OSCAR Bioenergy Joint Venture

Contract No. EP/SP/61/10 Organic Resources Recovery Centre (Phase 1): *Fifty-fifth Monthly EM&A Report*

1 December 2019 – 31 December 2019

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Meinhardt Infrastructure and Environment Limited

Organic Resources Recovery Centre, Phase I

Monthly EM&A Report

(1 December 2019 – 31 December 2019)

(January 2020)

Verified by: Helen Cochrane

Position: Independent Environmental Checker

Date: 15 Jan 2020

OSCAR Bioenergy Joint Venture

Contract No. EP/SP/61/10 Organic Resources Recovery Centre (Phase 1): *Fifty-fifth Monthly EM&A Report*

1 December 2019 – 31 December 2019

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: 11 January 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 55th monthly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 1 to 31 December 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

- Visitor Centre BS works (exhibition fixture installation).

Environmental Monitoring and Audit Progress

Air Quality Monitoring

Exceedances on NO_x and SO_2 from CHP and NO_x and SO_2 from ASP were recorded on the on-line monitoring system. 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 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 is recommended to closely monitor the processes of the modification of the ASP and the post-modification monitoring of emission level to avoid any exceedance.

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, 0.00 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. 2.83 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.

1,009 L of chemical waste was collected by licenced waste collector from the operation of the Project.

488.13 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 2.76 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 4 times
- Landscape & Visual Inspections 2 times

4 weekly joint environmental site inspections were carried out by the representatives of the Contractor and the ET. The ER and IEC were also present at the joint inspections on 6 December 2019. The environmental control/ mitigation measures (related to air quality, water quality, waste (including land contamination prevention), hazard-to-life and landscape and visual) recommended in the approved EIA Report and the EM&A Manual were properly implemented by the Contractor during the reporting month.

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

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

An incident related to the leakage of suspension liquid from the intermediate digestate tank occurred on 28 December 2019.

An incident related to the release of biogas occurred on 25 August 2019. The incident has been resolved. The investigation will be reported in the next reporting period.

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.
- Modification of the ASP to control the air emission.
- Visitor Centre BS works (exhibition fixture installation).

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 55th EM&A report which summarises the monitoring results and audit findings for the EM&A programme during the reporting period from **1** to **31 December 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
• Visitor Centre BS works (exhibition fixture installation).

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-RW0280-19 (Superseded CNP GW-RW0538-18)	21 July 2019-20 January 2020	Approved on 28 June 2019
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*(1).

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

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

Event	Action	
	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. F) 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)	5 - 680	680	Nil	Nil
Dust (or TSP)	0.0 – 0.0	6	Nil	Nil
Odour (including NH_3 & H_2S) (b)	0 – 40	220	Nil	Nil

Notes:

(a) Online monitoring was not available during this reporting period. 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 installed in the next reporting period.

(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 – 15	15	Nil	Nil
Carbon Monoxide	0 – 386	650	Nil	Nil
NO_x	0 – 297	300	Nil	Nil
SO_2	0 – 154	50	Identified [d]	Tripping of the desulphurisation system.
NMVOCs [b]	Nil	150	Nil	Nil
VOCs (including methane) [c]	0 – 1,126	1,500	Nil	Nil
HCl	0 – 1	10	Nil	Nil
HF	0.0 – 0.5	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.

(d) Dates with exceedances on SO_2 (number of exceedances on the day) were identified on 8 (13), 9 (23), 10 (20), 11 (3) and 20 (3) December 2019.

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 – 15	15	Nil	Nil
Carbon Monoxide	0 – 343	650	Nil	Nil
NO_x	0 – 300	300	Nil	Nil
SO_2	0 – 101	50	Identified [d]	Tripping of the desulphurisation system.
NMVOCs [b]	Nil	150	Nil	Nil
VOCs (including methane) [c]	0 – 1,310	1,500	Nil	Nil
HCl	0 – 1	10	Nil	Nil
HF	0 – 0.7	1	Nil	Nil

Notes:

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

(b) Quarterly sampling of NMVOCs in CHP2 was conducted on 19 November 2019. No exceedance was identified. The final result has been included in *Annex J*.

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

(d) Dates with exceedances on SO_2 (number of exceedances on the day) were identified on 6 (1), 8 (8), 9 (18), 10 (12) and 11 (2) December 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	15	Nil	Nil
Carbon Monoxide	0 – 285	650	Nil	Nil
NO_x	0 – 541	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 – 165	50	Identified [e]	Tripping of the desulphurisation system.
NMVOCs [b]	Nil	150	Nil	Nil
VOCs (including methane) [c]	0 – 1,394	1,500	Nil	Nil
HCl	0 – 1	10	Nil	Nil
HF	0 – 1.0	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 CHP3 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.

(d) Dates with exceedances on NO_x (number of exceedances on the day) were identified on 4 (12), 5 (19), 6 (16), 8 (11), 9 (16), 10 (13), 11 (11), 12 (19), 13 (16), 14 (15), 15 (12), 16 (5), 17 (4), 18 (16), 19 (18), 20 (7), 21 (3), 22 (11), 23 (10), 24 (7), 25 (9), 26 (11), 27 (11), 28 (9), 29 (7), 30 (6) and 31 (4) December 2019.

(e) Dates with exceedances on SO_2 (number of exceedances on the day) were identified on 4 (1), 5 (15), 6 (24), 7 (10), 8 (15), 9 (22), 10 (22), 11(3) and 20 (2) December 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)	0.0 – 3.0	5	Nil	Nil
Carbon Monoxide	0 – 56	100	Nil	Nil
NOx	0 – 409	200	Identified [c]	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.
SO_2	0 – 54	50	Identified [d]	Tripping of the desulphurisation system.
VOCs (including methane) [b]	0 – 5	20	Nil	Nil
NH_3	0 – 19	35	Nil	Nil

Parameter	Range of Hourly Average Conc. (mg/Nm^3) [(a)]	Max. Emission Limit (mg/Nm^3)	Exceedances Identified	Remarks
HCl	0 – 2	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 NO_x (number of exceedances on the day) were identified 11 (3), 13 (2), 14 (3), 15 (5), 16 (4), 19 (3), 20 (5), 25 (6), 26 (5), 27 (3), 28 (5), 29 (3), 30 (4) and 31 (3) December 2019.

(d) 2 exceedances on SO_2 (number of exceedances on the day) were identified on 10 December 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

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

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*.

Table 4.6 Results of the Discharge Sample

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
pH (pH units)	7.87 – 9.55	6-10 [(a)]	Yes
Suspended Solids [(b)]	107	800	Yes
Biochemical Oxygen Demand (5 days, 20°) [(b)]	29	800	Yes
Chemical Oxygen Demand [(b)]	477	2,000	Yes
Oil & Grease [(b)]	<5	40	Yes
Total Nitrogen [(b)]	65.1	200	Yes

Parameters	Discharged Effluent Concentration (mg/L)	Discharge Limit (mg/L)	Compliance with Discharge Limit
Total Phosphorus (b)	32.0	50	Yes
Surfactants (total) (b)	<1.0	25	Yes

Notes:
(a) Daily Average.
(b) Effluent sample collected on 9 December 2019.

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 G*). 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 4.7*.

Table 4.7 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
December 2019	0.00 tonnes	0.00 kg	2.83 tonnes	0.00 L

Notes:

(a) Inert C&D materials (public fill) include bricks, concrete, building debris, rubble and excavated spoil. In total, 0.00 tonnes of inert C&D material were generated from the Project. The detailed waste flow is presented in *Annex G*.

(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 G*). 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 4.8*.

Table 4.8 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]	Recycled [c]
December 2019	1,009 L	488.13 tonnes	0.00 tonnes	2.76 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 0.00 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.

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

5 SITE AUDIT

5.1 ENVIRONMENTAL SITE AUDIT

5.1.1 Construction Phase

Joint site inspections were conducted by representatives of the Contractor and the ET on 6, 11, 17 and 27 December 2019 as required for the construction of the Project. The IEC and ER were present at the joint inspection on 6 December 2019.

The audits checked the implementation of the recommended mitigation measures for air quality, landscape and visual, water quality, waste (land contamination) and hazard-to-life stated in the Implementation Schedule (see *Annex F*).

Follow-up actions resulting from the last site inspections were generally taken as reported by the Contractor.

Key observations during the reporting period are summarised as follows:

6 December 2019

- Contractor was reminded to properly place and cover chemical containers.

11 December 2019

- No particular observation during this inspection.

17 December 2019

- No particular observation during this inspection.

27 December 2019

- No particular observation during this inspection.

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

5.1.2 Operation Phase

The monthly inspection of the landscape and visual mitigation measures for the operation phase of the Project on 6 December 2019 covered the operation phase environmental site audit. Joint site inspections was conducted by representatives of the Contractor, ER, IEC and the MT on 6 December 2019 as required for the operation of the Project.

The audits checked the implementation of the recommended mitigation measures for air quality, landscape and visual, water quality, waste (land contamination) and hazard-to-life stated in the Implementation Schedule (see

Annex F).

Follow-up actions resulting from the last site inspections were generally taken as reported by the Contractor.

Key observations during the reporting period are summarised as follows:

6 December 2019

- No particular observation during this inspection.

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

5.2 LANDSCAPE AND VISUAL AUDIT

Inspection of the landscape and visual mitigation measures for the construction phase of the Project was performed on 6 and 16 December 2019. Inspection of the landscape and visual mitigation measures for the operation phase of the Project was performed on 6 December 2019.

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 specific observation was found during site inspections on 6 and 16 December 2019. No non-compliance in relation to the landscape and visual mitigation measures was identified during the site audits in this reporting period and therefore no further actions are required. The ET/MT will keep track of the EM&A programme to check compliance with environmental requirements and the proper implementation of all necessary mitigation measures.

6 ENVIRONMENTAL NON-CONFORMANCE AND DEFICIENCIES

6.1 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE AND DEFICIENCIES

Non-compliance of emission limits 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 system and the combustion system of the CHP and ASP and identified the following potential causes for the exceedance.

(a) CHP setting was undergoing fine-tuning for performance optimisation. Therefore, it could not effectively remove NO_x at a certain period of time which leads to the exceedance for NO_x limit for the CHP stacks;

(b) Tripping of the circulation pump resulting in the incompletion desulphurisation of biogas which gave rise to exceedances of SO_2 limits for CHP and ASP stacks.

(c) The ongoing performance optimisation of the ASP result in the incomplete combustion of biogas. The unstable emission leads to the exceedances of NO_x in ASP.

For item (a), 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 in the next reporting period.

For item (b), routine maintenance of the desulphurisation column, e.g. cleaning of sensors, has been carried out. Continuous monitoring of the desulphurisation column will remain in place to reduce the duration of tripping which causes exceedances in SO_2 in CHP and ASP stacks.

For item (c), parts of the modification works has been completed, with more components waiting to be delivered to Hong Kong. The Contractor has scheduled the remaining modification work for the next few reporting periods with schedule shutdown of the ASP to facilitate the installation of equipment for performance optimisation.

The investigation report is presented in *Annex I*.

Suspension liquid overflow from the intermediate digestate tank (IDT) to the surface channel inside AD tanks farm was observed on 28 December 2019.

The investigation report and the extract of the incident report provided by the Contractor are presented in *Annex I*.

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 I*.

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 H*.

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.
- Modification of the ASP to control the air emission.
- Visitor Centre BS works (exhibition fixture installation).

This EM&A Report presents the EM&A programme undertaken during the reporting period from **1** to **31 December 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 EM&A requirements.

For the operation phase, exceedances of the emission limits for ASP stack monitoring 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 NO_x on 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31 December 2019. • Exceeded emission limit of SO_2 on 4, 5, 6, 7, 8, 9, 10, 11 and 20 December 2019
Ammonia Stripping Plant (ASP)	• Exceeded emission limit of NO_x on 11, 13, 14, 15, 16, 19, 20, 25, 26, 27, 28, 29, 30 and 31 December 2019 • Exceeded emission limit of SO_2 on 10 December 2019

Exceedances in emission parameters of CHP and ASP were found to be a result of the continuous fine-tuning of CHP and ASP setting.

The Contractor has implemented mitigation measures to control the exceedance, which is the modification of the CHP and ASP to optimise overall performance.

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

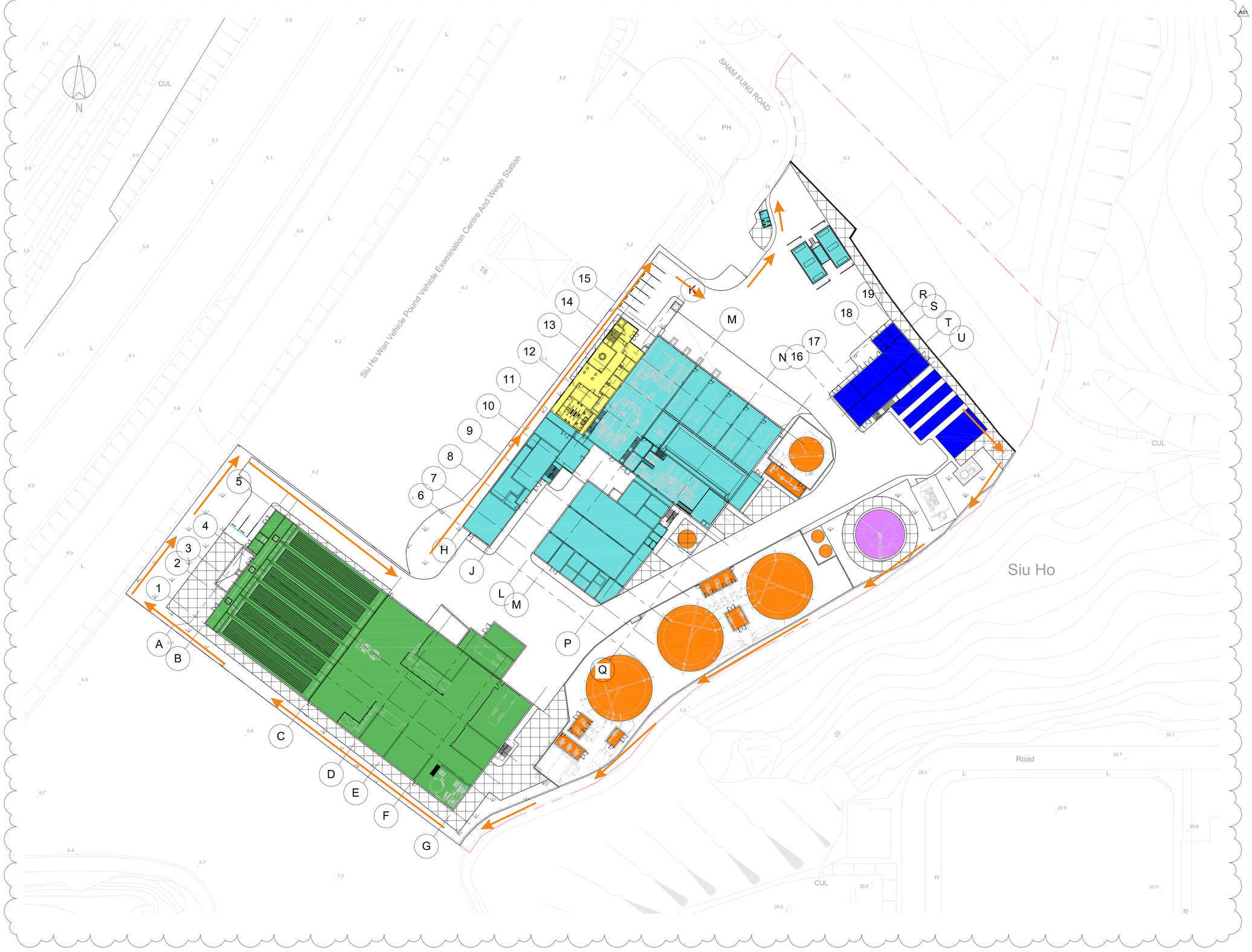
The environmental control /mitigation measures related to air quality, water quality, waste (including land contamination prevention), hazard-to-life and landscape and visual recommended in the approved EIA Report and the EM&A Manual were properly implemented by the Contractor during the reporting month.

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.

No complaint/summon/prosecution was received.

Annex A

Project Layout



Key

Patrol Route

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

CLIENT

ENVIRONMENTAL PROTECTION DEPARTMENT
GOVERNMENT OF THE HKSAR

CLIENT'S CONSULTANT

AECOM ASIA CO. LTD.

CONTRACTOR

OSCAR BIOENERGY JV

LEAD DESIGNER

ARUP
Ove Arup & Partners Hong Kong Limited

ENVIRONMENTAL TEAM

ERM HONG KONG LIMITED

INDEPENDENT CONSULTANTS

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

PROJECT

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

STATUS

DRAFT ISSUE

DRAWING TITLE

SITE LAYOUT

DRAWN	CHECKED	APPROVED
CW	RS	DP

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

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

0279222v.cdr

Plot Time: 05/03/15 21:20:07
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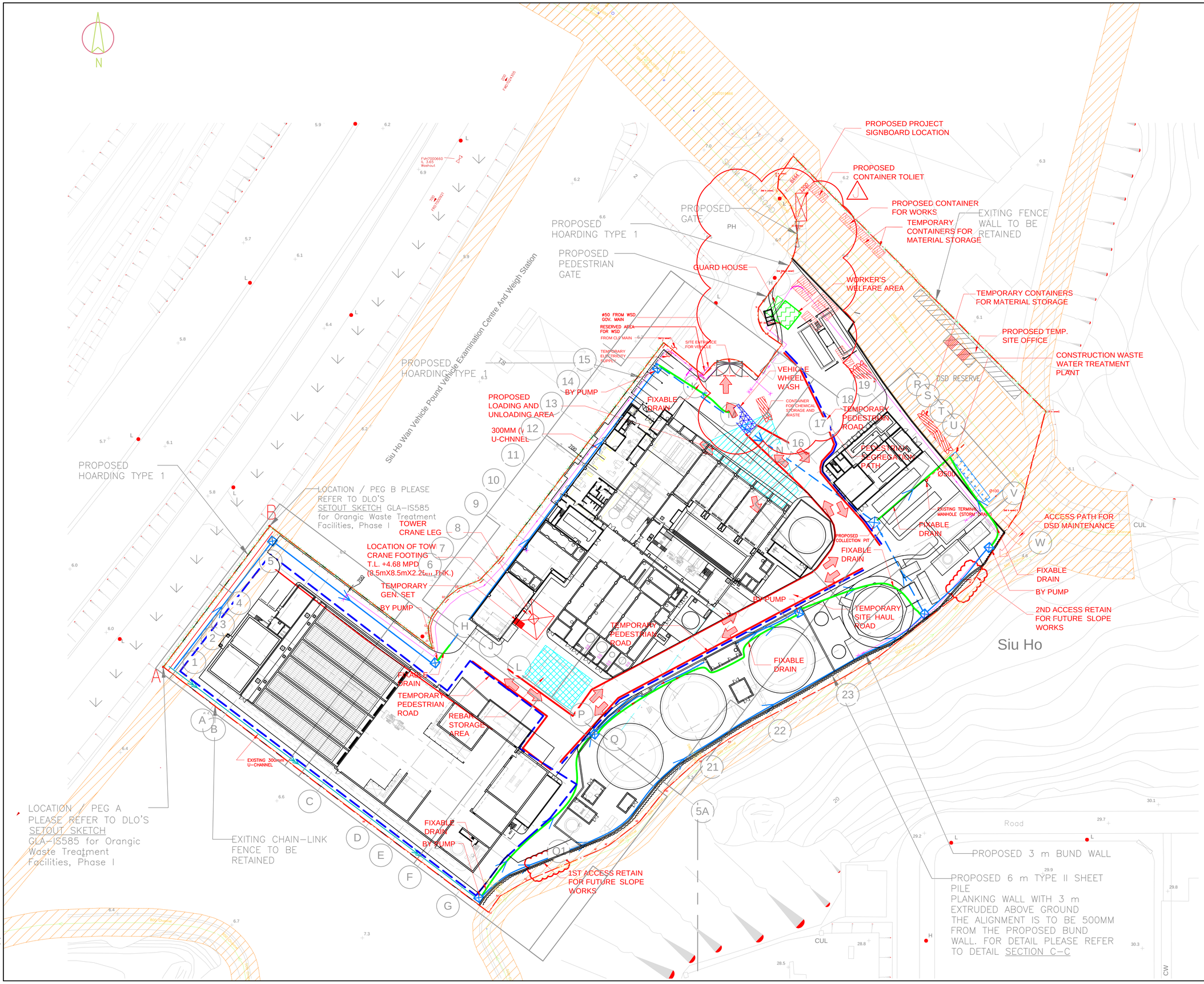
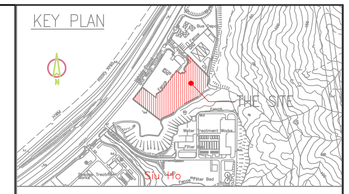
Annex B

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

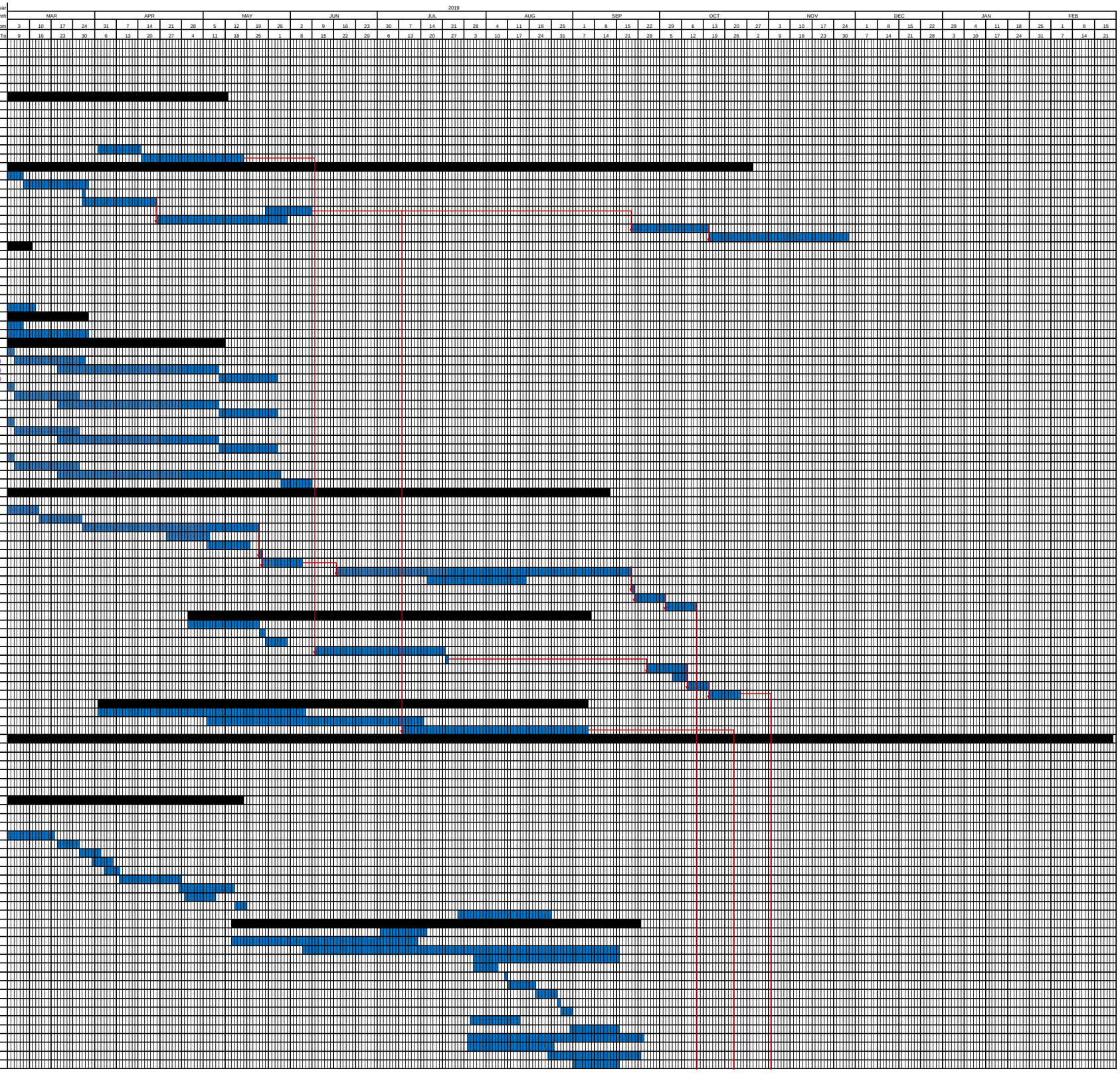
Construction Programme of the Project

Organic Resources Recovery Centre Phase 1

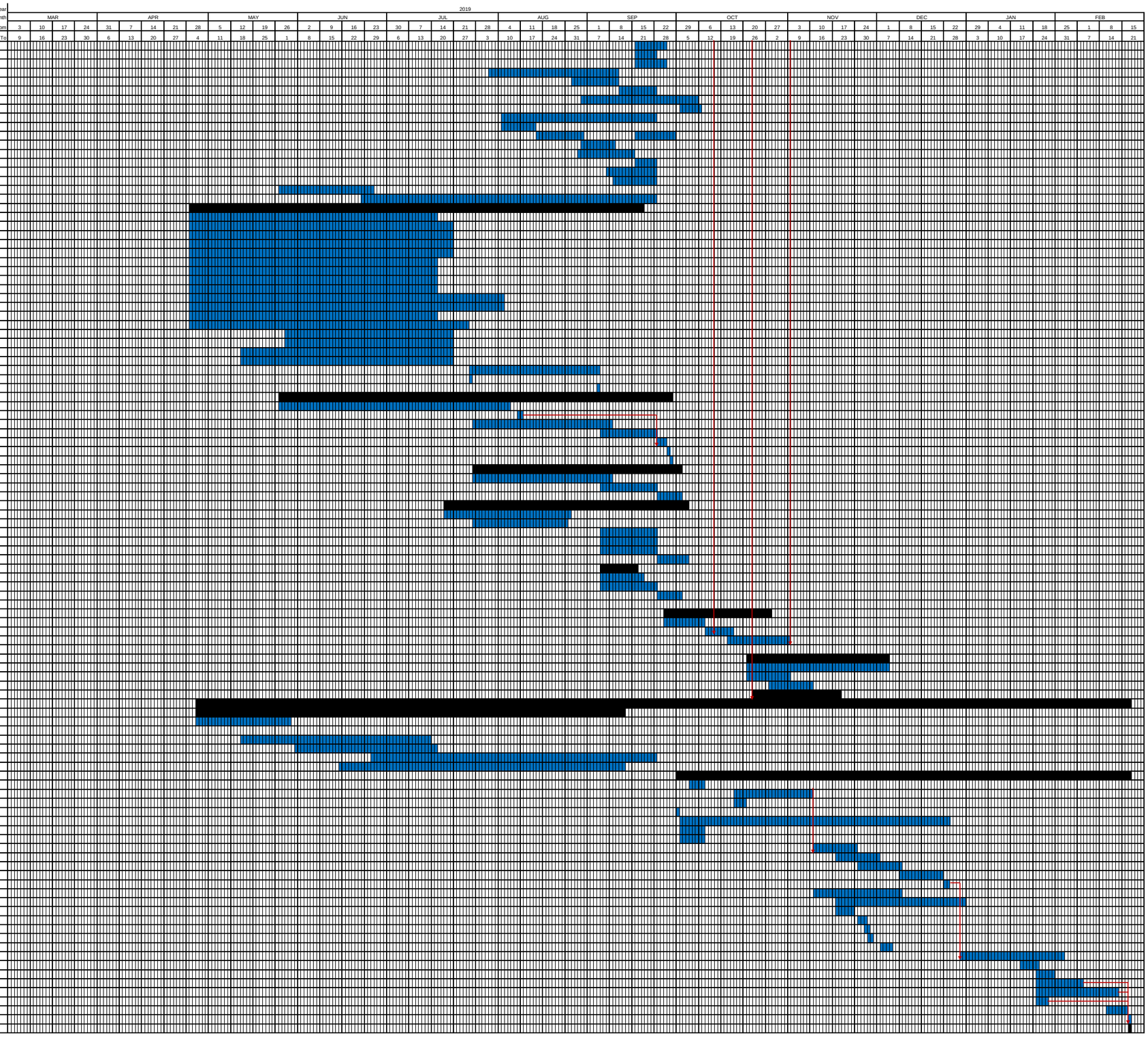
Work Programme for Visitor Centre

Updated: 12/9/2019

ID	Task Name	Contractor's Programme Duration (D)	Start	Finish	
1	**Organic Resources Recovery Centre (Phase 1), Visitor Centre**	**636**	**23/5/2018**	**17/2/2020**	
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**	**273**	**18/8/2018**	**17/5/2019**	
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	33	15/4/2019	17/5/2019	
15	**Architectural Design Submission**	**400**	**25/10/2018**	**28/11/2019**	
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	14	25/6/2019	8/7/2019	
21	Detailed design of facade cladding (internal layer)	42	20/4/2019	31/5/2019	
22	Preparation of offical submission to ArchSD	25	20/9/2019	14/10/2019	
23	ArchSD's approval period	45	15/10/2019	28/11/2019	
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**	**205**	**5/11/2018**	**28/5/2019**	
36	Electrical installation design preparation and submission	120	5/11/2018	4/3/2019	
37	Electrical installation design - IC/ ER vetting and comment	23	5/3/2019	27/3/2019	(A)
38	Electrical installation design - OSCAR reivse & re-submit	52	19/3/2019	9/5/2019	(A)
39	Electrical installation design IC/ER vetting and approval	19	10/5/2019	28/5/2019	(A)
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	25	5/3/2019	29/3/2019	
42	Fire services installation design - OSCAR reivse & re-submit	52	19/3/2019	9/5/2019	
43	Fire services installation design - IC/ER vetting and approval	19	10/5/2019	28/5/2019	
44	MVAC installation design preparation and submission	120	5/11/2018	4/3/2019	
45	MVAC installation design - IC/ ER vetting and comment	25	5/3/2019	29/3/2019	
46	MVAC installation design - OSCAR reivse & re-submit	52	19/3/2019	9/5/2019	
47	MVAC installation design - IC/ER vetting and approval	21	10/5/2019	30/5/2019	
48	Drainage installation design - preparation and submission	120	5/11/2018	4/3/2019	
49	Drainage installation design - IC/ ER vetting and comment	25	5/3/2019	29/3/2019	
50	Drainage installation design - OSCAR reivse & re-submit	72	19/3/2019	29/5/2019	
51	Drainage installation design - IC/ER vetting and approval	10	30/5/2019	8/6/2019	
52	**WSD Statutory Submission**	**282**	**2/1/2019**	**10/10/2019**	
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	57	27/3/2019	22/5/2019	
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	23/5/2019	23/5/2019	
60	Issurance of WW046 Part III by WSD	13	24/5/2019	5/6/2019	
61	FS Installation work (Water Side)	96	17/6/2019	20/9/2019	
62	Liaison with WSD for minor amendment	32	16/7/2019	16/8/2019	
63	Submit WW046 Part IV	1	20/9/2019	20/9/2019	
64	WSD inspection on FS water	10	21/9/2019	30/9/2019	
65	Issurance of Part V (Water Certificate) & Completion Advice	10	1/10/2019	10/10/2019	
66	**FSD VAC Submission**	**181**	**29/4/2019**	**26/10/2019**	
67	FS VAC preparation	24	29/4/2019	22/5/2019	
68	OSCAR/ER review and comment	2	23/5/2019	24/5/2019	
69	FS VAC revision	7	25/5/2019	31/5/2019	
70	FS VAC formal submission to FSD	49	10/6/2019	21/7/2019	
71	Issurance of acceptance letter (VAC)	1	22/7/2019	22/7/2019	
72	Submission of FS 314 and FS 501 for VAC system to FSD	13	25/9/2019	7/10/2019	
73	FSI Rehersal	5	3/10/2019	7/10/2019	
74	FS inspection for VAC	7	8/10/2019	14/10/2019	
75	FSD Issurance of acceptance letter (VAC)	10	17/10/2019	26/10/2019	
76	**Off-site Fabrication and Delivery to Site**	**158**	**1/4/2019**	**5/9/2019**	
77	Strutural steel frame	67	1/4/2019	6/6/2019	
78	Roof and façade cladding (internal layer)	70	6/5/2019	14/7/2019	
79	Façade cladding (external layer) & G/F outer skin	60	8/7/2019	5/9/2019	
80	**ON-SITE CONSTRUCTION**	**442**	**3/12/2018**	**17/2/2020**	
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)**	**254**	**14/12/2018**	**24/8/2019**	
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	
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	30	26/7/2019	24/8/2019	
101	**Superstructure Works**	**145**	**14/5/2019**	**5/10/2019**	
102	Construct site wide U/G drainage	15	1/8/2019	15/8/2019	
103	Erection of Structural Steel Frame	60	14/5/2019	12/7/2019	
104	Construct RC structure & RC deck	52	6/6/2019	15/9/2019	
104a	Staircase External R.C. Wall (M/F - 1/F)	47	31/7/2019	15/9/2019	
104b	Wall Formwork Erection & Rebar Fixing for 1st Concrete Casting	8	31/7/2019	7/8/2019	
104c	Wall 1st Concrete Casting	1	10/8/2019	10/8/2019	
104d	Wall 2nd Concrete Casting	9	11/8/2019	19/8/2019	
104e	Wall 3rd Concrete Casting	7	20/8/2019	26/8/2019	
104f	Remove Formwork after R.C. Wall 3rd concrete casting	1	27/8/2019	27/8/2019	
104g	Bamboo scaffold modification	4	28/8/2019	31/8/2019	
104h	Staircase Construction (G/F~M/F)	16	30/7/2019	14/8/2019	
104i	Staircase Construction (M/F~1/F)	16	31/8/2019	15/9/2019	
105	Install Roof Cladding and Staircase metal railing & Sprinkler Pipe	56	29/7/2019	22/9/2019	
105a	Roof Cladding - Scaffold, Fire Paint	28	29/7/2019	25/8/2019	
105b	Roof Cladding (Part 1 - Exhibition Hall) - Cladding & Gutter Install	30	24/8/2019	22/9/2019	
105c	Roof Cladding (Part 2 - Staircase & Link Bridge) - Cladding	15	1/9/2019	15/9/2019	



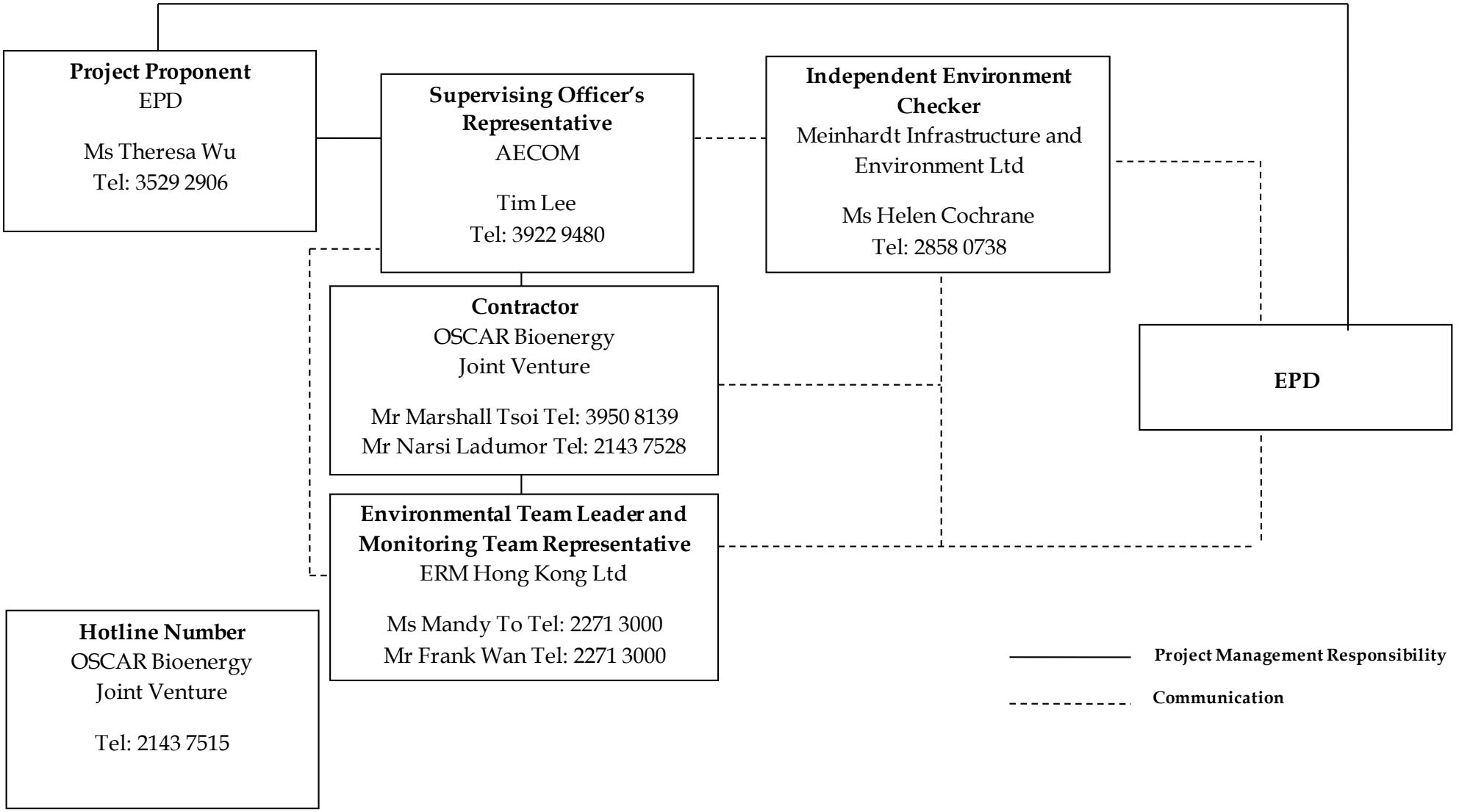
ID	Task Name	Contractor's Programme		
		Duration (D)	Start	Finish
105d	Metal Railing Install at Staircase	10	16/9/2019	25/9/2019
105e	Sprinkler Pipe Install along Staircase	7	16/9/2019	22/9/2019
106	External Wall Cladding (Internal Layer) & External Wall Finish	10	16/9/2019	25/9/2019
106a	Wall Cladding (Exhibition Hall - Internal Layer)	41	1/8/2019	10/9/2019
106b	Wall Cladding (Link Bridge)	15	27/8/2019	10/9/2019
106c	Wall Cladding Reinstate	12	11/9/2019	22/9/2019
106d	External R.C. Wall Finishes - Make good concrete surface, Plastering & Painting	37	30/8/2019	5/10/2019
106e	Dismantle Bamboo Scaffold	7	30/9/2019	6/10/2019
107	Interal BOH finishes & BS Installation (G/F & Staircase)	49	5/8/2019	22/9/2019
107a	Dismantle Staircase Formwork with Propping	11	5/8/2019	15/8/2019
107b	Erect Blockwork wall (G/F-M/F)	15	16/8/2019	30/8/2019
107c	Erect Blockwork wall (M/F-1/F)	10	30/8/2019	8/9/2019
107d	Staircase Wall & Ceiling Plastering	18	29/8/2019	15/9/2019
107e	Sprinkler pipe and BS install	7	16/9/2019	22/9/2019
107f	Glass Wall and Door install at Cloakroom	10	7/9/2019	16/9/2019
	Fire board false ceiling at Server Room	14	9/9/2019	22/9/2019
108	Closure of B1 lift lobby (Stage 1) - Building breakthrough, link bridge connection & FS pip	30	27/5/2019	25/6/2019
109	Closure of B1 lift lobby (Stage 2) - Finishes & Cladding Reinstate	93	22/6/2019	22/9/2019
110	**Building Services Installation**	**152**	**29/4/2019**	**27/9/2019**
111	Procurement and delivery of major BS equipment	99	29/4/2019	5/8/2019
112	Electrical - Light Fitting	83	29/4/2019	20/7/2019
113	Electrical - Conduit & Trunking	83	29/4/2019	20/7/2019
114	Electrical - MCB, MCCB & Distribution Board	83	29/4/2019	20/7/2019
115	Electrical - Cable & Accessories	83	29/4/2019	20/7/2019
116	MVAC - VRF air handing unit	78	29/4/2019	15/7/2019
117	MVAC - Filter unit	78	29/4/2019	15/7/2019
118	MVAC - Split type air conditioning units	78	29/4/2019	15/7/2019
119	MVAC - Inline Fan	78	29/4/2019	15/7/2019
120	MVAC - AHU / Fanb Control Panel	99	29/4/2019	5/8/2019
121	MVAC - S.S. Fire Damper	99	29/4/2019	5/8/2019
122	MVAC - GI Pipe & CU Pipe	78	29/4/2019	15/7/2019
123	MVAC - Air Duct Silencer	88	29/4/2019	25/7/2019
124	FS - FM200	53	29/5/2019	20/7/2019
125	FS - AFA Panel and equipment	53	29/5/2019	20/7/2019
126	FS - GI Pipe & Valve	67	15/5/2019	20/7/2019
127	FS - Fire Hydrant, Hose Reel, FS Inlet & Sprinkler Head	67	15/5/2019	20/7/2019
128	Assess date for BS installation	26	26/7/2019	4/9/2019
129	to Sever Room and MVAC Room on G/F	1	26/7/2019	26/7/2019
130	to M/F	1	4/9/2019	4/9/2019
131	Electrical Installation	**124**	**27/5/2019**	**27/9/2019**
132	Underground cable duct & cable pit	73	27/5/2019	7/8/2019
133	Underground cable laying from Building 3	2	10/8/2019	11/8/2019
134	On-site installation on G/F	44	27/7/2019	8/9/2019
135	On-site installation on M/F	18	5/9/2019	22/9/2019
136	Testing and commissioning	3	23/9/2019	25/9/2019
137	Power energization from LV Main Switch Room of Building 3 to VC	1	26/9/2019	26/9/2019
138	Energisation	1	27/9/2019	27/9/2019
139	MVAC Installation	**45**	**27/7/2019**	**30/9/2019**
140	On-site installation on G/F	44	27/7/2019	8/9/2019
141	On-site installation on M/F	18	5/9/2019	22/9/2019
142	Testing and commissioning	8	23/9/2019	30/9/2019
143	Fire Services Installation	**77**	**18/7/2019**	**2/10/2019**
144	Alteration and diversion of existing sprinkler pipes at Building 1	40	18/7/2019	26/8/2019
145	On-site installation on G/F	30	27/7/2019	25/8/2019
146	On-site installation on M/F	18	5/9/2019	22/9/2019
147	Connect FS Pipe to existing pipeline	18	5/9/2019	22/9/2019
148	AFA Re-programming & connection	18	5/9/2019	22/9/2019
149	Pipe Testing and commissioning; pressure test	10	23/9/2019	2/10/2019
150	CCTV System	**26**	**5/9/2019**	**30/9/2019**
151	Alteration of existing installation	14	5/9/2019	18/9/2019
152	Site installation	18	5/9/2019	22/9/2019
153	Testing & comissioning	8	23/9/2019	30/9/2019
154				
155	**FSI Inspection & Certificate**	**40**	**25/9/2019**	**3/11/2019**
156	FS Form 314 and FS 501 preparation and submission	13	25/9/2019	7/10/2019
157	FS Inspection	9	8/10/2019	16/10/2019
158	FS Certificate	18	17/10/2019	3/11/2019
159				
160	**Interior fitting out works by OSCAR**	**45**	**21/10/2019**	**4/12/2019**
161	G/F Cloakroom	45	21/10/2019	4/12/2019
162	Fire staircase from G/F to M/F	14	21/10/2019	3/11/2019
163	Link bridges to M/F & 1/F of Buidling 1	14	28/10/2019	10/11/2019
164	**Façade cladding (external layer) & G/F outer skin by OSCAR**	**28**	**23/10/2019**	**19/11/2019**
165	**Exhibits and Equipment Installation by Adbrownies**	**293**	**1/5/2019**	**17/2/2020**
166	**Pre-construction stage**	**135**	**1/5/2019**	**12/9/2019**
167	Design shop drawings	80	1/5/2019	19/7/2019
168	~~Statutory submission~~			
169	Material submission for approval	78	15/5/2019	31/7/2019
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**	**142**	**29/9/2019**	**17/2/2020**
174	Setting out review and confirmation	5	3/10/2019	7/10/2019
174a	Install Ceiling Grid System for LAV hanging at M/F level by OSCAR	25	17/10/2019	10/11/2019
174b	Temporary open of access panel from external cladding by OSCAR	4	17/10/2019	20/10/2019
175	Construction site Pre-handover to Adbrownies	1	29/9/2019	29/9/2019
176	Main construction works by Adbrownies	85	30/9/2019	23/12/2019
176a	M/F Floor Screeding & vinyl tile laying with protection	8	30/9/2019	7/10/2019
176b	Staircase (M/F-1/F) Finishes	8	30/9/2019	7/10/2019
176c	270-degree Projection Wall erection	14	11/11/2019	24/11/2019
176d	Partition Wall (Straw board) erection	14	18/11/2019	1/12/2019
176e	Install corrugated panel around the dome exhibit	14	25/11/2019	8/12/2019
176f	Install "Big waster & waste bins" and exhibit items	14	8/12/2019	21/12/2019
176g	Clean up	2	22/12/2019	23/12/2019
177	Electrical installation	28	11/11/2019	8/12/2019
178	IT, LAV cabling works	14	18/11/2019	1/12/2019
178a	Cat 6	6	18/11/2019	23/11/2019
178b	Audio	3	25/11/2019	27/11/2019
178c	Dome	2	27/11/2019	28/11/2019
178d	Others	2	28/11/2019	29/11/2019
178e	Racks & Cable Termination (Server Room)	4	2/12/2019	5/12/2019
179	Dust free LAV equipment installation	20	27/12/2019	27/1/2020
180	Full dome installation	6	14/1/2020	19/1/2020
180a	DOME EFX Equipment Installation	6	19/1/2020	24/1/2020
180b	Control Interface	15	19/1/2020	2/2/2020
181	Testing and commissioning	20	19/1/2020	13/2/2020
182	Furniture delivery & Setup	4	19/1/2020	22/1/2020
183	Client inspection ad defect rectificaton	7	10/2/2020	16/2/2020
184	Handover to Client	1	17/2/2020	17/2/2020
185	**Completion of Vistor Centre**	**1**	**17/2/2020**	**17/2/2020**



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:

Cal. Date and Line#		Test Items and their ppm in Span Gas	Carbon Dioxide (CO2)	Oxygen (O2)	Methane (CH4)	Carbon Monoxide (CO)	Nitric Oxide (NO)	Sulphur Dioxide (SO2)	Nitrogen Dioxide (NO2)	Hydrogen Chloride (HCl)	Ammonia (NH3)	Hydrogen Floride (HF)	Propane (C3H8)
			20	2.1	839	128.2	122	83.2	98.8	60.2	53.3	4.31	1117
07/May/2019	L1	Before				129.81	135.82	81.84	97.86				
		After				127.93	123.07	83.37	99.1				
07/May/2019	L2	Before				126.03	118.64	82.58	97.71				
		After				129.02	122.17	83.17	98.57				
09/May/2019	L1	Before									52.15		
		After									53.17		
09/May/2019	L2	Before									51.76		
		After									54.01		
05/Jun/2019	L1	Before		2.5									
		After		2.1									
05/Jun/2019	L2	Before		2.4									
		After		2.1									
	L1	Before											
		After											
	L2	Before											
		After											
	L1	Before											
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		After											
	L1	Before											
		After											
	L2	Before											
		After											

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	*Air Pollution Control (Construction Dust) Regulation & Good Site Practices* •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	√
B. Hazard to Life				

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
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				
5.44	4.5	<u>*Construction site run-off and general construction activities:*</u> The mitigation measures as outlined in the ProPECC PN 1/94 Construction Site Drainage should be adopted where applicable.	Construction Site / During Construction Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
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: •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.	Construction Site / During Construction Period	<>

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
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. •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.	Work Site / During Construction Period	N/A

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•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 treatment; and •Employ licensed waste collector to collect waste.	Work Site / During Construction Period	√
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;	Work Site/During Design & Construction Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•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.		
6.44	5.7	*Excavated and C&D Materials* 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 No. 31/2004).	Work Site/During Design & Construction Period	√
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*	Work Site / During	√

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

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		•Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities.		

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 (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	Work Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		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 prevent block of pipeline and leaching of wastewater, and therefore prevent overflowed or leached wastewater discharging into nearby drainages and water streams. • Regular site inspection should be conducted to ensure that no wastewater can be directly discharged into nearby water streams.	Work Site / During Design & Operation Period	√
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	Work Site / During Design &	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		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.	Operation Period	
5.57	4.5	All drainage system for collection and transferring wastewater generated in the OWTF to the on-site wastewater treatment plant as described in Section 5.54 should be capable of preventing clogging and easy maintenance and cleaning.	Work Site / During Design & Operation Period	√
D. Waste Management				
6.50	5.12	<u>*Good Site Practices*</u> Good operational practices should be adopted to Minimize waste management impacts: • Obtain the necessary waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Chemical Waste) (General) Regulation and the Land (Miscellaneous Provision) Ordinance (Cap. 28); • Nomination of an approved person to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site; • Use of a waste haulier licensed to collect specific category of waste; • A trip-ticket system should be included as one of the contractual requirements and implemented by the Environmental Team to monitor the disposal of solid wastes at public filling facilities and landfills, and to control fly tipping. Reference should be made to ETWB TCW No. 31/2004. • Training of site personnel in proper waste management and chemical waste handling procedures; • Separation of chemical wastes for special handling and appropriate treatment at a licensed facility; • Routine cleaning and maintenance programme for drainage systems, sumps and oil interceptors; • Provision of sufficient waste disposal points and regular collection for disposal; • Adoption of appropriate measures to minimize windblown litter and dust during transportation of waste, such as covering trucks or transporting wastes in enclosed containers; and • Implementation of a recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites).	During Operation Period	√
6.51	5.13	<u>*Waste Reduction Measures*</u> Good management and control can prevent the generation of significant amounts of waste. It is recommended that the following good operational practices should be adopted to ensure waste reduction: • Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;	During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		• 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.		
6.52	5.14	*Wastes Generated from Pre-Treatment Process* Wastes generated from pre-treatment process should be recycled as far as possible. Wastes generated from pre- treatment process should also be separated from any chemical waste and stored in covered skips. The recyclables should be collected by licensed collectors, while the rest of the waste should be removed from the site on a daily basis to minimize odour, pest and litter impacts. Open burning must be strictly prohibited.	Pre-Treatment Process/ During Operation Period	√
6.53-6.56	5.15-5.18	*Chemical Wastes* • Chemical waste generated from machinery maintenance and servicing should be managed in accordance with Code of Practice on the Packaging, Labelling and storage of Chemical Wastes under the provisions of Waste Disposal (Chemical Waste) (General) Regulation. The chemical waste should be collected by drum-type containers and removed by licensed chemical waste contractors. • Plant / equipment maintenance schedules should be planned in order to minimize the generation of chemical waste. • Non-recyclable chemical wastes and lubricants should be disposed of at appropriate facilities, such as CWTC. Copies or counterfoils from collection receipts issued by the licensed waste collector should be kept for recording purpose. • Recyclable chemical waste will be transported off-site for treatment by a licensed collector. The Contractor will need to register with EPD as a chemical waste producer. Where possible, chemical wastes (e.g. waste lubricants) would be recycled at appropriate facilities, such as Dunwell's oil re-refinery.	Whole Site / During Operation Period	√
6.57-6.58	5.19-5.20	General Refuse • 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				

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
6.65	5.21 (i)	Fuel Oil Containers •Fuel oil should be stored in suitable containers. •All fuel oil containers should be securely closed. •Appropriate labels showing the name of fuel oil should be posted on the containers. •Drip trays should be provided for all containers.	Fuel Oil Storage Containers /During Operation Period	√
6.65	5.21 (ii)	Storage Area ・Distance between the fuel oil 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)	Fuel Oil Spillage Response An Oil Spill Response Plan should be prepared by the operator to document the appropriate response procedures for oil spillage incident in detail. General procedures to be taken in case of fuel oil spillage are presented below. • Training Training on oil spill response actions should be given to relevant staff. The training should cover the followings: - Tools & resources to combat oil spillage and fire, e.g. locations of oil spill handling equipment and firefighting equipment; - General methods to deal with oil spillage and fire incidents; - Procedures for emergency drills in the event of oil spills and fire; and - Regular drills should be carried out. • Communication Establish communication channel with the Fire Services Department (FSD) and EPD to report any oil spillage incident so that necessary 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	Whole Site / During Operation Phase	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		discharge to storm water channels. - Remove the oil spillage. - Clean up the contaminated area. - If the oil spillage occurs during refuelling, the refuelling operation should immediately be stopped. - Recovered contaminated fuel oil and the associated material to remove the spilled oil should be considered as chemical waste. The handling and disposal procedures for chemical wastes are discussed in the following paragraphs.		
6.66	5.22 (i)	<u>Chemicals and Chemical Wastes Handling & Storage</u> • Chemicals and chemical wastes should only be stored in suitable containers in purpose-built areas. • The storage of chemical wastes should comply with the requirements of the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • The storage areas for chemicals and chemical wastes should have an impermeable floor or surface. The impermeable floor I surface should possess the following properties: - Not liable to chemically react with the materials and their containers to be stored. - Able to withstand normal loading and physical damage caused by container handling - The integrity and condition of the impermeable floor or surface should be inspected at regular intervals to ensure that it is satisfactorily maintained • For liquid chemicals and chemical wastes storage, the storage area should be bonded to contain at least 110% of the storage capacity of the largest containers or 20% of the total quantity of the chemicals/chemical wastes stored, whichever is the greater. • 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.	Whole Site / During Operation 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:	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		- Tools & resources to handle spillage, e.g. locations of spill handling equipment; - General methods to deal with spillage; and - Procedures for emergency drills in the event of spills. • Communication Establish communication channel with Fire Services Department (FSD) and EPD to report the spillage incident so that necessary assistance from relevant department could be quickly sought. • Response Procedures Any spillage within OWTF site should be reported to the Site Manager. Site Manager shall attend to the spillage and initiate any appropriate actions needed to confine and clean up the spillage. The response procedures should include the followings: - Identify and isolate the source of spillage as soon as possible; - Contain the spillage and avoid infiltration into soil / groundwater and discharge to storm water channels (in case the spillage occurs at locations out of the designated storage areas); - Remove the spillage; the removal method / procedures documented in the Material Safety Data Sheet (MSDS) of the chemicals spilled should be observed; - Clean up the contaminated area (in case the spillage occurs at locations out of the designated storage areas); and - The waste arising from the cleanup operation should be considered as chemical wastes.		
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*	Whole Site / During Operation Period	√

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location/ Timing	Status
		Manual for Use of Risk-based Remediation Goals for Contaminated Land Management and the *Guidance Note for Contaminated Land Assessment and Remediation*.		
F. Landscape and Visual				
7.98 & Table 7.8	Table 6.2	<u>Operation Phase</u> • Aesthetic design of the facade, including its colour theme, pattern, texture , materials, finishing and associated structures to harmonize with the surrounding settings • Grass / groundcover planting to soften the roof • Heavy standard tree planting to screen proposed associated structures • Grasscrete paving to soften the harshness of large paved surface areas wherever possible	Within Project Area / During Design & Operation Stages	√

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

Annex G

Waste Flow Table

Annex G1

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
September 2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.83
October 2019	4.51	0.00	0.00	0.00	4.51	0.00	0.00	0.00	0.00	6.42
November 2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
December 2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.83
Total	65071.82	8222.28	0.00	0.00	56849.54	605001.00	418801.30	110360.00	6695.00	2741.62

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 G2

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
September 2019	1,800	576.28	0	0	0	24	2.76	0	0	0	0	0	0
October 2019	0	441.22	0	0	0	25	2.88	0	0	0	0	0	0
November 2019	1,600	451.57	0	0	0	26	3.00	0	0	0	0	0	0
December 2019	1,009	488.13	0	0	0	24	2.76	0	0	0	0	0	0
Total	6,649	4,840.18	0	0	0	249	25.92	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 H

Environmental Complaint, Environmental Summons and Persecution Log

Annex H Cumulative Complaint and Summons/Prosecutions Log

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

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

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

Annex I

Investigation Report

Investigation Report of CEMS Exceedances

Date	1 - 31 December 2019
Time	Continuous monitoring throughout December 2019
Monitoring Location	Continuous Environmental Monitoring System (CEMS)
Parameter	Various emission parameters of the Cogeneration Unit (CHP) Ammonia Stripping Plan (ASP)
Exceedance Description	1. Continuous monitoring was carried out at the CHP and ASP throughout the reporting period using the CEMS. According to the EM&A Manual, exceedance is considered if the emission concentration of the concerned pollutants is higher than the emission limits stated in Tables 2.2, 2.3 and 2.5 of the EM&A Manual (Version F) for CAPCS, CHP and ASP respectively. The concentration of the concerned air pollutants were monitored on-line by the CEMS. Exceedances of various emission parameters were recorded on the CEMS including: • NO_x and SO_2 in the CHP • NO_x and SO_2 in the ASP. 2. According to the Contractor, the plant was receiving around 100 tonnes of SSOW daily and was operated normally. 3. Further optimisation of the chemical dosing system of the 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	• 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. • Parts of the modification works on the ASP has been completed, with more components waiting to be delivered to Hong Kong. The Contractor has scheduled the remaining modification work for the next few reporting periods with schedule shutdown of the ASP to facilitate the installation of equipment for performance optimisation.
Remedial Works and Follow-up Actions	The Contractor is recommended to closely monitor the processes, including the modification work and follow-up emission monitoring of the ASP to avoid exceedance. MT will carry out follow-up audit regarding the progress next month.

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

Investigation Report of Intermediate Digestate Tank Leakage

Date	28 December 2019
Time	10:00 am
Monitoring Location	Intermediate Digestate Tank (IDT)
Parameter	IDT level
Exceedance Description	Suspension liquid overflow from the intermediate digestate tank (IDT) to the surface channel inside AD tanks farm was observed on 28 December 2019. The digestate spilled into the storm water discharge channel, and subsequently into the nullah.
Action Taken / Action to be Taken	The Contractor arranged clean-up of the spillage in the nullah immediately and stopped the suspension liquid of the IDT from overflowing. The Contractor found that the programme that controls the IDT was not functioning properly resulting in the overflow of digestate at the IDT. In addition, the 3-way valve near the IDT was open which did not stop the spillage from entering the storm drain system.
Remedial Works and Follow-up Actions	The Contractor monitors the IDT level closely using CCTV, enhanced the routine patrol on the IDT and closed the 3-way valve to prevent possible leakage to the nullah.

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

Extract of the Incident Notification Form on Suspension Overflow at IDT Prepared by the Contractor

Description of the Process

Intermediate Digestate Tank (IDT) is a 30m^3 buffer tank to transfer digestate to the duty centrifuge use. The IDT is provided with liquid level measurements to detect the hydrostatic pressure at the bottom. The second level sensor detects the fill level by radar at the roof area. The digester recirculating / transfer pumps are inhibited by high level in the IDT.

IDT automatic operation is controlled through SCADA. When dewatering operation finishes (the required volume of digestate is processed) the digestate feed pump stops and the duty centrifuge stops after going through a ramp down sequence according to its programmed procedures. Afterwards, a back-flushing cycle of digestate feed pipe can be carried out automatically or manually to clear digestate off the pipeline to avoid release and accumulation of biogas gas within pipelines.

Description of the Incident

On 28 December 2019 morning at around 10:00 am, some black water was found discharging slowly to the nullah from the storm water discharge outlet. Investigation was carried out immediately and found that suspension was passing from the 3-way gate valve near AD3.

There was an incident happened in the early morning (around 08:30am). Suspension was overflowed from the IDT to the surface channel inside AD tanks farm (Figure 1). OSCAR was carrying out cleaning work inside the tank farm. OSCAR had checked the discharge outlet at around 9:30 and did not find any leakage at that moment. OSCAR also kept monitor the outlet by using CCTV. The 3-way gate valve was believed fully closed and the team did not aware suspension would pass through the 3-way gate valve.

Immediate Corrective Actions

The team immediate put sandbags at the stormwater discharge outlet to block the leakage. OSCAR also arranged a vacuum tanker truck immediately to clean up the suspension at the nullah (Figure 2&3). Cleaning work for the spillage inside the tank farm, nearby surface channel and around the IDT was also completed at around 4:00 pm (Figure 4).

Photo.1 Overflow of Suspension from IDT

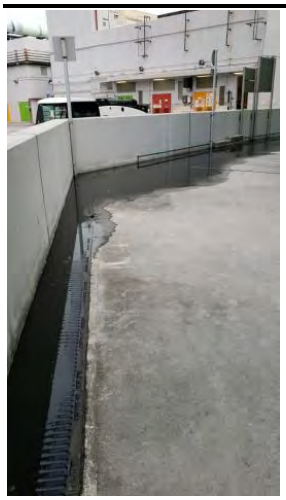


Figure.2&3 Sandbags was put at the discharge outlet and Vacuum tanker truck was arranged to cleanup

Figure.4 Completed cleanup of tank farm and nearby surface channels

Figure.5 Dye test carried out on 30 December to ensure the gate valve is fully closed

Root Cause Analysis

1. The centrifuge was running in the early morning and theoretically only suspension from AD3 would transfer to the IDT during the process.

2. Process water was found inject to IDT during the centrifuge process

3. Likely a hold in the control sequence logic causes the flushing water keep injecting to IDT even the flushing process finished.

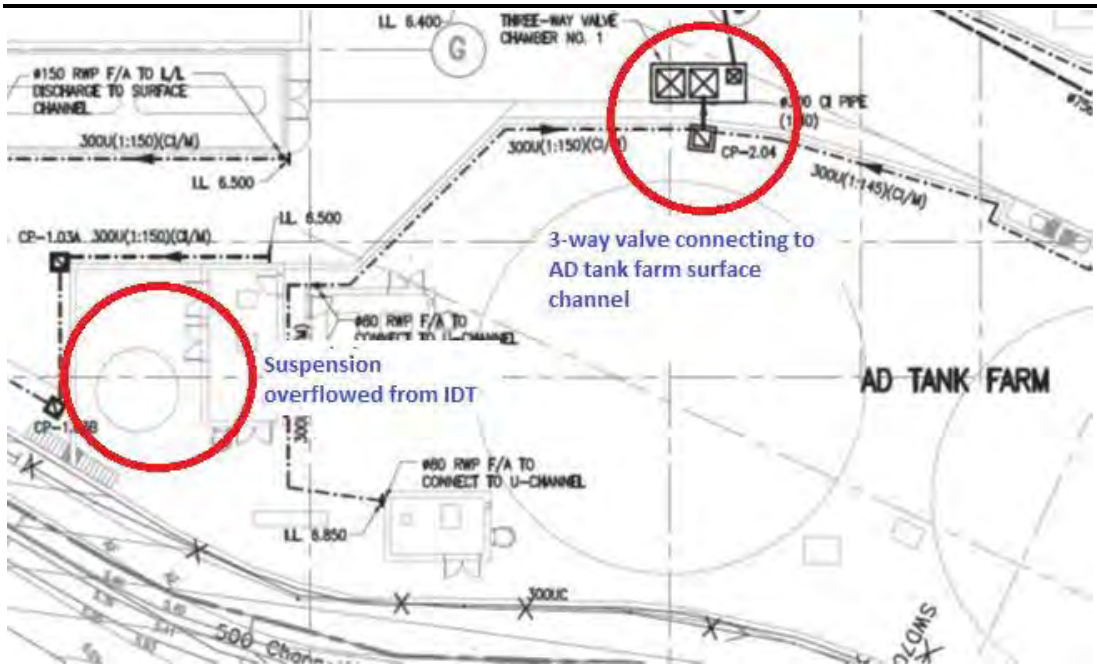
4. The team did aware the IDT tank was reaching high level however cannot immediately stop the flushing water injected to the IDT.

5. Process water with residual suspension overflowed from IDT to the overflow tank.

6. Process water with residual suspension overflowed to the surface channel at AD tank farm and discharged to the surface channel inside the AD tank farm.

7. The 3-way valve was closed at the time of the outbreak. Unfortunately the 3-way valve was not able to tight seal and some of the suspension passed through the valve and leaked to the nullah slowly.

Figure.6 Location map of the incident



Description of Corrective Actions (1)

1. Put sandbags at the discharge outlet to stop the leakage.
2. Arranged to clean up the suspension leaked to the nullah by a vacuum tanker truck.
3. Arranged to clean up the suspension at the surface channel near the IDT and inside AD tank farm.
4. Trouble shoot the centrifuge flushing control logic.

Description of Preventive Actions (2)

1. To check and fully close the 3-way gate valve to prevent possible leakage to nullah.
2. To carry out dye test to check the 3-way valve is fully closed.
3. To keep close monitoring the IDT level for each process (centrifuge and flushing).
4. To carry out programme enhancement to avoid injection of flushing water to IDT that may due to any interruption of programme sequence/logic.

(1) The corrective actions have been closed on 28 December 2019.
(2) The preventive actions have been closed on 31 December 2019.

Investigation Report of Treated Effluent 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 J

Laboratory Results for NMVOCs

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CERTIFICATE OF ANALYSIS

CLIENT:	Oscar Bioenergy Joint Venture	WORK ORDER:	HK1951146
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:	19th November, 2019
		DATE OF ISSUE:	4th December, 2019
PROJECT:	Stack Gas Sampling for CHP2	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 19th November, 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.

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 in Siu Ho Wan, North Lantau Island.

Sampling Period: 19th November, 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)	19 November 2019 13:32 - 14:32

4. Result

Parameter	Unit	Reporting Limit	Result [1]
Gaseous & vaporous organic substances (VOCs) [2]	mg/m^3	0.7	957
Methane (CH_4) [2]	mg/m^3	0.5	954
Non-Methane Organic Carbon (NMOC) [2]	mg/m^3	0.2	3.2
Oxygen [3]	%	0.5	8.5

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 oxygen content reported was the averaged result during the sampling period.