

**Environmental Monitoring Proposal
of 24-hr TSP Monitoring**

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

November 2015

APPROVAL SHEET

Prepared and Certified by: ET Leader (Environmental Pioneers & Solutions Limited)

Signature: 
Miss Goldie Fung

Date: 19 November 2015

TABLE OF CONTENT

	Page
1. Introduction	4
1.1. Project Background Information	4
1.2. Purpose of this Proposal	4
2. Air Quality Monitoring	5
2.1 Monitoring Parameters	5
2.2 Monitoring Equipment	5
2.3 Monitoring Methodology	6
2.4 TSP Monitoring Locations	7
2.5 Alternative Monitoring Locations for 24-hr TSP Monitoring	7
2.6 Proposed Monitoring Locations for 24-hr TSP Monitoring	8
2.7 Monitoring Frequency and Duration	8
Appendix A Monitoring Record Sheet	
Appendix B Calibration Certificate for Monitoring Equipment	
Appendix C Location of the Environmental Monitoring Stations	
Appendix D Records of Rejection of High Volume Sampler Installation	

1. Introduction

1.1. Project Background Information

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.

1.2. Purpose of this Proposal

Baseline monitoring for 1-hr TSP and noise has been carried out from 31st October 2015 to 13th November 2015. And due to the infeasibility of 24-hr TSP monitoring at the monitoring locations (AM2, AM3 and AM4) proposed in EM&A Manual. Alternative monitoring locations for the 24-hr TSP monitoring and the methodologies are proposed in this proposal. The frequency and duration for the 24-hr TSP monitoring during the pre-construction phase and construction phase of the project are also proposed.

This 24-hr TSP Monitoring Proposal is prepared for fulfilling the requirement stated in the Environmental Permit (no.: EP-455/2013) based on the EM&A Manual and reference to Annex 21 Technical Memorandum under the Environmental Impact Assessment Ordinance (EIAO-TM).

2. Air Quality Monitoring

The monitoring requirement for air quality during the pre-construction phase and construction phase is outlined in this section.

2.1 Monitoring Parameters

According to the EM&A Manual, monitoring of the Total Suspended Particulate (TSP) levels should be carried out for 1 set of 24-hr TSP at four monitoring locations.

Other relevant data such as monitoring location, time, weather conditions and any other special phenomena at the construction site will be recorded during sampling. Data record sheet is shown in **Appendix A** for reference.

24-hr TSP will be measured by the High Volume Sampler (HVS). The filter papers for each monitoring location will be sent to the accredited HOKLAS laboratory for further analysis.

2.2 Monitoring Equipment

The measurement equipment for 24-hr TSP is summarized in Table 2.1 and the calibration certificates of TE-5028A are given in **Appendix B**.

Table 2.1 Equipment List for TSP Monitoring

Equipment	Manufacturer & Model No.	Parameter	Qty
High Volume Sampler (HVS)	TE-5170	24hr-TSP	4
Calibration Kit for HVS	TE-5028A	N/A	1

2.3 Monitoring Methodology

2.3.1 Instrumentation of HVS

High Volume Samplers (HVS) completed 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).

2.3.2 Installation of HVS

- 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.

2.3.3 Collection of Wind Data and Weather Data

Data of wind speed and wind direction should be 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. Weather conditions will also be extracted from the Hong Kong Observatory.

2.4 TSP Monitoring Locations

Four monitoring locations were proposed in the EM&A Manual for the air quality monitoring, which are shown in the Table 2.2. The monitoring locations are near the residential area and school and are shown in **Appendix C**.

Table 2.2 TSP Monitoring Locations

Monitoring Location No.	TSP Monitoring Locations
AM1	Marine Department New Yau Ma Tei Public Cargo Working Area Administrative Building
AM2	Garden Building
AM3	The Cullinan I
AM4	Lai Chack Middle School

The coordination between main contractor and the representatives/ property management of premises for the installation of HVS has begun in June 2015. But the installation of HVS at AM2, AM3 and AM4 were rejected by the representatives/ property management of premises in October 2015 due to the concern of public access and the power supply of HVS. The records of rejection for each location are shown in **Appendix D**. The alternative monitoring locations for AM2, AM3 and AM4 are proposed in Section 2.5.

2.5 Alternative Monitoring Locations for 24-hr TSP Monitoring

Due to the infeasibility of 24-hr TSP monitoring at the original monitoring locations, alternative monitoring locations are proposed. According to the EM&A Manual, the following considerations are taken into account for choosing the alternative locations:

- Locate close to the major dust emission source;
- Locate close to the sensitive receptor; and
- Take into account the prevailing meteorological conditions.

The proposed alternative locations are shown in Table 2.3 and are shown in **Appendix C**.

Table 2.3 Proposed Alternative 24-hr TSP Monitoring Locations

Original Monitoring Location No.	Alternative Monitoring Location No.	Alternative Monitoring Locations
AM2	AM2-A	King George V Memorial Park
AM3	AM3-A	International Commerce Centre
AM4	AM4-A	Kowloon Park

2.6 Proposed Monitoring Locations for 24-hr TSP Monitoring

Coordination with the representatives of premises for the installation of HVS at AM1, AM2-A and AM4-A is in progress. The update status of the implementation of monitoring works is summarized in Table 2.4.

Table 2.4 Proposed Alternative 24-hr TSP Monitoring Locations

Proposed Monitoring Location No.	Proposed Monitoring Locations	Status of Implementation
AM1	Marine Department New Yau Ma Tei Public Cargo Working Area Administrative Building	Arrangement of power supply
AM2-A	King George V Memorial Park	Coordination with LCSD
AM3-A	International Commerce Centre	Ready
AM4-A	Kowloon Park	Coordination with LCSD

2.7 Monitoring Frequency and Duration

2.7.1 Baseline Monitoring

Baseline monitoring shall be conducted when no major construction or dust generating activities is carried out near the monitoring locations. Total 14 days of baseline monitoring data should be measured to determine the existing air quality in terms of 24-hr TSP with no construction activities being carried out in the project areas.

2.7.2 Impact Monitoring

TSP impact monitoring will commence once any project-related major construction works are carried and the corresponding HVS is ready for monitoring. The monitoring frequency of 24-hr TSP monitoring will be 1 set of 24-hr at least once in every six days when the highest dust impact occurs.

Before the action levels are derived from the baseline monitoring, the action level of monitoring locations of West Kowloon Cultural District (WKCD) project and the average TSP concentration monitored by Air Quality Monitoring Station at Sham Shui Po will be used for reference. The proposed action levels shown in Table 2.5 will be adopted as the temporary action levels.

Table 2.5 Proposed Action levels for 24-hr TSP

Proposed Monitoring Location No.	Representative Monitoring Location	Average TSP Concentration, $\mu\text{g}/\text{m}^3$	Action Level, $\mu\text{g}/\text{m}^3$
AM1	Air Quality Monitoring Station – Sham Shui Po	40	156
AM2-A	AM3 of WKCD – The Victoria Towers – Tower 1	34.4	152.4
AM3-A	AM1 of WKCD – International Commerce Centre	20.9	143.6
AM4-A	AM4 of WKCD – Canton Road Government Primary School	34.7	152.6

Appendix A

Monitoring Record Sheet

**1-hr / 24-hr TSP Air Quality Monitoring
Field Operation Data Log Sheet**

Station: _____

Sampling Date & Time: From: _____ (: am/pm) Collection Date: _____

Operators: _____ Weather: Sunny Cloudy Windy Rainy
Wind: Strong Mild Calm

High Volume Sampler	Model no.	
	Blower Motor Serial no.	

TSP - Total Suspended Particulates Sampler			
Equipment No.			Set Point
Slope, m			Intercept, b
	Initial, I	Final, f	
Ambient Pressure (mmHg), Pa			
Ambient Temperature (K), Ta			
Delta (in. of Water), W			
$Y = [W \times (Pa/760) \times (298/Ta)]^{1/2}$			
Standard flow, Qstd (m ³ /min) = (Y - b)*0.0283/m			
Elapsed Timer Indicator (Hours), T			
Filter Identification no.			
Weight of Filter (g)			
Weight of Particulate (g)			
Mean Standard Flow, $Qstd_{avg} = (Qstd_i + Qstd_f)/2$			
Total Time, Total Time = (Tf - Ti) x 60			
Standard Volume, $Vstd (m^3) = Qstd_{avg} \times \text{Total Time}$			
Particulate Concentration (µg/m³)			
Observed Construction Activities	Main Construction Site		
	Other Construction Site		

Remarks: _____

Conducted by: _____ Signature: _____ Date: _____

Checked by: _____ Signature: _____ Date: _____

Appendix B

Calibration Certificate for Monitoring Equipment



TISCH ENVIRONMENTAL, INC.
145 SOUTH MIAMI AVE
VILLAGE OF CLEVELAND, OH
44102
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5028A

Date - Jan 30, 2015 Rootmeter S/N 9833620 Ta (K) - 293
Operator Tisch Orifice I.D. - 2137 Pa (mm) - 762

PLATE OR VDC #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3460	4.1	1.50
2	NA	NA	1.00	1.0420	6.9	2.50
3	NA	NA	1.00	0.9580	8.1	3.00
4	NA	NA	1.00	0.8820	9.6	3.50
5	NA	NA	1.00	0.6710	16.2	6.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
1.0142	0.7535	1.2368		0.9946	0.7389	0.7595
1.0104	0.9697	1.5967		0.9909	0.9509	0.9805
1.0088	1.0530	1.7491		0.9893	1.0327	1.0740
1.0068	1.1415	1.8892		0.9873	1.1194	1.1601
0.9978	1.4871	2.4735		0.9785	1.4583	1.5189
Qstd slope (m) = 1.68658				Qa slope (m) = 1.05611		
intercept (b) = -0.03417				intercept (b) = -0.02098		
coefficient (r) = 0.99991				coefficient (r) = 0.99991		
y axis = SQRT[H2O(Pa/760) (298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol [(Pa-Diff. Hg)/760] (298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

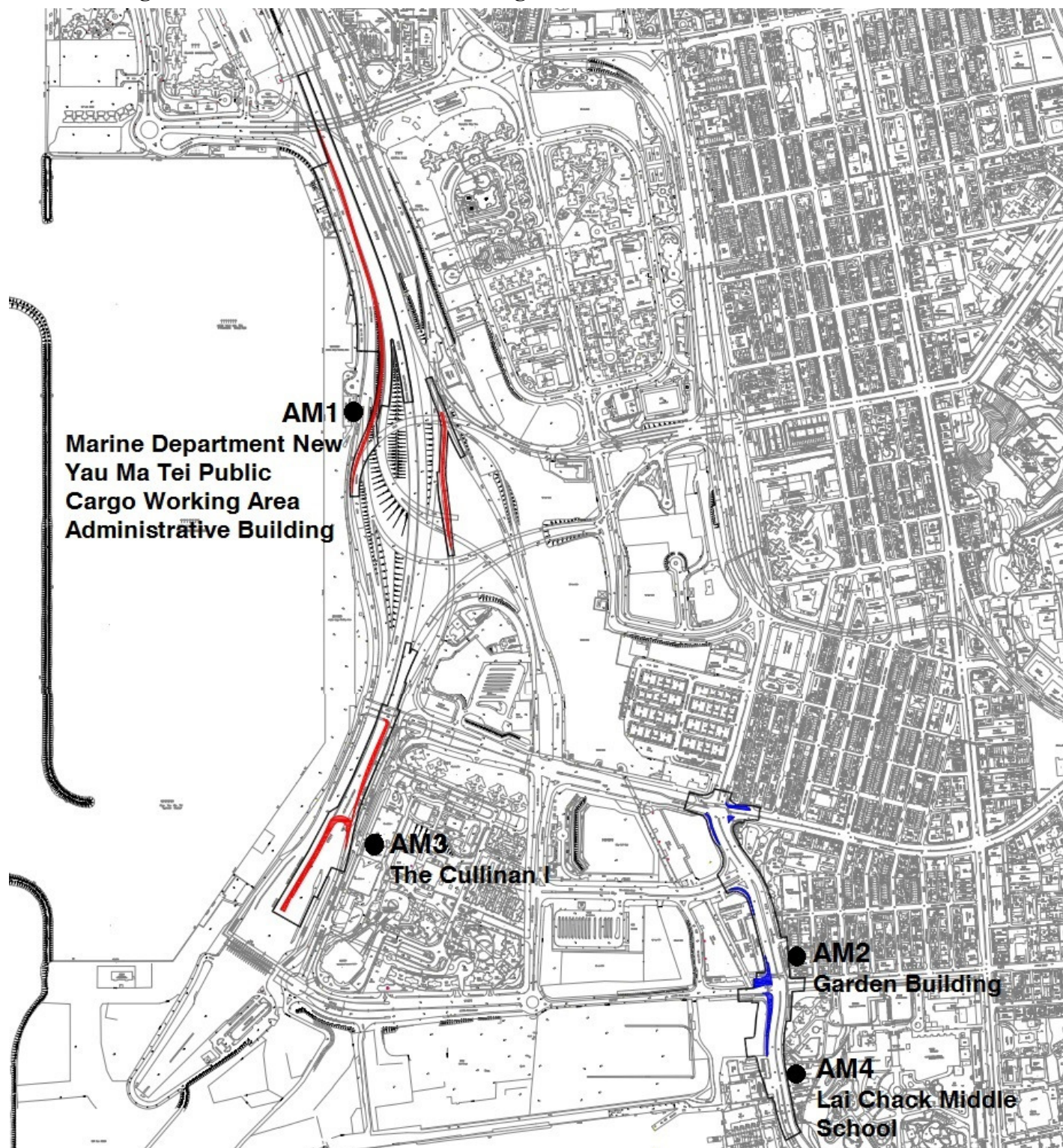
For subsequent flow rate calculations:

Qstd = 1/m{ [SQRT(H2O(Pa/760) (298/Ta))] - b}
Qa = 1/m{ [SQRT H2O(Ta/Pa)] - b}

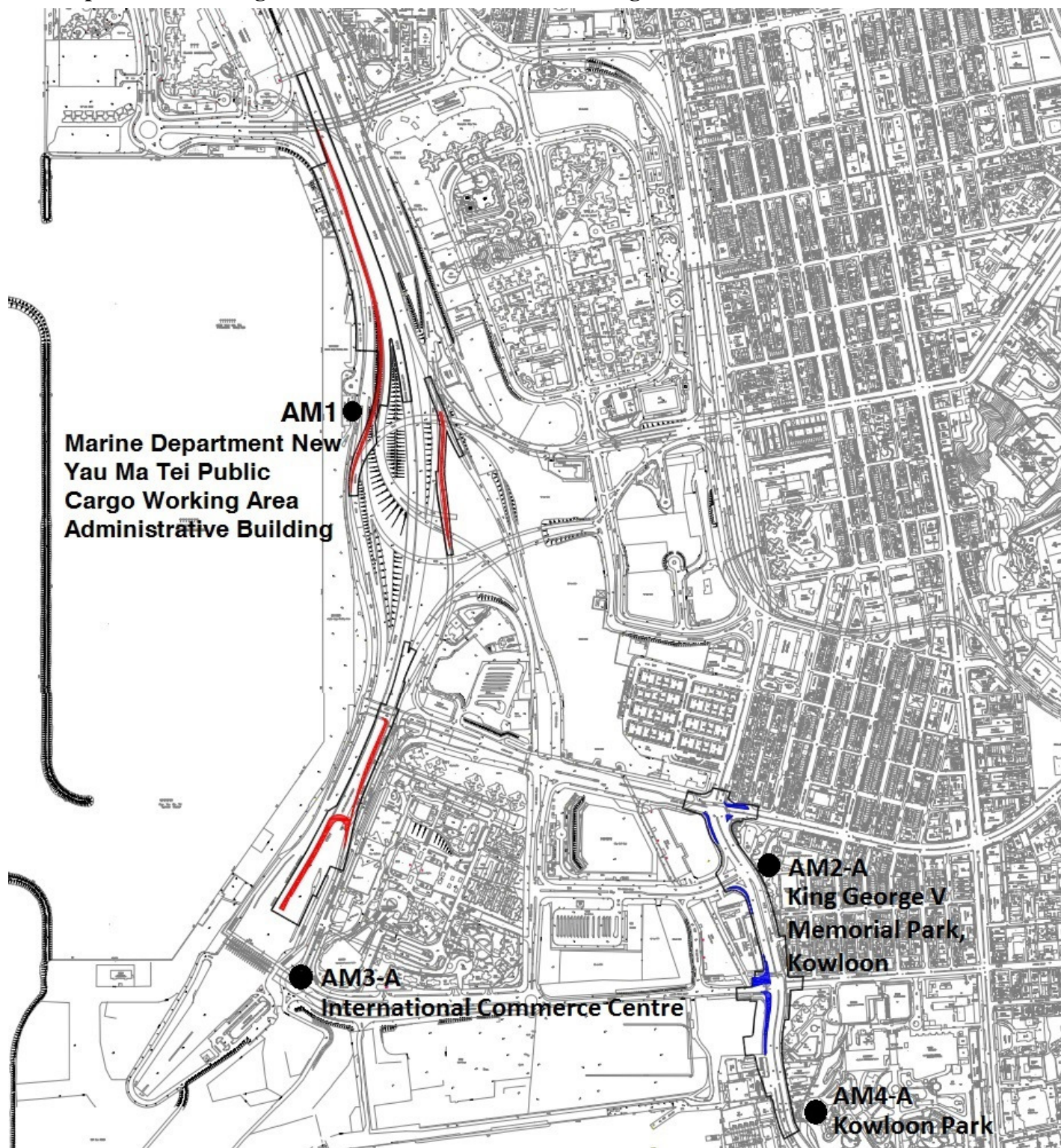
Appendix C

Location of the Environmental Monitoring Stations

Monitoring Locations for 24-hr TSP Monitoring



Proposed Monitoring Locations for 24-hr TSP Monitoring



Appendix D

Records of Rejection of High Volume Sampler Installation



惠保建築有限公司

VIBRO CONSTRUCTION CO LTD

新創建集團成員 Member of NWS Holdings

檔案編號.:S0720/VC201501-A01/JL/LC

公園大廈

By Hand

致: 業主立案法團

合約編號:HY/2013/17

西九龍填海發展道路改善工程
有關安裝空氣污染監測儀器事宜

來函目的記錄本公司曾於七月二日到訪 貴大廈商討有關安裝二十四小時空氣污染
監測儀器(HVS)事宜。得悉 貴大廈將會進行大型維修工程,因此拒絕本公司安裝空氣監
測儀器安排。

如有任何查問,請致電 6628 8983 陳小姐。

此致

公園大廈業主立案法團

惠保建築有限公司

梁金輝
地盤總管
(承建商代表)

二零一五年十月九日

cc

Parsons Brinckerhoff Asia Co., Ltd Attn: Mr. Angus Law



惠保建築有限公司
VIBRO CONSTRUCTION CO LTD

新創建集團成員 Member of NWS Holdings

檔案編號: S0763/VC201501-A01/JL/LC

天璽
柯士甸道西 1 號圓方

By Hand

致: 業主立案法團

合約編號: HY/2013/17

西九龍填海發展道路改善工程
有關安裝空氣污染監測儀器事宜

來函目的記錄本公司曾於七月二日到訪 貴樓宇商討有關安裝二十四小時空氣污染
監測儀器(HVS)事宜。得悉 貴樓宇因屬於私人地方而不便進行定期監測，因此拒絕本公
司安裝空氣監測儀器安排。

如有任何查問，請致電 6628 8983 陳小姐。

此致

天璽業主立案法團

惠保建築有限公司

梁金輝
地盤總管
(承建商代表)

二零一五年十月九日

cc

Parsons Brinckerhoff Asia Co., Ltd Attn: Mr. Angus Law
Environmental Pioneers &

Solutions Limited Attn: Ms. Goldie Fung



惠保建築有限公司
VIBRO CONSTRUCTION CO LTD

新創建集團成員 Member of NWS Holdings

檔案編號: S0719/VC201501-A01/JL/LC

麗澤中學

By Hand

致: 校長先生

合約編號: HY/2013/17

西九龍填海發展道路改善工程
有關安裝空氣污染監測儀器事宜

來函目的記錄本公司曾於七月二日到訪 貴校商討有關安裝二十四小時空氣污染監測儀器(HVS)事宜。得悉 貴校無法提供合適位置擺設監測儀器，因此拒絕本公司安裝空氣監測儀器安排。

如有任何查問，請致電 6628 8983 陳小姐。

此致

麗澤中學校長先生

惠保建築有限公司

梁金輝
地盤總管
(承建商代表)

二零一五年十月九日

cc

Parsons Brinckerhoff Asia Co., Ltd Attn: Mr. Angus Law