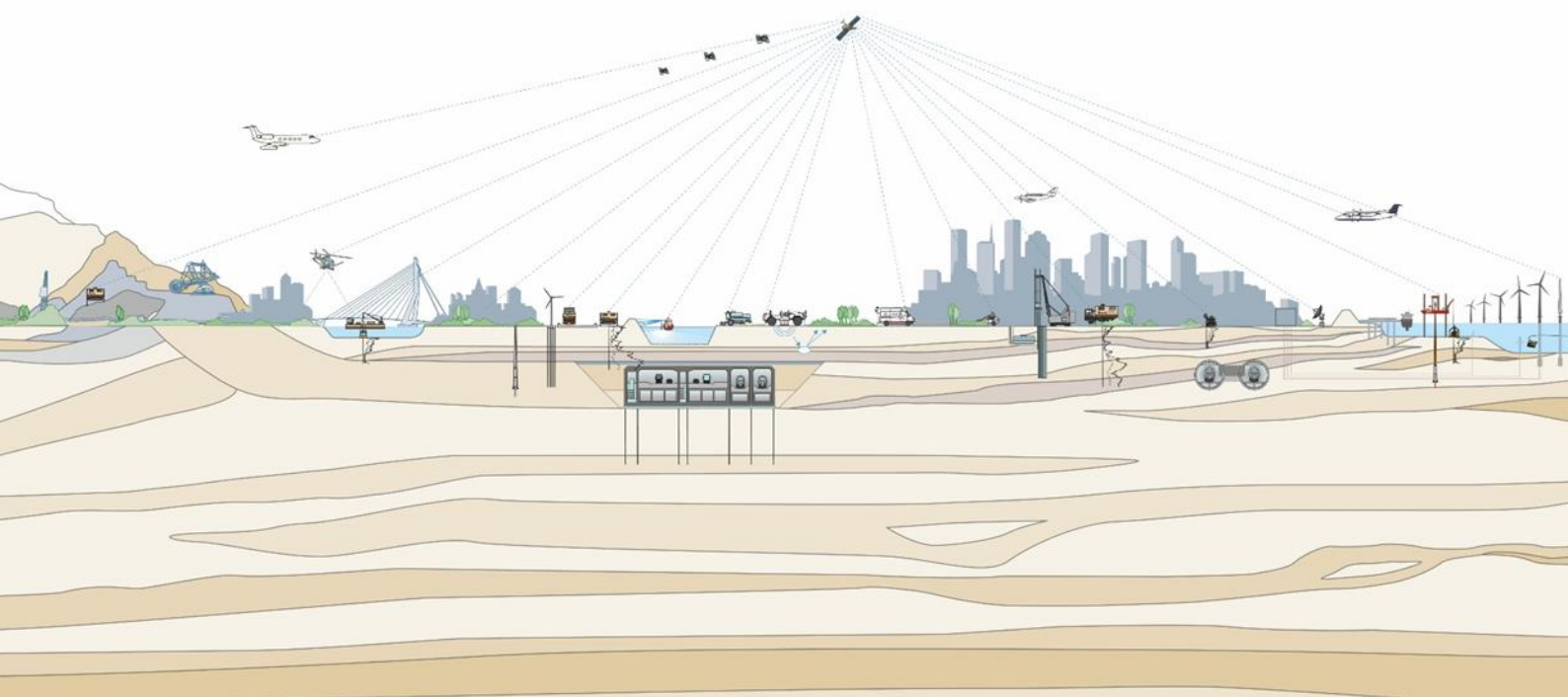


Baseline Air Quality Monitoring Report (KTN & FLN NDA)

Project Proponent : Civil Engineering and Development
Department

Project : Contract No. NDO 14/2018 - Advance and
First Stage Works of Kwu Tung North and
Fanling North New Development Areas

Report No. : 0032/19/ED/0227



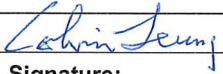
**Baseline Air Quality Monitoring Report
(KTN & FLN NDA)**

Project Proponent : Civil Engineering and Development
Department

Project : Contract No. NDO 14/2018 - Advance and
First Stage Works of Kwu Tung North and
Fanling North New Development Areas

Report No. : 0032/19/ED/0227



02	Final	Jimmy Lui, Wingo So	Calvin Leung		02/01/2020
Issue No.	Status	Prepared and Checked by:	Certified by:	Signature:	Date

Issue No.	Status	Reason for Issue/Reissue	Comments on Content	Date
01	Draft	IEC 1 st comments	Addressed IEC Comments and resubmitted on 23/12/2019.	23/12/2019
02	Final	IEC 2 nd comments	Addressed IEC Comments and resubmitted on 02/01/2020.	02/01/2020

CONTENTS

1. INTRODUCTION	1
2. AIR QUALITY MONITORING	3
2.1 Introduction	3
2.2 Monitoring Requirement	3
2.3 Monitoring Locations	3
2.4 Monitoring Equipment and Methodology	4
2.5 Baseline Monitoring Parameters, Frequency and Duration	6
2.6 Action and Limit Levels	7
2.7 Results and Observations	8
2.8 Revisions for inclusion in the EM&A Manual	9

FIGURES

Figure 2.1	Proposed Baseline and Construction Air Quality Monitoring Locations (KTN NDA)
Figure 2.2	Proposed Baseline and Construction Air Quality Monitoring Locations (FLN NDA)

APPENDICE

Appendix A	Photos of Air Quality Monitoring Equipment
Appendix B	Baseline Air Quality Monitoring Schedule
Appendix C	Copies of Calibration Certificates of Air Quality Monitoring Equipment
Appendix D	Photos of Air Quality Monitoring Locations
Appendix E	Weather and Meterological Conditions during Baseling Monitoring Period
Appendix F	Baseline Air Quality Monitoring Data
Appendix G	Observation of Air Quality Influencing Factor

EXECUTIVE SUMMARY

- i. This report presents the baseline monitoring requirements, methodologies and results of baseline measurements in accordance with the requirements in the updated EM&A Manual.
- ii. The baseline monitoring work was conducted from 17 September 2019 to 1 October 2019.
- iii. The average results and Action and Limit Levels (A/L Levels) of 1-hr TSP, 24-hr TSP and noise baseline monitoring at each monitoring locations are summarized in **Table I and II** respectively. The Action and Limit Levels for air quality impact monitoring were derived based on the criteria adopted from the updated EM&A Manual.

Table I Summary of 1-hr TSP Baseline Monitoring Results and A/L Levels

Monitoring Station	Description	Average (Range) in $\mu\text{g}/\text{m}^3$	AL $\mu\text{g}/\text{m}^3$	LL $\mu\text{g}/\text{m}^3$
KTN-DMS1	Nursery Classes and Kindergartens; Post Offices	65 (24~192)	292	500
KTN-DMS2	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre	61 (2~139)	290	
KTN-DMS3	Village Resite	63 (6~442)	291	
KTN-DMS4	Temporary Structure near Fanling Highway (near Pak Shek Au)	73 (13~187)	297	
FLN-DMS1	Scattered Village Houses North of Proposed Potential Ecopark	82 (61~112)	303	
FLN-DMS2	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office	55 (20~278)	286	
FLN-DMS3	House near Tong Hang	78 (69~88)	301	

Table II Summary of 24-hr TSP Baseline Monitoring Results and A/L Levels

Monitoring Station	Description	Average (Range) in $\mu\text{g}/\text{m}^3$	AL $\mu\text{g}/\text{m}^3$	LL $\mu\text{g}/\text{m}^3$
KTN-DMS1	Nursery Classes and Kindergartens; Post Offices	88 (35~246)	187	260
KTN-DMS2	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre	109 (15~370)	201	
KTN-DMS3	Village Resite	89 (16~326)	188	
KTN-DMS4	Temporary Structure near Fanling Highway (near Pak Shek Au)	95 (36~291)	192	
FLN-DMS1	Scattered Village Houses North of Proposed Potential Ecopark	30 (18~51)	150	
FLN-DMS2	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office	70 (34~148)	176	
FLN-DMS3	House near Tong Hang	54 (30~90)	165	

Note: KTN-DMS1, KTN-DMS2, KTN-DMS3, KTN-DMS4, and FLN-DMS2 were conducted by using Laser Particle Photometer Monitors due to power supply issue.

1. INTRODUCTION

- 1.1** The Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDAs) are one of the important sources of land and housing supply in the medium and long term. The development of the KTN and FLN NDAs will be implemented in phase for full completion by 2031. The Phase 1 of the NDAs development, comprising the Advance Works and First Stage Works, is targeted to be implemented from the second half of 2019 progressively. The Advance and First Stage Works would include site formation, engineering infrastructure works (including roads, drainage, sewerage, waterworks, landscaping works, pumping stations, and fresh water and flushing water service reservoirs), soil remediation, reprovisioning of North District Temporary Wholesale Market, development of a nature park at Long Valley and implementation of environmental mitigation measures.
- 1.2** The Environmental Impact Assessment (EIA) report for the North East New Territories (NENT) NDAs Study, which covered the Advance Works and First Stage Works of KTN and FLN NDAs, has been submitted to Environmental Protection Department (EPD) in mid-2013. The report was subsequently approved with conditions by EPD on 19 October 2013 under Register No. AEIAR-175/2013.
- 1.3** Contract No. NDO 14/2018 is the works package consists of the Advance and First Stage Works of KTN and FLN NDAs. This Contract is governed by 7 Environmental Permits (EPs) (EP-466/2013, EP-467/2013/A, EP-468/2013/A, EP-469/2013, EP-470/2013, EP-473/2013/A and EP-475/2013/A). EP-466/2013, EP-467/2013/A, EP-468/2013/A, EP-469/2013 and EP-470/2013 belongs to KTN NDAs, while EP-473/2013/A and EP-475/2013/A belongs to FLN NDAs.
- 1.4** The scope of works under the Advance and First Stage Works comprises the following and divides into seven Contracts.
- a) The Advance Works (PWP item No. 7747CL-2) consist of:
- i) site formation of land (including soil remediation) in KTN and FLN NDAs for housing, community facilities and engineering infrastructure;
 - ii) construction of roads including the eastern section of Fanling Bypass (FLBP(E)) connecting the FLN NDA to Fanling Highway and other roads with footpaths and cycle tracks, and associated junction/ road improvements;
 - iii) engineering infrastructure works including drainage. Sewerage (including two sewage pumping stations), waterworks (including a fresh water service reservoir and a flushing water service reservoir in the KTN NDA), landscape works and slopeworks;
 - iv) part expansion and upgrading of Shek Wu Hui Sewage Treatment Works (SWHSTW);
 - v) reprovisioning works; and

- vi) implementation of environmental mitigation measures and environmental monitoring and audit (EM&A) programme for the works mentioned in (i) to (v) above

- b) The First Stage Works (PWP item No. 7759CL) consist of:
 - i) development of a nature park at Long Valley including provision of a visitor centre and a footbridge spanning across Sheung Yue River for connection between these two facilities;
 - ii) reprovisioning of two egret sites in the FLN NDA and enhancement works to an existing egret site in the KTN NDA;
 - iii) site formation of land for a village resite area and a district police station in the KTN NDA;
 - iv) engineering infrastructure works including roads, drainage, sewerage, waterbirds, and landscape works; and
 - v) implementation of environmental mitigation measures and environmental monitoring and audit (EM&A) programme for the works mentioned in (i) to (iv) above.

1.5 This Baseline Monitoring Report is prepared for “the Advance and First Stage Works of FLN & KTN NDA” based on the Updated EM&A Manual of the Project. This report presents the baseline monitoring requirements, methodologies and results of baseline measurements in accordance with the requirements in the updated EM&A Manual.

2. AIR QUALITY MONITORING

2.1 Introduction

2.1.1 The baseline air quality monitoring involved daily 1-hr and 24-hr total suspended particulate (TSP) air quality monitoring, which the methodology, equipment, frequency, duration, calibration requirement, action and limit level determination are referenced to Section 2 of the Updated EM&A Manual.

2.2 Monitoring Requirement

2.2.1 With reference to Section 2.7 of the Updated EM&A Manual, the baseline TSP air quality monitoring will be conducted to determine the ambient TSP levels at the proposed monitoring locations prior to the commencement of the construction works. At each proposed monitoring station, it will be carried out for a continuous period of at least 14 consecutive days prior to the start of the construction works to obtain daily 24-hour TSP samples. 1-hour sampling shall also be carried out at least 3 times per day during the same period. The general meteorological conditions (e.g. wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should be recorded throughout the baseline monitoring.

2.3 Monitoring Locations

2.3.1 With reference to Section 2.6.1 of the Updated EM&A Manual, four air quality monitoring stations in KTN NDA (KTN-DMS1 to KTN-DMS4) and three air quality monitoring stations in FLN NDA (FLN-DMS1 to FLN-DMS3) are proposed and summarized in **Table 2.1**. The locations of the proposed air quality monitoring stations are shown in **Figure 2.1** and **Figure 2.2**.

Table 2.1 Summary of Air Quality Monitoring Stations

Monitoring Location No.	ASR ID in EIA	Planned or Existing	Description
KTN NDA			
KTN-DMS1	KTN-19	Planned	Nursery Classes and Kindergartens; Post Offices
KTN-DMS2	KTN-90	Planned	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre
KTN-DMS3	KTN-326	Planned	Village Resite
KTN-DMS4	KTN-E162	Existing	Temporary Structure near Fanling Highway (near Pak Shek Au)
FLN NDA			
FLN-DMS1	FLN-62	Existing	Scattered Village Houses North of Proposed Potential Ecopark
FLN-DMS2	FLN-243	Planned	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office
FLN-DMS3	FLN-E143	Existing	House near Tong Hang

- 2.3.2** ET delivered the power supply request letter twice to the property owners or occupiers nearby the air quality monitoring locations, however no response was received from the property owners or occupiers at KTN-DMS1, KTN-DMS2, KTN-DMS3 and FLN-DMS2. Therefore, these locations will be considered as no power supply available for High Volume Samplers (HVS).
- 2.3.3** As power supply for the HVS is not available at / in the vicinity of five air quality monitoring stations including KTN-DMS1, KTN-DMS2, KTN-DMS3, FLN-DMS2 and KTN-DMS4 was rejected by power owner, portable Laser Particle Photometer Monitors are proposed for conducting 24-hour TSP monitoring instead of High Volume samplers (HVS).
- 2.3.4** Previous example on similar CEDD project that approved by EPD for using portable Laser Particle Photometer Monitors to conduct 24-hour TSP monitoring can be referenced to the Project “Widening and Reconstruction of Tai Po Road (Sha Tin Section)” (EP-463/2013/B). The Project link is attached below:

https://www.epd.gov.hk/eia/english/alpha/aspd_219.html

2.4 Monitoring Equipment and Methodology

High Volume Samplers (HVS)

- 2.4.1** High volume samplers (HVS) completed with appropriate sampling inlets are employed for 24-hour TSP monitoring at FLN-DMS1 and FLN-DMS3.

Operating / Analytical Procedures

- 2.4.2** Operating / analytical procedures for the operation of HVS were as follow:
- A horizontal platform was provided with appropriate support to secure the samplers against gusty wind.
 - No two samplers were placed less than 2 metres apart.
 - The distance between the sampler and an obstacle, such as buildings, was at least twice the height that obstacle protrudes above the sampler.
 - A minimum of 2 metres away from any supporting structure, measured horizontally was required.
 - A minimum of 2 metres away from walls, parapets and penthouses was required for rooftop samples.
 - No furnaces or incineration flues were nearby.
 - Airflow around the sampler was unrestricted.
 - The sampler was more than 20 metres from the drip line.
 - Any wire fence and gate to protect the sampler, should not cause any obstruction during monitoring.
- 2.4.3** Prior to the commencement of the dust sampling, the flow rate of the high volume sampler was properly set (between 1.1 m³/min. and 1.4 m³/min.) in accordance with

the manufacturer's instruction to within the range recommended in USEPA Standard Title 40, CFR Part 50.

- 2.4.4** The power supply was checked to ensure the sampler worked properly.
- 2.4.5** During sampling, the sampler was operated for 5 minutes to establish thermal equilibrium before placing any filter media at the designated air monitoring station.
- 2.4.6** The filter holding frame was then removed by loosening the four nuts and carefully a weighted and conditioned filter was centered with the stamped number upwards, on a supporting screen.
- 2.4.7** The filter was aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter. Then the filter holding frame was tightened to the filter holder with swing bolts. The applied pressure should be sufficient to avoid air leakage at the edges.
- 2.4.8** The timer was then programmed. Information was 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).
- 2.4.9** After sampling, the filter was removed and sent to the laboratory for weighting. The elapsed time was also recorded.
- 2.4.10** Before weighing, all filters were 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%.

Maintenance / Calibration

2.4.11 The following maintenance / calibration was required for the HVS:

- The high volume motors and their accessories were properly maintained. Appropriate maintenance such as routine motor brushes replacement and electrical wiring checking were made to ensure that the equipment and necessary power supply were in good working condition.
- High volume samplers were calibrated at quarterly intervals using Tisch TE-5025A Calibration Kit throughout all stages of the air quality monitoring.

Direct Reading Dust Meter

2.4.12 Portable Laser Particle Photometer Monitors complete with appropriate sampling inlets are employed for 1-hour TSP monitoring at all seven air quality monitoring stations and 24-hour TSP monitoring at KTN-DMS1, KTN-DMS2, KTN-DMS3, KTN-DMS4 and FLN-DMS2. K-factor will be used to describe the correlation between the the measurement of portable Laser Particle Photometer Monitors and HVS.

Measuring Procedures

The measuring procedures of the Portable Laser Particle Photometer Monitors 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

Maintenance and Calibration

2.4.13 Calibration of air quality monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. Current calibration certificates are presented in **Appendix C**.

2.4.14 The equipment used for air quality monitoring is summarized in **Table 2.2**.

Table 2.2 Air Quality Monitoring Equipment

Manufacturer/Brand	Model	Equipment	Serial Number
Sibata	LD-5R	Sibata Portable TSP Monitors	620407
	LD-5R	Sibata Portable TSP Monitors	761106
	LD-5R	Sibata Portable TSP Monitors	882146
	LD-5R	Sibata Portable TSP Monitors	882147
	LD-5R	Sibata Portable TSP Monitors	892185
	LD-5R	Sibata Portable TSP Monitors	892186
	LD-5R	Sibata Portable TSP Monitors	892187
TISCH	TE-5170	High Volumn Sampler	4037
	TE-5170	High Volumn Sampler	3482

2.5 Baseline Monitoring Parameters, Frequency and Duration

2.5.1 **Table 2.3** summarizes the monitoring parameters, duration and frequency of baseline air quality monitoring.

Table 2.3 Baseline Monitoring Parameters, Duration and Frequency for Baseline Air Quality Monitoring

Parameter	Duration	Frequency
1 hour TSP	3 times per day	14 consecutive days
24 hour TSP	24 hour per day	

2.6 Action and Limit Levels

2.6.1 Action and limit levels for impact air quality monitoring are presented in **Table 2.4**.

Table 2.4 Action Level and Limit Level for Impact Air Quality Monitoring

Parameters	Action	Limit
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 200 \mu\text{g}/\text{m}^3$, Action level = $(\text{baseline level} * 1.3 + \text{Limit level})/2$; For baseline level $> 200 \mu\text{g}/\text{m}^3$ Action level = Limit level	$260 \mu\text{g}/\text{m}^3$
1-hour TSP Level in $\mu\text{g} /\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$, Action level = $(\text{baseline level} * 1.3 + \text{Limit level})/2$; For baseline level $> 384 \mu\text{g}/\text{m}^3$, Action level = Limit level	$500 \mu\text{g}/\text{m}^3$

2.7 Results and Observations

- 2.7.1 The baseline air quality monitoring was conducted from 17 September 2019 to 30 September 2019 and FLN-DMS1 delay one day (from 18 September 2019 to 1 October 2019) due to power supply problem. The detail monitoring schedule is shown in **Appendix B**.
- 2.7.2 The monitoring data of 1-hr TSP and 24-hr TSP are summarized in **Table 2.5** and **2.6** respectively. Detailed monitoring data are presented in **Appendix E**.

Table 2.5 Summary of 1-hr TSP Baseline Monitoring Results

Parameter	Monitoring Station	Description	Min ($\mu\text{g}/\text{m}^3$)	Max ($\mu\text{g}/\text{m}^3$)	Average ($\mu\text{g}/\text{m}^3$)
1-hr TSP in $\mu\text{g}/\text{m}^3$	KTN-DMS1	Nursery Classes and Kindergartens; Post Offices	24	192	65
	KTN-DMS2	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre	2	139	61
	KTN-DMS3	Village Resite	6	442	63
	KTN-DMS4	Temporary Structure near Fanling Highway (near Pak Shek Au)	13	187	73
	FLN-DMS1	Scattered Village Houses North of Proposed Potential Ecopark	61	112	82
	FLN-DMS2	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office	20	278	55
	FLN-DMS3	House near Tong Hang	69	88	78

Table 2.6 Summary of 24-hr TSP Baseline Monitoring Results

Parameter	Monitoring Station	Description	Min ($\mu\text{g}/\text{m}^3$)	Max ($\mu\text{g}/\text{m}^3$)	Average ($\mu\text{g}/\text{m}^3$)
24-hr TSP in $\mu\text{g}/\text{m}^3$	KTN-DMS1	Nursery Classes and Kindergartens; Post Offices	35	246	88
	KTN-DMS2	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre	15	370	109
	KTN-DMS3	Village Resite	16	326	89
	KTN-DMS4	Temporary Structure near Fanling Highway (near Pak Shek Au)	36	291	95
	FLN-DMS1	Scattered Village Houses North of Proposed Potential Ecopark	18	51	30
	FLN-DMS2	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office	34	148	70
	FLN-DMS3	House near Tong Hang	30	90	54

- 2.7.3 At KTN-DMS1, KTN-DMS2, KTN-DMS3, FLN-DMS1, FLN-DMS2 and FLN-DMS3, no air quality influencing factor was observed. At KTN-DMS4, road construction works from other

project was observed from 17 September 2019 to 30 September 2019 during the baseline monitoring period. No any project related construction activity in the vicinity of the monitoring stations during the baseline monitoring are noted and recorded. Observation of air quality influencing factor is shown in **Appendix G**.

Table 2.7 Summary of 1-hr TSP Baseline Monitoring Results and A/L Levels

Monitoring Station	Description	Average (Range) in $\mu\text{g}/\text{m}^3$	AL $\mu\text{g}/\text{m}^3$	LL $\mu\text{g}/\text{m}^3$
KTN-DMS1	Nursery Classes and Kindergartens; Post Offices	65 (24~192)	292	500
KTN-DMS2	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre	61 (2~139)	290	
KTN-DMS3	Village Resite	63 (6~442)	291	
KTN-DMS4	Temporary Structure near Fanling Highway (near Pak Shek Au)	73 (13~187)	297	
FLN-DMS1	Scattered Village Houses North of Proposed Potential Ecopark	82 (61~112)	303	
FLN-DMS2	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office	55 (20~278)	286	
FLN-DMS3	House near Tong Hang	78 (69~88)	301	

Table 2.8 Summary of 24-hr TSP Baseline Monitoring Results and A/L Levels

Monitoring Station	Description	Average (Range) in $\mu\text{g}/\text{m}^3$	AL $\mu\text{g}/\text{m}^3$	LL $\mu\text{g}/\text{m}^3$
KTN-DMS1	Nursery Classes and Kindergartens; Post Offices	88 (35~246)	187	260
KTN-DMS2	Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre	109 (15~370)	201	
KTN-DMS3	Village Resite	89 (16~326)	188	
KTN-DMS4	Temporary Structure near Fanling Highway (near Pak Shek Au)	95 (36~291)	192	
FLN-DMS1	Scattered Village Houses North of Proposed Potential Ecopark	30 (18~51)	150	
FLN-DMS2	Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office	70 (34~148)	176	
FLN-DMS3	House near Tong Hang	54 (30~90)	165	

Note: KTN-DMS1, KTN-DMS2, KTN-DMS3, KTN-DMS4, and FLN-DMS2 were conducted by using Laser Particle Photometer Monitors due to power supply issue.

2.8 Revisions for inclusion in the EM&A Manual

2.8.1 No revision is required for the updated EM&A Manual.

Figure 2.1
Baseline and Construction Air Quality Monitoring Locations (KTN NDA)

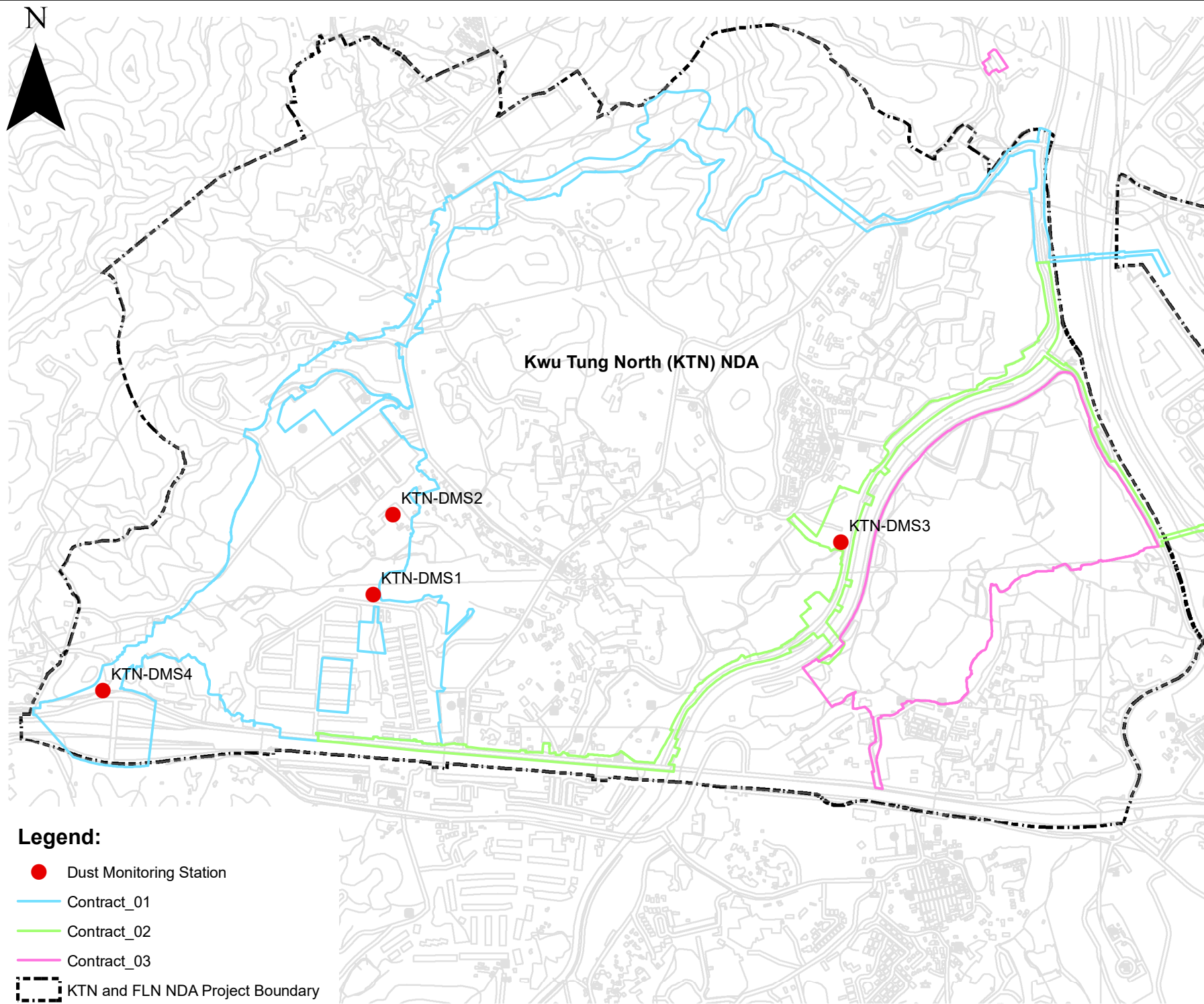


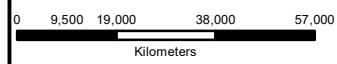
Figure 2.1
Baseline and Construction
Air Quality Monitoring
Location (KTN)



PRE-CONSTRUCTION ENVIRONMENTAL
 MONITORING AND AUDIT WORKS FOR
 THE ADVANCE AND FIRST STAGE WORKS
 OF KWU TUNG AND FANLING NORTH
 NEW DEVELOPMENT AREAS



I/R	DATE	DESCRIPTION	CHK



- Legend:**
- Dust Monitoring Station
 - Contract_01
 - Contract_02
 - Contract_03
 - KTN and FLN NDA Project Boundary

Contract No: NDO 14/2018

Figure 2.2
Baseline and Construction Air Quality Monitoring Locations (FLN NDA)

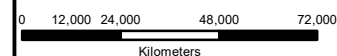
Figure 2.2
Baseline and Construction
Air Quality Monitoring
Location (FLN)



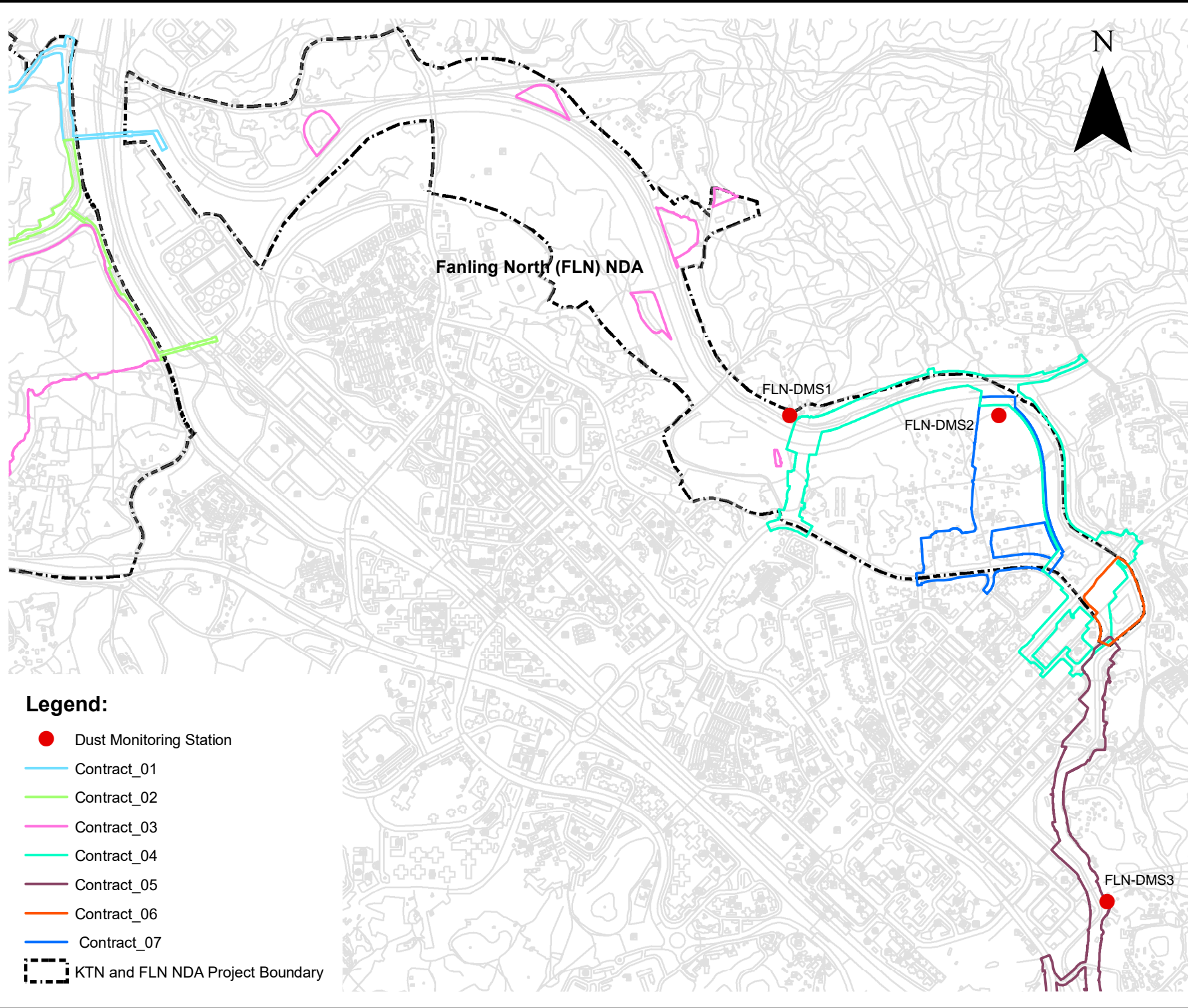
PRE-CONSTRUCTION ENVIRONMENTAL
MONITORING AND AUDIT WORKS FOR
THE ADVANCE AND FIRST STAGE WORKS
OF KWU TUNG AND FANLING NORTH
NEW DEVELOPMENT AREAS



I/R	DATE	DESCRIPTION	CHK



Contract No: NDO 14/2018



Legend:

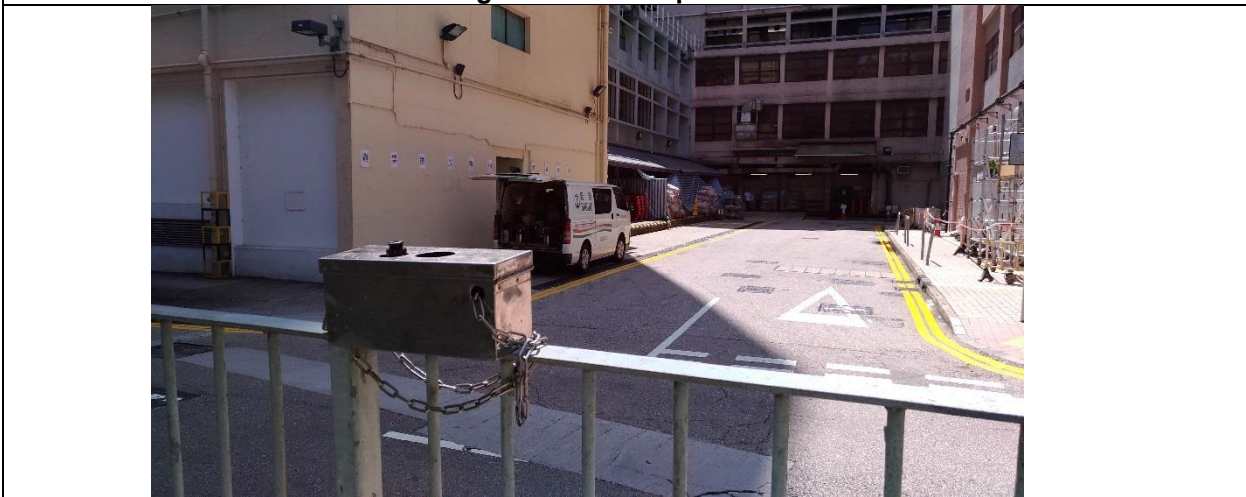
- Dust Monitoring Station
- Contract_01
- Contract_02
- Contract_03
- Contract_04
- Contract_05
- Contract_06
- Contract_07
- KTN and FLN NDA Project Boundary

APPENDICES

A. PHOTOS OF AIR QUALITY MONITORING EQUIPMENT



High Volume Sampler



Portable Laser Particle Photometer Monitor

B. BASELINE AIR QUALITY MONITORING SCHEDULE

Project: Contract No. NDO 14/2018 - Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas

Baseline Monitoring Schedule (Air_KLN&FLN)

Sun	Mon	Tue	Wed	Thur	Fri	Sat
1 September	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	18 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	19 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	20 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	21 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3
22 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	23 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	24 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	25 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	26 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	27 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	28 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3
29 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	30 KTN-DMS1 KTN-DMS2 KTN-DMS3 KTN-DMS4 FLN-DMS1 FLN-DMS2 FLN-DMS3	1 October KTN-DMS1	2	3	4	5

Notes:

- Monitoring Locations: KTN-DMS1 –Nursery Classes and Kindergartens, Post Office (Planned); KTN-DMS2 –Nursery Classes and Kindergartens (2 nos), District Elderly Community Centre (Planned); KTN-DMS3 – Village Resite (Planned); KTN-DMS4 –Temporary Structure near Fanling Highway (near Pak Shek Au); FLN-DMS1 – Scattered Village Houses North of Proposed Potential Ecopark; FLN-DMS2 – Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office (Planned); FLN-DMS3 – House near Tong Hang.

**C. COPIES OF CALIBRATION CERTIFICATE OF AIR QUALITY
MONITORING EQUIPMENT**

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report no. : 940891CA195965(4)

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-5R
Serial No. : 620407
Specification Limit : NA
Next Calibration Date : 11-Jul-2020

Laboratory Information

Description : Reference balance
Equipment ID. : R-053-12
Date of Calibration : 12-Jul-2019 Ambient Temperature : 22 °C
Calibration Location : Calibration Laboratory of FTS
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 ³)	Total count for 1 hour	CPM (Count per minute)
0.0678	2058	34.30
0.0424	1276	21.27
0.0364	842	14.03

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.002106
3. Correlation coefficient (r) : 0.9840

Checked by : cmf Date : 19-7-2019 Certified by : Leung Kwok Tai Date : 20-7-2019
CA-R-297 (22/07/2009) Leung Kwok Tai (Assistant Manager)

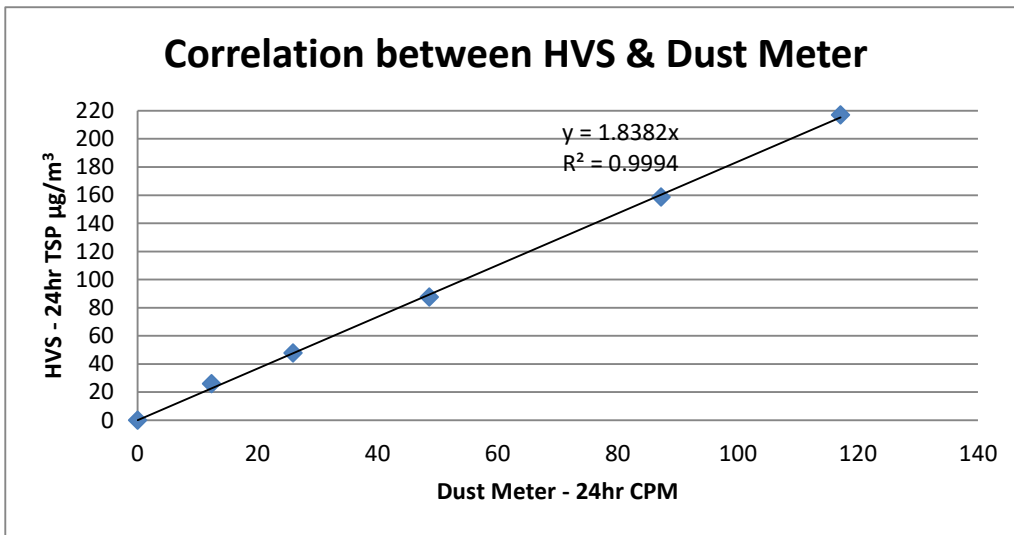
** End of Report **

Correlation between HVS & Dust Meter

Model: Sibata LD-5R
Serial No: 620407
Date of Calibration: 25 Febraury 2019
Date of Next Calibration: 24 Febraury 2020

Calibraion Record

HVS - 24hr TSP $\mu\text{g}/\text{m}^3$	25.99	47.66	87.57	158.63	216.9
Dust Meter - 24hr CPM	12.33	25.9	48.58	87.23	117.11



K factor = 1.8282

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report no. : 940891CA181789(4)

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-5R
Serial No. : 761106
Specification Limit : NA
Next Calibration Date : 04-Oct-2019

Laboratory Information

Description : Reference balance
Equipment ID. : R-039-12
Date of Calibration : 05-Oct-2018 Ambient Temperature : 21 °C
Calibration Location : Calibration Laboratory of FTS
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 ³)	Total count for 1 hour	CPM (Count per minute)
0.1165	3573	59.55
0.1232	3694	61.57
0.1489	3992	66.53

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.002071
3. Correlation coefficient (r) : 0.9962

Checked by : CONF Date : 15-11-2018 Certified by : K.T. Leung Date : 15-11-2018
CA-R-297 (22/07/2009) Leung Kwok Tai (Assistant Manager)

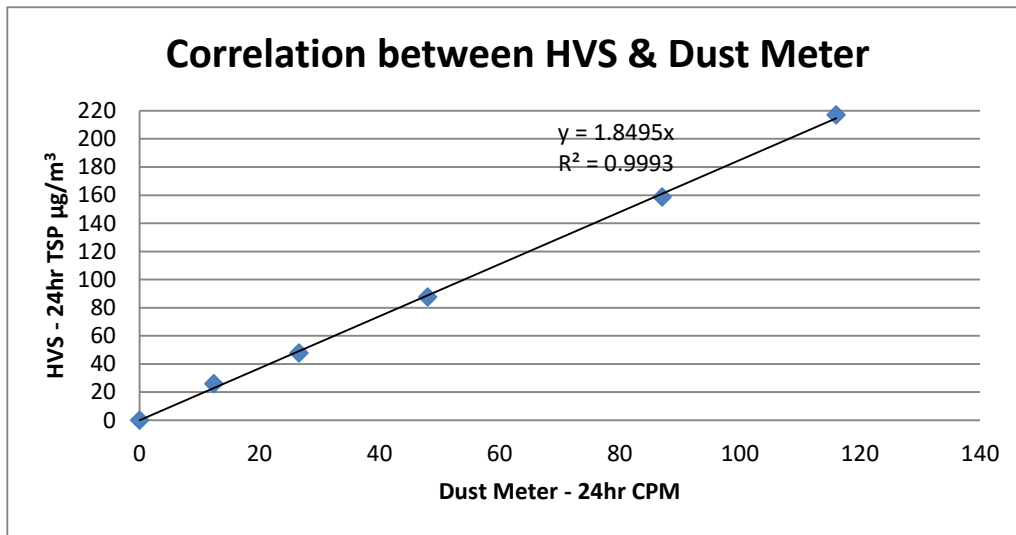
** End of Report **

Correlation between HVS & Dust Meter

Model: Sibata LD-5R
Serial No: 761106
Date of Calibration: 25 Febraury 2019
Date of Next Calibration: 24 Febraury 2020

Calibraion Record

HVS - 24hr TSP $\mu\text{g}/\text{m}^3$	25.99	47.66	87.57	158.63	216.9
Dust Meter - 24hr CPM	12.37	26.56	47.99	87.03	116.06



K factor = 1.8495

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report no. : 940891CA181731

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-5R
Serial No. : 882146
Specification Limit : NA
Next Calibration Date : 02-Oct-2019

Laboratory Information

Description : Reference balance
Equipment ID. : R-039-12
Date of Calibration : 03-Oct-2018 Ambient Temperature : 21 °C
Calibration Location : Calibration Laboratory of FTS
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 ³)	Total count for 1 hour	CPM (Count per minute)
0.0912	2918	48.63
0.0971	3050	50.83
0.0853	2721	45.35

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.001889
3. Correlation coefficient (r) : 0.9936

Checked by : Camf Date : 5-11-2018 Certified by : K.T. Leung Date : 6-11-2018
CA-R-297 (22/07/2009) Leung Kwok Tai (Assistant Manager)

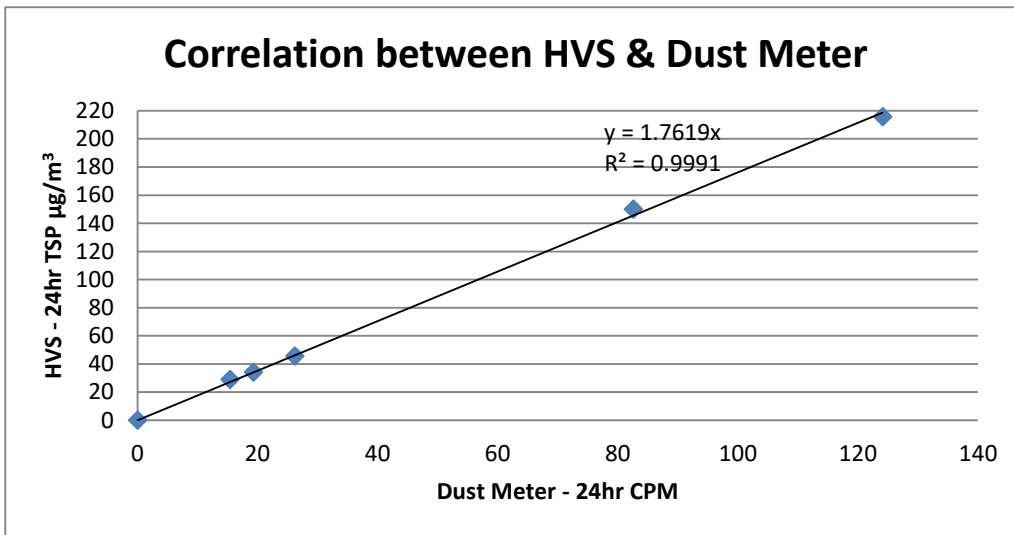
** End of Report **

Correlation between HVS & Dust Meter

Model: Sibata LD-5R
 Serial No: 882146
 Date of Calibration: 25 Febraury 2019
 Date of Next Calibration: 24 Febraury 2020

Calibraion Record

HVS - 24hr TSP $\mu\text{g}/\text{m}^3$	28.99	34.06	45.57	149.88	215.67
Dust Meter - 24hr CPM	15.4	19.3	26.2	82.59	124.12



K factor = 1.762

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report no. : 940891CA181731(4)

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-5R
Serial No. : 882147
Specification Limit : NA
Next Calibration Date : 02-Oct-2019

Laboratory Information

Description : Reference balance
Equipment ID. : R-039-12
Date of Calibration : 03-Oct-2018 Ambient Temperature : 21 °C
Calibration Location : Calibration Laboratory of FTS
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 ³)	Total count for 1 hour	CPM (Count per minute)
0.0912	2874	47.90
0.0971	3057	50.95
0.0853	2580	43.00

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.001929
3. Correlation coefficient (r) : 0.9911

Checked by : C. Wong Date : 5-11-2018 Certified by : K.T. Leung Date : 6-11-2018
CA-R-297 (22/07/2009)

Leung Kwok Tai (Assistant Manager)

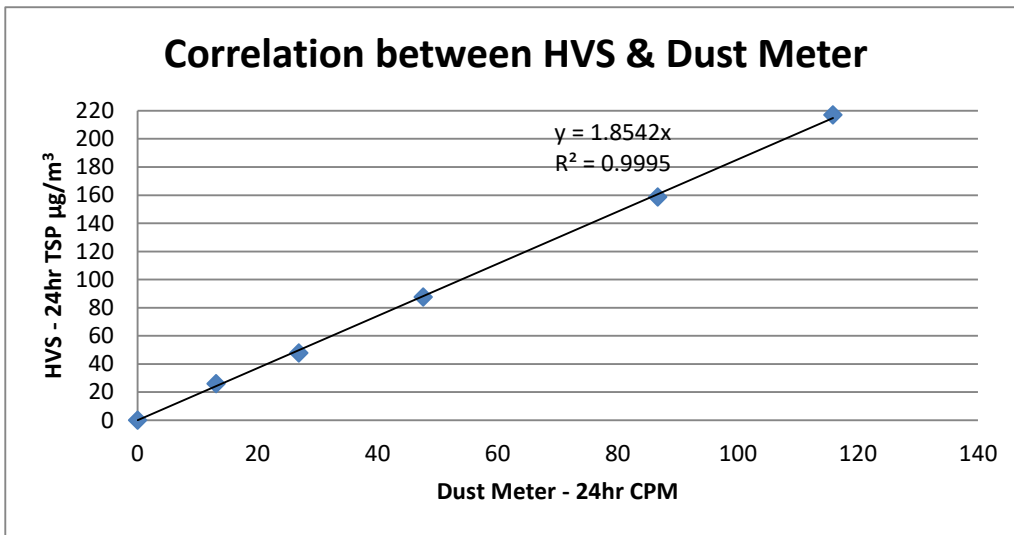
** End of Report **

Correlation between HVS & Dust Meter

Model: Sibata LD-5R
Serial No: 882147
Date of Calibration: 25 Febraury 2019
Date of Next Calibration: 24 Febraury 2020

Calibraion Record

HVS - 24hr TSP $\mu\text{g}/\text{m}^3$	25.99	47.66	87.57	158.63	216.9
Dust Meter - 24hr CPM	13.08	26.88	47.56	86.64	115.86



K factor = 1.8542

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report no. : 940891CA181902

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-5R
Serial No. : 892185
Specification Limit : NA
Next Calibration Date : 30-Oct-2019

Laboratory Information

Description : Reference balance
Equipment ID. : R-039-12
Date of Calibration : 31-Oct-2018 Ambient Temperature : 21 °C
Calibration Location : Calibration Laboratory of FTS
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 ³)	Total count for 1 hour	CPM (Count per minute)
0.1524	4423	73.72
0.1587	4618	76.97
0.1685	4828	80.47

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.002075
3. Correlation coefficient (r) : 0.9947

Checked by : Cammy Date : 6-12-2018 Certified by : K.T. Young Date : 6-12-2018
CA-R-297 (22/07/2009)

Leung Kwok Tai (Assistant Manager)

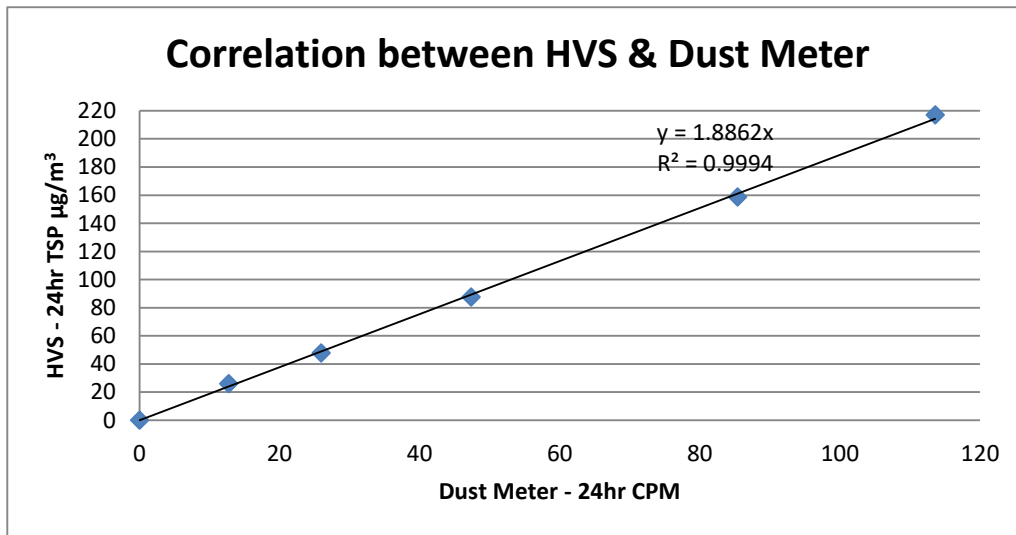
** End of Report **

Correlation between HVS & Dust Meter

Model: Sibata LD-5R
Serial No: 892185
Date of Calibration: 25 Febraury 2019
Date of Next Calibration: 24 Febraury 2020

Calibraion Record

HVS - 24hr TSP $\mu\text{g}/\text{m}^3$	25.99	47.66	87.57	158.63	216.9
Dust Meter - 24hr CPM	12.73	25.94	47.34	85.4	113.6



K factor = 1.8862

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report no. : 940891CA181902(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-5R
Serial No. : 892186
Specification Limit : NA
Next Calibration Date : 30-Oct-2019

Laboratory Information

Description : Reference balance
Equipment ID. : R-039-12
Date of Calibration : 31-Oct-2018 Ambient Temperature : 21 °C
Calibration Location : Calibration Laboratory of FTS
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 ³)	Total count for 1 hour	CPM (Count per minute)
0.1524	4032	67.20
0.1587	4269	71.15
0.1685	4816	80.27

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.002194
3. Correlation coefficient (r) : 0.9950

Checked by : CA-R-297 Date : 6-12-2018 Certified by : K.T. Young Date : 6-12-2018

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

Leung Kwok Tai (Assistant Manager)

** End of Report **

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report no. : 940891CA181902(2)

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-5R
Serial No. : 892187
Specification Limit : NA
Next Calibration Date : 30-Oct-2019

Laboratory Information

Description : Reference balance
Equipment ID. : R-039-12
Date of Calibration : 31-Oct-2018 Ambient Temperature : 21 °C
Calibration Location : Calibration Laboratory of FTS
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 ³)	Total count for 1 hour	CPM (Count per minute)
0.1524	4051	67.52
0.1587	4132	68.87
0.1685	4262	71.03

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.002312
3. Correlation coefficient (r) : 1.0000

Checked by : CA-R-297 Date : 6-12-2018 Certified by : P. I. Yung Date : 6-12-2018
CA-R-297 (22/07/2009)

Leung Kwok Tai (Assistant Manager)

** End of Report **

MATERIALAB CONSULTANTS LIMITED

Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

Tel : +852 2450 8238
Fax : +852 2450 8032
E-mail : mcl@fugro.com
Website : www.fugro.com



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Project :	Contract No. NDO 14/2018 - Advance and First Stage Works of KTN and FNL New Development Areas		Date of Calibration:	15-Sep-19
Location :	FLN-DMS3		Next Calibration Date:	15-Dec-19
Brand:	Tisch		Technician:	Tony Wan
Model:	TE-5170	S/N:	3482	

CONDITIONS			
Sea Level Pressure (hPa):	1009.0	Corrected Pressure (mm Hg):	757
Temperature (°C):	29.2	Temperature (K):	302

CALIBRATION ORIFICE			
Make:	Tisch	Qstd Slope:	2.13015
Model:	TE-5025A	Qstd Intercept:	-0.04186
Calibration Date:	17-Oct-18	Expiry Date:	17-Oct-19
S/N:	2154		

CALIBRATION							
Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	4.00	-8.10	12.100	1.638	51.00	50.54	Slope = 28.2944 Intercept = 4.4062 Corr. coeff.: 0.9984
13	2.50	-7.00	9.500	1.453	46.00	45.58	
10	1.40	-6.10	7.500	1.294	42.00	41.62	
7	0.90	-5.40	6.300	1.187	38.00	37.66	
5	0.60	-4.20	4.800	1.039	34.00	33.69	

Calculations:

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

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

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

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

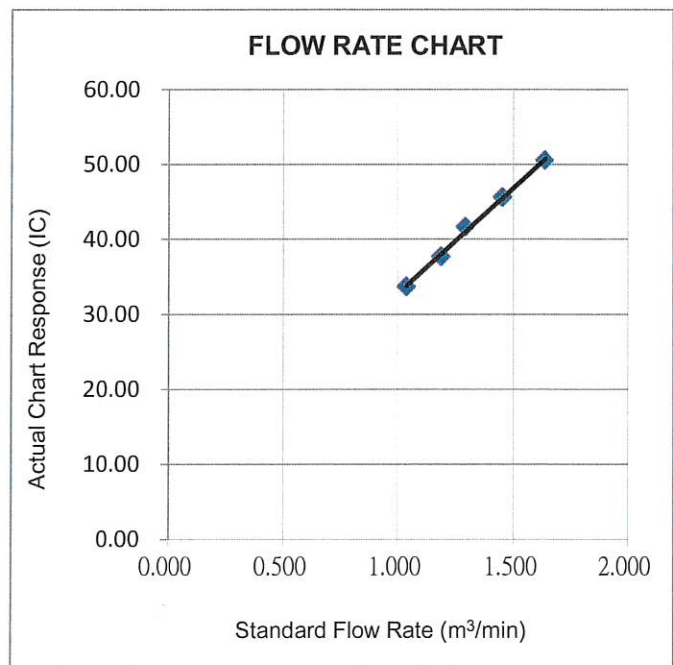
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



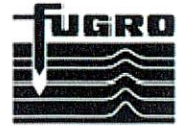
Lui Chi Yung
Project Consultant

Report Date: 15-Sep-2019

MATERIALAB CONSULTANTS LIMITED

Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

Tel : +852 2450 8238
Fax : +852 2450 8032
E-mail : mcl@fugro.com
Website : www.fugro.com



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Project : Contract No. NDO 14/2018 - Advance and First Stage Works of KTN and FNL New Development Areas Date of Calibration: 13-Sep-19
Location : FLN-DMS1 Next Calibration Date: 13-Dec-19
Brand: Tisch Technician: Tony Wan
Model: TE-5170 S/N: 4037

CONDITIONS

Sea Level Pressure (hPa): 1009.0 Corrected Pressure (mm Hg): 757
Temperature (°C): 29.2 Temperature (K): 302

CALIBRATION ORIFICE

Make: Tisch Qstd Slope: 2.13015
Model: TE-5025A Qstd Intercept: -0.04186
Calibration Date: 17-Oct-18 Expiry Date: 17-Oct-19
S/N: 2154

CALIBRATION

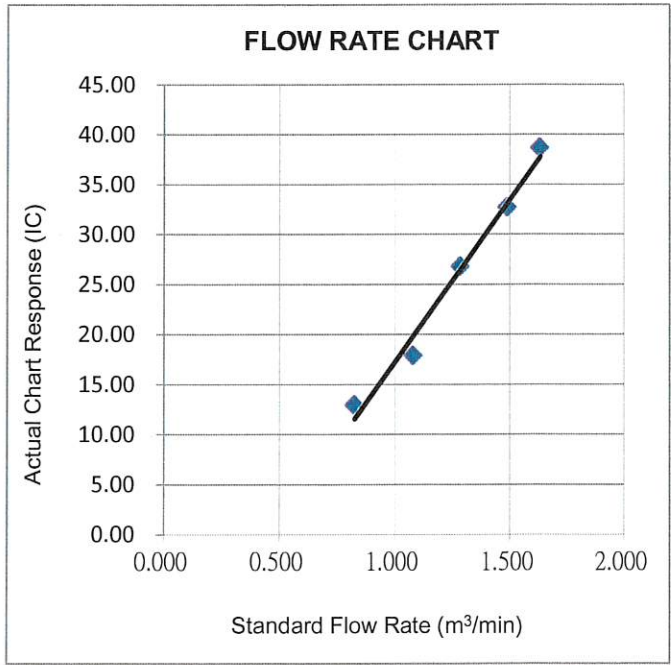
Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.20	-5.80	12.000	1.631	39.00	38.65	Slope = 32.5384 Intercept = -15.3177 Corr. coeff.: 0.9922
13	4.90	-5.10	10.000	1.491	33.00	32.70	
10	3.80	-3.60	7.400	1.285	27.00	26.76	
7	2.50	-2.70	5.200	1.080	18.00	17.84	
5	1.40	-1.60	3.000	0.825	13.00	12.88	

Calculations:

$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$
 $IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$
 Qstd = standard flow rate
 IC = corrected chart response
 I = actual chart response
 m = calibrator Qstd slope
 b = calibrator Qstd intercept
 Ta = actual temperature during calibration (deg K)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$
 m = sampler slope
 b = sampler intercept
 I = chart response
 Tav = daily average temperature
 Pav = daily average pressure



Lui Chi Yung
Project Consultant

Report Date: 14-Sep-2019



Certificate of Calibration

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

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

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

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

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

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

D. PHOTOS OF AIR QUALITY MONITORING LOCATIONS

Monitoring Location No.: KTN-DMS1
Description: Nursery Classes and Kindergartens; Post Office (Planned)



Monitoring Location No.: KTN-DMS2
Description: Nursery Classes and Kindergartens (2 nos); District Elderly Community Centre (Planned)



Monitoring Location No.: KTN-DMS3
Description: Village Resite (Planned)



Monitoring Location No.: KTN-DMS4
Description: Temporary Structure near Fanling Highway (near Pak Shek Au)



Monitoring Location No.: FLN-DMS1

Description: Scattered Village Houses North of Proposed Potential Ecopark



Monitoring Location No.: FLN-DMS2

Description: Residential Buildings, Nursery Classes and Kindergartens, Neighborhood Elderly Community Centre, Residential Home for the Elderly, Post Office (Planned)



Monitoring Location No.: FLN-DMS3
Description: House near Tong Hang



E. WEATHER AND METEOROLOGICAL CONDITIONS DURING BASELINE MONITORING PERIOD

Date	Mean Pressure (hPa)	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
		Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
September 2019						
17	1009.0	31.8	29.2	27.9	76	2.1
18	1010.9	32.0	28.8	25.8	79	18
19	1011.3	32.4	28.0	24.9	74	8.7
20	1008.7	32.6	29.0	26.2	52	0
21	1008.0	32.5	29.2	26.5	42	0
22	1012.2	31.3	28.3	25.9	40	0
23	1016.2	30.7	27.7	25.4	57	0
24	1017.5	30.3	27.5	26.3	70	0
25	1017.3	30.8	27.3	25.7	71	Trace
26	1017.2	30.8	27.5	25.5	71	0
27	1016.6	30.6	27.6	25.7	72	Trace
28	1015.0	32.2	28.2	25.9	71	0
29	1012.8	31.7	28.7	26.6	75	0
30	1008.8	33.4	30.1	27.2	64	0
October 2019						
01	1009.4	33.2	30.3	28.4	21.2	0

Source: Hong Kong Observatory – Hong Kong Observatory

F. BASELINE AIR QUALITY MONITORING DATA

1 HR Dust Monitoring

KTN-DMS1			
Serial No. 892185			
Date	1 st	2 nd	3 rd
17/9/2019	83	37	68
18/9/2019	59	61	68
19/9/2019	46	50	46
20/9/2019	26	35	35
21/9/2019	26	28	30
22/9/2019	26	28	30
23/9/2019	28	31	24
24/9/2019	39	35	44
25/9/2019	72	89	70
26/9/2019	46	46	50
27/9/2019	96	113	109
28/9/2019	89	85	78
29/9/2019	163	154	192
30/9/2019	87	81	80

KTN-DMS2			
Serial No. 882147			
Date	1 st	2 nd	3 rd
17/9/2019	15	12	6
18/9/2019	35	2	2
19/9/2019	17	17	21
20/9/2019	27	29	29
21/9/2019	33	35	35
22/9/2019	56	58	62
23/9/2019	50	54	54
24/9/2019	106	112	106
25/9/2019	112	48	35
26/9/2019	139	118	114
27/9/2019	139	118	114
28/9/2019	77	81	73
29/9/2019	93	83	75
30/9/2019	66	69	68

KTN-DMS3			
Serial No. 761106			
Date	1 st	2 nd	3 rd
17/9/2019	78	109	442
18/9/2019	74	59	55
19/9/2019	41	31	33
20/9/2019	6	11	6
21/9/2019	15	15	15
22/9/2019	26	24	24
23/9/2019	31	26	24
24/9/2019	33	30	24
25/9/2019	55	50	57
26/9/2019	43	46	44
27/9/2019	109	109	104
28/9/2019	72	63	52
29/9/2019	115	117	111
30/9/2019	96	72	68

KTN-DMS4			
Serial No. 882146			
Date	1 st	2 nd	3 rd
17/9/2019	91	87	111
18/9/2019	79	77	72
19/9/2019	60	59	53
20/9/2019	32	43	40
21/9/2019	38	49	40
22/9/2019	32	38	42
23/9/2019	38	38	36
24/9/2019	43	42	38
25/9/2019	77	76	76
26/9/2019	13	15	26
27/9/2019	125	161	145
28/9/2019	127	96	85
29/9/2019	187	130	138
30/9/2019	106	106	98

FLN-DMS1			
Serial No. 892186			
Date	1 st	2 nd	3 rd
18/9/2019	86	79	83
19/9/2019	92	105	101
20/9/2019	86	81	81
21/9/2019	92	99	97
22/9/2019	112	108	92
23/9/2019	83	86	83
24/9/2019	81	77	79
25/9/2019	61	68	70
26/9/2019	72	70	72
27/9/2019	75	77	75
28/9/2019	83	81	81
29/9/2019	77	79	70
30/9/2019	75	72	75
1/10/2019	79	81	77

FLN-DMS2			
Serial No. 620407			
Date	1 st	2 nd	3 rd
17/9/2019	278	161	139
18/9/2019	55	55	73
19/9/2019	35	42	53
20/9/2019	33	24	33
21/9/2019	29	27	29
22/9/2019	22	24	26
23/9/2019	24	24	24
24/9/2019	22	24	26
25/9/2019	22	20	26
26/9/2019	37	40	44
27/9/2019	84	69	51
28/9/2019	102	106	108
29/9/2019	51	48	49
30/9/2019	62	66	59

FLN-DMS3			
Serial No. 892187			
Date	1 st	2 nd	3 rd
17/9/2019	83	81	86
18/9/2019	81	86	79
19/9/2019	74	76	69
20/9/2019	72	74	72
21/9/2019	79	81	79
22/9/2019	88	86	83
23/9/2019	72	69	69
24/9/2019	74	76	74
25/9/2019	79	81	72
26/9/2019	74	76	76
27/9/2019	79	74	72
28/9/2019	74	76	76
29/9/2019	79	81	79
30/9/2019	79	83	83

KTN-DMS1
(Direct Reading Dust Meter)

Serial No. 892185

	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep
85	60	47	26	26	26	26	28	40	74	47	98	91	166	89
38	62	51	36	28	28	28	32	36	91	47	115	87	157	83
70	70	47	36	30	30	30	25	45	72	51	111	79	196	81
60	68	41	26	32	32	32	30	36	136	43	104	106	115	74
77	75	45	28	47	47	47	32	36	104	45	121	102	115	83
100	62	43	26	66	66	66	30	41	60	115	91	113	89	91
115	75	62	23	34	34	34	34	60	47	81	74	117	89	128
141	64	72	30	38	38	38	38	47	62	47	72	128	102	157
151	62	70	38	28	28	28	28	57	60	51	85	121	124	151
192	64	77	77	38	38	38	38	43	53	43	96	124	241	145
191	60	91	98	34	34	34	49	62	64	58	111	115	247	155
207	60	92	75	28	28	28	60	70	53	75	104	117	279	164
194	72	96	94	34	34	34	49	83	49	70	83	119	302	183
204	72	115	106	38	38	38	57	102	72	85	75	113	364	192
168	72	121	62	47	47	47	57	96	75	96	91	111	330	191
181	70	132	92	51	51	51	57	117	83	94	104	102	300	187
185	68	155	132	57	57	57	51	89	64	79	108	100	323	194
160	47	147	124	45	45	45	41	60	55	207	102	98	358	204
166	38	124	85	36	36	36	49	51	51	145	108	92	360	140
162	41	128	34	28	28	28	53	49	64	89	77	87	362	109
113	45	85	21	17	17	17	41	43	53	60	68	91	379	100
102	47	28	21	17	17	17	38	45	60	68	94	66	298	100
106	49	91	23	19	19	19	41	47	62	68	98	68	300	106
106	47	92	25	21	21	21	40	49	64	70	96	70	315	102
Average	136	61	86	56	35	35	42	59	68	77	95	101	246	134

Note: Air Monitoring was conducted by using Laser Particle Photometer Monitors due to power supply issue.

KTN-DMS2
(Direct Reading Dust Meter)

Serial No. 882147

	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep
15	35	17	27	33	56	50	106	112	139	139	77	93	66	66
12	2	17	29	35	58	54	112	48	118	118	81	83	69	69
6	2	21	29	35	62	54	106	35	114	114	73	75	68	68
2	2	17	29	31	156	52	93	27	110	110	71	68	83	83
4	2	23	31	33	79	48	87	35	120	120	77	58	114	114
6	6	23	35	44	54	75	71	50	87	87	95	62	85	85
73	6	23	35	54	42	83	62	44	104	297	112	75	100	100
37	8	17	35	50	48	64	123	58	224	224	122	139	108	108
31	12	14	33	54	46	69	135	79	116	116	123	174	120	120
33	14	8	42	46	48	60	122	77	268	268	123	127	137	137
50	19	21	42	50	46	64	98	73	297	297	125	137	149	149
56	33	19	46	58	50	69	89	52	322	322	125	147	150	150
46	27	23	44	68	50	66	68	27	403	403	131	150	143	143
54	25	21	44	75	60	79	73	17	577	577	152	147	123	123
50	10	23	41	79	60	71	81	23	903	903	145	131	123	123
66	4	35	39	83	50	66	98	27	413	413	156	129	125	125
81	10	29	50	71	48	77	89	33	503	503	156	133	127	127
85	12	25	44	71	52	149	73	27	951	951	152	147	135	135
64	12	29	41	58	44	162	68	23	500	500	160	156	110	110
71	10	21	42	56	50	95	66	29	511	511	133	152	58	58
60	27	15	56	71	69	95	62	122	532	532	100	95	48	48
62	29	15	62	60	77	110	64	106	451	451	98	73	69	69
62	31	17	60	58	81	108	66	102	457	473	100	75	71	71
58	33	15	54	54	83	110	64	104	529	457	102	81	66	66
Average	45	15	20	41	55	61	80	86	55	365	370	116	113	102

Note: Air Monitoring was conducted by using Laser Particle Photometer Monitors due to power supply issue.

KTN-DMS3
(Direct Reading Dust Meter)

Serial No. 761106

	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep
87	83	46	6	17	29	35	37	62	48	122	81	128	108	108
122	66	35	12	17	27	29	33	56	52	122	70	130	81	81
495	62	37	6	17	27	27	27	64	50	116	58	124	77	77
418	56	37	8	19	23	29	31	116	54	112	68	108	70	70
665	70	43	2	27	23	31	37	58	46	83	70	91	108	108
712	77	68	4	25	25	33	48	52	50	72	83	77	130	130
739	81	72	8	27	37	33	43	54	43	64	64	106	108	108
822	85	77	23	23	33	43	43	58	68	93	77	106	93	93
698	79	83	27	27	37	43	41	54	48	95	72	141	135	135
462	41	85	33	27	29	43	43	56	50	108	52	178	128	128
313	54	104	29	35	33	48	41	56	58	75	41	228	116	116
286	68	124	29	31	35	52	50	60	58	70	48	261	114	114
263	58	137	27	8	37	46	56	64	58	72	50	228	130	130
230	35	159	27	4	37	54	72	64	62	83	58	226	145	145
226	48	155	21	8	37	52	68	62	70	120	50	205	149	149
220	52	157	21	14	41	52	68	68	60	124	54	207	174	174
186	52	139	19	14	37	54	64	56	75	151	50	207	174	174
172	64	147	23	17	25	64	60	64	81	104	41	213	180	180
170	79	145	23	12	23	72	66	58	85	108	50	336	133	133
99	68	35	10	8	23	68	48	58	91	85	75	307	110	110
108	62	33	6	2	25	64	43	62	79	95	101	313	106	106
112	56	27	2	4	25	46	41	48	39	137	137	327	110	110
110	60	33	17	6	25	54	46	50	43	120	139	329	112	112
108	64	29	10	6	27	52	43	52	48	116	143	319	116	116
Average	326	63	84	16	30	47	48	60	59	102	72	204	121	121

Note: Air Monitoring was conducted by using Laser Particle Photometer Monitors due to power supply issue.

KTN-DMS4
(Direct Reading Dust Meter)

Serial No. 882146

	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep
85	74	56	30	35	30	35	41	72	12	116	118	174	99	
81	72	55	41	46	35	35	39	70	14	150	90	122	99	
104	67	49	37	37	39	33	35	70	25	136	79	129	92	
106	85	48	30	39	39	37	37	99	16	120	69	120	76	
120	62	48	23	42	39	39	39	150	19	122	70	109	81	
118	67	42	21	44	35	44	42	58	32	100	86	95	86	
141	83	55	26	42	32	69	44	62	32	86	81	85	86	
150	79	78	33	39	30	41	49	58	30	97	95	104	107	
159	67	72	32	41	39	67	49	60	58	111	146	139	136	
178	81	76	42	42	49	67	44	58	85	100	132	224	137	
218	70	90	46	48	49	51	49	69	113	194	104	226	139	
201	81	93	46	49	39	55	55	65	56	150	102	307	148	
204	63	99	53	53	39	60	58	69	44	115	60	335	157	
106	79	116	46	51	41	60	65	74	49	125	86	351	166	
245	62	107	41	26	42	46	65	72	42	113	74	329	153	
271	76	107	55	25	85	48	69	74	51	134	65	419	155	
294	78	111	55	30	46	58	74	69	67	141	83	423	192	
368	95	130	55	26	46	63	63	69	92	176	100	375	203	
109	93	116	55	25	48	70	56	83	100	166	86	456	176	
113	88	136	33	26	39	79	65	81	111	174	93	483	134	
106	93	92	25	28	28	74	76	90	92	174	123	515	106	
92	67	33	35	19	33	63	69	78	78	190	136	493	113	
93	72	99	39	28	35	65	70	74	79	192	137	478	115	
99	74	102	41	30	37	67	70	76	78	189	137	483	116	
Average	157	76	84	39	36	41	55	55	75	57	140	98	291	128

Note: Air Monitoring was conducted by using Laser Particle Photometer Monitors due to power supply issue.

FLN-DMS2
(Direct Reading Dust Meter)

Serial No. 620407

	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep
320	63	40	38	34	25	27	25	25	42	97	118	59	72	
185	63	48	27	32	27	27	27	23	46	80	122	55	76	
160	84	61	38	34	29	27	29	29	51	59	124	57	67	
150	84	88	44	40	32	27	32	32	42	76	116	57	74	
135	93	84	38	46	29	32	29	32	44	82	126	51	72	
150	97	86	53	48	27	27	27	25	48	82	105	53	76	
225	97	110	63	51	32	32	32	13	55	101	103	55	82	
185	72	122	65	48	48	53	48	51	61	139	101	63	84	
177	65	120	74	57	65	55	65	55	61	135	105	74	124	
139	86	116	69	69	48	59	48	61	63	133	107	80	118	
116	84	122	74	59	42	55	42	55	74	110	124	72	131	
133	59	141	78	36	44	55	36	51	78	116	116	74	135	
143	76	141	72	29	55	63	29	51	67	105	93	97	126	
145	82	152	63	25	57	63	25	40	67	114	88	63	139	
131	88	171	65	25	63	61	25	32	65	105	101	61	118	
187	95	177	63	34	61	57	34	34	51	122	116	53	110	
141	95	177	57	29	44	63	29	36	48	164	120	59	84	
112	88	65	53	32	34	59	32	38	44	166	114	55	67	
105	78	42	38	29	32	65	34	38	40	171	120	48	69	
101	67	42	29	27	48	59	38	32	36	118	86	44	74	
99	59	51	32	32	46	80	29	29	36	116	84	42	67	
103	55	36	110	27	48	48	34	27	34	40	82	25	72	
101	59	38	34	36	48	53	36	32	34	42	84	38	69	
99	59	40	38	34	51	59	40	34	36	44	80	36	76	
Average	148	77	95	55	38	43	50	34	36	51	105	106	57	91

Note: Air Monitoring was conducted by using Laser Particle Photometer Monitors due to power supply issue.

FLN-DMS1 (High Volume Sampler)				
Serial No. 4037				
Date	Filter Paper ID	Initial Weight (g)	Final Weight (g)	Concentration (mg/m3)
18/9/2019	M4065	2.732	2.819	29
19/9/2019	M4058	2.746	2.799	25
20/9/2019	M4060	2.724	2.783	31
21/9/2019	M4063	2.741	2.802	32
22/9/2019	M4000	2.769	2.813	18
23/9/2019	M4015	2.750	2.820	30
24/9/2019	M4016	2.755	2.805	18
25/9/2019	M4276	2.652	2.743	35
26/9/2019	M3765	2.757	2.854	37
27/9/2019	M4253	2.651	2.783	51
28/9/2019	M4254	2.667	2.763	38
29/9/2019	M4255	2.658	2.737	32
30/9/2019	M4257	2.646	2.722	22
1/10/2019	M4259	2.648	2.740	27

FLN-DMS3 (High Volume Sampler)				
Serial No. 3482				
Date	Filter Paper ID	Initial Weight (g)	Final Weight (g)	Concentration (mg/m3)
17/9/2019	M3972	2.767	2.839	52
18/9/2019	M4064	2.732	2.800	32
19/9/2019	M4057	2.736	2.811	51
20/9/2019	M4059	2.740	2.829	50
21/9/2019	M4061	2.724	2.834	45
22/9/2019	M3999	2.757	2.835	49
23/9/2019	M4019	2.749	2.823	43
24/9/2019	M4017	2.743	2.798	30
25/9/2019	M4275	2.667	2.772	83
26/9/2019	M3766	2.732	2.811	44
27/9/2019	M4018	2.734	2.874	87
28/9/2019	M4062	2.741	2.831	55
29/9/2019	M4256	2.643	2.797	90
30/9/2019	M4258	2.643	2.704	44

G. OBSERVATION OF AIR QUALITY INFLUENCING FACTOR

Location: Nearby Monitoring Location KTN-DMS4

Description: Road construction works from other project was observed during the baseline monitoring period

