

Vol. 1 of 5

EP-457/2013/C

Central Kowloon Route

Central Tunnel

Contract No. HY/2018/08

October 2019



Monthly EM&A Report No. 2 (October 2019)

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Client Address	Bouygues Travaux Publics, 3/F, Island Place Tower, 510 King's Road, North Point, Hong Kong
Client Contact	Mr. KAM Hing Lam, Alan
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Environmental Team

Initials	Name	Role	Signature
CL	Cyrus C.Y. LAI	Senior Environmental Consultant	
DH	David Y.O. HUNG	Environmental Team Leader	

Environmental Permit No. EP-457/2013/C

Central Kowloon Route

Independent Environmental Checker Verification

Works Contract:	Central Tunnel (HY/2018/08)
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Date of Report:	8 November 2019 (Rev. 02)
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Reference EP Condition

Environmental Permit Condition:	3.4
Submission of Monthly EM&A Report of the Project	
3.4 Four hard copies and one electronic copy of 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. The EM&A Reports shall include a summary of all non-compliance. The submissions shall be certified by the ET Leader and verified by the IEC as complying with the requirements as set out in the EM&A Manual before submission to the Director. Additional copies of the submission shall be provided to the Director upon request by the Director.	

IEC Verification

I hereby verify that the above referenced document/ plan complies with the above referenced condition of EP-457/2013/C.	
	
Ms Mandy To	Date: 11 November 2019
Independent Environmental Checker	

EXECUTIVE SUMMARY

I. Introduction

This is the 2nd Monthly EM&A Report prepared by Fugro Technical Services Limited for the Contract no. HY/2018/08 Central Kowloon Route – Central Tunnel. The Contract no. HY/2018/08 commenced on 19 September 2019. This report summarized the monitoring results and audits findings of the EM&A programme under the issued EP (EP No.: EP-457/2013/C) and in accordance with the EM&A Manual during the reporting period from 01/10/2019 to 31/10/2019.

II. Summary of Main Works Undertaken and Key Measures Implemented

The main construction works carried out in the reporting period were as follow:

- Pre-treatment for diaphragm wall;
- Pre-drilling for ventilation building foundation;
- Modification of the existing blast cover;
- Erection of Main Site Office.

III. Summary of Exceedances, Investigation and Follow-up

No Action or Limit Level Exceedance was recorded in the reporting period.

IV. Complaint Handling, Prosecution and Public Engagement

No complaints, notification of summons and prosecutions were received in the reporting period.

No public engagement activities were conducted in the reporting period.

V. Reporting Change

According to Section 14.3 of the EM&A Manual, at times during the construction phase the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA study. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the Project. It is the responsibility of the Contractor and ET, in accordance with established standards, guidelines and EIA study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET shall provide a copy of the Proactive Environmental Protection Proforma to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

The copy of the Proactive Environmental Protection Proforma is provided in **Appendix M**.

VI. Future Key Issues

The main works will be anticipated in the next reporting period are as follow:

- Pre-treatment for diaphragm wall;
- Pre-drilling for ventilation building foundation;

- Modification of the existing blast cover;
- Erection of Main Site Office.

The recommended mitigation measures corresponding to the main works in the next reporting period are listed as follow:

- Mitigation measures in form of regular watering under a good site practice should be adopted;
- Any excavated, stockpile of dusty material or load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting;
- Bulk stock of cement, dry pulverised fuel ash (PFA) or works of grout mixing should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;
- All construction plants / machineries should be checked / serviced on a regular basis during the courses of construction to minimize the emission of noise generation and eliminate dark smoke emission;
- All C&D materials generated should be transported and stored at temporary storage area. Suitable materials should be sorted for reuse on-site;
- Wastewater to be treated by wastewater treatment facilities before discharge;
- Provision of drip trays for equipment likely cause spillage of chemical / fuel, and provide routine maintenance;
- Conditions in the Environmental Permit and License should be followed;
- All recommended mitigation measures specified in the approved EIA Report and EM&A Manual shall be implemented.

The following EP submissions (EP-457/2013/C) were submitted during the reporting month:

Table I Status of Required Submission under Environmental Permit

EP Condition	Submission	Submission Date
3.4	Monthly EM&A Report (September 2019)	14 October 2019

Contents

EXECUTIVE SUMMARY	i
1. Introduction	1
1.1 Background	1
1.2 Project Organization	2
1.3 Construction Programme and Activities	2
1.4 Works undertaken during the month	2
1.5 Status of Environmental Licences, Notification and Permits	2
2. ENVIRONMENTAL MONITORING REQUIREMENTS	3
2.1 Construction Dust and Noise Monitoring Location	3
2.2 Construction Dust Monitoring	3
2.3 Construction Noise Monitoring	6
2.4 Construction Dust and Noise Monitoring Schedule	7
2.5 The Action and Limit Levels	7
2.6 Landscape and Visual	7
3. ENVIRONMENTAL MONITORING RESULTS	8
3.1 Construction Dust Monitoring	8
3.2 Construction Noise Monitoring	8
3.3 Waste Management	9
3.4 Landscape and Visual	9
4. ENVIRONMENTAL SITE INSPECTION AND AUDIT	10
5. ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE	11
5.1 Complaint Handling, Prosecution and Public Engagement	11
5.2 Summary of Environmental Non-Compliance	11
6. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURE	12
7. FUTURE KEY ISSUES	13
8. CONCLUSION AND RECOMMENDATIONS	14

Tables

Table I – Status of Required Submission under Environmental Permit	ii
Table 1.1 – Contact Information of Key Personnel	2
Table 1.2 – Environmental Licenses, Notification and Permits Summary	2
Table 2.1 – Construction Dust and Noise Monitoring Location	3
Table 2.2 – Construction Dust Monitoring Equipment	3
Table 2.3 – Construction Noise Monitoring Parameters, Frequency and Duration	6
Table 2.4 – Construction Noise Monitoring Equipment	6
Table 3.1 – Summary of 1-hour TSP Monitoring Results in the Reporting Period	8
Table 3.2 – Summary of 24-hour TSP Monitoring Results in the Reporting Period	8
Table 3.3 – Summary of Construction Noise Monitoring Results in the Reporting Period	8
Table 4.1 – Observations and Recommendation of Site Inspection in the Reporting Period	10
Table 6.1 – Status of Required Submission under Environmental Permit	12

Figures

Figure 1	The Site Layout Plan of the Contract
Figure 2	The Location of the Construction Dust and Noise Monitoring Station

Appendices

Appendix A	Construction Programme
Appendix B	Project Organization Chart
Appendix C	Calibration Certificate for Construction Dust Monitoring Equipment
Appendix D	Calibration Certificate for Construction Noise Monitoring Equipment
Appendix E	Environmental Monitoring Schedule
Appendix F	Action and Limit Levels for Construction Dust and Noise Monitoring
Appendix G	Construction Dust Monitoring Results and Meteorological Observations
Appendix H	Construction Noise Monitoring Results
Appendix I	Event and Action Plan
Appendix J	Implementation Status of Environment Mitigation Measures (Construction Phase)
Appendix K	Cumulative Statistics on Exceedances, Complaints, Notifications of Summons and Successful Prosecutions
Appendix L	Waste Flow Table
Appendix M	Proactive Environmental Proforma

1. INTRODUCTION

1.1 Background

- 1.1.1 In order to meet the traffic demand and relieve traffic congestion on the existing east-west roads across Central Kowloon, Central Kowloon Route (CKR) (hereinafter referred to as “the Project”) is proposed which is a 4.7 km long dual 3-lane trunk road in Central Kowloon linking Yau Ma Tei Interchange in West Kowloon with the road network on Kai Tak Development and Kowloon Bay in East Kowloon.
- 1.1.2 The Central Kowloon Route – Design and Construction Environmental Impact Assessment Report (Register No.: AEIAR-171/2013) was approved with conditions by the Environmental Protection Department (EPD) on 11 July 2013. An Environmental Permit (EP-457/2013) was issued on 9 August 2013. Variations of EP (VEP) was subsequently applied for and the latest EP (EP-457/2013/C) was issued by EPD on 16 January 2017.
- 1.1.3 Contract no. HY/2018/08 Central Kowloon Route – Central Tunnel (hereinafter referred to as “the Contract”), is one of the contracts of CKR which included the construction of the central tunnel, cut-and-cover tunnels at Yau Ma Tei and Ma Tau Kok and construction of piles and diaphragm walls for Ho Man Tin ventilation building.
- 1.1.4 Fugro Technical Services Limited (FTS) was appointed by Bouygues Travaux Publics (BTP) as the Environmental Team (ET) under the Contract no. HY/2018/08) to execute the environmental monitoring and audit (EM&A) programme under the issued EP (EP No.: EP-457/2013/C) and in accordance with the EM&A Manual.
- 1.1.5 This is the 2nd Monthly EM&A Report prepared by FTS for the Contract no. HY/2018/08 Central Kowloon Route – Central Tunnel. The Contract no. HY/2018/08 commenced on 19 September 2019. This report summarized the monitoring results and audits findings of the EM&A programme under the issued EP (EP No.: EP-457/2013/C) and in accordance with the EM&A Manual during the reporting period from 01/10/2019 to 31/10/2019.

1.2 Project Organization

1.2.1 The Project Organization structure is shown in **Appendix B**. The key personnel contact names and numbers are summarized in **Table 1.1**.

Table 1.1 Contact Information of Key Personnel

Party	Position	Name	Telephone
Highways Department (HyD)	E13/CKR	Mr. Joe Lam	2762 3380
Arup-Mott MacDonald Joint Venture (AMMJV)	Senior Resident Engineer	Mr. Ben Poon	3619 5967
ERM-Hong Kong, Limited (ERM)	Independent Environmental Checker (IEC)	Ms. Mandy To	2271 3000
Bouygues Travaux Publics (BTP)	Environmental Manager	Mr. Simon Wong	9281 4346
Fugro Technical Services Limited	ET Leader	Mr. David Hung	3565 4371

1.3 Construction Programme and Activities

1.3.1 The construction phase of this Contract under the EP was commenced in October 2019. The site layout plan of the Contract is shown in **Figure 1**.

1.3.2 The construction programme of this Contract is shown in **Appendix A**.

1.4 Works undertaken during the month

1.4.1 The main construction works carried out in the reporting period were as follow:

- Pre-treatment for diaphragm wall;
- Pre-drilling for ventilation building foundation;
- Modification of the existing blast cover;
- Erection of Main Site Office.

1.5 Status of Environmental Licences, Notification and Permits

1.5.1 A summary of the relevant permits, licenses and/or notifications on environmental protection for this Contract is presented in **Table 1.2**.

Table 1.2 Environmental Licenses, Notification and Permits Summary

Permit/ Notification/ License	Reference No	Valid From	Valid Till
Form NB	448930, 448970, 448971	Mid-Sep 2019	NA
Billing Account for Disposal of C&D waste	Account no. 7034790	6 Aug 2019	NA
Chemical Waste Producer Registration	5111-236-B2557-02	25 Sep 2019	NA
Construction Noise Permit	GW-RE0785-19	4 Oct 2019	3 Jan 2020

2. ENVIRONMENTAL MONITORING REQUIREMENTS

2.1 Construction Dust and Noise Monitoring Location

2.1.1 The monitoring station for construction dust and noise monitoring pertinent to the Project has been identified based on the approved EM&A Manual for the Project. The location of the construction dust and noise monitoring station is summarized in **Table 2.1** and displayed in **Figure 2**.

Table 2.1 Construction Dust and Noise Monitoring Location

Dust Monitoring Station ID	Noise Monitoring Station ID	Monitoring Location
M-A3	M-N3	SKH Tsoi Kung Po Secondary School

Notes:

1. The dust and noise monitoring station proposed in the EM&A Manual (i.e. Ko Fai House, Kwun Fai Court with ID: M-A6/ M-N6) was not available for impact dust and noise monitoring, therefore impact monitoring was conducted at M-A3/M-N3 as an alternative which was agreed by the ER, IEC and EPD;
2. The coordinates of SKH Tsoi Kung Po Secondary School can be represented as follow:
Latitude: 22.314719, Longitude: 114.180694 (HK80 Geographical Coordinates)

2.2 Construction Dust Monitoring

Monitoring Requirement

2.2.1 In accordance with the approved EM&A Manual, 1-hour and 24-hour Total Suspended Particulates (TSP) levels should be measured at the designated air quality monitoring stations to indicate the impacts of construction dust on air quality. Regular Impact 24-hour TSP monitoring should be carried out for at least once every 6 days, and 1-hour TSP monitoring should be done at least 3 times every 6 days when the highest dust impact occurs.

Monitoring Equipment

2.2.2 24-hour TSP air quality monitoring was performed using High Volume Sampler (HVS) deployed at the designated monitoring station. The HVS shall meet all the requirements of the EM&A Manual.

2.2.3 A portable direct reading dust meter was used to carry out the 1-hour TSP monitoring.

2.2.4 The model of the dust monitoring equipment used is summarized in **Table 2.2**.

Table 2.2 Construction Dust Monitoring Equipment

Equipment	Brand	Model	Serial No.
High Volume Sampler (24-hour TSP)	Tisch	TE-5170	4388
Portable direct reading dust meter (1-hour TSP)	Sibata	Model LD-3B	647594

Monitoring Methodology for HVS

- 2.2.5 The following guidelines were adopted during the installation of HVS:
- Sufficient support is provided to secure the samplers against gusty wind.
 - No two samplers are placed less than 2 meters apart.
 - The distance between the sampler and an obstacle, such as buildings, is at least twice the height that the obstacle protrudes above the sampler.
 - A minimum of 2 meters of separation from walls, parapets and penthouses is required for rooftop samples.
 - A minimum of 2 meters separation from any supporting structure, measured horizontally is required.
 - No furnaces or incineration flues are nearby.
 - Airflow around the samplers is unrestricted.
 - The samplers are more than 20 meters from the drip line.
 - Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring.
 - Permission must be obtained to set up the samplers and to obtain access to the monitoring stations.
 - A secured supply of electricity is needed to operate the samplers.
- 2.2.6 Prior to the commencement of the dust sampling, the flow rate of the high volume sampler shall be properly set. The power supply should be checked to ensure the proper functioning of the sampler. The sampler is recommended to be operated for 5 minutes to establish thermal equilibrium before placing any filter media at the designated air monitoring station.
- 2.2.7 The filter holding frame should be removed by loosening the four nuts and placing carefully a weighted and conditioned filter at the centre with the stamped number upwards on a supporting screen.
- 2.2.8 The filter should be aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter. The filter holding frame should be tightened to the filter holder with swing bolts. The applied pressure should be sufficient to avoid air leakage at the edges.
- 2.2.9 A programmed timer should be used to control the duration of operation. Information should be recorded on the record sheet, which included the starting time, the weather condition and the filter number.
- 2.2.10 After sampling process is finished, the filter should be removed and sent to the laboratory for weighting. The elapsed time should also be recorded.
- 2.2.11 All filters should be equilibrated in a conditioning environment for 24 hours before weighting. The conditioning environment temperature should be between 25°C and 30°C and not vary by more than $\pm 3^\circ\text{C}$; the relative humidity (RH) should be <50% and not vary by more than $\pm 5\%$. A convenient working RH is 40%.

Maintenance and Calibration for HVS

- 2.2.12 The high volume motors and their accessories should be properly maintained, including routine motor brushes replacement and electrical wiring checking, to ensure that the equipment and a continuous power supply were in good working condition.
- 2.2.13 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at fortnightly intervals. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The calibration certificate for the HVS is provided in **Appendix C**.

Monitoring Methodology for Direct Reading Dust Meter

- 2.2.14 Portable Laser Particle Photometer Monitors should be operated in accordance with the Manufacturer's instruction Manual as below:
- a) Pulling up the air sampling inlet cover
 - b) Changing the Mode 0 to BG
 - c) Pressing Start/Stop switch
 - d) Turning the knob to SENSI.ADJ and press it
 - e) Pressing Start/Stop switch again
 - f) Returning the knob to the position MEASURE slowly
 - g) Pressing the timer set switch to set measuring time
 - h) Removing the cap and start the measurement

Maintenance and Calibration for Direct Reading Dust Meter

- 2.2.15 ET shall submit sufficient information to the IEC to prove that the instrument is capable of achieving comparable results to the HVS. The instrument should also be calibrated regularly, and the 1-hour sampling shall be determined periodically by the HVS to check the validity and accuracy of the results measured by direct reading method. The calibration certificate for the direct reading dust meter is provided in **Appendix C**.

2.3 Construction Noise Monitoring

Monitoring Requirement

2.3.1 In accordance with the EM&A Manual, impact noise monitoring should be conducted at the designated noise monitoring stations for at least once a week during the construction phase of the Project. The parameters, frequency and duration of impact noise monitoring is summarized in **Table 2.3**.

Table 2.3 Construction Noise Monitoring Parameters, Frequency and Duration

Parameter	Duration	Frequency
A-weighted equivalent continuous sound pressure level (Leq). L10 and L90 were also recorded	30 minutes	At least once per week

Monitoring Equipment

2.3.2 Noise monitoring was performed using sound level meter at the designated monitoring station. The sound level meters deployed comply with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator was deployed to check the sound level meters at a known sound pressure level.

2.3.3 The model of the noise monitoring equipment used is summarized in **Table 2.4**.

Table 2.4 Construction Noise Monitoring Equipment

Equipment	Brand	Model	Serial No.
Acoustic Calibrator	Casella	CEL-120	4358443
Sound Level Meter	Casella	CEL-63X	4181568

Monitoring Methodology

2.3.4 Noise measurement should be conducted as the following procedures:

- a) Free field measurements was made at monitoring location M-N3. A correction of +3 dB(A) shall be made to the free field measurements.
- b) The battery condition should be checked to ensure good functioning of the meter.
- c) Parameters such as frequency weighting, the time weighting and the measurement time should set as follow:
 - (i) Frequency weighting: A
 - (ii) Time weighting: Fast
 - (iii) Measurement time: continuous 5 minutes interval
- d) Prior to and after noise measurement, the meter shall be calibrated using the calibrator for 94.0 dB at 1000 Hz. If the difference in the calibration level before and after measurement is more than 1.0 dB, the measurement will be considered invalid and repeat of noise measurement is required after re-calibration or repair of the equipment.

- e) The wind speed at the monitoring station shall be checked with the portable wind meter. Noise monitoring should be cancelled in the presence of fog, rain, and wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.
- f) Noise measurement should be paused during periods of high intrusive noise if possible and observation shall be recorded when intrusive noise is not avoided.
- g) At the end of the monitoring period, the Leq, L10 and L90 should be recorded. In addition, site conditions and noise sources should also be recorded on a standard record sheet.

Maintenance and Calibration

2.3.5 Maintenance and calibration procedures should also be carried out, including:

- a) The microphone head of the sound level meter and calibrator should be cleaned with a soft cloth at quarterly intervals.
- b) The sound level meter and calibrator should be calibrated annually by a HOKLAS laboratory or the manufacturer.

The calibration certificates for noise monitoring equipment are provided in **Appendix D**

2.4 Construction Dust and Noise Monitoring Schedule

2.4.1 The environmental monitoring schedule for the reporting period is provided in **Appendix E**.

2.5 The Action and Limit Levels

2.5.1 The Action and Limit Levels for construction dust and noise monitoring are provided in **Appendix F**.

2.6 Landscape and Visual

2.6.1 As per the EM&A Manuals, the landscape and visual mitigation measures shall be implemented and site inspections should be undertaken once every two weeks during the construction period. A summary of the implementation status is presented in **Section 4**.

3. ENVIRONMENTAL MONITORING RESULTS

3.1 Construction Dust Monitoring

3.1.1 The monitoring results for 1-hour TSP and 24-hour TSP are summarized in **Table 3.1** and **Table 3.2** respectively. Detailed construction dust monitoring results and daily extract of meteorological observations are presented in **Appendix G**.

Table 3.1 Summary of 1-hour TSP Monitoring Results in the Reporting Period

Station ID	Average ($\mu\text{g}/\text{m}^3$)	Range ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
M-A3	85	42 – 120	333	500

Table 3.2 Summary of 24-hour TSP Monitoring Results in the Reporting Period

Station ID	Average ($\mu\text{g}/\text{m}^3$)	Range ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
M-A3	29	18 – 39	153	260

3.1.2 No Action and Limit Level exceedance was recorded for 1-hour TSP monitoring and 24-hour TSP monitoring at the monitoring location in the reporting month.

3.1.3 Major dust sources during the monitoring included nearby traffic emission.

3.1.4 The Event and Action Plan for the construction dust monitoring is given in **Appendix I**.

3.2 Construction Noise Monitoring

3.2.1 The monitoring results for noise are summarized in **Table 3.3** and the monitoring data is given in **Appendix H**.

Table 3.3 Summary of Construction Noise Monitoring Results in the Reporting Period

Station ID	¹ Measured Noise Level, dB(A), Leq (30 mins)	^{1,2} Corrected Noise Level, dB(A), Leq (30 mins)	Action Level	³ Limit Level dB(A), Leq (30 mins)
M-N3	67.7– 69.1	54.4 – 63.5	When one documented compliant is received	For Schools: 70dB(A) during normal teaching period and 65 dB(A) during examination periods

Notes:

1. Free field noise levels were adjusted with a correlation of +3 dB(A);
2. Corrected Noise Level was applied on 18, 24 and 30 October 2019; Corrected Noise Level = Measured Noise Level - Baseline Noise Level (i.e. 67.7 dB(A));
3. The Limit Level was 70 dB(A) for teaching period (from 2 to 14 October 2019) and 65 dB(A) for examination period (from 18 to 30 October 2019).

- 3.2.2 No Action and Limit Level exceedance was recorded for construction noise monitoring at the monitoring location in the reporting month.
- 3.2.3 Major noise sources during the monitoring included nearby traffic emission and school activities.
- 3.2.4 The Event and Action Plan for the construction noise monitoring is given in **Appendix I**.

3.3 Waste Management

- 3.3.1 Auditing of waste management practices during regular site inspections were confirmed that the waste generated during construction were properly, stored, handled and disposed of. The Contractor was responsible for the implementation of any mitigation measures to reduce waste or redress issues arising from the waste materials.
- 3.3.2 The implemented environmental mitigation measures for the waste management in the reporting period are summarized in **Appendix J**. The summary of observations and recommendations made for waste management during the site inspections are presented in **Table 4.1**
- 3.3.3 Monthly summary of waste flow table is detailed in **Appendix L**.

3.4 Landscape and Visual

- 3.4.1 Bi-weekly inspection of the implementation of landscape and visual mitigation measures was conducted on 8 and 22 October 2019. The implementation the landscape and visual mitigation measures in the reporting period are summarized in **Appendix J**. The summary of observations and recommendations made for landscape and visual mitigation measures during the site inspections are presented in **Table 4.1**.
- 3.4.2 The Event and Action Plan for landscape and visual during construction phase is given in **Appendix I**.

4. ENVIRONMENTAL SITE INSPECTION AND AUDIT

- 4.1.1 Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Project. A summary of the mitigation measures implementation status is provided in **Appendix J**.
- 4.1.2 The outstanding items of observation which recorded in the site inspection on 30 September 2019 were rectified by the Contractor on 8 October 2019. In the reporting month, four site inspections were carried out on 8, 15, 22 and 29 October 2019. Details of observations recorded during the site inspections are presented in **Table 4.1**.

Table 4.1 Observations and Recommendation of Site Inspection in the Reporting Period

Environmental Aspect	Date	Observations and Recommendations	Follow-up Actions
Air Quality	29 Oct 2019	The cement bags shall be properly stored and covered with impervious sheet. The Contractor was reminded to cover the grout mixer properly with three sides and the top. Also, watering should be exercised during breaking to suppress dust emission as a reminder.	The item will be followed up in next reporting period.
Noise	29 Oct 2019	The Contractor was reminded to enclose the excavator tip with acoustic mat to reduce noise emission.	The item will be followed up in next reporting period.
Water Quality	29 Oct 2019	The debris at the edge of the step channel shall be cleared. Bunding or other mitigation measures should be provided to prevent discharge of wastewater.	The item will be followed up in next reporting period.
Waste Management	29 Oct 2019	Spillage of oil shall be cleaned up properly and treated as chemical waste.	The item will be followed up in next reporting period.
Landscape and Visual	Nil	Nil	Nil
Permit/ Licenses	Nil	Nil	Nil

5. ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE

5.1 Complaint Handling, Prosecution and Public Engagement

- 5.1.1 No environmental complaints, and no environmental related prosecutions or notification of summons were received in the reporting period.
- 5.1.2 Cumulative complaint log, summaries of complaints, notification of summons and successful prosecutions are presented in **Appendix K**.
- 5.1.3 No public engagement activities were conducted in the reporting period.

5.2 Summary of Environmental Non-Compliance

- 5.2.1 No environmental non-compliance was recorded in the reporting period.
- 5.2.2 No Action and Limit Level exceedance was recorded for construction dust and noise monitoring in the reporting month.

6. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURE

6.1.1 The Contractor had implemented environmental mitigation measures and requirements as stated in the EIA Reports, the EP and EM&A Manuals. The implementation status of the environmental mitigation measures during the reporting period is summarized in **Appendix J**. Status of required submissions under the EP during the reporting period is summarised in **Table 6.1**.

Table 6.1 Status of Required Submission under Environmental Permit

EP Condition	Submission	Submission Date
3.4	Monthly EM&A Report (September 2019)	14 October 2019

7. FUTURE KEY ISSUES

7.1.1 The main works will be anticipated in the next reporting period are as follow:

- Pre-treatment for diaphragm wall;
- Pre-drilling for ventilation building foundation;
- Modification of the existing blast cover;
- Erection of Main Site Office.

7.1.2 The recommended mitigation measures corresponding to the main works in the next reporting period are listed as follow:

- Mitigation measures in form of regular watering under a good site practice should be adopted;
- Any excavated, stockpile of dusty material or load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting;
- Bulk stock of cement, dry pulverised fuel ash (PFA) or works of grout mixing should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;
- All construction plants / machineries should be checked / serviced on a regular basis during the courses of construction to minimize the emission of noise generation and eliminate dark smoke emission;
- All C&D materials generated should be transported and stored at temporary storage area. Suitable materials should be sorted for reuse on-site;
- Wastewater to be treated by wastewater treatment facilities before discharge;
- Provision of drip trays for equipment likely cause spillage of chemical / fuel, and provide routine maintenance;
- Conditions in the Environmental Permit and Discharge License should be followed;
- All recommended mitigation measures specified in the approved EIA Report and EM&A Manual shall be implemented.

7.1.3 The environmental monitoring schedule for the next reporting month is provided in **Appendix E**.

8. CONCLUSION AND RECOMMENDATIONS

- 8.1.1 The 2nd Monthly EM&A Report for the Contract no. HY/2018/08 Central Kowloon Route – Central Tunnel summarized the monitoring results and audits findings of the EM&A programme under the issued EP (EP No.: EP-457/2013/C) and in accordance with the EM&A Manual during the reporting period from 01/10/2019 to 31/10/2019.
- 8.1.2 Construction dust (including 1-hour and 24-hour TSP) and noise monitoring were carried out in the reporting period. No Action and Limit Level exceedance was recorded for construction dust and noise monitoring in the reporting month.
- 8.1.3 Weekly environmental site inspections were conducted during the reporting period. In general, the Contractor had implemented environmental mitigation measures and requirements as stated in the EIA Reports, the EP and EM&A Manuals.
- 8.1.4 No environmental complaints, and no environmental related prosecutions or notification of summons were received in the reporting period.
- 8.1.5 No environmental non-compliance was recorded in the reporting period.
- 8.1.6 According to the environmental site inspections performed in the reporting month, the following recommendations were provided:

Air Quality Impact

- The cement bags shall be properly stored and covered with impervious sheet.
- The Contractor was reminded to cover the grout mixer properly with three sides and the top. Watering should be exercised during breaking to suppress dust emission.

Construction Noise Impact

- The Contractor was reminded to enclose the excavator tip with acoustic mat to reduce noise emission.

Water Quality Impact

- The debris at the edge of the step channel shall be cleared. Bunding or other mitigation measures should be provided to prevent discharge of wastewater.

Waste Management

- Spillage of oil shall be cleaned up properly and treated as chemical waste.

Landscape and Visual Impact

- No specific observation was identified in the reporting month.

Permit/ Licenses

- No specific observation was identified in the reporting month.

Figure 1

The Site Layout Plan of the
Contract

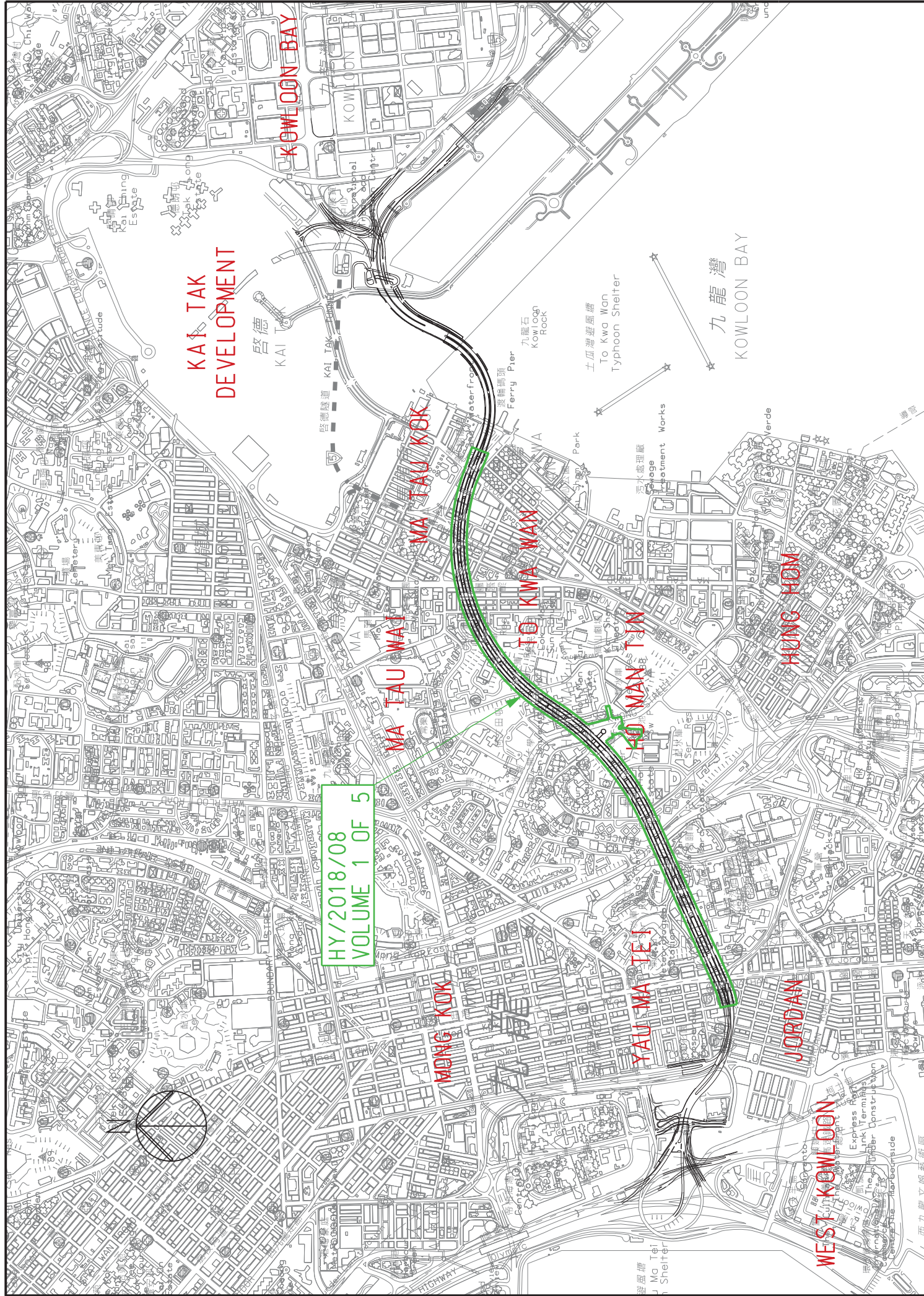


Figure 1 - Site Layout Plan of the Contract

Figure 2

The Location of the Construction
Dust and Noise Monitoring
Station

- Legend**
- Construction Dust Monitoring Station
 - CKR Alignment
 - - - CKR Works Limit
 - - - 500 m Study Boundary in the EIA Report
 - Construction Noise Monitoring Station



E	FIFTH ISSUE	QL	01/13
D	FOURTH ISSUE	QL	12/12
C	THIRD ISSUE	QL	09/12
B	SECOND ISSUE	QL	01/12
A	FIRST ISSUE	QL	12/11
Rev	Description	By	Date

Consultant
ARUP
 Mott MacDonald

Project title
Agreement No. CE 43/2010 (HY)
Central Kowloon Route -
Design and Construction

Drawing title
Location of Construction
Dust and Noise
Monitoring Stations
(Central Portion)

Figure 2

Drawn	12/13	Checked	Approved	Rev.	E
Scale	1:10000 ON A3	Status	PRELIMINARY		

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香港
HIGHWAYS DEPARTMENT
 主要工程管理處
 MAJOR WORKS PROJECT MANAGEMENT OFFICE

Appendix A

Construction Programme

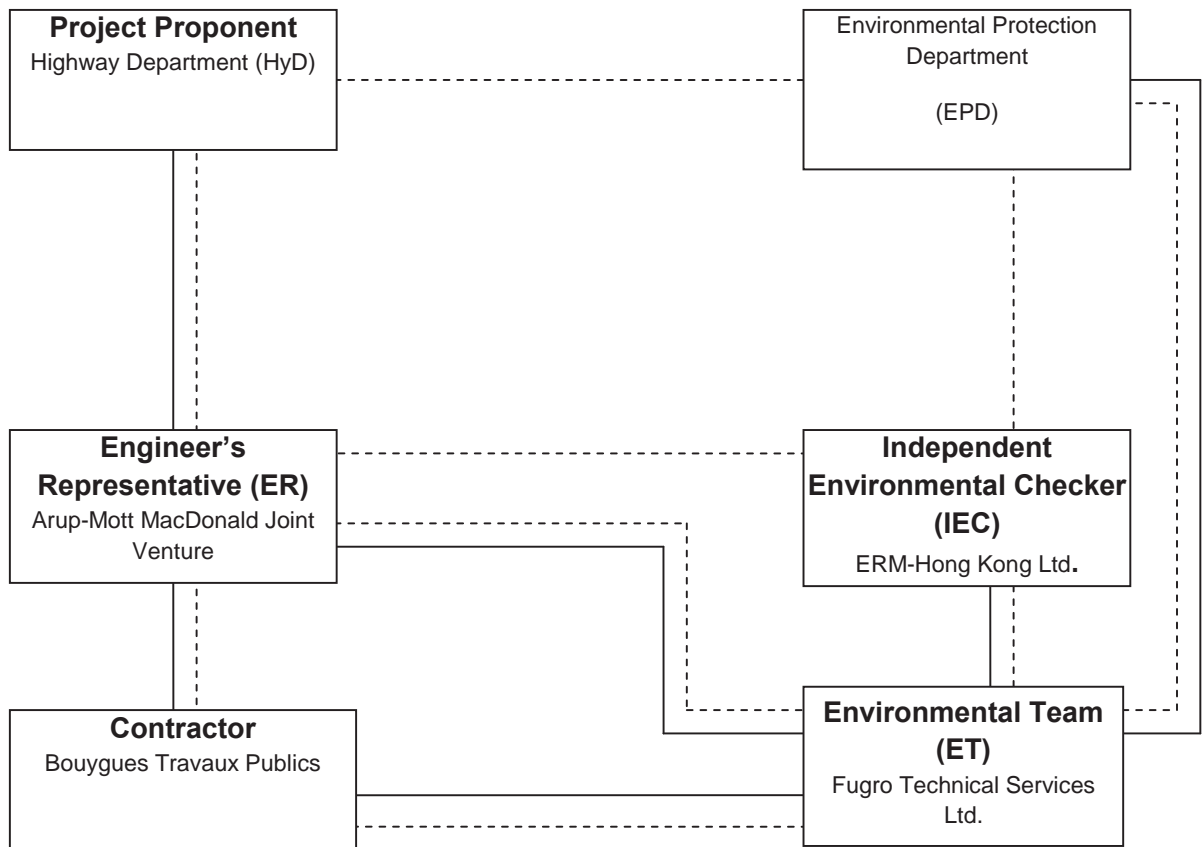


Tentative Programme for Major Construction Activities (Nov and Dec 2019)

Item	Construction Activities	Location
1	Pretreatment for diaphragm wall	HMT
2	Predrilling for ventilation building foundation	HMT
3	Modification of existing blast cover	HMT
4	Erection of Main Site Office	Portion 18

Appendix B

Project Organization Chart



Legend:

— Line of Reporting

- - - Line of Communication

Appendix C

Calibration Certificate for
Construction Dust Monitoring
Equipment



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : M-A3	Date of Calibration: 13-Sep-19		
Location : S.K.H Tsoi Kung Po Secondary School	Next Calibration Date: 12-Dec-19		
Make: <table border="1"><tr><td>Tisch</td></tr></table>	Tisch	Technician: Yiu Lai	
Tisch			
Model: <table border="1"><tr><td>TE-5170</td></tr></table>	TE-5170	S/N: <table border="1"><tr><td>4388</td></tr></table>	4388
TE-5170			
4388			

CONDITIONS			
Sea Level Pressure (hPa):	1008.30	Corrected Pressure (mm Hg):	752
Temperature (°C):	32	Temperature (K):	305

CALIBRATION ORIFICE					
Make:	<table border="1"><tr><td>Tisch</td></tr></table>	Tisch	Qstd Slope:	<table border="1"><tr><td>1.33386</td></tr></table>	1.33386
Tisch					
1.33386					
Model:	<table border="1"><tr><td>TE-5025A</td></tr></table>	TE-5025A	Qstd Intercept:	<table border="1"><tr><td>-0.02601</td></tr></table>	-0.02601
TE-5025A					
-0.02601					
Calibration Date:	<table border="1"><tr><td>17-Oct-18</td></tr></table>	17-Oct-18	Expiry Date:	<table border="1"><tr><td>16-Oct-19</td></tr></table>	16-Oct-19
17-Oct-18					
16-Oct-19					
S/N:	<table border="1"><tr><td>2154</td></tr></table>	2154			
2154					

CALIBRATIONS							
Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	7.20	-6.00	13.200	2.697	56.00	55.04	Slope = 23.2902
13	5.20	-4.00	9.200	2.255	46.00	45.21	Intercept = -7.2654
10	4.60	-3.40	8.000	2.104	43.00	42.27	Corr. coeff.= 0.9990
7	3.00	-1.80	4.800	1.634	32.00	31.45	
5	1.80	-0.70	2.500	1.185	20.00	19.66	

Calculations:

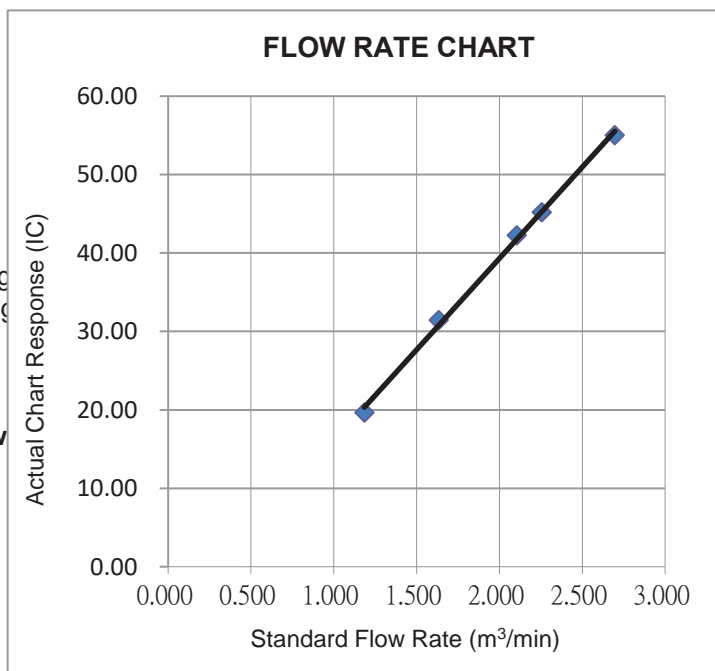
$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$
 $IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$

- Qstd = standard flow rate
- IC = corrected chart response
- I = actual chart response
- m = calibrator Qstd slope
- b = calibrator Qstd intercept
- Ta = actual temperature during calibration (deg C)
- Pa = actual pressure during calibration (mm Hg)
- Tstd = 298 deg K
- Pstd = 760 mm Hg

For subsequent calculation of sampler flow

$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$

- m = sampler slope
- b = sampler intercept
- I = chart response
- Tav = daily average temperature
- Pav = daily average pressure





Certificate of Calibration

Calibration Certification Information			
Cal. Date: October 17, 2018	Rootsmeter S/N: 438320	Ta: 294	°K
Operator: Jim Tisch		Pa: 755.7	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 2154		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4590	3.2	2.00
2	3	4	1	1.0410	6.4	4.00
3	5	6	1	0.9310	7.9	5.00
4	7	8	1	0.8840	8.8	5.50
5	9	10	1	0.7320	12.7	8.00

Data Tabulation					
Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
1.0035	0.6878	1.4197	0.9958	0.6825	0.8821
0.9993	0.9599	2.0078	0.9915	0.9525	1.2475
0.9973	1.0712	2.2448	0.9895	1.0629	1.3948
0.9961	1.1268	2.3543	0.9884	1.1180	1.4628
0.9909	1.3536	2.8394	0.9832	1.3432	1.7642
QSTD	m=	2.13015	QA	m=	1.33386
	b=	-0.04186		b=	-0.02601
	r=	0.99996		r=	0.99996

Calculations			
$Vstd = \Delta Vol \left(\frac{Pa - \Delta P}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)$	$Va = \Delta Vol \left(\frac{Pa - \Delta P}{Pa} \right)$		
$Qstd = Vstd / \Delta Time$	$Qa = Va / \Delta Time$		
For subsequent flow rate calculations:			
$Qstd = 1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$		$Qa = 1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$	

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: rootsmeter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION
US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

CALIBRATION CERTIFICATE

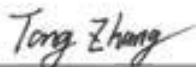
Date: May 28th, 2019

Equipment Name	:	Digital Dust Indicator, Model LD-3B
Code No.	:	080000-42
Quantity	:	1 unit
Serial No.	:	647594
Sensitivity	:	0.001 mg/m ³
Sensitivity Adjustment	:	752CPM
Scale Setting	:	May 24th, 2019

We hereby certify that the above mentioned instrment has been calibrated satisfactory.

Sincerely

SIBATA SCIENTIFIC TECHNOLOGY LTD.



Tong Zhang
Overseas & New Business Group
Overseas Sales Department



Appendix D

Calibration Certificate for
Construction Noise Monitoring
Equipment





CERTIFICATE OF CALIBRATION

Certificate No.: 19CA0905 03-03

Page: 1 of 2

Item tested

Description: Acoustical Calibrator (Class 1)
 Manufacturer: CASELLA
 Type/Model No.: CEL-120/1
 Serial/Equipment No.: 4358443 / N-36
 Adaptors used: -

Item submitted by

Customer: Furgo Technical Services Limited
 Address of Customer: -
 Request No.: -
 Date of receipt: 05-Sep-2019

Date of test: 09-Sep-2019

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	03-May-2020	SCL
Preamplifier	B&K 2673	2239857	17-May-2020	CEPREI
Measuring amplifier	B&K 2610	2346941	05-Jun-2020	CEPREI
Signal generator	DS 360	61227	10-May-2020	CEPREI
Digital multi-meter	34401A	US36087050	08-May-2020	CEPREI
Audio analyzer	8903B	GB41300350	13-May-2020	CEPREI
Universal counter	53132A	MY40003662	10-May-2020	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
 Relative humidity: 55 ± 10 %
 Air pressure: 1000 ± 5 hPa

Test specifications

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

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

Approved Signatory:



Feng Junqi

Date: 09-Sep-2019

Company Chop:



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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 19CA0905 03-03

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.

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	(Output level in dB re 20 μ Pa)
			Estimated Expanded Uncertainty dB
1000	94.00	93.39	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 = 0.011 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 = 1000.0 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 = 0.9 %**

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.

Calibrated by:

Date:

Fung Chi Yip
09-Sep-2019

- End -

Checked by:

Date:

Shek Kwong Tat
09-Sep-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.



CERTIFICATE OF CALIBRATION

Certificate No.: 19CA0905 03-02

Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone
Manufacturer:	CASELLA	-
Type/Model No.:	CEL-63X	CEL-251
Serial/Equipment No.:	4181568	03456
Adaptors used:	-	-

Item submitted by

Customer Name: Furgo Technical Services Limited
 Address of Customer: -
 Request No.: -
 Date of receipt: 05-Sep-2019

Date of test: 09-Sep-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-2020	CIGISMEC
Signal generator	DS 360	61227	26-Dec-2019	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
 Relative humidity: 55 ± 10 %
 Air pressure: 1000 ± 5 hPa

Test specifications

- 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.
- 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%.
- 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 responsiveness 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 Junq

Date: 10-Sep-2019

Company Chop:



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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 19CA0905 03-02

Page 2 of 2

1. Electrical Tests

The electrical tests were performed 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:	Uncertainty (dB) / Coverage Factor	
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	Pass	1.6	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	
	A	Pass	0.3	
	C	Pass	0.3	
Frequency weightings	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	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 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.

Calibrated by:

Date:


Fung Chi Yip
09-Sep-2019

- End -

Checked by:

Date:


Shek Kwong Tai
10-Sep-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.



Test Data for Sound Level Meter

Page 1 of 5

Sound level meter type: CEL-63X Serial No. 4181568 Date 09-Sep-2019
Microphone type: CEL-251 Serial No. 03456
Report: 19CA0905 03-02

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	15.9	dB
Noise level in C weighting	19.8	dB
Noise level in Lin	26.5	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	109.0	109.0	0.7	0.0	0.0
114.0	114.0	114.0	0.7	0.0	0.0
119.0	119.0	119.0	0.7	0.0	0.0
124.0	124.0	124.0	0.7	0.0	0.0
129.0	129.0	129.0	0.7	0.0	0.0
134.0	134.0	134.0	0.7	0.0	0.0
135.0	135.0	135.0	0.7	0.0	0.0
136.0	136.0	136.0	0.7	0.0	0.0
137.0	137.0	137.0	0.7	0.0	0.0
138.0	138.0	138.0	0.7	0.0	0.0
139.0	139.0	139.0	0.7	0.0	0.0
140.0	140.0	140.0	0.7	0.0	0.0
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	74.0	74.0	0.7	0.0	0.0
69.0	69.0	69.0	0.7	0.0	0.0
64.0	64.0	64.0	0.7	0.0	0.0
59.0	59.0	59.0	0.7	0.0	0.0
54.0	54.0	54.0	0.7	0.0	0.0
49.0	48.9	48.9	0.7	-0.1	-0.1



Test Data for Sound Level Meter

Page 2 of 5

Sound level meter type:	CEL-63X	Serial No.	4181568	Date	09-Sep-2019
Microphone type:	CEL-251	Serial No.	03456	Report: 19CA0905 03-02	
44.0	44.0	44.0	0.7	0.0	0.0
39.0	39.0	39.0	0.7	0.0	0.0
34.0	34.0	34.0	0.7	0.0	0.0
33.0	33.0	33.0	0.7	0.0	0.0
32.0	32.0	32.0	0.7	0.0	0.0
31.0	31.1	31.1	0.7	0.1	0.1
30.0	30.1	30.1	0.7	0.1	0.1

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

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	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
20-140	30.0	30.1	0.7	0.1
	138.0	138.0	0.7	0.0

FREQUENCY WEIGHTING TEST

The frequency response of the weighting networks 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 Hz	Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
				+	-	
1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	54.6	54.7	1.5	1.5	0.1
63.1	94.0	67.8	67.8	1.5	1.5	0.0
125.9	94.0	77.9	77.9	1.0	1.0	0.0
251.2	94.0	85.4	85.3	1.0	1.0	-0.1
501.2	94.0	90.8	90.7	1.0	1.0	-0.1
1995.0	94.0	95.2	95.2	1.0	1.0	0.0
3981.0	94.0	95.0	94.9	1.0	1.0	-0.1
7943.0	94.0	92.9	92.6	1.5	3.0	-0.3
12590.0	94.0	89.7	88.3	3.0	6.0	-1.4

Frequency weighting C:

Frequency Hz	Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
				+	-	
1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	91.0	90.9	1.5	1.5	-0.1
63.1	94.0	93.2	93.1	1.5	1.5	-0.1
125.9	94.0	93.8	93.8	1.0	1.0	0.0



Test Data for Sound Level Meter

Page 3 of 5

Sound level meter type: CEL-63X Serial No. 4181568 Date 09-Sep-2019
Microphone type: CEL-251 Serial No. 03456
Report: 19CA0905 03-02

251.2	94.0	94.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	94.0	1.0	1.0	0.0
1995.0	94.0	93.8	93.8	1.0	1.0	0.0
3981.0	94.0	93.2	93.1	1.0	1.0	-0.1
7943.0	94.0	91.0	90.7	1.5	3.0	-0.3
12590.0	94.0	87.8	86.4	3.0	6.0	-1.4

Frequency weighting Lin:

Frequency Hz	Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
				+	-	
1000.0	94.0	94.0	94.0	0.0	0.0	0.0
31.6	94.0	94.0	93.9	1.5	1.5	-0.1
63.1	94.0	94.0	94.0	1.5	1.5	0.0
125.9	94.0	94.0	94.0	1.0	1.0	0.0
251.2	94.0	94.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	94.0	1.0	1.0	0.0
1995.0	94.0	94.0	94.0	1.0	1.0	0.0
3981.0	94.0	94.0	93.9	1.0	1.0	-0.1
7943.0	94.0	94.0	94.0	1.5	3.0	0.0
12590.0	94.0	94.0	93.8	3.0	6.0	-0.2

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 dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
			+	-	
136.0	135.0	134.9	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 dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation dB
			+	-	
136.0	131.9	131.9	1.0	1.0	0.0

PEAK RESPONSE TEST

The onset time of the peak detector is tested on the reference range by comparing the response to a 100 us rectangular test pulse with the response to a 10 ms reference pulse of the same amplitude. The amplitude of the 10 ms reference pulse is such as to produce an indication 1 dB below the upper limit of the primary indicator range.

Positive polarities: (Weighting Z, set the generator signal to single, Lzpeak)

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
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Test Data for Sound Level Meter

Page 4 of 5

Sound level meter type: CEL-63X Serial No. 4181568 Date 09-Sep-2019
Microphone type: CEL-251 Serial No. 03456
Report: 19CA0905 03-02

dB	dB	dB	+/- dB	dB
139.0	139.0	139.5	2.0	0.5

Negative polarities:

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
139.0	139.0	139.5	2.0	0.5

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 weighting	dB	dB	indication(dB)	+/- dB	dB
Slow	136.0+6.6	136.0	135.7	0.5	-0.3

TIME WEIGHTING IMPULSE TEST

Time weighting I is tested on the reference range (Set the SLM to LAImax)

Test frequency: 2000 Hz
Amplitude: The upper limit of the primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
140.0	131.2	130.1	2.0	-1.1

Repeated at 100 Hz

Ref. Level	Repeated burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
140.0	137.3	136.9	1.0	-0.4

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	110.0	110.0	109.9	1.0	-0.1	60s integ.
10000	100.0	100.0	99.9	1.0	-0.1	6min. integ.

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



Test Data for Sound Level Meter

Page 5 of 5

Sound level meter type: CEL-63X Serial No. 4181568 Date 09-Sep-2019
Microphone type: CEL-251 Serial No. 03456 Report: 19CA0905 03-02

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	138.0	108.0	107.8	1.7	-0.2

The integrating sound level meter set to SEL:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10.0	138.0	118.0	118.0	1.7	0.0

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
134.9	133.9	130.9	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
141.3	140.3	100.3	100.1	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
		Measured (dB)			
Hz	dB		+ -		dB
1000	94.0	94.0	0.0 0.0		0.0
125	77.9	78.0	1.0 1.0		0.1
8000	92.9	92.6	1.5 3.0		-0.3

-----END-----

Appendix E

Environmental Monitoring

Schedule

Project: Contract No. HY/2018/08 Central Kowloon Route – Central Tunnel

Impact Monitoring Schedule for the Reporting Period (October 2019)

Sun	Mon	Tue	Wed	Thur	Fri	Sat
		1 October	2 Dust Monitoring Noise Monitoring (08:30-12:30)	3	4	5
6	7 Dust Monitoring Noise Monitoring (08:30-12:30)	8 Dust Monitoring Noise Monitoring (08:30-12:30)	9	10	11	12
13	14 Dust Monitoring Noise Monitoring (08:30-12:30)	15	16	17	18 Dust Monitoring Noise Monitoring (08:30-12:30)	19
20	21	22	23	24 Dust Monitoring Noise Monitoring (08:30-12:30)	25	26
27	28	29	30 Dust Monitoring Noise Monitoring (08:30-12:30)	31		

Remarks

- Actual monitoring may be subjected to change due to any safety concern or adverse weather condition;
- Dust Monitoring: 24-hours TSP Monitoring per 6 days, and 3 x 1-hour TSP Monitoring per 6 days;
- Noise Monitoring: Leq (30 min) between 0700 and 1900 hours;
- Monitoring Location: M-A3 and M-N3: SKH Tsoi Kung Po Secondary School.

Project: Contract No. HY/2018/08 Central Kowloon Route – Central Tunnel

Impact Monitoring Schedule for Next Reporting Period (November 2019)

Sun	Mon	Tue	Wed	Thur	Fri	Sat
					1 November	2
3	4	5 Dust Monitoring Noise Monitoring (13:00-17:00)	6	7	8	9
10	11 Dust Monitoring Noise Monitoring (08:30-12:30)	12	13	14	15 Dust Monitoring Noise Monitoring (08:30-12:30)	16
17	18	19	20	21 Dust Monitoring Noise Monitoring (13:00-17:00)	22	23
24	25	26	27 Dust Monitoring Noise Monitoring (08:30-12:30)	28	29	30

Remarks

- Actual monitoring may be subjected to change due to any safety concern or adverse weather condition;
- Dust Monitoring: 24-hours TSP Monitoring per 6 days, and 3 x 1-hour TSP Monitoring per 6 days;
- Noise Monitoring: Leq (30 min) between 0700 and 1900 hours;
- Monitoring Location: M-A3 and M-N3: SKH Tsoi Kung Po Secondary School.

Appendix F

Action and Limit Levels for
Construction Dust and Noise
Monitoring

Table F-1 Action and Limit Levels for 1-hour TSP

Station ID	Location	Action Level	Limit Level
M-A3	SKH Tsoi Kung Po Secondary School	333 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$

Table F-2 Action and Limit Levels for 24-hour TSP

Station ID	Location	Action Level	Limit Level
M-A3	SKH Tsoi Kung Po Secondary School	153 $\mu\text{g}/\text{m}^3$	260 $\mu\text{g}/\text{m}^3$

Table F-3 Action and Limit Levels for Construction Noise (0700 – 1900 hour of normal weekdays)

Station ID	Location	Action Level	Limit Level
M-N3	SKH Tsoi Kung Po Secondary School	When one documented compliant is received	For Schools: 70dB(A) during normal teaching period and 65 dB(A) during examination periods

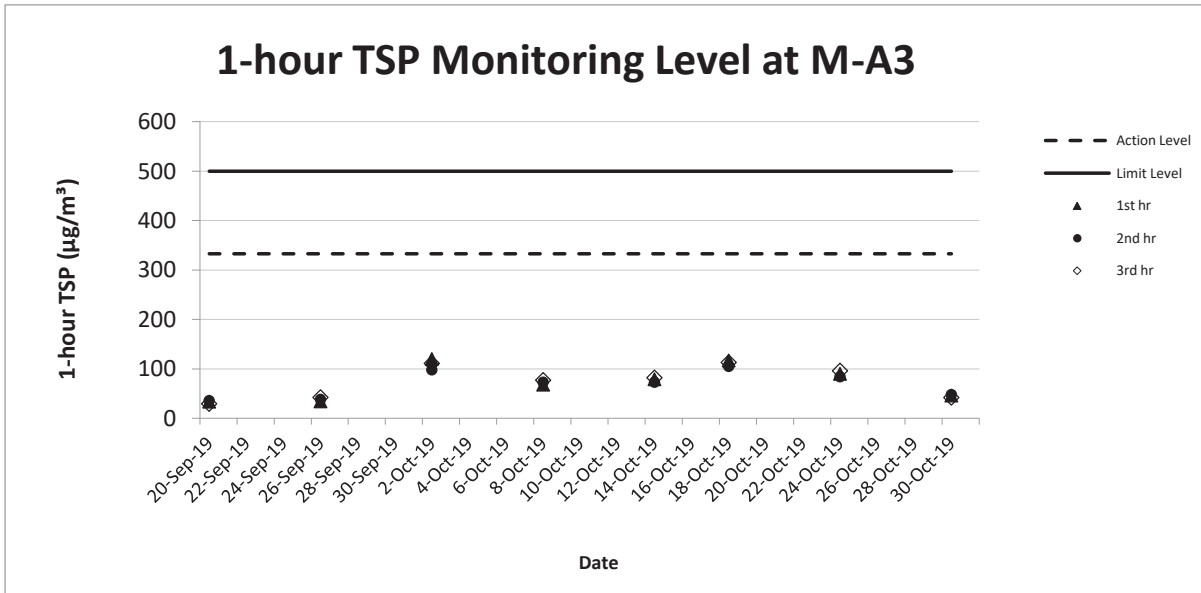
Appendix G

Construction Dust Monitoring
Results and Meteorological
Observations

1-hour TSP Monitoring Result for Contract No. HY/2018/08 Central Kowloon Route – Central Tunnel

M-A3 - SKH Tsoi Kung Po Secondary School

1-hour TSP ($\mu\text{g}/\text{m}^3$)								
Date	Start Time	1st hr	2nd hr	3rd hr	Average	Action Level	Limit Level	Weather
2-Oct-19	9:40	120	98	111	110	333	500	Sunny
8-Oct-19	13:00	68	73	77	73			Fine
14-Oct-19	13:15	79	73	82	78			Fine
18-Oct-19	13:48	117	105	113	112			Sunny
24-Oct-19	9:10	90	84	96	90			Fine
30-Oct-19	9:45	46	48	42	45			Fine
Average		85						
Max		120						
Min		42						



24-hour TSP Monitoring Result for Contract No. HY/2018/08 Central Kowloon Route – Central Tunnel

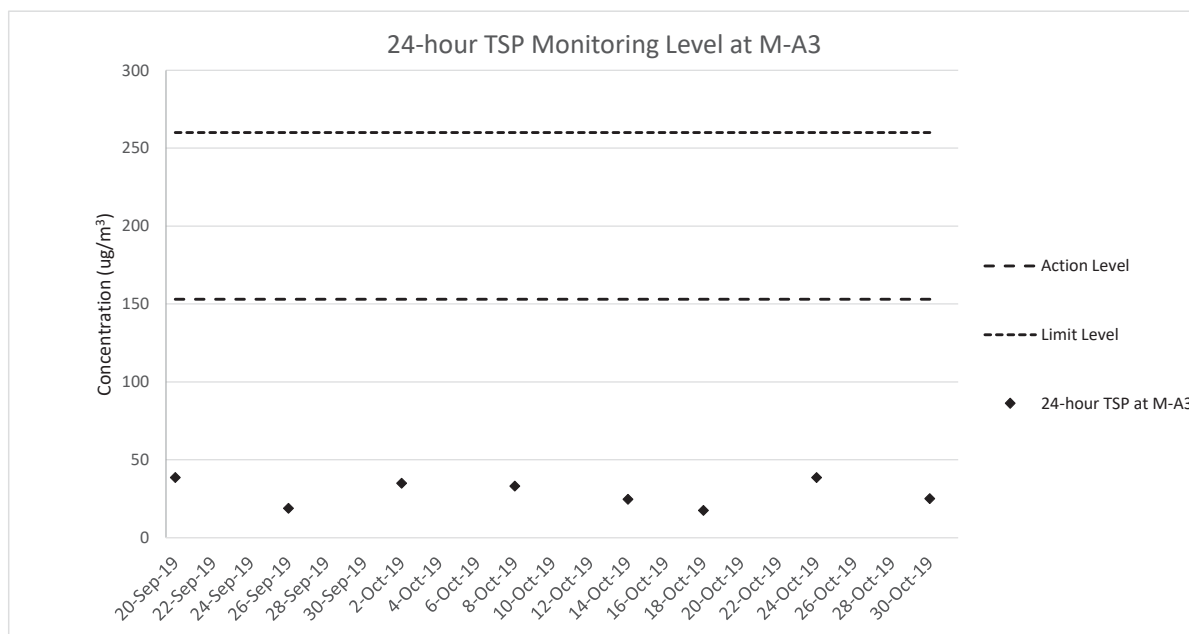
M-A3 - SKH Tsoi Kung Po Secondary School

Start Date	Weather Condition	Air Temperature (K)	Atmospheric Pressure, Pa (mmHg)	Filter Weight (g)		Particulate weight (g)	Sampling Time (hrs)	Flow Rate (m ³ /min.)		Average flow (m ³ /min)	Total volume (m ³)	Conc. (ug/m ³)	Action Level (ug/m ³)	Limit Level (ug/m ³)
				Initial	Final			Initial	Final					
2-Oct-19	Sunny	302.5	758.5	2.6362	2.7208	0.0846	24	1.67	1.69	1.68	2419.3	35	153	260
8-Oct-19	Fine	300.7	761.1	2.7575	2.8378	0.0803	24	1.68	1.69	1.68	2424.0	33		
14-Oct-19	Fine	298.8	763.3	2.6557	2.7156	0.0599	24	1.69	1.69	1.69	2428.5	25		
18-Oct-19	Sunny	299.5	762.7	2.7253	2.7440	0.0187	24	0.74	0.74	0.74	1067.3	18		
24-Oct-19	Fine	299.2	761.2	2.7609	2.8546	0.0937	24	1.68	1.69	1.69	2426.5	39		
30-Oct-19	Fine	297	762.6	2.7698	2.8308	0.0610	24	1.69	1.69	1.69	2431.1	25		
												Min		
												Max	39	
												Average	29	

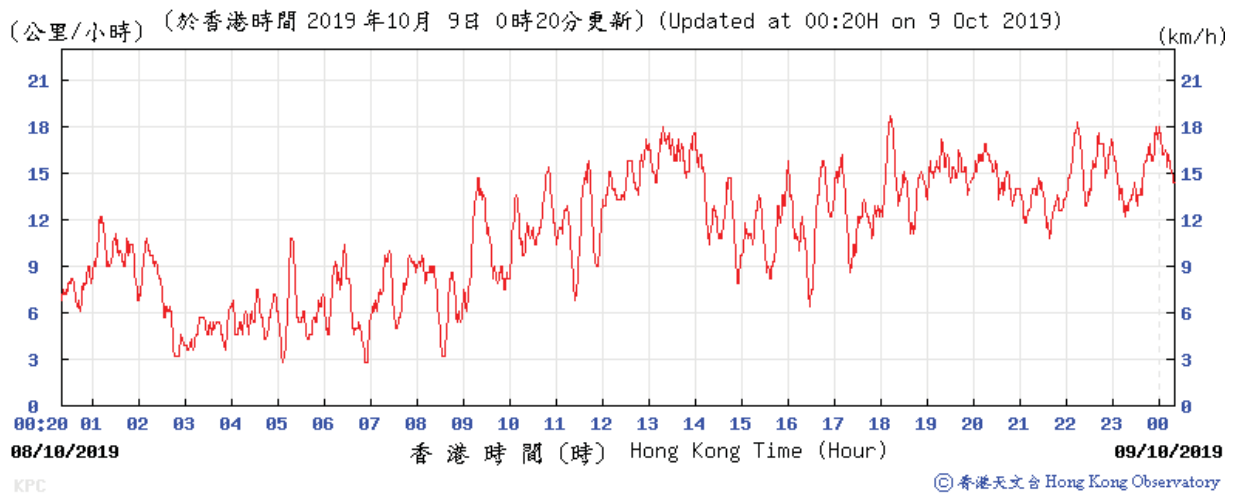
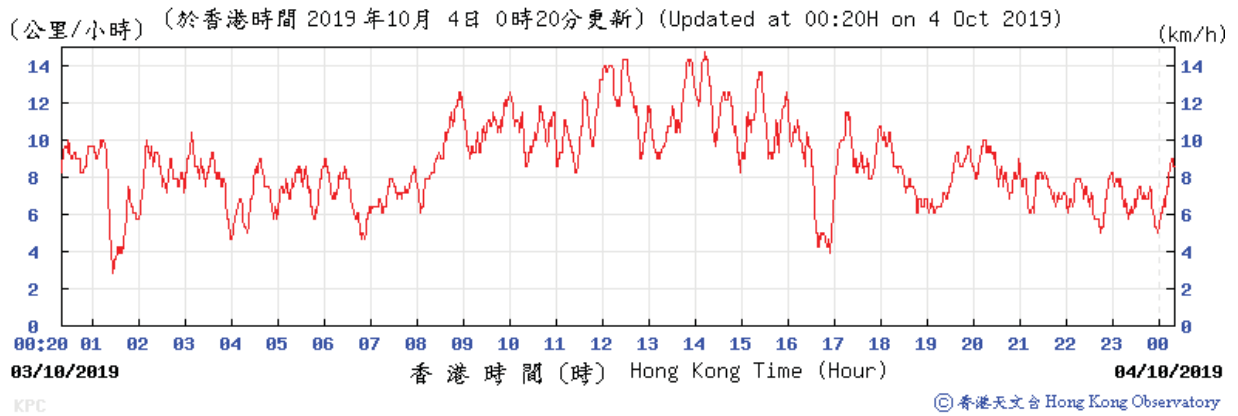
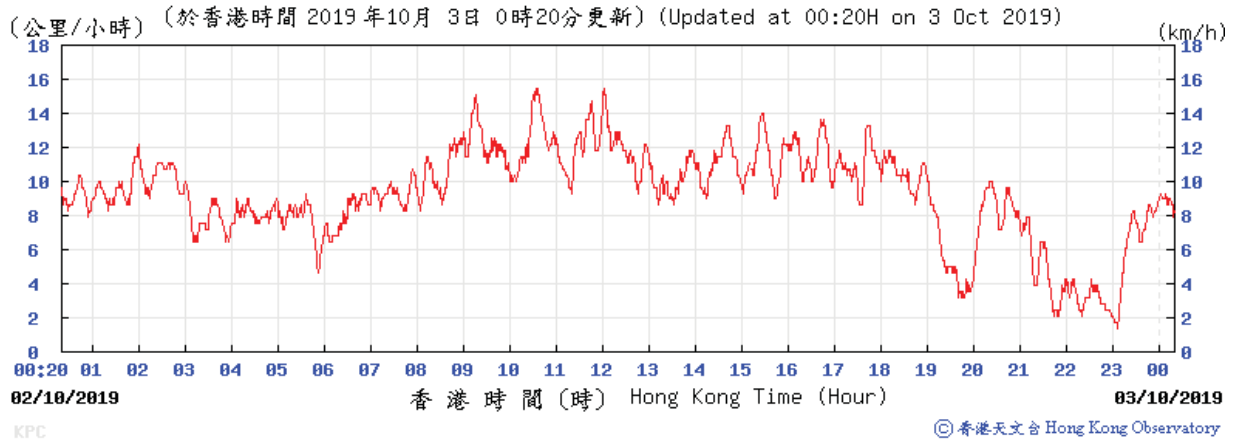
Note:

Underline: Exceedance of Action Level

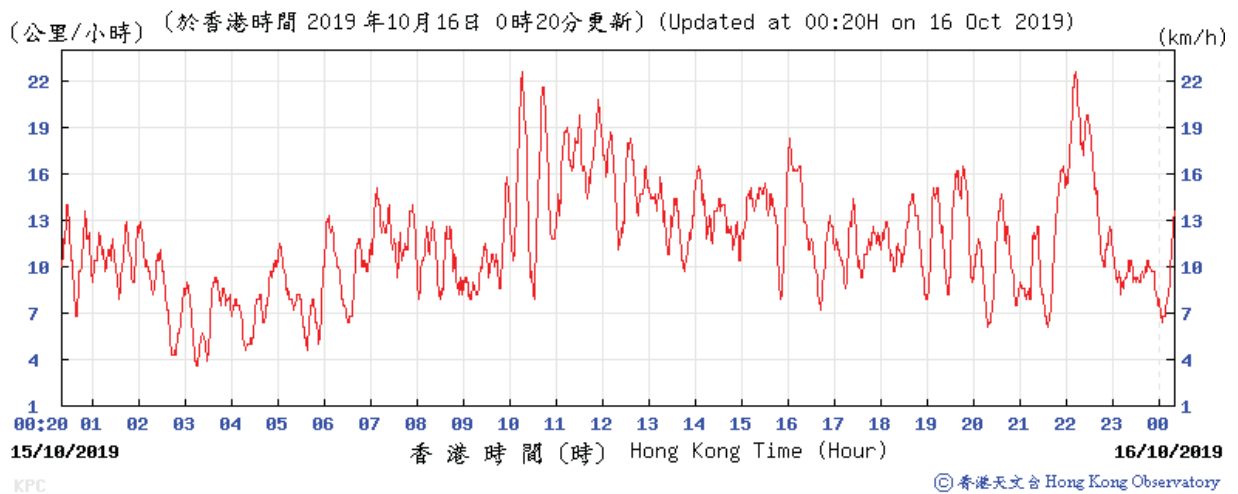
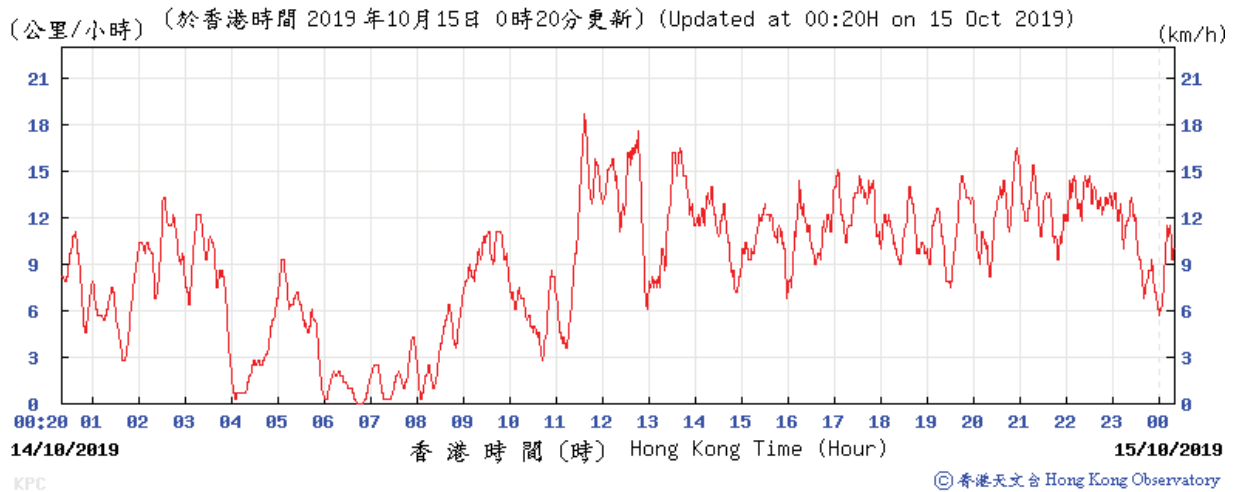
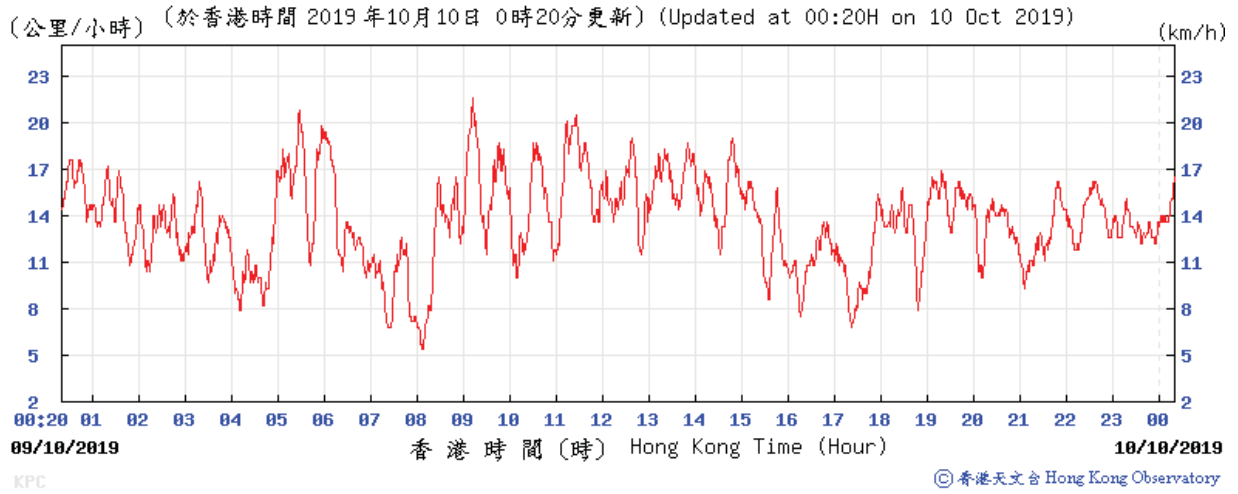
Underline and Bold: Exceedance of Limit Level



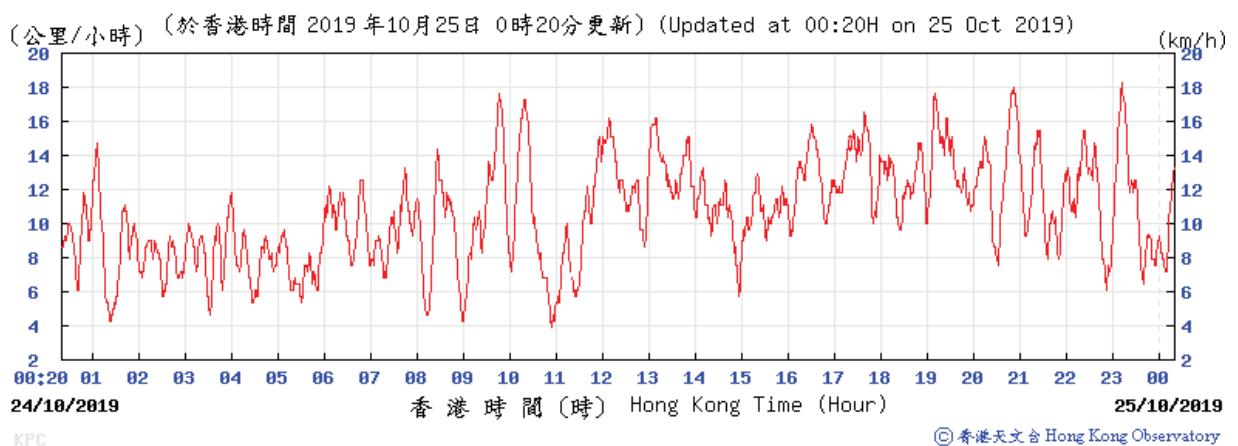
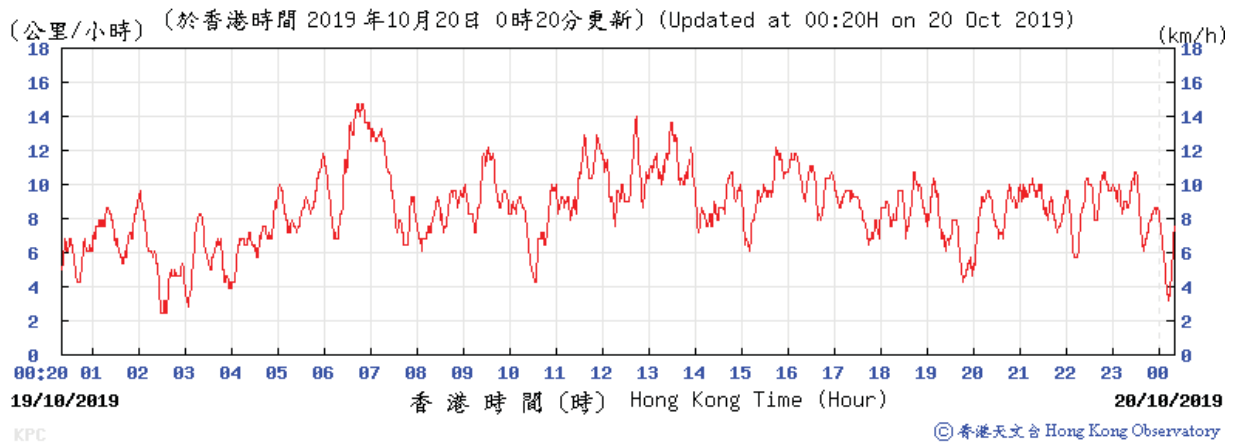
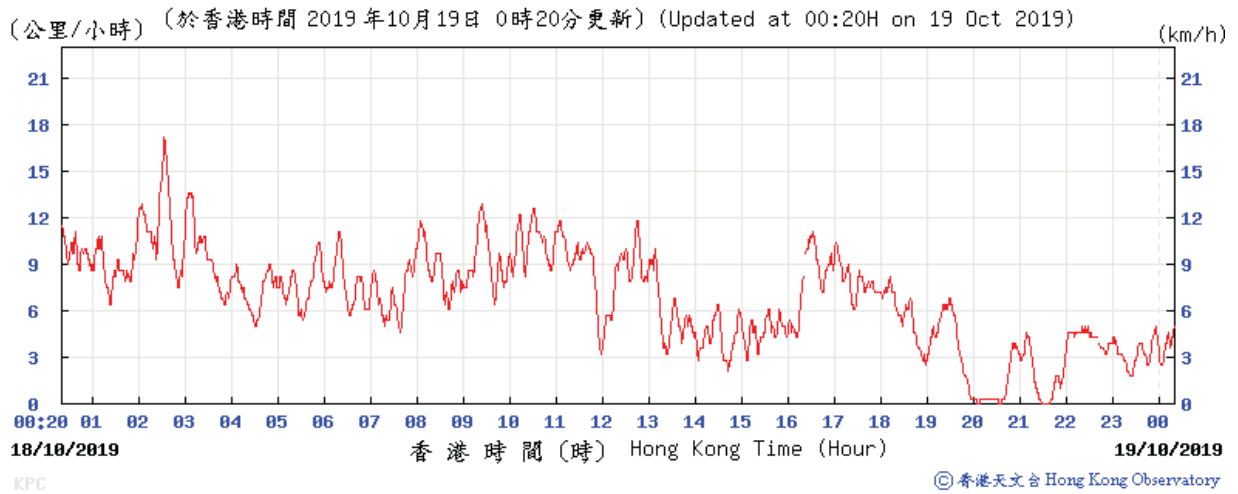
Wind Speed recorded at King's Park Meteorological Station on 2, 3 and 8 Oct 2019



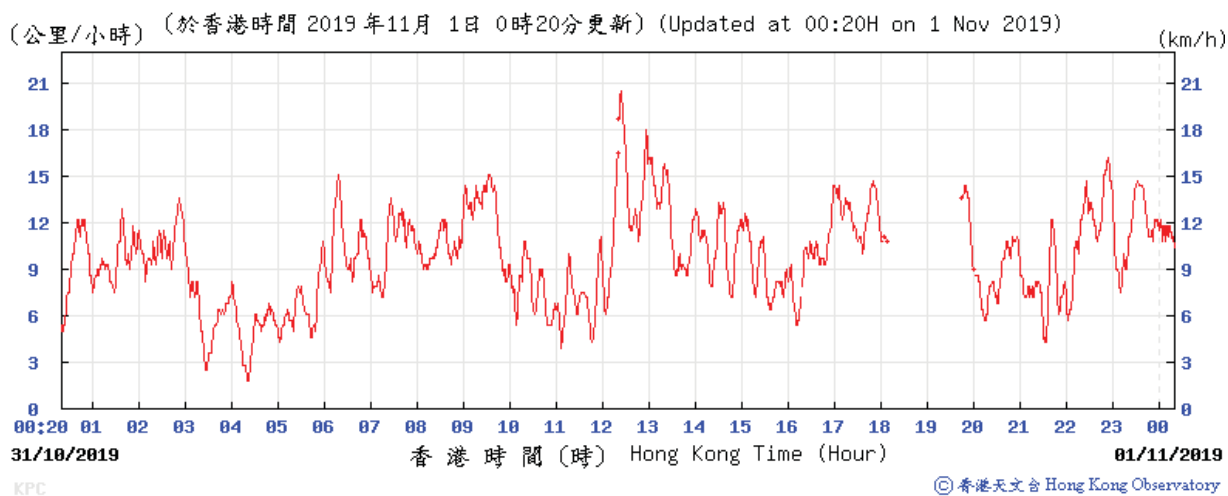
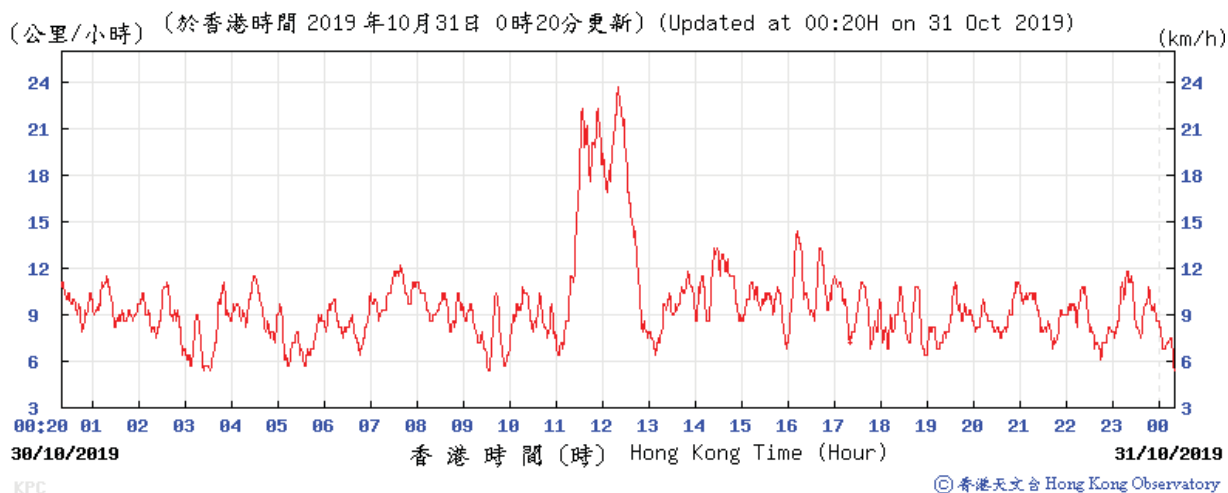
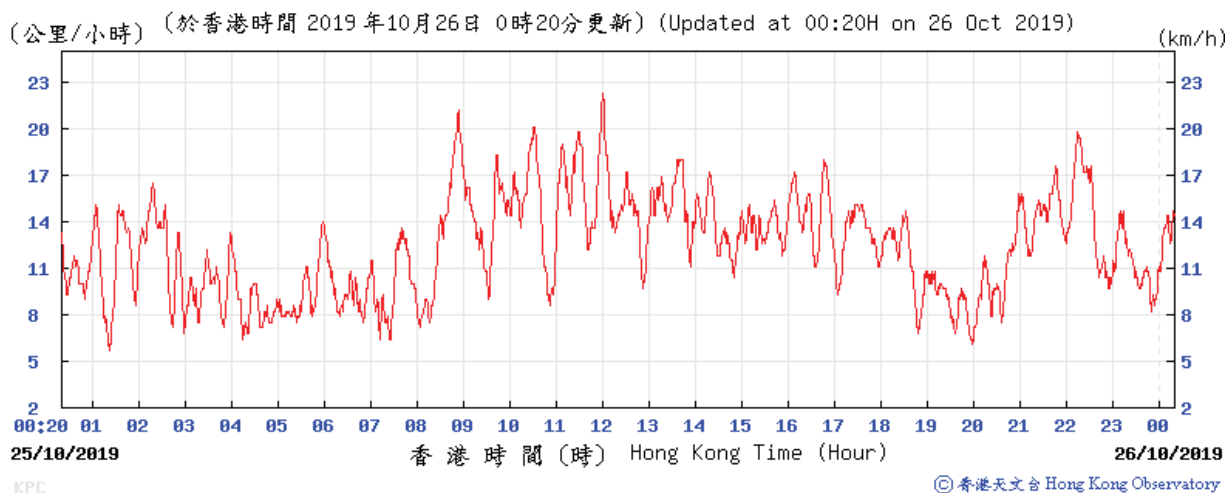
Wind Speed recorded at King's Park Meteorological Station on 9, 14 and 15 Oct 2019



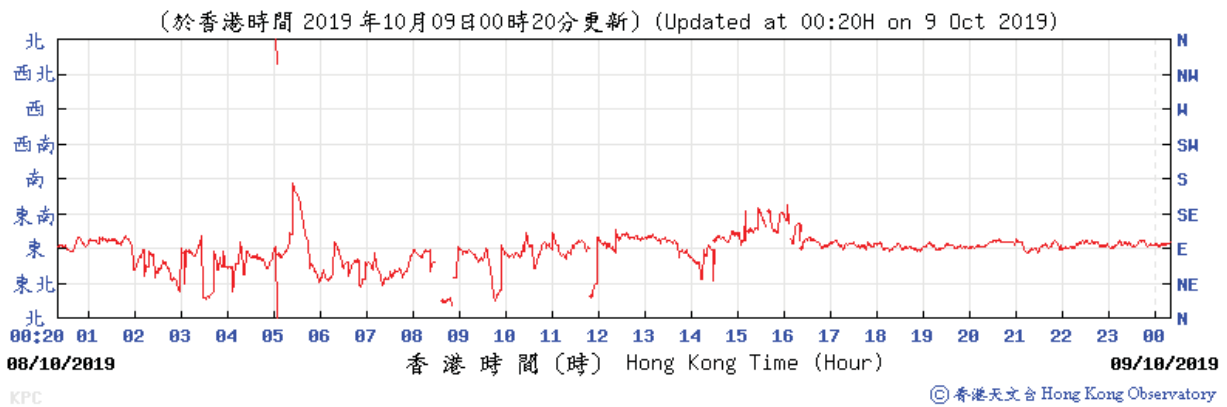
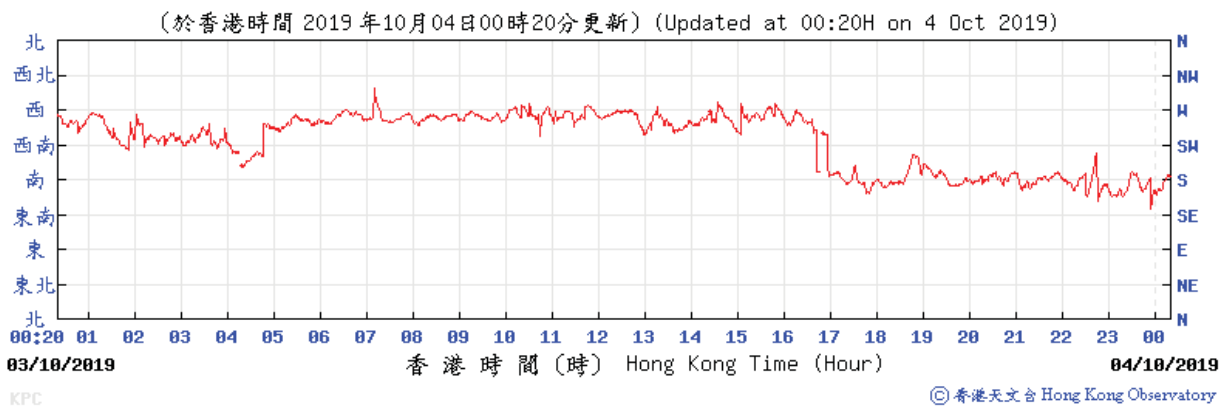
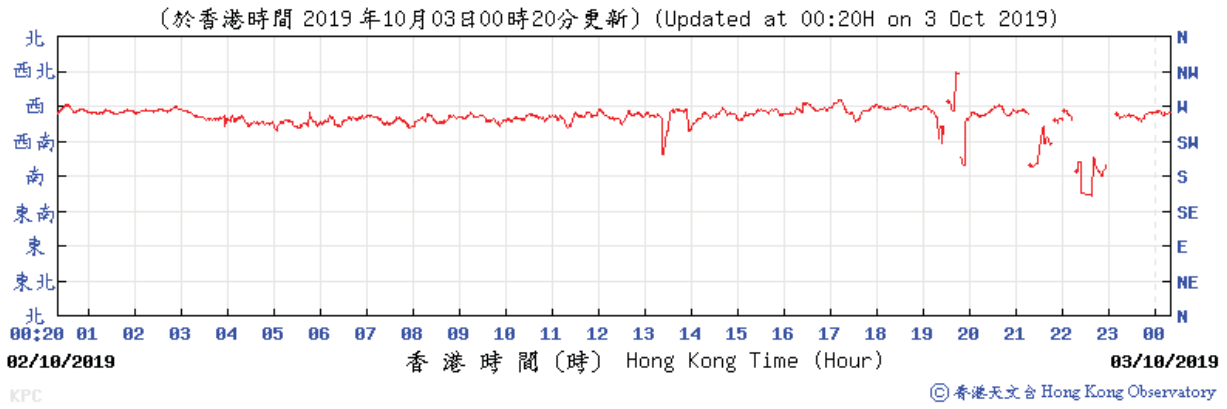
Wind Speed recorded at King's Park Meteorological Station on 18, 19 and 24 Oct 2019



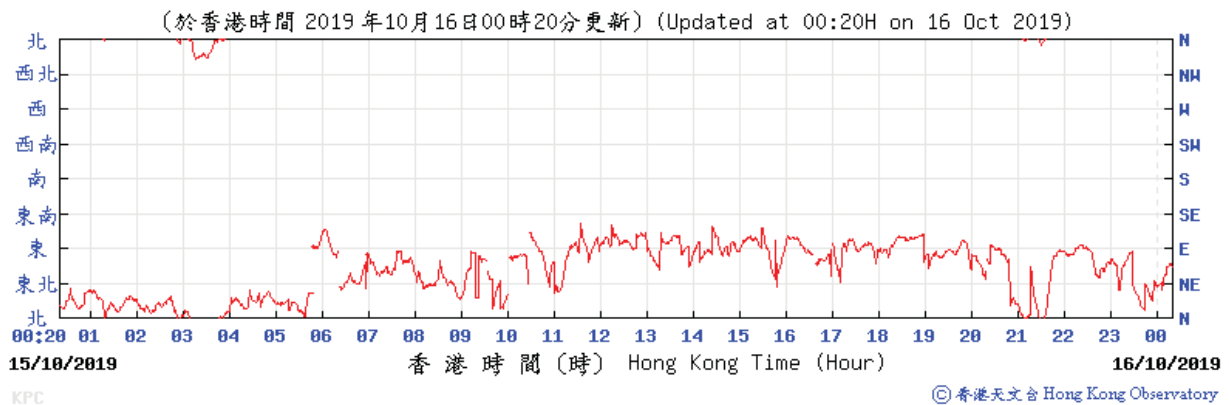
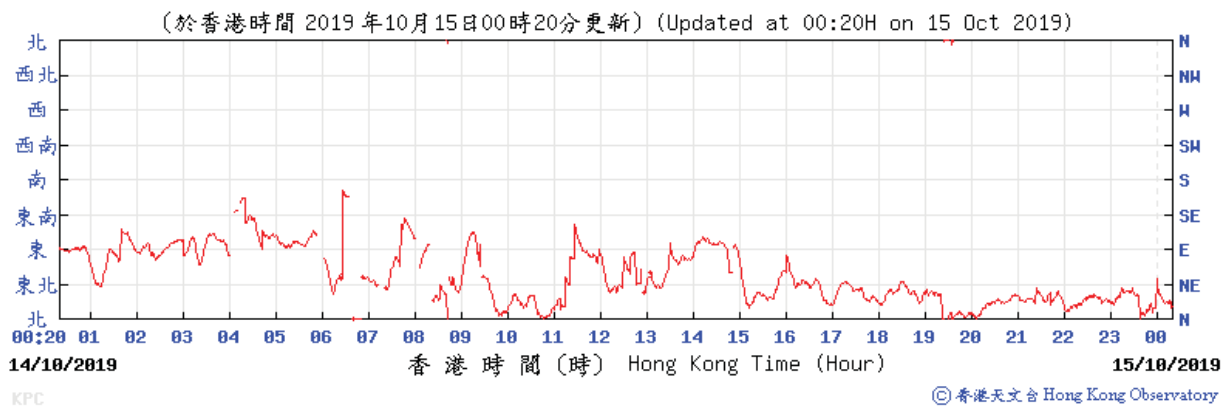
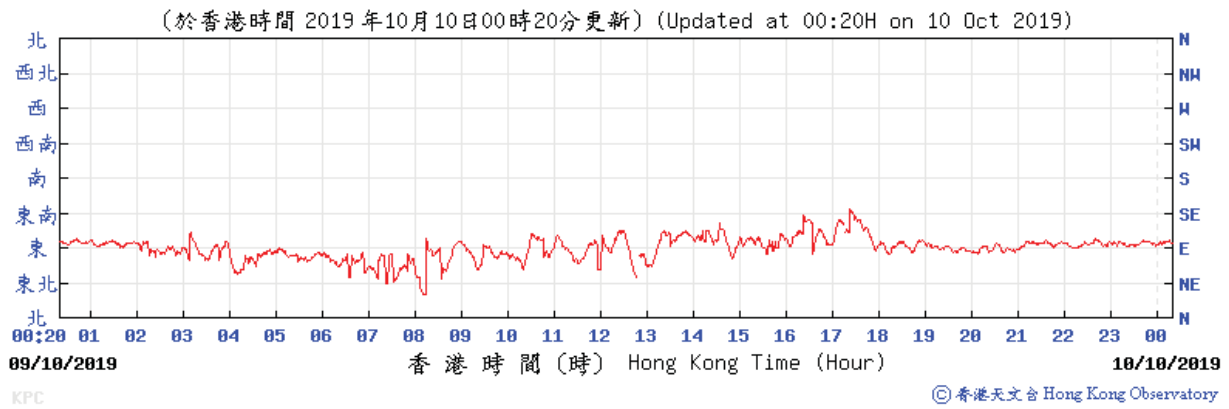
Wind Speed recorded at King's Park Meteorological Station on 25, 30 and 31 Oct 2019



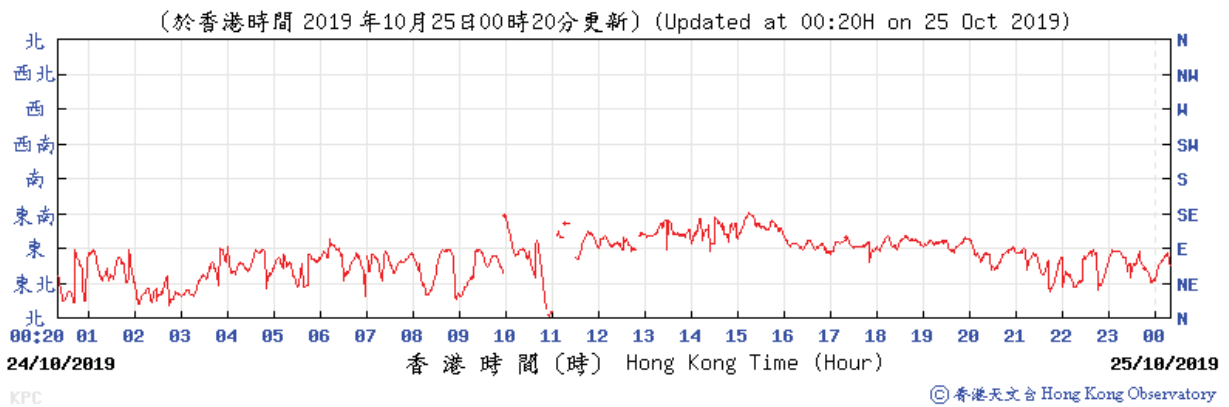
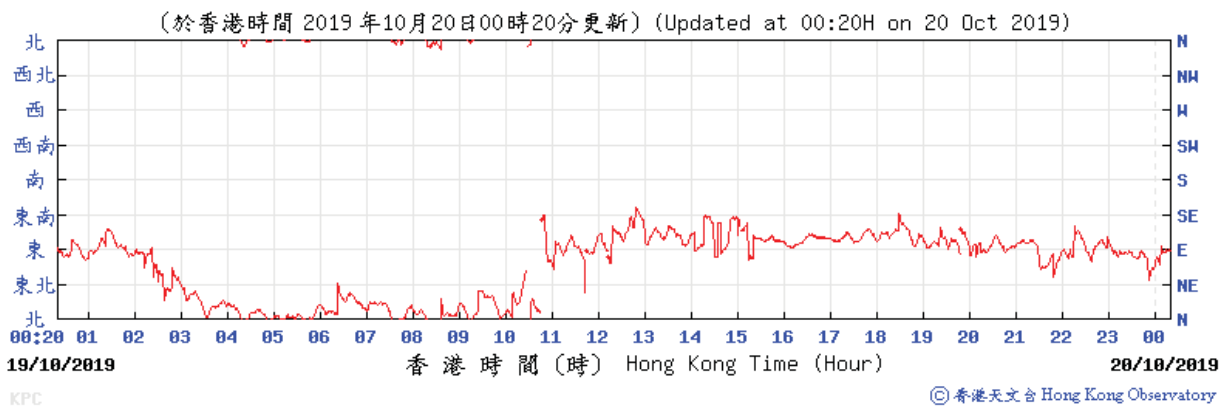
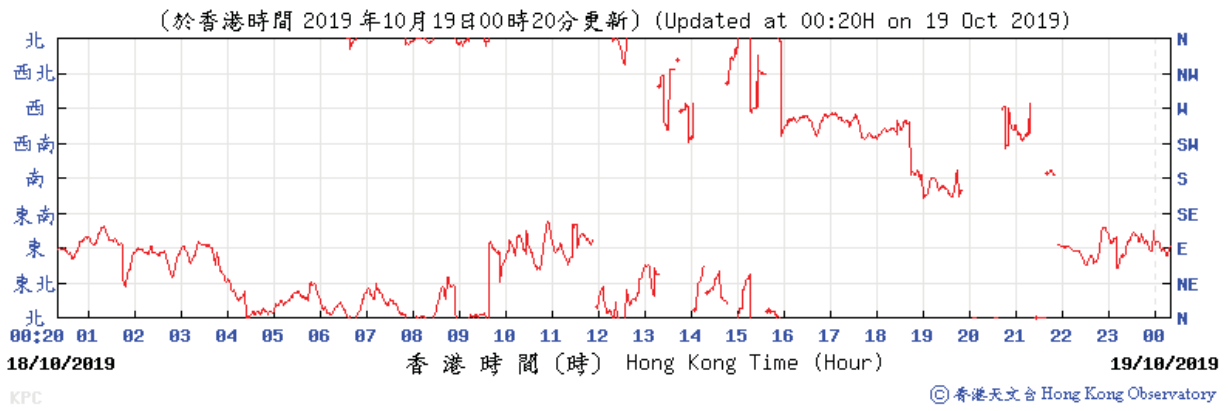
Wind Direction recorded at King's Park Meteorological Station on 2, 3 and 8 Oct 2019



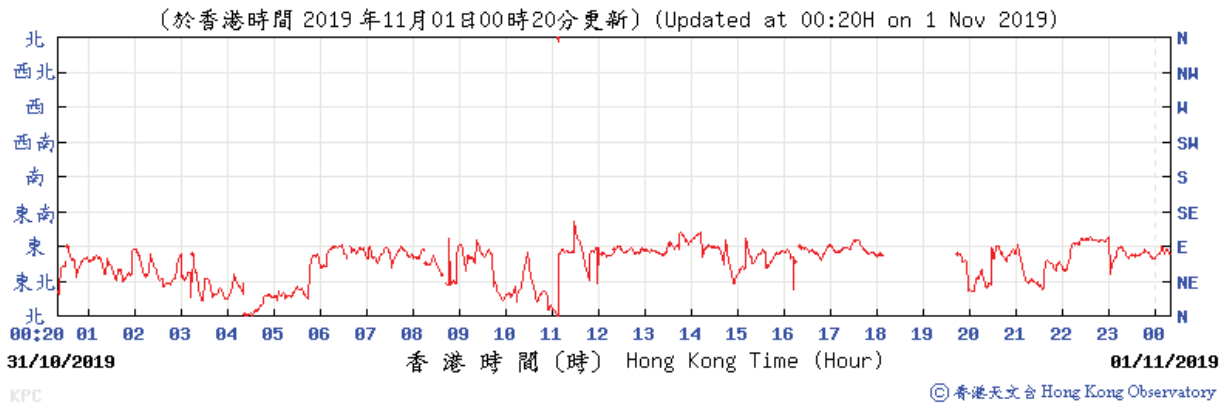
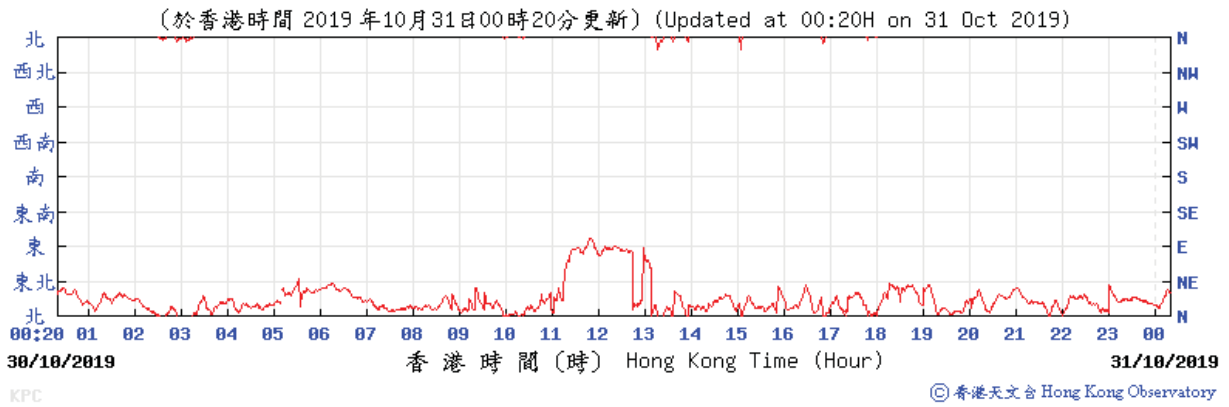
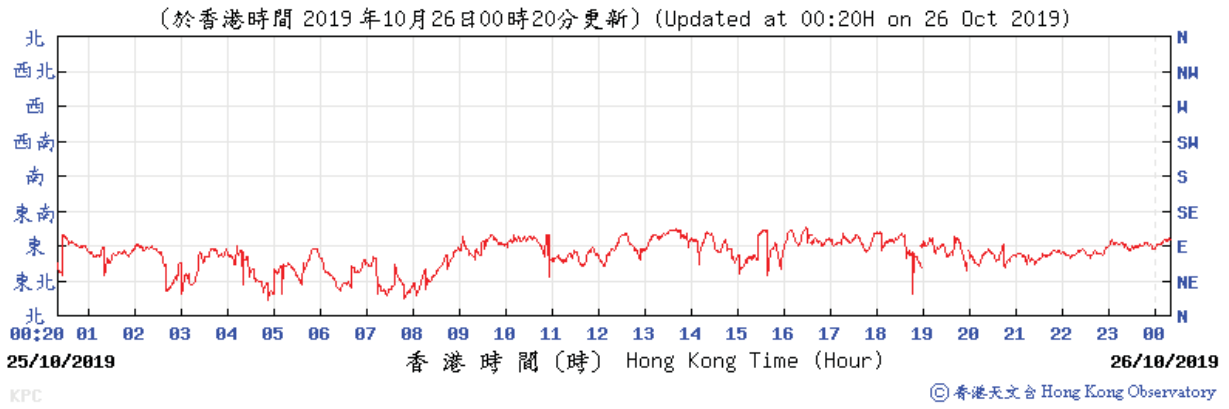
Wind Direction recorded at King's Park Meteorological Station on 9, 14 and 15 Oct 2019



Wind Direction recorded at King's Park Meteorological Station on 18, 19 and 24 Oct 2019



Wind Direction recorded at King's Park Meteorological Station on 25, 30 and 31 Oct 2019



Appendix H

Construction Noise Monitoring

Results

Noise Impact Monitoring Result for Contract No. HY/2018/08 Central Kowloon Route – Central Tunnel

M-N3 - SKH Tsoi Kung Po Secondary School

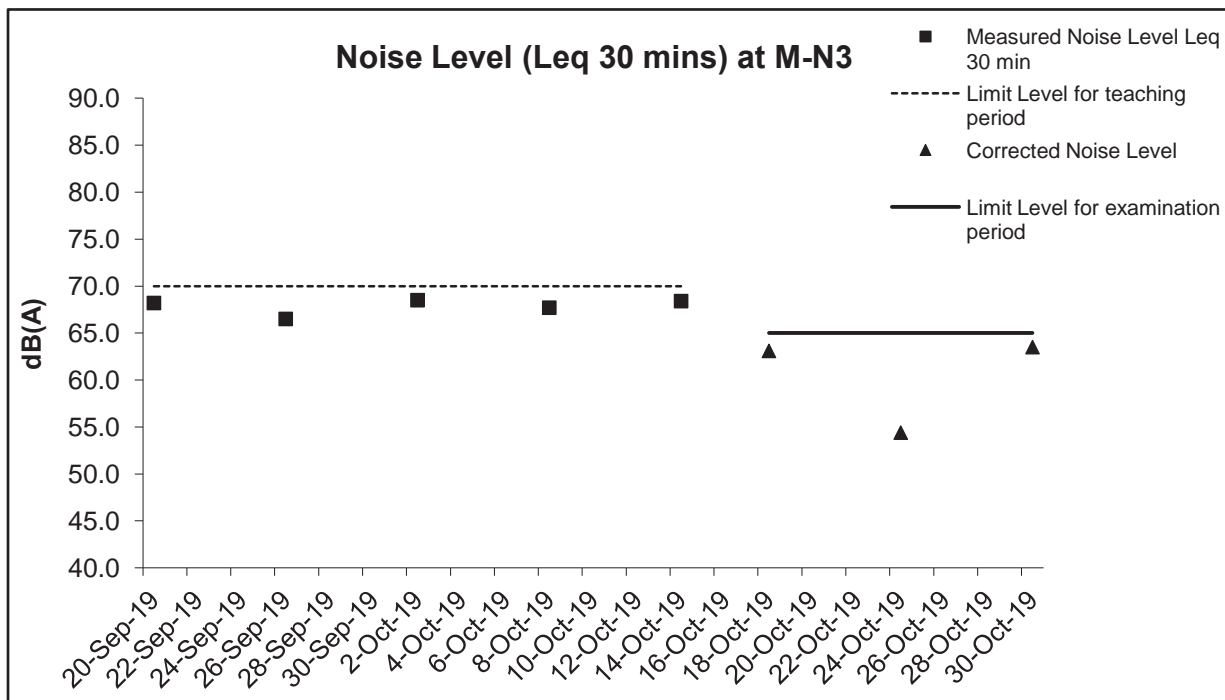
Date	Start Time	Measured Noise Level Leq 30min dB(A)	Corrected Noise Level* dB(A)	L10 dB(A)	L90 dB(A)	Wind Speed (m/s)	Weather
2-Oct-19	09:40	68.5	NA	71.5	61.0	3.3	Sunny
8-Oct-19	13:12	67.7	NA	71.0	63.5	4.0	Fine
14-Oct-19	13:21	68.4	NA	72.5	64.3	2.8	Fine
18-Oct-19	13:49	69.0	63.1	72.5	62.0	1.6	Sunny
24-Oct-19	09:15	67.9	54.4	70.5	62.0	2.2	Fine
30-Oct-19	10:00	69.1	63.5	71.0	67.5	1.7	Fine
Max		69.1	63.5				
Min		67.7	54.4				
Limit Level		70[^]	65[^]				

Notes:

Free field noise levels were adjusted with a correlation of +3 dB(A).

* Corrected Noise Level = Measured Noise Level - Baseline Noise Level (i.e. 67.7 dB(A)); NA refers to Not Applied as the Measured Noise Level < Limit Level.

[^]The Limit Level was 70 dB(A) for teaching period (from 2 to 14 Oct 2019) and 65 dB(A) for examination period (from 18 to 30 Oct 2019).



Remark: Corrected Noise Level was applied on 18, 24 and 30 October 2019; Corrected Noise Level = Measured Noise Level - Baseline Noise Level (i.e. 67.7 dB(A))

Appendix I

Event and Action Plan

Table I-1 Event and Action Plan for Construction Dust Monitoring

EVENT	Action			
	ET	IEC	ER	Contractor
Action Level				
Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method. 	<ol style="list-style-type: none"> 1. Notify Contractor. 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC and ER; 3. Advise the 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 IEC and ER; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ET on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Submit proposals for remedial to ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.

Table I-1 Event and Action Plan for Construction Dust Monitoring (Continued)

EVENT	Action			
	ET	IEC	ER	Contractor
<p>Limit Level</p> <p>Exceedance for one sample</p>	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform ER, Contractor and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
<p>Exceedance for two or more consecutive samples</p>	<ol style="list-style-type: none"> 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; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 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; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 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. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Table I-2 Event and Action Plan for Construction Noise Monitoring

EVENT	Action			
	ET	IEC	ER	Contractor
Exceedance of Action Level	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Notify IEC and Contractor; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 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 are properly implemented. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals.
Exceedance of Limit Level	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 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; 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. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Table I-3 Event and Action Plan for Landscape and Visual during construction phase

EVENT	Action			
	ET	IEC	ER	Contractor
Non-conformity on one occasion	<ol style="list-style-type: none"> 1. Identify source(s); 2. Inform the Contractor, IEC and ER; 3. Discuss remedial actions and preventive measures with IEC, ER and Contractor; 4. Monitor remedial action(s) and preventive measures until rectification has been completed. 	<ol style="list-style-type: none"> 1. Check inspection report; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measure(s) and preventive measure(s); 4. Advise ER on effectiveness of proposed remedial measure(s) and preventive measure(s); 5. Check implementation of proposed remedial measure(s) and preventive measure(s). 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of non-conformity in writing; 2. Notify the Contractor; 3. Review and agree on the remedial measure(s) and preventive measures proposed by the Contractor; 4. Check implementation of remedial measure(s) and preventive measures. 	<ol style="list-style-type: none"> 1. Identify source and investigate the non-conformity; 2. Implement remedial measure(s) and preventive measure(s); 3. Amend working methods agreed with ER as appropriate; 4. Rectify damage and undertake any necessary replacement.
Repeat Non-conformity	<ol style="list-style-type: none"> 1. Identify source(s); 2. Inform Contractor, IEC and ER; 3. Discuss inspection frequency; 4. Discuss remedial action(s) and preventive measures with IEC, ER and Contractor; 5. Monitor remedial action(s) and preventive measure(s) until rectification has been completed; 6. If non-conformity stops, cease any additional monitoring. 	<ol style="list-style-type: none"> 1. Check inspection report; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measure(s) and preventive measure(s) 4. Advise ER on effectiveness of proposed remedial measure(s) and preventive measures; 5. Supervise implementation of proposed remedial measure(s) and preventive measure(s). 	<ol style="list-style-type: none"> 1. Notify the Contractor; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measure(s) and preventive; measure(s) to be implemented; 3. Supervise implementation of remedial measure(s) and preventive measure(s). 	<ol style="list-style-type: none"> 1. Identify source and investigate the non-conformity; 2. Implement remedial measure(s) and preventive measure(s); 3. Amend working methods agreed with ER as appropriate; 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by ER until the non-conformity is abated.

Appendix J

Implementation Status of
Environment Mitigation
Measures (Construction Phase)

Implement Status of Environment Mitigation Measures (Construction Phase)

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
Air Quality			
S4.3.10	D1	- The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Implemented
S4.3.10	D2	- Mitigation measures in form of regular watering under a good site practice should be adopted. Watering once per hour on exposed worksites and haul road should be conducted to achieve dust removal efficiencies of 91.7%. While the above watering frequencies are to be followed, the extent of watering may vary depending on actual site conditions but should be sufficient to maintain an equivalent intensity of no less than 1.3 L/m ² to achieve the dust removal efficiency.	Implemented
		- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;	Implemented
		- Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;	Implemented
		- A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones;	Implemented
		- The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;	Implemented
S4.3.10	D3	- Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;	Implemented
		- When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided and properly maintained as far as practicable along the site boundary with provision for public crossing;	Implemented
		- The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;	Implemented
		- Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;	Implemented
		- Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire	Implemented

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
		surface wet	
		- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;	N.O.
		- Any skip hoist for material transport should be totally enclosed by impervious sheeting;	Implemented
		- Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;	Partially Implemented
		- Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;	Implemented
		- Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and	Implemented
		- Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.	N.O.
Noise (Airborne)			
		- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;	Implemented
		- Machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;	Implemented
		- Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;	
		- Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;	
		- Mobile plant should be sited as far away from NSRs as possible and practicable;	
		- Material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.	
S5.4.1	N1		N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
S5.4.1	N2	- Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Implemented
S5.4.1	N3	- Install movable noise barriers (typical design is wooden framed barrier with a small-cantilevered on a skid footing with 25mm thick internal sound absorptive lining), acoustic mat or full enclosure, screen the noisy plants including air compressors, generators and handheld breakers etc.	Partially Implemented
S5.4.1	N4	- Use "Quiet plants" .	N.O.
S5.4.1	N5	- Loading/unloading activities should be carried out inside the full enclosure of mucking out points.	N.O.
S5.4.1	N6	- Sequencing operation of construction plants where practicable.	N.O.
Water Quality			
S6.9.1.1	W1	<p><u>Construction Runoff</u></p> <p>- At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities;</p> <p>- The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a site/sediment trap. The sediment/silt traps should be incorporated in the permanent drainage channels to enhance deposition rates;</p> <p>- The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of 0.1 m³/s a sedimentation basin of 30m³ would be required and for a flow rate of 0.5 m³/s the basin would be 150 m³;</p> <p>- All exposed earth areas should be completed and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks where practicable. Exposed slope surfaces should be covered by tarpaulin or other means;</p>	Implemented
S6.9.1.1	W1		N.O.
S6.9.1.1	W1		N.O.
S6.9.1.1	W1		N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
		<ul style="list-style-type: none"> - The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all traffic areas and access roads protected by coarse stone ballast; - All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas; - Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities; - Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50m³ should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system; - Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers; - Precautions be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes. 	<p>N.O.</p> <p>N.O.</p> <p>N.O.</p> <p>Partially Implemented</p> <p>N.O.</p> <p>N.O.</p>
S6.9.1.1	W1	<ul style="list-style-type: none"> - All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains; 	<p>Implemented</p>

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
		<ul style="list-style-type: none"> - Oil interceptors should be provided in the drainage system downstream of any oil/fuel pollution sources. The oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for the oil interceptors to prevent flushing during heavy rain; 	N.O.
		<ul style="list-style-type: none"> - Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts; 	Partially Implemented
		<ul style="list-style-type: none"> - All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby; 	Implemented
		<ul style="list-style-type: none"> - All the earth works involving should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable. 	N.O.
S6.9.1.2	W2	<p><i>Tunnelling Works and Underground Works</i></p> <ul style="list-style-type: none"> - Cut-&-cover tunnelling work should be conducted sequentially to limit the amount of construction runoff generated from exposed areas during the wet season (April to September) as far as practicable; - Uncontaminated discharge should pass through sedimentation tanks prior to off-site discharge; - The wastewater with a high concentration of SS should be treated (e.g. by sedimentation tanks with sufficient retention time) before discharge. Oil interceptors would also be required to remove the oil, lubricants and grease from the wastewater; 	N.O.
S6.9.1.2	W2	<ul style="list-style-type: none"> - Direct discharge of the bentonite slurry (as a result of D-wall and bored tunnelling construction) is not allowed. It should be reconditioned and reused wherever practicable. Temporary storage locations (typically a properly closed warehouse) should be provided on site for any unused bentonite that needs to be transported away after all the related construction activities are completed. The requirements in ProPECC PN 1/94 should be adhered to in the handling and disposal of bentonite slurries. 	N.O.
S6.9.1.3	W3	<p><i>Sewage Effluent</i></p> <ul style="list-style-type: none"> - Portable chemical toilets and sewage holding tanks are recommended for handling the construction sewage generated by the workforce. A licensed contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance. 	Implemented
S6.9.1.5	W4	<p><i>Groundwater from Potential Contaminated Area</i></p> <ul style="list-style-type: none"> - No direct discharge of groundwater from contaminated areas should be adopted; 	N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
		<ul style="list-style-type: none"> - A discharge license under the WPCO through the Regional Office of EPD for groundwater discharge should be applied. Prior to the excavation works within these potentially contaminated areas, the groundwater quality should be reviewed during the process of discharge license application. The compliance to the Technical Memorandum on Standards for Effluents Discharged into Drainage on Sewerage Systems, Inland and Coastal Waters (TM-DSS) and the existence of prohibited substance should be confirmed. If the review results indicated that the groundwater to be generated from the excavation works would be contaminated, the contaminated groundwater should be either properly treated in compliance with the requirements of the TM-DSS or properly recharged into the ground; - If wastewater treatment is deployed, the wastewater treatment unit shall deploy suitable treatment process (e.g. oil interceptor / activated carbon) to reduce the pollution level to an acceptable standard and remove any prohibited substances (e.g. TPH) to undetectable range. All treated effluent from wastewater treatment plant shall meet the requirements as stated in TM-DSS and should be discharged into the foul sewers; - If groundwater recharging wells are deployed, 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 the Section 2.3 of TM-DSS. 	
S6.9.1.6	W6	<p><u>Accidental Spillage</u></p> <ul style="list-style-type: none"> - All the tanks, containers, storage area should be bunded and the locations should be locked as far as possible from the sensitive watercourse and stormwater drains; - The Contractor should register as a chemical waste producer if chemical wastes would be generated. Storage of chemical waste arising from the construction activities should be stored with suitable labels and warnings. Disposal of chemical wastes should be conducted in compliance with the requirements as stated in the Waste disposal (Chemical Waste) (General) Regulation. 	Implemented
Waste Management			
S7.4.1	WM1	<p><u>On-site sorting of C&D materials</u></p> <ul style="list-style-type: none"> - Geological assessment should be carried out by competent persons on site during excavation to identify materials which are not suitable to use as aggregate in structural concrete (e.g. volcanic rock, Aplite dyke rock, etc). Volcanic rock and Aplite dyke rock should be separated at the source sites as far as practicable and stored at designated stockpile areas preventing them from delivering to crushing facilities. The crushing plant operator should also be reminded to set up measures to prevent 	N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
		<p>unsuitable rock from ended up at concrete batching plants and be turned into concrete for structural use. Details regarding control measures at source site and crushing facilities should be submitted by the Contractors for the Engineer to review and agree. In addition, site records should also be kept for the types of rock materials excavated and the traceability of delivery will be ensured with the implementation of Trip Ticket System and enforced by site supervisory staff as stipulated under DEVB TC(W) No. 6/2010 for tracking of the correct delivery to the rock crushing facilities for processing into aggregates. Alternative disposal option for the reuse of volcanic rock and Aplite Dyke rock, etc should also be explored.</p>	
S7.5.1	WM2	<p><u>Construction and Demolition Materials</u></p> <ul style="list-style-type: none"> - Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; - Carry out on-site sorting; - Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; - Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; 	N.O.
S7.5.1	WM3	<ul style="list-style-type: none"> - Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and - Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. <p><u>C&D Waste</u></p> <ul style="list-style-type: none"> - Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage; - The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage. 	<p>Implemented</p> <p>Implemented</p> <p>N.O.</p>

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
S7.5.1	WM5	<p><u>Land-based Sediment</u></p> <ul style="list-style-type: none"> - All construction plant and equipment shall be designed and maintained to minimize the risk of silt, sediments, contaminants or other pollutants being released into the water column or deposited in the locations other than designated location; - Requirement in the ETWB TCW No. 34/2002 shall be followed; - For Type 3 special disposal treatment, sealing of contaminant with geosynthetic containment before dropping into designated mud pit would be a possible arrangement. A geosynthetic containment method is a method whereby the sediments are sealed in geosynthetic containers and, the containers would be dropped into the designated contaminated mud pit where they would be covered by further mud disposal and later by the mud pit capping at the disposal site, thereby fulfilling the requirements for fully confined mud disposal. 	N.O.
S7.5.1	WM6	<p><u>Chemical Waste</u></p> <ul style="list-style-type: none"> - Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes; - Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation; - The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated; - Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD. 	Implemented
S7.5.1	WM6	<p><u>General Refuse</u></p> <ul style="list-style-type: none"> - General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes; 	Implemented

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
		<ul style="list-style-type: none"> - A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law; - Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible; - Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. 	Implemented
Land Contamination			
S8.10, S8.12 & Appendix 8.4	LC1	<p><i>Remaining SI Works</i></p> <ul style="list-style-type: none"> - The potential for land contamination issues at EBH1 and EBH2 will be confirmed by site investigation after site possession and utility diversion by the construction contractor. Following the completion of the remaining SI works, the Project Proponent would prepare and submit a Second Supplementary CAR/RAP to EPD to present the findings of the SI works and to recommend specific remediation measures, if required. Upon completion of the remediation works, if any, a Remediation Report (RR) would be prepared and submitted to EPD for agreement prior to commencement of the construction works. 	N.O.
Hazard to Life			
S9.18	H1	<ul style="list-style-type: none"> - Blasting activities regarding transport and use of explosives should be supervised and audited by competent site staff to ensure full compliance with the blasting permit conditions. 	N.O.
S9.6, para 4	H2	<ul style="list-style-type: none"> - Detonators shall not be transported in the same vehicle with other Category 1 Dangerous Goods. 	N.O.
S9.6, para 8	H3	<ul style="list-style-type: none"> - The explosives delivery trucks should be approved by Mines Division and should meet the regulatory requirements for transport of explosives. 	N.O.
S9.10, para 7 and S9.18	H4	<ul style="list-style-type: none"> - Blast doors should be provided for tunnels and blast cover should be provided for shaft at HMT, and kept closed during blasting. Provision of blast doors or heavy duty blast curtains should be implemented at the shafts, adits and other suitable locations to prevent flyrock and control the air overpressure. 	N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
S9.18	H5	- Only the required quantity of explosives for a particular blast should be transported to avoid the return.	N.O.
S9.18	H6	- Maximum instantaneous charge (MIC) should be within the MIC as specified for the given section.	N.O.
S9.18	H7	- The approved truck dedicated for transport of explosives should comply with the "Guidance Note on Requirements for Approval of an Explosives Delivery Vehicle" issued by CEDD Mines Division. The truck should be periodically inspected and properly maintained in good operation conditions. The fuel carried in the fuel tank should be minimized to reduce the duration of fire. Adequate fire-fighting equipment shall be provided, inspected and replaced periodically (e.g. fire extinguishers).	N.O.
S9.18	H8	- The driver and his assistant should be physically healthy, experienced and have good safe driving records. The driver should hold a proper driving license for the approved transport truck. Dedicated training programme and regular road safety briefing sessions / workshops should be provided to enhance their safe driving attitude and practice. Smoking should be strictly prohibited.	N.O.
S9.18	H9	- Emergency response plans in case of road accident should be prepared and implemented. The driver and his assistant should be familiar with the emergency procedures including evacuation, and proper communication / fire-fighting equipment should be provided to the driver and his assistant.	N.O.
S9.18	H10	- Close liaison and communication among Mines Division, contractors for transport of explosives, and working staff of the tunnel blasting should be established. In case of any change of work schedule leading to cancellation or variation of explosives required, relevant parties should be informed in time to avoid unused explosives at the work sites.	N.O.
S9.18	H11	- Close liaison and communication with Fire Services Department should be established to reduce the accidental detonation escalated from a fire. The contractors for transport of explosives should use the preferred transport routes as far as practicable.	N.O.
S9.18	H12	- Contingency plan should be prepared for transport of explosives under severe weather conditions such as rainstorms and thunderstorms.	N.O.
S9.18	H13	- For explosive transport, all packages of explosives on the truck should be properly stored in the truck compartment as required. Packaging of the explosives should remain intact (i.e. damage free) until they are transferred to the blasting site.	N.O.
S9.18	H14	- Availability of a parking space should be ensured before commencement of transport of explosives. Location for loading and unloading of explosives should be as close as possible to the shaft or the adit. No hot work should be performed in the vicinity during the time of loading and unloading.	N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
S9.18	H15	- Good communication and coordination should be performed for safe blasting of different chainage locations on the same day.	N.O.
S9.18	H16	- Evacuation and secure refuge areas should be implemented / provided to the working staff.	N.O.
S9.18	H17	- Healthy competent licensed shotfirers and blasting engineers should be employed to conduct the blasting work.	N.O.
S9.18	H18	- Proper control measures should be enforced during explosive transport within the tunnel and charging the blast holes, such as speed limit for the truck, no hot work in the vicinity, etc.	N.O.
S9.18	H19	- Ground vibrations of the blasting operation should be monitored and MICs should be adjusted according to the actual geotechnical features to ensure blasting vibrations within the specified PPV limit.	N.O.
S9.18	H20	- For tunnel blasting near gas facilities, requirement of the "Gas Production and Supply Code of Practice - Avoiding Danger from Gas Pipes" should be respected. Close liaison and coordination with HKCG should be established to provide sufficient notice of the planned blasting activities in an appropriate format within a reasonable time period prior to blasting. Emergency response procedures should be prepared and implemented in case of gas leaks.	N.O.
S9.18	H21	- For tunnel blasting near MTRC railway tunnels, close liaison and coordination with MTRC should be established to provide sufficient notice of the planned blasting activities in an appropriate format within a reasonable time period prior to blasting. Emergency response procedures should be prepared and implemented in case of any damage to the railway facilities.	N.O.
S9.18	H22	- It is recommended to explore to minimize the use of the cartridge emulsion explosives and maximize the use of bulk emulsion explosive as far as practicable.	N.O.
S9.18	H23	- The use of bulk emulsion where the maximum instant charge (MIC) envisaged for a particular blast is above 0.5kg. This prevents the occurrence of excessive vibrations due to potential bulk emulsion dosing inaccuracy in the case of low MIC. It is recommended to explore the bulk emulsion dosing technology so as to maximize the use of bulk emulsion explosive as far as practicable.	N.O.
S9.18	H24	- It is recommended to explore to use smaller explosive charges such as 'cast boosters' or 'mini-cast booster' instead of cartridge emulsion as primers for bulk emulsion. This is option reduces the quantity of explosives required for transportation for the sections where bulk emulsion will be used.	N.O.
S9.18	H25	- Instrumentation and monitoring plan should be submitted to all relevant stakeholders for agreement prior to the commencement of the tunnel blasting works. Such plan should be implemented during construction of CKR tunnels.	N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
S9.18	H26	- Contingency plan should be submitted to all relevant stakeholders for agreement prior to the commencement of the tunnel blasting works.	N.O.
Landscape and Visual			
S10.10.1, Table 10.11	LV3	<p><u>Good Site Management</u></p> <p>- Large temporary stockpiles of excavated material shall be covered with unobtrusive sheeting to prevent dust and dirt spreading to adjacent landscape areas and vegetation, and to create a neat and tidy visual appearance. Construction plant and building material shall be orderly and carefully stored in order to create a neat and tidy visual appearance.</p>	Implemented
S10.10.1, Table 10.11	LV4	<p><u>Screen Hoarding</u></p> <p>- Decorative screen hoarding should be erected to screen the public from the construction area. It should be designed to be compatible with the existing urban context.</p>	N.O.
S10.10.1, Table 10.11	LV5	<p><u>Lighting Control during Construction</u></p> <p>- All lighting in the construction site shall be carefully controlled to minimize light pollution and night-time glare to nearby residences and GIC. The contractor shall consider other security measures, which shall minimize the visual impacts.</p>	N.O.
S10.10.1, Table 10.11	LV6	<p><u>Erosion Control</u></p> <p>- The potential for soil erosion shall be reduced by minimizing the extent of vegetation disturbance on site and by providing a protective cover over newly exposed soil.</p>	N.O.
S10.10.1, Table 10.11	LV7	<p><u>Tree Protection & Preservation</u></p> <p>- Carefully protected during construction. Tree protection measures will be detailed at the Tree Removal Application stage and plans submitted to the relevant Government Department for approval in due course in accordance with ETWB TC no. 3/2006.</p>	N.O.
S10.10.1, Table 10.11	LV8	<p><u>Tree Transplantation</u></p> <p>- For trees unavoidably affected by the Project that have to be removed, where practical transplantation will be chosen as the top priority method of removal. If this is not possible or practical compensatory planting will be provided for trees unavoidably felled (See LV10). For trees unavoidably affected by the Project works that are transplanted, transplantation must be carried out in accordance with ETWBTC 2/2004 and 3/2006.</p>	N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
S10.10.1, Table 10.11	LV9	<p><u>Compensatory Planting</u></p> <p>- All felled trees shall be compensated for by planting trees to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Felling Application process under ETWBTC 3/2006. Compensatory tree planting may be incorporated into public open spaces and along roadside amenity areas affected by the construction works and therefore be part of the bigger wider planting plans. Onsite compensation planting is preferred but if necessary, additional receptor sites outside the Works Area shall be agreed separately with Government during the Tree Felling Application process.</p>	N.O.
S10.10.1, Table 10.11	LV10	<p><u>Screen Planting</u></p> <p>- Tall screen/buffer trees, shrubs and climbers should be planted, in so far as is possible, to soften and screen proposed structures such as roads and central strip, vertical edges and buildings and to enhance streetscape greening effect where appropriate. Indiscriminate use of trees for screening must be avoided and the principle of 'right tree for the right place' must be followed.</p>	N.O.
S10.10.1, Table 10.11	LV11	<p><u>Green Roof</u></p> <p>- Roof greening is recommended be established on ventilation and administration buildings to reduce exposure to untreated concrete surfaces and particularly mitigate visual impact to VSRs at high levels.</p>	N.O.
S10.10.1, Table 10.11	LV12	<p><u>Reinstatement</u></p> <p>- All works areas, excavated areas and disturbed areas for tunnel construction and temporary road diversion or any other proposed works shall be reinstated to former conditions or better, with reasonable landscape treatment and to the satisfaction of the relevant Government departments. (Specific mitigation for disturbance to public open space is detailed separately under LV14).</p>	N.O.
S10.10.1, Table 10.11	LV13	<p><u>Reprovising of Public Open Space</u></p> <p>- All areas of public open space affected by the Project will be re-provisioned either at the same location following the completion of temporary works, or at a separate site, as agreed with relevant Government departments. Open space should be re-provisioned in an enhanced manner.</p>	N.O.
S10.10.1, Table 10.11	LV14	<p><u>Landscape enhancement</u></p> <p>- Implement a comprehensive landscape plan to maximize the greening opportunity and create a unique landscape for the project to blend in with the surrounding, including in re-provisioned areas. In particular: - landscape enhancement of re-provisioned Public Transport Interchange;</p>	N.O.

EIA Ref	EM&A Log Ref	Recommended Environmental Protection Measures/ Mitigation Measures	Implementation Status
		<ul style="list-style-type: none"> - landscape deck on tunnel portals; - viaduct planters for trailer planting. 	
Cultural Heritage			
S11.4.4	CH1	<ul style="list-style-type: none"> - The contractor should be alerted during the construction on the possibility of locating archaeological remains and as a precautionary measure, AMO shall be informed immediately in case of discovery of antiquities or supposed antiquities in the subject sites. 	
S12.6.1, Table 12.2	CH5	<p><u>Tin Hau Temple (CKR-02)</u></p> <ul style="list-style-type: none"> - The Alert, Alarm and Action (AAA) vibration limit is recommended to be set at 3/4/5 mm/s and a condition survey shall be carried out by the project proponent prior to the construction phase to confirm this assessment; - Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded. The monitoring proposal should be sent to AMO for comment. 	N.O.
S12.6.1, Table 12.2	CH6	<p><u>Kowloon Methodist Church (CKR-10)</u></p> <ul style="list-style-type: none"> - The Alert, Alarm and Action (AAA) vibration limit is recommended to be set at 5/6/7.5 mm/s; - Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded, and as such appropriate vibration monitoring on the building should be complied with as appropriate. The monitoring proposal should be sent to AMO for comment. 	N.O.
S12.6.1, Table 12.2	CH7	<p><u>Ma Tau Kok Animal Quarantine Depot (CKR-12)</u></p> <ul style="list-style-type: none"> - The Alert, Alarm and Action (AAA) vibration limit is recommended to be set at 5/6/7.5 mm/s; - Vibration monitoring of the structure shall be employed during the construction phase to ensure that the level is not exceeded, and as such appropriate vibration monitoring on the building should be complied with as appropriate. The monitoring proposal should be sent to AMO for comment. 	N.O.
S12.6.1, Table 12.2	CH11	<p><u>Air raid precaution tunnels of the K1 Network (CKR-14)</u></p> <ul style="list-style-type: none"> - A condition survey for the tunnel network should be undertaken by the project proponent to determine the present condition of the air raid tunnels and to recommend protective measures to ensure that the tunnels are not damaged by the construction works, and as such appropriate vibration monitoring on the building should be complied with as appropriate. The monitoring proposal should be sent to AMO for comment. 	N.O.

Remarks:

N.A. Not Applicable at this stage as no such site activities were conducted in the reporting period

N.O. Not Observed during site inspection in the reporting period.

Appendix K

Cumulative Statistics on
Exceedances, Complaints,
Notifications of Summons and
Successful Prosecutions



Table K-1 Environmental Complaints Log

Complaint Log No.	Date of Complaint	Received From	Received By	Nature of Complaint	Investigation/Mitigation Action	Status
Nil	-	-	-	-	-	-

Remark:

** No Complaints, Notifications of Summons or Successful Prosecutions was received in the reporting period.*

Table K-2 Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions and Public Engagement Activities

Reporting Period	Complaints	Notifications of Summons and Prosecutions	Public Engagement Activities
This Month	0	0	0
Cumulative Project-to-Date	0	0	0

Table K-3 Cumulative Statistics on Monitoring Exceedance

Monitoring Parameter	Month/Year	No. of Exceedance	
		Action	Limit
1-hour TSP	No. of Exceedance This Month	0	0
	Cumulative Project-to-Date	0	0
24-hour TSP	No. of Exceedance This Month	0	0
	Cumulative Project-to-Date	0	0
Noise (LAeq (30min))	No. of Exceedance This Month	0	0
	Cumulative Project-to-Date	0	0

Appendix L

Waste Flow Table

Monthly Summary Waste Flow Table (2019)

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of C&D Wastes Generated Monthly					
	Total Quantity Generated (in '000m ³)	Hard Rock and Large Broken Concrete (in '000m ³)	Reused in the Contract (in '000m ³)	Reused in other Projects (in '000m ³)	Disposed as Public Fill (in '000m ³)	Imported Fill (in '000m ³)	Metals (in '000m ³)	Paper/ cardboard packaging (in '000m ³)	Plastics (in '000m ³)	Chemical Waste (in '000m ³)	Others, e.g. general refuse (in '000m ³)	
Sep	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	
Oct	0.0367	0.0000	0.0000	0.0000	0.0367	0.0000	0.0000	0.0000	0.0000	0.0000	0.0070	
Nov												
Dec												
Sub-Total	0.0367	0.0000	0.0000	0.0000	0.0367	0.0000	0.0000	0.0000	0.0000	0.0000	0.0089	
Total	0.0367	0.0000	0.0000	0.0000	0.0367	0.0000	0.0000	0.0000	0.0000	0.0000	0.0089	

Notes:

1. Following assumption is made for calculation:
 - i) 1m³ of inert material weight 2.2 tonne;
 - ii) 1m³ of non-inert material weight 1.6 tonne;
 - iii) 1m³ of chemical waste weight 0.88 tonne.

Appendix M

Proactive Environmental

Proforma

Proactive Environmental Protection Proforma

Ref.: HMTS_201910

Ref ⁽¹⁾	Proposed Construction Method ⁽²⁾	Location / Working Period	Anticipated Impacts	Recommended Mitigation Measures
EIA Ref: 3.5.1 (Tunnel Alignment Sections)	Excavation by Drill & Blast at HMTS for the construction adit connecting Eastbound and Westbound of the Central Tunnel.	HMT Shaft towards YMT and MTK Anticipated working period to complete the temporary construction adit: 3 months	~1% additional C&D materials (13,000m ³) to be generated from the excavation of construction adit.	All excavated rocks from the construction adit shall be reused as much as possible on-site or in other approved/designated Contracts. The impact of surplus C&D materials to the public fills is very minimal.

Notes:

(1) EIA Ref/EM&A Log Ref/Design Document Ref

(2) Details of equipment, vehicles, plants, processes, technologies for the option of construction method

Reviewed by Environmental Team Leader:  (David HUNG)

Date: 4 November 2019

Approved by Independent Checker (Environment):  (Mandy TO)

Date: 4 NOV 2019



Proactive Environmental Protection Proforma for Alternative Construction Method – *Construction Adit at Ho Man Tin Access Shaft*

Introduction

Bouygues Travaux Publics (BYTP) was commissioned by the Highway Department as the Main Contractor of the Contract HY/2018/08. Fugro Technical Services Ltd is appointed by BYTP as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) programme during the construction phase of the Project.

The Environmental Impact Assessment (EIA) Report for Central Kowloon Route (CKR) (Register No.: AEIAR-171/2013) was approved on 11 July 2013. An Environmental Permit (EP) for the CKR was granted on 9 Aug 2013 (EP No.: EP-457/2013) and the latest Variation of EP (VEP) (EP No.: EP-457/2013/C) was subsequently issued by the EPD on 16 January 2017.

At times during the construction phase the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA study. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the Project. It is the responsibility of the Contractor and ET, in accordance with established standards, guidelines and EIA study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET shall provide a copy of the Proactive Environmental Proforma to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

Original Scheme for Construction of Central Tunnels

Excavations of Central Tunnel will be started from the Ho Man Tin (HMT) shaft by Drill and Blast method. Initially, there are four tube tunnels (Eastbound and Westbound), two will be excavated toward West to Yau Ma Tei (YMT) and the same will be excavated toward East to Ma Tau Kok (MTK).

The drill and blast excavation will be performed by repeating the same sequence of works for consecutive profiles until the breakthrough of the Westbound and Eastbound tunnels. One drill and blast cycle mainly involves the following steps:

1. Drilling
2. Charging
3. Blasting
4. Mucking Out
5. Scaling and mucking out the scaled spoils
6. Profile survey
7. Shotcreting & grouting (if necessary)
8. Mapping & Probing



Proposed Scheme for Temporary Adit (Construction Adit)

BYTP will propose to build a temporary construction adit (short bypass tunnel) by Drill and Blast method at the HMT shaft bottom connecting to the Eastbound and Westbound of the Central Tunnel. The reason for the proposal is to alleviate the foreseeable traffic congestion inside the Central Tunnel during the construction phase. A layout plan is attached showing the alignment of Central Tunnel and the temporary construction adit.

The construction adit will be blasted from the HMT shaft bottom to allow early access to the Eastbound and Westbound of the tunnel and followed by the construction of Central Tunnel towards YMT and MTK.

The construction adit shall be backfilled with suitable materials after the completion of excavation works for the Central Tunnel. In other words, the conforming design of the CKR Central Tunnel shall remain unchanged. The temporary construction adit will be blasted according to the requirements stipulated in the CKR EIA report and within the assessment zone of the blasting permit governed by Mines Department.

Environmental Impact Associated with the Proposed Scheme and Recommended Mitigation Measures

1. Airborne Construction Noise Impact

PME arrangements for the construction of Central Tunnel and the construction adit are the same, with the noise enclosure covering the shaft. In this case, no additional noise impact arising from the proposed scheme for construction adit is anticipated.

According to the EM&A programme, noise monitoring shall be conducted at the identified NSR (M-N3) by the Environmental Team on a regular basis. The monitored results will be reported in the monthly EM&A report accordingly.

2. Groundborne Construction Noise Impact

All blasting activities will be carried out according to the time table agreed among AMMJV, Mines Division and BYTP before the commencement of blasting operation.

Given that the duration of each blast will be short and the blasting operations will be carried out outside sensitive hours, no adverse groundborne construction noise impact is anticipated.

3. Waste Management

It is estimated that additional 13,000m³ C&D materials (Grade II granitic rocks) will be excavated from the construction adit. The quantities of other types of waste will be minimal. The quantity of excavated materials is considered insignificant comparing the construction adit to the 2.8km Central Tunnel (estimated 1,100,100 m³).

According to the Contract requirement, all excavated granitic rocks shall be reused as much as possible in other approved/designated Contracts. The impact of surplus C&D materials to the existing public fills is very minimal.



Provided that all the C&D materials and wastes are handled, transported and disposed of using the methods and good site practices recommended in the EIA report, adverse environmental impacts associated with the handling, transportation and disposal of surplus C&D materials and other general waste are not anticipated.

4. Water Quality

The main water quality concern in the EIA in connection with tunneling and excavation works relates to the suspended solid (SS) levels in effluent discharge. The discharge quality shall be regulated by the WPCO discharge license.

With the implementation of the mitigation measures recommended in the approved EIA report, no additional water quality impact is anticipated with the drill and blast work activities for the construction adit.

5. Air Quality Impact

All construction dust, fumes and smoke associated with the drill and blast activities inside the shaft will be confined by a blast cover (a full noise enclosure above the shaft).

Provided that the ventilation with sprinkler system are provided to mitigate fumes and dust, no additional air quality impact arising from the proposed works is anticipated. According to the EM&A programme, air monitoring shall be conducted at the identified NSR (M-A3) by the Environmental Team on a regular basis. The monitored results will be reported in the monthly EM&A report accordingly.

Conclusion

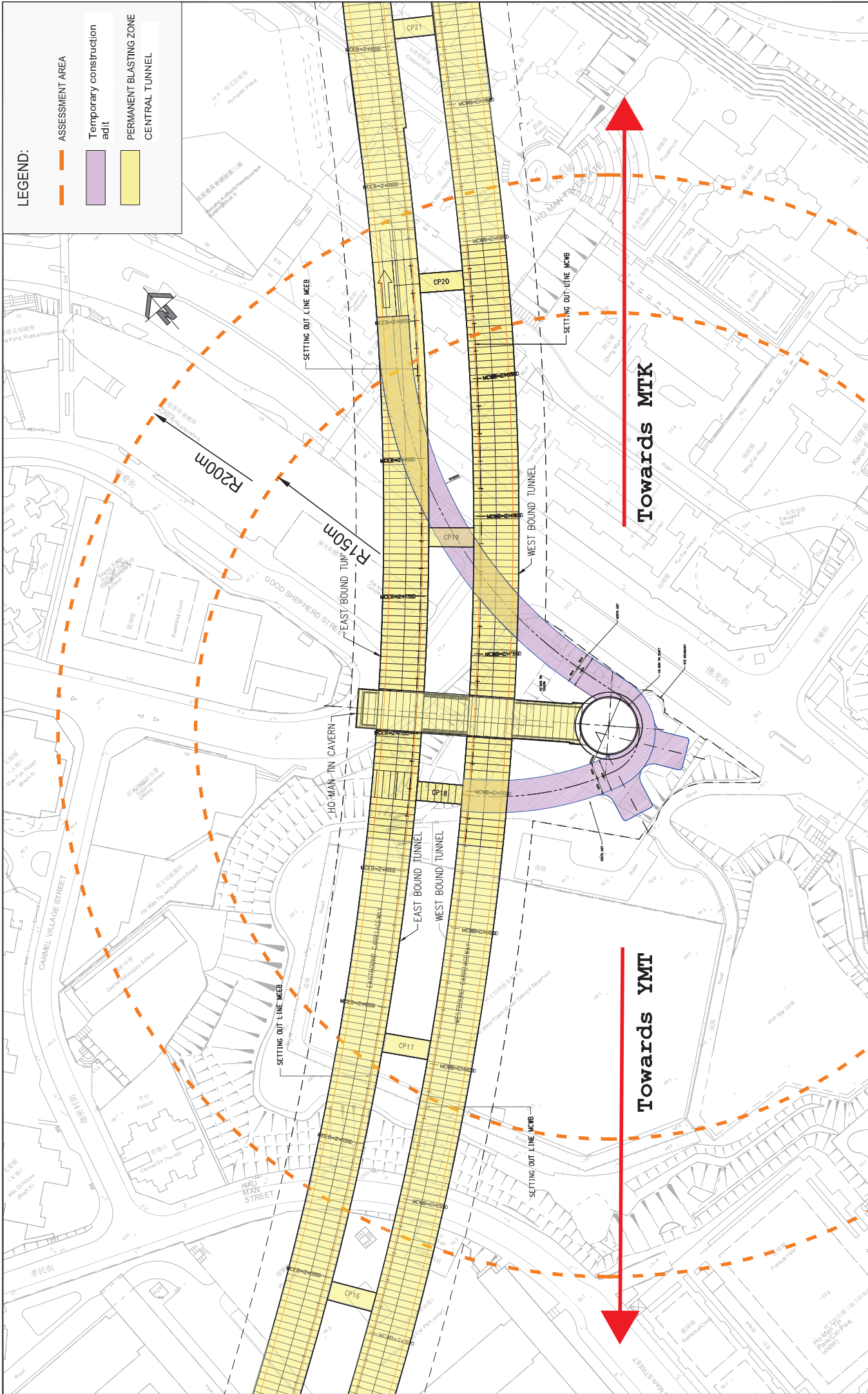
A review has been conducted to assess the potential environmental impacts associated with the adoption of the same construction methodology in the EIA, i.e. Drill and Blast method, for the construction of temporary adit. The review concluded that minimal environmental impacts are anticipated when comparing the proposed scheme with the original scheme in the EIA report.

With the use of construction adit to alleviate traffic condition during the construction phase of the Central Tunnel, it is anticipated that the overall construction period will be shortened and thus reduce the potential environmental impact to the nearby NSRs.

[END]

LEGEND:

- ASSESSMENT AREA
- Temporary construction adit
- PERMANENT BLASTING ZONE
- CENTRAL TUNNEL



Towards YMT

Towards MTK

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	IN-CHARGE
A1	FIRST ISSUE	11/07/2019	LLAM	AWC	AWC	AWC

CLIENT	 香港鐵路有限公司 HONG KONG RAILWAYS CORPORATION HIGHWAYS DEPARTMENT
THE SUPERVISOR	 ARUP Associates in Architecture CONTRACTOR'S TEMPORARY WORK DESIGNER
THE ENGINEER	 M M CONSULTANTS CONTRACTOR'S TEMPORARY WORK DESIGNER
PROJECT	Contract No. HY2019/08 Central Kowloon Route - Central Tunnel
DRAWING TITLE	HO MAN TIN SHAFT LAYOUT PLAN AREA FOR PERMIT OF USE CATEGORY 1 DANGEROUS GOODS
DRAWING NO.	HCKKR/BTP/MDS/HMT/OMS/000041
ISSUE STATUS	FOR REVIEW
CREATION DATE	11/07/2019
REVISION	A1
PAPER SIZE	A1
SCALE	AS SHOWN
PAGE	1

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