



# **Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1**

## **Environmental Monitoring & Audit Report**

**01/02/2019 – 28/02/2019**

|                  |  |
|------------------|--|
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## **TABLE OF CONTENT**

|   |           |
|---|-----------|
| <b>Executive Summary .....</b>  | <b>3</b>  |
| <b>1 Introduction .....</b>   | <b>5</b>  |
| <b>1.1 The Project .....</b>  | <b>5</b>  |
| <b>1.2 Construction Programme and Activities .....</b>                            | <b>6</b>  |
| <b>1.3 Project Organization .....</b>   | <b>6</b>  |
| <b>1.4 Status of Environmental Licences, Notification and Permits .....</b>       | <b>6</b>  |
| <b>2 Air Quality Monitoring .....</b>   | <b>8</b>  |
| <b>2.1 Monitoring Locations .....</b>   | <b>8</b>  |
| <b>2.2 Monitoring Frequency .....</b>   | <b>10</b> |
| <b>2.3 Monitoring Equipment .....</b>   | <b>10</b> |
| <b>2.4 Monitoring Methodology and Parameters .....</b>                            | <b>11</b> |
| <b>2.5 Maintenance and Calibration .....</b>                                      | <b>12</b> |
| <b>2.6 Quality Assurance / Quality Control Results and Detection Limits .....</b> | <b>12</b> |
| <b>2.7 Action and Limit Level for 1-hr TSP and 24-hr TSP .....</b>                | <b>13</b> |
| <b>2.8 Monitoring Results and Observations .....</b>                              | <b>14</b> |
| <b>2.9 Monitoring Schedule for Next Reporting Month .....</b>                     | <b>15</b> |
| <b>3 Noise Monitoring .....</b>   | <b>16</b> |
| <b>3.1 Monitoring Locations .....</b>   | <b>16</b> |
| <b>3.2 Monitoring Frequency .....</b>   | <b>16</b> |
| <b>3.3 Monitoring Equipment .....</b>   | <b>17</b> |
| <b>3.4 Monitoring Methodology and Parameters .....</b>                            | <b>17</b> |
| <b>3.5 Maintenance and Calibration .....</b>                                      | <b>18</b> |
| <b>3.6 Quality Assurance / Quality Control Results and Detection Limits .....</b> | <b>18</b> |
| <b>3.7 Action and Limit Level for Construction Noise .....</b>                    | <b>19</b> |
| <b>3.8 Monitoring Results and Observations .....</b>                              | <b>20</b> |
| <b>3.9 Monitoring Schedule for Next Reporting Month .....</b>                     | <b>21</b> |
| <b>4 Solid and Liquid Waste Management Status .....</b>                           | <b>22</b> |
| <b>5 Landscape and Visual Impact .....</b>  | <b>23</b> |
| <b>6 Environmental Site Inspection .....</b>                                      | <b>24</b> |
| <b>6.1 Site Audit .....</b>   | <b>24</b> |
| <b>6.2 Implementation Status of Environmental Mitigation Measures .....</b>       | <b>24</b> |
| <b>7 Environmental Non-Conformance .....</b>                                      | <b>27</b> |
| <b>7.1 Summary of Environmental Exceedances .....</b>                             | <b>27</b> |
| <b>7.2 Summary of Environmental Non-Compliance .....</b>                          | <b>27</b> |
| <b>7.3 Summary of Environmental Complaint .....</b>                               | <b>27</b> |
| <b>7.4 Summary of Notification of Summons and Successful Prosecution .....</b>    | <b>27</b> |
| <b>8 Future Key Issues .....</b>  | <b>28</b> |

|            |   |           |
|------------|---|-----------|
| <b>9</b>   | <b>Comment, Recommendations and Conclusions .....</b> | <b>29</b> |
| <b>9.1</b> | <b>Comment .....</b>                                  | <b>29</b> |
| <b>9.2</b> | <b>Recommendations .....</b>                          | <b>29</b> |
| <b>9.3</b> | <b>Conclusions .....</b>                              | <b>30</b> |

## **LIST OF APPENDICES**

[Appendix A: Construction Programme and Project Layout Plan](#)

[Appendix B: Project Organization Chart](#)

[Appendix C: Monitoring Locations](#)

[Appendix D: Calibration Certification](#)

[Appendix E: TSP Monitoring Data](#)

[Appendix F1: Noise Monitoring Data](#)

[Appendix F2: School Schedule](#)

[Appendix G: Waste Management Record](#)

[Appendix H: Environmental Mitigation Implementation Schedule](#)

[Appendix I: Cumulative Log for Environmental Exceedance, Complaints, Notification of  
Summons and Successful Prosecutions](#)

## **LIST OF TABLES**

[Table 1.4.1: Summary of the Status of Environmental Licences, Notification and Permits](#)

[Table 2.1.1: Air Quality Monitoring Locations](#)

[Table 2.1.2: Air Quality Monitoring Locations](#)

[Table 2.3.1: Air Quality Monitoring Equipment](#)

[Table 2.7.1: Established TSP Actions and Limit Level](#)

[Table 2.7.2: Event and action Plan for Air Quality](#)

[Table 2.8.1: Summary of average 1-hr TSP monitoring data](#)

[Table 2.8.2: Summary of average 24-hr TSP monitoring data](#)

[Table 3.1.1: Noise Monitoring Locations](#)

[Table 3.3.1: Equipment List for Noise Monitoring](#)

[Table 3.7.1: Action and Limit Levels for Construction Noise at all Sensitive Receivers](#)

[Table 3.7.2: Event / Action Plan for Construction Noise](#)

[Table 3.8.1: Summary of average noise monitoring data](#)

[Table 4.1: Quantities of Waste Disposed from the Project](#)

[Table 5.1: Proposed Monitoring Program](#)

[Table 5.2: Event / Action Plan for Landscape and Visual Impact](#)

[Table 6.1: Summary results of site inspections findings](#)

## **Executive Summary**

This is the thirty-seventh monthly Environmental Monitoring and Audit (EM&A) Report for Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1. The project commenced on 6 February 2016. This report documents the finding of EM&A Works conducted from 1 February 2019 to 28 February 2019.

### **Environmental Monitoring and Audit Progress**

#### *Air Quality Monitoring*

1-hr Total Suspended Particulates (TSP) monitoring and 24-hr TSP monitoring were carried out on 1, 4, 9, 14, 20 and 26 February 2019.

#### *Noise Monitoring*

30-min LAeq noise monitoring was carried out on 1, 4, 9, 14, 20 and 26 February 2019.

#### *Waste Management*

According to Contractor's waste flow data, 742.02 tonnes of inert C&D materials and 15.93 tonnes of general refuse were generated and disposed.

#### *Landscape and Visual Impact*

Bi-weekly inspections were conducted on 8 and 21 February 2019. Most of the necessary mitigation measures have been implemented. Details of the audit findings and implementation status are presented in Section 6.

#### *Environmental Site Inspection*

Joint weekly inspections were conducted by representatives of the Contract Administrator, Engineer, Contractor and ET on 13, 20 and 27 February 2019. The representative of the IEC conducted the site inspection on 20 February 2019. Details of the audit findings and implementation status are presented in Section 6.

### **Environmental Exceedance / Non-compliance / Compliant / Summons and Successful Prosecution**

No exceedance of action level and limit level was recorded for TSP and Noise. No Non-compliance event, environmental complaint, notification of summons and

successful prosecution against the Project were received in this reporting month.

#### Variation in Construction Method

No variation in construction method from the proposed construction programme was made and affected the EM&A.

#### Future Key Issues

The major construction works to be undertaken in the next reporting month include:

- Portion I – Pile Cap, Pier and Bridge Deck Construction Works
- Portion I – E&M Installation and Road Works
- Portion I – Road Pavement, Street Furniture Installation
- Portion HA – Pile Cap, Pier and Bridge Deck Construction Works
- Portion HA – Road Pavement, Street Furniture Installation

Potential environmental impacts arising from the above construction activities are mainly associated with dust, construction noise, water quality and waste management. The Contractor has been reminded to properly implement dust, construction noise and water quality control measures as well as proper waste management in order to minimize the potential environmental impacts due to the construction works of this Project.

## **1 Introduction**

### **1.1 The Project**

This is a road improvement project in West Kowloon Reclamation Development (WKRd) for completing the developments and the commissioning of the new transport facilities.

Apart from the additional traffic impacts arising from the major development and transport facilities in WKRd, several major junctions in the area are currently operating with insufficient capacity causing serious congestion to some existing major road corridors such as Jordan Road (JRD), Ferry Street (FST) and Canton Road (CRD).

To enhance the road network of the area, Transport Department commissioned the “West Kowloon Reclamation Development Traffic Study” which identified and recommended Core and Additional Schemes together with the improvement works at the junction of CRD/FST/JRD. Implementation of these schemes would enable most of the key road junctions in the study area to operate with spare capacity, and the traffic queue length would also be reduced avoiding blockage to the upstream junctions.

The Environmental Team (ET), Environmental Pioneers & Solutions Limited (EPSL), was appointed by Vibro Construction Co. Ltd. to undertake the Environmental Monitoring and Audit (EM&A) programme during construction phase of the Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1. The project proponent is Highways Department. This is a Designated Project under the Environmental Impact Assessment Ordinance (Cap.499). The No. of Environment Permit is EP-455/2013.

The construction works and EM&A programme of this project was commenced on 6 February 2016. The construction programme and project layout plan are shown in [Appendix A](#).

## 1.2 Construction Programme and Activities

A summary of the major construction activities undertaken in this reporting period is shown as follows.

- Portion I – Pile Cap, Pier and Bridge Deck Construction Works
- Portion I – E&M Installation and Road Works
- Portion I – Road Pavement, Street Furniture Installation
- Portion HA – Pile Cap, Pier and Bridge Deck Construction Works
- Portion HA – Road Pavement, Street Furniture Installation

## 1.3 Project Organization

The project organization chart and contact details are shown in [Appendix B](#).

## 1.4 Status of Environmental Licences, Notification and Permits

A summary of the relevant permits, licences, and notifications on environmental protection for this Project is presented in [Table 1.4.1](#).

Table 1.4.1 Summary of the Status of Environmental Licences and Permits

| Permit / License No.  | Valid Period |            | Status | Remark       |
|---|--------------|------------|--------|--------------|
|   | From         | To         |        |              |
| Notification pursuant to Air Pollution Control (Construction Dust) Regulation |              |            |        |              |
| Ref. No. 386894   | 23/03/2015   | N/A        | Valid  | /            |
| Effluent Discharge License  |              |            |        |              |
| WT00021818-2015   | 18/06/2015   | 30/06/2020 | Valid  | Portion I    |
| WT00021822-2015   | 18/06/2015   | 30/06/2020 | Valid  | Portion HA   |
| WT00021825-2015   | 18/06/2015   | 30/06/2020 | Valid  | Portion J    |
| WT00021826-2015   | 18/06/2015   | 30/06/2020 | Valid  | Portion Q    |
| WT00021903-2015   | 26/06/2015   | 30/06/2020 | Valid  | Works area 1 |
| Waste Disposal (Charges for Disposal of Construction Waste) Regulation        |              |            |        |              |
| Billing Account No.7022012  | 31/03/2015   | N/A        | Valid  | /            |
| Registration of Chemical Waste Producer                                       |              |            |        |              |
| WPN5213-229-V2215-01  | 01/06/2015   | N/A        | Valid  | /            |
| Construction Noise Permit   |              |            |        |              |
| GW-RE1183-15  | 04/12/2015   | 03/06/2016 | Expire | Portion HA   |

|              |            |            |        |            |
|--------------|------------|------------|--------|------------|
| GW-RE0469-16 | 04/06/2016 | 03/12/2016 | Expire | Portion HA |
| GW-RE0330-17 | 25/04/2017 | 23/10/2017 | Expire | Portion HA |
| PP-RE0029-17 | 18/10/2017 | 16/04/2018 | Expire | Portion HA |



## 2 Air Quality Monitoring

### 2.1 Monitoring Locations

According to the EM&A Manual Section 3.5, four impact monitoring locations have been established for air quality monitoring, which are summarized in [Table 2.1.1](#).

Table 2.1.1 Air Quality Monitoring Locations

| Identification No. | Monitoring Location  | Description                             | Parameter             |
|--------------------|--|---|-----------------------|
| AM1                | Marine Department New Yau Ma Tei Public Cargo Working Area Administrative Building | Ground Floor<br>Face to Hoi Po Road     | 1-hr TSP<br>24-hr TSP |
| AM2                | Garden Building  | Ground Floor<br>Face to Canton Road     | 1-hr TSP<br>24-hr TSP |
| AM3                | The Cullinan I   | Ground Floor<br>Face to Nga Cheung Road | 1-hr TSP<br>24-hr TSP |
| AM4                | Lai Chack Middle School  | Ground Floor<br>Face to Canton Road     | 1-hr TSP<br>24-hr TSP |

Due to the rejection from the representatives/ property management of the premises, high volume samplers are not feasible to be installed at AM3 and AM4 for the 24-hr TSP monitoring. Alternative locations AM3-B and AM4-A are proposed accordingly. The monitoring locations are summarized in [Table 2.1.2](#). The details of monitoring location plan are shown in [Appendix C](#).

Major construction works in Portion Q (Section 4 and 4A of the Works) have been substantially completed in August 2018. According to the completion of construction works, environmental monitoring records and positive log of environmental related complaint/ prosecution/ non-compliance, the 1-hr TSP and 24-hr TSP monitoring in Portion Q (AM2, AM4/AM4-A) is terminated starting from February 2019.

Table 2.1.2 Air Quality Monitoring Locations

| ID No.              | Monitoring Location  | Description                             | Coordinates                   | Parameter |
|---------------------|--|---|-------------------------------|-----------|
| AM1                 | Marine Department New Yau Ma Tei Public Cargo Working Area Administrative Building | Ground Floor<br>Face to Hoi Po Road     | 22°18'44.8"N<br>114°09'37.4"E | 1-hr TSP  |
| AM2                 | Garden Building  | Ground Floor<br>Face to Canton Road     | 22°18'12.7"N<br>114°10'05.7"E | 1-hr TSP  |
| AM3                 | The Cullinan I   | Ground Floor<br>Face to Nga Cheung Road | 22°18'22.0"N<br>114°09'39.3"E | 1-hr TSP  |
| AM4                 | Lai Chack Middle School  | Ground Floor<br>Face to Canton Road     | 22°18'05.4"N<br>114°10'05.3"E | 1-hr TSP  |
| AM1                 | Marine Department New Yau Ma Tei Public Cargo Working Area Administrative Building | Rooftop Face to Hoi Po Road             | 22°18'44.8"N<br>114°09'37.4"E | 24-hr TSP |
| AM2                 | Garden Building  | Ground Floor<br>Face to Canton Road     | 22°18'12.7"N<br>114°10'05.7"E | 24-hr TSP |
| AM3-B <sup>*1</sup> | The Cullinan II (W Hong Kong)  | Ground Floor<br>Face to The Cullinan II | 22°18'16.3"N<br>114°09'34.5"E | 24-hr TSP |
| AM4-A               | Tsim Sha Tsui Fire Station   | Ground Floor<br>Face to Canton Road     | 22°18'05.5"N<br>114°10'04.0"E | 24-hr TSP |

Remark:

<sup>\*1</sup> Monitoring station was amended from AM3-A to AM3-B from October 2016. AM3-B is located at the site boundary of Scheme I. There is no obstacle between the site (dust emission source) and monitoring point. It is more representative for monitoring the dust impact caused by the construction activities.

## 2.2 Monitoring Frequency

For 1-hr TSP monitoring, the sampling frequency is at least three times in every six days when the highest dust impact occurs.

For 24-hr TSP monitoring, the sampling frequency is once in every six days when the highest dust impact occurs.

Monitoring was carried out on 1, 4, 9, 14, 20 and 26 February 2019.

## 2.3 Monitoring Equipment

1-hr TSP monitoring was carried out by the portable dust meters. A comparison test for the portable dust meters with the HVS was carried out to ensure the accuracy for direct reading of the portable dust meter. 24-hr TSP monitoring was carried out by the high volume samplers. The monitoring equipment is listed in [Table 2.3.1](#) and Calibration Certificates of the equipment are shown in [Appendix D](#).

Table 2.3.1 Air Quality Monitoring Equipment

| Equipment              | Manufacturer<br>&<br>Model No. | Serial No. | Latest<br>Calibration<br>Date | Next<br>Calibration<br>Date |
|------------------------|--------------------------------|------------|-------------------------------|-----------------------------|
| Portable Dust<br>Meter | TSI AM510 /<br>TSI AM520       | 11503016   | 01/08/2018                    | 31/07/2019                  |
|                        |                                | 11506035   | 01/08/2018                    | 31/07/2019                  |
|                        |                                | 5201750010 | 02/05/2018                    | 01/05/2019                  |
|                        |                                | 5201707004 | 02/05/2018                    | 01/05/2019                  |
| High Volume<br>Sampler | Tisch TE-5170                  | 0001       | 01/02/2018                    | 30/04/2019                  |
|                        |                                | 0002       | 01/02/2018                    | 30/04/2019                  |
|                        |                                | 0003       | 01/02/2018                    | 30/04/2019                  |
| Calibration Kit        | Tisch TE-5028A                 | 2137       | 01/05/2018                    | 30/04/2019                  |

## 2.4 Monitoring Methodology and Parameters

Measurements of 1-hr TSP monitoring were taken by a Dust Trak aerosol monitor or its equivalent that is a portable and battery-operated laser photometer capable of performing real time 1-hr TSP measurements.

Field monitoring procedures are as follows:

- The monitoring station was set at a point 1m from the exterior of the sensitive receivers building façade and set at a position 1.2m above the ground.
- The battery condition was checked to ensure good functioning of the dust monitor.
- Zero Cal was conducted to the dust monitor to each test for ensuring more accurate data.
- Logging setup and Instrument setup such as log interval, test length, number of test and impactor adaptor will set as follows:
  - log interval : 1min
  - test length : 60mins
  - number of test : 3
  - Impactor adaptor: 100μ
- Start the monitoring lasting 3 hours for each monitoring location
- At the end of the monitoring period, the Average, Maximum and Minimum of each TSP test shall be recorded. In addition on a standard record sheet.

Measurements of 24-hr TSP monitoring were taken by High Volume Samplers (HVSs).

HVSs fitted with appropriate sampling inlets were employed for air quality monitoring. Each sampler was composed of a motor, a filter holder, a flow controller and a sampling inlet and its performance specification complies with that required by USEPA Standard Title 40, Code of Federation Regulations Chapter 1 (Part 50).

Installation of HVSs:

- A horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
- No two samplers should be placed less than 2 meters apart;
- The distance between the sampler and an obstacle, such as buildings, must be 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 samplers;
- A minimum of 2 meters separation from any supporting structure, measured horizontally is required;
- No furnace or incinerator flue is nearby;
- Airflow around the sampler is unrestricted;
- The sampler is more than 20 meters from the dripline;
- 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; and
- A secured supply of electricity is needed to operate the samplers.

Data of wind speed and wind direction was extracted from King's Park Meteorological Station of Hong Kong Observatory. The collection of wind data meets the prescribed criteria in S.3.4.3 of the EM&A Manual.

Other relevant data such as monitoring location, time, weather conditions and any other special phenomena at the construction site were recorded during the measurement period.

## **2.5 Maintenance and Calibration**

Dust Trak aerosol monitors were calibrated by the manufacturer or a HOKLAS Laboratory for every year and on-site Zero Cal before every monitoring. HVSs were calibrated after installation and re-calibrated on bi-monthly basis.

## **2.6 Quality Assurance / Quality Control Results and Detection Limits**

The portable dust meter was calibrated annually by the manufacturer or a HOKLAS laboratory. HVSs were first been calibrated after installation and repeated on bi-monthly basis. Calibration Kit for HVSs was calibrated annually by the manufacturer or a HOKLAS laboratory. The detection limits of the HVSs meet with the prescribed standard. Calibration details and current Calibration Certificates are shown in [Appendix D](#).

## 2.7 Action and Limit Level for 1-hr TSP and 24-hr TSP

The Action and Limit levels for air quality impact monitoring results at all monitoring locations are summarized in [Table 2.7.1](#), which would be applied for compliance assessment of air quality for this project. If the air quality monitoring results at any monitoring stations exceeded the criteria, the actions in accordance with the Event and Action Plan in [Table 2.7.2](#) shall be taken.

Table 2.7.1 Established TSP Actions and Limit Level

| Monitoring Locations | Monitoring Parameter | Action Level<br>( $\mu\text{g}/\text{m}^3$ ) | Limit Level<br>( $\mu\text{g}/\text{m}^3$ ) |
|----------------------|----------------------|--|---|
| AM1                  | 1-hr TSP             | 288  | 500   |
| AM3                  |                      | 299  | 500   |
| AM1                  | 24-hr TSP            | 157  | 260   |
| AM3-B                |                      | 177  | 260   |

Table 2.7.2 Event and action Plan for Air Quality

| EVENT   | ACTION  |  |   |  |
|---|---|--|---|--|
|   | ET  | IEC  | ER  | CONTRACTOR   |
| <b>ACTION LEVEL</b>                               |   |  |   |  |
| 1. Exceedance for one sample                      | 1. Inform IEC, ER and Contractor;<br>2. Identify source, investigate the causes of exceedance and propose remedial measures;<br>3. Repeat measurement to confirm finding.   | 1. Check monitoring data submitted by ET;<br>2. Check Contractor's working method.   | 1. Notify Contractor.   | 1. Rectify any unacceptable practice;<br>2. Amend working methods if appropriate.  |
| 2. Exceedance for two or more consecutive samples | 1. Inform IEC, ER and Contractor;<br>2. Identify source;<br>3. Advise the ER on the effectiveness of the proposed remedial measures;<br>4. Repeat measurements to confirm findings;<br>5. Increase monitoring frequency to daily;<br>6. Discuss with IEC, ER and Contractor on remedial actions required;<br>7. If exceedance continues, arrange meeting with IEC and ER;<br>8. If exceedance stops, cease additional monitoring. | 1. Check monitoring data submitted by ET;<br>2. Check Contractor's working method;<br>3. Discuss with ET and Contractor on possible remedial measures;<br>4. Advise the ET/ER on the effectiveness of the proposed remedial measures;<br>5. Supervise Implementation of remedial measures. | 1. Confirm receipt of notification of failure in writing;<br>2. Notify Contractor;<br>3. Ensure remedial measures properly implemented. | 1. Submit proposals for remedial to ER and IEC within 3 working days of notification;<br>2. Implement the agreed proposals;<br>3. Amend proposal if appropriate. |

| LIMIT LEVEL                                      |   |  |  |  |
|--|---|--|--|--|
| 1.Exceedance for one sample                      | 1. Inform IEC, ER, Contractor and EPD;<br>2. Identify source, investigate the causes of exceedance and propose remedial measures;<br>3. Repeat measurement to confirm finding;<br>4. Increase monitoring frequency to daily;<br>5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.  | 1. Check monitoring data submitted by ET;<br>2. Check Contractor's working method;<br>3. Discuss with ET and Contractor on possible remedial measures;<br>4. Advise the ER on the effectiveness of the proposed remedial measures;<br>5. Supervise implementation of remedial measures.  | 1. Confirm receipt of notification of failure in writing;<br>2. Notify Contractor;<br>3. Ensure remedial measures properly implemented.  | 1. Take immediate action to avoid further exceedance;<br>2. Discuss with ET and IEC on remedial actions<br>3. Submit proposals for remedial actions to IEC within 3 working days of notification;<br>4. Implement the agreed proposals;<br>5. Amend proposal if appropriate.   |
| 2.Exceedance for two or more consecutive samples | 1. Notify IEC, ER, Contractor and EPD;<br>2. Identify source;<br>3. Repeat measurement to confirm findings;<br>4. Increase monitoring frequency to daily;<br>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented;<br>6. Arrange meeting with IEC and ER and Contractor to discuss the remedial actions to be taken;<br>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results;<br>8. If exceedance stops, cease additional monitoring. | 1. Check monitoring data submitted by ET;<br>2. Check Contractor's working method;<br>3. Discuss amongst ER, ET, and Contractor on the potential remedial actions;<br>4. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly;<br>5. Supervise the implementation of remedial measures. | 1. Confirm receipt of notification of failure in writing;<br>2. Notify Contractor;<br>3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented;<br>4. Ensure remedial measures properly implemented;<br>5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to terminate that portion of work until the exceedance ceases. | 1. Take immediate action to avoid further exceedance;<br>2. Discuss with ET and IEC on remedial actions<br>3. Submit proposals for remedial actions to ER and IEC within 3 working days of notification;<br>4. Implement the agreed proposals;<br>5. Resubmit proposals if problems still not under control;<br>6. Stop the relevant portion of works as determined by the ER until the exceedance ceases. |

## 2.8 Monitoring Results and Observations

1-hr TSP monitoring was conducted at four monitoring locations. The monitoring results are summarized in [Table 2.8.1](#). 24-hr TSP monitoring was conducted at three monitoring locations. The monitoring results are summarized in [Table 2.8.2](#). Detailed impact monitoring data of 1-hr TSP, 24-hr TSP and meteorological data are shown in [Appendix E](#).

Table 2.8.1 Summary of average 1-hr TSP monitoring data

| Monitoring Locations | Average 1-hr TSP ( $\mu\text{g}/\text{m}^3$ ) | Range 1-hr TSP ( $\mu\text{g}/\text{m}^3$ ) | Action Level ( $\mu\text{g}/\text{m}^3$ ) | Limit Level ( $\mu\text{g}/\text{m}^3$ ) |
|----------------------|---|---|---|--|
| AM1                  | 87  | 47 – 120                                    | 288                                       | 500                                      |
| AM3                  | 59  | 50 – 70                                     | 299                                       | 500                                      |

Table 2.8.2 Summary of average 24-hr TSP monitoring data

| Monitoring Locations | Average 24-hr TSP ( $\mu\text{g}/\text{m}^3$ ) | Range 24-hr TSP ( $\mu\text{g}/\text{m}^3$ ) | Action Level ( $\mu\text{g}/\text{m}^3$ ) | Limit Level ( $\mu\text{g}/\text{m}^3$ ) |
|----------------------|--|--|---|--|
| AM1                  | 89   | 40 – 145                                     | 157                                       | 260                                      |
| AM3-B                | 48   | 34 – 60                                      | 177                                       | 260                                      |

In accordance with the established action and limited levels for impact monitoring, there was no exceedance recorded in the reporting period.

During the monitoring period, vehicle emissions were identified as one of the dust sources for AM1, AM3 and AM3-B.

## **2.9 Monitoring Schedule for Next Reporting Month**

TSP monitoring for next reporting month is scheduled on 4, 9, 15, 21 and 27 March 2019.



### 3 Noise Monitoring

#### 3.1 Monitoring Locations

According to the EM&A Manual Section 4.5, five impact monitoring locations have been established for noise impact monitoring during the construction phase of the project, which are summarized in [Table 3.1.1](#). The details of monitoring location plan are shown in [Appendix C](#).

Table 3.1.1 Noise Monitoring Locations

| Identification No. | Noise Monitoring Location                         | Description   | Measurement Type |
|--------------------|---|---|------------------|
| NM1                | Sorrento - Tower 1 <sup>*1</sup>                  | Podium Level <sup>*1</sup><br>Face to Nga Cheung Road | Façade           |
| NM2                | Yau Ma Ti Catholic Primary School (Hoi Wang Road) | Ground Floor<br>Face to Hoi Ting Road                 | Façade           |
| NM3                | The Cullinan I                                    | Ground Floor<br>Face to Nga Cheung Road               | Façade           |
| NM4                | Lai Chack Middle School                           | Ground Floor<br>Face to Canton Road                   | Façade           |
| NM5                | Yue Tak Building                                  | Ground Floor<br>Face to Jordan Road                   | Façade           |

Remark:

<sup>\*1</sup> According to EPD's comment and requirement for EM&A Report (February 2016) on 7 April 2016, noise measurement at NM1 was relocated from the ground level (roadside) of Nga Cheung Road to podium level of the Sorrenti Tower 1 starting from June 2016.

Major construction works in Portion Q (Section 4 and 4A of the Works) have been substantially completed in August 2018. According to the completion of construction works, environmental monitoring records and positive log of environmental related complaint/ prosecution/ non-compliance, the noise monitoring in Portion Q (NM4 and NM5) is terminated starting from February 2019.

#### 3.2 Monitoring Frequency

The regular monitoring for each location was performed on a weekly basis. The monitoring was carried out on 1, 4, 9, 14, 20 and 26 February 2019.

### 3.3 Monitoring Equipment

Noise monitoring was conducted by using BSWA 806 / SVANTEK 971 which complied with the International Electrotechnical Commission Publications 61672:2002 (Type 1), 60651:1979 (Type 1) and 60804:1985 (Type 1) Specifications as referred to the Technical Memorandum to the Noise Control Ordinance. The equipment was calibrated and verified by certified laboratory to ensure they can perform to the same level of accuracy as stated in the manufacturer's specification. Before and after the baseline measurement, the reading of sound level meter was checked with the acoustic calibrator and the measurements were accepted as valid if the calibration levels before and after the noise measurement agreed to within 1.0 dB. The measurement equipment is listed in [Table 3.3.1](#) and Calibration Certificates of the equipment are shown in [Appendix D](#).

Table 3.3.1 Equipment List for Noise Monitoring

| Equipment             | Manufacturer & Model No. | Precision Grade | Serial No. | Latest Calibration Date | Next Calibration Date |
|-----------------------|--------------------------|-----------------|------------|-------------------------|-----------------------|
| Sound level meter     | SVANTEK 971              | IEC61672 Type 1 | 72680      | 31/07/2018              | 30/07/2019            |
|                       | SVANTEK 971              | IEC61672 Type 1 | 34350      | 16/05/2018              | 15/05/2019            |
| Acoustical calibrator | SVANTEK SV30A            | IEC 942 Type 1  | 29085      | 21/05/2018              | 20/05/2019            |
|                       | BSWA CA111               | IEC 942 Type 1  | 520284     | 20/10/2018              | 19/10/2019            |

### 3.4 Monitoring Methodology and Parameters

The construction noise level was measured in terms of the A-weighted equivalent continuous sound pressure level,  $L_{Aeq}$ .  $L_{Aeq}$  (30minutes) was used as the monitoring parameter for the impact monitoring in the time period between 0700 to 1900 hours on normal weekdays.

In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action plan in Table 3.6.2, shall be carried out. This additional monitoring shall be carried out until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

Field monitoring procedures are as follows:

- The monitoring station was set at a point 1m from the exterior of the sensitive receivers building façade and set at a position 1.2m above the ground.
- The battery condition was checked to ensure good functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time will set as follows:
  - frequency weighting : A
  - time weighting : Fast
- 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.
- 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. Noise measurement should be paused during periods of high intrusive noise if possible and observation shall be recorded when intrusive noise is not avoided.
- At the end of the monitoring period, the  $L_{eq}$ ,  $L_{10}$  and  $L_{90}$  shall be recorded. In addition, site conditions and noise sources should be recorded on a standard record sheet.

### **3.5 Maintenance and Calibration**

Monitoring equipment was calibrated by the HOKLAS Laboratory for every year and on-site calibrated before and after every monitoring.

### **3.6 Quality Assurance / Quality Control Results and Detection Limits**

The sound level meter and calibrator were calibrated annually by the HOKLAS laboratory. The detection limits of the sound level meter meet with the prescribed standard. Calibration details and current Calibration Certificates are shown in [Appendix D](#).

### 3.7 Action and Limit Level for Construction Noise

The Action and Limit levels for construction noise are defined in [Table 3.7.1](#). Should exceedance of the criteria occur, action in accordance with the Action Plan in [Table 3.7.2](#) shall be carried out.

Table 3.7.1 Action and Limit Levels for Construction Noise at all Sensitive Receivers

| Monitoring Locations | Building Type | Time Period   | Action Level                                       | Limit Level         |
|----------------------|---------------|---|--|---------------------|
| NM1                  | Residential   | Daytime<br>0700 – 1900<br>hrs on normal<br>weekdays | When one<br>documented<br>complaint is<br>received | 75 dB(A)            |
| NM2                  | Education     |   |  | 70 dB(A) / 65dB(A)* |
| NM3                  | Residential   |   |  | 75 dB(A)            |

\*Remark: 70dB(A) and 65dB(A) for schools during normal teaching periods and school examination periods, respectively.

Table 3.7.2 Event / Action Plan for Construction Noise

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

### 3.8 Monitoring Results and Observations

Noise impact monitoring was conducted at five monitoring locations. The monitoring results are summarized in [Table 3.8.1](#). Detailed impact monitoring data of noise are shown in [Appendix F1](#).

Table 3.8.1 Summary of average noise monitoring data

| Monitoring Locations | Monitoring Date | Baseline Level (dB(A)) | $L_{Aeq}^{*1}$ (dB(A)) | Re-M <sup>*2</sup> $L_{Aeq}$ (dB(A)) | Action Level (dB(A))                      | Limit Level (dB(A))    |
|----------------------|-----------------|------------------------|------------------------|--------------------------------------|---|------------------------|
| NM1                  | 1/2/2019        | 75.1                   | 63.4                   | N/A                                  | When one documented complaint is received | 75 dB(A)               |
|                      | 4/2/2019        |                        | 65.3                   | N/A                                  |   |                        |
|                      | 9/2/2019        |                        | 64.3                   | N/A                                  |   |                        |
|                      | 14/2/2019       |                        | 65.8                   | N/A                                  |   |                        |
|                      | 20/2/2019       |                        | 63.0                   | N/A                                  |   |                        |
|                      | 26/2/2019       |                        | 66.4                   | N/A                                  |   |                        |
| NM2                  | 1/2/2019        | 66.5                   | 62.7                   | N/A                                  | When one documented complaint is received | 70 dB(A) <sup>*3</sup> |
|                      | 4/2/2019        |                        | 63.1                   | N/A                                  |   | 70 dB(A) <sup>*3</sup> |
|                      | 9/2/2019        |                        | 64.9                   | N/A                                  |   | 70 dB(A) <sup>*3</sup> |
|                      | 14/2/2019       |                        | 63.2                   | N/A                                  |   | 70 dB(A) <sup>*3</sup> |
|                      | 20/2/2019       |                        | 64.1                   | N/A                                  |   | 70 dB(A) <sup>*3</sup> |
|                      | 26/2/2019       |                        | 62.9                   | N/A                                  |   | 70 dB(A) <sup>*3</sup> |
| NM3                  | 1/2/2019        | 74.5                   | 74.5                   | N/A                                  | When one documented complaint is received | 75 dB(A)               |
|                      | 4/2/2019        |                        | 74.8                   | N/A                                  |   |                        |
|                      | 9/2/2019        |                        | 73.8                   | N/A                                  |   |                        |
|                      | 14/2/2019       |                        | 74.1                   | N/A                                  |   |                        |
|                      | 20/2/2019       |                        | 74.7                   | N/A                                  |   |                        |
|                      | 26/2/2019       |                        | 73.9                   | N/A                                  |   |                        |

Remark:

<sup>\*1</sup> Measured result would be rounded down before comparison with the limit level

<sup>\*2</sup> Repeat noise measurement when exceedance is recorded

<sup>\*3</sup> 70dB(A) for schools during normal teaching periods. School schedule is shown in [Appendix F2](#)

<sup>\*4</sup> 65dB(A) for schools examination periods. School schedule is shown in [Appendix F2](#)

During the monitoring period, traffic noise was identified as one of the noise source for NM2 and NM3. Noise levels of NM3 may be influenced by the construction activities from other construction sites near Nga Cheung Road. Noise level of NM2 may be influenced by construction activities from other construction sites near Hoi Ting Road.

### **3.9 Monitoring Schedule for Next Reporting Month**

Noise monitoring for next reporting month is scheduled on 4, 9, 15, 21 and 27 March 2019.

#### 4 Solid and Liquid Waste Management Status

With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in [Table 4.1](#). During this reporting month, inert C&D materials and general refuse were generated and disposed. No mixed waste was generated. No chemical waste was generated and collected by licensed collector. No paper, plastic and metal was recycled. Detail of waste management data is presented in [Appendix G](#).

Table 4.1 Quantities of Waste Disposed from the Project

| Reporting Month   | Quantity                             |  |             |                |                    |             |             |
|---|--------------------------------------|--|-------------|----------------|--------------------|-------------|-------------|
|   | C&D Materials (inert) <sup>(a)</sup> | C&D Materials (non-inert) <sup>(b)</sup> |             |                |                    |             |             |
|   |                                      | General Refuse                           | Mixed Waste | Chemical Waste | Recycled materials |             |             |
|   |                                      |  |             |                | Paper/ cardboard   | Plastics    | Metals      |
|   | (in '000kg)                          | (in '000kg)                              | (in '000kg) | (in '000kg)    | (in '000kg)        | (in '000kg) | (in '000kg) |
| Feb 2019  | 742.02                               | 15.93                                    | 0           | 0              | 0                  | 0           | 0           |
| Notes:  |                                      |  |             |                |                    |             |             |
| (a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil.   |                                      |  |             |                |                    |             |             |
| (b) Non-inert C&D materials include steel, paper/cardboard packaging waste, plastics and other wastes such as general refuse and vegetative wastes. Steel metal generated from the Project are grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials. |                                      |  |             |                |                    |             |             |

Waste materials were generated during this reporting period, such as excavated waste, demolition waste and general refuse. Contractor handled, stored and disposed in accordance with good waste management practice and EPD's regulation and requirements.

## 5 Landscape and Visual Impact

In accordance with the EM&A Manual, the landscape and visual mitigation measures shall be implemented to minimize the landscape and visual impacts during the construction works. The proposed monitoring program for landscape and visual impact is detailed in [Table 5.1](#).

Table 5.1 Proposed Monitoring Program

| Stage              | Monitoring Task                    | Frequency | Report   | Approval                                   |
|--------------------|------------------------------------|-----------|--|--|
| Construction stage | Mitigation measures implementation | Bi-weekly | Landscape and Visual Impact Assessment Checklist | Registered Landscape Architect & ET Leader |

Bi-weekly site inspections were conducted by representatives of the Engineer, Contractor and ET on 8 and 21 February 2019. The observations, reminders and recommendations made during the site inspections are summarized in Section 6, [Table 6.1](#).

The implementation status of the proposed mitigation measures for landscape and visual impacts is given in [Appendix H](#). Should non-conformity on one occur, action in accordance with the Action Plan in [Table 5.2](#) shall be carried out.

Table 5.2 Event / Action Plan for Landsscape and Visual Impact

| EVENT                          | ACTION   |   |  |   |
|--------------------------------|--|---|--|---|
|                                | ET   | IEC   | ER   | CONTRACTOR  |
| Non-conformity on one occasion | 1. Identify Source<br>2. Inform IEC and ER<br>3. Discuss remedial actions with IEC, ER and Contractor<br>4. Monitor remedial actions until rectification has been completed  | 1. Check report<br>2. Check Contractor's working method<br>3. Discuss with ET and Contractor on possible remedial measures<br>4. Advise ER on effectiveness of proposed remedial measures.<br>5. Check implementation of remedial measures.               | 1. Notify Contractor<br>2. Ensure remedial measures are properly implemented | 1. Amend working methods<br>2. Rectify damage and undertake any necessary replacement |
| Repeated Non-conformity        | 1. Identify Source<br>2. Inform IEC and ER<br>3. Increase monitoring frequency<br>4. Discuss remedial actions with IEC, ER and Contractor<br>5. Monitor remedial actions until rectification has been completed<br>6. If non-conformity stops, cease additional monitoring | 1. Check monitoring report<br>2. Check Contractor's working method<br>3. Discuss with ET and Contractor on possible remedial measures<br>4. Advise ER on effectiveness of proposed remedial measures<br>5. Supervise implementation of remedial measures. | 1. Notify Contractor<br>2. Ensure remedial measures are properly implemented | 1. Amend working methods<br>2. Rectify damage and undertake any necessary replacement |



## **6 Environmental Site Inspection**

### **6.1 Site Audit**

Site audit was carried out by ET on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.

Joint weekly inspections were conducted by representatives of the Contract Administrator, Engineer, Contractor and ET on 13, 20 and 27 February 2019. The representative of the IEC conducted the site inspection on 20 February 2019. Observations were recorded and summarized in Table 6.1.

During site inspection in the reporting month, no non-compliance was identified.

### **6.2 Implementation Status of Environmental Mitigation Measures**

According to the EM&A Manual of the Project, the mitigation measures detailed in the documents shall be implemented during the construction phase. Updated status summary of the Environmental Mitigation Implementation Schedule is provided in [Appendix H](#).

The observations, reminders and recommendations made during the audit sessions are summarized in [Table 6.1](#).

Table 6.1 Summary results of site inspections findings.

| Date                        | Findings  | Identification | Advice from ET  | Action taken  | Closing date |
|-----------------------------|---|----------------|---|---|--------------|
| 30 Jan 19                   | Sawdust was observed.   | Observation    | Contractor was advised to properly collect the sawdust for preventing dust emission.  | Sawdust was properly collected.   | 13 Feb 19    |
| 13 Feb 19                   | General refuse / construction waste were observed on the falsework decking.           | Observation    | Contractor was advised to properly remove the refuse and keep the site area clean and tidy.   | General refuse and construction waste were removed.   | 20 Feb 19    |
| 20 Feb 19                   | Muddy water was observed inside the treated channel of the wastewater treatment tank. | Observation    | Contractor was immediately requested to suspend the wastewater discharge and advised to properly clean up the wastewater treatment plant and control the retention time to enhance the treatment quality for fulfilling the discharge requirements. | Wastewater treatment plant was cleaned up and maintained.                                       | 27 Feb 19    |
| 20 Feb 19                   | Public gully near the site entrance was not properly covered and protected.           | Observation    | Contractor was advised to cover and seal the gully for preventing direct discharge.   | The gully is now located at the midspan of a temporary diverted public road and being operated. | 27 Feb 19    |
| 20 Feb 19                   | Silt and debris were accumulated at the site drainage channel.                        | Observation    | Contractor was advised to frequently clean up the drainage channels and maintain the system before and after rainstorms.  | The site drainage channel was cleaned up.   | 27 Feb 19    |
| 20 Feb 19                   | An old generator was set up on the road of bridge in Portion HA.                      | Reminder       | Contractor was reminded to provide additional drip tray for the generator to avoid land contamination.  | N/A   | N/A          |
| 27 Feb 19                   | General refuse was observed.  | Observation    | Contractor was advised to collect the refuse for keeping the site clean and tidy.   | The follow-up status will be reported in the next reporting period.                             | N/A          |
| 27 Feb 19                   | Sandy materials were exposed.   | Observation    | Contractor was advised to cover the sandy materials for dust suppression.   | The follow-up status will be reported in the next reporting period.                             | N/A          |
| Landscape and Visual Impact |   |                |   |   |              |
| 8 Feb 19<br>21 Feb 19       | Construction materials were piled within the TPZ of T25.                              | Observation    | Contractor was reminded to relocate the construction materials which were piled within the TPZ  | The follow-up status will be reported in the next reporting period.                             | N/A          |
| 8 Feb 19<br>21 Feb 19       | Construction works were started within Scheme J, Scheme HA and Scheme Q.              | Reminder       | Contractor was reminded to provide TPZ with robust fence at the dripline of all retained trees in order to avoid damage to the trees and their root zones. No works   | N/A   | N/A          |

| Date                  | Findings   | Identification | Advice from ET  | Action taken | Closing date |
|-----------------------|--|----------------|---|--------------|--------------|
|                       |  |                | were allowed to undertake within the TPZ.   |              |              |
| 8 Feb 19<br>21 Feb 19 | Several retained trees were found damaged by Typhoon Manghut. Some broken branches were hanging within the tree crown.   | Reminder       | Contractor was reminded to prepare incident report for the damaged trees and to conduct remedial pruning for the damaged trees. Tree at risk should be removed. | N/A          | N/A          |
| 8 Feb 19<br>21 Feb 19 | 2 <sup>nd</sup> transplantation was carried out for all the transplanted trees but no mulching was provided. No stabilization system was provided for T41, T44, T58, WKI 230, WKI 293, WKI 314 and WKI 316. Moreover, tree crown of T2 and T3 was tiled. | Reminder       | Contractor was reminded to mulching, stabilization system and remove the tie during / after the transplantation.  | N/A          | N/A          |

## **7 Environmental Non-Conformance**

### **7.1 Summary of Environmental Exceedances**

No exceedance of action level and limit level was recorded for TSP and Noise.

### **7.2 Summary of Environmental Non-Compliance**

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

### **7.3 Summary of Environmental Complaint**

No environment project-related complaint was received in the reporting period.

### **7.4 Summary of Notification of Summons and Successful Prosecution**

There was no successful environmental prosecution or notification of summons received since the Project commencement.

The cumulative log for environmental exceedance, non-compliance, complaint and summon and successful prosecution since the commencement of the Project is presented in [Appendix I](#).

## **8 Future Key Issues**

The major construction activities in the coming month will include:

- Portion I – Pile Cap, Pier and Bridge Deck Construction Works
- Portion I – E&M Installation and Road Works
- Portion I – Road Pavement, Street Furniture Installation
- Portion HA – Pile Cap, Pier and Bridge Deck Construction Works
- Portion HA – Road Pavement, Street Furniture Installation

Potential environmental impacts arising from the above construction activities are mainly associated with dust, construction noise, water quality and waste management. The Contractor has been reminded to properly implement dust, construction noise and water quality control measures as well as proper waste management in order to minimize the potential environmental impacts due to the construction works of this Project.

## **9 Comment, Recommendations and Conclusions**

### **9.1 Comment**

The recommended mitigation measures accordance with the EM&A Manual had been effectively implemented to minimize the environmental impacts due to the construction. The contractor had implemented the mitigation measures to control the dust and noise impacts. No dust and noise impacts obviously affected to the environment and sensitive receivers. The follow up actions were implemented for environmental observations made during the site inspections. The environmental performance during the reporting period was considered satisfactory.

### **9.2 Recommendations**

According to the environmental audit performed in the reporting month, the following recommendation was made:

#### **Water / Wastewater**

- To properly clean up the wastewater treatment plant and control the retention time to enhance the treatment quality for fulfilling the discharge requirements.
- To cover and seal the gully for preventing direct discharge.
- To frequently clean up the drainage channels and maintain the system before and after rainstorms.

#### **Air Quality**

- To cover the sandy materials for dust suppression.

#### **Waste Management / Materials Storage / Others**

- To properly remove the refuse and keep the site area clean and tidy.
- To provide additional drip tray for the generator to avoid land contamination.
- To collect the refuse for keeping the site clean and tidy.

#### **Visual and Landscape Impact**

- To relocate the construction materials which were piled within the TPZ.
- To provide TPZ with robust fence at the dripline of all retained trees in order to avoid damage to the trees and their root zones. No works were allowed to undertake within the TPZ.

- To provide robust TPZ for the trees and to avoid damaging the root zone under the dripline.
- To avoid crown and root damage of the tree.
- To prepare incident report for the damaged trees and to conduct remedial pruning for the damaged trees. Tree at risk should be removed.
- To provide mulching, stabilization system and remove the tie during / after the transplantation.

### **9.3 Conclusions**

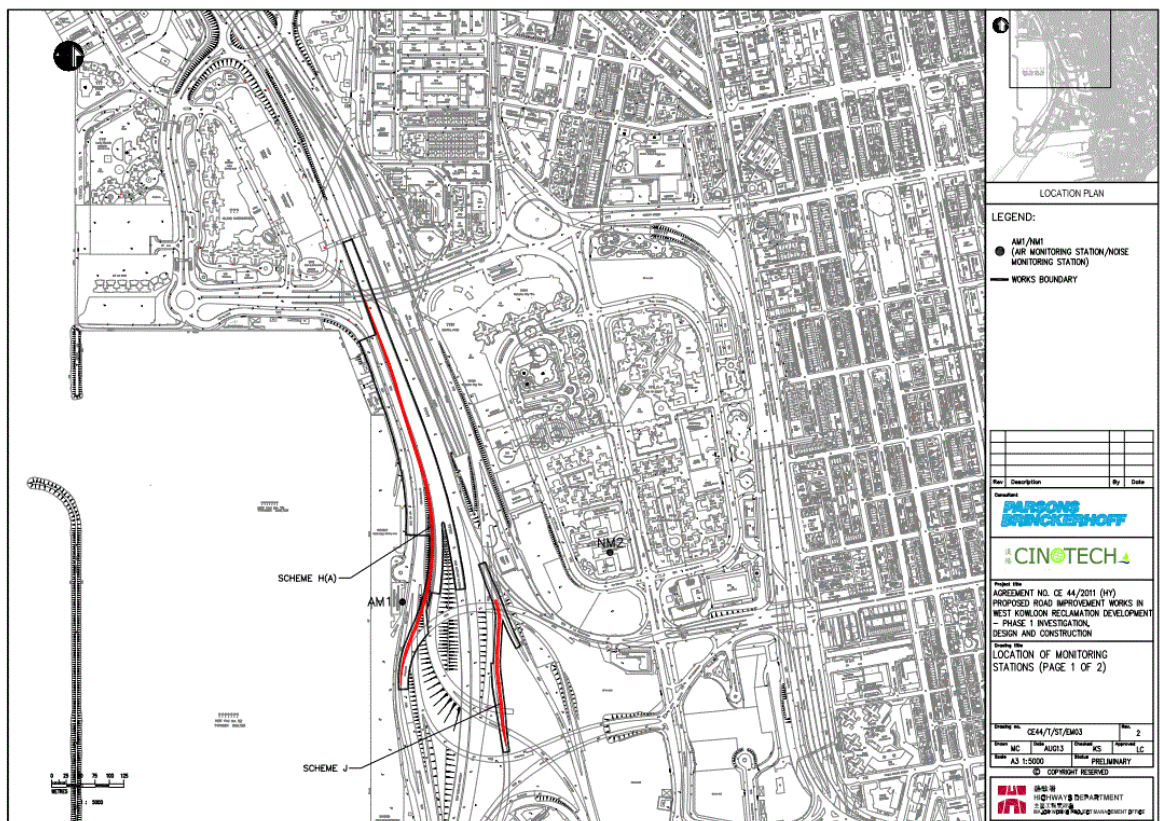
This is the monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken from 1 February 2019 to 28 February 2019 in accordance with the EM&A Manual.

No exceedance of action level and limit level was recorded for TSP and Noise. No Non-compliance event, environmental complaint, notification of summons and successful prosecution against the Project were received in this reporting month.

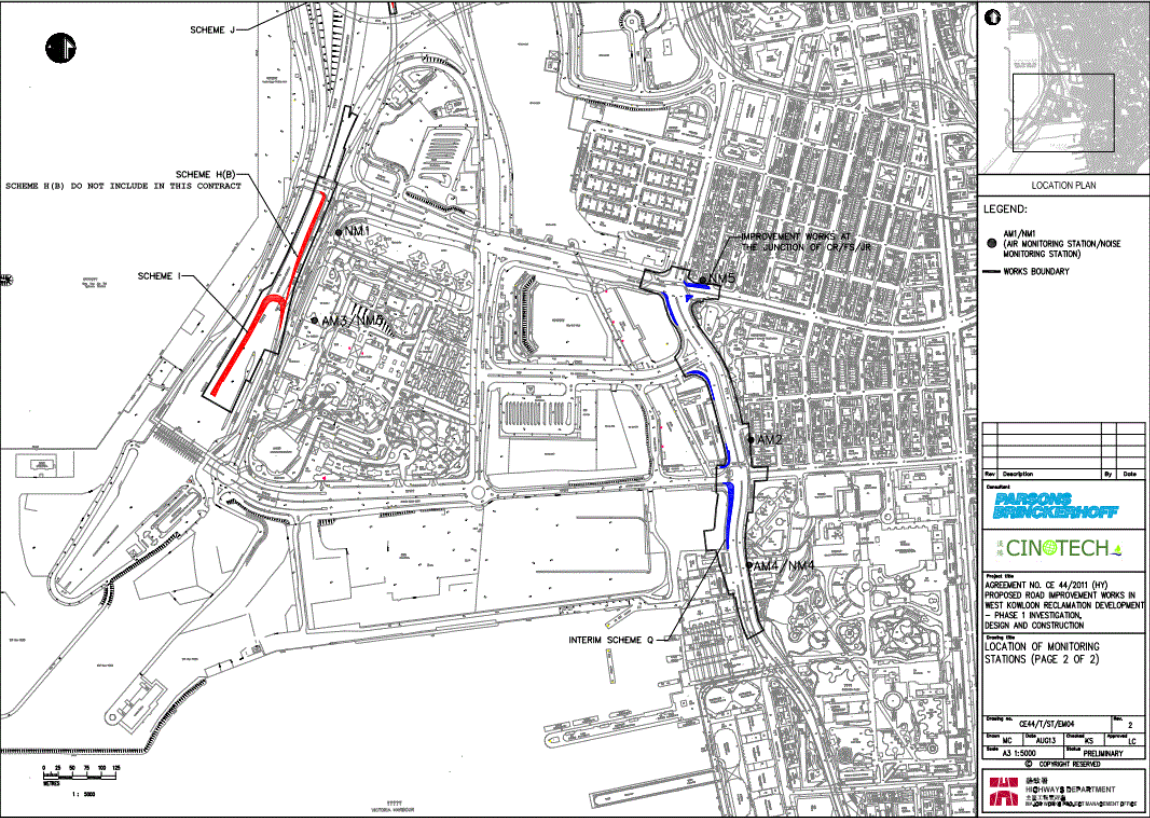
3 nos. of environmental site inspections and 2 nos. of landscape and visual inspections were carried out in this reporting month. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site audit.

ET has reminded the contractor to provided environmental pollution control measures, waste management measures and good site practice.

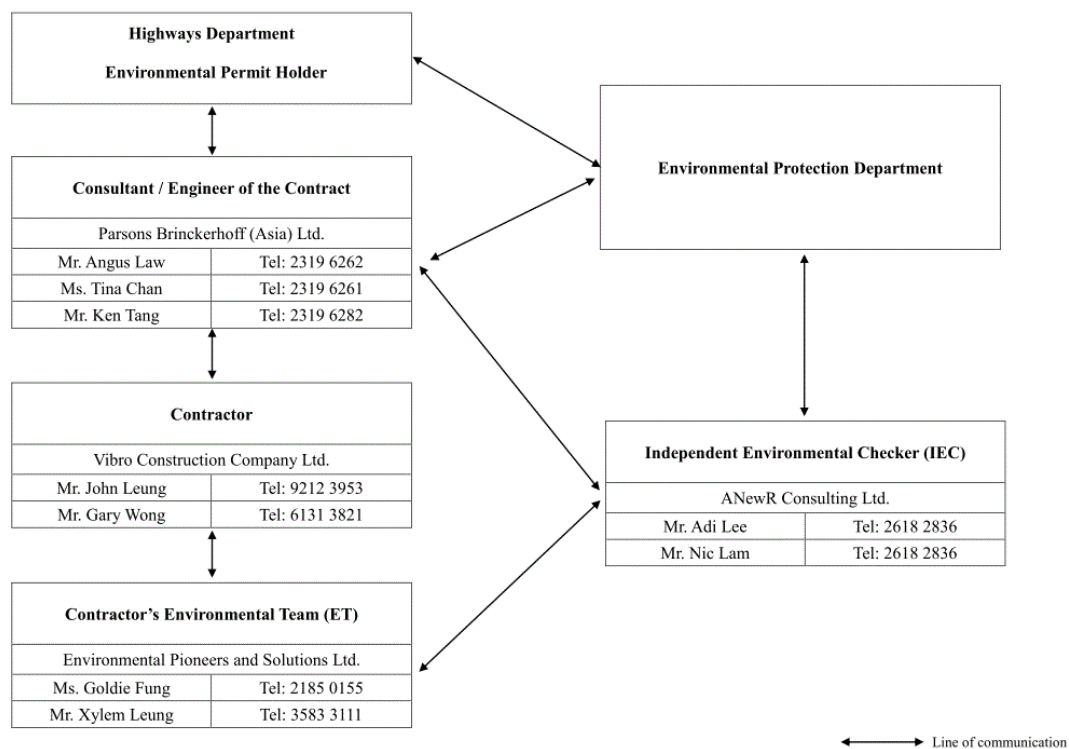
ET will keep tracking of the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all the necessary mitigation measures.





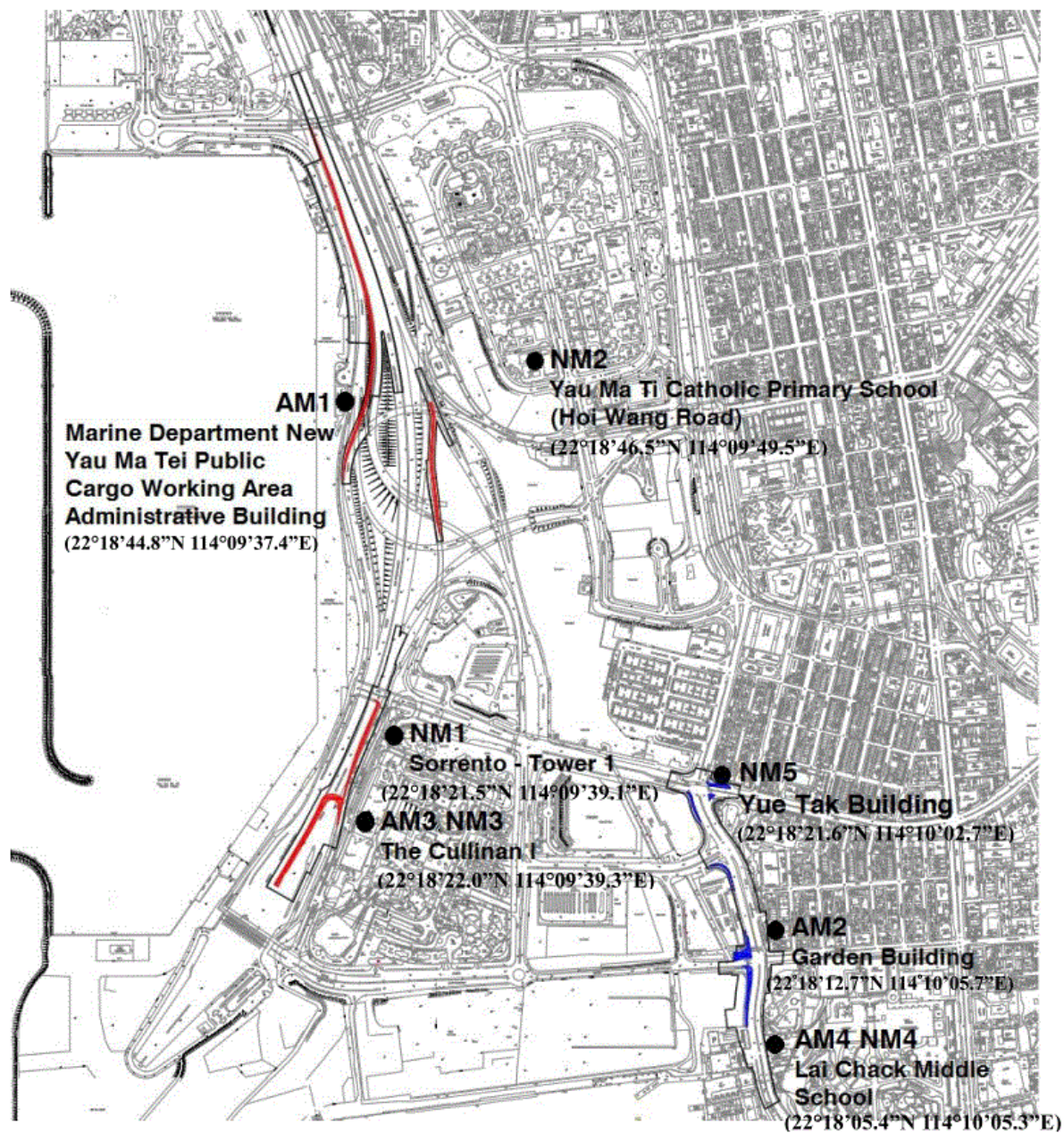


## Appendix B: Project Organization Chart







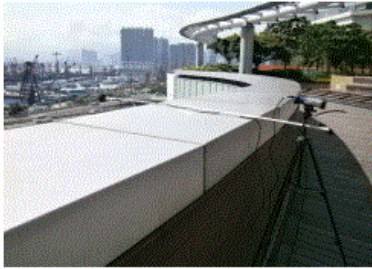




## Appendix C: Monitoring Locations

Locations for 1-hr TSP and Noise monitoring

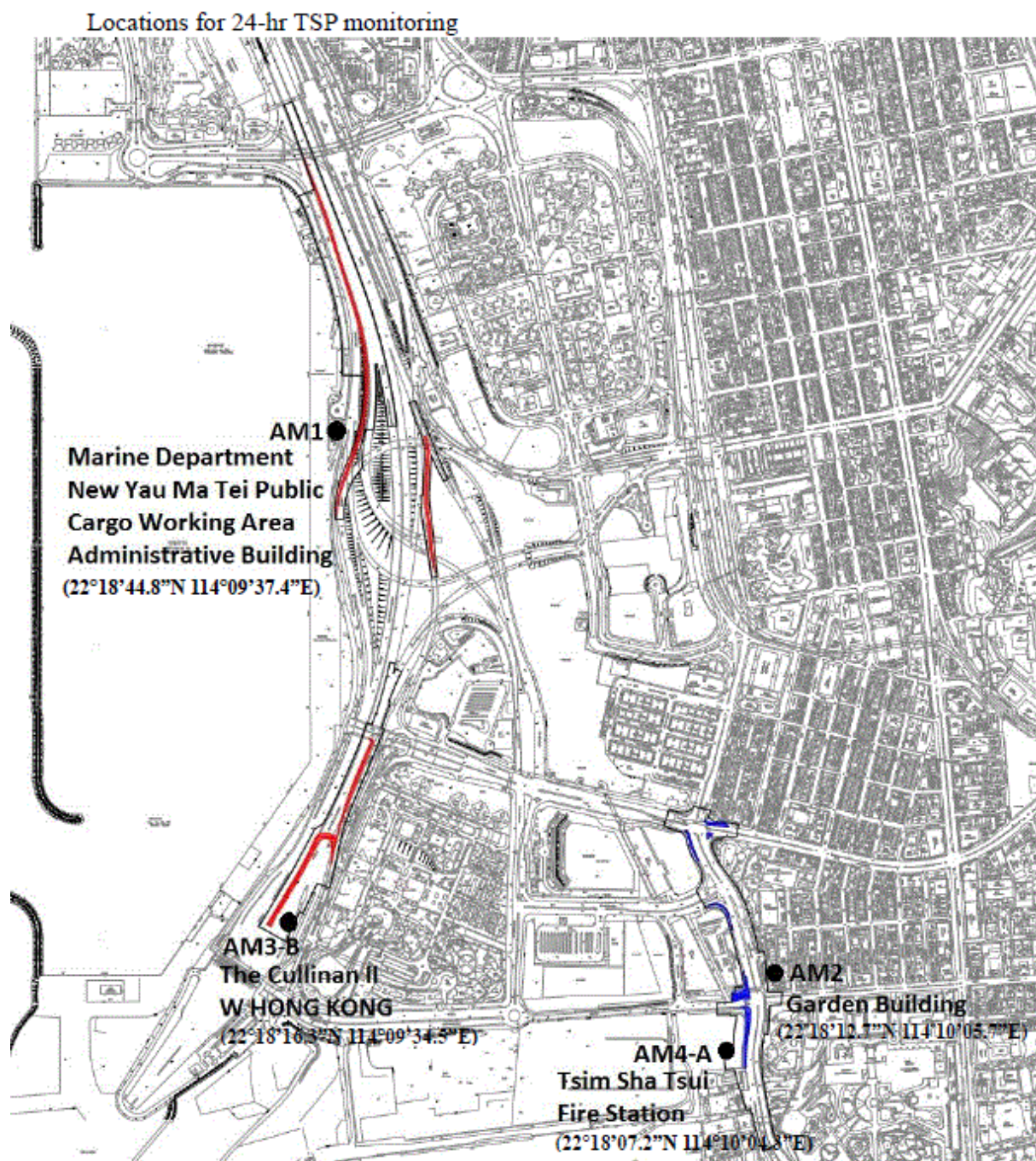




| Monitoring Location  | Photo Record   |
|--|--|
| AM1<br>Marine Department New Yau Ma Tei Public Cargo<br>Working Area Administrative Building |    |
| AM2<br>Garden Building   |    |
| AM3<br>The Cullinan I  |   |
| AM4<br>Lai Chack Middle School   |  |

| Monitoring Location                                      | Photo Record   |
|--|--|
| NM1<br>Sorrento - Tower 1                                |    |
| NM2<br>Yau Ma Ti Catholic Primary School (Hoi Wang Road) |    |
| NM3<br>The Cullinan I                                    |   |
| NM4<br>Lai Chack Middle School                           |  |
| NM5<br>Yue Tak Building                                  |  |





| Monitoring Location  | Photo Record   |
|--|--|
| <p>AM1</p> <p>Marine Department New Yau Ma Tei Public Cargo Working Area Administrative Building</p> |    |
| <p>AM2</p> <p>Garden Building</p>  |   |
| <p>AM3-B</p> <p>The Cullinan II<br/>(W Hong Kong)</p>  |  |
| <p>AM4-A</p> <p>Tsim Sha Tsui Fire Station</p>   |  |



## Appendix D: Calibration Certification

| Environment Conditions |                          | Model         | AM510    |
|------------------------|--------------------------|---------------|----------|
| Temperature            | 74.05 (23.4) °F (°C)     | Serial Number | 11503016 |
| Relative Humidity      | 48.5 %RH                 |               |          |
| Barometric Pressure    | 28.98 (981.4) inHg (hPa) |               |          |

☒ As Left      ☒ In Tolerance  
☐ As Found      ☐ Out of Tolerance

### Concentration Linearity Plot

○ = In Tolerance  
● = Out of Tolerance

System ID: DT1101-02

| CONCENTRATION |          |          |                 | Unit: mg/m3 |          |          |                 |
|---------------|----------|----------|-----------------|-------------|----------|----------|-----------------|
| #             | STANDARD | MEASURED | ALLOWABLE RANGE | #           | STANDARD | MEASURED | ALLOWABLE RANGE |
| 1             | 8.895    | 8.819    | 8.006-9.784     | 3           | 1.641    | 1.611    | 1.149-2.133     |
| 2             | 0.165    | 0.171    | 0.140-0.190     | 4           | 16.186   | 16.081   | 14.567-17.805   |

TSI Incorporated does hereby certify that all materials, components, and workmanship used in the manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. There is no NIST standard for optical mass measurements. Calibration of this instrument performed by TSI has been done using emery oil and has been nominally adjusted to respirable mass per standard ISO 12103-1. A1 test dust (Arizona dust). Our calibration ratio is greater than 4:1.

| <table border="1"> <thead> <tr> <th>Measurement Variable</th> <th>System ID</th> <th>Last Cal.</th> <th>Cal. Due</th> </tr> </thead> <tbody> <tr> <td>Temp/Humidity</td> <td>E005409</td> <td>10-19-17</td> <td>10-31-18</td> </tr> <tr> <td>DC Voltage</td> <td>E003314</td> <td>05-02-18</td> <td>05-31-19</td> </tr> <tr> <td>Photometer</td> <td>E003319</td> <td>07-31-18</td> <td>01-31-19</td> </tr> <tr> <td>Pressure</td> <td>E003511</td> <td>10-02-17</td> <td>10-31-18</td> </tr> </tbody> </table> | Measurement Variable | System ID | Last Cal. | Cal. Due | Temp/Humidity | E005409 | 10-19-17 | 10-31-18 | DC Voltage | E003314 | 05-02-18 | 05-31-19 | Photometer | E003319 | 07-31-18 | 01-31-19 | Pressure | E003511 | 10-02-17 | 10-31-18 | <table border="1"> <thead> <tr> <th>Measurement Variable</th> <th>System ID</th> <th>Last Cal.</th> <th>Cal. Due</th> </tr> </thead> <tbody> <tr> <td>Temp/Humidity</td> <td>E005410</td> <td>10-19-17</td> <td>10-31-18</td> </tr> <tr> <td>DC Voltage</td> <td>E003315</td> <td>05-17-18</td> <td>05-31-19</td> </tr> <tr> <td>Microbalance</td> <td>M001324</td> <td>11-02-16</td> <td>11-30-18</td> </tr> <tr> <td>Flowmeter</td> <td>E004025</td> <td>06-06-18</td> <td>06-30-19</td> </tr> </tbody> </table> | Measurement Variable | System ID | Last Cal. | Cal. Due | Temp/Humidity | E005410 | 10-19-17 | 10-31-18 | DC Voltage | E003315 | 05-17-18 | 05-31-19 | Microbalance | M001324 | 11-02-16 | 11-30-18 | Flowmeter | E004025 | 06-06-18 | 06-30-19 |
|---|----------------------|-----------|-----------|----------|---------------|---------|----------|----------|------------|---------|----------|----------|------------|---------|----------|----------|----------|---------|----------|----------|--|----------------------|-----------|-----------|----------|---------------|---------|----------|----------|------------|---------|----------|----------|--------------|---------|----------|----------|-----------|---------|----------|----------|
| Measurement Variable  | System ID            | Last Cal. | Cal. Due  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| Temp/Humidity   | E005409              | 10-19-17  | 10-31-18  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| DC Voltage  | E003314              | 05-02-18  | 05-31-19  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| Photometer  | E003319              | 07-31-18  | 01-31-19  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| Pressure  | E003511              | 10-02-17  | 10-31-18  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| Measurement Variable  | System ID            | Last Cal. | Cal. Due  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| Temp/Humidity   | E005410              | 10-19-17  | 10-31-18  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| DC Voltage  | E003315              | 05-17-18  | 05-31-19  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| Microbalance  | M001324              | 11-02-16  | 11-30-18  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |
| Flowmeter   | E004025              | 06-06-18  | 06-30-19  |          |               |         |          |          |            |         |          |          |            |         |          |          |          |         |          |          |  |                      |           |           |          |               |         |          |          |            |         |          |          |              |         |          |          |           |         |          |          |

Calibrated

August 20, 2018

Date





## REPORT OF EQUIPMENT CALIBRATION

### INSTRUMENT DESCRIPTION

It is certified that the calibrated dust meter has been calibrated by the calibrated High Volume Sampler.

#### Dust Meter

|  |  |
|--|--|
| Manufacturer & Model No.: <b>TSI AM510</b> | Date of Calibration: <b>1/8/2018</b>       |
| Serial No.: <b>11503016</b>                | Date of Next Calibration: <b>19/8/2019</b> |

#### High Volume Sampler

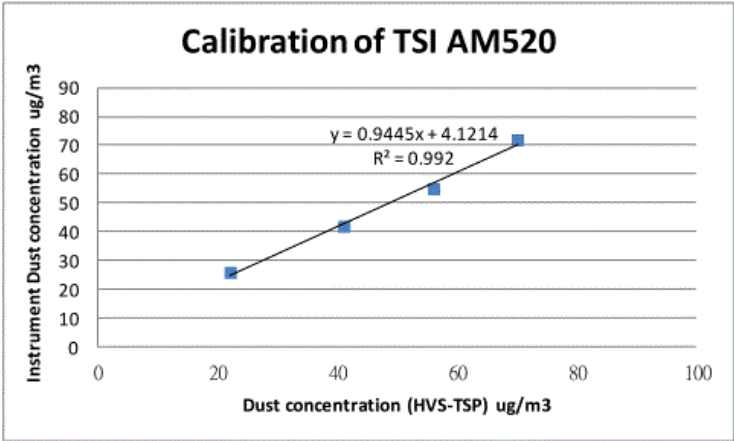
|  |                                      |
|--|--------------------------------------|
| Manufacturer & Model No.: <b>TE-5170 MFC</b> | Date of Calibration: <b>2/8/2018</b> |
| Serial No.: <b>0003</b>                      |                                      |

#### Calibration Orifice

|   |                                      |
|---|--------------------------------------|
| Manufacturer & Model No.: <b>TE-5028A</b> | Date of Calibration: <b>1/5/2018</b> |
| Serial No.: <b>2137</b>                   |                                      |

#### Calibration Record

|           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|
| HVS - TSP | <b>22</b> | <b>41</b> | <b>56</b> | <b>70</b> |
| TSI AM520 | <b>26</b> | <b>42</b> | <b>55</b> | <b>72</b> |



### **ISSUING ORGANISATION**

Environmental Pioneers & Solutions Limited

Flat A 8/F, Chaiwan Industrial Centre  
20 Lee Chung Street  
Chai Wan, Hong Kong

Phone: 852 - 2556 9172

Fax: 852 - 2856 2010


Date of Issue: 21/8/2018



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Mr. Ip Wing Hong, John  
Manager

TSI PN 2000157

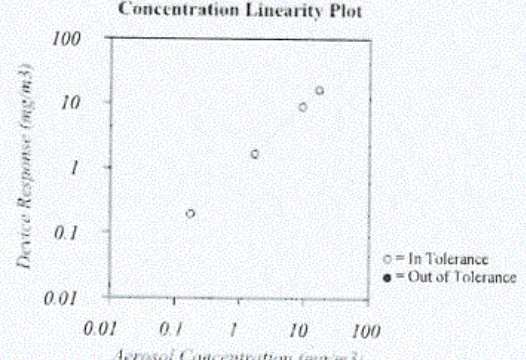


## CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA  
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 <http://www.tsi.com>

|   |  |               |  |               |  |          |  |
|---|--|---------------|--|---------------|--|----------|--|
| Environment Conditions  |  |               |  | Model         |  | AM510    |  |
| Temperature   |  | 74.2 (23.4)   |  | °F (°C)       |  |          |  |
| Relative Humidity   |  | 37            |  | %RH           |  |          |  |
| Barometric Pressure   |  | 29.40 (995.6) |  | inHg (hPa)    |  |          |  |
| <input checked="" type="checkbox"/> As Left <input checked="" type="checkbox"/> In Tolerance<br><input type="checkbox"/> As Found <input type="checkbox"/> Out of Tolerance |  |               |  | Serial Number |  | 11506035 |  |

### Concentration Linearity Plot



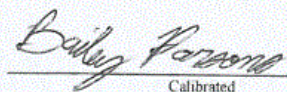
○ = In Tolerance  
● = Out of Tolerance

System ID: DT1101-02

| CONCENTRATION |          |          |                 | Unit: mg/m <sup>3</sup> |          |          |                 |
|---------------|----------|----------|-----------------|-------------------------|----------|----------|-----------------|
| #             | STANDARD | MEASURED | ALLOWABLE RANGE | #                       | STANDARD | MEASURED | ALLOWABLE RANGE |
| 1             | 9.166    | 8.935    | 8.249–10.083    | 3                       | 1.707    | 1.650    | 1.195–2.219     |
| 2             | 0.172    | 0.191    | 0.146–0.198     | 4                       | 16.589   | 16.530   | 14.930–18.248   |

TSI Incorporated does hereby certify that all materials, components, and workmanship used in the manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. There is no NIST standard for optical mass measurements. Calibration of this instrument performed by TSI has been done using emery oil and has been nominally adjusted to respirable mass per standard ISO 12103-1, A1 test dust (Arizona dust). Our calibration ratio is greater than 4:1.

|                      |           |           |          |                      |           |           |          |
|----------------------|-----------|-----------|----------|----------------------|-----------|-----------|----------|
| Measurement Variable | System ID | Last Cal. | Cal. Due | Measurement Variable | System ID | Last Cal. | Cal. Due |
| Temp/Humidity        | E005409   | 10-19-17  | 10-31-18 | Temp/Humidity        | E005410   | 10-19-17  | 10-31-18 |
| DC Voltage           | E003314   | 05-02-18  | 05-31-19 | DC Voltage           | E003315   | 05-17-18  | 05-31-19 |
| Photometer           | E003319   | 07-31-18  | 01-31-19 | Microbalance         | M001324   | 11-02-16  | 11-30-18 |
| Pressure             | E003511   | 10-02-17  | 10-31-18 | Flowmeter            | E004025   | 06-06-18  | 06-30-19 |



Calibrated

September 6, 2018

Date





## REPORT OF EQUIPMENT CALIBRATION

### INSTRUMENT DESCRIPTION

It is certified that the calibrated dust meter has been calibrated by the calibrated High Volume Sampler.

#### Dust Meter

|                                     |                                    |
|-------------------------------------|------------------------------------|
| Manufacturer & Model No.: TSI AM510 | Date of Calibration: 1/8/2018      |
| Serial No.: 11506035                | Date of Next Calibration: 5/9/2019 |

#### High Volume Sampler

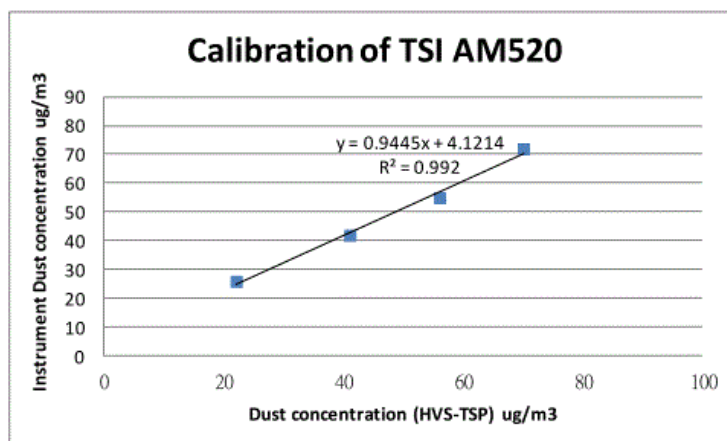
|                                       |                               |
|---------------------------------------|-------------------------------|
| Manufacturer & Model No.: TE-5170 MFC | Date of Calibration: 2/8/2018 |
| Serial No.: 0003                      |                               |

#### Calibration Orifice

|                                    |                               |
|------------------------------------|-------------------------------|
| Manufacturer & Model No.: TE-5028A | Date of Calibration: 1/5/2018 |
| Serial No.: 2137                   |                               |

#### Calibration Record

|           |    |    |    |    |
|-----------|----|----|----|----|
| HVS - TSP | 22 | 41 | 56 | 70 |
| TSI AM520 | 26 | 42 | 55 | 72 |



### **ISSUING ORGANISATION**

Environmental Pioneers & Solutions Limited

Flat A 8/F. Chaiwan Industrial Centre  
20 Lee Chung Street  
Chai Wan, Hong Kong

Phone: 852 - 2556 9172


Fax: 852 - 2856 2010

Date of Issue: 11/9/2018



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Mr. Ip Wing Hong, John  
Manager



## CERTIFICATE OF CALIBRATION AND TESTING

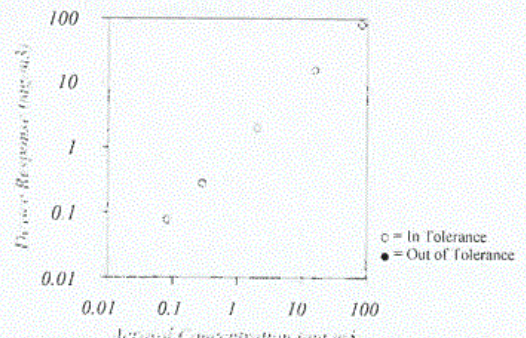
TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA  
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 <http://www.tsi.com>

|                        |               |            |               |  |                   |  |
|------------------------|---------------|------------|---------------|--|-------------------|--|
| Environment Conditions |               |            | Model         |  | <b>AM520</b>      |  |
| Temperature            | 76.4 (24.7)   | °F (°C)    | Serial Number |  | <b>5201750010</b> |  |
| Relative Humidity      | 45            | %RH        |               |  |                   |  |
| Barometric Pressure    | 29.16 (987.5) | inHg (hPa) |               |  |                   |  |

☒ As Left  
☐ As Found

☒ In Tolerance  
☐ Out of Tolerance

### Concentration Linearity Plot

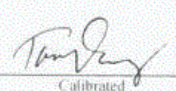


System ID: DTH01-02

| CONCENTRATION |          |          |                 | Unit: mg/m³ |          |          |                 |
|---------------|----------|----------|-----------------|-------------|----------|----------|-----------------|
| #             | STANDARD | MEASURED | ALLOWABLE RANGE | #           | STANDARD | MEASURED | ALLOWABLE RANGE |
| 1             | 0.080    | 0.076    | 0.056~0.104     | 4           | 15.536   | 15.495   | 13.982~17.090   |
| 2             | 0.283    | 0.281    | 0.241~0.325     | 5           | 82.272   | 81.134   | 74.045~90.499   |
| 3             | 2.012    | 1.983    | 1.811~2.213     |             |          |          |                 |

TSI Incorporated does hereby certify that all methods, comparisons, and procedures used in the performance of this report are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. There is no NIST standard for optical mass measurements. Calibration of this instrument performed by TSI has been done using emery oil and has been nominally adjusted to respirable mass per standard ISO 12103-1, A1 test dust (Arizona dust). Our calibration ratio is greater than 1:1.

| Measurement Variable | System ID | Last Cal. | Cal. Due | Measurement Variable | System ID | Last Cal. | Cal. Due |
|----------------------|-----------|-----------|----------|----------------------|-----------|-----------|----------|
| Temp/Humidity        | E005409   | 10-19-17  | 10-31-18 | Temp/Humidity        | E005410   | 10-19-17  | 10-31-18 |
| DC Voltage           | E003314   | 05-02-18  | 05-31-19 | DC Voltage           | E003315   | 05-17-18  | 05-31-19 |
| Photometer           | E003319   | 01-09-18  | 07-31-18 | Microbalance         | M001324   | 11-02-16  | 11-30-18 |
| Pressure             | E003511   | 10-02-17  | 10-31-18 | Flowmeter            | E002471   | 04-16-18  | 04-30-19 |

  
 Calibrated

May 23, 2018  
 Date





## REPORT OF EQUIPMENT CALIBRATION

### INSTRUMENT DESCRIPTION

It is certified that the calibrated dust meter has been calibrated by the calibrated High Volume Sampler.

#### Dust Meter

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| Manufacturer & Model No.: TSI AM520 | Date of Calibration: 2/5/2018       |
| Serial No.: 5201750010              | Date of Next Calibration: 22/5/2019 |

#### High Volume Sampler

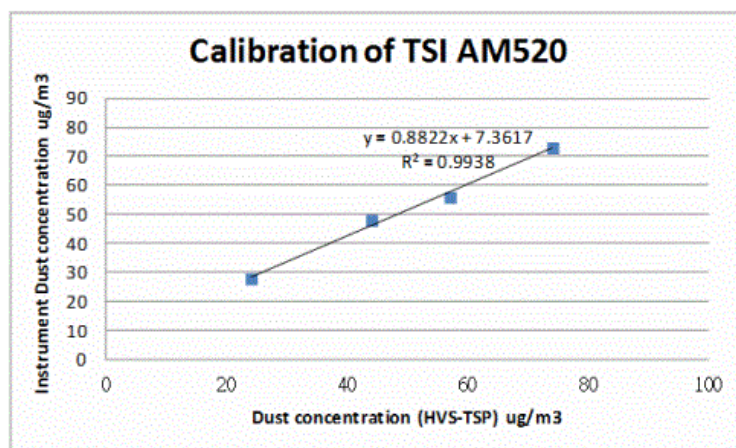
|                                       |                               |
|---------------------------------------|-------------------------------|
| Manufacturer & Model No.: TE-5170 MFC | Date of Calibration: 3/5/2018 |
| Serial No.: 0002                      |                               |

#### Calibration Orifice

|                                    |                               |
|------------------------------------|-------------------------------|
| Manufacturer & Model No.: TE-5028A | Date of Calibration: 1/5/2018 |
| Serial No.: 2137                   |                               |

#### Calibration Record

|           |    |    |    |    |
|-----------|----|----|----|----|
| HVS - TSP | 24 | 44 | 57 | 74 |
| TSI AM520 | 28 | 48 | 56 | 73 |



### **ISSUING ORGANISATION**

Environmental Pioneers & Solutions Limited

Flat A 8/F. Chaiwan Industrial Centre  
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Chai Wan, Hong Kong

Phone: 852 - 2556 9172

Fax: 852 - 2856 2010


Date of Issue: 28/5/2018



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Mr. Ip Wing Hong, John  
Manager





## CERTIFICATE OF CALIBRATION AND TESTING

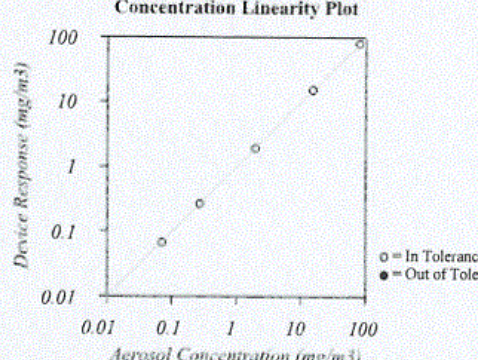
TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA  
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 <http://www.tsi.com>

|                        |               |            |               |  |                   |  |
|------------------------|---------------|------------|---------------|--|-------------------|--|
| Environment Conditions |               |            | Model         |  | <b>AM520</b>      |  |
| Temperature            | 74.3 (23.5)   | °F (°C)    | Serial Number |  | <b>5201707004</b> |  |
| Relative Humidity      | 43            | %RH        |               |  |                   |  |
| Barometric Pressure    | 29.09 (985.1) | inHg (hPa) |               |  |                   |  |

☒ As Left  
☐ As Found

☒ In Tolerance  
☐ Out of Tolerance

### Concentration Linearity Plot

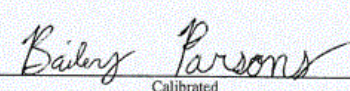


System ID: DTII01-02

| CONCENTRATION |          |          |                 | Unit: mg/m <sup>3</sup> |          |          |                 |
|---------------|----------|----------|-----------------|-------------------------|----------|----------|-----------------|
| #             | STANDARD | MEASURED | ALLOWABLE RANGE | #                       | STANDARD | MEASURED | ALLOWABLE RANGE |
| 1             | 0.071    | 0.068    | 0.050–0.092     | 4                       | 15.159   | 15.063   | 13.643–16.675   |
| 2             | 0.269    | 0.265    | 0.229–0.309     | 5                       | 80.323   | 78.980   | 72.291–88.355   |
| 3             | 1.944    | 1.894    | 1.750–2.138     |                         |          |          |                 |

TSI Incorporated does hereby certify that all materials, components, and workmanship used in the manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. There is no NIST standard for optical mass measurements. Calibration of this instrument performed by TSI has been done using emery oil and has been nominally adjusted to respirable mass per standard ISO 12103-1, A1 test dust (Arizona dust). Our calibration ratio is greater than 4:1

| Measurement Variable | System ID | Last Cal | Cal. Due | Measurement Variable | System ID | Last Cal | Cal. Due |
|----------------------|-----------|----------|----------|----------------------|-----------|----------|----------|
| Temp/Humidity        | E005409   | 10-19-17 | 10-31-18 | Temp/Humidity        | E005410   | 10-19-17 | 10-31-18 |
| DC Voltage           | E003314   | 05-02-18 | 05-31-19 | DC Voltage           | E003315   | 05-17-18 | 05-31-19 |
| Photometer           | E003319   | 01-09-18 | 07-31-18 | Microbalance         | M001324   | 11-02-16 | 11-30-18 |
| Pressure             | E003511   | 10-02-17 | 10-31-18 | Flowmeter            | E002471   | 04-16-18 | 04-30-19 |



Calibrated

June 13, 2018

Date



## REPORT OF EQUIPMENT CALIBRATION

### INSTRUMENT DESCRIPTION

It is certified that the calibrated dust meter has been calibrated by the calibrated High Volume Sampler.

#### Dust Meter

|  |  |
|--|--|
| Manufacturer & Model No.: <b>TSI AM520</b> | Date of Calibration: <b>2/5/2018</b>       |
| Serial No.: <b>5201707004</b>              | Date of Next Calibration: <b>12/6/2019</b> |

#### High Volume Sampler

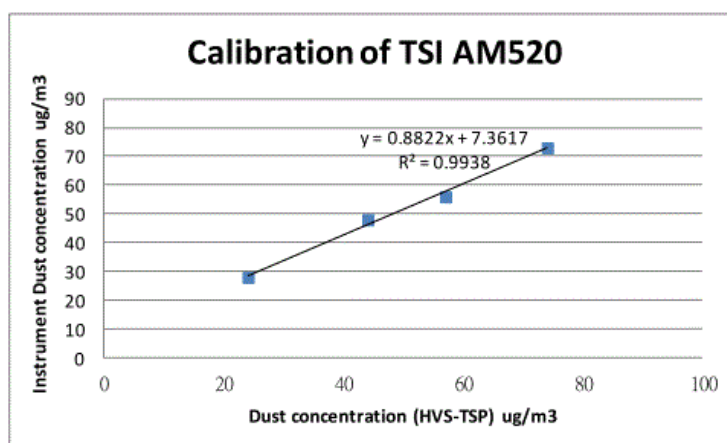
|  |                                      |
|--|--------------------------------------|
| Manufacturer & Model No.: <b>TE-5170 MFC</b> | Date of Calibration: <b>3/5/2018</b> |
| Serial No.: <b>0002</b>                      |                                      |

#### Calibration Orifice

|   |                                      |
|---|--------------------------------------|
| Manufacturer & Model No.: <b>TE-5028A</b> | Date of Calibration: <b>1/5/2018</b> |
| Serial No.: <b>2137</b>                   |                                      |

#### Calibration Record

|           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|
| HVS - TSP | <b>24</b> | <b>44</b> | <b>57</b> | <b>74</b> |
| TSI AM520 | <b>28</b> | <b>48</b> | <b>56</b> | <b>73</b> |



### **ISSUING ORGANISATION**

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Phone: 852 - 2556 9172

Fax: 852 - 2856 2010

Date of Issue: 15/6/2018



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Mr. Ip Wing Hong, John  
Manager





**RECALIBRATION  
DUE DATE:**

**May 1, 2019**

# Certificate of Calibration

## Calibration Certification Information

|                               |                      |                  |
|-------------------------------|----------------------|------------------|
| Cal. Date: May 1, 2018        | Rootsmer S/N: 438320 | Ta: 294 °K       |
| Operator: Jim Tisch           |                      | Pa: 755.65 mm Hg |
| Calibration Model #: TE-5028A | Calibrator S/N: 2137 |                  |

| Run | Vol. Init (m3) | Vol. Final (m3) | ΔVol. (m3) | ΔTime (min) | ΔP (mm Hg) | ΔH (in H2O) |
|-----|----------------|-----------------|------------|-------------|------------|-------------|
| 1   | 1              | 2               | 1          | 1.3280      | 4.2        | 1.50        |
| 2   | 3              | 4               | 1          | 1.0410      | 6.8        | 2.50        |
| 3   | 5              | 6               | 1          | 0.9470      | 8.3        | 3.00        |
| 4   | 7              | 8               | 1          | 0.8710      | 9.7        | 3.50        |
| 5   | 9              | 10              | 1          | 0.6640      | 16.5       | 6.00        |

## 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) |
|-------------|---------------|--|-----------|-------------|---|
| 1.0022      | 0.7547        | 1.2295   | 0.9944    | 0.7488      | 0.7639  |
| 0.9987      | 0.9594        | 1.5873   | 0.9910    | 0.9520      | 0.9862  |
| 0.9967      | 1.0525        | 1.7388   | 0.9890    | 1.0444      | 1.0804  |
| 0.9949      | 1.1422        | 1.8781   | 0.9872    | 1.1334      | 1.1669  |
| 0.9858      | 1.4846        | 2.4590   | 0.9782    | 1.4731      | 1.5279  |
| <b>QSTD</b> | m=            | 1.67739  | <b>QA</b> | m=          | 1.05036   |
|             | b=            | -0.03083   |           | b=          | -0.01916  |
|             | r=            | 0.99989  |           | r=          | 0.99989   |

## Calculations

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

## Standard Conditions

|            |                                       |
|------------|---------------------------------------|
| Tstd:      | 298.15 °K                             |
| Pstd:      | 760 mm Hg                             |
| <b>Key</b> |                                       |
| ΔH:        | calibrator manometer reading (in H2O) |
| ΔP:        | rootsmer 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.

Tisch Environmental, Inc.  
145 South Miami Avenue  
Village of Cleves, OH 45002

[www.tisch-env.com](http://www.tisch-env.com)  
TOLL FREE: (877)263-7610  
FAX: (513)467-9009



## TE-5170 Calibration Worksheet

### Site Information

|   |                   |
|---|-------------------|
| Location: YMT Public Cargo Working Area | Date: 6-Dec-18    |
| Location ID: AM1                        | Tech: Hendry Chan |
| Sampler: TE-5170 MFC (0001)             |                   |

### Site Conditions

|                                    |                                 |
|------------------------------------|---------------------------------|
| Barometric Pressure (in Hg): 29.50 | Corrected Pressure (mm Hg): 749 |
| Temperature (deg F): 68            | Temperature (deg K): 293        |
| Average Press. (in Hg): 29.65      | Corrected Average (mm Hg): 753  |
| Average Temp. (deg F): 68          | Average Temp. (deg K): 293      |

### Calibration Orifice

|                 |                          |
|-----------------|--------------------------|
| Make: Tisch     | Qstd Slope: 1.67739      |
| Model: TE-5028A | Qstd Intercept: -0.03083 |
| Serial#: 2137   | Date Certified: 1-May-18 |

### Calibration Information

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) | Linear Regression    |
|-----------------|----------|---------------|-----------|----------------|----------------------|
| 1               | 2.00     | 0.863         | 20.0      | 20.03          | Slope: 57.0801       |
| 2               | 3.10     | 1.069         | 32.0      | 32.04          | Intercept: -29.5435  |
| 3               | 4.20     | 1.242         | 40.0      | 40.05          | Corr. Coeff: 0.9982  |
| 4               | 5.40     | 1.406         | 50.0      | 50.07          |                      |
| 5               | 6.60     | 1.552         | 60.0      | 60.08          | # of Observations: 5 |

### Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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 K)  
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

|  |
|--|
| Average I (chart): 50.0                        |
| Average Flow Calculation m3/min<br>1.396970742 |
| Average Flow Calculation in CFM<br>49.32703689 |
| Sample Time (Hrs): 24.0                        |
| Total Flow/Volume in m3<br>2011.637868         |
| Total Flow in CFM<br>71030.93312               |



## TE-5170 Calibration Worksheet

### Site Information

|   |                   |
|---|-------------------|
| Location: YMT Public Cargo Working Area | Date: 1-Feb-19    |
| Location ID: AML                        | Tech: Hendry Chan |
| Sampler: TE-5170 MFC (0001)             |                   |

### Site Conditions

|                                    |                                 |
|------------------------------------|---------------------------------|
| Barometric Pressure (in Hg): 29.50 | Corrected Pressure (mm Hg): 749 |
| Temperature (deg F): 68            | Temperature (deg K): 293        |
| Average Press. (in Hg): 29.65      | Corrected Average (mm Hg): 753  |
| Average Temp. (deg F): 68          | Average Temp. (deg K): 293      |

### Calibration Orifice

|                 |                          |
|-----------------|--------------------------|
| Make: Tisch     | Qstd Slope: 1.67739      |
| Model: TE-5028A | Qstd Intercept: -0.03083 |
| Serial#: 2137   | Date Certified: 1-May-18 |

### Calibration Information

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) | Linear Regression    |
|-----------------|----------|---------------|-----------|----------------|----------------------|
| 1               | 1.80     | 0.819         | 20.0      | 20.03          | Slope: 52.0662       |
| 2               | 2.80     | 1.017         | 32.0      | 32.04          | Intercept: -21.4883  |
| 3               | 3.40     | 1.119         | 38.0      | 38.05          | Corr. Coeff: 0.9984  |
| 4               | 5.80     | 1.456         | 54.0      | 54.07          |                      |
| 5               | 6.80     | 1.575         | 60.0      | 60.08          | # of Observations: 5 |

### Calculations

$$Qstd = 1/m[\sqrt{(H_2O(Pa/Pstd)(Tstd/Ta))}] - b]$$

$$IC = [1/m[\sqrt{(H_2O(Pa/Pstd)(Tstd/Ta))}] - b]$$

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 K)  
Pa = actual pressure during calibration (mm Hg)  
Tstd = 298 deg K  
Pstd = 760 mm Hg  
For subsequent calculation of sampler flow:  
 $1/m(1/[\sqrt{(298/Tav)}](Pav/760)] - b)$

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

|  |
|--|
| Average I (chart): 50.0                        |
| Average Flow Calculation m3/min<br>1.37678619  |
| Average Flow Calculation in CFM<br>48.61432036 |
| Sample Time (Hrs): 24.0                        |
| Total Flow/Volume in m3<br>1982.572113         |
| Total Flow in CFM<br>70004.62131               |



## TE-5170 Calibration Worksheet

### Site Information

|  |                          |
|--|--------------------------|
| Location: <b>Nga Cheung Road Portion 1</b> | Date: <b>1-Feb-19</b>    |
| Location ID: <b>AM3-B</b>                  | Tech: <b>Hendry Chan</b> |
| Sampler: <b>TE-5170 MFC (0003)</b>         |                          |

### Site Conditions

|   |  |
|---|--|
| Barometric Pressure (in Hg): <b>29.50</b> | Corrected Pressure (mm Hg): <b>749</b> |
| Temperature (deg F): <b>68</b>            | Temperature (deg K): <b>293</b>        |
| Average Press. (in Hg): <b>29.65</b>      | Corrected Average (mm Hg): <b>753</b>  |
| Average Temp. (deg F): <b>68</b>          | Average Temp. (deg K): <b>293</b>      |

### Calibration Orifice

|                        |                                 |
|------------------------|---------------------------------|
| Make: <b>Tisch</b>     | Qstd Slope: <b>1.67739</b>      |
| Model: <b>TE-5028A</b> | Qstd Intercept: <b>-0.03083</b> |
| Serial#: <b>2137</b>   | Date Certified: <b>1-May-18</b> |

### Calibration Information

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) | Linear Regression    |
|-----------------|----------|---------------|-----------|----------------|----------------------|
| 1               | 2.00     | 0.863         | 18.0      | 18.02          | Slope: 43.3880       |
| 2               | 4.20     | 1.242         | 32.0      | 32.04          | Intercept: -20.6730  |
| 3               | 6.00     | 1.481         | 42.0      | 42.06          | Corr. Coeff: 0.9949  |
| 4               | 7.00     | 1.598         | 48.0      | 48.07          |                      |
| 5               | 8.60     | 1.769         | 58.0      | 58.08          | # of Observations: 5 |

### Calculations

$$Qstd = 1/m[\sqrt{(H_2O(Pa/Pstd)(Tstd/Ta))}] - b]$$

$$IC = [1/m[\sqrt{(Pa/Pstd)(Tstd/Ta))}] - b]$$

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 K)  
Pa = actual pressure during calibration (mm Hg)  
Tstd = 298 deg K  
Pstd = 760 mm Hg  
For subsequent calculation of sampler flow:  
 $1/m([1/\sqrt{(298/Tav)}](Pav/760)] - b)$

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

Average I (chart): **50.0**  
Average Flow Calculation m3/min  
1.633370659  
Average Flow Calculation in CFM  
57.67431798  
Sample Time (Hrs): **24.0**  
Total Flow/Volume in m3  
**2352.05375**  
Total Flow in CFM  
83051.0179



ISO9001 certified

# **FACTORY CALIBRATION DATA OF THE SV18 No. 72680** with preamplifier SVANTEK type SV18 No. 75633 and with microphone ACO type 7052E No. 71130

## **1. CALIBRATION** (acoustical)

| Characteristic | Correct value [dB] | Indication [dB] | Error [dB] |
|----------------|--------------------|-----------------|------------|
| A              | 113.97             | 113.90          | -0.07      |
| B              | 113.97             | 113.90          | -0.07      |
| C              | 113.97             | 113.90          | -0.07      |

Calibration measured with the microphone ACO type 7052E No. 71130 Calibration factor: 1.28 dB

## **2. LINEARITY TEST** (electrical)

LEVEL METER function: Range: Low; Characteristic: A;  $f_{ref} = 31.5$  Hz

| Nominal result LEQ [dB] | 24.0 | 25.0 | 26.0 | 28.0 | 30.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 |
|-------------------------|------|------|------|------|------|------|------|------|-------|-------|
| Error [dB]              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |

LEVEL METER function: Range: Low; Characteristic: A;  $f_{ref} = 1000$  Hz

| Nominal result LEQ [dB] | 24.0 | 25.0 | 26.0 | 28.0 | 30.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 |
|-------------------------|------|------|------|------|------|------|------|------|-------|-------|
| Error [dB]              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |

LEVEL METER function: Range: Low; Characteristic: A;  $f_{ref} = 8000$  Hz

| Nominal result LEQ [dB] | 24.0 | 25.0 | 26.0 | 28.0 | 30.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 |
|-------------------------|------|------|------|------|------|------|------|------|-------|-------|
| Error [dB]              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |

LEVEL METER function: Range: High; Characteristic: A;  $f_{ref} = 31.5$  Hz

| Nominal result LEQ [dB] | 34.0 | 35.0 | 36.0 | 38.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 |
|-------------------------|------|------|------|------|------|------|------|-------|-------|
| Error [dB]              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |

LEVEL METER function: Range: High; Characteristic: A;  $f_{ref} = 1000$  Hz

| Nominal result LEQ [dB] | 34.0 | 35.0 | 36.0 | 38.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 |
|-------------------------|------|------|------|------|------|------|------|-------|-------|
| Error [dB]              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |

LEVEL METER function: Range: High; Characteristic: A;  $f_{ref} = 8000$  Hz

| Nominal result LEQ [dB] | 34.0 | 35.0 | 36.0 | 38.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 |
|-------------------------|------|------|------|------|------|------|------|-------|-------|
| Error [dB]              | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |

1/3 OCTAVE (1/3Hz): Range: Low;  $f_{ref} = 1000$  Hz

| Nominal result [dB] | 25.0 | 30.0 | 40.0 | 60.0 | 80.0 | 100.0 | 120.0 |
|---------------------|------|------|------|------|------|-------|-------|
| Error [dB]          | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |

## **3. TONE BURST RESPONSE**

LEVEL METER function: Characteristic: A;  $f_{ref} = 4000$  Hz; Burst duration: 2s

Range: Low; Steady level nominal result = 120dB

| Result | Detector   | Duration [ms]   | 1000  | 500   | 200   | 100   | 50    | 20    | 10    | 5     | 2     | 1     | 0.5   |
|--------|------------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| MAX    | Fast       | Indication [dB] | 120.0 | 119.9 | 119.8 | 119.7 | 119.6 | 119.5 | 119.4 | 119.3 | 119.2 | 119.1 | 119.0 |
|        | Slow       | Indication [dB] | 117.9 | 117.8 | 117.7 | 117.6 | 117.5 | 117.4 | 117.3 | 117.2 | 117.1 | 117.0 | 116.9 |
|        | Error [dB] |                 | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  |
| SEL    | Fast       | Indication [dB] | 120.0 | 119.9 | 119.8 | 119.7 | 119.6 | 119.5 | 119.4 | 119.3 | 119.2 | 119.1 | 119.0 |
|        | Slow       | Indication [dB] | 117.9 | 117.8 | 117.7 | 117.6 | 117.5 | 117.4 | 117.3 | 117.2 | 117.1 | 117.0 | 116.9 |
|        | Error [dB] |                 | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  |

SVANTEK SV18 No. 72680 page 4/14

Range: Low; Steady level nominal result = 60dB

| Result | Detector   | Duration [ms]   | 1000 | 500  | 200  | 100  | 50   | 20   | 10   | 5    | 2    | 1    | 0.5  |
|--------|------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
| MAX    | Fast       | Indication [dB] | 60.0 | 59.9 | 59.8 | 59.7 | 59.6 | 59.5 | 59.4 | 59.3 | 59.2 | 59.1 | 59.0 |
|        | Slow       | Indication [dB] | 57.9 | 57.8 | 57.7 | 57.6 | 57.5 | 57.4 | 57.3 | 57.2 | 57.1 | 57.0 | 56.9 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| SEL    | Fast       | Indication [dB] | 60.0 | 59.9 | 59.8 | 59.7 | 59.6 | 59.5 | 59.4 | 59.3 | 59.2 | 59.1 | 59.0 |
|        | Slow       | Indication [dB] | 57.9 | 57.8 | 57.7 | 57.6 | 57.5 | 57.4 | 57.3 | 57.2 | 57.1 | 57.0 | 56.9 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |

Range: Low; Steady level nominal result = 35dB

| Result | Detector   | Duration [ms]   | 1000 | 500  | 200  |
|--------|------------|-----------------|------|------|------|
| MAX    | Fast       | Indication [dB] | 35.0 | 34.9 | 34.8 |
|        | Slow       | Indication [dB] | 32.9 | 32.8 | 32.7 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 |
| SEL    | Fast       | Indication [dB] | 35.0 | 34.9 | 34.8 |
|        | Slow       | Indication [dB] | 32.9 | 32.8 | 32.7 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 |

Range: High; Steady level nominal result = 134dB

| Result | Detector   | Duration [ms]   | 1000  | 500   | 200   | 100   | 50    | 20    | 10    | 5     | 2     | 1     | 0.5   |
|--------|------------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| MAX    | Fast       | Indication [dB] | 134.0 | 133.9 | 133.8 | 133.7 | 133.6 | 133.5 | 133.4 | 133.3 | 133.2 | 133.1 | 133.0 |
|        | Slow       | Indication [dB] | 131.9 | 131.8 | 131.7 | 131.6 | 131.5 | 131.4 | 131.3 | 131.2 | 131.1 | 131.0 | 130.9 |
|        | Error [dB] |                 | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  |
| SEL    | Fast       | Indication [dB] | 134.0 | 133.9 | 133.8 | 133.7 | 133.6 | 133.5 | 133.4 | 133.3 | 133.2 | 133.1 | 133.0 |
|        | Slow       | Indication [dB] | 131.9 | 131.8 | 131.7 | 131.6 | 131.5 | 131.4 | 131.3 | 131.2 | 131.1 | 131.0 | 130.9 |
|        | Error [dB] |                 | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  | -0.0  |

Range: High; Steady level nominal result = 34dB

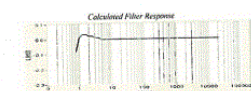
| Result | Detector   | Duration [ms]   | 1000 | 500  | 200  | 100  | 50   |
|--------|------------|-----------------|------|------|------|------|------|
| MAX    | Fast       | Indication [dB] | 34.0 | 33.9 | 33.8 | 33.7 | 33.6 |
|        | Slow       | Indication [dB] | 31.9 | 31.8 | 31.7 | 31.6 | 31.5 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| SEL    | Fast       | Indication [dB] | 34.0 | 33.9 | 33.8 | 33.7 | 33.6 |
|        | Slow       | Indication [dB] | 31.9 | 31.8 | 31.7 | 31.6 | 31.5 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |

Range: High; Steady level nominal result = 45dB

| Result | Detector   | Duration [ms]   | 1000 | 500  | 200  |
|--------|------------|-----------------|------|------|------|
| MAX    | Fast       | Indication [dB] | 45.0 | 44.9 | 44.8 |
|        | Slow       | Indication [dB] | 42.9 | 42.8 | 42.7 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 |
| SEL    | Fast       | Indication [dB] | 45.0 | 44.9 | 44.8 |
|        | Slow       | Indication [dB] | 42.9 | 42.8 | 42.7 |
|        | Error [dB] |                 | -0.0 | -0.0 | -0.0 |

## **4. FREQUENCY RESPONSE** (electrical)

LEVEL METER function: Characteristic: Z; Range: Low; Input signal = 120 dB



Measured Filter Response with Preamplifier SV18

| Frequency [Hz] | 10    | 100   | 1000  | 10000 | 100000 |
|----------------|-------|-------|-------|-------|--------|
| Level [dB]     | 120.0 | 120.0 | 120.0 | 120.0 | 120.0  |

All frequencies are nominal center values for the 1/3 octave bands

## **5. INTERNAL NOISE LEVEL** (electrical - compensated)

LEVEL METER function: Range: Low; (Backlight - off); Calibration factor: 0dB

| Characteristic | Z    | A    | C    |
|----------------|------|------|------|
| Level [dB]     | 62.0 | 61.3 | 61.2 |

\* measured with preamplifier SVANTEK type SV18 No. 75633.

## **6. INTERNAL NOISE LEVEL** (acoustical - compensated)

LEVEL METER function: Characteristic: A; (Backlight - off)

| Range           | Low  | High |
|-----------------|------|------|
| Indication [dB] | 21.5 | 21.0 |

Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 72421

## **ENVIRONMENTAL CONDITIONS**

| Temperature | Relative humidity | Ambient pressure |
|-------------|-------------------|------------------|
| 20 °C       | 61%               | 1007 hPa         |

## **TEST EQUIPMENT**

| Item | Manufacturer | Model     | Serial no. | Description                                      |
|------|--------------|-----------|------------|--|
| 1    | SVANTEK      | SVAN 400  | 127        | Signal generator                                 |
| 2    | SVANTEK      | SVAN 912A | 4369       | Sound & Vibration Analyzer                       |
| 3    | KEITHLEY     | 2000      | 0810105    | Digital multimeter                               |
| 4    | SVANTEK      | SV13      | 48878      | Acoustic calibrator                              |
| 5    | SVANTEK      | SV10      | -          | Microphone equivalent electrical impedance (16Ω) |

## **CONFORMITY & TEST DECLARATION**

1. Herewith SvanteK company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively herein.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GLUM (Central Office of Measures) reference standard - sound level calibrator, type 9231 No. 2202775.
3. The vibration calibration was performed using the Back-to-Back Comparison method and is traceable to the GLUM (Central Office of Measures) reference standard - accelerometer type 8005 No. 1433233.
4. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which provide comprehensive quality assurance verification of all data supplied herein.
5. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Kubel

Test date: 2018-07-31





# 綜合試驗有限公司

SOILS & MATERIALS ENGINEERING CO., LTD.

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Tel: (852) 2873 6860  
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## CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 18CA0509 01-01

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: | Expanded Uncertainty (dB) | Coverage Factor |
|-------------------------|--|---------|---------------------------|-----------------|
| Self-generated noise    | A  | Pass    | 0.3                       | 2.1             |
|                         | C  | Pass    | 0.8                       |                 |
|                         | Lin  | Pass    | 1.6                       |                 |
| Linearity range for Leq | At reference range, Step 5 dB at 4 kHz           | Pass    | 0.3                       | 2.2             |
|                         | 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                       |                 |
|                         | At reference range, Step 5 dB at 4 kHz           | Pass    | 0.3                       |                 |
| Linearity range for SPL | A  | Pass    | 0.3                       |                 |
|                         | C  | Pass    | 0.3                       |                 |
|                         | Lin  | Pass    | 0.3                       |                 |
| Time weightings         | Single Burst Fast                                | Pass    | 0.3                       |                 |
|                         | Single Burst Slow                                | Pass    | 0.3                       |                 |
| Peak response           | Single 100µs rectangular pulse                   | Pass    | 0.3                       |                 |
| R.M.S. accuracy         | Crest factor of 3                                | Pass    | 0.3                       |                 |
| Time weighting I        | Single burst 5 ms at 2000 Hz                     | Pass    | 0.3                       |                 |
|                         | Repeated at frequency of 100 Hz                  | Pass    | 0.3                       |                 |
| Time averaging          | 1 ms burst duty factor 1/10 <sup>3</sup> at 4kHz | Pass    | 0.3                       |                 |
|                         | 1 ms burst duty factor 1/10 <sup>4</sup> at 4kHz | Pass    | 0.3                       |                 |
| Pulse range             | Single burst 10 ms at 4 kHz                      | Pass    | 0.4                       |                 |
| Sound exposure level    | Single burst 10 ms at 4 kHz                      | Pass    | 0.4                       |                 |
| Overload indication     | SPL  | Pass    | 0.3                       |                 |
|                         | Leq  | Pass    | 0.4                       |                 |

### 2. Acoustic tests

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

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

### 3. Response to associated sound calibrator

N/A

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

Calibrated by:

Fung Chi Yip  
Date: 16-May-2018

Checked by:

Lam Tze Wai  
Date: 23-May-2018

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

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Form No CARP153-2/Issue 1/Rev. C/01/02/2007

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. HOKLAS 028) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. This certificate shall not be reproduced except in full.



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**SMECLab**

Test Data for Sound Level Meter

Page 1 of 5

Sound level meter type: 971 Serial No. 34350 Date 16-May-2018  
Microphone type: 7052E Serial No. 54635  
Report: 18CA0509 01-01

### SELF GENERATED NOISE TEST

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

|                            |      |    |
|----------------------------|------|----|
| Noise level in A weighting | 20.9 | dB |
| Noise level in C weighting | 20.9 | dB |
| Noise level in Lin (Z)     | 25.9 | 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<br>dB | Actual level         |                  | Tolerance<br>+/- dB | Deviation            |                  |
|--------------------------------|----------------------|------------------|---------------------|----------------------|------------------|
|                                | non-integrated<br>dB | integrated<br>dB |                     | non-integrated<br>dB | integrated<br>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              |
| 120.0                          | 120.0                | 120.0            | 0.7                 | 0.0                  | 0.0              |
| 121.0                          | 121.0                | 121.0            | 0.7                 | 0.0                  | 0.0              |
| 122.0                          | 122.0                | 122.0            | 0.7                 | 0.0                  | 0.0              |
| 123.0                          | 123.0                | 123.0            | 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                           | 49.1                 | 49.1             | 0.7                 | 0.1                  | 0.1              |
| 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              |
| 29.0                           | 28.9                 | 28.9             | 0.7                 | -0.1                 | -0.1             |
| 28.0                           | 27.8                 | 27.8             | 0.7                 | -0.2                 | -0.2             |
| 27.0                           | 26.9                 | 26.9             | 0.7                 | -0.1                 | -0.1             |
| 26.0                           | 25.8                 | 25.8             | 0.7                 | -0.2                 | -0.2             |

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**SMECLab**

Test Data for Sound Level Meter

Page 2 of 5

Sound level meter type: 971 Serial No. 34350 Date 16-May-2018  
Microphone type: 7052E Serial No. 54635  
Report: 18CA0509 01-01

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        |
| 35.8-137.8   | 94.0           | 94.0         | 0.7       | 0.0       |
| 25.8-123.8   | 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        |
| 35.8-137.8 | 38.0                     | 37.9         | 0.7       | -0.1      |
|            | 136.0                    | 136.0        | 0.7       | 0.0       |
| 25.8-123.8 | 28.0                     | 27.8         | 0.7       | -0.2      |
|            | 122.0                    | 122.0        | 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 | Ref. level | Expected level | Actual level | Tolerance(dB) |     | Deviation |
|-----------|------------|----------------|--------------|---------------|-----|-----------|
| Hz        | dB         | dB             | dB           | +             | -   | dB        |
| 1000.0    | 94.0       | 94.0           | 94.0         | 0.0           | 0.0 | 0.0       |
| 31.6      | 94.0       | 54.6           | 54.7         | 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           | 95.0         | 1.0           | 1.0 | 0.0       |
| 7943.0    | 94.0       | 92.9           | 93.0         | 1.5           | 3.0 | 0.1       |
| 12590.0   | 94.0       | 89.7           | 89.6         | 3.0           | 6.0 | -0.1      |

Frequency weighting C:

| Frequency | Ref. level | Expected level | Actual level | Tolerance(dB) |     | Deviation |
|-----------|------------|----------------|--------------|---------------|-----|-----------|
| Hz        | dB         | dB             | dB           | +             | -   | dB        |
| 1000.0    | 94.0       | 94.0           | 94.0         | 0.0           | 0.0 | 0.0       |
| 31.6      | 94.0       | 91.0           | 91.1         | 1.5           | 1.5 | 0.1       |
| 63.1      | 94.0       | 93.2           | 93.2         | 1.5           | 1.5 | 0.0       |
| 125.9     | 94.0       | 93.8           | 93.8         | 1.0           | 1.0 | 0.0       |
| 251.2     | 94.0       | 94.0           | 93.9         | 1.0           | 1.0 | -0.1      |
| 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           | 93.2         | 1.0           | 1.0 | 0.0       |

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**SMECLab**

Test Data for Sound Level Meter

Page 3 of 5

Sound level meter type: 971 Serial No. 34350 Date 16-May-2018  
Microphone type: 7052E Serial No. 54635  
Report: 18CA0509 01-01

|         |      |      |      |     |     |      |
|---------|------|------|------|-----|-----|------|
| 7943.0  | 94.0 | 91.0 | 91.1 | 1.5 | 3.0 | 0.1  |
| 12590.0 | 94.0 | 87.8 | 87.6 | 3.0 | 6.0 | -0.2 |

Frequency weighting Z:

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

TIME WEIGHTING FAST TEST

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

| Ref. level | Expected level | Actual level | Tolerance(dB) |     | Deviation |
|------------|----------------|--------------|---------------|-----|-----------|
| dB         | dB             | dB           | +             | -   | dB        |
| 120.0      | 119.0          | 119.0        | 1.0           | 1.0 | 0.0       |

TIME WEIGHTING SLOW TEST

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

| Ref. level | Expected level | Actual level | Tolerance(dB) |     | Deviation |
|------------|----------------|--------------|---------------|-----|-----------|
| dB         | dB             | dB           | +             | -   | dB        |
| 120.0      | 115.9          | 115.9        | 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 |
|------------|-------------------|--------------------|-----------|-----------|
| dB         | dB                | dB                 | +/- dB    | dB        |
| 122.0      | 122.0             | 121.0              | 2.0       | -1.0      |

Negative polarities:

| Ref. level | Response to 10 ms | Response to 100 us | Tolerance | Deviation |
|------------|-------------------|--------------------|-----------|-----------|
| dB         | dB                | dB                 | +/- dB    | dB        |

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**SMECLab**

Test Data for Sound Level Meter

Page 4 of 5

Sound level meter type: 971 Serial No. 34350 Date 16-May-2018  
Microphone type: 7052E Serial No. 54635  
Report: 18CA0509 01-01

|       |       |       |     |      |
|-------|-------|-------|-----|------|
| 122.0 | 122.0 | 121.0 | 2.0 | -1.0 |
|-------|-------|-------|-----|------|

#### 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           | 88.0       | 88.0           | 87.9              | 0.5       | -0.1      |

#### 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    |
| 123.0      | 114.2                   | 114.1       | 2.0       |
|            |                         |             | -0.1      |

Repeated at 100 Hz

| Ref. Level | Repeated burst indication | Tolerance   | Deviation |
|------------|---------------------------|-------------|-----------|
| dB         | Expected (dB)             | Actual (dB) | +/- dB    |
| 123.0      | 120.3                     | 120.2       | 1.0       |
|            |                           |             | -0.1      |

#### TIME AVERAGING TEST

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

Frequency of tone burst: 4000 Hz

Duration of tone burst: 1 ms

| Repetition Time | Level of tone burst | Expected Leq | Actual Leq | Tolerance | Deviation | Remarks      |
|-----------------|---------------------|--------------|------------|-----------|-----------|--------------|
| msec            | dB                  | dB           | dB         | +/- dB    | dB        |              |
| 1000            | 93.0                | 93.0         | 92.9       | 1.0       | -0.1      | 60s integ.   |
| 10000           | 83.0                | 83.0         | 82.9       | 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

Integration time: 10 sec

The integrating sound level meter set to Leq:

| Duration | Rms level of tone burst (dB) | Expected | Actual | Tolerance | Deviation |
|----------|------------------------------|----------|--------|-----------|-----------|
| msec     | dB                           | dB       | dB     | +/- dB    | dB        |
| 10       | 88.0                         | 58.0     | 58.0   | 1.7       | 0.0       |

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**SMECLab**

Test Data for Sound Level Meter

Page 5 of 5

Sound level meter type: 971 Serial No. 34350 Date 16-May-2018  
Microphone type: 7052E Serial No. 54635  
Report: 18CA0509 01-01

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     | 88.0            | 68.0     | 68.0   | 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        |
| 119.1            | 118.1            | 115.1           | 3.0        | 1.0       | 0.0       |

For integrating SLM, with the instrument indicating Leq.

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

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

Test frequency: 4000 Hz  
Integration time: 10 sec  
Single burst duration: 1 msec

| Rms level        | Level reduced by | Expected level | Actual level | Tolerance | Deviation |
|------------------|------------------|----------------|--------------|-----------|-----------|
| at overload (dB) | 1 dB             | dB             | dB           | dB        | dB        |
| 125.5            | 124.5            | 84.5           | 84.4         | 2.2       | -0.1      |

**ACOUSTIC TEST**

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

| Frequency | Expected level | Actual level  | Tolerance (dB) | Deviation |
|-----------|----------------|---------------|----------------|-----------|
| Hz        | dB             | Measured (dB) | + -            | dB        |
| 1000      | 94.0           | 94.0          | 0.0 0.0        | 0.0       |
| 125       | 77.9           | 77.9          | 1.0 1.0        | 0.0       |
| 8000      | 92.9           | 90.5          | 1.5 3.0        | -2.4      |

-----END-----



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## CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0509 01-02

Page: 1 of 2

### Item tested

Description: Acoustical Calibrator (Type 1)  
Manufacturer: SVANTEK  
Type/Model No.: SV30A  
Serial/Equipment No.: 29085  
Adaptors used:

### Item submitted by

Customer: Environmental Pioneers & Solutions Limited  
Address of Customer: Flat A, 19/F, Chaiwan Industrial Centre, 20 Lee Chung Street, Chai Wan, Hong Kong  
Request No.:  
Date of receipt: 09-May-2018

Date of test: 21-May-2018

### Reference equipment used in the calibration

| Description:            | Model:   | Serial No. | Expiry Date: | Traceable to: |
|-------------------------|----------|------------|--------------|---------------|
| Lab standard microphone | B&K 4180 | 2412857    | 20-Apr-2019  | SCL           |
| Preamplifier            | B&K 2673 | 2239857    | 27-Apr-2019  | CEPREI        |
| Measuring amplifier     | B&K 2610 | 2346941    | 08-May-2019  | CEPREI        |
| Signal generator        | DS 360   | 62217      | 24-Apr-2019  | CEPREI        |
| Digital multi-meter     | 34401A   | US36087050 | 23-Apr-2019  | CEPREI        |
| Audio analyzer          | 8903B    | GB41300350 | 23-Apr-2019  | CEPREI        |
| Universal counter       | 53132A   | MY40003662 | 24-Apr-2019  | CEPREI        |

### Ambient conditions

Temperature:  $21 \pm 1$  °C  
Relative humidity:  $50 \pm 10$  %  
Air pressure:  $1005 \pm 5$  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

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

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

Approved Signatory:

  
Feng Jun Qi

Date: 23-May-2018

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.



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## CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 18CA0509 01-02

Page: 2 of 2

### 1. Measured Sound Pressure Level

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

| Frequency Shown<br>Hz | Output Sound Pressure Level Setting<br>dB | Measured Output Sound Pressure Level<br>dB | (Output level in dB re 20 µPa)<br>Estimated Expanded Uncertainty<br>dB |
|-----------------------|---|--|--|
| 1000                  | 94.00                                     | 93.81                                      | 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 = 0.005 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 = 0.6 %

Estimated expanded uncertainty 0.7 %

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

- End -

Calibrated by:

Fung Chi Yip

Date: 21-May-2018

Checked by:

Lam Tze Wai

Date: 23-May-2018


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

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Form No. CARP155-2015001 Rev C 01/05/2005

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. HOKLAS 028) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. This certificate shall not be reproduced except in full.



 **SVANTEK**

ISO9001 certified


**Sound Level Calibrator**  
Type: SV35A Serial No: 64263

**Calibration Chart**

|                               |                         |  |
|-------------------------------|-------------------------|--|
| Sound pressure level (94dB):  | 93.95 dB (THD: 0.23 %)  | <b>Measurement conditions</b><br>Temperature: 24 °C<br>Relative humidity: 30 %<br>Ambient pressure: 1018 hPa   |
| Sound pressure level (114dB): | 113.95 dB (THD: 0.12 %) |  |
| Frequency: 1000 Hz            |                         |  |
| Short term level stability:   | 0.05 dB                 | <b>Reference conditions</b><br>Temperature: 23.0 °C<br>Relative humidity: 50 %<br>Ambient pressure: 1013.2 hPa |
| Frequency stability:          | 0.01 %                  |  |

**CONFORMITY & TEST DECLARATION**

|  |   |
|--|---|
| The stated level is valid at reference conditions.<br>Measured according to IEC 60942:2003.<br>The stated level is relative to 20 µPa. | The level is traceable to GUM (Central Office of<br>Measures, Poland) with a calculated uncertainty less than<br>±0.15 dB (2*sd). |
|--|---|

Calibration specialist : 

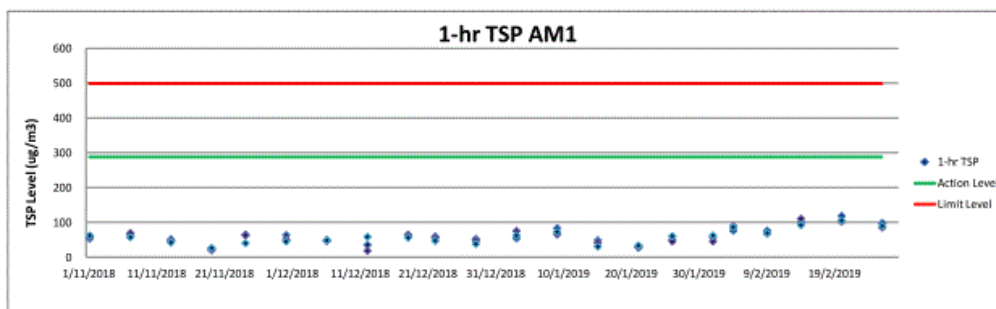
Date : 2018-01-09

## Appendix E: TSP Monitoring Data

1-hr TSP Monitoring Result for AM1

| Date      | Weather | Temperature (°C)<br>* | Wind<br>Direction * | Wind Speed<br>(m/s) * | Sampling Time |       |       | Reading (µg/m³) |     |     |         |
|-----------|---------|-----------------------|---------------------|-----------------------|---------------|-------|-------|-----------------|-----|-----|---------|
|           |         |                       |                     |                       | 1             | 2     | 3     | 1               | 2   | 3   | Average |
| 1/2/2019  | Sunny   | 17.6 - 22.0           | N                   | <5m/s                 | 9:10          | 10:11 | 11:12 | 59              | 47  | 64  | 57      |
| 4/2/2019  | Sunny   | 19.5 - 25.5           | NE                  | <5m/s                 | 9:00          | 10:01 | 11:02 | 78              | 91  | 88  | 86      |
| 9/2/2019  | Cloudy  | 18.4 - 20.1           | NE                  | <5m/s                 | 9:07          | 10:08 | 11:09 | 78              | 70  | 71  | 73      |
| 14/2/2019 | Cloudy  | 18.5 - 23.2           | NE                  | <5m/s                 | 9:05          | 10:06 | 11:07 | 101             | 112 | 94  | 102     |
| 20/2/2019 | Cloudy  | 20.8 - 25.6           | NE                  | <5m/s                 | 9:00          | 10:01 | 11:02 | 120             | 104 | 107 | 110     |
| 26/2/2019 | Cloudy  | 17.6 - 19.7           | NE                  | <5m/s                 | 9:00          | 10:01 | 11:02 | 100             | 87  | 91  | 93      |

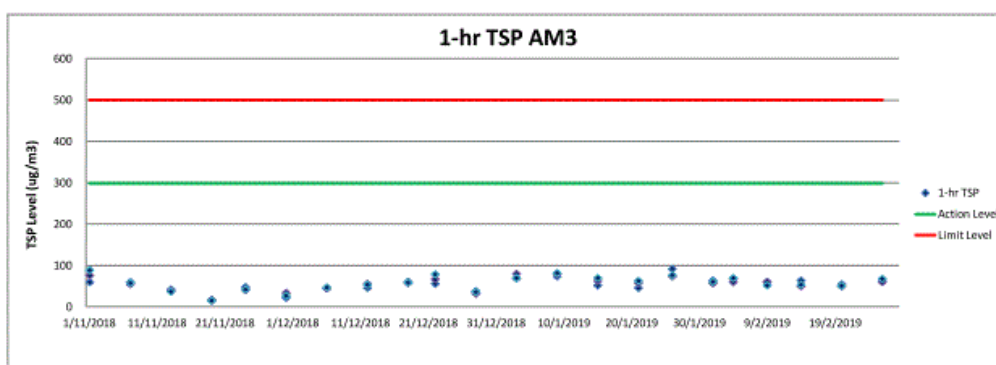
\*Remark: Data of temperature, wind direction and wind speed was extracted from King's Park Meteorological Station of HKO



1-hr TSP Monitoring Result for AM3

| Date      | Weather | Temperature (°C)<br>* | Wind<br>Direction * | Wind Speed<br>(m/s) * | Sampling Time |      |       | Reading (µg/m³) |    |    |         |
|-----------|---------|-----------------------|---------------------|-----------------------|---------------|------|-------|-----------------|----|----|---------|
|           |         |                       |                     |                       | 1             | 2    | 3     | 1               | 2  | 3  | Average |
| 1/2/2019  | Sunny   | 17.6 - 22.0           | N                   | <5m/s                 | 8:24          | 9:25 | 10:26 | 64              | 57 | 61 | 61      |
| 4/2/2019  | Sunny   | 19.5 - 25.5           | NE                  | <5m/s                 | 8:15          | 9:16 | 10:17 | 68              | 60 | 70 | 66      |
| 9/2/2019  | Cloudy  | 18.4 - 20.1           | NE                  | <5m/s                 | 8:10          | 9:11 | 10:12 | 59              | 61 | 52 | 57      |
| 14/2/2019 | Cloudy  | 18.5 - 23.2           | NE                  | <5m/s                 | 8:10          | 9:11 | 10:12 | 64              | 50 | 54 | 56      |
| 20/2/2019 | Cloudy  | 20.8 - 25.6           | NE                  | <5m/s                 | 8:15          | 9:16 | 10:17 | 55              | 50 | 51 | 52      |
| 26/2/2019 | Cloudy  | 17.6 - 19.7           | NE                  | <5m/s                 | 8:21          | 9:22 | 10:23 | 63              | 60 | 68 | 64      |

\*Remark: Data of temperature, wind direction and wind speed was extracted from King's Park Meteorological Station of HKO

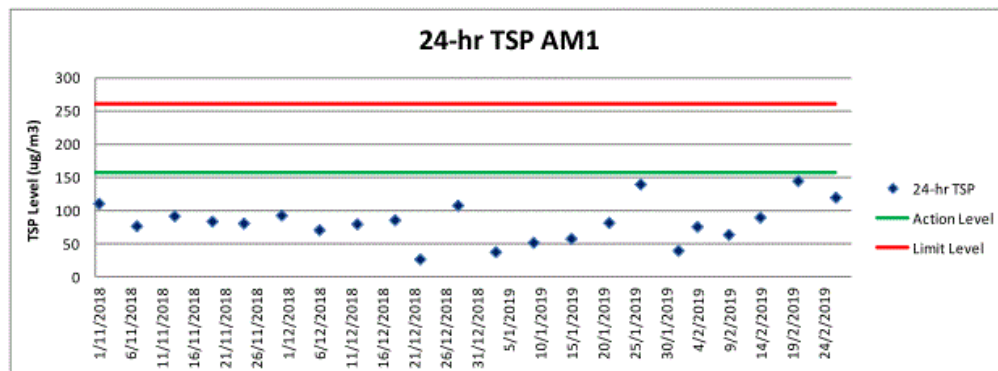


24-hr TSP Monitoring Result for AM1

| Sampling ID & Paper No. | Temperature (°C)<br>*1 | Wind Direction<br>*1 | Wind Speed (m/s)<br>*1 | Sampling Date | Wt. of paper (g) |           |             | Flow Rate (CFM) | Total Volume *2 (m³) | TSP Concentration (µg/m³) |
|-------------------------|------------------------|----------------------|------------------------|---------------|------------------|-----------|-------------|-----------------|----------------------|---------------------------|
|                         |                        |                      |                        |               | Initial Wt.      | Final Wt. | Wt. of dust |                 |                      |                           |
| AM10201                 | 17.6 - 22.0            | N                    | <5m/s                  | 1/2/2019      | 2.6927           | 2.7720    | 0.0793      | 50.0            | 1982.57              | 40                        |
| AM10204                 | 19.5 - 25.5            | NE                   | <5m/s                  | 4/2/2019      | 2.6869           | 2.8377    | 0.1508      | 50.0            | 1982.57              | 76                        |
| AM10209                 | 18.4 - 20.1            | NE                   | <5m/s                  | 9/2/2019      | 2.6720           | 2.7986    | 0.1266      | 50.0            | 1982.57              | 64                        |
| AM10214                 | 18.5 - 23.2            | NE                   | <5m/s                  | 14/2/2019     | 2.6751           | 2.8545    | 0.1794      | 50.0            | 1982.57              | 90                        |
| AM10220                 | 20.8 - 25.6            | NE                   | <5m/s                  | 20/2/2019     | 2.6855           | 2.9727    | 0.2872      | 50.0            | 1982.57              | 145                       |
| AM10226                 | 17.6 - 19.7            | NE                   | <5m/s                  | 26/2/2019     | 2.6853           | 2.9233    | 0.2380      | 50.0            | 1982.57              | 120                       |

\*1 Remark: Data of temperature, wind direction and wind speed was extracted from King's Park Meteorological Station of HKO

\*2 Remark: Total volume of the 24 hrs sampling was calculated from the Calibration worksheet (refer to Appendix D)

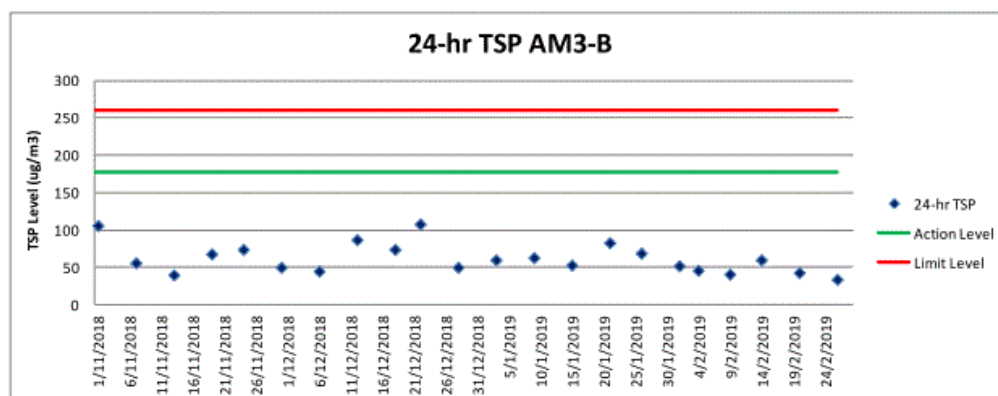





24-hr TSP Monitoring Result for AM3-B

| Sampling ID & Paper No. | Temperature (°C)<br>*1 | Wind Direction<br>*1 | Wind Speed (m/s)<br>*1 | Sampling Date | Wt. of paper (g) |           |             | Flow Rate (CFM) | Total Volume *2 (m³) | TSP Concentration (µg/m³) *3 |
|-------------------------|------------------------|----------------------|------------------------|---------------|------------------|-----------|-------------|-----------------|----------------------|------------------------------|
|                         |                        |                      |                        |               | Initial Wt.      | Final Wt. | Wt. of dust |                 |                      |                              |
| AM3B0201                | 17.6 - 22.0            | N                    | <5m/s                  | 1/2/2019      | 2.6717           | 2.7947    | 0.1230      | 50.0            | 2352.05              | 52                           |
| AM3B0204                | 19.5 - 25.5            | NE                   | <5m/s                  | 4/2/2019      | 2.6833           | 2.7913    | 0.1080      | 50.0            | 2352.05              | 46                           |
| AM3B0209                | 18.4 - 20.1            | NE                   | <5m/s                  | 9/2/2019      | 2.6815           | 2.7772    | 0.0957      | 50.0            | 2352.05              | 41                           |
| AM3B0214                | 18.5 - 23.2            | NE                   | <5m/s                  | 14/2/2019     | 2.6779           | 2.8186    | 0.1407      | 50.0            | 2352.05              | 60                           |
| AM3B0220                | 20.8 - 25.6            | NE                   | <5m/s                  | 20/2/2019     | 2.6817           | 2.7827    | 0.1010      | 50.0            | 2352.05              | 43                           |
| AM3B0226                | 17.6 - 19.7            | NE                   | <5m/s                  | 26/2/2019     | 2.6846           | 2.7650    | 0.0804      | 50.0            | 2352.05              | 34                           |

\*1 Remark: Data of temperature, wind direction and wind speed was extracted from King's Park Meteorological Station of HKO

\*2 Remark: Total volume of the 24 hrs sampling was calculated from the Calibration worksheet (refer to Appendix D)



|   |   |   |  |
|---|---|---|--|
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| <b>CERTIFICATE OF ANALYSIS</b>  |   |   |  |
| Client  | : ENVIRONMENTAL PIONEERS & SOLUTION LTD   | Laboratory  | : ALS Technichem (HK) Pty Ltd  |
| Contact   | : MR ANDY TSANG   | Contact   | : Richard Fung   |
| Address   | : FLAT A, 8/F, CHAI WAN INDUSTRIAL CENTRE, 20 LEE CHUNG STREET, CHAI WAN HONG KONG  | Address   | : 11/F., Chung Shun Kitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong |
| E-mail  | : kytsang@fsenv.com.hk  | E-mail  | : richard.fung@alsglobal.com   |
| Telephone   | : +852 2185 0159  | Telephone   | : +852 2610 1044   |
| Facsimile   | : +852 2258 0568  | Facsimile   | : +852 2610 2021   |
| Project   | : PROPOSED ROAD IMPROVEMENT WORKS IN WEST KOWLOON RECLAMATION DEVELOPMENT - PHASE 1 | Date received   | : 28-Feb-2019  |
| Order number  | : ---   | Date of issue   | : 04-Mar-2019  |
| C-O-C number  | : ---   | No. of samples  | : 6  |
| Site  | : ---   | Analysed  | : 6  |
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| Signature<br><br>Fung Lim Chee, Richard  |   | Position<br>General Manager   |  |
|   |   | Authorised results for:<br>Inorganics   |  |
| <b>ALS Technichem (HK) Pty Ltd</b><br>Part of the <b>ALS Laboratory Group</b><br><small>11/F., Chung Shun Kitting Centre, 1-3 Wing Yip Street, Kwai Chung, N.T., Hong Kong<br/>         Tel: +852 2610 1044 Fax: +852 2610 2021 www.alsglobal.com</small> |   |   |  |
| Page Number : 2 of 3<br>Client : ENVIRONMENTAL PIONEERS & SOLUTION LTD<br>Work Order : HK1908678  |   |                        |  |

#### Report Comments

This report for ALS Technichem (HK) Pty Ltd work order reference HK1908678 supersedes any previous reports with this reference. Testing period is from 28-Feb-2019 to 02-Mar-2019. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release. When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for process purposes. Abbreviations: CAS number = Chemical Abstract Services number. LOR = Limit of reporting.

#### Specific Comments for Work Order HK1908678 :

Sample(s) were received in ambient condition.  
Sample(s) analysed and reported on an as received basis.

Page Number : 3 of 3  
Client : ENVIRONMENTAL PIONEERS & SOLUTION LTD  
Work Order : HK1908678



#### Analytical Results

| Sub-Matrix: FILTER (TSP/IRSP) |                             |                      | Compound                                 | HK-TSP: Final Weight                     | HK-TSP: Initial Weight                   | HK-TSP: Total Suspended Particulates | --- | --- |
|-------------------------------|-----------------------------|----------------------|--|--|--|--------------------------------------|-----|-----|
|                               |                             |                      | LOR Unit                                 | 0.0010 g                                 | 0.0010 g                                 | 0.0010 g                             | --- | --- |
| Client sample ID              | Client sampling date / time | Laboratory sample ID | EA/ED: Physical and Aggregate Properties | EA/ED: Physical and Aggregate Properties | EA/ED: Physical and Aggregate Properties | ---                                  | --- | --- |
| AM10201 205467                | 01-Feb-2019                 | HK1908678-001        | 2.7720                                   | 2.6927                                   | 0.0793                                   | ---                                  | --- | --- |
| AM10204 205634                | 04-Feb-2019                 | HK1908678-002        | 2.8377                                   | 2.6069                                   | 0.1508                                   | ---                                  | --- | --- |
| AM10209 205635                | 09-Feb-2019                 | HK1908678-003        | 2.7986                                   | 2.6720                                   | 0.1266                                   | ---                                  | --- | --- |
| AM10214 205640                | 14-Feb-2019                 | HK1908678-004        | 2.8545                                   | 2.6751                                   | 0.1794                                   | ---                                  | --- | --- |
| AM10220 205629                | 20-Feb-2019                 | HK1908678-005        | 2.9727                                   | 2.6855                                   | 0.2872                                   | ---                                  | --- | --- |
| AM10226 205626                | 26-Feb-2019                 | HK1908678-006        | 2.9233                                   | 2.6853                                   | 0.2380                                   | ---                                  | --- | --- |

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#### CERTIFICATE OF ANALYSIS

|              |   |              |  |                |               |
|--------------|---|--------------|--|----------------|---------------|
| Client       | : ENVIRONMENTAL PIONEERS & SOLUTION LTD   | Laboratory   | : ALS Technichem (HK) Pty Ltd  | Page           | : 1 of 3      |
| Contact      | : MR. ANDY TSANG  | Contact      | : Richard Fung   | Work Order     | : HK1908681   |
| Address      | : FLAT A, 8/F, CHAI WAN INDUSTRIAL CENTRE, 20 LEE CHUNG STREET, CHAI WAN HONG KONG  | Address      | : 11/F., Chung Shun Kidding Centre, 1-3 Wing Yip Street, Kwai Chung, N.T., Hong Kong |                |               |
| E-mail       | : kytsang@feenv.com.hk  | E-mail       | : richard.fung@alsglobal.com   |                |               |
| Telephone    | : +852 2185 0159  | Telephone    | : +852 2610 1044   | Date received  | : 28-Feb-2019 |
| Facsimile    | : +852 2258 0568  | Facsimile    | : +852 2610 2021   | Date of issue  | : 04-Mar-2019 |
| Project      | : PROPOSED ROAD IMPROVEMENT WORKS IN WEST KOWLOON RECLAMATION DEVELOPMENT - PHASE 1 | Quote number | : HKE/3415/2018  | No. of samples | : 6           |
| Order number | : ---   |              |  | - Received     | : 6           |
| C-O-C number | : ---   |              |  | - Analysed     | : 6           |
| Site         | : ---   |              |  |                |               |

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| Signatory              | Position        | Authorised results for: |
|------------------------|-----------------|-------------------------|
|                        | General Manager | Inorganics              |
| Fung Lim Chee, Richard |                 |                         |

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Page Number : 2 of 3  
Client : ENVIRONMENTAL PIONEERS & SOLUTION LTD  
Work Order : HK1908681



#### Report Comments

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#### Specific Comments for Work Order HK1908681 :

Sample(s) were received in ambient condition.  
Sample(s) analysed and reported on an as received basis.

Page Number : 3 of 3  
Client : ENVIRONMENTAL PIONEERS & SOLUTION LTD  
Work Order : HK1908681



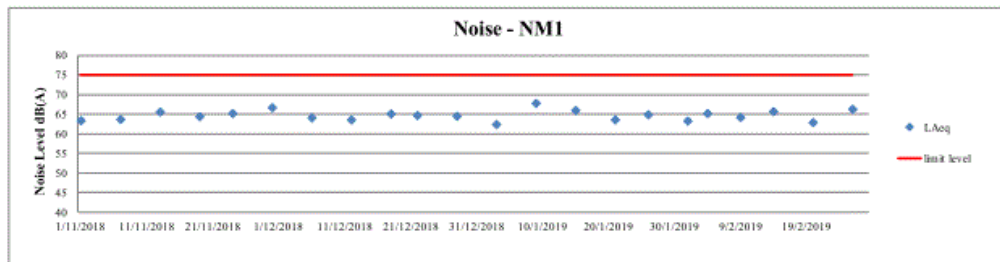
#### Analytical Results

| Sub-Matrix: FILTER (TSP/IRSP) |                             |                      | Compound                                 | HK-TSP: Final Weight                     | HK-TSP: Initial Weight                   | HK-TSP: Total Suspended Particulates     | ---- | ---- |
|-------------------------------|-----------------------------|----------------------|--|--|--|--|------|------|
|                               |                             |                      | LOR Unit                                 | 0.0010 g                                 | 0.0010 g                                 | 0.0010 g                                 | ---- | ---- |
| Client sample ID              | Client sampling date / time | Laboratory sample ID | EA/ED: Physical and Aggregate Properties | EA/ED: Physical and Aggregate Properties | EA/ED: Physical and Aggregate Properties | EA/ED: Physical and Aggregate Properties | ---- | ---- |
| AMS-B0201 206537              | 01-Feb-2019                 | HK1908681-001        | 2.7947                                   | 2.6717                                   | 0.1230                                   | ----                                     | ---- |      |
| AMS-B0204 206481              | 04-Feb-2019                 | HK1908681-002        | 2.7913                                   | 2.6833                                   | 0.1080                                   | ----                                     | ---- |      |
| AMS-B0209 206538              | 09-Feb-2019                 | HK1908681-003        | 2.7772                                   | 2.6815                                   | 0.0957                                   | ----                                     | ---- |      |
| AMS-B0214 206538              | 14-Feb-2019                 | HK1908681-004        | 2.8186                                   | 2.6779                                   | 0.1407                                   | ----                                     | ---- |      |
| AMS-B0220 206539              | 20-Feb-2019                 | HK1908681-005        | 2.7827                                   | 2.6817                                   | 0.1010                                   | ----                                     | ---- |      |
| AMS-B0226 206521              | 26-Feb-2019                 | HK1908681-006        | 2.7650                                   | 2.6846                                   | 0.0804                                   | ----                                     | ---- |      |

## Appendix F1: Noise Monitoring Data

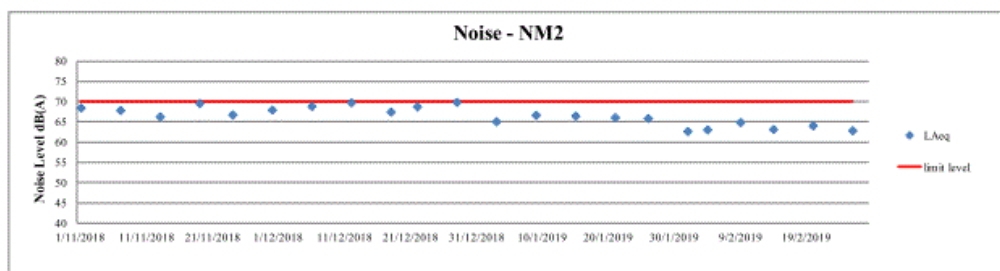
Noise Monitoring Result for NM1

| Location           | NM1      |          |          |           |           |           |
|--------------------|----------|----------|----------|-----------|-----------|-----------|
| Date               | 1/2/2019 | 4/2/2019 | 9/2/2019 | 14/2/2019 | 20/2/2019 | 26/2/2019 |
| Weather Condition  | Sunny    | Sunny    | Cloudy   | Cloudy    | Cloudy    | Cloudy    |
| Start Time         | 10:00    | 10:00    | 10:00    | 10:00     | 10:00     | 10:00     |
| Measurement Period | 30min    | 30min    | 30min    | 30min     | 30min     | 30min     |
| Baseline Level     | 75.1     |          |          |           |           |           |
| $L_{Aeq}$          | 63.4     | 65.3     | 64.3     | 65.8      | 63.0      | 66.4      |
| $L_{10}$           | 66.2     | 67.3     | 66.0     | 67.1      | 65.9      | 68.3      |
| $L_{90}$           | 58.9     | 60.1     | 59.8     | 62.2      | 60.0      | 61.7      |



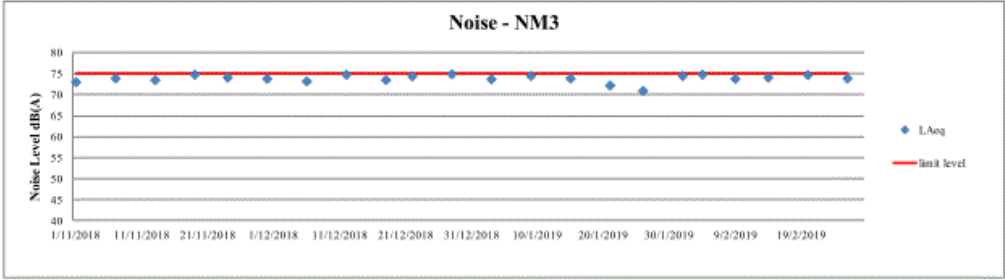
Noise Monitoring Result for NM2

| Location           | NM2      |          |          |           |           |           |
|--------------------|----------|----------|----------|-----------|-----------|-----------|
| Date               | 1/2/2019 | 4/2/2019 | 9/2/2019 | 14/2/2019 | 20/2/2019 | 26/2/2019 |
| Weather Condition  | Sunny    | Sunny    | Cloudy   | Cloudy    | Cloudy    | Cloudy    |
| Start Time         | 14:00    | 14:00    | 14:00    | 14:00     | 14:00     | 14:00     |
| Measurement Period | 30min    | 30min    | 30min    | 30min     | 30min     | 30min     |
| Baseline Level     | 66.5     |          |          |           |           |           |
| $L_{Aeq}$          | 62.7     | 63.1     | 64.9     | 63.2      | 64.1      | 62.9      |
| $L_{10}$           | 64.8     | 66.5     | 68.2     | 66.8      | 67.3      | 64.1      |
| $L_{90}$           | 56.9     | 58.0     | 58.3     | 57.2      | 59.3      | 58.6      |



Noise Monitoring Result for NM3

| Location           | NM3      |          |          |           |           |           |
|--------------------|----------|----------|----------|-----------|-----------|-----------|
| Date               | 1/2/2019 | 4/2/2019 | 9/2/2019 | 14/2/2019 | 20/2/2019 | 26/2/2019 |
| Weather Condition  | Sunny    | Sunny    | Cloudy   | Cloudy    | Cloudy    | Cloudy    |
| Start Time         | 9:00     | 9:00     | 9:00     | 9:00      | 9:00      | 9:00      |
| Measurement Period | 30min    | 30min    | 30min    | 30min     | 30min     | 30min     |
| Baseline Level     | 74.5     |          |          |           |           |           |
| L <sub>Aeq</sub>   | 74.5     | 74.8     | 73.8     | 74.1      | 74.7      | 73.9      |
| L <sub>10</sub>    | 76.8     | 77.1     | 76.0     | 76.8      | 77.2      | 77.0      |
| L <sub>90</sub>    | 68.1     | 67.7     | 66.2     | 66.4      | 67.4      | 66.9      |



## Appendix F2: School Schedule

油蔴地天主教小學(海泓道)  
二零一八至二零一九年度校曆表(九月至二月)

| 月份  | 周次 | 日  | 一    | 二    | 三    | 四    | 五    | 六  | 行事曆  |
|-----|----|----|------|------|------|------|------|----|--|
| 九月  |    |    |      |      |      |      |      | ①  | 1/9 我和班主任有個約會                                    |
|     | 一  | 2  | 3 S  | 4 S  | 5 S  | 6 S  | 7 S  | 8  | 3/9 開學、升旗禮 8/9 小一簡介會                             |
|     | 二  | 9  | 10 S | 11 S | 12 A | 13 B | 14 C | 15 | 10/9 新學年感恩祭                                      |
|     | 三  | 16 | 17 D | 18 E | 19 F | 20 A | 21 B | 22 |  |
|     | 四  | 23 | 24 C | 25   | 26 D | 27 E | 28 F | 29 | 25/9 中秋節翌日                                       |
| 十月  |    | 30 |      |      |      |      |      |    |  |
|     | 五  |    | 1    | 2 A  | 3 B  | 4 C  | 5 D  | 6  | 1/10 國慶日   |
|     | 六  | 7  | 8 E  | 9 F  | 10 A | 11 B | 12 C | 13 |  |
|     | 七  | 14 | 15 D | 16 E | 17   | 18 F | 19 A | 20 | 17/10 重陽節  |
|     | 八  | 21 | 22 B | 23 C | 24 D | 25 E | 26 F | 27 | 26/10 J.6 升中座談會(一)                               |
| 十一月 | 九  | 28 | 29 A | 30 B | 31 C |      |      |    |  |
|     | 十  |    |      |      |      | 1 D  | 2 E  | 3  |  |
|     | 十一 | 4  | 5 F  | 6 A  | 7 S  | 8 S  | 9 S  | 10 | 8/11-13/11 J.2-6 第一段考                            |
|     | 十二 | 11 | 12 S | 13 S | 14 B | 15 S | 16   | 17 | 15/11 學校旅行 16/11 五十周年晚宴<br>16/11 旅行翌日假期          |
|     | 十三 | 18 | 19 C | 20 D | 21 E | 22 F | 23 A | 24 | 22/11 九龍南水運會                                     |
| 十二月 | 十四 | 25 | 26 B | 27 C | 28 D | 29 E | 30 S |    | 30/11 水運會、校慶金禧游泳邀請賽                              |
|     |    |    |      |      |      |      |      | 1  |  |
|     | 十四 | 2  | 3 F  | 4 A  | 5 B  | 6 C  | 7 D  | 8  |  |
|     | 十五 | 9  | 10 E | 11 F | 12 A | 13 B | 14 C | 15 | 10/12-18/12 全方位學習周 15/12 家長日                     |
|     | 十六 | 16 | 17 D | 18 E | 19 S | 20   | 21   | 22 | 19/12 聖誕祈禱聚會 20/12 教師發展日(1)<br>20/12-1/1 聖誕及新年假期 |
| 一月  |    | 23 | 24   | 25   | 26   | 27   | 28   | 29 |  |
|     |    | 30 | 31   |      |      |      |      |    |  |
|     | 十七 |    |      | 1    | 2 F  | 3 A  | 4 B  | 5  | 1/1 元旦   |
|     | 十八 | 6  | 7 C  | 8 D  | 9 E  | 10 F | 11 A | 12 |  |
|     | 十九 | 13 | 14 B | 15 C | 16 D | 17 E | 18 F | 19 | 16/1 九龍南水運會 19/1 家教會周年大會暨頒獎禮(1)                  |
| 二月  | 廿  | 20 | 21 A | 22 B | 23 C | 24 D | 25 E | 26 | 23-25/1 J.5 教育營 21/1 下學期                         |
|     | 廿一 | 27 | 28 F | 29 A | 30 B | 31 C |      |    | 29/1 拍攝畢業照及班照                                    |
|     |    |    |      |      |      |      | 1 S  | 2  | 1/2 中華文化日 2/2-12/2 農曆新年假期                        |
|     | 廿二 | 3  | 4    | 5    | 6    | 7    | 8    | 9  | 5/2-7/2 初一至初三                                    |
|     | 廿三 | 10 | 11   | 12   | 13 D | 14 E | 15 F | 16 | 15/2 J.5 升中座談會                                   |
| 二月  | 廿四 | 17 | 18 A | 19 B | 20 C | 21 D | 22 E | 23 |  |
|     | 廿五 | 24 | 25 F | 26 A | 27 S | 28 S |      |    | 28/2-5/3 第二段考                                    |

## Appendix G: Waste Management Record

Monthly Summary Waste Flow Table for 2016 (year)

| Month     | <u>Actual Quantities of Inert C&amp;D Materials Generated Monthly</u> |                              |                        |                          |                         | <u>Actual Quantities of Non-inert C&amp;D Wastes Generated Monthly</u> |             |                             |             |                |                         |
|-----------|---|------------------------------|------------------------|--------------------------|-------------------------|--|-------------|-----------------------------|-------------|----------------|-------------------------|
|           | Total Quantity Generated  | Hard Rocks & Broken Concrete | Reused in the Contract | Reused in other Projects | Disposed as Public Fill | Mixed Waste Disposal at Sorting Facility                               | Metals      | Paper / cardboard packaging | Plastics    | Chemical Waste | Others (general refuse) |
|           | (in '000kg)   | (in '000kg)                  | (in '000kg)            | (in '000kg)              | (in '000kg)             | (in '000kg)  | (in '000kg) | (in '000kg)                 | (in '000kg) | (in '000kg)    | (in '000kg)             |
| Jan       | --  | --                           | --                     | --                       | --                      | --   | --          | --                          | --          | --             | --                      |
| Feb       | 521.76  | 0                            | 0                      | 0                        | 521.76                  | 0  | 0           | 0                           | 0           | 0              | 38.34                   |
| Mar       | 1527.37   | 0                            | 0                      | 0                        | 1527.37                 | 0  | 0           | 0                           | 0           | 0              | 188.63                  |
| Apr       | 2676.73   | 0                            | 0                      | 0                        | 2676.73                 | 0  | 0           | 0                           | 0           | 0              | 87.72                   |
| May       | 2028.43   | 0                            | 0                      | 0                        | 2028.43                 | 0  | 0           | 0                           | 0           | 0              | 47.78                   |
| Jun       | 2058.16   | 0                            | 0                      | 0                        | 2058.16                 | 0  | 0           | 0                           | 0           | 0              | 81.13                   |
| Sub-total | 8812.45   | 0                            | 0                      | 0                        | 8812.45                 | 0  | 0           | 0                           | 0           | 0              | 443.6                   |
| Jul       | 5031.54   | 0                            | 0                      | 0                        | 5031.54                 | 0  | 0           | 0                           | 0           | 0              | 17.12                   |
| Aug       | 1026.39   | 0                            | 0                      | 0                        | 1026.39                 | 0  | 0           | 0                           | 0           | 0              | 52.44                   |
| Sep       | 1833.94   | 0                            | 0                      | 0                        | 1833.94                 | 0  | 0           | 0                           | 0           | 0              | 7.14                    |
| Oct       | 785.58  | 0                            | 0                      | 0                        | 785.58                  | 0  | 0           | 0                           | 0           | 0              | 16.77                   |
| Nov       | 832.23  | 0                            | 0                      | 0                        | 832.23                  | 0  | 0           | 0                           | 0           | 0              | 48.09                   |
| Dec       | 2183.48   | 0                            | 0                      | 0                        | 2183.48                 | 0  | 0           | 0                           | 0           | 0              | 19.96                   |
| Total     | 20505.61  | 0                            | 0                      | 0                        | 20505.61                | 0  | 0           | 0                           | 0           | 0              | 605.12                  |



Monthly Summary Waste Flow Table for 2017 (year)

| Month                   | <u>Actual Quantities of Inert C&amp;D Materials Generated Monthly</u> |                              |                        |                          |                         | <u>Actual Quantities of Non-inert C&amp;D Wastes Generated Monthly</u> |             |                             |             |                |                         |
|-------------------------|---|------------------------------|------------------------|--------------------------|-------------------------|--|-------------|-----------------------------|-------------|----------------|-------------------------|
|                         | Total Quantity Generated  | Hard Rocks & Broken Concrete | Reused in the Contract | Reused in other Projects | Disposed as Public Fill | Mixed Waste Disposal at Sorting Facility                               | Metals      | Paper / cardboard packaging | Plastics    | Chemical Waste | Others (general refuse) |
|                         | (in '000kg)   | (in '000kg)                  | (in '000kg)            | (in '000kg)              | (in '000kg)             | (in '000kg)  | (in '000kg) | (in '000kg)                 | (in '000kg) | (in '000kg)    | (in '000kg)             |
| Jan                     | 717.69  | 0                            | 0                      | 0                        | 717.69                  | 0  | 0           | 0                           | 0           | 0              | 7.57                    |
| Feb                     | 2721.53   | 0                            | 0                      | 0                        | 2721.53                 | 0  | 0           | 0                           | 0           | 0              | 13.08                   |
| Mar                     | 2504.26   | 0                            | 0                      | 0                        | 2504.26                 | 0  | 0           | 0                           | 0           | 0              | 5.55                    |
| Apr                     | 2006.4  | 0                            | 0                      | 0                        | 2006.4                  | 0  | 0           | 0                           | 0           | 0              | 10.43                   |
| May                     | 1083.4  | 0                            | 0                      | 0                        | 1083.4                  | 0  | 0           | 0                           | 0           | 0              | 10.04                   |
| Jun                     | 840.63  | 0                            | 0                      | 0                        | 840.63                  | 0  | 0           | 0                           | 0           | 0              | 12.53                   |
| Sub-total               | 9873.91   | 0                            | 0                      | 0                        | 9873.91                 | 0  | 0           | 0                           | 0           | 0              | 59.2                    |
| Jul                     | 1115.46   | 0                            | 0                      | 0                        | 1115.46                 | 0  | 0           | 0                           | 0           | 0              | 19.58                   |
| Aug                     | 1061.18   | 0                            | 0                      | 0                        | 1061.18                 | 0  | 0           | 0                           | 0           | 0              | 25.19                   |
| Sep                     | 3410.43   | 0                            | 0                      | 0                        | 3410.43                 | 0  | 0           | 0                           | 0           | 0              | 30.62                   |
| Oct                     | 2213.94   | 0                            | 0                      | 0                        | 2213.94                 | 0  | 0           | 0                           | 0           | 0              | 30.56                   |
| Nov                     | 2961.95   | 0                            | 0                      | 0                        | 2961.95                 | 0  | 0           | 0                           | 0           | 0              | 26.85                   |
| Dec                     | 3174.36   | 0                            | 0                      | 0                        | 3174.36                 | 0  | 0           | 0                           | 0           | 0              | 35.72                   |
| Total                   | 23811.23  | 0                            | 0                      | 0                        | 23811.23                | 0  | 0           | 0                           | 0           | 0              | 227.72                  |
| Grand Total (2016&2017) | 44316.84  | 0                            | 0                      | 0                        | 44316.84                | 0  | 0           | 0                           | 0           | 0              | 832.84                  |

Monthly Summary Waste Flow Table for 2019 (year)

| Month                   | <u>Actual Quantities of Inert C&amp;D Materials Generated Monthly</u> |                              |                        |                          |                         | <u>Actual Quantities of Non-inert C&amp;D Wastes Generated Monthly</u> |             |                             |             |                |                         |
|-------------------------|---|------------------------------|------------------------|--------------------------|-------------------------|--|-------------|-----------------------------|-------------|----------------|-------------------------|
|                         | Total Quantity Generated  | Hard Rocks & Broken Concrete | Reused in the Contract | Reused in other Projects | Disposed as Public Fill | Mixed Waste Disposal at Sorting Facility                               | Metals      | Paper / cardboard packaging | Plastics    | Chemical Waste | Others (general refuse) |
|                         | (in '000kg)   | (in '000kg)                  | (in '000kg)            | (in '000kg)              | (in '000kg)             | (in '000kg)  | (in '000kg) | (in '000kg)                 | (in '000kg) | (in '000kg)    | (in '000kg)             |
| Jan                     | 1359.4  | 0                            | 0                      | 0                        | 1359.4                  | 0  | 0           | 0                           | 0           | 0              | 29.60                   |
| Feb                     | 742.02  | -                            | -                      | -                        | 742.02                  | -  | -           | -                           | -           | -              | 15.93                   |
| Mar                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Apr                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| May                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Jun                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Sub-total               | 2101.42   | 0                            | 0                      | 0                        | 2101.42                 | 0  | 0           | 0                           | 0           | 0              | 45.53                   |
| Jul                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Aug                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Sep                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Oct                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Nov                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Dec                     | -   | -                            | -                      | -                        | -                       | -  | -           | -                           | -           | -              | -                       |
| Total                   | 2101.42   | 0                            | 0                      | 0                        | 2101.42                 | 0  | 0           | 0                           | 0           | 0              | 45.53                   |
| Grand Total (2016-2019) | 73351.23  | 0                            | 0                      | 0                        | 73351.23                | 0  | 0           | 0                           | 0           | 0              | 1290.9                  |

## Appendix H: Environmental Mitigation Implementation Schedule

Implementation Schedule for Environmental Mitigation Measures

| EIA Ref.                                | EM&A Ref. | Recommended Mitigation Measures  | Objectives of the Recommended Measure & Main Concerns to address   | Who to Implement the measure | Location of the measure | When to implement the measure | What requirements or standard for the measure to achieve | Implementation Status |
|---|-----------|--|--|------------------------------|-------------------------|-------------------------------|--|-----------------------|
| Air Quality Impact (Construction Phase) |           |  |  |                              |                         |                               |  |                       |
| 4.8                                     | A1        | Good housekeeping to minimize dust generation, e.g. by properly handling and storing dusty materials   | To minimize dust generation  | HyD's Contractor             | Whole construction site | Throughout construction phase | EIAO-TM, APCO  | ✓                     |
| 4.8                                     | A2        | Adopt dust control measures, such as dust suppression using water spray on exposed soil (at least 8 times per day), in areas with dusty construction activities and during material handling | To minimize dust generation due to erosion                         | HyD's Contractor             | Whole construction site | Throughout construction phase | EIAO-TM, APCO  | ✓                     |
| 4.8                                     | A3        | Store cement bags in shelter with 3 sides and the top covered by impervious materials if the stack exceeds 20 bags   | To prevent leakage of cement                                       | HyD's Contractor             | Whole construction site | Throughout construction phase | EIAO-TM, APCO  | ✓                     |
| 4.8                                     | A4        | Maintain a reasonable height when dropping excavated materials to limit dust generation  | To minimize dust generation during movement of excavated materials | HyD's Contractor             | Whole construction site | Throughout construction phase | EIAO-TM, APCO  | ✓                     |
| 4.8                                     | A5        | Limit vehicle speed within site to 10km/hr and confine vehicle movement in haul road   | To minimize dust generation due to traffic movement                | HyD's Contractor             | Whole construction site | Throughout construction phase | EIAO-TM, APCO  | ✓                     |

|     |     |   |   |                  |                         |                               |               |   |
|-----|-----|---|---|------------------|-------------------------|-------------------------------|---------------|---|
| 4.8 | A6  | Minimize exposed earth after completion of work in a certain area by hydroseeding, vegetating, soil compacting or covering with bitumen | To minimize dust generation due to erosion                                  | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO | # |
| 4.8 | A7  | Provide wheel washing at site exit to clean the vehicle body and wheel  | To prevent dust from being brought offsite                                  | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO | ✓ |
| 4.8 | A8  | Hard pave the area at site exit with concrete, bitumen or hardcore  | To prevent dust from being brought offsite                                  | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO | ✓ |
| 4.8 | A9  | Cover materials on trucks before leaving the site to prevent debris from dropping during traffic movement or being blown away by wind   | To prevent falling of debris during traffic movement and by wind            | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO | ✓ |
| 4.8 | A10 | Regular maintenance of plant equipment to prevent black smoke emission  | To minimize black smoke emission  | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO | ✓ |
| 4.8 | A11 | Throttle down or switch off unused machines or machine in intermittent use  | To minimize unnecessary emission  | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO | ✓ |
| 4.8 | A12 | Carry out regular site inspection to audit the implementation of mitigation measures  | To check the implementation status and effectiveness of mitigation measures | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO | ✓ |

|                                   |     |   |   |                  |                         |  |             |     |
|-----------------------------------|-----|---|---|------------------|-------------------------|--|-------------|-----|
| 4.8                               | A13 | Carry out air quality monitoring throughout the construction period   | To monitor construction dust level      | HyD's Contractor | At representative ASRs  | Prior to and throughout construction phase | EIAO-TM     | ✓   |
| Noise Impact (Construction Phase) |     |   |   |                  |                         |  |             |     |
| 3.8                               | N1  | Adopt good site practice, such as regular maintenance of plant equipment, throttle down unused machines   | To minimize construction noise level    | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM | ✓   |
| 3.8                               | N2  | Use Quality Powered Mechanical Equipment (QPME) which produces lower noise level (e.g. Excavator/Loader (EPD-01431), Asphalt Paver (EPD-01226), Road Roller (EPD-00244) and Mobile Crane (EPD-01477)) | To minimize construction noise level    | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM | ✓   |
| 3.8                               | N3  | Erect movable noise barrier at significant noise source(e.g. Concrete Pump, Concrete Lorry Mixer, Excavator/Loader, Road Sweeper, Asphalt Paver, Road Roller, Lorry, Breaker and Poker)               | To lower noise transmission             | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM | ✓   |
| 3.8                               | N5  | Regular maintenance of plant equipment to prevent noise emission due to impair  | To prevent noise emission due to impair | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM | ✓   |
| 3.8                               | N6  | Position mobile noisy equipment in location and direction away from NSR   | To minimize noise transmission to NSR   | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM | N/A |

|                                   |     |   |   |                  |                         |  |                          |     |
|-----------------------------------|-----|---|---|------------------|-------------------------|--|--------------------------|-----|
| 3.8                               | N7  | Use silencer or muffler on plant equipment and should be properly maintained  | To minimize noise transmission                        | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM              | ✓   |
| 3.8                               | N8  | Throttle down or switch off unused machines or machine in intermittent use between work                             | To minimize noise production                          | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM              | ✓   |
| 3.8                               | N9  | Make good use of stockpiles or other structures for noise screening   | To minimize noise transmission                        | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM              | N/A |
| 3.8                               | N10 | Avoid carrying out noisy activities at the same time  | To minimize noise production                          | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM              | ✓   |
| 3.8                               | N11 | Reduce the percentage on-time for some noisy PMEs   | To minimize noise production                          | HyD's Contractor | Whole construction site | Throughout construction phase              | NCO,EIAO-TM              | ✓   |
| 3.8                               | N12 | Carry out noise monitoring  | To monitor construction noise level                   | HyD's Contractor | At representative NSRs  | Prior to and throughout construction phase | EIAO-TM                  | ✓   |
| Water Impact (Construction Phase) |     |   |   |                  |                         |  |                          |     |
| 5.8                               | W1  | Recirculate settled water for ground boring and drilling during site investigation or rock/soil anchoring.          | To minimize wastewater generation                     | HyD's Contractor | Whole construction site | Throughout construction phase              | ProPECC PN 1/94, EIAO-TM | ✓   |
| 5.8                               | W2  | Set up sedimentation tank for settling suspended solids in wastewater before discharge into storm drains. Sand/silt | To reduce the amount of suspended solid in wastewater | HyD's Contractor | Whole construction site | Throughout construction phase              | ProPECC PN 1/94, EIAO-TM | *   |

|     |    |  |   |                  |                         |                               |                          |   |
|-----|----|--|---|------------------|-------------------------|-------------------------------|--------------------------|---|
|     |    | removal facilities such as sand traps, silt traps and sedimentation basin should be provided with adequate capacity. |   |                  |                         |                               |                          |   |
| 5.8 | W3 | Pave the construction road between the wheel washing bay and the public road with backfall                           | To prevent soil and site runoff from leaving the site | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓ |
| 5.8 | W4 | Follow ProPECC PN 1/94 "Construction Site Drainage" as far as practicable  | To minimize surface runoff and chance of erosion      | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓ |
| 5.8 | W5 | Provide perimeter channels at site boundaries.   | To stop offsite storm runoff from entering the site   | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓ |
| 5.8 | W6 | Construct catchpits and perimeter channels prior to commencement of site formation works and earthworks.             | To stop runoff from flowing across the site           | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓ |
| 5.8 | W7 | Maintain silt removal facilities, channels, manholes before and after rainstorm.                                     | To prevent failure that may lead to flooding          | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | * |
| 5.8 | W8 | Remove sediment from silt and grit at regular interval.  | To prevent blockage the may lead to flooding          | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓ |
| 5.8 | W9 | Consider environmental requirements when diverting or realigning drainage.   | To ensure adequate hydraulic capacity of all drains   | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓ |

|     |     |  |  |                  |                         |                               |                          |   |
|-----|-----|--|--|------------------|-------------------------|-------------------------------|--------------------------|---|
| 5.8 | W10 | Maintain a minimum distance of 100m between discharge point of construction site runoff and the existing saltwater intakes. No effluent will be discharged into typhoon shelter. (for locations of seawater intakes, please refer to Figure 5.1 in EIA Report)   | To prevent mixing                                | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓   |
| 5.8 | W11 | <p>Arrange soil excavation works outside rainy seasons (April to September) as far as possible. If this cannot be achieved, the following measures should be implemented:</p> <ul style="list-style-type: none"> <li>-Cover temporary exposed slope surfaces with impermeable materials, e.g. tarpaulin</li> <li>- Protect temporary access roads by crushed stone or gravel</li> <li>- Provide intercepting channels along crest/edge of excavation</li> <li>- Carry out adequate surface protection measures well before the arrival of a rainstorm</li> </ul> | To minimize surface runoff and chance of erosion | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | <div>✓</div> <div>N/A</div> <div>✓</div> <div>✓</div> |
| 5.8 | W12 | Compact soil after earthwork. Provide permanent work or surface protection with appropriate drainage channels immediately after forming the final surfaces.  | To prevent soil erosion under rainstorm          | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓   |
| 5.8 | W13 | Prevent rainwater from entering trenches. Excavation of trenches should be dug and backfilled in short sections during rainy   | To prevent soil erosion under rainstorm          | HyD's Contractor | Whole Construction site | Throughout construction phase | ProPECC PN 1/94, ELAO-TM | ✓   |

|     |     |  |  |                  |                         |                               |   |   |
|-----|-----|--|--|------------------|-------------------------|-------------------------------|---|---|
|     |     | seasons. Remove silt in rainwater collected from the trenches or foundation excavations prior to discharge to storm drains.  |  |                  |                         |                               |   |   |
| 5.8 | W14 | Cover open stockpiles of construction materials (e.g. aggregates, sand and fill materials) with impermeable materials such as tarpaulin during rainstorms.           | To prevent soil erosion under rainstorm                  | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM                  | ✓ |
| 5.8 | W15 | Cover and temporary seal manholes (including newly constructed ones) to prevent silt, construction materials or debris and surface runoff from entering foul sewers. | To prevent overloading of foul sewers                    | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM                  | * |
| 5.8 | W16 | Remove waste from the site regularly.  | To prevent waste accumulation                            | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM                  | ✓ |
| 5.8 | W17 | Apply discharge license for effluent discharge. Treat the discharge to comply with the requirement in TM-DSS.  | To ensure compliance with effluent discharge requirement | HyD's Contractor | Whole construction site | Throughout construction phase | WPCO, TM-DSS, EIAO-TM                     | ✓ |
| 5.8 | W18 | Reuse treated effluent onsite, e.g. dust suppression, wheel washing and general cleaning.  | To minimize wastewater generation                        | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM         | ✓ |
| 5.8 | W19 | Monitor effluent water quality.  | To ensure compliance with effluent discharge requirement | HyD's Contractor | Whole construction site | Throughout construction phase | WPCO, EIAO-TM                             | ✓ |
| 5.8 | W20 | Register as chemical waste producer if chemical waste will be generated.   | To control chemical waste                                | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) | ✓ |

|     |     |   |   |                  |                         |                               |   |   |
|-----|-----|---|---|------------------|-------------------------|-------------------------------|---|---|
|     |     |   |   |                  |                         |                               | Regulation, EIAO-TM   |   |
| 5.8 | W21 | Perform maintenance of vehicles and equipment that have oil leakage and spillage potential on hard standings within a bunded area with sumps and oil interceptors.  | To prevent oil leakage or spillage              | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM | ✓ |
| 5.8 | W22 | Dispose chemical waste in accordance to Waste Disposal Ordinance. Follow the <i>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i> , examples as follows:<br>- Store chemical wastes with suitable containers to avoid leakage or spillage during storage, handling and transport<br>- Label chemical waste containers according to the CoP to notify and warn the waste handlers<br>- Store chemical wastes at designated safe location with adequate space | To avoid accident in waste storage and handling | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM                             | ✓ |



|                                       |     |  |   |                  |                         |                               |                                   |   |
|---------------------------------------|-----|--|---|------------------|-------------------------|-------------------------------|-----------------------------------|---|
| 5.8                                   | W23 | Provide sufficient chemical toilets with regular maintenance by licensed chemical waste collector  | To proper collection of taskforce waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM | ✓ |
| Water Impact (Operational Phase)      |     |  |   |                  |                         |                               |                                   |   |
| 5.8                                   | W24 | Direct surface runoff for silt removal through silt trap before flowing to public storm water drainage system  | To remove silt in surface runoff        | HyD              | Whole construction site | Throughout construction phase | WPCO, EIAO-TM                     | ✓ |
| 5.8                                   | W25 | Regularly maintain the silt traps  | To prevent blockage                     | HyD              | Whole construction site | Throughout construction phase | WPCO, EIAO-TM                     | ✓ |
| Waste Management (Construction Phase) |     |  |   |                  |                         |                               |                                   |   |
| 6.5                                   | WM1 | Allocate an area for waste sorting and storage of C&D materials into the following categories for reuse, recycle or disposal:<br>- excavated material suitable for reuse<br>- inert C&D material for disposal offsite<br>- non-inert C&D materials for disposal at landfills<br>- chemical waste<br>- general refuse | To minimize waste generation            | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM | # |
| 6.5                                   | WM2 | Adopt good site practice as follows:<br>- Provide training to workers on site cleanliness, waste management (waste   | To proper handling of waste             | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM | ✓ |

|     |     |   |   |                  |                         |                               |                                   |   |
|-----|-----|---|---|------------------|-------------------------|-------------------------------|-----------------------------------|---|
|     |     | reduction, reuse and recycle) and chemical handling procedures<br>- Provide sufficient waste collection points and regular removal<br>- Cover waste materials with tarpaulin or in enclosure during transportation<br>- Maintain drainage systems, sumps and oil interceptors<br>- Sort out chemical waste for proper handling and treatment  |   |                  |                         |                               |                                   |   |
| 6.5 | WM3 | Adopt waste reduction measures as follows:<br>- Allocate area/containers for sorting, recovering and storing waste for reuse, recycle or disposal (e.g. demolition debris and excavated materials, general refuse like aluminium cans)<br>- Allocate area for proper storage of construction materials to prevent contamination<br>- Minimize wastage through careful planning and avoiding over-purchase of construction materials | To minimize waste generation            | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM | ✓ |
| 6.5 | WM4 | Prepare and implement a site specific Waste Management Plan (WMP) as part of Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/25. Detail waste management method in the form of avoidance, reuse, recovery,   | To provide guidance to waste management | HyD's Contractor | Whole construction site | Throughout construction phase | ETWB TCW No. 19/2005, EIAO-TM     | ✓ |

|     |     |  |                           |                  |                         |                               |   |   |
|-----|-----|--|---------------------------|------------------|-------------------------|-------------------------------|---|---|
|     |     | recycling, storage, collection, treatment and disposal according to the recommendations on the EIA and EM&A Manual. It should be approved by the ER and  |                           |                  |                         |                               |   |   |
| 6.5 | WM5 | Store waste materials properly as follows:<br>- Avoid contamination by proper handling and storing waste<br>- Prevent erosion by covering waste or applying water spray<br>- Maintain and clean storage area regularly<br>- Sort and stockpile different materials at designated location to enhance reuse | To properly store waste   | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM  | * |
| 6.5 | WM6 | Apply for relevant waste disposal permits in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28).   | To properly dispose waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28), EIAO-TM | ✓ |

|     |      |  |   |                  |                         |                               |   |   |
|-----|------|--|---|------------------|-------------------------|-------------------------------|---|---|
| 6.5 | WM7  | Hire licensed waste disposal contractors for waste collection and removal. Dispose waste at licensed waste disposal facilities   | To properly dispose waste                       | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM   | ✓ |
| 6.5 | WM8  | Implement trip-ticket system for recording the amount of waste generated, recycled and disposed, including chemical wastes   | To monitor movement of waste                    | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, Waste Disposal Ordinance, EIAO-TM | ✓ |
| 6.5 | WM9  | Provide wheel washing bay at site exit to clean the vehicle body and wheel   | To prevent dust from being brought offsite      | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM  | ✓ |
| 6.5 | WM10 | Reduce water content in wet spoil generated from piling work by mixing with dry materials. Only dispose treated spoil with less than 25% dry density to Public Fill Reception Facilities | To minimize load to reception facilities        | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM   | ✓ |
| 6.5 | WM11 | Dispose dry waste or waste with less than 70% water content by weight to landfill  | To minimize load to reception facilities        | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM   | ✓ |
| 6.5 | WM12 | Follow the <i>Code of Practice on the Packaging, Labelling and Storage of Chemical Waste</i> as follows:<br>- Store chemical wastes with suitable  | To avoid accident in waste storage and handling | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM   | ✓ |

|     |      |   |   |                  |                         |                               |   |     |
|-----|------|---|---|------------------|-------------------------|-------------------------------|---|-----|
|     |      | containers. Seal and maintain the container to avoid leakage or spillage during storage, handling and transport<br>- Label chemical waste containers in both English and Chinese with instructions in accordance to Schedule 2 of the Waste Disposal (Chemical Waste) (General) Regulation<br>- The container capacity should be smaller than 450 litres unless agreed by the EPD   |   |                  |                         |                               |   |     |
| 6.5 | WM13 | Comply with the requirement of the chemical storage area:<br>- Store only chemical waste and label clearly the chemical characters of the waste<br>- Have at least 3 sides enclosed and protected from rainfall with cover<br>- Provide sufficient ventilation<br>- Have impermeable floor and has bunds to contain 110% of the capacity of the largest container or 20% of the total volume of the stored waste in the area, whichever is larger<br>- Adequately spaced incompatible materials | To ensure proper storage of chemical waste  | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM                             | ✓   |
| 6.5 | WM14 | Transfer used lubricants, waste oils and other chemicals to oil recycling companies, if possible, and empty oil drums for reuse or refill. No direct or indirect discharge is permitted   | To ensure proper disposal of chemical waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM | N/A |

|     |      |  |   |                     |  |                               |   |     |
|-----|------|--|---|---------------------|--|-------------------------------|---|-----|
| 6.5 | WM15 | Hire licensed chemical waste disposal contractors for waste collection and removal. Dispose chemical waste at the approved CWTC at Tsing Yi or other licensed facility   | To ensure proper disposal of chemical waste   | HyD's Contractor    | Whole construction site  | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM | N/A |
| 6.5 | WM16 | Hire reputable waste collector to separately collect and dispose general refuse from other wastes. Cover the waste to prevent being blown away   | To ensure proper disposal of general refuse   | HyD's Contractor    | Whole construction site  | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM | ✓   |
| 6.5 | WM17 | Provide recycling bins for sorting out recyclables for collection by recycling companies. Non-recyclables should be removed to designated landfills every day by licensed collectors to prevent environmental and health nuisance. | To ensure proper recycling and disposal of general refuse                                     | HyD's Contractor    | Whole construction site  | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM                             | ✓   |
| 6.5 | WM18 | Organize training and reminders to site staff on waste minimization through avoidance and reduction, reusing and recycling   | To ensure proper management of general refuse   | HyD's Contractor    | Whole construction site  | Throughout construction phase | EIAO-TM   | ✓   |
| 6.5 | WM19 | Carry out testing to verify sediment quantity and quality  | To verify the categories of sediment to be disposed in accordance with ETWB TC(W) No. 34/2002 | HyD's GI Contractor | Drillholes CB1 to 5 as shown in Sediment Sampling and Testing Plan | Throughout construction phase | ETWB TC(W) No. 34/2002  | ✓   |

| Landscape and Visual |     |   |   |                  |                                 |                               |                         |     |
|----------------------|-----|---|---|------------------|---------------------------------|-------------------------------|-------------------------|-----|
| 7.9.3                | CM1 | Shorten the construction period   | To minimize duration of landscape and visual impact             | HyD's Contractor | Whole construction site         | Throughout construction phase | EIAO-TM                 | N/A |
| 7.9.3                | CM2 | Limit work within site area without encroaching into the landscape resources offsite.   | To minimize landscape and visual impact                         | HyD's Contractor | Whole construction site         | Throughout construction phase | EIAO-TM                 | ✓   |
| 7.9.3                | CM3 | Protect retained trees from damage during construction work according to the recommended in the detailed tree assessment report and the approval of Tree Removal Application under ETWB TCW No. 3/2006 Tree Preservation  | To maintain and minimize damage to existing greenery            | HyD's Contractor | Whole construction site         | Throughout construction phase | ETWB TCW 3/2006, EIAOTM | ✓   |
| 7.9.3                | CM4 | Transplant unavoidably affected trees wherever possible in accordance with ETWB TCW No. 3/2006 Tree Preservation. Maintain transplanted trees to ensure healthy development during the establishment period   | To minimize tree loss and ensure survival of transplanted trees | HyD's Contractor | Whole construction site         | Throughout construction phase | ETWB TCW 3/2006, EIAOTM | N/A |
| 7.9.2.6              | OM1 | Carry out compensatory planting in areas proposed in the Tree Survey and Landscape and Greening Study Report in accordance to ETWB TCW 3/2006, which will be subjected to refinement in detailed design stage. Compensatory planting of a ratio no less than 1:1 in terms of quality and quantity will be provided for any potential tree | To compensate for loss greenery                                 | HyD's Contractor | Whole construction site/Offsite | Construction phase            | ETWB TCW 3/2006, EIAOTM | N/A |

|         |     |  |  |                  |                         |                    |                  |     |
|---------|-----|--|--|------------------|-------------------------|--------------------|------------------|-----|
|         |     | felling within the site. Offsite planting may be required due to land constraint. 410 nos. of compensatory trees have been proposed  |  |                  |                         |                    |                  |     |
| 7.9.2.6 | OM2 | Provide vertical greening at piers of elevated roads and shrub planting near amenity planting strips to soften the hard landscape (e.g. climber and shrub for hiding central divider and enclosures). Early comments from the ACABAS and relevant departments, implementation and maintenance agents shall be sought at the earlier stage. | To soften hard landscape                   | HyD's Contractor | Whole construction site | Construction phase | ETWB TCW 36/2004 | N/A |
| 7.9.2.6 | OM3 | Match the design and materials of road structure with the surrounding environment and with the schematic theme paving of the future West Kowloon Reclamation Development and the Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS)  | To match with existing landscape character | HyD's Contractor | Whole construction site | Construction phase | ETWB TCW 36/2004 | N/A |

Remarks:

- ✓ Compliance of mitigation measure
- X Non-compliance of mitigation measure
- Non-compliance but rectified by the contractor
- \* Recommendation was made during site audit but improved/rectified by the contractor
- # Waiting for improving/rectifying by the contractor
- N/A Not Applicable

## Appendix I: Cumulative Log for Environmental Exceedance, Complaints, Notification of Summons and Successful Prosecutions

**Cumulative Log for Environmental Exceedance, Non-Compliance, Complaints, Notification of Summons and Successful Prosecution**

| Reporting Month | Number of Exceedance | Number of Non-Compliance | Number of Environmental Complaints | Number of Notification of Summons | Number of Successful Prosecutions |
|-----------------|----------------------|--------------------------|------------------------------------|-----------------------------------|-----------------------------------|
| February 2016   | 0                    | 0                        | 0                                  | 0                                 | 0                                 |
| March 2016      | 0                    | 0                        | 0                                  | 0                                 | 0                                 |
| April 2016      | 0                    | 0                        | 2                                  | 0                                 | 0                                 |
| May 2016        | 7                    | 0                        | 0                                  | 0                                 | 0                                 |
| June 2016       | 11                   | 0                        | 0                                  | 0                                 | 0                                 |
| July 2016       | 6                    | 0                        | 0                                  | 0                                 | 0                                 |
| August 2016     | 6                    | 0                        | 0                                  | 0                                 | 0                                 |
| September 2016  | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| October 2016    | 6                    | 1                        | 0                                  | 0                                 | 0                                 |
| November 2016   | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| December 2016   | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| January 2017    | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| February 2017   | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| March 2017      | 6                    | 0                        | 0                                  | 0                                 | 0                                 |
| April 2017      | 6                    | 0                        | 1                                  | 0                                 | 0                                 |
| May 2017        | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| June 2017       | 6                    | 0                        | 0                                  | 0                                 | 0                                 |
| July 2017       | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| August 2017     | 5                    | 0                        | 0                                  | 0                                 | 0                                 |
| September 2017  | 6                    | 0                        | 0                                  | 0                                 | 0                                 |



|                |     |   |   |   |   |
|----------------|-----|---|---|---|---|
| October 2017   | 5   | 0 | 0 | 0 | 0 |
| November 2017  | 6   | 0 | 0 | 0 | 0 |
| December 2017  | 5   | 0 | 0 | 0 | 0 |
| January 2018   | 5   | 0 | 0 | 0 | 0 |
| February 2018  | 5   | 0 | 0 | 0 | 0 |
| March 2018     | 6   | 0 | 0 | 0 | 0 |
| April 2018     | 5   | 0 | 0 | 0 | 0 |
| May 2018       | 7   | 0 | 1 | 0 | 0 |
| June 2018      | 5   | 0 | 0 | 0 | 0 |
| July 2018      | 5   | 0 | 0 | 0 | 0 |
| August 2018    | 7   | 0 | 0 | 0 | 0 |
| September 2018 | 5   | 0 | 0 | 0 | 0 |
| October 2018   | 5   | 0 | 0 | 0 | 0 |
| November 2018  | 7   | 0 | 0 | 0 | 0 |
| December 2018  | 5   | 0 | 0 | 0 | 0 |
| January 2019   | 5   | 0 | 0 | 0 | 0 |
| February 2019  | 0   | 0 | 0 | 0 | 0 |
| Grand Total    | 188 | 1 | 4 | 0 | 0 |