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

NOVEMBER 2019

CLIENTS:

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DATE:

December 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 November 2019

12 December 2019

By Email

Dear Sir,

I refer to the letter dated 12 December 2019 (ref: LES/J2019-02/CS/L039) from the Environmental Team Leader certifying the captioned Monthly EM&A Report for November 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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Independent Environmental Checker
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Encl.

c.c.	DSD	Mr. Kenneth Poon	By Email
	Lam Environmental Services Limited	Mr. Derek Lo	By Email
	China State Joint Venture	Mr. F M Chung	By Email

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

i. This is the Environmental Monitoring and Audit (EM&A) Monthly Report – November 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 9th EM&A report presenting the environmental monitoring findings and information recorded during the period of 1 November 2019 to 30 November 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
- Construction of site office
- Hoarding erection
- Hand dig trial pit excavation
- Root pruning and transplantation
- Site entrance construction
- Ground investigation
- Excavation for temporary haul road construction
- Construction of cycle track
- Soil nail
- Retaining wall construction
- Piling works
- Construction of noise barrier
- Drainage works
- Watermain installation

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

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

Noise Monitoring

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

vii. Noise monitoring for stations CM4 and CM5 were commenced on 13 April 2019 and 18 April 2019 respectively. Noise monitoring for stations CM1 and CM3 were commenced on 2 May 2019. CM2(A) is under liaison for approval.

viii. 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

ix. The Environmental Team (ET) conducted weekly site inspections for the Contract on 6, 14, 20 and 28 November 2019. IEC attended the joint site inspection on 28 November 2019. No non-compliance was found during the site inspection.

Complaints, Notifications of Summons and Successful Prosecutions

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

xi. No notification of summons and successful prosecutions was received in the reporting month.

Reporting Changes

xii. The Ecological Monitoring Report is attached in the **Appendix 1.1**.

Future Key Issues

xiii. 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, construction of noise barrier and Community Liaison Centre, hoarding erection, hand dig trial pit excavation, site entrance construction, ground investigation, excavation for temporary haul road construction, construction of cycle track, soil nail, retaining wall construction, piling works, haul road construction, drainage works an watermain installation	• 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

Key Construction Works	Recommended Mitigation Measures
• Root pruning and transplantation	construction of noise barrier and Community Liaison Centre

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
- Construction of site office

- Hoarding erection
- Hand dig trial pit excavation
- Root pruning and transplantation
- Site entrance construction
- Ground investigation
- Excavation for temporary haul road construction
- Construction of cycle track
- Soil nail
- Retaining wall construction
- Piling works
- Construction of noise barrier
- Drainage works
- Watermain installation

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

- Site Clearance
- Hoarding erection
- Hand dig trial pit excavation
- Root pruning and transplantation
- Site entrance construction
- Ground investigation
- Excavation for temporary haul road construction
- Construction of cycle track
- Soil nail
- Retaining wall construction
- Piling works
- Haul road construction
- Construction of noise barrier
- Drainage works
- Watermain installation
- Construction of Community Liaison Centre

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	WT00034319-2019	3/9/2019	30/9/2024	Valid
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
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

EP Condition	Submission	Date of Submission
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. AM3(A) is under liaison for approval, no monitoring for AM3(A) was conducted in the reporting period.

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

4.1.3. 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 approved by EPD on 9 May 2019.

4.1.4. 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

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

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

4.1.7. 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.

SAMPLING PROCEDURE AND MONITORING EQUIPMENT

4.1.8. 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

4.1.9. 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.

4.1.10. 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
	Hal Technology HAL-HPC301

4.1.11. 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

4.1.12. 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

4.1.13. 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. CM2(A) is under liaison for approval, no monitoring for CM2(A) was conducted in the reporting period.

4.2.2. Based on the Project baseline report, the noise monitoring station CM2, Ma On Shan Tsung Tsin Secondary School was relocated to CM2(A), Kowloon City Baptist Church Hay Nien Primary School.

4.2.3. 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 field	G/F
CM2(A)	Kowloon City Baptist Church Hay Nien Primary School	Free field (tentative)	G/F (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

4.2.4. 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).

4.2.5. 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.

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

4.2.7. 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

4.2.8. 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

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

SAMPLING PROCEDURE AND MONITORING EQUIPMENT

4.2.10. 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.

4.2.11. 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

4.2.12. 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	335	1465	Fill Bank at Tuen Mun Area 38
	1022	1022	Tai Po Area 9 under HKHA's Contract No.20160310 (Alternative Disposal Ground)

Waste Type	**Quantity this month**	**Cumulative Quantity-to-Date**	**Disposal / Dumping Grounds**
Inert C&D materials recycled**, m^3**	0	108.9	Fill Bank at Tuen Mun Area 38
Non-inert C&D materials disposed**, tonne**	32.21	255.48	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 6, 14, 20 and 28 November 2019. IEC attended the joint site inspection on 28 November 2019.

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

Item	Date	Reminders/Observations	Action taken by Contractor	Outcome
20191106_01Env	6-11-2019	Portion 2: Stockpile should be well covered by tarpaulin sheets and provide watering regularly	The stockpile was covered by tarpaulin sheets	Completed by contractor on 7 November 2019
20191106_02Env	6-11-2019	Portion 2: Drip tray should be provided to chemical container	Drip tray provided	Completed by contractor on 7 November 2019
20191114_01Env	14-11-2019	Portion 6: Drip tray should be provided to chemical container	All unused chemical containers have been removed	Completed by contractor on 15 November 2019
20191114_02Env	14-11-2019	Portion 6: Contractor is reminded to maintain and clean waste storage area regularly	Waste storage area have been cleaned	Completed by contractor on 15 November 2019
20191120_01Env	20-11-2019	Portion 6: Dusty process should be watering and covered entirely by impervious sheets and placed in at sheltered on the top and 3 sides	Cover fully enclosed and watering during operation of dusty process	Completed by contractor on 20 November 2019

7.0.2. Within this reporting month, bi-weekly landscape site audits were conducted on 6 and 20 November 2019.

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

Item	Date	Reminders/Observations	Action taken by Contractor	Outcome
Nil	Nil	Nil	Nil	Nil

7.0.3. Within this reporting month, monthly ecology site audits were conducted on 12 November 2019.

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

Item	Date	Reminders/Observations	Action taken by Contractor	Outcome
20191112_01Eco	12-11-2019	Receptor site: The contractor is reminded to carry out regular watering to the transplanted H0002	Regularly watering to H0002 by contractor	Completed by contractor on 13 November 2019

8. Complaints, Notification of Summons and Prosecution

8.0.1. No notification of summons and successful prosecutions was received in the reporting month.

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
November 2019	0
Total	**1**

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.

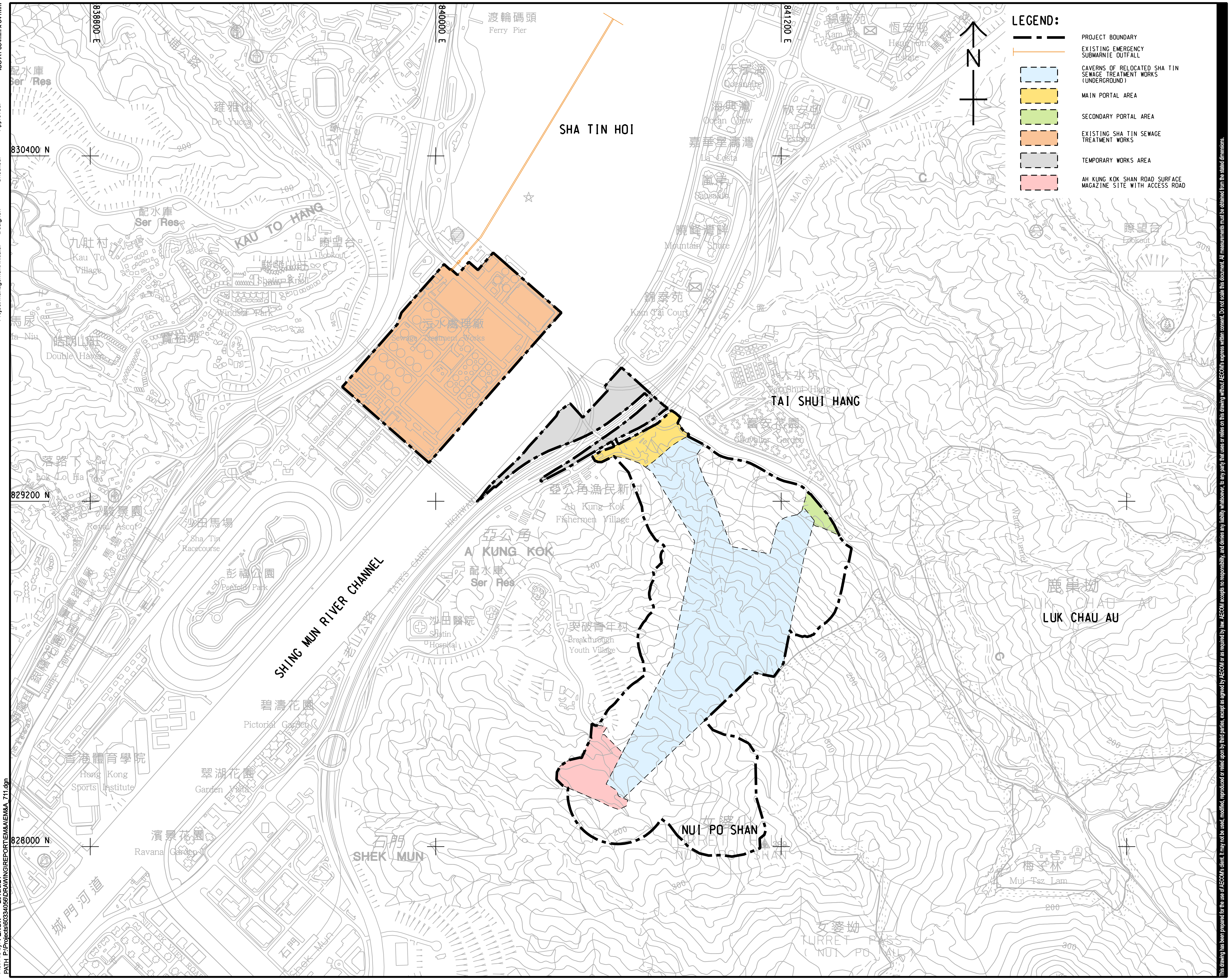
9.0.2. The scheduled construction activities and the recommended mitigation measures for the coming month are listed in **Table 9.1**. The construction programmes of the Project are provided in **Appendix 9.1**.

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

Key Construction Works	Recommended Mitigation Measures
• Site clearance, construction of noise barrier and Community Liaison Centre, hoarding erection, hand dig trial pit excavation, site entrance construction, ground investigation, excavation for temporary haul road construction, construction of cycle track, soil nail, retaining wall construction, piling works, haul road construction, drainage works an watermain installation • Root pruning and transplantation	• 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 construction of noise barrier and Community Liaison Centre

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

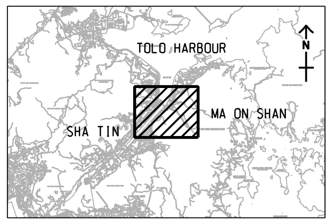
I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 複核

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

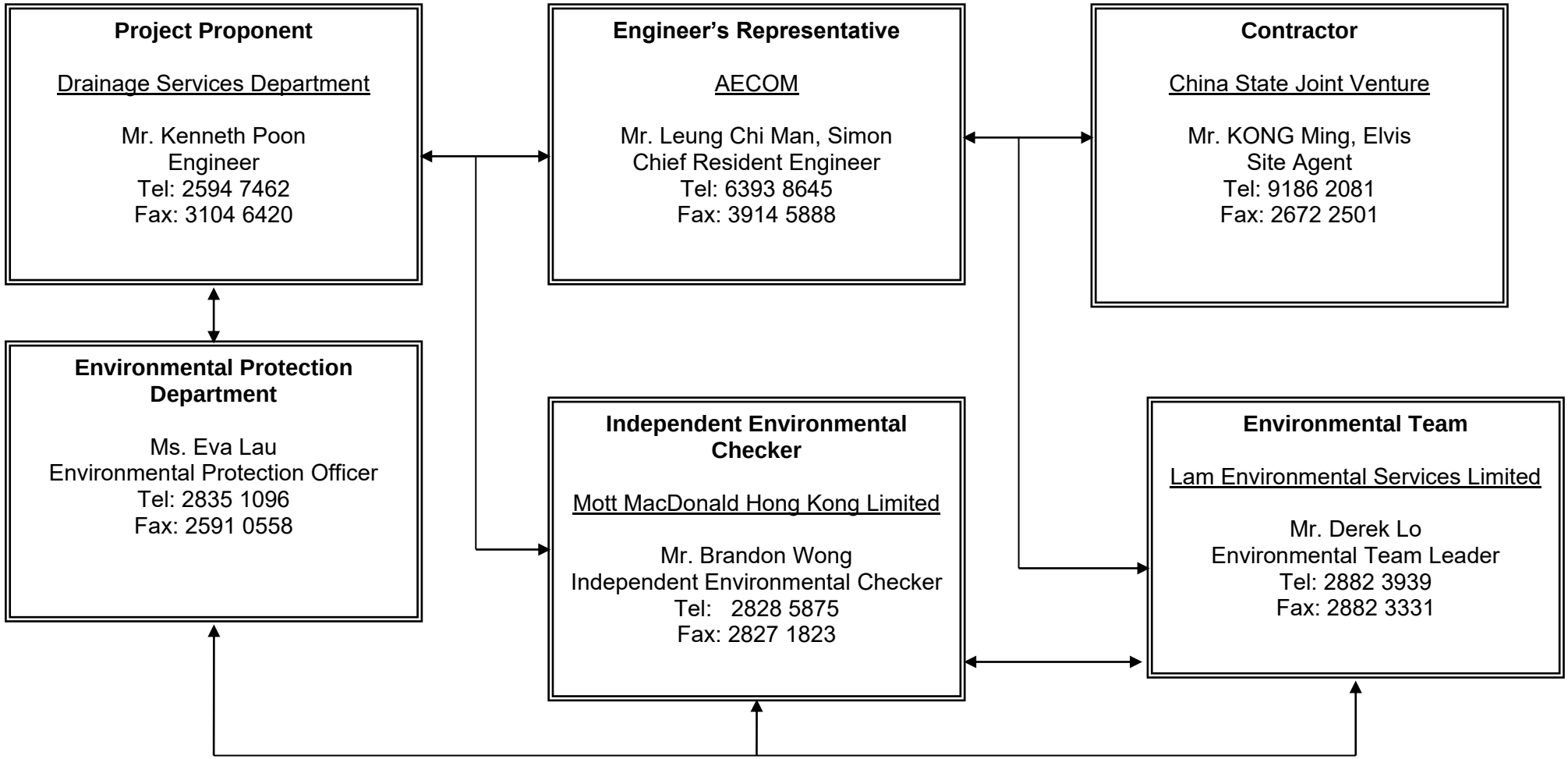
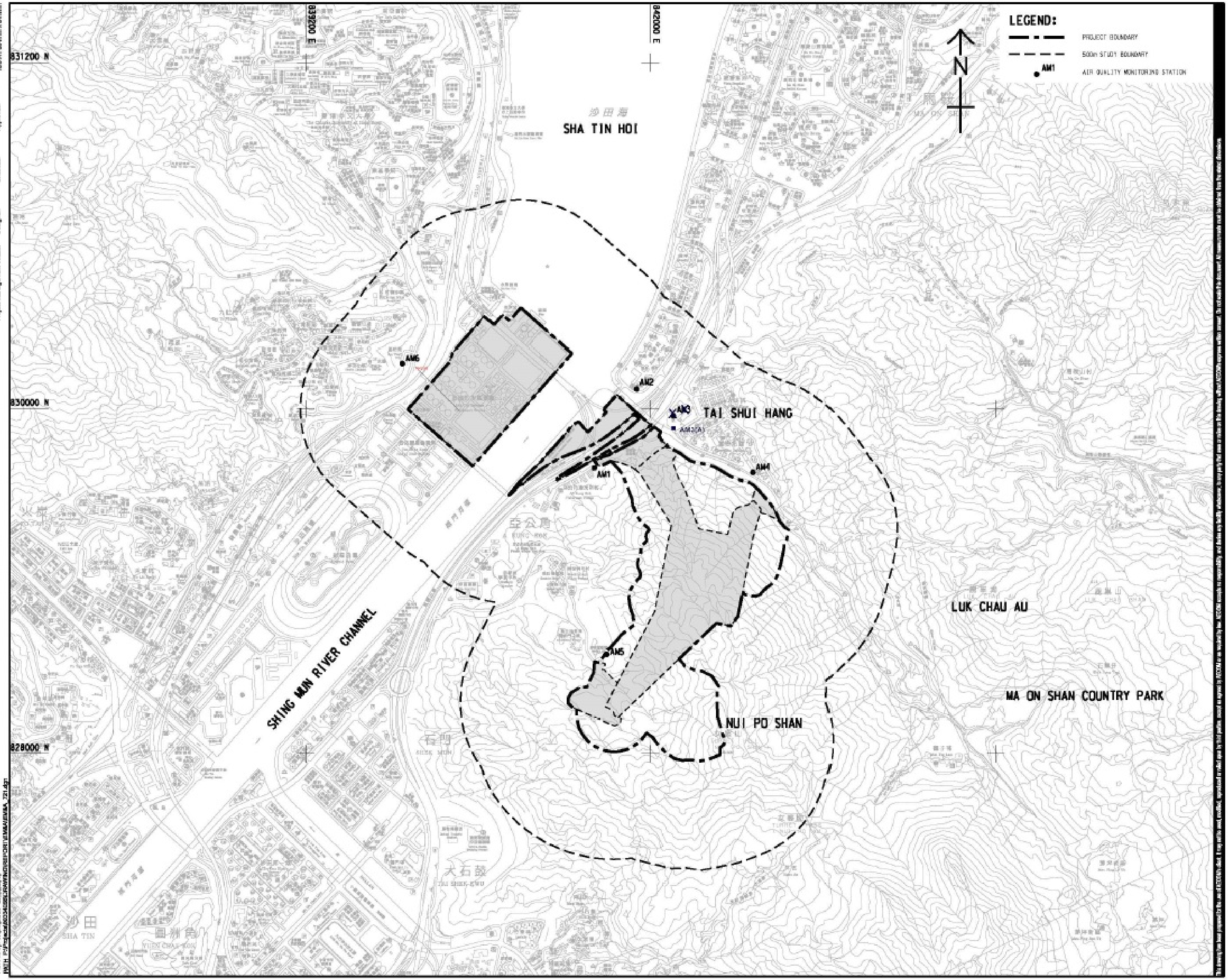


Figure 4.1 to Figure 4.2

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

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ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.

STATUS

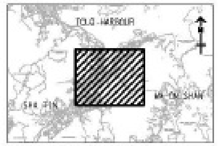
SCALE

A3 1 : 16000

DIMENSION UNIT

METRES

KEY PLAN A3 1 : 400000



PROJECT NO.

60334056

CONTRACT NO.

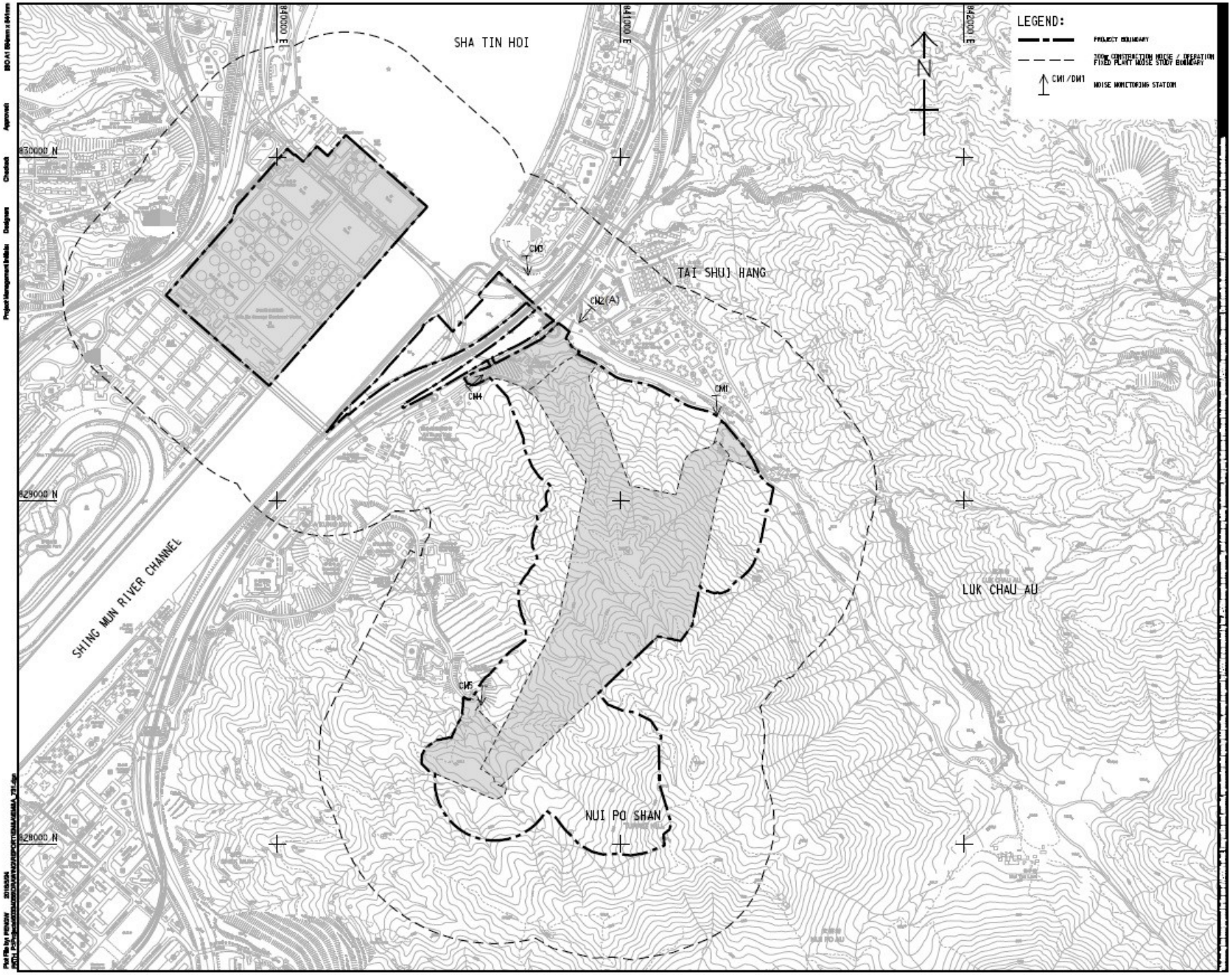
CE 30/2014 (DS)

SHEET TITLE

LOCATION OF AIR QUALITY MONITORING STATION DURING CONSTRUCTION PHASE

SHEET NUMBER

60334056/EM&A/2.01



AECOM

PROJECT

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

CLIENT

Drainage Services Department

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ISSUE/REVISION

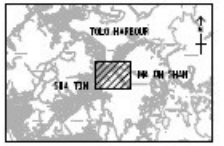
ID	Date	Description	Chk'd

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
Ecological Monitoring Report

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

5th ECOLOGICAL MONITORING REPORT
NOVEMBER 2019

TABLE OF CONTENTS

1. RECOMMENDATION ON PLANT SPECIES OF CONSERVATION IMPORTANCE UNDER APPROVED PROTECTION AND TRANSPLANTATION PROPOSAL

According to the approved Protection and Transplantation Proposal, four out of six recorded plant species of conservation importance are to be transplanted. They were summarized in **Table 1**.

2. ECOLOGICAL MONITORING

2.1 Pre-construction survey

As per Section 3.1 of the approved Protection and Transplantation Proposal, pre-construction survey shall be carried out by a qualified ecologist which includes: -

(1) Desktop study and survey preparation based on the specific area of site clearance as notified by the construction contractor and confirmed with the Resident Site Staff;
(2) Schedule and conduct physical site survey to locate the affected species, reconfirm the species condition and record the physical condition before transplantation; and
(3) Report site survey results and provide recommendations to contractor on transplantation and post-transplantation maintenance.

Pre-construction survey implementation

For the reporting month, there was no pre-construction survey according to work progress notified by the construction contractor.

2.2 Transplantation

Based on method statement in the approved Protection and Transplantation Proposal, transplantation works of *Diospyros vaccinioides* were carried out by the Landscape Specialist Contractor on 3 Aug 2019, and did not require onsite monitoring from ET's Ecologist as agreed. They were temporarily stored and kept at the nursery before being transplanted to designated planting area at Site 3.

Pre-transplantation surveys of *Diospyros vaccinioides* at Portion 12 of Site 1 were carried out by the Landscape Specialist Contractor on 8, 12, 15 and 19 November 2019, on-site monitoring by ET's Ecologist was not required as agreed. It was reported that 228 nos. individuals of *Diospyros vaccinioides,* which have fair to good health condition and structural condition, were suitable for transplantation.

Another 140 individuals found within Portion 12 of Site 1 were reported as not suitable for transplantation.

Transplantation implementation

The 1st batch of *Diospyros vaccinioides* transplantation involved 40 nos. of individuals originated from Site 1 (named as DV0001-DV0040) (**Figure 1**).

The nursery is an open cleared wasteland within Site 2 (**Figure 2**), shelter was erected for the transplanted *Diospyros vaccinioides* against environmental stress. Each plant was tagged and lined up in rows. Water supply is ready for irrigation (**Plate 1**).

There was no construction activity during the reporting month at/ around the nursery.

2.3 One-year Establishment Period after Planting (Post-Transplantation Monitoring)

Regular monitoring of health condition of transplanted plants, also called post-transplantation monitoring, should be carried out in monthly basis in the first three months, quarterly afterwards during one-year establishment period after transplanting to receptor site/ nursery as per Section 5.4 and 5.5 of the approved Protection and Transplantation Proposal.

Post-transplantation monitoring implementation

Post-transplantation monitoring for *Diospyros vaccinioides* (DV0001-DV0040) were conducted on 12 November 2019 at their corresponding receptor sites/ nursery (**Figure 2**) with extra effort on 26 November 2019; while 1 no. of *Ania hongkongensis* (named as H0002) was monitored with extra effort on 1, 12 and 26 November 2019 respectively (**Figure 3**). Monitoring for 1 no. of *Aquilaria sinensis* seedling (named as C0001), 7 nos. of *Cibotium barometz* (grouped as E0004) will be conducted on a quarterly basis and the coming monitoring will be carried out in December 2019 (**Figure 4**).

Post-transplantation monitoring findings

Plant conditions of DV0001-DV0040 were listed in **Table 2**. DV0001 is actually a *Syzygium buxifolium* rather than targeted *Diospyros vaccinioides*. It shall be replaced during next transplantation.

Most seedlings were generally tiny (about 10cm in height) aiming at smaller root zone and better survival. However, some of them have yet developed sufficient leaves. Sign of leaf drop and dehydration has been observed (**Plate 1**), despite provision of shelter and irrigation. Although tiny new branch or leaf buds were observed, seedlings may struggle for survival against environmental stress.

Since transplanted on 12 November 2019, 47.5% (19 out of 40 individuals) of transplanted seedlings has died or turned in poor condition, as illustrated in **Appendix 1**.

For C0001, E0004 and H0002, plant conditions were listed in **Table 3**, and corresponding photographic records were shown in **Appendix 2**. Despite root balls were maintained intact as far as possible, transplanted plants need time to grow into new soil of the receptor site. Therefore, sign of dehydration, leaf yellowing/ wilting, or even die-off were expected. Meanwhile, it is observed that site clearance was carried out in the continue patch of woodland surrounding receptor sites of H0002. Landscape Contractor was recommended to provide shelter to the transplanted plants to provide similar shading against adverse environmental condition (e.g. strong sunlight, rainstorm and construction dust). Next few monitoring would be important to access their progress of recovery and establishment of new root system at the receptor site. In addition, it is observed that organic soil conditioner was applied by the Contractor to H0002 in order to retain water moisture in the soil.

Recommendation on post-transplantation monitoring maintenance

According to environmental condition and location of the receptor sites/ nursery, watering frequency was recommended in a daily practice for at least the first 3 months as the transplant time is in summer months with strong sunlight and high temperature; except the days with fog and rain. Water frequency may be reduced based on the plant condition after monitoring in the first 3 months.

In contrast, the Landscape Contractor was recommended to check all transplanted plants after heavy rains/ typhoon under safe condition, in order to carry out any stabilization/ maintenance work. Blocked drainage shall be cleared; excessive water shall be pumped or diverged from nursery ground; saturated soil shall be aerated.

Other maintenance works (e.g. weeding, spraying off construction dust, use of approved pesticide and fertilization) shall be determined throughout the monitoring period in agreement with the Supervisor of the Contract and ET.

2.4 Bi-weekly Ecological Monitoring

According to Section 6.4 of the approved Protection and Transplantation Proposal, regular ecological site inspection should be carried out at least once every two weeks during the construction period.

Bi-weekly ecological monitoring implementation

Bi-weekly ecological monitoring was carried out on 1, 12 and 26 November 2019 in the reporting month.

Bi-weekly ecological monitoring findings

Similar to H0002, site clearance was found in the continue patch of woodland surrounding sites

of 4 nos. of retained *Ania hongkongensis* (named as H0001). Landscape Contractor was reminded to carry out regular watering to the transplanted H0002.

FIGURES

Figure 1. Original location of DV0001-DV0040 at Site 1 to be transplanted to the nursery.

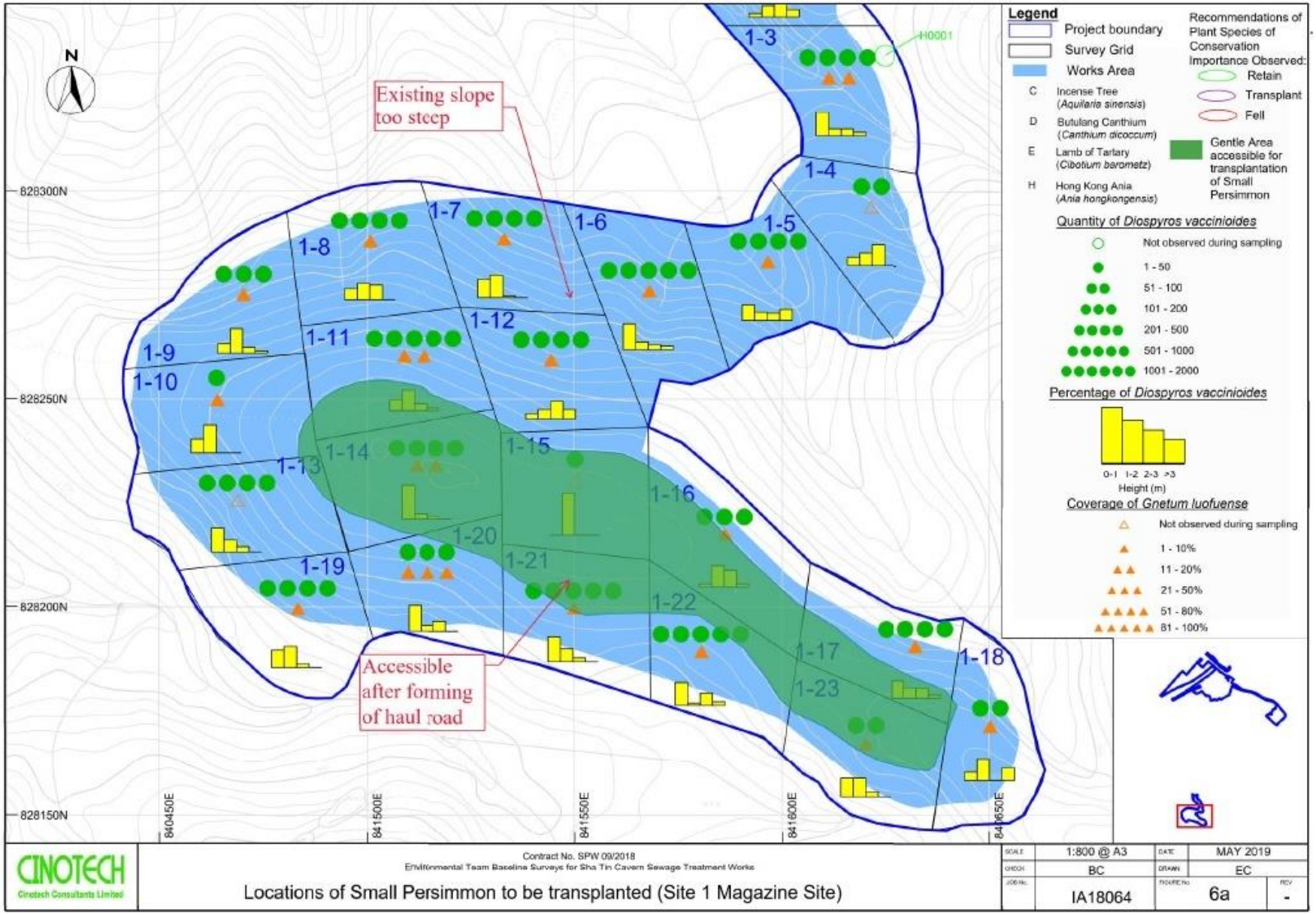


Figure 2. Nursery site highlighted in red frame for DV0001-DV0040 at Site 2.

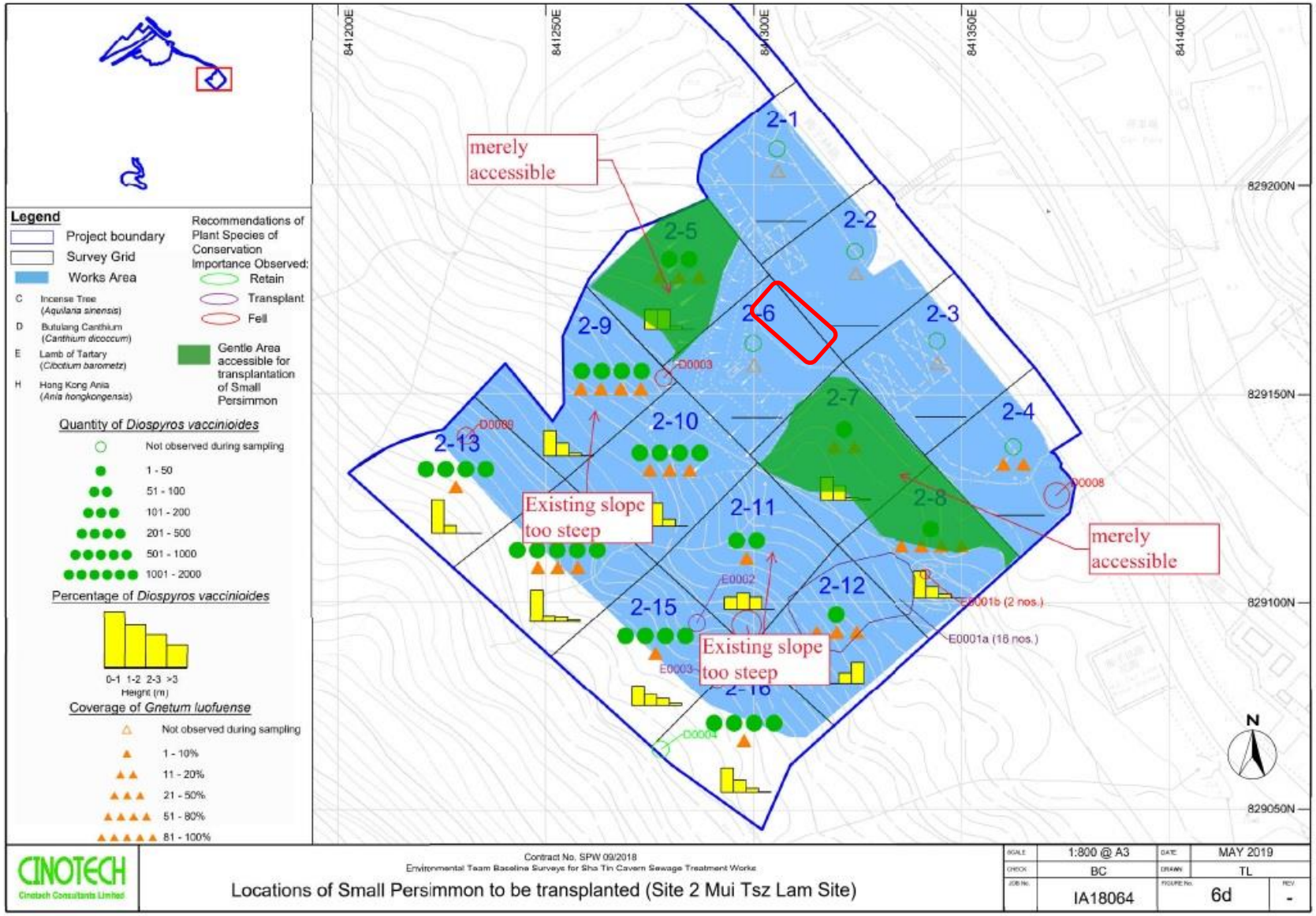


Figure 3. Original location of H0002 highlighted in yellow frame and its receptor site highlighted in red frame.

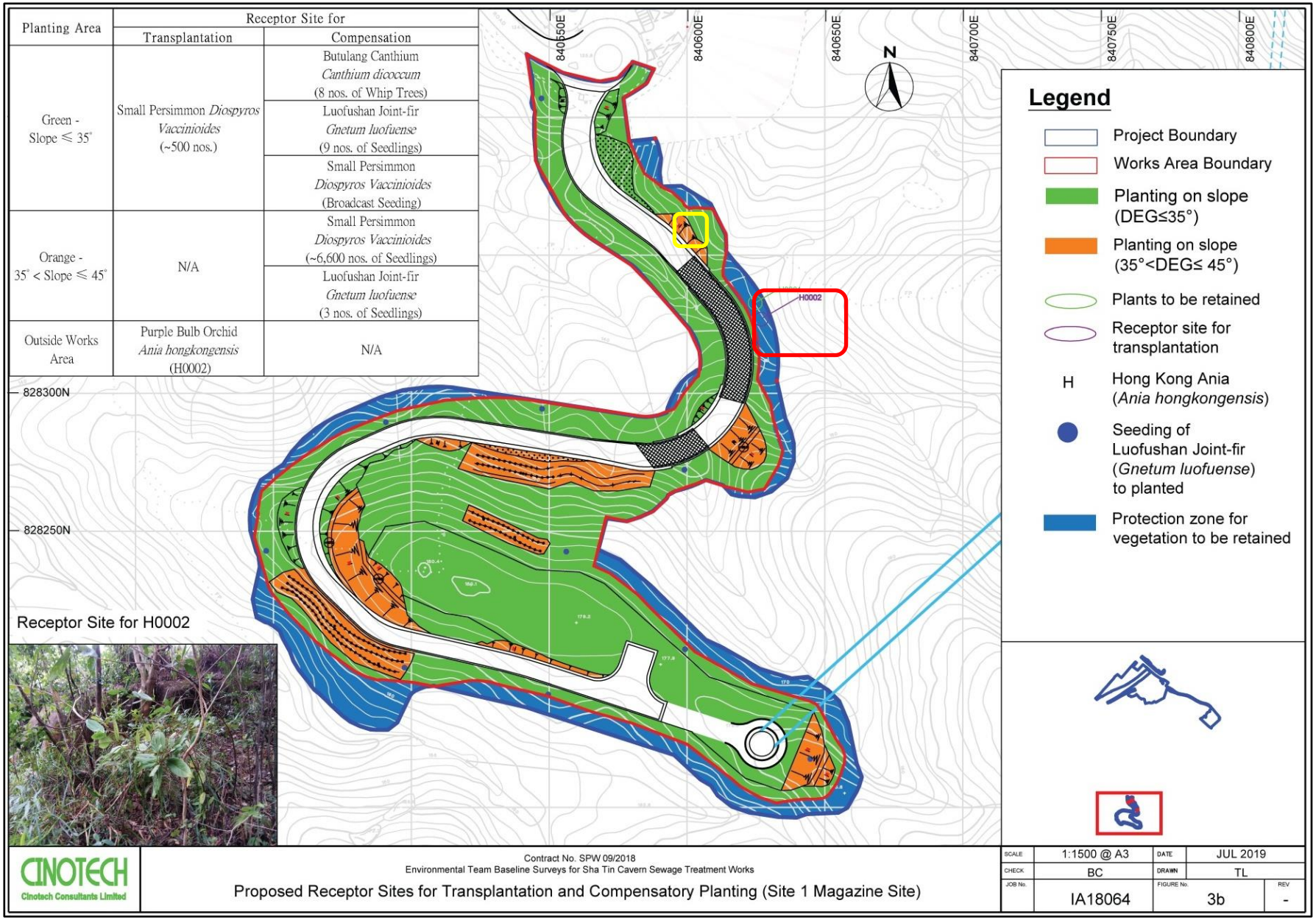
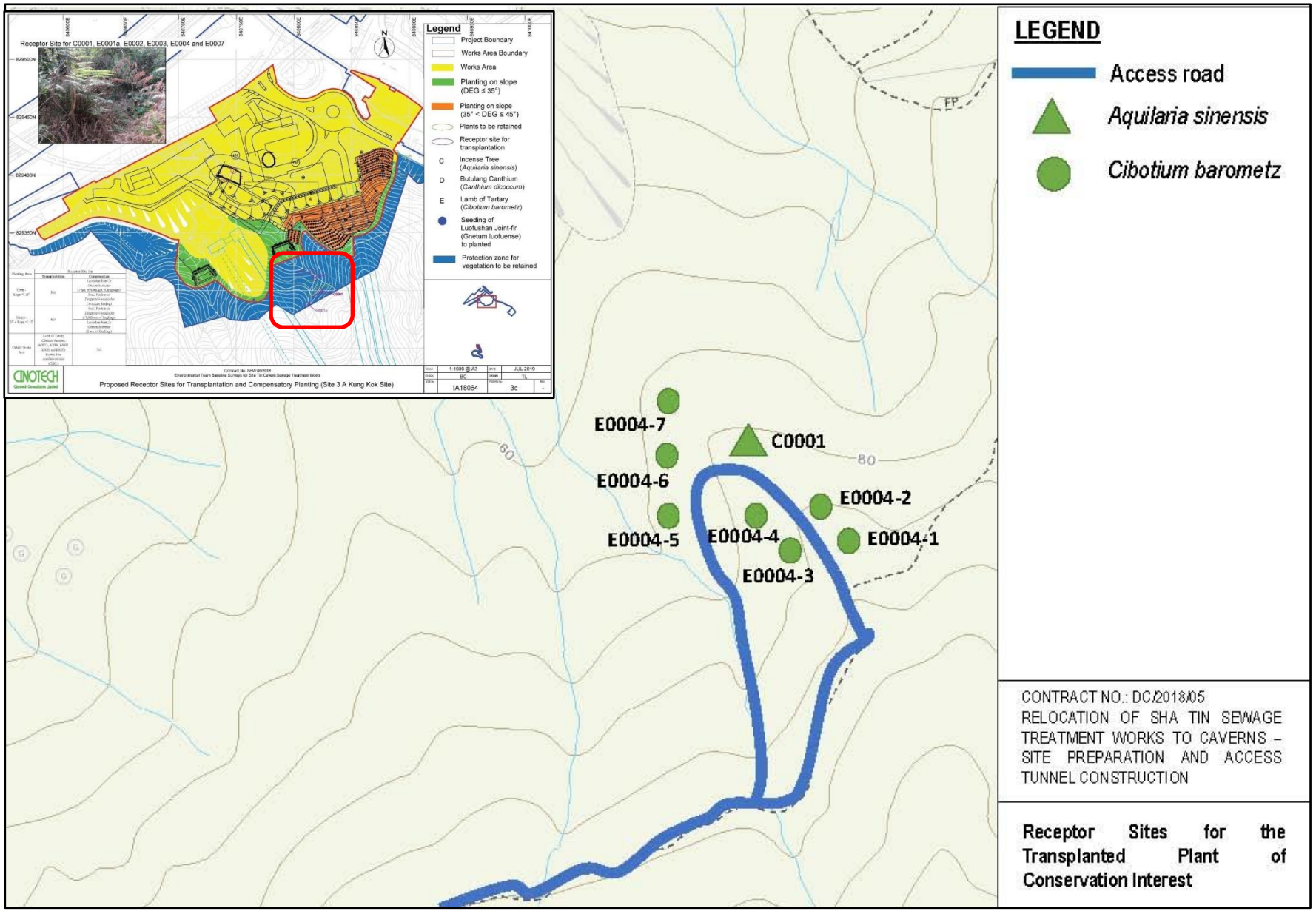


Figure 4. Receptor site for C0001 and E0004, the area highlighted in red frame is enlarged.



PLATE

Plate 1. The 1st batch of 40 nos. of *Diospyros vaccinioides* transplanted from Site 1; and stored by Landscape Specialist Contractor at the on-site nursery.

TABLE

Table 1. Recommendations on the recorded plant species of conservation importance (adopted from previously approved Protection and Transplantation Proposal Version 7.1).

Common Name	Species Name	Units	Recommendations					
			Retain	Transplant	Tag No.	Fell	Total (in Project Boundary)	Transplantation Date
Site 1								
Small Persimmon	*Diospyros vaccinioides*	No.	950	350 (228 confirmed at Portion 12)	TBC	4800 (140 confirmed at Portion 12)	6100	TBC
Luofushan Joint-fir	*Gnetum luofuense*	m2	300	0	NA	1700	2000	NA
Purple Bulb Orchid	*Ania hongkongensis*	No.	4	1	H0002	0	5	23/7/2019
Site 2								
Small Persimmon	*Diospyros vaccinioides*	No.	950	40	DV0001-DV0040	1500	2500	3/8/2019
				10				TBC
Luofushan Joint-fir	*Gnetum luofuense*	m2	300	0	NA	2500	2800	NA
Butulang Canthium	*Canthium dicoccum*	No.	1	0	NA	4	5	NA
Lamb of Tartary	*Cibotium barometz*	No.	0	19		2	21	TBC

Site 3								
Small Persimmon	*Diospyros vaccinioides*	No.	3700	100	TBC	7450	11100	TBC
Luofushan Joint-fir	*Gnetum luofuense*	m2	750	0	NA	1900	2650	NA
Butulang Canthium	*Canthium dicoccum*	No.	0	0	NA	4	4	NA
Lamb of Tartary	*Cibotium barometz*	No.	101	7	E0004-1 ~ E0004-7	50	158	12/7/2019
Incense Tree	*Aquilaria sinensis*	No.	0	1	C0001	0	1	12/7/2019

Table 2. Conditions of the transplanted *Diospyros vaccinioides* at nursery in post-transplantation monitoring.

Date of monitoring	No.	Form	Health condition	Structural condition	Amenity value	Remarks
12 Nov-19	DV0001	Poor	Poor	Poor	Poor	*Syzygium buxifolium*
	DV0002	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0003	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0004	Fair	Fair	Fair	Fair	
	DV0005	Fair	Fair	Fair	Fair	Young leaves observed
	DV0006	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0007	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0008	Fair	Fair	Fair	Fair	Young leaves observed
	DV0009	Poor	Poor	Poor	Poor	Dead (certified on 12 Nov 2019)
	DV0010	Fair	Fair	Fair	Fair	Young leaves observed
	DV0011	Fair	Fair	Fair	Fair	Young leaves observed
	DV0012	Good	Good	Fair	Good	
	DV0013	Fair	Fair	Fair	Fair	
	DV0014	Fair	Fair	Fair	Fair	
	DV0015	Fair	Fair	Fair	Fair	Young leaves observed
	DV0016	Fair	Fair	Fair	Fair	Young leaves observed
	DV0017	Poor	Poor	Poor	Poor	Dead (certified on 12 Nov 2019)
	DV0018	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0019	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0020	Fair	Fair	Fair	Fair	
	DV0021	Fair	Fair	Fair	Fair	
	DV0022	Fair	Fair	Fair	Fair	
	DV0023	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0024	Fair	Fair	Fair	Fair	
	DV0025	Fair	Fair	Fair	Fair	
	DV0026	Fair	Fair	Fair	Fair	
	DV0027	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0028	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0029	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0030	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0031	Poor	Poor	Poor	Poor	Dead (certified on 12 Nov 2019)
	DV0032	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0033	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0034	Fair	Fair	Fair	Fair	Young leaves observed
	DV0035	Fair	Fair	Fair	Fair	Young leaves observed
	DV0036	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated

	DV0037	Fair	Fair	Fair	Fair	
	DV0038	Poor	Poor	Poor	Poor	No fresh foliage; dehydrated
	DV0039	Good	Good	Fair	Good	
	DV0040	Fair	Fair	Fair	Fair	

Note:

Height, spread and DBH is not applicable for undersized tree, shrubs and herbs.

Table 3. Conditions of the transplanted plants at receptor sites in post-transplantation monitoring.

Date of monitoring	No.	**Form**	**Health condition**	**Structural condition**	**Amenity value**	**Remarks**	
20 Sept 19	C0001	Fair	Fair	Fair	Poor	Young leaves kept growing	Quarterly monitoring (next monitoring will be scheduled in Dec 2019)
	E0004-1	Fair	Fair	Fair	Fair		
	E0004-2	Fair	Fair	Fair	Fair		
	E0004-3	Fair	Fair	Fair	Fair		
	E0004-4	Fair	Fair	Fair	Fair		
	E0004-5	Fair	Fair	Fair	Fair		
	E0004-6	Fair	Fair	Fair	Fair	Some leaves drop	
	E0004-7	Fair	Fair	Fair	Fair		
1, 12 & 26 Nov-19	H0002	Fair	Poor	Fair	Fair	Yellow leaf observed	Monthly Monitoring

Note:

Height, spread and DBH is not applicable for undersized tree, shrubs and herbs.

APPENDIX 1

Photographic records of post-transplantation monitoring on plants of conservation importance transplanted at nursery

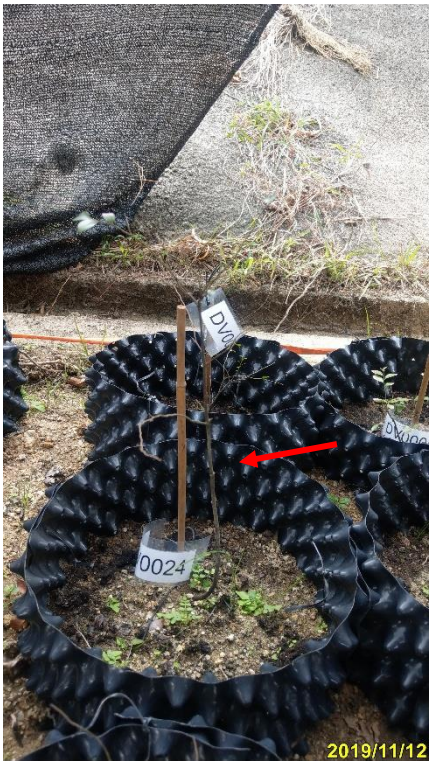
Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0001	DV0002
	
DV0003	DV0004

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0005	DV0006
	
DV0007	DV0008

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0009	DV0010
	
DV0011	DV0012

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0013	DV0014
	
DV0015	DV0016

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0017	DV0018
	
DV0019	DV0020

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0021	DV0022
	
DV0023	DV0024

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0025	DV0026
	
DV0027	DV0028

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0029	DV0030
	
DV0031	DV0032

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0033	DV0034
	
DV0035	DV0036

Post-transplantation monitoring at temporary nursery on 12 November 2019	
	
DV0037	DV0038
	
DV0039	DV0040

APPENDIX 2

Photographic records of post-transplantation monitoring

on plants of conservation importance transplanted at receptor site

Post-transplantation monitoring at receptor site on 1, 12 & 26 November 2019	
	
H0002	H0002
	
H0002	H0002
	
H0002	H0002

APPENDIX 3

Photographic records of bi-weekly ecological monitoring

On retained plants of conservation importance at Site 1

<table>
<tr><td colspan="2">Bi-weekly ecological monitoring at Site 1 on 1, 12 & 26 November 2019</td></tr>
<tr><td> 
</td><td> 
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<tr><td>H0001</td><td>H0001</td></tr>
<tr><td> 
</td><td> 
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<tr><td>H0001</td><td>H0001</td></tr>
<tr><td> 
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<tr><td>H0001</td><td></td></tr>
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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)

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					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

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					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

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					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

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					Des	C	O	Dec	
	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

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					Des	C	O	Dec	
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

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					Des	C	O	Dec	
		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

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					Des	C	O	Dec	
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

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					Des	C	O	Dec	
		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
					Des	C	O	Dec	
		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

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					Des	C	O	Dec	
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

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					Des	C	O	Dec	
		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

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					Des	C	O	Dec	
		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

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					Des	C	O	Dec	
		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

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					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							

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					Des	C	O	Dec	
		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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					Des	C	O	Dec	
		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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					Des	C	O	Dec	
	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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					Des	C	O	Dec	
		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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					Des	C	O	Dec	
		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	√	√			-

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					Des	C	O	Dec	
		• 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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					Des	C	O	Dec	
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	√	√			-

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	
		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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					Des	C	O	Dec	
	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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					Des	C	O	Dec	
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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					Des	C	O	Dec	
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		√			-

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					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		√			-

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					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		√			-

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					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		√	√		-

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					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	√	√			-

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					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

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					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	√	√	√		

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					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								

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					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

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					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.							

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					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							

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					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:

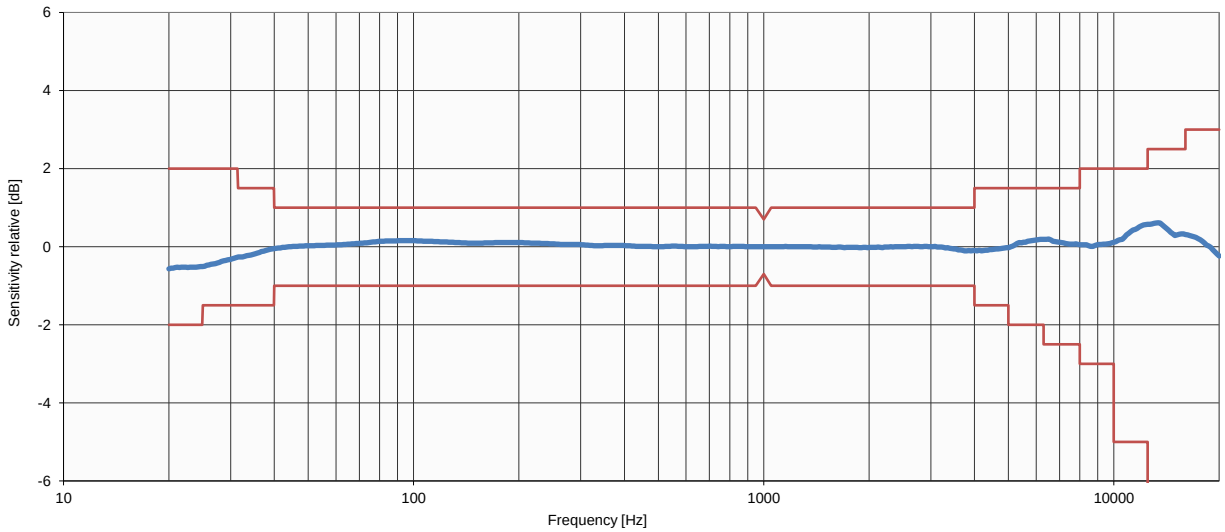
Stamp:

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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HOKLAS 028
CAL

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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Tel: (852) 2873 6860
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

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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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

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.

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

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---------

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

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, 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

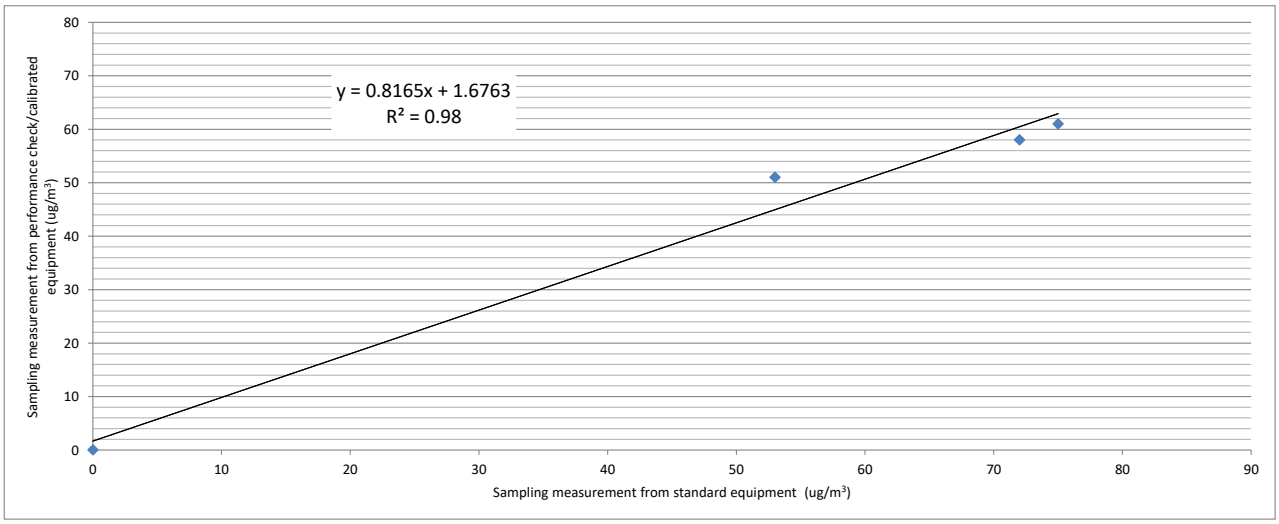
Portable Dust Meter Performance Check Results

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 Firmware Rev:**	*1.1.0*
Serial Number:	*R22586*	**81113**	*0.2.4*
Calibrated By:	*Kevin Ricks* AT21	**Cal. Date:**	*01/18/2019*
Quality Inspector:	AT25	**Date:**	JAN 2 1 2019
Calibration Hz/µg/m³:	*6.71*		

Final Test

Flow (2.0 L/M): Pass

Ambient T (C) *22*

RH, % *34*

Serial Communication: Pass

BT-645 Conc.: *336.53* Standard Conc: *338.79*

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 : R22586

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	1018	22	0	0
1	27/2/19 11:00	1016	24	72	58
2	27/2/19 08:45	1016	24	76	61
3	14/3/19 08:30	1018	22	104	74

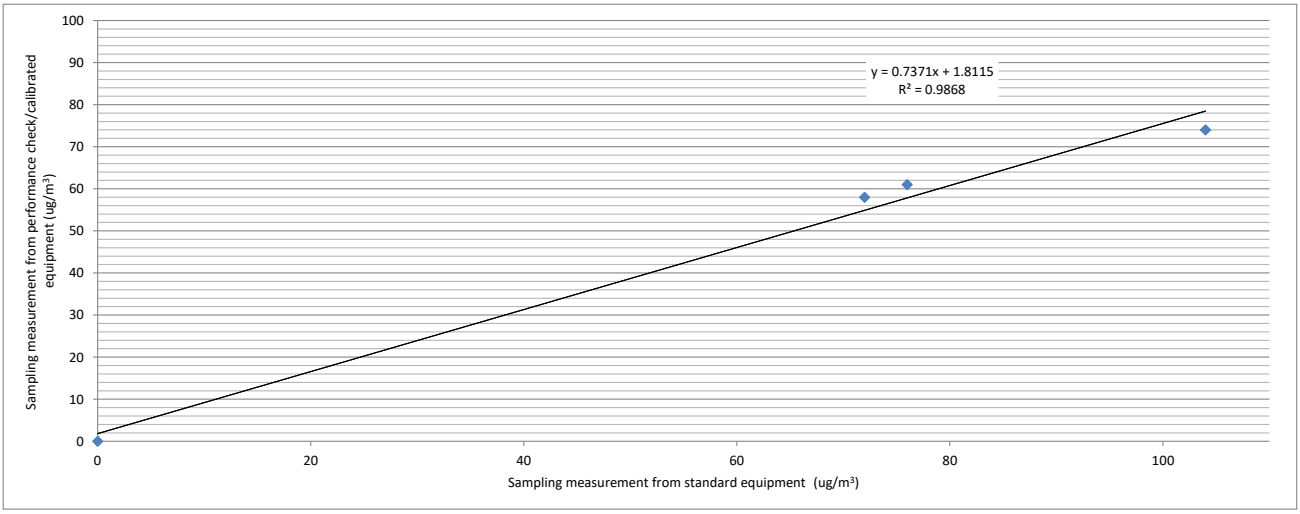
* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor) : 1.4000

Correlation Coefficient : 0.9934

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

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

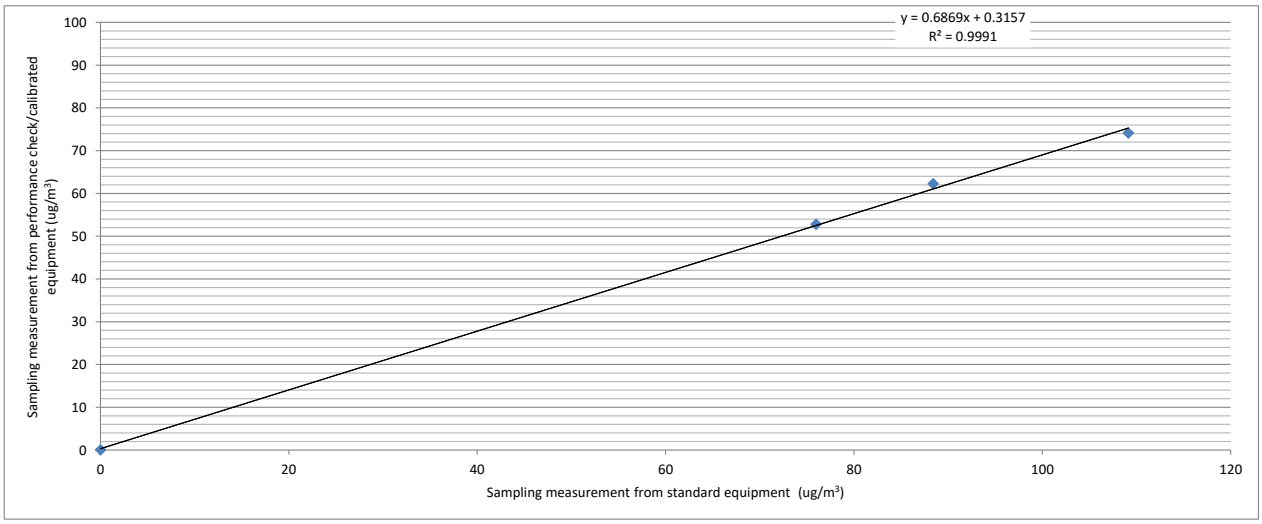
Portable Dust Meter Performance Check Results

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

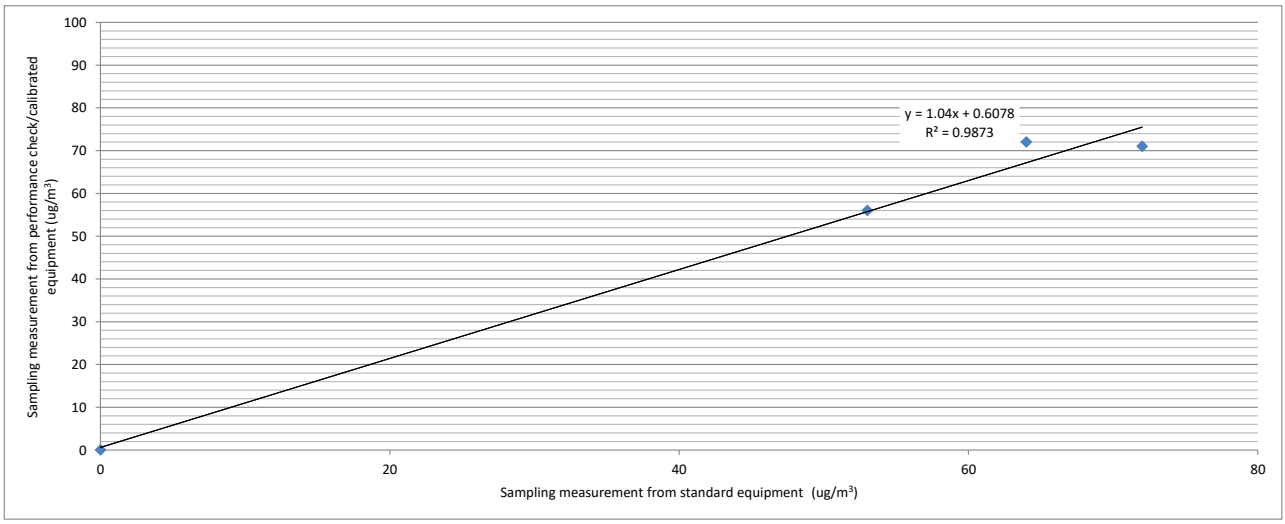
Portable Dust Meter Performance Check Results

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

Hal Technology

Certificate No.: 20190730-03

CERTIFICATE OF CALIBRATION AND TRACEABILITY

This certifies that the particle counter **HAL-HPC301 (S/N: 3011907012)** for the Customer _____ was produced and calibrated according to the US Standards: ASTM F649-01 "Standard Practice for Secondary Calibration of Airborne Particle Counter Using Comparison Procedures" and ASTM F328-98 "Standard practice for Calibration of Airborne Particle Counter Using Monodisperse Spherical Particles". The instruments and the standard particles used for calibrations are listed as following:

NO	Name	Type	S/N	Calibration
1	Standard Particles	299nm±6nm	3300-022 Lot# 24932	NIST
2	Standard Particles	498nm±5nm	3500-020 Lot# 34605	NIST
3	Standard Particles	707nm±6nm	3700-018 Lot# 35148	NIST
4	Standard Particles	0.993um±0.021um	4009-022 Lot# 25628	NIST
5	Standard Particles	2.001um±0.025um	4202-024 Lot# 25754	NIST
6	Standard Particles	5.0um±0.3um	DC-05-013 Lot# 34739	NIST
7	Flowmeter	4140	41400928015	TSI
8	Oscilloscope	V-1560/100MHz	6103147	Tektronics
9	Multi-channel Signal Analyzer	MCSA-16K	4401	CITMT

Note: ASTM — American Society for Testing and Materials
NIST — National Institute of Standards and Technology

Zero Count Test: Passed

We would like to certify that all the materials, component, and workmanship used in manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by Hal Technology and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications according to required specifications and standard practice per ANSI/NCSL Z540 at the time of testing.

Test Conditions: **Flow Rate** 2.85 L/Min **Temperature** 23 °C **Humidity** 47 %RH

Signatory _____ **Cal Date** 7-30-2019 **Due Date** 7-30-2020

On behalf of HAL Technology, LLC

Hal Technology, LLC, 7970 Cherry Avenue, Suite 303, Fontana, CA 92336 USA
Phone/Fax: (855) GET-HALTECH or (855) 438-4258 (toll-free) Email: services@haltechnologies.com

Lam Environmental Services Limited

Portable Dust Meter Performance Check Record

Portable Dust Meter

Type	:	Portable Dust Meter
Manufacturer	:	Hal Technology
Model Number	:	HAL-HPC301
Serial Number	:	3011907012
Performance Check Date	:	29-Aug-19

Standard Equipment

Type	:	High Volume Sampler
Manufacturer	:	TISCH
Model Number	:	TE-5170
Equipment Number	:	HVS018
Last Calibration Date	:	1-Aug-19

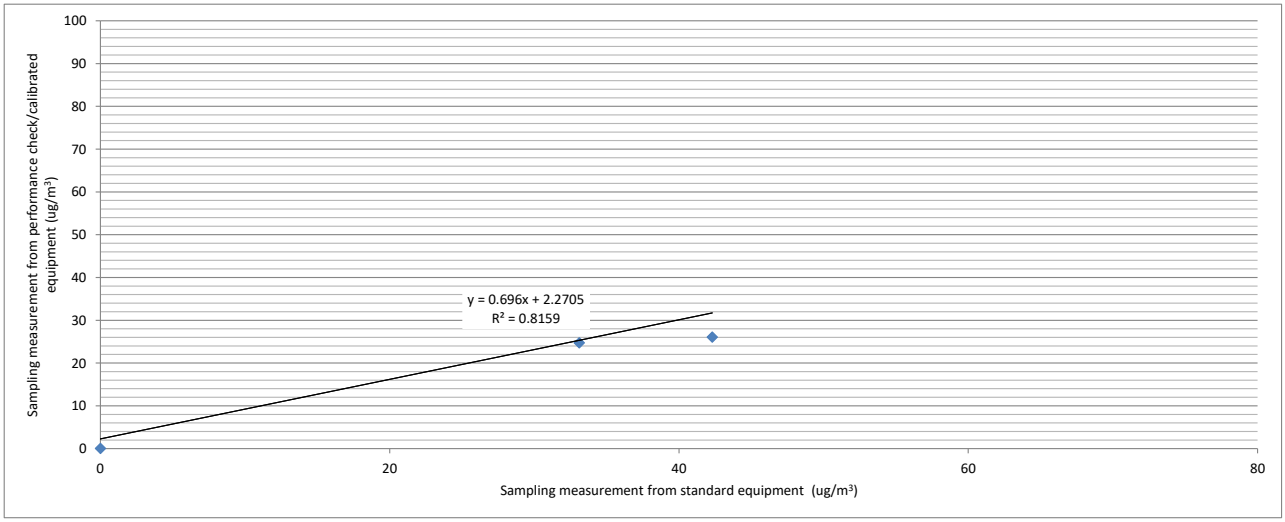
Portable Dust Meter Performance Check Results

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	29/8/2019 08:00	1002	29	0	0
1	29/8/2019 09:23	1002	29	30	32
2	29/8/2019 10:24	1002	29	42	26
3	29/8/2019 11:25	1002	29	33	25

* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor)	:	1.2000
Correlation Coefficient	:	0.9033
Validity of Performance Check / Calibration Record	:	28/8/2020



Operator:	Henry Lau	Date:	29-Aug-19
Checked by:	James Chu	Date:	30-Aug-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#** *W15448*

Date of Calibration *8/5/2019* **Sensor #** *16438*

Darleen Best AT

Calibration Technician

AT25

Quality Check

Temperature *24* °C **Relative Humidity** *43* %

Test Procedure: *Aerocet 831-6100*

PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration
0.3	Pass	± 10%	196947	04/30/2021
0.5	Pass	± 10%	180556	02/28/2020
1.0	Pass	± 10%	193291	1/31/2021
2.5	Pass	± 10%	181944	3/31/2020
4.0	Pass	± 10%	REF	NA
5.0	Pass	± 10%	205967	12/31/2021
7.0	Pass	± 10%	REF	NA
10.0	Pass	± 10%	187001	07/31/2020

Standards	Model	SN	Cal Due
Particle Counter	GT-526	M1760	11/14/2019
Dry Cal	Defender 510	143545	12/18/2019
DMM	287	40900121	2/4/2020
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	:	Metone AEROCET 831
Model Number	:	831
Serial Number	:	W15448
Performance Check Date	:	30-Sep-19

Standard Equipment

Type	:	High Volume Sampler
Manufacturer	:	TISCH
Model Number	:	TE-5170
Equipment Number	:	HVS006
Last Calibration Date	:	16-Sep-19

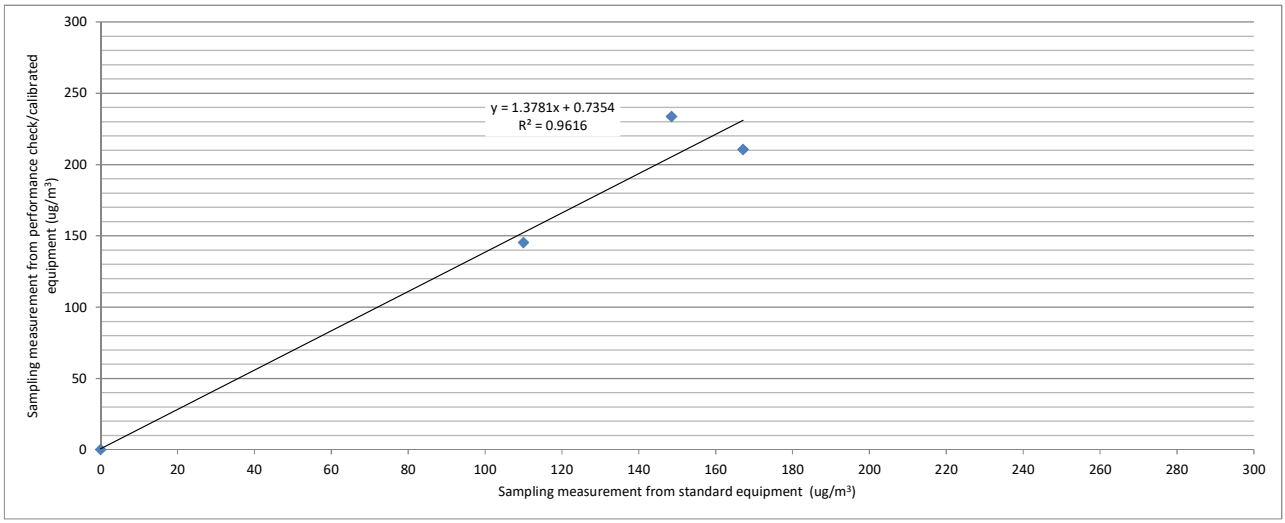
Portable Dust Meter Performance Check Results

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	29/9/2019 08:00	1013	29	0	0
1	30/9/2019 08:16	1009	30	149	234
2	30/9/2019 09:17	1009	30	110	145
3	30/9/2019 10:18	1009	30	167	211

* Filter paper weighting was conducted by HOKLAS accredited laboratory.

Linear Regression of Y on X

Slope (K- factor)	:	0.7000
Correlation Coefficient	:	0.9806
Validity of Performance Check / Calibration Record	:	29/9/2020



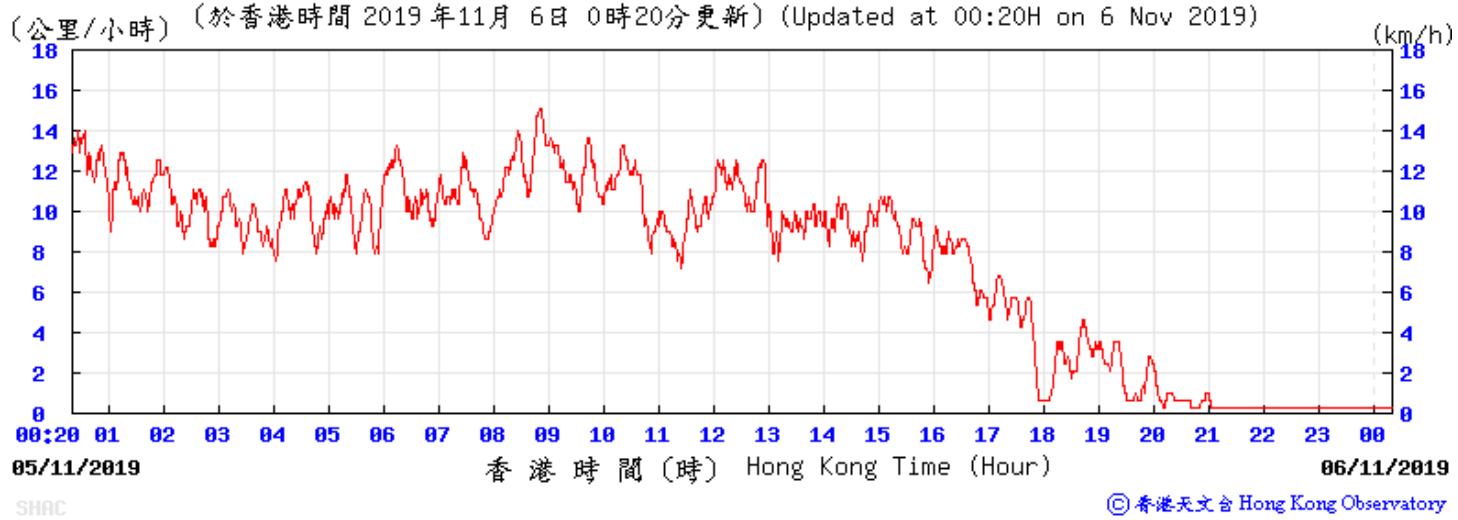
Operator: Henry Lau Date: 30-Sep-19

Checked by: James Chu Date: 1-Oct-19

Appendix 4.3

Wind data extracted from Sha Tin HKO Automatic Weather Station

Wind Speed:



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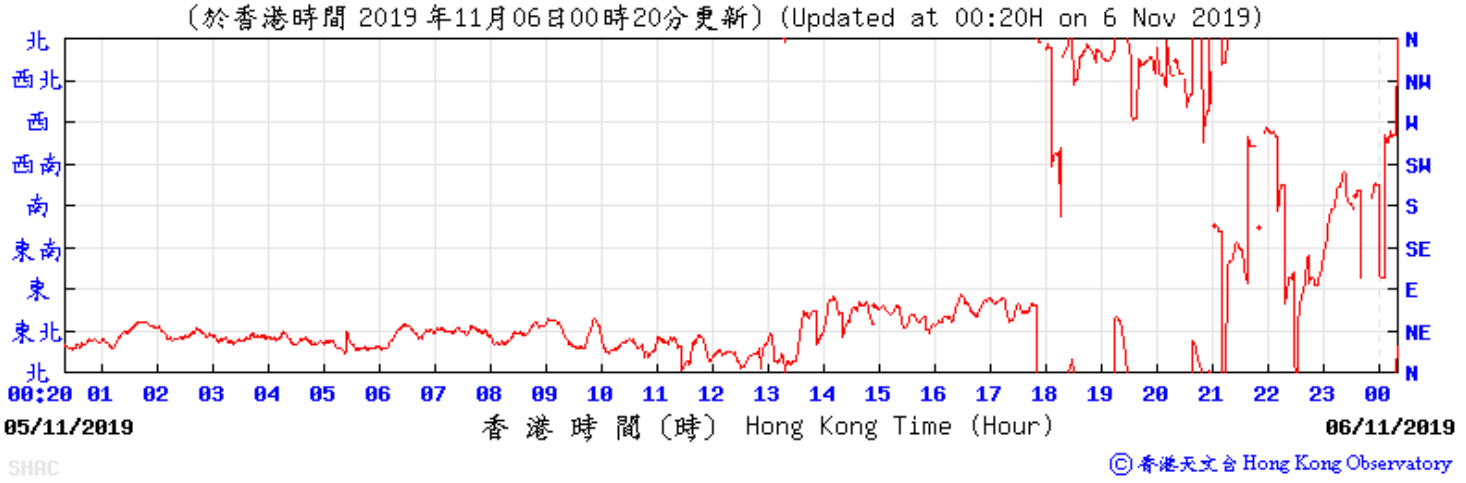

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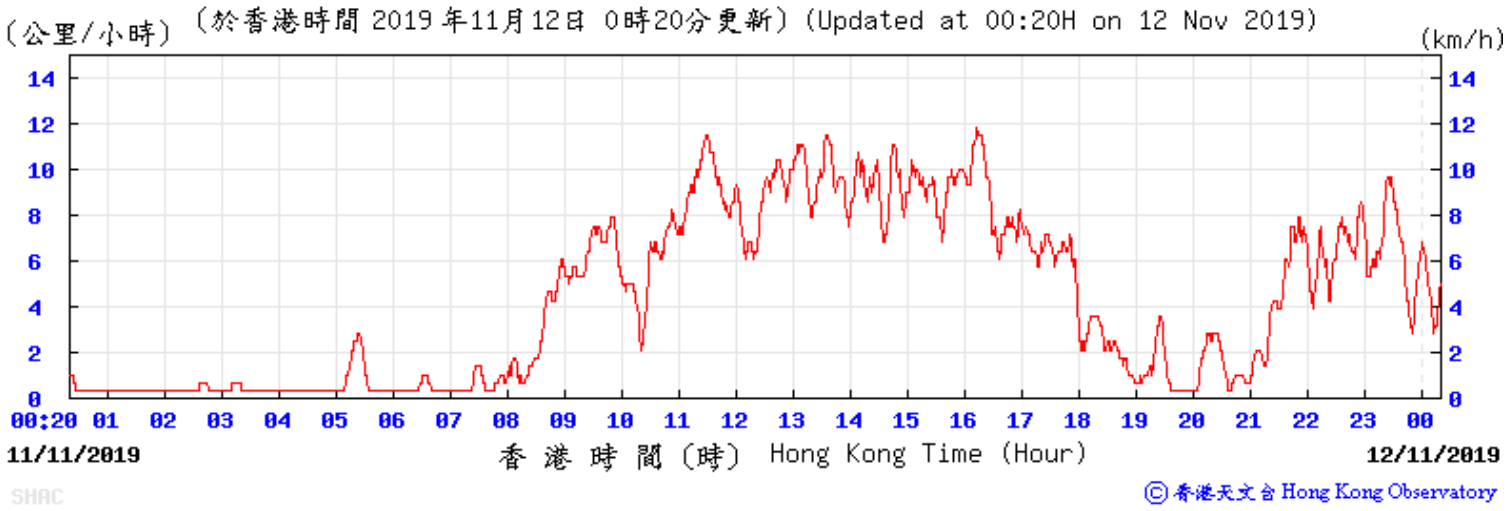

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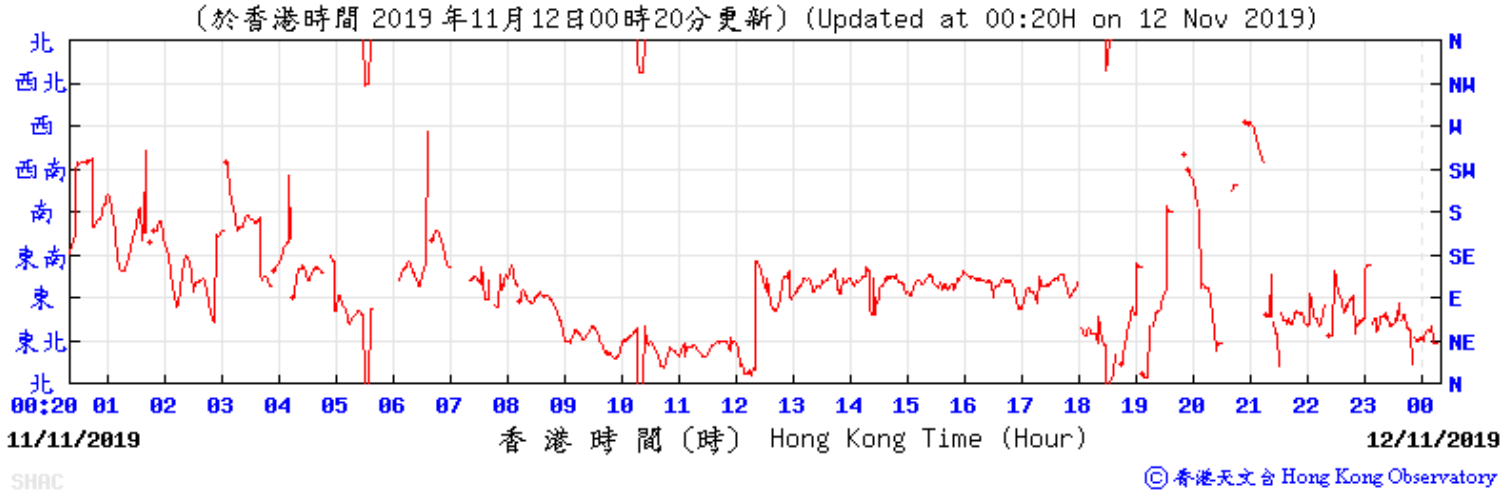

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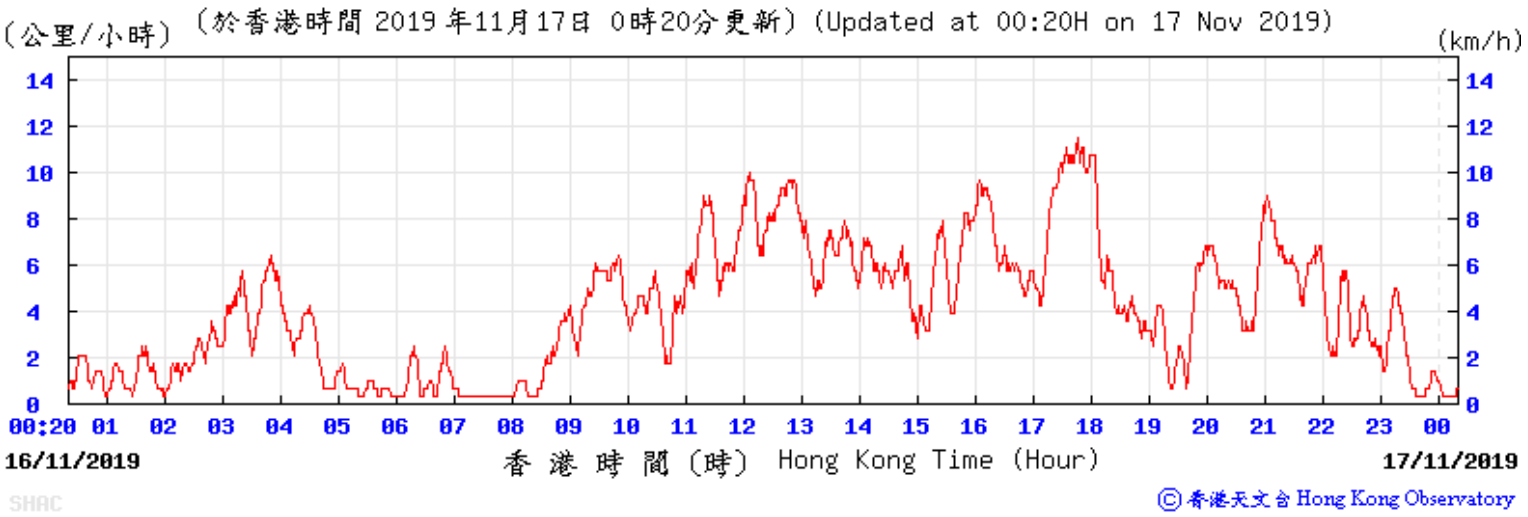

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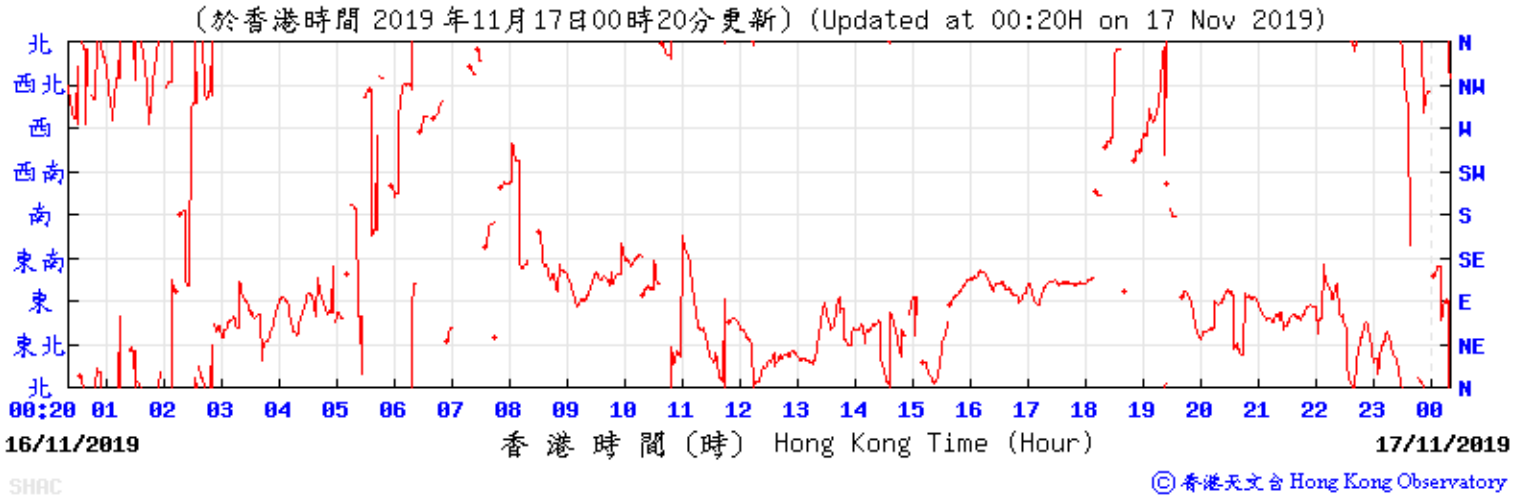

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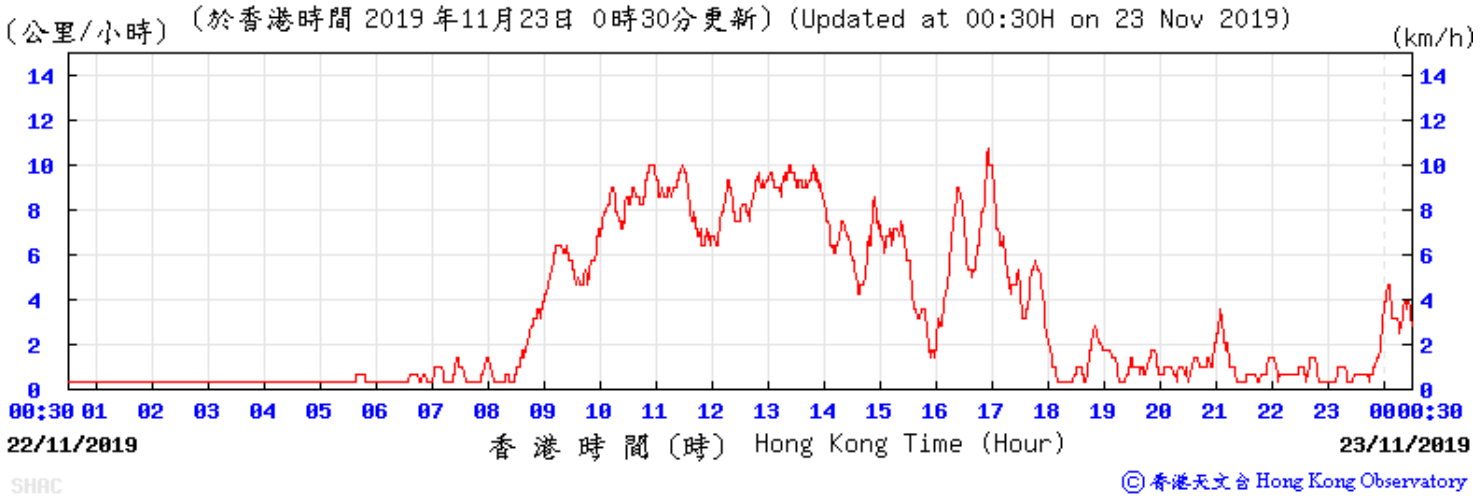
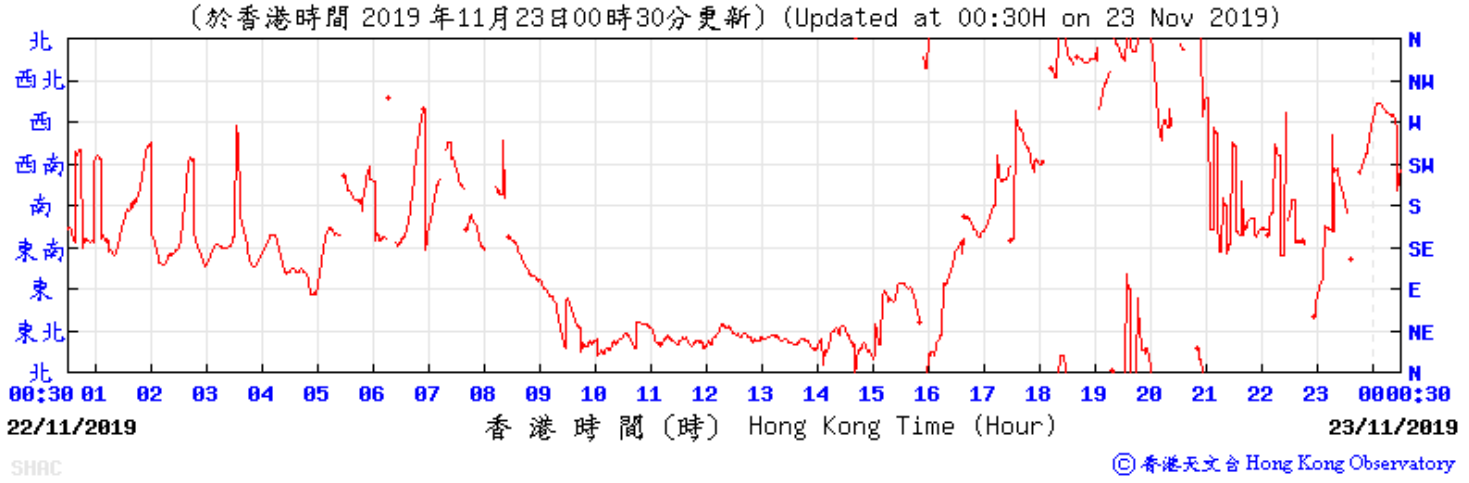
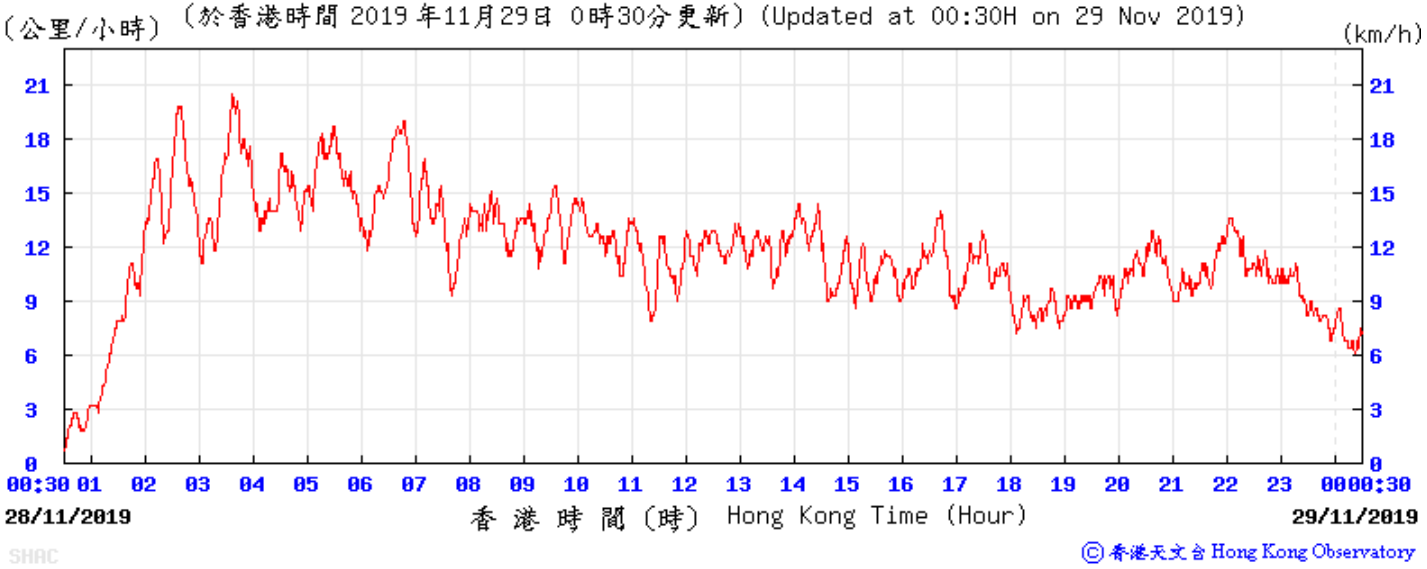


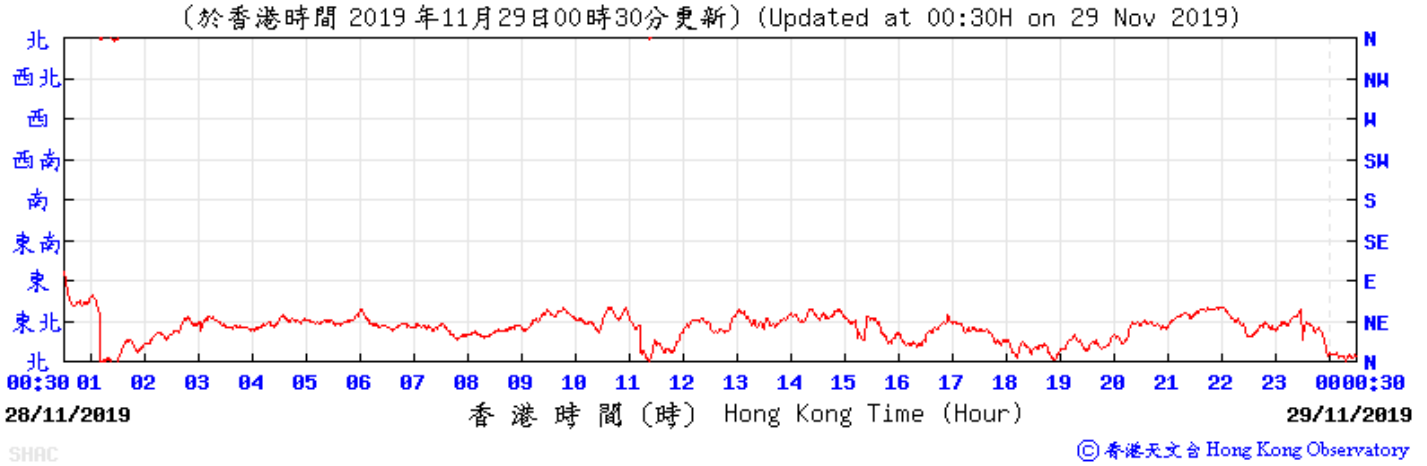
Wind Direction:



Wind Speed:



Wind Direction:



香港天文台
HONG KONG OBSERVATORY

Daily Extract of Meteorological Observations , November 2019

Back Year 2019 Month 11 Go

Day	Hong Kong Observatory								King's Park	Waglan Island^	
	Mean Pressure (hPa)	Air Temperature			Mean Dew Point (deg. C)	Mean Relative Humidity (%)	Mean Amount of Cloud (%)	Total Rainfall (mm)	Total Bright Sunshine (hours)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
		Absolute Daily Max (deg. C)	Mean (deg. C)	Absolute Daily Min (deg. C)							
01	1015.7	29.3	25.7	24.0	20.4	73	49	0.0	9.7	***	***
02	1014.6	28.2	25.3	23.9	20.3	74	31	0.0	9.6	***	***
03	1013.9	28.8	25.7	23.8	20.7	74	48	0.0	9.3	***	***
04	1014.5	28.6	25.0	22.8	15.5	56	28	0.0	9.5	***	***
05	1013.4	27.4	23.9	21.6	14.5	56	11	0.0	10.2	***	***
06	1012.0	26.5	23.8	22.3	17.7	69	47	0.0	9.0	***	***
07	1013.7	26.9	23.8	21.4	14.3	56	32	0.0	10.1	***	***
08	1017.0	26.8	23.3	20.8	12.5	51	21	0.0	10.2	***	***
09	1017.6	26.0	22.7	20.4	15.0	62	33	0.0	10.1	***	***
10	1016.1	26.7	22.7	20.6	16.7	70	16	0.0	10.1	***	***
11	1014.7	26.8	23.1	20.9	17.7	72	32	0.0	10.2	***	***
12	1016.4	25.2	23.3	22.3	19.2	78	70	0.0	4.6	***	***
13	1018.3	26.8	24.1	22.3	19.4	75	39	0.0	9.0	***	***
14	1018.9	25.9	23.0	21.1	15.7	64	42	0.0	8.6	***	***
15	1016.9	25.7	22.8	21.5	16.9	70	29	0.0	9.8	***	***
16	1015.7	25.6	22.5	21.5	18.0	76	33	0.0	6.8	***	***
17	1015.0	26.5	23.4	21.4	19.5	79	18	0.0	9.8	***	***
18	1015.7	28.4	24.3	20.6	18.1	69	18	0.0	9.9	***	***
19	1018.4	22.7	20.5	17.9	13.3	63	49	0.0	4.3	***	***
20	1019.5	24.0	21.1	19.4	14.6	66	56	0.0	6.3	***	***
21	1018.9	25.2	21.7	19.2	15.0	66	16	Trace	10.0	***	***
22	1017.1	26.3	22.3	19.6	15.3	66	14	0.0	10.0	***	***
23	1016.9	26.9	23.3	21.4	19.2	78	44	0.0	8.7	***	***
24	1017.5	27.4	23.4	21.1	19.1	77	24	0.0	9.9	***	***
25	1019.6	26.6	23.8	22.4	18.7	73	58	0.0	8.2	***	***

26	1020.7	23.4	22.0	21.0	17.5	76	88	Trace	0.9	***	***
27	1020.0	24.8	22.3	21.1	18.2	78	53	0.0	9.0	***	***

30	1020.4	23.8	20.4	17.9	14.9	71	34	0.0	9.8	***	***
Mean/Total	1017.1	26.1	23.0	21.0	16.8	69	37	Trace	263.0	***	***
Normal[?]	1017.7	24.1	21.8	19.8	16.0	71	54	37.6	180.1	080	27.0

*** *unavailable*
^ *Information of wind direction and wind speed for Waglan Island are based on automatic weather station data since January 1989*
Trace means rainfall less than 0.05 mm
? 1981-2010 Climatological Normal, unless otherwise specified

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
November 2019

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

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
December 2019

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

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)
5-Nov-19	Fine	13:00	61
5-Nov-19	Fine	14:01	62
5-Nov-19	Fine	15:02	59
11-Nov-19	Fine	13:00	37
11-Nov-19	Fine	14:01	37
11-Nov-19	Fine	15:02	33
16-Nov-19	Fine	08:06	53
16-Nov-19	Fine	09:07	48
16-Nov-19	Fine	10:08	44
22-Nov-19	Fine	08:36	48
22-Nov-19	Fine	09:37	42
22-Nov-19	Fine	10:38	36
28-Nov-19	Fine	08:49	20
28-Nov-19	Fine	09:50	20
28-Nov-19	Fine	10:51	20

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)
5-Nov-19	Fine	13:00	66
5-Nov-19	Fine	14:01	60
5-Nov-19	Fine	15:02	64
11-Nov-19	Fine	13:00	65
11-Nov-19	Fine	14:01	60
11-Nov-19	Fine	15:02	61
16-Nov-19	Fine	08:58	60
16-Nov-19	Fine	09:59	49
16-Nov-19	Fine	11:00	49
22-Nov-19	Fine	09:25	33
22-Nov-19	Fine	10:26	28
22-Nov-19	Fine	13:00	19
28-Nov-19	Fine	09:08	22
28-Nov-19	Fine	10:09	29
28-Nov-19	Fine	13:00	47

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

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

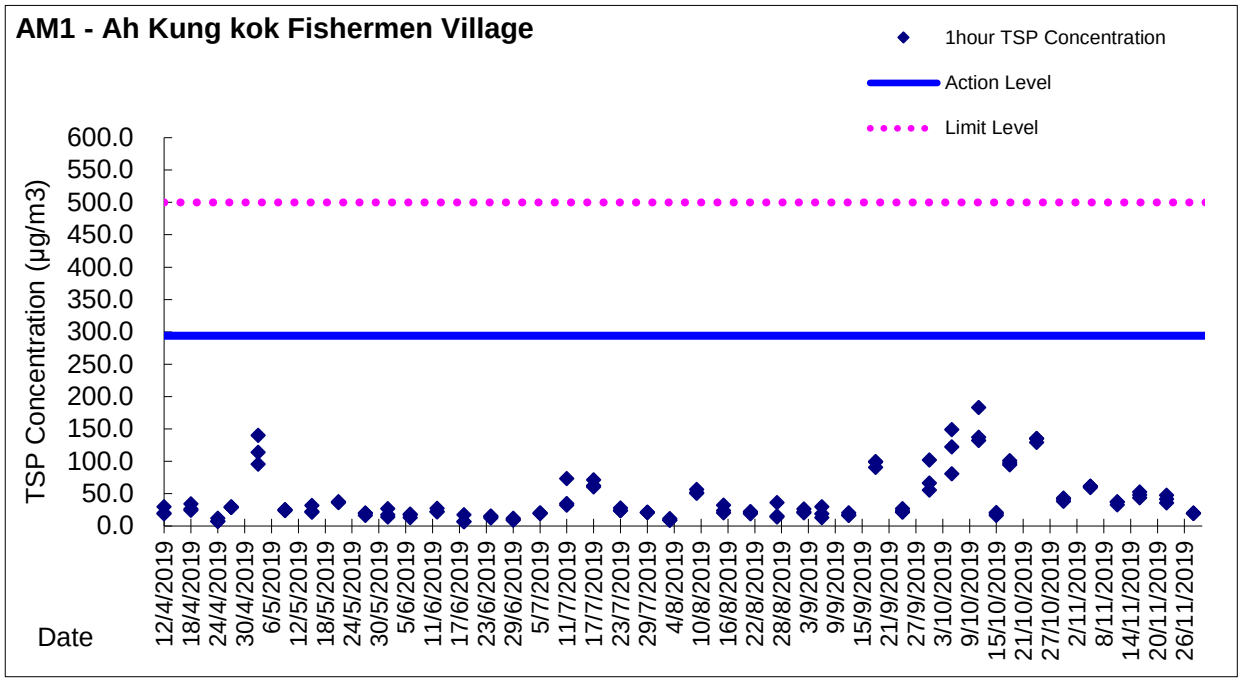
Date	Weather Condition	Time	Mass Concentration (μg/m3)
5-Nov-19	Fine	13:00	32
5-Nov-19	Fine	14:01	34
5-Nov-19	Fine	15:02	34
11-Nov-19	Fine	13:00	24
11-Nov-19	Fine	14:01	26
11-Nov-19	Fine	15:01	25
16-Nov-19	Fine	08:19	62
16-Nov-19	Fine	09:20	58
16-Nov-19	Fine	10:21	51
22-Nov-19	Fine	08:25	40
22-Nov-19	Fine	09:26	33
22-Nov-19	Fine	10:27	31
28-Nov-19	Fine	08:54	18
28-Nov-19	Fine	09:55	20
28-Nov-19	Fine	10:56	18

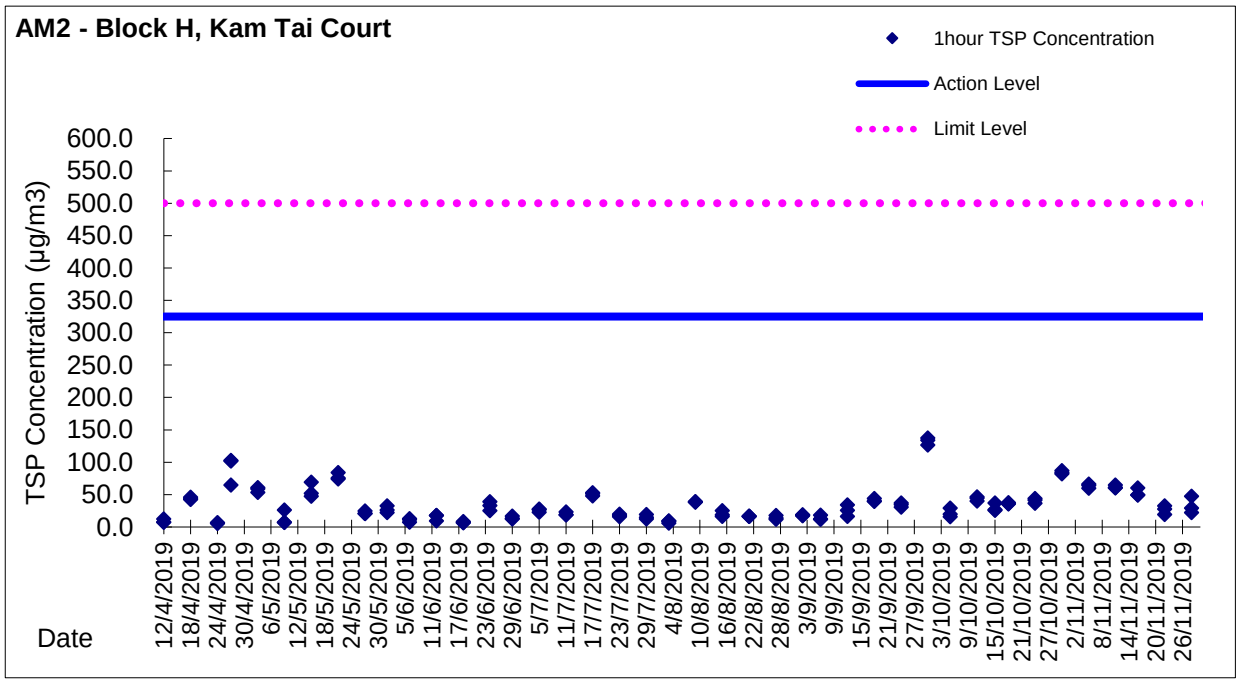
Report on 1-hour TSP monitoring at AM5 - The NAAC Harmony Manor

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

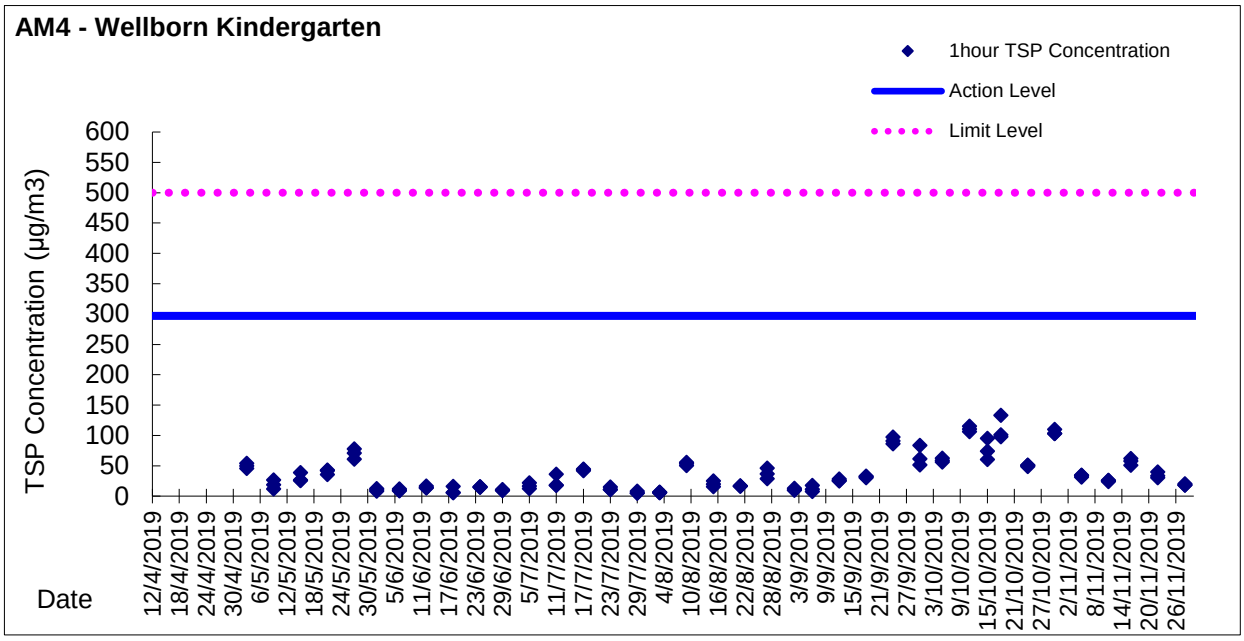
Date	Weather Condition	Time	Mass Concentration (μg/m3)
5-Nov-19	Fine	13:00	43
5-Nov-19	Fine	14:01	47
5-Nov-19	Fine	15:02	49
11-Nov-19	Fine	13:00	35
11-Nov-19	Fine	14:01	34
11-Nov-19	Fine	15:02	35
16-Nov-19	Fine	08:00	69
16-Nov-19	Fine	09:01	68
16-Nov-19	Fine	10:02	42
22-Nov-19	Fine	08:34	26
22-Nov-19	Fine	09:35	23
22-Nov-19	Fine	10:36	20
28-Nov-19	Fine	09:30	11
28-Nov-19	Fine	10:31	13
28-Nov-19	Fine	13:00	12

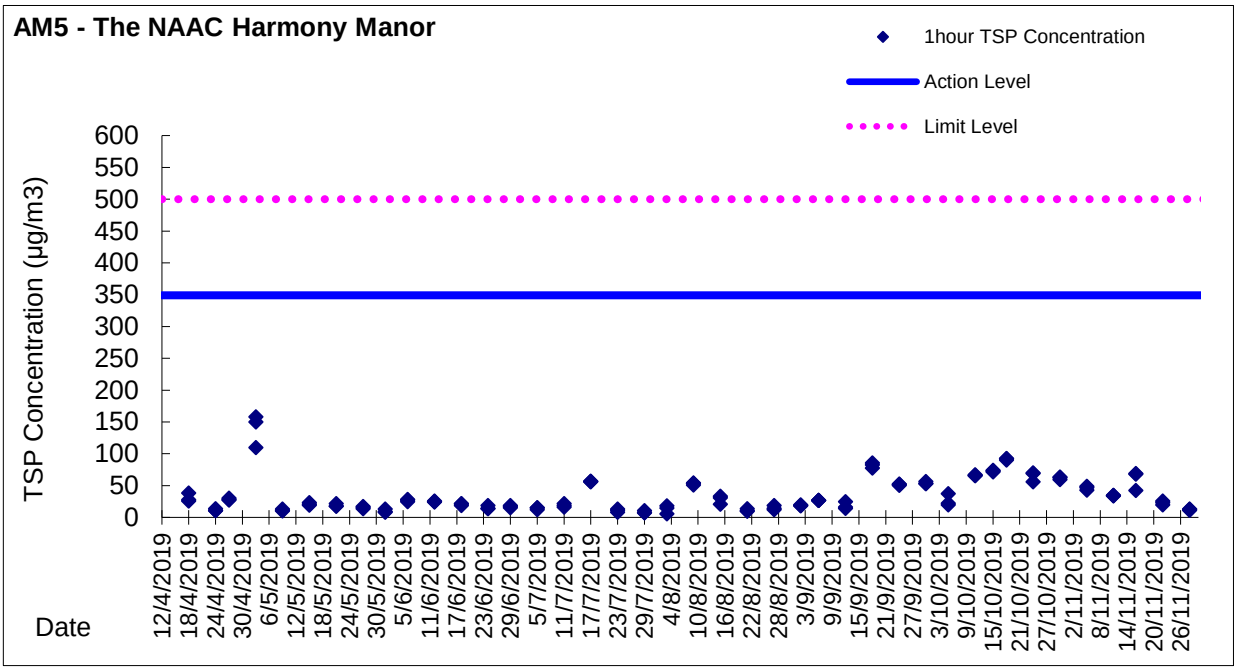
Graphic Presentation of TSP Result





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			Limit Level
				Leq	L10	L90	Leq
				Unit: dB(A), (30min)			
05/11/2019	13:30	Fine	0.2	69.5	71.0	57.0	70
11/11/2019	13:00	Fine	0.0	52.4	54.5	47.0	70
22/11/2019	11:10	Fine	0.0	60.4	62.0	57.5	70
28/11/2019	13:00	Fine	0.0	50.2	55.0	43.5	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			Limit Level
				Leq	L10	L90	Leq
				Unit: dB(A), (30min)			
04/11/2019	08:55	Fine	0.0	61.5	63.0	58.5	65
11/11/2019	13:45	Fine	0.1	61.9	64.0	57.5	70
22/11/2019	09:45	Fine	0.2	62.8	65.5	58.5	70
28/11/2019	15:25	Fine	0.3	63.4	64.3	60.0	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			Limit Level
				Leq	L10	L90	Leq
				Unit: dB(A), (30min)			
05/11/2019	16:10	Fine	0.0	65.8	69.5	57.5	75
11/11/2019	15:15	Fine	0.0	63.8	66.5	56.0	75
22/11/2019	8:45	Fine	0.0	64.7	67.5	60.5	75
28/11/2019	14:10	Fine	0.0	61.3	63.0	58.2	75

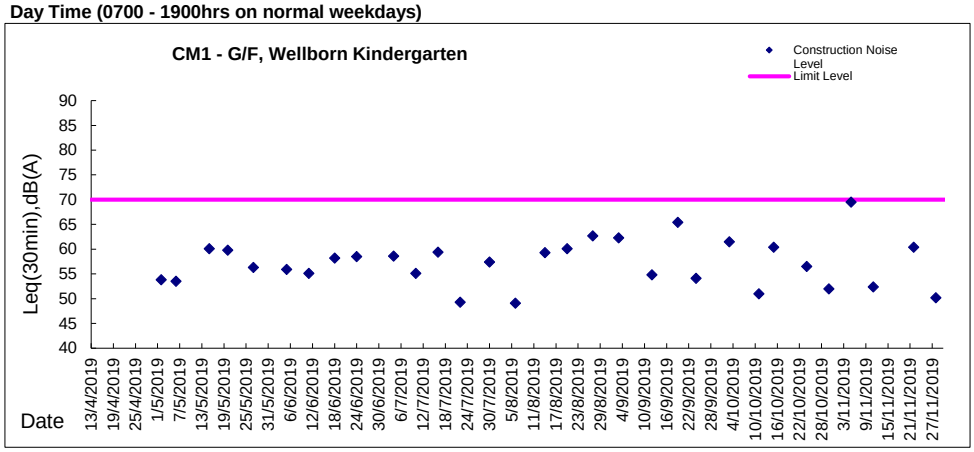
Location: CM5 - R/F, The Neighbourhood Advice-Action Council Harmony Manor

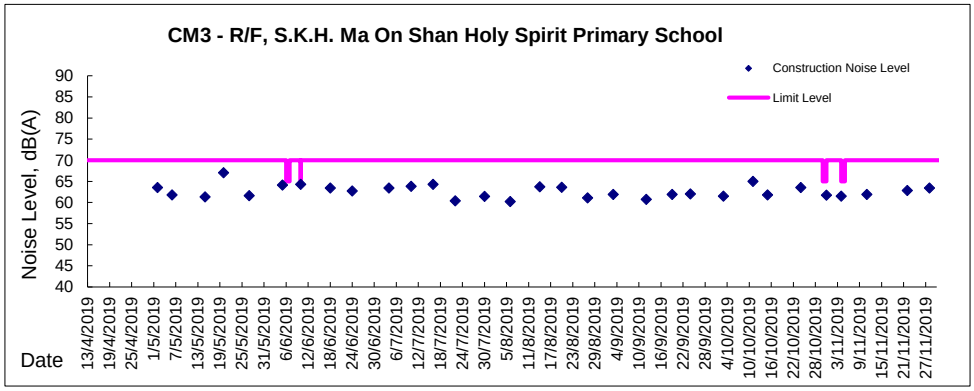
Date	Time	Weather	Wind Speed (m/s)	Measurement Noise Level			Limit Level
				Leq	L10	L90	Leq
				Unit: dB(A), (30min)			
05/11/2019	15:30	Fine	0.3	59.6	62.0	56.0	75
11/11/2019	14:30	Fine	0.2	56.3	59.5	50.0	75
22/11/2019	14:30	Fine	0.1	61.4	64.0	55.5	75
28/11/2019	14:50	Fine	0.0	68.6	72.5	53.6	75

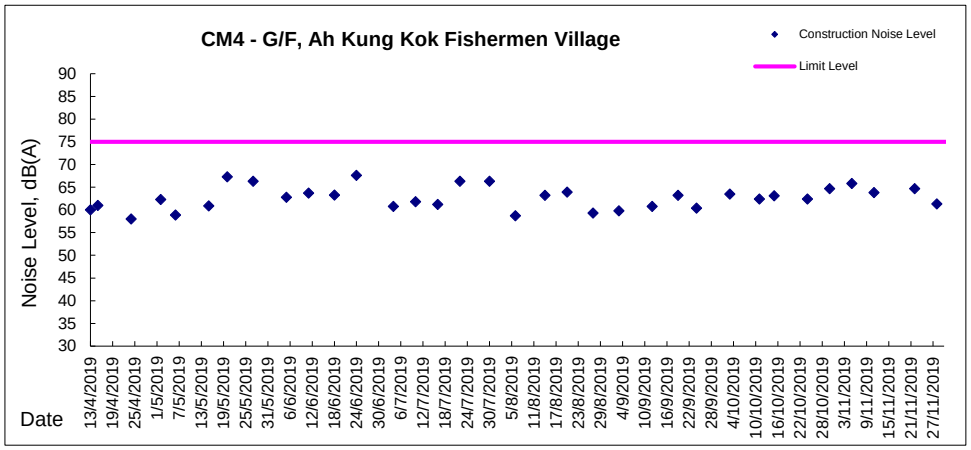
* Free field correction (Additional 3dB(A)) was made on CM1&CM4 measurement result

Graphic Presentation of Noise Monitoring Result

Day Time (0700 - 1900hrs on normal weekdays)

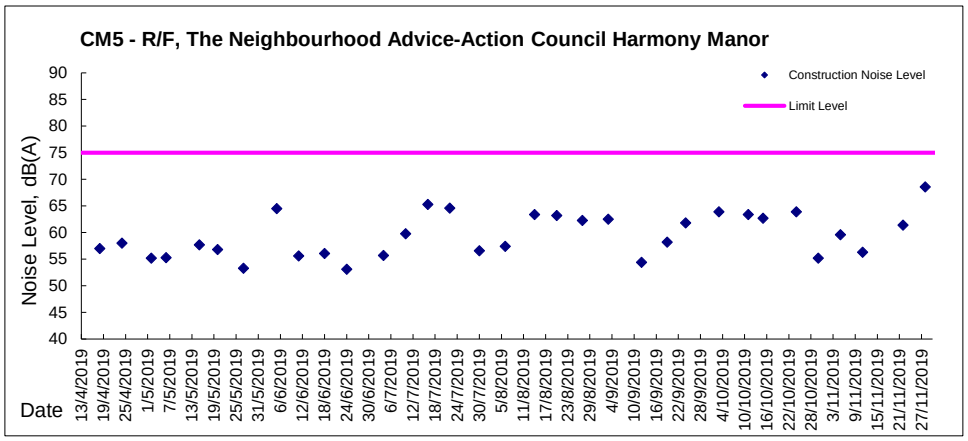






Graphic Presentation of Noise Monitoring Result

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 November 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 tonne)
Feb-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.00
Mar-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.00
Apr-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.00
May-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	5.20
Jun-19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	41.18
Jul-19	0.055	0.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	89.55
Sub-total	0.055	0.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	135.93
Aug-19	0.121	0.054	0.000	0.000	0.067	0.000	0.000	0.000	0.000	10.98
Sep-19	0.049	0.000	0.000	0.000	0.049	0.000	0.000	0.000	0.000	60.49
Oct-19	1.014	0.000	0.000	0.000	1.014	0.000	0.000	0.000	0.000	15.87
Nov-19	1.357	0.000	0.000	1.022	0.335	0.000	0.000	0.000	0.000	32.21
Total	2.596	0.109	0.000	1.022	1.465	0.000	0.000	0.000	0.000	255.48

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.

(5) Conversion factors for reporting purpose:

Excavated: rock = 2.0 tonnes/m^3, soil = 1.8 tonnes/m^3, broken concrete and bitumen = 2.4 tonnes/m^3, Slurry = 2.8 tonnes/m^3

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

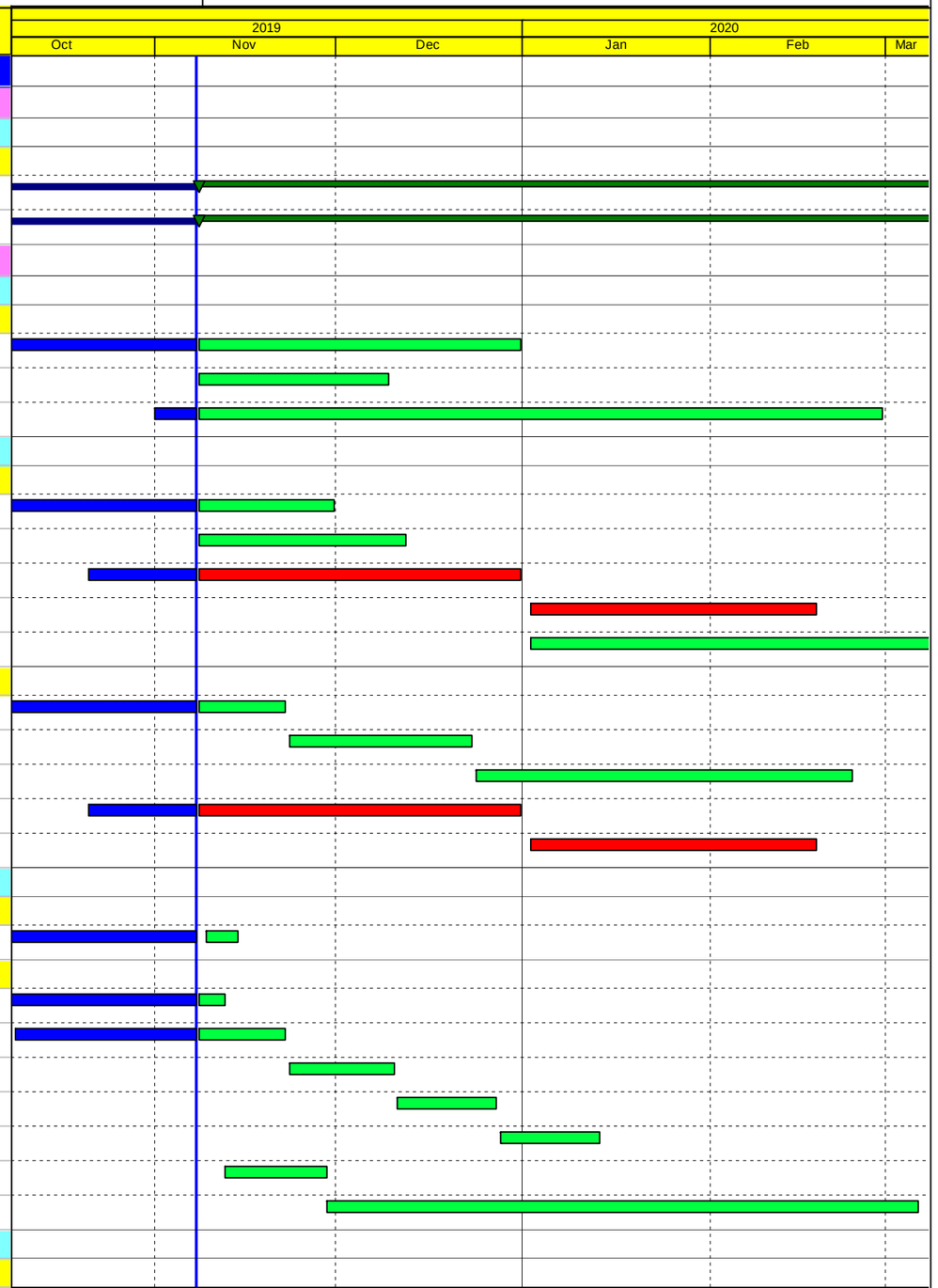
Environmental Complaints Log

Complaint Log No.	Date of Complaint	Received From and Received By	Location of Complainant	Nature of Complaint	Outcome	Status
190808	29 July 2019	DSD	Construction site area Portion 6	Exposed slope surface without any covering was observed at Portion 6	A public complaint regarding construction dust received by DSD on 29 July 2019 was subsequently referred to ET on 6 August 2019. The complainant reported that exposed slope surface without any covering at Portion 6. Based on the information provided by the Contractor, the concerned area was under slope cutting and filling works for temporary haul road construction. Based on the observation on 6 August 2019 and weekly site inspection on 7 August 2019, the concerned slope was observed covered with the tarpaulin sheets to alleviate the potential dust impact to the surroundings. Upon review on the monitoring data, no exceedances were recorded at the air quality monitoring stations AM2 - Block H, Kam Tai Court and AM4 - Wellborn Kindergarten (located nearest to the concerned slope) during the 1hr TSP monitoring on 23 July 2019 and 29 July 2019 respectively. Follow up site inspection was conducted by the Environmental Team on 07 August 2019 and it was observed that the slope at Portion 6 was properly covered. Nevertheless, in view of the public concern, the Contractor of DC/2018/05 was reminded to enhance the dust suppression measure by providing adequate watering to any exposed surface during cutting slope and fill works to avoid potential dust impact to the surroundings.	Interim investigation report was issue on 16 August 2019

Appendix 9.1

Construction Programme of Individual Contracts

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish
Relocation of Sha Tin Sewage Treatment Works to Caverns - Site Preparation & Access Tunnel							
Preliminary Works							
Preliminary Works							
Preliminary Works							
A11980	Preservation and Protection of Existing Trees	836	28-Feb-19 A	28-Dec-21	0	28-Dec-21	28-Dec-21
A12340	Establishment Works to landscape softworks (Section 7)	719	23-Jul-19 A	28-Dec-21	0	23-Jul-19	28-Dec-21
Access Road to Main Portal Area							
Tree Treatment							
Tree Treatment							
A11032	Tree transplant (Portion 4)	70	09-Sep-19 A	31-Dec-19	115	01-Apr-20	28-May-20
A15290	Tree felling & protection (Mui Tsz Lam Road realigment)	27	08-Nov-19 A	09-Dec-19	534	02-Sep-21	06-Oct-21
A15300	Tree transplant (Mui Tsz Lam Road realigment)	96	01-Nov-19 A	29-Feb-20	472	21-Jun-21	06-Oct-21
Steel Bridge							
North Tower of Steel Bridge							
A10290	Footings at North Ramp (5 nos)	57	03-Oct-19 A	30-Nov-19	47	06-Jan-20	04-Feb-20
A10293	Abutment (North Ramp)	30	08-Nov-19	12-Dec-19	37	21-Dec-19	04-Feb-20
A10295	Steel Piers & deck fabrication (North Tower & Ramp)	60	21-Oct-19 A	31-Dec-19	3	12-Nov-19	04-Jan-20
A10300	Steel Piers & deck erection (North Tower)	35	02-Jan-20	18-Feb-20	3	06-Jan-20	21-Feb-20
A10303	Steel Piers & deck erection (North Ramp)	60	02-Jan-20	18-Mar-20	23	05-Feb-20	18-Apr-20
South Tower of Steel Bridge							
A10320	Piling (pre-bored H, 15no)	52	17-Sep-19 A	22-Nov-19	8	18-Nov-19	02-Dec-19
A10330	Pile test	26	23-Nov-19	23-Dec-19	8	03-Dec-19	04-Jan-20
A10340	Abutment (South Ramp)	45	24-Dec-19	24-Feb-20	15	14-Jan-20	12-Mar-20
A10345	Steel Piers & deck fabrication (South Tower & Ramp)	60	21-Oct-19 A	31-Dec-19	3	12-Nov-19	04-Jan-20
A10350	Steel Piers & deck erection (South Tower)	35	02-Jan-20	18-Feb-20	3	06-Jan-20	21-Feb-20
Noise Barrier							
Design							
A15020	Noise Barrier Design approval (NB1 & NB3)	119	09-Jul-19 A	14-Nov-19	605	06-Jul-21	11-Jul-21
NB1							
A10780	Excavation - NB1 (0-75m)	13	04-Oct-19 A	12-Nov-19	469	18-Jun-21	22-Jun-21
A10790	Footing & wall structure - NB1 (0-75m)	75	09-Oct-19 A	22-Nov-19	475	25-Jun-21	10-Jul-21
A10795	Backfill - NB1 (0-75m)	15	23-Nov-19	10-Dec-19	574	08-Nov-21	24-Nov-21
A10800	NB post installation - NB1 (0-75m)	13	11-Dec-19	27-Dec-19	574	25-Nov-21	09-Dec-21
A10810	NB panel installation - NB1 (0-75m)	13	28-Dec-19	13-Jan-20	574	10-Dec-21	24-Dec-21
A10830	Excavation - NB1 (75-150m)	15	12-Nov-19	29-Nov-19	469	23-Jun-21	10-Jul-21
A10840	Footing & wall structure - NB1 (75-150m)	75	29-Nov-19	06-Mar-20	469	12-Jul-21	08-Oct-21
Water Mains Diversion							
Preliminary Works							



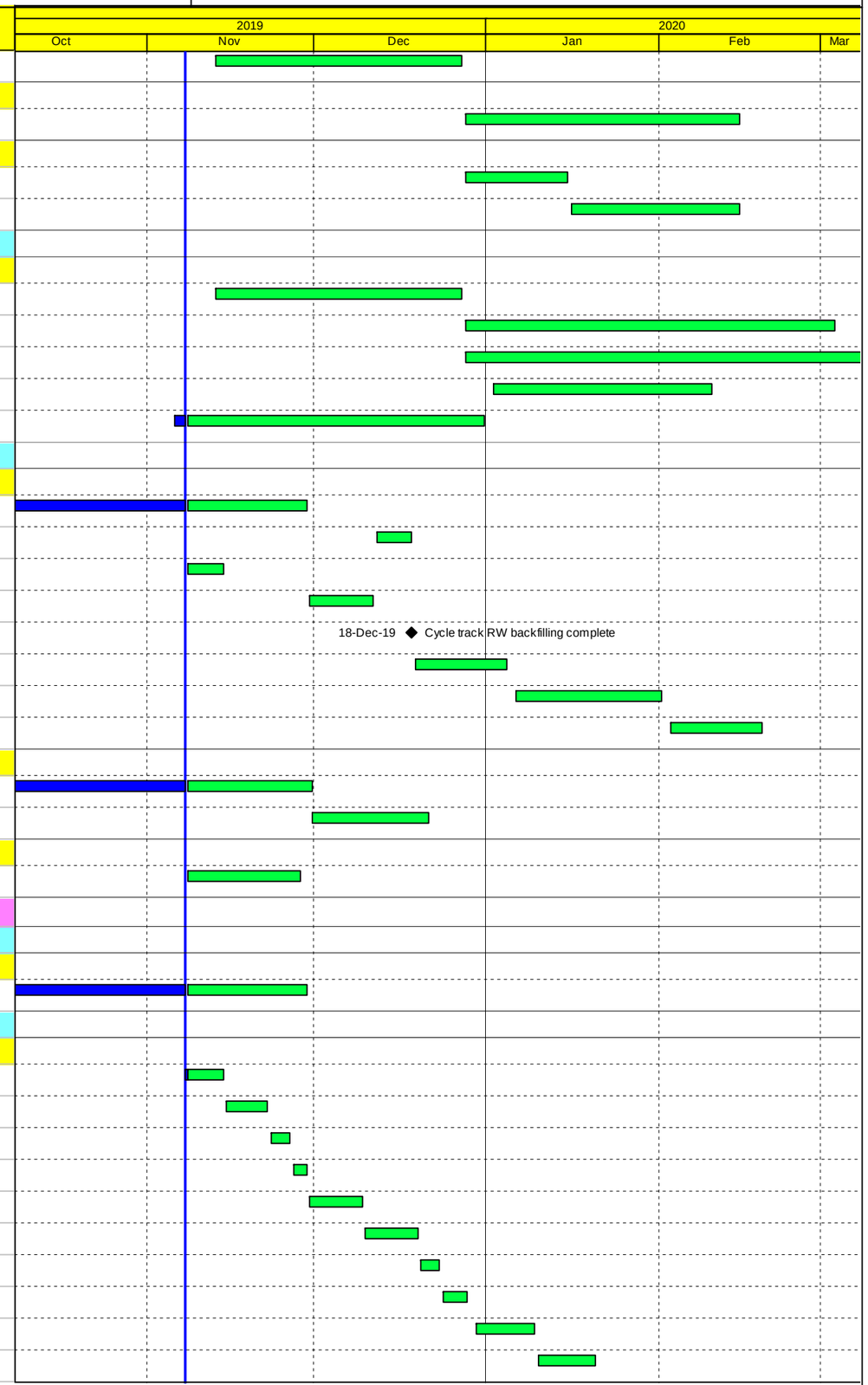
Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Crit. Milestone

Project ID: MP005 (1911)
Layout: 3 Month Rolling Programme
Data Date: 08-Nov-19
Page 1 of 7
Primavera Systems, Inc.

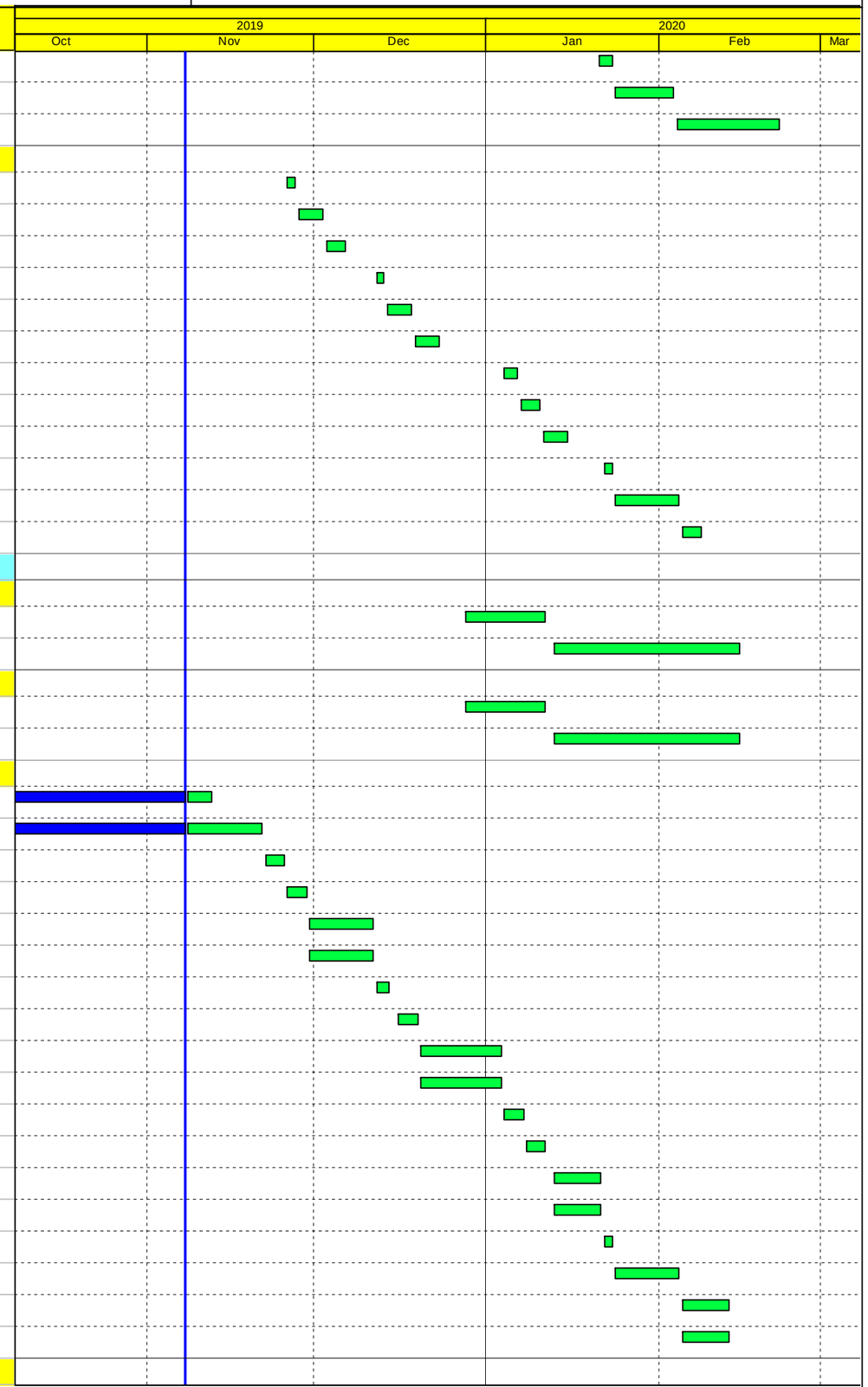
Contract No. DC/2018/05
Relocation of Sha Tin Sewge Treatment Works to Caverns - Site Preparation and Access Tunnel Construction
3 Month Rolling Programme

CHINA STATE JOINT VENTURE

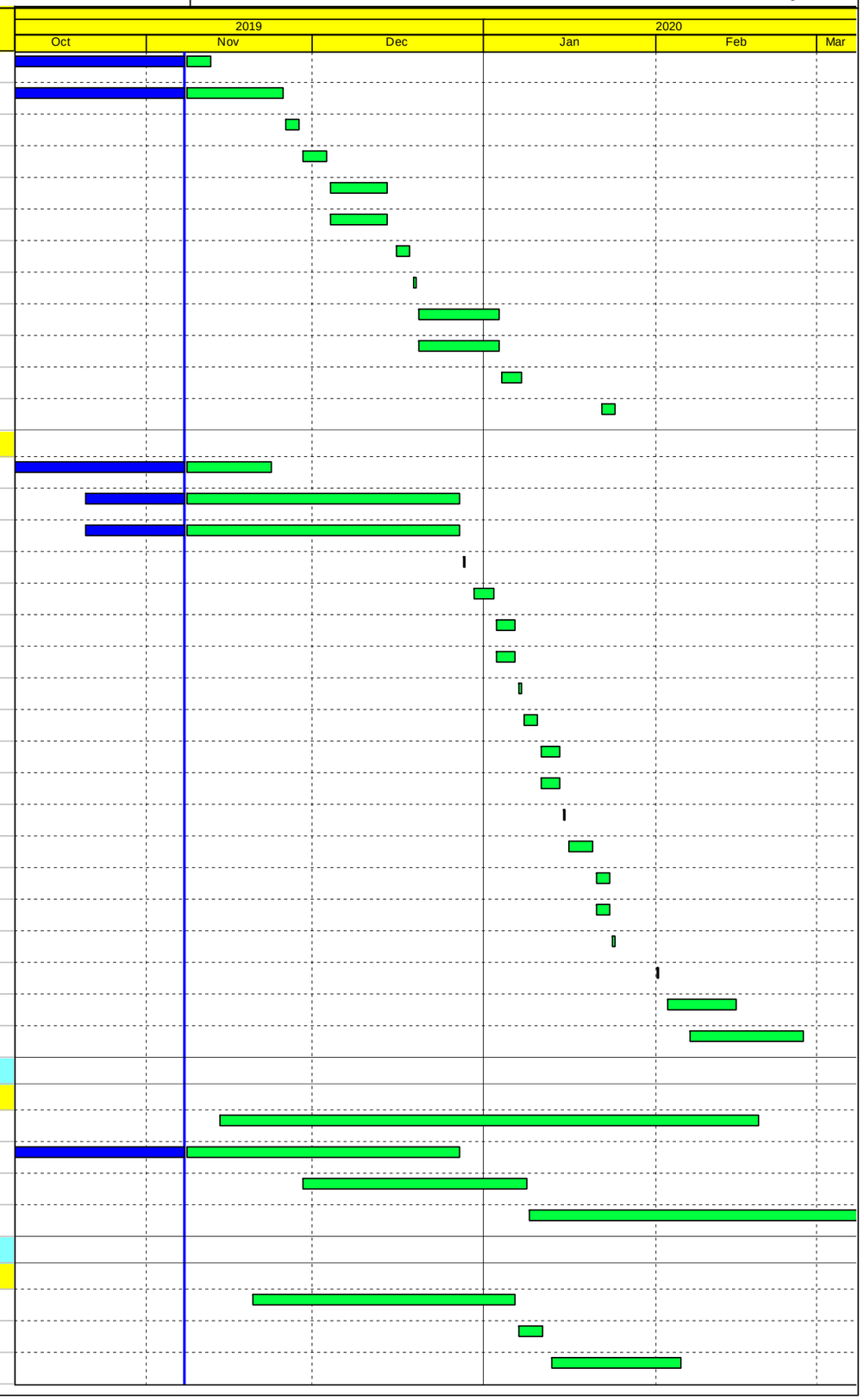
Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish
A13130	TTA submission & approval	37	13-Nov-19*	27-Dec-19	291	09-Nov-20	22-Dec-20
DN600 Water Main							
A10550	Jacking pit at CHA80.2 (Portion 4)	36	28-Dec-19	15-Feb-20	291	22-Dec-20	05-Feb-21
DN450 Water Main							
A10660	ELS (CHB 0 - 37)	15	28-Dec-19	15-Jan-20	313	20-Jan-21	06-Feb-21
A10670	Excavation (CHB 0 - 37)	21	16-Jan-20	15-Feb-20	313	06-Feb-21	10-Mar-21
Drainage Works							
Mui Tsz Lam Road Realigment							
A10400	TTA submission & approval	37	13-Nov-19*	27-Dec-19	16	02-Dec-19	16-Jan-20
A10990	Drainage work from SMH1009 (3mh ~6m depth)(TTA)	50	28-Dec-19	03-Mar-20	365	29-Mar-21	01-Jun-21
A10995	Drainage work from SMH2010 to 2011 (2mh ~6 to 7.5m depth)	90	28-Dec-19	23-Apr-20	16	17-Jan-20	14-May-20
A13230	Jacking pit in portion 6 for 1350 dia pipe jacking	28	02-Jan-20	10-Feb-20	49	05-Mar-20	08-Apr-20
A13240	Jacking pit in portion 4 for 1350 dia pipe jacking	28	06-Nov-19 A	31-Dec-19	49	07-Jan-20	05-Mar-20
Road Works							
PMI-010: Additional RW along Cycle Track and Footpath in Portion 1							
A16860	Footing & wall structure - Cycle track RW (Bay 1- 3, 0-19m)	57	23-Sep-19 A	29-Nov-19	11	21-Nov-19	12-Dec-19
A16870	Backfill - Cycle track RW (Bay 1- 3, 0-19m) (Coarse fill)	6	12-Dec-19	18-Dec-19	11	27-Dec-19	03-Jan-20
A16910	Backfill - Cycle track RW (Bay 4-6, 19- 42-m) (Coarse fill)	6	08-Nov-19	14-Nov-19	40	27-Dec-19	03-Jan-20
A16920	Miradrain & pipe sleeve installation - Cycle track RW (Bay 1- 3, 0-19m)	10	30-Nov-19	11-Dec-19	11	13-Dec-19	24-Dec-19
A16940	Cycle track RW backfilling complete	0		18-Dec-19	11		03-Jan-20
A16950	cycle track site formation work other than RW section	12	19-Dec-19	04-Jan-20	11	04-Jan-20	17-Jan-20
A16960	Pavement work	18	06-Jan-20	01-Feb-20	11	18-Jan-20	14-Feb-20
A16970	Railing installation	15	03-Feb-20	19-Feb-20	11	15-Feb-20	03-Mar-20
Haul Road Under Ma On Shan Rail							
A11936	Haul Road Design preparation	41	02-Oct-19 A	30-Nov-19	55	15-Jan-20	13-Feb-20
A11938	Haul Road Design approval	21	30-Nov-19	21-Dec-19	75	14-Feb-20	05-Mar-20
Construction Access connecting Ma On Shan Road							
A13340	Construction Access Connecting Ma On Shan Road construction at Portion 4	18	08-Nov-19	28-Nov-19	141	08-May-20	28-May-20
Main Portal Area							
Tree Treatment							
Tree Treatment							
A11041	Tree felling & protection (Portion 6) - remaining	71	05-Aug-19 A	29-Nov-19	629	29-Dec-21	20-Jan-22
Site Formation for Main Portal							
Slope SMP 2							
A12670	Soil Nail at 45.8mpd (An1-24)- 24nos	6	08-Nov-19 A	14-Nov-19	165	04-Jun-20	11-Jun-20
A12680	Soil Nail at 43.8mpd (Am1-25 & TN6)- 26nos	7	15-Nov-19	22-Nov-19	165	11-Jun-20	19-Jun-20
A12690	Excavation (45.8- 42.8mpd)	3	23-Nov-19	26-Nov-19	165	19-Jun-20	23-Jun-20
A12700	Form temp working platform for soil nail (after temp access formation)	3	27-Nov-19	29-Nov-19	165	23-Jun-20	27-Jun-20
A12710	Soil Nail at 42.3mpd (Ak1-30)- 30nos	8	30-Nov-19	09-Dec-19	165	27-Jun-20	08-Jul-20
A12720	Soil Nail at 40.3mpd (Ap1-32 & TN5)- 33nos	9	10-Dec-19	19-Dec-19	165	08-Jul-20	18-Jul-20
A12730	Excavation (42.8 - 40.3mpd)	3	20-Dec-19	23-Dec-19	165	18-Jul-20	22-Jul-20
A12740	Form temp working platform for soil nail	3	24-Dec-19	28-Dec-19	165	22-Jul-20	25-Jul-20
A12750	Soil Nail at 38.3mpd (Ah1-34 & TN4)- 35nos	9	30-Dec-19	09-Jan-20	165	25-Jul-20	05-Aug-20
A12760	Soil Nail at 36.3mpd (Ag1-35)- 35nos	9	10-Jan-20	20-Jan-20	187	31-Aug-20	10-Sep-20



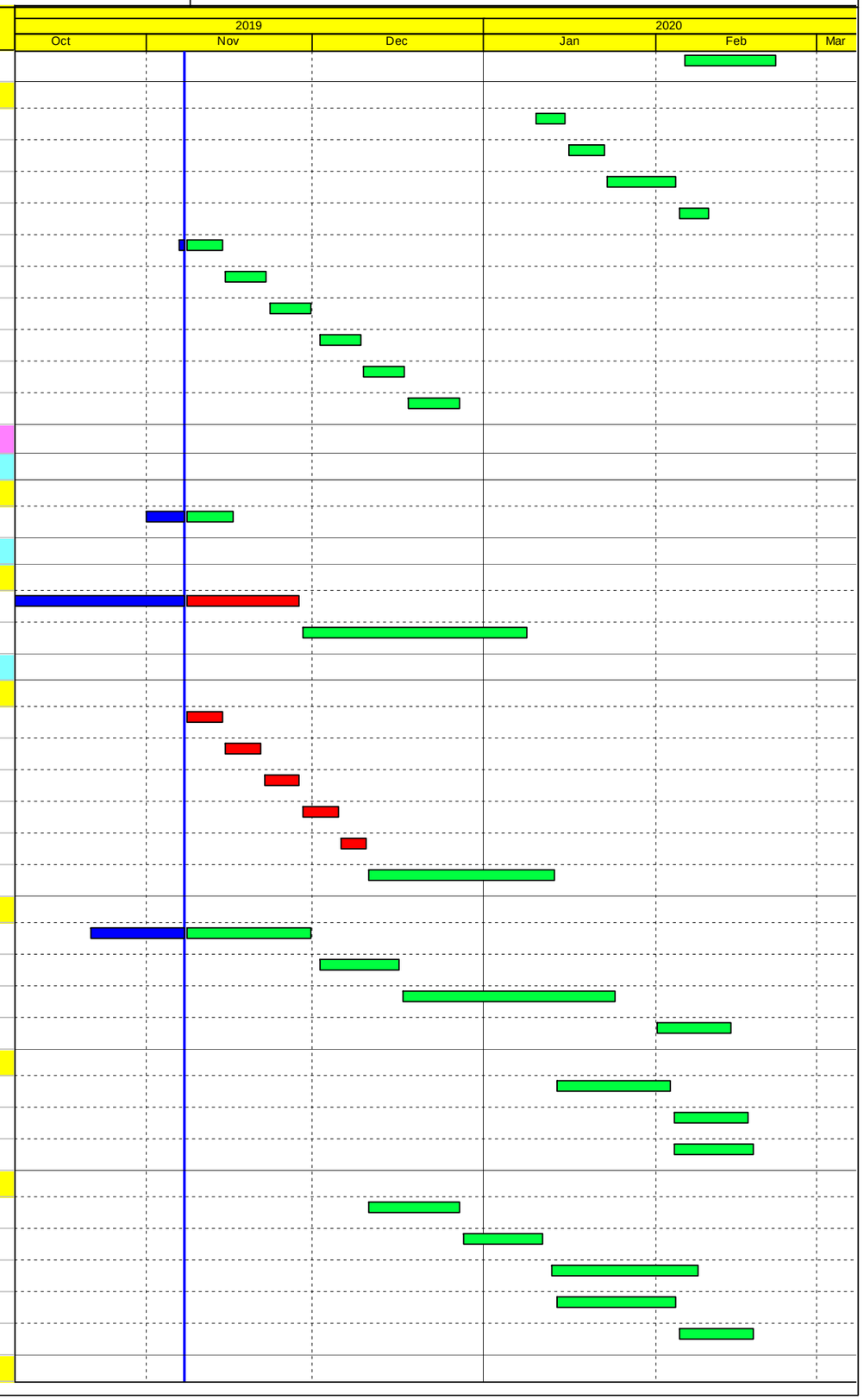
Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish
A12770	Excavation (40.3 - 35.3mpd)	3	21-Jan-20	23-Jan-20	187	10-Sep-20	14-Sep-20
A12780	Form temp working platform for soil nail	3	24-Jan-20	03-Feb-20	187	14-Sep-20	17-Sep-20
A12790	Soil Nail at 32.5mpd (Af1-65 & TN3)- 66nos	17	04-Feb-20	22-Feb-20	187	17-Sep-20	09-Oct-20
Temp Site Formation at SMP2 +23mpd Portal Area							
A16060	Excavation & Form temp working platform for soil nail at 21mpd	2	26-Nov-19	27-Nov-19	37	10-Jan-20	13-Jan-20
A16070	GFRP Soil Nail at 21mpd - 15nos (assume)	4	28-Nov-19	02-Dec-19	37	13-Jan-20	17-Jan-20
A16090	GFRP Soil Nail at 19.5mpd - 14nos (assume)	4	03-Dec-19	06-Dec-19	37	17-Jan-20	22-Jan-20
A16100	Excavation & Form temp working platform for soil nail at 18mpd	2	12-Dec-19	13-Dec-19	33	22-Jan-20	24-Jan-20
A16110	GFRP Soil Nail at 18mpd - 15nos (assume)	4	14-Dec-19	18-Dec-19	33	24-Jan-20	05-Feb-20
A16130	GFRP Soil Nail at 16.5mpd - 14nos (assume)	4	19-Dec-19	23-Dec-19	33	05-Feb-20	10-Feb-20
A16140	Excavation & Form temp working platform for soil nail at 15mpd	2	04-Jan-20	06-Jan-20	26	10-Feb-20	12-Feb-20
A16150	GFRP Soil Nail at 15mpd - 15nos (assume)	4	07-Jan-20	10-Jan-20	26	12-Feb-20	17-Feb-20
A16170	GFRP Soil Nail at 13.5mpd - 14nos (assume)	4	11-Jan-20	15-Jan-20	26	17-Feb-20	21-Feb-20
A16180	Excavation & Form temp working platform for soil nail at 11mpd	2	22-Jan-20	23-Jan-20	21	21-Feb-20	24-Feb-20
A16190	GFRP Soil Nail at 11mpd - 15nos (assume)	4	24-Jan-20	04-Feb-20	21	24-Feb-20	28-Feb-20
A16210	GFRP Soil Nail at 9.5mpd - 14nos (assume)	4	05-Feb-20	08-Feb-20	21	28-Feb-20	04-Mar-20
Retaining Wall for Main Portal							
Retaining Wall RMP3							
A13160	Temp access road formation	12	28-Dec-19	11-Jan-20	81	09-Apr-20	27-Apr-20
A13170	Erect temp working platform for piling	24	13-Jan-20	15-Feb-20	81	27-Apr-20	27-May-20
Retaining Wall RMP2							
A13260	Temp access road formation	12	28-Dec-19	11-Jan-20	105	13-May-20	27-May-20
A13270	Erect temp working platform for piling	24	13-Jan-20	15-Feb-20	105	27-May-20	24-Jun-20
Retaining Wall RMP6 - CSD							
A15320	CSD approval period (CSD)	134	01-Jun-19 A	12-Nov-19	838	23-Feb-22	27-Feb-22
A15330	Piling (pre-bored H, 15no, 23mpd) - CSD RMP6	38	02-Oct-19 A	21-Nov-19	16	26-Nov-19	10-Dec-19
A15350	Excavation & Form temp working platform for soil nail at 21mpd - CSD RMP6	3	22-Nov-19	25-Nov-19	16	10-Dec-19	13-Dec-19
A15360	GFRP Soil Nail at 20.5mpd - 8nos	4	26-Nov-19	29-Nov-19	16	13-Dec-19	18-Dec-19
A15370	Welding soil nail head to H pile and testing	10	30-Nov-19	11-Dec-19	16	18-Dec-19	02-Jan-20
A15380	Testing for test nail at 20.5mpd	10	30-Nov-19	11-Dec-19	33	10-Jan-20	22-Jan-20
A15390	Excavation & Form temp working platform for soil nail at 17.5mpd - CSD RMP6	3	12-Dec-19	14-Dec-19	16	02-Jan-20	06-Jan-20
A15400	GFRP Soil Nail at 17.5mpd - 7nos	4	16-Dec-19	19-Dec-19	16	06-Jan-20	10-Jan-20
A15410	Welding soil nail head to H pile and testing	10	20-Dec-19	03-Jan-20	16	10-Jan-20	22-Jan-20
A15420	Testing for test nail at 17.5mpd	10	20-Dec-19	03-Jan-20	16	10-Jan-20	22-Jan-20
A15430	Excavation & Form temp working platform for soil nail at 14.5mpd - CSD RMP6	3	04-Jan-20	07-Jan-20	16	22-Jan-20	01-Feb-20
A15440	GFRP Soil Nail at 14.5mpd - 8nos	4	08-Jan-20	11-Jan-20	16	01-Feb-20	06-Feb-20
A15450	Welding soil nail head to H pile and testing	8	13-Jan-20	21-Jan-20	16	06-Feb-20	15-Feb-20
A15460	Testing for test nail at 14.5mpd	8	13-Jan-20	21-Jan-20	16	06-Feb-20	15-Feb-20
A15462	Excavation & Form temp working platform for soil nail at 11.5mpd - CSD RMP6	2	22-Jan-20	23-Jan-20	16	15-Feb-20	18-Feb-20
A15464	GFRP Soil Nail at 11.5mpd - 6nos	4	24-Jan-20	04-Feb-20	16	18-Feb-20	22-Feb-20
A15466	Welding soil nail head to H pile and testing	8	05-Feb-20	13-Feb-20	16	22-Feb-20	03-Mar-20
A15468	Testing for test nail at 11.5mpd	8	05-Feb-20	13-Feb-20	16	22-Feb-20	03-Mar-20
Retaining Wall RMP5 - CSD (Tunnel Portal Area)							



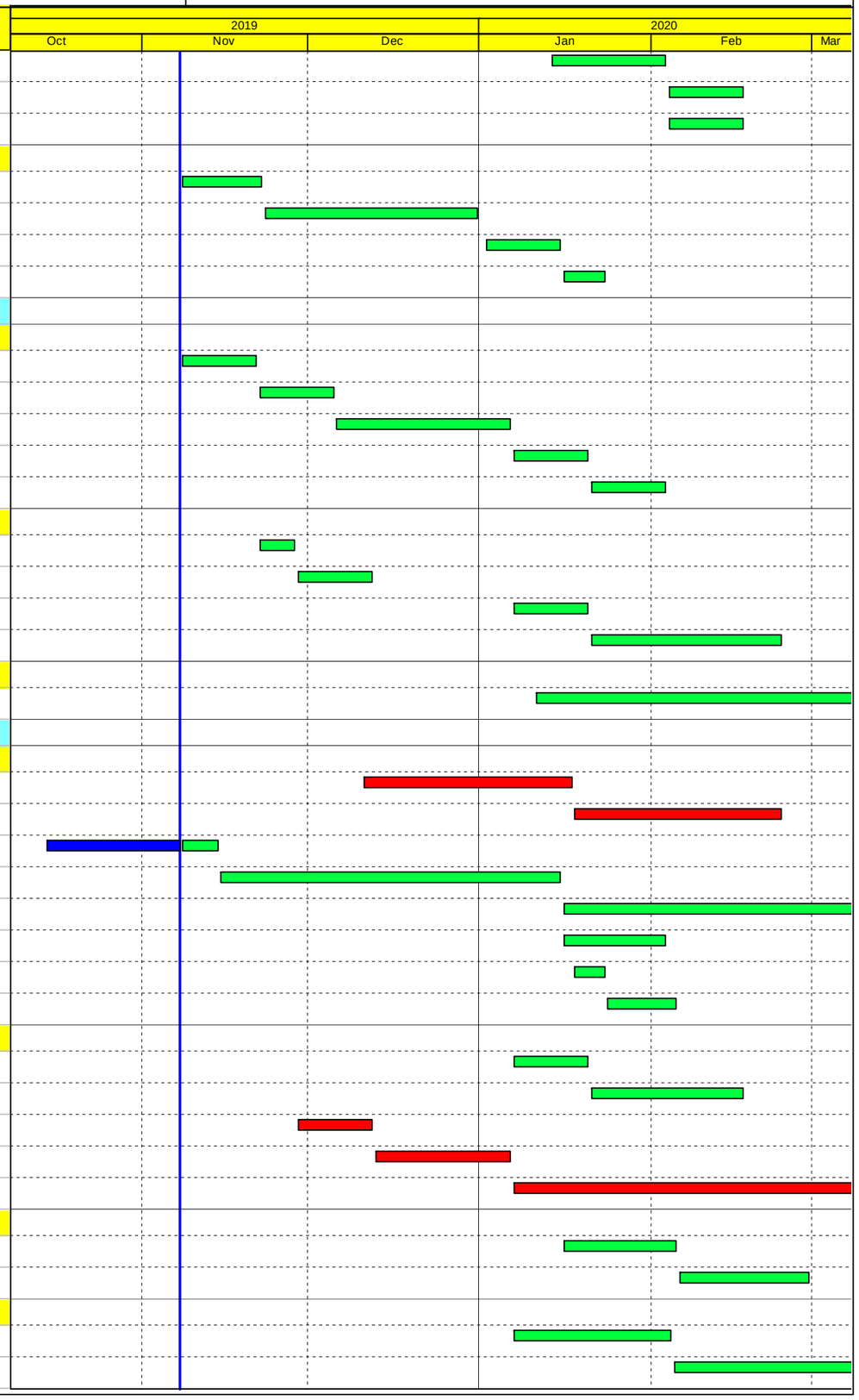
Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish
A15560	CSD approval period (CSD)	134	01-Jun-19 A	12-Nov-19	838	23-Feb-22	27-Feb-22
A15570	Piling (pre-bored H, 16no, 23mpd)(P34-49) - CSD RMP5 (Tunnel Portal Area)	43	30-Sep-19 A	25-Nov-19	16	26-Nov-19	13-Dec-19
A16240	Excavation & Form temp working platform for soil nail at 21mpd - CSD RMP5 (Tunnel Portal Area)	3	26-Nov-19	28-Nov-19	39	13-Jan-20	16-Jan-20
A16250	GFRP Soil Nail at 21mpd - 8nos	4	29-Nov-19	03-Dec-19	39	16-Jan-20	21-Jan-20
A16260	Welding soil nail head to H pile and testing	10	04-Dec-19	14-Dec-19	39	21-Jan-20	08-Feb-20
A16270	Testing for test nail at 21mpd	10	04-Dec-19	14-Dec-19	39	21-Jan-20	08-Feb-20
A16280	Excavation & Form temp working platform for soil nail at 18mpd - CSD RMP5 (Tunnel Portal Area)	3	16-Dec-19	18-Dec-19	39	08-Feb-20	12-Feb-20
A16290	GFRP Soil Nail at 18mpd - 2nos	1	19-Dec-19	19-Dec-19	39	12-Feb-20	13-Feb-20
A16300	Welding soil nail head to H pile and testing	10	20-Dec-19	03-Jan-20	39	13-Feb-20	25-Feb-20
A16310	Testing for test nail at 18mpd	10	20-Dec-19	03-Jan-20	39	13-Feb-20	25-Feb-20
A16360	Excavation from 18 to 14mpd - CSD RMP5 (Tunnel Portal Area)	3	04-Jan-20	07-Jan-20	39	25-Feb-20	28-Feb-20
A16370	Excavation from 14 to 11.5mpd - CSD RMP5 (Tunnel Portal Area)	3	22-Jan-20	24-Jan-20	27	28-Feb-20	03-Mar-20
Retaining Wall RMP5 - CSD							
A15800	CSD approval period (CSD)	145	01-Jun-19 A	23-Nov-19	827	12-Feb-22	27-Feb-22
A15810	Piling (pre-bored H, 17no, 23mpd)(P1-17) - CSD RMP5	56	21-Oct-19 A	27-Dec-19	81	20-Feb-20	09-Apr-20
A15820	Piling (pre-bored H, 16no, 23mpd)(P18-33) - CSD RMP5	48	21-Oct-19 A	27-Dec-19	81	20-Feb-20	09-Apr-20
A16460	Excavation & Form temp working platform for soil nail at 21mpd - CSD RMP5 (Tunnel Portal Area)	1	28-Dec-19	28-Dec-19	355	17-Mar-21	18-Mar-21
A16470	GFRP Soil Nail at 21mpd - 17nos	3	30-Dec-19	02-Jan-20	355	18-Mar-21	22-Mar-21
A16480	Welding soil nail head to H pile and testing	3	03-Jan-20	06-Jan-20	355	22-Mar-21	25-Mar-21
A16490	Testing for test nail at 21mpd	3	03-Jan-20	06-Jan-20	362	30-Mar-21	06-Apr-21
A16500	Excavation & Form temp working platform for soil nail at 18mpd - CSD RMP5 (Tunnel Portal Area)	1	07-Jan-20	07-Jan-20	355	25-Mar-21	26-Mar-21
A16510	GFRP Soil Nail at 18mpd - 16nos	3	08-Jan-20	10-Jan-20	355	26-Mar-21	30-Mar-21
A16520	Welding soil nail head to H pile and testing	3	11-Jan-20	14-Jan-20	355	30-Mar-21	06-Apr-21
A16530	Testing for test nail at 18mpd	3	11-Jan-20	14-Jan-20	363	12-Apr-21	15-Apr-21
A16540	Excavation & Form temp working platform for soil nail at 16.5mpd - CSD RMP5 (Tunnel Portal Area)	1	15-Jan-20	15-Jan-20	355	06-Apr-21	07-Apr-21
A16550	GFRP Soil Nail at 16.5mpd - 22nos	4	16-Jan-20	20-Jan-20	355	07-Apr-21	12-Apr-21
A16560	Welding soil nail head to H pile and testing	3	21-Jan-20	23-Jan-20	355	12-Apr-21	15-Apr-21
A16570	Testing for test nail at 16.5mpd	3	21-Jan-20	23-Jan-20	356	13-Apr-21	16-Apr-21
A16580	Excavation from 16.5 to 14mpd - CSD RMP5 (Tunnel Portal Area)	1	24-Jan-20	24-Jan-20	355	15-Apr-21	16-Apr-21
A16590	Excavation from 14 to 8mpd - CSD RMP5 (Tunnel Portal Area)	1	01-Feb-20	01-Feb-20	355	16-Apr-21	17-Apr-21
A16600	Retaining Wall base (42m) - CSD RMP5	12	03-Feb-20	15-Feb-20	355	17-Apr-21	03-May-21
A16610	Retaining Wall wall structure to 7.5mpd - CSD RMP5	18	07-Feb-20	27-Feb-20	355	22-Apr-21	14-May-21
Tunnel							
Preliminary Works							
A11810	TTA submission and approval during blasting works	75	14-Nov-19*	19-Feb-20	171	17-Jun-20	15-Sep-20
A11820	Update BAR (Blasting Assessment Report) - preparation and submission	71	06-Sep-19 A	27-Dec-19	210	29-Jul-20	15-Sep-20
A11825	Blasting door design	32	29-Nov-19	08-Jan-20	201	08-Aug-20	15-Sep-20
A11830	Blasting Permit/ License - Preparation and submission	50	09-Jan-20	13-Mar-20	201	15-Sep-20	16-Nov-20
Rigid Barriers							
Rigid Barrier BMP1							
A13430	Temp.Access Road Formation	38	20-Nov-19*	06-Jan-20	167	18-Jun-20	04-Aug-20
A13440	Form temp working platform for soil nail	5	07-Jan-20	11-Jan-20	167	04-Aug-20	10-Aug-20
A13450	Soil Nail at 33.6mpd (Rows D & TN2)- 25nos	15	13-Jan-20	05-Feb-20	167	10-Aug-20	27-Aug-20



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish
A13460	Soil Nail at 32.1mpd (Rows C)- 25nos	15	06-Feb-20	22-Feb-20	167	27-Aug-20	14-Sep-20
Rigid Barrier BMP2							
A13570	Form temp working platform for soil nail - BMP2	5	10-Jan-20	15-Jan-20	165	05-Aug-20	11-Aug-20
A13580	Soil Nail at 38mpd (Cd1-6 & TN2)- 7nos - BMP2	6	16-Jan-20	22-Jan-20	165	11-Aug-20	18-Aug-20
A13590	Soil Nail at 36mpd (Cc1-5)- 5nos - BMP2	5	23-Jan-20	04-Feb-20	165	18-Aug-20	24-Aug-20
A13600	Soil Nail at 34mpd (Cb1-5 & TN1)- 6nos - BMP2	5	05-Feb-20	10-Feb-20	165	24-Aug-20	29-Aug-20
A13810	Soil Nail at 46mpd (Df1-9)- 9nos	7	07-Nov-19 A	14-Nov-19	333	23-Dec-20	02-Jan-21
A13820	Soil Nail at 44mpd (De1-9)- 9nos	7	15-Nov-19	22-Nov-19	333	02-Jan-21	11-Jan-21
A13830	Soil Nail at 42mpd (Dd1-10)- 10nos	7	23-Nov-19	30-Nov-19	333	11-Jan-21	19-Jan-21
A13840	Soil Nail at 40mpd (Dc1-9)- 9nos	7	02-Dec-19	09-Dec-19	333	19-Jan-21	27-Jan-21
A13850	Soil Nail at 38mpd (Db1-9)- 9nos	7	10-Dec-19	17-Dec-19	333	27-Jan-21	04-Feb-21
A13860	Soil Nail at 36mpd (Da1-9 & TN4)- 10nos	7	18-Dec-19	27-Dec-19	333	04-Feb-21	19-Feb-21
Access Road to Portion 12 - Phase 1							
Preliminary Works							
Temporary Access							
A11118	Temp access to RMZ2	14	01-Nov-19 A	16-Nov-19	17	28-Nov-19	06-Dec-19
Tree Treatment							
Tree Treatment							
A11070	Tree felling & protection (Portion 11)	104	25-Jun-19 A	28-Nov-19	7	16-Nov-19	06-Dec-19
A11078	Tree felling (Portion 12)	32	29-Nov-19	08-Jan-20	270	02-Nov-20	08-Dec-20
Bridge A							
Piling							
A11100	Piling (mini-pile, 6nos) - Pier A2-1	6	08-Nov-19	14-Nov-19	5	14-Nov-19	20-Nov-19
A11120	Piling (mini-pile, 6nos) - Pier A2-2	6	15-Nov-19	21-Nov-19	5	21-Nov-19	27-Nov-19
A11140	Piling (mini-pile, 6nos) - Pier A3-2	6	22-Nov-19	28-Nov-19	5	28-Nov-19	04-Dec-19
A11160	Piling (mini-pile, 6nos) - Pier A4-1	6	29-Nov-19	05-Dec-19	5	05-Dec-19	11-Dec-19
A11180	Piling (mini-pile, 4nos) - Pier A4-2	4	06-Dec-19	10-Dec-19	5	12-Dec-19	16-Dec-19
A11210	Pile Test	26	11-Dec-19	13-Jan-20	10	23-Dec-19	24-Jan-20
Abutment A1							
A11230	Excavation - Abutment A1	31	22-Oct-19 A	30-Nov-19	71	10-Feb-20	03-Mar-20
A11240	Base slab - Abutment A1	13	02-Dec-19	16-Dec-19	71	04-Mar-20	18-Mar-20
A11250	Abutment Wall - Abutment A1	31	17-Dec-19	24-Jan-20	71	19-Mar-20	28-Apr-20
A11260	Backfill (~9m) - Abutment A1 (Coarse fill)	12	01-Feb-20	14-Feb-20	71	29-Apr-20	14-May-20
Pier A2							
A11340	ELS - Pier A2-1	12	14-Jan-20	03-Feb-20	16	08-Feb-20	21-Feb-20
A11350	Excavation - Pier A2-1	12	04-Feb-20	17-Feb-20	16	22-Feb-20	06-Mar-20
A11370	ELS - Pier A2-2	13	04-Feb-20	18-Feb-20	21	28-Feb-20	13-Mar-20
Pier A3							
A11430	ELS - Pier A3-1	13	11-Dec-19	27-Dec-19	35	24-Jan-20	14-Feb-20
A11440	Excavation - Pier A3-1	12	28-Dec-19	11-Jan-20	35	15-Feb-20	28-Feb-20
A11450	Pile cap - Pier A3-1	18	13-Jan-20	08-Feb-20	35	29-Feb-20	20-Mar-20
A11460	ELS - Pier A3-2	13	14-Jan-20	04-Feb-20	33	28-Feb-20	13-Mar-20
A11470	Excavation - Pier A3-2	12	05-Feb-20	18-Feb-20	33	14-Mar-20	27-Mar-20
Pier A4							



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish
A11520	ELS - Pier A4-1	12	14-Jan-20	03-Feb-20	10	01-Feb-20	14-Feb-20
A11530	Excavation - Pier A4-1	12	04-Feb-20	17-Feb-20	10	15-Feb-20	28-Feb-20
A11550	ELS - Pier A4-2	12	04-Feb-20	17-Feb-20	22	29-Feb-20	13-Mar-20
Abutment A5							
A11300	Base slab - Abutment A5	13	08-Nov-19	22-Nov-19	54	14-Jan-20	04-Feb-20
A11310	Abutment Wall - Abutment A5	31	23-Nov-19	31-Dec-19	54	05-Feb-20	11-Mar-20
A11320	Backfill (~7m)- Abutment A5 (Coarse fill)	12	02-Jan-20	15-Jan-20	91	29-Apr-20	14-May-20
A11330	Transition Slab - Abutment A5	7	16-Jan-20	23-Jan-20	91	15-May-20	22-May-20
Bridge B							
Abutment B1							
A11690	Excavation - Abutment B1	12	08-Nov-19 A	21-Nov-19	50	09-Jan-20	22-Jan-20
A11700	Base slab - Abutment B1	12	22-Nov-19	05-Dec-19	50	23-Jan-20	12-Feb-20
A11710	Abutment Wall - Abutment B1	24	06-Dec-19	06-Jan-20	50	13-Feb-20	11-Mar-20
A11720	Backfill (~6m) - Abutment B1 (Coarse Fill)	12	07-Jan-20	20-Jan-20	92	07-May-20	20-May-20
A11730	Transition Slab - Abutment B1	6	21-Jan-20	03-Feb-20	92	21-May-20	27-May-20
Abutment B2							
A11740	ELS - Abutment B2	6	22-Nov-19	28-Nov-19	74	27-Feb-20	04-Mar-20
A11750	Excavation - Abutment B2	12	29-Nov-19	12-Dec-19	74	05-Mar-20	18-Mar-20
A11760	Base slab - Abutment B2	12	07-Jan-20	20-Jan-20	56	19-Mar-20	01-Apr-20
A11770	Abutment Wall - Abutment B2	24	21-Jan-20	24-Feb-20	56	02-Apr-20	06-May-20
Parapet							
A16810	Steel Vehicle parapet manufacturing	80	11-Jan-20	24-Apr-20	56	24-Mar-20	03-Jul-20
Site Formation for Access Road to Portion 12							
Retaining Wall RMZ1							
A13900	Piling (mini-pile, 30nos) - RMZ1 (bay 9-10)	30	11-Dec-19	17-Jan-20	5	17-Dec-19	23-Jan-20
A13910	pile test - RMZ1 (bay 9-10)	26	18-Jan-20	24-Feb-20	5	24-Jan-20	29-Feb-20
A13940	Excavation - RMZ1 (Bay 1- 5, 0-37.5m)	8	15-Oct-19 A	14-Nov-19	23	05-Dec-19	11-Dec-19
A13950	Footing & wall structure - RMZ1 (Bay 1- 3, 0-22.5m)	50	15-Nov-19	15-Jan-20	23	12-Dec-19	18-Feb-20
A13960	Backfill - RMZ1 (Bay 1- 3, 0-22.5m)(~10m)	66	16-Jan-20	09-Apr-20	66	14-Apr-20	03-Jul-20
A13962	Footing structure - RMZ1 (Bay 4- 5, 22.5-37.5m)	10	16-Jan-20	03-Feb-20	23	19-Feb-20	29-Feb-20
A13970	ELS - RMZ1 (Bay 6-10, 37.5-76.5m)	5	18-Jan-20	23-Jan-20	21	19-Feb-20	24-Feb-20
A13980	Excavation - RMZ1 (Bay 6-10, 37.5-76.5m)	5	24-Jan-20	05-Feb-20	21	25-Feb-20	29-Feb-20
Retaining Wall RMZ2							
A14020	Erect temp working platform for piling - RMZ2 (bay 2-8)	12	07-Jan-20	20-Jan-20	69	03-Apr-20	21-Apr-20
A14030	Pre-drilling work - RMZ2 (bay 2-8)	18	21-Jan-20	17-Feb-20	69	22-Apr-20	14-May-20
A14060	Erect temp working platform for piling - RMZ2 (bay 10-18)	12	29-Nov-19	12-Dec-19	7	07-Dec-19	20-Dec-19
A14070	Pre-drilling work - RMZ2 (bay 10-18)	18	13-Dec-19	06-Jan-20	7	21-Dec-19	14-Jan-20
A14080	Piling (mini-pile, 100nos) - RMZ2 (bay 10-18)	50	07-Jan-20	11-Mar-20	7	15-Jan-20	19-Mar-20
Cut Slope SMZ1							
A14360	Excavation - Cut Slope SMZ1	12	16-Jan-20	05-Feb-20	92	16-May-20	29-May-20
A14370	Slope formation - Cut Slope SMZ1	21	06-Feb-20	29-Feb-20	92	30-May-20	23-Jun-20
Cut Slope SMZ5							
A14440	Excavation - Cut Slope SMZ5	19	07-Jan-20	04-Feb-20	108	26-May-20	16-Jun-20
A14450	Slope formation - Cut Slope SMZ5	31	05-Feb-20	11-Mar-20	108	17-Jun-20	24-Jul-20



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	Late Start	Late Finish
Cut Slope SMZ6							
A14460	Excavation (162 - 156 mpd) - SMZ6	11	07-Jan-20	18-Jan-20	50	12-Mar-20	24-Mar-20
A14470	Form temp working platform for soil nail - SMZ6	4	20-Jan-20	23-Jan-20	50	25-Mar-20	28-Mar-20
A14480	Soil Nail at 154mpd (D1-9 & TN4)- 10nos - SMZ6	6	24-Jan-20	06-Feb-20	50	30-Mar-20	06-Apr-20
A14490	Soil Nail at 152mpd (C1-9 & TN3)- 10nos - SMZ6	6	07-Feb-20	13-Feb-20	50	07-Apr-20	16-Apr-20
Cut Slope SMZ8							
A14600	Excavation - Cut Slope SMZ8	19	29-Nov-19	20-Dec-19	94	28-Mar-20	23-Apr-20
A14610	Slope formation - Cut Slope SMZ8	31	21-Dec-19	05-Feb-20	211	12-Sep-20	20-Oct-20
A14810	Maintenance staircase & stepped channel - SMZ8	25	06-Feb-20	05-Mar-20	316	04-Mar-21	01-Apr-21
Road Works							
Road Work from A Kung Kok Shan Road to Bridge A							
A14860	400 dia contrete pipe around the road besides SMZ2	19	16-Jan-20	13-Feb-20	113	10-Jun-20	03-Jul-20
Access Road to Portion 12 - Phase 2							
Road Works							
Road work at A Kung Kok Shan Road Roundabout							
A15230	Demolish existing footpath atA Kung Kok Shan Road Roundabout	6	08-Nov-19	14-Nov-19	413	10-Apr-21	16-Apr-21
A15240	Demolish existing planter at Cul-De-Sac	6	15-Nov-19	21-Nov-19	413	17-Apr-21	23-Apr-21
Other Works Area							
Tree Treatment							
Tree Treatment							
A11052	Tree transplant (Portion 8)	91	08-Nov-19	03-Mar-20	260	26-Sep-20	16-Jan-21
A11060	Tree felling & protection (Portion 10)	61	29-Nov-19	18-Feb-20	181	17-Jul-20	25-Sep-20
Community Liaison Centre							
Design							
A16720	Community Liaison Centre Design approval (Architectual)	50	27-Aug-19 A	15-Nov-19	109	25-Feb-20	03-Mar-20
A16740	Community Liaison Centre Design approval (Drainage & E&M)	21	09-Oct-19 A	15-Nov-19	116	03-Mar-20	10-Mar-20
A16750	Community Liaison Centre Design Preparation (Landscape)	22	09-Oct-19 A	15-Nov-19	86	27-Feb-20	05-Mar-20
A16760	Community Liaison Centre Design approval (Landscape)	21	16-Nov-19	06-Dec-19	111	06-Mar-20	26-Mar-20
Community Liaison Centre							
A10140	Excavation	12	14-Oct-19 A	18-Nov-19	76	15-Feb-20	25-Feb-20
A10150	G/F slab	12	19-Nov-19	02-Dec-19	76	26-Feb-20	10-Mar-20
A10152	Shop Drawing Preparation & submission	18	11-Nov-19*	30-Nov-19	0	11-Nov-19	30-Nov-19
A10154	Shop Drawing approval	21	23-Nov-19	13-Dec-19	0	23-Nov-19	13-Dec-19
A10160	Off-site factory fabrication	60	14-Dec-19	03-Mar-20	0	14-Dec-19	03-Mar-20