CONTRACT NO. SPW 25/2018

ENVIRONMENTAL TEAM FOR RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS – SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION

UNDER ENVIRONMENTAL PERMIT NO. EP-533/2017

MONTHLY ENVIRONMENTAL MONITORING & AUDIT REPORT

MAY 2019

CLIENTS:

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DATE:

June 2019

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Sha Tin Cavern Sewage Treatment Works

Environmental Permit No. EP-533/2017

Contract No. DC/2018/05 Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction

EP Condition 3.5 – Monthly EM&A Report for May 2019

11 June 2019

By Email

Dear Sir,

I refer to the letter dated 11 June 2019 (ref: LES/J2019-02/CS/L021) from the Environmental Team Leader certifying the captioned Monthly EM&A Report for May 2019.

I have no comment on the captioned report and hereby verify it as having complied with the requirements as set out in the EM&A Manual for the captioned project, in accordance with Condition 3.5 of Environmental Permit No. EP-533/2017.

Should you have any queries regarding the captioned or require any further information, please contact the undersigned at 2828 5875.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED

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Encl.

c.c.	DSD	Mr. Kenneth Poon	By Email
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EXECUTIVE SUMMARY

i. This is the Environmental Monitoring and Audit (EM&A) Monthly Report – May 2019 of Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction under Environmental Permit no. EP-533/2017 (Hereafter as "the Project"). This is the 3rd EM&A report presenting the environmental monitoring findings and information recorded during the period of 1 May 2019 to 31 May 2019. The cut-off date of reporting is at the end of each reporting month.

ii. In the reporting month, the principal work activities conducted are as follow:
Contract no. DC/2018/05 - Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction

- Site clearance;
- Hand dig trial pit excavation
- Hoarding erection

Air Quality Monitoring

iii. 1-hour Total Suspended Particulates (TSP) monitoring would be conducted at five monitoring stations. The sampling frequency is 3 times in every 6 days.

iv. Air quality monitoring for the stations AM1 and AM2 were commenced on 12 April 2019 while

v. station AM5 was commenced on 18 April 2019. Air quality monitoring for the station AM4 was commenced on 3 May 2019 in the reporting period. AM3(A) is under liaison for approval.

vi. No action or limit level exceedance was determined in the reporting period for the stations of AM1, AM2, AM4 and AM5.

Noise Monitoring

vii. Noise monitoring would be conducted at five noise monitoring stations once per week.

viii. Noise monitoring for stations CM4 and CM5 were commenced on 13 April 2019 and 18 April

ix. 2019 respectively. Noise monitoring for stations CM1 and CM3 were commenced on 2 may 2019 in the reporting period. CM2(A) is under liaison for approval.

x. No action or limit level exceedance was determined in the reporting period for the stations of CM1, CM3, CM4 and CM5.

Site Inspections and Audit

xi. The Environmental Team (ET) conducted weekly site inspections for the Contract on 2, 8, 15, 24 and 29 May 2019. IEC attended the joint site inspection on 24 May 2019. No non-compliance was found during the site inspection.

Complaints, Notifications of Summons and Successful Prosecutions

xii. No environmental complaint was received in the reporting period.

Reporting Changes

xiii. Based on the Project baseline report, the air quality monitoring station AM3 and noise monitoring station CM2, Ma On Shan Tsung Tsin Secondary School were relocated to AM3(A) and CM2(A), Kowloon City Baptist Church Hay Nien Primary School.

xiv. Air quality monitoring station AM6 will commence at a later stage upon the commencement of the decommissioning and demolition of the existing Shatin Sewage Treatment Works. The proposal was verified by IEC and submitted to EPD. The proposal has approved by EPD on 9 May 2019 and attached in the **Appendix 1.1**.

xv. Portable direct reading dust meter was proposed to use for 1-hour TSP level instead of HVS to undertaking the air quality monitoring for the project at the stations of AM1, AM2, AM3(A), AM4 and AM5. The proposal was verified by IEC and submitted to EPD, the proposal has approved by EPD on 28 May 2019 and attached in the **Appendix 1.2**.

Future Key Issues

xvi. In coming reporting months, the scheduled construction activities and the recommended mitigation measures are listed as follows:

Key Construction Works	Recommended Mitigation Measures
• Site clearance • Hand dig trial pit excavation • Hoarding and site office erection	• Dust control during dust generating works; • Implementation of proper noise pollution control; and • Provision of protection to ensure no runoff out of site area or direct discharge into public drainage system. • Direct impact to plant species of conservation importance recorded in the vicinity of the construction sites shall be avoided • Excavation materials shall be well covered • Mitigation measures to dust and noise control should be provided to erection of hoarding and site office

1 Introduction

1.1 Scope of the Report

1.1.1. Lam Environmental Services Limited (LES) has been appointed to work as the Environmental Team (ET) under Environmental Permit (EP) no. EP-533/2017 to implement the Environmental Monitoring and Audit (EM&A) programme as stipulated in the EM&A Manual of the approved Environmental Impact Assessment (EIA) Report for Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction (Register No.: AEIAR-202/2016).

1.1.2. In accordance with Clause 3.5 stated in EP-533/2017, 4 hard copies and 3 electronic copies of the Monthly EM&A Report shall be submitted to the Director within 2 weeks after the end of each reporting month throughout the entire construction period.

1.1.3. In accordance with Section 13.4.1.1 of the Project EM&A Manual, the Monthly EM&A Report should be prepared and submitted to the Contractor, the IEC, the ER and EPD within 10 working days at the end of each reporting month, with the first report due the month after construction commences.

1.2 Structure of the Report

Section 1 ***Introduction*** – details the scope and structure of the report.

Section 2 ***Project Background*** – summarizes background and scope of the project, site description, project organization and contact details of key personnel during the reporting period.

Section 3 ***Status of Regulatory Compliance*** – summarizes the status of valid Environmental Permits / Licenses during the reporting period.

Section 4 ***Monitoring Requirements*** – summarizes all monitoring parameters, monitoring methodology and equipment, monitoring locations, monitoring frequency, criteria and respective event and action plan and monitoring programmes.

Section 5 ***Monitoring Results*** – summarizes the monitoring results obtained in the reporting period.

Section 6 ***Compliance Audit*** – summarizes the auditing of monitoring results, all exceedances environmental parameters.

Section 7 **Environmental Site Audit** – summarizes the findings of weekly site inspections undertaken within the reporting period, with a review of any relevant follow-up actions within the reporting period.

Section 8 ***Complaints, Notification of summons and Prosecution*** – summarizes the cumulative statistics on complaints, notification of summons and prosecution

Section 9 ***Conclusion***

2 Project Background

2.1 Background

2.1.1. The Relocation of Sha Tin Sewage Treatment Works (STSTW) to Caverns (the Project) is implemented so as to release the existing site, of a size about 28 hectares, for other uses.

2.1.2. In May 2012, Drainage Services Department (DSD), the Project Proponent commenced a detailed feasibility study on "Relocation of Sha Tin Sewage Treatment Works to Caverns" (the Feasibility Study). The findings of Feasibility Study affirmed that relocating the STSTW to caverns to be constructed at Nui Po Shan of A Kung Kok is technically feasible and financially viable.

2.1.3. The Project is a Designated Project (DP) under the Environmental Impact Assessment Ordinance (EIAO). An application for an Environmental Impact Assessment (EIA) Study Brief under section 5(1)(a) of the EIAO was submitted on 12 May 2014 with a Project Profile (No. PP-508/2014) for the Project. An EIA Study Brief (No. ESB-273/2014) was issued in June 2014. An EIA for the Project was then undertaken, as part of the Assignment, in accordance with this EIA Study Brief and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM). The location of the Project is shown **Figure 2.1**.

2.2 Scope of the Project and Site Description

2.2.1. The Project covers the following DP elements as specified in Schedule 2 of the EIAO (Cap.499), ***Table 2.1*** summarises the DPs under this Project.

Table 2.1 Schedule 2 Designated Projects under this Project

Item	Designated Project	EIAO Reference
DP1	Sewage treatment works with an installed capacity of more than 15,000 m3 per day under Item F.1	Schedule 2, Part I,
DP2	Sewage treatment works under Item F.2 • With an installed capacity of more than 5,000 m3 per day; and • A boundary of which is less than 200m from the nearest boundary of an existing or planned residential area, educational institution and health care institution.	Schedule 2 Part I
DP3	An activity for the reuse of treated sewage effluent from a treatment plant under Item F.4	Schedule 2 Part I

DP4	Underground rock caverns under Item Q.2	Schedule 2 Part I
DP5	An explosives depot in a stand-alone, purpose built building under Item K.10	Schedule 2 Part I;
DP6	Decommissioning of an explosives depot under Item 11	Schedule 2 Part II

2.3 Project Organization and Contact Personnel

2.3.1 Drainage Services Department is the overall project controllers for the Project. For the construction phase of the Project, Project Engineer, Contractor(s), Environmental Team and Independent Environmental Checker are appointed to manage and control environmental issues.

2.3.2 The proposed project organization and lines of communication with respect to environmental protection works are shown in ***Figure 2.2***. Key personnel and contact particulars are summarized in ***Table 2.2***:

Table 2.2 Contact Details of Key Personnel

Party	Role	Post	Name	Contact No.	Contact Fax
AECOM	Engineer's Representative	Chief Resident Engineer	Mr .Leung Chi Man, Simon	6393 8645	3914 5888
China State Joint Venture	Contractor	Site Agent	Mr. KONG Ming, Elvis	9186 2081	2672 2501
		Environmental Officer	Ms. CHIU Mei Yu, Gloria	9224 2413	
Mott MacDonald Hong Kong Limited	Independent Environmental Checker (IEC)	Independent Environmental Checker (IEC)	Mr. Brandon Wong	2828 5875	2827 1823
Lam Environmental Services Limited	Environmental Team (ET)	Environmental Team Leader (ETL)	Mr. Derek Lo	2882 3939	2882 3331

2.4 Construction Activities

2.4.1 In the reporting month, the principal work activities conducted are as follow.

- Site clearance;
- Hand dig trial pit excavation

- Hoarding erection

2.4.2 In coming reporting months, the scheduled construction activities are listed as follows:

- Site clearance;
- Hand dig trial pit excavation
- Hoarding erection
- Site office erection

3 Status of Regulatory Compliance

3.1 Status of Environmental Licensing and Permitting under the Project

3.1.1. A summary of the current status on licences and/or permits on environmental protection pertinent to the Project is shown in ***Table 3.1***.

Table 3.1 Summary of the current status on licences and/or permits on environmental protection pertinent to the Project

Permits and/or Licences	**Reference No.**	**Issued Date**	**Valid Period & Expiry Date** (dd-MM-yyyy to dd-MM-yyyy)	**Status**
Notification of Works Under APCO	442872	7/3/2019	N.A.	Valid
Discharge Licence	444024			Acknowledge receipt from EPD on 8 Apr 2019 (Application Ref.: 444024)
Billing account under Waste Disposal Ordinance	7033825	17/4/2019	N/A	Valid
Registration as a Chemical Waste Producer	5117-756-C4363-01	9/5/2019	N/A	Valid
Asbestos Abatement Licence				Nil
Construction Noise Permit				Nil

3.2 Status of Submission under the EP- 533/2017

3.2.1. A summary of the current status on submission for Contract no. DC/2018/05 under EP-533/2017 is shown in ***Table 3.2***.

Table 3.2 Summary of submission status for Contract no. DC2018/05 under EP-533/2017

EP Condition	**Submission**	**Date of Submission**
Condition 1.12	Notification of Commencement Date of Works	18 February 2019
Condition 2.12	Management Organization of Main Construction Companies	18 April 2019

EP Condition	Submission	Date of Submission
Condition 2.14	Submission of Detailed Vegetation Survey Report and Protection and Transplantation Proposal	18 April 2019
Condition 2.15	Submission of Detailed Woodland Compensation Plan	TBC
Condition 2.18	Submission of Landscape & Visual Mitigation and Tree Preservation Plan(s)	18 April 2019
Condition 2.22	Submission of Measures to Mitigate Traffic Noise from Ma On Shan Road	18 April 2019

4 Monitoring Requirements

4.1 Air Monitoring

AIR QUALITY MONITORING STATIONS

4.1.1. Air monitoring stations AM1 and AM2 were setup and commencement of monitoring on 12 April 2019 while AM5 was setup and commencement of monitoring on 18 April 2019. Air quality monitoring for the station AM4 was commenced on 3 May 2019 in the reporting period. AM3(A) is under liaison for approval, no monitoring for AM3(A) was conducted in the reporting period.

4.1.2. The air monitoring stations for the Project are listed and shown in ***Table 4.1*** and ***Figure 4.1***.

Table 4.1 Air Monitoring Station

Monitoring Station ID	Monitoring Location	Level (in terms of no. of floor)
AM1	Ah Kung Kok Fishermen Village	G/F
AM2	Block H, Kam Tai Court	Roof
AM3(A)	Kowloon City Baptist Church Hay Nien Primary School	G/F (tentative)
AM4	Wellborn Kindergarten	G/F
AM5	The Neighbourhood Advice-Action Council Harmony Manor	Roof

AIR MONITORING PARAMETERS, FREQUENCY AND DURATION

4.1.3. One-hour TSP levels should be measured to indicate the impacts of construction dust on air quality.

4.1.4. The sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs.

SAMPLING PROCEDURE AND MONITORING EQUIPMENT

4.1.5. Monitoring Procedures

(a) Check the calibration period of portable direct reading dust meter prior to monitoring (The direct reading dust meter was calibrated at 2-years interval and checked with High Volume Sampler (HVS) yearly.)
(b) Record the site condition near / around the monitoring stations.
(c) Install the portable direct reading dust meter to the monitoring location.
(d) Slide the power switch to turn the power on.
(e) Check of portable direct reading dust meter to ensure the equipment operation in

normal condition.

(f) Select the period of measurement to 60mins.

(g) Check and set the correct time.

(h) Select the appropriate unit display for the equipment.

(i) Slide the power switch to turn the power off when the monitoring period ended (3 times 1 hour TSP monitoring per day).

(j) Uninstall the portable direct reading dust meter

(k) Collected the sampled data for analysis.

(l) Remark: Procedures (c) to (h) may be different subject to the brands and models of portable direct reading dust meter

4.1.6. Maintenance and Calibration

(a) The direct reading dust meter was calibrated at 2-years interval and checked with High Volume Sampler (HVS) yearly to determine the accuracy and validity of the results measured.

(b) Checking of direct reading dust meter will be carried out in order to determine the conversion factor between the direct reading dust meter and the standard equipment, HVS. The comparison check is to be considered valid based on correlation coefficient checked by HOKLAS laboratory.

4.1.7. The 1-hour TSP air quality monitoring was performed by using portable direct reading dust meters at each designated monitoring station. The brand and model of the equipment are given in **Table 4.2**.

Table 4.2 Air Quality Monitoring Equipment

Equipment	Brand and model
Portable direct reading dust meter	Met One BT- 645
	Met One AEROCET 831

4.1.8. The calibration certificates of the air quality monitoring equipment are attached in **Appendix 4.2**. The calibration dates in the calibration certificates for portable direct reading dust meter models Met One BT-645 and Met One Aerocet 831 are presented in “month/day/year” format.

WIND DATA

4.1.9. The representative wind data from Sha Tin HKO Automatic Weather Station was obtained covering the 1-hr TSP monitoring periods. The wind data were extracted and shown in **Appendix 4.3**.

EVENT AND ACTION PLAN

4.1.10. The Action and Limit levels for construction air quality are defined in **Table 4.3** and **Appendix 4.1**. Should non-compliance of the air quality criteria occur, action in accordance with the Event and Action Plan in **Appendix 6.1** shall be carried out.

Table 4.3 Action and Limit Level for Air Quality Monitoring

Monitoring Locations	1-hour TSP Level in µg/m3	
	Action Level	Limit Level
AM1	294	500
AM2	325	500
AM3(A)	360	500
AM4	297	500
AM5	349	500

4.2 Noise Monitoring

NOISE MONITORING STATIONS

4.2.1. Noise monitoring stations CM4 and CM5 were setup and commencement of monitoring on 13 April 2019 and 18 April 2019 respectively. Noise monitoring for stations CM1 and CM3 were commenced on 2 May 2019 in the reporting period. CM2(A) is under liaison for approval, no monitoring for CM2(A) was conducted in the reporting period.

4.2.2. The noise monitoring stations for the Project are listed and shown in ***Table 4.4*** and ***Figure 4.2.***

Table 4.4 Noise Monitoring Station

Monitoring Station ID	Monitoring Location	Measurement Type	Level (in terms of no. of floor)
CM1	Wellborn Kindergarten	Free	G/F
CM2(A)	Kowloon City Baptist Church Hay Nien Primary School	Façade (tentative)	Roof (tentative)
CM3	S.K.H. Ma On Shan Holy Spirit Primary School	Façade	Roof
CM4	Ah Kung Kok Fishermen Village	Free field	G/F
CM5	The Neighbourhood Advice-Action Council Harmony Manor	Façade	Roof

NOISE MONITORING PARAMETERS, FREQUENCY AND DURATION

4.2.3. Noise monitoring shall be carried out at all the designated monitoring stations. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a weekly basis when noise generating activities are underway:

- One set of measurements between 0700-1900 hours on normal weekdays;
- One set of measurements between 1900-2300 hours;
- One set of measurements between 2300-0700 hours of next day; and
- One set of measurements between 0700-2300 hours on holidays (three consecutive Leq/5min readings).

4.2.4. If construction works are extended to include works during the hours of 1900-0700, additional weekly impact monitoring shall be carried out during evening and night-time works for the latter 3 sets of measurements specified in Section 4.1.2 above, one set of measurements shall at least include 3 consecutive Leq (5min) results.

4.2.5. Supplementary information for data auditing, statistical results such as L10 and L90 shall also be obtained for reference.

4.2.6. If a school exists near the construction activity, noise monitoring shall be carried out at the monitoring stations for the schools during the examination periods. The ET leader shall liaise with the school's personnel and the examination authority to ascertain the exact dates and times of all examination periods during the course of the contract.

MONITORING EQUIPMENT

4.2.7. Noise monitoring was performed using sound level meter at the designated monitoring locations. The sound level meters shall comply with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator shall be deployed to check the sound level meters at a known sound pressure level. Brand and model of the equipment is given in **Table 4.5**.

Table 4.5 Noise Monitoring Equipment

Equipment	Brand and Model
Integrated Sound Level Meter	NTi XL2
	B&K2236
	HONGLIM HLES-01
Acoustic Calibrator	Larson Davis CAL200

4.2.8. The calibration certificates of the noise monitoring equipment are attached in **Appendix 4.2**.

SAMPLING PROCEDURE AND MONITORING EQUIPMENT

4.2.9. Monitoring Procedure

(a) The monitoring station shall normally be at a point 1m from the exterior of the sensitive receiver's building façade and be at a position 1.2m above the ground.

(b) Façade measurements were made at the monitoring locations. For free-field measurement, a correction factor of +3 dB (A) would be applied.

(c) The battery condition was checked to ensure the correct functioning of the meter.

(d) Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:

(e) Frequency weighting: A, Time weighting: Fast, Measurement time set: continuous 5 mins

(f) Prior and after to the noise measurement, the meter was checked using the acoustic calibrator for 94dB (A) at 1000 Hz. If the difference in the calibration level before and after measurement was more than ±1 dB (A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.

(g) Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

4.2.10. Maintenance and Calibration

(a) The microphone head of the sound level meter was cleaned with soft cloth at regular intervals.

(b) The sound level meter and calibrator were calibrated at yearly intervals.

EVENT AND ACTION PLAN

4.2.11. Noise Standards for Daytime Construction Activities are specified under EIAO-TM. The Action and Limit levels for construction noise are defined in **Table 4.6** and **Appendix 4.1.** Should non-compliance of the criteria occurs, action in accordance with the Event and Action Plan in **Appendix 6.1** shall be carried out.

Table 4.6 Action and Limit Level for Noise Monitoring

Monitoring Station	Action Level	Limit Level (dB(A))		
		0700-1900 hrs on normal weekdays	0700-2300 hrs on holidays (including Sundays); and 1900-2300 hrs on all days [2]	2300-0700 hrs of all days [2]
CM1	When one documented complaint is received	65 / 70 [1]	60 / 65 / 70 [3]	45 / 50 / 55 [3]
CM2(A)		65 / 70 [1]		
CM3		65 / 70 [1]		
CM4		75		
CM5		75		

Remark 1: Limit level of CM1, CM2(A) and CM3 reduce to 65 dB (A) during examination periods if any.

Remark 2: Construction noise during restricted hours is under the control of Noise Control Ordinance Limit Level to be selected based on Area Sensitivity Rating.

Remark 3: Limit Level for restricted hour monitoring shall act as reference level only. Investigation would be conducted on CNP compliance if exceedance recorded during restricted hour noise monitoring period.

5. Monitoring Results

5.0.1 The environmental monitoring will be implemented based on the division of works areas of each designed projects. Overall layout showing work areas and monitoring stations is shown in **Figure 2.1** and **Figure 4.1 – 4.2** respectively.

5.0.2 The environment monitoring schedules for reporting month and coming month are presented in **Appendix 5.1**.

5.1 Air Monitoring Results

5.1.1 1-hour TSP monitoring was conducted at AM1, AM2, AM4 and AM5 in the reporting month. No 1-hour TSP monitoring was scheduled at AM3(A) due to approval of monitoring station is still under liaison.

5.1.2 No action or limit level exceedance was determined in the reporting period at stations of AM1, AM2, AM4 and AM5

5.1.3 Air quality monitoring results measured in this reporting period for AM1, AM2, AM4 and AM5 are reviewed and summarized. Details of air monitoring results and graphical presentation can be referred in **Appendix 5.2.**

5.2 Noise Monitoring Results

5.2.1 Noise monitoring was conducted at CM1, CM3, CM4 and CM5 in the reporting month. No noise monitoring was scheduled at CM2(A) due to approval of monitoring station is still under liaison.

5.2.2 No action or limit level exceedance was determined in the reporting period at stations of CM1, CM3, CM4 and CM5.

5.2.3 Noise monitoring results measured in this reporting period for CM1, CM3, CM4 and CM5 are reviewed and summarized. Details of noise monitoring results and graphical presentation can be referred in **Appendix 5.3**.

5.3 Waste Management

5.3.1 The quantities of waste for disposal in the Reporting Period are summarized in **Table 5.1** and **Table 5.2**. The Monthly Summary Waste Flow Table is shown in **Appendix 5.4**. Whenever possible, materials were reused on-site as far as practicable.

Table 5.1 Details of Waste Disposal for Contract no. DC/2018/05

Waste Type	Quantity this month	Cumulative Quantity-to-Date	Disposal / Dumping Grounds
Inert C&D materials disposed, m^3	0	0	
Inert C&D materials recycled, m^3	0	0	

Waste Type	**Quantity this month**	**Cumulative Quantity-to-Date**	**Disposal / Dumping Grounds**
Non-inert C&D materials disposed**, ton**	5.2	5.2	NENT
Non-inert C&D materials recycled**, kg**	0	0	
Chemical waste disposed, **L**	0	0	
Asbestos waste disposed, **Kg**	0	0	

6. Compliance Audit

6.0.1. The Event Action Plan for construction noise, air quality are presented in ***Appendix 6.1***.

6.0.2. The summary of exceedance is presented in ***Appendix 6.2***.

6.1 Air Monitoring

6.1.1 No action or limit level exceedance was determined in the reporting period at stations of AM1, AM2, AM4 and AM5. No 1hr TSP monitoring was scheduled at stations of AM3(A) due to approval of monitoring station is still under liaison.

6.2 Noise Monitoring

6.2.1 No action or limit level exceedance was determined in the reporting period at stations of CM1, CM3, CM4 and CM5, No noise monitoring was scheduled at stations of CM2(A) due to approval of monitoring station is still under liaison.

6.3 Review of the Reasons for and the Implications of Non-compliance

6.3.1 No environmental non-compliance was recorded in the reporting month.

6.4 Summary of action taken in the event of and follow-up on non-compliance

6.4.1 There was no particular action taken since no non-compliance was recorded in the reporting period.

7. Environmental Site Audit

7.0.1. Within this reporting month, weekly environmental site audits were conducted on 2, 8, 15, 24 and 29 May 2019. IEC attended the joint site inspection on 24 May 2019.

Table 7.1 Summary of Environmental Inspections for Contract no. SPW 25/2018

Item	Date	Reminders/Observations	Action taken by Contractor	Outcome
20190425_01Env	25-4-2019	Contractor is reminded to clean up the debris from site clearance regularly of cover with tarpaulin sheets	Pending for contractor's follow up action	Completion as observed on 2 May 2019.
20190502_01Env	2-5-2019	Contractor is reminded to clean up the u-channel regularly at portion 3 & 11	U-channel was cleaned up	Completion as observed on 8 May 2019.
20190515_01Env	15-5-2019	Contractor is reminded to provide mitigation measures to prevent site run off / muddy water into public drainage with the site area	The drain hole is intercepted by a layer of geotextile and embanked with sand bags at surrounding.	Completion as observed on 24 May 2019.
20190524_01Env	24-5-2019	Contractor is reminded to replace the damaged sand bag	Damaged sand bags were replaced	Completion as observed on 24 May 2019.
20190524_02Env	24-5-2019	Excavation soil was found with the U-channel, contractor is reminded to clear and cover the excavation soil with tarpaulin sheets	U-channel cleaned and excavation soil well covered	Completion as observed on 29 May 2019.

7.0.2. Within this reporting month, bi-weekly landscape site audits were conducted on 8 and 24 May 2019. IEC attended the joint site inspection on 24 May 2019.

Table 7.2 Summary of Landscape Inspections for Contract no. SPW 25/2018

Item	Date	Reminders/Observations	Action taken by Contractor	Outcome
20190508_01Lan	8-5-2019	Horticultural debris at Portion 7 should be removed from the site	Horticultural debris removed	Completion as observed on 15 May 2019.

7.0.3. Within this reporting month, monthly ecology site audits were conducted on 24 May 2019. IEC attended the joint site inspection on 24 May 2019.

Table 7.3 Summary of Ecology Inspections for Contract no. SPW 25/2018

Item	Date	Reminders/Observations	Action taken by Contractor	Outcome
20190524_01Eco	24-5-2019	Contractor is reminded that all access / alignment for	Pending for contractor's follow	Pending for contractor's

Item	Date	Reminders/Observations	Action taken by Contractor	Outcome
		construction activities shall avoid disturbance of existing plant species of conservation importance	up action	follow up action

8. Complaints, Notification of Summons and Prosecution

8.0.1. No environmental complaint was received in the reporting period.

8.0.2. The details of cumulative complaint log and updated summary of complaints are presented in **Appendix 8.1**.

8.0.3. Cumulative statistic on complaints and successful prosecutions are summarized in **Table 8.1** and **Table 8.2** respectively.

Table 8.1 Cumulative Statistics on Complaints

Reporting Period	No. of Complaints
May 2019	0
Total	**0**

Table 8.2 Cumulative Statistics on Successful Prosecutions

Environmental Parameters	Cumulative No. Brought Forward	No. of Successful Prosecutions this month (Offence Date)	Cumulative No. Project-to-Date
Air	-	0	0
Noise	-	0	0
Waste	-	0	0
Total	**-**	**0**	**0**

9. Conclusion

9.0.1. The EM&A programme was carried out in accordance with the EM&A Manual requirements, minor alterations to the programme proposed were made in response to changing circumstances.

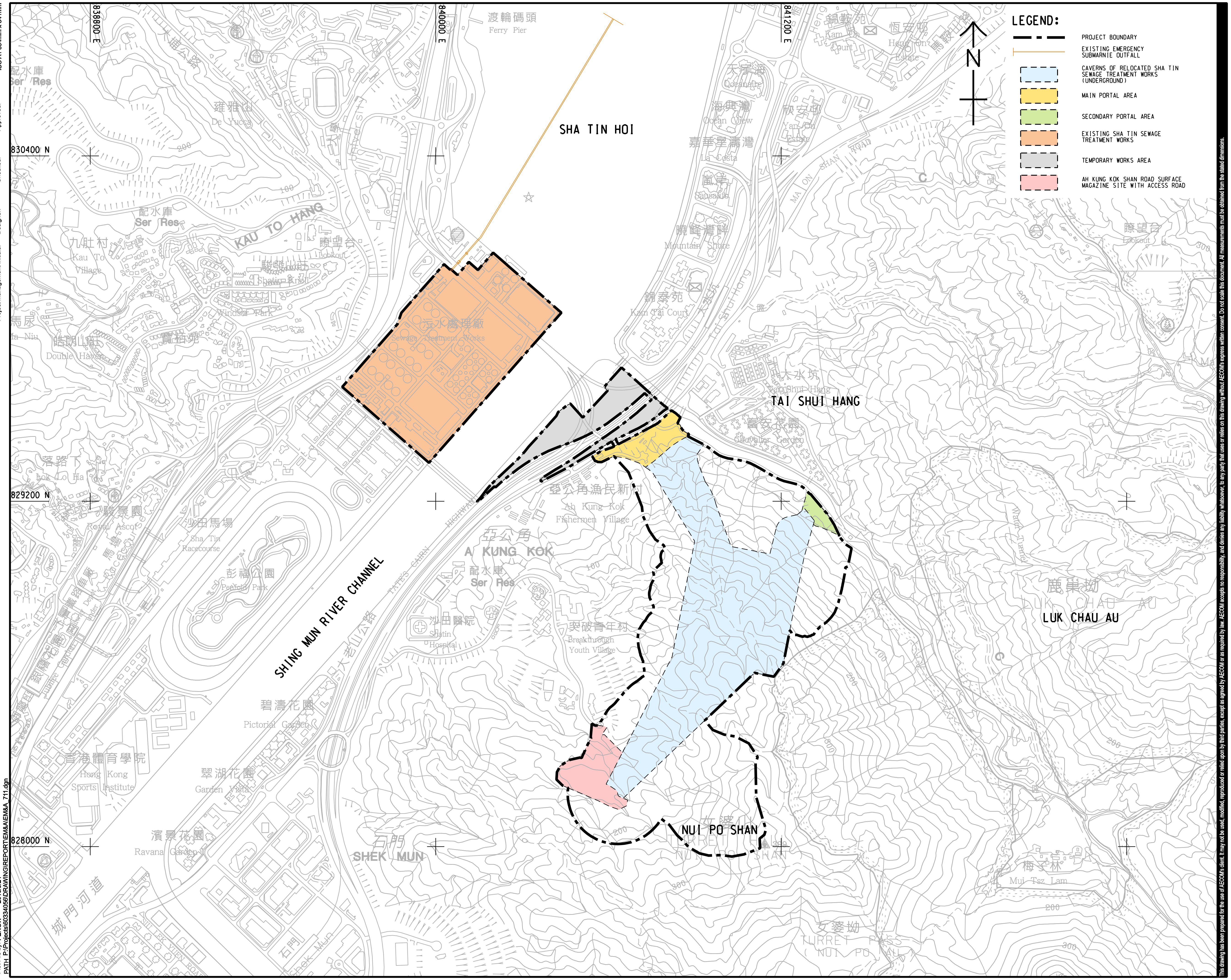
9.0.2. The scheduled construction activities and the recommended mitigation measures for the coming months are listed in **Table 9.1**. The construction programmes of the Project are provided in **Appendix 9.1**.

Table 9.1 Construction Activities and Recommended Mitigation Measures in Coming Reporting Months

Key Construction Works	Recommended Mitigation Measures
• Site clearance	• Dust control during dust generating works; • Implementation of proper noise pollution control; • Provision of protection to ensure no runoff out of site area or direct discharge into public drainage system, and • Direct impact to plant species of conservation importance recorded in the vicinity of the construction sites shall be avoided
• Hand dig trial pit excavation • Hoarding and site office erection	• Excavation materials shall be well covered • Mitigation measures to dust and noise control should be provided to erection of hoarding and site office

Figure 2.1

Project Layout



AECOM

PROJECT 項目

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT 業主

渠務署 Drainage Services Department

CONSULTANT 工程顧問公司

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS 分判工程顧問公司

ISSUE/REVISION 修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

STATUS 階段

SCALE 比例: A3 1 : 12000

DIMENSION UNIT 尺寸單位: METRES

KEY PLAN 索引圖 A3 1 : 500000

PROJECT NO. 項目編號: 60334056

CONTRACT NO. 合約編號: CE 30/2014 (DS)

SHEET TITLE 圖紙名稱

LOCATION PLAN OF THE PROJECT

SHEET NUMBER 圖紙編號

60334056/EM&A/1.01

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:
Plot File by: PENGW 2016/5/24
PATH P:\Projects\60334056\DRAWING\REPORT\EM&A\EM&A_711.dgn

Figure 2.2

Project Organization Chart

Project Organization Chart

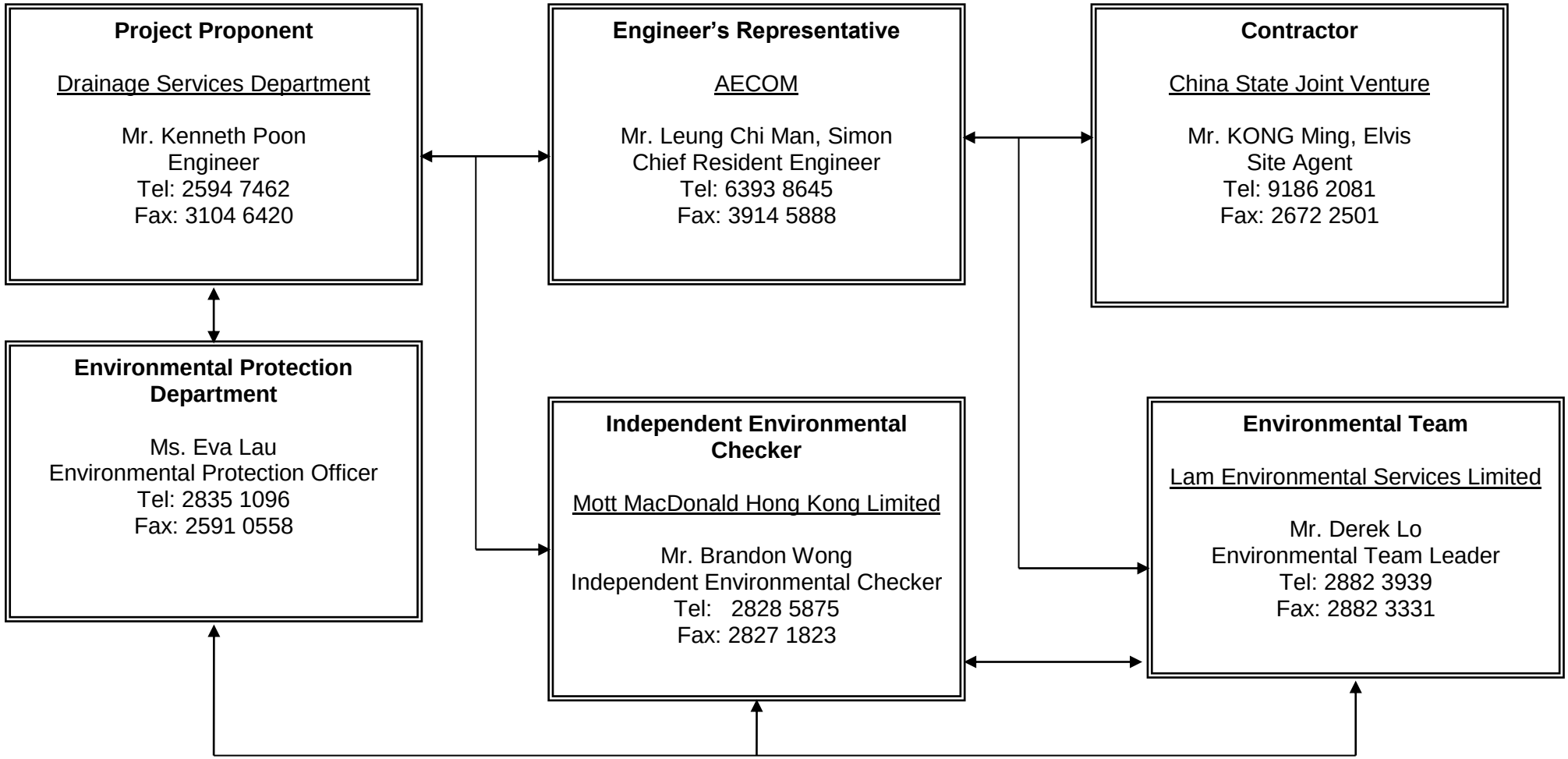
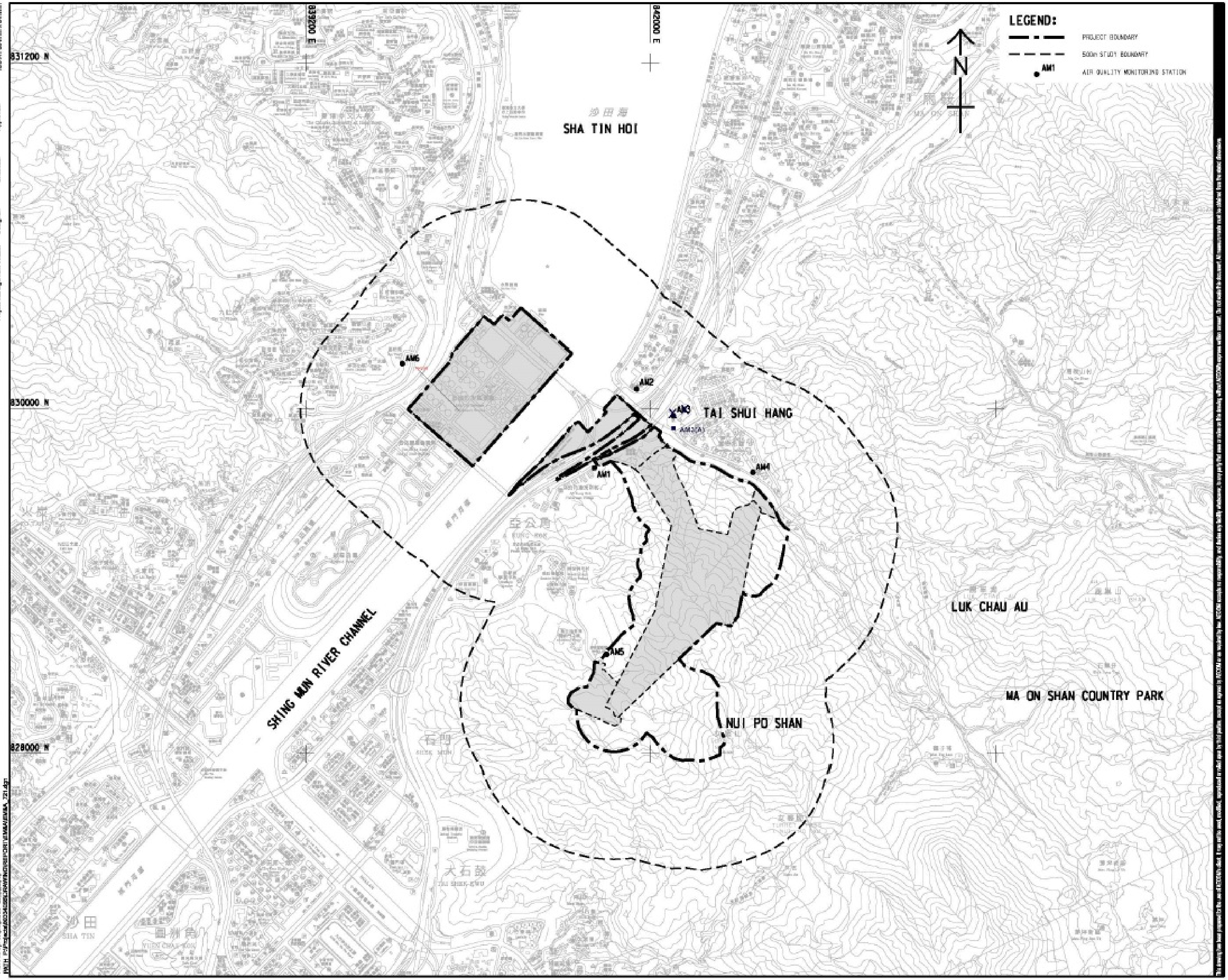


Figure 4.1 to Figure 4.2

Locations of Monitoring Stations



AECOM

PROJECT

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT

渠務署
Drainage Services Department

CONSULTANT

AECOM Asia Company Ltd.
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SUB-CONSULTANTS

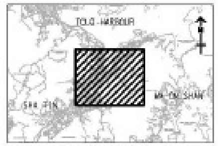
ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE	DIMENSION UNIT
A3 1 : 16000	METRES

KEY PLAN A3 1 : 400000



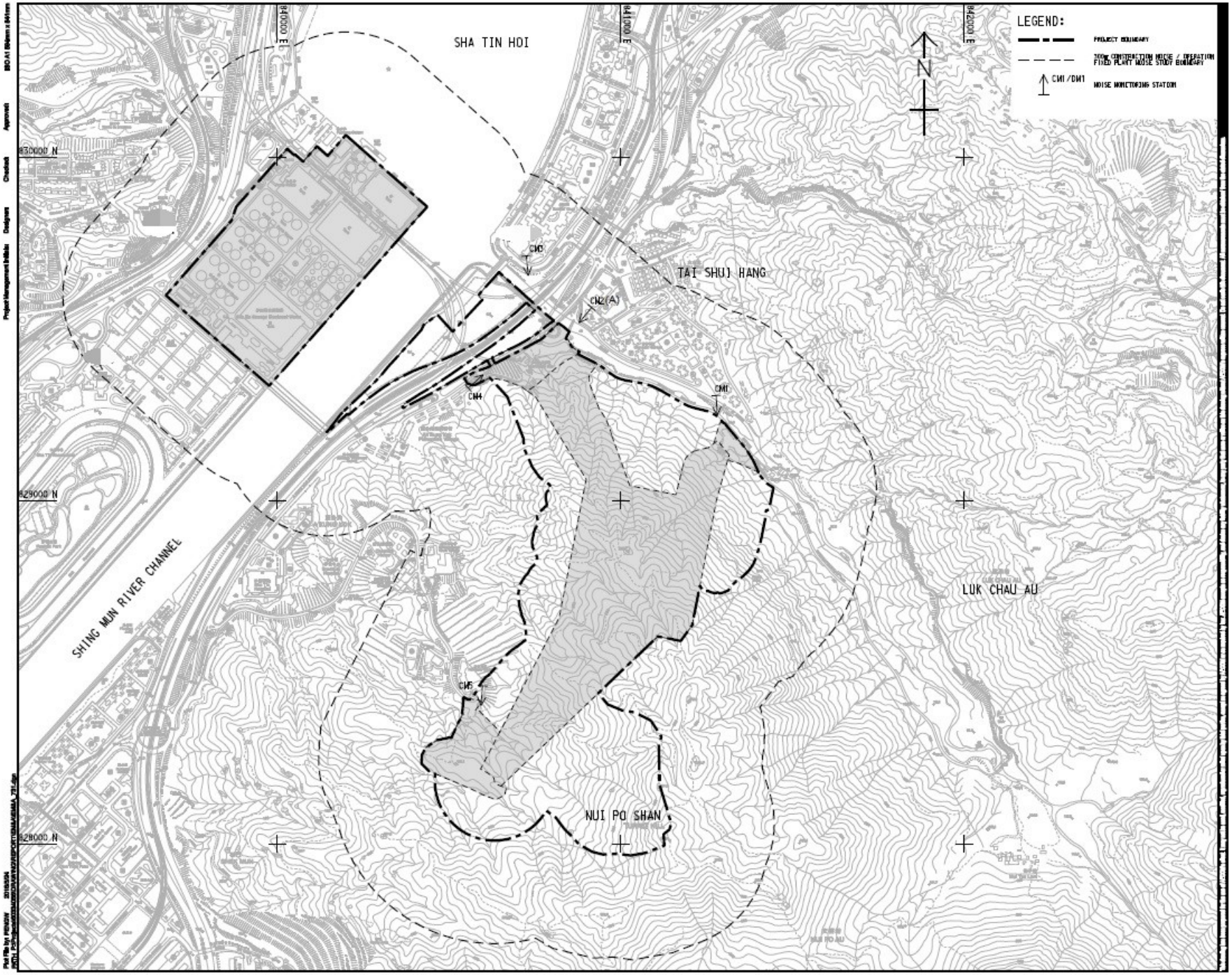
PROJECT NO.	CONTRACT NO.
60334056	CE 30/2014 (DS)

SHEET TITLE

LOCATION OF AIR QUALITY MONITORING STATION DURING CONSTRUCTION PHASE

SHEET NUMBER

60334056/EM&A/2.01



AECOM

PROJECT

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT

Drainage Services Department

CONSULTANT

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

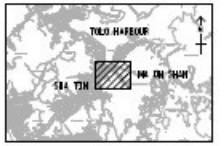
ID	Date	Description	Chk'd

STATUS

SCALE A3 1 : 10000

DIMENSION UNIT METRES

KEY PLAN A3 1 : 800000



PROJECT NO. 60334056

CONTRACT NO. CE 30/2014 (DS)

SHEET TITLE

LOCATION OF CONSTRUCTION PHASE TRAFFIC NOISE MONITORING STATION

SHEET NUMBER

60334056/EM&A/3.01

Appendix 1.1

Proposal for Commencement of Construction Phase Air Quality Monitoring in Phases

Our ref.: LES/J2019-02/CS/L014
Date : 17 April 2019

Environmental Protection Department
Environmental Assessment Division
Metro Assessment Group (43)

By Hand

27th floor, Southorn Centre,
130 Hennessy Road,
Wan Chai, Hong Kong

Attn: Ms. Eva LAU (Env Protection Offr (Metro Assessment)43)

Dear Ms. LAU,

Contract No. DC/2018/05
Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction

Submission under the Requirement of EM&A Manual

Pursuant to Section 2.2.4.1 and 2.2.4.2 of the captioned Environmental Monitoring and Audit (EM&A) Manual, we submit herewith 4 hard copies and 3 electronic copies of proposal with the following items for your approval.

1. Proposal for commencement of construction phase AQM in phases;
2. Letter from the Independent Environmental Checker showing they have no further comment on this proposal.

Should you have any queries, please contact the undersigned at 9108 0531.

Yours faithfully,
For and On Behalf Of
Lam Environmental Services Limited

Derek Lo
Environmental Team Leader

Encl.

c.c.	DSD	Ms. Carol Yip	Email w/e
	AECOM (CRE Office)	Mr. Simon Leung	Email w/e
	Mott MacDonald Hong Kong Limited	Mr. Brandon Wong	Email w/e

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Tel: 2882 3939 Fax: 2882 3331

AECOM
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新城市中央廣場第 2 座 8 樓
www.aecom.com
+852 3922 9000 tel
+852 3922 9797 fax

Your Ref : LES/J2019-02/CS/L014
Our Ref : (DC/2018/05)/M15/100/(B00150)

15 May 2019

By Hand and By Fax (2882 3331)

Lam Environmental Services Limited
11/F Centre Point,
181 – 185 Gloucester Road
Wanchai, Hong Kong

Attn: Mr. Derek Lo (Environmental Team Leader)

Dear Sirs,

Contract No. DC/2018/05
Relocation of Sha Tin Sewage Treatment Works to Caverns –
Site Preparation and Access Tunnel Construction

Proposal for Commencement of Construction Phase Air Quality Monitoring in Phases

I refer to your above referenced letter dated 17 April 2019, addressing to EPD and copied to us, regarding the captioned submission.

I have no comment to the recommendation as stated in the proposal, i.e. by commencing the air quality monitoring at station AM1 to AM5 for the Contract no. DC/2018/05, whereas impact air quality monitoring at station AM6 will commence air quality monitoring at a later stage upon the commencement of the decommissioning and demolition of the existing Shatin Sewage Treatment Works.

Yours faithfully,

Simon Leung
Chief Resident Engineer
AECOM Asia Co. Ltd.

c.c.	CE/SP, DSD	-	Attn: Mr. W. Y. Leung	(By Fax 3104 6420)
	IEC	-	Attn: Mr. Brandon Wong	(By Fax 2827 1823)
	The *Project Manager*	-	Attn: Mr. Robert Chan	(By Fax 3922 9797)

SL/WC/WY/tc

MOTT MACDONALD

AECOM Asia Co. Ltd.
13/F Grand Central Plaza
Tower 2, 138 Shatin Rural Committee Road
Shatin, Hong Kong

Attn: Mr. Simon Leung

Your Reference

Our Reference
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Correspondence/L012

3/F Mapletree Bay Point
348 Kwun Tong Road
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Hong Kong

T +852 2828 5757
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Sha Tin Cavern Sewage Treatment Works

Environmental Permit No. EP-533/2017

Contract No. DC/2018/05 Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction

Proposal for Commencement of Construction Phase Air Quality Monitoring in Phases

17 April 2019

By Email

Dear Sir,

I refer to the letter dated 17 April 2019 (ref: LES/J2019-02/CS/L014) from the Environmental Team Leader certifying his proposal to commence the construction phase impact air quality monitoring for the captioned Project in phases.

I have no comment on the captioned proposal and hereby verify it as conforming to the information and recommendations contained in the EM&A Manual, in accordance with Condition 3.1 of Environmental Permit No. EP-533/2017 and Section 2.2.4.2 of the EM&A Manual.

Should you have any queries regarding the captioned or require any further information, please contact the undersigned at 2828 5875.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED

Brandon Wong
Independent Environmental Checker
T +852 2828 5875
Brandon.Wong@mottmac.com

Encl.

c.c. DSD — Ms. Carol Yip — By Email
Lam Environmental Services Limited — Mr. Derek Lo — By Email

CONTRACT NO. SPW 25/2018

ENVIRONMENTAL TEAM FOR RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS – SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION

UNDER ENVIRONMENTAL PERMIT NO. EP-533/2017

PROPOSAL FOR COMMENCEMENT OF CONSTRUCTION PHASE AIR QUALITY MONITORING IN PHASES

CLIENTS:

Drainage Services Department

PREPARED BY:

Lam Environmental Services Limited

11/F Centre Point
181-185 Gloucester Road
Wanchai, H.K.

Telephone: (852) 2882-3939
Facsimile: (852) 2882-3331
E-mail: info@lamenviro.com
Website: http://www.lamenviro.com

DATE: 17 April 2019

Table of Contents

LIST OF APPENDIXES

1 Introduction

1.1 Background

1.1.1. Lam Environmental Services Limited has been commissioned by Drainage Services Department to undertake the Environmental Monitoring and Audit works for Contract No. SPW 25/2018 Environmental Team for Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction, i.e. Contract No. DC/2018/05.

1.1.2. According to Section 2.2 of the EM&A manual under this Project, the major construction activities of the Project would likely be demolition of existing structures, drill & blasts for caverns and access tunnels by excavation and rock crushing, construction of temporary haul road/access road/explosive compound structures which would generate insignificant amount of small size particulates, hence, no significant Respirable Suspended Particulates (RSP) or Fine Suspended Particulates (FSP) impacts would be anticipated. Monitoring of 24-hour RSP and 24-hour FSP levels are not proposed. Therefore, only 1-hour Total Suspended Particulates (TSP) is required to be monitored and audited at the proposed monitoring locations.

1.1.3. This proposal provides a review of the work boundary of Contract No. DC/2018/05, Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction, for proposing the commencement of air quality monitoring in phases.

1.2 Monitoring Locations

1.2.1. As referred to Section 2.2.4.1 of the EM&A manual, the dust monitoring locations will be determined when the engineering details for the dust modelling is available. The selected monitoring locations are the worst potentially affected air sensitive receivers located in the vicinity of construction sites of the Project. **Table 1** below presents the proposed air quality monitoring locations based on the overall project scope of Relocation of Sha Tin Sewage Treatment Works to Caverns.

Table 1 Proposed Air Quality Monitoring Stations

Station ID	EIA ID	Location
AM1	ASR 8	Ah Kung Kok Fishermen Village
AM2	ASR 6	Block H, Kam Tai Court
AM3 (A)*	ASR 4	Kowloon City Baptist Church Hay Nien Primary School
AM4	ASR 2	Wellborn Kindergarten
AM5	ASR 12	The Neighbourhood Advice-Action Council Harmony Manor
AM6	ASR 21	Seaview Villa

* Remark: Updated based on baseline report submitted under Contract No. SPW 09/2018 as Environmental Team Baseline Environmental Monitoring for Sha Tin Cavern Sewage Treatment Works as compared with the original location is Ma On Shan Tsung Tsin Secondary School (AM3) as per the EM&A manual.

1.2.2. Geographical locations of the baseline air monitoring stations are presented in **Appendix A**.

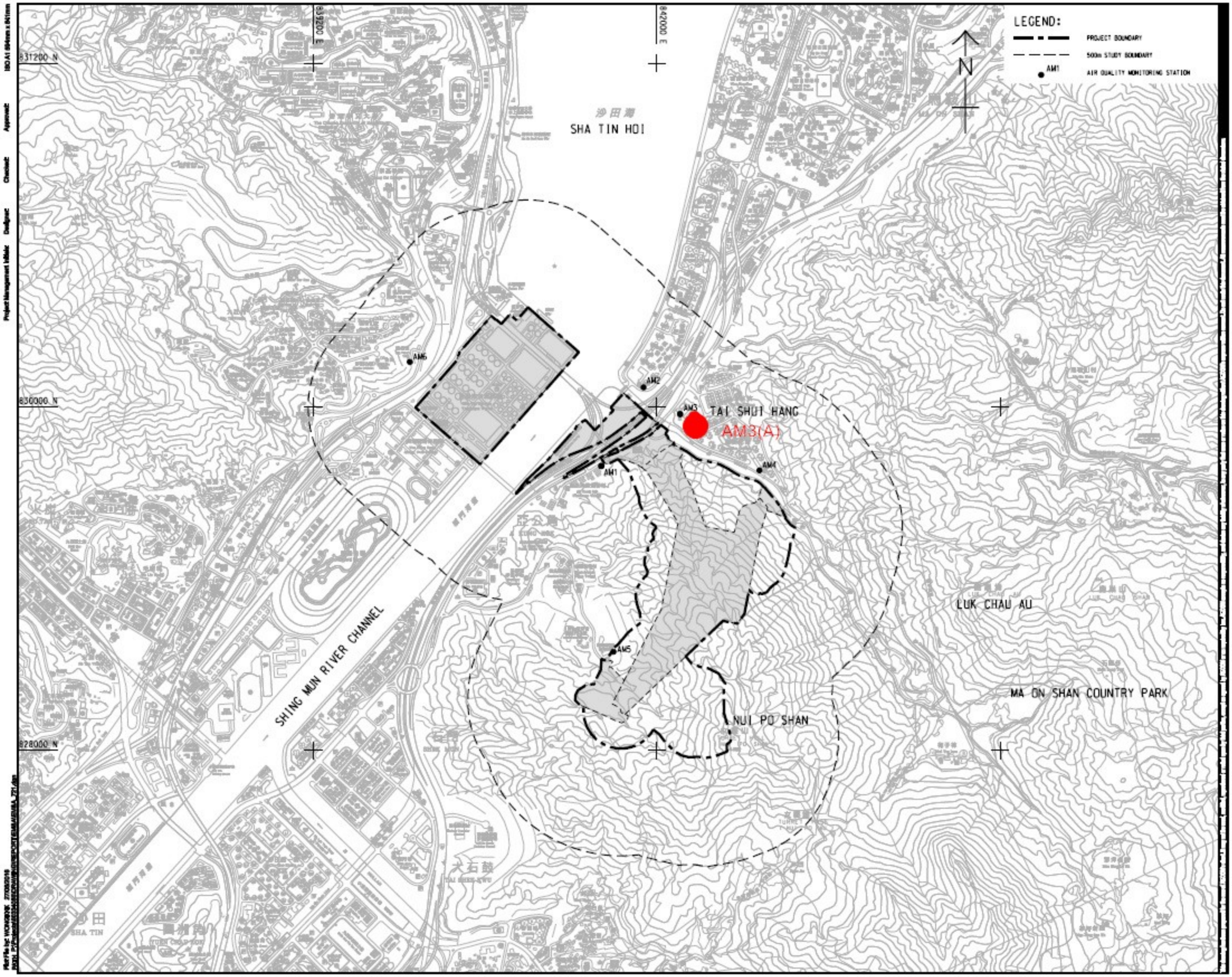
1.3 Justification and Conclusion

1.3.1. With respect to the work boundary of DC/2018/05, the horizontal distance from air quality monitoring station AM6 (Seaview Villa) to the nearest construction site Portion 2 is around 810m as shown in **Appendix B**. In view of impact air quality monitoring station AM6 is located outside the 500m boundary of the site area of Contract No. DC/2018/05.

1.3.2. Considering the principle underlined as per Section 2.2.4.1 of the EM&A manual that the selected monitoring locations shall be the worst potentially affected air sensitive receivers located in the vicinity of construction sites of the Project, the respective air quality monitoring station AM1 – AM5 is expected to be affected upon construction work commencement of DC/2018/05 whereas air quality monitoring station AM6 (Seaview Villa), located at around 810m away from the work boundary of DC/2018/05 is considered to be affected upon the commencement of the decommissioning and demolition of the existing Shatin Sewage Treatment Works at a later stage.

1.3.3. To conclude, the impact air quality monitoring for the Project is therefore proposed to be commenced in phases with impact air quality monitoring commence at station AM1 – AM5 for the Contract DC/2018/05 whereas impact air quality monitoring at station AM6 will commence air quality monitoring at a later stage upon the commencement of the decommissioning and demolition of the existing Shatin Sewage Treatment Works.

Appendix A
Proposed Air Quality Monitoring Stations



AECOM

PROJECT

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT

Drainage Services Department

CONSULTANT

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

NO.	DATE	DESCRIPTION	CHK'D

STATUS

SCALE: AS 1 : 16000

DIMENSION UNIT: METRES

KEY PLAN AS 1 : 400000

PROJECT NO.: 60334056

CONTRACT NO.: CE 30/2014 (DS)

SHEET TITLE

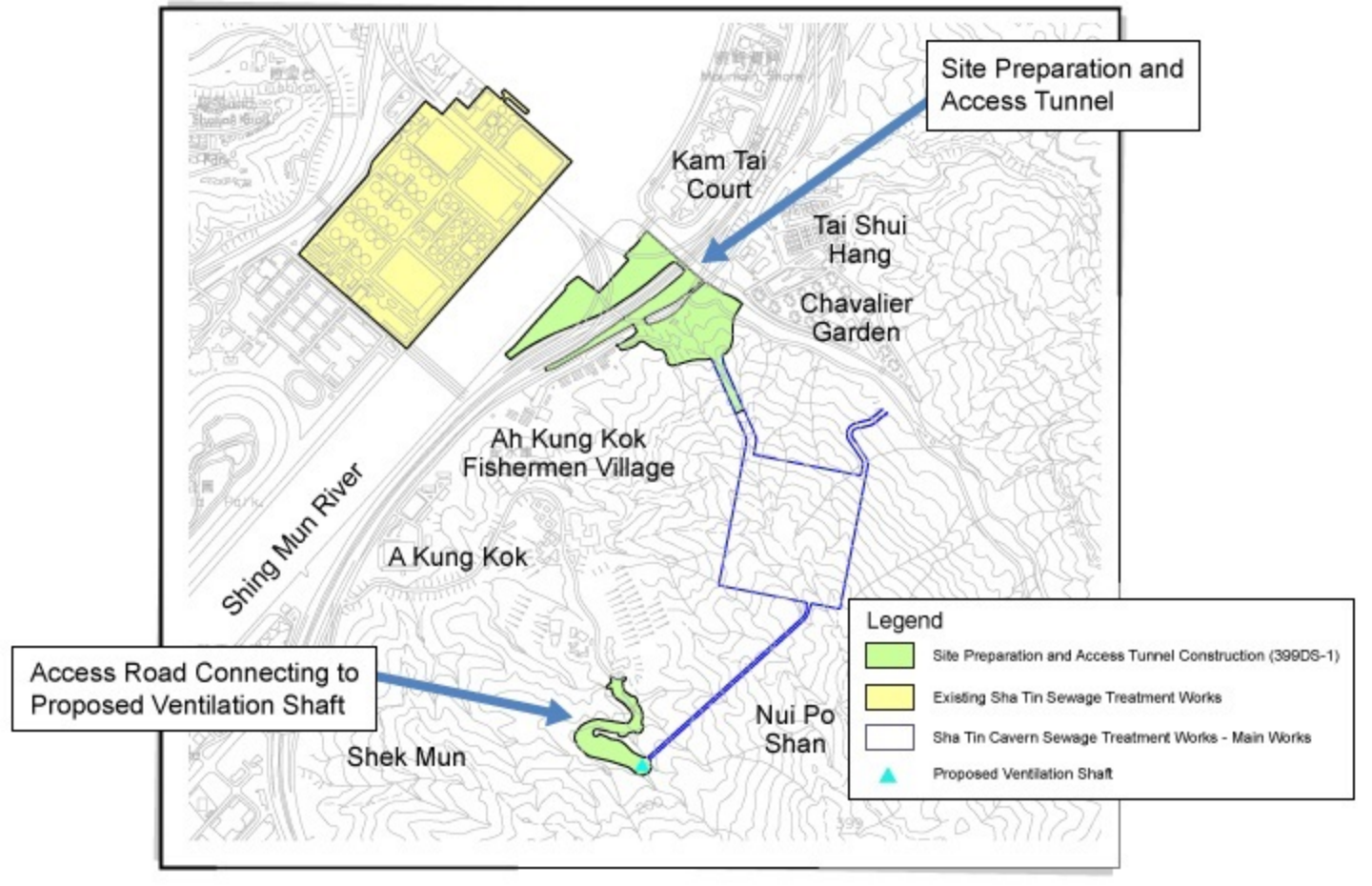
LOCATION OF AIR QUALITY MONITORING STATION DURING CONSTRUCTION PHASE

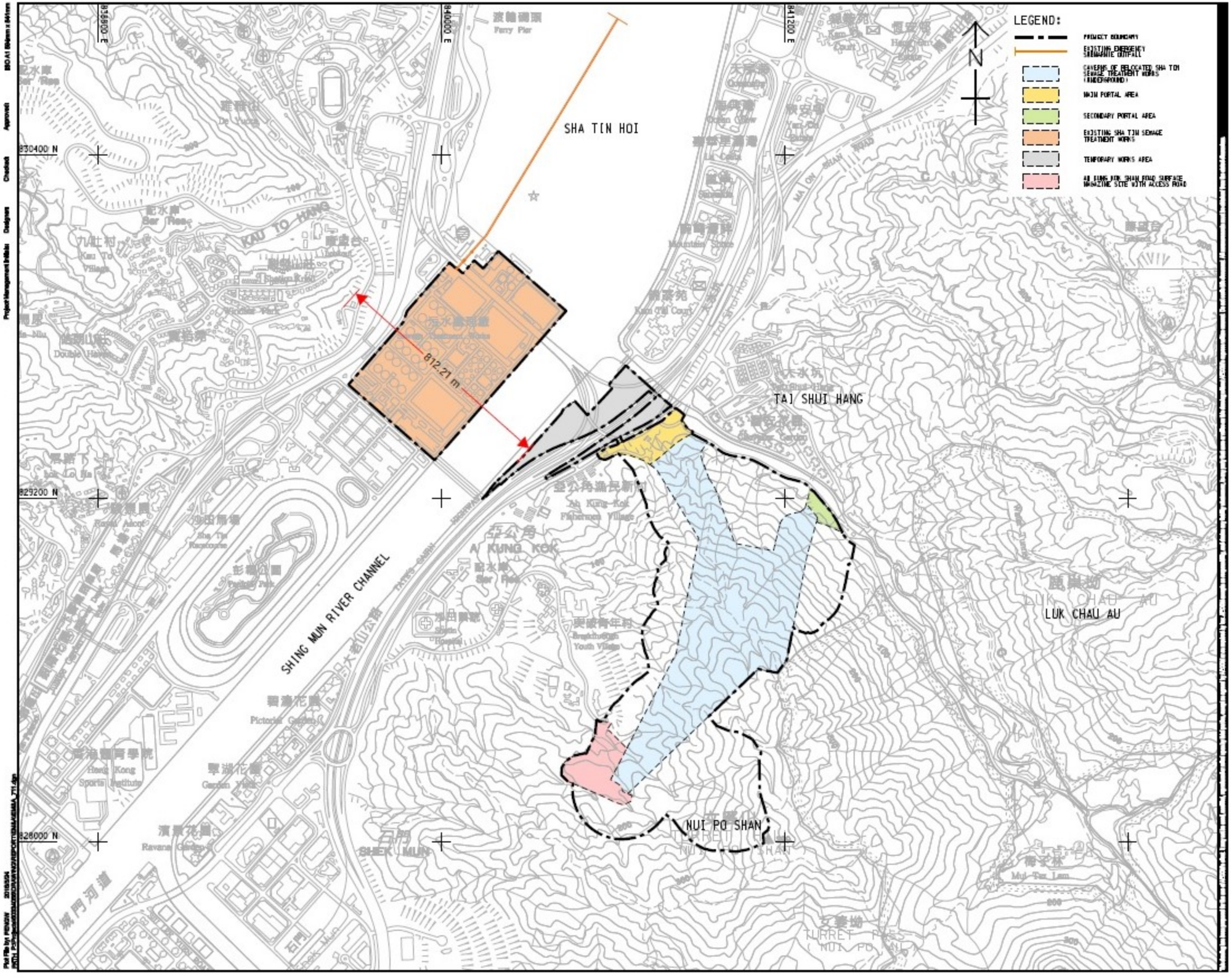
SHEET NUMBER

60334056/EM&A/2.01

ISO A1 (841mm x 841mm) Approved: Checked: Designed: Project Management Made:

Appendix B
Measure distance


Site Preparation and Access Tunnel
Kam Tai Court
Tai Shui Hang
Chavalier Garden
Ah Kung Kok Fishermen Village
Shing Mun River
A Kung Kok
Access Road Connecting to Proposed Ventilation Shaft
Shek Mun
Nui Po Shan
Legend
Site Preparation and Access Tunnel Construction (399DS-1)
Existing Sha Tin Sewage Treatment Works
Sha Tin Cavern Sewage Treatment Works - Main Works
Proposed Ventilation Shaft



AECOM

PROJECT

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT

Drainage Services Department

CONSULTANT

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ISSUE/REVISION

NO.	DATE	DESCRIPTION	CHK'D

STATUS

SCALE AS 1 : 12000

DIMENSION UNIT METRES

KEY PLAN AS 1 : 600000

PROJECT NO. 60334056

CONTRACT NO. CE 30/2014 (DS)

SHEET TITLE

LOCATION PLAN OF THE PROJECT

SHEET NUMBER

60334056/EM&A/1.01

Appendix 1.2

Proposal for using direct reading dust meter for construction phase air monitoring

Our ref.: LES/J2019-02/CS/L018
Date : 23 May 2019

Environmental Protection Department
Environmental Assessment Division
Metro Assessment Group (43)

By Hand

27th floor, Southorn Centre,
130 Hennessy Road,
Wan Chai, Hong Kong

Attn: Ms. Eva LAU (Env Protection Offr (Metro Assessment)43)

Dear Ms. LAU,

Contract No. DC/2018/05
Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction

Proposal for Using Direct Reading Dust Meter for Construction Phase Air Monitoring

Submission under the Requirement of EM&A Manual

We refer to the comments from your email dated on 22 May 2019 regarding the captioned, we submit herewith 4 hard copies and 3 electronic copies of proposal with the following items for your approval.

1. Proposal for using direct reading dust meter for construction phase air monitoring;
2. Response to comments
3. Letter from the Independent Environmental Checker showing they have no further comment on this proposal.

Should you have any queries, please contact the undersigned at 9108 0531.

Yours faithfully,
For and On Behalf Of
Lam Environmental Services Limited

Derek Lo
Environmental Team Leader

Encl.

c.c.	DSD	Mr. Kenneth	Email w/e
	AECOM (CRE Office)	Mr. Simon Leung	Email w/e
	Mott MacDonald Hong Kong Limited	Mr. Brandon Wong	Email w/e

MOTT MACDONALD

Environmental Protection Department
EIAO Register Office
27/F, Southorn Centre
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Wanchai, Hong Kong

Attn: Ms. Eva Lau

Your Reference

Our Reference
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Sha Tin Cavern Sewage Treatment Works

Environmental Permit No. EP-533/2017

Contract No. DC/2018/05 Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction

Proposal to use Direct Reading Dust Meter for Construction Phase 1-hour TSP Impact Air Quality Monitoring

23 May 2019
By Hand

Dear Madam,

I refer to the letter dated 23 May 2019 (ref: LES/J2019-02/CS/L018) from the Environmental Team Leader regarding his proposal to use direct reading dust meter for construction phase 1-hour TSP impact air quality monitoring, pursuant to Sections 2.2.2.2 and 2.2.2.5 of the EM&A Manual for the captioned Project.

I have no comment on the captioned proposal and hereby verify it as conforming to the information and recommendations contained in the EM&A Manual, in accordance with Condition 3.1 of Environmental Permit No. EP-533/2017 and Section 2.2.1.5 of the EM&A Manual.

Should you have any queries regarding the captioned or require any further information, please contact the undersigned at 2828 5875.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED

Brandon Wong
Independent Environmental Checker
T +852 2828 5875
Brandon.Wong@mottmac.com

Encl.

c.c.	DSD	Mr. Kenneth Poon	By Email
	AECOM Asia Co. Ltd.	Mr. Simon Leung	By Email
	Lam Environmental Services Limited	Mr. Derek Lo	By Email

CONTRACT NO. SPW 25/2018

ENVIRONMENTAL TEAM FOR RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS – SITE PREPARATION AND ACCESS TUNNEL CONSTRUCTION

UNDER ENVIRONMENTAL PERMIT NO. EP-533/2017

PROPOSAL FOR USING DIRECT READING DUST METER FOR CONSTRUCTION PHASE AIR MONITORING

CLIENTS:

Drainage Services Department

PREPARED BY:

Lam Environmental Services Limited

11/F Centre Point
181-185 Gloucester Road
Wanchai, H.K.

Telephone: (852) 2882-3939
Facsimile: (852) 2882-3331
E-mail: info@lamenviro.com
Website: http://www.lamenviro.com

CERTIFIED BY:

Derek Lo
Environmental Team Leader

DATE:
23 May 2019

Table of Contents

LIST OF FIGURES

LIST OF APPENDIXES

1 Introduction

1.1 Background

1.1.1. Lam Environmental Services Limited has been commissioned by Drainage Services Department to undertake the Environmental Monitoring and Audit works for Contract No. SPW 25/2018 Environmental Team for Relocation of Sha Tin Sewage Treatment Works to Caverns – Site Preparation and Access Tunnel Construction, i.e. Contract No. DC/2018/05.

1.1.2. According to EM&A Manual Section 2.2.1.5,1-hour TSP levels should be measured by following the standard method as set out in High Volume Sampling Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the US Environmental Protection Agency (USEPA) (hereinafter referred to as "High Volume Sampler (HVS) method"). Upon approval of EPD and IEC, an alternative sampling method of using direct reading methods which are capable of producing comparable results as that by the high volume sampling method can be used to indicate short event impacts.

1.1.3. This proposal comprised of the monitoring method proposed as per EM&A manual Section S2.2.1.5 for seeking approval of EPD and IEC, the alternative sampling method of using direct reading methods for which the monitoring result is comparable with the high volume sampling method can be used for the impact air monitoring.

1.2 Proposed Monitoring Equipment

1.2.1. With reference to S1.2.5 of Appendix D2 of the General Technical Requirements of Environmental Monitoring Guidelines for Development Projects in Hong Kong, If the ET Leader proposes to use a direct reading dust meter to measure 1-hr TSP levels, he shall submit sufficient information to the IC(E) to prove that the instrument is capable of achieving a comparable result as that the HVS and may be used for the 1-hr sampling. The instrument shall also be calibrated regularly, and the 1-hr sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

1.2.2. The 1-hour TSP air quality monitoring is proposed to be performed by using portable direct reading dust meters at the air quality monitoring stations of AM1, AM2, AM3(A), AM4 and AM5 which stated in Project EM&A Manual and baseline monitoring report. The monitoring stations are listed and shown in ***Table 1.1*** and ***Figure 1.1***.

Table 1.1 Air Monitoring Stations

Monitoring Station ID	Monitoring Location	Level (in terms of no. of floor)
AM1	Ah Kung Kok Fishermen Village	G/F
AM2	Block H, Kam Tai Court	Roof

AM3(A)	Kowloon City Baptist Church Hay Nien Primary School	G/F (tentative)
AM4	Wellborn Kindergarten	G/F
AM5	The Neighbourhood Advice-Action Council Harmony Manor	Roof

1.2.3. The portable direct reading dust meters was calibrated at 1-year interval (For Met One AEROCET 831) or 2-years interval (For Met One BT-645) based on the requirement of manufacturer.

1.2.4. The portable direct reading dust meters was checked with standard equipment, High volume Sampler (HVS) at 1-year interval to ensure the accuracy and validity. The accuracy and validity checking of portable direct reading dust meters will be carried out in order to determine the conversion factor between the portable direct reading dust meters and HVS. The accuracy and validity checking is to be considered as very strong correlation and valid if the calculated correlation coefficient (r) between 0.80-1.0 (Evans, 1996).

1.2.5. The brand and model of the equipment to be used for this project are given **in *Table 1.2***.

Table 1.2 Air Quality Monitoring Equipment

Equipment	Brand and model	Series Number
Portable direct reading dust meter	Met One BT- 645	R22584 R22586 X19295 X19296 X19297 X19298 X19299
	Met One AEROCET 831	W14016 W15448 W15449 W16848

1.2.6. The proposed portable direct reading dust meters operating principal are summarized as follow (Detail refers to Appendix A):

- Operating Principal of Met One BT-645: The Met One Instruments, Inc. model BT-645 is a type of nephelometer which measures real-time airborne TSP particulate concentration levels using the principle of forward laser light scatter. Sample air is drawn into the BT-645 and through the laser optical module, where the particulate in the sample air stream scatters the laser light through reflective and refractive properties. This scattered light is collected onto a photodiode detector at a near-forward angle, and the resulting electronic signal is processed to determine a continuous, real-time measurement of airborne particulate mass concentrations.

- Operating Particle of Met One AEROCET 831: The AEROCET 831 counts and sizes particles then uses proprietary algorithm to convert count data to mass measurements (µg/m3). Fundamentally, the AEROCET 831 calculates a volume for each detected particle then assigns a standard density for the conversion assigns.

1.2.7. The proposed portable direct reading dust meters was adopted in EM&A project such as EDO/01/2017 Environmental Team for Development of Anderson Road Quarry Site Road improvement works and were approved by IEC and EPD.

1.2.8. The proposed validity and accuracy checking method was adopted in EM&A project such as EDO/01/2017 Environmental Team for Development of Anderson Road Quarry Site Road improvement works and was approved by IEC and EPD.

1.2.9. The specification, a sample of calibration certificate and certificate of comparison check with High Volume Sampler of the proposed air quality monitoring equipment listed in Table 1 are attached in Appendix A and Appendix B.

1.3 Monitoring Methodology

1.3.1. Measuring Procedures

(a) Check the calibration period of portable direct reading dust meter prior to monitoring (The direct reading dust meter was calibrated at 1-year interval (For Met One AEROCET 831) or 2-years interval (For Met One BT-645) and checked with High Volume Sampler at 1-year interval.
(b) Record the site condition near / around the monitoring stations.
(c) Install the portable direct reading dust meter to the monitoring location.
(d) Slide the power switch to turn the power on.
(e) Check of portable direct reading dust meter to ensure the equipment operation in normal condition.
(f) Select the period of measurement to 60mins.
(g) Check and set the correct time.
(h) Select the appropriate unit display for the equipment.
(i) Slide the power switch to turn the power off when the monitoring period ended (3 times 1 hour TSP monitoring per day).
(j) Uninstall the portable direct reading dust meter
(k) Collected the sampled data for analysis.

Remark: Procedures (c) to (h) may be different subject to the brands and models of portable direct reading dust

1.3.2. Maintenance and Calibration

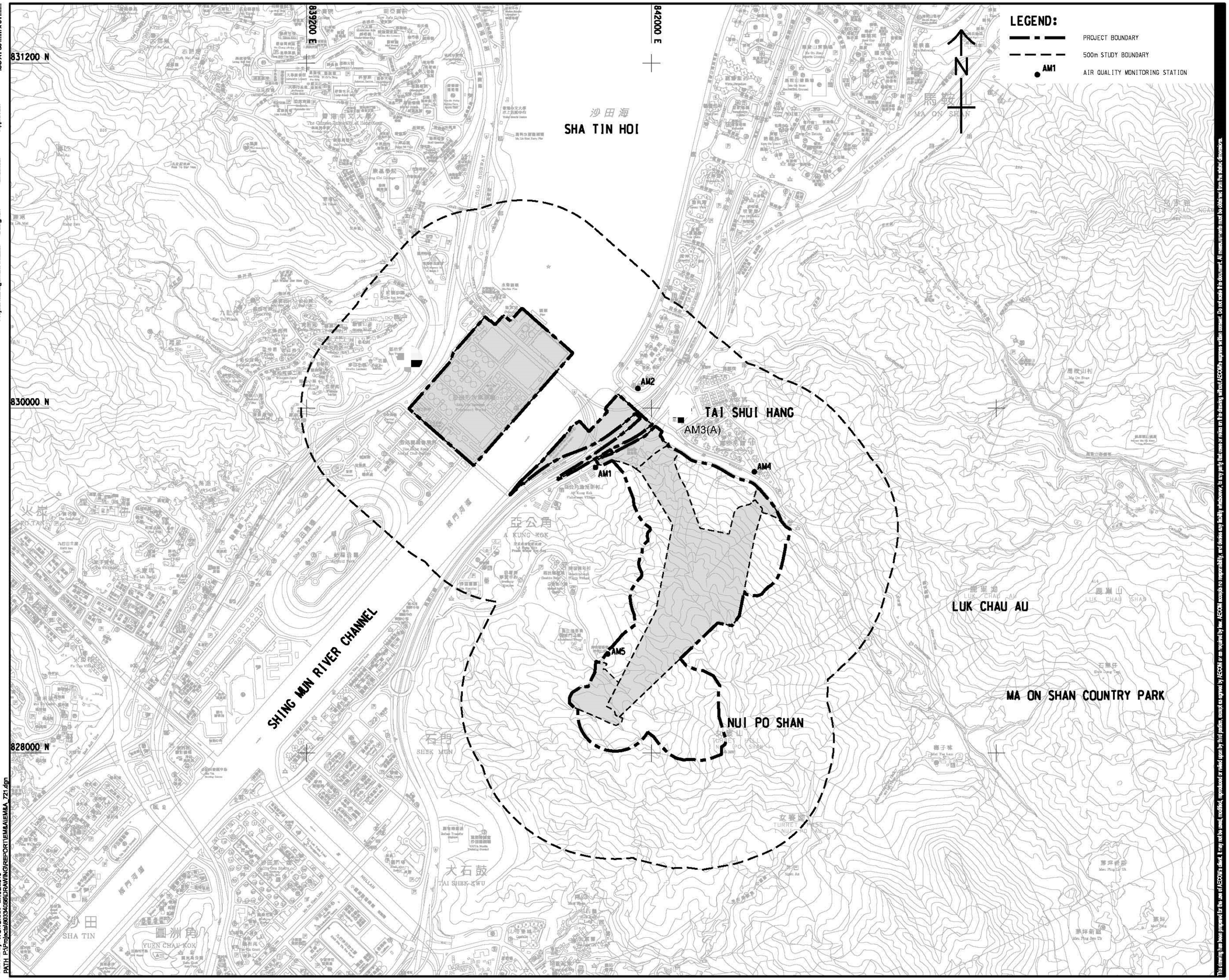
(a) The Portable direct reading dust meter was calibrated at 1-year interval (For Met One AEROCET 831) or 2-years interval (For Met One BT-645) based on the requirement of manufacturer.

(b) Accuracy and validity checking of Portable direct reading dust meter will be carried out at 1-year interval in order to determine the conversion factor between the direct reading dust meter and the standard equipment, HVS.

Figure 1.1 Air Quality Monitoring Stations

ISO A1 594mm x 841mm

Project Management Initials:
Designer:
Checked:
Approved:



Plot File by: WONGKKK 27/05/2016
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AECOM

PROJECT
項目

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT
業主

渠務署
Drainage Services Department

CONSULTANT
工程顧問公司

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

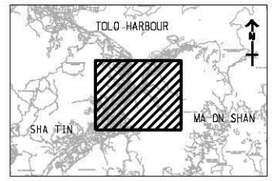
I/R 修訂	DATE 日期	DESCRIPTION 內容簡述	CHK. 核查

STATUS
現況

SCALE 比例
A3 1 : 16000

DIMENSION UNIT 尺寸單位
METRES

KEY PLAN 索引圖 A3 1 : 400000



PROJECT NO. 項目編號
60334056

CONTRACT NO. 合約編號
CE 30/2014 (DS)

SHEET TITLE 圖紙名稱
LOCATION OF AIR QUALITY MONITORING STATION DURING CONSTRUCTION PHASE

SHEET NUMBER 圖紙編號
60334056/EM&A/2.01

Appendix A Specification of equipment

BT-645 Portable Dust Monitor

The **BT-645** Portable Dust Monitor has been designed to continuously measure and record particulate information for indoor work place and public place environments.

Key Features:

- 'Real Time' monitoring
- Simple operation
- Rugged design
- Built-in Datalogger
- Purge air system
- Low power consumption

Optical Sensor

A laser optical sensor is used to detect and measure particulate concentrations up to 100 milligrams per cubic meter. The continuous flow optical sensor is combined with purge air to ensure accurate measurements in adverse environments.

Rugged Design

The optical sensor, matched electronics and backlit display, are enclosed in a rugged metal enclosure to protect the instrument from normal daily use.

Data Storage

The internal datalogger will store over 5,000 samples. Sample history events can be viewed on the display or downloaded to a computer using Comet software.

Battery Operation

The internal battery pack provides over 10 hours of continuous operation. Battery recharge time is approximately 2.5 hours.

Optional Inlets

The standard unit is supplied with a TSP inlet. Optional sampling inlets are available for PM2.5, PM4 and PM10.

Applications:

- Public and Workplace Monitoring
- Industrial / Occupational Hygiene
- Indoor Air Quality

Note: Not recommended for continuous outdoor use.

Met One Instruments, Inc.
1600 Washington Blvd. ● Grants Pass, OR 97526 ● 541.471.7111 ● www.metone.com
sales@metone.com

BT-645 Portable Dust Monitor

Measurements & Specifications

OPERATING PRINCIPLE	Forward light scatter laser nephelometer
PERFORMANCE	
Concentration Range	0 to 100 mg/m^3 (0 to 100,000 µg/m^3)
Sensitivity	1 µg/m^3
Accuracy	5% traceable to standard with 0.6 µm PSL
Measuring Time	1, 5, 10, 15, 30 and 60 minutes
Flow Rate	2 LPM
	Note: Measurement accuracy requires use of appropriate K-factor for the material being measured.
ELECTRICAL	
Light Source	Laser diode, 5 mW, 670 nm
Power	14.8V Li-ion (Lithium Ion) battery pack
Battery Life	Over 10 hours continuous operation
AC Adapter/Charger	Li-ion battery charger, 100 – 240 VAC, 50/60Hz to 16.8 V @ 1.8 A
Communications	RS-232, USB
Data Storage	Over 5,000 samples
INTERFACE	
Display	4 X 20 LCD
Keyboard	6-key membrane type
PHYSICAL	
Size	Height = 4.25” (10.8 cm) Width = 7.44” (18.9 cm) Thickness = 3.25” (5.4 cm)
Weight	3.7 lbs (1.7 kg)
ENVIRONMENTAL	
Operating Temperature	0˚C to +50˚C
Relative Humidity	90% (non-condensing)
Storage Temperature	-20˚C to +60˚C
ACCESSORIES	
Supplied	User Manual USB Cable Communications Software (Comet) AC Adapter / Battery Charger
Optional	PM2.5 Sharp Cut Cyclone (SCC-112) PM10 Sharp Cut Cyclone (SCC-110) Custom Serial Cable (PN 3228)

BT-645 w/SCC-112 PM2.5 Sharp Cut Cyclone

REV SEPT 2014

Met One Instruments, Inc.
1600 Washington Blvd. ● Grants Pass, OR 97526 ● 541.471.7111 ● www.metone.com
sales@metone.com

AEROCET 831 Aerosol Mass Monitor

Small - Reliable - Affordable

Key Features:

Five Mass Ranges
(PM1, PM2.5, PM4, PM10 and TSP)

A mass monitor that simultaneously provides five important mass ranges in one minute.

Handheld Operation

Survey the environment with this extremely portable, size selective mass monitor. This small lightweight instrument is only 28 ounces and is the perfect survey tool for a wide range of applications.

Simple Operation

Only two front-panel buttons accompany the multifunction rotary scroll wheel to provide simple and efficient operation. Just press and rotate to scroll through the menu driven platform.

Sample History

View sample history easily on the display or export data via the USB port using the included software. Unit stores up to 2500 sample events. USB interface provides quick data download and field firmware upgrades.

Battery Powered

24 hours of typical intermittent operation and up to 8 hours of continuous use. Recharge time is only 2.5 hours. The included AC charger / adapter operates the counter even when the batter pack is discharged.

Figure 1 – AEROCET 831 with optional protective boot

Applications:

- Indoor Air Quality
- Industrial / Occupational Hygiene
- HVAC Applications

Note: Not recommended for continuous outdoor use. Avoid sampling in rainy or foggy conditions.

Met One Instruments, Inc.

1600 Washington Blvd. ● Grants Pass, OR 97526 ● 541.471.7111 ● www.metone.com

sales@metone.com

AEROCET 831 Aerosol Mass Monitor

Specifications:

Operating Principle	Particle count to mass conversion	
Features		
Sample Duration	1 minute	
Sample Modes	Manual and Continuous	
Data storage	2,500 records	
Display	2-line by 16-character LCD	
Controls	2 button keypad with rotary dial	
Performance		
PM Ranges	PM1, PM2.5, PM4 and PM10	
Concentration Range	0 – 1,000 µg/m^3	
Resolution	0.1µg/m^3 (display / serial output)	
Sensitivity	High = 0.3µm, Low = 0.5 µm	
Accuracy	± 10% to calibration aerosol	
Flow rate	0.1 CFM (2.83 lpm)	
Electrical		
Light Source	Laser Diode, 780 nm, 40 mW typical	
AC Adapter/Charger	AC to DC module, 100 – 240 VAC to 8.4 VDC	
Battery Type	Li-ion rechargeable Battery	
Battery Operating Time	8 hours continuous operation. Up to 24 hours intermittent operation.	
Battery Recharge Time	2.5 hours typical	
Communication	USB Mini B Type	
Physical		
Size	Height: 6.25” (15.9 cm) Width: 3.63” (9.22 cm)	
	Thickness: 2.00” (5.08 cm)	
Weight	1.74 lbs – 28 ounces – (0.79 kg)	
Environmental		
Operating Temperature	0º C to +50º C	
Storage Temperature	-20º C to +60º C	
Accessories		
Supplied	Battery charger / adapter	
	USB Cable	
	Operation manual	
	Comet software	
Optional	Carrying Case	(PN 8517)
	Protective Boot	(PN 80450)
	Zero Filter Kit	(PN 80846)
	Flow Meter Kit	(PN 80530)

REV JUNE 2014

Met One Instruments, Inc.
1600 Washington Blvd. ● Grants Pass, OR 97526 ● 541.471.7111 ● www.metone.com
sales@metone.com

Appendix B Sample of equipment calibration certification

Met One Instruments, Inc.
1600 NW Washington Blvd, Grants Pass, OR
TEL (541) 471-7111 Fax (541) 471-7116

Certificate of Calibration

BT-645

Particulate Monitor

Recommended calibration interval is 24 months from first day of use.

Unit Info

Model:	*BT-645*	**81865 Firmware Rev:**	*1.1.0*
Serial Number:	*R22584*	**81113**	*0.2.4*
Calibrated By:	*Kevin Ricks* AT21	**Cal. Date:**	*01/18/2019*
Quality Inspector:	AT28	**Date:**	JAN 21 2019
Calibration Hz/µg/m³:	*9.50*		

Final Test

Flow (2.0 L/M): Pass

Ambient T (C) *22*

RH, % *34*

Serial Communication: Pass

BT-645 Conc.: *350.93* Standard Conc: *353.81*

Calibration Standards

Standards	Manufacturer	Model	SN	Cal Due
RMS Multimeter	Fluke	289 Multimeter	23740018	5/03/2019
RH &TEMPERATURE	Met One Instruments	083E-1-6	R20313	9/18/2019
Primary Flow Meter	BIOS	Defender-510	1033419	3/28/2019
Digital Dust Indicator	SIBATA	LD-3B	476795	5/18/2019

The standards used for this calibration have accuracy equal to or greater than the instrument tested. These standards are on record and traceable to NIST to the extent allowed by the institute's calibration facility. Unless otherwise stated, all instruments are calibrated to meet the manufacturer's published specifications. The Calibration system complies with MIL-STD-45662A.

Lam Environmental Services Limited

Portable Dust Meter Performance Check Record

Portable Dust Meter

Type	:	Particulare Monitor
Manufacturer	:	MET ONE INSTRUMENTS
Model Number	:	BT-645
Serial Number	:	R22584
Performance Check Date	:	27-Feb-19

Standard Equipment

Type	:	High Volume Sampler
Manufacturer	:	TISCH
Model Number	:	TE-5170
Equipment Number	:	HVS018
Last Calibration Date	:	4-Dec-18

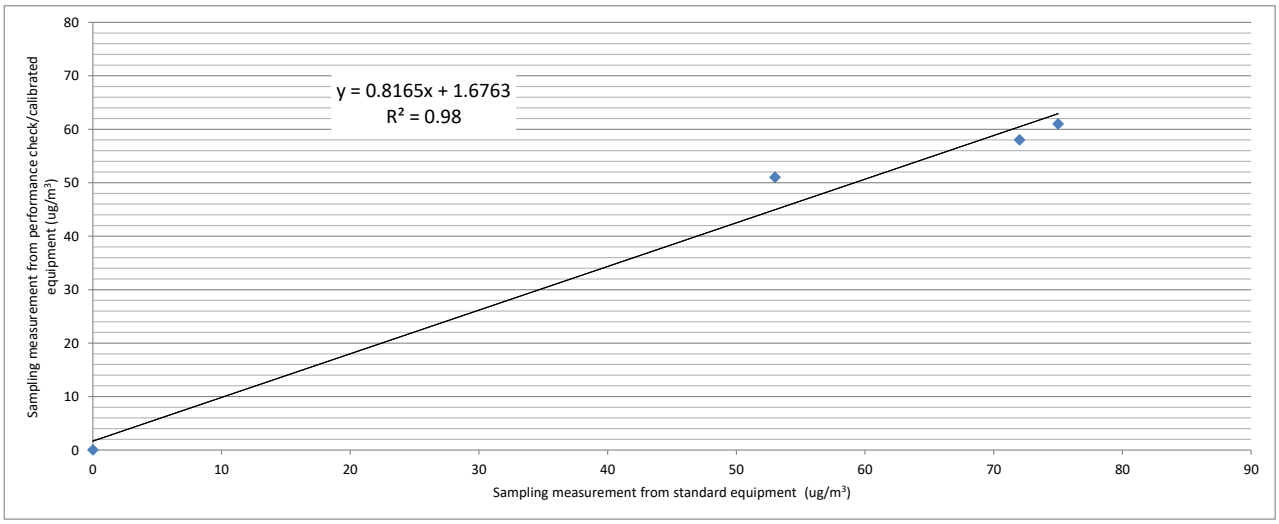
Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (˚C)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	27/2/19 07:00	1016	21	0	0
1	27/2/19 08:45	1016	21	75	61
2	27/2/19 09:52	1016	21	53	51
3	27/2/19 11:00	1016	21	72	58

* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor)	:	1.3000
Correlation Coefficient	:	0.9900
Validity of Performance Check / Calibration Record	:	27/2/2020



Operator: Henry Lau Date: 27-Feb-19

Checked by: Chan Ka Chun Date: 4-Mar-19

Met One Instruments
1600 Washington Blvd
Grants Pass, OR 97526
(541) 471-7111
(541) 471-7116 (Fax)
Service@metone.com

Calibration Certificate

The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.

Recommended calibration interval is 12 months from the first day of use.

Instrument Model# *Aerocet 831* **Instrument Serial#** *W15449*

Date of Calibration *10/4/2018* **Sensor #** *16439*

Darleen Best AT7
Calibration Technician

AT25
Quality Check

Temperature *23* °C **Relative Humidity** *36.5* %

Test Procedure: *Aerocet 831-6100*

PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration
0.3	Pass	± 10%	183039	03/31/2020
0.5	Pass	± 10%	180556	02/28/2020
1.0	Pass	± 10%	169240	5/31/2019
2.5	Pass	± 10%	REF	NA
4.0	Pass	± 10%	REF	NA
5.0	Pass	± 10%	REF	NA
7.0	Pass	± 10%	REF	NA
10.0	Pass	± 10%	REF	NA

Standards	Model	SN	Cal Due
Particle Counter	GT-526	M1760	10/9/2018
Flowmeter	DCL-M	103751	1/29/2019
DMM	289	27720071	6/29/2019
RH/TEMP SENSOR	083E-1-6	R20313	9/18/2019

PILOT TESTING

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO.	: HK1811054
PROJECT NAME	: PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	: 24/10/2018
CUSTOMER	: LAM ENVIRONMENTAL SERVICES LTD
ADDRESS	: 11/F, CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

REPORT NO.	: HK1811054
PROJECT ITEM NO.	: HK1811054-01
PERFORMANCE CHECK / CALIBRATED EQUIPMENT	
TYPE	: AEROSOL MASS MONITOR
MANUFACTURER	: MET ONE INSTRUMENTS
MODEL NO.	: AEROCET - 831
SERIAL NO.	: W15449
EQUIPMENT NO.	: ---
RECEIPT DATE	: 18/10/2018
PERFORMANCE CHECK / CALIBRATION DATE	: 23/10/2018

PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory : Wong Po Yan Pauline
(Assistant Laboratory Manager)

Issue Date: 24/10/2018

REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME	:	PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	:	24/10/2018
REPORT NO.	:	HK1811054

PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE	:	AEROSOL MASS MONITOR
MANUFACTURER	:	MET ONE INSTRUMENTS
MODEL NO.	:	AEROCET - 831
SERIAL NO.	:	W15449
EQUIPMENT NO.	:	---
PERFORMANCE CHECK / CALIBRATION DATE	:	23/10/2018

STANDARD EQUIPMENT

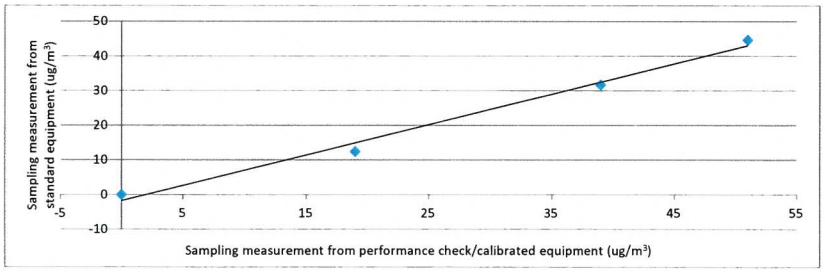
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check[1]	23/10/2018,9:05:00 AM	25.3	1017	0	0
1	23/10/2018,10:20:00 AM	25.3	1017	45	51
2	23/10/2018,11:22:00 AM	25.3	1017	32	39
3	23/10/2018,12:29:00 PM	25.3	1017	12	19

Linear Regression of Y on X

Slope (K- factor)	:	0.8800
Correlation Coefficient	:	0.9945
Validity of Performance Check / Calibration Record	:	23/10/2019



Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

2. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.

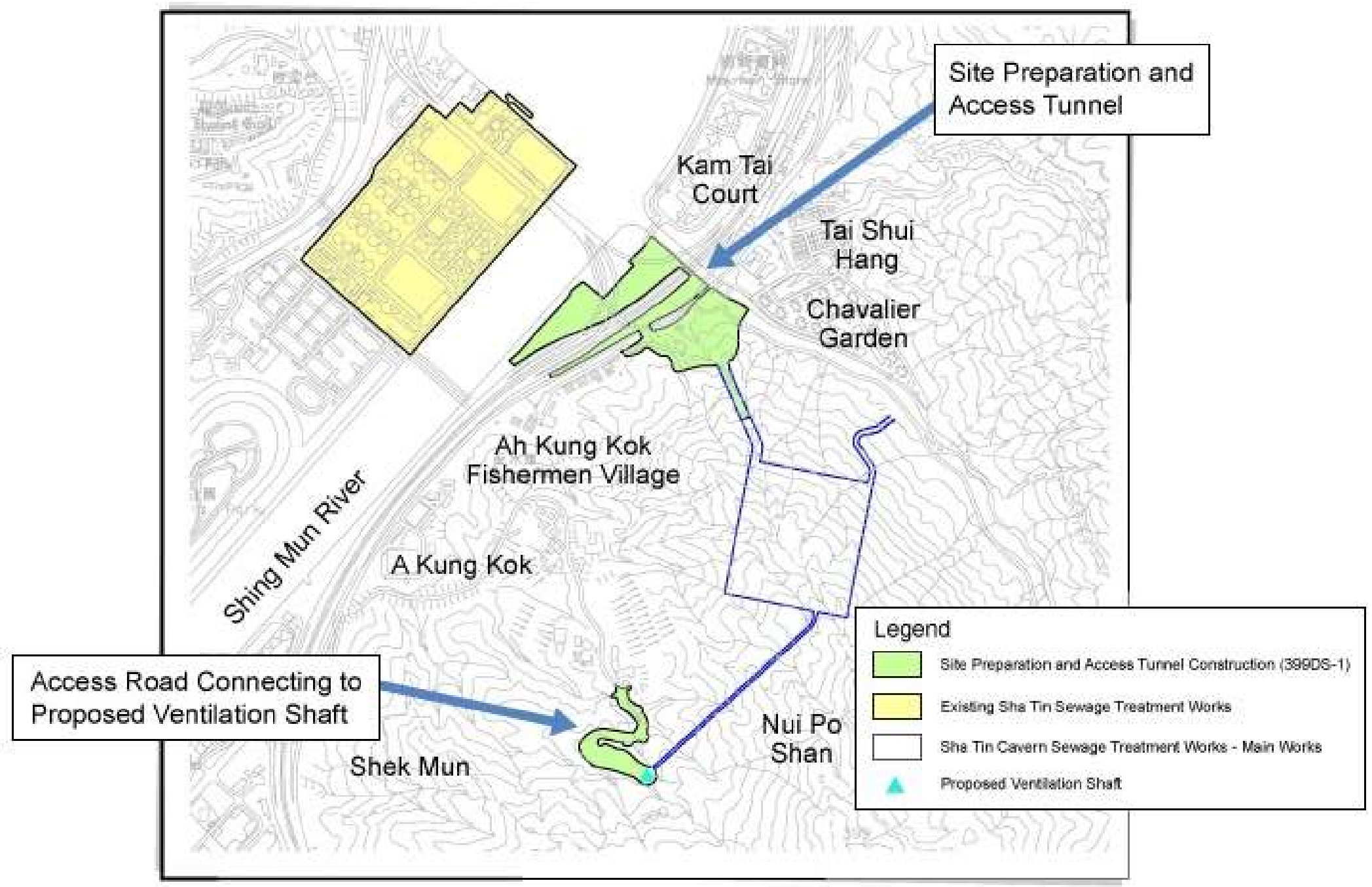
3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: Lau, Natalie Signature: _____ Date: 23/10/2018

Checked by: Wong Po Yan, Pauline Signature: _____ Date: 24/10/2018

Room B12, Block B, 5/F, Tonic Industrial Centre, 19 Lam Hing Street, Kowloon Bay, Kowloon
Tel: (852) 2527 6691 Email: info@pilot-testing.com

Appendix C Project layout plan


Site Preparation and Access Tunnel
Kam Tai Court
Tai Shui Hang
Chavalier Garden
Ah Kung Kok Fishermen Village
Shing Mun River
A Kung Kok
Access Road Connecting to Proposed Ventilation Shaft
Shek Mun
Nui Po Shan
Legend
Site Preparation and Access Tunnel Construction (399DS-1)
Existing Sha Tin Sewage Treatment Works
Sha Tin Cavern Sewage Treatment Works - Main Works
Proposed Ventilation Shaft

Appendix 3.1

Environmental Mitigation Implementation Schedule

APPENDIX C IMPLEMENTATION SCHEDULE OF RECOMMENDED MITIGATION MEASURES

C.1 Introduction

C.1.1 This section presents the implementation schedule of mitigation measures for the Project. **Table C.1** summarises the details of the recommended mitigation measures for all works areas. For each recommended mitigation measures, both the location and timing for the measure have clearly been identified as well as the parties responsible for implementing the measure and for maintenance (where applicable).

Table C.1 Implementation Schedule of Recommended Mitigation Measures

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Air Quality Impact								
	Construction Phase								
Table 3.5	2.4.1	The rock crushing plant is configured as an enclosed system. Dust collector with dust removal efficiency of 99% will be provided at the exhaust of the rock crusher during rock crushing. Watering will be provided to maintain material in wet condition. Vehicles would be required to pass through the wheel washing facilities provided at site exit.	Rock Crushing Plant / Construction Phase	Contractor	√	√		√	Air Pollution Control Ordinance (APCO)
3.8.1	2.4.1	Watering eight times a day on active works areas, exposed areas and unpaved haul roads to reduce dust emission by 87.5%.	All active works areas, exposed areas and unpaved haul roads	Contractor		√		√	APCO

[1] Des = Design; C = Construction; O = Operation; Dec = Decommissioning

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
3.8.1	2.4.1	Dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices: • Use of regular watering 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 shall be applied to aggregate fines. • Open stockpiles shall 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 area of barging point, and use of water sprinklers at the loading area	Construction Sites	Contractor		√		√	APCO and Air Pollution Control (Construction Dust) Regulation

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods. • Provision of not less than 2.4m high hoarding from ground level along site boundary where adjoins a road, streets or other accessible to the public except for a site entrance or exit. • Imposition of speed controls for vehicles on site haul roads. • 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 PFA should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides. • Instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Operation Phase								
3.5.2	-	Sludge tanks with totally enclosed design proven by DSD should be deployed for transporting sludge. With thorough cleaning practice and regular condition test of the sludge tanks, odour emission and leachate leakage during storage and transportation are not anticipated.	Cavern Sewage Treatment Works (CSTW) / Operation Phase	Project Proponent / Operator	√		√		-
3.6.2, 3.7.2	2.4.2	All treatment units with potential odour emission will be covered and the exhausted air will be conveyed to the deodouriser (with 80 – 97% odour removal efficiency) for treatment before discharge to the environment.	CSTW / Operation Phase	Design team / Project Proponent / Operator	√		√		-
3.7.2	2.4.2	The following appropriate odour control measures would be implemented. (i) Adopting the advantage of caverns as natural barriers for odour control; (ii) Covering up of odour sources; (iii) Preventing odour leakage through the access tunnels by applying negative pressure inside caverns; (iv) Installing deodourizing units to clean up the collected foul air; (v) Discharging exhausted air at height to further enhance the dilution effect; and (vi) Enhancing the odour management of the sludge transportation.	CSTW / Operation Phase	Design team / Project Proponent / Operator	√		√		-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
3.10.2	2.3.1	Odour monitoring at the inlet and outlet of the deodourizing units is proposed to be conducted for first three years of the operation of CSTW, quarterly in the first year, and once every 6 months in the second and third years if monitoring results remain below the limit levels.	CSTW / Operation Phase	Project Proponent / Operator	√		√		-
3.10.2	2.3.2	An Odour Complaint Registration System is also proposed in the EM&A programme to check whether the deodorizing units can fulfill the recommended odour removal performance.	CSTW / Operation Phase	Operator			√		-
3.10.2	-	Any unexpected leakage from tanks could be observed with monitoring equipment. Monitoring equipment would be installed in the CSTW to monitor the concentration of H_2S, CO and CO_2 and methane. Investigation and repair works would be carried out immediately if abrupt increase of these concentrations are reported. Emergency Plan would be established for these upset conditions.	CSTW / Operation Phase	Project Proponent / Operator	√		√		-
	Noise Impact								
	Construction Phase								
4.5.1.6	-	Re-provision of 220m length noise barrier with 10mPD on temporary access haul road to replace the existing 150m length noise barrier with 9.2mPD to 10mPD on Ma On Sha Road. The	Proposed temporary access / Construction Phase	Contractor		√			Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), Noise Control Ordinance (NCO)

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		location of the relocated noise barrier is shown in **Figure No. 60334056/EIA/4.02** and **Appendix 4.07**. Once the construction work for the CSTW is completed, the temporary access roads would be demolished and the relevant section of Ma On Shan Road and associated noise barrier would be recovered as before.							
4.8.1	3.8.1	The use of quiet plant associated with the construction works is prescribed in British Standard "Code of practice for noise and vibration control on construction and open sites, BS5228" which contains the SWLs for specific quiet PME.	All Construction Work Sites	Contractor		√		√	EIAO-TM, NCO
4.8.1	3.8.1	To alleviate the construction noise impact on the affected NSRs, movable noise barrier for Air Compressor, Bar Bender and Cutter, Breaker, Chisel, Saw, Compactor, Mixers, Pump, Crane, Desander, Drilling Rig, Dump Truck, Excavator, Generator, Grab, Lorry, Paver, Poker and Roller are proposed.	All Construction Work Sites	Contractor		√		√	EIAO-TM, NCO
4.8.1	3.8.1	Provision of noise barrier/acoustic mats for Drilling Jumbo so as to have screening effecting with 10 dB(A) noise attenuation	Drilling Jumbo operate outside the portal and within 20m inside the portal	Contractor		√			EIAO-TM, NCO
4.8.1	3.8.1	To further alleviate the construction noise impact on the Neighbourhood Advice-Action Council Harmony	Construction Site for access road for	Contractor		√		√	EIAO-TM, NCO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		Manor, it is proposed to limit the number of on-time operating PMEs within 120m of this NSR during construction of access road.	magazine at A Kung Kok Road						
4.9.1	3.8.1	In addition to the above-mentioned mitigation measures, good site practices listed below shall be adopted by all the contractors to further ameliorate the noise impacts. • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program. • Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction program. • Mobile plant, if any, should be sited as far away from NSRs as possible. • Machines and plant (such as trucks) that may be in intermittent use should be shut down between works 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.	All Construction Work Sites	Contractor		√		√	EIAO-TM, NCO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		• Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.							
	Operation Phase								
4.7.4	3.8.2	The maximum allowable sound power levels for the ventilation shaft, ventilation buildings at main portal and emergency portal, ventilation fan for chiller plant room and cooling tower at the administration building as presented in Table 4.16 of the EIA Report should be achieved such that the nearest affected NSRs can be in compliance with the noise criteria	Ventilation Shaft, Administration Building and Ventilation Buildings/ Operation Phase	Project Proponent	√		√		EIAO-TM, NCO
4.11.2	3.8.2	Prior to the operational phase of the Project, a commissioning test for the ventilation buildings, the ventilation shaft, ventilation fan for chiller plant room at administration building and cooling tower at the administration building would be conducted to ensure compliance with the relevant allowable maximum sound power levels.	Ventilation Shaft, Administration Building and Ventilation Buildings/ Operation Phase	Contractor			√		EIAO-TM, NCO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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	Water Quality Impact								
	Construction Phase								
5.7.2	4.10	Water used in ground boring and drilling for site investigation or rock / soil anchoring should as far as practicable be re-circulated after sedimentation. When there is a need for final disposal, the wastewater should be discharged into storm drains via silt removal facilities.	Construction Sites / Construction Phase	Contractor		√			Water Pollution Control Ordinance (WPCO), EIAO-TM
5.7.2	4.10	All vehicles and plant should be cleaned before they leave a construction site to minimise the deposition of earth, mud, debris on roads. A wheel washing bay should be provided at every site exit if practicable and wash-water should have sand and silt settled out or removed before discharging into storm drains. The section of construction road between the wheel washing bay and the public road should be paved with backfill to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.	Construction Sites / Construction Phase	Contractor		√			Professional Persons Environmental Consultative Committee (ProPECC) Practice Note (PN) 1/94, WPCO, Waste Disposal Ordinance (WDO)
5.7.2	4.10	Good site practices should be adopted to remove rubbish and litter from construction sites so as to prevent the rubbish and litter from spreading from the site area. It is recommended to clean the construction sites on a regular basis.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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5.7.2	4.10	The site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed where applicable to minimise surface run-off and the chance of erosion.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, ProPECC PN 1/94
5.7.2	4.10	There is a need to apply to EPD for a discharge licence for discharge of effluent from the construction site under the WPCO. The discharge quality must meet the requirements specified in the discharge licence. All the runoff and wastewater generated from the works areas should be treated so that it satisfies all the standards listed in the Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS). The beneficial uses of the treated effluent for other on-site activities such as dust suppression, wheel washing and general cleaning etc., can minimise water consumption and reduce the effluent discharge volume. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the relevant WPCO licence which is under the ambit of RO of EPD.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, (TM-DSS)
5.7.2	4.10	Contractor must register as a chemical waste producer if chemical wastes would be produced from the	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, WDO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		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.							
5.7.2	4.10	Any service shop and maintenance facilities should be located on hard standings within a bonded area, and sumps and oil interceptors should be provided. Maintenance of vehicles and equipment involving activities with potential for leakage and spillage should only be undertaken within the areas appropriately equipped to control these discharges.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM
5.7.2	4.10	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 should be followed to avoid leakage or spillage of chemicals.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, WDO
5.7.2	4.10	Sufficient chemical toilets should be provided in the works areas. A licensed waste collector should be deployed to clean the chemical toilets on a regular basis.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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5.7.2	4.10	Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the surrounding environment.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM
5.7.2	4.10	The practices outlined in ETWB TC (Works) No. 5/2005 "Protection of natural streams/rivers from adverse impacts arising from construction works" should also be adopted where applicable to minimise the water quality impacts upon any natural streams or surface water systems.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, ETWB TC (Works) No. 5/2005
5.7.2	4.10	Appropriate measures during the construction of the cavern construction should be implemented to minimise the groundwater infiltration.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM
5.7.2	4.10	No directly discharge of groundwater from contaminated areas should be adopted. Prior to any excavation works within the potentially contaminated areas at the existing STSTW site, the baseline groundwater quality in these areas should be reviewed based on the relevant SI data and any additional groundwater quality measurements to be performed with reference to *Guidance Note for Contaminated Land Assessment and Remediation* and the review results should be submitted to EPD for examination. If the review results indicated that the groundwater to be generated from the excavation	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, Guidance Note for Contaminated Land Assessment and Remediation

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		works would be contaminated, this contaminated groundwater should be either properly treated or properly recharged into the ground in compliance with the requirements of the TM-DSS. If wastewater treatment is to be deployed for treating the contaminated groundwater, the wastewater treatment unit shall deploy suitable treatment processes (e.g. oil interceptor / activated carbon) to reduce the pollution level to an acceptable standard and remove any prohibited substances (such as TPH) to an undetectable range. All treated effluent from the wastewater treatment plant shall meet the requirements as stated in TM-DSS and should be either discharged into the foul sewers or tankered away for proper disposal.							
5.7.2	4.10	If deployment of wastewater treatment is not feasible for handling the contaminated groundwater, groundwater recharging wells should be installed as appropriate for recharging the contaminated groundwater back into the ground. The recharging wells should be selected at places where the groundwater quality will not be affected by the recharge operation as indicated in section 2.3 of the TM-DSS. The baseline groundwater quality should be determined prior to the selection of the recharge wells, and submit a working plan to EPD for agreement. Pollution	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, TM-DSS

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		levels of groundwater to be recharged shall not be higher than pollutant levels of ambient groundwater at the recharge well. Groundwater monitoring wells should be installed near the recharge points to monitor the effectiveness of the recharge wells and to ensure that no likelihood of increase of groundwater level and transfer of pollutants beyond the site boundary. Prior to recharge, free products should be removed as necessary by installing the petrol interceptor. The Contractor should apply for a discharge licence under the WPCO through the Regional Office of EPD for groundwater recharge operation or discharge of treated groundwater							
5.7.2	4.10	THEES connection works should be synchronized with the THEES maintenance, for a duration not longer than 4 weeks each outside the algae blooming season (January to May) and frequency of THEES maintenance shall be no more than once per year during the construction phase of the Project.	Tolo Harbour / Construction Phase	Project Proponent / Contractor	√	√			EIAO-TM
	Construction and Operation Phases								
5.10.2	4.10	Shutdown of the THEES for maintenance should be shortened as far as possible. It is recommended that the maintenance of the THEES tunnel should be avoided during the algae blooming season (January to May).	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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5.10.2	4.10	Relevant government departments including EPD, WSD, AFCD as well as the key stakeholders for mariculture and fisheries in Tolo Harbour should be informed of the maintenance event prior to any discharge.	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		WPCO, EIAO-TM
5.10.3	4.2-4.5	An event and action plan and a water quality monitoring programme (as presented in the EM&A Manual) should be implemented for the THEES maintenance discharge	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		WPCO, EIAO-TM
5.10.1	4.10	Silt screen may be installed at the flushing water intakes during the THEES maintenance discharge should it appear necessary. Close communication between DSD and WSD should be maintained to minimize any impact on the flushing water intakes due to THEES maintenance discharge.	WSD flushing water intakes / Construction and Operation Phase	WSD / Project Proponent		√	√		WPCO, EIAO-TM
	Design and Operation Phases								
5.8.3	4.6	In case adverse impact on KTN is identified based on the result of the three-month monitoring programme after commissioning of the project, the operation conditions of the treatment and THEES system should be investigated, and corrective and remedial action should be implemented to improve the effluent discharge from the CSTW. Furthermore, DSD should extend the water quality monitoring	Project site / Design and Operation Phases	Project Proponent			√		WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		programme for at least three months or as agreed by the Director of Environmental Protection.							
5.11.2	4.10	Dual power supply or ring main supply from CLP Power Hong Kong Ltd. CLP should be provided for the CSTW to prevent the occurrence of power failure. In addition, standby facilities for the main treatment units and standby equipment parts / accessories should also be provided in order to minimise the chance of emergency discharge. CLP should be consulted in order to ascertain the power supply for normal plant operation within the caverns. It is recommended that government departments including EPD, WSD and AFCD as well as the key stakeholders for mariculture and fisheries in Tolo Harbour should be informed as soon as possible in case of any emergency discharge so that appropriate actions can be taken.	Project site / Design and Operation Phases	Project Proponent	√		√		WPCO, EIAO-TM
5.11.2	4.10	In case of emergency discharge, the plant operators of CSTW should carry out necessary follow-up actions according to the procedures of the current contingency plan formulated for the existing STSTW to minimise the water quality impact.	Project site / Operation Phase	Project Proponent			√		WPCO, EIAO-TM
5.11.2	4.10	WSD may also consider, should it appear necessary, to shut down the Sha Tin seawater pumping station for a short period of time in case of	Sha Tin seawater pumping station / Operation Phase	WSD / Project Proponent			√		WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		emergency discharge in order to minimize any adverse impacts.							
5.13.2	4.10	Best Management Practices to reduce storm water and non-point source pollution are also proposed as follows: <u>Design Measures</u> • Exposed surface shall be avoided within the road and portal sites to minimise soil erosion. The access road and the portal areas shall be either hard paved or covered by landscaping area where appropriate. • Streams near the Project site will be retained to maintain the original flow path. The drainage system will be designed to avoid flooding. • Green areas / planting etc. should be introduced alongside the access road and within the portal areas, as far as possible, to minimise runoff pollution. <u>Devices/ Facilities to Control Pollution</u> • Screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening off large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system. • Road gullies with standard design and silt traps should be provided to	Project site / Design and Operation Phase	Project Proponent	√		√		WPCO, ProPECC PN 5/93

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		remove particles present in stormwater runoff, where appropriate. <u>Administrative Measures</u> • Good management measures such as regular cleaning and sweeping of road surface/ open areas are suggested. The road surface/ open area cleaning should also be carried out prior to occurrence rainstorm. • Manholes, as well as stormwater gullies, ditches provided at the Project site should be regularly inspected and cleaned (e.g. monthly). Additional inspection and cleansing should be carried out before forecast heavy rainfall.							
	Land Contamination								
6.7.1	-	Further site walkover and/or detailed land contamination assessment will be required for sites that are inaccessible or currently in operation / yet to be constructed (i.e. existing STSTW, David Camp and part of existing Sha Tin VDC, and proposed A Kung Kok Shan Road surface magazine site within the Project boundary). The site walkover, detailed land contamination assessment and if necessary, remediation works should be carried out after decommissioning of the sites	Existing STSTW, David Camp and VDC / Construction Phase	Project Proponent / Contractor		√		√ (for existing STSTW)	Guidance Note for Contaminated Land Assessment and Remediation, Practice Guide for Investigation and Remediation of Contaminated Land, Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		but prior to re-development and should include the following: • Prior to the commencement of the SI works, review the CAP to confirm whether the proposed SI works (e.g. sampling locations, testing parameters etc.) are still valid and to confirm the appropriate RBRGs land use scenario for the development; • Submit supplementary CAP(s), presenting the findings of the above review for EPD endorsement. If land contamination issues were identified within David Camp or part of existing VDC / proposed A Kung Kok Shan Road surface magazine site within the Project boundary in the further site walkover, findings of the site walkover and the proposal for SI works should also be presented in the supplementary CAP(s); • Carry out SI works according to the supplementary CAP endorsed by EPD; • Submit CAR(s), detailing findings of the SI works and nature/extent of any soil/groundwater contamination, and, if contaminated identified, RAP(s), discussing the appropriate remedial methods and mitigation							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		measures, for the identified contamination, for EPD agreement; and • Carry out soil/groundwater remediation works according to EPD agreed RAP and submit RR(s) afterwards for EPD agreement. The remediation works and agreement of RR should be completed prior to re-development.							
6.7.2	-	If contamination were identified, mitigation measures as recommended in the RAP should be followed and should include the following: • Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety; • Excavation shall be carried out during dry season as far as possible to minimise contaminated runoff from contaminated soils; • Supply of suitable clean backfill material (or treated soil) after excavation; • Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust emission. If this is not practicable due to frequent	Project Site / Construction Phase	Contractor		√		√ (for existing STS TW)	Guidance Note for Contaminated Land Assessment and Remediation, Practice Guide for Investigation and Remediation of Contaminated Land, Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management

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		usage, regular watering shall be applied. However, watering shall be avoided on stockpiles of contaminated soil to minimise contaminated runoff. • Vehicles containing any excavated materials shall be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates shall be sealed to prevent any discharge during transport or during wet conditions; • Speed control for the trucks carrying contaminated materials shall be enforced; • Vehicle wheel and body washing facilities at the site's exist points shall be established and used; and • Pollution control measures for air emissions (e.g. from biopile blower and handling of cement), noise emissions (e.g. from blower or earthmoving equipment), and water discharges (e.g. runoff control from treatment facility) shall be implemented and complied with relevant regulations and guidelines.							

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	Hazard to Life								
	Construction Phase								
7.14.1	6.2.2	The following recommendations are justified to be implemented to meet the EIAO-TM requirements: • The truck should be designed to minimise the amount of combustible in the cabin. The fuel carried in the fuel tank should also be minimised to reduce the duration of any fire; • The accident involvement frequency of the explosives delivery truck should be minimised through implementation of several administrative measures, such as providing training programme to the driver, regular "tool box" briefing session, implementing a defensive driving attitude, selecting driver with good safety record, and providing regular medical checks for the driver; • Avoidance of returning unused explosives to the magazine, only the required quantity of explosives for a particular blast should be transported; • Maintain a minimum headway of 10 minutes between two	Explosives dlivery route / Construction Phase	Contractor	√	√			EIAO-TM

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		consecutive truck convoys whenever practicable; and • The fire involvement frequency should be minimised by carrying better types of fire extinguishers and with bigger capacity onboard of the explosives delivery truck. Emergency plans and trainings could also be provided to make sure that the fire extinguishers are used adequately.							
7.14.2	6.2.3	The magazine should be designed, built, operated and maintained in accordance with Mines Division's guidelines and appropriate industry best practice. In addition, the following recommendations should be implemented: • The security plan should address different alert security level to reduce opportunity for arson or deliberate initiation of explosives; • Emergency plan should be developed to address uncontrolled fire in magazine area, and drill of the emergency plan should be regularly carried out; • Suitable work control system should be set-up, such as an operational manual including Permit-to-Work system, to ensure that work activities undertaken	Magazine Site/ Construction Phase	Contractor	√	√			-

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		during operation of the magazine are properly controlled; • Good house-keeping within the magazine to ensure no combustible materials are accumulated; • Good house-keeping outside the magazine stores to ensure no combustible materials are accumulated; and • Regular checking of the magazine store to ensure no water seepage through the roof, walls or floor.							
7.14.3	6.2.4	The following recommendations should be implemented: • Emergency plan should be developed to address uncontrolled fire during transport. Case of fire near an explosive delivery truck in jammed traffic should be included in the plan. Activation of fuel and battery isolation switches on vehicle when fire breaks out should also be included in the emergency plan to reduce likelihood of prolonged fire leading to explosion; • Working guideline should be developed to define procedure for explosives transport during adverse weather such as thunderstorm;	To and from Magazine Site / Construction Phase	Contractor	√	√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
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		• Detonators should be transported separately from other Class 1 explosives. Separation of vehicles should also be maintained through the trip; • Develop procedure to ensure the availability of parking space on site for the explosives delivery truck. Delivery should not be commenced if parking space on site is not secured; • Hot work or other activities should be banned in the vicinity of the explosives offloading or charging activities; • Lining should be provided within the transportation box on the vehicle; • Fire screen should be used between cabin and the load on the vehicle; • Ensure packaging of detonators remains intact until handed over at blasting site; • Ensure that cartridged emulsion packages are not damaged before every trip; and • Use experienced driver with good safety record.							

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7.14.4	6.2.5	The following recommendations should be implemented for the safe use of explosives: • Blast Charge Weight should be within MIC as specified for the given blast face; • Temporary mitigation measures such as blast doors or heavy duty blast curtains should be installed at the portals or shafts and at suitable locations underground to prevent flyrock and control the air overpressure; • Multiple faces blasting will be carried out for the construction of cavern in this project. Good communication and control will need to be adopted in ensuring that the works are carried out safely; • It is not intended to carry out complete evacuation of the construction areas and secure refuge areas should be identified to workers in the areas; • A Chief Shotfirer and a Blasting Engineer shall be employed in addition to the normal blasting personnel to ensure that the works are safe and coordinated between blasting areas; • Shotfirer to be provided with a lightning detector, and appropriate	CSTW / Construction Phase	Contractor	√	√			-

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		control measures should be in place; • Speed limit for the diesel vehicle truck and bulk emulsion truck in the access tunnel and cavern should be imposed. The truck may be escorted while underground to ensure route is clear from hazards and obstructions; and • Hot work should be suspended during passage of the diesel vehicle truck and bulk emulsion truck in the access tunnel and cavern. • A boulder survey should be undertaken based on the likely PPV values that would result from the blasting process. Those boulders subject to the vibration higher than the allowable limit should be strengthened, removed, or constructed with boulder fence, prior to the commencement of blasting.							
	Operation Phase								
		Nil							

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	Ecological Impact (Terrestrial and Marine)								
	Construction Phase								
8.8.2	7.2.1	Construction of access roads and other temporary works should be carefully designed (e.g. elevated road for crossing streams) to avoid / minimise habitat loss and fragmentation.	Project site – areas access road / Pre-Construction Phase	Design team / Project Proponent	√				-
8.8.3	7.2.2	Minimise habitat loss to nearby habitats and associated wildlife by implementing the following mitigation measures: - • confining the works within the site boundary; • controlling access of site staff to avoid damage to the vegetation in surrounding areas; and • placement of equipment or stockpile in the existing disturbed / urbanised land within the site boundary of the Project to minimise disturbance to vegetated areas;	Project site / Construction Phase	Contractor		√			-
8.8.3	7.2.2	Reinstatement planting should be implemented upon the completion of construction works to minimise the ecological impact arising from the temporary habitat loss	Project Site (Main Portal Area / Secondary Portal Area / Access Road / Temporary Works Area) /Construction Phase	Project Proponent	√	√		√	

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8.8.2, 8.8.3 & 8.10	7.2.2	Detailed Vegetation Survey shall be conducted by a suitably qualified botanist / ecologist within the works area requiring vegetation clearance prior to commencement of works to identify plant species of conservation importance. The potentially affected individuals shall be tagged and fenced off for preservation, and in the case of unavoidable loss, for transplantation to nearby suitable habitat(s).	Proposed works areas (Main Portal, Secondary Portal, Access Road) / Pre-Construction Phase	Project Proponent / Qualified botanist or ecologist		√			
8.8.2, 8.8.3 & 8.10	7.3.1	A Protection and Transplantation Proposal including the subsequent monitoring visit for the affected plant species should be prepared and conducted by a suitably qualified local ecologist. The Proposal should be submitted for approval at least one month before works commencement. To review the performance of the transplantation exercise, monitoring of transplanted flora should be conducted monthly after the transplantation throughout the construction phase. The parameters to be monitored should include the health condition and survival rate of the transplanted flora and presence of weedy species. Any observations and recommendations should be reported in monthly EM&A reports	Recipient Site for transplanted species / Construction Phase	Project Proponent / Qualified botanist or ecologist		√			

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8.8.3	7.2.2	Mitigation measures should be implemented to control runoff from the construction site, as well as the adopting guidelines and good site practices for handling and disposal of construction discharges in order to minimise the potential indirect impact on the streams (particularly S2) resulting from site runoff. Precautionary measures should also be implemented to minimise indirect impacts to the streams, such as isolating the work site by placing sandbags and silt curtains, covering up construction materials, debris and spoil to avoid being washed into the stream, and properly collecting and treating construction effluent and sewage.	Access Road on Nui Po Shan / Construction Phase	Contractor		√			ETWB TCW No. 5/2005
8.8.3	7.2.2	Implement good site practice to further minimise impacts from disturbance such as noise, air quality and water quality issues, such as: - • the use of quiet plant and EPD's QPME and the availability of British Standards 5228 has been considered; • the use of movable noise barrier; • the use of temporary noise screening structures or purpose-built temporary noise barriers;	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		• install site hoarding as temporary noise barrier where construction works are undertaken; • only well-maintained plant should be operated on site and plant should be serviced regularly during the construction programme; • Mitigation measures stipulated in the ProPECC PN 1/94 "Construction Site Drainage" should be complied to minimise water quality impact; • Installation of stand-by pump, emergency power supply and telemetry system to avoid sewage overflow and surcharge to sewerage system due to power/equipment failure.							
8.8.3	7.2.2	Minimise groundwater infiltration during cavern construction with the following water control strategies:- • Probing Ahead: As a normal practice, the Contractor will undertake rigorous probing of the ground ahead of excavation works to identify zones of significant water inflow. The probe drilling results will be evaluated to determine specific grouting requirements in line with the tunnel / cavern advance. In such zones of significant water inflow that could occur as a result of discrete, permeable features, the intent	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		would be to reduce overall inflow by means of cut-off grouting executed ahead of the tunnel / cavern advance; • Pre-grouting: Where water inflow quantities are excessive, pre-grouting will be required to reduce the water inflow into the tunnel / cavern. The pre-grouting will be achieved via a systematic and carefully specified protocol of grouting; • In principle, the grout pre-treatment would be designed on the basis of probe hole drilling ahead of the tunnel / cavern face; • The installation of waterproof lining would also be adopted after the formation of the tunnels and caverns.							
8.8.3	7.2.2	In the event of excessive infiltration being observed as a result of the tunnelling or excavation works even after incorporation of the water control strategies, post-grouting should be applied as far as practicable as described below: • Post-grouting: Groundwater drawdown will be most likely due to inflows of water into the tunnel / cavern that have not been sufficiently controlled by the pre-grouting measures in high permeability area. Where this	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		occurs post grouting will be undertaken before the lining is installed. Whilst unlikely to be required in significant measure, such a contingency should be allowed for reduction in permeability of the tunnel / cavern surround (by grouting) to limit inflow to acceptable levels. The practical groundwater control measures stated above are proven technologies and have been extensively applied in other past projects. These measures or other similar methods, as approved by the Engineer to suit the works condition shall be applied to minimise the groundwater infiltration.							
8.8.3	7.2.2	In case seepage of groundwater occurs, groundwater should be pumped out from works areas and discharged to the storm system via silt trap. Uncontaminated groundwater from dewatering process should also be discharged to the storm system via silt removal facilities.	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
8.8.3	7.2.2	Mitigation measures recommended in the water quality impact assessment for controlling water quality impact will also serve to protect marine ecological resources from indirect impacts and ensure no unacceptable impact on marine ecological resources. Relevant government departments including EPD, WSD and AFCD as well as key stakeholders for mariculture and fisheries in Tolo Harbour should be informed of the THEES maintenance / emergency discharge event prior to any discharge. It is recommended that the temporary effluent bypass event and the THEES maintenance period should be shortened as far as possible.	Tolo Harbour / Construction Phase	Contractor and Operator		√			-
	Construction and Operation Phase								
8.8.3	7.2.2	Overall reduction of glare during both construction and operation phase should be considered. A balance between lighting for safety, and avoiding excessive lighting can be achieved through the use of directional lighting to avoid light spill into sensitive areas, and control/timing of lighting periods of some facilities, particularly at the secondary portal which lies approximately 200 m northwest of Ma On Shan Country Park.	Project site / Construction and Operation Phase	Contractor and Operator		√	√		-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
8.8.3	7.2.2	During the decommissioning and demolition of the existing STSTW, the direction and lighting periods should be controlled during ardeid breeding season (March to August) to minimise the potential indirect impact on Penfold Park Egretry and the ardeids flying over the existing STSTW.	Existing STSTW / Decommissioning / March to August	Contractor				√	-
8.10	7.3	It is anticipated that the construction of rock caverns would not have adverse impacts on groundwater in Nui Po Shan. Nonetheless, surface water level or groundwater level near the caverns will be closely monitored during the construction and operation stage.	Project site / Construction and Operation Phase	Contractor and Operator		√	√		-
	Compensatory Planting								
8.8.4& 8.10.1	7.2.3	Compensatory planting would be provided at main and secondary portal areas, and along the access road.	Main portal, secondary portal, and along access road	Project Proponent	√	√			DEVB TC(W) No. 7/2015
8.8.4 & 8.10.1	7.2.3	To facilitate successful planting, a detailed Woodland Compensation Plan should be prepared by local ecologists with at least 10 years relevant experience to form the basis of the proposed compensatory planting. The Woodland Compensation Plan should include implementation details, management requirement, as well as monitoring requirements (e.g. frequency and parameters) of the	Compensatory planting area (Main portal, secondary portal, and along access road) / pre-construction	Project Proponent	√	√			

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		compensatory planting area. Approval of the Plan should be obtained from EPD at least three months before the prior to commencement of compensatory woodland planting.							
8.8.4 & 8.10.1	7.2.3	Upon the completion of planting, monitoring of the woodland compensation areas should be implemented, with maintenance works (e.g. irrigation, weeding, pruning, control of pests and diseases, replacement planting, repair of damage, etc.) conducted as necessary.	Compensatory planting area (Main portal, secondary portal, and along access road) / Operation	Project Proponent / CSTW Operator			√		
	Fisheries Impact								
9.6	8.2	Potential impacts on fisheries resources and fishing operations arising from the Project have been avoided and minimised by construction of a connection pipes to the existing emergency outfall of STSTW by trenchless method underneath Shing Mun River with the least water quality impact. In addition, the temporary effluent bypass event for THEES connection work would be synchronized within regular THEES maintenance. Therefore, additional water quality impact and fisheries impact from changes of water quality have been avoided. Furthermore, the THEES maintenance discharge would avoid the blooming season of algae (i.e. January to May) to minimise the potential water quality impacts. It is	Tolo Harbour /Construction and Operation Phase	Project Proponent / Contractor	√	√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		recommended that any THEES maintenance period should be shortened as far as possible.							
9.6	8.2	Mitigation measures recommended in the water quality impact assessment for controlling water quality impact will also serve to protect fisheries from indirect impacts and ensure no unacceptable impact on fisheries resources and operations. For more detailed mitigation measures regarding water quality refer to Sections 5.7.2 and 5.13.2 of the EIA Report.	Construction and Operation Phase	Contractor and Operator		√	√		-
9.6	8.2	Relevant government departments including EPD, WSD and AFCD as well as key stakeholders for mariculture and fisheries in Tolo Harbour should be informed prior to the THEES maintenance / emergency discharge events.	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		
	Landscape and Visual Impact								
Table 10.10	-	CM1 - Preservation of Existing Vegetation	Construction Sites/ Construction Phase	Project Proponent	√	√		√	DEVB TCW No. 7/2015 and latest Guidelines on Tree Preservation during Development issued by GLTM Section of DEVB
Table 10.10	-	CM2 - Transplanting of Affected Trees	Construction Sites/ Construction Phase	Project Proponent	√	√		√	DEVB TCW No. 7/2015 and the latest Guidelines on Tree Transplanting issued by GLTM Section of DEVB

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Table 10.10	-	CM3 - Compensatory Tree Planting	Construction Sites/ Construction Phase	Project Proponent	√	√		√	DEVB TCW No. 7/2015
Table 10.10	-	CM4 - Control of Night-time Lighting Glare	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.10	-	CM5 - Erection of Decorative Screen Hoarding	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.10	-	CM6 - Management of Construction Activities and Facilities	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.10	-	CM7 - Reinstatement of Temporarily Disturbed Landscape Areas	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.11	-	OM1 - Tree and Shrub Planting at the Temporary Project Magazine Site after Completion of Engineering Works	Temporary Project Magazine Site / Operation Phase	Project Proponent	√	√	√		
Table 10.11	-	OM2 - Aesthetically pleasing design of Aboveground Structures	Tunnel Portals, Administration Building, Ventilation Buildings, Electrical Substations and Ventilation Shaft / Operation Phase	Project Proponent	√	√	√		

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Table 10.11	-	OM3 - Aesthetically pleasing design of Highways Structures	Access Road to Ventilation Shaft / Operation Phase	Highways Department	√	√	√		
Table 10.11	-	OM4 - Reprovision of Cycle Track	Cycle track / Operation Phase	Highways Department	√	√	√		
Table 10.11	-	OM5 - Provision of Green Roof	Administration Building and Ventilation Buildings / Operation Phase	Project Proponent	√	√	√		
Table 10.11	-	OM6 - Provision of Buffer Planting	Main and Secondary Portal Areas / Operation Phase	Project Proponent	√	√	√		
Table 10.11	-	OM7 - Hydroseeding on the disturbed ground surface after demolition works prior to future redevelopment of the existing STSTW	Existing STSTW / Operation Phase	Lands Department (LandsD) or future development agent in existing STSTW	√	√	√		
Table 10.11	-	OM8 - Woodland Mix Planting on Soil Slopes	Soil Slopes / Operation Phase	Project Proponent	√	√	√		

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Cultural Heritage Impact								
11.5.1.1	10.1.1	No potential direct or indirect impact to cultural heritage resource is anticipated, and therefore no mitigation measures are required.	N/A	N/A					EIAO EIAO-TM Antiquities and Monuments Ordinance Guidelines for Cultural Heritage Impact Assessment
	Wastes Management Implications								
12.6.2	11.2.2	Appropriate waste handling, transportation and disposal methods for all waste arising generated during the construction works for the Project should be implemented to ensure that construction wastes do not enter the nearby streams or drainage channel. It is anticipated that adverse impacts would not arise on the construction site, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities include: • Nomination of approved personnel, such as a site manager, to be responsible for good site practices, and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility.	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		• Training of site personnel in proper waste management and chemical waste handling procedures. • Provision of sufficient waste reception/ disposal points, of a suitable vermin-proof design that minimises windblown litter. • Arrangement for regular collection of waste for transport off-site and final disposal. • Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers. • Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors. • A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed. • A Waste Management Plan should be prepared and should be submitted to the Engineer for approval. One may make reference to ETWB TCW No. 19/2005 for details. In order to monitor the disposal of C&D material at landfills and public filling areas, as appropriate, and to control fly tipping, a trip-ticket system should be included as one of the contractual								

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		requirements to be implemented by an Environmental Team undertaking the Environmental Monitoring and Audit work. One may make reference to DEVB TCW No.6/2010 for details.							
12.6.3	11.2.3	Good management and control of construction site activities / processes can minimise the generation of waste. 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: • Segregate and store different types of construction related waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. • Provide separate labelled bins to segregate recyclable waste such as aluminium cans from other general refuse generated by the work force, and to encourage collection by individual collectors. • Any unused chemicals or those with remaining functional capacity shall be recycled. • Maximising the use of reusable steel formwork to reduce the amount of C&D material. • Prior to disposal of C&D waste, it is recommended that wood, steel	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill. • On-site crushing and sorting facilities are being considered to reduce the rock size to fulfill the size requirements from relevant waste collection / transfer / disposal facilities; • Adopt proper storage and site practices to minimise the potential for damage to, or contamination of, construction materials. • Plan the delivery and stock of construction materials carefully to minimise the amount of surplus waste generated. • Adopt pre-cast construction method instead of cast-in-situ method for construction of concrete structures as much as possible; and • Minimise over ordering of concrete, mortars and cement grout by doing careful check before ordering. In addition to the above measures, other specific mitigation measures are recommended below to minimise environmental impacts during handling, transportation and disposal of wastes.							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
12.6.4	11.2.4	Storage of materials on site may induce adverse environmental impacts if not properly managed, recommendations to minimise the impacts include: • Waste, such as soil, should be handled and stored well to ensure secure containment, thus minimising the potential of pollution; • Maintain and clean storage areas routinely; • Stockpiling area should be provided with covers as much as practicable and water spraying system to prevent materials from wind-blown or being washed away; and • Different locations should be designated to stockpile each material to enhance reuse.	Project Site Area / Construction Phase	Contractor		√		√	-
12.6.4	11.2.4	Licensed waste haulers should be employed for the collection and transportation of waste generated. The following measures should be enforced to minimise the potential adverse impacts: • Remove waste in timely manner; • Waste collectors should only collect wastes prescribed by their permits; • Impacts during transportation, such as dust and odour, should be	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance Waste Disposal (Charges for Disposal of Construction Waste) Regulation Land (Miscellaneous Provisions) Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		mitigated by the use of covered trucks or in enclosed containers; • Obtain relevant waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28); • Waste should be disposed of at licensed waste disposal facilities; and • Maintain records of quantities of waste generated, recycled and disposed.							
12.6.4	11.2.4	Land transport will be used for transportation of excavated and stockpile materials. It is expected there will be 1260 vehicles per day for transporting waste during peak construction phase. The tentative transportation routings for the disposal of various types of wastes are shown in Table 12.4. The transportation routing may be changed subject to the traffic conditions. Nevertheless, it is anticipated that there is no adverse impact from the waste during transportation with the implementation of appropriated measures (e.g. using water-tight containers and covered trucks).	Transportation Route of Waste / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
12.6.4	11.2.4	In order to monitor the disposal of C&D materials at PFRFs and landfills and to control fly-tipping, a trip-ticket system should be established in accordance with DEVB TCW No. 6/2010. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. Warning signs should be put up to remind the designated disposal sites. Close-circuited television should be installed at the vehicular entrance and exit of the site as additional measures to prevent fly-tipping.	Project Site Area / Construction Phase	Contractor		√		√	DEVB TCW No. 6/2010
12.6.4	11.2.5	In addition to the above general measures, other specific mitigation measures on handling the C&D materials and materials generated from site formation and demolition work are recommended below, which should form the basis of the WMP to be prepared by the contractor(s) in construction phase.	Project Site Area / Construction Phase	Contractor		√		√	Technical Circular (Works) No. 19/2005 Environmental Management on Construction Site
12.6.5	11.2.5	In order to minimise the impact resulting from collection and transportation of C&D materials 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:	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance ETWB TCW No.19/2005 DEVB TCW No. 6/2010

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		• A WMP, which becomes part of the EMP, should be prepared in accordance with ETWB TCW No.19/2005; • A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be adopted for easy tracking; and • In order to monitor the disposal of C&D materials at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be adopted (refer to DEVB TCW No. 6/2010). It is recommended that specific areas should be provided by the Contractors for sorting and to provide temporary storage areas (if required) for the sorted materials.							
12.6.5	11.2.5	The Contactor should prepare and implement an EMP 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. Such a management plan should incorporate site specific factors, such as the designation of areas for segregation and temporary storage of reusable and recyclable materials. The EMP should	Project Site Area / Construction Phase	Contractor		√			ETWB TCW No.19/2005

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		be submitted to the Engineer for approval. The Contractor should implement waste management practices in the EMP throughout the construction stage of the Project. The EMP should be reviewed regularly and updated by the Contractor, preferably on a monthly basis.							
12.6.5	11.2.5	All surplus C&D materials arising from or in connection with construction works should become the property of the Contractor when it is removed unless otherwise stated. The Contractor would be responsible for devising a system to work for on-site sorting of C&D materials and promptly removing all sorted and process materials arising from the construction activities to minimise 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.	Project Site Area / Construction Phase	Contractor		√		√	-
12.6.6	11.2.6	The practices of good housekeeping for CSTW listed below should be followed to ameliorate any odour impact from handling, collection, transportation and disposal of sludge:	Operation Phases	Operator			√		Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		• Screens should be cleaned regularly to remove any accumulated organic debris • Grit and screening transfer systems should be flushed regularly with water to remove organic debris and grit • Grit and screened materials should be transferred to closed containers • Scum and grease collection wells and troughs should be emptied and flushed regularly to prevent putrefaction of accumulated organics • Skim and remove floating solids and grease from primary clarifiers regularly • Frequent sludge withdrawal from tanks is necessary to prevent the production of gases • Sludge should be transported to the STF by water-tight containers to avoid Hydrogen Sulphide (H_2S)/odour emission and ingress of water into the containers which would lower the sludge dryness during transportation • Sludge cake should be transferred to closed containers • Sludge containers should be flushed with water regularly							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		• Sludge trucks and containers should be washed thoroughly before leaving the CSTW to avoid any odour nuisance during transportation							
12.6.6	11.2.6	In addition, all wastewater generated from the sludge dewatering process and all contaminated water from the cleaning operations recommended for odour control will be diverted to the relocated STSTW for proper treatment.	Operation Phases	Operator			√		Waste Disposal Ordinance
12.6.7	11.2.7	If chemical wastes are produced at the construction site or during operation, the Contractor during construction or the operator during operation will be required to register with the 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, oxidising, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to the licensed Chemical Waste Treatment Centre, or other	Construction and Operation Phases	Contractor / Operator		√	√		Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage [1]				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		licensed facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.							
12.6.8	11.2.8	Recycling of waste paper, aluminium cans and plastic bottles should be encouraged, it is recommended to place clearly labelled recycling bins at designated locations which could be accessed conveniently. Other general refuse should be separated from chemical and industrial waste by providing separated bins for storage to maximise the recyclable volume.	Construction and Operation Phases	Contractor / Operator		√	√		Public Health and Municipal Services Ordinance (Cap.132)
12.6.8	11.2.8	A reputable licensed waste collector should be employed to remove general refuse on a daily basis to minimise odour, pest and litter impacts.	Construction and Operation Phases	Contractor / Operator		√	√		Public Health and Municipal Services Ordinance (Cap. 132)
	Health Impact								
-	-	Not applicable.							

Appendix 4.1

Action and Limit Level

Action and Limit Level

Action and Limit Level for Noise Monitoring

Monitoring Station	Action Level	Limit Level (dB(A))		
		0700-1900 hrs on normal weekdays	0700-2300 hrs on holidays (including Sundays); and 1900-2300 hrs on all days [2]	2300-0700 hrs of all days [2]
CM1	When one documented complaint is received	65 / 70 [1]	60 / 65 / 70 [3]	45 / 50 / 55 [3]
CM2(A)		65 / 70 [1]		
CM3		65 / 70 [1]		
CM4		75		
CM5		75		

Remark 1: Limit level of CM1, CM2(A) and CM3 reduce to 65 dB (A) during examination periods if any.
Remark 2: Construction noise during restricted hours is under the control of Noise Control Ordinance Limit Level to be selected based on Area Sensitivity Rating.
Remark 3: Limit Level for restricted hour monitoring shall act as reference level only. Investigation would be conducted on CNP compliance if exceedance recorded during restricted hour noise monitoring period.

Action and Limit Level for Air Quality Monitoring

Monitoring Locations	1-hour TSP Level in µg/m3	
	Action Level	Limit Level
AM1	294	500
AM2	325	500
AM3(A)	360	500
AM4	297	500
AM5	349	500

Appendix 4.2

Copies of Calibration Certificates

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **XL2 Audio and Acoustic Analyzer**
- Serial Number: **A2A-15360-E0**

- Certificate Issued: **19 February 2019**
- Certificate Number: **43515-A2A-15360-E0**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: M. Frick

Signature:

Stamp:

NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Calibration of: XL2 Audio and Acoustic Analyzer
Serial Number: A2A-15360-E0
Date: 19 February 2019

- Detailed Calibration Test Results:

		reference	actual	unit	actual error	XL2 tolerance	calibration uncertainty[2]
RMS Level @ 1kHz, XLR Input		0.1	**0.100**	V	≤0.1%	±0.5%	±0.10%
		1	**1.000**	V	≤0.1%	±0.5%	±0.09%
		10	**9.991**	V	-0.1%	±0.5%	±0.09%
Flatness, XLR Input[1]	20 Hz	1	**0.996**	V	-0.4%	±1.1%	±0.09%
	20 kHz	1	**1.005**	V	0.5%	±1.1%	±0.09%
Frequency		1000	**999.99**	Hz	≤0.003%	±0.003%	±0.01%
Residual Noise	XLR		**< 2 uV**			<2 uV	±0.50%
THD+N @ 0 dBu, 1 kHz, XLR Input			**-99.7**	dB		typ. -100 dB	±0.50%

- Test Conditions: Temperature: **29.7** °C
  Relative Humidity: **21.7** %

- Calibration Equipment Used:

  - Agilent Multimeter, Typ 34401A, Serial No. MY 5300 4607
    Last calibration: 15.08.2018, Next calibration: 15.08.2019
    Calibrated by ELCAL to the national standards maintained
    at Swiss Federal Office of Metrology. SCS 0002

  - FX100 Audio Analyzer, Serial No. 10408
    Last Calibration: 27.04.2018, Next Calibration: 27.04.2019
    Manufacturer calibration based on Agilent 34410, Serial No. MY47014254,
    Last Calibration: 11.05.2018, Next Calibration: 11.05.2019
    which is calibrated by ELCAL to national standards maintained
    at Swiss Federal Office of Metrology. SCS 002

[1] The specified tolerance +/-0.1 dB @ 1V = +/- 1.1%

[2] The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 8034
  Capsule Serial Number: A16673

- Certificate Issued: **19 February 2019**
- Certificate Number: **43515-8034-M2230**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

Signature:

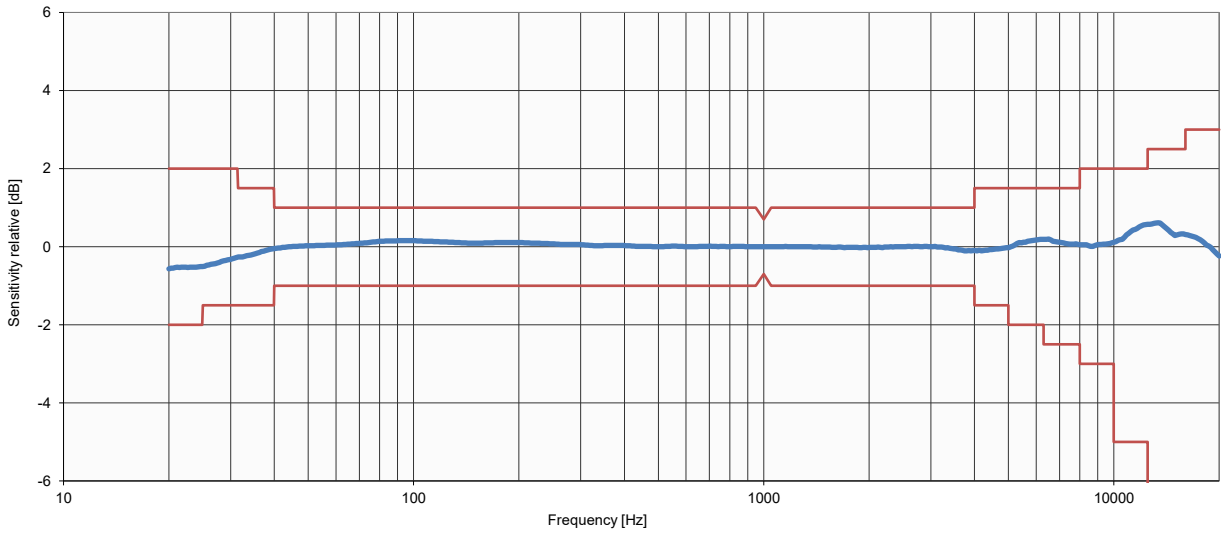
Stamp:

NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date: 19 February 2019
Calibration of: M2230 Measurement Microphone
MA220 Serial Number: 8034
Capsule Serial Number: A16673

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	tolerance	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**45.5 mV/Pa**	34-53 mV/Pa	±2.85%

- Test Conditions:

Temperature:	21.8 °C	±0.5 °C
Relative Humidity:	35.9 %	±2%
Air Pressure:	96.56 kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 05.12.2018, Next Calibration: 05.12.2020
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 14.08.2018, Next Calibration: 14.08.2019
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
  Last Calibration: 08.12.2017, Next Calibration: 08.12.2019
  Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

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E-mail: smec@cigismec.com Website: www.cigismec.com
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CERTIFICATE OF CALIBRATION

Certificate No.: 18CA1114 02 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2236	,	4188
Serial/Equipment No.:	2100736	,	2288941
Adaptors used:	-	,	-

Item submitted by

Customer Name:	Lam Environmental Service Ltd.
Address of Customer:	-
Request No.:	-
Date of receipt:	14-Nov-2018

Date of test: 15-Nov-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019	CIGISMEC
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Signal generator	DS 360	61227	23-Apr-2019	CEPREI

Ambient conditions

Temperature:	20 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1000 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi **Date:** 15-Nov-2018 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 18CA1114 02 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	1.0	2.1
	Lin	Pass	2.0	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Date:** 15-Nov-2018

Checked by: Shek Kwong Tat **Date:** 15-Nov-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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CERTIFICATE OF CALIBRATION

Certificate No.: 19CA0329 01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Class 1)	,	Microphone
Manufacturer:	Honglim Co., Ltd.	,	-
Type/Model No.:	HLES-01	,	CDM101
Serial/Equipment No.:	201692136	,	05866
Adaptors used:	-	,	-

Item submitted by

Customer Name:	Lam Environmental Service Ltd.
Address of Customer:	-
Request No.:	-
Date of receipt:	29-Mar-2019

Date of test: 02-Apr-2019

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019	CIGISMEC
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Signal generator	DS 360	61227	26-Dec-2019	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi **Date:** 02-Apr-2019 **Company Chop:** SOILS & MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 19CA0329 01 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	N/A	N/A	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	N/A	N/A	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	N/A	N/A	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	N/A	N/A	
	Repeated at frequency of 100 Hz	N/A	N/A	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	N/A	N/A	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fong Chun Wai **Checked by:** Fung Chi Yip

Date: 02-Apr-2019 **Date:** 02-Apr-2019

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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SMECLab

Sound level meter type:	HLES-01	Serial No.	201692136	Date	02-Apr-2019
Microphone type:	CDM101	Serial No.	05866		
				Report:	19CA0329 01

SELF GENERATED NOISE TEST

The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

Noise level in A weighting	17.7	dB
Noise level in C weighting	20.5	dB

LINEARITY TEST

The linearity is tested relative to the reference sound pressure level using a continuous sinusoidal signal of frequency 4 kHz. The measurement is made on the reference range for indications at 5 dB intervals starting from the 94 dB reference sound pressure level. And until within 5 dB of the upper and lower limits of the reference range, the measurements shall be made at 1 dB intervals.(SLM set to LEQ/SPL)

Reference/Expected level	Actual level		Tolerance	Deviation	
	non-integrated	integrated		non-integrated	integrated
dB	dB	dB	+/- dB	dB	dB
94.0	94.0	94.0	0.7	0.0	0.0
99.0	99.0	99.0	0.7	0.0	0.0
104.0	104.0	104.0	0.7	0.0	0.0
109.0	109.1	109.1	0.7	0.1	0.1
110.0	110.1	110.1	0.7	0.1	0.1
111.0	111.1	111.1	0.7	0.1	0.1
112.0	112.1	112.1	0.7	0.1	0.1
113.0	113.1	113.1	0.7	0.1	0.1
114.0	113.9	113.9	0.7	-0.1	-0.1
115.0	114.4	114.4	0.7	-0.6	-0.6
89.0	89.0	89.0	0.7	0.0	0.0
84.0	84.0	84.0	0.7	0.0	0.0
79.0	79.0	79.0	0.7	0.0	0.0
74.0	73.9	73.9	0.7	-0.1	-0.1
69.0	68.9	68.9	0.7	-0.1	-0.1
64.0	63.9	63.9	0.7	-0.1	-0.1
59.0	58.9	58.9	0.7	-0.1	-0.1
54.0	53.9	53.9	0.7	-0.1	-0.1
49.0	49.0	49.0	0.7	0.0	0.0
48.0	48.0	48.0	0.7	0.0	0.0
47.0	46.8	46.8	0.7	-0.2	-0.2
46.0	45.8	45.8	0.7	-0.2	-0.2
45.0	44.9	44.9	0.7	-0.1	-0.1

Measurements for an indication of the reference SPL on all other ranges which include it

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SMECLab

Sound level meter type: HLES-01 Serial No. 201692136 Date 02-Apr-2019
Microphone type: CDM101 Serial No. 05866
Report: 19CA0329 01

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
65-135	94.0	94.0	0.7	0.0
45-115	94.0	94.0	0.7	0.0
25-95	94.0	94.0	0.7	0.0

Measurements on all level ranges for indications 2 dB below the upper limit and 2 dB above the lower limit

Ranges	Reference/Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
65-135	67.0	67.2	0.7	0.2
	133.0	133.3	0.7	0.3
45-115	47.0	46.8	0.7	-0.2
	113.0	113.1	0.7	0.1
25-95	27.0	27.2	0.7	0.2
	93.0	93.2	0.7	0.2

FREQUENCY WEIGHTING TEST

The frequency response of the weighting netwoks are tested at octave intervals over the frequency ranges 31.5 Hz to 12500 Hz. The signal level at 1000 Hz is set to give an indication of the reference SPL.

Frequency weighting A:

Frequency	Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
Hz	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	54.6	54.1	1.5	1.5	-0.5
63.1	94.0	67.8	67.3	1.5	1.5	-0.5
125.9	94.0	77.9	77.6	1.0	1.0	-0.3
251.2	94.0	85.4	85.1	1.0	1.0	-0.3
501.2	94.0	90.8	90.6	1.0	1.0	-0.2
1995.0	94.0	95.2	95.3	1.0	1.0	0.1
3981.0	94.0	95.0	95.2	1.0	1.0	0.2
7943.0	94.0	92.9	93.3	1.5	3.0	0.4
12590.0	94.0	89.7	90.8	3.0	6.0	1.1

Frequency weighting C:

Frequency	Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
Hz	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	91.0	90.4	1.5	1.5	-0.6
63.1	94.0	93.2	92.7	1.5	1.5	-0.5
125.9	94.0	93.8	93.6	1.0	1.0	-0.2
251.2	94.0	94.0	93.8	1.0	1.0	-0.2

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SMECLab

Sound level meter type: HLES-01 Serial No. 201692136 Date 02-Apr-2019
Microphone type: CDM101 Serial No. 05866
Report: 19CA0329 01

501.2	94.0	94.0	93.9	1.0	1.0	-0.1
1995.0	94.0	93.8	93.8	1.0	1.0	0.0
3981.0	94.0	93.2	93.3	1.0	1.0	0.1
7943.0	94.0	91.0	91.3	1.5	3.0	0.3
12590.0	94.0	87.8	88.7	3.0	6.0	0.9

Note: No corrections for the frequency response of the microphone, instrument case and windshield are made to the sound level meter.

TIME WEIGHTING FAST TEST

Time weighting F is tested on the reference range with a single sinusoidal burst of duration 200 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
dB	dB	dB	+	-	dB
111.0	110.0	109.9	1.0	1.0	-0.1

TIME WEIGHTING SLOW TEST

Time weighting S is tested on the reference range with a single sinusoidal burst of duration 500 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
dB	dB	dB	+	-	dB
111.0	106.9	106.8	1.0	1.0	-0.1

RMS ACCURACY TEST

The RMS detector accuracy is tested on the reference range for a crest factor of 3.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz. (Set to INT)

	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time wighting	dB	dB	indication(dB)	+/- dB	dB
Slow	107.0+6.6	108.0	106.9	0.5	-1.1

TIME AVERAGING TEST

This test compares the SLM reading for continuous sine signals with readings obtained from a sine tone burst sequence having the same RMS level. The test level is 30 dB below the upper limit of the linearity range and repeated for Type 1 SLM with 40 dB below the upper limit of the linearity.

Frequency of tone burst: 4000 Hz

Duration of tone burst: 1 ms

Repetition Time	Level of tone burst	Expected Leq	Actual Leq	Tolerance	Deviation	Remarks
msec	dB	dB	dB	+/- dB	dB	
1000	85.0	85.0	84.8	1.0	-0.2	60s integ.
10000	75.0	75.0	74.6	1.0	-0.4	6min. integ.

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Fax: (852) 2555 7533

SMECLab

Sound level meter type:	HLES-01	Serial No.	201692136	Date	02-Apr-2019
Microphone type:	CDM101	Serial No.	05866		
				Report:	19CA0329 01

PULSE RANGE AND SOUND EXPOSURE LEVEL TEST

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range

Test frequency: 4000 Hz

Integration time: 10 sec

The integrating sound level meter set to Leq:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10	103.0	73.0	72.7	1.7	-0.3

OVERLOAD INDICATION TEST

For SLM capable of operating in a non-integrating mode.

Test frequency: 2000 Hz

Amplitude: 2 dB below the upper limit of the primary indicator range.

Burst repetition frequency: 40 Hz

Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz.

Level	Level reduced by	Further reduced	Difference	Tolerance	Deviation
at overload (dB)	1 dB	3 dB	dB	dB	dB
104.1	103.1	100.1	3.0	1.0	0.0

For integrating SLM, with the instrument indicating Leq.

For integrating SLM, with the instrument indicating Leq and set to the reference range. The test signal as following:

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range

Test frequency: 4000 Hz

Integration time: 10 sec

Single burst duration: 1 msec

Rms level	Level reduced by	Expected level	Actual level	Tolerance	Deviation
at overload (dB)	1 dB	dB	dB	dB	dB
109.3	108.3	68.3	68.1	2.2	-0.2

ACOUSTIC TEST

The acoustic test of the complete SLM is tested at the frequency 125 Hz and 8000 Hz using a B&K type 4226 Multifunction Acoustic Calibrator. The test is performed in A weighting.

Frequency	Expected level	Actual level	Tolerance (dB)		Deviation
Hz	dB	Measured (dB)	+	-	dB
1000	94.0	94.0	0.0	0.0	0.0
125	77.9	77.7	1.0	1.0	-0.2
8000	92.9	90.9	1.5	3.0	-2.0

----------END---------

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CERTIFICATE OF CALIBRATION

Certificate No.: 18CA1220 02 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	Larson Davis
Type/Model No.:	CAL200
Serial/Equipment No.:	13128
Adaptors used:	-

Item submitted by

Curstomer:	Lam Environmental Service Ltd.
Address of Customer:	-
Request No.:	-
Date of receipt:	20-Dec-2018

Date of test: 28-Dec-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	20-Apr-2019	SCL
Preamplifier	B&K 2673	2239857	27-Apr-2019	CEPREI
Measuring amplifier	B&K 2610	2346941	08-May-2019	CEPREI
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Digital multi-meter	34401A	US36087050	23-Apr-2019	CEPREI
Audio analyzer	8903B	GB41300350	23-Apr-2019	CEPREI
Universal counter	53132A	MY40003662	24-Apr-2019	CEPREI

Ambient conditions

Temperature:	20 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1000 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Junqi **Date:** 29-Dec-2018 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港黃竹坑道37號利達中心12樓
12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 18CA1220 02 **Page:** 2 **of** 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	93.84	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.006 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 999.4 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.4%**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Checked by:** Shek Kwong Tat

Date: 28-Dec-2018 **Date:** 29-Dec-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Met One Instruments
1600 Washington Blvd
Grants Pass, OR 97526
(541) 471-7111
(541) 471-7116 (Fax)
Service@metone.com

Calibration Certificate

The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.

Recommended calibration interval is 12 months from the first day of use.

Instrument Model# Aerocet 831 Instrument Serial# W15448

Date of Calibration 6/14/2018 Sensor # 16438

Darleen Best
Calibration Technician

Quality Check

Temperature 23.5 °C Relative Humidity 38 %

Test Procedure: Aerocet 831-6100

PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration
0.3	Pass	± 10%	183039	03/31/2020
0.5	Pass	± 10%	180556	02/28/2020
1.0	Pass	± 10%	169240	5/31/2019
2.5	Pass	± 10%	REF	NA
4.0	Pass	± 10%	REF	NA
5.0	Pass	± 10%	REF	NA
7.0	Pass	± 10%	REF	NA
10.0	Pass	± 10%	REF	NA

Standards	Model	SN	Cal Due
Particle Counter	GT-526	M1762	7/31/2018
Flowmeter	DCL-M	103751	1/29/2019
DMM	289	27720071	6/15/2018
RH/TEMP SENSOR	083E-1-6	R20313	9/18/2018

PILOT TESTING

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO.	: HK1811049
PROJECT NAME	: PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	: 24/10/2018
CUSTOMER	: LAM ENVIRONMENTAL SERVICES LTD
ADDRESS	: 11/F, CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

REPORT NO.	: HK1811049
PROJECT ITEM NO.	: HK1811049-01
PERFORMANCE CHECK / CALIBRATED EQUIPMENT	
TYPE	: AEROSOL MASS MONITOR
MANUFACTURER	: MET ONE INSTRUMENTS
MODEL NO.	: AEROCET - 831
SERIAL NO.	: W15448
EQUIPMENT NO.	: ---
RECEIPT DATE	: 18/10/2018
PERFORMANCE CHECK / CALIBRATION DATE	: 18/10/2018

PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory : Issue Date: 24/10/2018

Wong Po Yan Pauline
(Assistant Laboratory Manager)

REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME	:	PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	:	24/10/2018
REPORT NO.	:	HK1811049

PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE	:	AEROSOL MASS MONITOR
MANUFACTURER	:	MET ONE INSTRUMENTS
MODEL NO.	:	AEROCET - 831
SERIAL NO.	:	W15448
EQUIPMENT NO.	:	---
PERFORMANCE CHECK / CALIBRATION DATE	:	18/10/2018

STANDARD EQUIPMENT

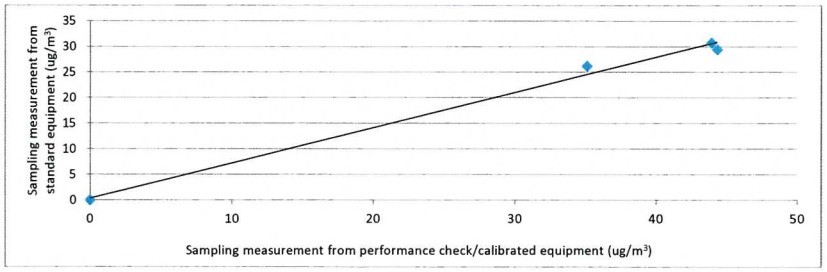
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check[1]	18/10/2018,9:05:00 AM	22.5	1015	0	0
1	18/10/2018,2:16:00 PM	22.5	1015	31	44
2	18/10/2018,3:18:00 PM	22.5	1015	30	44
3	18/10/2018,4:21:00 PM	22.5	1015	26	35

Linear Regression of Y on X

Slope (K- factor)	:	0.7000
Correlation Coefficient	:	0.9962
Validity of Performance Check / Calibration Record	:	18/10/2019



Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

2. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.

3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: Lau, Natalie Signature: _____ Date: 18/10/2018

Checked by: Wong Po Yan, Pauline Signature: _____ Date: 24/10/2018

Met One Instruments
1600 Washington Blvd
Grants Pass, OR 97526
(541) 471-7111
(541) 471-7116 (Fax)
Service@metone.com

Calibration Certificate

The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.

Recommended calibration interval is 12 months from the first day of use.

Instrument Model# *Aerocet 831* **Instrument Serial#** *W15449*

Date of Calibration *10/4/2018* **Sensor #** *16439*

Darleen Best AT7
Calibration Technician

AT25
Quality Check

Temperature *23* °C **Relative Humidity** *36.5* %

Test Procedure: *Aerocet 831-6100*

PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration
0.3	Pass	± 10%	183039	03/31/2020
0.5	Pass	± 10%	180556	02/28/2020
1.0	Pass	± 10%	169240	5/31/2019
2.5	Pass	± 10%	REF	NA
4.0	Pass	± 10%	REF	NA
5.0	Pass	± 10%	REF	NA
7.0	Pass	± 10%	REF	NA
10.0	Pass	± 10%	REF	NA

Standards	Model	SN	Cal Due
Particle Counter	GT-526	M1760	10/9/2018
Flowmeter	DCL-M	103751	1/29/2019
DMM	289	27720071	6/29/2019
RH/TEMP SENSOR	083E-1-6	R20313	9/18/2019

PILOT TESTING

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO.	: HK1811054
PROJECT NAME	: PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	: 24/10/2018
CUSTOMER	: LAM ENVIRONMENTAL SERVICES LTD
ADDRESS	: 11/F, CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

REPORT NO.	: HK1811054
PROJECT ITEM NO.	: HK1811054-01
PERFORMANCE CHECK / CALIBRATED EQUIPMENT	
TYPE	: AEROSOL MASS MONITOR
MANUFACTURER	: MET ONE INSTRUMENTS
MODEL NO.	: AEROCET - 831
SERIAL NO.	: W15449
EQUIPMENT NO.	: ---
RECEIPT DATE	: 18/10/2018
PERFORMANCE CHECK / CALIBRATION DATE	: 23/10/2018

PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory : Wong Po Yan Pauline
(Assistant Laboratory Manager)

Issue Date: 24/10/2018

REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME	:	PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	:	24/10/2018
REPORT NO.	:	HK1811054

PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE	:	AEROSOL MASS MONITOR
MANUFACTURER	:	MET ONE INSTRUMENTS
MODEL NO.	:	AEROCET - 831
SERIAL NO.	:	W15449
EQUIPMENT NO.	:	---
PERFORMANCE CHECK / CALIBRATION DATE	:	23/10/2018

STANDARD EQUIPMENT

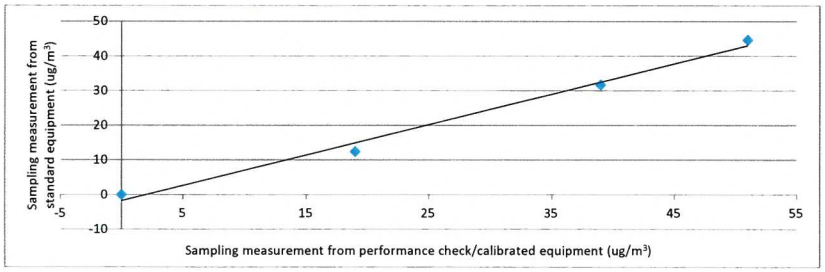
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check[1]	23/10/2018,9:05:00 AM	25.3	1017	0	0
1	23/10/2018,10:20:00 AM	25.3	1017	45	51
2	23/10/2018,11:22:00 AM	25.3	1017	32	39
3	23/10/2018,12:29:00 PM	25.3	1017	12	19

Linear Regression of Y on X

Slope (K- factor)	:	0.8800
Correlation Coefficient	:	0.9945
Validity of Performance Check / Calibration Record	:	23/10/2019



Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

2. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.

3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: Lau, Natalie Signature: _____ Date: 23/10/2018

Checked by: Wong Po Yan, Pauline Signature: _____ Date: 24/10/2018

Room B12, Block B, 5/F, Tonic Industrial Centre, 19 Lam Hing Street, Kowloon Bay, Kowloon
Tel: (852) 2527 6691 Email: info@pilot-testing.com

Met One Instruments, Inc.
1600 NW Washington Blvd, Grants Pass, OR
TEL (541) 471-7111 Fax (541) 471-7116

Certificate of Calibration

BT-645

Particulate Monitor

Recommended calibration interval is 24 months from first day of use.

Unit Info

Model:	*BT-645*	**81865 Firmware Rev:**	*1.1.0*
Serial Number:	*R22584*	**81113**	*0.2.4*
Calibrated By:	*Kevin Ricks* AT21	**Cal. Date:**	*01/18/2019*
Quality Inspector:	AT28	**Date:**	JAN 21 2019
Calibration Hz/µg/m³:	*9.50*		

Final Test

Flow (2.0 L/M): Pass

Ambient T (C) *22*

RH, % *34*

Serial Communication: Pass

BT-645 Conc.: *350.93* Standard Conc: *353.81*

Calibration Standards

Standards	Manufacturer	Model	SN	Cal Due
RMS Multimeter	Fluke	289 Multimeter	23740018	5/03/2019
RH &TEMPERATURE	Met One Instruments	083E-1-6	R20313	9/18/2019
Primary Flow Meter	BIOS	Defender-510	1033419	3/28/2019
Digital Dust Indicator	SIBATA	LD-3B	476795	5/18/2019

The standards used for this calibration have accuracy equal to or greater than the instrument tested. These standards are on record and traceable to NIST to the extent allowed by the institute's calibration facility. Unless otherwise stated, all instruments are calibrated to meet the manufacturer's published specifications. The Calibration system complies with MIL-STD-45662A.

Lam Environmental Services Limited

Portable Dust Meter Performance Check Record

Portable Dust Meter

Type	:	Particulare Monitor
Manufacturer	:	MET ONE INSTRUMENTS
Model Number	:	BT-645
Serial Number	:	R22584
Performance Check Date	:	27-Feb-19

Standard Equipment

Type	:	High Volume Sampler
Manufacturer	:	TISCH
Model Number	:	TE-5170
Equipment Number	:	HVS018
Last Calibration Date	:	4-Dec-18

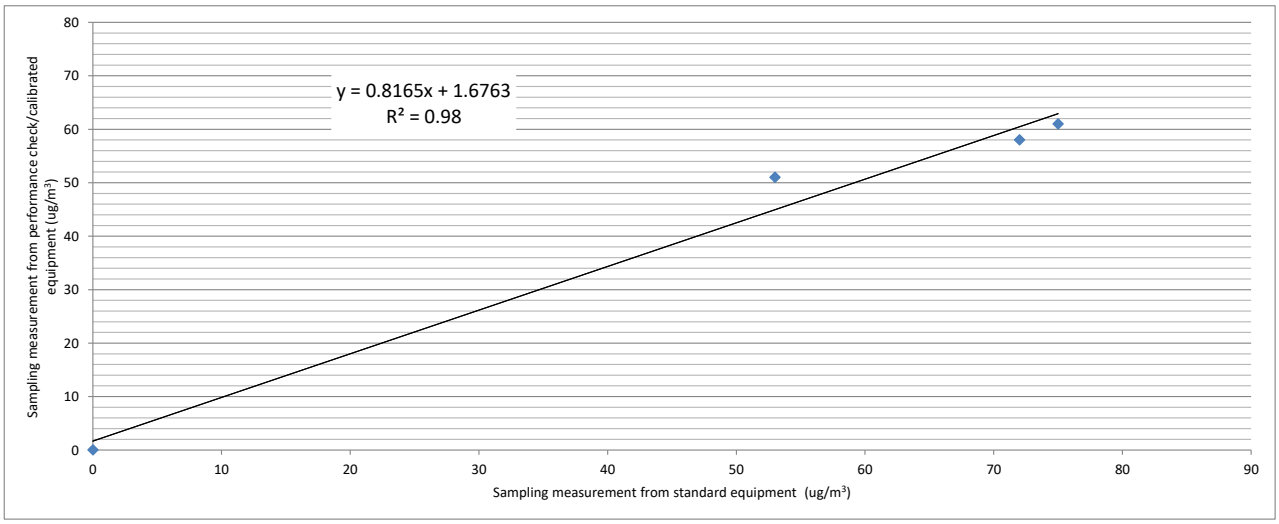
Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (˚C)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	27/2/19	1016	21	0	0
1	27/2/19 08:45	1016	21	75	61
2	27/2/19 09:52	1016	21	53	51
3	27/2/19 11:00	1016	21	72	58

* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor)	:	1.3000
Correlation Coefficient	:	0.9900
Validity of Performance Check / Calibration Record	:	27/2/2020



Operator: Henry Lau Date: 27-Feb-19

Checked by: Chan Ka Chun Date: 4-Mar-19

Met One Instruments, Inc.
1600 NW Washington Blvd, Grants Pass, OR
TEL (541) 471-7111 Fax (541) 471-7116

Certificate of Calibration

BT-645

Particulate Monitor

Recommended calibration interval is 24 months from first day of use.

Unit Info

Model: *BT-645* **81865-1 Firmware Rev:** *1.1.0*

Serial Number: *X19297* *1.0.1*

Calibrated By: *R. von Krohn* **Cal. Date:** *7/27/2018*

Quality Inspector: R Von **Date:** 7-27-2018

Calibration Hz/µg/m³: *5.8*

Final Test

Flow (2.0 L/M): Pass

Ambient T (C) *24.8*

RH, % *39*

Serial Communication: Pass

BT-645 Conc.: *421.14* Standard Conc: *413.04*

Calibration Standards

Standards	Manufacturer	Model	SN	Cal Due
DMM Multimeter	Fluke	189 Multimeter	94060816	8/28/2018
RH &TEMPERATURE	Met One Instruments	083E-1-35	R17149	July 28, 2018
BAROMETRIC PRESSURE	Met One Instruments	092	P22757	April 2, 2019
Primary Flow Meter	BIOS	DC-Lite	R537	May 29, 2019
LD-3B	SIBATA	LD-3B	6X7759	Nov 17, 2018

The standards used for this calibration have accuracy equal to or greater than the instrument tested. These standards are on record and traceable to NIST to the extent allowed by the institute's calibration facility. Unless otherwise stated, all instruments are calibrated to meet the manufacturer's published specifications. The Calibration system complies with MIL-STD-45662A.

PILOT TESTING

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO.	: HK1810828
PROJECT NAME	: PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	: 22/8/2018
CUSTOMER	: LAM ENVIRONMENTAL SERVICES LTD
ADDRESS	: 11/F, CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG

REPORT NO.	: HK1810828
PROJECT ITEM NO.	: HK1810828-01
PERFORMANCE CHECK / CALIBRATED EQUIPMENT	
TYPE	: PARTICULATE MONITOR
MANUFACTURER	: MET ONE INSTRUMENTS
MODEL NO.	: BT 645
SERIAL NO.	: X19297
EQUIPMENT NO.	: ---
RECEIPT DATE	: 16/8/2018
PERFORMANCE CHECK / CALIBRATION DATE	: 17/8/2018

PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.
2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory : Wong Po Yan Pauline
(Assistant Laboratory Manager)

Issue Date: 22/8/2018

REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME	:	PERFORMANCE CHECK / CALIBRATION OF DUST METER
DATE OF ISSUE	:	22/8/2018
REPORT NO.	:	HK1810828

PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE	:	PARTICULATE MONITOR
MANUFACTURER	:	MET ONE INSTRUMENTS
MODEL NO.	:	BT 645
SERIAL NO.	:	X19297
EQUIPMENT NO.	:	---
PERFORMANCE CHECK / CALIBRATION DATE	:	17/8/2018

STANDARD EQUIPMENT

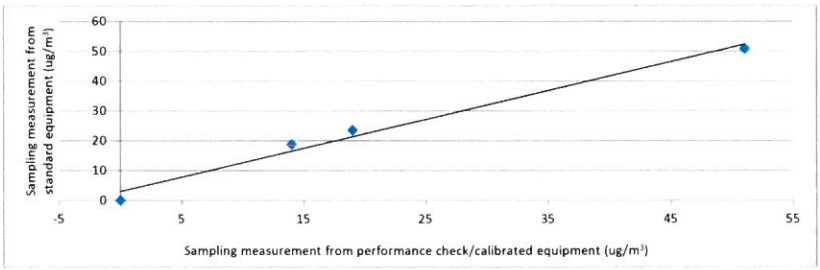
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check[1]	17/8/2018,7:20:00 AM	28	1005	0	0
1	17/8/2018,8:24:00 PM	28	1005	51	51
2	17/8/2018,9:26:00 PM	28	1005	24	19
3	17/8/2018,10:28:00 PM	28	1005	19	14

Linear Regression of Y on X

Slope (K- factor)	:	1.0000
Correlation Coefficient	:	0.9921
Validity of Performance Check / Calibration Record	:	17/8/2019



Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

2. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.

3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: Lau, Natalie Signature: _____ Date: 17/8/2018

Checked by: Wong Po Yan, Pauline Signature: _____ Date: 22/8/2018

Met One Instruments, Inc.
1600 NW Washington Blvd, Grants Pass, OR
TEL (541) 471-7111 Fax (541) 471-7116

Certificate of Calibration

BT-645

Particulate Monitor

Recommended calibration interval is 24 months from first day of use.

Unit Info

Model: *BT-645* **81865-1 Firmware Rev:** *1.1.0*

Serial Number: *X19299* *1.0.1*

Calibrated By: *R. von Krohn* **Cal. Date:** *7/27/2018*

Quality Inspector: R. Von **Date:** 7-27-2018

Calibration Hz/µg/m³: *5.81*

Final Test

Flow (2.0 L/M): Pass

Ambient T (C) *24.8*

RH, % *39*

Serial Communication: Pass

BT-645 Conc.: *413.52* Standard Conc: *412.22*

Calibration Standards

Standards	Manufacturer	Model	SN	Cal Due
DMM Multimeter	Fluke	189 Multimeter	94060816	8/28/2018
RH &TEMPERATURE	Met One Instruments	083E-1-35	R17149	July 28, 2018
BAROMETRIC PRESSURE	Met One Instruments	092	P22757	April 2, 2019
Primary Flow Meter	BIOS	DC-Lite	R537	May 29, 2019
LD-3B	SIBATA	LD-3B	6X7759	Nov 17, 2018

The standards used for this calibration have accuracy equal to or greater than the instrument tested. These standards are on record and traceable to NIST to the extent allowed by the institute's calibration facility. Unless otherwise stated, all instruments are calibrated to meet the manufacturer's published specifications. The Calibration system complies with MIL-STD-45662A.

Lam Environmental Services Limited

Portable Dust Meter Performance Check Record

Portable Dust Meter

Type	:	Particulare Monitor
Manufacturer	:	MET ONE INSTRUMENTS
Model Number	:	BT-645
Serial Number	:	X19299
Performance Check Date	:	10-Jan-19

Standard Equipment

Type	:	High Volume Sampler
Manufacturer	:	TISCH
Model Number	:	TE-5170
Equipment Number	:	HVS018
Last Calibration Date	:	4-Dec-18

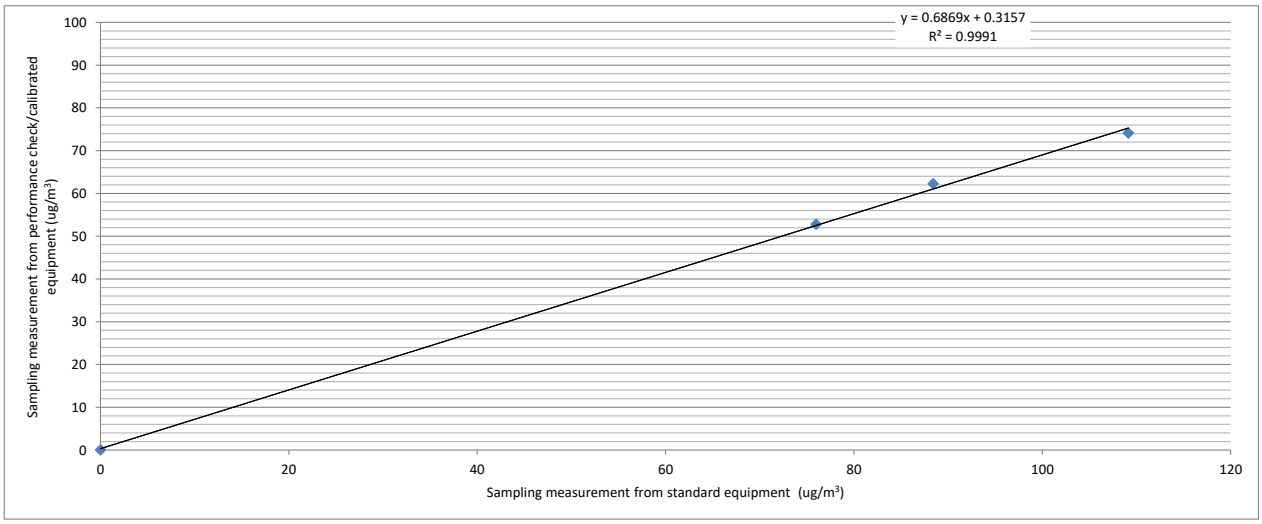
Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Temp (˚C)	Mean Pressure (hPa)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	10/1/19 07:00	19	1020	0	0
1	10/1/19 08:05	19	1020	109	74
2	10/1/19 09:25	19	1020	88	62
3	10/1/19 10:27	19	1020	76	53

* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor)	:	1.5000
Correlation Coefficient	:	0.9995
Validity of Performance Check / Calibration Record	:	10/1/2020



Operator:	Henry Lau	Date:	14/1/19
Checked by:	Chan Ka Chun	Date:	14/1/19

Met One Instruments
1600 Washington Blvd
Grants Pass, OR 97526
(541) 471-7111
(541) 471-7116 (Fax)
Service@metone.com

Calibration Certificate

The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.

Recommended calibration interval is 12 months from the first day of use.

Instrument Model# *Aerocet 831* **Instrument Serial#** *R14332*

Date of Calibration *1/10/2019* **Sensor #** *14332*

Darleen Best AT7
Calibration Technician

AT25
Quality Check

Temperature *23* °C **Relative Humidity** *38* %

Test Procedure: *Aerocet 831-6100*

PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration
0.3	Pass	± 10%	183039	03/31/2020
0.5	Pass	± 10%	180556	02/28/2020
1.0	Pass	± 10%	169240	5/31/2019
2.5	Pass	± 10%	REF	NA
4.0	Pass	± 10%	REF	NA
5.0	Pass	± 10%	REF	NA
7.0	Pass	± 10%	REF	NA
10.0	Pass	± 10%	REF	NA

Standards	Model	SN	Cal Due
Particle Counter	GT-526	M1762	1/30/2019
Flowmeter	DCL-M	103751	1/29/2019
DMM	289	27720071	6/29/2019
RH/TEMP SENSOR	083E-1-6	R20313	9/18/2019

Lam Environmental Services Limited

Portable Dust Meter Performance Check Record

Portable Dust Meter

Type	:	Particulare Monitor
Manufacturer	:	MET ONE INSTRUMENTS
Model Number	:	831
Serial Number	:	R14332
Performance Check Date	:	27-Feb-19, 14-Mar-19

Standard Equipment

Type	:	High Volume Sampler
Manufacturer	:	TISCH
Model Number	:	TE-5170
Equipment Number	:	HVS018
Last Calibration Date	:	4-Feb-19

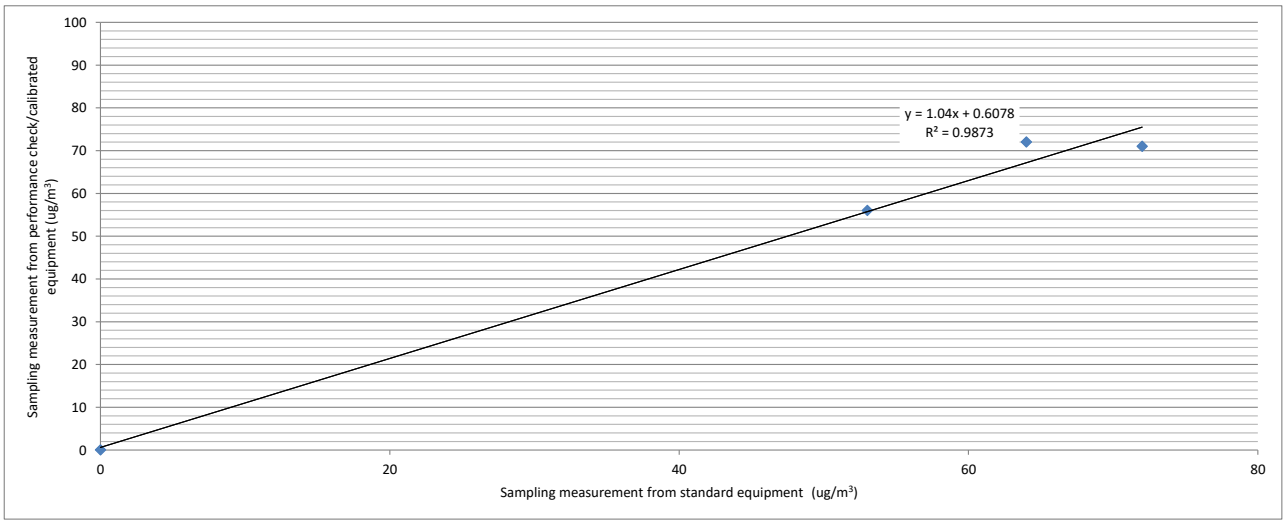
Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (˚C)	Concentration in ug/m^3 (Standard equipment) (Y - Axis)	Concentration in ug/m^3 (Performance Check / Calibrated equipment) (X - Axis)
Zero Check	27/2/19	1016	24	0	0
1	27/2/19 09:52	1016	24	53	56
2	14/3/19 09:32	1018	22	64	72
3	27/2/19 11:00	1016	24	72	71

* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor)	:	1.0000
Correlation Coefficient	:	0.9936
Validity of Performance Check / Calibration Record	:	13/3/2020



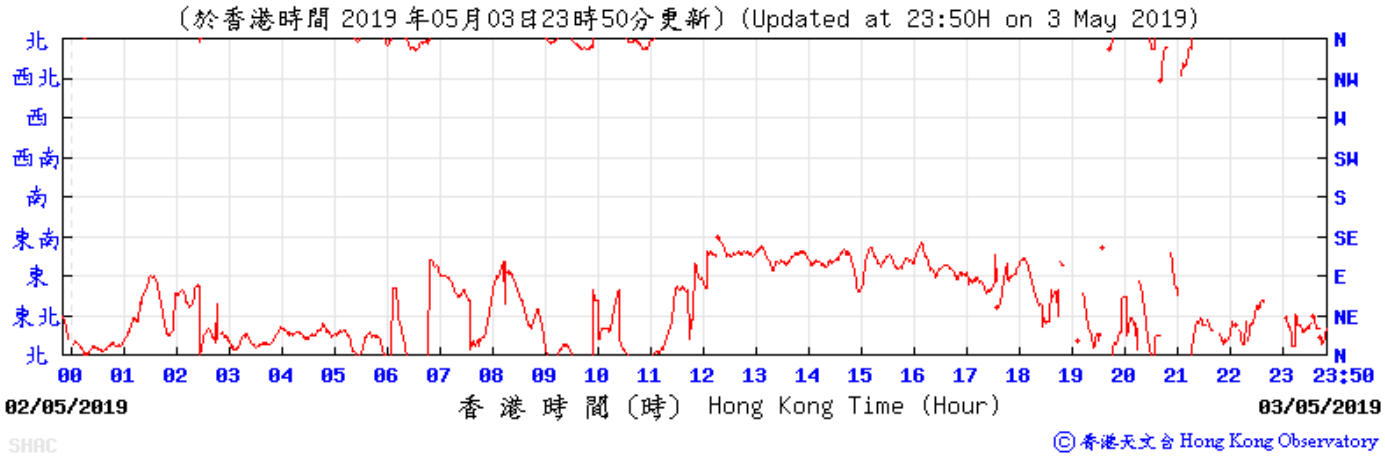
Operator: Henry Lau Date: 14-Mar-19

Checked by: Chan Ka Chun Date: 21-Mar-19

Appendix 4.3

Wind data extracted from Sha Tin HKO Automatic Weather Station

Wind Direction:



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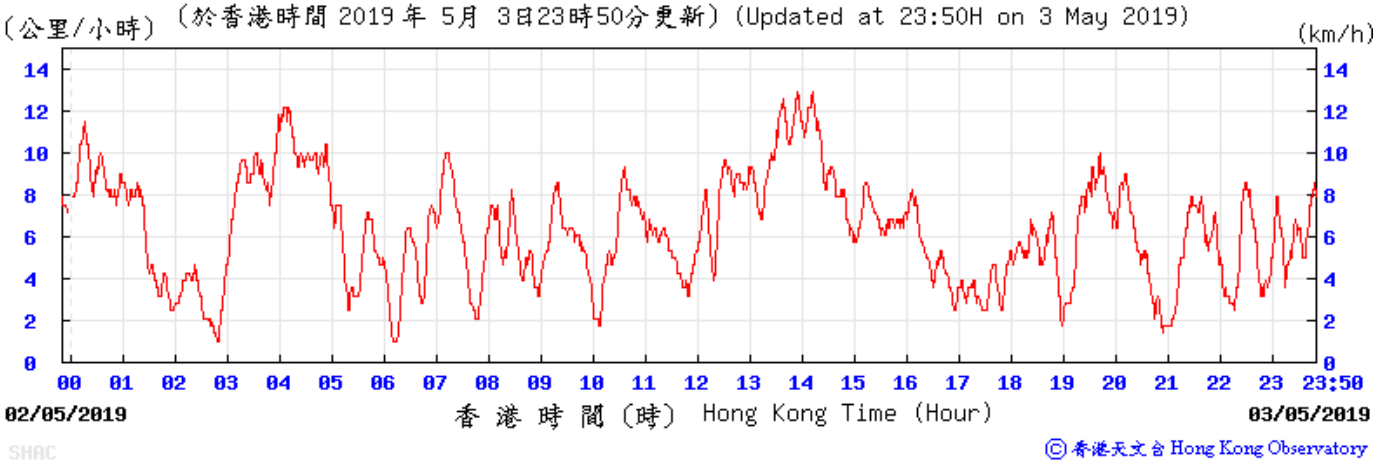

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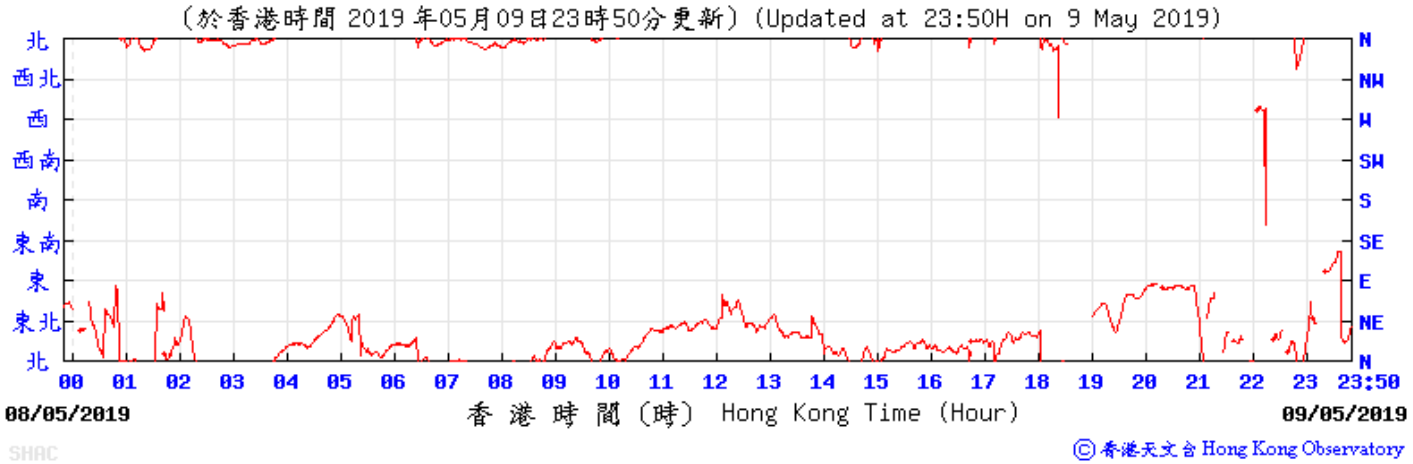

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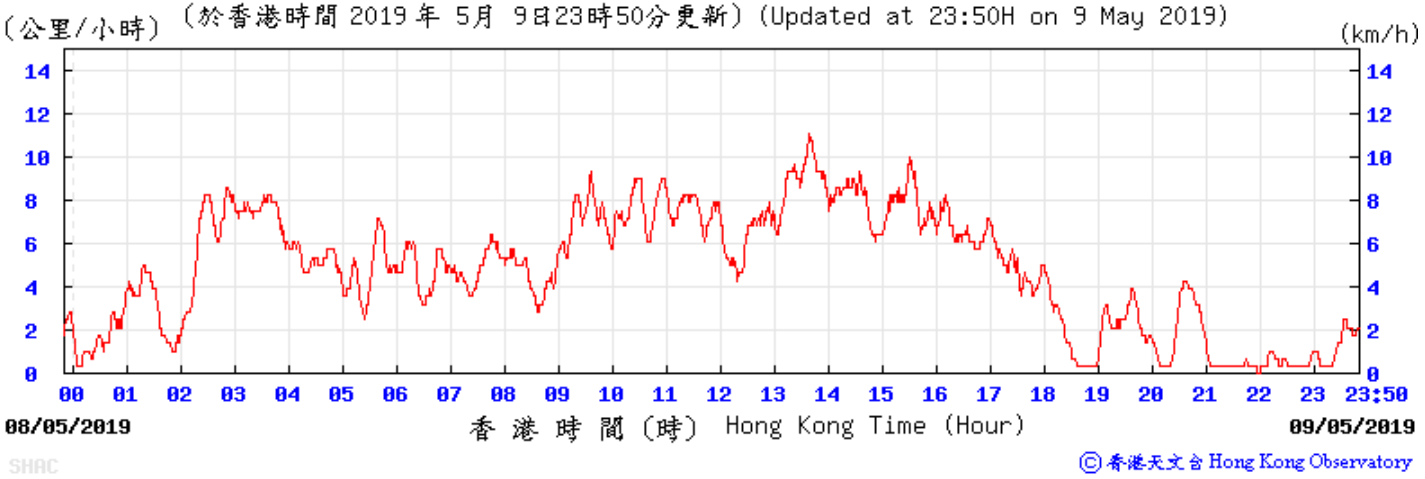

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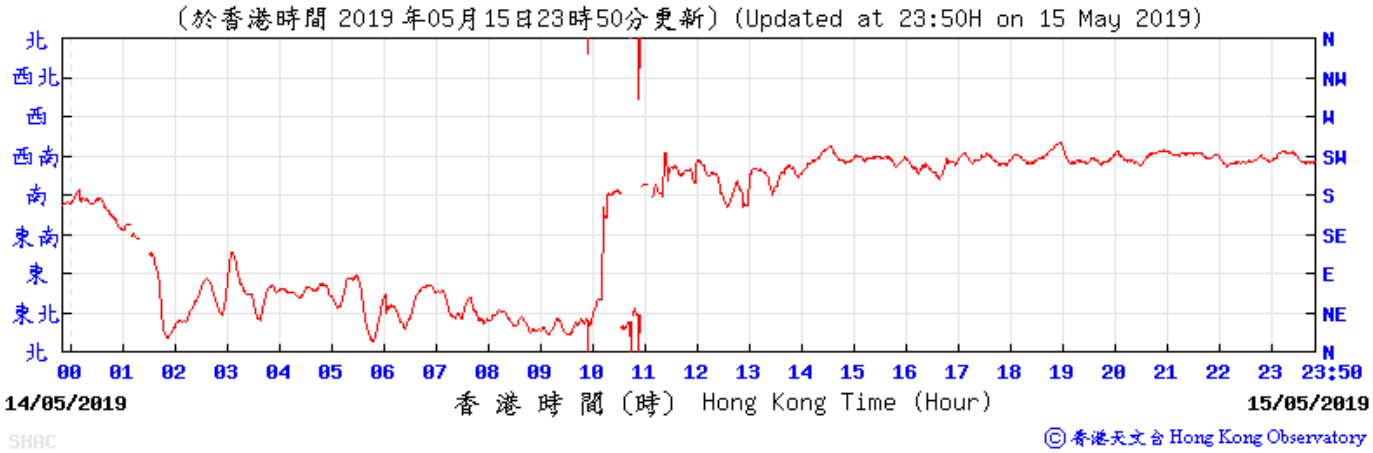

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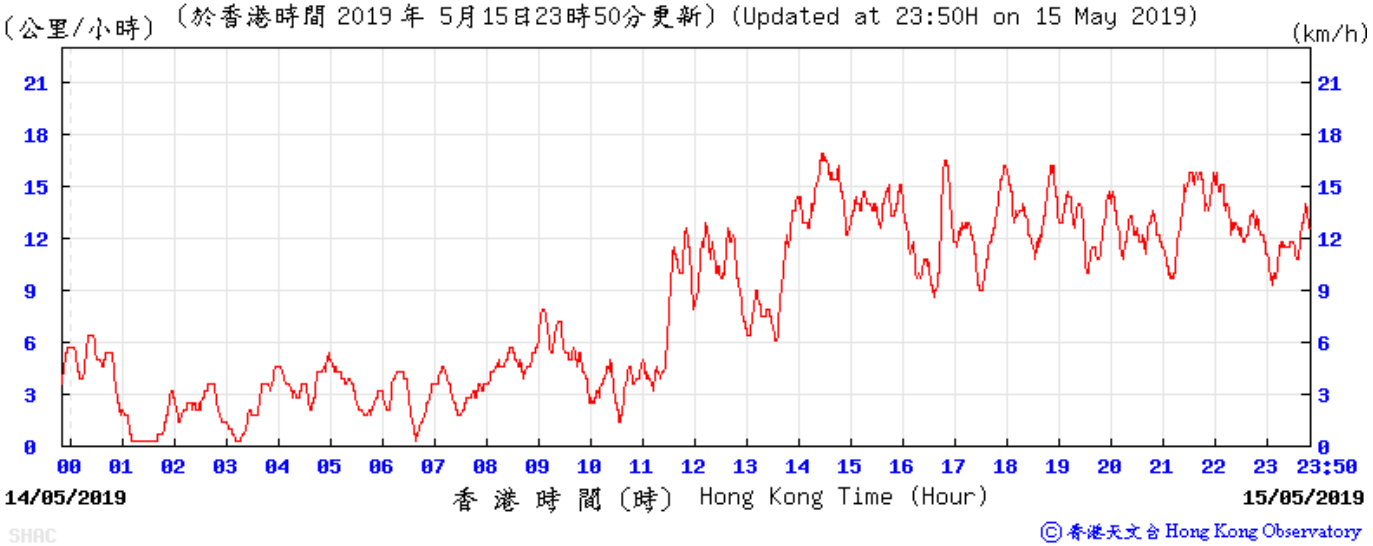

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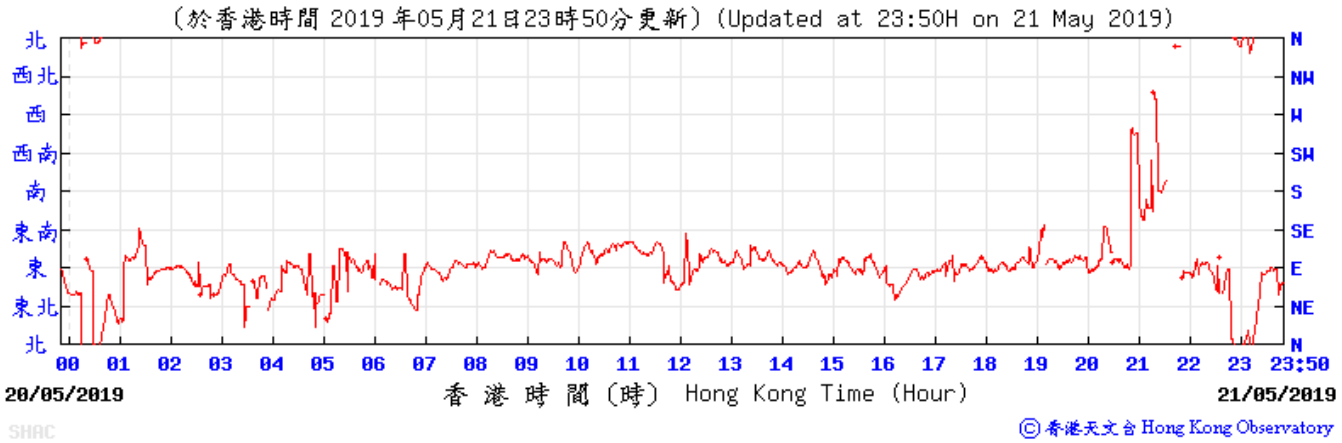

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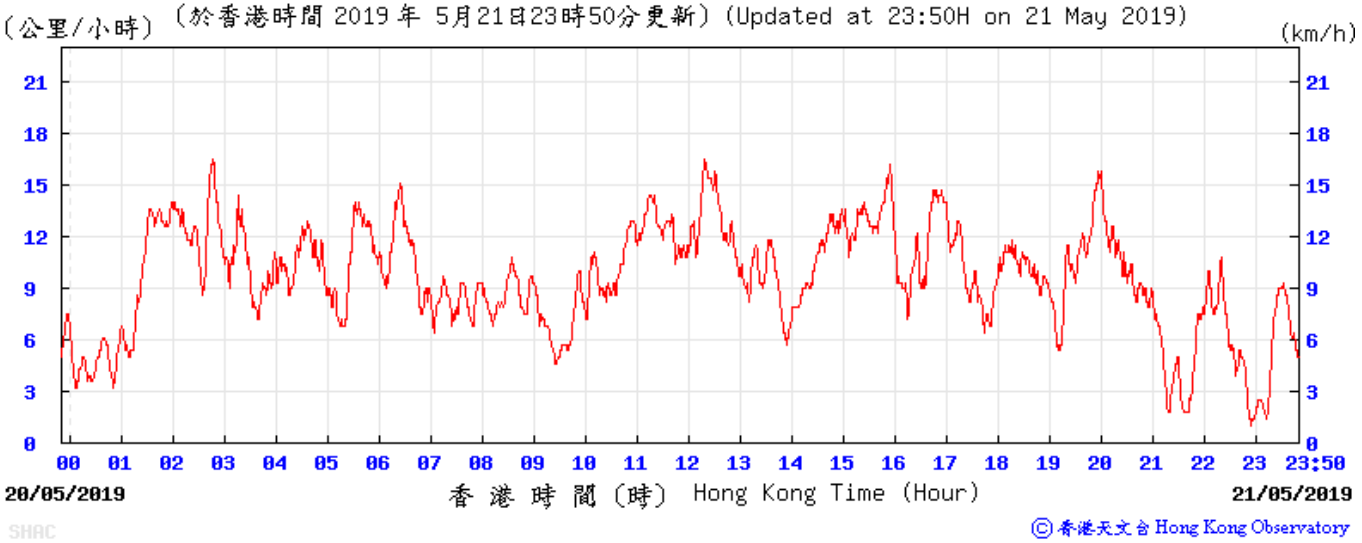

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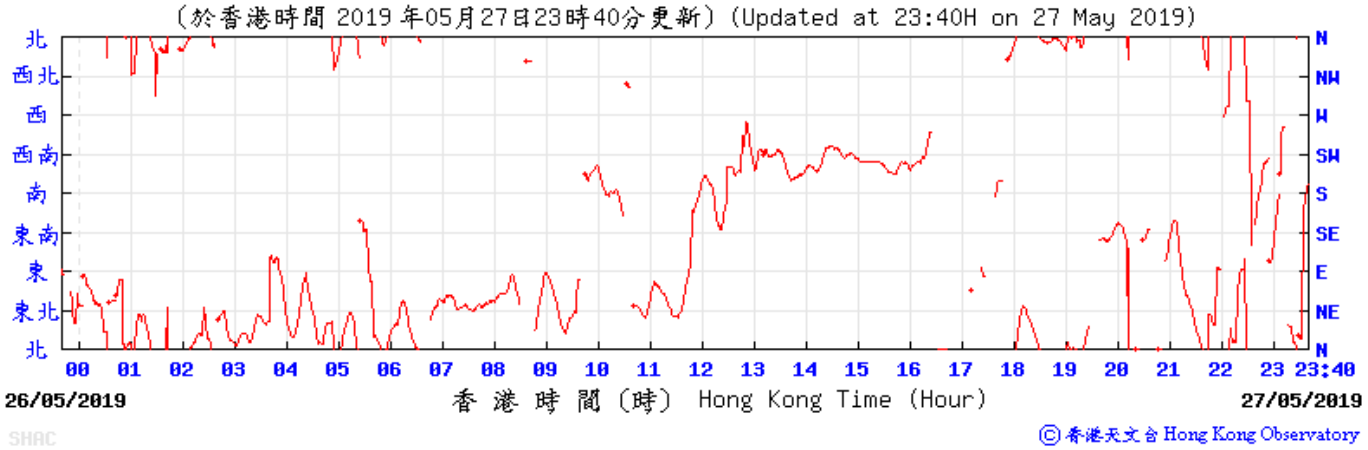

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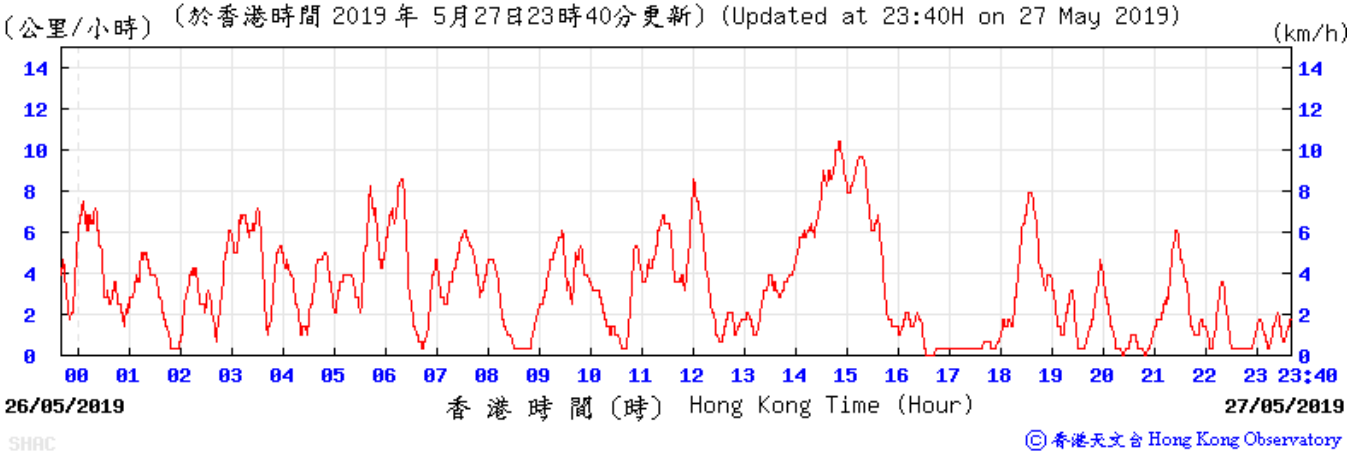


Back

Daily Extract of Meteorological Observations , May 2019

Year 2019 Month 5 Go

Day	Hong Kong Observatory							
	Mean Pressure (hPa)	Air Temperature			Mean Dew Point (deg. C)	Mean Relative Humidity (%)	Mean Amount of Cloud (%)	Total Rainfall (mm)
		Absolute Daily Max (deg. C)	Mean (deg. C)	Absolute Daily Min (deg. C)				
01	1009.1	27.1	25.4	23.8	21.1	78	85	0.2
02	1012.1	24.4	23.0	21.7	19.2	80	89	0.5
03	1014.5	24.0	21.8	19.3	18.2	81	91	5.3
04	1013.2	23.6	22.6	21.0	18.1	76	88	8.4
05	1009.4	22.3	21.7	20.9	20.6	93	94	8.3
06	1008.7	22.8	21.8	20.0	20.1	90	95	11.3
07	1010.2	21.4	20.5	18.9	18.3	87	95	17.0
08	1009.3	21.2	20.4	19.8	18.3	88	93	25.1
09	1008.1	26.3	22.7	20.2	21.1	90	92	10.0
10	1010.0	26.7	23.9	22.7	21.6	87	63	0.0
11	1011.5	28.9	25.3	22.8	20.8	76	14	0.0
12	1011.2	28.9	25.5	23.5	21.7	80	57	0.0
13	1010.5	26.3	25.1	23.9	23.1	89	92	Trace
14	1009.2	31.1	27.5	25.2	24.4	84	64	0.0
15	1009.1	30.9	28.5	26.4	25.6	85	85	Trace
16	1007.4	31.5	29.2	27.8	26.0	83	82	0.8
17	1005.5	31.6	29.6	28.4	25.9	80	82	0.1
18	1005.2	32.3	30.0	28.5	26.1	80	77	Trace
19	1006.9	32.3	30.2	29.2	26.3	80	79	0.0
20	1008.0	32.0	29.1	25.0	25.9	83	85	9.0
21	1010.8	26.5	25.0	22.6	21.6	82	91	3.3
22	1010.1	28.3	25.3	22.6	22.1	83	77	0.7
23	1010.2	26.8	25.9	24.7	24.1	90	89	6.5
24	1011.0	25.8	24.8	23.8	23.4	92	97	21.5
25	1008.8	28.9	26.7	25.1	24.9	90	89	2.4
26	1007.8	28.1	26.5	24.7	25.0	92	83	15.1
27	1008.1	28.0	26.5	25.4	25.2	93	87	27.8
28	1008.7	27.7	25.9	23.9	24.6	92	87	43.9
29	1009.9	25.7	24.7	23.4	23.1	91	95	3.2
30	1010.1	25.9	24.4	23.2	22.5	89	97	3.2
31	1008.7	26.7	25.7	25.0	24.4	93	93	11.0
Mean/Total	1009.5	27.2	25.3	23.7	22.7	86	83	234.6
Normal§	1009.3	28.4	25.9	24.1	22.6	83	76	304.7

Trace means rainfall less than 0.05 mm

§ 1981-2010 Climatological Normal

Climatological Information Services

Appendix 5.1

Monitoring Schedules for Reporting Month and Next Month

Contract No. SPW 25/2018
Environmental Team for Relocation of Sha Tin Sewage Treatment Works to Caverns –Site Preparation and Access Tunnel Construction
Tentative Impact Air Quality and Noise Monitoring Schedule
May 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28-Apr	29-Apr	30-Apr	1-May	2-May NM (CM1, CM3, CM4, CM5)	3-May AQM (AM1, AM2, AM4, AM5)	4-May
5-May	6-May NM (CM1, CM3, CM4, CM5)	7-May	8-May	9-May AQM (AM1, AM2, AM4, AM5)	10-May	11-May
12-May	13-May	14-May	15-May AQM (AM1, AM2, AM4, AM5) NM (CM1, CM3, CM4, CM5)	16-May	17-May	18-May
19-May	20-May NM (CM1, CM3, CM4, CM5)	21-May AQM (AM1, AM2, AM4, AM5)	22-May	23-May	24-May	25-May
26-May	27-May AQM (AM1, AM2, AM4, AM5) NM (CM1, CM3, CM4, CM5)	28-May	29-May	30-May	31-May	1-Jun

Remark:

1. AQM: Air Quality Monitoring
   NM: Noise Monitoring

Contract No. SPW 25/2018
Environmental Team for Relocation of Sha Tin Sewage Treatment Works to Caverns –Site Preparation and Access Tunnel Construction
Tentative Impact Air Quality and Noise Monitoring Schedule
June 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26-May	27-May	28-May	29-May	30-May	31-May	1-Jun AQM (AM1, AM2, AM4, AM5)
2-Jun	3-Jun	4-Jun	5-Jun NM (CM1, CM3, CM4, CM5)	6-Jun AQM (AM1, AM2, AM4, AM5)	7-Jun	8-Jun
9-Jun	10-Jun NM (CM3)	11-Jun NM (CM1, CM4, CM5)	12-Jun AQM (AM1, AM2, AM4, AM5)	13-Jun	14-Jun	15-Jun
16-Jun	17-Jun	18-Jun AQM (AM1, AM2, AM4, AM5) NM (CM1, CM3, CM4, CM5)	19-Jun	20-Jun	21-Jun	22-Jun
23-Jun	24-Jun AQM (AM1, AM2, AM4, AM5) NM (CM1, CM3, CM4, CM5)	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun AQM (AM1, AM2, AM4, AM5)

Remark:

1. AQM: Air Quality Monitoring
   NM: Noise Monitoring

Appendix 5.2

Air Quality Monitoring Results and Graphical Presentations

Report on 1-hour TSP monitoring at AM1 - Ah Kung Kok Fishermen Village

Action Level (μg/m3) - 294
Limit Level (μg/m3) - 500

Date	Weather Condition	Time	Mass Concentration (μg/m3)
3-May-19	Cloudy	08:47	140
3-May-19	Cloudy	09:48	114
3-May-19	Cloudy	10:49	95
9-May-19	Cloudy	08:36	25
9-May-19	Cloudy	09:37	24
9-May-19	Cloudy	10:38	25
15-May-19	Cloudy	08:31	32
15-May-19	Cloudy	09:32	22
15-May-19	Cloudy	10:33	22
21-May-19	Cloudy	08:02	37
21-May-19	Cloudy	09:03	36
21-May-19	Cloudy	10:04	37
27-May-19	Cloudy	8:02	20
27-May-19	Cloudy	9:03	20
27-May-19	Cloudy	10:04	16

Report on 1-hour TSP monitoring at AM2 - Block H, Kam Tai Court

Action Level (μg/m3) - 325
Limit Level (μg/m3) - 500

Date	Weather Condition	Time	Mass Concentration (μg/m3)
3-May-19	Cloudy	08:55	59
3-May-19	Cloudy	09:56	54
3-May-19	Cloudy	10:57	61
9-May-19	Cloudy	08:38	26
9-May-19	Cloudy	09:39	7
9-May-19	Cloudy	10:40	7
15-May-19	Cloudy	09:32	48
15-May-19	Cloudy	10:33	52
15-May-19	Cloudy	13:00	69
21-May-19	Cloudy	08:56	74
21-May-19	Cloudy	09:57	76
21-May-19	Cloudy	10:58	84
27-May-19	Cloudy	8:57	21
27-May-19	Cloudy	9:58	25
27-May-19	Cloudy	10:59	21

Report on 1-hour TSP monitoring at AM4 - Wellborn Kindergarten

Action Level (μg/m3) - 297
Limit Level (μg/m3) - 500

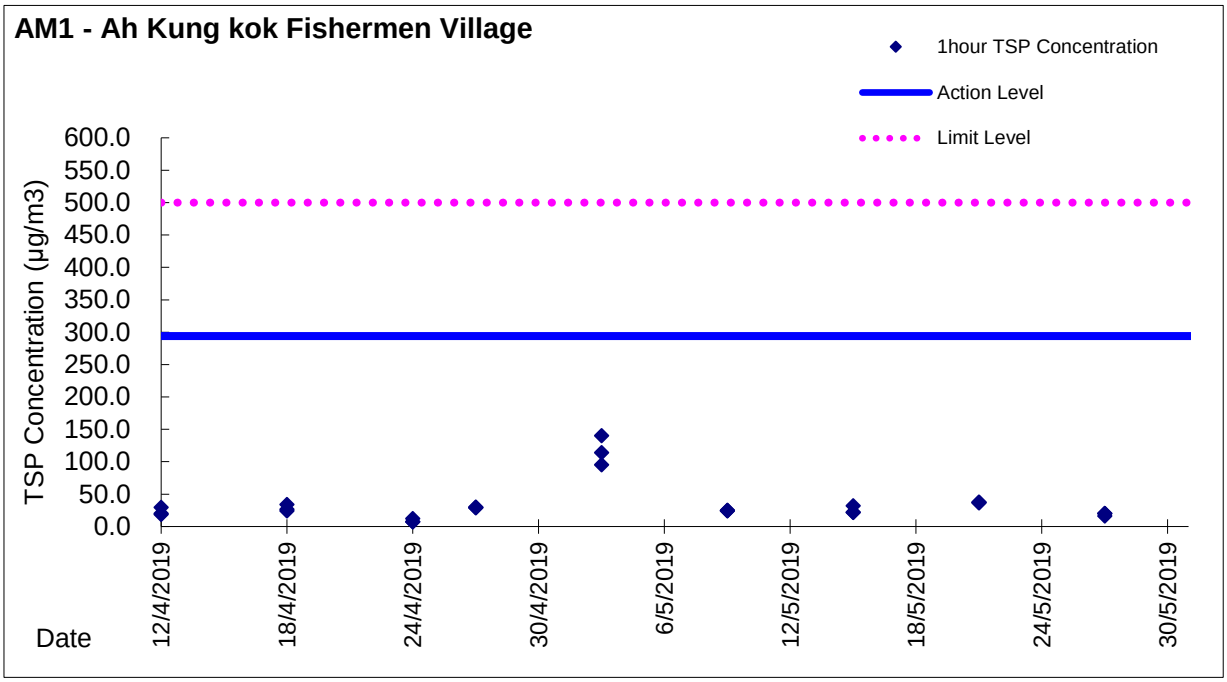
Date	Weather Condition	Time	Mass Concentration (μg/m3)
3-May-19	Cloudy	08:49	54
3-May-19	Cloudy	09:50	46
3-May-19	Cloudy	10:51	50
9-May-19	Cloudy	08:39	27
9-May-19	Cloudy	09:40	12
9-May-19	Cloudy	10:41	19
15-May-19	Cloudy	08:25	39
15-May-19	Cloudy	09:26	26
15-May-19	Cloudy	10:27	27
21-May-19	Cloudy	08:15	43
21-May-19	Cloudy	09:16	42
21-May-19	Cloudy	10:18	36
27-May-19	Cloudy	8:30	78
27-May-19	Cloudy	9:31	71
27-May-19	Cloudy	10:32	61

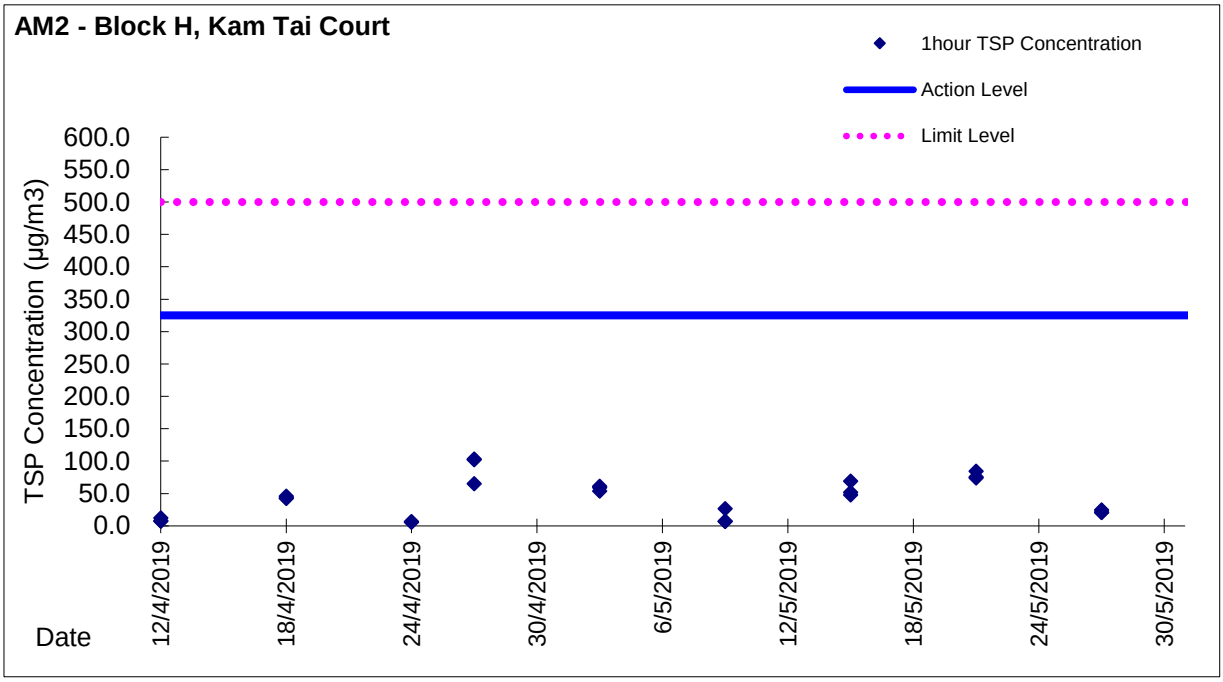
Report on 1-hour TSP monitoring at AM5 - The NAAC Harmony Manor

Action Level (μg/m3) - 349
Limit Level (μg/m3) - 500

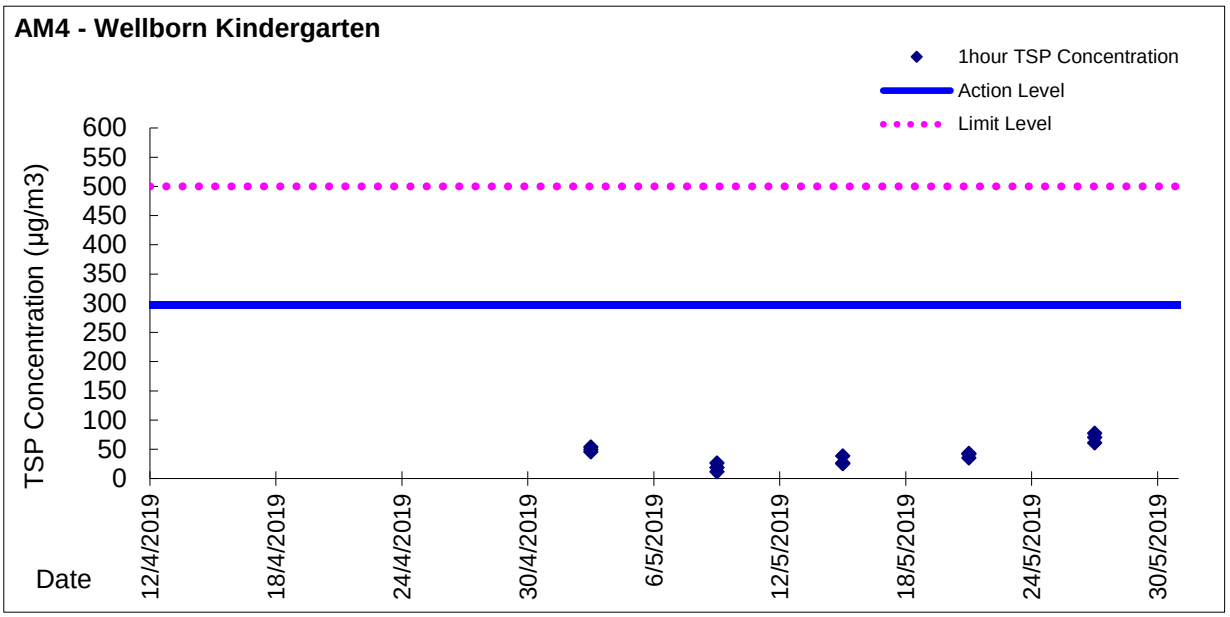
Date	Weather Condition	Time	Mass Concentration (μg/m3)
3-May-19	Cloudy	08:56	110
3-May-19	Cloudy	09:57	150
3-May-19	Cloudy	10:58	158
9-May-19	Cloudy	08:32	13
9-May-19	Cloudy	09:33	10
9-May-19	Cloudy	10:34	11
15-May-19	Cloudy	08:48	23
15-May-19	Cloudy	09:49	19
15-May-19	Cloudy	10:50	21
21-May-19	Cloudy	8:09	22
21-May-19	Cloudy	9:10	18
21-May-19	Cloudy	10:11	18
27-May-19	Cloudy	8:02	17
27-May-19	Cloudy	9:03	14
27-May-19	Cloudy	10:04	15

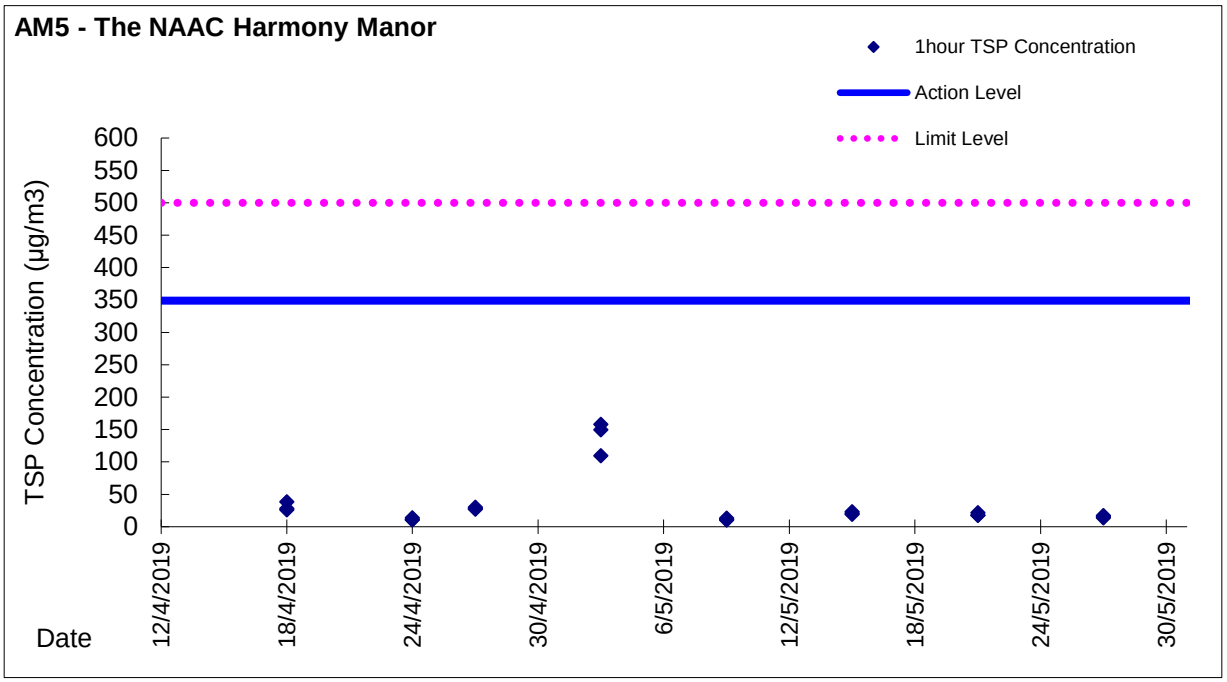
Graphic Presentation of TSP Result





Graphic Presentation of TSP Result





Appendix 5.3

Noise Quality Monitoring Results and Graphical Presentations

Noise Monitoring Result

Day Time (0700 - 1900hrs on normal weekdays)

Location: CM1 - G/F, Wellborn Kindergarten

Date	Time	Weather	Wind Speed (m/s)	Measurement Noise Level Leq	L10	L90	Limit Level Leq
				Unit: dB(A), (30min)			
02/05/2019	09:27	Cloudy	0.2	53.8	54.9	47.8	70
06/05/2019	09:25	Cloudy	0.3	53.5	57.0	47.0	70
15/05/2019	09:11	Cloudy	0.1	60.1	62.5	50.5	70
20/05/2019	09:07	Fine	0.0	59.8	63.5	51.2	70
27/05/2019	10:00	Cloudy	0.0	56.3	59.0	50.0	70

* Limit level of noise monitoring station CM1 was adjusted to 65dB(A) during examination period.

Location: CM3 - R/F, S.K.H. Ma On Shan Holy Spirit Primary School

Date	Time	Weather	Wind Speed (m/s)	Measurement Noise Level Leq	L10	L90	Limit Level Leq
				Unit: dB(A), (30min)			
02/05/2019	11:15	Cloudy	0.4	63.5	64.5	58.5	70
06/05/2019	11:00	Cloudy	0.4	61.8	63.0	59.0	70
15/05/2019	10:18	Cloudy	0.3	61.3	63.0	58.0	70
20/05/2019	10:10	Fine	0.4	67.0	67.8	63.3	70
27/05/2019	08:35	Cloudy	0.2	61.6	63.5	58.5	70

* Limit level of noise monitoring station CM3 was adjusted to 65dB(A) during examination period.

Location: CM4 - G/F, Ah Kung Kok Fishermen Village

Date	Time	Weather	Wind Speed (m/s)	Measurement Noise Level Leq	L10	L90	Limit Level Leq
				Unit: dB(A), (30min)			
02/05/2019	10:11	Cloudy	0.2	62.3	63.8	59.5	75
06/05/2019	10:04	Cloudy	0.2	58.9	60.5	56.0	75
15/05/2019	13:25	Cloudy	0.1	60.9	63.5	56.5	75
20/05/2019	11:05	Fine	0.0	67.3	69.0	66.5	75
27/05/2019	10:40	Cloudy	0.2	66.3	67.5	61.5	75

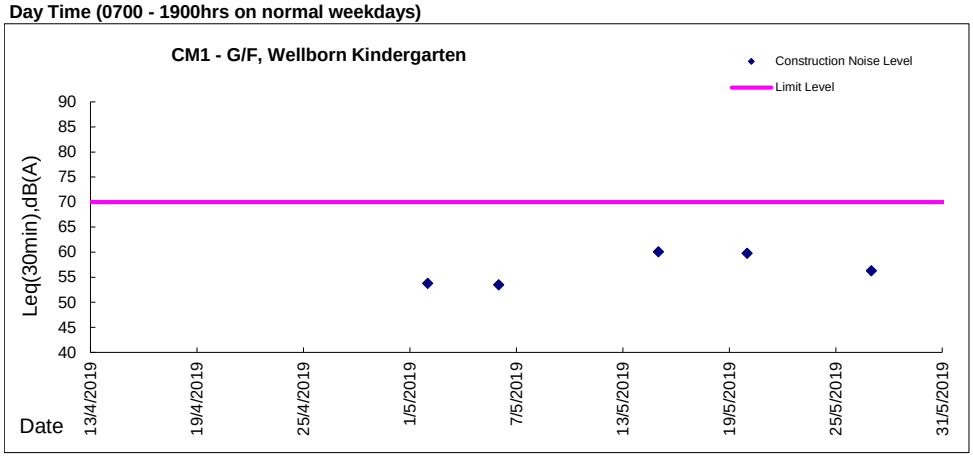
Location: CM5 - R/F, The Neighbourhood Advice-Action Council Harmony Manor

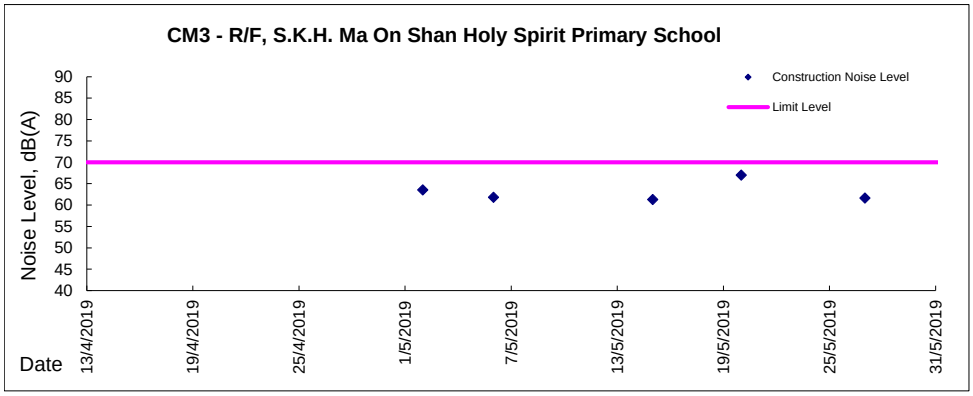
Date	Time	Weather	Wind Speed (m/s)	Measurement Noise Level Leq	L10	L90	Limit Level Leq
				Unit: dB(A), (30min)			
02/05/2019	13:00	Cloudy	0.5	55.2	55.5	54.5	75
06/05/2019	13:05	Cloudy	0.1	55.3	55.5	54.5	75
15/05/2019	11:25	Cloudy	0.4	57.7	59.0	54.0	75
20/05/2019	11:10	Fine	0.3	56.8	60.5	50.0	75
27/05/2019	11:25	Cloudy	0.4	53.3	56.0	49.5	75

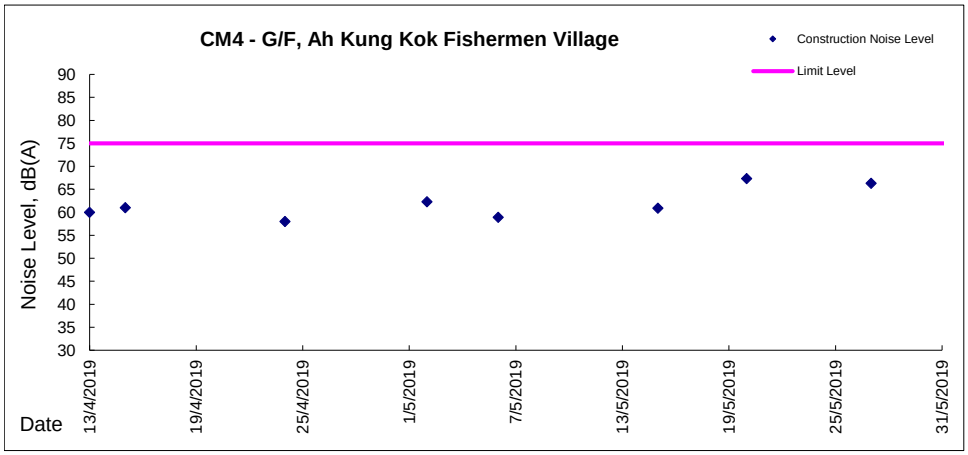
* Free field correction (Additional 3dB(A)) was made on CM1&CM4 measurement result

Graphic Presentation of Noise Monitoring Result

Day Time (0700 - 1900hrs on normal weekdays)

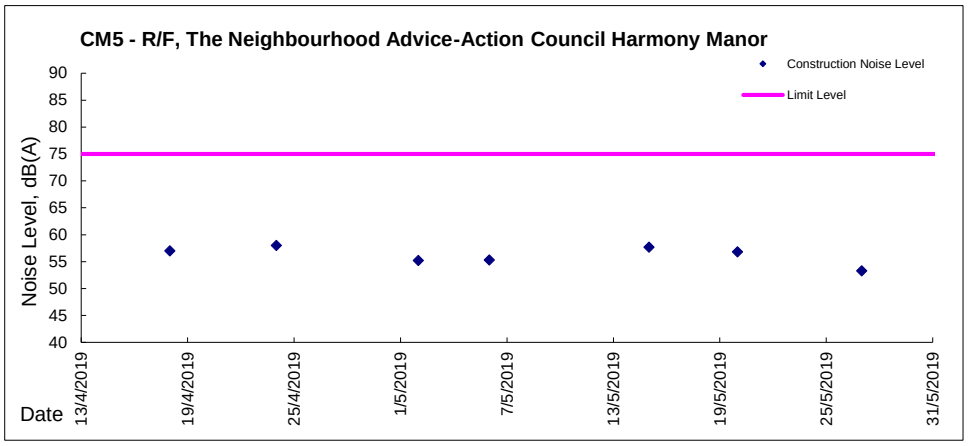






Graphic Presentation of Noise Monitoring Result

Day Time (0700 - 1900hrs on normal weekdays)



Appendix 5.4

Monthly Summary Waste Flow Table

Monthly Summary Waste Flow Table

Name of Department: Drainage Services Department **Contract No.: DC/2018/05**

Monthly Summary Waste Flow Table for May 2019 [to be submitted not later than the 15th day of each month following reporting month]

(All quantities shall be rounded off to 3 decimal places.)

Month	Actual Quantities of Inert C&D Materials Generated Monthly					Actual Quantities of C&D Wastes Generated Monthly				
	(a)=(b)+(c)+(d)+(e) Total Quantity Generated	(b) Broken Concrete (see Note 3)	(c) Reused in the Contract	(d) Reused in other Projects	(e) Disposed as Public Fill	(f) Metals	(g) Paper/cardboard packaging	(h) Plastics (see Note 2)	(i) Chemical Waste	(j) Others, e.g. general refuse disposed at Landfill
	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000m^3)	(in '000kg)	(in '000kg)	(in '000kg)	(in L)	(in ton)
Feb-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0
Mar-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0
Apr-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0
May-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	5.2
Sub-total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.200
Total	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.200

Notes:
(1) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
(2) Plastics refer to plastics bottles/containers, plastic sheets/foam from packaging material.
(3) Broken concrete for recycling into aggregates.
(4) If necessary, use the conversion factor: 1 full load of dumping truck being equivalent to 5 m^3 by volume.

Appendix 6.1

Event Action Plans

Event and Action Plan for Construction Air Quality

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
1. Action level being exceedance by one sampling	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC and ER; 3. Repeat measurement to confirm finding; and 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; and 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Notify Contractor.	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; and 3. Amend working methods agreed with the ER as appropriate
2. Action level being exceeded by two or more consecutive sampling	1. Identify source; 2. Inform Contractor, IEC and ER; 3. Advise the Contractor and ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with Contractor, IEC and ER; 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise Implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 4. 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.	1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.

Event and Action Plan for Construction Air Quality (Con't)

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
LIMIT LEVEL				
1. Limit level exceedance by one sampling	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; and 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	1. Check monitoring data submitted by ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 4. Supervise implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification; 4. Implement the agreed proposals; and 5. Amend proposal if appropriate.
2. Limit level exceedance by two or more consecutive sampling	1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review Contractor' s remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 4. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. 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.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Event and Action Plan for Construction Noise

EVENT	ACTION			
	ET	**IEC**	**ER**	**CONTRACTOR**
Action Level	1. Notify IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; and 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; and 3. Supervise the implementation of remedial measures	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analyzed noise problem; and 4. Ensure remedial measures are properly implemented.	1. Submit noise mitigation proposals to IEC; and 2. Implement noise mitigation proposals.
Limit Level	1. Identify source; 2. Inform IEC, ER, EPD and Contractor; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures properly implemented; and 5. 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.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC and ER within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposal if problem still not under control; and 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Appendix 6.2

Summary for Notification of Exceedance

Ref no.	Date	Location	Parameters (Unit)	Measured	Action Level	Limit Level	Follow-up action
-	-	-	-	-	-	-	-

Appendix 8.1

Complaint Log

Environmental Complaints Log

Complaint Log No.	Date of Complaint	Received From and Received By	Location of Complainant	Nature of Complaint	Outcome	Status
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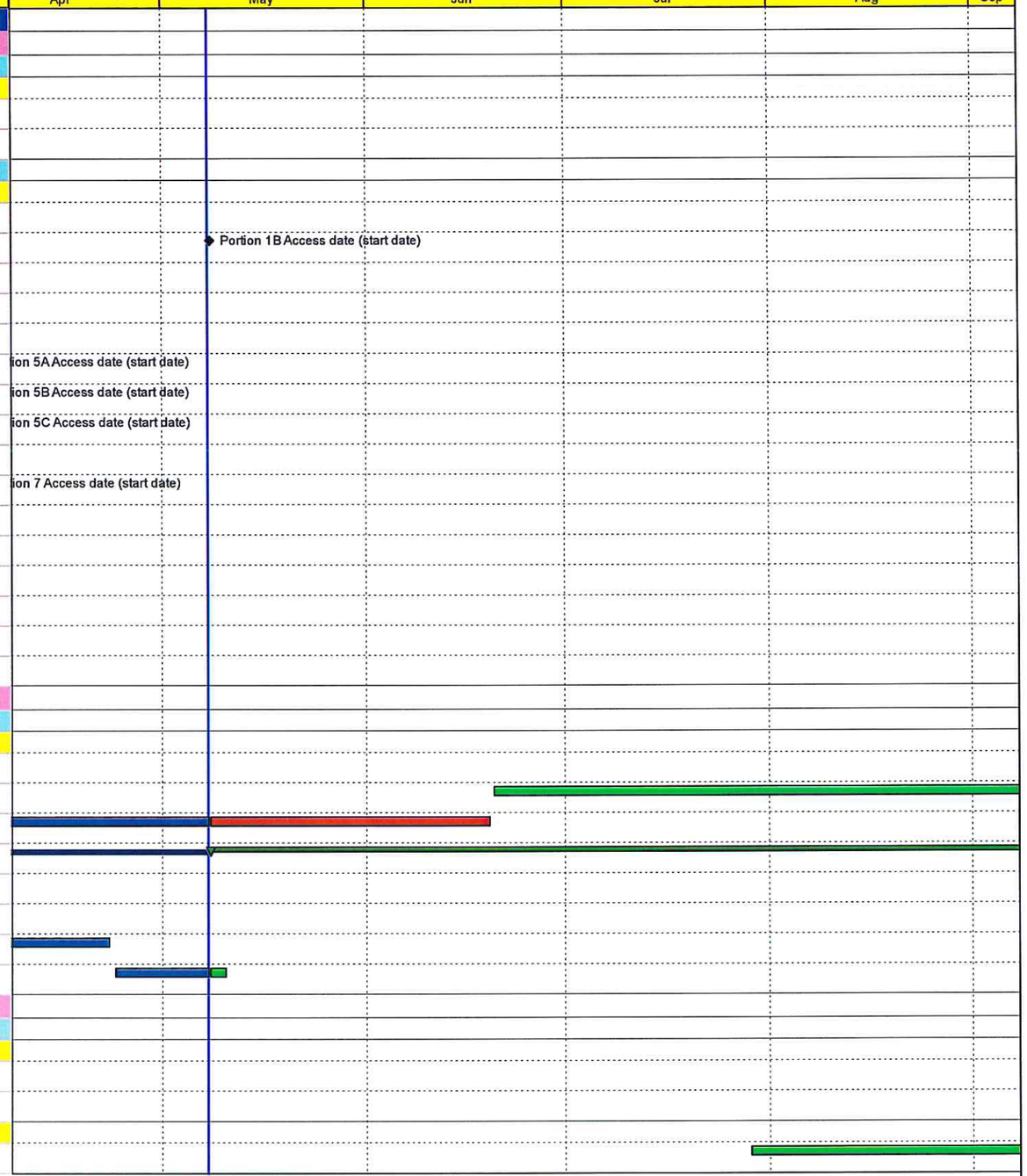
Appendix 9.1

Construction Programme of Individual Contracts

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish	Time Risk Allowances
Relocation of Sha Tin Sewage Treatment Works to Caverns - Site Preparation & Access Tunnel								
Contract Particular								
General								
General								
A10000	Contract Date	0	18-Feb-19 A			08-May-19		0
A10010	Starting Date	0	28-Feb-19 A			08-May-19		0
Access Date								
Access Date								
Acc010A	Portion 1A Access date (start date)	0	28-Feb-19 A			31-Aug-19		0
Acc010B	Portion 1B Access date (start date)	0	08-May-19		115	31-Aug-19		0
Acc020	Portion 2 Access date (start date)	0	28-Feb-19 A			28-Dec-19		0
Acc030	Portion 3 Access date (start date)	0	28-Feb-19 A			04-Mar-20		0
Acc040	Portion 4 Access date (start date)	0	28-Feb-19 A			13-Jul-19		0
Acc050A	Portion 5A Access date (start date)	0	03-Apr-19 A			08-Aug-19		0
Acc050B	Portion 5B Access date (start date)	0	03-Apr-19 A			08-Aug-19		0
Acc050C	Portion 5C Access date (start date)	0	03-Apr-19 A			08-Aug-19		0
Acc060	Portion 6 Access date (start date)	0	28-Feb-19 A			24-Jun-19		0
Acc070	Portion 7 Access date (start date)	0	03-Apr-19 A			18-May-21		0
Acc080	Portion 8 Access date (start date)	0	28-Feb-19 A			02-Jul-19		0
Acc090	Portion 9 Access date (start date)	0	28-Feb-19 A			18-Apr-20		0
Acc100	Portion 10 Access date (start date)	0	28-Feb-19 A			26-Jun-20		0
Acc110	Portion 11 Access date (start date)	0	28-Feb-19 A			17-Jul-19		0
Acc120	Portion 12 Access date (start date)	0	28-Feb-19 A			12-Oct-20		0
Acc130	Works Area WA1 Access date (start date)	0	28-Feb-19 A			31-Jul-19		0
Preliminary Works								
Preliminary Works								
Preliminary Works								
A10015	Contract information familisation	27	28-Feb-19 A	30-Mar-19 A		21-May-19	21-May-19	1
A10020	Site office erection	76	20-Jun-19	18-Sep-19*	34	31-Jul-19	30-Oct-19	1
A10030	Sub-letting & procurement for the 1st batch sub-contract	90	28-Feb-19 A	19-Jun-19	0	08-May-19	19-Jun-19	2
A11980	Preservation and Protection of Existing Trees	836	28-Feb-19 A	28-Dec-21	0	28-Feb-19	28-Dec-21	0
A12440	Prepare & submit Draft Construction Health and Safety Plan	12	18-Feb-19 A	02-Mar-19 A		17-Jun-19	17-Jun-19	1
A12450	PM comment Draft Construction Health and Safety Plan	11	04-Mar-19 A	15-Mar-19 A		17-Jun-19	17-Jun-19	1
A12460	Prepare & submit Construction Health and Safety Plan	21	18-Mar-19 A	23-Apr-19 A		17-Jun-19	17-Jun-19	1
A13920	Construction Health and Safety Plan approval	12	24-Apr-19 A	10-May-19	33	17-Jun-19	19-Jun-19	1
Access Road to Main Portal Area								
Hoarding								
Design								
A10040	Hoarding Design preparation	9	04-Mar-19 A	13-Mar-19 A		25-Jun-19	25-Jun-19	2
A10050	Hoarding Design approval	10	14-Mar-19 A	25-Mar-19 A		25-Jun-19	25-Jun-19	1
Hoarding								
A10060	Hoarding erection (portion 2)	66	29-Jul-19	16-Oct-19	126	28-Dec-19	21-Mar-20	6



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Crit. Milestone

Project ID: MP004 (1905)
Layout: 3 Month Rolling Programme
Data Date: 08-May-19
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Primavera Systems, Inc.

Contract No. DC/2018/05

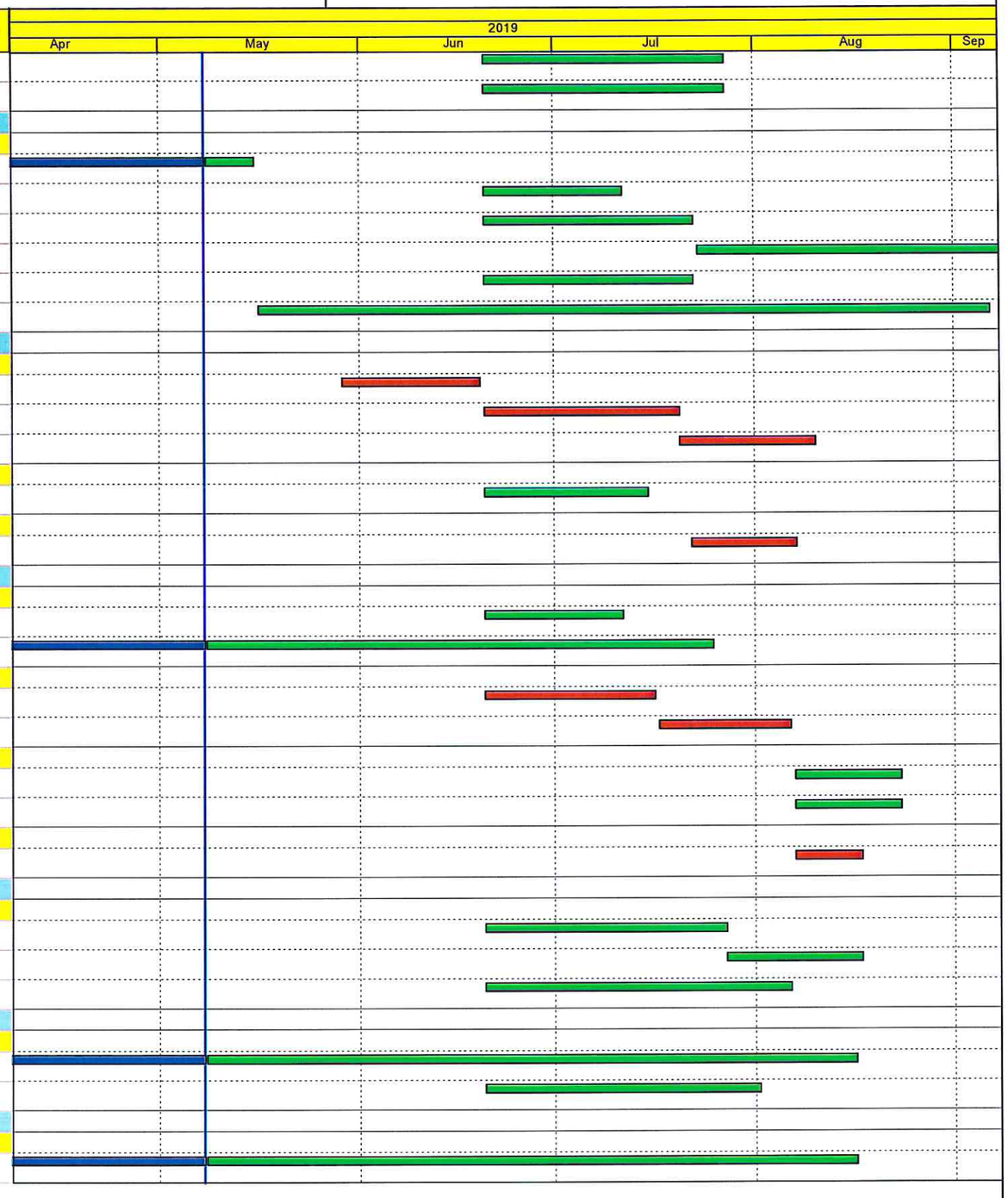
Relocation of Sha Tin Sewge Treatment Works to Caverns - Site Preparation and Access Tunnel Construction

3 Month Rolling Programme

CHINA STATE JOINT VENTURE

Date	Revision	Ch...	Approved
10-May-19	First Programme		

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish	Time Risk Allowances
A10070	Hoarding erection along Ma On Shan Road (portion 4)	32	20-Jun-19	27-Jul-19	19	13-Jul-19	19-Aug-19	6
A10080	Hoarding erection along Mui Tsz Lam Road (portion 6)	32	20-Jun-19	27-Jul-19	43	09-Aug-19	17-Sep-19	6
Tree Treatment								
Tree Treatment								
A11015	Tree Survey	34	01-Apr-19 A	15-May-19	33	15-Jun-19	24-Jun-19	0
A11020	Tree felling & protection (Portion 1)	18	20-Jun-19	11-Jul-19	43	10-Aug-19	30-Aug-19	6
A11030	Tree felling & protection (Portion 4)	27	20-Jun-19	22-Jul-19	14	08-Jul-19	07-Aug-19	6
A11032	Tree transplant (Portion 4)	96	23-Jul-19	14-Nov-19	153	24-Jan-20	28-May-20	6
A15290	Tree felling & protection (Mui Tsz Lam Road realigment)	27	20-Jun-19	22-Jul-19	629	07-Aug-21	08-Sep-21	6
A15300	Tree transplant (Mui Tsz Lam Road realigment)	96	16-May-19	06-Sep-19	589	15-May-21	08-Sep-21	6
Steel Bridge								
Design								
A10235	Trial pits excavation & U/G utility detection	18	29-May-19	19-Jun-19	3	01-Jun-19	22-Jun-19	0
A10240	Steel Bridge Design preparation & submission	26	20-Jun-19	20-Jul-19	3	24-Jun-19	24-Jul-19	0
A10250	Steel Bridge Design approval	21	20-Jul-19	10-Aug-19	4	25-Jul-19	14-Aug-19	0
North Tower of Steel Bridge								
A10265	Pre-drilling Works	21	20-Jun-19	15-Jul-19	770	27-Jan-22	26-Feb-22	3
South Tower of Steel Bridge								
A10310	Pre-drilling Works	15	22-Jul-19	07-Aug-19	6	29-Jul-19	14-Aug-19	3
Noise Barrier								
Preliminary Works								
A14340	TTA submission & approval	18	20-Jun-19	11-Jul-19	23	18-Jul-19	07-Aug-19	3
A14400	XP application for NB construction	158	18-Feb-19 A	25-Jul-19	13	21-May-19	07-Aug-19	8
Design								
A15010	Noise Barrier Design preparation	22	20-Jun-19	16-Jul-19	1	21-Jun-19	17-Jul-19	0
A15020	Noise Barrier Design approval	21	17-Jul-19	06-Aug-19	1	18-Jul-19	07-Aug-19	0
NB1								
A10770	ELS - NB1 (0-75m)	15	07-Aug-19	23-Aug-19	18	28-Aug-19	13-Sep-19	3
A10820	ELS - NB1 (75-150m)	15	07-Aug-19	23-Aug-19	24	04-Sep-19	21-Sep-19	3
NB2								
A10870	ELS - NB2 (0-63m)	10	07-Aug-19	17-Aug-19	1	08-Aug-19	19-Aug-19	1
Demolition Works								
Demolition Works								
A12360	Prepare & submit method statement	32	20-Jun-19	27-Jul-19	552	07-May-21	15-Jun-21	2
A12370	Method statement approval	21	27-Jul-19	17-Aug-19	689	16-Jun-21	06-Jul-21	2
A12372	Initial Survey (including Asbestos survey)	40	20-Jun-19	06-Aug-19	561	18-May-21	06-Jul-21	2
Water Mains Diversion								
Preliminary Works								
A13110	XP application for Water mains construction	180	18-Feb-19 A	16-Aug-19	468	17-Aug-20	26-Nov-20	0
A13130	TTA submission & approval	36	20-Jun-19	01-Aug-19	391	14-Oct-20	26-Nov-20	6
Drainage Works								
Mui Tsz Lam Road Realigment								
A10395	XP application for Mui Tsz Lam Road realigment	180	18-Feb-19 A	16-Aug-19	565	22-Nov-20	03-Mar-21	17



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Crit. Milestone

Project ID: MP004 (1905)
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Primavera Systems, Inc.

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Relocation of Sha Tin Sewge Treatment Works to Caverns -

Site Preparation and Access Tunnel Construction

3 Month Rolling Programme

CHINA STATE JOINT VENTURE

Date	Revision	Ch...	Approved
10-May-19	First Programme		

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish	Time Risk Allowances
A10400	TTA submission & approval	36	20-Jun-19	01-Aug-19	465	13-Jan-21	03-Mar-21	6
A10995	Drainage work from SMH2010 to 2011 (2mh ~6 to 7.5m depth)	100	29-Jul-19	25-Nov-19	83	06-Nov-19	11-Mar-20	10
A13230	Jacking pit in portion 6 for 1350 dia pipe jacking	28	29-Jul-19	29-Aug-19	43	17-Sep-19	22-Oct-19	2
Road Works								
Cycle Track and footpath								
A10452	TTA submission & approval	18	20-Jun-19	11-Jul-19	43	10-Aug-19	30-Aug-19	3
A10454	XP application for portion 1 access	158	18-Feb-19 A	25-Jul-19	36	13-Jun-19	30-Aug-19	8
A10460	Site clearance	32	26-Jul-19	31-Aug-19	31	31-Aug-19	10-Oct-19	2
Haul Road Under Ma On Shan Road								
A11931	TTA submission & approval	18	20-Jun-19	11-Jul-19	192	14-Feb-20	05-Mar-20	0
A11932	XP application for portion 3 works	158	18-Feb-19 A	25-Jul-19	224	18-Dec-19	05-Mar-20	8
A11935	Trial pits excavation & U/G utility detection	21	20-Jun-19	15-Jul-19	111	01-Nov-19	25-Nov-19	2
A11936	Haul Road Design preparation	60	16-Jul-19	24-Sep-19	111	26-Nov-19	13-Feb-20	2
Construction Access connecting Ma On Shan Road								
A12291	TTA submission & approval for access at portion 4 works	18	20-Jun-19	11-Jul-19	206	02-Mar-20	21-Mar-20	0
A12292	XP application for construction access at portion 4 works	180	18-Feb-19 A	16-Aug-19	219	13-Dec-19	22-Mar-20	17
A12293	TTA submission & approval for access at portion 2 works	18	20-Jun-19	11-Jul-19	206	02-Mar-20	21-Mar-20	0
A12294	XP application for construction access at portion 2 works	180	18-Feb-19 A	16-Aug-19	219	13-Dec-19	22-Mar-20	17
Main Portal Area								
Tree Treatment								
Tree Treatment								
A11040	Tree felling & protection (Portion 6)	32	20-Jun-19	27-Jul-19	4	24-Jun-19	01-Aug-19	2
A11041	Tree felling & protection (Portion 6) - remaining	60	29-Jul-19	09-Oct-19	654	18-Oct-21	28-Dec-21	0
A11042	Tree transplant (Portion 6)	96	29-Jul-19	20-Nov-19	324	01-Sep-20	28-Dec-20	6
A11062	Flora Species Transplant (including Cibotium barometz)	12	29-Jul-19	10-Aug-19	702	13-Dec-21	28-Dec-21	2
Site Formation for Main Portal								
Slope SMP 2								
A12570	Temp. Access Road Formation	26	29-Jul-19	27-Aug-19	4	01-Aug-19	31-Aug-19	2
Retaining Wall for Main Portal								
Retaining Wall RMP3								
A13160	Temp access road formation	12	29-Jul-19	10-Aug-19	65	15-Oct-19	29-Oct-19	6
Retaining Wall RMP2								
A13260	Temp access road formation	12	29-Jul-19	10-Aug-19	215	22-Apr-20	08-May-20	6
Retaining Wall RMP6								
A13310	Erect temp working platform for piling	21	29-Jul-19	21-Aug-19	43	17-Sep-19	14-Oct-19	6
Retaining Wall RMP5								
A13370	Erect temp working platform for piling	24	29-Jul-19	24-Aug-19	8	06-Aug-19	03-Sep-19	3
Tunnel								
Preliminary Works								
A11810	TTA submission and approval during blasting works	75	20-Jun-19	17-Sep-19	150	16-Dec-19	23-Mar-20	3
A11825	Blasting door design	32	20-Jun-19	27-Jul-19	320	21-Jul-20	27-Aug-20	2
Rigid Barriers								
Rigid Barrier BMP1								
A13430	Temp. Access Road Formation	10	29-Jul-19	08-Aug-19	198	28-Mar-20	14-Apr-20	5

Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
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Crit. Milestone

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Site Preparation and Access Tunnel Construction

3 Month Rolling Programme

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10-May-19	First Programme		

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish	Time Risk Allowances
Access Road to Portion 12								
Preliminary Works								
Hoarding								
A10090	Hoarding erection at A Kung Kok Shan Road (portion 11)	18	20-Jun-19	11-Jul-19	4	25-Jun-19	16-Jul-19	1
A10260	TTA submission & approval	18	20-Jun-19	11-Jul-19	4	25-Jun-19	16-Jul-19	3
Tree Treatment								
Tree Treatment								
A11070	Tree felling & protection (Portion 11)	60	12-Jul-19	20-Sep-19	4	17-Jul-19	25-Sep-19	1
A11078	Tree felling & protection (Portion 12)	32	12-Jul-19	17-Aug-19	371	12-Oct-20	19-Nov-20	2
Road Works								
Preliminary Works								
A15270	TTA submission & approval	35	20-Jun-19	31-Jul-19	480	01-Feb-21	19-Mar-21	5
A15280	XP application for A Kung Kok Shan Road Roundabout	180	18-Feb-19 A	16-Aug-19	581	09-Dec-20	19-Mar-21	15
Other Works Area								
Tree Treatment								
Tree Treatment								
A11050	Tree felling & protection (Portion 8)	31	20-Jun-19	26-Jul-19	9	02-Jul-19	06-Aug-19	1
A11052	Tree transplant (Portion 8)	91	27-Jul-19	13-Nov-19	330	07-Sep-20	28-Dec-20	1
Community Liaison Centre								
Design								
A10100	Community Liaison Centre Design Preparation	22	20-Jun-19	16-Jul-19	0	20-Jun-19	16-Jul-19	1
A10110	Community Liaison Centre Design approval	21	17-Jul-19	06-Aug-19	0	17-Jul-19	06-Aug-19	0
Community Liaison Centre								
A10120	Site Clearance	18	20-Jun-19	11-Jul-19	22	17-Jul-19	06-Aug-19	1
A10130	Site formation	12	07-Aug-19	20-Aug-19	0	07-Aug-19	20-Aug-19	1

Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
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Primavera Systems, Inc.

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