

## MATERIALAB CONSULTANTS LIMITED

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### Baseline Monitoring Methodology and Location

January 2016

**Client** : Civil Engineering and Development  
Department, HKSAR

**Contract No.** : KLN/2015/07

**Contract Name** : Environmental Monitoring Works for  
Contract KL/2014/03 – Kai Tak Development  
– Stage 3 Infrastructure Works for Developments  
at the Southern Part of the Former Runway

**Report No.** : 0405/15/ED/0203F

EP-337/2009 New Distributor Roads Serving the Planned Kai Tak  
Development Area


EP-339/2009/A Decommissioning of the Remaining Parts (Ex-GFS  
Building, Radar Station and Hong Kong Aviation Club)  
of the former Kai Tak Airport

EP-451/2013 Trunk Road T2

Prepared by: Cyrus C.Y. Lai

Reviewed by: Vincent C. T. Chan

Certified by:

  
Colin K. L. Yung  
Environmental Team Leader

Ref.: CEDKTDS3EM00\_0\_0017L.16

15 January 2016

Hyder-Meinhardt Joint Venture  
Site Office  
11 Shing Kai Road  
Kowloon Bay  
Kowloon

By E-mail and Fax (2983 6214)

Attention: Mr. Pat T. H. Lam

Dear Mr. Lam,

**Re: Contract No. KL/2014/03 – Kai Tak Development – Stage 3 Infrastructure Works for Developments at the Southern Part of the Former Runway Baseline Monitoring Methodology and Location (Report No. 0405/15/ED/0203F)**

Reference is made to the Environmental Team's submission of the captioned *Baseline Monitoring Methodology and Location* (including proposal of alternative monitoring locations) (Report No. 0405/15/ED/0203F) we received by e-mail on 14 Jan. 2016.

Please be informed that we have no adverse comment on your proposed alternative monitoring locations. We hereby verify the captioned submission according to Condition 3.1 of EP-451/2013. (No conditions of EP-337/2009 and EP-339/2009/A are relevant to this submission.)

Thank you for your attention. Please do not hesitate to contact the undersigned should you have any queries.

Yours sincerely,  
For and on behalf of  
Ramboll Environ Hong Kong Limited



F. C. Tsang  
Independent Environmental Checker

c.c. CEDD	Attn.: Mr. S. K. Ng	Fax: 2369 4980
HMJV	Attn.: Mr. Sam K. P. Lee	Fax: 2540 1580
MaterialLab	Attn.: Mr. Colin K. L. Yung	Fax: 2450 8032

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## 1. Introduction

The Kai Tak Development is located in the south-eastern part of Kowloon Peninsula of the HKSAR, comprising the apron and runway areas of the former Kai Tak Airport and existing waterfront areas at To Kwa Wan, Ma Tau Kok, Kowloon Bay, Kwun Tong and Cha Kwo Ling.

Contract No, KL/2014/03 is the works package to construct an approximately 420m long supporting underground structure (SUS) underneath Shing Cheong Road and Cheung Yip Street. The EM&A programme under this Contract is governed by three EPs (EP-337/2009, EP-339/2009/A and EP-451/2013) and two EM&A Manuals (AEIAR-130/2009 and AEIAR-174/2013). The Works to be executed under this Contract and corresponding EPs include but not be limited to the following main items:

### **EP-451/2013 – Trunk Road T2**

- (i) Construction of approximately 420m long supporting underground structure (SUS) including diaphragm walls, barrettes, piled foundation, top and bottom slabs, end wall and adits underneath Shing Cheong Road and Cheung Yip Street;

### **EP-337/2009 – New Distributor Roads Serving the Planned Kai Tak Development**

- (ii) Widening and re-alignment of Cheung Yip Street of approximately 330m long and associated footpaths;
- (iii) Demolition, reconstruction and widening of Shing Cheong Road of approximately 410m long and associated footpaths;
- (iv) Construction of drainage outfall and modification of existing seawall;
- (v) Construction of ancillary works including surface drainage, sewerage, water, fire fighting, street lighting, street furniture, road marking, road signage, utilities and services, irrigation and landscape works.

### **EP-339/2009/A – Decommissioning of the Remaining Parts (Ex-GFS Building, Radar Station and Hong Kong Aviation Club) of the former Kai Tak Airport**

- (vi) Demolition of RADAR Tower and guard house;

### **Other works not covered by any EP**

- (vii) Construction of two subways between Phase II of New Acute Hospital (Site A) and Hong Kong Children's Hospital (Site C), and between Phase I of New Acute Hospital (Site B) and Site C;
- (viii) Construction of District Cooling System (DCS) along Cheung Yip Street and Shing Cheong Road

The project proponent was the Civil Engineering and Development Department, HKSAR (CEDD). Hyder Meinhardt Joint Venture (HMJV) was commissioned by CEDD as the Engineer for the Project. Ramboll Environ was commissioned as the Independent Environmental Checker (IEC). China Road and Bridge Corporation (Hong Kong) (CRBC) was appointed as the main contractor for the construction works under the contract KL/2014/03. Materialab Consultants Limited (MCL) was appointed as the Environmental Team (ET) by CEDD to implement the EM&A programme for the Project. The location and boundary of the site is shown in **Figure 1**.

Relevant submissions prior to project commencement as required by the three EPs and their respective current status are summarized in **Table 1.1**.

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**Table 1.1 EPs Submissions prior to commencement of construction covered by this Contract**

<u>Documents</u>	<u>EP Conditions</u>	<u>Submission Schedule</u>	<u>Current Status</u>
Management Organization of Main Construction Companies	EP-337/2009 Condition 2.3	No later than 1 week before the commencement of construction	Submitted to EPD on 18 December 2015 under HMJV letter ref. KL/2014/03/M45/100/0094
	EP-339/2009/A Condition 2.4	No later than one week before the commencement of the decommissioning works of the Project	
	EP-451/2013 Condition 2.3	No later than 1 month before the commencement of construction	
Design Drawing of the Project	EP-337/2009 Condition 2.4	No later than 1 month before construction commencement	Submitted to EPD on 18 December 2015 under HMJV letter ref. KL/2014/03/M45/100/0094
	EP-339/2009/A Condition 2.5	No later than 1 month before commencement of decommissioning works of the Project	
	EP-451/2013 Condition 2.4	No later than 1 month before the commencement of the construction	
Landscape Mitigation Plan(s)	EP-337/2009 Condition 2.11	At least 1 month before the commencement of construction of each of the distributor roads covered under the EP	Submitted to EPD on 18 December 2015 under HMJV letter ref. KL/2014/03/M45/100/0094
	EP-451/2013 Condition 2.5	At least 1 month before the commencement of construction of the corresponding component(s) of the Project	
Submission for Mitigating Land Contamination Impact ● for Works Area 2; ● for location EH01 and EH03	EP451/2013 Condition 2.10	No later than 2 months after the completion of the supplementary works, CAP shall be submitted; If remediation required, RR shall be submitted no later than 1 month after the completion of the remediation works.	Submitted to EPD on 18 December 2015 under HMJV letter ref. KL/2014/03/M45/100/0092
Baseline Monitoring Report	EP-337/2009 Condition 3.2	at least 1 month before the construction commencement	Baseline Monitoring Report will be submitted after baseline monitoring.
	EP-339/2009/A Condition 3.2	at least 1 month before construction commencement	
	EP-451/2013 Condition 3.3	At least 2 weeks before construction commencement	

## **2. Monitoring Methodology for Air Quality and Noise Monitoring**

### **2.1 Air Quality Monitoring Methodology**

Baseline air quality monitoring methodology, equipment, frequency, duration, calibration requirement, AL/LL determination are conducted according to Section 2.2.1, 2.2.3 and 2.2.6 of AEIAR-174/2013 T2 EM&A Manual and Section 2.2 of AEIAR-130/2009 KTD EM&A Manual. Detail of baseline air quality monitoring methodology are provided in **Appendix A** for reference.

### **2.2 Noise Monitoring Methodology**

Baseline noise monitoring methodology, equipment, frequency, duration, calibration requirement, AL/LL determination are conducted according to Section 3.5.1 and 3.5.2 of AEIAR-174/2013 T2 EM&A Manual and Section 2.3 of AEIAR-130/2009 KTD EM&A Manual. Detail of baseline noise monitoring methodology are provided in **Appendix B** for reference.

### 3 Monitoring Locations

#### 3.1 Air Quality and Noise Monitoring Locations covered under the EM&A Manuals

Under the T2 EM&A Manual (AEIAR-174/2013), 3 air quality and noise monitoring locations are covered by this Contract within the South Apron Area of Former Kai Tak Airport, they are shown in **Figure 2**. The other 2 air quality and noise monitoring locations, which are identified in Cha Kwo Ling area, are farther than 500m away from the site boundary and thus not covered by this Contract. The monitoring works in Cha Kwo Ling area are covered by other Contract(s) respectively.

Under the KTD EM&A Manual (AEIAR-130/2009), 6 air quality monitoring locations and 10 noise monitoring locations are identified, all these monitoring locations are farther than 500m away from the site boundary and thus not covered by this Contract. They are monitored under other Contracts (KL/2010/03, KL/2012/02, KL/2012/03) respectively.

The 2 monitoring locations in Cha Kwo Ling area under T2 EM&A Manual, and the monitoring locations under KTD EM&A Manual that are not included in Contract No. KL/2014/03 are shown in **Figure 3**.

#### 3.2 Original Noise and TSP Monitoring Locations covered under this Contract

Noise and TSP monitoring should be conducted at the designated monitoring stations during the construction of Works Contract KL/2014/03. **Table 3.1** shows the designated air quality and noise monitoring locations identified in the T2 EM&A Manual (AEIAR-174/2013).

**Table 3.1 Original Air Quality and Noise Monitoring Stations**

SR and NSR ID	Location
KTD 1	Centre of Excellence in Paediatrics
KTD 2	G/IC Zone next to Kwun Tong Bypass (Future Hospital at Site 3C1)
KER 1	Future Residential Development at Kerry Godown

Site visit was conducted at the designated monitoring location KTD 1, KTD 2 and KER 1 in November 2015. Site conditions was evaluated and it was found that all of them are future sensitive receivers, their current conditions are summarized in **Table 3.2**.

**Table 3.2 Current Conditions of Original Monitoring Locations**

ASR and NSR ID	Location	Current Conditions
KTD 1	Centre of Excellence in Paediatrics	Renamed as Children’s Hospital, currently under construction
KTD 2	G/IC Zone next to Kwun Tong Bypass (Future Hospital at Site 3C1)	Currently no work in progress
KER 1	Future Residential Development at Kerry Godown	Operates as a warehouse for dangerous goods.

#### 3.3 Alternative Monitoring Locations

When alternative air quality monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

- (i) At the site boundary or such locations close to the major dust emission source;

- (ii) Close to the ASRs;
- (iii) Proper position/sitting and orientation of the monitoring equipment; and
- (iv) Take into account the prevailing meteorological conditions.

In addition, with reference to T2 EM&A Manual (AEIAR-174/2013) Section 3.3.1.2, when alternative noise monitoring locations are proposed, they should be chosen based on the following criteria:

- (i) The monitoring locations close to the major construction works activities that are likely to have noise impacts;
- (ii) The monitoring close to the NSRs as defined in the EIAO-TM; and
- (iii) The assurance of the minimal disturbance and working under a safe condition to the occupants during the monitoring in the vicinity of the NSRs.

In view of the above selection criteria, the proposed alternative monitoring location and reason of selection are listed in **Table 3.3**.



**Table 3.3 Alternative Air Quality and Noise Monitoring Locations**

Original Monitoring Station ID	Original Monitoring Location in T2 EM&A Manual (AEIAR-174/2013)	Alternative Monitoring Station ID	Alternative Monitoring Location	Reasons
KTD 1	Centre of Excellence in Paediatrics (Children's Hospital)	KTD 1a	Centre of Excellence in Paediatrics (Children's Hospital)	<ol style="list-style-type: none"> <li>1. The original monitoring location situates at the site entrance of the Children's Hospital construction site and would be heavily affected by the construction works and associated activities of the hospital.</li> <li>2. The alternative location is at the site boundary of this contract and close to the future Children's Hospital, the interference from existing non-project related construction activities is minimized. Thus it is a suitable alternative noise and TSP monitoring location.</li> </ol>
KTD 2	G/IC Zone next to Kwun Tong Bypass (Future Hospital at Site 3C1)	KTD 2a	G/IC Zone next to Kwun Tong Bypass (Future Hospital at Site 3C1)	<ol style="list-style-type: none"> <li>1. The original monitoring location is located at the site of future hospital, the construction of this future hospital is planned to commence in later stage. Considering its close proximity to the future construction site, non-project related dust and noise interference will be anticipated.</li> <li>2. The alternative location is at the site boundary of the future hospital, and interference should be minimized. Thus it is considered as a suitable monitoring location.</li> </ol>
KER 1	Future Residential Development at Kerry Godown	KER 1a	Site Boundary at Cheung Yip Street	<ol style="list-style-type: none"> <li>1. The original monitoring location is in operation as a warehouse for dangerous goods. Warehouse activities, including frequent traffic of goods vehicles and loading and unloading of goods would generate non-project related dust and noise interference to the monitoring. Also, as the site may develop into residential building, any demolition/construction works involved will also generate dust and noise impact which are not related to this project.</li> <li>2. The alternative monitoring location situates at the site boundary of this contract and close to the alignment of the Trunk Road T2. It is also in close proximity and representative to the existing Kerry Godown (future sensitive receiver), thus, it is a suitable monitoring location.</li> </ol>

Note:

Façade noise measurement will be conducted for KTD 1a;

Free field noise measurement will be conducted for KTD 2a and KER 1a.

The proposed alternative monitoring locations satisfy the selection criteria as stated above, that the locations are situated at the site boundary and close to the sensitive receivers. The monitoring equipment will also be properly oriented.

The original monitoring locations and the proposed alternative monitoring locations are indicated in **Figure 2**, photo illustrations of the monitoring locations are shown in **Appendix E**.

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With reference to the approved T2 EM&A Manual (AEIAR-174/2013), notes regarding any non-project related construction activities in the vicinity of monitoring stations or significant adjacent dust producing sources should be recorded through the baseline monitoring and the source and location of such activities should be recorded.

Based on the selection criteria and site observations, the proposed alternative monitoring locations are considered as suitable monitoring locations for air quality and noise monitoring.

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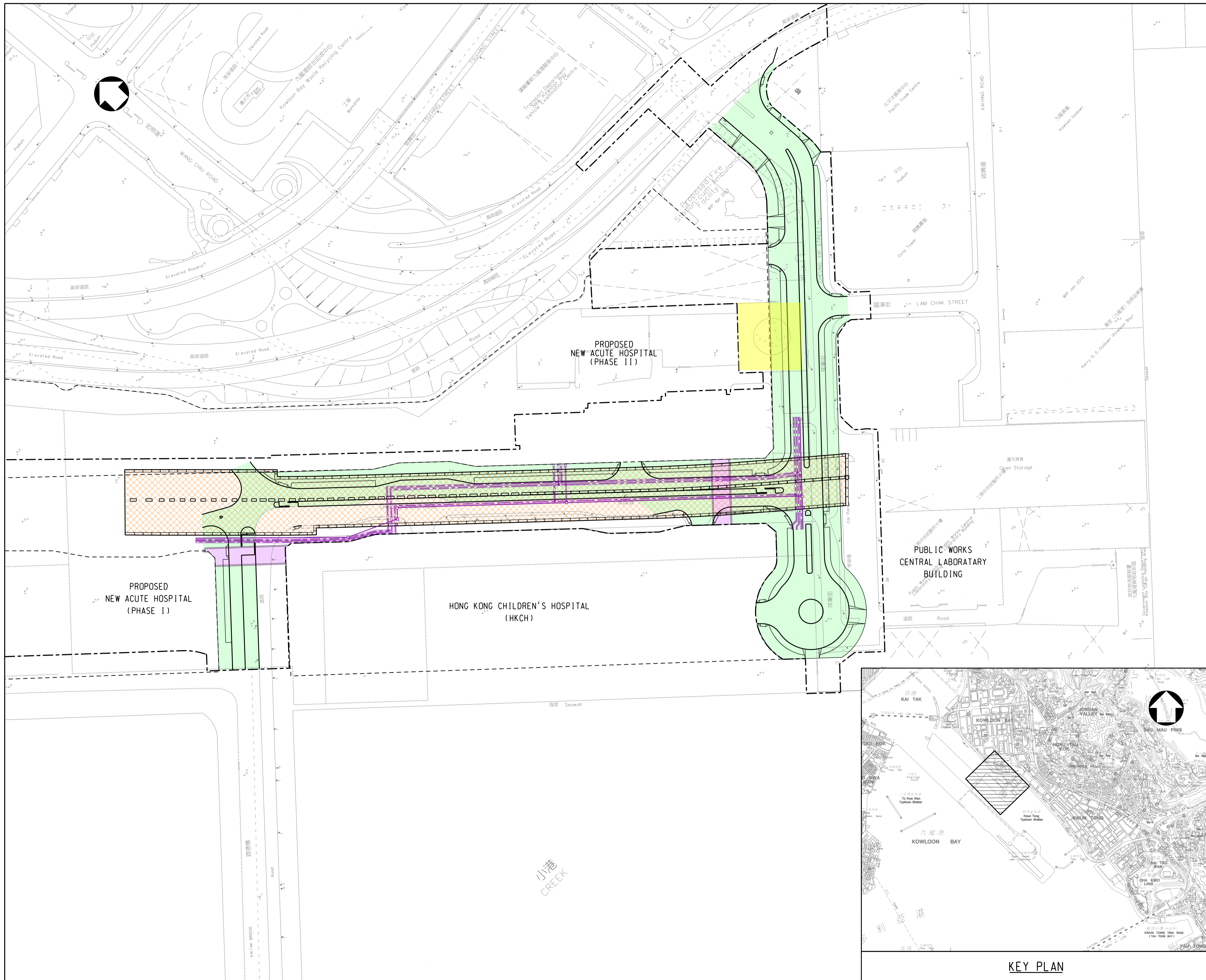
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### **Figure 1**

#### **Project Location Plan**



- LEGENDS:**
- SITE BOUNDARY
  - HOSPITAL SITE BOUNDARY
  - PROPOSED SUPPORTING UNDERGROUND STRUCTURE
  - PROPOSED SUBWAYS
  - PROPOSED ROADWORKS
  - PROPOSED DISTRICT COOLING SYSTEM
  - DEMOLITION OF RADAR TOWER

Rev.	Date	Drawn	Description	Checked	Approved



CLIENT



土木工程拓展署  
Civil Engineering and  
Development Department  
九龍拓展處  
Kowloon Development Office

PROJECT

CONTRACT NO. KL/2014/03  
KAI TAK DEVELOPMENT - STAGE 3  
INFRASTRUCTURE WORKS FOR  
DEVELOPMENTS AT THE SOUTHERN PART OF  
THE FORMER RUNWAY

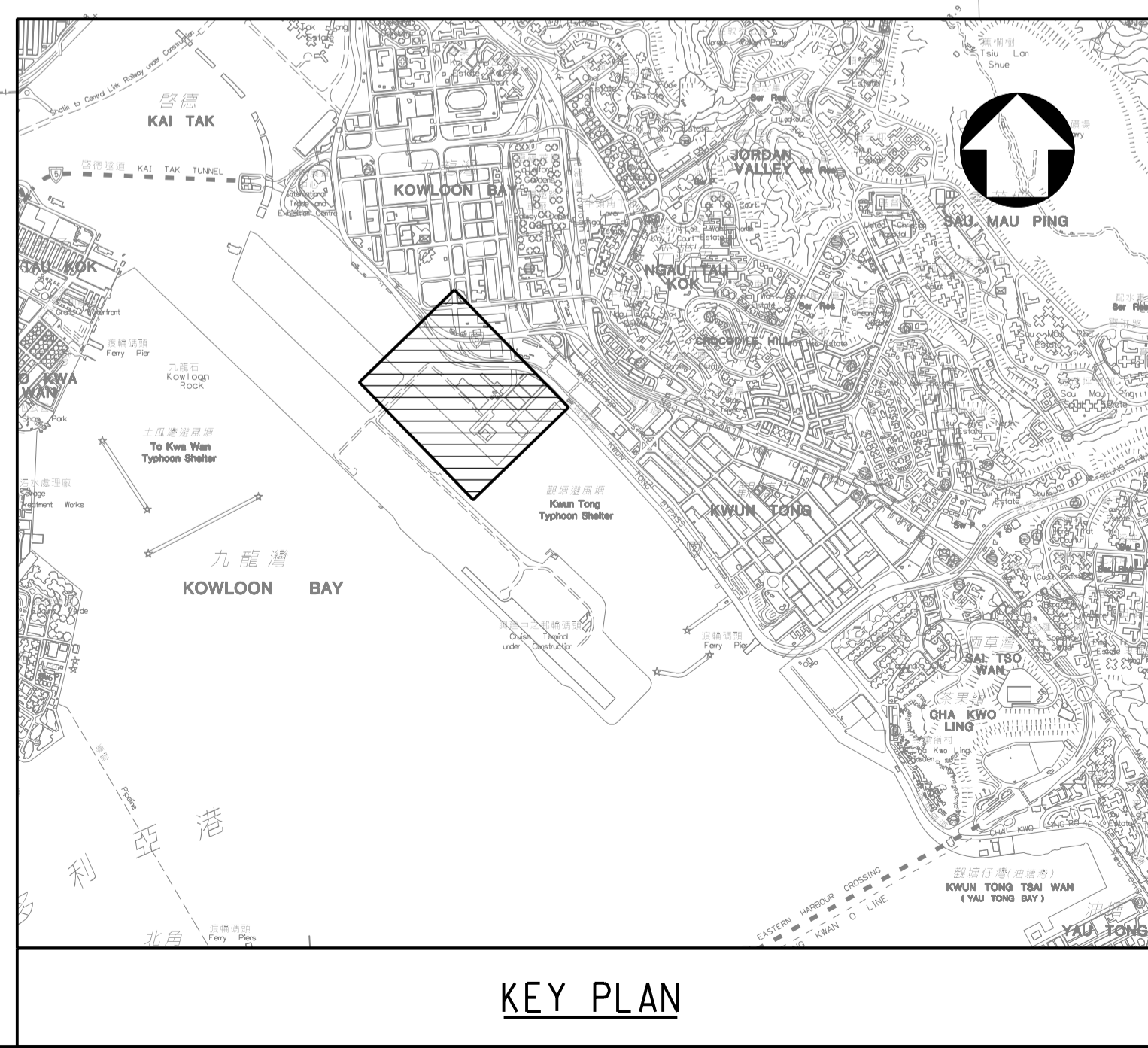
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GENERAL LAYOUT PLAN

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Drawing No. **FIGURE 1.0**

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KEY PLAN

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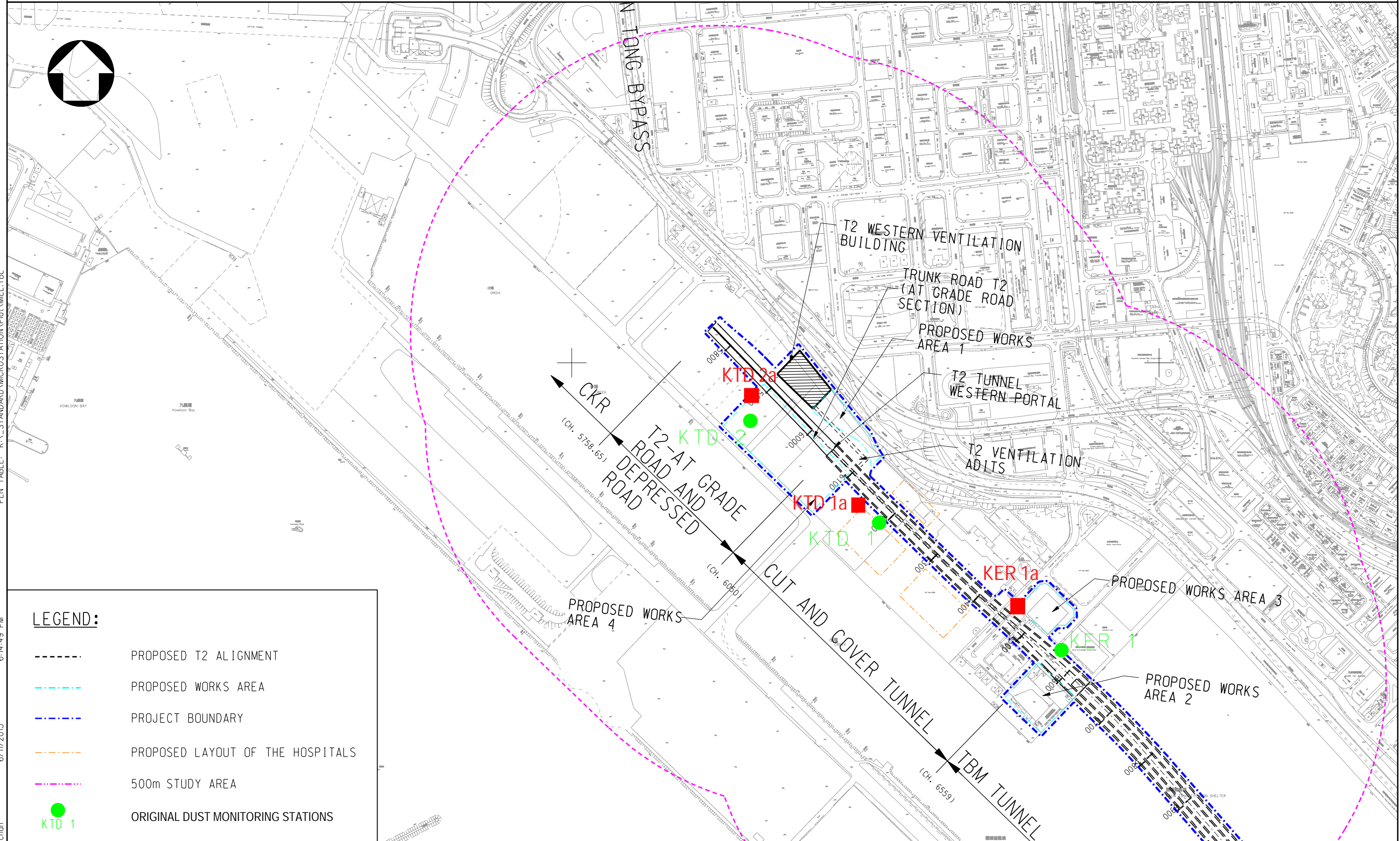
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### **Figure 2**

#### **Proposed Air Quality and Noise Monitoring Locations**

**EM&A Manual Figure 2.1a (revised) – Dust Monitoring Locations**  
**EM&A Manual Figure 3.1a (revised) – Noise Monitoring Locations**



**LEGEND:**

- PROPOSED T2 ALIGNMENT
- PROPOSED WORKS AREA
- PROJECT BOUNDARY
- PROPOSED LAYOUT OF THE HOSPITALS
- 500m STUDY AREA
- ORIGINAL DUST MONITORING STATIONS
- PROPOSED DUST MONITORING STATIONS

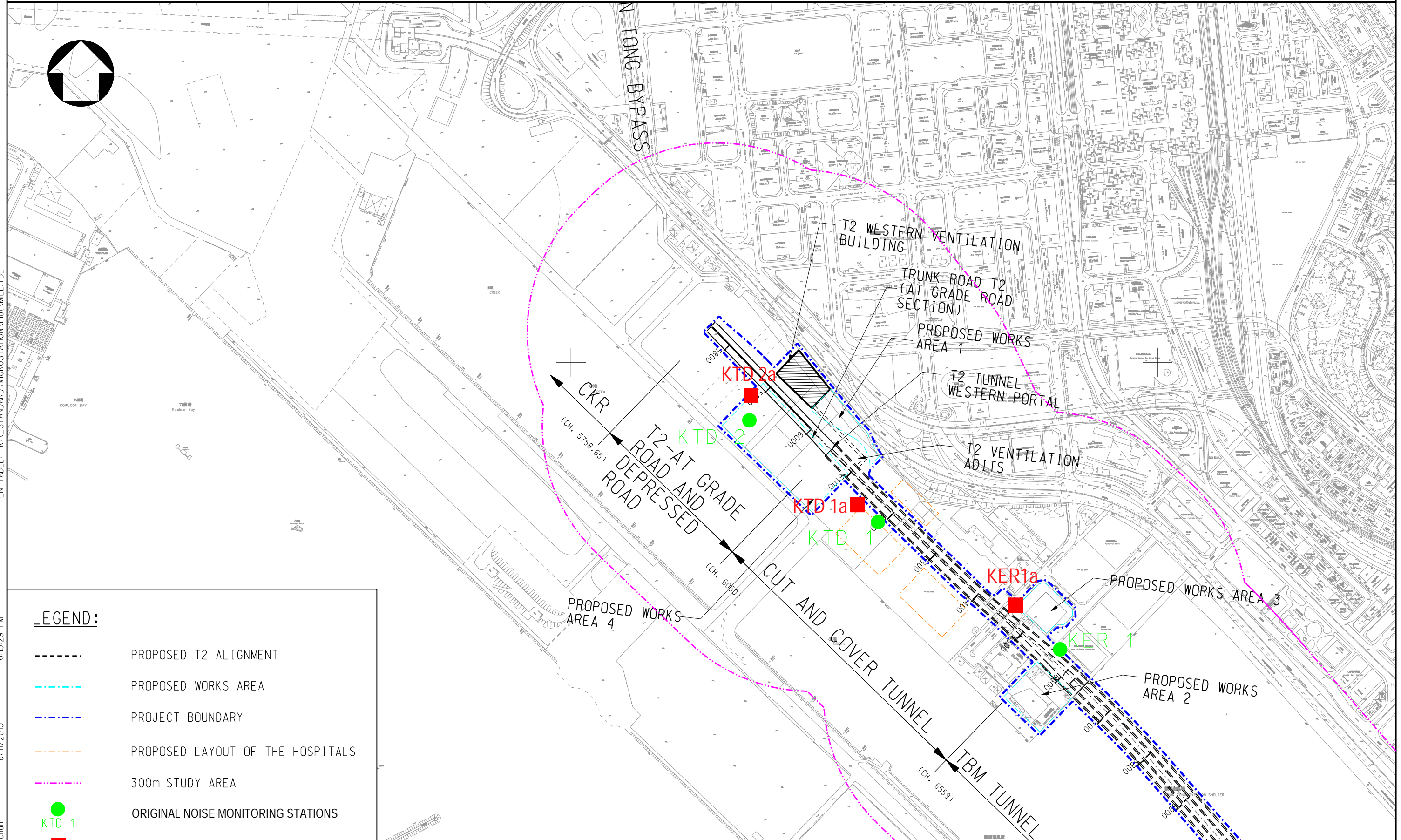
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Drawing title	IDENTIFIED DUST MONITORING STATIONS AT SOUTH APRON OF FORMER KAI TAK AIRPORT
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Original Size	A3	Scale	1 : 6000	Date	30/01/2012	
© Copyright reserved		File name	Drawing No. FIGURE 2.1a(revised)			
					Rev.	--



**LEGEND:**

-  PROPOSED T2 ALIGNMENT
-  PROPOSED WORKS AREA
-  PROJECT BOUNDARY
-  PROPOSED LAYOUT OF THE HOSPITALS
-  300m STUDY AREA
-  ORIGINAL NOISE MONITORING STATIONS
-  PROPOSED NOISE MONITORING STATIONS

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		Drawing No.	FIGURE 3.1a (revised)		
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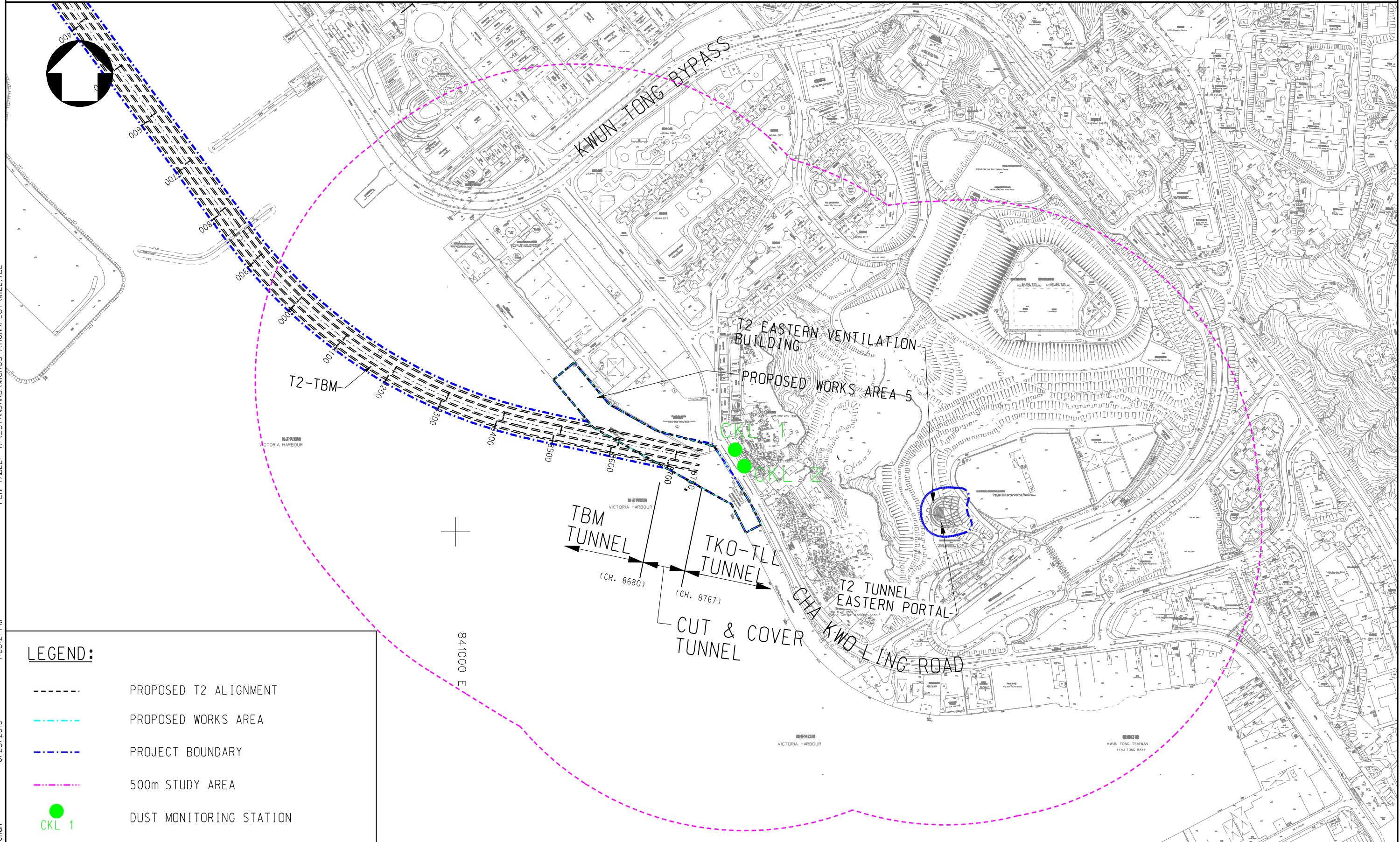
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### **Figure 3**






**Monitoring Locations Covered by T2 EM&A Manual and KTD EM&A Manual  
But not under Contract KL/2014/03**

**T2 EM&A Manual Figure 2.1b (revised) – Dust Monitoring Locations  
T2 EM&A Manual Figure 3.1b (revised) – Noise Monitoring Locations  
KTD EM&A Manual Figure 2.1 – Air Quality Monitoring Stations  
KTD EM&A Manual Figure 2.2 – Noise Monitoring Stations**



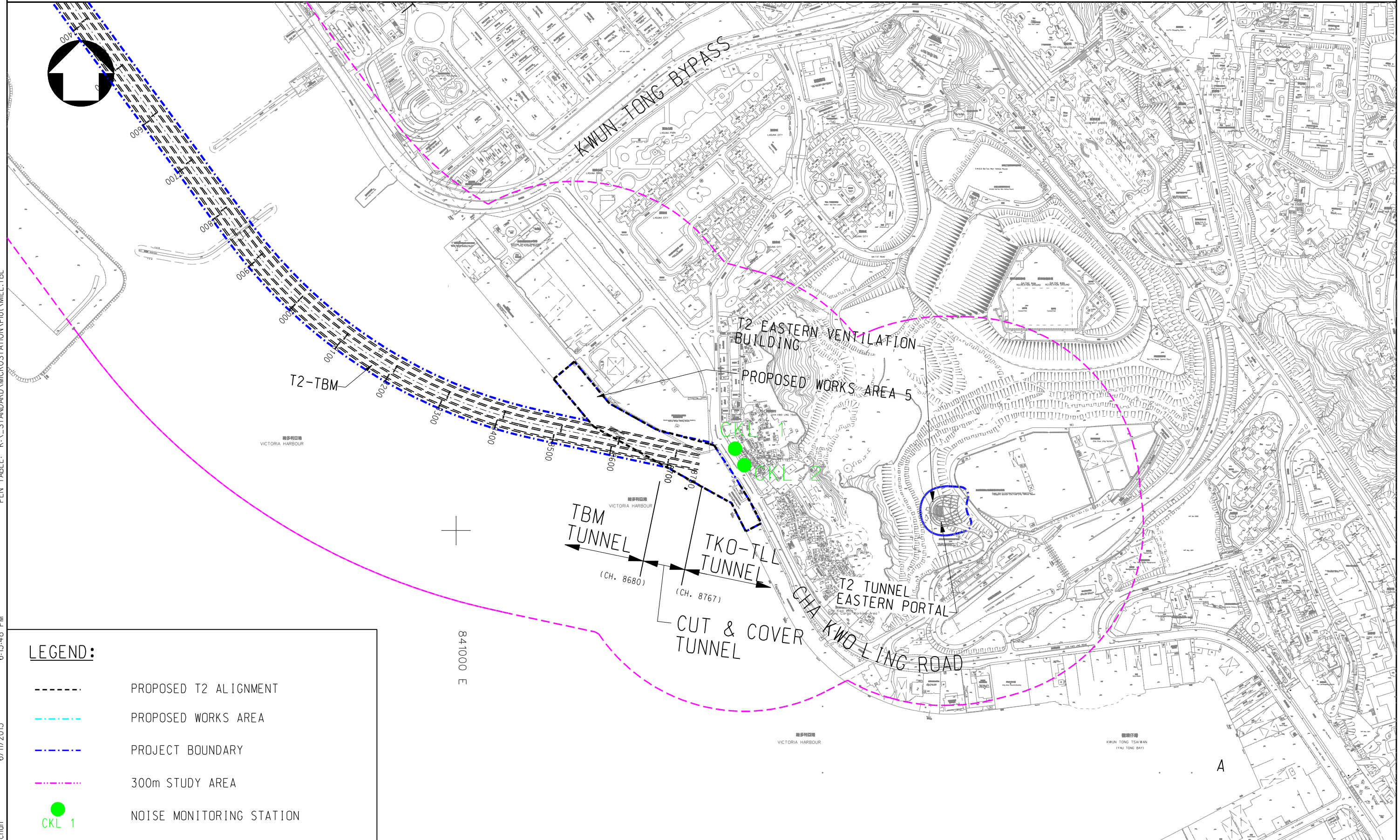


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




	PROPOSED T2 ALIGNMENT
	PROPOSED WORKS AREA
	PROJECT BOUNDARY
	500m STUDY AREA
	DUST MONITORING STATION
<b>CKL 1</b>	

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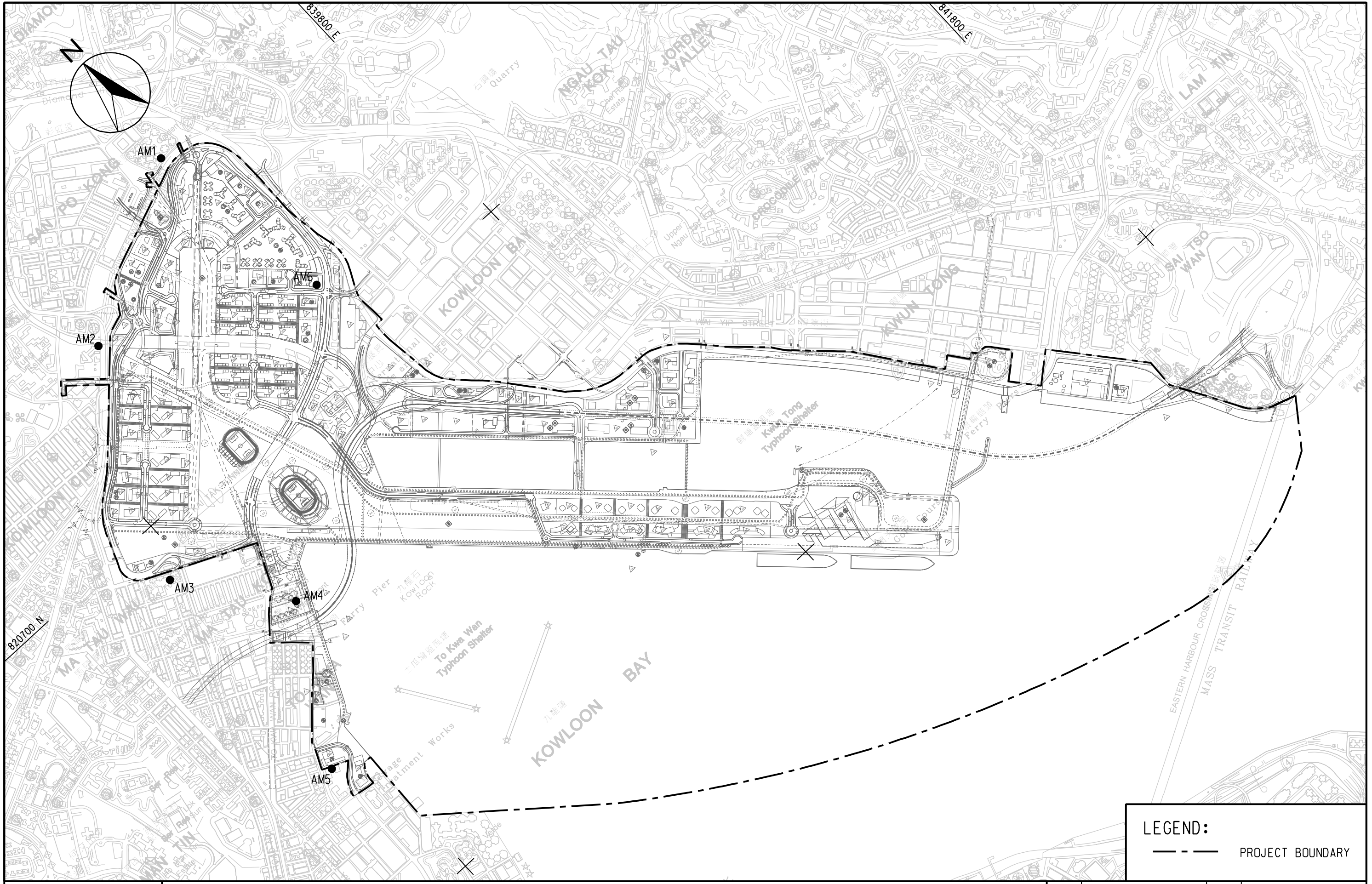


**LEGEND:**

	PROPOSED T2 ALIGNMENT
	PROPOSED WORKS AREA
	PROJECT BOUNDARY
	300m STUDY AREA
	NOISE MONITORING STATION
<b>CKL 1</b>	

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<b>IDENTIFIED NOISE MONITORING STATIONS AT          CHA KWO LING</b>		© Copyright reserved		File name	Drawing No. <b>FIGURE 3.1b</b>		
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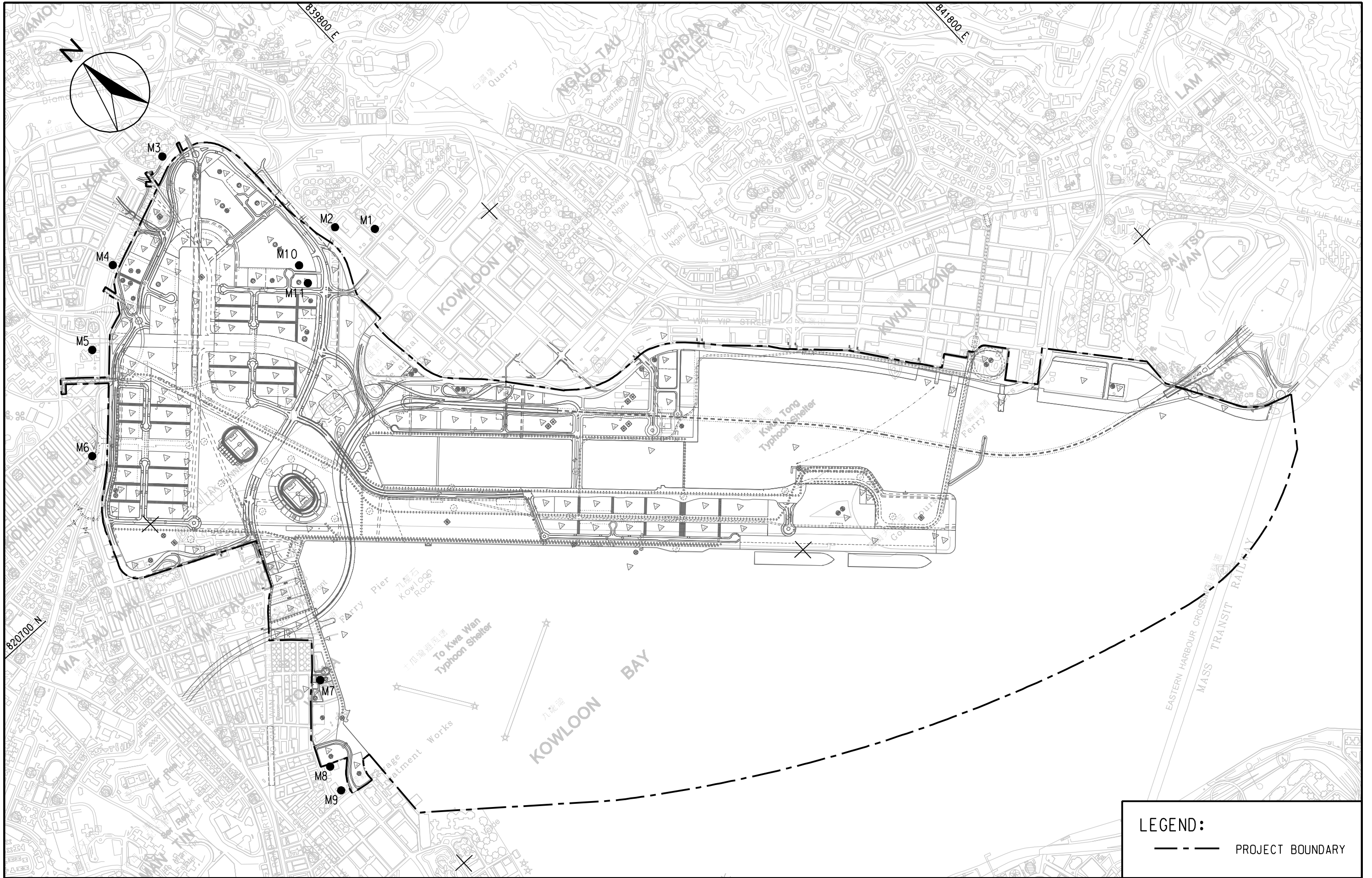
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AGREEMENT NO. CE 35/2006 (CE)  
KAI TAK DEVELOPMENT ENGINEERING STUDY CUM DESIGN AND  
CONSTRUCTION OF ADVANCE WORKS-INVESTIGATION, DESIGN AND CONSTRUCTION  
**LOCATIONS OF AIR QUALITY MONITORING STATIONS**

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**LOCATIONS OF NOISE MONITORING STATIONS**

SCALE	A3 1:15000	DATE	JAN. 2008
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### **Appendix A**

#### **Monitoring Methodology for 1-hour and 24-hour TSP Monitoring**

**Appendix A Monitoring Methodology for 1-hour and 24-hour TSP Monitoring**

**A.1 Monitoring Requirement**

The Baseline Air Quality Monitoring will be conducted to determine the ambient 1-hour and 24-hour average TSP levels at the monitoring locations prior to the commencement of the construction works. It will be carried out for a continuous period of at least two weeks with the 24-hour and three sets of 1-hour ambient measurements taken daily at all of the designated monitoring locations.

**A.2 Monitoring Equipment**

The 24-hour TSP air quality monitoring will be performed using High Volume Air Samplers (HVS) located at each of the designated monitoring station. While 1-hour TSP air quality monitoring will be performed using portable TSP monitors.

**Table A.2** summarizes the equipment used in air quality monitoring.

**Table A.2** Air Quality Monitoring Equipment

Item	Brand	Model	Equipment	Serial Number
1	Tisch	TE-5170 (TSP)	High Volume Sampler	
		TE-300-310X	- Mass Flow Controller	2037
		TE-5005X	- Blower Motor Assembly	3482
		TE-5007X	- Mechanical Timer	4488
		TE-5009X	- Continuous Flow Recorder	4371
2	Tisch	TE-5170 (TSP)	High Volume Sampler	
		TE-300-310X	- Mass Flow Controller	2043
		TE-5005X	- Blower Motor Assembly	3478
		TE-5007X	- Mechanical Timer	4492
		TE-5009X	- Continuous Flow Recorder	4377
3	Tisch	TE-5170 (TSP)	High Volume Sampler	
		TE-300-310X	- Mass Flow Controller	2618
		TE-5005X	- Blower Motor Assembly	3838
		G3031	- Mechanical Timer	2251
		G1051	- Continuous Flow Recorder	2307
4	Tisch	TE-5025A	HVS Sampler Calibrator	0438320 / 2154
5	Sibata	Model LD-3B	Sibata Portable TSP Monitors	567195
6	Sibata	Model LD-3B	Sibata Portable TSP Monitors	567191

Note:

Equipment may be subject to change according to actual conditions during measurement.

**A.3 Baseline Monitoring Parameters, Frequency and Duration**

**Table A.3** summarizes the baseline monitoring parameters, monitoring duration and frequencies of air quality monitoring.

**Table A.3** Baseline Monitoring Parameters, Duration and Frequency of Air Quality Monitoring

Parameter	Duration	Frequency
1-hr TSP	14 consecutive days	1 hour x 3 per day
24-hr TSP	14 consecutive days	24 hours per day

## A.4 Monitoring Methodology

### A.4.1 24-hour TSP air quality monitoring

#### HVS Installation

The following guidelines shall be adopted during the installation of HVS:

- Sufficient support is provided to secure the samplers against gusty wind.
- No two samplers are placed less than 2 meters apart.
- The distance between the sampler and an obstacle, such as buildings, is at least twice the height that the obstacle protrudes above the sampler.
- A minimum of 2 meters of separation from walls, parapets and penthouses is required for rooftop samples.
- A minimum of 2 meters separation from any supporting structure, measured horizontally is required.
- No furnaces or incineration flues are nearby.
- Airflow around the samplers is unrestricted.
- The samplers are more than 20 meters from the drip line.
- Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring.

#### Filters Preparation

Fiberglass filters (G810) shall be used (Note: these filters have a collection efficiency of larger than 99% for particles of 0.3 mm diameter). A HOKLAS accredited laboratory is responsible for the preparation of 24-hr conditioned and pre-weighed filter papers for monitoring team.

All filters are equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature is around 25°C and not variable by more than  $\pm 3^\circ\text{C}$ ; the relative humidity (RH) is  $< 50\%$  and not variable by more than  $\pm 5\%$ . A convenient working RH is 40%.

#### Operating / Analytical Procedures

Operating / analytical procedures for the air quality monitoring are highlighted as follows:

- Prior to the commencement of the dust sampling, the flow rate of the HVS are properly set (between 1.1 m<sup>3</sup>/min. and 1.4 m<sup>3</sup>/min.) in accordance with the manufacturer's instruction to within the range recommended in USEPA Standard Title 40, CFR Part 50. The flow rate shall be indicated on the flow rate chart.
- The power supply shall be checked to ensure the samplers worked properly.
- On sampling, the samplers shall be operated for 5 minutes to establish thermal equilibrium before placing any filter media at the designated air quality monitoring station.
- The filter holding frame is then removed by loosening the four nuts and carefully a weighted and conditioned filter is centered with the stamped number upwards, on a supporting screen.
- The filter shall be aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter. Then the filter holding frame is tightened to the filter holder with swing bolts. The applied pressure should be sufficient to avoid air leakage at the edges.
- The shelter lid shall be closed and secured with the aluminum strip.

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The logo for MaterialLab, featuring the word "MaterialLab" in a bold, black, sans-serif font. The text is centered within a thick, black horizontal bar that extends slightly beyond the text on both sides.

- The timer is then programmed. Information shall be recorded on the record sheet, which included the starting time, the weather condition and the filter number (the initial weight of the filter paper can be found out by using the filter number).
- After sampling, the filter shall be removed and sent to laboratory for weighing. The elapsed time is also recorded.
- Before weighing, all filters are equilibrated in a conditioning environment for 24 hours. The conditioning environment temperature should be between 25°C and 30°C and not vary by more than  $\pm 3^\circ\text{C}$ ; the relative humidity (RH) should be  $< 50\%$  and not vary by more than  $\pm 5\%$ . A convenient working RH is 40%. Weighing results are returned to MCL for further analysis of TSP concentrations collected by each filter.

### A.4.2 1-hour TSP air quality monitoring

#### Operating / Analytical Procedures

The measuring procedures of the 1-hr dust meter are in accordance with the Manufacturer's instruction Manual as follows:

- Pull up the air sampling inlet cover
- Change the Mode 0 to BG with once
- Push Start/Stop switch once
- Turn the knob to SENSI.ADJ and press it
- Push Start/Stop switch once
- Return the knob to the position MEASURE slowly
- Push the timer set switch to set measuring time
- Remove the cap and make a measurement

## A.5 Maintenance / Calibration

### A.5.1 24-hour TSP air quality monitoring

The following maintenance / calibration are required for the HVS:

- The high volume motors and their accessories are properly maintained. Appropriate maintenance such as routine motor brushes replacement and electrical wiring checking are made to ensure that the equipments and necessary power supply are in good working condition.
- All HVS shall be calibrated (five point calibration) using Calibration Kit upon installation and thereafter in every 3 months.
- A copy of the calibration certificates for the HVS and calibrator are attached.

### A.5.2 1-hour TSP air quality monitoring

The portable TSP monitor should be calibrated at 1 year intervals, relevant calibration certificates are given in **Appendix D**.

## A.6 Action and Limit Levels for TSP Monitoring

Table A.6 summarizes the Action and Limit (A/L) Levels to be used for construction dust.



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**Table A.6** Action and Limit Levels for Construction Dust Impact Monitoring

Parameter	Action Level	Limit Level
TSP (24 hour average)	BL $\leq$ 200 $\mu\text{g}/\text{m}^3$ , AL = (BL x 1.3 + LL)/2 BL > 200 $\mu\text{g}/\text{m}^3$ , AL = LL	260 $\mu\text{g}/\text{m}^3$
TSP (1 hour average)	BL $\leq$ 384 $\mu\text{g}/\text{m}^3$ , AL = (BL x 1.3 + LL)/2 BL > 384 $\mu\text{g}/\text{m}^3$ , AL = LL	500 $\mu\text{g}/\text{m}^3$

Note:

BL= Baseline Level; AL = Action Level; LL = Limit Level

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### **Appendix B**

#### **Monitoring Methodology for Noise Monitoring**

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## Appendix B Monitoring Methodology for Noise Monitoring

### B.1 Monitoring Requirement

Baseline Noise Monitoring will be conducted for a period of 14 consecutive days prior to the commencement of construction works at a minimum logging interval of 30 minutes during the daytime between 0700 and 1900 at the designated monitoring locations.

### B.2 Monitoring Equipment

The sound level meter used in noise monitoring will comply with the International Electrotechnical Commission Publication (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications as referred to in the Technical Memorandum issued under the Noise Control Ordinance (NCO).

Sound level calibrator will be used for the on-site calibration of the meter. This calibrator complies with the IEC Publication 942 (1988) Class 1 and ANSI S1.40 - 1984. Noise measurements were only accepted to be valid if the calibration levels from before and after the measurement agree to within 1.0dB.

Measurements shall be recorded to the nearest 0.1dB. This noise monitors are programmed to measure A-weighted equivalent continuous sound pressure level at 30-minute intervals between 0700 and 1900 during the daytime. The noise measurement shall be conducted for 14 consecutive days.

**Table B.2** summarizes the noise monitoring equipment model being used for this project. Copies of equipment catalogue are given **Appendix C**.

**Table B.2** Noise Monitoring Equipment

Item	Brand	Model	Equipment	Serial Number
1	Casella	CEL-63X Series	Integrating Sound Level Meter	1057002
2	Casella	CEL-63X Series	Integrating Sound Level Meter	1057055
3	Casella	CEL-63X Series	Integrating Sound Level Meter	2451028
4	Casella	CEL-120/1	Calibrator	5230950
5	Casella	CEL-120/1	Calibrator	5230923
6	Casella	CEL-120/1	Calibrator	5230758
7	Smart Sensor	Wind Speed Anemometer	AR816+	Z-001-16

### B.3 Monitoring Parameters and Frequency

**Table B.3** presents the baseline noise monitoring parameters and frequencies.

**Table B.3** Baseline Monitoring Parameters and Frequencies of Noise Monitoring

Parameter	Frequency and Period
LAeq (30min) L10 and L90 will be recorded for reference	Continuously throughout the measurement period (Daytime: 0700-1900) for 14 consecutive days

**B.4 Monitoring Methodology**

The monitoring procedures are as follows:

- The monitoring station will 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
  - measurement time : Daily for 24 hours
- 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 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 Leq, L10 and L90 shall be recorded. In addition, site conditions and noise sources should be recorded on a standard record sheet.

**B.5 Maintenance / Calibration**

Maintenance and Calibration procedures are as follows:

- The microphone head of the sound level meter and calibrator should be cleaned with a soft cloth at quarterly intervals.
- The sound level meter and calibrator should be calibrated annually by a HOKLAS laboratory.
- Relevant calibration certificates are provided in **Appendix D**.

**B.6 Action and Limit Levels for Noise Impact**

Table B.6 summarizes the Action and Limit (A/L) Levels to be used for construction noise.

**Table B.6 Action and Limit Levels for Construction Noise Impact Monitoring**

Time Period	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received	75 dB (A) for residential premises
		70 dB (A) for school and 65 dB (A) during examination period

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### **Appendix C**

### **Monitoring Equipment**



**MFC TSP**  
Ambient Air Sampler

The TE-5170 is a high volume ambient Total Suspended Particulate (TSP) air sampler featuring a mass flow controller (MFC) for accurate and consistent particulate sampling. The mass flow controller adjust the motor speed as the filter media collects particulate to maintain a constant flow rate throughout the entire sample duration. The system utilizes a stainless steel filter holder for use with standard 8" x 10" filter paper. The anodized aluminum shelter and robust electrical components allow the system to operate a continuous 24 hour sample.

**ABOUT US:** Tisch Environmental Inc. Tisch Environmental is the benchmark for high volume air sampling, particulate, metals, volatiles, and specialty monitoring equipment. Since the company's inception in 1953 as General Metal Works, our product line has expanded from the first high volume air sampler to include high-tech and custom samplers. Our clients are professionals from every sector of the regulatory and industrial markets.

- ④ **Meets EPA CFR, Appendix B to Part 50**
- ④ **Total Suspended Particulate(TSP)**
- ④ **Mass Flow Controlled**
- ④ **7-Day Mechanical Timer**
- ④ **Elapsed Time Indicator**
- ④ **Aluminum Outdoor Shelter**
- ④ **Brush Style Motor**
- ④ **Dickson Chart Recorder, 24 Hour**
- ④ **Stainless Steel Filter Holder**
- ④ **36-60 CFM**
- ④ **Made in USA**

## General System Specifications

- Particulate Size:**Total Suspended Particulate (TSP)
- EPA Designation:** CFR 40 Part 50 Appendix B
- Flow Controller:** Mass Flow Controller
- Motor Style:**Brush Style Motor Assembly
- Pressure Recorder:**Dickson Chart Recorder, 24 hour
- Timer:**7 Day Mechanical
- Elapsed Time Indicator:**Mechanical, Hours and Tenths
- Flow Range:**39-60CFM, 1.09M<sup>3</sup>M-1.68M<sup>3</sup>M
- Housing:**Anodized Aluminum
- Filter Holder:**Stainless Steel, 8" x 10"
- 4" Recorder Charts:** Box of 100
- Filter Holder:** 8" x 10" Stainless Steel with hold down frame

## Available Models

- TE-5170 TSP MFC, 110 Volt 60 Hertz, 8 Amps*
- TE-5170X TSP MFC, 220 Volt 50 Hertz 4 Amps*
- TE-5170XZ TSP MFC, 220 Volts 60 Hertz, 4 Amps*

## Calibration Equipment

- TE-5028 -Variable Flow Calibration Kit
- TE-HVC-V Xcalibrator HiVol Calibrator

## Applications

- US EPA Reference Method Sampling, CFR Appendix J Part 50 Regulatory Compliance
- Institutional Studies
- Construction Sites
- Bridge and Water Tower Painting Sites
- Fence Line Monitoring
- Industrial Monitoring
- Landfill Monitoring
- Public Health Applications

## Optional Equipment

- TE-3000 Filter Holder Cartridge
- TE-G653 8" x 10" Glass Fiber Filter Media
- TE-33384 Motor Brush Set (110volt)
- TE-33378 Motor Brush Set (220volt)
- TE-116311 Replacement Motor (110volt)
- TE-116312 Replacement Motor (220volt)
- TE-106 Recorder Charts
- TE-160 Recorder Pen Points
- TE-5018 Gasket 8" x 10"

## Physical Specifications

- Weight:** 75lbs, Shelter
- Shipping Dimensions:** 46"W x 23"L x 20" H, Shelter  
19"W x 19"L x 20"H, Lid
- Assembled Dimensions:** 28"W x 28"L x 61"H



## Casella 63X Digital Sound Level Meter



### Applications

#### Occupational Noise Measurement

- Workplace noise assessments according to ISO9612, OSHA 29CFR 1910.95
- Selection of hearing protection
- Calculation of noise exposure
- Ensuring compliance with workplace noise legislation

#### Environmental Noise Measurement

- Boundary noise assessments
- Noise nuisance complaints
- Measurements according to ISO1996, BS4142
- UK Construction Section 61 notices

### Key features

- Ideal for environmental or occupational monitoring
- Easy to use switch-on-and-go functionality
- Latest digital technology with a high resolution colour TFT display
- Pre-configured setups for occupational and environmental measurements
- Voice notes to annotate measurements
- Audio (WAV) recording
- Single measurement range up to 140dB, no range adjustment required
- Data markers, back erase function and audio recording
- Level triggered events for transient measurements
- Real-time octave & 1/3 octave measurements
- Simultaneous measurement of all parameters with all frequency and time weightings
- Class 1 or Class 2 models available
- 2GB memory for more than 1 year of data storage
- Removable pre-amp
- Environmental outdoor kit available



# Noise measurements could not be easier — a step by step guide on how simple the 63X Series is to use!

## Step 1

### Switch On

When powered up the 63X Series will show battery status and memory capacity, as well as the measurement view currently selected.

- 2GB of memory stores more than 1 year of continuous data
- Automatically powers up in the last setup used
- Up to 15 hours of battery life



## For Occupational Noise

- Simultaneous measurements of all workplace noise parameters
- Standard setups for workplace noise legislation
- Measures parameters for hearing protection selection by the SNR, HML and octave band method
- Analyse time history of noise levels
- Optional high range microphone, up to 165dB

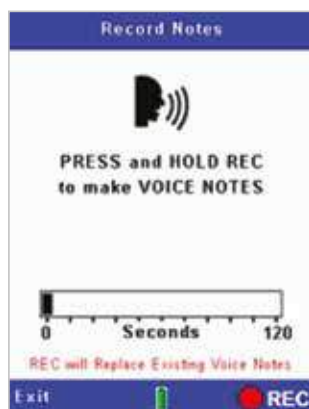
The 63X Series is designed to make workplace noise measurements as quick and simple as possible. The displayed information can be made as simple or comprehensive as required and all measurement parameters are stored simultaneously, so no incorrect measurements can be made.

When the instrument is calibrated with the 120 calibrator, the calibration dates and times are stored and can be downloaded to Casella Insight software, validating the accuracy of measurements.

Average, Peak, and Octave Band measurements are performed at the same time, so only one measurement needs to be made for all workplace noise applications.



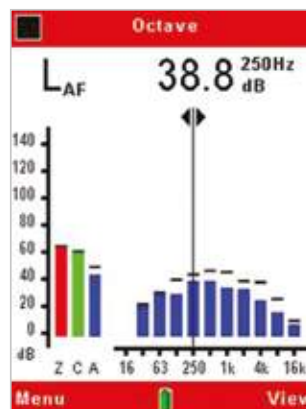
Small and lightweight with a bright colour display, the 63x Series makes workplace noise measurements easy



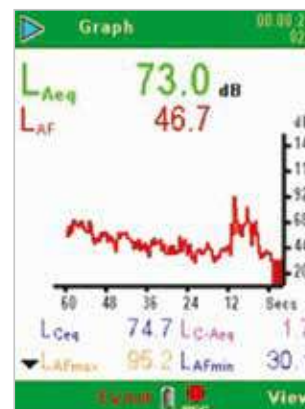
Record voice notes to easily identify measurements



Simple icon based user interface



Octave measurements for the selection of PPE



See the time history of noise levels

## Step 2

### Select Data to View

Pick from a selection of workplace or environmental views, or define your own.

- Make displayed data as simple or comprehensive as needed
- Regardless of data viewed, stores ALL parameters
- Pick from a selection of workplace or environmental views, or make your own



## Step 3

### Calibration

Calibration is important to validate your measurement data. Once the 120 calibrator is placed on the microphone, the 63X Series recognises when a calibration tone is present and enters the calibration mode, it will then automatically adjust to the calibration level when selected by the user.



- Automatic calibration
- Stores calibration level, time and date to validate results
- Can store pre and post measurement calibration values

## For Environmental Noise

- Simultaneous broadband and frequency measurement
- Data markers
- Back erase function
- Real-time frequency analysis
- Single measurement range
- Triggered 'event' capture

Data can be marked to signify any significant events, the data from which can be removed afterwards in insight software.

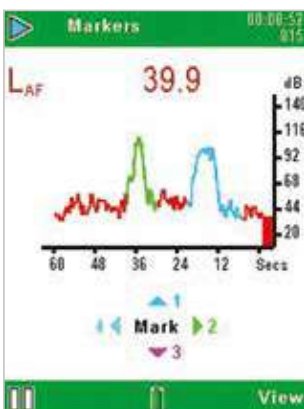
Up to 60 hours of audio files can be stored, commonly used for noise source identification. Stored audio can be played back on the instrument using headphones or downloaded to Casella insight software.

For unattended monitoring, event mode (CEL-633) allows trigger levels (dB) to be set, so additional data (e.g. Leq, Lmax) is stored together with the audio file for later play back or analysis, as well as a profiles down to 10ms intervals.

An environmental noise monitoring kit is available which protects the instrument and microphone from the weather and allows unattended monitoring for up to 10 days.



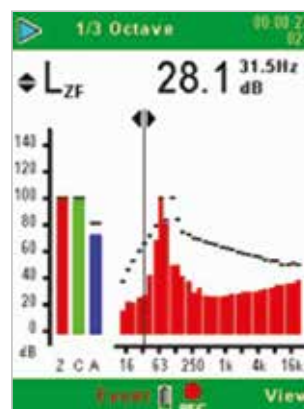
A dedicated environmental kit is available



Significant noise events can be marked



Listen to audio files from the 63X Series with headphones



Realtime frequency analysis and single measurement range



Set 2 levels of time history storage

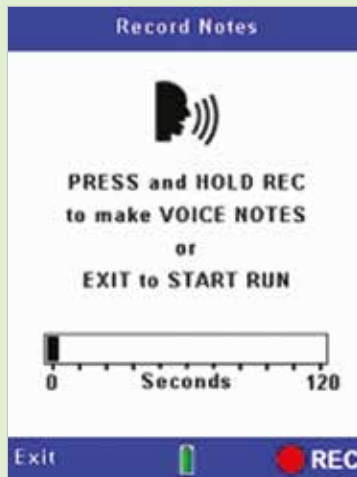


### Step 4

#### Record Voice Notes

Once the 'Play' key has been pressed you can record an audio (voice) note to define the measurement. Once this is done your measurement will begin.

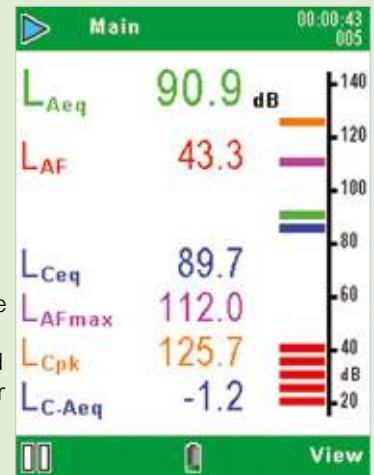
- Record voice notes to identify your measurement
- Record audio during measurements
- Automatic 'events' trigger audio recording



### Step 5

#### Start a Measurement

When the measurement is started the status bars at the top and bottom of the screen go green, when the measurement is stopped the bars go red. During a measurement, simply press the 'View' key to scroll through the data. All parameters are stored together so there is no need for multiple measurements. Once the measurement is stopped, data can be reviewed in the instrument memory.



- Single measurement range, no adjustment required
- Colour coded, easy to read measurements
- The most important parameters displayed on screen
- Simultaneous measurement of broadband and frequency data

## 63X Series Model Selection

#### Model Functionality

There are 2 models available, please see the model selection table below for the one you require (e.g. CEL-632). Then select your frequency analysis requirements by adding 'A' for broadband, 'B' adds octave band and 'C' adds 1/3 octave e.g. CEL-632C. Then add your class, '1' for class 1 and '2' for class 2 e.g. CEL-632C1 for a class 1 instrument. Each instrument comes complete with a standard kit case, windshield and calibration certificate.

Model	632	633
Cumulative Results	Y	Y
Period Results	Y	Y
Profile Results	Y	Y
Statistical Values (Ln%)		Y
Audio Voice Notes	Y	Y
Marker Events	Y	Y
Level Events		Y
External Events	Y	Y

#### Accessories

CEL-6840	Standard kit case*
196030C	Executive kit case**
CEL-251	Microphone Class 1*
CEL-252	Microphone Class 2*
CEL-120/1	Acoustic Calibrator Class 1**
CEL-120/2	Acoustic Calibrator Class 2**
PC18	Universal power supply
CMC51	USB download cable*
CEL-6718	Lightweight tripod
CMC73	Portable printer kit (fits in 196030 kit case)
196137B	Printer cable
MIC1	High range microphone (to 165dB)
MPA1	High range microphone adaptor (for use with MIC1)

\* included with instrument

\*\* included with instrument kit (with CEL-63XY/K1 where 'X' and 'Y' represent the model numbers)

#### Instrument Kits

For an instrument kit add /K1 to the instrument part number e.g. CEL-632C1/K1. Instrument kits include the relevant instrument, acoustic calibrator (CEL-120), USB download cable, batteries, calibration certificates and an executive kit case.



## Casella Insight Data Management Software

- Analysis of noise level time history
- Replay voice notes and event audio
- Intuitive user interface
- Remove anomalous data from results
- Analysis of time history
- Generate comprehensive reports
- Store data by, person, place, location
- Manage multiple instruments and calibration

# CASELLA

## INSIGHT

Switch between managing data or instruments with simple tabs

Simple tree structure to manage data e.g. person, place, etc

Time history may be viewed, analysed and annotated as required

Sort data by person, process, etc



Multiple parameters can be displayed and sorted simultaneously

Data can be dragged and dropped to the tree structure as required

Data is automatically graphed and can be copied to other applications

Casella Insight data management software is a powerful yet simple tool to download, analyse and report from either workplace or environmental noise data.

Once the 63X series is connected by the USB cable, Insight software automatically recognises that the instrument is connected and downloads the data. Data is automatically saved to a database so data cannot accidentally be deleted.

Noise exposure or environmental exceedance levels can be colour coded by a simple 'traffic light' system, it is easy to see which measurements have exceeded specific levels. Stored data can be analysed and graphs zoomed in to look at specific times. Graphs can be coloured as required, and notes inserted to illustrate important events.

Graphs can be further analysed by adding 'zones' which subsequently recalculates levels inside and outside these zones, this can be used to see what effect on overall levels is coming from specific environmental noise sources, or in the case of workplace noise, to investigate 'what if' scenarios, taking noise exposure levels out of a workers day.

A simple 'tree view' can be created with which to store and manage data by person, place or process. Once data is downloaded, files can be dragged and dropped to the relevant tree location and all data is stored within a central database. Templates are provided to view data for local legislation (e.g.OSHA) or can be customised, displayed and reported simply or comprehensively as required. Exposure data from multiple hazards such as noise and dust can be viewed and reported simultaneously. Reports can be stored in multiple formats (e.g .pdf, .jpg, or .csv) allowing them to be shared and viewed easily, as well as exported to other applications. To create a report, simply 'right click' on the appropriate part of the tree view and the report wizard allows creation of a report for people, processes etc. from that part of the tree. The integral report wizard allows reported parameters to be selected as required and report settings are retained for the next time it is used. Written notes can be added to data (on top of any audio notes recorded when taking a measurement), which appear on reports as required.

## Technical Specification

### Standards

IEC61672: 2002 Class 1 and 2, ANSI S1.4: Type 1 and 2 (1983)

Filters: IEC61260: Class 0, ANSI S1.43: (1996)

Note: IEC61672 replaces 2 obsolete standards, IEC60651 and IEC60804

### General

Measurement range:	20-140dB RMS (143.3dB peak)
Total Noise floor:	19dB(A) Class 1, 25dB(A) Class 2
Time weightings:	Fast, Slow and Impulse simultaneously
Frequency weightings:	A, C and Z (un-weighted) simultaneously
Frequency bands:	11 Octave bands 16Hz-16kHz (B&C models) 33 Octave bands 12.5Hz-20kHz (C models)
Amplitude weighting (Q):	3, 4 and 5 simultaneously
Back erase:	Last 10s in cumulative mode (all models)
Timers:	Duration 1s-24h,
On/Off timers:	6 sets with selectable times and a repeat function

### Physical

Tripod mount:	1/4" Whitworth socket
Batteries:	3x AA Alkaline, 10-15 hours dependent on back light
External power:	9-14V DC at 150mA
Weight:	332g including batteries
Size:	230x72x31mm inc preamp and microphone

### Measured Parameters

Broadband: LXY, LXYmax, LXYmin, LXeq, LXpeak, Lavg, LC-LA, LXleq, LTM3, LTM5, LAE. Workplace dose values are calculated within insight software.

Octaves & 1/3 octaves: LXY, LXeq, LXYmax, 5x Ln% (on CEL-633). Where X is the frequency weighting A, C or Z and Y represents time weighting Fast (F), Slow (S) or Impulse (I). All weightings simultaneously measured where appropriate.

CEL-633 model additionally stores 5x Ln values in broadband and octave modes.

For time history data, all parameters are logged for period times plus 6 selectable profile parameters (plus 5x Ln values on CEL-633).

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### Ideal Industries India Pvt.Ltd.

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### Ideal Industries China

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Yang Gong Zhong Lu, Chao Yang District,  
Beijing 100028,  
China  
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Fax: 8610-84298061  
Email: info@casellameasurement.cn

### Memory

Memory: 2GB (>1 year logging when set to 1 second interval, 999 runs). All parameters stored and accessible via Casella insight. Total measurement runs: 999.

Events: 999 events/run. 10 hours of audio recording in high quality mode, 60 hours in low quality mode. For long term unattended monitoring the CEL-630 takes a new run daily for up to a total of 400 days.

### Audio Recording

Low Quality:	8,000 samples/s @ 8bit (64kb/s), up to 4kHz
High Quality:	24,000 samples/s @ 8 bit (192kb/s), up to 12kHz

### Environmental

Operating 0 to 90%RH in the absence of condensation

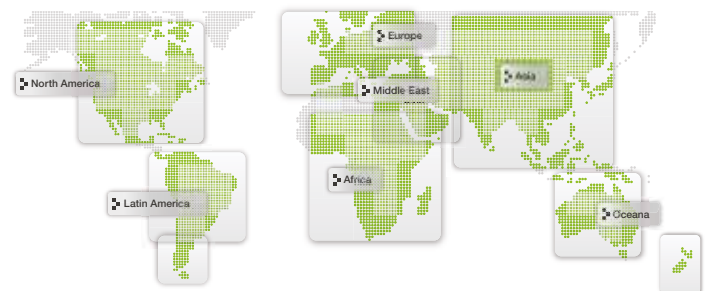
Conditions: Temperature of -10 to +50°C (Class 1) and 0 to 40°C (Class 2) Atmospheric pressure of 65 to 108kPa.

### Languages

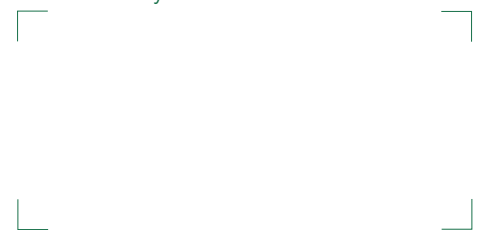
User interface can be changed via the menu: English, French, German, Spanish, Italian, Portuguese, Chinese.

## Global Company

Casella is a global company with a network of offices and distributors, giving excellent customer support wherever you are. Contact us to find your local office or distributor.



Distributed by



SM10006 v4.0

# DUST INDICATOR

Model:LD-3B



The LD-3B is an aerosol photometer designed to read the relative mass concentration of aerosol.



Shoulder belt



This displays the LCD CONTRAST and LCD BACKLIGHT menu. Adjust the contrast in the liquid crystal display and setup ON/OFF of the backlight in this mode.



## DUST INDICATOR Model:LD-3B

An Aerosol is a group of particles suspended in air.

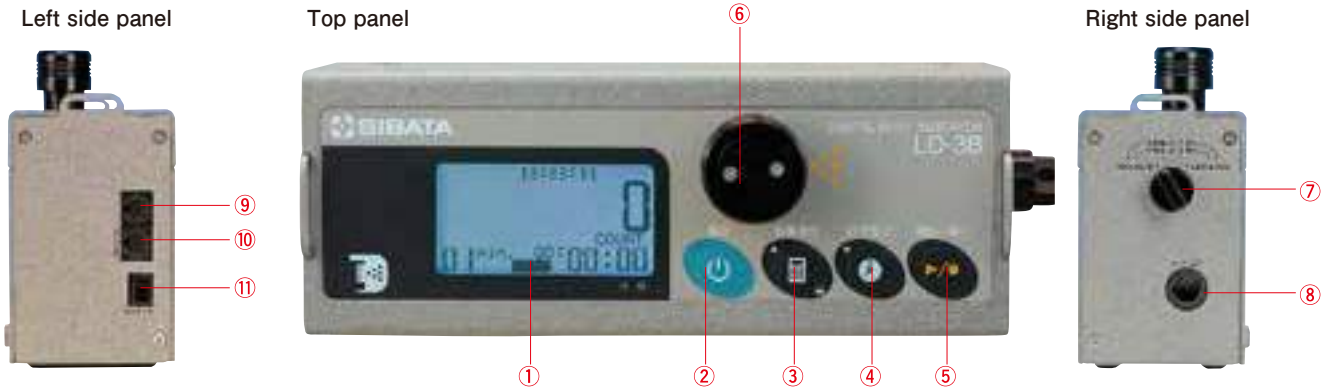
Aerosols can be introduced into the body primarily through the respiratory system. Total dust measurements indicate concentrations that can enter the nose and mouth of a worker as well as that which can settle on the skin while the respirable fraction of dust is that portion which can reach the lower or gas exchange part of the respiratory system. This respirable fraction has been defined for sampling purposes all over the world.

### Features

- The Model LD-3B can easily convert mass concentration of the measured value and display it by pre-setting a conversion factor for mass concentration.
- Equipped with a recording function (logging function) of the measured value.  
※ An optional RS-232C cable with software is required to retrieve data. (Refer to chapter 6)
- The calibrated value is stored even after turning the power supply off. An automatic correction of the measured value of aerosol will be performed by using data of calibrated value.
- Provides 3 types of standard data output: RS232C interface output, voltage output (0-1V) and non voltage pulse output (open collector)  
※ An optional RS232C cable with software is required to use the RS-232C output.

### Theory

This product uses the fact that the amount of scattered light is in proportion to mass concentration when the physical natures of dust particles in the same condition are exposed to light. Therefore mass concentrations of dust particles floating in the air are measured by the strength of scattered light.



## ■ Description of parts

### ① Graphic liquid crystal display

### ② Power switch

### ③ Mass concentration switch

When this switch is pressed, the Model LD-3B converts the measured value to mass concentration value.

### ④ Time setting switch

This switch is used to set measuring time and to change measuring modes.

### ⑤ Start/Stop switch

This switch is used for starting and stopping the measurement and selection of an item in the measuring mode.

### ⑥ Mass concentration switch

When this switch is pressed, the Model LD-3B converts the measured value to mass concentration value.

### ⑦ Measurement / Sensitivity adjusting knob

### ⑧ Exhaust outlet

### ⑨ Digital input/output connector.

### ⑩ Analog output connector

### ⑪ External power source connection connector

By connecting to the AC adapter, the Model LD-3B may be operated by an AC power source.

## ◆ Procedures for measurement

### Down timer measurement

When the Model LD-3B is turned on, the set time displayed at the bottom left of the liquid crystal display is [01 min].

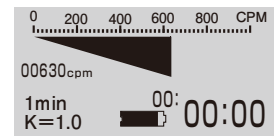
When the start/stop switch is pressed once at this time, a measurement of 1 minute is taken. The length of the measurement will depend on the time that is set and displayed. A down timer is displayed at the bottom right of the liquid crystal display.



### Graph display

When the mass concentration switch is pressed during measurement, the display will change from count to graph display.

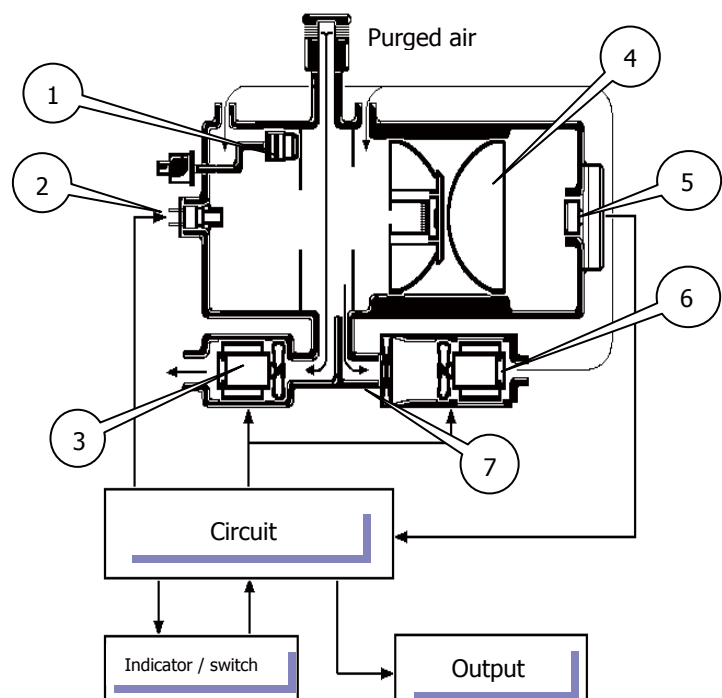
When the mass concentration switch is pressed again, the display will switch back to count.



### Exhaust outlet

This is an exhaust outlet. Be careful not to obstruct this outlet during measurement.

## ◆ Block diagram of the LD-3B



- 1: Light scattering plate
- 2: Laser diode (light emitting part)
- 3: Suction fan
- 4: Optics for receiving light
- 5: Photodiode (for receiving light)
- 6: Circulation fan for purged air
- 7: Fine particle filter for purged air generation



## Specification

Product code	080000-42
Model	Model LD-3B
Measuring theory	Light scattering method
Light source	Laser diode
Measuring accuracy	±10% of calibrated particles
Measuring sensitivity	1CPM=0.001mg/m <sup>3</sup>
Measuring range	0.001 – 10.00mg/m <sup>3</sup>
Display	Graphic liquid crystal display
Displayed contents	<ol style="list-style-type: none"> <li>1. Measuring time (Down timer)</li> <li>2. Measured value (00000-99999) 5 digits displayed</li> <li>3. Measuring mode</li> <li>4. Remaining battery power</li> <li>5. K factor</li> <li>6. Graph (by pressing the switch during measuring)</li> </ol>
Measuring mode	<ol style="list-style-type: none"> <li>1. Measuring time (Down timer mode) Set measuring time with built in down timer and perform measurement. (Initial time set for measuring when turning the instrument on is 1 min. in down timer mode.) 6 sec., 10 sec., 30 sec., 1 min., 2 min., 3 min., 5 min., and 10 min., are available.</li> <li>2. Manual Manually operate the start and stop of measuring.</li> <li>3. LOG (Logging) Set date to start measurement and measurement length. Measured data will be stored in memory of the Model LD-3B while measurement is taking place.</li> <li>4. Span check The value of the scattering plate may be measured and the adjusted value recorded by inserting the scattering plate for sensitivity calibration.</li> <li>5. BG (Background) Close the air collection opening, fill the detector with purged air and take a measurement. Background value is measured and recorded.</li> </ol>
Data recording points	Max.63488points (Hours data will be kept: 8hours during operation (after charging approx. 5days) Recording cycle 17.6hours in 1second Recording cycle approx. 44days in 1minute
Output	RS-232C/USB output, pulse output, Voltage output: 0-1V (selection of 3 ranges available) ① 0-1000CPM: 0 – 1V /10-10000CPM: 0.1 – 1V Auto range ② 0-1000CPM x 1 fixed range ③ 0-10000CPM x 10 fixed ranges
Operating time using a battery	Alkaline battery : approximately 24hours Nickel hydrogen battery : approximately 12hours
Power source	DC12V (AC adapter), 8pcs of size AA dry cell batteries, Nickel hydrogen battery (optional)
Operating environment	0-40°C 5-90%RH (Provided there is no condensation)
Dimension	185 (W) x 69 (D) x 105 (H) mm (Projections not included)
Weight	Approximately 1.2kg (weight of battery not included)
Accessories	Soft case, shoulder belt, AC adapter (PA-314), dry cell battery box, adapter for tripod*, size AA manganese dry cell battery (for confirming operation) . Operation Manual

\* Use the included tripod adapter if the rubber bottoms of the tripod interfere when putting it on to the main device.

## ■ Spare parts/Options

Shape					
Spare parts/Options	Nickel hydrogen battery <sup>**</sup>	battery charger <sup>**</sup> Model:QC-961	Soft case	Adapter for air suction and exhaust	Communication Cable with Software S-USB
Code	080000-032	080000-033	080000-06	080000-002	080000-415

<sup>\*\*</sup>By connecting to the AC adapter, the Model LD-3B may be operated by an AC power source.  
It is also a connector for the battery charger for the nickel hydrogen storage batteries (optional).

Spare parts/Options	AC Adapter Model:PA-314	Analog output connector	Tripod
Code	080000-314	080000-052	080160-3



Specifications, and appearance described in this document are based on information as of April 10, 2015. They are subject to change without notice for improvement of the product.

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201504K

## **MATERIALAB CONSULTANTS LIMITED**

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The logo for MaterialLab, featuring the word "MaterialLab" in a bold, sans-serif font. The text is centered between two thick, horizontal black bars, one above and one below.

### **Appendix D**

### **Calibration Certificates**



# 校准证书

## CALIBRATION CERTIFICATE

证书编号  
Certificate No. SS0201504447

第 1 页, 共 4 页  
Page of

委托方  
Client Material Lab Consultants Limited

委托方地址  
Add. of Client Fugro Development Centre, 5 Lok Yi Street, Tai Tau, Tuen Mun, N.T., Hong Kong

计量器具名称  
Description Sound Level Calibrator

型号规格  
Model/Type CCL-120/1

制造厂  
Manufacturer CASELLA

出厂编号  
Serial No. 5230950

接收日期  
Date of Receipt 2015 年 07 月 27 日  
Y M D

设备编号  
Equipment No.

结论  
Conclusion 符合 JJG 176-2005 Ⅰ级技术要求

校准日期  
Date of Calibration 2015 年 07 月 28 日  
Y M D

批准人  
Approved Signatory

核 验  
Checked by

校 准  
Calibrated by

李如冰  
陈旭理  
何卓敏

证书号印章  
Stamp



本中心地址: 中国广州白田中路松栢苑东楼 邮政编码: 510405  
 电话: (8620)86594172 传真: (8620)86594173 投开电话: (8620)26296063 E-mail: scm@scm.com.cn  
 Add: No.30, Songbaodong Street, Guangyuanzhongqiang Road, Guangzhou, P. R. China  
 Post Code: 510405 Tel: (8620)86594172 Fax: (8620)86594173 Complaint Tel: (8620)26296063  
 证书真伪查询: www.scm.com.cn; www.mhspp.com; Certificate Authenticity Identity: www.scm.com.cn; www.mhspp.com  
 HZ7727 1



# 说 明

## DIRECTIONS

第 2 页, 共 4 页  
Page of

证书编号  
Certificate No. SS0201504447

1. 本中心是国家质量监督检验检疫总局在华南地区设立的国家法定计量检定机构, 计量授权证书号是: (国) 法计 (2012) 01043号, (国) 法计 (2012) 01032号。本中心质量管理体系符合 ISO/IEC 17025:2005 标准的要求, This laboratory is the National Legal Metrological Verification Institution in southern China set up by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ) under authorization certificates No.(2012)01043 & (2012)01032. The quality system is in accordance with ISO/IEC 17025:2005.

2. 本中心所出具的数据均可溯源至国家计量基准和国际单位制(SI), All data issued by this laboratory are traceable to national primary standards and International System of Units (SI).

3. 本次校准的技术依据: Reference documents for the calibration: JJG 176-2005 声校准器检定规程 V. R. of Sound Calibrators

4. 本次校准所使用的主要计量标准器具: Major standards of measurement used in the calibration:

设备名称/型号 编号 证书号/有效期  
Name of Equipment /Model Serial No. Certificate No. /Due Date

测量放大器 2160821 SS02015090612  
Measuring Amplifier /2636 /2016-01-27

声校准器 2713562 SS02015030615  
Sound Calibrator /4231 /2016-05-25

测量特性 1 级  
Metrological Characteristic Grade 1

1 级  
Grade 1

温度 (23±3) °C 相对湿度 (50~60) %  
Temperature R.H.I.

校准地点, 环境条件:  
Place and environmental conditions of the calibration:  
地点 广州/振动实验室 Acoustics/Vibration Lab.

限制使用条件:  
Limiting condition of the instrument calibrated:

注: 1. 本证书校准结果只与受校准仪器有关。  
2. 本证书机构为我司批准, 不得充分复印此证书。  
Note: 1. The results relate only to the items calibrated.  
2. This certificate shall not be reproduced except in full, without the written approval of our laboratory.



## 校准结果 RESULTS OF CALIBRATION

证书编号: SSD201504447  
Certification No.

原始记录编号: 2201504447  
Record No.

第 3 页, 共 4 页  
Page of

1 外观: 合格

Apparent inspection: Pass

2 声压级 (dB): 见表1

Sound Pressure Level: Showed in table 1

表1 Table 1

标称值 (dB) Nominal Value	实测值 (dB) Measured Value	允差 (dB) Tolerance	结论 Conclusion	稳定性 (dB) Stabilization	稳定性允差 (dB) Stabilization Tolerance	结论 Conclusion
94	93.95	±0.40	合格(Pass)	0.01	≤0.10	合格(Pass)
114	113.93	±0.40	合格(Pass)	0.01	≤0.10	合格(Pass)

3 频率: 见表2

Frequency: Showed in table 2

表2 Table 2

标称值 (Hz) Nominal Value	实测值 (Hz) Measured Value	允差 (%) Tolerance	结论 Conclusion
1000	1000.0	±1.0	合格(Pass)

4 总失真: 见表3

Total harmonic distortion: Showed in table 3

表3 Table 3

频率 (Hz) Frequency	声压级 (dB) Sound Pressure Level	总失真 (%) Total Harmonic Distortion	允差 (%) Tolerance	结论 Conclusion
1000	94	0.1	≤3	合格(Pass)
1000	114	0.2	≤3	合格(Pass)



## 校准结果 RESULTS OF CALIBRATION

证书编号: SSD201504447  
Certification No.

原始记录编号: 2201504447  
Record No.

第 4 页, 共 4 页  
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说明(Notes):

1 测量结果扩展不确定度:

Expanded uncertainty of measurement:

声压级:  $U=0.15$  dB,  $k=2$

Sound Pressure Level Calibration

频率:  $U_{rel}=0.1\%$ ,  $k=2$

Frequency

失真度:  $U_{rel}=1.4\%$ ,  $k=2$

Harmonic distortion

(依据JJF 1059.1-2012 测量不确定度评定与表示)

(According to JJF 1059.1-2012 Evaluation and Expression of Uncertainty in Measurement)

2 建议校准周期不超过1年。

The interval of calibration advised within one year.

# FUGRO TECHNICAL SERVICES LIMITED

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Hong Kong.

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Fax : +852 2450 6138  
E-mail : matlab@fugro.com.hk  
Website : www.materialab.com.hk

# Materialab

Report no.: 940891CA150256(1)

Page 1 of 1

## CALIBRATION CERTIFICATE OF SOUND CALIBRATOR

Client : Fugro Technical Services Ltd.

Project : Calibration Services

### Client Supplied Information

Details of Unit Under Test, UUT

Description : Sound Calibrator  
Manufacturer : Casella (Model no. CEL-120/1)  
Serial No. : 5230758  
Next Calibration Date : 02-Feb-2016  
Specification Limit :  $\pm 0.5\text{dB}$

### Laboratory Information


Description : B & K Acoustic Multifunction Calibrator 4226  
Equipment ID. : R-108-1  
Date of Calibration : 03-Feb-2015 Ambient Temperature : 21 °C  
Calibration Location : Calibration Laboratory of Materialab  
Method Used : By direct comparison

### Calibration Results :

Parameters (Setting of UUT)	Mean Value (error of measurement)	Specification Limit(dB)
94dB	0.2dB	$\pm 0.5\text{dB}$
114dB	0.2dB	

### Remarks :

1. The equipment used in this calibration is traceable to recognized National Standards.
2. The mean value is the average of four measurements.
3. Sound level meter used is client sound level meter (S/N: 3321814).
4. The equipment does comply with specification limit.

Checked by : T.W.Tsang Date : 03 Feb., 2015 Certified by :  Date : 03 Feb., 2015  
CA-R-297 (22/07/2009) So Chi Kuen (Engineer)

\*\* End of Report \*\*

# FUGRO TECHNICAL SERVICES LIMITED

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# Materialab

Report no.: 940891CA150535

Page 1 of 1

## CALIBRATION CERTIFICATE OF SOUND CALIBRATOR

Client : Fugro Technical Services Ltd.

Project : Calibration Services

### Client Supplied Information

Details of Unit Under Test, UUT

Description : Sound Calibrator  
Manufacturer : Casella (Model no. CEL-120/1)  
Serial No. : 5230923 (Eq. No. N-15)  
Next Calibration Date : 12-Mar-2016  
Specification Limit :  $\pm 0.5\text{dB}$

### Laboratory Information


Description : B & K Acoustic Multifunction Calibrator 4226  
Equipment ID. : R-108-1  
Date of Calibration : 13-Mar-2015 Ambient Temperature : 21 °C  
Calibration Location : Calibration Laboratory of Materialab  
Method Used : By direct comparison

### Calibration Results :

Parameters (Setting of UUT)	Mean Value (error of measurement)	Specification Limit(dB)
94dB	0.2dB	$\pm 0.5\text{dB}$
114dB	0.1dB	

### Remarks :

1. The equipment used in this calibration is traceable to recognized National Standards.
2. The mean value is the average of four measurements.
3. Sound level meter used is Casella sound level meter (S/N: 4637931).
4. The equipment does comply with specification limit.

Checked by : T.W.Tsang Date : 16 Mar., 2015 Certified by :  Date : 16 Mar, 2015  
So Chi Kuen (Engineer)

CA-R-297 (22/07/2009)

\*\* End of Report \*\*

# Certificate of Conformity and Calibration

**Instrument Model:-** CEL-633A  
**Serial Number** 1057002  
**Firmware revision** V129-08

**Microphone Type:-** CEL-251  
**Serial Number** 995

**Preamplifier Type:-** CEL-495  
**Serial Number** 002645

**Instrument Class/Type:-** 1



**Applicable standards:-**

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)  
 IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

**Note:-** The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceded Sound Level Meter Standards - IEC60651 and IEC60804.

**Test Conditions:-** 22.1 °C  
 44 %RH  
 1004.2 mBar

**Test Engineer:-** Millie Duncan  
**Date of Issue:-** June 22, 2015

**Declaration of conformity:-**

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

**Test Summary:-**

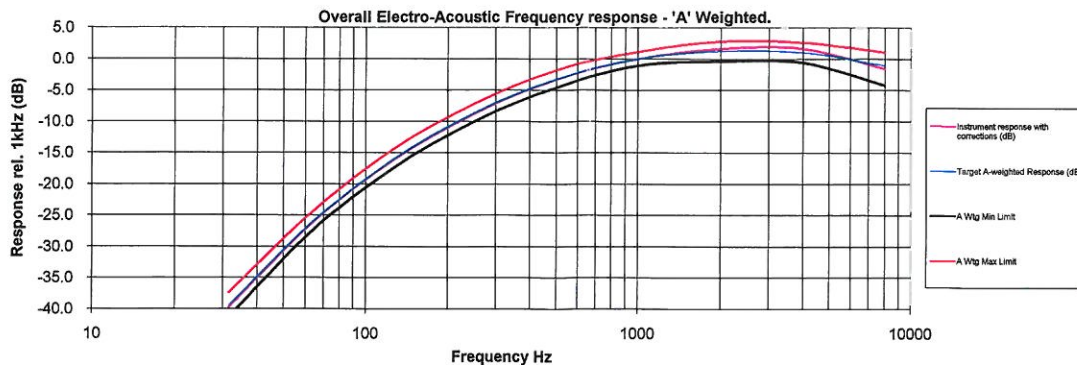
Self Generated Noise Test  
 Electrical Signal Test Of Frequency Weightings  
 Frequency & Time Weightings At 1 kHz  
 Level Linearity On The Reference Level Range  
 Toneburst Response Test  
 C-peak Sound Levels  
 Overload Indication  
 Acoustic Tests

**All Tests Pass**  
**All Tests Pass**  
**All Tests Pass**  
**All Tests Pass**  
**All Tests Pass**  
**All Tests Pass**  
**All Tests Pass**  
**All Tests Pass**

**Combined Electro-Acoustic Frequency Response - A Weighted**

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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 E-mail: info@casellausa.com  
 Web: www.casellausa.com

# Certificate of Conformity and Calibration

**Instrument Model:-** CEL-633A  
**Serial Number** 1057055  
**Firmware revision** V129-08

**Microphone Type:-** CEL-251  
**Serial Number** 937

**Preamplifier Type:-** CEL-495  
**Serial Number** 002712

**Instrument Class/Type:-** 1



**Applicable standards:-**

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)  
 IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

**Note:-** The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.

**Test Conditions:-** 22.2 °C      **Test Engineer:-** Millie Duncan  
 43.6 %RH                      **Date of Issue:-** June 22, 2015  
 1003.6 mBar

**Declaration of conformity:-**

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

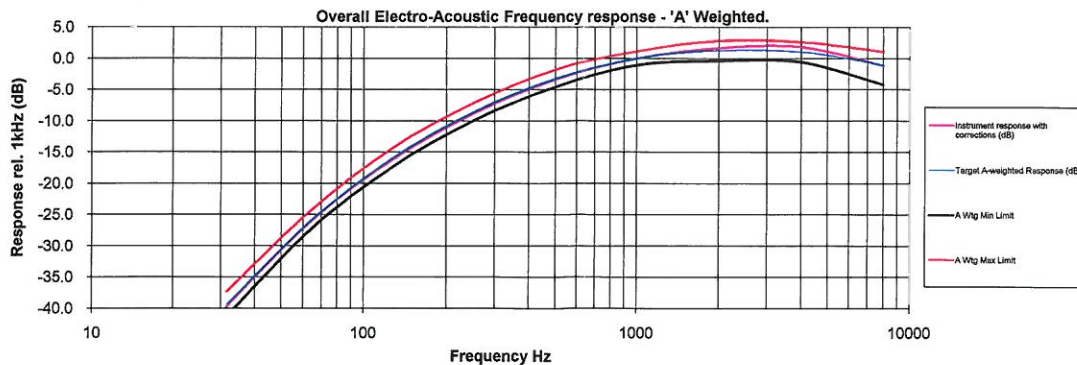
**Test Summary:-**

Self Generated Noise Test	<b>All Tests Pass</b>
Electrical Signal Test Of Frequency Weightings	<b>All Tests Pass</b>
Frequency & Time Weightings At 1 kHz	<b>All Tests Pass</b>
Level Linearity On The Reference Level Range	<b>All Tests Pass</b>
Toneburst Response Test	<b>All Tests Pass</b>
C-peak Sound Levels	<b>All Tests Pass</b>
Overload Indication	<b>All Tests Pass</b>
Acoustic Tests	<b>All Tests Pass</b>

**Combined Electro-Acoustic Frequency Response - A Weighted**

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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 Tel: (603) 672-0031 Fax: (603) 672-8053  
 E-mail: info@casellausa.com  
 Web: www.casellausa.com



# Certificate of Conformity and Calibration

**Instrument Model:-** CEL-633A  
**Serial Number** 2451028  
**Firmware revision** V129-09

**Microphone Type:-** CEL-251 **Preamplifier Type:-** CEL-495  
**Serial Number** 1163 **Serial Number** 002850

**Instrument Class/Type:-** 1



**Applicable standards:-**

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)  
 IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

**Note:-** The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.

**Test Conditions:-** 21.3 °C **Test Engineer:-** Millie Duncan  
 45.1 %RH **Date of Issue:-** October 26, 2015  
 1008.8 mBar

**Declaration of conformity:-**

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

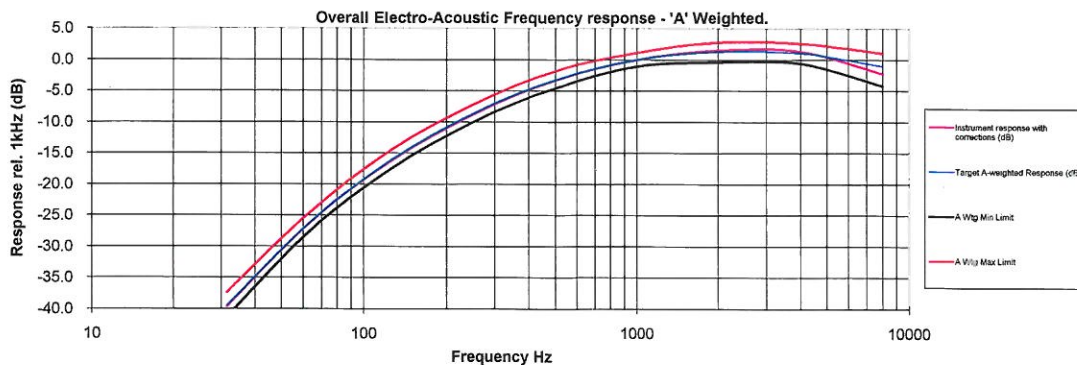
**Test Summary:-**

Self Generated Noise Test	<b>All Tests Pass</b>
Electrical Signal Test Of Frequency Weightings	<b>All Tests Pass</b>
Frequency & Time Weightings At 1 kHz	<b>All Tests Pass</b>
Level Linearity On The Reference Level Range	<b>All Tests Pass</b>
Toneburst Response Test	<b>All Tests Pass</b>
C-peak Sound Levels	<b>All Tests Pass</b>
Overload Indication	<b>All Tests Pass</b>
Acoustic Tests	<b>All Tests Pass</b>

**Combined Electro-Acoustic Frequency Response - A Weighted**

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Feb 02, 2015 Rootsmeter S/N 0438320 Ta (K) - 292  
 Operator Tisch Orifice I.D. - 2154 Pa (mm) - 754.38

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER	ORFICE
					DIFF Hg (mm)	DIFF H2O (in.)
1	NA	NA	1.00	1.4720	3.2	2.00
2	NA	NA	1.00	1.0450	6.4	4.00
3	NA	NA	1.00	0.9320	7.9	5.00
4	NA	NA	1.00	0.8900	8.8	5.50
5	NA	NA	1.00	0.7330	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
1.0087	0.6852	1.4234	0.9957	0.6764	0.8799
1.0044	0.9612	2.0130	0.9915	0.9488	1.2443
1.0023	1.0754	2.2506	0.9894	1.0616	1.3912
1.0012	1.1249	2.3604	0.9883	1.1105	1.4591
0.9959	1.3587	2.8468	0.9831	1.3412	1.7597
Qstd slope (m) = 2.11451			Qa slope (m) = 1.32407		
intercept (b) = -0.02267			intercept (b) = -0.01402		
coefficient (r) = 0.99995			coefficient (r) = 0.99995		
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}

# FUGRO TECHNICAL SERVICES LIMITED

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Website : www.materialab.com.hk

# Materialab

Report no. : 940891CA151495(1)

Page 1 of 1

## CALIBRATION CERTIFICATE OF DUST METER

Client : Fugro Technical Services Limited

Project : Calibration Services

### Client Supplied Information

Details of Unit Under Test, UUT

Description : Laser Dust Monitor  
Manufacturer : SIBATA  
Model No. : LD-3B  
Serial No. : 567191  
Specification Limit : NA  
Next Calibration Date : 18-Aug-2016

### Laboratory Information

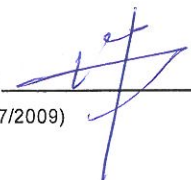
Description : Reference balance  
Equipment ID. : R-039-4  
Date of Calibration : 19-Aug-2015 Ambient Temperature : 32 °C  
Calibration Location : Calibration Lab. of Materialab  
Method Used : By direct comparison the weight of dust particle trapped in a filter paper using high volume sampler (TSP method) for a certain period, with the reading of the UUT. They should be placed at the same location and powered on and off at the same time.

### Calibration Results :

Reference concentration (mg/m <sup>3</sup> )	Total count for 1 hour	CPM (Count per minute)
0.0948	1108	18.47
0.1254	1752	29.20
0.1028	1330	22.17


### Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m<sup>3</sup>) = K x UUT reading (CPM) where K = 0.00456
3. Correlation coefficient (r) : 0.9958

Checked by :   
CA-R-297 (22/07/2009)

Date : 14-8-2015

Certified by :

  
So Chi Kuen (Engineer)

Date :

24 Aug, 2015

\*\* End of Report \*\*

## CALIBRATION CERTIFICATE

Date: August 4, 2015

Equipment Name	:	Digital Dust Indicator, Model LD-3B
Code No.	:	080000-42
Quantity	:	1 unit
Serial No.	:	567191
Sensitivity	:	0.001 mg/m <sup>3</sup>
Sensitivity Adjustment	:	528CPM
Scale Setting	:	June 8, 2015

We hereby certify that the above mentioned instrument has been calibrated satisfactorily.

Sincerely

**SIBATA SCIENTIFIC TECHNOLOGY LTD.**

Shintaro Okamura

Shintaro Okamura

Overseas Sales Division

# FUGRO TECHNICAL SERVICES LIMITED

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# Materialab

Report no. : 940891CA151495(3)

Page 1 of 1

## CALIBRATION CERTIFICATE OF DUST METER

Client : Fugro Technical Services Limited

Project : Calibration Services

### Client Supplied Information

Details of Unit Under Test, UUT

Description : Laser Dust Monitor  
Manufacturer : SIBATA  
Model No. : LD-3B  
Serial No. : 567195  
Specification Limit : NA  
Next Calibration Date : 18-Aug-2016

### Laboratory Information

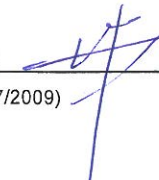
Description : Reference balance  
Equipment ID. : R-039-4  
Date of Calibration : 19-Aug-2015      Ambient Temperature : 32 °C  
Calibration Location : Calibration Lab. of Materialab  
Method Used : By direct comparison the weight of dust particle trapped in a filter paper using high volume sampler (TSP method) for a certain period, with the reading of the UUT. They should be placed at the same location and powered on and off at the same time.

### Calibration Results :

Reference concentration (mg/m <sup>3</sup> )	Total count for 1 hour	CPM (Count per minute)
0.0948	1111	18.52
0.1254	1342	22.37
0.1028	1191	19.85

### Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m<sup>3</sup>) = K x UUT reading (CPM) where K = 0.00533
3. Correlation coefficient (r) : 0.9956

Checked by :   
CA-R-297 (22/07/2009)

Date : 24-8-2015

Certified by :

  
So Chi Kuen (Engineer)

Date : 24 Aug., 2015

\*\* End of Report \*\*

## CALIBRATION CERTIFICATE

Date: August 4, 2015

Equipment Name	:	Digital Dust Indicator, Model LD-3B
Code No.	:	080000-42
Quantity	:	1 unit
Serial No.	:	567195
Sensitivity	:	0.001 mg/m <sup>3</sup>
Sensitivity Adjustment	:	552CPM
Scale Setting	:	June 8, 2015

We hereby certify that the above mentioned instrument has been calibrated satisfactorily.

Sincerely

**SIBATA SCIENTIFIC TECHNOLOGY LTD.**

Shintaro Okamura

Shintaro Okamura

Overseas Sales Division

## **MATERIALAB CONSULTANTS LIMITED**

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Fax : (852)-24508032  
Email : mcl@fugro.com.hk

The logo for MaterialLab, featuring the word "MaterialLab" in a bold, sans-serif font. The text is centered between two thick, horizontal black bars.

### **Appendix E**

#### **Photo of Proposed Air Quality and Noise Monitoring Locations**

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# MaterialLab

Original Location: KTD 1 – Centre of Excellence in Paediatrics (Children’s Hospital)



Proposed Location: KTD 1a – Centre of Excellence in Paediatrics (Children’s Hospital)



→ Proposed Air Quality and Noise Monitoring Location  
(Façade noise measurement will be conducted at KTD 1a)



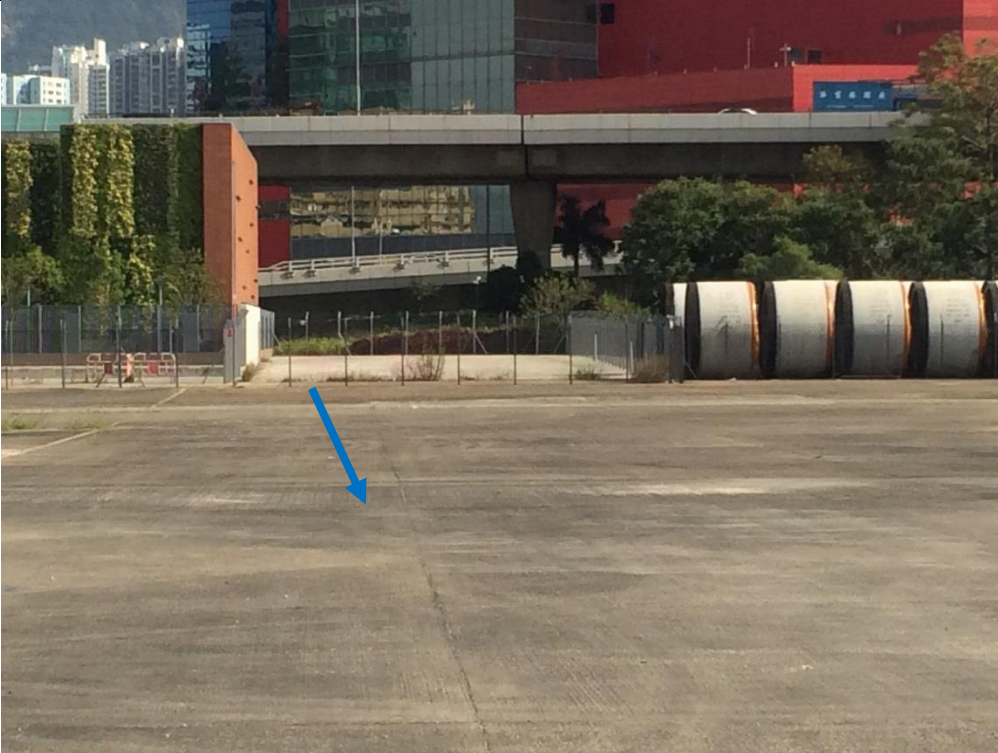
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# MaterialLab

Original Location: KTD 2 – G/IC Zone next to Kwun Tong Bypass (Future Hospital at Site 3C1)



Proposed Location: KTD 2a – G/IC Zone next to Kwun Tong Bypass (Future Hospital at Site 3C1)



-  Original Air Quality and Noise Monitoring Location
-  Proposed Air Quality and Noise Monitoring Location  
(Free-field noise measurement will be conducted at KTD 2a)

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# MaterialLab

Original Location: KER 1 - Future Residential Development at Kerry Godown



Proposed Location: KER 1a – Site Boundary at Cheung Yip Street



→ Proposed Air Quality and Noise Monitoring Location  
(Free-field noise measurement will be conducted for KER 1a)