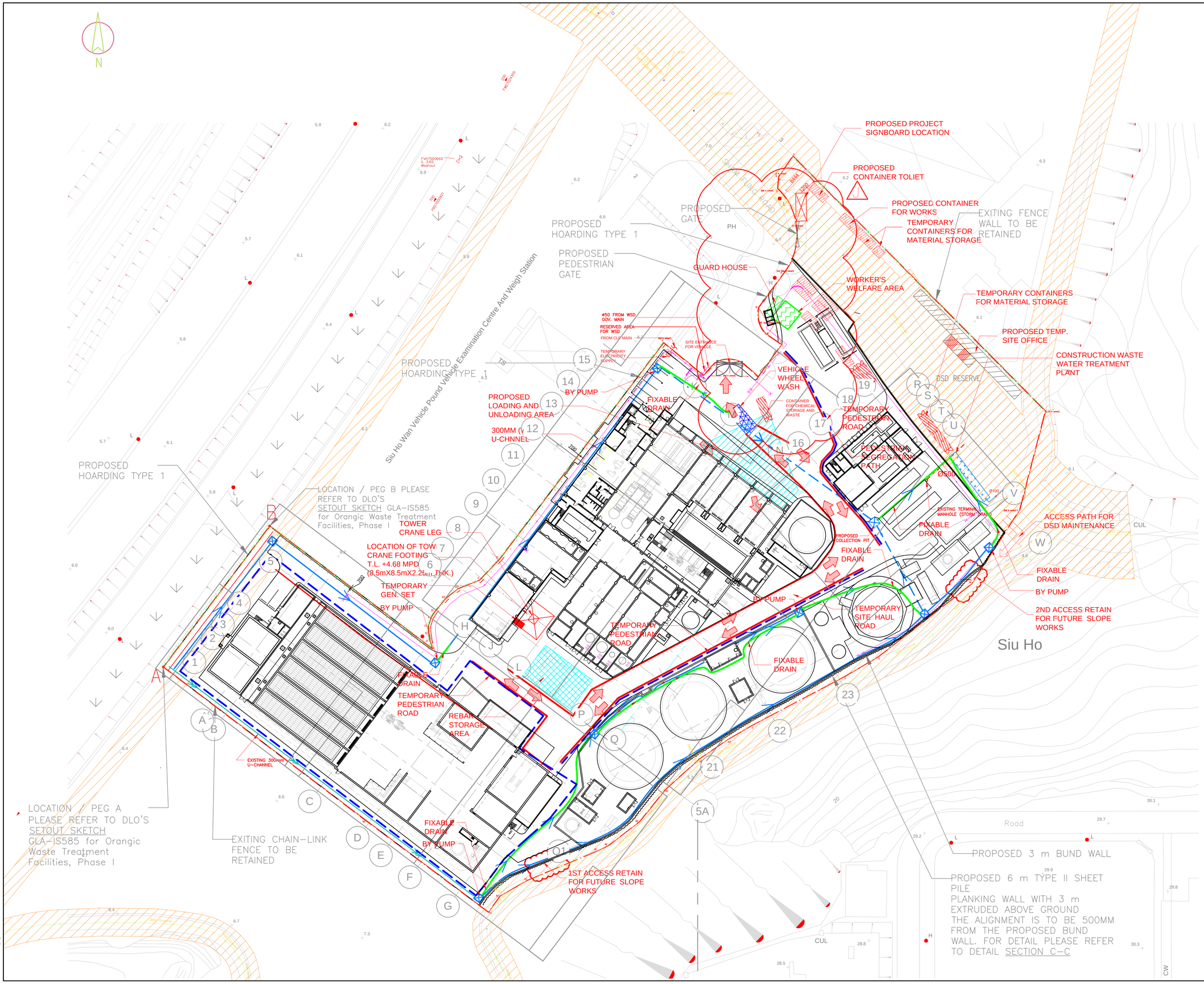
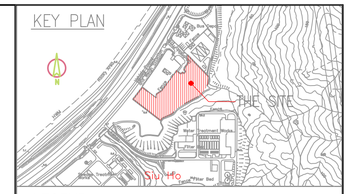
0279222v.cdr

Annex B

Works Location



KEY PLAN



LEGEND

- SITE BOUNDARY
- PROPOSED HOARDING TYPE 1
- EXISTING CHAIN-LINK FENCE
- PROPOSED 6 m TYPE II SHEET PILE PLANKING WALL WITH 3 m EXTRUDED ABOVE GROUND
- EXISTING FENCE WALL
- DISCHARGE DRAINAGE
- 300mm(W) PROPOSED TEMP. CHANNEL
- 300mm(W) EXISTING U-CHANNEL
- 50/75mm FLEXIBLE DRAIN
- PROPOSED TEMP. CATCH PIT
- PORTABLE WATER PIPE
- TRAFFIC DIRECTION
- REBAR STORAGE AREA AND BENDING YARD
- GENERAL MATERIAL STORAGE AREA
- C & D MATERIAL STORAGE AREA
- VEHICLE WHEEL WASH
- WATER TREATMENT PLANT

REV	DATE	BY	APP	DESCRIPTION
J	01 SEP 2016	LL	JC	REVISED LAYOUT
I	27 APR 2016	LL	JC	REVISED LAYOUT
H	30 DEC 2015	LL	JC	REVISED LAYOUT
G	30 MAY 2015	LL	CL	REVISED LAYOUT

CLIENT

ENVIRONMENTAL PROTECTION DEPARTMENT
GOVERNMENT OF THE HKSAR

CLIENT'S CONSULTANT

AECOM
AECOM ASIA CO. LTD.

CONTRACTOR

SUEZ ATAL RosRoca
OSCAR Bioenergy Joint Venture

LEAD DESIGNER

ARUP
Ove Arup & Partners Hong Kong Limited

ENVIRONMENTAL TEAM

ERM
ERM HONG KONG LIMITED

INDEPENDENT CONSULTANTS

MEINHARDT
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 I
EP/SP/61/10

STATUS

ISSUED FOR COMMENT

DRAWING TITLE

GENERAL SITE LAYOUT PLAN AT PORTION 1

DRAWN	CHECKED	APPROVED
LL	JC	JC

SCALE	DATE
1:500@A1; 1:1000@A3	01 SEP 2016

JOB NO.	DRAWING NO.	REV.
P00424	DR-PSC-00-0-CN-1002	J

Plot by : LeoLAM
Plot Time : 9/1/2016 7:26:29 PM

DR-PSC-00-0-CN-1002

Annex C

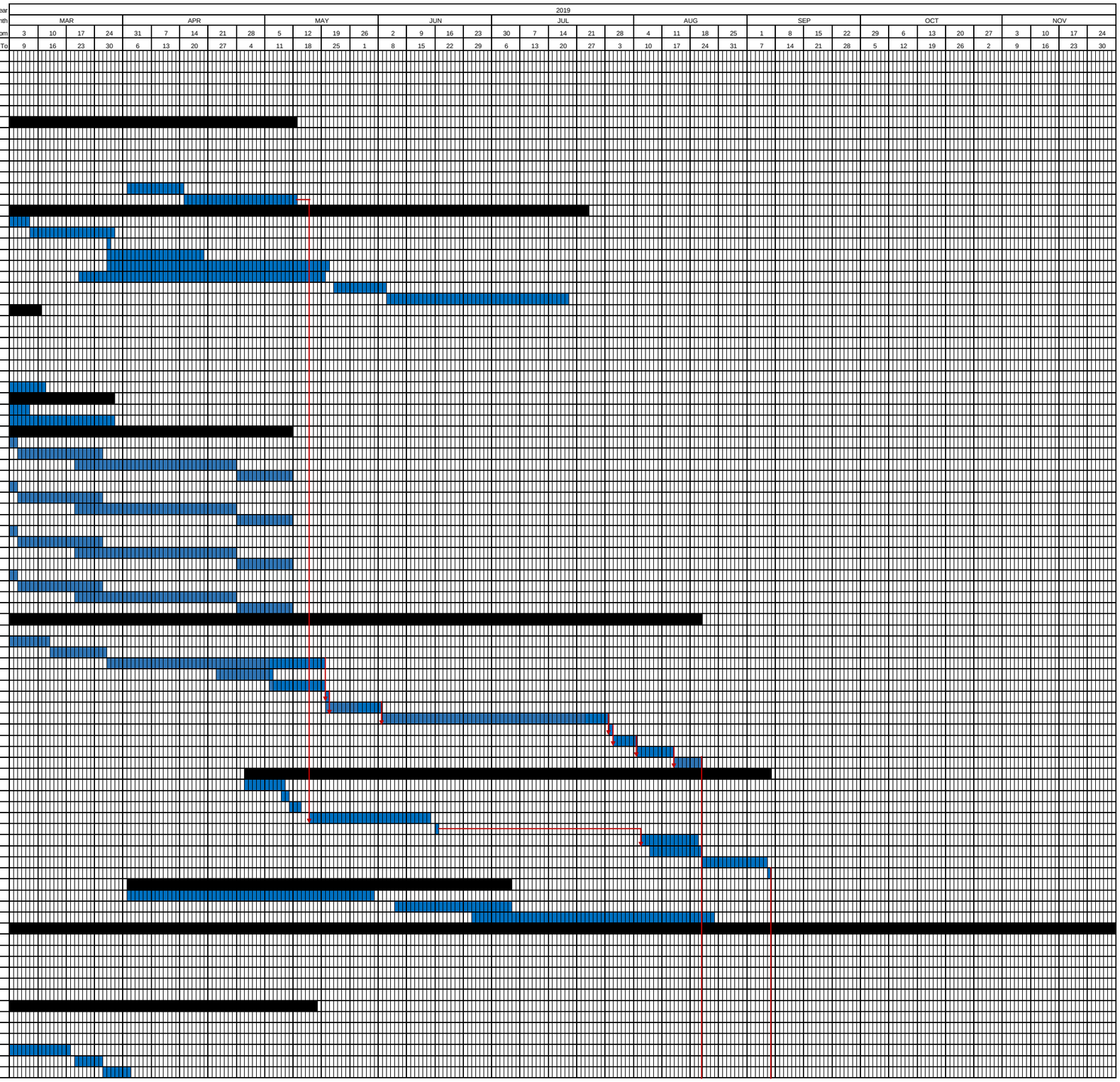
Construction Programme of the Project

Organic Resources Recovery Centre Phase 1

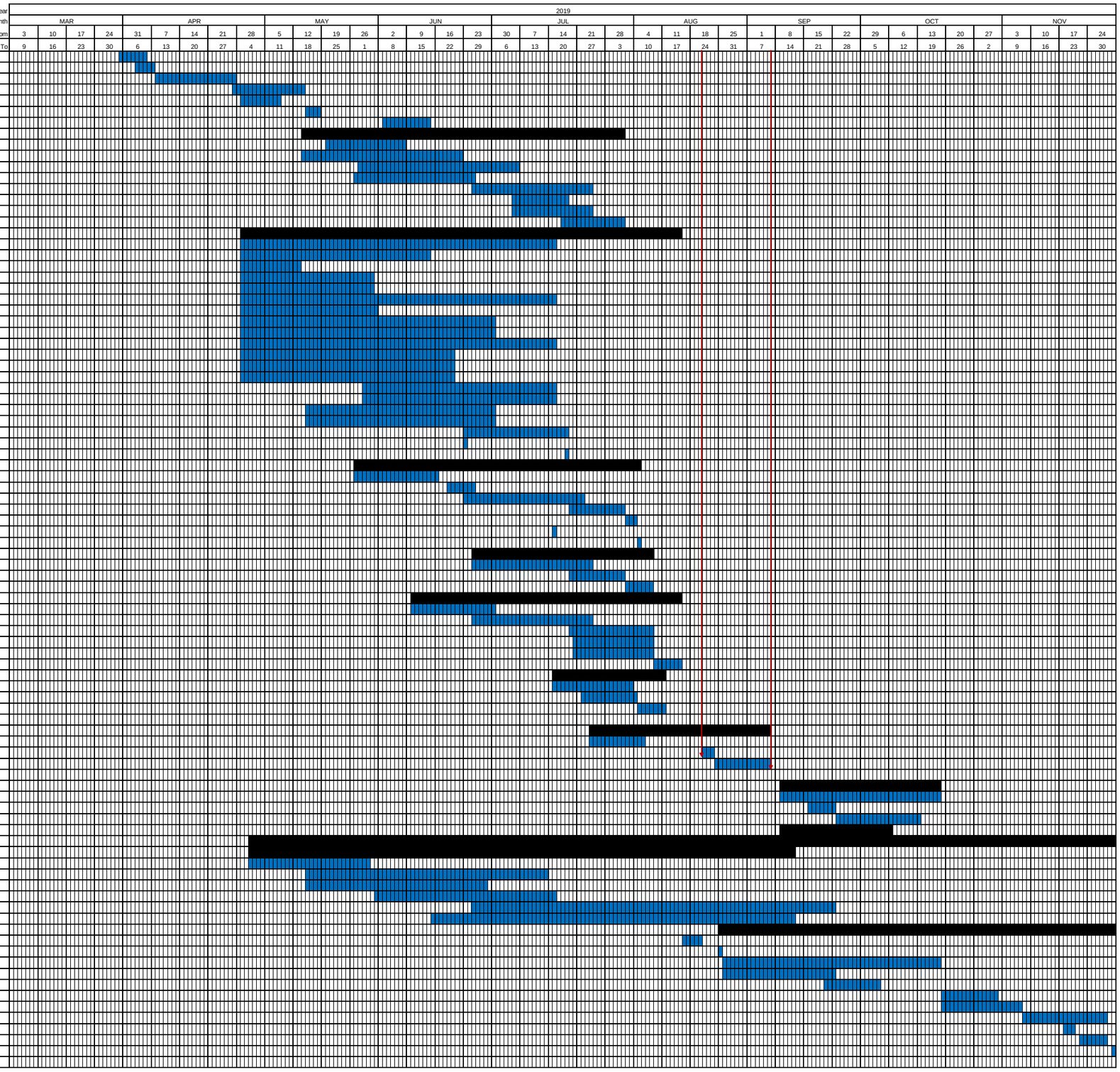
Work Programme for Visitor Centre

Updated: 10/5/2019

ID	Task Name	Contractor's Programme		
		Duration (D)	Start	Finish
1	**Organic Resources Recovery Centre (Phase 1), Visitor Centre**	**557**	**23/5/2018**	**30/11/2019**
2				
3	Employer Change No. 20 - Design & Construction of Visitor Centre	1	23/5/2018	23/5/2018
4	Design Feasibility Study of adding separate access for visiotrs to VC	67	12/6/2018	17/8/2018
5				
6	**DESIGN & SUBMISSION**			
7	**GBP Submission**	**268**	**18/8/2018**	**12/5/2019**
8	Preparation of GBP submission	67	18/8/2018	23/10/2018
9	Vetting by OSCAR / ER	7	24/10/2018	30/10/2018
10	Final revision and preparation of offical submission to FSD	3	31/10/2018	2/11/2018
11	Offical GBP submission to FSD	1	2/11/2018	2/11/2018
12	FSD approval period	45	3/11/2018	17/12/2018
13	GBP Amendment submission to FSD	14	1/4/2019	14/4/2019
14	FSD approval period	28	15/4/2019	12/5/2019
15	**Architectural Design Submission**	**267**	**25/10/2018**	**18/7/2019**
16	Detailed architectural design preparation and submission	134	25/10/2018	7/3/2019
17	Vetting by OSCAR/IC/ER	21	8/3/2019	28/3/2019
18	Submission of façade design	1	27/3/2019	27/3/2019
19	EPD confirmation of façade design (internal layer)	24	27/3/2019	19/4/2019
20	EPD confirmation of façade design (external layer) & G/F outer skin	55	27/3/2019	20/5/2019
21	Detailed design of facade cladding (internal layer)	30	20/4/2019	19/5/2019
22	Preparation of offical submission to ArchSD	14	21/5/2019	3/6/2019
23	ArchSD's approval period	45	4/6/2019	18/7/2019
24	**Structural - Superstructure Design Submission**	**155**	**8/10/2018**	**11/3/2019**
25	Site Survey	7	8/10/2018	14/10/2018
26	Detail foundation design preparation and submission	61	15/10/2018	14/12/2018
27	IC vetting and comment	7	15/12/2018	21/12/2018
28	OSCAR revision and re-submission	10	22/12/2018	31/12/2018
29	IC vetting and further comment	18	1/1/2019	18/1/2019
30	OSCAR revision and re-submission	12	19/1/2019	30/1/2019
31	Vetting and approval by OSCAR/IC/ER	40	31/1/2019	11/3/2019
32	**Structural - Superstructure Design Submission**	**155**	**25/10/2018**	**28/3/2019**
33	Detail superstructure design preparation and submission	134	25/10/2018	7/3/2019
34	Vetting by OSCAR/IC/ER	21	8/3/2019	28/3/2019
35	**Building Services Design Submission**	**188**	**5/11/2018**	**11/5/2019**
36	Electrical installation design preparation and submission	120	5/11/2018	4/3/2019
37	Electrical installation design - IC/ ER vetting and comment	21	5/3/2019	25/3/2019
38	Electrical installation design - OSCAR reivse & re-submit	40	19/3/2019	27/4/2019
39	Electrical installation design IC/ER vetting and approval	14	28/4/2019	11/5/2019
40	Fire services installation design preparation and submission	120	5/11/2018	4/3/2019
41	Fire services installation design - IC/ ER vetting and comment	21	5/3/2019	25/3/2019
42	Fire services installation design - OSCAR reivse & re-submit	40	19/3/2019	27/4/2019
43	Fire services installation design - IC/ER vetting and approval	14	28/4/2019	11/5/2019
44	MVAC installation design preparation and submission	120	5/11/2018	4/3/2019
45	MVAC installation design - IC/ ER vetting and comment	21	5/3/2019	25/3/2019
46	MVAC installation design - OSCAR reivse & re-submit	40	19/3/2019	27/4/2019
47	MVAC installation design - IC/ER vetting and approval	14	28/4/2019	11/5/2019
48	Drainage installation design - preparation and submission	120	5/11/2018	4/3/2019
49	Drainage installation design - IC/ ER vetting and comment	21	5/3/2019	25/3/2019
50	Drainage installation design - OSCAR reivse & re-submit	40	19/3/2019	27/4/2019
51	Drainage installation design - IC/ER vetting and approval	14	28/4/2019	11/5/2019
52	**WSD Statutory Submission**	**231**	**2/1/2019**	**20/8/2019**
53	WWO542 (FS Water) preparation and submission	30	2/1/2019	31/1/2019
54	WSD comment on WWO542 submission	40	1/2/2019	12/3/2019
55	WWO542 (FS Water) revision and re-submission	14	13/3/2019	26/3/2019
56	WSD approval on WWO542	54	27/3/2019	19/5/2019
57	Prepare WW046 Part I & II	14	23/4/2019	6/5/2019
58	OSCAR/ ER review WW046 Part I & II document	14	6/5/2019	19/5/2019
59	Submission of WW046 Part I & II	1	20/5/2019	20/5/2019
60	Issurance of WW046 Part III by WSD	14	20/5/2019	2/6/2019
61	FS Installation work (Water Side)	56	3/6/2019	28/7/2019
62	Submit WW046 Part IV	1	29/7/2019	29/7/2019
63	Liaison with WSD for minor amendment, if needed	6	30/7/2019	4/8/2019
64	WSD inspection on FS water	9	5/8/2019	13/8/2019
65	Issurance of Part V (Water Certificate)	7	14/8/2019	20/8/2019
66	**FSD VAC Submission**	**131**	**29/4/2019**	**6/9/2019**
67	FS VAC preparation	11	29/4/2019	9/5/2019
68	OSCAR/ER review and comment	2	9/5/2019	10/5/2019
69	FS VAC revision	3	11/5/2019	13/5/2019
70	FS VAC formal submission to FSD	30	16/5/2019	14/6/2019
71	Issurance of acceptance letter (VAC)	1	16/6/2019	16/6/2019
72	Submission of FS 314 and FS 501 for VAC system to FSD	14	6/8/2019	19/8/2019
73	FSI Rehersal for VAC	13	8/8/2019	20/8/2019
74	FS inspection for VAC	16	21/8/2019	5/9/2019
75	FSD Issurance of acceptance letter (VAC)	1	6/9/2019	6/9/2019
76	**Off-site Fabrication and Delivery to Site**	**95**	**1/4/2019**	**4/7/2019**
77	Strutural steel frame	60	1/4/2019	30/5/2019
78	Roof and façade cladding (internal layer)	60	6/5/2019	4/7/2019
79	Façade cladding (external layer) & G/F outer skin	60	25/6/2019	23/8/2019
80	**ON-SITE CONSTRUCTION**	**363**	**3/12/2018**	**30/11/2019**
81	**Site Preparation and U/G Servoces Diversion**	**19**	**3/12/2018**	**21/12/2018**
82	Site Take Over	1	3/12/2018	3/12/2018
83	Set up temporary office & electricity	10	3/12/2018	12/12/2018
84	Hoarding erection	10	3/12/2018	12/12/2018
85	Surveying and Setting Out	10	3/12/2018	12/12/2018
86	U/G utilities detection / site vertification	14	8/12/2018	21/12/2018
87	**Foundation Works (Piling ELS and Pile Caps)**	**183**	**14/12/2018**	**14/6/2019**
88	Pre-drilling boreholes	13	14/12/2018	26/12/2018
89	Material procurement and delivery of Pile material	30	22/12/2018	20/1/2019
90	Mobilization of piling plant and set up on site	7	10/1/2019	16/1/2019
91	Installation of working pile	56	21/1/2019	17/3/2019
92	Proof-drilling boreholes	7	19/3/2019	25/3/2019
93	Moblization & set-up for loading test	7	26/3/2019	1/4/2019



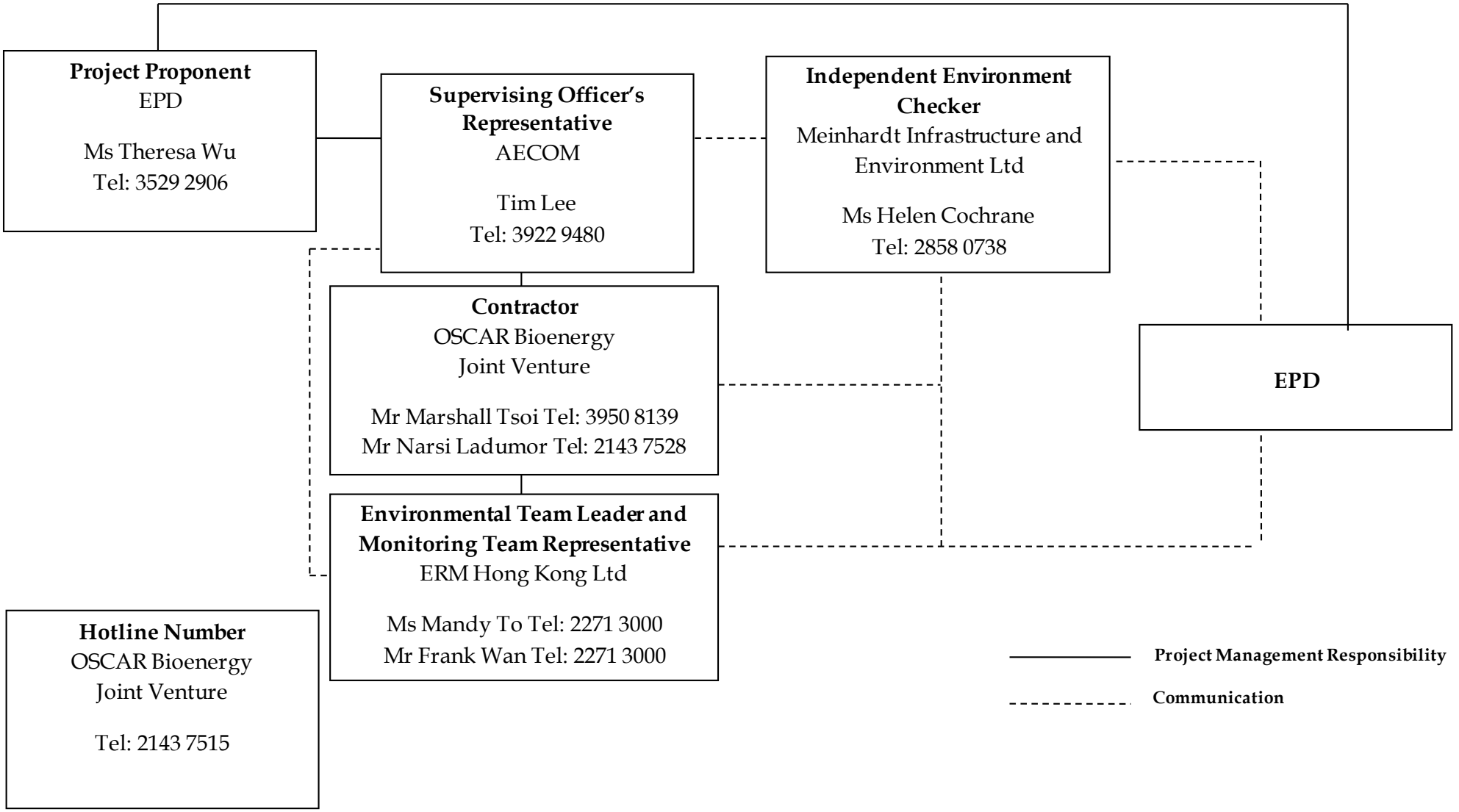
ID	Task Name	Contractor's Programme		
		Duration (D)	Start	Finish
94	Temporary covered walkway to B1	7	30/3/2019	5/4/2019
95	Loading test, demoblization and submit preliminary report	5	3/4/2019	7/4/2019
96	ELS works for pile cap	20	8/4/2019	27/4/2019
97	Construct pile cap, tie beam & pier wall	18	27/4/2019	14/5/2019
98	Submission of Pile Record	10	29/4/2019	8/5/2019
99	Back filling to formation level & contruct on-grade slab	4	15/5/2019	18/5/2019
100	Diversion of U/G Portable Water Pipe	12	3/6/2019	14/6/2019
101	**Superstructure Works**	**80**	**14/5/2019**	**1/8/2019**
102	Construct site wide U/G drainage & cable pit	20	20/5/2019	8/6/2019
103	Erection of Structural Steel Frame	40	14/5/2019	22/6/2019
104	Construct RC structure & RC deck	40	28/5/2019	6/7/2019
105	Closure of B1 lift lobby for building breakthrough and link bridge connection	30	27/5/2019	25/6/2019
106	B1 lift lobby finishes & BS works by separate hoarding erection	30	25/6/2019	24/7/2019
107	Install Roof Cladding	14	5/7/2019	18/7/2019
108	Install Facade Wall Cladding (Internal Layer)	20	5/7/2019	24/7/2019
109	Interal BOH finishes	16	17/7/2019	1/8/2019
110	**Building Services Installation**	**109**	**29/4/2019**	**15/8/2019**
111	Procurement and delivery of major BS equipment	78	29/4/2019	15/7/2019
112	Electrical - Light Fitting	47	29/4/2019	14/6/2019
113	Electrical - Conduit & Trunking	15	29/4/2019	13/5/2019
114	Electrical - MCB, MCCB & Distribution Board	33	29/4/2019	31/5/2019
115	Electrical - Cable & Accessories	33	29/4/2019	31/5/2019
116	MVAC - VRF air handing unit	78	29/4/2019	15/7/2019
117	MVAC - NCCO unit	34	29/4/2019	1/6/2019
118	MVAC - Split type air conditioning units	63	29/4/2019	30/6/2019
119	MVAC - Inline Fan	63	29/4/2019	30/6/2019
120	MVAC - AHU / Fanb Control Panel	78	29/4/2019	15/7/2019
121	MVAC - S.S. Fire Damper	53	29/4/2019	20/6/2019
122	MVAC - GI Pipe & CU Pipe	53	29/4/2019	20/6/2019
123	MVAC - Air Duct Silencer	53	29/4/2019	20/6/2019
124	FS - FM200	48	29/5/2019	15/7/2019
125	FS - AFA Panel and equipment	48	29/5/2019	15/7/2019
126	FS - GI Pipe & Valve	47	15/5/2019	30/6/2019
127	FS - Fire Hydrant, Hose Reel, FS Inlet & Sprinkler Head	47	15/5/2019	30/6/2019
128	Assess date for BS installation	26	23/6/2019	18/7/2019
129	to Sever Room and MVAC Room on G/F	1	23/6/2019	23/6/2019
130	to M/F	1	18/7/2019	18/7/2019
131	Electrical Installation	**70**	**27/5/2019**	**4/8/2019**
132	Underground cable duct & cable pit	21	27/5/2019	16/6/2019
133	Underground cable laying from Building 3	7	19/6/2019	25/6/2019
134	On-site installation on G/F	30	23/6/2019	22/7/2019
135	On-site installation on M/F	14	19/7/2019	1/8/2019
136	Testing and commissioning	3	2/8/2019	4/8/2019
137	Power energization from LV Main Switch Room of Building 3 to VC	1	15/7/2019	15/7/2019
138	Energisation	1	5/8/2019	5/8/2019
139	MVAC Installation	**45**	**25/6/2019**	**8/8/2019**
140	On-site installation on G/F	30	25/6/2019	24/7/2019
141	On-site installation on M/F	14	19/7/2019	1/8/2019
142	Testing and commissioning	7	2/8/2019	8/8/2019
143	Fire Services Installation	**50**	**27/6/2019**	**15/8/2019**
144	Alteration and diversion of existing sprinkler pipes at Building 1	21	27/6/2019	17/7/2019
145	On-site installation on G/F	30	25/6/2019	24/7/2019
146	On-site installation on M/F	21	19/7/2019	8/8/2019
147	Connect FS Pipe to existing pipeline	20	20/7/2019	8/8/2019
148	AFA Re-programming & connection	20	20/7/2019	8/8/2019
149	Testing and commissioning; pressure test	7	9/8/2019	15/8/2019
150	CCTV System	**28**	**15/7/2019**	**11/8/2019**
151	Alteration of existing installation	14	15/7/2019	28/7/2019
152	Site installation	14	22/7/2019	4/8/2019
153	Testing & comissioning; Pressure Test	7	5/8/2019	11/8/2019
154				
155	**FSI Inspection & Certificate**	**45**	**24/7/2019**	**6/9/2019**
156	FS Form 314 and FS 501 preparation and submission	14	24/7/2019	6/8/2019
157	FS Inspection	3	21/8/2019	23/8/2019
158	FS Certificate	14	24/8/2019	6/9/2019
159				
160	**Interior fitting out works by OSCAR**	**40**	**9/9/2019**	**18/10/2019**
161	G/F Lobby	40	9/9/2019	18/10/2019
162	Fire staircase from G/F to M/F	7	16/9/2019	22/9/2019
163	Link bridges to M/F & 1/F of Buidling 1	21	23/9/2019	13/10/2019
164	**Façade cladding (external layer) & G/F outer skin by OSCAR**	**28**	**9/9/2019**	**6/10/2019**
165	**Exhibits and Equipment Installation by Adbrownies**	**214**	**1/5/2019**	**30/11/2019**
166	**Pre-construction stage**	**135**	**1/5/2019**	**12/9/2019**
167	Design shop drawings	30	1/5/2019	30/5/2019
168	Statutory submission	60	15/5/2019	13/7/2019
169	Material submission for approval	45	15/5/2019	28/6/2019
170	Mock-up for approval (if any)	45	1/6/2019	15/7/2019
171	Procurement for long-lead item	90	25/6/2019	22/9/2019
172	Off-site fabrication	90	15/6/2019	12/9/2019
173	**Construction stage**	**98**	**25/8/2019**	**30/11/2019**
174	Setting out review and confirmation	5	16/8/2019	20/8/2019
175	Construction site handover	1	25/8/2019	25/8/2019
176	Main construction works	54	26/8/2019	18/10/2019
177	Electrical installation	28	26/8/2019	22/9/2019
178	IT, LAV cabling works	14	20/9/2019	3/10/2019
179	Full dome installation	14	19/10/2019	1/11/2019
180	Dust free LAV equipment installation	20	19/10/2019	7/11/2019
181	Testing and commissioning	21	8/11/2019	28/11/2019
182	Furniture delivery & Setup	3	18/11/2019	20/11/2019
183	Client inspection ad defect rectificaton	7	22/11/2019	28/11/2019
184	Handover to Client	1	30/11/2019	30/11/2019
185	**Completion of Vistor Centre**	**1**	**30/11/2019**	**30/11/2019**



Annex D

Project Organisation Chart with Contact Details

Project Organization (with contact details)



Annex E

Calibration Certification for the On-line Stack Monitoring System

Annex E1

Calibration Certification for the CEMS

(1)

Commissioning Check List 试运行检查项目表
MCS100FT

Customer data 客户资料

Customer: OSCAR Plant: OWTF

Location: SHW

1. Device data 设备资料

Device type 设备类型: MCS100FT (1)

Serial no. 序列号: 16070493

Sample probe type 取样探头类型: SFU

2. Plant data 电厂资料

Location 标签编号: Outside 室外 ☐ Under cover 有保护罩 ☐ Inside 室内 ☑

Orientation of the stack 取样点方向: Horizontal 水平 ☐ Vertical 垂直 ☑

Orientation of sample gas probe 取样探头方向: Horizontal 水平 ☑ Vertical 垂直 ☐

Pressure 压力 1010 hpa Gas temperature 烟气温度 410 °C

Plant operating status 电厂运行情况 Normal

3. Prerequisite 系统运行条件

	Y	N	Remarks 备注
3.1. Documentation + Delivery complete 文件+货物是否齐全	☑	☐	
3.2. Platform at measurement spot has suitable dimension? 测量点平台的尺寸是否合适?	☑	☐	
3.3. If this measurement location is under legal regulation, has it been acknowledged by an official body? 如果安装位置需要符合法律法规，此安装位置是否被官方认可?	☑	☐	
3.4. Customer specific data for parameterization available? 用户对系统参数的特殊要求是否可行?	☑	☐	
3.5. Cables, tubes and sample line installed but not connected? 电缆、管线和取样管线安装但没有连接?	☑	☐	
3.6. Compressed air station installed and compressed air available? 压缩空气站已安装并且压缩空气可以使用?	☑	☐	

4. **Preliminary work** 预备工作	Y	N	Remarks 备注
4.1. Mounting of flanges like described in the Operating Instruction? 法兰安装是否按照图纸?	☑	☐	
4.2. Check for damage 检查外部损伤	☑	☐	
4.3. Check ambient conditions 检查环境条件	☑	☐	
4.4. Check mounting conditions 检查安装条件	☑	☐	
4.5. Check cables / wires for correct installation 检查电缆/电线及其连接状况	☑	☐	
4.6. Check main power supply voltage 检查总供电电压	☑	☐	

5. **Periphery** 外部设备	Y	N	Remarks 备注
5.1. Check compressed air supply 检查压缩空气供应	☑	☐	
Inlet 入口(5 bar): 6 Bar			

6. **Sample probe** 取样探头	Y	N	Remarks 备注
6.1. Connect bundle of tubes and cables 管线和电缆的连接	☑	☐	
6.2. Install probe 探头安装	☑	☐	

7. MCS100FT	Y	N	Remarks 备注
7.1. Switch on analyzer and wait for warm up 打开分析仪并等待预热	☑	☐	
7.2. Check sample conditions 检查样气情况	☑	☐	
Flow rate 流量: 230 l/h			
7.3. Check zero conditions 检查零点情况	☑	☐	
Flow rate 流量: 160 l/h			
7.4. Perform zero point setting 零点设置	☑	☐	Test results within specification.
7.5. Perform span test 量程测试	☑	☐	
7.6. Parameterize the I/O Module 设置 I/O 模块参数	☑	☐	
7.7. Measured values are plausible 测量值是否合理	☑	☐	
7.8. Save device data 储存设备数据	☑	☐	
7.9. Complete Commissioning Sign-Off Sheet 完成试运行签署表	☑	☐	
7.10. Instruct the operator personnel 操作员培训 Hand over the maintenance manual and check lists 移交维护手册和检查表 - Measurement reading 读取测量值 - Perform customer maintenance 演示维护方法 - Read messages 读取信息	☑	☐	

8. Measured value

Index 编号	Source 信号源	Unit 单位	Range 范围		Reading (actual) 实际读数	Output value 产值
			Start 开始	End 结束		
1	HCL	mg/Nm^3	0	120	60.22ppm	60.22ppm
2	HF	mg/Nm^3	0	5	4.34ppm	4.34ppm
3	CO	mg/Nm^3	0	1000	128.21ppm	128.20ppm
4	NO	mg/Nm^3	0	500	122.01ppm	122.00ppm
5	NO_2	mg/Nm^3	0	200	98.81ppm	98.80ppm
6	NO_X	mg/Nm^3	0	500	412.11 mg/m³	412.12 mg/m³
7	SO_2	mg/Nm^3	0	300	83.21ppm	83.21ppm
8	CO_2	Vol o/o	0	25	20.01 o/o	20.01 o/o
9	H_2O	Vol o/o	0	40	32.02 o/o	32.01 o/o
10	O_2	Vol o/o	0	21	20.95 o/o	20.95 o/o
11	TOC	mg/Nm^3	0	300	122.01ppm	122.01ppm
12	NH_3	mg/Nm^3	0	100	53.30ppm	53.31ppm
13	CH_4	mg/Nm^3	0	100	112.01ppm	112.01ppm
14						
15						

Remarks 备注

Name 签名

Date
日期: 25/7/2018

Engineer
工程师:

Plant personnel
用户代表:

(2)

Commissioning Check List 试运行检查项目表
MCS100FT

Customer data 客户资料

Customer: Oscar
Plant: OWTF
Location: SHW

1. Device data 设备资料

Device type 设备类型: MCS100FT (2)
Serial no. 序列号: 1607 0494
Sample probe type 取样探头类型: SFU

2. Plant data 电厂资料

Location 标签编号	Outside 室外 ☐	Under cover 有保护罩 ☐	Inside 室内 ☑
Orientation of the stack 取样点方向	Horizontal 水平 ☐	Vertical 垂直 ☑	
Orientation of sample gas probe 取样探头方向	Horizontal 水平 ☑	Vertical 垂直 ☐	

Pressure 压力 1010 hpa
Gas temperature 烟气温度 410 °C
Plant operating status 电厂运行情况 Normal

3. Prerequisite 系统运行条件

	Y	N	Remarks 备注
3.1. Documentation + Delivery complete 文件+货物是否齐全	☑	☐	
3.2. Platform at measurement spot has suitable dimension? 测量点平台的尺寸是否合适?	☑	☐	
3.3. If this measurement location is under legal regulation, has it been acknowledged by an official body? 如果安装位置需要符合法律法规，此安装位置是否被官方认可?	☑	☐	
3.4. Customer specific data for parameterization available? 用户对系统参数的特殊要求是否可行?	☑	☐	
3.5. Cables, tubes and sample line installed but not connected? 电缆、管线和取样管线安装但没有连接?	☑	☐	
3.6. Compressed air station installed and compressed air available? 压缩空气站已安装并且压缩空气可以使用?	☑	☐	

4. **Preliminary work** 预备工作	Y	N	Remarks 备注
4.1. Mounting of flanges like described in the Operating Instruction? 法兰安装是否按照图纸?	☑	☐	
4.2. Check for damage 检查外部损伤	☑	☐	
4.3. Check ambient conditions 检查环境条件	☑	☐	
4.4. Check mounting conditions 检查安装条件	☑	☐	
4.5. Check cables / wires for correct installation 检查电缆/电线及其连接状况	☑	☐	
4.6. Check main power supply voltage 检查总供电电压	☑	☐	

5. **Periphery** 外部设备	Y	N	Remarks 备注
5.1. Check compressed air supply 检查压缩空气供应	☑	☐	
Inlet 入口(5 bar): 6 Bar			

6. **Sample probe** 取样探头	Y	N	Remarks 备注
6.1. Connect bundle of tubes and cables 管线和电缆的连接	☑	☐	
6.2. Install probe 探头安装	☑	☐	

7. MCS100FT	Y	N	Remarks 备注
7.1. Switch on analyzer and wait for warm up 打开分析仪并等待预热	☑	☐	
7.2. Check sample conditions 检查样气情况	☑	☐	
Flow rate 流量: 240 l/h			
7.3. Check zero conditions 检查零点情况	☑	☐	
Flow rate 流量: 150 l/h			
7.4. Perform zero point setting 零点设置	☑	☐	
7.5. Perform span test 量程测试	☑	☐	Test results within specification.
7.6. Parameterize the I/O Module 设置 I/O 模块参数	☑	☐	
7.7. Measured values are plausible 测量值是否合理	☑	☐	
7.8. Save device data 储存设备数据	☑	☐	
7.9. Complete Commissioning Sign-Off Sheet 完成试运行签署表	☑	☐	
7.10. Instruct the operator personnel 操作员培训 Hand over the maintenance manual and check lists 移交维护手册和检查表 - Measurement reading 读取测量值 - Perform customer maintenance 演示维护方法 - Read messages 读取信息	☑	☐	

8. Measured value

Index 编号	Source 信号源	Unit 单位	Range 范围		Reading (actual) 实际读数	Output value 产值
			Start 开始	End 结束		
1	HCL	mg/Nm^3	0	120	60.21 ppm	60.21 ppm
2	HF	mg/Nm^3	0	5	4.32 ppm	4.32 ppm
3	CO	mg/Nm^3	0	1000	128.20 ppm	128.20 ppm
4	NO	mg/Nm^3	0	500	122.00 ppm	122.00 ppm
5	NO_2	mg/Nm^3	0	200	98.80 ppm	98.81 ppm
6	NO_X	mg/Nm^3	0	500	412.22 mg/Nm^3	412.21 mg/Nm^3
7	SO_2	mg/Nm^3	0	300	83.21 ppm	83.21 ppm
8	CO_2	Vol o/o	0	25	20.00 o/o	20.00 o/o
9	H_2O	Vol o/o	0	40	32.01 o/o	32.01 o/o
10	O_2	Vol o/o	0	21	20.95 o/o	20.95 o/o
11	TOC	mg/Nm^3	0	300	122.01 ppm	122.01 ppm
12	NH_3	mg/Nm^3	0	100	53.30 ppm	53.30 ppm
13	CH_4	mg/Nm^3	0	100	112.02 ppm	112.02 ppm
14						
15						

Remarks 备注

Date 日期: 25/7/2018

Engineer 工程师: Eddie Law

Name 签名

Plant personnel 用户代表:

Annex E2

Calibration Certification for the CAPCS

QM Zertifikat / QM certificate

Dusthunter SP30

SICK
Sensor Intelligence.

Identifikation / *identification*

Artikel Nr. / *Part No.:* **1089203** **DHSP30-T2V2FPNNNNNXXS**

Ident Nr. / *Ident no.:* 00116 Serien Nr. / *Serial no.:* **18168223**

Firmware Version / *Firmware version:* 01.02.06 (Feb 27 2018 11:37:54)
Bootloader Version / *Bootloader version:* 01.00.02
Hardware Revision / *Hardware version:* 1.2
Geräteausführung / *Device version:*
BUS-Adresse / *Bus address:* 1

Parameter / *Parameter*

Sensorantwortzeit / *Sensor response time* 60.0 sec.

Gebläse / *Blower:* installiert / *installed*

Messgrößen u. Koeffizienten / *Measuring variables and coefficients*

Streulichtfaktoren / *Scattered light coefficients:*

CC0 (abs.): -0.3800
CC1 (lin.): 0.6850
CC2 (square): 0.0000

Verstärkungsfaktor, Offset / *Gain factor, Offset:*

Gain 0: 10.0000 Offset 0: 0.00045

Faktoren Analogausgang / *Analog Output factors:*

CC0 (abs.): 2.00
CC1 (lin.): 170.85
CC2 (square): 0.00

Referenzgerät Streulicht DHSP100 Serien-Nr.:
Reference measuring device DHSP100 Serial no.:

SN: 00014 / 08518553

Spantest 70 Laser / *Span 70 Laser* 70.00 %

Relais 3: Wartung / Maintenance

Koeffizientensätze Messbereich 0 / *Coefficient Sets meas. range 0:*

Koeff. Satz 1 / *Coeff. set 1:*

CC 0 (abs.): 0.0000
CC 1 (lin.): 1.0000
CC 2 (square): 0.0000

Koeff. Satz 2 / *Coeff. set 2:*

CC 0 (abs.): 0.0000
CC 1 (lin.): 1.0000
CC 2 (square): 0.0000

Messbereich, Grenzwert / *Meas. range, limit:*

Messbereichsschalter / *Meas. range switch:* 0 (Software)

Messbereich Wert1 / *Meas. range low value:* 0.0 mg

Messbereich Wert2 / *Meas. range high value:* 75.0 mg

Grenzwert / *Limit value:* 50.0 mg

Gebläse Druck/*Blower Pressure:* 10.0 mbar

Modbus Schnittstelle / *Modbus interface:*

Protokoll / *protocol:* RTU
Adresse / *address:* 1
Baudrate / *baudrate:* 19200
Datenbits Parität Stopbits / *Databits parity stopbits:* 8 EVEN 1
Endian Codierung / *endian code:* NONE

Das Gerät mit der o.g. Serien-Nr. wurde überprüft und kalibriert nach den Qualitätsstandards der SICK-Gruppe basierend auf einem nach ISO9001 zertifizierten Qualitätssicherungssystem.

This device with the serial no. noted above has been tested and calibrated according to the quality standards of the SICK-Group, which are based on a ISO9001 certified Quality Assurance System.

Ottendorf-Okrilla, 16.04.2018

Unterschrift: / *Signature:*

Annex F

Implementation Schedule of Mitigation Measures

Annex F1

Implementation Schedule of Mitigation Measures for Construction Phase

Annex F1 Summary of Mitigation Measures Implementation Schedule for Construction 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				
3.73	2.5	<u>*Air Pollution Control (Construction Dust) Regulation & Good Site Practices*</u> •Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather. •Use of frequent watering for particularly dusty construction areas and areas close to ASRs. •Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering should be applied to aggregate fines. •Open stockpiles should be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs. •Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations. •Establishment and use of vehicle wheel and body washing facilities at the exit points of the site. •Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading points, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods. •Imposition of speed controls for vehicles on unpaved site roads. 8 kilometers per hour is the recommended limit. •Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs. •Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides. •Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed. •Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system.	Construction Site / During Construction Period	<>

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
B. Hazard to Life				
4.102	3.3	<u>*Construction Phase*</u> •The number of workers on site during construction stage should be kept at the same level as the assessment. •Construction works should be suspended when delivery of chlorine takes place. •3m high fence should be constructed along the boundary facing the SHWWTW. •Emergency evacuation procedures should be formulated and the Contractor should ensure all workers on site should be familiar with these procedures as well as the route to escape in case of gas release incident. Relevant Departments, such as Fire Services Department (FSD), should be consulted during the development of Emergency 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 construction workers in the event of chlorine gas release in the SHWWTW. •The Contractor should establish a communication channel with the SHWWTW operation personnel and FSD during construction stage. In case of any hazardous incidents in the treatment works, operation personnel of SHWWTW should advise the Contractor to inform construction workers to proceed with emergency procedure. The Contractor should appoint a Liaison Officer to communicate with FSD Incident Commander on site in case of emergency. •Introduction training should be provided to any staff before carryout construction works at the Project site. •Periodic drills should be coordinated and conducted to ensure all construction 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.	Construction Site / During Construction Period	√
C. Water Quality				

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
5.44	4.5	*Construction site run-off and general construction activities:* The mitigation measures as outlined in the ProPECC PN 1/94 Construction Site Drainage should be adopted where applicable.	Construction Site / During Construction Period	√
5.45	4.5	*Excavation of Soil Materials* The construction programme should be properly planned to minimise soil excavation, if any, in rainy seasons. This prevents soil erosion from exposed soil surfaces. Any exposed soil surfaces should also be properly protected to minimise dust emission. In areas where a large amount of exposed soils exist, earth bunds or sand bags should be provided. Exposed stockpiles should be covered with tarpaulin or impervious sheets at all times. The stockpiles of materials should be placed at locations away from any stream courses so as to avoid releasing materials into the water bodies. Final surfaces of earthworks should be compacted and protected by permanent work.	Construction Site / During Construction Period	N/A
5.46	4.5	*Accidental spillage of chemicals:* Contractor must register as a chemical waste producer if chemical wastes would be produced from the construction activities. The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes.	Construction Site / During Construction Period	√
5.47	4.5	Maintenance of vehicles and equipments involving activities with potential for leakage and spillage should only be undertaken within the areas which appropriately equipped to control these discharges.	Construction Site / During Construction Period	√
5.48	4.5	Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. All fuel tanks and storage areas should be sited on sealed areas in order to prevent spillage of fuels and solvents to the nearby watercourses. All waste oils and fuels should be collected in designated tanks prior to disposal.	Construction Site / During Construction Period	N/A
5.49	4.5	Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance. The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the Waste Disposal Ordinance details the requirements to deal with chemical wastes. General requirements are given as follows:	Construction Site / During Construction Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport. •Chemical waste containers should be suitably labeled, to notify and warn the personnel who are handling the wastes, to avoid accidents. •Storage area should be selected at a safe location on site and adequate space should be allocated to the storage area.		
5.50	4.5	Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid entering to the nearby watercourses. Stockpiles of cement and other construction materials should be kept covered when not being used. Rubbish and litter from construction sites should also be collected to prevent spreading of rubbish and litter from the site area. It is recommended to clean the construction sites on a regular basis.	Construction Site / During Construction Period	√
5.51	4.5	*Sewage Effluent* The presence of construction workers generates sewage. It is recommended to provide sufficient chemical toilets in the works areas. The toilet facilities should be more than 30m from any watercourse. A licensed waste collector should be deployed to clean the chemical toilets on a regular basis.	Work site/During the construction period	N/A
5.52	4.5	Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase of the project. Regular environmental audit on the construction site can provide an effective control of any malpractices and can achieve continual improvement of environmental performance on site.	Work Site / During Construction Period	√
5.53	4.5	*Nullah Decking* To minimize the potential water quality impacts from the nullah reconstruction works, the practices outlined below should be adopted where applicable: •The proposed works should be carried out within the dry season between October and March when the flow in the open nullah is low. •The use of less or smaller construction plants may be specified to reduce the disturbance to the nullah bed.	Work Site / During Construction Period	N/A

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•Temporary storage of materials (e.g. equipment, filling materials, chemicals and fuel) and temporary stockpile of construction materials should be located well away from the nullah and any water courses during carrying out of the construction works. •Stockpiling of construction materials and dusty materials should be covered and located away from the nullah any water courses. •Construction debris and spoil should be covered up and/or disposed of as soon as possible to avoid being washed into the nullah and nearby water receivers. •Construction activities, which generate large amount of wastewater, should be carried out in a distance away from the nullah, where practicable. •Construction effluent, site run-off and sewage should be properly collected and/or treated. •Any works site inside the nullah should be temporarily isolated, such as by placing of sandbags or silt curtains with lead edge at bottom and properly supported props to prevent adverse impact on the water quality. •Proper shoring may need to be erected in order to prevent soil/mud from slipping into the nullah and nearby watercourse. •Supervisory staff should be assigned to station		
D. Waste Management				
6.41	5.4	<u>*Good Site Practices*</u> Recommendations for good site practices during the construction phase would include: •Obtain relevant waste disposal permits from appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354) and subsidiary Regulations and the Land (Miscellaneous Provisions) Ordinance (Cap. 28); •Provide staff training for proper waste management and chemical handling procedures; •Provide sufficient waste disposal points and regular waste collection; •Provide appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers; •Carry out regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; •Separate chemical wastes for special handling and disposed of to licensed facility for	Work Site / During Construction Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		treatment; and •Employ licensed waste collector to collect waste.		
6.42	5.5	<u>*Waste Reduction Measures*</u> Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include: •Design foundation works that could minimise the amount of excavated material to be generated; •Provide training to workers on the importance of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling; •Sort out demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions (i.e. soil, broken concrete, metal etc.); •Segregate and store different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal; •Encourage the collection of aluminium cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the workforce; and •Plan and stock construction materials carefully to minimize the amount of waste to be generated and to avoid unnecessary generation of waste.	Work Site/During Design & Construction Period	√
6.44	5.7	<u>*Excavated and C&D Materials*</u> In order to minimise the impact resulting from collection and transportation of C&D material for off-site disposal, the excavated material arising from site formation and foundation works should be reused on-site as backfilling material and for landscaping works as far as practicable. Other mitigation requirements are listed below: •A WMP, which becomes part of the Environmental Management Plan (EMP), should be prepared in accordance with ETWB TCW No.19/2005; •A recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites) should be adopted for easy tracking; and •In order to monitor the disposal of excavated and C&D material at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be adopted (refer to ETWB TCW	Work Site/During Design & Construction Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		No. 31/2004).		
6.45 – 6.46	5.8 – 5.9	An EMP should be prepared and implemented in accordance with ETWB TCW No. 19/2005 which describes the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from construction activities. The EMP should be submitted to the Supervising Officer (SO) and Supervising Officer's Representative (SOR) for approval. The EMP should be reviewed regularly and updated, preferably on a monthly basis. A system should be devised to work for on-site sorting of excavated and C&D materials and promptly removing all sorted and process materials arising from the construction activities to minimize temporary stockpiling on-site. The system should be included in the EMP identifying the source of generation, estimated quantity, arrangement for on-site sorting, collection, temporary storage areas and frequency of collection by recycling Contractors or frequency of removal off-site.	Work Site/During Design & Construction Period	√
6.47	5.10	*Chemical Waste* Should chemical wastes be produced at the construction site, the Contractor would be required to register with EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste (such as explosive, flammable, oxidizing, irritant, toxic, harmful, or corrosive). The Contractor should employ a licensed collector to transport and dispose of the chemical wastes, to either the CWTC in Tsing Yi, or any other licensed facilities, in accordance with the Waste Disposal (Chemical Waste) General) Regulation.	Work Site / During Construction Period	<>
6.48	5.11	*General Refuse* General refuse should be stored in enclosed bins or compaction units separated from C&D material. A licensed waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.	Work Site / During Construction Period	√
E. Landscape and Visual				
7.99 & Table 7.7	Table 6.1	Construction Phase Topsoil, where identified, should be stripped and stored for re-use in the construction of the	Work Site / During Construction Period	N/A

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		soft landscape works, where practical •Compensatory tree planting should be provided to compensate for felled trees. - Compensation tree species shall be chosen from both indigenous and ornamental species - Compensatory tree planting quantities shall be as per DLO approved requirement. •Control of night-time lighting •Erection of decorative screen hoarding compatible with the surrounding setting		
F. Noise				
8.25	7.3	Good Site Practice: •Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program; •Mobile plant, if any, should be sited as far from noise sensitive receivers (NSRs) as possible; •Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; •Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and •Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities.	Work site/During Design & Construction 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 F2

Implementation Schedule of Mitigation Measures for Operation Phase

Annex F2 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	Work Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		(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.		
C. Water Quality				
5.44	4.5	<u>*Wastewater from Organic Waste Treatment Process*</u> 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	Work Site / During Design & Operation Period	√

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

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

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

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		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 assistance from relevant department could be quickly sought. • Response Procedure 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)	Chemicals and Chemical Wastes Handling & Storage	Whole Site / During Operation	<>

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

Annex G

Laboratory Results for NMVOCs

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CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK1923574
CONTACT:	Mr Edwin wong		
ADDRESS:	No. 5, Sham Fung Road, Siu Ho Wan, Lantau Island, NT, Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	0
		DATE RECEIVED:	4 June, 2019
		DATE OF ISSUE:	17 June, 2019
PROJECT:	Stack Gas Sampling	SAMPLE TYPE:	Air
SITE:	ORRC1, Siu Ho Wan, Lantau Island	NO OF SAMPLES:	1
PO:	---		

COMMENTS

One (1) stack gas sample for CHP-2 was collected by ALS Technichem (HK) staff on 4th June, 2019 at the Organic Resources Recovery Centre (Phase 1) in Lantau Island.

The sample(s) was analysed and reported on an as received basis.

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

PP

Richard Fung
Managing Director - Hong Kong

1. Summary of Work

The document is the final report for the stack gas sampling and testing event for Oscar Bioenergy Joint Venture at Siu Ho Wan, North Lantau Island.

Sampling Period: 4th June, 2019
Location of Stack: ORRC1, Siu Ho Wan
No. of Stack: 1
Name of Stack: CHP-2

Methods for Stack Sampling and Analysis:

Parameter	Method Reference	Sampling Time (minutes)
Volatile Organic Compounds (VOCs) [1]	US EPA Method 18	60
Non-Methane Volatile Organic Compounds (NMCOCs)) [1]	US EPA Method 18	60

Note:
[1]: Results expressed as carbon

2. Sampling Summary

Volatile Organic Compounds (VOCs)
Sample gas was collected by using a stainless steel sampling probe, from the centroid of the stack, into the Tedlar bag by passive sampling technique.
The measurement of total volatile organic compounds (VOCs) content in the sample was conducted in references to BS EN 12619. VOCs content was determined by measuring the methane and non-methane volatile organic compounds of the sample by Gas Chromatograph-Flame Ionisation Detector (GC-FID).

VOCs was reported as the sum of methane and non-methane organics content in the sample.

3. Sampling Period

Test Parameters	Sampling Period
Volatile Organic Compounds (VOCs)	4 June 2019 10:17 – 11:17

4. Result

Parameter	Unit	Reporting Limit	Result [1]
Gaseous & vaporous organic substances (VOCs) [2]	mg/m^3	0.7	971
Methane (CH_4) [2]	mg/m^3	0.5	966
Non-Methane Organic Carbon (NMOC) [2]	mg/m^3	0.2	5.7

Note:
[1] Results expressed as dry, at 0 degree Celsius temperature, 101.325 kilopascal pressure and 6% O_2 content conditions.
[2] Results expressed as carbon.
[3] The average Oxygen content in the flue gas was **9.4%** during the sampling period.

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STACK GAS SAMPLING AND LABORATORY TESTING REPORT

Location: Organic Resources Recovery Centre Phase 1 (ORRC1)

Sampling Period: 18th June, 2019

Stack ID: CHP-2

ALS Work Order No: HK1926111B

Report Issue Date: 27th June, 2019

CLIENT:
Oscar Bioenergy Joint Venture
No. 5, Sham Fung Road,
Siu Ho Wan, Lantau Island, NT,
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PREPARED BY:

Mr Poon Kwong Lun, Allen
Manager

Mr Fung Lim Chee, Richard
Managing Director - Hong Kong

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

1. Summary of Work

The document is the final report for the stack gas sampling and testing event for Oscar Bioenergy Joint Venture at Siu Ho Wan, North Lantau Island.

Sampling Period: 18th June, 2019
Location of Stack: ORRC1, Siu Ho Wan
No. of Stack: 1
Name of Stack: CHP-2

Methods for Stack Sampling and Analysis:

Parameter	Method Reference	Sampling Time (minutes)
Volatile Organic Compounds (VOCs) [1]	US EPA Method 18	60

Note:
[1]: Results expressed as carbon.

2. Sampling Summary

Volatile Organic Compounds (VOCs)

Sample gas was collected by using a stainless steel sampling probe, from the centroid of the stack, into the Tedlar bag by passive sampling technique.
The measurement of total volatile organic compounds (VOCs) content in the sample was conducted in references to BS EN 12619. VOCs content was determined by measuring the methane and non-methane volatile organic compounds of the sample by Gas Chromatograph-Flame Ionisation Detector (GC-FID).
VOCs was reported as the sum of methane and non-methane organics content in the sample.

3. Sampling Period

Test Parameters	Sampling Period
Volatile Organic Compounds (VOCs)	18 June, 2019 13:38 – 14.38

4. Stack Parameter

Test Parameter	Sampling Volume (m^3) [1]	Carbon Dioxide Content (%) [1]	Oxygen Content (%) [1]	Moisture Content (%)
VOCs	-	10.3	8.6	14.8

Note:
[1] Expressed as at dry, 0 deg. C, 101.325 kilopascal pressure conditions.

5. Result

Parameter	Unit	Reporting Limit	Result
Gaseous & vaporous organic substances (VOCs) [3]	mg/m^3 [1]	0.7	1110
	kg/hr	0.003	4.116
Methane (CH_4) [3]	mg/m^3 [1]	0.5	1105
	kg/hr	0.002	4.097
Non-Methane Organic Carbon (NMOC) [3]	mg/m^3 [1]	0.2	5.3
	kg/hr	0.001	0.020

Note:
[1] Results expressed as dry, at 0 degree Celsius temperature, 101.325 kilopascal pressure and 6% O_2 content conditions.
[2] Results expressed as carbon.

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STACK GAS SAMPLING AND LABORATORY TESTING REPORT

Location: Organic Resources Recovery Centre Phase 1 (ORRC1)

Sampling Period: 27th June, 2019

Stack ID: CHP-2

ALS Work Order No: HK1927355B

Report Issue Date: 10th July, 2019

CLIENT:
Oscar Bioenergy Joint Venture
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PREPARED BY:

Mr Poon Kwong Lun, Allen
Manager

Mr Fung Lim Chee, Richard
Managing Director - Hong Kong

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

1. Summary of Work

The document is the final report for the stack gas sampling and testing event for Oscar Bioenergy Joint Venture at Siu Ho Wan, North Lantau Island.

Sampling Period: 27th June, 2019
Location of Stack: ORRC1, Siu Ho Wan
No. of Stack: 1
Name of Stack: CHP-2

Methods for Stack Sampling and Analysis:

Parameter	Method Reference	Sampling Time (minutes)
Volatile Organic Compounds (VOCs) [1]	US EPA Method 18	60

Note:
[1]: Results expressed as carbon.

2. Sampling Summary

Volatile Organic Compounds (VOCs)

Sample gas was collected by using a stainless steel sampling probe, from the centroid of the stack, into the Tedlar bag by passive sampling technique.
The measurement of total volatile organic compounds (VOCs) content in the sample was conducted in references to BS EN 12619. VOCs content was determined by measuring the methane and non-methane volatile organic compounds of the sample by Gas Chromatograph-Flame Ionisation Detector (GC-FID).
VOCs was reported as the sum of methane and non-methane organics content in the sample.

3. Sampling Period

Test Parameters	Sampling Period
Volatile Organic Compounds (VOCs)	27 June, 2019 13:38 – 14.38

4. Stack Parameter

Test Parameter	Carbon Dioxide Content (%) [1]	Oxygen Content (%) [1]	Moisture Content (%)
VOCs	11.3	7.8	15.0

Note:
[1] Expressed as at dry, 0 deg. C, 101.325 kilopascal pressure conditions.

5. Result

Parameter	Unit	Reporting Limit	Result
Gaseous & vaporous organic substances (VOCs) [3]	mg/m^3 [1]	0.7	872
	kg/hr	0.003	2.751
Methane (CH_4) [3]	mg/m^3 [1]	0.5	869
	kg/hr	0.002	2.742
Non-Methane Organic Carbon (NMOC) [3]	mg/m^3 [1]	0.2	2.9
	kg/hr	0.001	0.009

Note:
[1] Results expressed as dry, at 0 degree Celsius temperature, 101.325 kilopascal pressure and 6% O_2 content conditions.
[2] Results expressed as carbon.

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CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK1929939
CONTACT:	Mr Edwin wong		
ADDRESS:	No. 5, Sham Fung Road, Siu Ho Wan, Lantau Island, NT, Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	0
		DATE RECEIVED:	10 July, 2019
		DATE OF ISSUE:	5 Aug, 2019
PROJECT:	Stack Gas Sampling	SAMPLE TYPE:	Air
SITE:	ORRC1, Siu Ho Wan, Lantau Island	NO OF SAMPLES:	1
PO:	---		

COMMENTS

One (1) stack gas sample for CHP-2 was collected by ALS Technichem (HK) staff on 10th July, 2019 at the Organic Resources Recovery Centre (Phase 1) in Lantau Island.

Sampling information (Project name, Sample ID) is provided by client.

The sample(s) was analysed and reported on an as received basis.

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Richard Fung
Managing Director - Hong Kong

1. Summary of Work

The document is the final report for the stack gas sampling and testing event for Oscar Bioenergy Joint Venture at Siu Ho Wan, North Lantau Island.

Sampling Period: 10th July, 2019
Location of Stack: ORRC1, Siu Ho Wan
No. of Stack: 1
Name of Stack: CHP-2

Methods for Stack Sampling and Analysis:

Parameter	Method Reference	Sampling Time (minutes)
Volatile Organic Compounds (VOCs) [1]	US EPA Method 18	60
Non-Methane Volatile Organic Compounds (NMCOCs)) [1]	US EPA Method 18	60

Note:
[1]: Results expressed as carbon

2. Sampling Summary

Volatile Organic Compounds (VOCs)
Sample gas was collected by using a stainless steel sampling probe, from the centroid of the stack, into the Tedlar bag by passive sampling technique.
The measurement of total volatile organic compounds (VOCs) content in the sample was conducted in references to BS EN 12619. VOCs content was determined by measuring the methane and non-methane volatile organic compounds of the sample by Gas Chromatograph-Flame Ionisation Detector (GC-FID).

VOCs was reported as the sum of methane and non-methane organics content in the sample.

3. Sampling Period

Test Parameters	Sampling Period
Volatile Organic Compounds (VOCs)	10 July 2019 14:55 – 15:55

4. Result

Parameter	Unit	Reporting Limit	Result [1]
Gaseous & vaporous organic substances (VOCs) [2]	mg/m^3	0.7	981
Methane (CH_4) [2]	mg/m^3	0.5	975
Non-Methane Organic Carbon (NMOC) [2]	mg/m^3	0.2	5.2

Note:
[1] Results expressed as dry, at 0 degree Celsius temperature, 101.325 kilopascal pressure and 6% O_2 content conditions.
[2] Results expressed as carbon.
[3] The average Oxygen content in the flue gas was **9.2%** during the sampling period.

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STACK GAS SAMPLING AND LABORATORY TESTING REPORT

Location: Organic Resources Recovery Centre Phase 1 (ORRC1)

Sampling Period: 23rd July, 2019

Stack ID: CHP-3

ALS Work Order No: HK1931406B

Report Issue Date: 2nd August, 2019

CLIENT:
Oscar Bioenergy Joint Venture
No. 5, Sham Fung Road,
Siu Ho Wan, Lantau Island, NT,
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PREPARED BY:

Mr Poon Kwong Lun, Allen
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Mr Fung Lim Chee, Richard
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This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Sampling information (Project name, Sample ID) is provided by client.

1. Summary of Work

The document is the final report for the stack gas sampling and testing event for Oscar Bioenergy Joint Venture at Siu Ho Wan, North Lantau Island.

Sampling Period: 23rd July, 2019
Location of Stack: ORRC1, Siu Ho Wan
No. of Stack: 1
Name of Stack: CHP-3

Methods for Stack Sampling and Analysis:

Parameter	Method Reference	Sampling Time (minutes)
Volatile Organic Compounds (VOCs) [1]	US EPA Method 18	60

Note:
[1]: Results expressed as carbon.

2. Sampling Summary

Volatile Organic Compounds (VOCs)
Sample gas was collected by using a stainless steel sampling probe, from the centroid of the stack, into the Tedlar bag by passive sampling technique.
The measurement of total volatile organic compounds (VOCs) content in the sample was conducted in references to BS EN 12619. VOCs content was determined by measuring the methane and non-methane volatile organic compounds of the sample by Gas Chromatograph-Flame Ionisation Detector (GC-FID).
VOCs was reported as the sum of methane and non-methane organics content in the sample.

3. Sampling Period

Test Parameters	Sampling Period
Volatile Organic Compounds (VOCs)	23 Jul 2019 14:35 - 15.35

4. Stack Parameter

Test Parameter	Sampling Volume (m^3) [1]	Carbon Dioxide Content (%) [1]	Oxygen Content (%) [1]	Moisture Content (%)
VOCs	-	11.3	7.8	14.9

Note:
[1] Expressed as at dry, 0 deg. C, 101.325 kilopascal pressure conditions.

5. Result

Parameter	Unit	Reporting Limit	Result
Gaseous & vaporous organic substances (VOCs) [2]	mg/m^3 [1]	0.7	835
	kg/hr	0.002	2.387
Methane (CH_4) [2]	mg/m^3 [1]	0.5	828
	kg/hr	0.002	2.367
Non-Methane Organic Carbon (NMOC) [2]	mg/m^3 [1]	0.2	6.8
	kg/hr	0.001	0.020

Note:
[1] Results expressed as dry, at 0 degree Celsius temperature, 101.325 kilopascal pressure and 6% O_2 content conditions.
[2] Results expressed as carbon.

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CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK1933588
CONTACT:	Mr Edwin wong		
ADDRESS:	No. 5, Sham Fung Road, Siu Ho Wan, Lantau Island, NT, Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	0
		DATE RECEIVED:	6 August, 2019
		DATE OF ISSUE:	13 August, 2019
PROJECT:	Stack Gas Sampling	SAMPLE TYPE:	Air
SITE:	ORRC1, Siu Ho Wan, Lantau Island	NO OF SAMPLES:	1
PO:	---		

COMMENTS

One (1) stack gas sample for CHP-3 was collected by ALS Technichem (HK) staff on 6th Aug, 2019 at the Organic Resources Recovery Centre (Phase 1) in Lantau Island.

Sampling information (Project name, Sample ID) is provided by client.

The sample(s) was analysed and reported on an as received basis.

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Richard Fung
Managing Director - Hong Kong

1. Summary of Work

The document is the final report for the stack gas sampling and testing event for Oscar Bioenergy Joint Venture at Siu Ho Wan, North Lantau Island.

Sampling Period: 6th August, 2019
Location of Stack: ORRC1, Siu Ho Wan
No. of Stack: 1
Name of Stack: CHP-3

Methods for Stack Sampling and Analysis:

Parameter	Method Reference	Sampling Time (minutes)
Volatile Organic Compounds (VOCs) [1]	US EPA Method 18	60
Non-Methane Volatile Organic Compounds (NMCOCs)) [1]	US EPA Method 18	60

Note:
[1]: Results expressed as carbon

2. Sampling Summary

Volatile Organic Compounds (VOCs)
Sample gas was collected by using a stainless steel sampling probe, from the centroid of the stack, into the Tedlar bag by passive sampling technique.
The measurement of total volatile organic compounds (VOCs) content in the sample was conducted in references to BS EN 12619. VOCs content was determined by measuring the methane and non-methane volatile organic compounds of the sample by Gas Chromatograph-Flame Ionisation Detector (GC-FID).

VOCs was reported as the sum of methane and non-methane organics content in the sample.

3. Sampling Period

Test Parameters	Sampling Period
Volatile Organic Compounds (VOCs)	6 August 2019 11:35 – 12:35

4. Result

Parameter	Unit	Reporting Limit	Result [1]
Gaseous & vaporous organic substances (VOCs) [2]	mg/m^3	0.7	993
Methane (CH_4) [2]	mg/m^3	0.5	986
Non-Methane Organic Carbon (NMOC) [2]	mg/m^3	0.2	6.9

Note:
[1] Results expressed as dry, at 0 degree Celsius temperature, 101.325 kilopascal pressure and 6% O_2 content conditions.
[2] Results expressed as carbon.
[3] The average Oxygen content in the flue gas was **8.5%** during the sampling period.

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		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.		
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	√
F. Landscape and Visual				

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
7.98 & Table 7.8	Table 6.2	Operation Phase • 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 H

Waste Flow Table

Annex H1

Construction Phase Waste Flow Table

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

Month	Actual Quantities of Inert C&D Materials Generated					Actual Quantities of Non-inert C&D Materials (Construction Waste) Generated				
	Total Quantity Generated	Reused in the Contract	Reused in other Projects	Hard Rocks & Large Broken Concrete	Disposed as Public Fill	Metals (see Note 1)	Paper/ cardboard packaging (see Note 1)	Plastics (see Note 2)	Chemical Waste	Others, e.g. general refuse (see Note 3)
	tonne	tonne	tonne	tonne	tonne	kilogram	kilogram	kilogram	Litre	tonne
May 2015	29.58	0.00	0.00	0.00	29.58	0.00	0.00	0.00	0.00	0.00
June 2015	2226.90	0.00	0.00	0.00	2226.90	0.00	0.00	0.00	0.00	9.66
July 2015	2832.27	0.00	0.00	0.00	2832.27	0.00	0.00	0.00	0.00	33.68
August 2015	6657.25	0.00	0.00	0.00	6657.25	0.00	20.00	0.00	0.00	55.06
September 2015	5467.05	0.00	0.00	0.00	5467.05	3480.00	0.00	0.00	0.00	83.81
October 2015	5419.04	0.00	0.00	0.00	5419.04	18710.00	0.00	0.00	0.00	20.45
November 2015	1375.26	0.00	0.00	0.00	1375.26	21610.00	0.00	0.00	0.00	17.38
December 2015	2199.56	75.28	0.00	0.00	2124.28	0.00	41.00	0.00	0.00	21.83
January 2016	4601.43	0.00	0.00	0.00	4601.43	18140.00	50.00	0.00	640.00	20.86
February 2016	4167.01	0.00	0.00	0.00	4167.01	510.00	79.00	0.00	0.00	16.57
March 2016	299.92	41.28	0.00	0.00	258.64	22320.00	75.00	0.00	0.00	22.69
April 2016	3186.37	98.37	0.00	0.00	3088.00	60690.00	77.00	0.00	255.00	37.63
May 2016	1612.33	63.41	0.00	0.00	1548.92	13490.00	35000.00	0.00	0.00	40.76
June 2016	1144.73	30.43	0.00	0.00	1114.30	14600.00	120.00	0.00	0.00	58.34
July 2016	662.76	0.00	0.00	0.00	662.76	13370.00	0.00	0.00	0.00	40.48
August 2016	391.88	0.00	0.00	0.00	391.88	18660.00	84.00	0.00	0.00	61.91
September 2016	324.35	0.00	0.00	0.00	324.35	56800.00	2780.00	0.00	0.00	138.25
October 2016	1561.82	39.00	0.00	0.00	1522.82	40000	9.30	0.00	700.00	114.47
November 2016	897.23	507.94	00.00	0.00	389.76	0.00	123.00	0.00	0.00	154.22
December 2016	2477.95	489.00	0.00	0.00	1988.95	2960.00	93.00	0.00	0.00	136.80
January 2017	2150.92	503.60	0.00	0.00	1647.32	31240.00	21051.00	3630.00	0.00	127.43

Month	Actual Quantities of Inert C&D Materials Generated					Actual Quantities of Non-inert C&D Materials (Construction Waste) Generated				
	Total Quantity Generated	Reused in the Contract	Reused in other Projects	Hard Rocks & Large Broken Concrete	Disposed as Public Fill	Metals (see Note 1)	Paper/ cardboard packaging (see Note 1)	Plastics (see Note 2)	Chemical Waste	Others, e.g. general refuse (see Note 3)
	tonne	tonne	tonne	tonne	tonne	kilogram	kilogram	kilogram	Litre	tonne
February 2017	553.80	440.00	0.00	0.00	113.80	14940.00	18820.00	2880.00	460.00	83.46
March 2017	665.93	460.00	0.00	0.00	205.93	11660.00	29370.00	4400.00	660.00	99.59
April 2017	553.41	220.00	0.00	0.00	333.41	8600.00	25610.00	520.00	700.00	81.83
May 2017	388.82	211.00	0.00	0.00	177.82	1090.00	64.00	0.00	0.00	109.10
June 2017	352.12	104.00	0.00	0.00	248.12	1800.00	16400.00	12030.00	700.00	70.58
July 2017	400.72	165.00	0.00	0.00	235.72	6500.00	12330.00	4690.00	0.00	52.20
August 2017	589.89	202.00	0.00	0.00	387.89	23330.00	27079.00	5220.00	700.00	69.52
September 2017	3347.18	1364.00	0.00	0.00	1983.18	33379.00	29426.00	3990.00	0.00	62.82
October 2017	2384.86	984.00	0.00	0.00	1400.86	11842.00	34071.00	5230.00	0.00	74.13
November 2017	797.42	384.18	0.00	0.00	413.24	20210.00	25225.00	4030.00	0.00	163.03
December 2017	106.32	51.00	0.00	0.00	55.32	17650.00	19520.00	3210.00	0.00	82.23
January 2018	283.65	125.83	0.00	0.00	157.82	12900.00	15600.00	12330.00	0.00	30.93
February 2018	122.31	55.70	0.00	0.00	66.61	10950.00	13260.00	6570.00	0.00	16.95
March 2018	217.06	99.80	0.00	0.00	117.26	12260.00	12120.00	5960.00	0.00	32.53
April 2018	1118.36	460.58	0.00	0.00	657.78	16320.00	12590.00	6280.00	0.00	33.90
May 2018	475.54	198.85	0.00	0.00	276.69	15230.00	11024.00	0.00	0.00	40.02
June 2018	684.10	256.50	0.00	0.00	427.60	14320.00	10260.00	2630.00	0.00	43.01
July 2018	93.99	42.00	0.00	0.00	51.99	11220.00	6200.00	0.00	0.00	59.77
August 2018	528.56	225.00	0.00	0.00	303.56	13620.00	33400.00	26760.00	0.00	44.50
September 2018	765.70	325.00	0.00	0.00	440.70	10600.00	4500.00	0.00	0.00	41.82
October 2018	0.00	0.00	0.00	0.00	0.00	0.00	2330.00	0.00	0.00	109.49
November 2018	77.71	0.00	0.00	0.00	77.71	0.00	0.00	0.00	0.00	30.18
December 2018	88.43	0.00	0.00	0.00	88.43	0.00	0.00	0.00	0.00	5.72
January 2019	21.13	0.00	0.00	0.00	21.13	0.00	0.00	0.00	1880.00	4.55

Month	Actual Quantities of Inert C&D Materials Generated					Actual Quantities of Non-inert C&D Materials (Construction Waste) Generated				
	Total Quantity Generated	Reused in the Contract	Reused in other Projects	Hard Rocks & Large Broken Concrete	Disposed as Public Fill	Metals (see Note 1)	Paper/ cardboard packaging (see Note 1)	Plastics (see Note 2)	Chemical Waste	Others, e.g. general refuse (see Note 3)
	tonne	tonne	tonne	tonne	tonne	kilogram	kilogram	kilogram	Litre	tonne
February 2019	326.44	0.00	0.00	0.00	326.44	0.00	0.00	0.00	0.00	26.69
March 2019	190.4	0.00	0.00	0.00	190.40	0.00	0.00	0.00	0.00	16.45
April 2019	199.71	0.00	0.00	0.00	199.71	0.00	0.00	0.00	0.00	2.92
May 2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.16
June 2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.45
July 2019	15.57	0.00	0.00	0.00	15.57	0.00	0.00	0.00	0.00	0.00
August 2019	15.19	0.00	0.00	0.00	15.19	0.00	0.00	0.00	0.00	9.73
Total	65067.31	8222.28	0.00	0.00	56845.03	605001.00	418801.30	110360.00	6695.00	2725.54

Notes: (1) Metal and paper/cardboard packaging were collected by recycler for recycling.
(2) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material collected by recycler for recycling.
(3) General refuse was disposed of at NENT by subcontractors.

Annex H2

Operation Phase 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	kilogram	kilogram	kilogram	No. of collection	tonne	No. of collection	kilogram	No. of collection	kilogram	No. of collection	kilogram
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	390
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
Total	2,240	2,882.98	0	0	0	150	14.52	0	0	0	0	1	390

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 I

Environmental Complaint, Environmental Summons and Persecution Log

Annex I 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
Overall Total	**1**	**0**

Annex J

Investigation Report

Annex J1

Investigation Report – June 2019

Investigation Report of CEMS Exceedances

Date	1 – 31 June 2019
Time	Continuous monitoring throughout May 2019
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	1. Continuous monitoring was carried out for 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 E) 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: • NO_x and VOC (including methane) in the CHP; and • Dust, NO_x, VOCs and NH_3 in the ASP. 2. According to the Contractor, the plant was receiving around 100 tonnes of SSOW daily and was operated normally. 3. CHP setting was undergoing fine-tuning for performance optimisation which leads to the ineffective removal of NO_x and VOC (including methane) at a certain period of time. 4. The Contractor explained that the exceedances recorded in Dust, NO_x, SO_2 and NH_3 in the ASP was because the thermal combustion unit of the ASP still require tuning to optimise the combustion efficiency. In addition, the Contractor reported that the tuning of the thermal combustion unit took longer than anticipated resulting in the many exceedances recorded during the reporting period.
Action Taken / Action to be Taken	• The number of exceedances in CHP has drastically decreased since the beginning of the operation period. Only 1 exceedance on NO_x and 1 exceedance on VOC (including methane) were recorded from the 3 CHP stacks during this reporting period. Continuous optimisation of CHP and re-adjustment of NO_x and VOC (including methane) control for CHP has been carried out to further reduce the exceedance. The re-adjustment is expected to be completed in the next reporting period. • Tuning of the thermal combustion unit of the ASP was carried out by the ASP suuplier to optimise the combustion efficiency in order to remove the

	pollutants in the biogas. The ASP supplier gave the Contractor a set of procedures for the fine-tuning of the ASP. By having the procedure guidelines, the Contractor can perform the ASP fine tuning in-house without relying on the ASP supplier which can minimise the extent of exceedances. The fine tuning is expected to be completed in the next reporting period.
Remedial Works and Follow-up Actions	The Contractor is recommended to closely monitor the processes, including the combustion of biogas in the ASP to avoid the reoccurrence of similar problems. MT will carry out follow-up audit regarding the progress next month.

Prepared by: Bonia Leung, MT Representative
Date 10 July 2019

Investigation Report of Biogas Leakage

Date	18 June 2019
Time	17:30
Monitoring Location	Biogas system
Parameter	Biogas pressure
Description	Biogas release as a result of unstable power supply by CLP on 18 June 2019.
Action Taken / Action to be Taken	The Contractor closed the biogas holder inlet valve to safeguard the biogas system as per emergency response procedures. The biogas pressure began to build up in the biogas system (before the biogas holder) resulting in the biogas being released through one of the pressure relief valves as per designed scenario to safeguard the biogas tanks.
Remedial Works and Follow-up Actions	The Contractor resumed the power supply from CLP and the biogas booster set. A thorough check was conducted to confirm the situation was under control with stable performance.

Prepared by: Bonia Leung, MT Representative
Date 10 October 2019

Extract of the Incident Notification Form on Release of Biogas to the Environment Prepared by the Contractor

Description of the Process

The purpose of Organic Resources Recovery Centre Phase 1 (ORRC1 or the facility) is to convert source-separated organic waste into compost and biogas through proven biological treatment technologies. The biogas generated, after post-treatment including sulphur and water removal, would be in the on-site Combined Heat and Power (CHP) generators to generate hot water and electricity to be used on site and exported to the China Light and Power (CLP) power grid network.

The major equipment involving biogas includes:

- Anaerobic Digesters (AD)
- Suspension Buffer Tank (SBT)
- Desulphurisation Column
- Gasholder (GH)
- Dehumidifier
- Biogas booster system

The biogas consumers include:

- Emergency Flare
- Combined Heat and Power (CHP) Unit
- Ammonia Stripping Plant (ASP)

Description of the Incident

Time	Event
18 June 2019	High biogas production rate was observed in the afternoon. Three (3) Combined Heat and Power (CHPs) Units were in operation to consume the biogas. The Ammonia Stripping plant (ASP) was offline due to planned maintenance works. Due to the high biogas production rate, the biogas holder was observed to be high (>90%).
16:30	Seeing the biogas holder was reaching to high level, team members attended to the Standby Flare System on site to check if the standby flare can be ready to start. It resulted in identifying that the air compressor has overheated, and the cabinet was also found to be hot to the touch. The compressed air was not available for the pneumatic actuation valve Standby flare not able to be activated.
16:45	Preparation and installation work for the addition a standby pneumatic line to be attached the plant-wide compressed air system. During the repair of the standby flare, the biogas booster set was tripped resulted in the CHPs to shut down due to the lack of fuel. The booster set was immediately reset and restarted. CHPs in turn were then restarted to resume to reduce the level in the Biogas holder. Three CHPs were back into operation.
17:30	The electrical connections Q1 and Q2 opened. Later all CHPs tripped and loss of electrical power to the entire facility. The status electrical connections status of H1 and H2 were not changed.
17:48	After immediate diagnosis at the HV switch room and clearing the fault of Q1, the Q1 connection was closed allowing electricity back into the facility from CLP. After the power was

	resumed to the plant, an attempt to restart the Booster Set was conducted. However, the Booster Set failed to start due to the lack of compressed air. Immediate review of the system was undertaken to resolve this issue. A temporary pneumatic line was laid from the AD Area to the Booster Set to provide compressed air to the system. During the course of repairing, the biogas pressure was observed to building up and biogas started to release from the pressure safety valve of the biogas holder (@25 mbar). All repair team members were evacuated away from the booster area until the working condition was able to the secured safely. According to the emergency response procedure, the biogas valves (3040-V-105 & 3040-V-205) at the exit of the each of the Desulphurization columns were manually closed to prevent further biogas from flowing to the Biogas Holder. The arrangement discontinued the pressure build up at the biogas holder.
18:55	Once the valves were closed, the PSV of the Biogas Holder was allowed to release biogas until the pressure was reduced below 25 mbar. After the pressure stabilized below the release set point of the biogas holder, the biogas stopped releasing from the PSV of biogas holder and site monitoring results confirmed the booster area is free from biogas. The team members returned to complete the repair of the booster set and temporary compressed airline for the Booster Set system. The Booster Set system was then repaired and restarted to allow biogas to be fed to the CHPS. One (1) CHP was then restarted to attempt to reduce the level in the Biogas Holder. Later the ASP was also operated. After the biogas holder feeding line was isolated from 3040-V105 & 3040-V-205, the biogas pressure before the isolation was built up in the AD and SBT tanks resulting in the biogas being released through the pressure relief valves (33 mbar) as per designed scenario. The gas concentration was closely monitored at ground level. The monitoring results were consistent to the modelling results from Quantitative Risk Analysis report that he biogas released from pressure safety valves was able to dispersed to a safe level on ground.
19:15	Standby Flare repair works were also completed to allow the unit to begin flaring the biogas.
19:45	In conjunction with the start-up of the Standby Flare, the Desulphurization System's exit valves were opened slowly in incremental amounts to resume flow of the biogas from Ads to the Biogas Holder. At this time, one (1) CHP, the ASP and the Standby Flare were operating to consume the gas.
20:00	The biogas Holder level was reduced to approximately 45%. The facility resumed to normal operations using the CHP and ASP to control the biogas consumption.

Immediate Corrective Actions

- The Contractor immediately arranged onsite personnel for evacuation except the Emergency Response Team (including Maintenance Team, Operation Team and QHSE).
- The Contractor maintained close monitoring the gas concentration around the site.
- The Contractor arranged to resume all essential plant equipment in safe condition.
- The Contractor arranged to conduct a thorough check to confirm the situation was under control with stable performance at around 20:00.
- The Contractor also carried out indoor ambient air monitoring at all RCV bays to confirm the condition was safe to resume waste reception.
- Food waste reception was suspended for about 2 hours. 4 trucks were arranged to wait at a safe location (outside the main gate of the plant).
- Food waste reception resumed to normal at around 20:30.

Root Cause Analysis

1. Biogas production rate was higher (1,200 m^3/h) than normal because of the Organic Loading Rate was not calculated precisely enough. The OLR was higher by 50% that

precise day (approx.. 14 tons of VS fed to the Ads on 17 June 2019, compared to an average feeding fo 9 tons of VS fed to the Ads on the previous days):

   a. Variation on nature of SSOW could result fluctuation of organic loading.
   b. The SBT Jet Mixing efficiency is unstable (based on the SBT level) and produces suspension of variable moisture content
   c. In these conditions, due to improper Jet Mixing, sampling the SBT three times a week appeared to be not frequent enough.

2. Flare not able to be activated due to loss of compressed air to actuation valves. The air compressor of the flare system found defective. The root cause of the system was due to the overheating of the air compressor in the standby flare system. This was the primary source of compressed air to the system. At the time of the incident, there was no redundant supply of compressed air installed and maintenance works were started to provide redundant compressed air to the system.
3. HV switch gears Q1 and Q2 tripped and later resulted all CHPs tripped. (HV contractor collected plant data to study the cause of Q1 & Q2 trip).
   a. No biogas pressure from the booster set – because the flare system was switched from remote to local to conduct the repair works which caused the biogas booster set to enter a controlled shutdown the CHPs to Tip.
   b. CHPs could not run due to Q1 & Q2 tripped – from the investigation report, it was found that a voltage drop occurred, and the relays tripped to protect the system. However the report is inconclusive as to why a voltage drop occurred on that day. So further investigation will be carried out by subcontractor to provide a more thorough report to see if they can determine the root cause of Q1 & Q2.
4. The plant black out period accelerated the accumulation of biogas and eventually biogas pressure reached the release pressure set point. Standby flare could not function because lack of compressed air and electricity to power the control panel to allow the ignition of the flare.

Description of Corrective Actions (1)

1. To install a temporary pneumatic line to emergency flare system
2. To replace defective air compressor of emergency flare
3. To keep close monitoring the biogas production rate and its content
4. To arrange to test run the Emergency flare regularly (at least weekly to ensure the flare is well functioning
5. To inspect and diagnosis the function of Q1 and Q2

Description of Preventive Actions (2)

1. Monitoring & Prediction of Biogas Production:
   a. To define a target OLR per day with/without Asp in operation
   b. To measure the suspension moisture content of the SBT during Monday to Friday.

(1) The corrective actions have been closed on 30 June 2019
(2) The preventive actions have been closed on 30 June 2019.

   c. To give updated Ads feeding guidelines every day based on the actual SBT moisture content and OLR.
2. Monitoring & Inspection of standby fare system
   a. Implement regular testing flare (weekly)
   b. Install redundant compressed air source
   c. Air compressor will automatically start to maintain a set pressure if there is a failure in the plant compressed air system
   d. Implemented daily visual check for air compressor.
3. Training & Inspection of relays
   a. Addition training provided to the MT and operation staff
   b. Routine Maintenance: Regular visual inspection of the relays to ensure they are running normally. Additionally the sub-contractor for the high voltage system can come in on a regular basis to do a software diagnostic on the relays to ensure they are operation normally.
   c. Annually: a "WR2" (as required by the EMSD) is conducted on an annual basis for the high voltage system which does a complete power down of the relays. This allows the relays' hardware to be inspected more thoroughly to ensure they are functioning normally.
4. Emergency response during black out period
   a. Supply power from UPS to the control panel of the standby flare and control panel for duty standby compressor.
   b. Establish SOP to resume plant after blackout.

Annex J2

Investigation Report - July 2019

Investigation Report of CEMS Exceedances

Date	1 – 31 July 2019
Time	Continuous monitoring throughout July 2019
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Units (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	1. Continuous monitoring was carried out for 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 E) 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: • NO_x, SO_2 and VOC (including methane) in the CHP; and • NO_x, SO_2 and NH_3 in the ASP. 2. According to the Contractor, the plant was receiving around 100 tonnes of SSOW daily and was operated normally. 3. CHP setting was undergoing fine-tuning for performance optimisation which leads to the ineffective removal of NO_x and VOC (including methane) at a certain period of time. 4. The Contractor explained that the exceedances recorded in NO_x and NH_3 in the ASP was because the thermal combustion unit of the ASP still require tuning to optimise the combustion efficiency.
Action Taken / Action to be Taken	• The number of exceedances in CHP has further decreased since the beginning of the operation period. It was arranged with the supplier of CHPs to check the performance of CHPs onsite during the reporting period. The supplier will conduct a detailed investigation of the remaining exceedance recorded on the CHPs. After the investigation, the Contractor will perform the maintenance work according to suggestions raised by the supplier. The maintenance work is expected to complete in the next reporting period. • The number of exceedances in ASP has significantly decreased since the beginning of the operation period. It was arranged with the supplier of the ASP to modify the system onsite. . The supplier suggested that main components required for the modification work, i.e. an

	air cooler, will be delivered to Hong Kong by early October 2019. Meanwhile, the supplier will perform some minor modification work, such as the replacement of control valves in the next reporting period. The Contractor is developing a detailed schedule with the supplier to ensure preparatory works are completed for the major modification work to take place. The operation team of the Contractor will also liaise and agree with the supplier for any shutdown period required to replace and install the equipment.
Remedial Works and Follow-up Actions	The Contractor is recommended to closely monitor the processes, including the combustion of biogas in the ASP to avoid the reoccurrence of similar problems. MT will carry out follow-up audit regarding the progress next month.

Prepared by: Bonia Leung, MT Representative
Date 14 August 2019

Annex J3

Investigation Report - August 2019

Investigation Report of CEMS Exceedances

Date	1 – 31 August 2019
Time	Continuous monitoring throughout July 2019
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Centralised Air Pollution Unit (CAPCS), Cogeneration Units (CHP) and Ammonia Stripping Plan (ASP)
Exceedance Description	1. Continuous monitoring was carried out for 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 E) 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: • Odour (including NH_3 & H_2S) in the CAPCS; • Dust (or TSP), NO_x, SO_2, HCl and HF in the CHP; and • Carbon Monoxide, NO_x, SO_2, VOCs (including methane) and NH_3 in the ASP. 2. According to the Contractor, the plant was receiving around 100 tonnes of SSOW daily and was operated normally. 3. The chemical dosing system of the CAPCS was undergoing optimisation. The new setting of the chemical dosing system could not effectively remove the odourous gas (mainly NH_3) and caused exceedances of odour limits in the CAPCS. 4. CHP setting was undergoing fine-tuning for performance optimisation which leads to the ineffective removal of NO_x and VOC (including methane) at a certain period of time. 5. The Contractor explained that the exceedances recorded in the ASP was because the thermal combustion unit of the ASP still require tuning to optimise the combustion efficiency.
Action Taken / Action to be Taken	• The setting of the chemical dosing system has been revised to its original during this reporting period; the chemical dosing system can effectively remove odourous gases at the CAPCS. • It was arranged with the supplier of CHPs to check the performance of CHPs onsite during the reporting period. The supplier will conduct a detailed investigation of the remaining exceedance recorded on

	the CHPs. After the investigation, the Contractor will perform the maintenance work according to suggestions raised by the supplier. The maintenance work is expected to complete in the next reporting period. • It was arranged with the supplier of the ASP to modify the system onsite. . The supplier suggested that main components required for the modification work, i.e. an air cooler, will be delivered to Hong Kong by early October 2019. Meanwhile, the supplier will perform some minor modification work, such as the replacement of control valves in the next reporting period. The Contractor is developing a detailed schedule with the supplier to ensure preparatory works are completed for the major modification work to take place. The operation team of the Contractor will also liaise and agree with the supplier for any shutdown period required to replace and install the equipment.
Remedial Works and Follow-up Actions	The Contractor is recommended to closely monitor the processes, including the combustion of biogas in the ASP to avoid the reoccurrence of similar problems. MT will carry out follow-up audit regarding the progress next month.

Prepared by: Bonia Leung, MT Representative
Date 10 September 2019

Investigation Report of Biogas Leakage

Date	25 August 2019
Time	12:35 am
Monitoring Location	Biogas system
Parameter	Biogas pressure
Exceedance Description	Biogas release as a result of unstable power supply by CLP on 25 August 2019.
Action Taken / Action to be Taken	The Contractor closed the biogas holder inlet valve to safeguard the biogas system as per emergency response procedures. The biogas pressure began to build up in the biogas system (before the biogas holder) resulting in the biogas being released through one of the pressure relief valves as per designed scenario to safeguard the biogas tanks.
Remedial Works and Follow-up Actions	The Contractor resumed the power supply from CLP and the biogas booster set. A thorough check was conducted to confirm the situation was under control with stable performance at around 5am.

Prepared by: Bonia Leung, MT Representative
Date 11 January 2020

Extract of the Incident Notification Form on Release of Biogas to the Environment Prepared by the Contractor

Description of the Process

The purpose of Organic Resources Recovery Centre Phase 1 (ORRC1 or the facility) is to convert source-separated organic waste into compost and biogas through proven biological treatment technologies. The biogas generated, after post-treatment including sulphur and water removal, would be in the on-site Combined Heat and Power (CHP) generators to generate hot water and electricity to be used on site and exported to the China Light and Power (CLP) power grid network.

The major equipment involving biogas includes:

- Anaerobic Digesters (AD)
- Suspension Buffer Tank (SBT)
- Desulphurisation Column
- Gasholder (GH)
- Dehumidifier
- Biogas booster system

The biogas consumers include:

- Emergency Flare
- Combined Heat and Power (CHP) Unit
- Ammonia Stripping Plant (ASP)

Description of the Incident

Time (Roughly)	Event
00:35	The electrical connections Q1 and Q2 opened because of the unstable power supply by CLP (Confirmed by CLP that there was a problem with their overhead lines). CHP2 & 3 were supply by CLP (Confirmed by CLP that there was a problem with their overhead lines). CHP2 & 3 were
00:40	CHP3 tripped off.
00:52	CHP2 tripped off and the plant blackout
01:58	Biogas holder inlet valve was arranged to close to safeguard the biogas system as per the emergency response procedures. This arrangement discontinued the pressure and level build up inside the biogas holder.
02:01	Q1 & Q2 closed, CLP power resumed.
02:01	Biogas holder level reached over 90%, booster set was unable to start due to lack of compress air supply.
02:01	Emergency flare was unable to start due to booster set was unable to start and therefore also no biogas supply to the flare
02:08	Anaerobic Digester (AD) Tank 1 Pressure relief Valve (PRV) triggered, biogas released from AD1 PRV intermittently. The biogas pressure was built up in the biogas system (before biogas holder) resulting in the biogas being released through one of the pressure relief valves as per designed scenario to safeguard the biogas tanks.

04:22	Biogas booster set resumed and thus biogas supply resumed
04:24	CHP2 resumed to consume biogas
04:52	Flare system tested and restarted to rapidly reduce the pressure and biogas holder level
05:00	Plant resumed normal operation

Immediate Corrective Actions

The Contractor immediate arranged onsite personnel to prepare for emergency (Biogas release). The Contractor immediate arranged maintenance team to carry urgent maintenance. The Contractor arranged to conduct a thorough check to confirm the situation was under control with stable performance at around 5:00am.

Root Cause Analysis

1. CHP's were able to enter "Island Mode". CHP 2 for approximately 15 minutes and CHP 3 for approximately 4 minutes after Q1 and Q2 opened. Primary cause for CHPs tripped is that the power demand exceeded the load generation step of the CHPs therefore as explained in "Electrical Operation philosophy" CHPs shutdown.
2. There were 2 sources of compressed air supply to the booster set (plant air and a standby portable air compressor). The plant air supply was resumed after CLP power resumed. However, a valve (0014-AV-001) was closed resulted in no plant air supply to a Sub-loop which provided plant air supply to the booster set and flare. The valve's operation philosophy is to maintain the pressure in the Biogas Area Compressed Air Sub-loop if the main loop loses pressure. Therefore, the valve was operating properly at the time of the incident and should have been placed into manual to open once the pressure in the main system reaches approximately 7 bar to return normal plant air to the Biogas Compressed Air Sub-loop.
3. The booster set resumed normal operation once the plant air was manually isolated from booster set to allow the air to activate the pneumatic valves on the booster set. A check valve (non-return valve) was found malfunction and caused the standby portable air compressor continues running and finally overheated. For normal weekly testing, the plant air isolated from the booster set therefore the effectiveness of the check valve between the plant air and the booster was unable to check. The check valve was not included in the normal testing protocol. The testing protocol and a detailed review of the biogas safety system will be conducted to mitigate the risk of future biogas incidents.
4. The flare could not start primarily due to the booster set being inoperative. Without adequate pressure and flow provided by the booster set, no fuel (biogas) reached the flare to allow for consumption of biogas. Flare was in automatic mode during blackout and power was supplied through the UPS system. The testing protocol and a detailed review of the biogas safety system will be conducted to mitigate the risk of future biogas incidents.

Description of Corrective Actions (1)

1. To immediate arranged maintenance team to carry urgent maintenance

(1) The corrective actions have been closed on 30 September 2019

2. To replace the malfunction check valve
3. To train up staff for emergency response during the planned Loss of Main test
4. To conduct review of the biogas safety system to mitigate the risk of future biogas incidents.

Description of Preventive Actions (2)

1. To review the system and the testing protocol revised to allow testing of the check valve to the plant air system.
2. To add extra compressed air source (3rd Source) in case of emergency and prepare the emergency operation procedure of the diesel compressor
3. To provide refreshment training for staff about the updated response
4. To update the plant resume and checking procedures during blackout
5. To manage the plant loading while CHPs in island mode a detailed operation procedure will need to be developed. OSCAR has invited the CHP supplier (MWM) engineer to review the capability of the CHPs to understand how island mode conditions and expecting engineer visit in November 2019 afterword we can provide more a detailed road map for the island mode situation for the CHPs.

(2) Items 1 to 4 have been closed on 4 October 2019. Items 5 is an on-going action.

Annex K

Odour Patrol Result

Annex K1

Odour Patrol Result - July 2019

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

CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK1931109
CONTACT:	Mr Terence Chan		
ADDRESS:	No. 5, Sham Fung Road, Siu Ho Wan, North Lantau Island, NT, Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	0
		DATE OF PATROL:	19 & 23 July 2019
		DATE OF ISSUE:	30 July 2019
PROJECT:	Odour Patrol for the Organic Resources Recovery Centre Phase 1 in Siu Ho Wan		
SITE:	ORRC1, Siu Ho Wan		

COMMENTS

Odour Patrol was conducted by ALS staff during 10:33 - 10:46 (19 Jul 2019) and 16:32 - 16:47 (23 Jul 2019).

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Richard Fung
Managing Director - Hong Kong

Sampling information (Project name, Sample ID) is provided by client.

1. Summary of Work

The odour patrol was conducted during daytime and evening time.

2. Odour Patrol

Odour patrolling is a process to make use of the calibrated olfactory senses (ie the nasal sense) of the patrol members to evaluate the odour and its intensity during a patrol exercise at the site.

The patrol work was conducted by two odour patrol team members from ALS Technichem (HK) Pty Ltd during each time session. All members are free from any respiratory diseases during patrol day. None of the members has been working or living in the area of the vicinity of the inspection zone.

The patrol team was required to move slowly from one to the other monitoring locations and use their olfactory senses to detect odour at each location.
The location of odour sources and the areas to be affected by the odour nuisance were identified as much as possible.

During the patrolling, the meteorological and surrounding information were recorded:

- the prevailing weather condition;
- the wind direction;
- the wind speed;
- location where odour is spotted;
- possible source of odour;
- perceived intensity of the odour;
- duration of odour; and
- characteristics of the odour detected

The perceived intensity is to be divided into 5 levels which are ranked in an ascending order as follows:

0	Not detected	No odour perceives or an odour so weak that it cannot be easily characterised or described
1	Slight	Identifiable odour, slight
2	Moderate	Identifiable odour, moderate
3	Strong	Identifiable odour, strong
4	Extreme	Severe odour

The odour patrol location was shown in Appendix 1.

3. Odour Patrol Result:
3.1. Daytime: 19 July 2019

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
1	1	Sunny	10:33	32.0	77.4	0.0	-	0	NA	NA	NA	NA
	2							1	Continuous	NA	Grassy	Nearby vegetation
2	1	Sunny	10:35	32.7	75.5	0.0	-	1	Continuous	NA	Biogas	Biogas Holder Tank Relief Valve
	2							1				
3	1	Sunny	10:36	32.8	76.2	0.0	-	0	NA	NA	NA	NA
	2							0				
4	1	Sunny	10:38	32.6	79.8	0.0	-	0	NA	NA	NA	NA
	2							0				
5	1	Sunny	10:39	32.3	81.2	0.0	-	1	Continuous	NA	Grassy	Nearby vegetation
	2							1				

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
6	1	Sunny	10:41	32.8	78.2	1.0	306	0	NA	NA	NA	NA
	2							0				
7	1	Sunny	10:44	34.3	77.3	0.4	300	1	Continuous	Downwind	Garbage	Waste Truck
	2							1				
8	1	Sunny	10:46	33.1	76.2	1.1	310	0	NA	NA	NA	NA
	2							0				

Remark:
T: Air Temperature;
RH: Relative Humidity;
WD: Wind Direction;
WS: Wind Speed.

3.2. Evening / Night time: 23 July 2019

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
1	1	Sunny	16:32	33.1	70.4	0.9	335	1	Intermittent	Downwind	Biogas	Biogas Holder Tank Relief Valve
	2							1				
2	1	Sunny	16:34	32.2	69.3	0.7	322	1	Intermittent	Upwind	Biogas	Biogas Holder Tank Relief Valve
	2							1				
3	1	Sunny	16:36	31.4	73.6	0.4	325	1	Continuous	Downwind	Biogas	Biogas Holder Tank Relief Valve
	2							1				
4	1	Sunny	16:39	31.7	74.4	0.6	281	0	NA	NA	NA	NA
	2							0				
5	1	Sunny	16:41	32.0	73.1	0.0	-	1	Continuous	NA	Grassy	Nearby Vegetation
	2							1				

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
6	1	Sunny	16:43	32.7	70.3	0.0	-	1	Continuous	NA	Garbage	Process Hall
	2							1				
7	1	Sunny	16:45	32.0	72.3	0.8	300	1	Continuous	Side wind	Biogas	Biogas Holder Tank Relief Valve
	2							1				
8	1	Sunny	16:47	32.9	70.6	1.0	302	1	Intermittent	Upwind	Biogas	Biogas Holder Tank Relief Valve
	2							1				

Remark:
T: Air Temperature;
RH: Relative Humidity;
WD: Wind Direction;
WS: Wind Speed.

APPENDIX 1
Odour Patrol Route

Proposed Patrol Route

Possible Odour Sources (No.) / Checkpoint

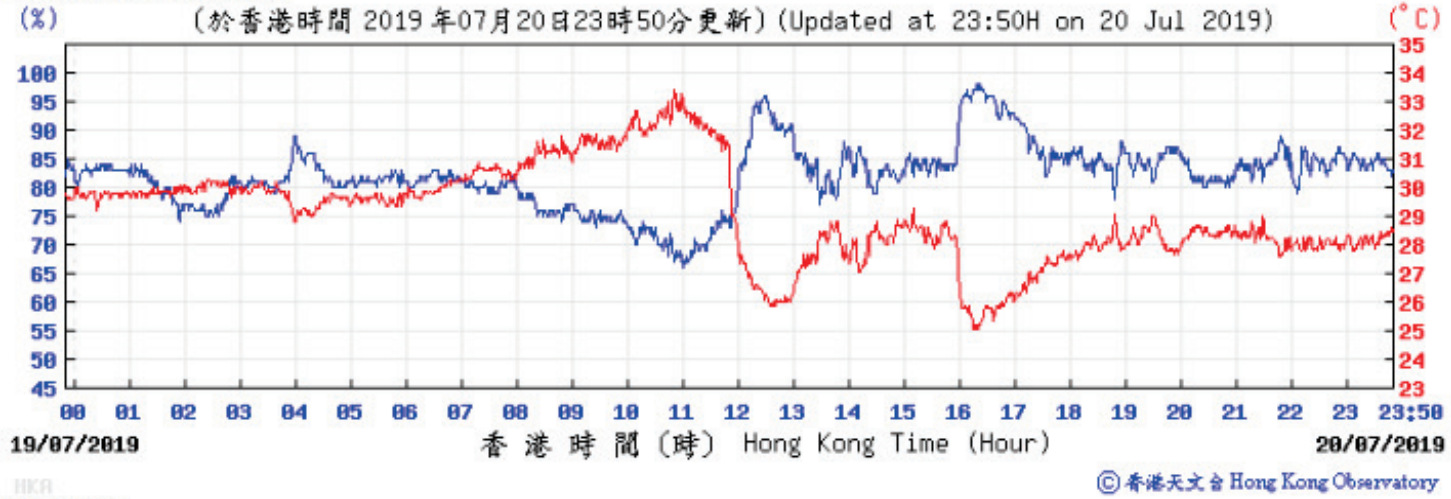
Assumed Odour Potential (normal operation)
From 1 (min.) to 3 (max.)

APPENDIX 2

Extract Of Meteorological Observations from Hong Kong Airport Observatory Station

19 July 2019

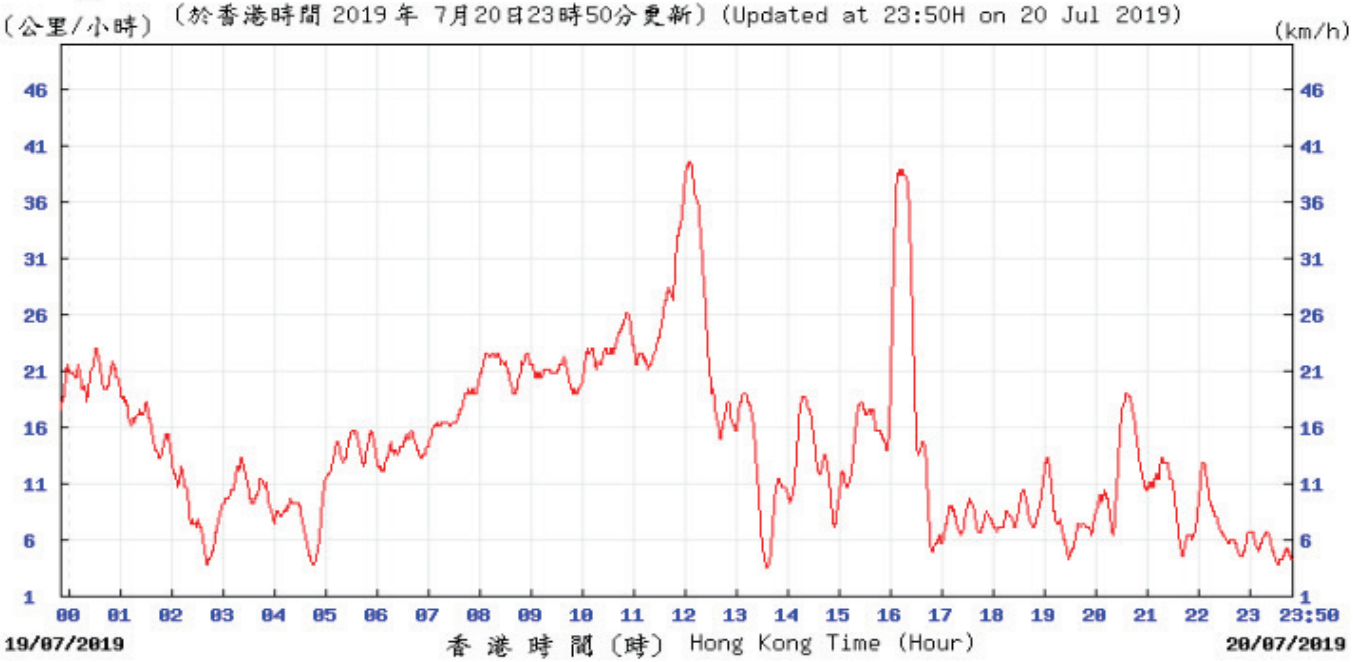
Tempearture/Humidity:



Pressure:

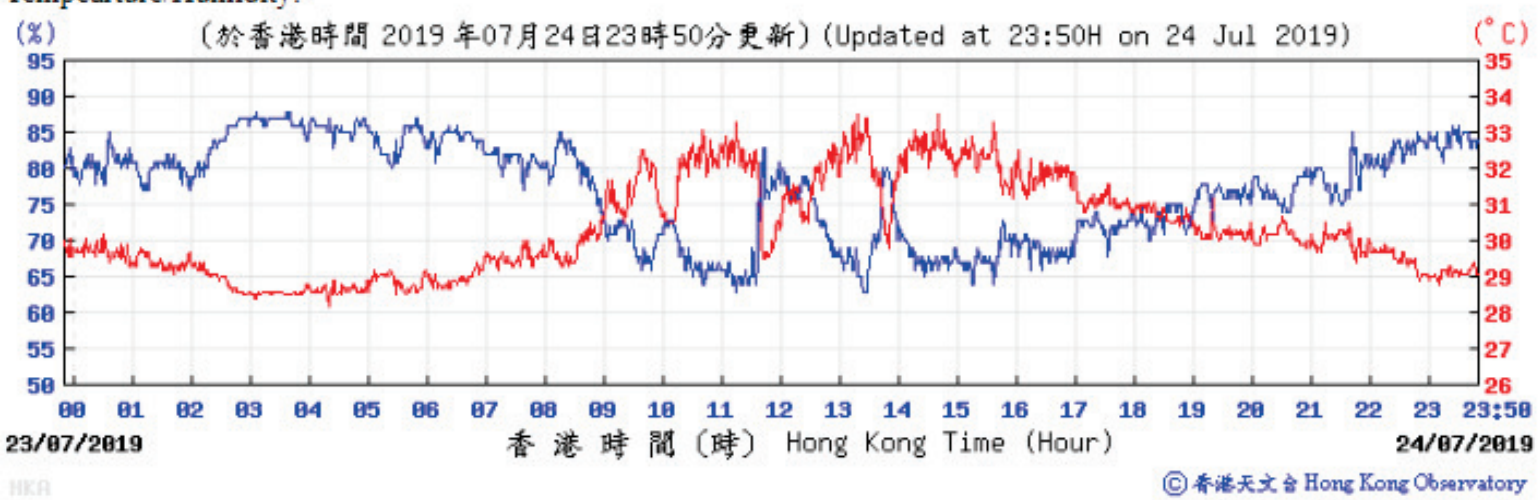
Wind Direction:

Wind Speed:

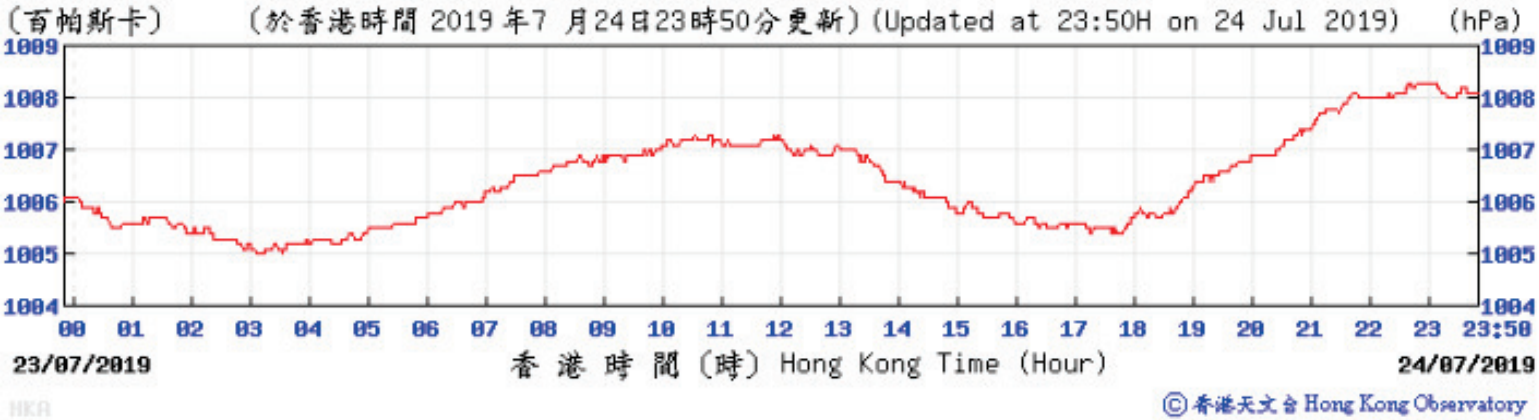


23 July 2019

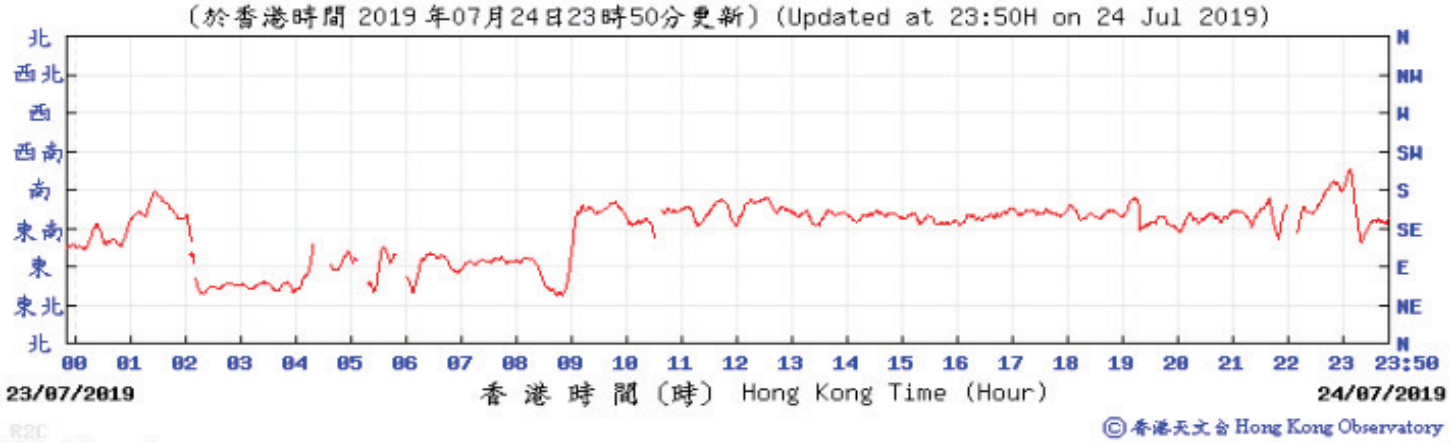
Tempearture/Humidity:



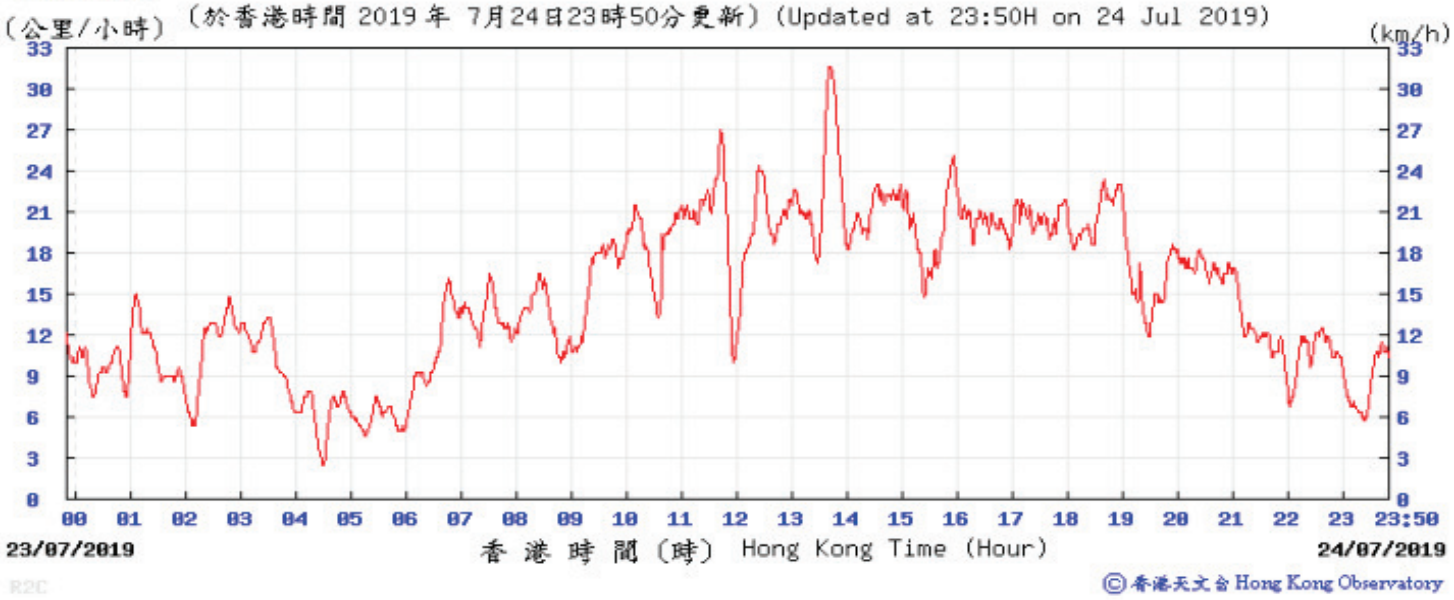
Pressure:



Wind Direction:



Wind Speed:



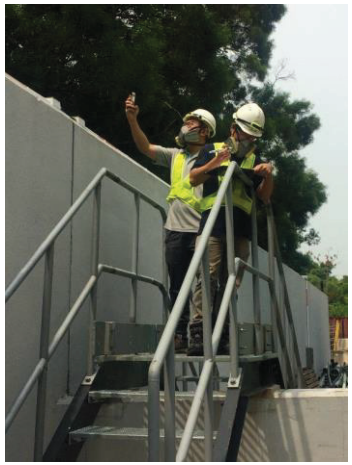
APPENDIX 3

A3.1. Odour Patrol at Different Locations – Daytime (19 Jul 2019)

Location: 1

Location: 2

Location: 3



Location: 4

Location: 5

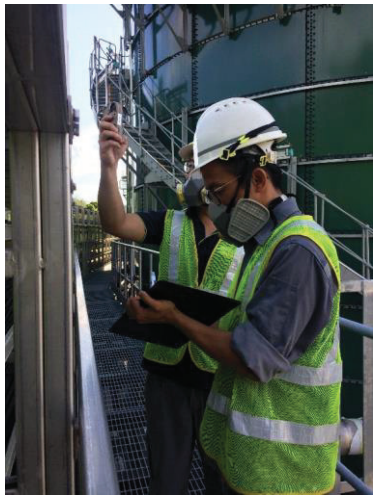
Location: 6

Location: 7

Location: 8

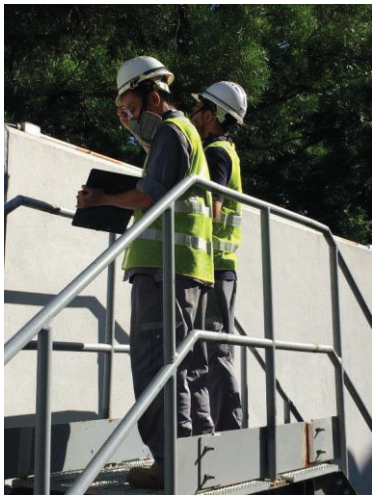
A3.2. Odour Patrol at Different Locations – Evening / Night time (23 Jul 2019)

Location: 1



Location: 2

Location: 3



Location: 4

Location: 5

Location: 6

Location: 7

Location: 8

Annex K2

Odour Patrol Result - August 2019

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

CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK1933589
CONTACT:	Mr Terence Chan		
ADDRESS:	No. 5, Sham Fung Road, Siu Ho Wan, North Lantau Island, NT, Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	0
		DATE OF PATROL:	6 August 2019
		DATE OF ISSUE:	13 August 2019
PROJECT:	Odour Patrol for the Organic Resources Recovery Centre Phase 1 in Siu Ho Wan		
SITE:	Organic Resources Recovery Centre Phase 1 (ORRC1)		

COMMENTS

Date of Odour Patrol: 6th August 2019.

Odour Patrol was conducted by ALS Technichem (HK) Pty Ltd staff during 10:43 - 11:07 and 16:29 - 16:48.

Sampling information (Project name, Sample ID) is provided by client.

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Richard Fung
Managing Director - Hong Kong

1. Summary of Work

The odour patrol was conducted during daytime and evening time.

2. Odour Patrol

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During the patrolling, the meteorological and surrounding information were recorded:

- the prevailing weather condition;
- the wind direction;
- the wind speed;
- location where odour is spotted;
- possible source of odour;
- perceived intensity of the odour;
- duration of odour; and
- characteristics of the odour detected

The perceived intensity is to be divided into 5 levels which are ranked in an ascending order as follows:

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1	Slight	Identifiable odour, slight
2	Moderate	Identifiable odour, moderate
3	Strong	Identifiable odour, strong
4	Extreme	Severe odour

The odour patrol location was shown in Appendix 1.

3. Odour Patrol Result:
3.1. Daytime:

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
1	1	Cloudy	10:43	29.3	87.0	1.2	343	0	NA	NA	NA	NA
	2							1	Intermittent		Grassy smell	Nearby vegetation
2	1	Cloudy	10:45	29.4	83.6	0.6	336	1	Continuous	Upwind	Biogas	Biogas Holder Tank Relief Valve
	2							1				
3	1	Cloudy	10:47	29.4	86.5	0.0	-	0	NA	NA	NA	NA
	2							0				
4	1	Cloudy	10:49	30.3	89.0	0.0	-	0	NA	NA	NA	NA
	2							0				
5	1	Cloudy	10:51	29.1	90.8	0.0	-	0	NA	NA	NA	NA
	2							1	Intermittent	NA	Grassy smell	Nearby vegetation
6	1	Cloudy	10:53	29.8	82.1	0.5	317	1	Intermittent	Downwind	Sweet smell	Liquid sugar tank
	2							1				
7	1	Cloudy	10:58	29.9	84.8	1.0	318	0	NA	NA	NA	NA
	2							0				

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
8	1	Cloudy	10:59	29.8	86.6	0.5	334	0	NA	NA	NA	NA
	2							0				
9	1	Cloudy	10:36	25.5	67.3	-	-	1	Continuous	NA	Decoration smell	Paint
	2							1				
10	1	Cloudy	11:07	29.3	70.9	-	-	1	Continuous	NA	Bleaching smell	Corridor floor surface
	2							1	Intermittent			

Remark:
T: Air Temperature;
RH: Relative Humidity;
WD: Wind Direction;
WS: Wind Speed.

Location 9 (Multi-Purpose Room) and Location 10 (Corridor outside Multi-Purpose Room) were the Ad Hoc odour patrol points requested by the client

3.2. Evening time:

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
1	1	Sunny	16:29	31.2	68.4	1.0	212	0	NA	NA	NA	NA
	2							0				
2	1	Sunny	16:31	31.8	68.4	0.0	-	1	Continuous	NA	Biogas	Biogas Holder Tank Relief Valve
	2							1				
3	1	Sunny	16:32	31.6	68.3	0.0	-	0	NA	NA	NA	NA
	2							0				
4	1	Sunny	16:35	32.5	70.5	0.0	-	0	NA	NA	NA	NA
	2							0				
5	1	Sunny	16:36	32.3	71.1	0.5	118	0	NA	NA	NA	NA
	2							1	Intermittent	Side wind	Grassy smell	Nearby vegetation
6	1	Sunny	16:39	32.3	65.1	2.7	100	0	NA	NA	NA	NA
	2							0				
7	1	Sunny	16:42	32.7	66.2	1.2	276	1	Intermittent	Upwind	Biogas	Biogas Holder Tank Relief Valve
	2							1				

Location	Panellist	Weather	Time	T (°C)	RH (%)	WS (m/s)	WD (Degree)	Odour Intensity	Duration of Odour	Direction from Source	On-Site Observation	
											Odour Characteristics	Potential Odour Source
8	1	Sunny	16:43	33.0	67.3	1.1	122	0	NA	NA	NA	NA
	2							0				
9	1	Sunny	16:48	27.8	62.1	-	-	1	Continuous	NA	Decoration smell	Paint
	2							1				
10	1	Sunny	16:47	28.9	63.8	-	-	0	NA	NA	NA	NA
	2							0				

Remark:
T: Air Temperature;
RH: Relative Humidity;
WD: Wind Direction;
WS: Wind Speed.

Location 9 (Multi-Purpose Room) and Location 10 (Corridor outside Multi-Purpose Room) were the Ad Hoc odour patrol points requested by the client

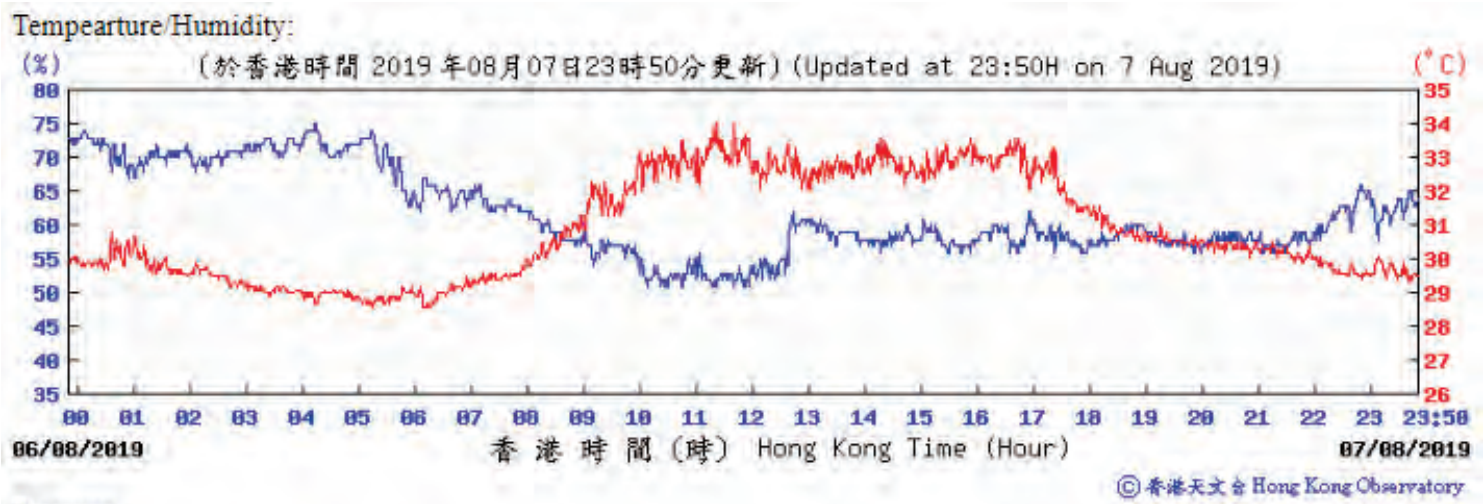
APPENDIX 1

Odour Patrol Route

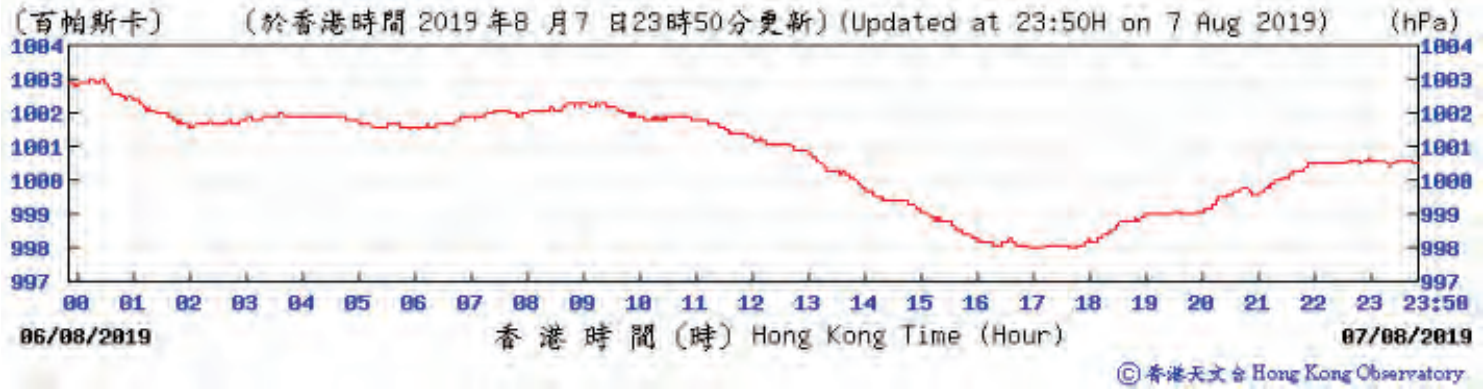
APPENDIX 2

Extract Of Meteorological Observations from Hong Kong Airport Observatory Station

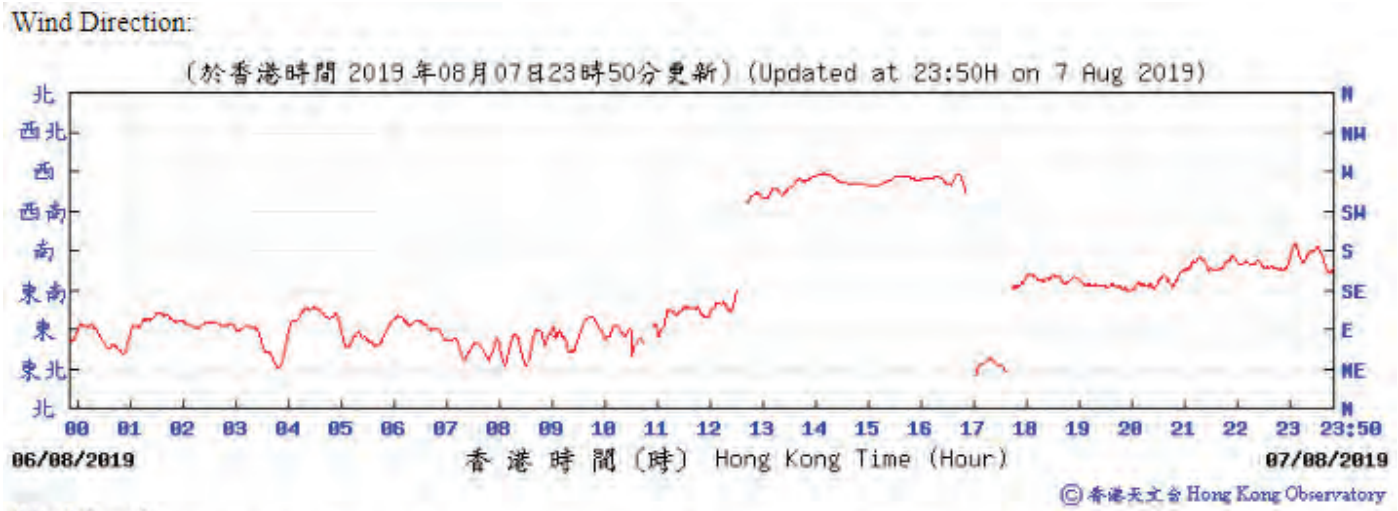
Tempearture/Humidity:



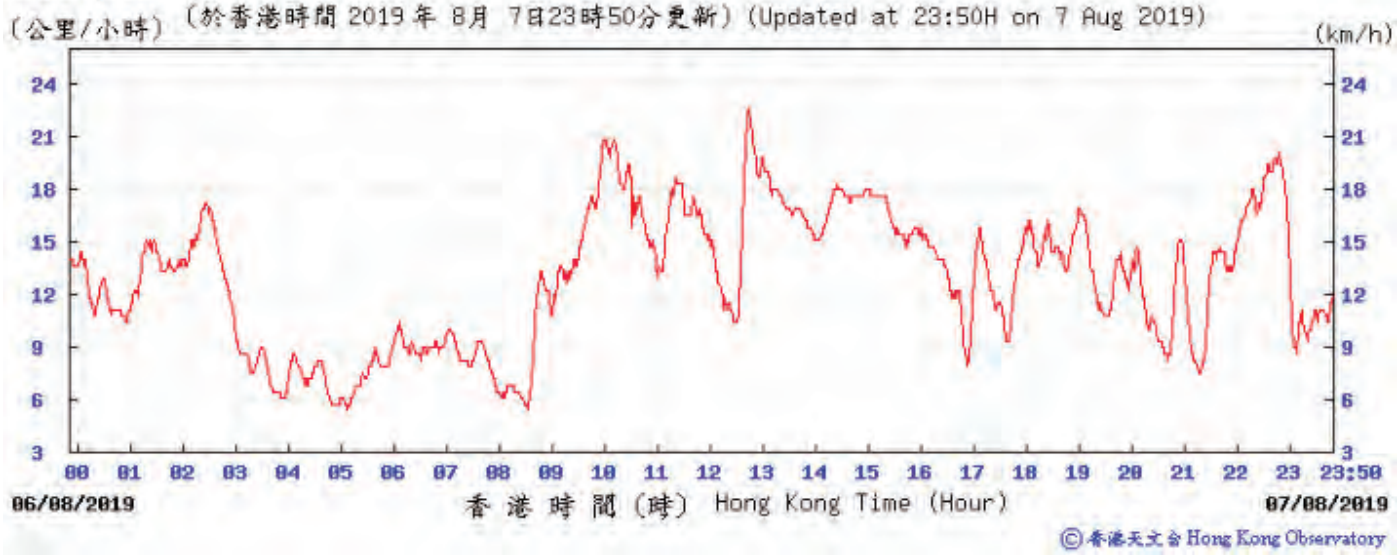
Pressure:



Wind Direction:



Wind Speed:



APPENDIX 3

A3.1. Odour Patrol at Different Locations – Daytime

Location: 1

Location: 2

Location: 3

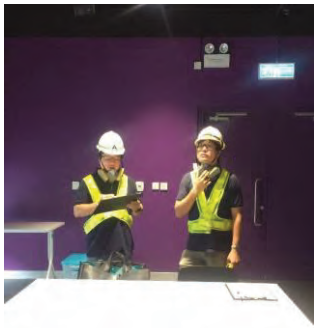
Location: 4

Location: 5

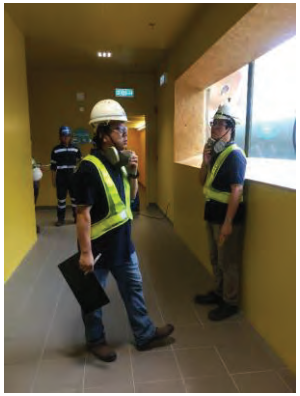
Location: 6

Location: 7

Location: 8



Location: 9



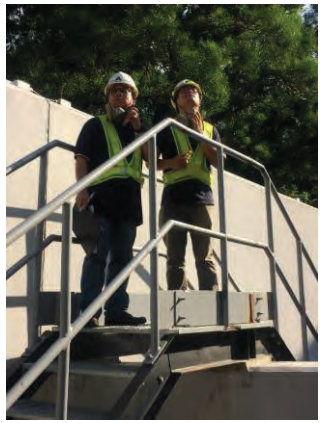
Location: 10

A3.2. Odour Patrol at Different Locations – Evening time

Location: 1

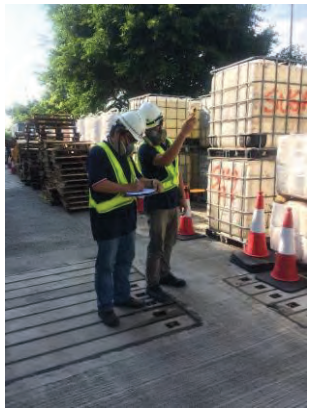
Location: 2

Location: 3



Location: 4

Location: 5



Location: 6

Location: 7

Location: 8

Location: 9

Location: 10