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ATAL-Degremont-China Harbour Joint Venture

Contract No. DC/2013/10
Design, Build and Operate San Wai Sewage Treatment Works

Monthly Operational Phase EM&A Report for June 2022

[07/2022]

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Version:	Rev. 0	Date: 14 July 2022

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ANEWR

Drainage Services Department
Sewage Services Branch
Harbour Area Treatment Scheme
5/F, Western Magistracy
2A Po Fu Lam Road
Hong Kong

Your reference:

Our reference: HKDSD203/50/108102

Date: 12 July 2022

Attention: Mr Paul Law

BY EMAIL & POST
(email: psclaw@dsd.gov.hk)

Dear Sirs

Agreement No. HATS 02/2016
Services for Independent Environmental Checker (IEC) for
Contract No. DC/2013/10 – Design, Build and Operate San Wai Sewage Treatment Works – Phase 1
Monthly Operational Phase Environmental Monitoring and Audit Report No.13 (June 2022)

We refer to email on 7 July 2022 from AECOM Asia Co. Ltd. attaching the Monthly Operational Phase Environmental Monitoring and Audit Report No. 13 (June 2022).

We have no comments and hereby verify the Monthly Operational Phase Environmental Monitoring and Audit Report No. 13 (June 2022) in accordance with Clause 5.4 of the Environmental Permit no. EP-464/2013.

Should you have any queries, please do not hesitate to contact the undersigned or our Mr Ricky Lau on 2618 2831.

Yours faithfully
ANEWR CONSULTING LIMITED

James Choi
Independent Environmental Checker

CPSJ/LCCR/lsmt

cc AECOM – Mr CY Hung (email: cy.hung@swstw-aecom.com)
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EXECUTIVE SUMMARY

In accordance with the Environmental Monitoring and Audit Manual (EM&A Manual) and the Environmental Permit (EP-464/2013) for the Contract No. DC/2013/10 - Design, Build and Operate San Wai Sewage Treatment Works – Stage 1 (the Project), air quality and water quality monitoring are required during operational phase of the Project. The purpose of operational phase monitoring is to confirm the predictions of mitigation measures advised in the EIA report.

As confirmed by the Contractor, all major construction activities of the Project has been completed in May 2021. The Operational Phase of the Project commenced in March 2021. This Monthly Operational Phase Monitoring Report summarizes monitoring events carried out during period from 1 to 30 June 2022. There was no monitoring event carried out during the reporting month.

Air Quality Monitoring

No H_2S measurement or odour patrol was conducted in the reporting month.

Water Quality Monitoring

No marine water and effluent monitoring were conducted in the reporting month.

Toxicity Test

No toxicity test was conducted in the reporting month.

Landscape and Visual Auditing

No landscape and visual auditing was conducted in the reporting month.

Environmental complaint, notification of summons and successful prosecution

No environmental complaint, notification of summons and successful prosecution was received in the reporting month.

Reporting Change

There were no reporting changes in the reporting month.

Future Key Issue

The Project has entered the Operation Phase since March 2021 and its normal operation in the reporting month. Mitigation measures as proposed in the approved Environmental Impact Assessment report will be provided and maintained at the Project.

1 INTRODUCTION

1.1 Background

1.1.1. This Monthly Operational Phase Environmental Monitoring and Audit (EM&A) Report is prepared for Contract No. DC/2013/10 - Design, Build and Operate San Wai Sewage Treatment Works – Stage 1 (the Project). The Project was awarded to ATAL-Degremont-China Harbour Joint Venture (ADCJV) by the Drainage Services Department (DSD). AECOM Asia Co. Ltd. was appointed as the Environmental Team (ET) by ADCJV to implement the operational phase EM&A program in compliance with the EP and the EM&A Manuals.

1.1.2. The project involves expansion of the preliminary treatment works at San Wai STW from 164,000 m^3/d to 200,000 m^3/d Average Dry Weather Flow, upgrading the preliminary treatment level to CEPT and adding centralized disinfection. The site layout plan is shown in **Figure1.1**.

1.1.3. According to the Section 25 of the Particular Specification (PS) and the Environmental Permit No. EP-464/2013, an EM&A programme should be implemented in accordance with the procedures and requirements in the Environmental Monitoring & Audit Manual (EM&A Manual) of the approved EIA report (Registration No. AEIAR-072/2003). The EM&A Manual and EP provide guidelines for the Operational Phase Monitoring Reports and for preparation of the Operational Phase Monitoring Reports.

1.1.4. The operational phase of the Project was commenced in March 2021.

1.1.5. As part of the project EM&A program, baseline monitoring was conducted during July 2019 to April 2020 to determine the ambient environmental conditions before the Project commence operation works.

1.1.6. This is the 13th Monthly Operational Phase Environmental Monitoring and Audit (EM&A) Report for the Project which summaries the audit findings of the EM&A programme during the reporting month from 1 to 30 June 2022.

2 AIR QUALITY MONITORING

2.1 Monitoring Requirement

2.1.1 In accordance with Section 2.5 of the EM&A Manual, odour panel tests and H_2S measurement are required to be conducted for one year after commission of the expanded and upgraded Sai Wai STW.

2.2 Monitoring Parameters

2.2.1 15-min Hydrogen Sulphide (H_2S) concentration (in parts per million) was measured at the site boundary, nearby air sensitive receivers and the exhaust of deodourisation units. Meteorological conditions including temperature, wind speed, wind direction and relative humidity was measured at the time of the monitoring.

2.2.2 Since no correlation between H_2S concentration and odour units was established in the first set of odour monitoring, no subsequent odour units monitoring would be conducted in the air quality monitoring as requested in Section 2.5.1.34 of the EM&A manual.

2.2.3 Apart from odour monitoring, regular oduor patrolling in the vicinity of the STW was also conducted in a monthly interval during the operational phase to ensure that prompt action would be taken whenever any excessive odour emissions area detected.

2.3 Monitoring Frequency

2.3.1 The monitoring frequency of each odour parameters are listed in the **Table 2.1**.

Table 2.1 Parameter and Frequency of Odour monitoring

Monitoring Parameter	Frequency
H_2S Measurement	Quarterly
Odour Patrol	Monthly

2.4 Monitoring Method

H_2S Measurement

2.4.1 H_2S concentration were measured by using of two H_2S analyzers, which utilizes a gold film sensor for the detection of H_2S. The H_2S analyzers were controlled by microprocessor and ensuring raid accurate analyses. The H_2S analyzers were fitted with Data logger, Interface cable and interface software, and Data download and graphics service.

2.4.2 Weather condition including wind direction, wind speed, temperature and humidity was recorded during H_2S measurement.

Odour Patrol

2.4.3 The odour patrol was a simple judgement by an observer patrolling and sniffing around the facilities to detect any odour. This observer should be free from any respiratory disease and not normally working at the facilities.

2.4.4 The observer followed a predeterminded route which should normally be going from non-odours to odours area. The observer would patrol slowly along the route and use his olfactory sense to detect any odours. The locations listed in the predeterminded route are shown **Figure 2.3**.

2.4.5 The observer brought along a logbook to record the findings. The logbook book was kept in the plant office where it could be inspected when necessary. The findings were included the followings:

- Prevailing weather condition
- Wind directions
- Location where odour spotted
- Possible source of odour
- Perceived intensity of the odour
- Duration of odour

2.5 Monitoring Locations for Impact Monitoring

2.5.1 H_2S measurements was undertaken at the proposed monitoring locations, the proposed monitoring locations were determined by the ET Leader and agreed with ER and EPD as the request of the Section 2.5.1.25 and 2.5.1.26 of the EM&A Manual. The monitoring locations are presented in **Table 2.2** and shown in **Figure 2.1** and **Figure 2.2**.

Table 2.2 Proposed Monitoring Locations for Odour Sampling and H_2S Measurement

Identification of Monitoring Location	Description
ASR1a	晉榮貨櫃服務有限公司
ASR2b	永康貨櫃服務有限公司
Site Boundary, SB1*1	Site boundary
OD1*2	Downwind of the exhaust point of deodourisation units
OD2*2	

*1 According to Sections 2.5.1.25 of the EM&A Manual, the H_2S measurement shall be undertaken at the site boundary downwind of the exhaust point of the deodourisation unit and the covered odour source. **Figure 2.2** shown the locations of the site boundary downwind of the exhaust point of the deodourisation unit.

*2 According to Sections 2.5.1.26 of the EM&A Manual, H_2S measurement shall be conducted at the exhaust point of the deodorization unit (OD1&2). Considered the situation of the COVID-19, the ET Leader proposed to conduct only the H_2S measurement at OD1&2. The proposal for this change was approved by the EPD.

2.6 Action and Limit Levels

2.6.1 The Action and Limit Levels established from the baseline monitoring are shown in the **Table 2.3** and **Appendix B**.

Table 2.3 Action and Limit Level for Oduor Monitoring

Location of Monitoring	Parameters	Action Level	Limit Level
SB1	H_2S concentration, ppm	0.0109	0.0109
ASR1		0.0100	0.0100
ASR2		0.0157	0.0157
OD1	H_2S concentration in ppb/ppm, flow rate of exhaust in m^3/s and temperature of exhaust (^oC)	AL = LL/2 = 139 µg/s of H_2S	LL = 277 µg/s of H_2S
OD2			

2.7 Event and Action Plan

2.7.1 The Event and Action Plan for the operational phase odour monitoring was annexed in **Appendix C**.

2.8 Results and Observation

2.8.1 The H_2S measurement and odour patrol were completed for the first year of operational phase EM&A programme. Since no exceedance was recorded in the first year of operational phase, the H_2S measurement and odour patrol will be discontinued as request in Section 2.5.1.3 of the EM&A manual.

3 WATER QUALITY MONITORING

Marine Water Quality Monitoring

3.1 Monitoring Requirements

3.1.1 In accordance with Section 4.5.1.12 of the EM&A Manual, operational phase marine water quality monitoring is suggested three months after the commissioning of the expanded and upgraded San Wai STW.

3.1.2 Marine water samples and in situ measurement should be collected from all the sampling stations on 8 occasions at intervals of approximates 3 months during the operational phase of the Project. On each occasion, marine water samples should be collected every 2 hours for a 12-hour duration. When significant change in the marine water quality are detected, the monitoring frequency should be increase as necessary until the cause for the change is identified.

3.2 Monitoring Equipment

3.2.1 Equipment used in the marine water quality monitoring programme is summarized in **Table 3.1**.

Table 3.1 Marine Water Quality Monitoring Equipment

Monitoring Equipment	Equipment Model
Multifunctional Meter (measurement of Dissolved Oxygen, pH, temperature, salinity and turbidity)	YSI 6820 V2
Water Depth	Lowrance x-4
Positioning Equipment	Garmin GPS72H

3.3 Monitoring Parameter, Frequency and Duration

3.3.1 **Table 3.2** summarises the monitoring parameters, frequency and duration of marine water quality monitoring, as request in Section 4.5.1.13 of the EM&A manual.

Table 3.2 Marine Water Quality Monitoring Parameters, Frequency and Duration

Monitoring Stations	Parameters, unit	Frequency	Duration
W1 to W8	**In-situ Measurement:** • Temperature, °C • Salinity, ppt • DO, mg/L • DO Saturation, % • Turbidity, NTU **Laboratory Analysis:** • SS, mg/L • TIN, mg/L • Unionised ammonia, mg/L • BOD_5,mg/L • *E. coli* , cfu/100mL • Cadmium, Copper, Nickel, Lead, Chromium, Mercury and Zinc, µg/L • PCBs, µg/L • PAHs, µg/L	8 occasions at intervals of approximately 3 months during the operation phase of the upgraded and expanded San Wai STW.	On each occasion, marine water samples will be collected every 2 hours for a 12-hour duration.

3.4 Monitoring Locations

3.4.1 Marine water quality monitoring was undertaken at the proposed monitoring stations set out in the Section 4.5.1.6 of EM&A Manual. The proposed marine water quality stations were presented in **Table 3.3** and shown in **Figure 3.1**.

Table 3.3 Proposed Marine Water Quality Monitoring Stations

Station	Easting	Northing
W1	808231	827494
W2	807469	828888
W3	807221	823737
W4	806309	829988
W5	809062	824638
W6	807066	825034
W7	805592	828162
W8	805412	829400

3.5 Monitoring Methodology

3.5.1 Operating/Analytical Procedures

(a) Digital Differential Global Positioning System (DGPS) was used to ensure that the correct location was selected prior to sample collection.
(b) Portable, battery-operated echo sounder was used for the determination of water depth at each designated monitoring station.
(c) All in-situ measurements were taken at 3 water depths, 1 m below water surface, mid-depth and 1 m above seabed, except where the water depth was less than 6 m, in which case the mid-depth station was omitted. Should the water depth be less than 3 m, only the mid-depth station was monitored.
(d) During the marine water quality measurement, a portable multifunctional meter will be used for measurement of pH, dissolved oxygen, water temperature, turbidity and salinity.
(e) Spare parts of equipment will be maintained for necessary replacement.
(f) Water samples were collected using the water sampler at the monitoring stations and the samples were stored in high-density polythene bottles and then packed in cool-boxes (cooled at 4oC without being frozen) for carrying out the laboratory analysis. The analysis will be commenced in a HOKLAS accredited laboratory, WELLAB LIMITED. (HOKLAS Registration No. 083) within 24 hours after collection of the samples.

3.5.2 Maintenance and Calibration

(a) Before each round of monitoring, the dissolved oxygen probe of YSI 6820 V2 was calibrated by the wet bulb method. A zero check in distilled water was performed with the turbidity probe of YSI 6820 V2 once per monitoring day.

(b) The monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS before use and subsequently re-calibrated at 3-monthly intervals throughout all stages of the water quality monitoring.

3.6 Monitoring Result for Marine Water Quality Monitoring

3.6.1 No marine water quality monitoring was conducted in the reporting month, since the marine water quality monitoring shall be conducted at interval of approximately 3 months during the operational phase of the Project as required in Section 4.5.1.13 of the EM&A manual.

3.6.2 The next marine water quality monitoring is scheduled in August 2022 tentatively.

Effluent Quality Monitoring

3.7 Monitoring Requirement

3.7.1 In accordance with Section 4.6.1.1 of the EM&A Manual, in order to ensure the effectiveness of the proposed treatment process, effluent quality monitoring is recommended.

3.8 Monitoring Parameter

3.8.1 As recommended by the EM&A Manual, the effluent quality monitoring was included the follows parameters:

- pH
- BOD (mg/L)
- SS (mg/L)
- TIN (µg/L)
- NH_3-N (mg/L)
- E. coli (cfu/100mL)
- Cadmium (µg/L)
- Copper (µg/L)
- Nickel (µg/L)
- Lead (µg/L)
- Mercury (µg/L)
- Chromium (µg/L)
- PCBs (µg/L)
- PAHs (µg/L)

3.9 Monitoring Location

3.9.1 Effluent quality monitoring was carried out at the effluent outlet of the San Wai STW as shown in **Figure 3.2**.

3.10 Monitoring Result for Effluent Quality Monitoring

3.10.1 No effluent monitoring was conducted in the reporting month since the effluent monitoring shall be conducted at interval of approximately 3 months during the operational phase of the Project.

3.10.2 The next effluent quality monitoring is scheduled in August 2022 tentatively.

4 TOXICITY TEST

4.1 Monitoring Requirement

4.1.1 In accordance with Section 4.6.1.2 of the EM&A Manual, toxicity testing shall be carried out on 8 occasions at intervals of approximately 3 months during the operational phase of the Project for two marine species. One of the two marine species shall be selected from local environment. The representative species that will be chosen for testing and technical details of the testing method should be agreed and approved by the EPD prior to the operation of the sewage treatment works. The testing method for the EPD approval was submitted on 22 April 2021.

4.2 Monitoring methodology

4.2.1 The methodology of the toxicity testing is summarized in the **Table 4.1**.

Table 4.1 Methodology for Toxicity Testing

Types of Respective Species	Diatom (Skeletonema Costatum)	Barnacle larvae (Balanus Amphitrite)
Toxicity Testing	Chronic Toxicity	Acute Toxicity
Time requirement	7 days	48 hours
Toxicity testing methods	NOEC in 7-day diatom growth inhibition test	LC50 in 48-hr barnacle larvae survival test
Target Levels Proposed in Method Statement	≥0.51%	≥7.10%

4.3 Testing result

4.3.1 No toxicity test was conducted in the reporting month, since toxicity test shall be conducted at interval of approximately 3 months during the operational phase of the Project as required in Section 4.6.1.2 of the EM&A manual.

4.3.2 The next toxicity testing is scheduled in August 2022 tentatively.

5 LANDSCAPE AND VISUAL AUDITING

5.1 Monitoring Requirement

5.1.1 In accordance with Section 6.4 of the EM&A Manual, a competent landscape architect should be employed by the Contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12 months establishment period. The establishment works should be undertaken throughout the Contractor's first year maintenance period which will be within the first operational year of the Project.

5.1.2 All measures undertaken by the both Contractor and the Landscape Contractor during the first year of the operational phase should be audited by a Landscape Architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. Site inspections should be undertaken at least once every two months during the operational phase.

5.2 Result and Recommendations

5.2.1 No landscape and visual auditing was conducted in the reporting month. The next landscape and visual auditing is scheduled in July 2022 tentatively.

6 WASTE MANAGEMENT FOR SLUDGE

6.1.1 All dewatered sludge from the operation stage of the Project has been transported to the Sludge Treatment Facility (STF) for disposal, in accordance with the admission tickets obtained from VW-VES(HK) Ltd, the contractor of EPD operating the STF. When the CEPT sludge reception and dilution facilities in Shatin Sewage Treatment Works are commissioned, part or all of the dewatered sludge will be transported to Shatin Sewage Treatment Works for digestion and / or co-digestion with food waste, while STF will remain to be the default location of disposal.

7 ENVIRONMENTAL COMPLAINT, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTION

7.1.1 No environmental complaint, notification of summons and successful prosecution was received in the reporting month.

8 CONCLUSIONS

8.1.1 No H_2S measurement or odur patrol was conducted in the reporting month.

8.1.2 No marine water monitoring was conducted in the reporting month.

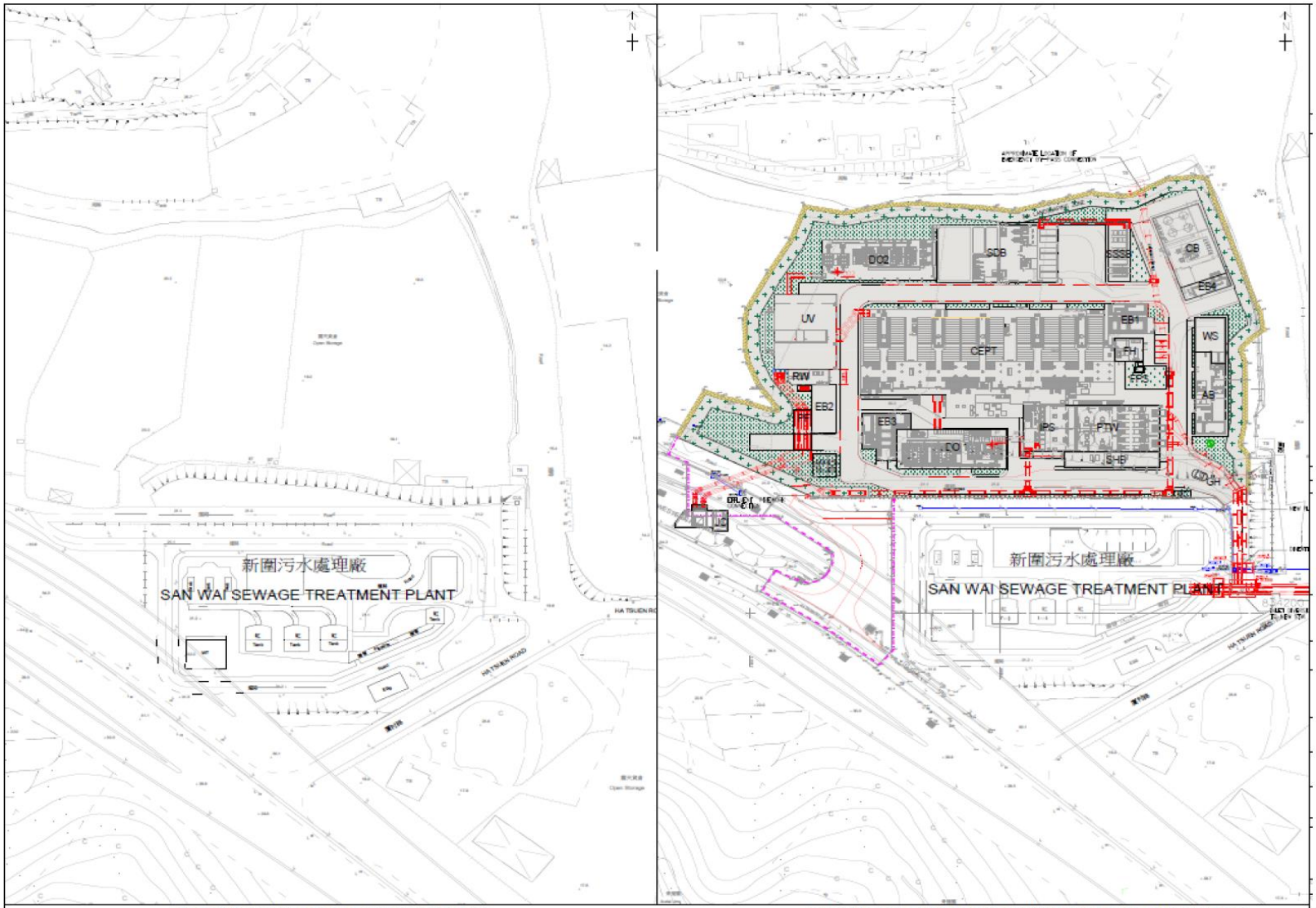
8.1.3 No effluent monitoring was conducted in the reporting month.

8.1.4 No toxicity test was conducted in the reporting month.

8.1.5 No landscape and visual auditing was conducted in the reporting month.

8.1.6 No environmental complaint, notification of summons and successful prosecution was received in the reporting month.

FIGURES



EXISTING SAN WAI SEWAGE TREATMENT WORKS

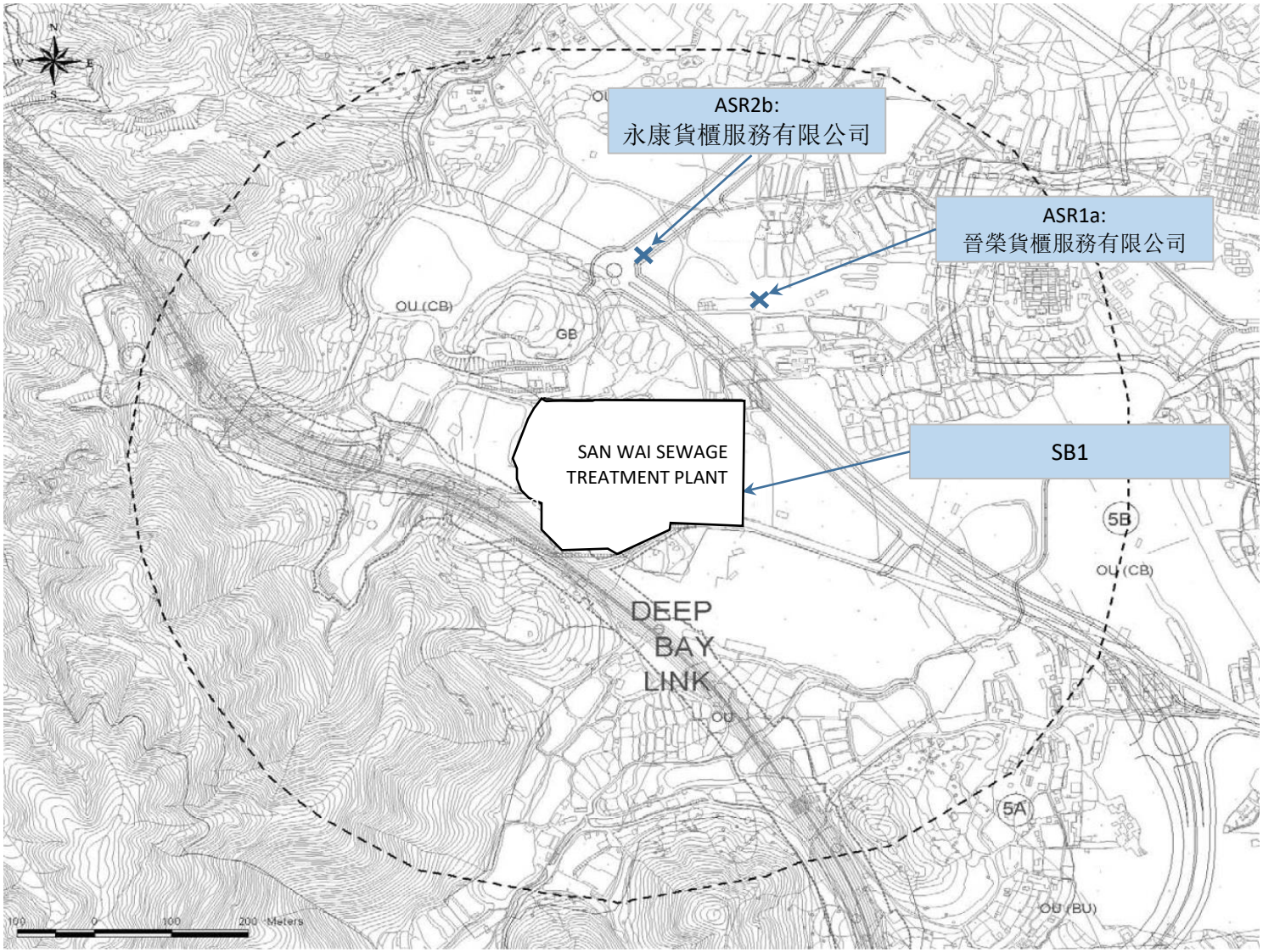
EXPANDED AND UPGRADED SAN WAI SEWAGE TREATMENT WORKS

Contract No. DC/2013/10: Design, Build and Operate
San Wai Sewage Treatment Works –
Operational Phase Monitoring

Site Layout Plan

Date: July 2021

Figure 1.1



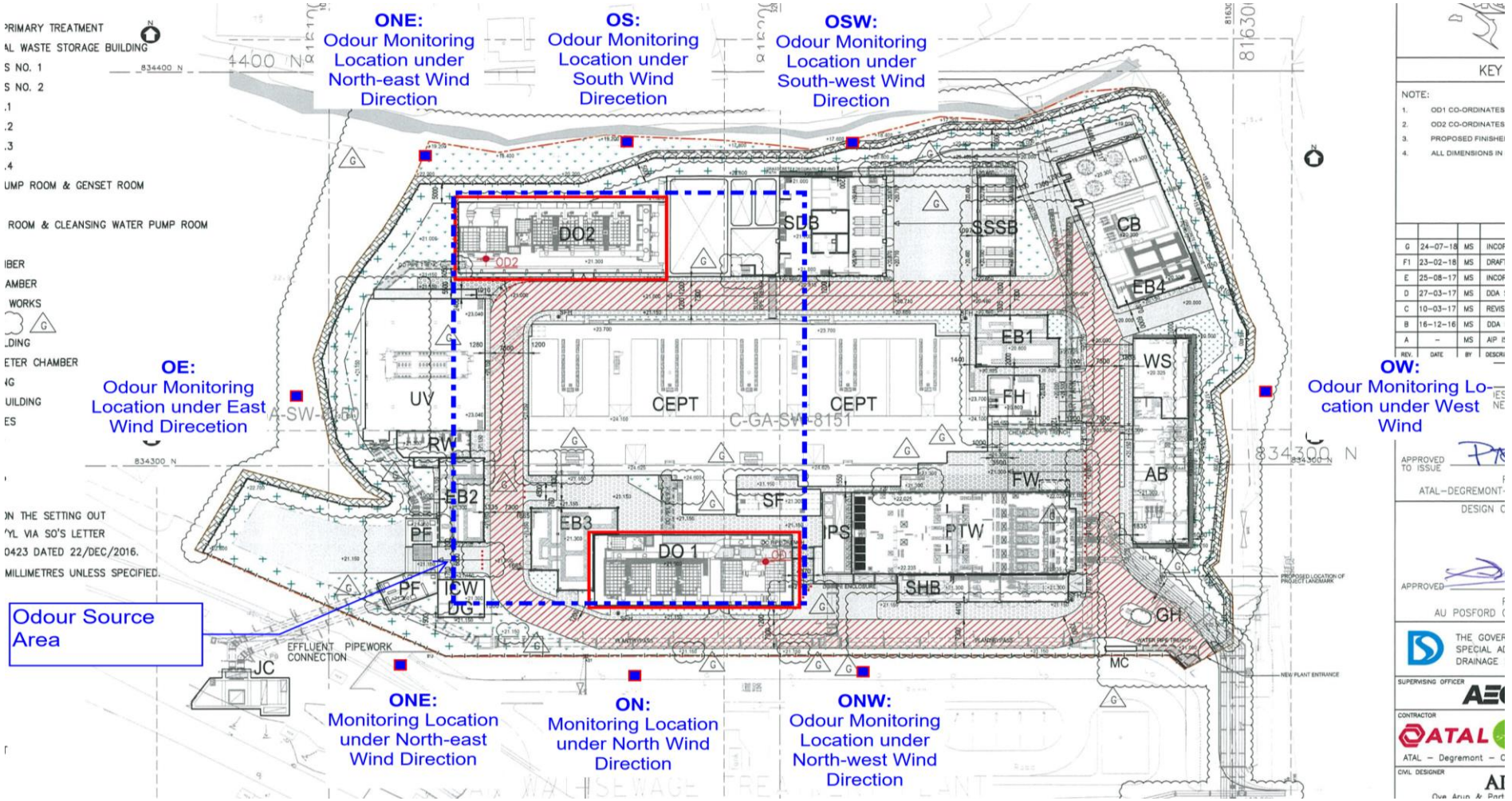
Contract No. DC/2013/10: Design, Build and Operate
San Wai Sewage Treatment Works –
Operational Phase Monitoring

Locations of Odour Monitoring Stations

AECOM

Date: July 2021

Figure 2.1

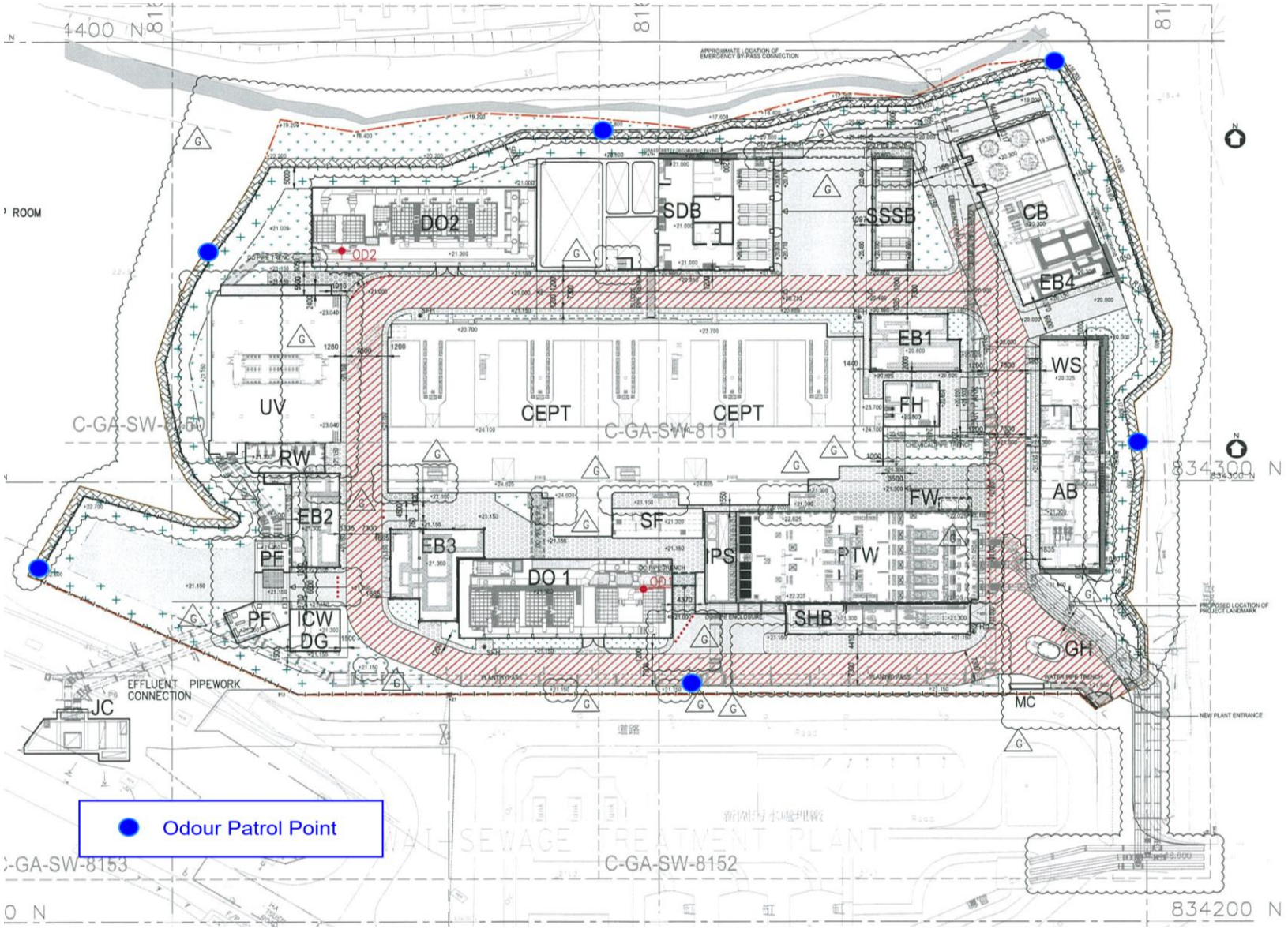


Contract No. DC/2013/10: Design, Build and Operate San Wai Sewage Treatment Works – Operational Phase Monitoring

Site Boundary Downwind Location of Exhaust Point of the Deodourisation Unit

Date: August 2021

Figure 2.2



Contract No. DC/2013/10: Design, Build and Operate
San Wai Sewage Treatment Works –
Operational Phase Monitoring

Locations of Odour Patrol Point

AECOM

Date: July 2021

Figure 2.3

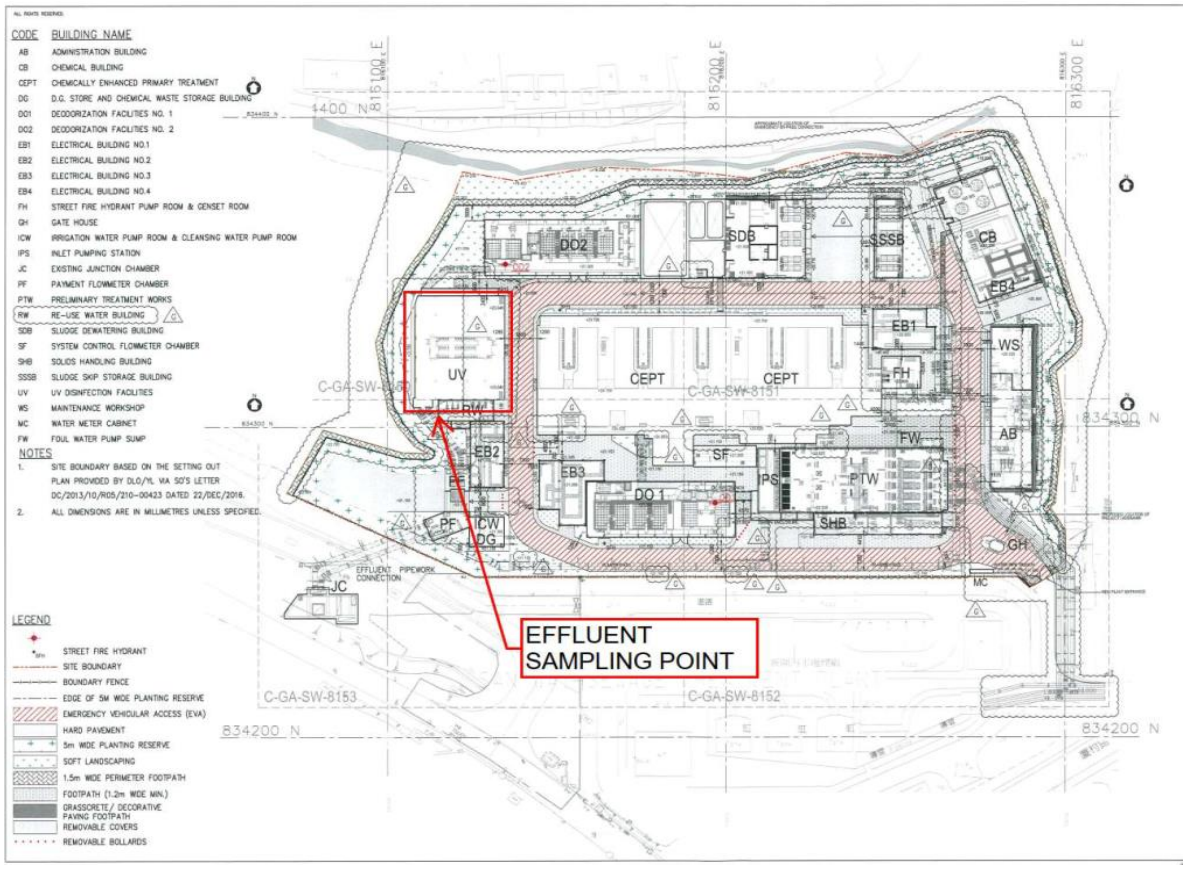
Contract No. DC/2013/10: Design, Build and Operate
San Wai Sewage Treatment Works –
Operational Phase Monitoring

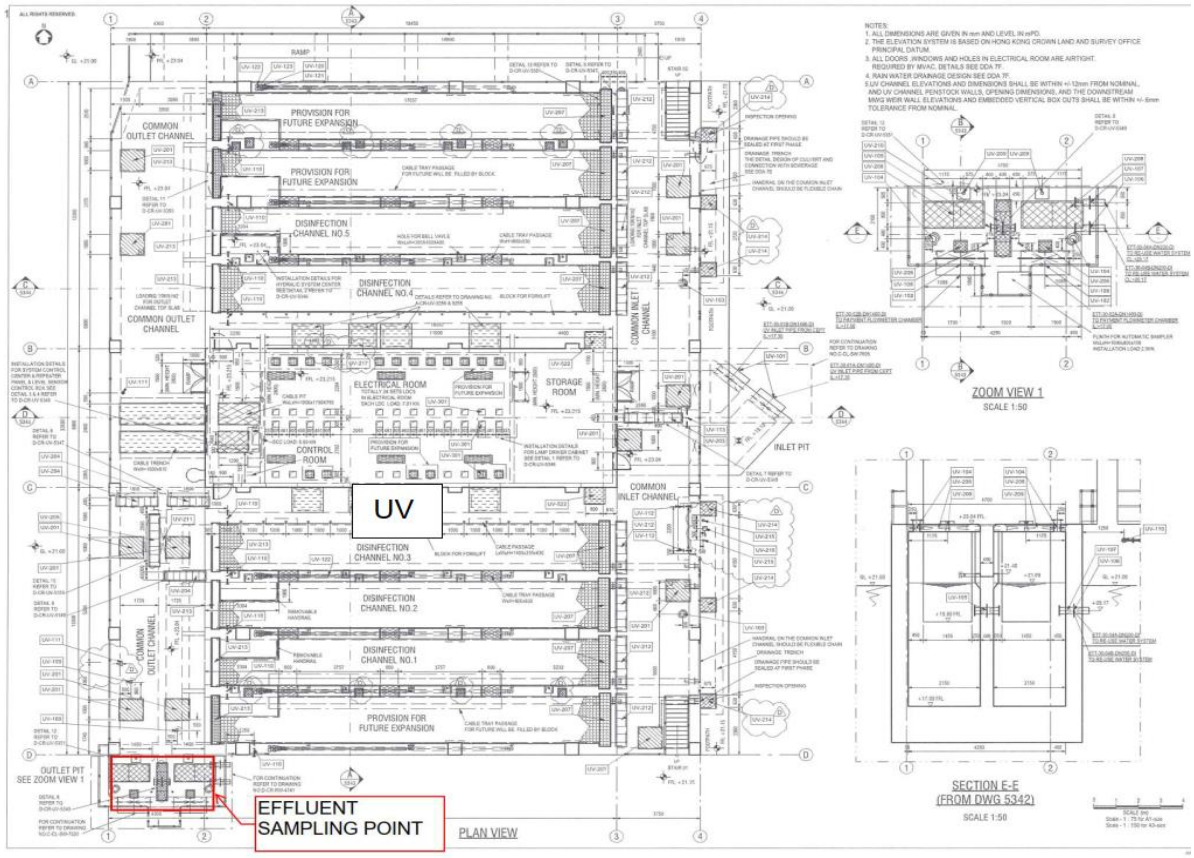
Locations of Marine Warer Qaulity Monitoring Stations

AECOM

Date: July 2021

Figure 3.1





Contract No. DC/2013/10: Design, Build and Operate
San Wai Sewage Treatment Works –
Operational Phase Monitoring

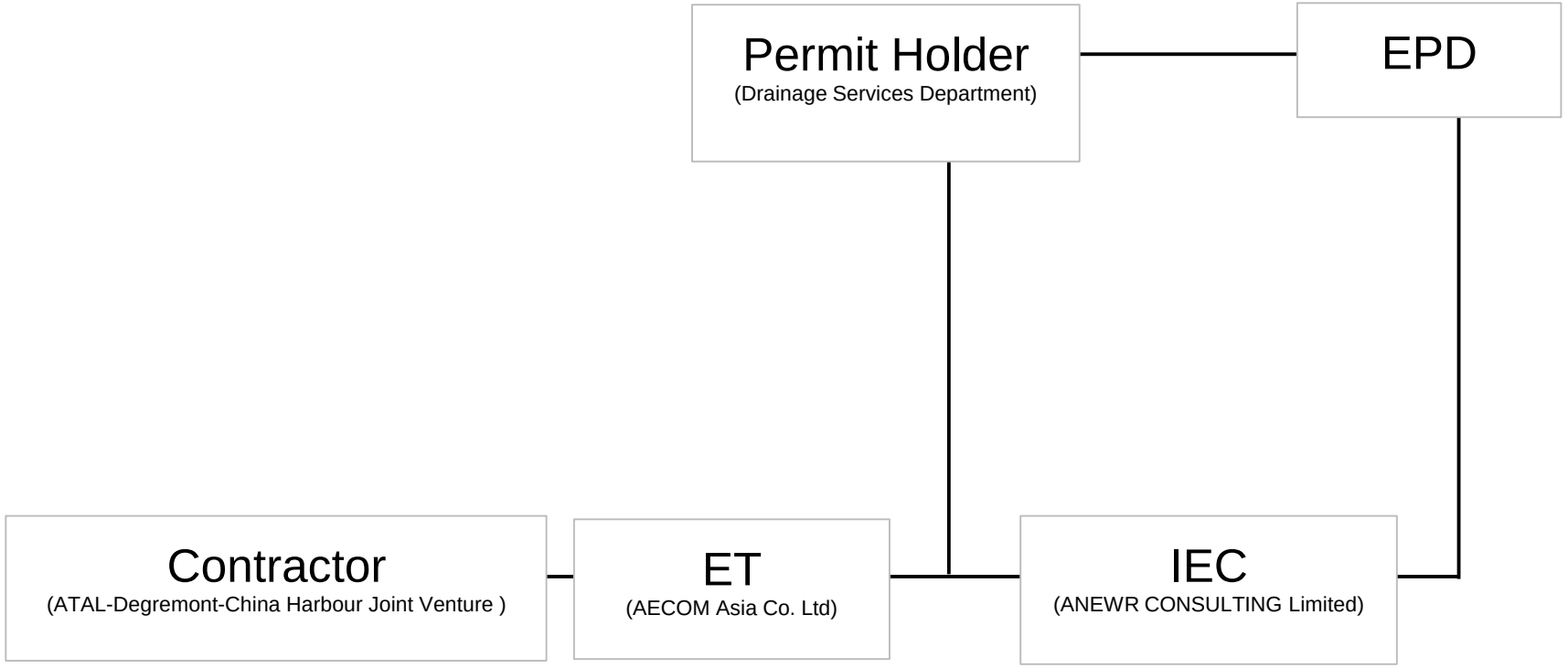
Locations of Effluent Monitoring Stations

AECOM

Date: July 2021

Figure 3.2

APPENDIX A
PROJECT ORGANIZATION STRUCTURE



Project Organization Structure

Contract No. DC/2013/10
Design, Build and Operate San Wai Sewage Treatment Works

Date: June 2022

Appendix A

APPENDIX B
ACTION AND LIMIT LEVELS

Action and Limit Levels

Action and Limit Levels for Operational Phase Odour Monitoring

Location of Monitoring	Parameters	Action Level	Limit Level
SB1	H_2S concentration, ppm	0.0109	0.0109
ASR1		0.0100	0.0100
ASR2		0.0157	0.0157
OD1	H_2S concentration in ppb/ppm, flow rate of exhaust in m^3/s and temperature of exhaust (^oC)	AL = LL/2 = 139 µg/s of H_2S	LL = 277 µg/s of H_2S
OD2			

APPENDIX C
EVENT AND ACTION PLAN

Event and Action Plan

Event / Action Plant for the Operational Phase Odour Monitoring

Event	Action			
	ET	IEC	ER	Contractor
Exceedance of Action Level for one sample at site boundary, ASRs or exhaust of deodourisation unit	• Identify source/ reason of exceedance; • Inform IEC and ER; • Repeat measurement to confirm finding.	• Check with Contractor on the operating activities and implementation of odour mitigation measures; • Discuss with ET and Contractor on the possible remedial actions; • Advise the ER on the effectiveness of the proposed remedial measures; • Supervise implementation of remedial measures.	• Confirm receipt of notification of exceedance in writing; • Notify Contractor; • Ensure remedial actions properly implemented.	• Carry out investigation to identify the source/reason of exceedance or complaints. Investigation shall be completed within 1 week; • Rectify any unacceptable practice; • Amend working methods as required; • Inform ET and EPD if the cause of exceedance is considered to be caused by the project; • Implement amended working methods.
Exceedance of Limit Level for one or more samples at site boundary, ASRs or exhaust of deodourisation unit	• Notify IEC, ER, Contractor and EPD; • Identify source of odour; • Increase monitoring frequency; • Carry out analysis of the operating activities and implementation of odour mitigation measures to determine possible mitigation to be implemented • Arrange meeting with IEC and ER to discuss the remedial actions to be taken; • Assess effectiveness of the remedial actions and keep IEC, EPD and ER informed of the results; • Carry out odour measurement using dynamic olfactometry after implementation of remedial measures to confirm their effectiveness.	• Discuss amongst ET, ER and the Contractor on the potential remedial actions; • Review the proposed remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; • Supervise implementation of remedial measures.	• Confirm receipt of notification of exceedance in writing; • Notify Contractor; • In consultation with the ET, agree with the Contractor on the remedial measures to be implemented; • Ensure remedial measures properly implemented; • If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	• Carry out investigation to identify the source/reason of exceedance. Investigation shall be completed within 1 week; • Rectify any unacceptable practice; • Amend working methods as required; • Inform ET and EPD; • Formulate remedial actions; • Ensure amended working methods and remedial actions properly implemented; • If exceedance continues, consider what portion of the work is responsible and stop that portion of work until the exceedance is abated.