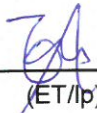




Contractor's General Submission Form (CGS)

Contract No.	3/WSD/15		
Project Title:	In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works) – Advance Works		
CGS No.:	3WSD15/CGS/SEQ/ALL/JV0207A	Issue:	A Date: 12/01/2017
To:	Engineer's Representative	Your Ref:	
Attention:	Mr. Derek K H Ng		
From:	Ming Hing – Ming Hing Civil – Vastream Joint Venture		
Title:	EM&A Impact Monitoring Report (December)		
Specification:	---		
Purpose:	<input type="checkbox"/> For Information <input type="checkbox"/> For Comment <input type="checkbox"/> For Approval <input checked="" type="checkbox"/> For Record		
Description of Contents:			
We herewith submit the EM&A Impact Monitoring Report (December 2016) for your perusal and record.			
Attachment:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Number of Copies:	4+3 CD
Expected reply date:	26 January 2017		
Issued By:	 _____ (ET/lp)	Printed Name:	Mr. Eros To
Designation:	Site Agent	Date:	12 January 2017
Received By:	_____		Received Date: _____
	(Signature & Received Chop)		

* Delete if not applicable

CC. JV Partner – (w/ encl.)
 Office Master Copy – (w/ encl.)

Your ref:

Our ref: CJO-3113

By hand

Chief Engineer /Project Management

Water Supplies Department

46/F., Immigration Tower

7 Gloucester Road, Wanchai

(Attn: Mr. Aletta CHIU)

10 January, 2017

Dear Sir,

In-Situ Re provisioning of Sha Tin Water Treatment Works – South Works

Environmental Permit EP-494/2015

Submission of 10th monthly EM&A Report

In accordance with the Condition 3.4 of the Environmental Permit (No. EP-494/2015), we submit herewith 5 hard copies and 2 electronic copies of the 10th monthly Environmental Monitoring and Audit (EM&A) Report (Rev.0) for your processing. I certified and confirmed the submission of this monthly EM&A Report had complied with the requirements as set out in the approved Environmental Monitoring and Audit (EM&A) Manual of the EIA Report (Register No.: AEIAR-187/2015).

Yours faithfully,



Ir Dr Lam, Gabriel, C.K.

Environmental Team Leader

c.c. Independent Environmental Checker

Your Ref:
Our Ref: 60479142/C/fyw1701101

By Hand & By Email

Chief Engineer/Project Management
Water Supplies Department
46/F., Immigration Tower
7 Gloucester Road, Wanchai

Attn: Mr. Aletta CHIU

11 January 2017

Dear Sir,

Contract No.3/WSD/15
In-situ reprovisioning of Sha Tin Water Treatment Works (South Works) Advance Works
Submission of 10th Monthly EM&A Report for December 2016

Reference is made to Environmental Team (ET)'s 10th Monthly EM&A Report for December 2016 (Rev. 0) submitted on 10 January 2017.

In accordance with the Condition 3.4 of the Environmental Permit (No.EP-494/2015), I verified and confirmed the submission of this Monthly EM&A Monitoring Report as compiled with the requirements as set in the approved Environmental Monitoring and Audit (EM&A) Manual of the EIA Report (Register No.: AEIAR-187/2015).

Should you have any queries, please feel free to contact the undersigned at 3922 9366.

Yours faithfully,
AECOM Asia Co. Ltd.



Y W Fung
Independent Environmental Checker

c.c. Environmental Team Leader

**MONTHLY ENVIRONMENTAL MONITORING AND AUDIT
(EM&A) REPORT (NO. 10)**

FOR

**CONTRACT NO. 3/WSD/15
IN-SITU REPROVISIONING OF SHA TIN
WATER TREATMENT WORKS – SOUTH WORKS**

(Rev. 0)

**MONTHLY ENVIRONMENTAL
MONITORING AND AUDIT
(EM&A) REPORT (NO. 10) -**

FOR

**CONTRACT NO. 3/WSD/15
IN-SITU REPROVISIONING OF SHA TIN WATER
TREATMENT WORKS – SOUTH WORKS**



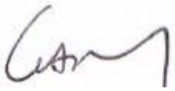

	Name	Signature
Prepared by	Mr. Lok, Kenny, K. M.	
Checked & Reviewed by	Ir Leung, Jacky, C. H.	
Approved & Certified by	Ir Dr. Lam, Gabriel, C. K. Environmental Team Leader (ETL)	
Verified & Confirmed by	Mr. Fung, Y. W. Independent Environmental Checker (IEC)	

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EXECUTIVE SUMMARY

- A.1 Pursuant to the Environmental Impact Assessment (EIA) Ordinance, the Director of Environmental Protection (DEP) granted the Environmental Permit (No. EP- 494/2015) to the Water Supplies Department (WSD) to construct and operate the designated project for “In-situ Reprovisioning of Sha Tin Water Treatment Works - South Works” (“The Project”).
- A.2 Under Contract No. 3/WSD/15, Ming Hing - Ming Hing Civil - Vasteam Joint Venture (MMVJV) is commissioned by WSD to undertake the construction of the advance works while AECOM Asia Company Limited was appointed by WSD as the Engineer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, Acumen Environmental Engineering & Technologies Company Limited was appointed by MMVJV as the Environmental Team (ET). AECOM Asia Company Limited was also employed by the WSD as the Independent Environmental Checker (IEC).
- A.3 The construction phase of the Contract commenced on 30 October 2015 for completion by 2018. The impact monitoring of the EM&A programme, including air quality, noise, water quality monitoring as well as environmental site inspections, commenced on 17 February 2016.
- A.4 This is the 10th monthly Environmental Monitoring and Audit Report for this Contract covering the period from 1 December 2016 to 31 December 2016 (the Reporting Period). As informed by the Contractor, major activities in the reporting period included:
- Site clearance and site formation works at Logistics Centre area.
 - Construction of bored pile for Wall C and D.
 - Construction of Valve Chamber at Wall D
 - Modification of clarifier no.1
 - Site formation works for North Works Temporary Power House
 - Laying of storm water drain and construct box culvert at Tin Sum Nullah

- A.5 Environmental monitoring activities under the EM&A program in this reporting period are summarized below

Issues	Environmental Monitoring Parameters / Inspection	Occasions
Air	1-Hour TSP	7
Noise	$L_{eq(30mins)}$ Daytime	7
Water Quality	Water Sampling	12
Inspection / Audit	ET Regular Environmental Site Inspection	5
	IEC Monthly Environmental Site Audit	1

- A.6 No exceedance of air quality, noise and water quality monitoring were recorded in this reporting period.
- A.7 No environmental complaint were received via EPD in this reporting period.
- A.8 No notification of any summons and successful prosecutions was received in this reporting period.
- A.9 No reporting change was made in this reporting period.
- A.10 There was no EPD site inspection were conducted in the reporting period.
- A.11 As informed by the Contractor, the major works for this Project in January 2017 will be:
- Construction of valve chamber at Wall D
 - Site clearance and site formation works at Logistics Centre area.
 - Construction of bored pile for Wall C and Wall D.
 - Modification of clarifier no.1



- Site formation works for North Works Temporary Power House
- Laying of storm water drain and construct box culvert at Tin Sum Nullah

A.12 EM&A monitoring for the 10th reporting period has been completed. The 11th monthly EM&A report will cover the period from 1 January 2017 to 31 January 2017.



1. INTRODUCTION

1.1. PROJECT BACKGROUND

- 1.1.1 Pursuant to the Environmental Impact Assessment (EIA) Ordinance, the Director of Environmental Protection (DEP) granted the Environmental Permit (No. EP- 494/2015) on 28 January 2015, subsequent to approval of the EIA Report (Register No. AEIAR-187/2015), to the Water Supplies Department (WSD) to construct and operate the designated project for “In-situ Reprovisioning of Sha Tin Water Treatment Works - South Works” (“The Project”).
- 1.1.2 Under Contract No. 3/WSD/15, Ming Hing - Ming Hing Civil - Vasteam Joint Venture (MMVJV) is commissioned by WSD to undertake the construction of the advance works while AECOM Asia Company Limited was appointed by WSD as the Engineer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, Acumen Environmental Engineering & Technologies Company Limited was appointed by MMVJV as the Environmental Team (ET). AECOM Asia Company Limited was also employed by the WSD as the Independent Environmental Checker (IEC).
- 1.1.3 The construction phase of the Contract commenced on 30 October 2015 for completion by 2018. The general layout plan of the Contract components is presented in **Appendix A**.
- 1.1.4 ET conducted below baseline monitoring at designated locations according to the EM&A Manual.
- Air quality and noise: from 21 December 2015 to 3 January 2016.
- Water quality: from 15 December 2015 to 8 January 2016.
- 1.1.5 Baseline Monitoring Report was issued by the ET and verified by the IEC on 27 January 2016 and submitted to the EPD on 2 February 2016.
- 1.1.6 The impact monitoring of the EM&A programme, including air quality, noise, water quality monitoring as well as environmental site inspections, commenced on 17 February 2016.

1.2. ORGANIZATION STRUCTURE

1.2.1 The organization structure of the Contract is shown in **Appendix B**. Contact details of key personnel are summarized in below table:

Table 1-1: Key Personnel Contact for Environmental Works

Party	Position	Name	Telephone
Water Supplies Department	Engineer / Project Management	Mr. Chiu, Aletta C. M.	2829 5653
AECOM	Senior Resident Engineer (Civil)	Mr. Ng, Derek, K. H.	9717 1420
	Independent Environmental Checker	Mr. Fung, Y. W.	3922 9366
	Deputy Independent Environmental Checker	Ms. Lam, Lemon, M. C.	3922 9381
Ming Hing - Ming Hing Civil - Vasteam Joint Venture	Project Manager	Mr. Lam, Larry, M. W.	6478-0501
	Site Agent	Mr. To, Eros, W. H.	9223 9590
Acumen Env. Eng. & Tech. Co. Ltd.	Environmental Team Leader	Ir Dr. Lam, Gabriel, C. K.	2333 6823
	Deputy Environmental Team Leader	Ir Leung, Jacky, C. H.	9060 2368
	Ecologist	Mr. Liu, Vincent, W. L.	6505 5827

1.3. SCOPE OF REPORT

1.3.1 This is the 10th monthly EM&A Report under the Contract No. 3/WSD/15 In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works) – Advance Works covering the period from 1 December 2016 to 31 December 2016 (the reporting period).

1.3.2 The EM&A requirements for impact monitoring are set out in the approved EM&A Manual. Environmental aspects such as the construction air quality, noise, water quality and ecology were identified as the key issues during the construction phase of the Project.

1.4. SUMMARY OF CONSTRUCTION WORKS

1.4.1 The construction phase of the Contract commenced on 30 October 2015. Latest construction programmes is shown in **Appendix C**.

1.4.2 As informed by the Contractor, details of the major works carried out in this reporting month are listed below:

- Site clearance and site formation works at Logistics Centre area.
- Construction of bored pile for Wall C and D.
- Construction of Valve Chamber at Wall D
- Modification of clarifier no.1
- Site formation works for North Works Temporary Power House
- Laying of storm water drain and construct box culvert at Tin Sum Nullah

1.4.3 The locations of the construction activities are shown in **Appendix D**. The Environmental Sensitive Receivers in the vicinity of the Project are shown in **Appendix E**.

2. EM&A RESULTS

2.1. EM&A BACKGROUND

2.1.1 The EM&A programme required environmental monitoring for air quality, noise, water quality and ecology as well as environmental site inspections for air quality, noise, water quality, waste management and ecology impacts. The EM&A requirements and related findings for each component are summarized in the following sections. A summary of impact monitoring programme is presented in Table 2-1.

Table 2-1: Summary of Impact Monitoring Programme

Impact Monitoring	Sampling Parameter	Frequency
Air Quality	1-hour TSP	3 times in every 6 days when documented and valid complaint was received
Noise	$L_{eq\ 30\ min}$, $L_{eq\ 5\ min}$, L_{10} and L_{90} as reference.	1 time per week: ◆ $L_{eq\ 30\ min}$ for normal weekdays from 0700 - 1900;
Water Quality	Duplicate in-situ measurements: Dissolved Oxygen (DO), Turbidity and pH; HOKLAS-accredited laboratory analysis: Suspended Solids (SS).	3 days per week. The interval between 2 monitoring days will be more than 36 hours.
Ecology	-	A detailed at least 6 years post-planting monitoring and maintenance programme

Remark: Sampling Depth for Water Quality:

- (i) 3 depths: 1m below water surface, 1m above bottom and at mid-depth when the water depth exceeds 6m.
- (ii) If the water depth is between 3m and 6m, 2 depths: 1m below water surface and 1m above bottom.
- (iii) If the water depth is less than 3m, 1 sample at mid-depth is taken

2.1.2 A summary of the monitoring parameters is presented in Table 2-2.

Table 2-2: Summary of the monitoring parameters of EM&A Requirements

Environmental Issue	Parameter
Air Quality	● 1-hour TSP Monitoring by Real-Time Portable Dust Meter
Noise	● $L_{eq\ (30min)}$ during normal working hours
Water Quality	In-situ measurement <ul style="list-style-type: none"> ● Dissolved Oxygen (mg/L); ● Dissolved Oxygen Saturation (%); ● Turbidity (NTU); ● pH value; ● Water depth (m); and ● Temperature (°C)
	Laboratory analysis <ul style="list-style-type: none"> ● Suspended Solids (mg/L)

- 2.1.3 Summary of determination of Action/Limit (A/L) Levels for air quality, noise and water quality are presented in **Appendix F**.
- 2.1.4 Should non-compliance of the environmental quality criteria occurs, remedial actions will be triggered according to the Event and Action Plan enclosed in **Appendix G**.
- 2.1.5 The impact monitoring schedules are presented in **Appendix H** and the monitoring results are detailed in the following sub-sections.

2.2. AIR QUALITY MONITORING

- 2.2.1 Impact monitoring for air quality had been carried out in accordance with Sections 2.29 of the approved EM&A Manual to determine the ambient 1-hour total suspended particulates (TSP) levels at the monitoring locations. 1-hour TSP sampling should be undertaken at least 3 times in every six-days at each monitoring station when the highest dust impacts are expected. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources had also been recorded throughout the impact monitoring period.
- 2.2.2 Two (2) designated monitoring stations, AM1 located at the L Louey and AM2 located at Hin Keng Estate - Hin Wan House, were recommended in Section 2.18 of the approved EM&A Manual. In order to identify and seek for the access of the air monitoring locations designated in the EM&A Manual, site visit was conducted among ET, IEC and EPD.
- 2.2.3 During the site visit, all designated air monitoring locations were identified. Details of air monitoring stations are described in Table 2-3. The location plan of air quality monitoring stations is shown in **Appendix I**.

Table 2-3: Location of the Air Quality Monitoring Stations

Air Quality Monitoring Station	Air Sensitive Receiver (ASR) ID in the approved EIA Report	Dust Monitoring Station
AM1	ASR2	The L Louey (at a platform level of about 5m above road level nearby)
AM2	ASR4	Hin Keng Estate - Hin Wan House (at the roof top)

- 2.2.4 The monitoring equipment using for the air quality impact monitoring was proposed by ET and verified by IEC. 1-hour TSP levels had been measured with direct reading dust meter. It has been demonstrated its capability in achieving comparable results with high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50). The details of equipment using for impact monitoring are listed in Table 2-4 as below.

Table 2-4: Air Quality Impact Monitoring Equipment

Equipment	Model
Portable dust meter – 1-hour TSP	TSI DustTrak Aerosol Monitor Model 8532
Portable Wind Speed Indicator	The Kestrel Pocket Weather Meter

- 2.2.5 The 1-hour TSP meter provides a real time 1-hour TSP measurement based on 90° light scattering. The 1-hour TSP monitor consists of the following:
- A pump to draw sample aerosol through the optic chamber where TSP is measured;
 - A sheath air system to isolate the aerosol in the chamber to keep the optics clean for maximum

reliability; and

- A built-in data logger compatible with based program to facilitate data collection, analysis and reporting.

2.2.6 The 1-hour TSP meter was calibrated by the manufacturer prior to purchasing. Zero response of the instrument was checked before and after each monitoring event. Operation of the 1-hour TSP meter followed manufacturer’s Operation and Service Manual. A valid calibration certificate is attached in **Appendix J**.

2.2.7 In this Reporting Period, a total of seven (7) sampling days perform air quality monitoring at the two designated locations. The results for 1-hour TSP are summarized in Table 2-5 and Table 2-6.

Table 2-5: Summary of 1-hour TSP Monitoring Results – AM1

Date	Weather	1-hour TSP ($\mu\text{g}/\text{m}^3$)				
		Start Time	End Time	1 st Measurement	2 nd Measurement	3 rd Measurement
2/12/2016	Sunny	09:09	12:09	149	144	138
5/12/2016	Sunny	09:11	12:11	140	128	123
9/12/2016	Sunny	08:58	11:58	165	172	177
14/12/2016	Cloudy	08:59	11:59	166	170	158
19/12/2016	Sunny	09:00	12:00	143	149	153
23/12/2016	Cloudy	09:04	12:04	150	158	147
28/12/2016	Sunny	08:59	11:59	143	149	140
Average				150.6		
Range				123-177		

Table 2-6: Summary of 1-hour TSP Monitoring Results – AM2

Date	Weather	1-hour TSP ($\mu\text{g}/\text{m}^3$)				
		Start Time	End Time	1 st Measurement	2 nd Measurement	3 rd Measurement
2/12/2016	Sunny	13:23	16:23	117	103	111
5/12/2016	Sunny	13:16	16:16	121	114	110
9/12/2016	Sunny	13:59	16:59	148	151	159
14/12/2016	Cloudy	13:44	16:44	138	129	117
19/12/2016	Sunny	13:01	16:01	110	117	121
23/12/2016	Cloudy	12:59	15:59	117	122	113
28/12/2016	Sunny	14:00	17:00	123	129	114
Average				123.0		
Range				103-159		

2.2.8 In this Reporting Month, all monitoring result were below the action level. Hence, no Action or Limit Level exceedance was triggered during this month. The impact air quality monitoring results and graphical presentation are shown in **Appendix K**.

2.3. NOISE MONITORING

- 2.3.1 Impact monitoring for noise levels had been measured in accordance with Sections 3.13 of approved EM&A Manual on normal weekdays at a frequency of once a week at logging interval of 30 minutes for daytime (between 0700 and 1900 hours of normal weekdays). The L_{eq} had been recorded at the specified intervals. The non-project related construction activity – Sha Tin to Central Link (SCL) for Hin Keng to Diamond Hill Tunnel, in the vicinity of the monitoring stations during the impact monitoring had been noted and the source and location of this activity had been recorded.
- 2.3.2 According to Section 3.7 of the approved EM&A Manual, 3 noise sensitive receivers designated for the construction noise monitoring. The designated monitoring stations are identified and successfully granted by the premises. The details of noise monitoring stations are described in Table 2-7 and the location plan of noise monitoring stations is shown in **Appendix L**.

Table 2-7: Details of Noise Monitoring Stations

Noise Monitoring Station	Noise Sensitive Receiver (NSR) ID in the approved EIA Report	Identified Noise Monitoring Station
NM1	HK2	The L Louey (South) (at a platform level of about 5m above road level nearby - free field measurement)
NM2	HK5	Hin Keng Estate – Hin Wan House (at the roof level - facade measurement)
NM3	HK7	C.U.H.K.F.A.A. Thomas Cheung School (at the roof level - free field measurement)

- 2.3.3 The monitoring equipment using for the noise impact monitoring was proposed by ET and verified by IEC. Sound level meter in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications has been used for carrying out the noise monitoring. The sound level meter has been checked using an acoustic calibrator. The wind speed has been checked with a portable wind speed meter capable of measuring the wind speed in m/s. The details of equipment using for impact monitoring are listed in Table 2-8 as below.

Table 2-8: Noise Impact Monitoring Equipment

Noise	
Sound Level Meter	Pulsar 43 Sound level meter
Acoustic Calibrator	Sound Calibrator Pulsar 105
Portable Wind Speed Indicator	The Kestrel Pocket Weather Meter

- 2.3.4 All noise measurements were the meter set to FAST response and on the A-weighted equivalent continuous sound pressure level (L_{eq}).
- 2.3.5 Prior to the impact noise measurement, the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Regular checking was conducted in impact monitoring period. The calibration level before and after the noise measurement is agreed to within 1.0 dB.
- 2.3.6 An acoustic calibrator and sound level meter using impact monitoring is within the valid period and were calibrated per year. A set of valid calibration certificates is attached in Appendix M.
- 2.3.7 Noise measurements should not be made in presence of fog, rain, wind with a steady speed exceeding 5 ms^{-1} or wind with gusts exceeding 10 ms^{-1} . The wind speed was checked with a portable wind speed meter capable of measuring with speeds in ms^{-1} .
- 2.3.8 In this Reporting Period, a total seven (7) occasions noise monitoring was undertaken in Reporting period. The noise monitoring results at the designated locations are summarized in Tables 2-9 to 2-11.

Table 2-9: Summary of Noise Monitoring Results – NM1

Date	Weather	Start Time	1 st Leq _{5min}	2 nd Leq _{5min}	3 rd Leq _{5min}	4 th Leq _{5min}	5 th Leq _{5min}	6 th Leq _{5min}	Leq _{30min}	
2/12/2016	Sunny	13:07-13:37	67.3	68.0	68.3	69.1	68.6	69.4	68.5	
5/12/2016	Sunny	14:38-15:08	64.1	63.4	61.2	63.0	62.9	62.5	62.9	
9/12/2016	Sunny	16:39-17:09	65.2	62.4	63.6	64.2	64.8	67.3	64.9	
14/12/2016	Cloudy	15:07-15:37	67.9	68.1	66.3	67.5	65.9	66.6	67.1	
19/12/2016	Sunny	10:22-10:52	68.3	69.0	67.1	67.3	67.9	68.1	68.0	
23/12/2016	Cloudy	10:51-11:21	68.6	69.7	69.5	69.7	70.1	68.3	69.4	
28/12/2016	Sunny	9:50-10:20	67.9	67.5	68.3	66.7	69.1	69.6	68.3	
Limit Level		>75dB(A)							Average	67.5
									Range	62.9-69.4

Table 2-10: Summary of Noise Monitoring Results – NM2

Date	Weather	Start Time	1 st Leq _{5min}	2 nd Leq _{5min}	3 rd Leq _{5min}	4 th Leq _{5min}	5 th Leq _{5min}	6 th Leq _{5min}	Leq _{30min}	
2/12/2016	Sunny	13:54-14:24	59.1	58.4	58.7	59.3	57.9	58.4	58.7	
5/12/2016	Sunny	14:03-14:33	58.6	59.1	58.4	58.9	57.7	59.3	58.7	
9/12/2016	Sunny	16:01-16:31	55.8	55.4	57.2	56.3	56.6	55.8	56.2	
14/12/2016	Cloudy	14:52-15:22	58.7	59.3	57.9	58.1	58.1	58.4	58.4	
19/12/2016	Sunny	11:01-11:31	56.1	56.5	55.9	56.9	57.3	55.3	56.4	
23/12/2016	Cloudy	11:40-12:10	57.1	56.8	56.8	58.1	57.5	55.9	57.1	
28/12/2016	Sunny	10:34-11:04	56.7	55.9	56.3	55.4	56.0	55.1	55.9	
Limit Level		>75dB(A)							Average	57.5
									Range	55.9-58.7

Table 2-11: Summary of Noise Monitoring Results – NM3

Date	Weather	Start Time	1 st Leq _{5min}	2 nd Leq _{5min}	3 rd Leq _{5min}	4 th Leq _{5min}	5 th Leq _{5min}	6 th Leq _{5min}	Leq _{30min}
2/12/2016	Sunny	14:49-15:19	55.1	55.7	56.0	53.8	54.3	54.7	55.0
5/12/2016	Sunny	15:27-15:57	57.3	56.6	56.4	55.9	57.0	56.3	56.6
9/12/2016	Sunny	15:05-15:35	54.1	55.2	54.8	54.5	53.8	55.0	54.6
14/12/2016	Cloudy	15:41-16:11	54.1	53.7	53.5	54.4	52.9	53.1	53.6
19/12/2016	Sunny	11:41-12:11	53.1	55.7	54.9	55.1	55.3	55.8	55.1
23/12/2016	Cloudy	10:13-10:43	53.1	53.7	53.0	53.4	53.9	54.2	53.6
28/12/2016	Sunny	11:14-11:44	53.2	52.9	53.7	55.1	54.4	53.1	53.8
Limit Level								Average	54.7
70dB(A) during normal teaching periods and 65 dB(A) during examination periods								Range	53.6-56.6

2.3.9 As shown in the results were well below the limit level, also no complaint was received by the RE, WSD, EPD and contractor. Hence, no Action or Limit Level exceedance was triggered during this month. The impact noise quality monitoring results and graphical presentation are shown in **Appendix N**.

2.4. WATER QUALITY MONITORING

2.4.1 Water Impact monitoring had been taken three days per week with sampling or measurement in accordance with Sections 4.12 of the approved EM&A Manual at all designated monitoring stations in the 2 water courses. The interval between 2 sets of monitoring had been more than 36 hours. Replicate in-situ measures had been carried out in each sampling event.

2.4.2 Three (3) control and two (2) impact stations were recommended in the Section 4.7 of the approved EM&A Manual to carry out water quality monitoring. In order to identify and seek for the access of the water monitoring locations designated in the approved EM&A Manual, site visit was conducted among ET, IEC and Environmental Protection Department (EPD).

2.4.3 During the site visit, all designated monitoring locations were identified however one more impact stations (M3) along the same water course was introduced due to the concern on multiple site effect, in particular to address the potential impact to M2 from a source at upstream of the water course. Details and coordinates of the monitoring stations are described in Table 2-12 and the location plan of water quality monitoring stations is shown in **Appendix O**.

Table 2-12: Details of Water Quality Monitoring Station

Water Quality Monitoring Station	Description	Co-ordinates	
		Easting	Northing
C1	Control Stations	835110	824716
C2		835403	824470
C3		835642	824386
M1	Impact Monitoring Stations	835215	824827
M2		835536	824775
M3		835501	824648

- 2.4.4 The water monitoring equipment and analysis using for the water quality monitoring were proposed by ET and verified by IEC. The details of equipment using for impact monitoring are listed in the Table 2-13 below:

Table 2-13: Monitoring Equipment Used in Impact Monitoring Program

Water quality	
YSI Model ProDSS Multi-parameter Water Quality Monitoring System	
Thermometer & DO meter	The instrument is a portable and weatherproof dissolved oxygen (DO) measuring instrument complete with cable and sensor, and use a DC power source. The equipment is capable of measuring as included a DO level in the range of 0 - 20mg/L and 0 - 200% saturation; and a temperature of 0 - 45°C.
pH meter	The instrument consists of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It is readable to 0.1 pH in range of 0 to 14.
Turbidimeter	The instrument is a portable and weatherproof turbidity measuring instrument using a DC power source. It has a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU.
Laboratory Analysis	
Suspended Solids	HOKLAS-accredited laboratory (Acumen Laboratory and Testing Limited)

Remark:

- (i) *Water samples for suspended solids (SS) have been stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen).*

- 2.4.5 Before the commencement of the sampling, general information such as the date and time of sampling as well as the personnel responsible for monitoring were recorded on the monitoring field data sheet.
- 2.4.6 Water temperature, turbidity, DO, pH and water depth were measured in-situ. Since water depths at C1, C2, M1, M2 and M3 were less than 3 m, all in-situ measurements and sampling conducted at one water depth such as mid-depth are performed. Moreover, C3 was recorded dry throughout the sampling period. Therefore, in-situ measurements and sampling could not be conducted at C3 in accordance with the water monitoring requirements in the approved EM&A Manual.
- 2.4.7 At each sampling point, (two) 2 consecutive measurements of temperature, DO, turbidity and pH were measured. The Multi-Parameter Water Quality Monitoring Probe were retrieved out of the water after the first measurement and then re-deployed for the second measurement. Where the difference in the value between the first and second readings of each set was more than 25% of the value of the first reading, the reading was discarded and further readings were taken. The certification of the Multi-parameter Water Quality Monitoring System is showed in **Appendix P**.
- 2.4.8 All water samples were delivered to the Acumen Laboratory and Testing Limited (HOKLAS registration no.: 241). SS testing was used HOKLAS accredited Analytical method APHA 2540 D. The certification of laboratory with HOKLAS accredited analytical tests are provided in **Appendix Q**.
- 2.4.9 In this reporting period, a total of twelve (12) sampling days perform water monitoring at the six designated locations. Monitoring results of 4 key parameters: dissolved oxygen (DO), turbidity, suspended solids and pH in this Reporting Months, are summarized in Table 2-14.

Table 2-14: Summary of Water Quality Monitoring Results

Dissolved Oxygen – Mid Depth (mg/L)	C1	C2	C3	M1	M2	M3
Average	8.26	8.46	N/A	9.01	9.02	9.23
Min.	7.81	8.12	N/A	8.91	8.94	9.17
Max.	9.01	9.21	N/A	9.19	9.14	9.33
Turbidity – Mid Depth (NTU)	C1	C2	C3	M1	M2	M3
Average	3.29	2.60	N/A	3.01	5.60	0.79
Min.	2.40	1.70	N/A	1.90	2.20	0.60
Max.	3.70	3.00	N/A	3.90	8.60	1.00
Suspended Solid – Mid depth (mg/L)	C1	C2	C3	M1	M2	M3
Average	2.19	1.87	N/A	1.72	2.42	<1
Min.	2.00	1.30	N/A	1.10	1.10	<1
Max.	2.50	2.30	N/A	2.30	5.50	<1
pH value (unit)	C1	C2	C3	M1	M2	M3
Average	7.72	8.03	N/A	7.71	7.97	8.01
Min.	7.50	7.17	N/A	7.10	7.24	7.50
Max.	7.84	8.40	N/A	8.12	8.50	8.53

2.4.10 In this Reporting Month, all monitoring result were below or within the action level. Hence, no Action or Limit Level exceedance was triggered during this month. Detailed monitoring results including in-situ measurements, laboratory analysis data are shown in **Appendix R**.

2.5. ECOLOGY

2.5.1 Detailed Vegetation Survey Report and Woodland Compensation Plan submitted to EPD and approved on 17 February 2016. To ensure the planting works are properly implemented, bi-weekly monitoring is proposed throughout the planting phase. The frequency of monitoring is proposed to be bi-monthly during the first years of the planting stage, and then reduced to quarterly for the six (6) year post-planting period.

2.5.2 A 6 years post-planting review report will be submitted within a month after completion of the at least 6 years post-planting monitoring and maintenance.

2.5.3 A bi-weekly monitoring scheduled on 10 and 24 December 2016 during the Reporting Period. Detailed monitoring report (No. 21 and No. 22) are shown in **Appendix S**.

2.5.4 *Ailanthus* (*Ailanthus fordii*) and Incense Tree (*Aquilaria sinensis*) was transplanted to new location within STWTW. The condition of TA572 was observed in fair condition while TA326 and TA327 were in poor condition. Tree crown of TA326 and TA327 was observed thinner than the observation in last observation. Moreover, fungi attack and dead wood had been observed on TA326 on 12 November 2016. Contractor was advised to apply the growing hormone helping TA326 and TA327 to regenerate their roots. Hong Kong Eagle's Claw was observed dead during inspection on 20 August 2016. New fronds of transplanted Lamb of Tartary were observed growing out. Lamb of Tartary was under recovery after transplantation. Currently, Lamb of Tartary were temporally stored on Nursery garden at Wang Toi Shan, Kam Tin. It is recommended to retain them at the nursery garden under proper maintenance during current recovery stage.

2.5.5 In general, all transplanted Lamb of Tartary were in fair condition while Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016 and the survival rate was 96%.

2.5.6 In order to compensate for the lost of transplanted Hong Kong Eagle's Claw, it is recommended to plant an individual of native climber species at compensatory planting site (Sha Tin South Fresh Water Service Reservoir (STSFWSR)) together with compensatory tree planting. The suggested species in planting list would have certain ecological value in terms of plant ecology and the associated wildlife including birds.

2.5.7 After transplantation, root ball of TA572, TA326 and TA327 tree should be kept moisture especially during dry and non-raining day. Greenland has applied mulching for TA572, TA326 and TA327 to control the growth of weeds and act as slow releasing fertilizer. In order to effectively maintain the growth of weeds, contractor was advised to remove weeds and to increase the mulching area.

2.6. WASTE MANAGEMENT STATUS

- 2.6.1 The Contractor has submitted application form for registration as chemical waste producer under the Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting. The Waste Producer Number to the Contractor is assigned in respect of the project site.
- 2.6.2 Wastes generated during this reporting period include mainly construction wastes (inert and non-inert). Waste flow table was prepared by the Contractor to record amount of waste generated and disposed (**Appendix T**).
- 2.6.3 The Contractor was advised to properly maintain on site C&D materials and waste collection, sorting and recording system, dispose of C&D materials and wastes at designated ground and maximize reuse/ recycle of C&D materials and wastes.
- 2.6.4 The Contractor was also reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly. For chemical waste containers, the Contractor was reminded to treat properly and store temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

2.7. DELIVERY, STORAGE AND HANDLING OF CHLORINE

- 2.7.1 Chlorine is delivered to Sha Tin WTW in batches of up to 6×1-tonne drums. The transport route from Sham Shui Kok dock on North Lantau is shown in **Figure 1**. The route passes along the North Lantau Expressway, around the northern edge of Tsing Yi, through Tsuen Wan and along Tai Po Road (Piper's Hill) to Sha Tin (Table 2-15)

Figure 1: Chlorine Transport Route to Sha Tin Water Treatment Works



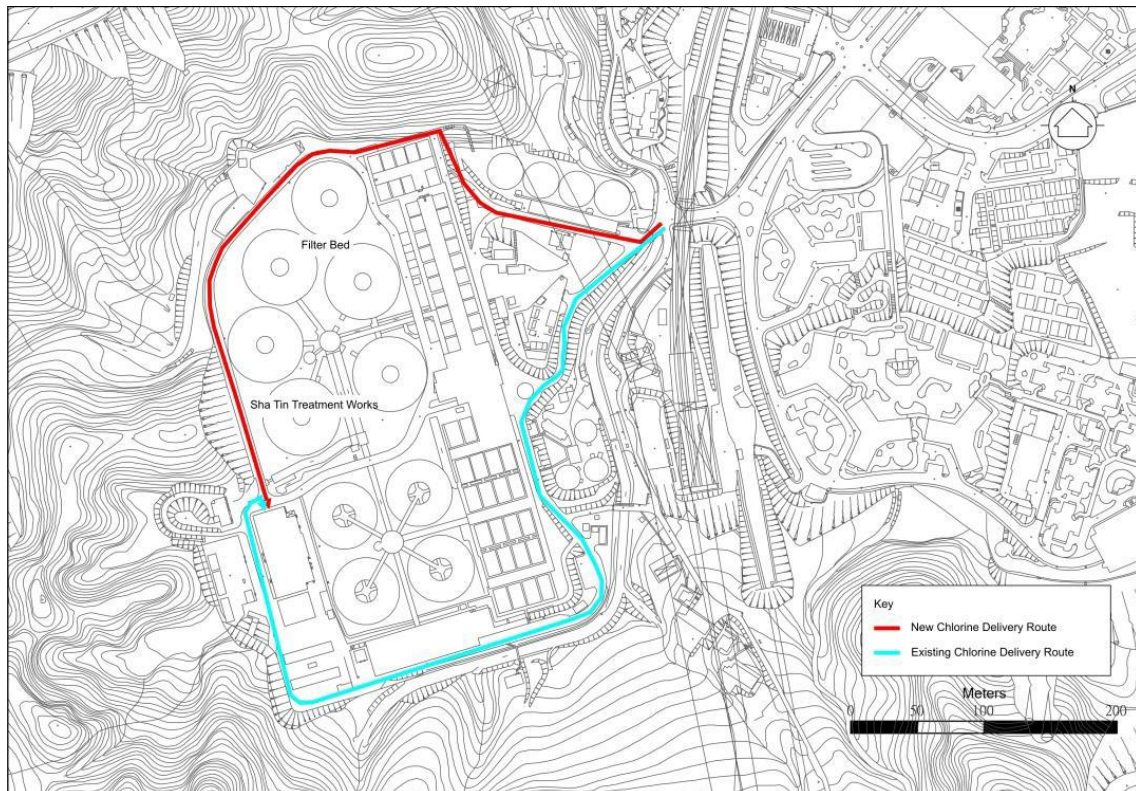
Table 2-15: Chlorine Truck Transport Route

Destination	Route
From SSK Dock to Sha Tin WTW	Sham Shui Kok Dock > Cheung Tung Road > Sunny Bay Road > N Lantau Highway > Lantau Link > NW Tsing Yi Interchange > Tsing Yi North Coastal road > Tsing Tsuen Road > Tsuen Wan Road > Kwai Chung Road > Ching Cheung Road > Tai Po Road > Tai Po Road (Piper’s Hill) > Tai Po Road (Sha Tin Heights) > Tai Po Road > Tsing Sha Highway (Sha Tin) > Tai Po Rd (Sha Tin) > Sha Tin Rural Committee Rd > Tai Chung Kiu Rd > Che Kung Miu Road > Sha Tin WTW

2.7.2 Unloading takes place inside the Chlorination House, with the doors closed, in a designated truck unloading bay. The movement of drums within the storage area and ‘drive-through’ unloading bay is carried out using a hoist/monorail system with a purpose-built lifting beam. Prior to usage, the drums are stored on cradles within the chlorine storage area.

2.7.3 The on-site chlorine delivery route is shown in Figure 2.

Figure 2: Chlorine Delivery Route at Sha Tin WTW





- 2.7.4 An emergency chlorine scrubbing system is installed to remove any leaked chlorine in the chlorine handling and storage areas. The system is a packed tower utilising sodium hydroxide as the neutralising agent. The plant and equipment are installed in a separate scrubber room.
- 2.7.5 On detection of chlorine at a concentration of 3 ppm or above in the chlorine handling or storage areas, the scrubbing system will activate automatically. The air/chlorine mixture in the affected areas is drawn into the scrubber by the scrubber fan via ducting connected to the normal ventilation system. An electrically-operated isolating damper is provided in the scrubber intake which opens automatically when the scrubber fan starts up.
- 2.7.6 The scrubber system is normally set at auto standby mode and is activated if the chlorine concentration rises above 3 ppm. A continuous chlorine monitor is installed at a point downstream of the packed tower and upstream of the vent/recycle changeover dampers to monitor the scrubber performance; a “Chlorine concentration high” alarm will be initiated if the concentration of chlorine in the tower exhaust exceeds the preset value.
- 2.7.7 According to the Fire Services Department’s fire safety requirements, an emergency repair/stoppage kit for chlorine spillage/leakage is provided and maintained in good working condition at all times for use by the trained persons and stowed adjacent to but outside the store/plant room. Regular drills are conducted to train personnel on the proper use of the breathing apparatus and protective clothing.
- 2.7.8 A Hazard Assessment of the risks associated with the storage, handling and transport of chlorine at Sha Tin WTW and the off-site transport of chlorine for the Construction and Operational Phases of the reprovisioning project has been conducted in the approved EIA Report (Register No. AEIAR-187/2015).
- 2.7.9 This In-situ Reprovisioning of Sha Tin WTW is an improvement project, following its completion the chlorine-related risks levels to the general public will be lowered due to the anticipated reduction of the chlorine storage and usage levels.
- 2.7.10 Implementation of the recommended mitigation measures would be regularly audited. No specific Environmental Monitoring would be required.

2.8. EM&A SITE INSPECTION

- 2.8.1 Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. In the reporting period, five (5) site inspections were carried out on 2, 9, 16, 23 & 30 December 2016.
- 2.8.2 One joint site inspection with IEC also undertaken on 23 December 2016. Minor deficiencies were observed during weekly site inspection or joint site inspection. Key observations during the site inspections are summarized in Table 2-16.

Table 2-16: Site Observations

Date	Environmental Observations	Follow-up Status
2 December 2016	No environmental issue was observed during the site inspection	N/A
9 December 2016	Contractor was reminded to spray water on access road regularly.	Reminder only.
16 December 2016	<u>Reminder:</u> The Contractor was reminded to check the condition at wall C and Wall D.	Reminder only.
23 December 2016	<u>Observation(s) and Recommendation(s)</u> No drip tray was provided to oil product containers at Wall C. The contractor should provide secondary containment to chemical containers to prevent land contamination. <u>Reminder:</u> The Contractor was reminded to properly wash the vehicle before leave site at Wall D.	Concerned chemicals were removed from site on 24 December 2016. Reminder only.
30 December 2016	<u>Reminder:</u> The Contractor was reminded to update the upcoming construction schedule regularly.	Reminder only.

- 2.8.3 The Contractor has rectified all of the observations identified during environmental site inspections in the reporting period.

2.9. ENVIRONMENTAL LICENSES AND PERMITS

- 2.9.1 The status of environmental license and permit is summarized in Table 2-17 below:

Table 2-17: Summary of Environmental License and Permit

License / Permit	License / Permit No.	Date of Issue	Date of Expiry	License / Permit Holder	Remark
Environmental Permit	EP- 494/2015	28/1/2015	N/A	WSD	
Registration of Chemical Waste Producer	WPN5218-759 -M2936-01	31/12/2015	N/A	MMVJV	
Trip Ticket (Chit) Account	7023723	10/12/2015	N/A	MMVJV	
Waste Water Discharge License (Wall C)	WT0023932 -2016	1/4/2016	31/3/2021	MMVJV	
Waste Water Discharge License (Wall D)	WT0024211 -2016	10/6/2016	30/6/2021	MMVJV	
Construction Noise Permit	GW-RN0906-16	6/12/2016	7/6/2017	MMVJV	

2.10. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

- 2.10.1 In response to the site audit findings, the Contractors carried out corrective actions. A summary of the environmental mitigation measures implemented by the Contractor in this Reporting Period are summarized in Table 2-18.
- 2.10.2 The environmental mitigation measures that recommended in the Implementation Schedule for Environmental Mitigation Measures (EMIS) in the approved EM&A Manual covered the issues of dust, noise, water and waste and they are showed **Appendix U**.

Table 2-18: Environmental Mitigation Measures

Issues	Environmental Mitigation Measures
Air Quality	<ul style="list-style-type: none"> - Tarpaulin covering of any dusty materials on a vehicle leaving the site; - Imposition of speed controls for vehicles on site haul roads; - Use of regular watering to reduce dust emissions from exposed site surfaces and roads; - Side enclosure and covering of any aggregate or stockpiling of dusty materials to reduce emissions; - Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.
Noise	<ul style="list-style-type: none"> - Good site practices to limit noise emissions at the sources; - Use of quiet plant and working methods; - Use of site hoarding or other mass materials as noise barrier to screen noise at ground level of NSRs; - Scheduling of construction works outside school examination period in critical area.
Water	<ul style="list-style-type: none"> - Drainage systems were regularly and adequately maintained; - Effluent discharged from the construction site should comply with standards stipulated in the TM-DSS; - Open stockpiles of construction materials on sites should be covered.
General	<ul style="list-style-type: none"> - The site was generally kept tidy and clean.

- 2.10.3 The necessary mitigation measures were implemented properly for this Contract.

2.11. SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

- 2.11.1 Results for 1-hour TSP, noise and water quality monitoring complied with the Action/ Limit levels in the reporting period.
- 2.11.2 Cumulative statistics on exceedances is provided in **Appendix V**.

2.12. SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND PROSECUTIONS

2.12.1 The Environmental Complaint Handling Procedure is shown in below table:

Table 2-19: Environmental Complaint Handling Procedure

Complaint Received via Project Hotline	Complaint Received via 1823 or from other government departments
MMVJV notify ER, ET and IEC	ER notify MMVJV, ET and IEC
Register of the complaint. MMVJV and ET to conduct investigation of complaint and report to ER and IEC the investigation results	
If complaint is considered not valid	If complaint is found valid
ET or ER to reply the complainant if necessary	MMVJV to implement necessary improvement measures in consultation with the IEC, ET and ER. ET to check and inspect if the situation is improved. ER to conduct further inspection as necessary.
	ER to report the follow up actions done to WSD and reply to complainant is necessary. If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up action
ER prepare complaint report for submission to WSD ET to record the complaint case in monthly EM&A report	

2.12.2 No environmental complaint were received in the reporting period.

2.12.3 No notification of summons and prosecution was received in the reporting period.

2.12.4 Statistics on complaints, notifications of summons and successful prosecutions are summarized in **Appendix V**.

2.13. DATA MANAGEMENT AND DATA QA/QC CONTROL

2.13.1 The impact monitoring data were handled by ET's in-house data recording and management system.

2.13.2 The monitoring data recorded in the equipment were downloaded directly from the equipment at the end of each monitoring day. The downloaded monitoring data were input into computerized database properly. The laboratory results were input directly into the computerized database and checked by personnel other than those who had input the data.

2.13.3 For monitoring parameters that require laboratory analysis, the local laboratory had followed the QA/QC requirements as set out under the HOKLAS scheme for the relevant laboratory testing.

3. FUTURE KEY ISSUES

3.1. CONSTRUCTION PROGRAMME FOR THE COMING MONTHS

3.1.1 As informed by the Contractor, the major works for this Project in January 2017 to March 2017 will be:

- Construction of valve chamber at Wall D
- Site clearance and site formation works at Logistics Centre area.
- Construction of bored pile for Wall C and Wall D.
- Modification of clarifier no.1
- Site formation works for North Works Temporary Power House
- Laying of storm water drain and construct box culvert at Tin Sum Nullah

3.2. KEY ISSUES FOR COMING MONTH

3.2.1 Potential environmental impacts arising from the above upcoming construction activities in January 2017 are mainly associated with dust, noise, water quality issues and waste management issues.

3.2.2 Particular issues to be considered in the coming month include:

- Implementation of dust suppression measures at all times.
- Implementation of adequate measures to prevent discharge of site effluent to the nearby water bodies
- Desilting tanks and catch-pits should be regularly maintained.
- Implementation of construction noise preventative control measures.

3.2.2 The tentative monitoring schedule for January 2017 to March 2017 can be found in **Appendix W**.

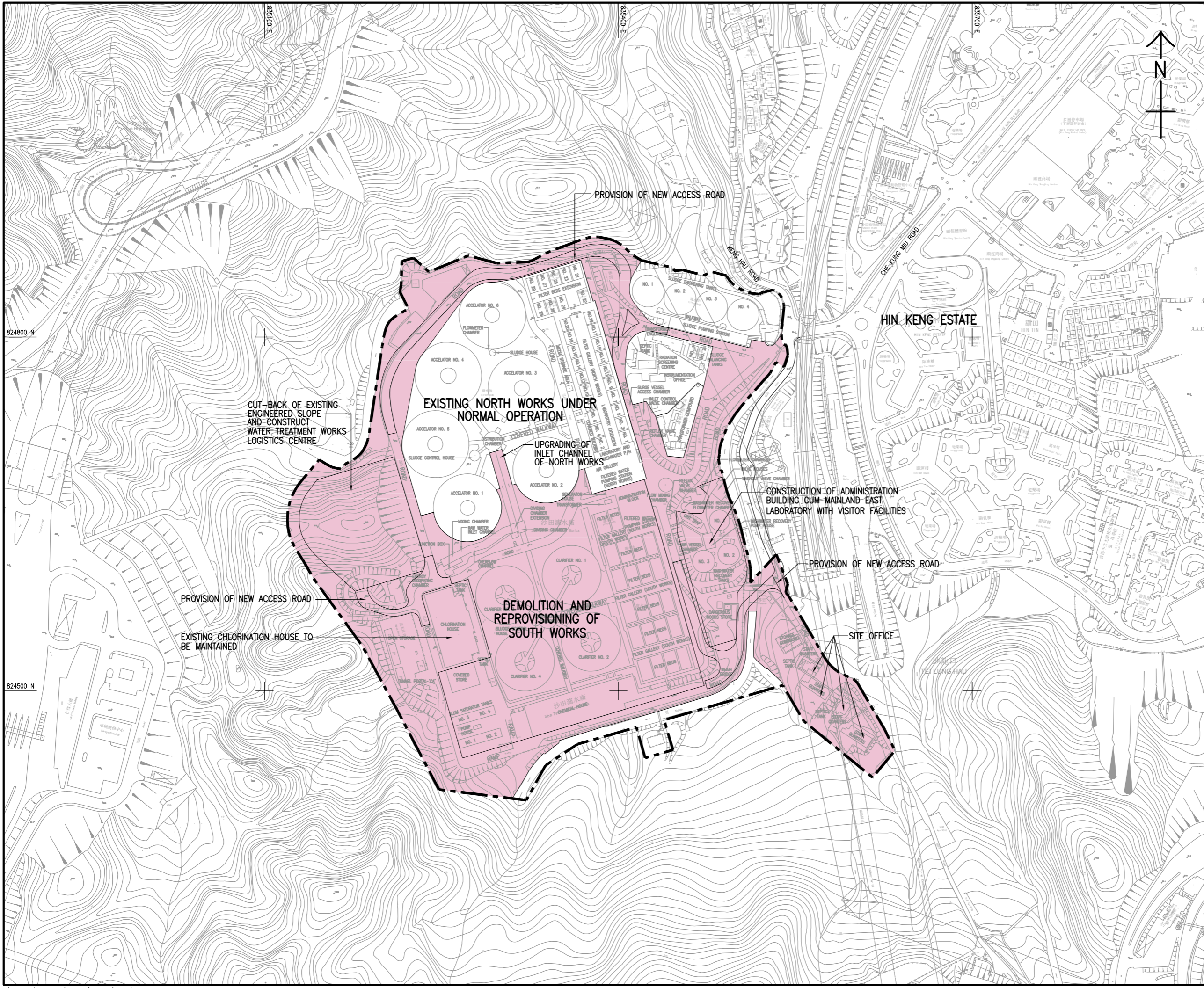
4. CONCLUSIONS AND RECOMMENDATIONS

4.1. SUMMARY

- 4.1.1 Air quality (including 1-hour TSP), noise, water quality and ecology impact monitoring were carried out in the reporting period. All monitoring results are satisfactory and no NOEs or associated corrective action was therefore issued.
- 4.1.2 Five (5 nos.) environmental site inspection were conducted during the reporting period. Joint site inspection with IEC were carried out on 23 December 2016. Minor deficiencies were observed during site inspection and were rectified within the specified deadlines. The environmental performance of the Project was therefore considered satisfactory.
- 4.1.3 To control the site performance on waste management, the contractor shall ensure that all solid and liquid waste management works are fully in compliance with the relevant license/permit requirements, such as the effluent discharge licence and the chemical waste producer registration. Contractor is also reminded to implement the recommended environmental mitigation measures according to the Environmental Monitoring and Audit Manual.
- 4.1.4 No environmental complaint were received in the reporting period.
- 4.1.5 No notification of summons or prosecution was received since commencement of the Contract.
- 4.1.6 The ET will keep track on the construction works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Appendix A

General Layout Plan



LEGEND:

--- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS

WORKS AREA

824800 N

824500 N

CUT-BACK OF EXISTING ENGINEERED SLOPE AND CONSTRUCT WATER TREATMENT WORKS LOGISTICS CENTRE

PROVISION OF NEW ACCESS ROAD

EXISTING CHLORINATION HOUSE TO BE MAINTAINED

EXISTING NORTH WORKS UNDER NORMAL OPERATION

UPGRADING OF INLET CHANNEL OF NORTH WORKS

DEMOLITION AND REPROVISIONING OF SOUTH WORKS

CONSTRUCTION OF ADMINISTRATION BUILDING CUM MAINLAND EAST LABORATORY WITH VISITOR FACILITIES

PROVISION OF NEW ACCESS ROAD

SITE OFFICE

HIN KENG ESTATE

TEI LUNG HAU

水務署
WATER SUPPLIES DEPARTMENT

AGREEMENT NO. CE 13/2009 (WS)

IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
DESIGN AND CONSTRUCTION

LOCATION PLAN AND THE MAJOR SCOPE OF WORKS



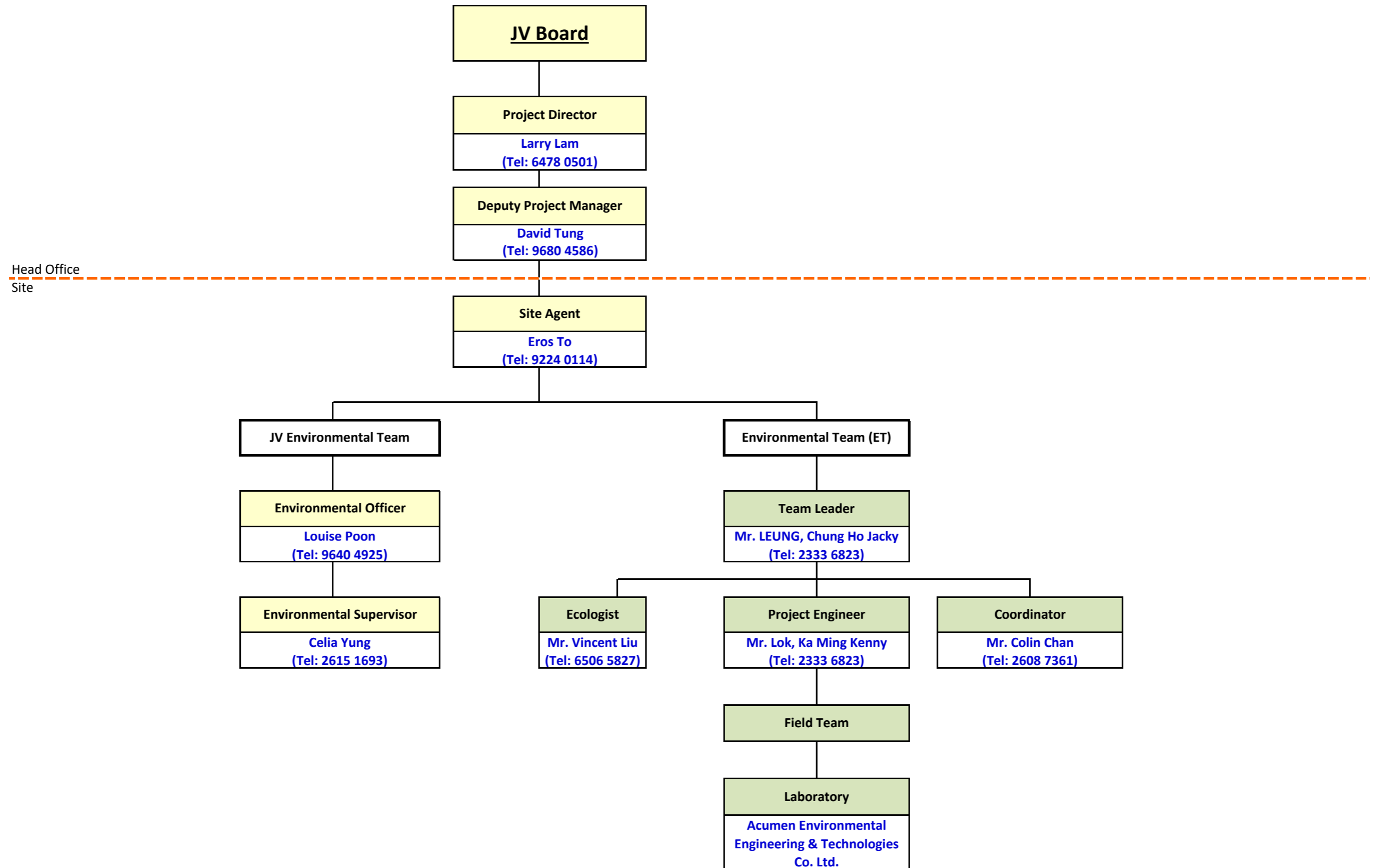
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Appendix B

Project Organization

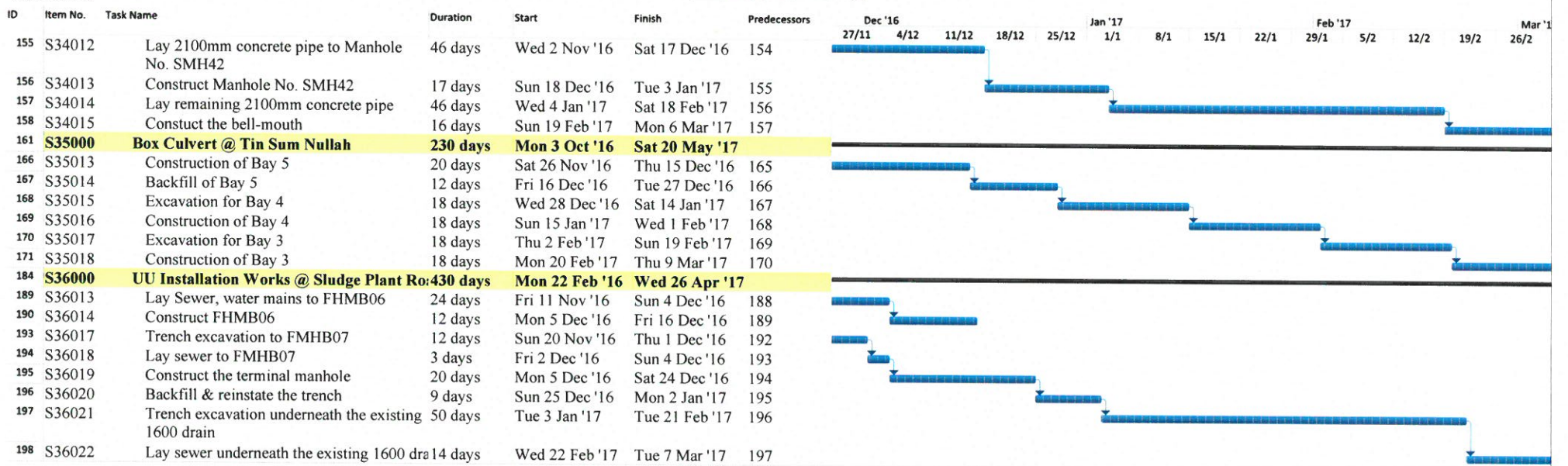
Environmental Organization Chart



Appendix C

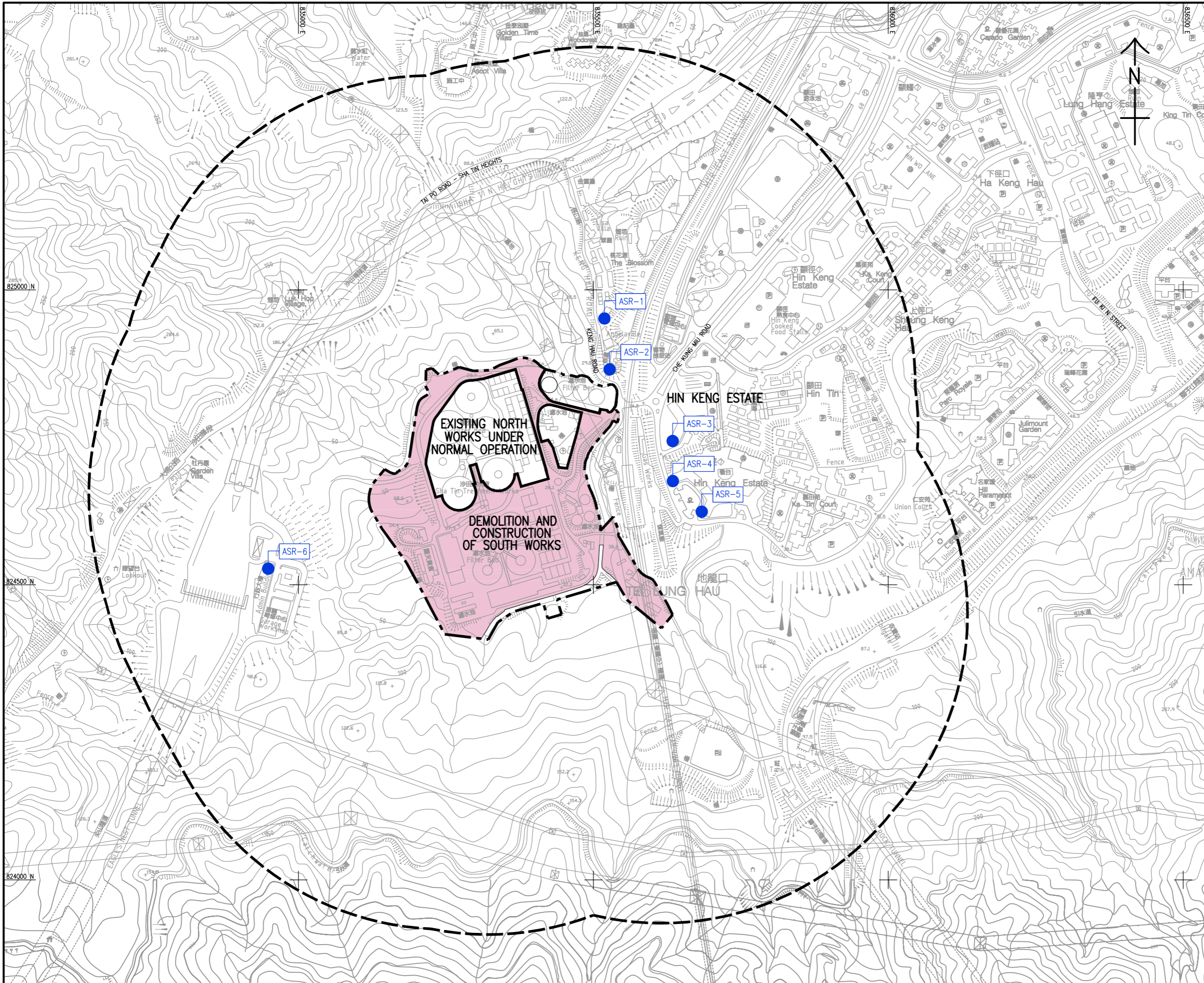
Latest Construction Programme

ID	Item No.	Task Name	Duration	Start	Finish	Predecessors	Dec '16		Jan '17		Feb '17		Mar '17
							27/11	4/12	11/12	18/12	25/12	1/1	
1		Three Months Rolling Programme (from Dec 2016 to Feb 2017)	1538 days	Fri 30 Oct '15	Wed 15 Jan '20								
2	S10000	Section 1	810 days	Fri 30 Oct '15	Tue 16 Jan '18								
5	S11000	Hydro Turbine House (HTH)	701 days	Mon 15 Feb '16	Tue 16 Jan '18								
10	S11013	Water suspension of raw water mains Path A (Depending to WSD)	1 day	Mon 16 Jan '17	Mon 16 Jan '17	9							
11	S11014	ELS works and demolition of EDH	60 days	Tue 17 Jan '17	Fri 17 Mar '17	10							
13	S12000	North Works Temporary Power House (NWTPH)	704 days	Fri 12 Feb '16	Tue 16 Jan '18								
19	S12014	Construction footing & upper structure	114 days	Wed 26 Oct '16	Thu 16 Feb '17								
23	S12018	Backfill to ground level	8 days	Thu 1 Dec '16	Thu 8 Dec '16	22							
24	S12019	Construct cable trough at G/F	20 days	Fri 9 Dec '16	Wed 28 Dec '16	23							
25	S12020	Construct cable trough at 1/F	20 days	Thu 29 Dec '16	Tue 17 Jan '17	24							
26	S12021	Construct structure up to roof level	30 days	Wed 18 Jan '17	Thu 16 Feb '17	25							
27	S12022	Finishing works	216 days	Mon 20 Feb '17	Sat 23 Sep '17	26							
28	S12023	Cable support from CLP Substation to NWTPH	135 days	Thu 17 Nov '16	Fri 31 Mar '17								
30	S12025	BS works for NWTPH	112 days	Wed 9 Nov '16	Tue 28 Feb '17								
31	S12026	Conceal conduit installation work	85 days	Mon 14 Nov '16	Mon 6 Feb '17	22SS							
32	S12027	Initial work for electrical and FS cabling work	60 days	Tue 7 Feb '17	Fri 7 Apr '17	24SS,31							
33	S12028	Initial installation work for AC equipment	21 days	Fri 17 Feb '17	Thu 9 Mar '17	26							
34	S12029	Cabling work and connection process for Lighting & S/O	14 days	Fri 17 Feb '17	Thu 2 Mar '17	26,31							
35	S12030	Cabling work and connection process for FS-AFA system	10 days	Fri 17 Feb '17	Sun 26 Feb '17	26,31							
36	S12031	Cabling work and connection process for AC-split unit, exhaust fan	14 days	Fri 17 Feb '17	Thu 2 Mar '17	26,31							
38	S12033	EM Electrical HV-LV switchboard and cable connection	183 days	Thu 24 Nov '16	Thu 25 May '17								
39	S12034	Earthing copper tape branches cast-in works for EM-BS	38 days	Thu 24 Nov '16	Sat 31 Dec '16	22SS							
40	S12035	Builder work opening, cast in item works for EM-BS	70 days	Fri 9 Dec '16	Thu 16 Feb '17	24SS							
41	S12036	EM-equipment plinths construction work	20 days	Thu 29 Dec '16	Tue 17 Jan '17	24							
42	S12037	Metal-steel supporting works installation for Elect-DBs at G/F	31 days	Thu 29 Dec '16	Sat 28 Jan '17	24							
43	S12038	Metal-steel supporting works installation for Elect-DBs at 1/F	27 days	Fri 20 Jan '17	Wed 15 Feb '17	25							
44	S12039	Main cable containment install on cable trenches	31 days	Fri 17 Feb '17	Sun 19 Mar '17	40							
45	S12040	HV-LV BDs delivery and positioning work	18 days	Wed 22 Feb '17	Sat 11 Mar '17	41							
50	S20000	Section 2	628 days	Fri 30 Oct '15	Wed 19 Jul '17								
53	S21000	Site Formation @ Wall D - North Circular Road	528 days	Sun 7 Feb '16	Wed 19 Jul '17								
58	S21013	Backfill L-shaped retaining wall	36 days	Wed 26 Oct '16	Wed 30 Nov '16								
59	S21014	Pre-drill for bored pile	30 days	Thu 1 Dec '16	Fri 30 Dec '16	58							
60	S21015	Construction of Bored pile	90 days	Sat 31 Dec '16	Thu 30 Mar '17	59							
65	S30000	Section 3	1173 days	Fri 30 Oct '15	Tue 15 Jan '19								
68	S31000	Bored Pile Wall C & WTW Logistics Center cum Alum Saturation Tank	1092 days	Tue 19 Jan '16	Tue 15 Jan '19								
75	S31015	Construction of capping beam (CB2-CB13) for Wall C	21 days	Tue 29 Nov '16	Mon 19 Dec '16	74							
76	S31016	Excavation (from +42.5mPD to +40.0mPD)	14 days	Tue 20 Dec '16	Mon 2 Jan '17	75							
77	S31017	Construction of lagging wall CB2 to CB13 (+40mPD to +42.5mPD)	21 days	Tue 3 Jan '17	Mon 23 Jan '17	76							
78	S31018	Construction of piling platform for bored pile (CA2-CA4; CB1; CC1-CC3)	45 days	Thu 1 Dec '16	Sat 14 Jan '17								
79	S31019	Construction of bored pile (CA2-CA4; CB1; CC1-CC3) - Phase 2	60 days	Sun 15 Jan '17	Wed 15 Mar '17	78,76							
85	S32000	Temporary Washwater Recovery Tank (TWRT)	414 days	Sun 28 Feb '16	Sun 16 Apr '17								
88	S32011	Construction of DN900 Washwater Pipe	269 days	Wed 1 Jun '16	Fri 24 Feb '17								
94	S32017	Reinstate the concrete wall of Recovery Tank	8 days	Fri 25 Nov '16	Fri 2 Dec '16	93							
95	S32018	Hand dug tunnel to main drain & culvert	67 days	Wed 5 Oct '16	Sat 10 Dec '16	90							
96	S32019	Make opening at existing main drain & culvert	16 days	Sun 11 Dec '16	Mon 26 Dec '16	95							
97	S32020	Install 900mm pipes to main drain & culvert	23 days	Tue 27 Dec '16	Wed 18 Jan '17	96							
98	S32021	Reinstate the structure for the main drain and culvert	8 days	Tue 3 Jan '17	Tue 10 Jan '17	97SS+7 days							
99	S32022	Grouting the hand dug tunnels	7 days	Thu 19 Jan '17	Wed 25 Jan '17	97							
100	S32023	Testing of pipelines	7 days	Thu 26 Jan '17	Wed 1 Feb '17	99							
101	S32024	Backfill the trench and extract sheetpile	23 days	Thu 2 Feb '17	Fri 24 Feb '17	100							
115	S32038	Construction of Steel Bridge & Decking	68 days	Sun 16 Oct '16	Thu 22 Dec '16								
118	S32041	Erect the steel bridge & decking	31 days	Wed 16 Nov '16	Fri 16 Dec '16	117							
119	S32042	Erect the railing & remaining parts	6 days	Sat 17 Dec '16	Thu 22 Dec '16	118							
120	S32043	Lay 400mm & 100mm pipes (External)	154 days	Thu 1 Sep '16	Wed 1 Feb '17								
123	S32046	Lay 100mm pipes near Temporary Recovery Tank	20 days	Fri 23 Dec '16	Wed 11 Jan '17	119							
124	S32047	Lay 400mm pipes near Temporary Recovery Tank	21 days	Thu 12 Jan '17	Wed 1 Feb '17	123							
125	S32048	Construct cable ducts & draw pits	41 days	Fri 23 Dec '16	Wed 1 Feb '17	119							
126	S32049	E & M; and BS Works	100.5 days	Thu 1 Dec '16	Sat 11 Mar '17								
127	S32050	Install penstocks and related framework-accessory	31 days	Thu 1 Dec '16	Sat 31 Dec '16	118SS							
128	S32051	Initial installation on supernatant & sludge pump set	34 days	Thu 1 Dec '16	Tue 3 Jan '17								
129	S32052	Pump sets connection with all pipeline & accessory	49 days	Wed 14 Dec '16	Tue 31 Jan '17	118SS							
130	S32053	Davit installation and control wiring work	23 days	Wed 1 Feb '17	Thu 23 Feb '17	129							
131	S32054	New LVS positioning and modification at NWD chamber	16 days	Thu 15 Dec '16	Fri 30 Dec '16								
132	S32053	New XLPE power cable containment and cable laying work	33 days	Thu 1 Dec '16	Mon 2 Jan '17								
133	S32056	Install 100mm & 400mm s.s. pipes inside TWRT	34 days	Thu 1 Dec '16	Tue 3 Jan '17								
134	S32057	Power and control cabling works & final connection	14 days	Tue 3 Jan '17	Mon 16 Jan '17	131,132							
135	S32058	Testing and Commissioning & divert the water flow	34 days	Sat 25 Feb '17	Thu 30 Mar '17	101,133,134							
138	S33000	New Valve Chamber @ Wall D	143 days	Tue 1 Nov '16	Thu 23 Mar '17								
143	S33013	Excavation and demolishing of existing concrete trough	24 days	Thu 17 Nov '16	Sat 10 Dec '16	142							
144	S33014	Lay granular rock fill & blinding layer	3 days	Sun 11 Dec '16	Tue 13 Dec '16	143							
145	S33015	Construct the base slab of new valve chamber	16 days	Wed 14 Dec '16	Thu 29 Dec '16	144							
146	S33016	Suspension of Twin DN1600 water mains	1 day	Fri 30 Dec '16	Fri 30 Dec '16	145							
147	S33017	Install new DN1600 pipes & Valves	32 days	Sun 1 Jan '17	Wed 1 Feb '17	146							
148	S33018	Construct the wall & top slab of the valve chamber	34 days	Thu 2 Feb '17	Tue 7 Mar '17	147							
151	S34000	Storm Drain Decking @ Tin Sum Nullah	387 days	Wed 9 Mar '16	Fri 31 Mar '17								



Appendix E

Environmental Sensitive Receivers in the Vicinity of the Project



- LEGEND:**
- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
 - STUDY AREA (500m BOUNDARY)
 - WORKS AREA
 - REPRESENTATIVE AIR SENSITIVE RECEIVERS (ASRS)
 - ASR-1 THE BLOSSOM PHASE 4
 - ASR-2 THE L LOUEY
 - ASR-3 HIN KENG ESTATE - HIN YAU HOUSE
 - ASR-4 HIN KENG ESTATE - HIN WAN HOUSE
 - ASR-5 HIN KENG ESTATE - HIN KWAI HOUSE
 - ASR-6 SHA TIN HEIGHT TUNNEL ADMINISTRATION BUILDING

REV.	DESCRIPTION	BY	CHK.	DATE

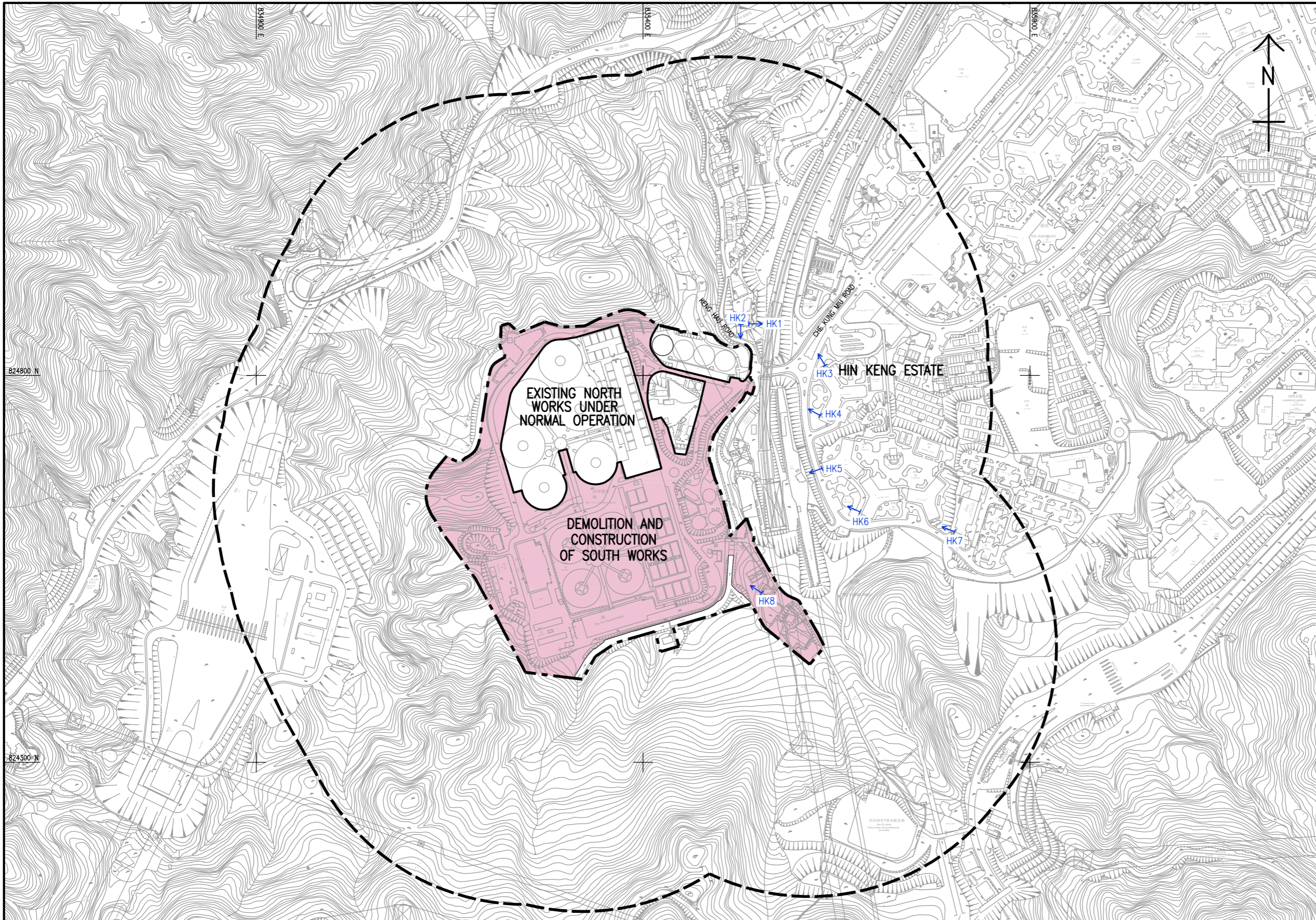
水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

LOCATIONS OF REPRESENTATIVE AIR SENSITIVE RECEIVERS



DRG. NO. 60162073/EIA/FIG 4.1
 圖紙編號

DESIGNED BY	CONTRACT NO.	P. No. APPROVED
DRAWN BY	DATE	
SCALE		



LEGEND:

- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
- 300m STUDY AREA
- WORKS AREA
- HK1 REPRESENTATIVE NOISE SENSITIVE RECEIVERS

ID	DESCRIPTION	CONSTRUCTION NOISE	OPERATIONAL FIXED PLANT NOISE
HK1	THE L LOUEY (EAST)	Y	Y
HK2	THE L LOUEY (SOUTH)	Y	Y
HK3	HIN KENG ESTATE, HIN YAU HOUSE (NORTH)	Y	Y
HK4	HIN KENG ESTATE, HIN YAU HOUSE (SOUTH)	Y	Y
HK5	HIN KENG ESTATE, HIN WAN HOUSE	Y	Y
HK6	HIN KENG ESTATE, HIN KWAI HOUSE	Y	Y
HK7	CUHKFAA THOMAS CHEUNG SCHOOL	Y	Y
HK8	SHA TIN WTW STAFF QUARTERS	Y	Y

NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR TENDER	13/09/09	WSD

水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

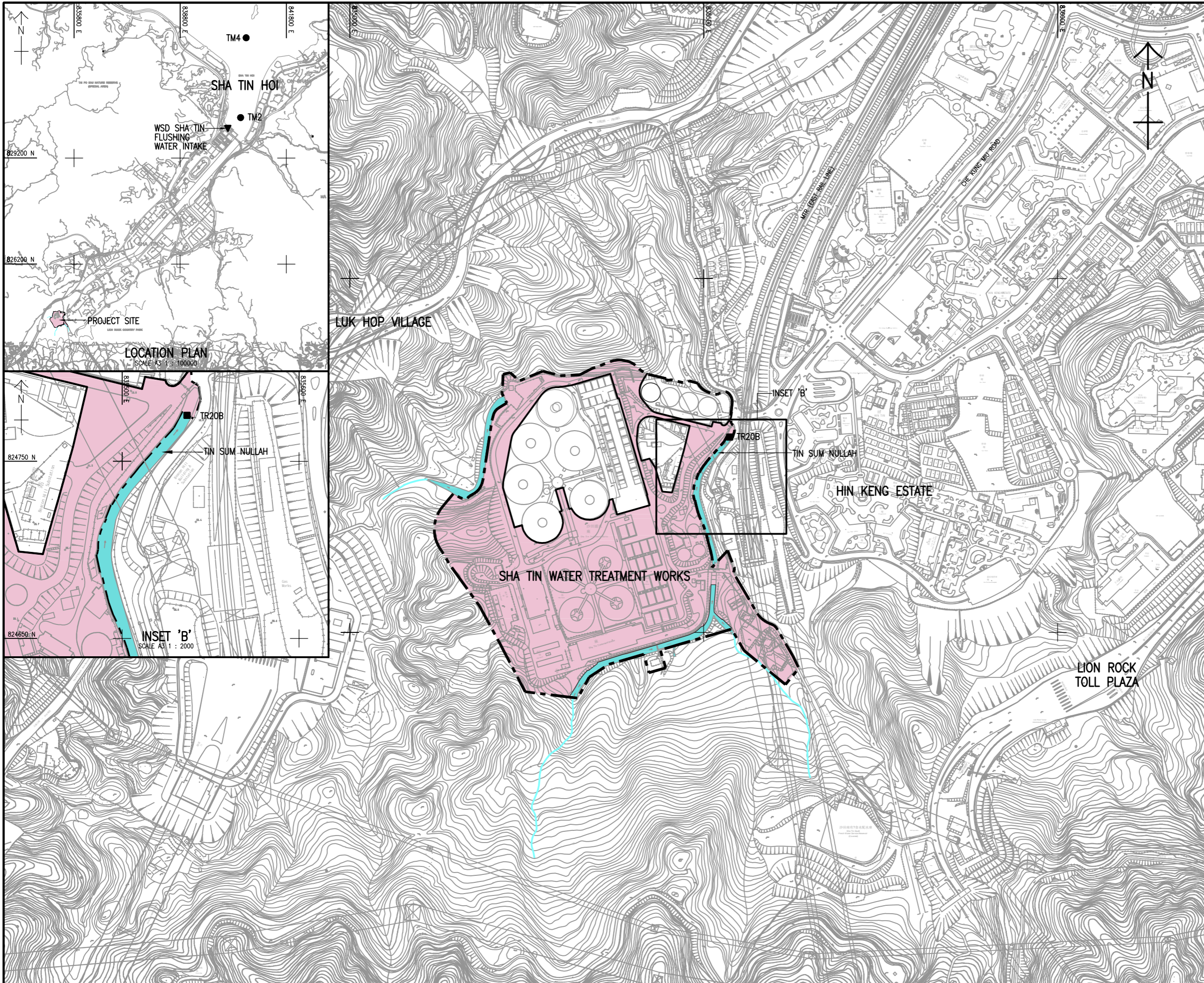
LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS

AECOM

DRG. NO. 60162073/EIA/FIG 5.1
 圖紙編號

DESIGNED BY	CONTRACT NO.	P. NO. APPROVED
WSD	CE 13/2009 (WS)	5.1
DRAWN BY	SCALE	DATE
LJ	A3 1 : 5000	13/09/09
DATE	SCALE	DATE
13/09/09	A3 1 : 5000	13/09/09
UNIT OF MEASURE	METRES	

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- LEGEND:**
- SITE BOUNDARY OF SHATIN WATER TREATMENT WORKS
 - WORKS AREA
 - INLAND WATER COURSE
 - EPD MARINE WATER QUALITY MONITORING STATION
 - EPD RIVER WATER QUALITY MONITORING STATION
 - WSD SHA TIN FLUSHING WATER INTAKE

REV.	DESCRIPTION	BY	CHK.	DATE

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WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

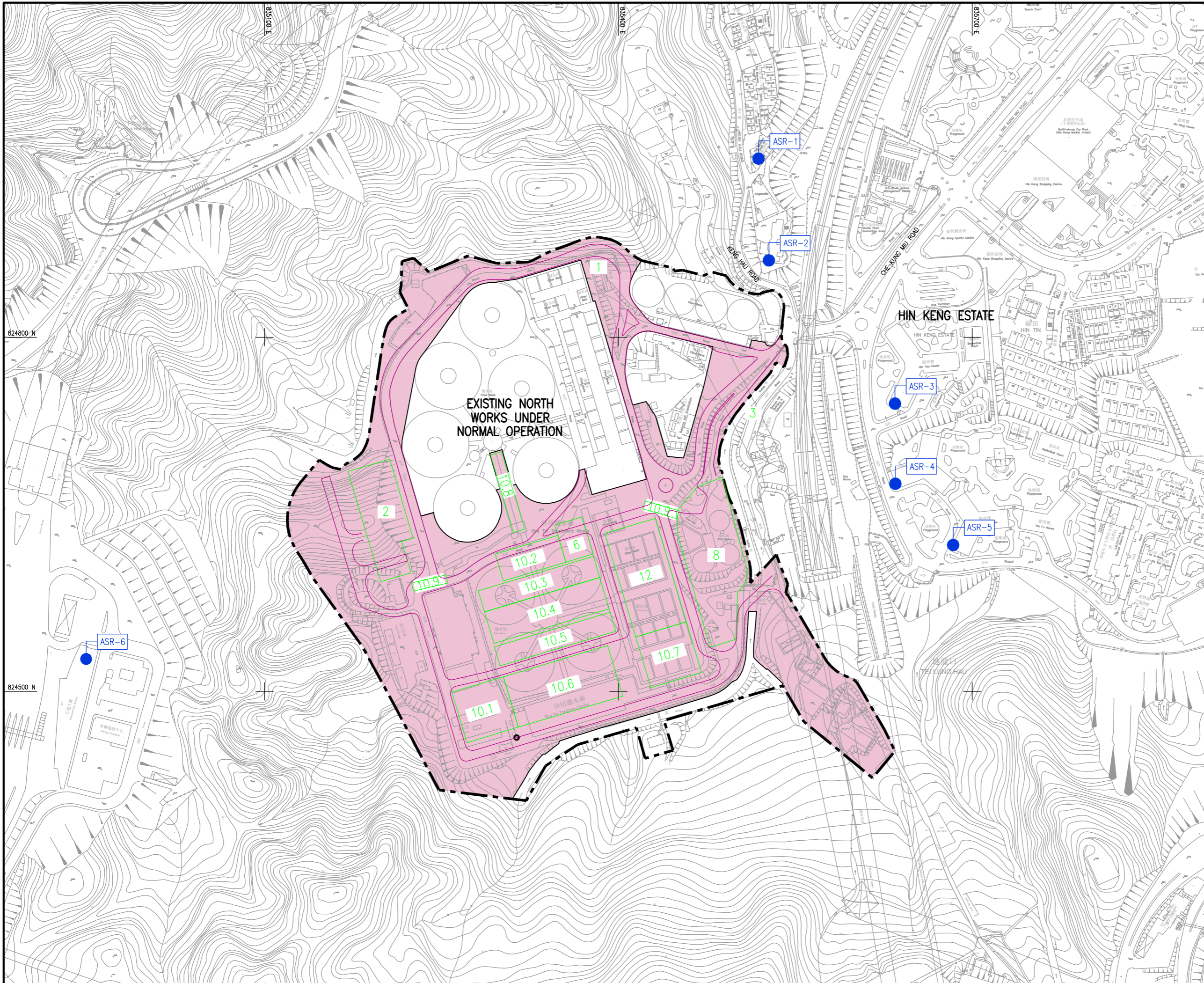
LOCATIONS OF WATER SENSITIVE RECEIVERS



DRG. NO. 圖紙編號	60162073/EIA/FIG 6.1	
DESIGNED BY 設計	CONTRACT NO. 合約編號	P. No. APPROVED 批准人
DRAWN BY 繪圖	STATUS 階段	
SCALE 比例	A3 1 : 5000	
DIMENSIONS ARE IN 尺寸單位	METRES	
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Appendix D

Location of Construction Activities



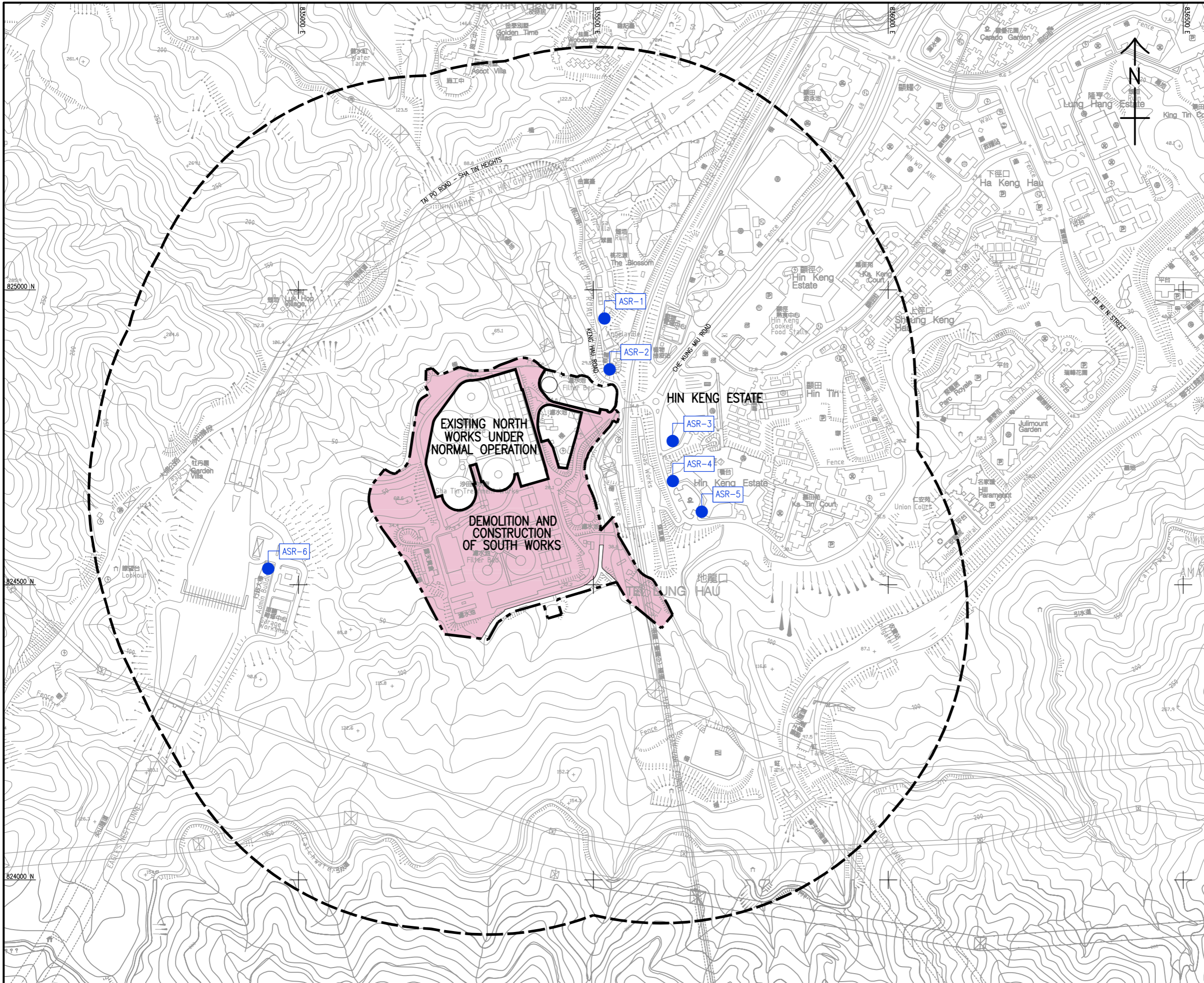
LEGEND:

	SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
	WORKS AREA
	RESPRESENTATIVE AIR SENSITIVE RECEIVERS (ASRS)
ASR-1	THE BLOSSOM PHASE 4
ASR-2	THE L LOUEY
ASR-3	HIN KENG ESTATE - HIN YAU HOUSE
ASR-4	HIN KENG ESTATE - HIN WAN HOUSE
ASR-5	HIN KENG ESTATE - HIN KWAI HOUSE
ASR-6	SHA TIN HEIGHT TUNNEL ADMINISTRATION BUILDING
	RETAINING WALL AND NEW ACCESS ROAD
	WATER TREATMENT WORKS LOGISTICS CENTRE
	UPGRADED MAIN ENTRY ROAD
	WASHWATER EQUALIZATION TANKS (NORTH WORKS)
	DEMOLITION OF EXISTING WASHWATER RECOVERY TANKS
	CONSTRUCTION OF SOUTH WORKS
	RESIDUAL MANAGEMENT FACILITIES
	PRE-OZONATION HOUSE AND COAGULATION TANKS
	FLOCCULATION TANKS
	HIGH RATE SEDIMENTATION TANKS
	INTERMEDIATE OZONATION HOUSE
	STAGE 1 BIOLOGICAL FILTERS
	SOUTH WORKS PUMPING STATION
	INLET CHANNEL STATIC MIXERS (NORTH WORKS)
	PEDESTRIAN WALKWAY
	STAGE 2 GRANULAR MEDIA FILTERS & UV REACTORS
	OPERATION OF HAUL ROAD

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WATER SUPPLIES DEPARTMENT	
AGREEMENT NO. CE 13/2009 (WS)	
IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS	
DESIGN AND CONSTRUCTION	
LOCATIONS OF CONSTRUCTION WORKS AREA	
DRG. NO.	60162073/FIGURE 4.2
DESIGNED BY	
DRAWN BY	NHP
SCALE	A3 1 : 3000
UNIT	METRES
CONTRACT NO.	
P. NO. APPROVED	
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Appendix E

Environmental Sensitive Receivers in the Vicinity of the Project



- LEGEND:**
- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
 - STUDY AREA (500m BOUNDARY)
 - WORKS AREA
 - REPRESENTATIVE AIR SENSITIVE RECEIVERS (ASRS)
 - ASR-1 THE BLOSSOM PHASE 4
 - ASR-2 THE L LOUEY
 - ASR-3 HIN KENG ESTATE - HIN YAU HOUSE
 - ASR-4 HIN KENG ESTATE - HIN WAN HOUSE
 - ASR-5 HIN KENG ESTATE - HIN KWAI HOUSE
 - ASR-6 SHA TIN HEIGHT TUNNEL ADMINISTRATION BUILDING

REV. NO.	DESCRIPTION	BY	CHK.	DATE

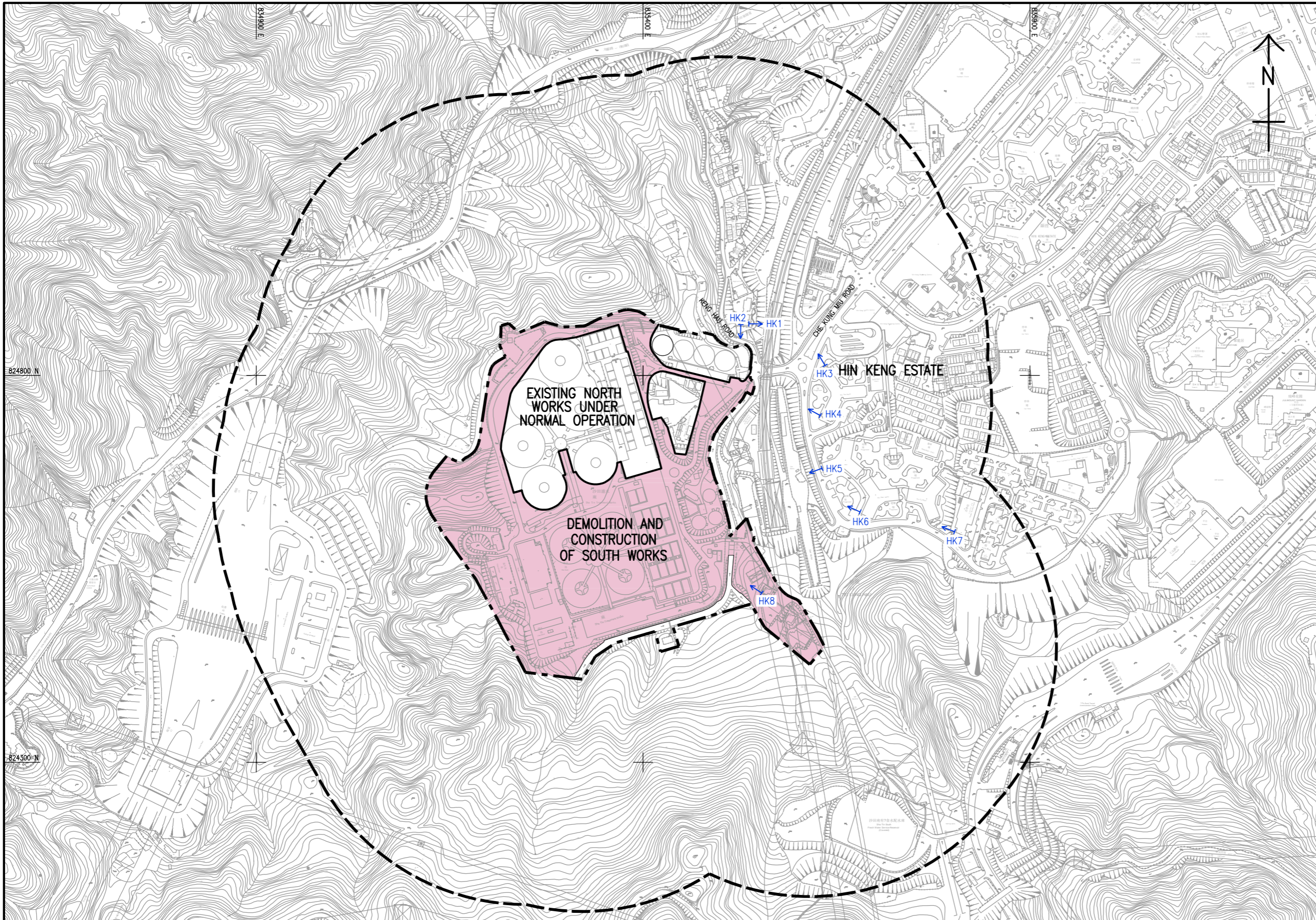
水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

LOCATIONS OF REPRESENTATIVE AIR SENSITIVE RECEIVERS



DRG. NO. 60162073/EIA/FIG 4.1
 圖紙編號

DESIGNED BY	CONTRACT NO.	P. No. APPROVED
DRAWN BY NHP		
SCALE A3 1 : 6000		
DIMENSIONS ARE IN METRES	© COPYRIGHT RESERVED	



LEGEND:

- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
- 300m STUDY AREA
- WORKS AREA
- REPRESENTATIVE NOISE SENSITIVE RECEIVERS

ID	DESCRIPTION	CONSTRUCTION NOISE	OPERATIONAL FIXED PLANT NOISE
HK1	THE L LOUEY (EAST)	Y	Y
HK2	THE L LOUEY (SOUTH)	Y	Y
HK3	HIN KENG ESTATE, HIN YAU HOUSE (NORTH)	Y	Y
HK4	HIN KENG ESTATE, HIN YAU HOUSE (SOUTH)	Y	Y
HK5	HIN KENG ESTATE, HIN WAN HOUSE	Y	Y
HK6	HIN KENG ESTATE, HIN KWAI HOUSE	Y	Y
HK7	CUHKFAA THOMAS CHEUNG SCHOOL	Y	Y
HK8	SHA TIN WTW STAFF QUARTERS	Y	Y

NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR CONSTRUCTION	12/11/2012	WJ

水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

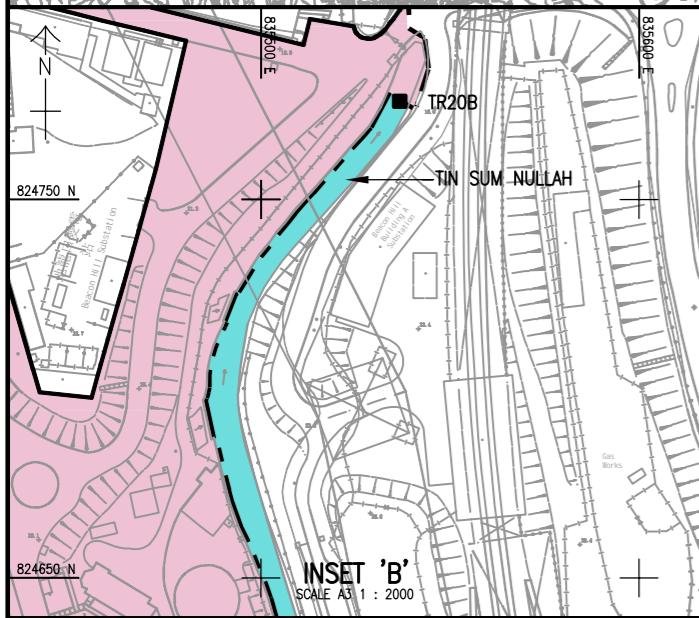
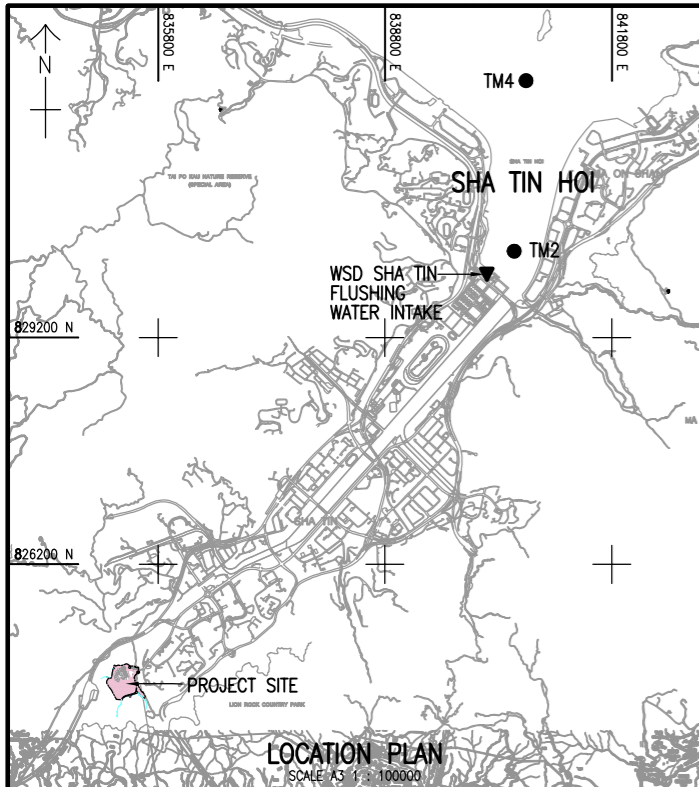
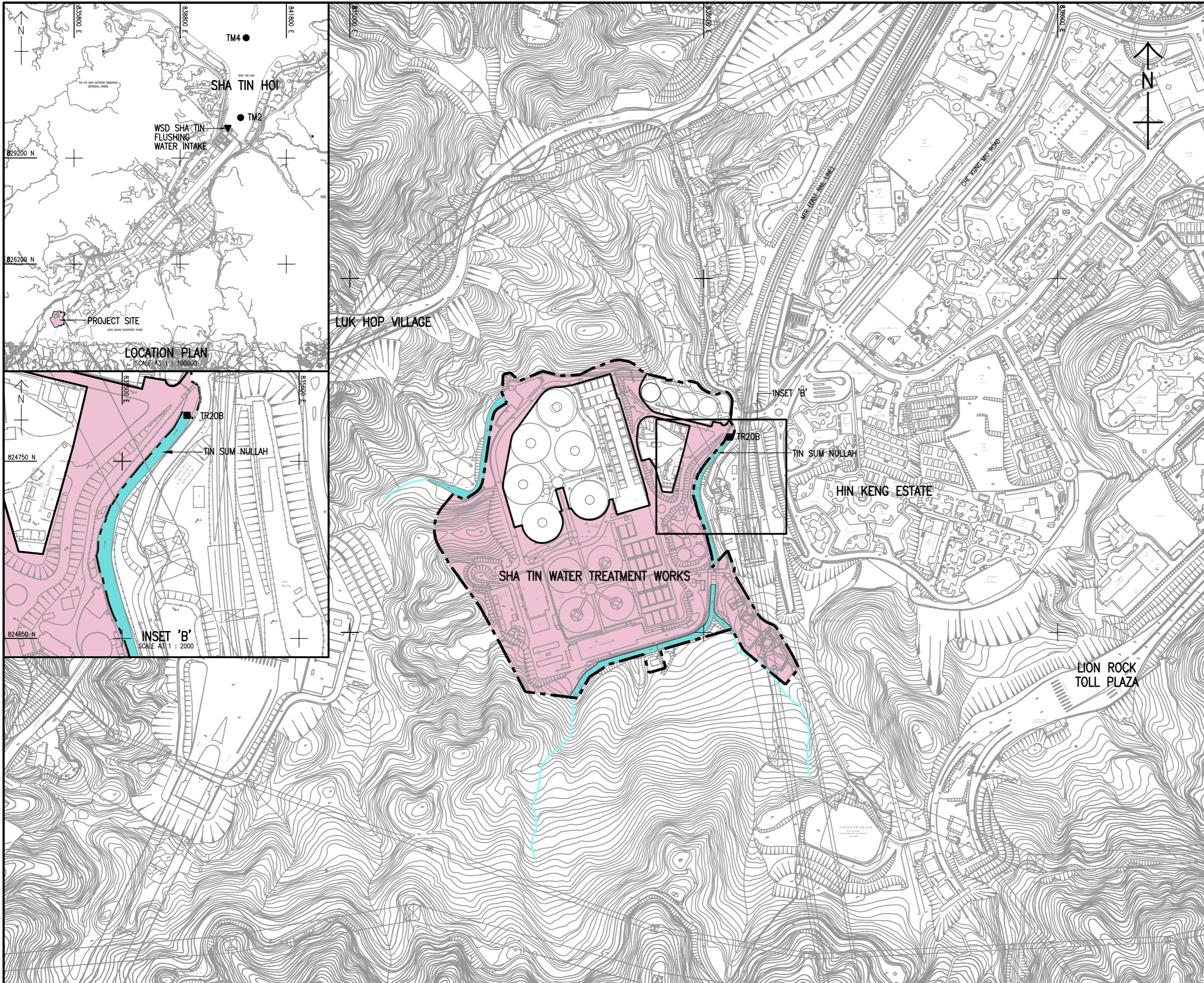
LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS

AECOM

DRG. NO. 60162073/EIA/FIG 5.1
 圖紙編號

DESIGNED BY	CONTRACT NO.	P. NO. APPROVED
WJ	CE 13/2009 (WS)	5/2
DRAWN BY	SCALE	DATE
LJ	A3 1 : 5000	12/11/2012
DATE	SCALE	DATE
12/11/2012	A3 1 : 5000	12/11/2012
UNIT	METRES	

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- LEGEND:**
- SITE BOUNDARY OF SHATIN WATER TREATMENT WORKS
 - WORKS AREA
 - INLAND WATER COURSE
 - EPD MARINE WATER QUALITY MONITORING STATION
 - EPD RIVER WATER QUALITY MONITORING STATION
 - WSD SHA TIN FLUSHING WATER INTAKE

REV.	DESCRIPTION	BY	CHK	DATE

水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

LOCATIONS OF WATER SENSITIVE RECEIVERS



DRG. NO. 圖紙編號	60162073/EIA/FIG 6.1	
DESIGNED BY 設計	CONTRACT NO. 合約編號	P. No. APPROVED 批准人
DRAWN BY 繪圖	STATUS 階段	
SCALE 比例	A3 1 : 5000	
DIMENSIONS ARE IN 尺寸單位	METRES	
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Appendix F

Summary of Action and Limit Levels



Determination of Action and Limit Levels for Air Quality

Monitoring Locations	Action Level 1-hour TSP, ($\mu\text{g}/\text{m}^3$)	Limit Level 1-hour TSP, ($\mu\text{g}/\text{m}^3$)
AM1	357	500
AM2	334	500

Determination of Action and Limit Levels for Noise

Monitoring Location	Action Level	Limit Level in dB(A)
	0700-1900 hours on normal weekdays	
NM1	When one documented complaint is received	For domestic premises: 75 dB(A) for NM1 & NM2
NM2		
NM3		For schools: 70dB(A) during normal teaching periods and 65 dB(A) during examination periods for NM3

Determination of Action and Limit Levels for Water Quality

Water monitoring stations	Dissolved Oxygen (mg/L)		Suspended Solids (mg/L)		Turbidity (NTU)		pH	
	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
C1	7.51	7.44	4.19	6.73	3.99	4.00	Beyond the range 6.6 to 7.9	Beyond the range 6.5 to 8.0
C2	8.10	7.98	4.33	8.16	3.13	3.28	Beyond the range 6.6 to 8.8	Beyond the range 6.5 to 8.9
C3*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
M1	8.90	8.89	3.30	3.56	4.36	4.48	Beyond the range 6.6 to 8.2	Beyond the range 6.6 to 8.3
M2	8.92	8.91	18.84	26.80	12.64	13.72	Beyond the range 6.6 to 11.0	Beyond the range 6.6 to 11.0
M3	9.16	9.15	1.00	1.00	1.10	1.18	Beyond the range 6.6 to 8.6	Beyond the range 6.6 to 8.7

Remark: For DO, action should be taken when monitoring result of either one of the surface, middle or bottom DO is lower than the proposed Action/Limit Levels.

Appendix G

Event/Action Plan

Air Quality

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
1. Exceedance for one sample	1. Inform the Contractor, IEC and ER; 2. Discuss with the Contractor on the remedial measures required; 3. Repeat measurement to confirm findings; and 4. Increase monitoring frequency.	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; and 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing.	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; and 3. Amend working methods agreed with the ER as appropriate.
2. Exceedance for two or more consecutive samples	1. Inform the Contractor, IEC and ER; 2. Discuss with the ER and Contractor on the remedial measures required; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. If exceedance continues,	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; and 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Supervise implementation of remedial measures.	1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and

	arrange meeting with the IEC, ER and Contractor; and 6. If exceedance stops, cease additional monitoring.			4. Amend proposal as appropriate.
LIMIT LEVEL				
Event	ET	IEC	ER	CONTRACTOR
1. Exceedance for one sample	1. Inform the Contractor, IEC, EPD and ER; 2. Repeat measurement to confirm findings; 3. Increase monitoring frequency to daily; and 4. Discuss with the ER, IEC and contractor on the remedial measures and assess the effectiveness.	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ET, ER and Contractor on possible remedial measures; and 4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Supervise implementation of remedial measures.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification; 4. Implement the agreed proposals; and 5. Amend proposal if appropriate.

	ET	IEC	ER	CONTRACTOR
2. Exceedance for two or more consecutive samples	<p>1. Notify Contractor, IEC, EPD and ER;</p> <p>2. Repeat measurement to confirm findings;</p> <p>3. Increase monitoring frequency to daily;</p> <p>4. Carry out analysis of the Contractor's working procedures with the ER to determine possible mitigation to be implemented;</p> <p>5. Arrange meeting with the IEC and ER to discuss the remedial measures to be taken;</p> <p>6. Review the effectiveness of the Contractor's remedial measures and keep IEC, EPD and ER informed of the results; and</p> <p>7. If exceedance stops, cease additional monitoring.</p>	<p>1. Check monitoring data submitted by the ET;</p> <p>2. Check the Contractor's working method;</p> <p>3. Discuss with ET, ER, and Contractor on the potential remedial measures; and</p> <p>4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.</p>	<p>1. Confirm receipt of notification of exceedance in writing;</p> <p>2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented;</p> <p>3. Supervise the implementation of remedial measures; and</p> <p>4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</p>	<p>1. Identify source(s) and investigate the causes of exceedance;</p> <p>2. Take immediate action to avoid further exceedance;</p> <p>3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification;</p> <p>4. Implement the agreed proposals;</p> <p>5. Revise and resubmit proposals if problem still not under control; and</p> <p>6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.</p>

Noise

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL	<p>1. Notify the Contractor, IEC and ER;</p> <p>2. Discuss with the ER and Contractor on the remedial measures required; and</p> <p>3. Increase monitoring frequency to check mitigation effectiveness.</p>	<p>1. Review the investigation results submitted by the Contractor; and</p> <p>2. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.</p>	<p>1. Confirm receipt of notification of complaint in writing;</p> <p>2. Review and agree on the remedial measures proposed by the Contractor; and</p> <p>3. Supervise implementation of remedial measures.</p>	<p>1. Investigate the complaint and propose remedial measures;</p> <p>2. Report the results of investigation to the IEC, ET and ER;</p> <p>3. Submit noise mitigation proposals to the ER with copy to the IEC and ET within three working days of notification; and</p> <p>4. Implement noise mitigation proposals.</p>
LIMIT LEVEL	<p>1. Notify the Contractor, IEC, EPD and ER;</p> <p>2. Repeat measurement to confirm findings;</p> <p>3. Increase monitoring frequency;</p> <p>4. Carry out analysis of</p>	<p>1. Check monitoring data submitted by the ET;</p> <p>2. Check the Contractor's working method;</p> <p>3. Discuss with the ER, ET and Contractor on the potential remedial measures;</p>	<p>1. Confirm receipt of notification of failure in writing;</p> <p>2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be</p>	<p>1. Identify source and investigate the causes of exceedance;</p> <p>2. Take immediate action to avoid further exceedance;</p> <p>3. Submit proposals for remedial measures to the ER</p>

	<p>Contractor's working procedures to determine possible mitigation to be implemented;</p> <p>5. Arrange meeting with the IEC and ER to discuss the remedial measures to be taken;</p> <p>6. Review the effectiveness of Contractor's remedial measures and keep IEC, EPD and ER informed of the results; and</p> <p>7. If exceedance stops, cease</p>	<p>and</p> <p>4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.</p>	<p>implemented;</p> <p>3. Supervise the implementation of remedial measures; and</p> <p>4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</p>	<p>with copy to the IEC and ET within three working days of notification;</p> <p>4. Implement the agreed proposals;</p> <p>5. Revise and resubmit proposals if problem still not under control; and</p> <p>6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.</p>
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Water Quality

EVENT	ACTION			
	ET Leader	IEC	ER	CONTRACTOR
Action level being exceeded by one sampling day	<ul style="list-style-type: none"> ● Repeat <i>in situ</i> measurement to confirm findings; ● Identify reasons for non-compliance and source(s) of impact; ● Inform IEC and Contractor; ● Check monitoring data, all plant, equipment and Contractor's working methods; ● Discuss mitigation measures with IEC and Contractor; ● Repeat measurement on next day of exceedance. 	<ul style="list-style-type: none"> ● Discuss with ET and Contractor on the mitigation measures; ● Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; ● Assess the effectiveness of the Implemented mitigation measures. 	<ul style="list-style-type: none"> ● Discuss with IEC on the proposed mitigation measures; ● Make agreement on the mitigation measures to be implemented. ● Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> ● Inform the ER and confirm notification of the non-compliance in writing; ● Rectify unacceptable practice; ● Check all plant and equipment; ● Consider changes of working methods; ● Discuss with ET and IEC and propose mitigation measures to IEC and ER; ● Implement the agreed mitigation measures.

	ET Leader	IEC	ER	CONTRACTOR
Action level being exceeded by more than one consecutive sampling day	<ul style="list-style-type: none"> ● Repeat <i>in situ</i> measurement to confirm findings; ● Identify reasons for non-compliance and source(s) of impact; ● Inform IEC and Contractor; ● Check monitoring data, all plant, equipment and Contractor's working methods; ● Discuss mitigation measures with IEC and Contractor; ● Ensure mitigation measures are implemented; ● Prepare to increase the monitoring frequency to daily; 	<ul style="list-style-type: none"> ● Discuss with ET and Contractor on the mitigation measures; ● Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; ● Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> ● Discuss with IEC on the proposed mitigation measures; ● Make agreement on the mitigation measures to be implemented; ● Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> ● Inform the ER and confirm notification of the non-compliance in writing; ● Rectify unacceptable practice; ● Check all plant and equipment; ● Consider changes of working methods; ● Discuss with ET and IEC and propose mitigation measures to IEC and ER within three working days; ● Implement the agreed mitigation measures.

	<ul style="list-style-type: none"> ● Repeat measurement on next day of exceedance. 			
	ET Leader	IEC	ER	CONTRACTOR
Limit level being exceeded by one sampling day	<ul style="list-style-type: none"> ● Repeat <i>in situ</i> measurement to confirm findings; ● Identify reasons for non-compliance and source(s) of impact; ● Inform IEC Contractor and EPD; ● Check monitoring data, all plant, equipment and Contractor's working methods; ● Discuss mitigation measures with IEC, ER and Contractor; ● Ensure mitigation measures are implemented; 	<ul style="list-style-type: none"> ● Discuss with ET and Contractor on the mitigation measures; ● Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; ● Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> ● Discuss with IEC, ET and Contractor on the proposed mitigation measures; ● Request Contractor to critically review the working methods; ● Make agreement on the mitigation measures to be implemented; ● Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> ● Inform the ER and confirm notification of the non-compliance in writing; ● Rectify unacceptable practice; ● Check all plant and equipment; ● Consider changes of working methods; ● Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within three working days; ● Implement the agreed mitigation measures.

	<ul style="list-style-type: none"> ● Increase the monitoring frequency to daily until no exceedance of Limit level. 			
	ET Leader	IEC	ER	CONTRACTOR
Limit level being exceeded by more than one consecutive sampling day	<ul style="list-style-type: none"> ● Repeat <i>in situ</i> measurement to confirm findings; ● Identify reasons for non-compliance and source(s) of impact; ● Inform IEC Contractor and EPD; ● Check monitoring data, all plant, equipment and Contractor's working methods; ● Discuss mitigation measures with IEC, ER and Contractor; ● Ensure mitigation measures are 	<ul style="list-style-type: none"> ● Discuss with ET and Contractor on the mitigation measures; ● Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; ● Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> ● Discuss with IEC, ET and Contractor on the proposed mitigation measures; ● Request Contractor to critically review the working methods; ● Make agreement on the mitigation measures to be implemented; ● Assess the effectiveness of the implemented mitigation measures; ● Consider and instruct, if necessary, the Contractor to slow 	<ul style="list-style-type: none"> ● Inform the ER and confirm notification of the non-compliance in writing; ● Rectify unacceptable practice; ● Check all plant and equipment; ● Consider changes of working methods; ● Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within three working days; ● Implement the agreed mitigation measures;

	implemented; Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.		down or to stop all or part of the construction activities until no exceedance of Limit level.	<ul style="list-style-type: none">● As directed by the ER, to slow down or to stop all or part of the construction activities.
--	--	--	--	--

Appendix H

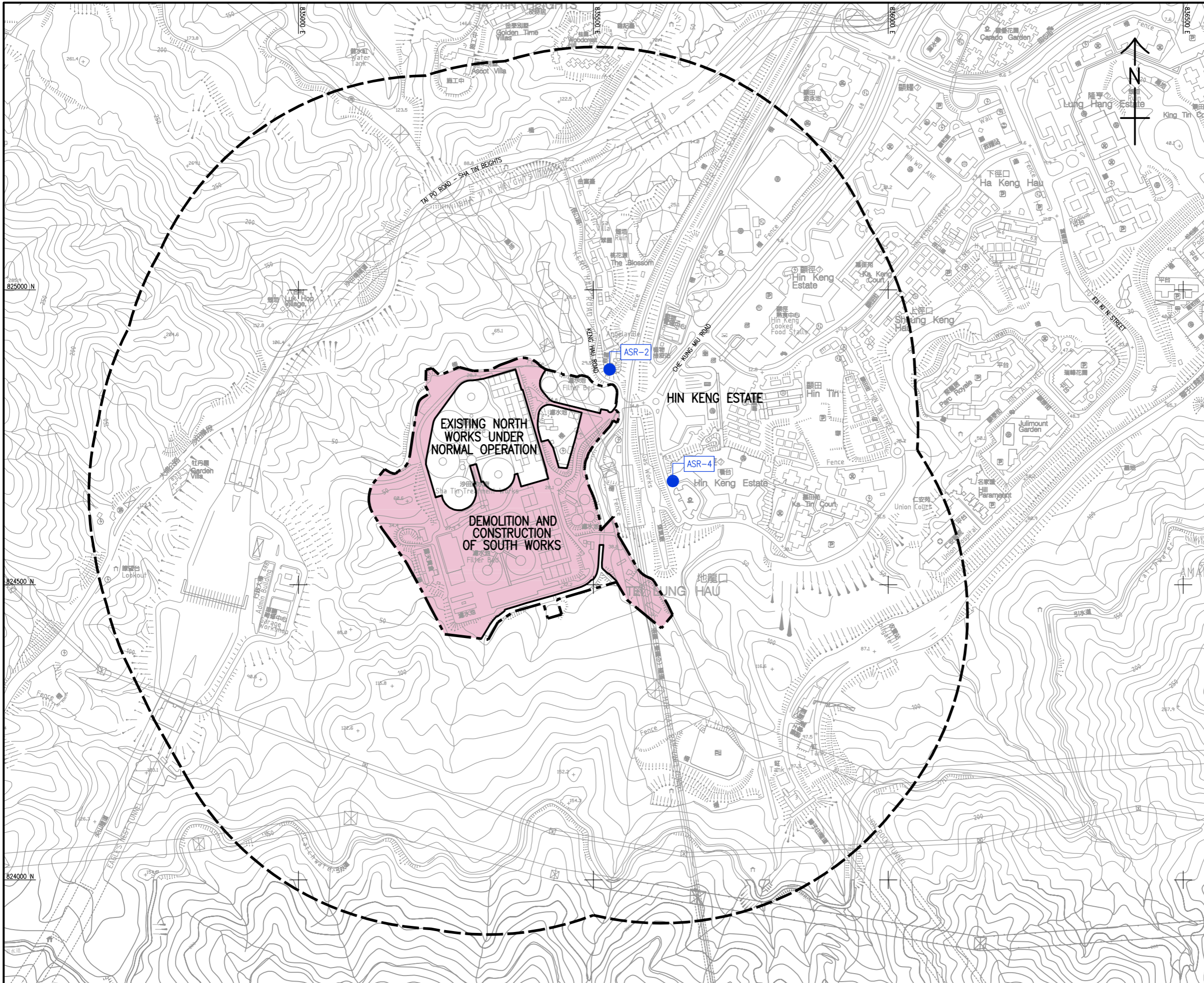
Impact Monitoring Schedules

Dec-16						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
				1	2 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	3
4	5 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	6	7 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	8	9 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	10
11	12 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	13	14 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	15	16 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	17
18	19 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	20	21 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	22	23 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	24
25	26	27	28 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	29	30 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	31

*Remark: No construction works performed on public holiday 26/12 & 27/12

Appendix I

Location Plan of Air Quality Monitoring Station



- LEGEND:**
- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
 - STUDY AREA (500m BOUNDARY)
 - WORKS AREA
 - REPRESENTATIVE AIR SENSITIVE RECEIVERS (ASRS)
 - ASR-2 THE L LOUEY
 - ASR-4 HIN KENG ESTATE - HIN WAN HOUSE

REV.	DESCRIPTION	BY	CHK.	DATE

水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

LOCATIONS OF PROPOSED DUST MONITORING STATIONS

AECOM

DRG. NO. 60162073/EM&A/FIG 3
 圖紙編號

DESIGNED BY	CONTRACT NO.	P. No. APPROVED
DRAWN BY	DATE	批准人
SCALE	© COPYRIGHT RESERVED	
UNIT	版權所有	

Appendix J

Calibration Certificates

(Air Monitoring)



CERTIFICATE OF CALIBRATION AND TESTING

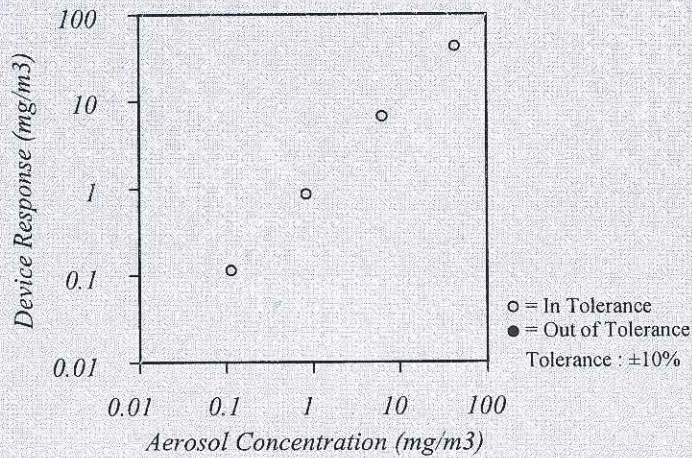
TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

Environment Conditions			Model	8532
Temperature	73.92 (23.3)	°F (°C)	Serial Number	8532114409
Relative Humidity	59.8	%RH		
Barometric Pressure	28.73 (972.9)	inHg (hPa)		

As Left
 As Found

In Tolerance
 Out of Tolerance

Concentration Linearity Plot



System ID: DTII01-02

FLOW AND PRESSURE VERIFICATION

SYSTEM DTII01-02

Parameter	Standard	Measured	Allowable Range	Parameter	Standard	Measured	Allowable Range
Flow lpm	3.1	3.0	2.97 ~ 3.29	Pressure kPa	97.3	97.3	92.44 ~ 102.17

TSI Incorporated does hereby certify that all materials, components, and workmanship used in the manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. There is no NIST standard for optical mass measurements. Calibration of this instrument performed by TSI has been done using emery oil and has been nominally adjusted to respirable mass per standard ISO 12103-1, A1 test dust (Arizona dust). Our calibration ratio is greater than 1.2:1

Measurement Variable	System ID	Last Cal.	Cal. Due	Measurement Variable	System ID	Last Cal.	Cal. Due
Temp/Humidity	E005656	03-08-16	03-08-17	Temp/Humidity	E005657	03-16-16	03-16-17
DC Voltage	E003314	05-19-16	05-19-17	DC Voltage	E003315	05-19-16	05-19-17
Photometer	E003319	01-22-16	07-22-16	Microbalance	M001324	01-05-15	01-05-17
1 um PSL	655458	n/a	n/a	3 um PSL	43042	n/a	n/a
10 um PSL	42808	n/a	n/a	Pressure	E003511	10-22-15	10-22-16
Flowmeter	E002471	04-26-16	04-26-17				

Soua Chang

Calibrated

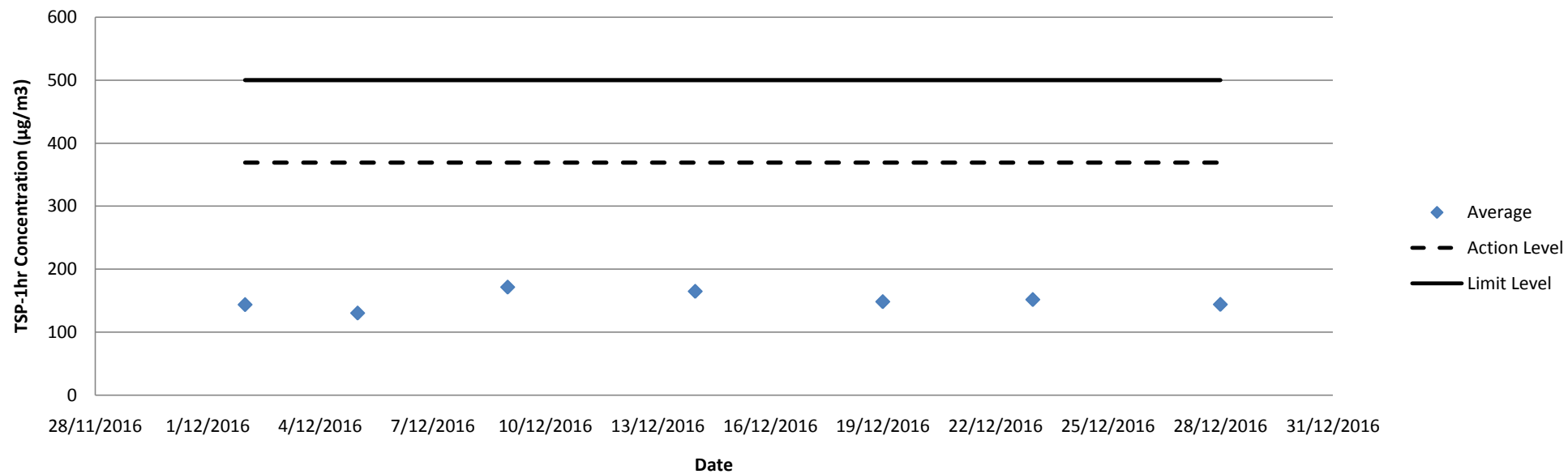
June 15, 2016

Date

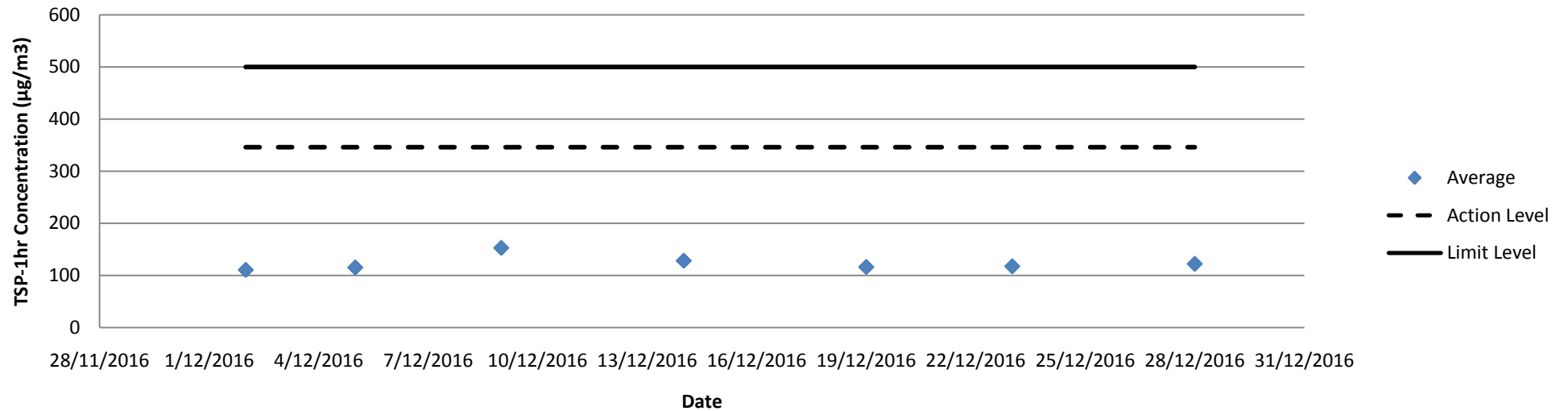
Appendix K

Impact Air Quality Monitoring Results and Graphical Presentation

The Summary of TSP-1hr Concentration ($\mu\text{g}/\text{m}^3$) at AM1 The L Louey

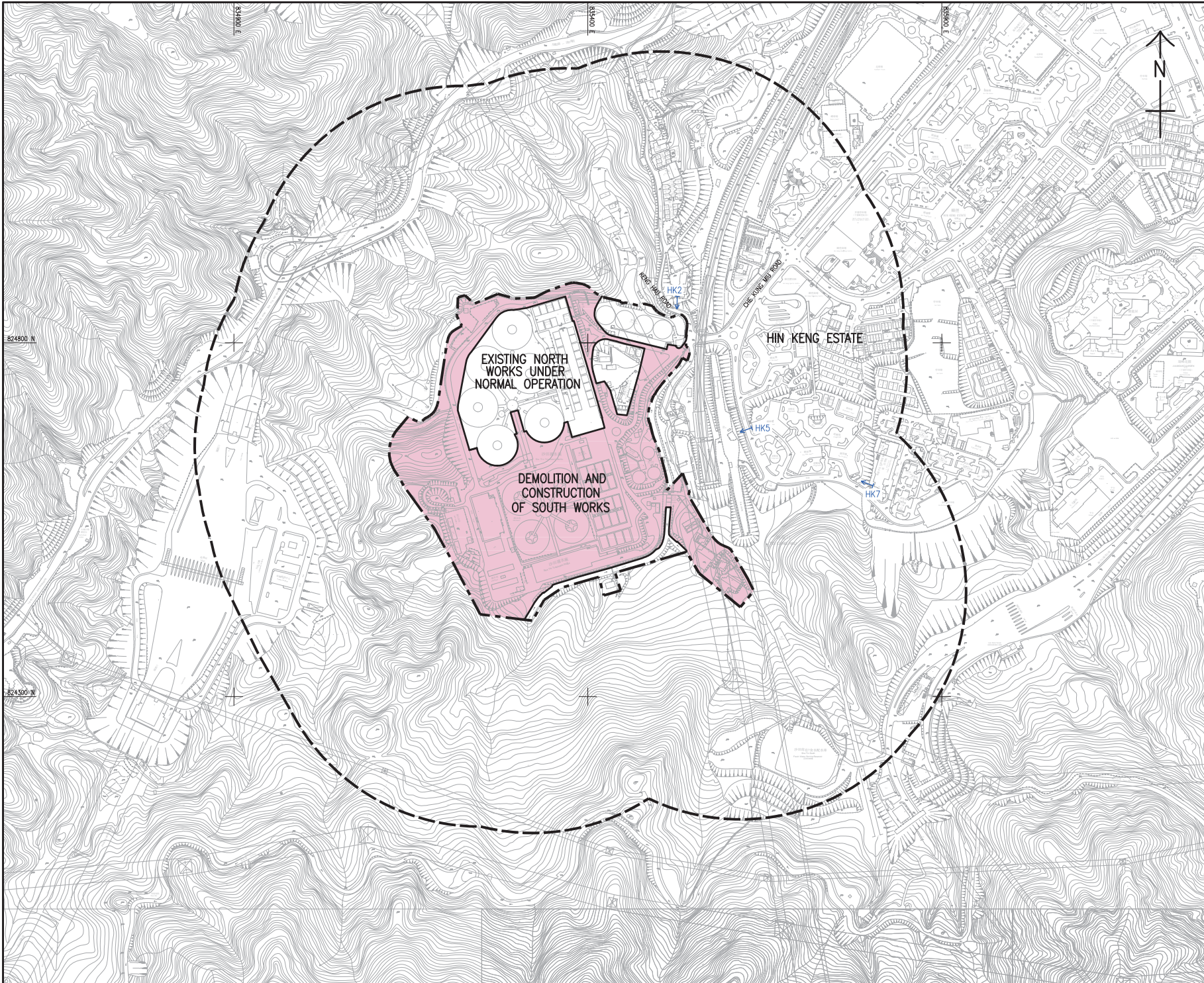


The Summary of TSP-1hr Concentration ($\mu\text{g}/\text{m}^3$) at AM2 Hin Keng Estate - Hin Wan House



Appendix L

Location Plan of Noise Monitoring Station



LEGEND:

- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
- 300m STUDY AREA
- WORKS AREA
- HK2
- THE L LOUEY (SOUTH)
- HK5
- HIN KENG ESTATE - HIN WAN HOUSE
- HK7
- CHUKFAA THOMAS CHEUNG SCHOOL

水務署
WATER SUPPLIES DEPARTMENT

AGREEMENT NO. CE 13/2009 (WS)
IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
DESIGN AND CONSTRUCTION

LOCATIONS OF PROPOSED NOISE MONITORING STATIONS

AECOM

DRG NO 60162073/EM&A/FIG 4
圖紙編號

DESIGNED BY NHP	CHECKED BY NHP	DATE A3 1 : 5000
© COPYRIGHT RESERVED 版權所有		

Appendix M

Calibration Certificates (Noise)



Certificate of Calibration

校正證書

Certificate No. : C166584
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-2614) Date of Receipt / 收件日期 : 15 November 2016

Description / 儀器名稱 : Sound Level Meter
Manufacturer / 製造商 : Pulsar
Model No. / 型號 : 43
Serial No. / 編號 : PN1374
Supplied By / 委託者 : Acumen Environmental Engineering and Technologies Co., Ltd.
Lot 11, Tam Kon Shan Road, North Tsing Yi, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^\circ\text{C}$ Relative Humidity / 相對濕度 : $(55 \pm 20)\%$
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 25 November 2016


TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

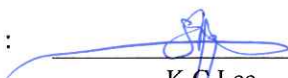
The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By
測試


H T Wong
Technical Officer

Certified By
核證


K C Lee
Project Engineer

Date of Issue : 25 November 2016
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。

Certificate of Calibration

校正證書

Certificate No. : C166584
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- Self-calibration using laboratory acoustic calibrator was performed before test from 6.1.1.2 to 6.3.2.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C160077
CL281	Multifunction Acoustic Calibrator	PA160023

- Test procedure : MA101N.

- Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)
Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
LA	F	94.00	1	93.9

6.1.1.2 After Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
LA	F	94.00	1	93.7	± 1.1

6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
LA	F	94.00	1	93.7 (Ref.)
		104.00		103.7
		114.00		113.7

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

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6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
LA	F	94.00	1	93.7	Ref.
	S			93.7	± 0.3

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Frequency Weighting	Time Weighting	Level (dB)	Freq.		
LA	F	94.00	63 Hz	67.5	-26.2 ± 1.5
			125 Hz	77.5	-16.1 ± 1.5
			250 Hz	85.0	-8.6 ± 1.4
			500 Hz	90.4	-3.2 ± 1.4
			1 kHz	93.7	Ref.
			2 kHz	94.9	$+1.2 \pm 1.6$
			4 kHz	94.7	$+1.0 \pm 1.6$
			8 kHz	92.9	$-1.1 (+2.1 ; -3.1)$
			12.5 kHz	89.4	$-4.3 (+3.0 ; -6.0)$

6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Frequency Weighting	Time Weighting	Level (dB)	Freq.		
LC	F	94.00	63 Hz	92.9	-0.8 ± 1.5
			125 Hz	93.5	-0.2 ± 1.5
			250 Hz	93.7	0.0 ± 1.4
			500 Hz	93.7	0.0 ± 1.4
			1 kHz	93.7	Ref.
			2 kHz	93.5	-0.2 ± 1.6
			4 kHz	93.0	-0.8 ± 1.6
			8 kHz	91.0	$-3.0 (+2.1 ; -3.1)$
			12.5 kHz	87.5	$-6.2 (+3.0 ; -6.0)$

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Certificate of Calibration

校正證書

Certificate No. : C166584
證書編號

Remarks : - UUT Microphone Model No. : PM1 & S/N : 011060C

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value : 94 dB : 63 Hz - 125 Hz : ± 0.35 dB
250 Hz - 500 Hz : ± 0.30 dB
1 kHz : ± 0.20 dB
2 kHz - 4 kHz : ± 0.35 dB
8 kHz : ± 0.45 dB
12.5 kHz : ± 0.70 dB
104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)
114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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Sun Creation Engineering Limited – Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 – 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com



The Government of
The Hong Kong Special Administrative Region
Standards and Calibration Laboratory
香港特別行政區政府標準及校正實驗所

Certificate of Calibration
校正證書



Certificate No. PA160049
證書編號

Page 1 of 6 pages
第 1 頁 (共 6 頁)

Customer / 客戶 Acumen Environmental Engineering & Technologies Co. Ltd.
Lot 11, Tam Kon Shan Road,
Tsing Yi (N),
Hong Kong

Equipment / 儀器

Description / 名稱 Sound Calibrator
Make / 製造商 Pulsar
Model / 型號 105
Serial No. / 序號 70396

Date of Receipt / 收件日期 25 April 2016

Test Environment / 測試環境

Temperature / 溫度 $(23 \pm 1) ^\circ\text{C}$
Relative Humidity / 相對濕度 $(45 \pm 8) \%$
Air Pressure / 氣壓 $(99.3 \text{ to } 99.4) \text{ kPa}$

Date of Test / 測試日期 26 April 2016

Test Specifications / 測試規格

Calibrate the sound pressure level, frequency and total distortion of the acoustical calibrator at 94 dB in accordance with the International Standard IEC 60942 : 2003 Annex B.

Test Results / 測試結果

The results are detailed in the continuation pages.

Approved Signatory Lam Hoi Shan
批簽 *Brenda*

Date: 27 April 2016
日期

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. HOKLAS 051) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are metrologically traceable to the International System of Units (S.I.) or recognised measurement standards.
香港認可處已根據香港實驗所認可計劃，認可本實驗所 (Reg. No. HOKLAS 051) 進行《認可實驗所所名冊》內載列的指定活動。本證書所載結果可溯源至國際單位制或公認的計量標準。

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Branch Laboratory : G04, Public Works Central Laboratory Building, 2B Cheung Yip Street, Kowloon Bay, Kowloon.
總所：香港灣仔告士打道7號入境事務大樓36樓
分所：九龍九龍灣祥業街2號B工務中央試驗所大樓地下04室

Tel : 2829 4830
Tel : 2798 7347

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Certificate of Calibration (Continuation Page)
校正證書 (續頁)

Certificate No. PA160049
證書編號

Page 2 of 6 pages
第 頁 (共 頁)

1. The test equipment was allowed to stabilise in the laboratory environment at 23 °C and 45 % RH for over 24 hours before the test.
2. The power supply to the instrument under test was one 9 V battery.
3. Procedures from IEC 60942 : 2003 Annex B were used to perform the calibration, which included the following tests :

(1) Sound pressure level

Performance tests were carried out in accordance with Section B.3.4 of IEC 60942 : 2003. The sound pressure level generated by the Pulsar 105 was measured by a laboratory B & K 4180 standard microphone. Measurement results are presented in Table 1.

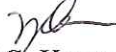
(2) Frequency


Relevant tests were carried out in accordance with Section B.3.5 of IEC 60942 : 2003. The frequency of the acoustic signal was measured by a frequency counter. Measurement results are presented in Table 2.

(3) Total distortion

Relevant tests were carried out in accordance with Section B.3.6 of IEC 60942 : 2003. The distortion of the acoustic signal was measured by a distortion meter. Measurement results are presented in Table 3.

4. No adjustment was made to the instrument under test.

Calibrated by : 
Y.C. Kwan

Checked by : 
H.S. Lam

Date : 26 April 2016

Date : 26 April 2016



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香港特別行政區政府標準及校正實驗所


Certificate of Calibration (Continuation Page)
校正證書 (續頁)


Certificate No. PA160049
證書編號

Page 3 of 6 pages
第 頁 (共 頁)

5. The Sound Calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942 : 2003 for the sound pressure level, frequency and total distortion stated, for the environmental conditions under which the tests were performed. However, as public evidence was not available, from a testing organization responsible for pattern approval, to demonstrate that the model of sound calibrator conformed to the requirements for pattern evaluation described in Annex A of IEC 60942 : 2003, no general statement or conclusion can be made about conformance of the sound calibrator to the requirements of IEC 60942 : 2003.
6. The measurement uncertainty evaluation has been carried out in accordance with principles in the Evaluation of Measurement Data – Guide to the Expression of Uncertainty in Measurement, JCGM 100:2008. The expanded measurement uncertainty U , with its coverage factor k , corresponds to a 95 % probability that the value of the measurand Y lies within the interval $y-U$ to $y+U$. The combined standard measurement uncertainty u_c can be calculated as $u_c = U/k$ and its degrees of freedom ν_{eff} is given by the t -distribution with the respective k value.
7. The values given in this Certificate of Calibration only relate to the values measured at the time of the test and any measurement uncertainties quoted will not include allowances for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, or the capability of any other laboratory to repeat the measurement.
8. This certificate is consistent with the capabilities that are included in Appendix C of the MRA drawn up by the CIPM. Under the MRA, all participating institutes recognise the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details see <http://www.bipm.org>).

CIPM : International Committee for Weights and Measures
MRA : Mutual Recognition Arrangement

Calibrated by : 
Y.C. Kwan

Checked by : 
H.S. Lam

Date : 26 April 2016

Date : 26 April 2016



The Government of
The Hong Kong Special Administrative Region
Standards and Calibration Laboratory
香港特別行政區政府標準及校正實驗所

Certificate of Calibration (Continuation Page)
校正證書 (續頁)

Certificate No. PA160049
證書編號

Page 4 of 6 pages
第 頁 (共 頁)


Table 1


Sound Pressure Level Test Results

Pulsar 105 Sound Pressure Level Setting	Measured Sound Pressure Level ⁽¹⁾		
	Value y	Measurement Uncertainty	
		Expanded Measurement Uncertainty U	Coverage Factor k
94 dB	93.94 dB	0.06 dB	2.0

Note (1) : Measurement results at measurement conditions were corrected to the following reference conditions :

Temperature : 23 °C
Humidity : 50 % RH
Pressure : 101.325 kPa

Calibrated by : 
Y.C. Kwan

Checked by : 
H.S. Lam

Date : 26 April 2016

Date : 26 April 2016



The Government of
The Hong Kong Special Administrative Region
Standards and Calibration Laboratory
香港特別行政區政府標準及校正實驗所

Certificate of Calibration (Continuation Page)
校正證書 (續頁)


Certificate No. PA160049
證書編號


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第 頁 (共 頁)

Table 2
Frequency Test Results⁽¹⁾

Pulsar 105 Sound Pressure Level Setting	Measured Frequency		
	Value y	Measurement Uncertainty	
		Expanded Measurement Uncertainty U	Coverage Factor k
94 dB	1 000.275 Hz	0.010 Hz	2.0

Note (1) : Items not supported by CIPM MRA.

Calibrated by : 
Y.C. Kwan

Checked by : 
H.S. Lam

Date : 26 April 2016

Date : 26 April 2016



The Government of
The Hong Kong Special Administrative Region
Standards and Calibration Laboratory
香港特別行政區政府標準及校正實驗所

Certificate of Calibration (Continuation Page)
校正證書 (續頁)

Certificate No. PA160049
證書編號

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第 頁 (共 頁)

Table 3

Total Distortion Test Results⁽¹⁾

Pulsar 105 Sound Pressure Level Setting	Measured Total Distortion		
	Value y	Measurement Uncertainty	
		Expanded Measurement Uncertainty U	Coverage Factor k
94 dB	0.2 %	0.5 %	2.0

Note (1) : Items not supported by CIPM MRA.

- END -

Calibrated by :


Y.C. Kwan

Checked by :


H.S. Lam

Date : 26 April 2016

Date : 26 April 2016



**Certificate of
Conformity**

This instrument was produced under rigorous factory production control and documented standard procedures. It was individually visually inspected, leak tested and function tested for display, backlight, button and software performance. The accuracy of each of its primary measurements was individually calibrated and/or tested against standards traceable to the National Institute of Standards and Technology ("NIST") or calibrated intermediary standards. This instrument is certified to have performed at the time of manufacture in compliance with the following specifications as they apply to this meter's specific model, measurements and features.

Methods Used in Calibration and Testing

Wind Speed:

The Kestrel Pocket Weather Meter impeller installed in this unit was individually tested in a subsonic wind tunnel operating at approximately 300 fpm (1.5 m/s) and 1200 fpm (6.1 m/s) monitored by a Gill Instruments Model 1350 ultrasonic time-of-flight anemometer. The Standard's maximum combined uncertainty is $\pm 1.04\%$ within the airspeed range 706.6 to 3923.9 fpm (3.59 to 19.93 m/s), and $\pm 1.66\%$ within the airspeed range 166.6 to 706.6 fpm (0.85 to 3.59 m/s).

Temperature:

Temperature response is verified in comparison with a Eutechnics 4600 Precision Thermometer or a standard Kestrel 4000 Weather and Environmental Meter calibrated weekly against the Eutechnics 4600. The Eutechnics 4600 is calibrated annually and is traceable to NIST with a system accuracy of ± 0.05 °C.

Direction / Heading

The sensitivity of the magnetic directional sensor is verified at the component level by applying a magnetic field to the sensor and measuring the signal output at 4 points, as well as after assembly by orienting the unit to the cardinal directions and measuring the magnetic field output. In both cases the compass output must be accurate to within ± 5 degrees.

Relative Humidity:

Relative humidity receives a two-point calibration in humidity and temperature controlled chambers at 75.3% RH and 32.8% RH at 25° C. The calibration tanks are monitored with an Edgetech Model 2002 DewPrime II Standard Chilled Mirror Hygrometer. Following calibration, performance is further verified at an RH of approximately 43.2% against the Edgetech Hygrometer. The Edgetech Hygrometer is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of $\pm 0.2\%$ RH.

Barometric Pressure:

Pressure response is verified against a Mensor Series 6000 Digital Barometer or a standard Kestrel 4000 Weather and Environmental Meter calibrated weekly against the Mensor Barometer. The Mensor Barometer is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of $\pm 0.02\%$ F.S.

Approved By:

Michael Naughton, Engineering Manager

SENSORS																		
SENSOR	1000	2000	2500	3000	3500	3500 DT	4000	4200	4250	4300	4400	4500	4500 HOR	ACCURACY (H+) ¹	RESOLUTION	SPECIFICATION RANGE	OPERATIONAL RANGE	NOTES
Wind Speed Air Flow	•	•	•	•	•	•	•	•	•	•	•	•	•	0.1 m/s Larger of 3% of reading, least significant digit or 20 ft/min 0.1 km/h 0.1 mph 1.2 to 77.8 knots 1 ft	0.6 to 40.0 m/s 118 to 7,874 ft/min 2.2 to 144.0 km/h 1.3 to 89.5 mph 1.2 to 116.6 knots 0 to 12 ft	0.6 to 60.0 m/s 118 to 11,811 ft/min 2.2 to 216.0 km/h 1.3 to 134.2 mph 1.2 to 116.6 knots 0 to 12 ft	1 inch/25 mm diameter impeller with precision axle and low-friction 2yell® bearings. Startup speed stated as lower limit, readings may be taken down to 0.4 m/s (78 ft/min) 1.5 km/h 0.9 mph 0.4 m/s after impeller startup. Off-axis accuracy: ±1% @ 5° off-axis; ±2% @ 10° off-axis. Calibration drift < 1% after 100 hours use at 16 MPH / 7 m/s. Replacement impeller (NK-PN-0801) field install without tools. (US Patent 5,763,753). Wind speed calibration and testing should be done with impeller located at the top front face of the Kestrel.	
Ambient Temperature	•	•	•	•	•	•	•	•	•	•	•	•	•	0.5 °F 0.1 °C	0.1 °F 0.1 °C	-20.0 to 158.0 °F -29.0 to 70.0 °C	14.0 to 131.0 °F -10.0 to 55.0 °C	Hermetically-sealed, precision thermistor mounted externally and thermally isolated (US Patent 5,939,645) for rapid response. Airflow of 2.2 m/s (1 m/s or greater) provides fastest response and reduction in insulation effect. Calibration drift negligible. Thermistor may also be used to measure temperature of water or snow by submerging thermistor portion into material - remove impeller prior to taking submerged measurements and ensure humidity sensor membrane is free of liquid water prior to taking humidity based measurements after submersion.
Globe Temperature - Tg														1.4 °F 0.1 °C	0.1 °F 0.1 °C	-20.0 to 140.0 °F -29.0 to 60.0 °C	14.0 to 131.0 °F -10.0 to 55.0 °C	Temperature inside 1in/25 mm black powder coated copper globe converted to Tg equivalent for standard 6 in/150 mm globe. Closest equivalence obtained with airflow greater than 2.2 m/s (1 m/s).
Relative Humidity														3.0 %RH 0.1 %RH	5 to 95% non-condensing 0 to 100%	0 to 100%	Polymer capacitive humidity sensor mounted in thin-walled chamber external to case for rapid, accurate response (US Patent 6,257,074). To achieve stated accuracy, unit must be permitted to equilibrate to external temperature when exposed to large, rapid temperature changes and be kept out of direct sunlight. Calibration drift < 2% over 24 months. Humidity sensor may be recalibrated at factory or in field using Kestrel Humidity Calibration Kit (NK-PN-0802).	
Pressure														0.03 inHg 1.0 hPa/mbar 0.01 PSI	0.03 to 32.49 inHg 300.0 to 1,000.0 hPa/mbar 4.35 to 15.95 PSI and 33.0 to 185.0 °F 0.0 to 85.0 °C	0.30 to 48.67 inHg 10.0 to 1654.3 hPa/mbar 0.14 to 24.00 PSI and 14.0 to 131.0 °F -10.0 to 55.0 °C	Monolithic silicon piezoresistive pressure sensor with second-order temperature correction. Pressure sensor may be recalibrated at factory or in field. Adjustable reference altitude allows display of station pressure or barometric pressure corrected to MSL. Kestrel 4200 displays station pressure on a dedicated screen. Kestrel 2500 and 3500 display continuously updating three-hour barometric pressure trend indicator: rising rapidly, rising, steady, falling, falling rapidly. Kestrel 4000 series displays pressure trend through graphing function. PSI display on Kestrel 4000 series only.	
Compass														5° 1° 1/16th Cardinal Scale	0 to 360°	0 to 360°	2-axis solid-state magnetoresistive sensor mounted perpendicular to unit plane. Accuracy of sensor dependent upon unit's vertical position. Self-calibration routine eliminates magnetic error from batteries or unit and must be run after every full power-down (battery removal or charge). Readout indicates direction to which the back of the unit is pointed when held in a vertical orientation. Declination/variation adjustable for True North readout.	

CALCULATED MEASUREMENTS																		
MEASUREMENT	1000	2000	2500	3000	3500	3500 DT	4000	4200	4250	4300	4400	4500	4500 HOR	ACCURACY (H+) ¹	RESOLUTION	SPECIFICATION RANGE	SENSORS EMPLOYED	NOTES
Air Density														0.0002 lb/ft ³ 0.003 kg/m ³	0.001 lb/ft ³ 0.001 kg/m ³	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Mass of air per unit volume
Air Flow														6.71%	1 cfm 1 m ³ /hr 0.1 m ³ /s 1 L/s	Refer to Ranges for Sensors Employed	Air Flow User Input (Duct Shape & Size)	Volume of air flowing through an opening. Automatically calculated from Air Velocity measurement and user-specified duct shape (circle or rectangle) and dimensions (units: ft, in, cm or m). Maximum duct dimension input: 258.0 in 21.5 ft 655.3 cm 6.55 m
Altitude														typical: 23.6 ft 7.2 m max: 48.2 ft 14.7 m	1 ft 1 m	typical: 750 to 1100 mBar max: 300 to 750 mBar	Pressure User Input (Reference Pressure)	Height above Mean Sea Level (MSL). ² Temperature compensated pressure (barometric) altimeter requires accurate reference barometric pressure to produce maximum absolute accuracy. Both accuracy specs corresponds to a reference pressure anywhere from 890 to 1100 mBar.
Barometric Pressure														0.07 inHg 2.4 hPa/mbar 0.03 PSI	0.01 inHg 0.1 hPa/mbar 0.01 PSI	Refer to Ranges for Sensors Employed	Pressure User Input (Reference Altitude)	Air pressure that would be present in identical conditions at MSL. Station pressure compensated for local elevation provided by reference altitude. Requires accurate reference altitude to produce maximum absolute accuracy.
Crosswind & Headwind/Tailwind														7.1% 1 mph 1 ft/min 0.1 km/h 0.1 m/s 1.1 knots	Refer to Ranges for Sensors Employed	Wind Speed Compass	Effective wind relative to a target or travel direction. Auto-switching headwind/tailwind indication.	
Delta T														3.2 °F 1.8 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Difference between dry bulb temperature and wet bulb temperature. When spraying, indicates evaporation rate and droplet lifetime. Safe range for pesticide spraying is 4 to 16 °F / 2 to 9 °C.
Density Altitude														226 ft 69 m	1 ft 1 m	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Local air density converted to equivalent elevation above sea level in a uniform layer consisting of the International Standard Atmosphere.
Dewpoint														3.4 °F 1.9 °C	0.1 °F 0.1 °C	15 to 95 % RH Refer to Range for Temperature Sensor	Temperature Relative Humidity	Temperature that a volume of air must be cooled to at constant pressure for the water vapor present to condense into and drop from on a solid surface. Can also be considered to be the water-air saturation temperature.
Evaporation Rate														0.01 lb/ft ² /hr 0.05 kg/m ² /hr	0.01 lb/ft ² /hr 0.01 kg/m ² /hr	Refer to Ranges for Sensors Employed	Wind Speed Temperature Relative Humidity Pressure User Input (Concrete Temperature)	The rate at which moisture is lost from the surface of curing concrete. Requires user measurement and entry of concrete temperature obtained with an accurate IR or probe thermometer (°F or °C, not included). Readings should be taken 20 inches above pour surface with the thermometer shaded, and averaged for 6-10 seconds using built-in averaging function.
Heat Index														7.1 °F 4.0 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Perceived temperature resulting from the combined effect of temperature and relative humidity. Calculated based on NWS Heat Index (HI) tables. Measurement range limited by extent of published tables.
Moisture Content Humidity Ratio ("Grains")														3 gpp 04 g/kg	0.1 gpp 0.01 g/kg	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Mass of water vapor in a mass of air.
Relative Air Density														0.3%	0.1%	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	The ratio, expressed as a percentage, of measured air density to the air density of a standard atmosphere as defined by the ICAO.
Thermal Work Limit (TWL)														10.9 W/m ²	0.1 W/m ²	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Estimated safe maximum continuously sustainable human metabolic rate (W/m ²) for the conditions and clothing factors. Based off of estimated metabolic output of typical human. On-screen zone warnings.
Outdoor Wet Bulb Globe Temperature (WBGT)														1.3 °F 0.7 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Measure of human heat stress defined as the combination of effects due to radiation, convection, and conduction. Outdoor WBGT is calculated from a weighted sum of natural wet bulb (Twb), globe temperature (Tg), and dry bulb temperature (Td). User settable on-screen warning zones.
Wet Bulb Temperature - Naturally Aspirated (Twb)														1.4 °F 0.8 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Similar to psychrometric wet-bulb temperature (see below). However, Twb only undergoes forced convection from the ambient air velocity. Twb is a measure of the evaporative cooling that the air will allow. This is accounted for by combining the effects of, mainly, relative humidity and windspeed.
Wet Bulb Temperature - Psychrometric														3.2 °F 1.8 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Temperature indicated by a sling psychrometer. Due to nature of the psychrometric ratio for a water-air system, this approximates the thermodynamic wet-bulb temperature. The thermodynamic wet-bulb temperature is the temperature a parcel of air would have if cooled adiabatically to saturation temperature via water evaporating into it.
Wind Chill														1.6 °F 0.9 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature	Perceived temperature resulting from combined effect of wind speed and temperature. Calculated based on the NWS Wind Chill Temperature (WCT) Index, revised 2001, with wind speed adjusted by a factor of 1.5 to yield equivalent results to wind speed measured at 10 m above ground. Measurement range limited by extent of published tables.

ADDITIONAL SPECIFICATIONS															
Display & Backlight	•	•	•	•	•	•	•	•	•	•	•	•	•	Reflective 3 1/2 digit LCD. Digit height 0.29 in / 9 mm. Aviation green electroluminescent backlight. Manual activation with auto-off. Reflective 5 digit LCD. Digit height 0.36 in / 9 mm. Choice of aviation green or visible red (NV models only) electroluminescent backlight. Manual activation with auto-off.	
Response Time & Display Update	•	•	•	•	•	•	•	•	•	•	•	•	•	All measurements except those based on relative humidity respond accurately within 1 second. Relative humidity and all measurements which include RH in their calculation may require as long as 1 minute to fully equilibrate to a large change in the measurement environment. Display updates every 1 second.	
Max/Avg Wind	•	•	•	•	•	•	•	•	•	•	•	•	•	One-button clear and restart of Max Wind Gust and Average Wind measurement. Max and average wind calculation may be started and stopped independently of data logging of other values, along with all other wind-related functions: air velocity, crosswind, headwind/tailwind, wind chill, WBGT, TWL, evaporation rate.	
Data Storage & Archival Display, Min/Max/Avg History														4000 points 3200 points 3200 points 3600 points 2300 points 2900 points 2500 points	Minimum, maximum, average and logged history stored and displayed for every measured value. Large capacity data logger with graphical display. Manual and auto data storage. Min/Max/Avg history may be reset independently. Auto-store interval settable from 2 seconds to 12 hours, overwrite on or off. Logs even when display off for 2 and 5 second intervals (code version 4.18 and later). Data capacity shown.
Data Upload & Bluetooth® Data Connect Option														Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software. Bluetooth Data Transfer Option: Adjustable power consumption and radio range from up to 30 ft / 9 meters. Individual unit ID and 4-digit PIN code preprogrammed for easy identification and data security when pairing and transmitting. Employs Bluetooth Serial Port Protocol for data transmission.	
Clock / Calendar	•	•	•	•	•	•	•	•	•	•	•	•	•	Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.	
Auto Shutdown	•	•	•	•	•	•	•	•	•	•	•	•	•	Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.	
Languages	•	•	•	•	•	•	•	•	•	•	•	•	•	English, French, German, Italian, Spanish.	
Certifications	•	•	•	•	•	•	•	•	•	•	•	•	•	CE certified, RoHS and WEEE compliant. Individually tested to NIST-traceable standards (written certificate of tests available at additional charge).	
Battery Origin	•	•	•	•	•	•	•	•	•	•	•	•	•	Designed and manufactured in the USA from US and imported components. Complies with Regional Value Content and Tariff Code. Transportation requirements for NAFTA Preference Criterion B. CR2032, one, included. Average life, 300 hours. Battery life reduced by backlight use in 2000 to 3500 models.	
Shock Resistance	•	•	•	•	•	•	•	•	•	•	•	•	•	Standard Models: AAA Alkaline, two, included. Average life, 400 hours of use, reduced by backlight or Bluetooth radio transmission use. MIL-STD-810g, Transit Shock, Method 516.5 Procedure IV, unit only, impact may damage replaceable impeller.	
Sealing	•	•	•	•	•	•	•	•	•	•	•	•	•	Waterproof (IP67) and NEMA-6.	
Operational Temperature Limits	•	•	•	•	•	•	•	•	•	•	•	•	•	14° F to 131° F -10 °C to 55 °C. Measurements may be taken beyond the limits of the operational temperature range of the display and batteries by maintaining the unit within the operational range and exposing it to the more extreme environment for the minimum time necessary to take reading.	
Storage Temperature	•	•	•	•	•	•	•	•	•	•	•	•	•	-22.0 °F to 140.0 °F -30.0 °C to 60.0 °C	
Size & Weight	•	•	•	•	•	•	•	•	•	•	•	•	•	4.8 x 1.9 x 1.1 in 12.2 x 4.8 x 2.8 cm, 3.6 oz / 102 g (including slip-on cover). 5.0 x 1.8 x 1.1 in 12.7 x 4.5 x 2.8 cm, 3.6 oz / 102 g. 6.5 x 2.3 x 1.1 in 16.5 x 5.9 x 2.8 cm, 4.4 oz / 125 g.	

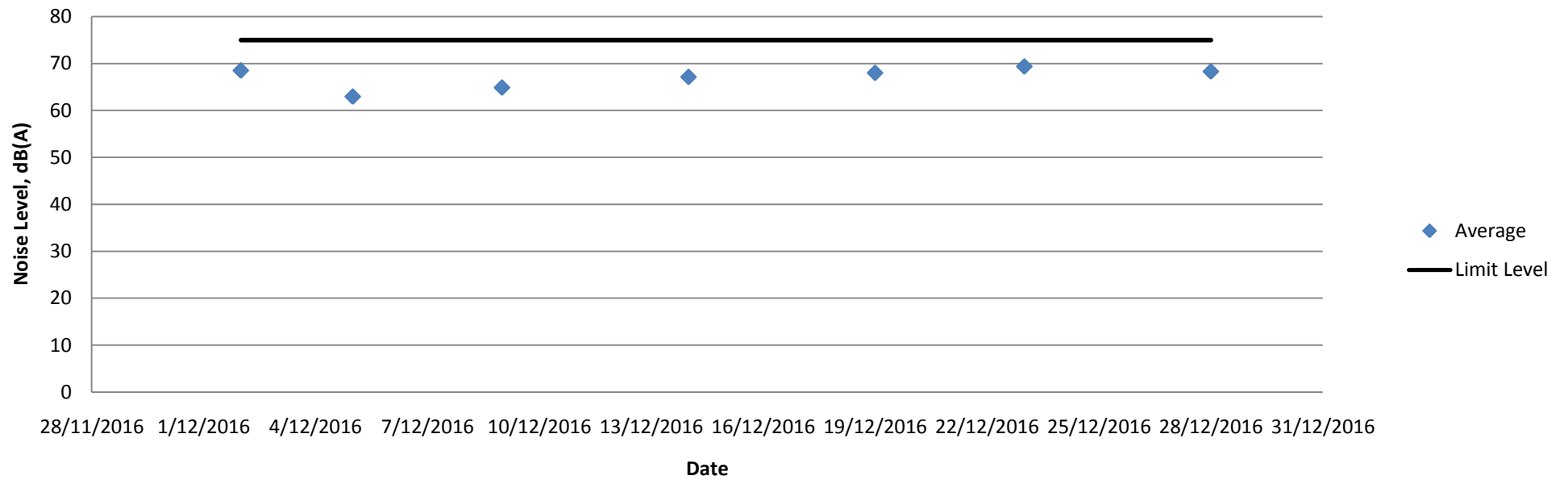
* NOTE: Accuracy calculated as uncertainty of the measurement derived from statistical analysis considering the combined effects from primary sensor specifications, circuit conversions, and all other sources of error using a coverage factor of k=2, or two standard deviations (2σ).

Please note, these specifications are valid for all Kestrel 4400 products and all other Kestrel 4000 series with a serial number higher than 659340. If your product has a lower serial number, please reference the previous version of the specifications.

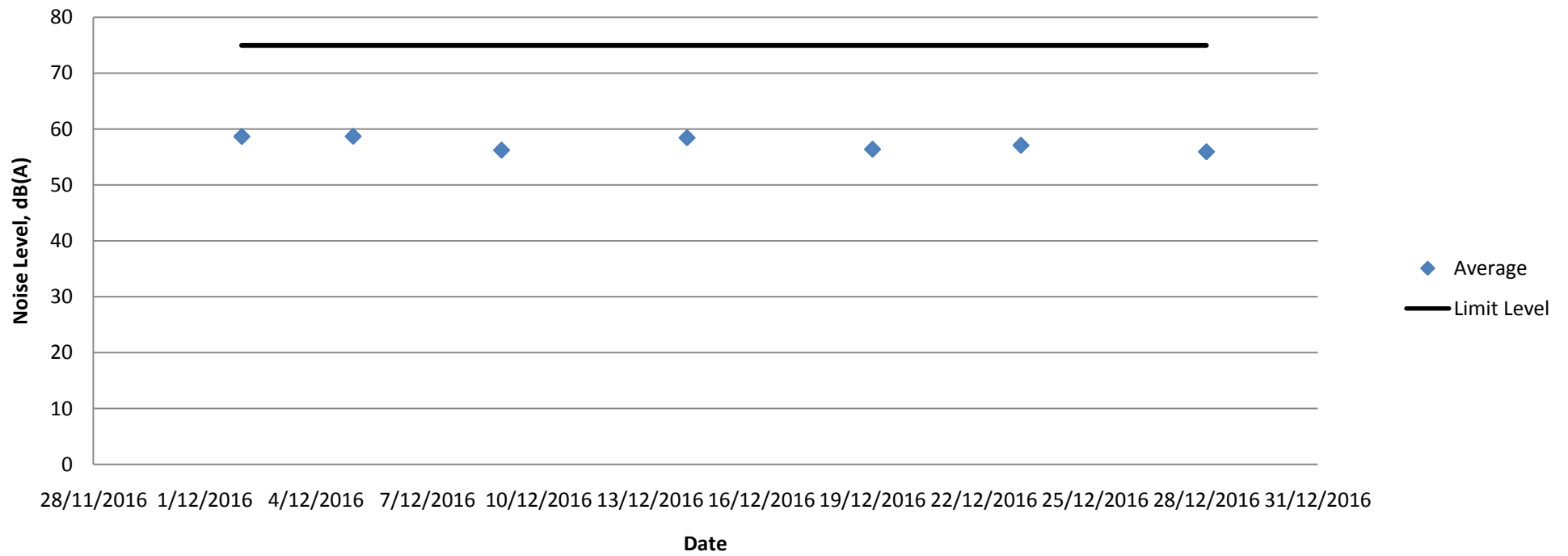
Appendix N

Impact Noise Monitoring Results and Graphical Presentation

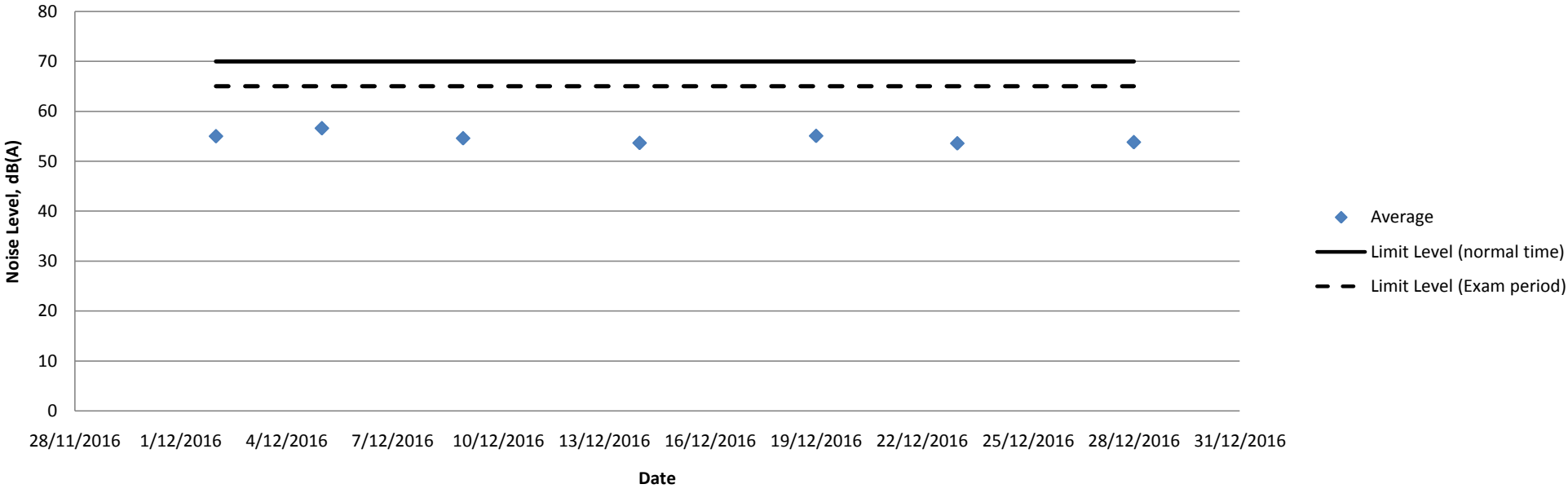
Noise Level Results at NM1 -The L Louey (South)



Noise Level Results at NM2 -Hin Keng Estate - Hin Wan House

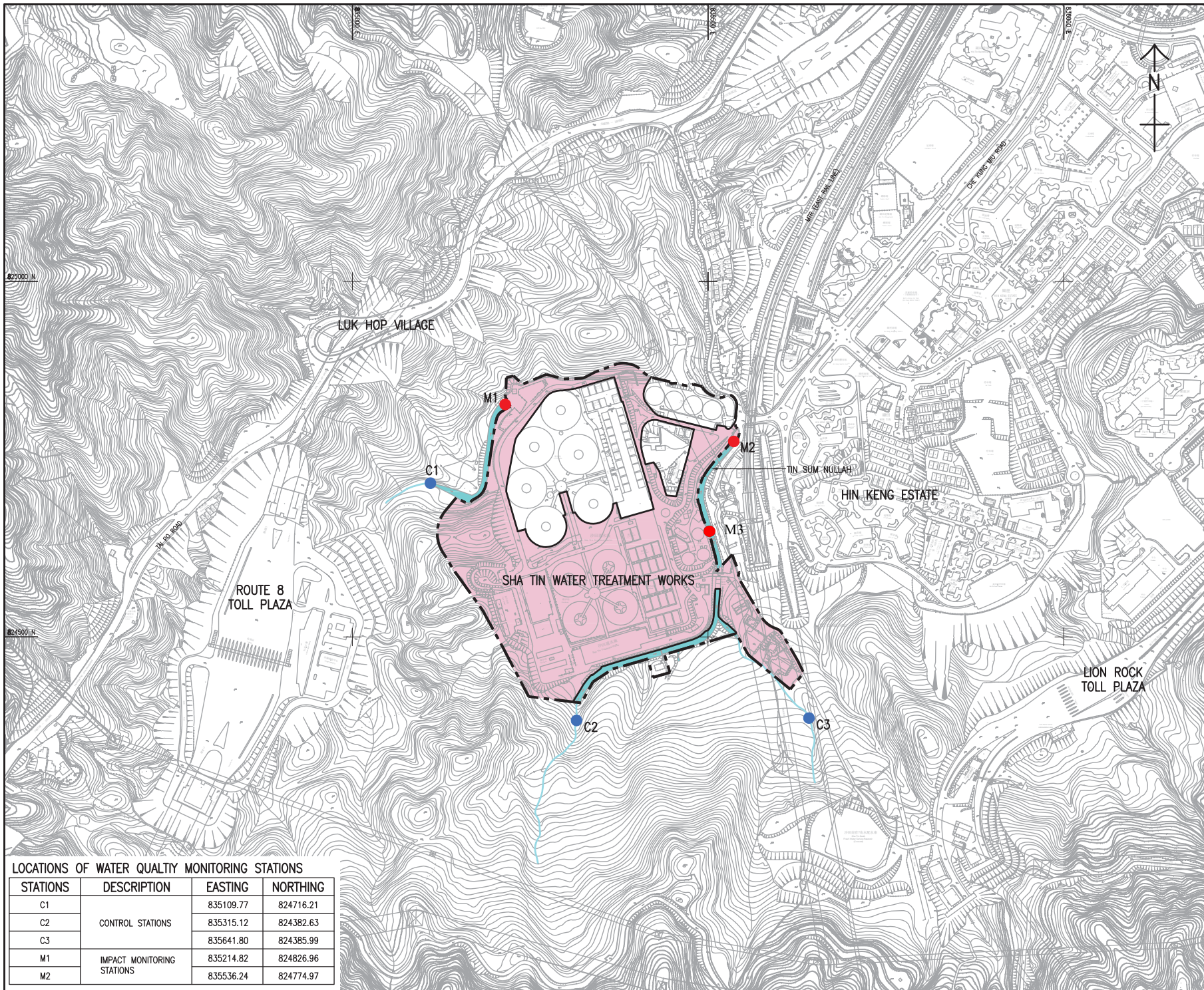


Noise Level Results at NM3 -C.U.H.K.F.A.A. Thomas Cheung School



Appendix O

Location Plan of Water Quality Monitoring Station



LEGEND:

- SITE BOUNDARY OF SHATIN WATER TREATMENT WORKS
- WORKS AREA
- INLAND WATER COURSE
- IMPACT MONITORING STATION
- CONTROL STATION

LOCATIONS OF WATER QUALITY MONITORING STATIONS

STATIONS	DESCRIPTION	EASTING	NORTHING
C1	CONTROL STATIONS	835109.77	824716.21
C2		835315.12	824382.63
C3		835641.80	824385.99
M1	IMPACT MONITORING STATIONS	835214.82	824826.96
M2		835536.24	824774.97


水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS--
 SOUTH WORKS
 DESIGN AND CONSTRUCTION

LOCATIONS OF PROPOSED WATER QUALITY MONITORING STATIONS

AECOM

DRG NO 60162073/EM&A/FIG 5
 圖紙編號
 DESIGNED BY: DXL
 CHECKED BY: A3 1 : 5000
 DATE: 11/11/12
 SCALE: A3 1 : 5000
 METRES
 © COPYRIGHT RESERVED
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Appendix P

Calibration Certificate (Water Quality)

Acumen Laboratory and Testing Ltd.

Lot 12, Tam Kon Shan Road, Tsing Yi (N), Hong Kong
Tel: (852) 2333 6823 Fax: (852) 2333 1316

Page 1 of 2

Test Report

Job Number : CJO-3113
Completion Date : 26/11/2016

Client Information

Company/ Organization : Acumen Environmental Engineering and Technologies
Co. Ltd.
Address : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.

Project Name : CJO-3113-103
Sample Description : Certificate of Reference Check

Test Information

Laboratory ID : R160677/6
Item : YSI ProDSS Multi-parameter Water Quality Monitoring
System
Serial No. : 16A101332
Receive Date : 25/11/2016
Test Period : 26/11/2016-26/11/2016
Test Result : The results are presented on page 2

Authorized Signature: _____



Hui Wai Fung, Huntington
Laboratory Manager
Chemical Division

Acumen Laboratory and Testing Ltd.

Lot 12, Tam Kon Shan Road, Tsing Yi (N), Hong Kong
Tel: (852) 2333 6823 Fax: (852) 2333 1316

Page 2 of 2

Test Report

Job Number : CJO-3113
Completion Date : 26/11/2016

Test Result:

pH	Reference Reading	Recorded Reading	Testing Method: APHA 4500-H*B
	4.00	4.02	
	7.00	6.95	
	10.00	9.91	
	Allowing Deviation	±0.2 unit	

Temperature	Reference Reading	Recorded Reading	Testing Method: In-house method
	8.0°C	8.6°C	
	25.0°C	24.7°C	
	42.0°C	41.5°C	
	Allowing Deviation	±2.0°C	

Turbidity	Reference Reading	Recorded Reading	Testing Method: APHA 2130B
	0.0NTU	0.1NTU	
	4.0NTU	3.8NTU	
	40.0NTU	39.1NTU	
	80.0NTU	78.6NTU	
	400.0NTU	395.8NTU	
	800.0NTU	805.8NTU	
	Allowing Deviation	±10%	

Dissolved Oxygen	Reference Reading	Recorded Reading	Testing Method: APHA 4500-OC & G
	3.30mg/L	3.39mg/L	
	5.91mg/L	6.01mg/L	
	8.08mg/L	8.15mg/L	
	Allowing Deviation	±0.2mg/L	

-----End of Report-----

Appendix Q

The Certification of Laboratory with HOKLAS accredited Analytical Tests



Hong Kong Accreditation Service
香港認可處

Certificate of Accreditation
認可證書

This is to certify that
特此證明

ACUMEN LABORATORY AND TESTING LIMITED
浩科檢測中心有限公司

Lot 12, Tam Kon Shan Road, North Tsing Yi, New Territories, Hong Kong
香港新界青衣北担杆山路12路段

*has been accepted by the HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a
在認可諮詢委員會的建議下獲香港認可處執行機關接受為*

HOKLAS Accredited Laboratory
「香港實驗所認可計劃」認可實驗所

*This laboratory meets the requirements of ISO/IEC 17025:2005 and it has been accredited for performing specific tests or
calibrations as listed in the scope of accreditation within the test category of*

Environmental Testing

*此實驗所符合ISO/IEC 17025:2005所訂的要求
並獲認可進行載於認可範圍內下述測試類別中的指定測試或校正工作*

環境測試

*This accreditation to ISO/IEC 17025:2005 demonstrates technical competence for a defined scope and
the operation of a laboratory quality management system (see Joint IAF-ILAC-ISO Communiqué).
此項 ISO/IEC 17025:2005 的認可資格證明此實驗所具備指定範圍內所須的技術能力並
實施一套實驗所質量管理體系(見國際認可論壇、國際實驗所認可合作組織及國際標準化組織的聯合公報)。*

*The common seal of the Hong Kong Accreditation Service is affixed hereto by the authority of the HKAS Executive
現經香港認可處執行機關授權在此蓋上香港認可處的印章*

WONG Wang-wah, Executive Administrator
執行幹事 黃宏華
Issue Date: 16 July 2014
簽發日期：二零一四年七月十六日

Registration Number: **HOKLAS 241**
註冊號碼：



Date of First Registration: 16 July 2014
首次註冊日期：二零一四年七月十六日

*This certificate is issued subject to the terms and conditions laid down by HKAS
本證書按照香港認可處訂立的條款及條件發出*

L 001195

Appendix R

Impact Water Quality Monitoring Results

Date	Time	Weather	Location	Co-ordinates		Water Depth m	Sample Depth m	Temp.		DO con.		DO Saturation		Turbidity		pH		SS mg/L	
				East	North			°C		mg/L		%		NTU		unit			
2/12/2016	16:11	Sunny	C1	835110	824716	0.04	0.02	21.5	21.5	8.51	8.50	96.4	96.4	3.2	3.2	7.74	7.75	2.1	
	16:27	Sunny	C2	835403	824470	0.02	0.01	20.2	20.2	8.76	8.76	96.8	96.8	2.7	2.7	7.17	7.17	1.8	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	16:00	Sunny	M1	835215	824827	0.8	0.4	21.2	21.2	8.96	8.98	99.8	99.8	2.8	2.8	7.54	7.54	1.8	
	16:52	Sunny	M2	835536	824775	0.05	0.025	21.6	21.6	8.99	9.02	99.1	99.0	5.3	5.3	7.24	7.24	3.3	
	16:43	Sunny	M3	835501	824648	0.02	0.01	20.1	20.1	9.21	9.20	98.3	98.3	0.7	0.7	7.78	7.78	<1	
5/12/2016	14:30	Sunny	C1	835110	824716	0.04	0.02	21.4	21.4	8.07	8.08	97.6	97.4	3.1	3.2	7.84	7.83	1.8	
	14:47	Sunny	C2	835403	824470	0.02	0.01	21.6	21.6	8.66	8.68	98.3	98.3	2.8	2.7	8.14	8.13	1.1	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	14:57	Sunny	M1	835215	824827	0.8	0.4	21.6	21.6	8.98	9.00	98.8	98.9	3.3	3.4	7.57	7.57	2.1	
	15:09	Sunny	M2	835536	824775	0.05	0.025	21.8	21.8	9.01	9.00	96.8	96.9	5.8	6.0	8.33	8.34	1.6	
	15:18	Sunny	M3	835501	824648	0.02	0.01	21.3	21.2	9.26	9.28	98.4	98.4	0.7	0.8	8.32	8.30	<1	
7/12/2016	16:42	Cloudy	C1	835110	824716	0.04	0.02	22.0	22.0	8.62	8.64	98.4	98.6	3.7	3.7	7.57	7.57	2.5	
	16:58	Cloudy	C2	835403	824470	0.02	0.01	22.1	22.0	8.37	8.37	98.4	98.4	2.7	2.7	8.13	8.12	1.7	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	17:09	Cloudy	M1	835215	824827	0.8	0.4	22.4	22.4	9.05	9.03	97.9	98.0	2.6	2.6	8.08	8.08	1.1	
	17:14	Cloudy	M2	835536	824775	0.05	0.025	22.6	22.6	8.97	8.96	98	98.0	7.1	7.1	8.50	8.48	1.1	
	17:20	Cloudy	M3	835501	824648	0.02	0.01	22.2	22.3	9.19	9.19	97.4	97.4	0.9	0.8	7.89	7.91	<1	
9/12/2016	17:08	Sunny	C1	835110	824716	0.04	0.02	23.3	23.3	8.67	8.67	98.5	98.4	3.7	3.6	7.81	7.81	2.2	
	17:14	Sunny	C2	835403	824470	0.02	0.01	23.4	23.5	8.28	8.28	97.3	97.3	2.9	2.8	8.21	8.20	1.5	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	17:24	Sunny	M1	835215	824827	0.8	0.4	23.1	23.2	8.95	8.94	98.3	98.3	3.0	3.1	7.89	7.90	1.6	
	17:30	Sunny	M2	835536	824775	0.05	0.025	23.5	23.3	8.98	8.98	97.4	97.4	6.0	6.0	7.97	7.97	1.1	
	17:42	Sunny	M3	835501	824648	0.02	0.01	23.6	23.5	9.21	9.20	98.4	98.3	0.8	0.8	8.37	8.39	<1	
12/12/2016	9:18	Sunny	C1	835110	824716	0.04	0.02	24	24.00	7.92	7.92	97.6	97.5	3.2	3.20	7.79	7.78	2.0	
	9:24	Sunny	C2	835403	824470	0.02	0.01	23.8	23.8	8.59	8.59	98.8	98.9	2.7	2.7	8.33	8.31	1.9	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	9:29	Sunny	M1	835215	824827	0.8	0.4	23.7	23.7	9.07	9.07	99.1	99.0	3.6	3.6	8.12	8.12	1.8	
	9:36	Sunny	M2	835536	824775	0.05	0.025	23.8	23.7	8.99	8.97	97.4	97.3	3.4	3.3	8.29	8.29	1.7	
	9:41	Sunny	M3	835501	824648	0.02	0.01	23.8	23.7	9.18	9.17	97.2	97.2	0.6	0.7	8.53	8.50	<1	
14/12/2016	14:30	Cloudy	C1	835110	824716	0.04	0.02	23	22.9	8.06	8.06	97.4	97.4	3.7	3.7	7.82	7.84	2.1	
	14:37	Cloudy	C2	835403	824470	0.02	0.01	22.7	22.8	8.46	8.44	98.8	98.8	2.3	2.3	7.64	7.65	2	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	14:43	Cloudy	M1	835215	824827	0.8	0.4	22.9	23	8.95	8.95	99.3	99.3	1.9	1.9	7.69	7.69	1.8	
	14:54	Cloudy	M2	835536	824775	0.05	0.025	23.1	23.2	9.01	9.04	97.6	97.6	7.4	7.4	7.94	7.94	1.8	
	14:57	Cloudy	M3	835501	824648	0.02	0.01	23.3	23.3	9.30	9.30	97.2	97.2	1	1.0	7.50	7.50	<1	
16/12/2016	9:07	Sunny	C1	835110	824716	0.04	0.02	20.8	20.8	8.03	8.05	97.9	97.9	2.4	2.4	7.75	7.78	2.3	
	9:14	Sunny	C2	835403	824470	0.02	0.01	21.0	21	8.34	8.35	98.5	98.5	1.7	1.7	8.28	8.28	2.0	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	9:21	Sunny	M1	835215	824827	0.8	0.4	20.6	20.8	9.13	9.13	98.7	98.7	3.2	3.1	7.59	7.59	1.5	
	9:38	Sunny	M2	835536	824775	0.05	0.025	21.3	21.3	9.12	9.11	98.4	98.4	5.6	5.6	7.87	7.87	1.9	
	9:51	Sunny	M3	835501	824648	0.02	0.01	20.9	20.8	9.20	9.20	97.9	97.9	0.6	0.6	7.96	7.96	<1	

19/12/2016	16:08	Sunny	C1	835110	824716	0.04	0.02	22.3	22.3	8.39	8.40	98.7	98.7	3.2	3.2	7.76	7.78	2.1
	16:19	Sunny	C2	835403	824470	0.02	0.01	22.3	22.2	8.23	8.22	97.7	97.7	2.8	2.8	7.84	7.84	2.0
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	16:24	Sunny	M1	835215	824827	0.8	0.4	22.1	22.1	8.93	8.95	97.4	97.4	2.9	2.9	8.07	8.07	1.7
	16:37	Sunny	M2	835536	824775	0.05	0.025	22	22.1	8.94	8.96	98.7	98.7	5.3	5.3	8.33	8.33	1.6
	16:43	Sunny	M3	835501	824648	0.02	0.01	22.3	22.2	9.24	9.25	97.4	97.5	0.8	0.8	8.12	8.12	<1
21/12/2016	15:48	Cloudy	C1	835110	824716	0.04	0.02	22.1	22.1	8.05	8.04	92.1	92.1	3.5	3.5	7.50	7.52	2.3
	16:04	Cloudy	C2	835403	824470	0.02	0.01	20.9	21.0	8.30	8.30	92.8	92.9	3	3	8.22	8.20	2.1
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	15:47	Cloudy	M1	835215	824827	0.8	0.4	22.0	22.0	8.91	8.93	94.4	94.4	2.6	2.6	7.41	7.43	1.9
	16:21	Cloudy	M2	835536	824775	0.05	0.025	22	22	8.97	8.97	99.1	99.1	8.6	8.6	7.31	7.32	1.7
	16:18	Cloudy	M3	835501	824648	0.02	0.01	20.8	21.0	9.19	9.20	97.7	97.7	1	0.9	7.50	7.50	<1
23/12/2016	16:43	Cloudy	C1	835110	824716	0.04	0.02	20.9	20.6	8.01	8.00	95.4	95.3	2.8	2.8	7.50	7.50	2.2
	16:57	Cloudy	C2	835403	824470	0.02	0.01	20.3	20.5	8.18	8.17	98.6	98.5	2.4	2.3	8.39	8.40	2.0
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	16:36	Cloudy	M1	835215	824827	0.8	0.4	21.4	21.5	9.08	9.10	98.9	98.8	3.3	3.3	7.81	7.81	1.6
	17:09	Cloudy	M2	835536	824775	0.05	0.025	21.1	21.2	9.08	9.06	98.7	98.7	3.4	3.6	8.48	8.50	1.5
	17:17	Cloudy	M3	835501	824648	0.02	0.01	20.9	20.7	9.22	9.25	98.7	98.6	0.9	0.8	8.32	8.32	<1
28/12/2016	9:02	Sunny	C1	835110	824716	0.04	0.02	18.9	18.9	7.81	7.81	96.7	96.7	3.3	3.2	7.84	7.84	2.1
	9:09	Sunny	C2	835403	824470	0.02	0.01	19.2	19.2	8.12	8.12	98.6	98.6	2.6	2.6	7.82	7.82	1.3
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	9:16	Sunny	M1	835215	824827	0.8	0.4	19.6	19.6	8.93	8.93	96.5	96.5	3	3.0	7.64	7.64	<1
	9:22	Sunny	M2	835536	824775	0.05	0.025	18.4	18.4	9.01	9.01	97.3	97.3	6.9	6.9	7.52	7.52	5.5
	9:32	Sunny	M3	835501	824648	0.02	0.01	23	22.9	9.21	9.21	97.2	97.2	0.7	0.7	7.59	7.59	<1
30/12/2016	15:59	Cloudy	C1	835110	824716	0.04	0.02	19.2	19.3	9.01	9.01	97.6	97.6	3.7	3.7	7.66	7.66	2.3
	16:13	Cloudy	C2	835403	824470	0.02	0.01	17.7	17.8	9.21	9.21	96.6	96.5	2.8	2.8	8.20	8.19	2.3
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	15:48	Cloudy	M1	835215	824827	0.8	0.4	18.6	18.6	9.19	9.19	98.4	98.4	3.9	3.9	7.10	7.11	2.3
	16:32	Cloudy	M2	835536	824775	0.05	0.025	19.4	19.4	9.14	9.14	99.3	99.3	2.2	2.2	7.86	7.86	4.5
	16:26	Cloudy	M3	835501	824648	0.02	0.01	17.6	17.6	9.33	9.33	100.5	100.5	0.8	0.8	8.21	8.21	<1

Acumen Laboratory and Testing Limited

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Test Report


Page 1 of 2

Report Number : Q150003aR160687
Job Number : R160687
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-145
Sample Description : SS test
Laboratory ID : R160687/1-5
Date of Sampling : 02/12/2016
Date Received : 02/12/2016
Test Period : 02/12/2016–03/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160687

Job Number : R160687

Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160687/1	02/12/2016	C1	2.1
R160687/2	02/12/2016	C2	1.8
R160687/3	02/12/2016	M1	1.8
R160687/4	02/12/2016	M2	3.3
R160687/5	02/12/2016	M3	<1

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

End of Report

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Test Report

Page 1 of 2

Report Number : Q150003aR160711
Job Number : R160711
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-146
Sample Description : SS test
Laboratory ID : R160711/1-5
Date of Sampling : 05/12/2016
Date Received : 05/12/2016
Test Period : 05/12/2016–06/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature: _____



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160711

Job Number : R160711

Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160711/1	05/12/2016	C1	1.8
R160711/2	05/12/2016	C2	1.1
R160711/3	05/12/2016	M1	2.1
R160711/4	05/12/2016	M2	1.6
R160711/5	05/12/2016	M3	<1

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

End of Report

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Test Report

Page 1 of 2

Report Number : Q150003aR160712
Job Number : R160712
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-147
Sample Description : SS test
Laboratory ID : R160712/1-5
Date of Sampling : 07/12/2016
Date Received : 07/12/2016
Test Period : 07/12/2016–08/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature: _____



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

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Report Number : Q150003aR160712

Job Number : R160712

Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160712/1	07/12/2016	C1	2.5
R160712/2	07/12/2016	C2	1.7
R160712/3	07/12/2016	M1	1.1
R160712/4	07/12/2016	M2	1.1
R160712/5	07/12/2016	M3	<1

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

End of Report

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Test Report

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Report Number : Q150003aR160713
Job Number : R160713
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-148
Sample Description : SS test
Laboratory ID : R160713/1-5
Date of Sampling : 09/12/2016
Date Received : 09/12/2016
Test Period : 09/12/2016–10/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington
Laboratory Manager
Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160713

Job Number : R160713

Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160713/1	09/12/2016	C1	2.2
R160713/2	09/12/2016	C2	1.5
R160713/3	09/12/2016	M1	1.6
R160713/4	09/12/2016	M2	1.1
R160713/5	09/12/2016	M3	<1

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

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Test Report

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Report Number : Q150003aR160716
Job Number : R160716
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-149
Sample Description : SS test
Laboratory ID : R160716/1-5
Date of Sampling : 12/12/2016
Date Received : 12/12/2016
Test Period : 12/12/2016–13/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature: _____



Hui Wai Fung, Huntington
Laboratory Manager
Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160716

Job Number : R160716

Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160716/1	12/12/2016	C1	2.0
R160716/2	12/12/2016	C2	1.9
R160716/3	12/12/2016	M1	1.8
R160716/4	12/12/2016	M2	1.7
R160716/5	12/12/2016	M3	<1

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

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Report Number : Q150003aR160717
Job Number : R160717
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-150
Sample Description : SS test
Laboratory ID : R160717/1-5
Date of Sampling : 14/12/2016
Date Received : 14/12/2016
Test Period : 14/12/2016–15/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160717
Job Number : R160717
Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160717/1	14/12/2016	C1	2.1
R160717/2	14/12/2016	C2	2.0
R160717/3	14/12/2016	M1	1.8
R160717/4	14/12/2016	M2	1.8
R160717/5	14/12/2016	M3	<1

Note:

1. mg/L indicates milligram per liter
2. mg O₂/ L indicates milligram oxygen per liter
3. < indicates less than.
4. > indicates more than.
5. NA indicates Not Applicable.

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
Page 1 of 2

Report Number : Q150003aR160718
Job Number : R160718
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-151
Sample Description : SS test
Laboratory ID : R160718/1-5
Date of Sampling : 16/12/2016
Date Received : 16/12/2016
Test Period : 16/12/2016–17/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington
Laboratory Manager
Chemical Division

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Test Report

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Report Number : Q150003aR160718
Job Number : R160718
Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160718/1	16/12/2016	C1	2.3
R160718/2	16/12/2016	C2	2.0
R160718/3	16/12/2016	M1	1.5
R160718/4	16/12/2016	M2	1.9
R160718/5	16/12/2016	M3	<1

Note:

1. mg/L indicates milligram per liter
2. mg O₂/ L indicates milligram oxygen per liter
3. < indicates less than.
4. > indicates more than.
5. NA indicates Not Applicable.

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Report Number : Q150003aR160727
Job Number : R160727
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-152
Sample Description : SS test
Laboratory ID : R160727/1-5
Date of Sampling : 19/12/2016
Date Received : 19/12/2016
Test Period : 19/12/2016–20/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

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Report Number : Q150003aR160727

Job Number : R160727

Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160727/1	19/12/2016	C1	2.1
R160727/2	19/12/2016	C2	2.0
R160727/3	19/12/2016	M1	1.7
R160727/4	19/12/2016	M2	1.6
R160727/5	19/12/2016	M3	<1

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

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Test Report

Page 1 of 2

Report Number : Q150003aR160728
Job Number : R160728
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-153
Sample Description : SS test
Laboratory ID : R160728/1-5
Date of Sampling : 21/12/2016
Date Received : 21/12/2016
Test Period : 21/12/2016–22/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington
Laboratory Manager
Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160728
Job Number : R160728
Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160728/1	21/12/2016	C1	2.3
R160728/2	21/12/2016	C2	2.1
R160728/3	21/12/2016	M1	1.9
R160728/4	21/12/2016	M2	1.7
R160728/5	21/12/2016	M3	<1

Note:

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2. mg O₂/ L indicates milligram oxygen per liter
3. < indicates less than.
4. > indicates more than.
5. NA indicates Not Applicable.

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Test Report

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Report Number : Q150003aR160729
Job Number : R160729
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-154
Sample Description : SS test
Laboratory ID : R160729/1-5
Date of Sampling : 23/12/2016
Date Received : 23/12/2016
Test Period : 23/12/2016–24/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160729
Job Number : R160729
Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160729/1	23/12/2016	C1	2.2
R160729/2	23/12/2016	C2	2.0
R160729/3	23/12/2016	M1	1.6
R160729/4	23/12/2016	M2	1.5
R160729/5	23/12/2016	M3	<1

Note:
1. mg/L indicates milligram per liter
2. mg O₂/ L indicates milligram oxygen per liter
3. < indicates less than.
4. > indicates more than.
5. NA indicates Not Applicable.

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Test Report

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Report Number : Q150003aR160731
Job Number : R160731
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-155
Sample Description : SS test
Laboratory ID : R160731/1-5
Date of Sampling : 28/12/2016
Date Received : 28/12/2016
Test Period : 28/12/2016–29/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

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Report Number : Q150003aR160731

Job Number : R160731

Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160731/1	28/12/2016	C1	2.1
R160731/2	28/12/2016	C2	1.3
R160731/3	28/12/2016	M1	<1
R160731/4	28/12/2016	M2	5.5
R160731/5	28/12/2016	M3	<1

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

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Test Report

Page 1 of 2

Report Number : Q150003aR160732
Job Number : R160732
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-156
Sample Description : SS test
Laboratory ID : R160732/1-5
Date of Sampling : 30/12/2016
Date Received : 30/12/2016
Test Period : 30/12/2016–31/12/2016
Test Required : 1. Suspended Solids (SS)
Method Used : 1. QPL-15e, APHA 22ed 2540 D
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160732
Job Number : R160732
Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R160732/1	30/12/2016	C1	2.3
R160732/2	30/12/2016	C2	2.3
R160732/3	30/12/2016	M1	2.3
R160732/4	30/12/2016	M2	4.5
R160732/5	30/12/2016	M3	<1

Note:
1. mg/L indicates milligram per liter
2. mg O₂/ L indicates milligram oxygen per liter
3. < indicates less than.
4. > indicates more than.
5. NA indicates Not Applicable.

End of Report

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Appendix S

Impact Monitoring report for Ecology

Post-Transplantation Monitoring Report

for Agreement No. CE 13/2009 (WS)

IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS – SOUTH WORKS

Report No.21

10 December 2016

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APPENDIX II- Table for condition of transplanted plant

1. INTRODUCTION

- 1.1 Pursuant to the Environmental Impact Assessment (EIA) Ordinance, the Director of Environmental Protection (DEP) granted the Environmental Permit (No. EP- 494/2015) to the Water Supplies Department (WSD) to construct and operate the designated project for “In-situ Reprovisioning of Sha Tin Water Treatment Works - South Works” (“The Project”).
- 1.2 Upon the requirement of the Environmental Permit, a detailed vegetation report presenting the baseline vegetation condition for flora species with conservation interest, transplanting and monitoring programme for the Project has been prepared and approved by DEP in February 2016.
- 1.3 There were 4 flora species of conservation importance were recorded in the woodland habitat within project site including Ailanthus (*Ailanthus fordii*), Incense Tree (*Aquilaria sinensis*), Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*). In total, 2 nos. of Incense Tree (*Aquilaria sinensis*), 1 no. of Ailanthus (*Ailanthus fordii*) trees, 5 colonies of Lamb of Tartary (*Cibotium barometz*) and 1 no. Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*) was recommended to be transplanted in the approved detailed vegetation survey report.
- 1.4 Detailed vegetation report was planned that Incense Tree (*Aquilaria sinensis*) and Ailanthus (*Ailanthus fordii*) trees will be transplanted within existing Sha Tin Water Treatment Works (STWTW). All other shrubs including Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*) will be transplanted to the hillside slope at Sha Tin South Fresh Water Service Reservoir (STSFWSR).
- 1.2 Upon the requirement of the Environmental Permit, a qualified Ecologist was commissioned to prepare a post-transplantation monitoring report to present the status (health condition and survival rate) of transplanted vegetation and submitted to the DEP.
- 1.3 Monitoring of transplanted flora was conducted after the transplantation. The monitoring will be conducted at twice per month during the first year and once per month during the course of planting works. The parameters to be monitoring will include the health condition and survival rate of the transplanted flora. Any observations and recommendations will be reported in monthly EM&A reports.
- 1.3 This is no. 21 Tree Report presents data collected in 10 December 2016. It contains the following information:
 - Introduction (Section 1)
 - Description Of Tree Monitoring Area (Section 2)
 - Monitoring Methodology (Section 3)
 - Result (Section 4)

- Summary
- Photos (Appendix I)
- Summary table (Appendix II)

2. DESCRIPTION OF TREE MONITORING SITE

- 2.1 Incense Tree (*Aquilaria sinensis*) and Ailanthus (*Ailanthus fordii*) trees will be transplanted within existing Sha Tin Water Treatment Works (STWTW) where is the extended compensatory plantation area. The area was flat and without covering with concrete.
- 2.2 Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) will be transplanted to the Sha Tin South Fresh Water Service Reservoir (STSFWSR) where is currently covered with concrete. Plough is required before planting on to this area.
- 2.3 The planting site at Sha Tin South Fresh Water Service Reservoir (STSFWSR) was still under preparation. Transplanted Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) will be temporally stored at nursery garden at Wang Toi Shan, Kam Tin. Once the planting site at Sha Tin South Fresh Water Service Reservoir (STSFWSR) was prepared and temporally stored transplanted vegetation were in fair condition, all transplanted Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) will be planted at the planting site.

3. MONITORING METHODOLOGY

- 3.1 Site inspection will be carried out by walking through the transplanting area. Health condition and survival rate will be observed during inspection.
- 3.4 Health condition of all transplanted vegetation including trees/Shrubs surveyed was evaluated according to the following criteria:
 - Transplanted vegetation with good health are classified as **good**;
 - Transplanted vegetation with few or no visible defects or health problems are classified as being **fair**;
 - Transplanted vegetation were badly damaged or clearly suffering from decay die back or the effects of very heavy vine growth are classified as **poor**.
- 3.5 Survival rate for each of transplanted vegetation species will be calculated based on site observation.

4. RESULT

- 4.1 Monitoring inspection was conducted on 10 December 2016. TA572, TA326 and TA327 tree was transplanted to tree compensation area within the Sha Tin Water Treatment Works (STWTW) in 20 June 2016. The condition of TA572 was observed in fair condition while TA326 and TA327 were in poor condition. Tree crown of TA326 and TA327 was observed thinner than the observation in last observation. Moreover, fungi attack and dead wood had been observed on TA326 on 12 November 2016. Fruiting body was found removed during this monitoring period. New fronds of transplanted Lamb of Tartary (*Cibotium barometz*) were observed growing out and increasing in size.
- 4.2 Since Sha Tin South Fresh Water Service Reservoir (STSFWSR) was still under preparation, Lamb of Tartary and Hong Kong Eagle's Claw was still temporally stored on Nursery garden at Wang Toi Shan, Kam Tin.
- 4.3 In general, all transplanted Lamb of Tartary (*Cibotium barometz*) were in fair condition while Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. The survival rate for Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was 96%. The new fronds of Lamb of Tartary were increasing in size compared with last inspection. The Summary table for health condition and survival rate was shown in Appendix II.
- 4.4 All transplanted Lamb of Tartary (*Cibotium barometz*) were under recovery stage. It is recommended to retain them at the nursery garden under proper maintenance during current recovery stage. Once their condition has recovered to acceptable level, they can be moved to the transplantation site at Sha Tin South Fresh Water Service Reservoir (STSFWSR) in order to increase their transplantation survival rate.
- 4.5 After transplantation, root ball of TA572, TA326 and TA327 tree should be kept moisture especially during non-raining day. Greenland has applied mulching for TA572, TA326 and TA327 to control the growth of weeds and act as slow releasing fertilizer.

5. MITIGATION MEASURE

- 5.1 Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. In order to compensate for the lost of transplanted Hong Kong Eagle's Claw which is in climber growing form, it is recommended to plant an individual of native climber species at compensatory planting site (Sha Tin South Fresh Water Service Reservoir (STSFWSR)) together with compensatory tree planting. Recommended list of species are given in the table below. It is suggested that about 1 species of climber to be selected from the following list according to availability of the nursery source. The recommended plant species have been recorded from

adjacent secondary woodland in an approved EIA Report (AEIAR-187/2015). These species would have certain ecological value in terms of plant ecology and the associated wildlife including birds.

Table for Recommended species list to be planted

<u>Native Tree Species</u>			
Common Name	Latin Name	Chinese name	Growing form
Climbing Bauhinia	<i>Bauhinia glauca</i>	粉葉羊蹄甲	Climber
Spiny-fruited Vine	<i>Byttneria aspera</i>	刺果藤	Climber
Cassytha	<i>Cassytha filiformis</i>	無根藤	Climber
Bentham,s Rose-wood	<i>Dalbergia benthamii</i>	兩廣黃檀	Climber
Desmos	<i>Desmos chinensis</i>	假鷹爪	Climber
Glaucous Diploclisia	<i>Diploclisia glaucescens</i>	蒼白秤鈞風	Climber
Luofushan Joint-fir	<i>Gnetum luofuense</i>	羅浮買麻藤	Climber
Australian Cow-plant	<i>Gymnema sylvestre</i>	匙羹藤	Climber
Shining Hypserpa	<i>Hypserpa nitida</i>	夜花藤	Climber
Large-floweredHoneysuckle	<i>Lonicera macrantha</i>	大花忍冬	Climber
Splash-of-white	<i>Mussaenda pubescen</i>	玉葉金花	Climber
Rusty-haired Raspberry	<i>Rubus reflexus</i>	鏽毛莓	Climber
Sandpaper Vine	<i>Tetracera asiatica</i>	錫葉藤	Climber
Hong Kong Eagle's Claw	<i>Artabotrys hongkongensis</i>	鷹爪花	Climber

6. SUMMARY

- 6.1 *Ailanthus (Ailanthus fordii)* and Incense Tree (*Aquilaria sinensis*) was transplanted to new location within STWTW. The condition of TA572 was observed in fair condition while TA326 and TA327 were in poor condition. Tree crown of TA326 and TA327 was observed thinner than the observation in last observation. Moreover, fungi attack and dead wood had been observed on TA326 on 12 November 2016. Hong Kong Eagle's Claw was observed dead during inspection on 20 August 2016. New fronds of transplanted Lamb of Tartary were observed growing out. Lamb of Tartary was under recovery after transplantation. Currently, Lamb of Tartary were temporally stored on Nursery garden at Wang Toi Shan, Kam Tin. It is recommended to retain them at the nursery garden under proper maintenance during current recovery stage.
- 6.2 In general, all transplanted Lamb of Tartary were in fair condition while Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016 and the survival rate was 96%.
- 6.3 In order to compensate for the lost of transplanted Hong Kong Eagle's Claw, it is recommended to plant an individual of native climber species at compensatory planting site (Sha Tin South Fresh Water Service Reservoir (STSFWSR)) together with compensatory tree planting. The suggested

species in planting list would have certain ecological value in terms of plant ecology and the associated wildlife including birds.

- 6.4 After transplantation, root ball of TA572, TA326 and TA327 tree should be kept moisture especially during dry and non-raining day. Greenland has applied mulching for TA572, TA326 and TA327 to control the growth of weeds and act as slow releasing fertilizer.

APPENDIX I

Photo



Photo 1. General view of transplanted target vegetation



Photo 2. New frond of *Cibotium barometz*.



Photo 3. New frond of *Cibotium barometz*.



Photo 4. New frond of *Cibotium barometz*.



Photo 5. New frond of *Cibotium barometz*.



Photo 6. New frond of *Cibotium barometz*.



Photo 7. New frond of *Cibotium barometz*.



Photo 8. New frond of *Cibotium barometz*.



Photo 9. Incense Tree after transplantation (*Aquilaria sinensis*) – TA327 (middle) and TA326 (left), (*Ailanthus fordii*) – TA572 (right)



Photo 10. Applied mulching for T327



Photo 11. Applied mulching for T326



Photo 12. Applied mulching for T572

APPENDIX II

Table for condition of transplanted plant

Shrubs of Lamb of Tartary and Hong Kong Eagle’s Claw

No.	Species	Condition	Alive/Dead	Remark
1	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
2	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
3	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
4	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
5	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
6	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
7	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
8	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
9	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
10	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
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12	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
13	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
14	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
15	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
16	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
17	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
18	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
19	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
20	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
21	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
22	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
23	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
24	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
25	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
26	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
27	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
28	<i>Artabotrys hongkongensis</i>	--	Dead	--
Survival rate (%)			96%	

Trees of Ailanthus and Incense Tree

No.	Species	Condition	Alive/Dead	Remark
TA572	<i>Ailanthus fordii</i>	Fair	Alive	New shoot was observed generating
TA327	<i>Aquilaria sinensis</i>	Poor	Alive	Tree crown of TA326 was thinner after transplantation. A fungi and dead wood was seen growing on tree basement on 12 November 2016 .
TA326	<i>Aquilaria sinensis</i>	Poor	Alive	Tree crown of TA327 was thinner after transplantation.
Survival rate (%)			100%	

Post-Transplantation Monitoring Report

for Agreement No. CE 13/2009 (WS)

IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS – SOUTH WORKS

Report No.22

24 December 2016

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APPENDICES

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1. INTRODUCTION

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- 1.3 This is no. 22 Tree Report presents data collected in 24 December 2016. It contains the following information:
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 - Description Of Tree Monitoring Area (Section 2)
 - Monitoring Methodology (Section 3)
 - Result (Section 4)

- Summary
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- 2.1 Incense Tree (*Aquilaria sinensis*) and Ailanthus (*Ailanthus fordii*) trees will be transplanted within existing Sha Tin Water Treatment Works (STWTW) where is the extended compensatory plantation area. The area was flat and without covering with concrete.
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- 4.2 Since Sha Tin South Fresh Water Service Reservoir (STSFWSR) was still under preparation, Lamb of Tartary and Hong Kong Eagle's Claw was still temporally stored on Nursery garden at Wang Toi Shan, Kam Tin.
- 4.3 In general, all transplanted Lamb of Tartary (*Cibotium barometz*) were in fair condition while Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. The survival rate for Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was 96%. The new fronds of Lamb of Tartary were increasing in size compared with last inspection. The Summary table for health condition and survival rate was shown in Appendix II.
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- 4.5 After transplantation, root ball of TA572, TA326 and TA327 tree should be kept moisture especially during non-raining day. In order to effectively maintain the growth of weeds, contractor was advised to remove weeds and to increase the mulching area.

5. MITIGATION MEASURE

- 5.1 Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. In order to compensate for the lost of transplanted Hong Kong Eagle's Claw which is in climber growing form, it is recommended to plant an individual of native climber species at compensatory planting site (Sha Tin South Fresh Water Service Reservoir (STSFWSR)) together with compensatory tree planting. Recommended list of species are given in the table below. It is suggested that about 1 species of climber to be selected from the following list according to availability of the nursery source. The recommended plant species have been recorded from

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Desmos	<i>Desmos chinensis</i>	假鷹爪	Climber
Glaucous Diploclisia	<i>Diploclisia glaucescens</i>	蒼白秤鈞風	Climber
Luofushan Joint-fir	<i>Gnetum luofuense</i>	羅浮買麻藤	Climber
Australian Cow-plant	<i>Gymnema sylvestre</i>	匙羹藤	Climber
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Rusty-haired Raspberry	<i>Rubus reflexus</i>	鏽毛莓	Climber
Sandpaper Vine	<i>Tetracera asiatica</i>	錫葉藤	Climber
Hong Kong Eagle's Claw	<i>Artabotrys hongkongensis</i>	鷹爪花	Climber

6. SUMMARY

- 6.1 *Ailanthus (Ailanthus fordii)* and Incense Tree (*Aquilaria sinensis*) was transplanted to new location within STWTW. The condition of TA572 was observed in fair condition while TA326 and TA327 were in poor condition. Tree crown of TA326 and TA327 was observed thinner than the observation in last observation. Moreover, fungi attack and dead wood had been observed on TA326 on 12 November 2016. Contractor was advised to apply the growing hormone helping TA326 and TA327 to regenerate their roots. Hong Kong Eagle's Claw was observed dead during inspection on 20 August 2016. New fronds of transplanted Lamb of Tartary were observed growing out. Lamb of Tartary was under recovery after transplantation. Currently, Lamb of Tartary were temporally stored on Nursery garden at Wang Toi Shan, Kam Tin. It is recommended to retain them at the nursery garden under proper maintenance during current recovery stage.
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- 6.3 In order to compensate for the lost of transplanted Hong Kong Eagle's Claw, it is recommended to plant an individual of native climber species at compensatory planting site (Sha Tin South

Fresh Water Service Reservoir (STSFWSR)) together with compensatory tree planting. The suggested species in planting list would have certain ecological value in terms of plant ecology and the associated wildlife including birds.

- 6.4 After transplantation, root ball of TA572, TA326 and TA327 tree should be kept moisture especially during dry and non-raining day. In order to effectively maintain the growth of weeds, contractor was advised to remove weeds and to increase the mulching area.

APPENDIX I

Photo



Photo 1. General view of transplanted target vegetation



Photo 2. New frond of *Cibotium barometz*.



Photo 3. New frond of *Cibotium barometz*.



Photo 4. New frond of *Cibotium barometz*.



Photo 5. New frond of *Cibotium barometz*.



Photo 6. New frond of *Cibotium barometz*.



Photo 7. New frond of *Cibotium barometz*.



Photo 8. New frond of *Cibotium barometz*.



Photo 9. Incense Tree after transplantation (*Aquilaria sinensis*) – TA326 (left) and TA327 (middle), (*Ailanthus fordii*) – TA572 (right)

APPENDIX II

Table for condition of transplanted plant

Shrubs of Lamb of Tartary and Hong Kong Eagle’s Claw

No.	Species	Condition	Alive/Dead	Remark
1	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
2	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
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4	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
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21	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
22	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
23	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
24	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
25	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
26	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
27	<i>Cibotium barometz</i>	Fair	Alive	Under recovering
28	<i>Artabotrys hongkongensis</i>	--	Dead	--
Survival rate (%)			96%	

Trees of Ailanthus and Incense Tree

No.	Species	Condition	Alive/Dead	Remark
TA572	<i>Ailanthus fordii</i>	Fair	Alive	New shoot was observed generating
TA327	<i>Aquilaria sinensis</i>	Poor	Alive	Tree crown of TA326 was thinner after transplantation. A fungi and dead wood was seen growing on tree basement on 12 November 2016 .
TA326	<i>Aquilaria sinensis</i>	Poor	Alive	Tree crown of TA327 was thinner after transplantation.
Survival rate (%)			100%	

Appendix T

Monthly Summary of Waste Flow Table

Water Supplies Department
Monthly Summary Waste Flow Table
for Contract with Environmental Management Plan under ETWB TCW No. 19/2005 and its Interim Guidance Note
Reporting Year: 2016
Contract No. 3/WSD/15

(To be submitted to C&D MM Coordinator of Respective Division/Region via Engineer's Representative before 15th of the following month)

Month	Actual Quantities of Inert C&D Materials Generated / Imported (in '000 m ³)						Actual Quantities of Other C&D Materials / Wastes Generated				
	Total Quantities Generated [a+b+c+d]	Broken Concrete (including rock for recycling into aggregates) (a)	Reused in the Contract (b)	Reused in Other Projects (c)	Disposed as Public Fill (d)	Imported C&D Material	Metal (in '000kg)	Paper/ Cardboard Packaging (in '000kg)	Plastic (bottles/containers, plastic sheets/ foams from package material) (in '000kg)	Chemical Waste (in '000kg)	Others (e.g. General Refuse etc.) (in '000m ³)
January	0.016	0.000	0.000	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000
February	0.108	0.000	0.000	0.000	0.108	0.000	0.000	0.000	0.000	0.000	0.002
March	8.179	0.000	0.000	0.000	8.179	0.000	0.000	0.000	0.000	0.000	0.000
April	14.561	0.000	0.000	0.000	14.561	0.000	0.000	0.000	0.000	0.000	0.005
May	20.416	0.000	0.574	0.172	19.671	0.000	0.000	0.000	0.000	0.000	0.002
June	14.577	0.000	0.646	13.264	0.667	0.000	0.000	0.000	0.000	0.000	0.001
Half-year total	57.857	0.000	1.220	13.436	43.202	0.000	0.000	0.000	0.000	0.000	0.011
July	18.545	0.000	0.076	18.215	0.254	0.000	0.000	0.000	0.000	0.000	0.001
August	17.966	0.000	0.000	17.129	0.836	0.000	1.710	0.001	0.001	0.045	0.001
September	5.280	0.000	0.000	3.933	1.347	0.000	0.001	0.010	0.001	0.000	0.010
October	1.034	0.000	0.013	0.892	0.129	0.000	0.000	0.000	0.000	0.000	0.006
November	9.206	0.000	0.058	8.833	0.315	0.000	0.008	0.010	0.012	0.000	0.003
December	8.124	0.000	0.000	7.550	0.574	0.000	0.000	0.000	0.000	0.000	0.004
Yearly Total	118.012	0.000	1.367	69.987	46.657	0.000	1.719	0.021	0.014	0.045	0.035

Appendix U

Implementation Schedule of Environmental Mitigation Measures (EMIS)

Environmental Mitigation and Enhancement Measure Implementation Schedule at Construction Stage

EIA Ref.	Recommended Mitigation Measures	Location of the Measures	Implementation Agent	Relevant Legislation and Guidelines	Implementation Phase			Status
					D	C	O	
Air Quality								
4.7.1	Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.	All works areas	Contractor	Air Pollution Control Ordinance and Air Pollution Control (Construction Dust) Regulation EM&A Manual		√		Y
4.7.1	Side enclosure and covering of any aggregate or stockpiling of dusty material to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.	All works areas	Contractor			√		Y
4.7.1	Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.	All works areas	Contractor			√		Y
4.7.1	Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.	All works areas	Contractor			√		Y
4.7.1	Imposition of speed controls for vehicles on site haul roads.	All works areas	Contractor			√		Y
4.7.1	Implement EM&A program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.	All works areas / Monitoring points	Contractor			√		Y
Noise								
5.6.4	Implement good site practices to reduce noise level	All works areas	Contractor	Noise Control Ordinance		√		Y
5.6.5	Adoption of Quiet PME	All works areas	Contractor			√		N/A
5.6.6	Use of Movable Noise Barrier	All works areas	Contractor			√		N/A
5.8	Noise monitoring	Monitoring points	Contractor		√		Y	
Water Quality								
6.8.1	Surface run-off from construction sites should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand	All works areas	Contractor	ProPECC PN 1/94 Construction		√		Y

	traps, silt traps and sedimentation basins. Channels or earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Perimeter channels at site boundaries should be provided where necessary to intercept storm run-off from outside the site so that it will not wash across the site. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.			Site Drainage TM-DSS Water Pollution Control Ordinance				
6.8.2	Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly, at the onset of and after each rainstorm to prevent local flooding.	All works areas	Contractor			√		Y
6.8.3	Temporary exposed slope surfaces should be covered and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds. Intercepting channels should be provided to prevent storm run-off from washing across exposed soil surfaces.	All works area	Contractor			√		Y
6.8.4	Earthworks final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate drainage like intercepting channels should be provided where necessary.	All works areas	Contractor			√		N/A
6.8.5	Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	All works areas	Contractor			√		Y
6.8.6	Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric during rainstorms.	All works areas	Contractor			√		Y
6.8.7	Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system.	All works areas	Contractor			√		Y
6.8.8	Good site practices should be adopted to remove rubbish and litter from construction sites so as to prevent the rubbish and litter from spreading from the site area.	All works areas	Contractor			√		Y
6.8.9	All vehicles and plant should be cleaned before they leave a construction site to minimize the deposition of earth, mud, debris on roads. A wheel washing bay should be provided at every site exit if practicable and wash-water should have sand and silt settled out or removed before discharging into storm drains.	All works areas	Contractor			√		Y
6.8.10	Before commencing any demolition works, all drainage connections should be sealed to prevent building debris, soil, sand etc. from entering	All works areas	Contractor			√		N/A

	drains.							
6.8.11	Wastewater generated from building construction activities including concreting, plastering, internal decoration, cleaning of works and similar activities should not be discharged into the stormwater drainage system. If the wastewater is to be tankered off site for disposal into foul sewers, it should undergo the removal of settleable solids in a silt removal facility, and pH adjustment as necessary.	All works areas	Contractor			√		Y
6.8.12	Acidic wastewater generated from acid cleaning, etching, pickling and similar activities should be neutralized to within the pH range of 6 to 10. The neutralized wastewater should be tankered off site for disposal into foul sewers or treated to a standard acceptable to storm drains and the receiving waters.	All works areas	Contractor			√		N/A
6.8.13	All surface run-off must proper collected and discharge at designated location. The discharge quality must meet the requirements specified in the discharge license.	All works areas	Contractor			√		Y
6.8.15	Contractor must register as a chemical waste producer if chemical wastes would be produced from the construction activities. The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes.	All works areas	Contractor			√		Y
6.8.16	Maintenance of vehicles and equipment involving activities with potential for leakage and spillage should only be undertaken within the areas appropriately equipped to control these discharges	All works areas	Contractor			√		Y
6.8.17	Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance.	All works areas	Contractor			√		Y
6.8.18	Sewage generated from the workforce should be properly treated by interim treatment facilities, such as chemical toilets which are properly maintained with the employment of licensed collectors for the collection and disposal on a regular basis.	All works areas	Contractor			√		Y
6.8.19	Adopt relevant measures stated in ETWB TC (Works) No. 5/2005 "Protection of Natural Streams/rivers from Adverse Impacts arising from Construction Works" to minimize the potential water quality impacts from the construction works near any water courses.	All works areas	Contractor			√		Y
6.10	Water quality monitoring	Monitoring points	Contractor			√		Y
Waste Management								

7.6.1	Appropriate waste handling, transportation and disposal methods for all waste arisings generated during the construction works for the Project should be implemented to ensure that construction wastes do not enter the nearby streams or drainage channel.	All works areas	Contractor	Waste Disposal Ordinance DEVB TCW No. 6/2010, ETWB TCW No. 19/2005 Land (Miscellaneous Provisions) Ordinance Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes		√		Y
7.6.2	Implementation of good site practices for waste management	All works areas	Contractor			√		Y
7.6.3	Implementation of trip ticket system to control waste disposal	All works areas	Contractor			√		Y
7.6.4	Implementation of good site practices to reduce waste generations	All works areas	Contractor			√		Y
7.6.5	Re-use of excavated C&D materials on site as far as practical. A suitable area should be designated within the site for temporary stockpiling of C&D material and to facilitate the sorting process.	All works areas	Contractor			√		Y
7.6.8	General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material.	All works areas	Contractor			√		Y
7.6.9	All storage of asbestos waste should be carried out properly in a secure place isolated from other substances so as to prevent any possible release of asbestos fibres into the atmosphere and contamination of other substances. The storage area should bear warning panels to alert people of the presence of asbestos waste.	All works areas	Contractor			√		N/A
7.6.10	A licensed asbestos waste collector will be appointed to collect the asbestos waste and deliver to the designated landfill for disposal. Application should be submitted to EPD.	All works areas	Contractor			√		N/A
7.6.11	If chemical wastes were to be produced at the construction site, the Contractor would be required to register with the EPD as a Chemical Waste Producer, and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport the chemical wastes. The licensed collector shall deliver the waste to the Chemical Waste Treatment Centre at Tsing Yi, or other licenced facility, in accordance with	All works areas	Contractor			√		Y

	the Waste Disposal (Chemical Waste) (General) Regulation.								
Ecology									
8.8.1	Ecological impacts on important habitats and the associated wildlife caused by the proposed development should be mitigated and compensation approaches to the maximum practical extent	All works areas in particular important habitats All works areas	The Engineer/ Contractor	EIAO-TM EM&A Manual		√		Y	
8.8.2	Reduce the amount of vegetation removal required and thereby minimize the footprint of the slope at the woodland habitat		The Engineer/ Contractor			√		Y	
8.8.3	Conduct detailed vegetation survey and implement suggested measures for species of conservation importance.		The Engineer/ Contractor			√		Y	
8.8.4	The affected Incense Tree and Ailanthus as mentioned in the detailed vegetation survey report within the works area will be transplanted		The Engineer/ Contractor			√		Y	
8.8.5	To avoid impacts on Short-nosed Fruit Bat, the tree with records of an active roost and trees showing evidence of roosting activity should be retained where possible. Where Chinese Fan-palm (<i>Livistona chinensis</i>) removal is required, these should be checked by suitably qualified ecologist with over 7 years relevant experience for roosting bats prior to their removal. If roosting bats are observed, a strategy for passive removal will be agreed with the AFCD and implemented. This could include undertaking the works just after the bats have left the roost (i.e. dusk).		The Engineer/ Contractor				√		N/A
8.8.6	The inclusion of Chinese Fan-palm of similar size as the affected plant within the areas of compensatory planting or other suitable areas is recommended to replace affected specimens, and compensate for the impact to roosting opportunities for this bat species		The Engineer/ Contractor				√		N/A
8.8.7	Implement good site measures to minimize the disturbance impacts to terrestrial habitat and associated wildlife arising from the land-based construction activities.		The Engineer/ Contractor				√		Y
8.8.8	To minimize the contamination of wastewater discharge, accidental chemical spillage and construction site run-off to the receiving water bodies, mitigation measures such as diverting the site runoff to silt trap facilities before discharging into storm drain, proper waste and dumping management and standard good site practice for land-based construction.		The Engineer/ Contractor				√		Y
8.8.9-8.8.11	Implement woodland compensation		The Engineer/ Contractor				√		N/A

Landscape and Visual								
9.8.1	Existing trees to be retained on site shall be carefully protected during construction. Trees unavoidably affected by the works shall be transplanted as far as possible.	All works areas	Contractor	DEVB TCW No. 10/2013		√		Y
	Compensatory Planting shall be provided in accordance with DEVB TCW No. 10/2013 – Tree Preservation.	All works areas	Contractor	EIAO TM		√		Y
	Control of night-time lighting glare.	All works areas	Contractor			√		Y
	Erection of decorative screen hoarding compatible with the surrounding setting.	All works areas	Contractor			√		Y
	Management of facilities on work sites which give control on the height and disposition/arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs.	All works areas	Contractor			√		Y
Cultural Heritage								
10.6.2	Vibration monitoring at Ex KCR Beacon Hill Tunnel during piling works of Administration Building	Work site	The Engineer /Contractor			√		N/A
Land Contamination								
11.7	Identify contamination and implement appropriate remedial measures on site. Provide relevant submission and obtain approval from EPD if necessary.	All works areas	Contractor	Guidance Note for Contaminated Land Assessment and Remediation				
				Guidance Manual for Use of Risk based Remediation Goals for Contaminated Land Management (Guidance Manual)		√		N/A
Hazard to Life								
Table 12.22	Ensure speed limit enforcement is specified in the contractor's Method Statement to limit the speed of construction vehicles on site	All works areas	The Engineer	EIAO-TM		√		Y
	Develop an audit procedure to ensure enforcement of speed limits and to ensure adequate site access control	All works areas	The Engineer			√		Y
	Ensure construction method statement is endorsed by the Engineer (AECOM)	All works areas	The Engineer			√		Y

Ensure designated manoeuvring area for the new access road construction is away from the Chlorination House	New access road area	Contractor/ The Engineer		√		Y
Ensure that the emergency response plan and procedures (including drills) cover the reprovisioning activities	All works areas	Contractor/ The Engineer		√		Y
Safety training to be provided to construction workers and WSD/Engineer staff regarding evacuation procedures	All works area	Contractor/ The Engineer		√		Y
Ensure communication protocol is in place between construction and operation staff with regard to the change of chlorine delivery route and the switchover from the existing to new chlorinated water piping;	All works areas	Contractor/ The Engineer		√		N/A
Ensure temporary suspension of crane operation and construction truck movements during chlorine delivery	All works areas	Contractor/ The Engineer		√		Y
Provide a crash barrier between the construction site and the north side of the Chlorination House.	Chlorination House area	Contractor		√		Y
Conduct vibration monitoring at the Chlorination House during piling activities to ensure vibration levels are acceptable and will not lead to any damage of the Chlorination House	Chlorination House area	Contractor		√		Y
Civil engineering calculation to be performed to confirm differential settlement from excavation work is within acceptable limits for the Chlorination House	Chlorination House area	Contractor		√		Y
Provide settlement monitoring for the Chlorination House to ensure no subsidence occurs from nearby excavation works.	Chlorination House area	Contractor		√		Y
Confirm the chlorine concentration for the chlorinated water before the switchover from the existing to new piping. This is to avoid the potential for chlorine gas vapours being released if the concentration is too high and there is spillage during switchover	Chlorinated water piping	WSD		√		N/A
Develop an operating procedure for performing the chlorinated water switchover from the existing piping to new piping.	All works areas	Contractor/ The Engineer / WSD		√		N/A
Ensure the location/height of the lifting equipment is such there is no impact on Chlorination House/chlorine delivery route in case of falling, swinging or dropped load.	Chlorination House area	Contractor/ The Engineer		√		Y
Implement the controlled demolition of the existing E&M workshop to ensure that any steel structural elements can only fall away from the Chlorination House	Existing E&M Workshop and Chlorination House	Contractor/ The Engineer		√		N/A

		areas						
	Stop any construction activities which may lead to vibrations and potential slope/boulder disturbance during the chlorine deliveries	All works areas	Contractor			√		Y
	Installation of Chlorine gas monitors with audible alarms in the relevant reprovisioning works area	Reprovisioning works areas	Contractor/ The Engineer			√		k.i.v.
	Provision of an accompanying vehicle for the chlorine truck on the WTW site and ensuring that during the chlorine drums delivery construction works are stopped and the construction workers moved away from Chlorination House	All works areas	Contractor			√		Y
	Establish a liaison between the contractor and HKCG and develop a chlorine/town gas emergency plan to ensure gas safety during the Construction Phase	Beacon Hill North Gas Offtake Station and Gas Pipelines in Old Beacon Hill Tunnel	The Engineer / Contractor / HKCG			√		k.i.v.
	Temporary suspend chlorine delivery during the short period of construction of the concerned section of elevated walkway to avoid mobile crane impact on the chlorine truck		The Engineer / Contractor			√		N/A
	Provide clear road signs for site vehicles	Chlorine delivery route and reprovisioning works access roads	The Engineer / Contractor			√		Y
	Large equipment/plant movement should be controlled by 'Permit-to-move' system	All works areas	The Engineer / Contractor / WSD			√		Y
	Define restricted zone for the equipment (i.e. keep the equipment from the Chlorination House at a safe distance). The extent of the restricted zone would be determined by the size of the equipment	Chlorination House area	The Engineer / Contractor			√		Y
	Locate the construction site office at or near property boundary away from the Chlorination House as far as possible	Construction Office area	The Engineer / Contractor			√		Y
	Entry of non-authorized personnel to the construction site to be prohibited	All works areas	Contractor			√		Y

12.15.4, 12.18.1, 12.22.9	GPS fleet management system with driver training to help enforce truck speeds	Chlorine delivery trucks, fleet management centre	WSD / Chlorine Supply Contractor	EIAO-TM		√		k.i.v.
	Improved clamps with independent checks to prevent load shedding	Chlorine delivery trucks				√		F
	Installation of fire screen and larger fire extinguishers to prevent engine and wheel fires from spreading to the cargo area					√		F
	Adoption of the chlorine delivery route from Sham Shui Kok Dock to Sha Tin WTW					√		F
	Provision of emergency repair kit					√		F
12.34.3 Table 12.37 & 12.38	Ban the use of retreaded tyres and perform regular visual checks on the tyres.		WSD	EIAO-TM		√		F
	A vehicle accompanying chlorine truck along critical road sections in Sha Tin. The truck should be equipped with emergency kit, fire extinguisher, radio set for communication. The accompanying vehicle will be ahead of the chlorine truck after the vehicles entering the water treatment works site – An accompanying vehicle may provide rapid response to an incident but any action would be limited to containing a small leak.					√		F
	Limit fuel tanks capacity at the beginning of the Project (Item 2.3 of Table 12.37 – advance measure).					√		F
	Review the practicality of reducing combustible materials or use of fire retardant materials in the cab. (Item 2.3 of Table 12.37 – further measure)					√		k.i.v.
	Annual periodic radiography or ultrasonic test inspections of the chlorine drums should be considered for implementation as soon as feasible (Item 3.8 of Table 12.37).				Chlorine drums		√	
	Implement side, front and rear crash guards with high energy absorption in coordination and accordance with the relevant authorities.	Chlorine delivery trucks				√		k.i.v.
	Implement a sturdy steel frame to minimize the potential for chlorine release due to truck rollover					√		k.i.v.
	12.34.4	WSD will continue to keep under review the latest development of use of alternative disinfectants in water supply industry to aim at minimising on-site chlorine storage.4			Chlorine delivery Route			

Training should be provided for the use of the GPS fleet management and improved safe driving.				√		k.i.v.
Ensured that independent checks are performed to ensure proper chlorine drum latching and clamping.				√		F
Chlorine truck drivers or driver attendants should be further trained to check and detect potential chlorine leaks during transport. This should include the timely application of the emergency kit.				√		k.i.v.
Training should be provided to driver and driver attendant for the emergency use of the new 2 × 9L AFFF extinguishers.				√		F
Induction training for new drivers and driver attendant should include familiarisation with the route, familiarisation with chlorine risks, defensive driving, application of emergency kits, use of fire extinguishers and emergency response				√		k.i.v.
Provision of a fire screen between the cab and cargo as well as fire retardant materials for the wheel arches on the chlorine truck should be planned and provided				√		F
To keep under review alternate chlorine receiving dock in Sha Tin/Tai Po area for chlorine delivery to STWTW.				√		k.i.v.

Legend

D – Design Phase

C – Construction Phase

O – Operation Phase

Y - Compliance of Mitigation Measures

N/A – Not Applicable in Reporting Period

k.i.v – Keep In View

F - Completed

Appendix V

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



Statistical Summary of Exceedances (Air Quality)

Air Quality									
Location	Action Level			Limit Level				Total	
AM1	0			0				0	
AM2	0			0				0	
Noise									
Location	Action Level			Limit Level				Total	
NM1	0			0				0	
NM2	0			0				0	
NM3	0			0				0	
Water Quality									
Location	Action Level				Limit Level				Total
	DO	Turbidity	SS	pH	DO	Turbidity	SS	pH	
C1	0	0	0	0	0	0	0	0	0
C2	0	0	0	0	0	0	0	0	0
C3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
M1	0	0	0	0	0	0	0	0	0
M2	0	0	0	0	0	0	0	0	0
M3	0	0	0	0	0	0	0	0	0

Statistical Summary of Environmental Complaints

Reporting Period	Environmental Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
1 Dec - 31 Dec	0	3	Water Quality

Statistical Summary of Environmental Summons

Reporting Period	Environmental Summons Statistics		
	Frequency	Cumulative	Details
1 Dec - 31 Dec	0	0	N/A

Statistical Summary of Environmental Prosecution

Reporting Period	Environmental Prosecution Statistics		
	Frequency	Cumulative	Details
1 Dec - 31 Dec	0	0	N/A

Appendix W

Tentative schedule for environmental monitoring

Jan-17						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	4	5 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	6	7 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3
8	9 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	10	11 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	12	13 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	14
15	16 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	17	18 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	19	20 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	21
22	23 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	24	25 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	26	27 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	28
29	30	31				

*Remark: No construction works will be performed on public holiday 30/1 & 31/1

Feb-17						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
			1 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	2	3 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	4
5	6 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	7	8 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	9	10 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	11
12	13 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	14	15 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	16	17 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	18
19	20 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	21	22 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	23	24 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	25
26	27 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	28				

Impact Monitoring Schedule for STWTW

Mar-17						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
			1 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	2	3 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	
5	6 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	7	8 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	9	10 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	11
12	13 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	14	15 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	16	17 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	18
19	20 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	21	22 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	23	24 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	25
26	27 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	28	29 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	30	31 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	

Acumen Laboratory and Testing Limited

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Test Report

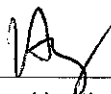
Page 1 of 2

Report Number : Q150003aR160734
Job Number : R160734
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-154-01
Sample Description : pH Value, TSS and COD tests
Laboratory ID : R160734/1
Date of Sampling : 23/12/2016
Date Received : 23/12/2016
Test Period : 23/12/2016 – 24/12/2016
Test Required : 1. pH Value;
2. Total Suspended Solids (TSS);
3. Chemical Oxygen Demand (COD)
Method Used : 1. QPL-15d, APHA 22ed 4500-H⁺ B
2. QPL-15e, APHA 22ed 2540 D
3. QPL-15f, APHA 22ed 5220 B
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature:



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160734
Job Number : R160734
Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	pH Value at (measured temperature °C)	Total Suspended Solids (TSS), mg/L	Chemical Oxygen Demand (COD), mg O ₂ /L
R160734/1	23/12/2016	Hing Keng, Wall C	7.8 (24)	3.0	<50

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

End of Report

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Test Report

Page 1 of 2

Report Number : Q150003aR160735
Job Number : R160735
Issue Date : 03/01/2017
Name of Applicant : Acumen Environmental Engineering and Technologies Co., Ltd.
Address of Applicant : No. 12, Tam Kon Shan Road, Tsing Yi (North), N.T.
Project Name : CJO-3113-154-02
Sample Description : pH Value, TSS and COD tests
Laboratory ID : R160735/1
Date of Sampling : 23/12/2016
Date Received : 23/12/2016
Test Period : 23/12/2016 – 24/12/2016
Test Required : 1. pH Value;
2. Total Suspended Solids (TSS);
3. Chemical Oxygen Demand (COD)
Method Used : 1. QPL-15d, APHA 22ed 4500-H⁺ B
2. QPL-15e, APHA 22ed 2540 D
3. QPL-15f, APHA 22ed 5220 B
Test Result : Refer to the results on page 2.

For and on behalf of

Acumen Laboratory and Testing Limited

Authorized Signature: _____



Hui Wai Fung, Huntington

Laboratory Manager

Chemical Division

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Test Report

Page 2 of 2

Report Number : Q150003aR160735
Job Number : R160735
Issue Date : 03/01/2017

Test Result:

Lab ID	Date of Sampling	Client Sample ID	pH Value at (measured temperature °C)	Total Suspended Solids (TSS), mg/L	Chemical Oxygen Demand (COD), mg O ₂ /L
R160735/1	23/12/2016	Hing Keng, Wall D	8.2 (24)	4.1	<50

- Note:
1. mg/L indicates milligram per liter
 2. mg O₂/ L indicates milligram oxygen per liter
 3. < indicates less than.
 4. > indicates more than.
 5. NA indicates Not Applicable.

End of Report

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