



浩科環境工業有限公司

Acumen Environmental Engineering & Technologies Co., Ltd.

香港青衣(北)担杆山路12號地段

Lot 12, Tam Kon Shan Road, Tsing Yi (N), Hong Kong

☎ (852) 2333-6823

🌐 www.acumenhk.com

☎ (852) 2333-1316

Our Ref.: CJO-3113

15 October 2021

The EIA Ordinance Register Office,
Environmental Protection Department,
27th floor, Southorn Centre,
130 Hennessy Road,
Wanchai, Hong Kong

CONTRACT NO. 1/WSD/19

**IN-SITU REPROVISIONING OF SHA TIN WATER
TREATMENT WORKS (SOUTH WORKS) – WATER TREATMENT WORKS AND
ANCILLARY FACILITIES
Environmental Permit EP-494/2015**

We are enclosing the following information for your kind considerations of our application:

- (a) Three hard copies,
- (b) Two copies of the 67th monthly Environmental Monitoring and Audit (EM&A) Report (Rev.0). (Register No.: AEIAR-187/2015)

Please feel free to contact us should you need further information.

Yours sincerely,
Acumen Environmental Engineering and Technologies Co. Ltd.

Mr. Vega Wong
2333 6823

c.c. Water Supplies Department
c.c. AECOM

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. H C Wong, Heinz)

15 October, 2021

Dear Sir,

In-Situ Re provisioning of Sha Tin Water Treatment Works (South Works) – Water Treatment Works and Ancillary Facilities

Environmental Permit EP-494/2015

Submission of 67th monthly EM&A Report

In accordance with the Condition 3.4 of the Environmental Permit (No. EP-494/2015), we submit herewith 3 hard copies and 2 electronic copies of the 67th 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,



Mr. Wong, Vega, T. L.

Environmental Team Leader

c.c. Independent Environmental Checker

Your Ref:
Our Ref: 60479142/C/fyw2110151

By Hand & By Email

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

Attn: Mr. Edmund Huen

15 October 2021

Dear Sir,

**Contract No.1/WSD/19
In-situ repositioning of Sha Tin Water Treatment Works (South Works) – Water Treatment
Works and Ancillary Facilities
Submission of 67th Monthly EM&A Report for September 2021**

Reference is made to Environmental Team (ET)'s 67th Monthly EM&A Report for September 2021 (Rev. 0) submitted on 15 October 2021.

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



Water Supplies Department



**MONTHLY ENVIRONMENTAL MONITORING AND AUDIT
(EM&A) REPORT (NO. 67)**

FOR

**CONTRACT NO. 1/WSD/19
IN-SITU REPROVISIONING OF SHA TIN
WATER TREATMENT WORKS (SOUTH WORKS) –
Water Treatment Works and Ancillary Facilities**

(Rev. 0)

**MONTHLY ENVIRONMENTAL
MONITORING AND AUDIT
(EM&A) REPORT (NO. 67)**

**FOR
CONTRACT No. 1/WSD/19
IN-SITU REPROVISIONING OF SHA TIN WATER
TREATMENT WORKS (SOUTH WORKS) – WATER TREATMENT WORKS AND
ANCILLARY FACILITIES**




	Name	Signature
Prepared and Reviewed by	Ms. Choy, Yiting, Y. T.	
Approved & Certified by	Mr. Wong, Vega, T. L. Environmental Team Leader (ETL)	
Verified & Confirmed by	Mr. Fung, Y. W. Independent Environmental Checker (IEC)	

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Water Supplies Department

In-situ Reprovisioning of Sha Tin Water Treatment Works – South Works

Monthly EM&A Report (No. 67)

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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 Re-provisioning of Sha Tin Water Treatment Works - South Works” (“The Project”).
- A.2 Under Contract No. 1/WSD/19, ATAL - CW - MH JV (ACMJV) 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 ACMJV 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 Contract No. 3/WSD/15 commenced on 30 October 2015 for completion by 31 December 2020. The construction phase of Contract No. 1/WSD/19 commenced on 01 January 2021. 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 67th monthly Environmental Monitoring and Audit Report for Contract No. 1/WSD/19 covering the period from 1 to 30 September 2021 (the Reporting Period). As informed by the Contractor, major activities in the reporting period included:
- M1-M5 Water Main Diversion Work
 - Washwater Equalization Tank (WET)- Excavation with ELS Work
 - Site formation work – sheet pile and site formation excavation work
 - Clarifier No.2,3 4 – Backfilling and Demolition Work
 - DN1200 drainage work -Excavation & drainage pile laying.
 - Tree felling, transplantation and landscape works
 - MIC office Construction
 - Installation of fencing nearby South Gate
- 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 | 15 |
| Noise | $L_{eq(30mins)}$ Daytime | 5 |
| Water Quality | Water Sampling | 13 |
| 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 was 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 conducted in the reporting period.
- A.11 As informed by the Contractor, the major works for Contract No. 1/WSD/19 between October to December 2021 will be:



- M1-M5 Water Main Diversion
- Washwater Equalization Tank (WET)- Excavation with ELS Work
- Site formation work – sheet pile and site formation excavation work
- 3D scanning and Relocate antique of Chemical Building and Stage 2 Filter
- Demolition of Chemical Building
- Clarifier No.2,3 4 – Backfilling and Demolition Work
- Excavation work on WET area
- DN1200 drainage work in Administration Building-
- Excavation & drainage pile laying
- Tree felling, transplantation, and landscape works
- MIC office Construction
- Remove Asbestos
- Pipe pile work at Stage 1, RMF, Ozone, FST and Stage 2 Filter

A.12 EM&A monitoring for the 67th reporting period for Contract No. 1/WSD/19 has been completed. The 68th monthly EM&A report will cover the period from 1 to 31 October 2021.



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. 1/WSD/19, ATAL – CW – MH JV (ACMJV) 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 ACMJV 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 Contract No. 3/WSD/15 commenced on 30 October 2015 for completion by 31 December 2020. The construction phase of Contract No. 1/WSD/19 commenced on 01 January 2021. 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	Senior Engineer	Mr. Ng, Horace, C. K.	2829 5693
AECOM	Chief Resident Engineer	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
ATAL-CW-MH Joint Venture	Project Manager	Mr. Tam, Wilson, Y. C.	9031 5600
	Site Agent	Ms. Cheung, S. Y.	6323 4716
Acumen Env. Eng. & Tech. Co. Ltd.	Project Director	Ir Dr. Lam, Gabriel, C. K.	2333 6823
	Environmental Team Leader	Mr. Wong, Vega, T. L.	6113 2368
	Ecologist	Mr. Wan, Jay, P. H.	2333 6823

1.3. SCOPE OF REPORT

1.3.1 This is the 67th monthly EM&A Report under the Contract No. 1/WSD/19 In-situ Re-provisioning of Sha Tin Water Treatment Works (South Works) – Water Treatment Works and Ancillary Facilities covering the period from 1 to 30 September 2021 (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 are shown in **Appendix C**.

1.4.2 As informed by the Contractor, no major works for Contract No.3/WSD/15 will be conducted. The major works for Contract No. 1/WSD/19 in September 2021 are:

- M1-M5 Water Main Diversion Work
- Washwater Equalization Tank (WET)- Excavation with ELS Work
- Site formation work – sheet pile and site formation excavation work
- Clarifier No.2,3 4 – Backfilling and Demolition Work
- DN1200 drainage work -Excavation & drainage pile laying.
- Tree felling, transplantation and landscape works
- MIC office Construction
- Installation of fencing nearby South Gate



- 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 Model AM 510
	CASC Model PC -3A(E)
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 five (5) 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
4/9/2021	Cloudy	14:45	17:45	58	62	67
10/9/2021	Fine	15:22	18:22	75	84	66
16/9/2021	Cloudy	15:38	18:38	62	51	48
21/9/2021	Cloudy	15:10	18:10	52	48	50
27/9/2021	Fine	14:35	17:35	68	63	57
Average				60.7		
Range				48 – 84		

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
4/9/2021	Cloudy	14:51	17:51	50	41	46
10/9/2021	Fine	15:28	18:28	56	67	51
16/9/2021	Cloudy	15:44	18:44	49	52	47
21/9/2021	Cloudy	15:15	18:15	40	35	31
27/9/2021	Fine	14:41	17:41	55	59	49
Average				48.5		
Range				31 – 67		

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	Svantek 971
Acoustic Calibrator	Svantek SV 33B
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 five (5) 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	Time	Weather	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}
4/9/2021	16:03 - 16:33	Cloudy	62.5	61.8	63.5	62.6	60.9	63.1	62.5
10/9/2021	16:39 - 17:09	Fine	61.2	60.8	58.4	61.1	59.8	62.2	60.7
16/9/2021	16:56 - 17:26	Cloudy	62.4	61.5	60.9	60.4	62.5	61.7	61.6
21/9/2021	16:26 - 16:56	Cloudy	63.1	62.2	61.1	62.8	63.3	62.9	62.6
27/9/2021	15:51 - 16:21	Fine	61.6	62.8	63.4	63.1	62.5	61.4	62.5
Average									62.1
Range									60.7– 62.6
Limit Level >75dB(A)									

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

Date	Time	Weather	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}
4/9/2021	14:52 - 15:22	Cloudy	58.6	57.4	59.2	56.8	59.3	60.2	58.7
10/9/2021	15:29 - 15:59	Fine	58.3	59.2	57.4	59.8	57.1	56.5	58.2
16/9/2021	15:45 - 16:15	Cloudy	59.4	62.1	60.8	58.3	57.6	60.9	60.1
21/9/2021	15:16 - 15:46	Cloudy	56.3	57.8	55.2	56.9	56.8	56.4	56.6
27/9/2021	14:42 - 15:12	Fine	58.4	57.5	59.4	62.3	61.1	59.1	59.9
Average									58.9
Range									56.6 – 60.1
Limit Level >75dB(A)									



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

Date	Time	Weather	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}
4/9/2021	15:27 - 15:57	Cloudy	57.1	56.5	56.8	59.3	55.4	57.2	57.2
10/9/2021	16:03 - 16:33	Fine	58.6	57.3	58.8	56.2	57.1	56.9	57.6
16/9/2021	16:20 - 16:50	Cloudy	57.4	58.4	57.9	59.2	60.3	61.1	59.3
21/9/2021	15:50 - 16:20	Cloudy	57.8	55.2	56.1	55.6	54.9	56.2	56.1
27/9/2021	15:16 - 15:46	Fine	58.4	56.9	57.3	55.5	56.2	56.8	56.9
Average									57.5
Range									56.1 – 59.3
Limit Level 70dB(A) during normal teaching periods or 65dB(A) during examination periods									

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	
Horiba Multi Water Quality Checker U-53	
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 thirteen (13) 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	8.47	8.53	N/A	9.21	9.23	9.53
Min.	8.26	8.20	N/A	8.91	8.96	9.27
Max.	8.78	8.77	N/A	9.45	9.52	9.78
Turbidity – Mid Depth (NTU)	C1	C2	C3	M1	M2	M3
Average	2.58	2.51	N/A	2.47	2.60	0.29
Min.	2.30	2.20	N/A	2.30	2.30	-0.10
Max.	2.80	2.80	N/A	2.80	2.80	0.60
Suspended Solid – Mid depth (mg/L)	C1	C2	C3	M1	M2	M3
Average	3.72	3.48	N/A	2.72	8.25	<1
Min.	3.50	3.00	N/A	2.50	7.50	<1
Max.	3.90	3.90	N/A	3.00	9.20	<1
pH value (unit)	C1	C2	C3	M1	M2	M3
Average	7.48	7.55	N/A	7.52	7.49	7.50
Min.	7.21	7.21	N/A	7.20	7.19	7.31
Max	7.77	7.76	N/A	7.80	7.74	7.80

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 The condition of TA572 was observed in poor condition due to broken of main trunk. TA327 was also in poor condition; while already dead TA326 collapsed under Signal No. 10 typhoon Mangkhut in September 2018. Tree guying cables have been installed to provide external support to the two remaining transplanted trees.
- 2.5.2 Compensatory planting of TA326 has been completed on 25 March 2020 by planting two *Syzygium levinei* and one *Schefflera heptaphylla*. However, the two native *Syzygium levinei* were mis-planted by two exotic *Syzygium jambos*, which has been replaced by another native tree species *Celtis sinensis* on 31 May 2021.
- 2.5.3 *Desmos chinensis* has been finalized as the candidate to compensate the loss of *Artabotrys hongkongensis*. Two individuals were planted at Wall C in STWTW on 1 April 2021.
- 2.5.4 All Lamb of Tartary (*Cibotium barometz*) previously stored at the nursery have been severely damaged by Typhon Wipha on 30-31 July 2019. During the monitoring in December 2020, all are dehydrated without foliage in poor condition; however, 27 nos. new individuals are propagated from previously collected spores since then.
- 2.5.5 They are at acceptable condition to be transplanted back at Portion E of STSFWSR on 23 April 2021.
- 2.5.6 In order to enhance a sustainable survival during the post-transplantation stage, a shelter (such as 遮光網) has been installed to reduce intensity of direct sunlight received and avoid direct hit of rainstorm/typhoon to the 27 nos. *Cibotium barometz*.
- 2.5.7 Regular irrigation, set up of protection zone and weeding by hand held tools within protection zone, shall also be provided to the transplanted/ compensated plants in order to sustain their survival during the post-transplantation (establishment) stage.
- 2.5.8 Root ball of TA572 and TA327 tree should be kept moisture especially during dry and non-raining day.
- 2.5.9 The post-transplantation monitoring of woodland compensation (quarterly report) is supplemented in **Appendix S(2)**.

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



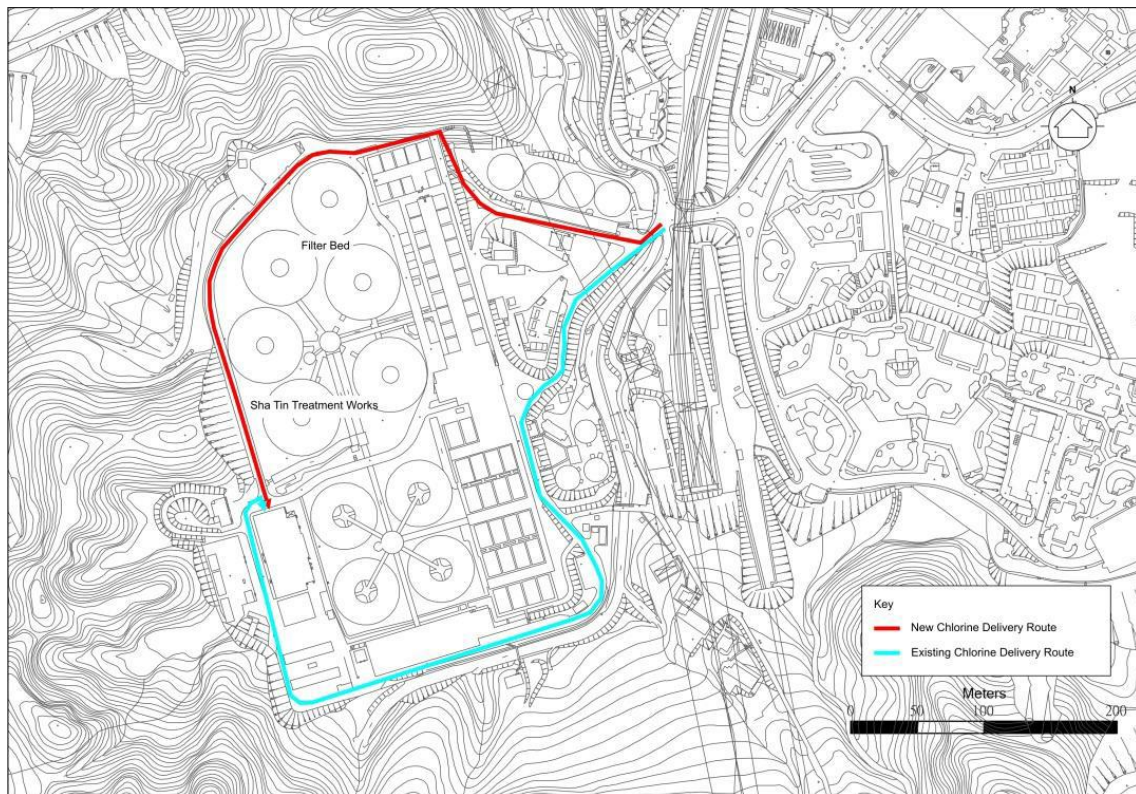
Table 2-15: Chlorine Truck Transport Route

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 1, 8, 14, 20 and 29 September 2021.
- 2.8.2 One joint site inspection with IEC also undertaken on 20 September 2021. 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
1 September 2021	Water retained at the site formation area. Contractor is reminded to remove the retained water.	Retained water was removed.
8 September 2021	No environmental issue was observed during the site inspection.	N/A
14 September 2021	No environmental issue was observed during the site inspection.	N/A
20 September 2021	No environmental issue was observed during the site inspection.	N/A
29 September 2021	Accumulated waste are observed near administration building. Contractor is reminded to remove and dispose them properly.	Accumulated waste were removed.

- 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	28/01/2015	N/A	WSD	
Notification of Construction Works under the Air Pollution Control (Construction Dust) Regulation (Form NA)	Reference No: 458807	10/8/2020	N/A	ACMJV	
Registration of Chemical Waste Producer	WPN5296-759-A3012-01	28/09/2020	N/A	ACMJV	
Trip Ticket (Chit) Account	7038091	26/8/2020	N/A	ACMJV	
Waste Water Discharge Licence	WT00037213-2020	19/1/2021	31/1/2026	ACMJV	
Disposal of Sludge at Landfill-Admission Ticket System	16134	5/3/2021	4/9/2021	ACMJV	
Construction Noise Permit	GW-RN0584-21	13/8/2021	18/2/2022	ACMJV	



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 quite 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
ACMJV notify ER, ET and IEC	ER notify ACM, ET and IEC
Register of the complaint. ACMJV 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	ACMJV 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 No visit from EPD in the reporting period.

2.12.5 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 Contract No. 1/WSD/19 between October to December 2021 will be:

- M1-M5 Water Main Diversion
- Washwater Equalization Tank (WET)- Excavation with ELS Work
- Site formation work – sheet pile and site formation excavation work
- 3D scanning and Relocate antique of Chemical Building and Stage 2 Filter
- Demolition of Chemical Building
- Clarifier No.2,3 4 – Backfilling and Demolition Work
- Excavation work on WET area
- DN1200 drainage work in Administration Building-
- Excavation & drainage pile laying
- Tree felling, transplantation, and landscape works
- MIC office Construction
- Remove Asbestos
- Pipe pile work at Stage 1, RMF, Ozone, FST and Stage 2 Filter

3.2. KEY ISSUES FOR COMING MONTH

3.2.1 Potential environmental impacts arising from the above upcoming construction activities in September 2021 are mainly associated with dust, noise, water quality issues and waste management issues.

3.2.2 The tentative monitoring schedule for October 2021 to December 2021 can be found in **Appendix W**.



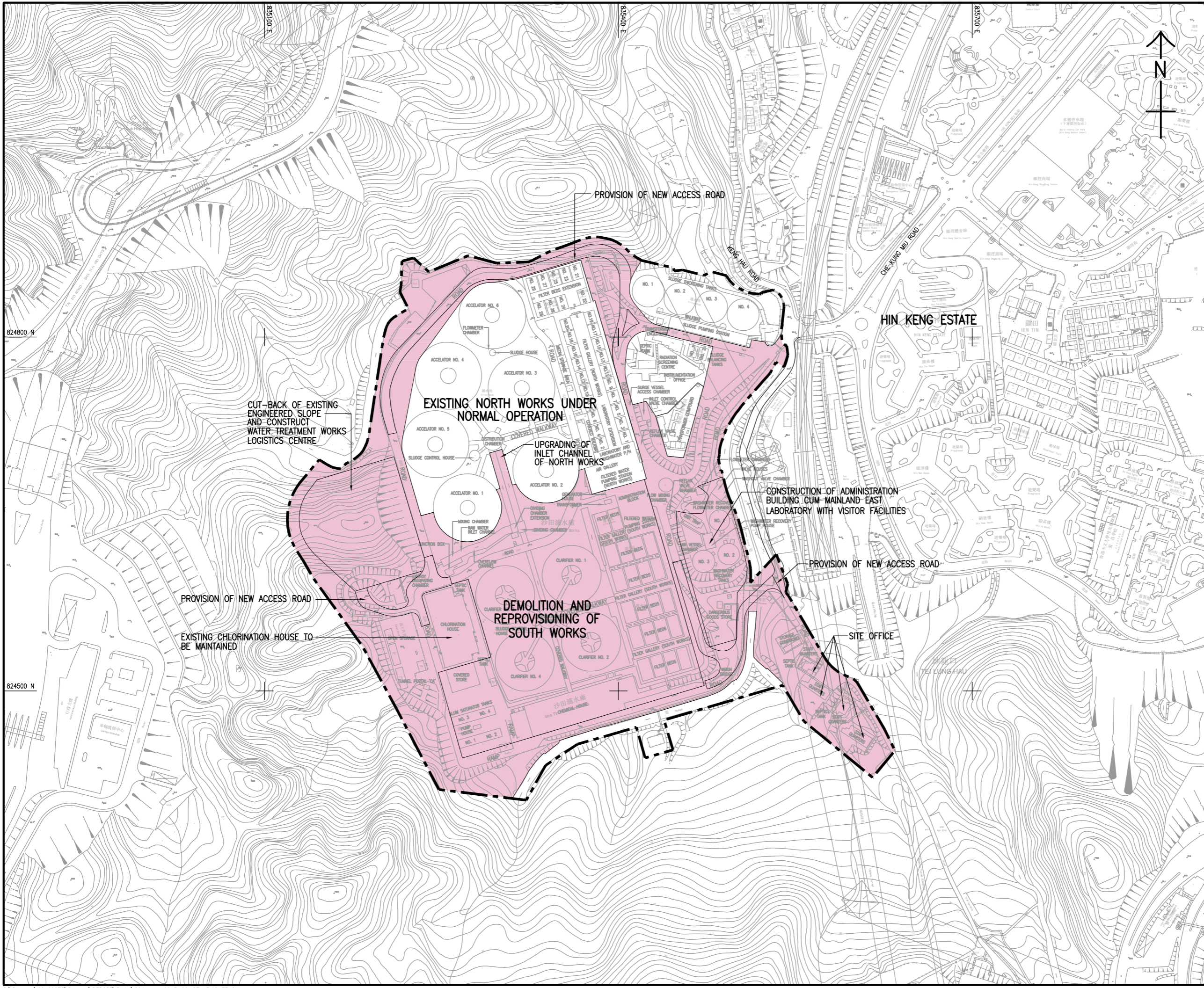
4. CONCLUSIONS AND RECOMMENDATIONS

4.1. SUMMARY

- 4.1.1 Air quality (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 inspections were conducted during the reporting period. Joint site inspection with IEC were carried out on 20 September 2021. 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 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

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



DRG. NO. 60162073/EM&A/FIG 1
 圖紙編號

DESIGNED BY	CONTRACT NO.	P. DR. APPROVED
DRAWN BY	DATE	批准人
SCALE	比例	
DIMENSIONS ARE IN METRES		

Appendix B

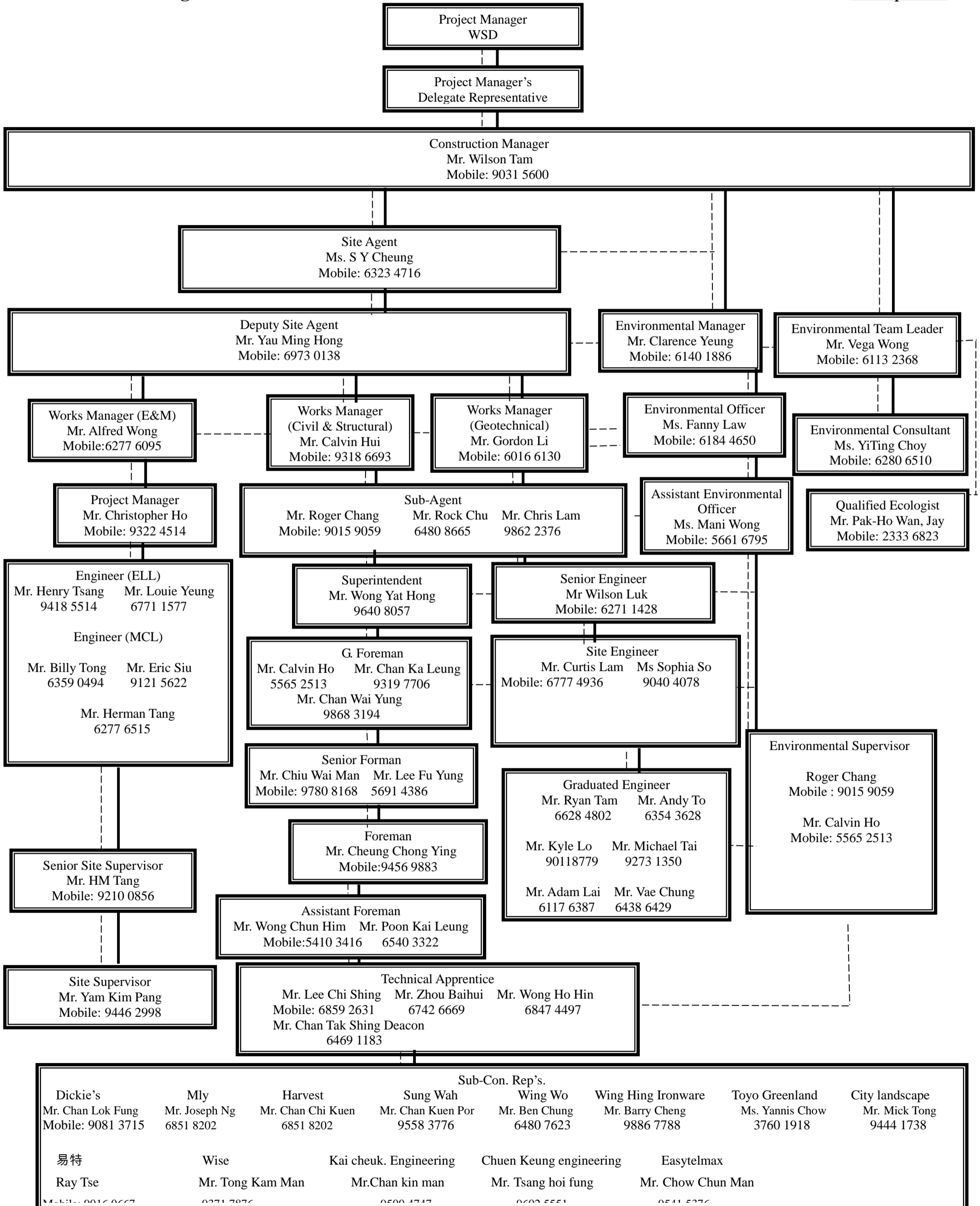
Project Organization

In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works)

– Water Treatment Works and Ancillary Facilities

Environmental Organizational Chart

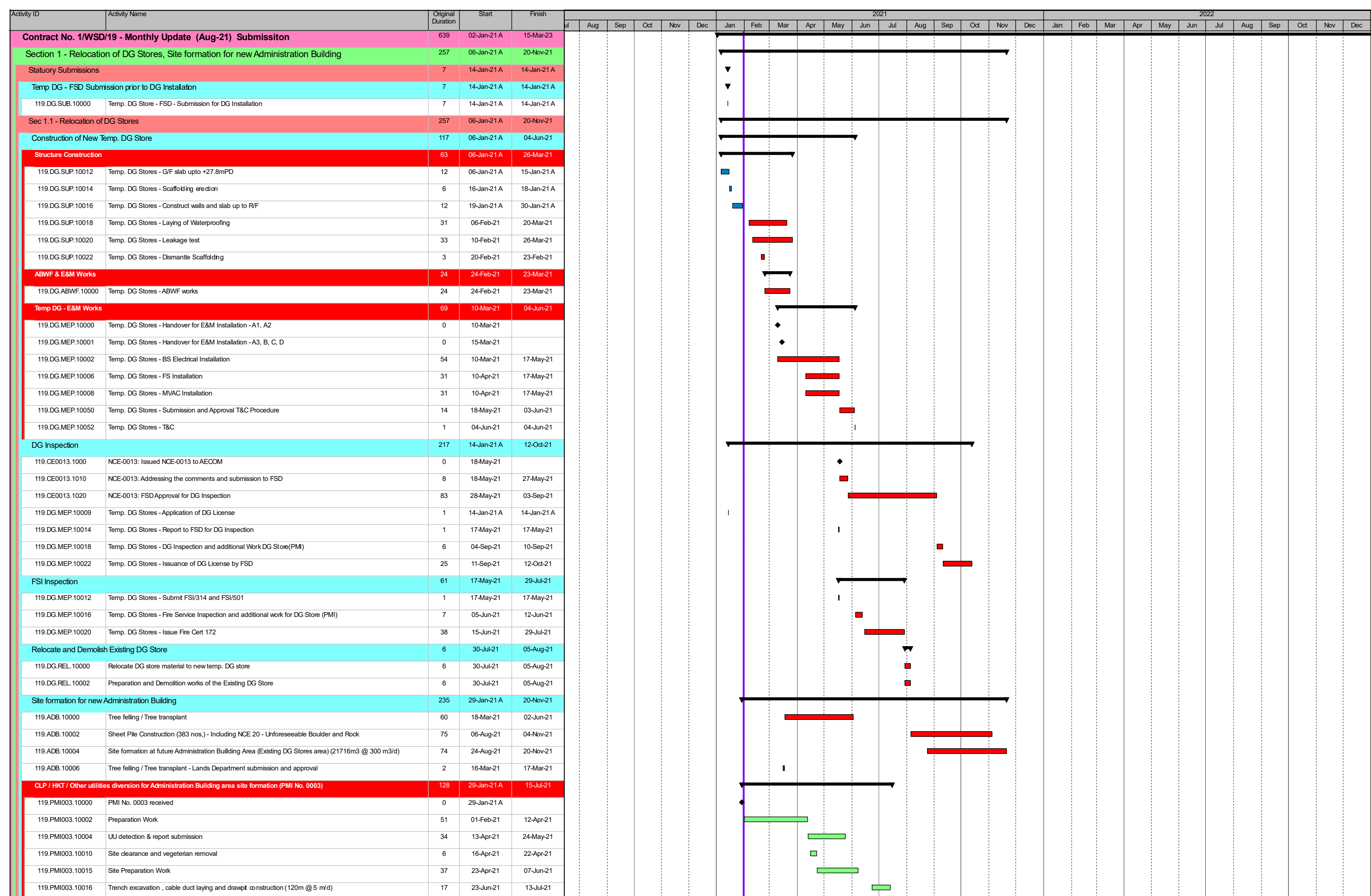
Date: 30 Sep 2021



— Authorization
 - - - - - Communication Line

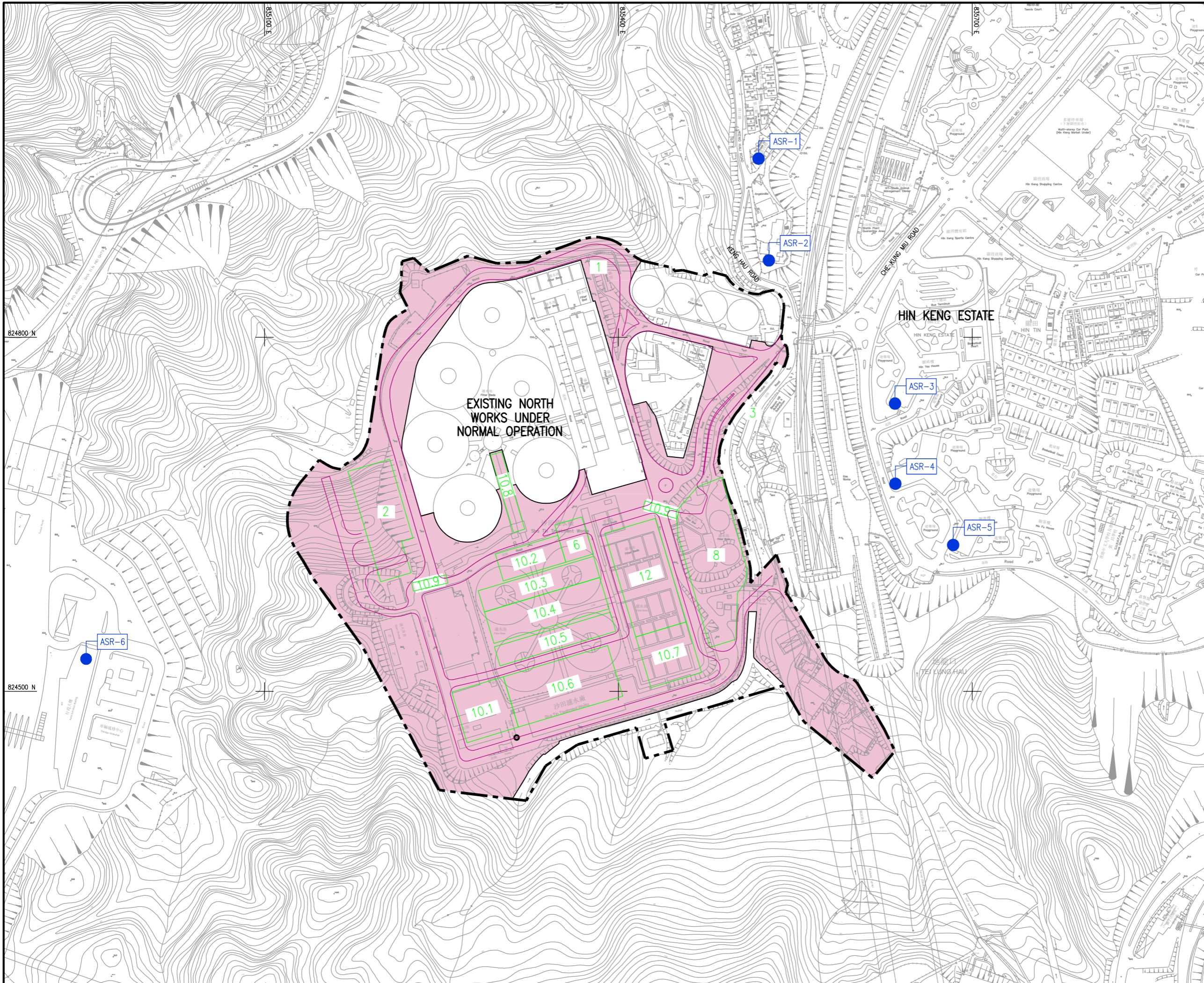
Appendix C

Latest Construction Programme



Appendix D

Location of Construction Activities



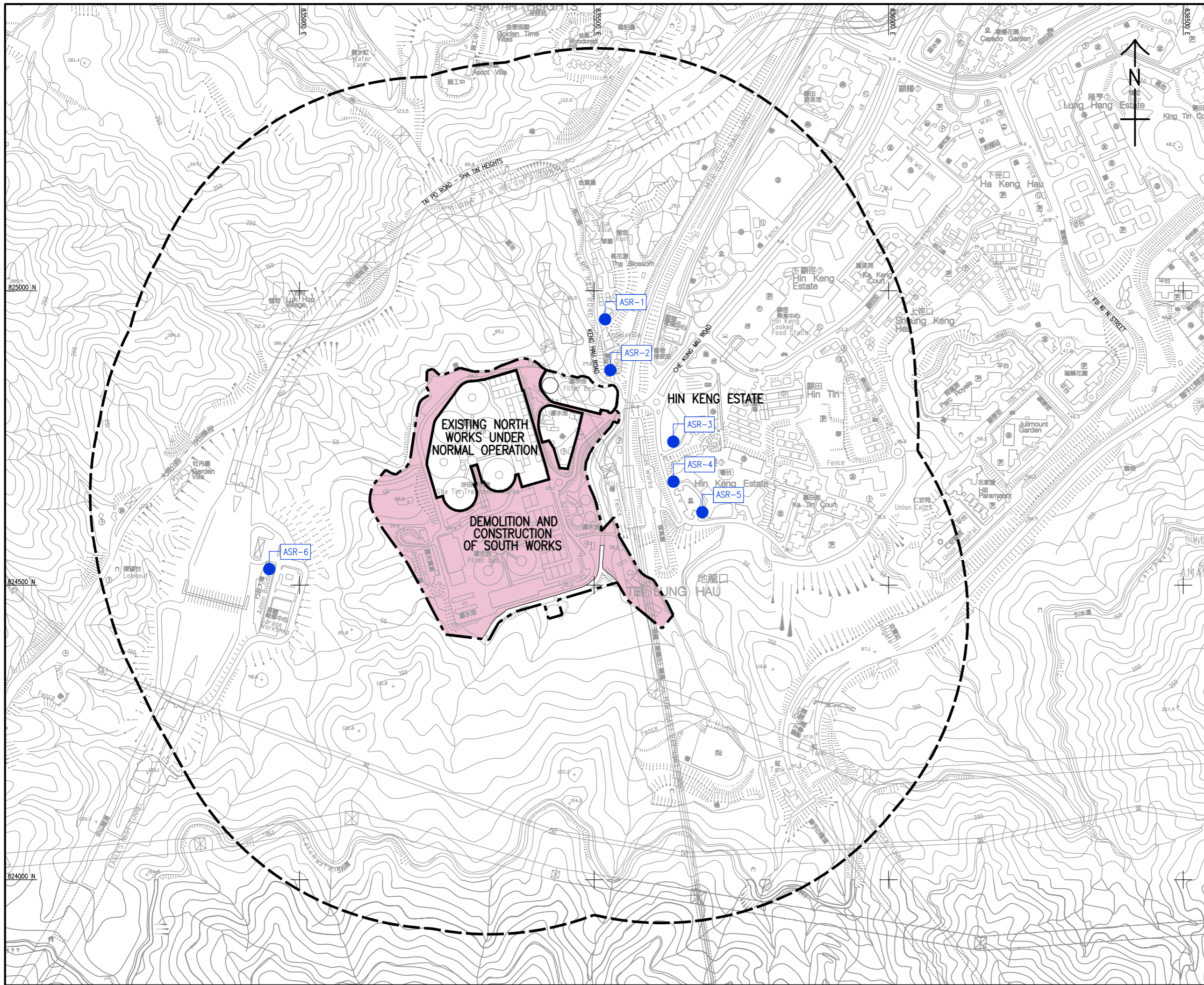
LEGEND:

	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

<p>水務署 WATER SUPPLIES DEPARTMENT</p> <p>AGREEMENT NO. CE 13/2009 (WS) IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS DESIGN AND CONSTRUCTION</p>	<p>LOCATIONS OF CONSTRUCTION WORKS AREA</p> <p>AECOM</p> <p>DRG. NO. 60162073/FIGURE 4.2</p>
<p>DESIGNED BY: NHP</p> <p>DRAWN BY: NHP</p> <p>SCALE: A3 1 : 3000</p> <p>CONSTRUCTION AREA: METRES</p>	<p>DATE: 2014-10-23</p> <p>BY: [Signature]</p> <p>FOR: [Signature]</p> <p>APPROVED: [Signature]</p> <p>DATE: 2014-10-23</p> <p>SCALE: A3 1 : 3000</p> <p>CONSTRUCTION AREA: METRES</p> <p>© COPYRIGHT RESERVED</p>

Appendix E

Environmental Sensitive Receivers in the Vicinity of the Projects



- 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

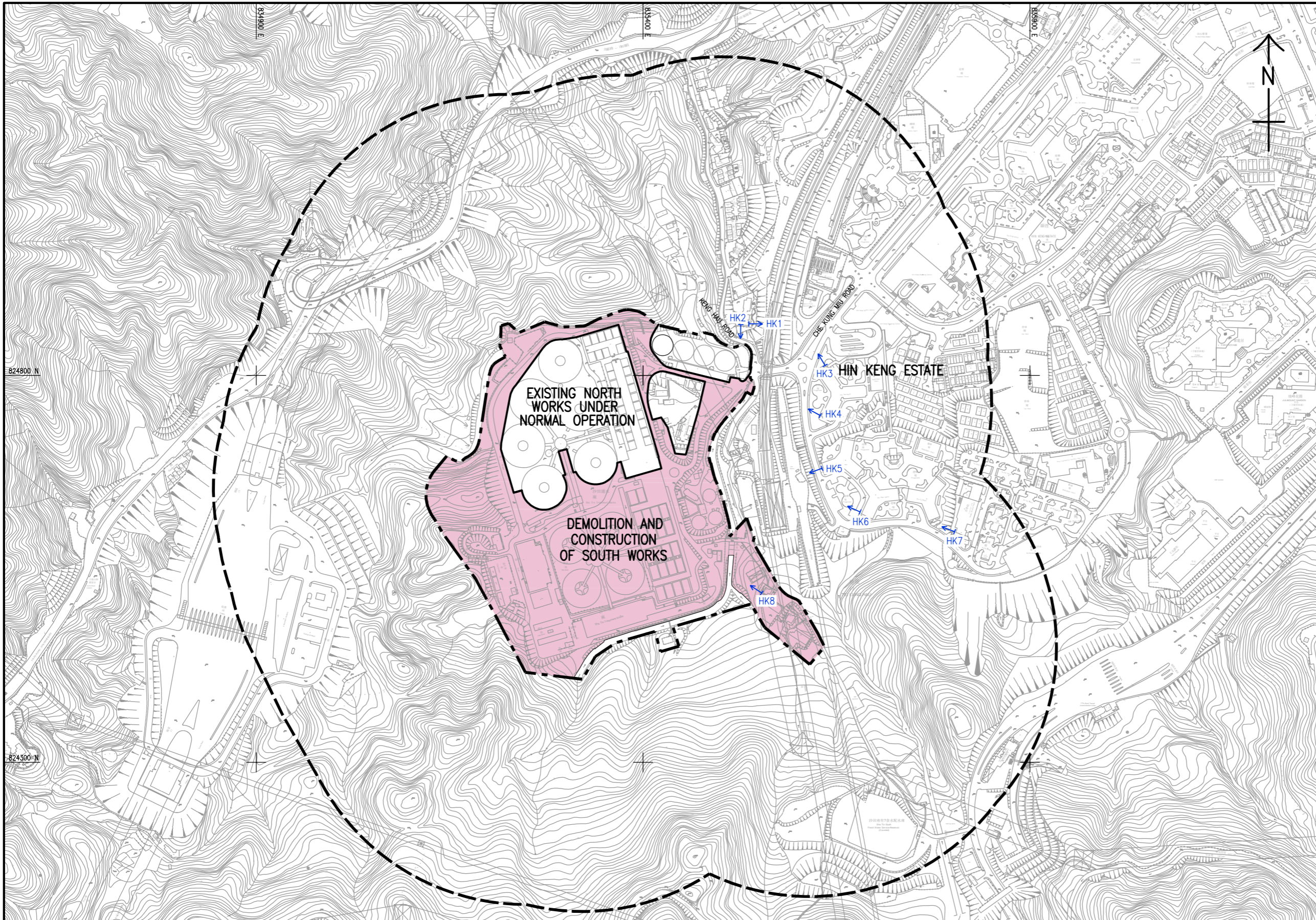
水務署
WATER SUPPLIES DEPARTMENT
 AGREEMENT NO. CE 13/2009 (WS)
 IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS - SOUTH WORKS
 DESIGN AND CONSTRUCTION

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 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
- 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

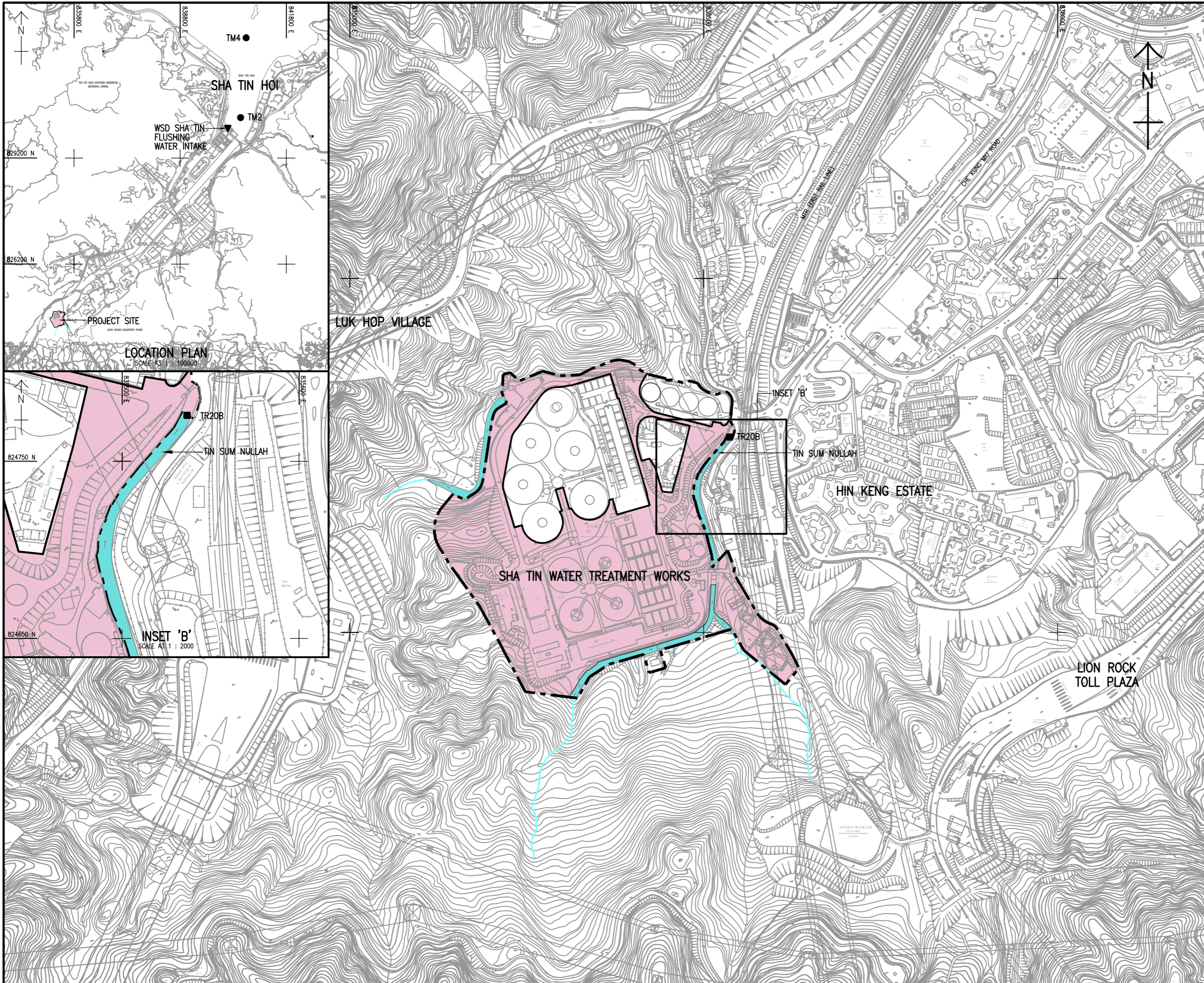
LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS







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	UNIT	UNIT
METRES	METRES	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	
© COPYRIGHT RESERVED 版權所有		

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

	<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.
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Appendix H

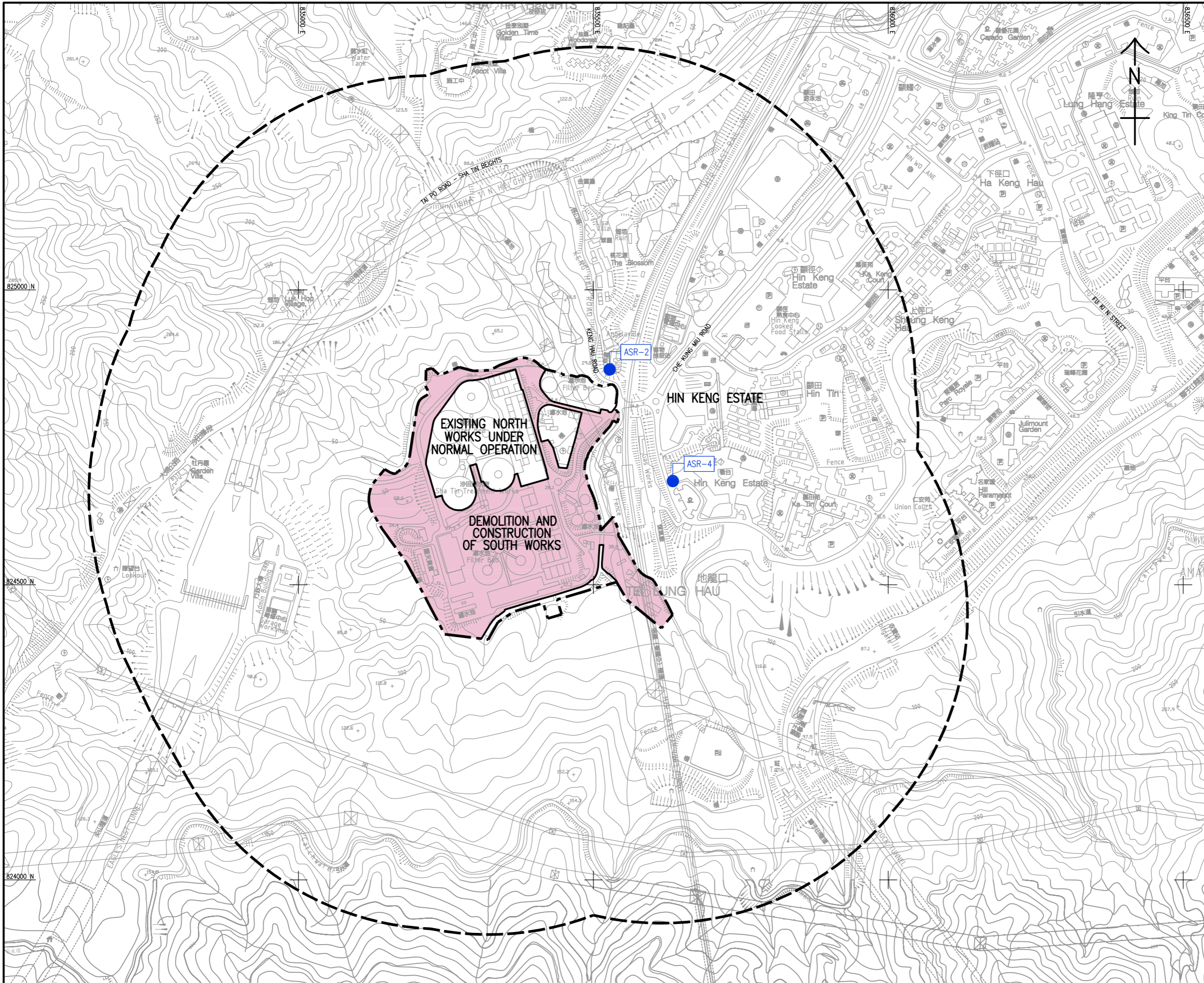
Impact Monitoring Schedules

Impact Monitoring Schedule for STWTW

Sep-21						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
			1 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	2	3 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	4 Impact Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3
5	6 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	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	16 Impact Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	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	21 Impact Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	22	23 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	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 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	30		

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. DR. APPROVED
DRAWN BY	DATE	
SCALE		
CONSTRUCTION ARE IN		

Appendix J

Calibration Certificates

(Air Monitoring)



北京航天计量测试技术研究所

Beijing Aerospace Institute for Metrology and Measurement Technology

证书编号: HD1e-2021-01-2867823
CERTIFICATE No:

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PAGE 1 OF 3 PAGES

校准证书

CALIBRATION CERTIFICATE

委托方 CLIENT

名称: 浩科环境工业有限公司
NAME: Acumen Environmental Engineering and Technologies Company Limited
地址: 香港青衣(北)担杆山路 12 号地段
ADDRESS: Lot 12, Tam Kon Shan Road, North Tsing Yi, Hong Kong

计量器具 MEASURING INSTRUMENTS

名称: TSP 全尘浓度检测仪
NAME: 型号: PC-3A (E)
TYPE:
制造者: 青岛精诚仪器仪表有限公司
MANUFACTURER: 编号: JC-2001141
No:

校准人:
OPERATOR:

沈北屹

核验人:

孙景波

INSPECTOR:

签发人:

杨广强

APPROVED SIGNATORY:



接收日期:	2021	年	01	月	14	日
RECEIVED DATE:		YEAR		MONTH		DAY
校准日期:	2021	年	01	月	14	日
CAL. DATE:		YEAR		MONTH		DAY
建议下次校准日期:	2022	年	01	月	13	日
NEXT TIME TO CALIBRAT:		YEAR		MONTH		DAY

本结果仅对所校准样品有效, 证书未经本实验室批准, 不得部分复印。

These results apply only to the calibrated sample, this certificate can't be partly copied without authorization.

地址: 中国北京市丰台区东高地南大红门路 1 号
通讯: 北京 9200 信箱 24 分箱 邮政编码: 100076
电话: 86-10-68383637, 86-10-68383657
传真: 86-10-88522409
网址: <http://www.102.com.cn>

Address: No.1 South Dahongmen Road, Beijing, China.
P.O.Box: 9200-24, Beijing, China. Zip: 100076
Tel.: 86-10-68383637, 86-10-68383657
Fax: 86-10-88522409
E-mail: jiliang102@163.com





北京航天计量测试技术研究所

Beijing Aerospace Institute for Metrology and Measurement Technology

证书编号: HD1e-2021-01-2867823
CERTIFICATE No:

第 2 页 共 3 页
PAGE 2 OF 3 PAGES

本实验室是法定计量检定机构 (包括被授权的计量检定机构)
This body is an institute of legal verification (including authorized body)

授权单位: 国家国防科技工业局

Authorized by: State Administration of Science Technology and Industry for National Defence

授权证书号: 国防军工-JLJG-1-003

Authorization certificate No 国防军工-JLJG-1-003

本实验室的质量管理体系符合 ISO/IEC17025 标准的要求, 并经中国合格评定国家认可委员会认可, 认可证书号: CNAS L0283

This body is a CNAS accredited laboratory with a qualified quality management system in compliance with the ISO/IEC17025 standard, Accreditation certificate No CNAS L0283

本实验室通过国家认证认可监督管理委员会的资质认定, 认定证书编号: 170020180155

This body is accredited by Certification and Accreditation administration of the People's Republic of China, Accreditation Certificate No 170020180155

测量溯源性的说明: 国家计量基准

A statement of Measurement traceability: National Metrology Standards

校准所使用的计量标准及主要测量设备 STANDARD AND EQUIPMENT USED IN THE CALIBRATION

名称/编号 NAME/NO.	测量范围 MEASURING RANGE	扩展不确定度 /准确度等级 /最大允许误差 EXPANDED UNCERTAINTY /ACCURACY CLASS /MAX.PERMISSIBLE ERROR	证书编号 CERTIFICATE NO.	证书有效期至 DUE DATE
低浓度粉尘发生装置	(0~10) mg/m ³	5.0%	2020D11-09-012990	2021-09-03

校准所依据的技术文件 (编号、名称)

BASIS OF CALIBRATION (CODE, NAME)
JJG 846-2015 粉尘浓度测量仪

校准的环境条件、地点, 限制使用条件和测量范围

ENVIRONMENTAL CONDITION IN THE CALIBRATION, LOCATION, LIMITED USING CONDITION AND MEASURING RANGE

温度 Temperature: 20.2 °C

湿度 Moisture: 53 %RH

地点 Location: 北京市丰台区南大红门路一号

限制使用条件和测量范围 Limited using condition and measuring range:



证书编号: HD1e-2021-01-2867823
CERTIFICATE No:

第 3 页 共 3 页
PAGE 3 OF 3 PAGES

校准结果

RESULTS OF CALIBRATION

外观及标志	名牌内容及标识	完整
	粉尘仪表面及采样头	无缺陷
示值误差	$\pm 20\%$	5.5%
示值重复性	$\pm 10\%$	2.9%
绝缘强度	应能承受 1500V、50Hz 的电压， 泄露电流不大于 5mA，持续时间 1min，无飞弧和击穿现象	符合要求

- 说明
1. 本次校准测量结果的扩展不确定度: $U_{rel}=5.2\%$; ($k=2$)。
 2. 经校准, 所校项目符合检定规程技术要求。

以下空白

Blank Below



CERTIFICATE OF CALIBRATION AND TESTING

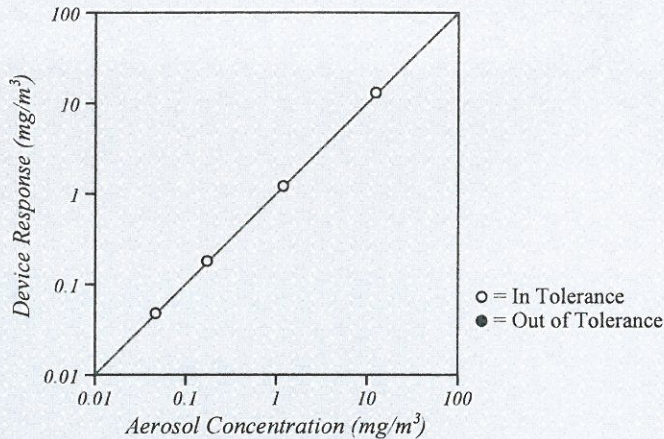
TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

Environment Conditions			Model	AM510
Temperature	75.29 (24.1)	°F (°C)	Serial Number	10712016
Relative Humidity	47.4	%RH		
Barometric Pressure	29.11 (985.8)	inHg (hPa)		

- As Left In Tolerance
 As Found Out of Tolerance



Concentration Linearity Plot



System ID: DTII01-02

CONCENTRATION				Unit: mg/m ³			
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	1.176	1.143	1.058~1.294	3	0.046	0.045	0.032~0.060
2	0.170	0.169	0.144~0.196	4	12.285	12.277	11.056~13.514

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

Measurement Variable	System ID	Last Cal.	Cal. Due	Measurement Variable	System ID	Last Cal.	Cal. Due
DC Voltage	E003314	01-11-21	01-31-22	Photometer	E003319	02-15-21	08-31-21
Microbalance	M001324	01-29-21	01-31-23	Pressure	E003511	10-26-20	10-31-21
Flowmeter	E005626	03-09-21	03-31-22	DC Voltage	E003315	01-11-21	01-31-22

Tom Wang

Calibrated

June 28, 2021

Date



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+)	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 110 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 110 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 (79 ft/min) 1.5 km/h 0.9 mph 0.6 ft 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	1.0 %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	0.01 inHg 0.1 hPa/mbar 0.01 PSI	8.86 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 1,654.7 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 pressure on a dedicated screen. Kestrel 3500 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+)	RESOLUTION	SPECIFICATION RANGE	SENSORS EMPLOYED	NOTES
Air Density								•	•					0.0002 lbm³ 0.003 kg/m³	0.001 lbm³ 0.001 kg/m³	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Mass of air per unit volume
Air Flow								•						6.71% 1 cfm 1 m³/hr 0.1 m³/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: in, ft, cm or m). Maximum duct dimension input: 256.0 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). 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 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 dew on a solid surface. Can also be considered to be the water-air saturation temperature.
Evaporation Rate														0.01 lbm/hr 0.05 kg/m²/hr	0.01 lbm/hr 0.01 kg/m²/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/m² 0.1 W/m²	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Estimated safe maximum continuously sustainable human metabolic rate (W/m²) 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. Multifunction, multi-digit monochrome dot-matrix display. Choice of aviation green or visible red (NV models only) electroluminescent backlight. Automatic or manual activation.
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 & Graphical Display, Min/Max/Avg History														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 1 and 2 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.

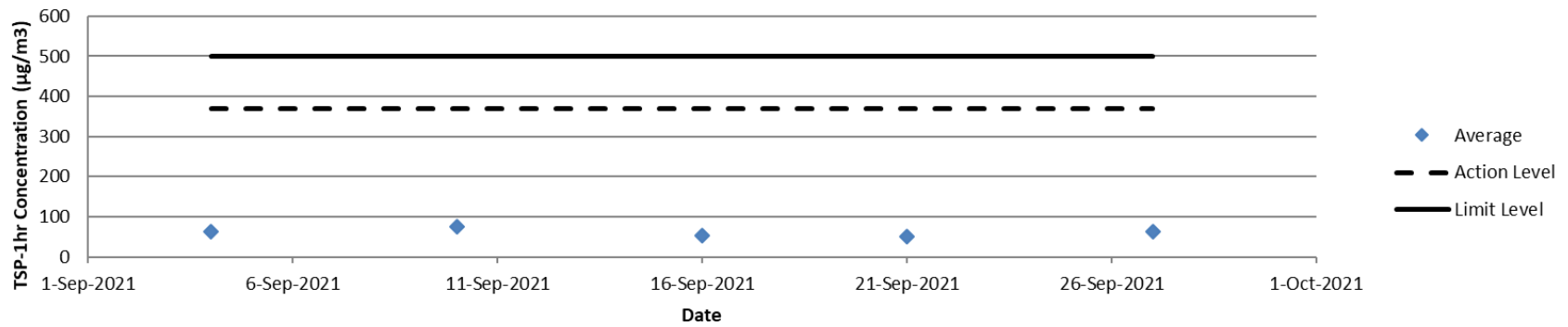
* NOTE: Accuracy calculated as uncertainty of the measurement derived from statistical analysis considering the combined effects from primary sensor specifications, circuit conversions, and all other sources of error using a coverage factor of k=2, or two standard deviations (2σ).

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.

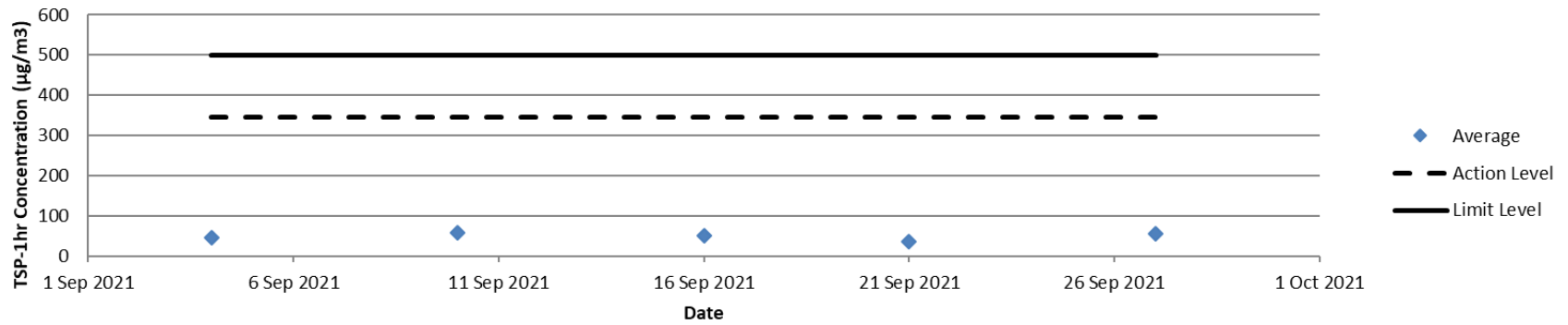
Appendix K

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

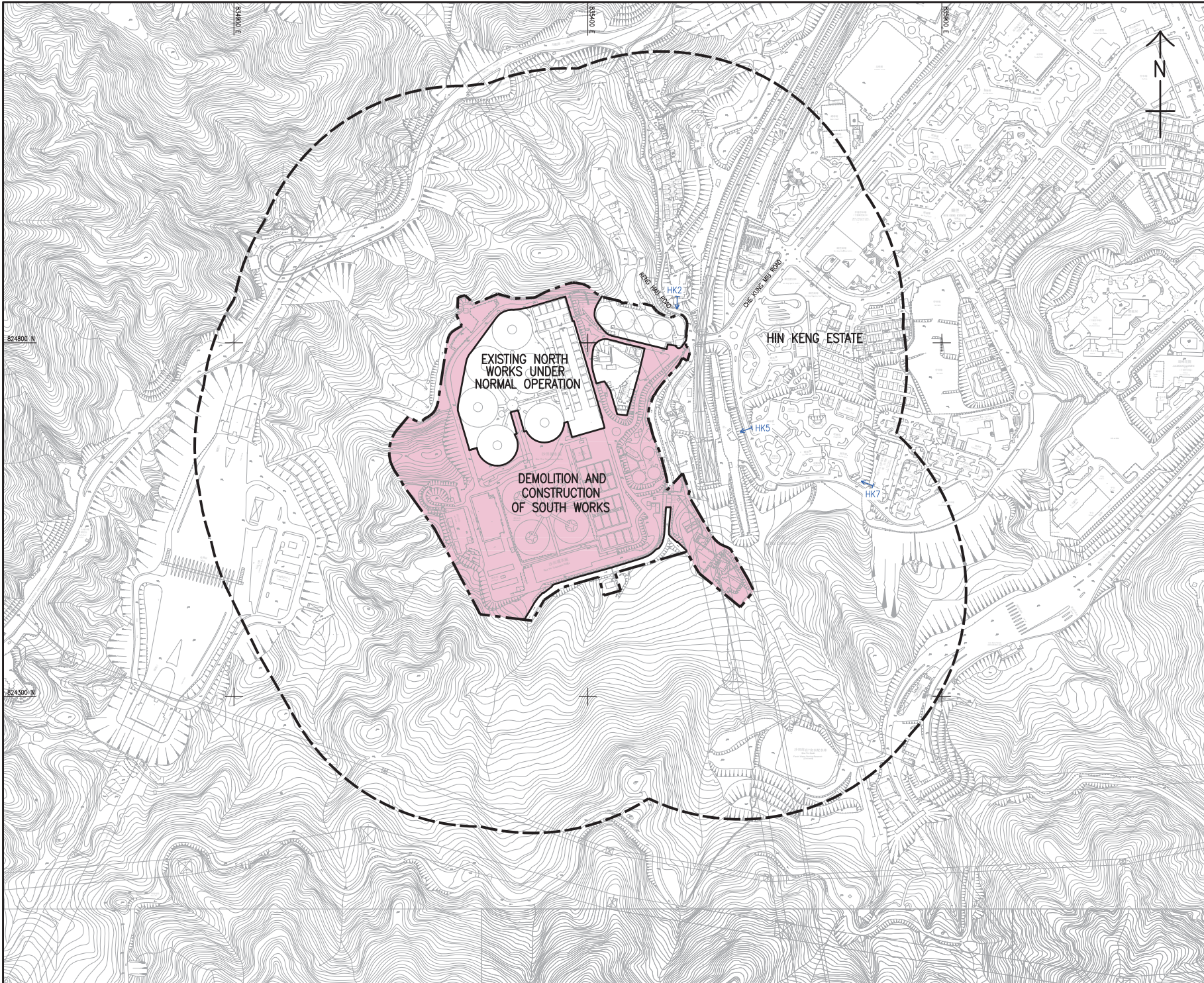


The Summary of TSP-1hr Concentration ($\mu\text{g}/\text{m}^3$) at AM2 Hin Keng Estate - Hin Wan House



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
- CHEUKFAA 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
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Appendix M

Calibration Certificates (Noise)



MAXLAB

CALIBRATION CERTIFICATE

<i>Certificate Information</i>																
Date of Issue	20-Mar-2021	Certificate Number MLCN210569S														
<i>Customer Information</i>																
Company Name	Acuity Sustainability Consulting Limited															
Address	Unit C, 11/F., Ford Glory Plaza, Nos. 37-39 Wing Hing Street, Cheung Sha Wan, Kowloon, HK															
<i>Equipment-under-Test (EUT)</i>																
Description	Sound Calibrator															
Manufacturer	Svantek															
Model Number	SV 33B															
Serial Number	83042															
Equipment Number	--															
<i>Calibration Particular</i>																
Date of Calibration	20-Mar-2021															
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-23 1357(MLTE190) / MLEC20/05/02 / 26-May-21															
Calibration Procedure	MLCG00, MLCG15															
Calibration Conditions	<table border="1"> <tr> <td>Laboratory</td> <td>Temperature</td> <td>23 °C ± 5 °C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>55% ± 25%</td> </tr> <tr> <td>EUT</td> <td>Stabilizing Time</td> <td>Over 3 hours</td> </tr> <tr> <td></td> <td>Warm-up Time</td> <td>Not applicable</td> </tr> <tr> <td></td> <td>Power Supply</td> <td>Internal battery</td> </tr> </table>	Laboratory	Temperature	23 °C ± 5 °C		Relative Humidity	55% ± 25%	EUT	Stabilizing Time	Over 3 hours		Warm-up Time	Not applicable		Power Supply	Internal battery
Laboratory	Temperature	23 °C ± 5 °C														
	Relative Humidity	55% ± 25%														
EUT	Stabilizing Time	Over 3 hours														
	Warm-up Time	Not applicable														
	Power Supply	Internal battery														
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.															
<i>Approved By & Date</i>																
		K.O. Lo 20-Mar-2021														
<i>Statements</i>																
<ul style="list-style-type: none"> * Calibration equipment used for this calibration are traceable to national / international standards. * The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement. * MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. * The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited. 																



MAXLAB

Certificate No. MLCN210569S

<i>Calibration Data</i>				
EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Dan
Date : 20-Mar-21

Checked : K.O. Lo
Date : 20-Mar-21

Page 2 of 2

Certificate of Calibration

for

Description: *Sound Level Meter*
Manufacturer: *SVANTEK*
Type No.: *971 (Serial No.: 96062)*
Microphone: *ACO 7052 E (Serial No.:78090)*
Preamplifier: *SVANTEK SV 18 (Serial No.:103808)*

Submitted by:

Customer: *Acuity Sustainability Consulting Limited*
Address: *Unit 1908, Nos. 301-305 Castle Peak Road,
Kwai Chung, N.T.*

Upon receipt for calibration, the instrument was found to be:

- Within (31.5 Hz to 4k Hz)**
 Outside

the allowable tolerance.

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

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory

Date of receipt: 2 July 2021

Date of calibration: 5 July 2021

Calibrated by: _____
Calibration Technician

Certified by: _____
*Mr. Ng Yan Wa
Laboratory Manager*

Date of issue: 5 July 2021

Certificate No.: APJ21-029-CC001



Page 1 of 4

1. Calibration Precaution:

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.

2. Calibration Conditions:

Air Temperature: 24.2 °C
 Air Pressure: 1004 hPa
 Relative Humidity: 60.8 %

3. Calibration Equipment:

	Type	Serial No.	Calibration Report Number	Traceable to
Multifunction Calibrator	B&K 4226	2288467	AV200041	HOKLAS

4. Calibration Results

Sound Pressure Level

Reference Sound Pressure Level

Setting of Unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz			
20-140	dBA SPL	Fast	94	1000	94.0	±0.4	

Linearity

Setting of Unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz			
20-140	dBA SPL	Fast	94	1000	94.0	Ref	
			104		104.0	±0.3	
			114		114.0	±0.3	

Time Weighting

Setting of Unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz			
20-140	dBA SPL	Fast	94	1000	94.0	Ref	
		Slow			94.0	±0.3	

Certificate No.: APJ21-029-CC001

Page 2 of 4

Frequency Response

Linear Response

Setting of Unit-under-test (UUT)			Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB	
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz			
20-140	dB	SPL	94	Fast	31.5	94.1	±2.0
					63	94.1	±1.5
					125	94.1	±1.5
					250	94.1	±1.4
					500	94.1	±1.4
					1000	94.0	Ref
					2000	93.8	±1.6
4000	93.3	±1.6					

A-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB	
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz			
20-140	dBA	SPL	94	Fast	31.5	54.9	-39.4±2.0
					63	68.0	-26.2±1.5
					125	78.0	-16.1±1.5
					250	85.4	-8.6±1.4
					500	90.8	-3.2±1.4
					1000	94.0	Ref
					2000	95.0	+1.2±1.6
4000	94.3	+1.0±1.6					

C-weighting

Setting of Unit-under-test (UUT)			Applied value		UUT Reading, dB	IEC 61672 Class 1 Specification, dB	
Range, dB	Freq. Weighting	Time Weighting	Level, dB	Frequency, Hz			
20-140	dBC	SPL	94	Fast	31.5	91.1	-3.0±2.0
					63	93.3	-0.8±1.5
					125	93.9	-0.2±1.5
					250	94.1	-0.0±1.4
					500	94.1	-0.0±1.4
					1000	94.0	Ref
					2000	93.6	-0.2±1.6
4000	92.5	-0.8±1.6					

5. Calibration Results Applied

The results apply to the particular unit-under-test only. All calibration points are within manufacture's specification as IEC 61672 Class 1.

Uncertainties of Applied Value:

94 dB	31.5 Hz	± 0.15
	63 Hz	± 0.10
	125 Hz	± 0.05
	250 Hz	± 0.05
	500 Hz	± 0.05
	1000 Hz	± 0.05
	2000 Hz	± 0.05
	4000 Hz	± 0.05
104 dB	1000 Hz	± 0.05
114 dB	1000 Hz	± 0.05

The uncertainties are evaluated for a 95% confidence level.

Note:

The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. (A+A)*L shall not be liable for any loss or damage resulting from the use of the equipment.



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 (±)	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 m/s 1 ft/min 0.1 km/h 0.1 mph 1.2 to 7.8 knots 1 ft	0.6 to 60.0 m/s 116 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 B	0.6 to 60.0 m/s 116 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 B	1 inch/25 mm diameter impeller with precision axle and low-friction 2y88 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 0.8 ft after impeller startup. Off-axis accuracy: ±1% @ 9° off-axis; ±2% @ 15° 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 triangle on 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 (2.2 mph) 1 m/s or greater provides fastest response and reduction of 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 °F 1.4 °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 1 1/2 inch 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 mph/1 m/s.
Relative Humidity				•	•									3.0 %RH	0.1 %RH	5 to 95% non-condensing	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	0.01 inHg 0.1 hPa/mbar 0.01 PSI	30.0 to 32.49 inHg 4.05 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 1654.7 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 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 (±)	RESOLUTION	SPECIFICATION RANGE	SENSORS EMPLOYED	NOTES
Air Density								•	•					0.0002 lbm/ft³ 0.003 kg/m³	0.001 lbm/ft³ 0.001 kg/m³	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Mass of air per unit volume
Air Flow									•					6.71%	1 cfm 1 m³/hr 0.1 m³/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). 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 dew and form on a solid surface. Can also be considered to be the water-air saturation temperature.
Evaporation Rate														0.01 lbm/hr 0.05 kg/m²/hr	0.01 lbm/hr 0.01 kg/m²/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 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)														10.2 W/m²	0.1 W/m²	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Estimated safe maximum continuously sustainable human metabolic rate (W/m²) 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.					
Response Time & Display Update	•	•	•	•	•									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.					
Max/Avg Wind	•	•	•	•	•									Multifunction, multi-digit monochrome dot-matrix display. Choice of aviation green or visible red (NV models only) electroluminescent backlight. Automatic or manual activation.					
Data Storage & Archival Display, Min/Max/Avg History	•	•	•	•	•									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.					
Data Upload & Bluetooth® Data Connect Option	•	•	•	•	•									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.					
Clock / Calendar	•	•	•	•	•									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 and for 2 and 5 second intervals (code version 4.18 and later). Data capacity shown.					
Auto Shutdown	•	•	•	•	•									Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.					
Languages	•	•	•	•	•									Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.					
Certifications	•	•	•	•	•									Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.					
Battery Origin	•	•	•	•	•									Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.					
Shock Resistance	•	•	•	•	•									Standard Models: AAA Alkaline, two, included. Average life, 400 hours of use, reduced by backlight or Bluetooth radio transmission use.					
Sealing	•	•	•	•	•									MIL-STD-810g, Transit Shock, Method 516.5 Procedure IV, unit only, impact may damage replaceable impeller.					
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	•	•	•	•	•									4.8 x 1.9 x 1.1 in 12.2 x 4.8 x 2.8 cm, 3.6 oz / 102 g 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 5.8 x 2.8 cm, 4.4 oz / 125 g					
Size & Weight	•	•	•	•	•									-22.0 °F to 140.0 °F -30.0 °C to 60.0 °C					

* 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).

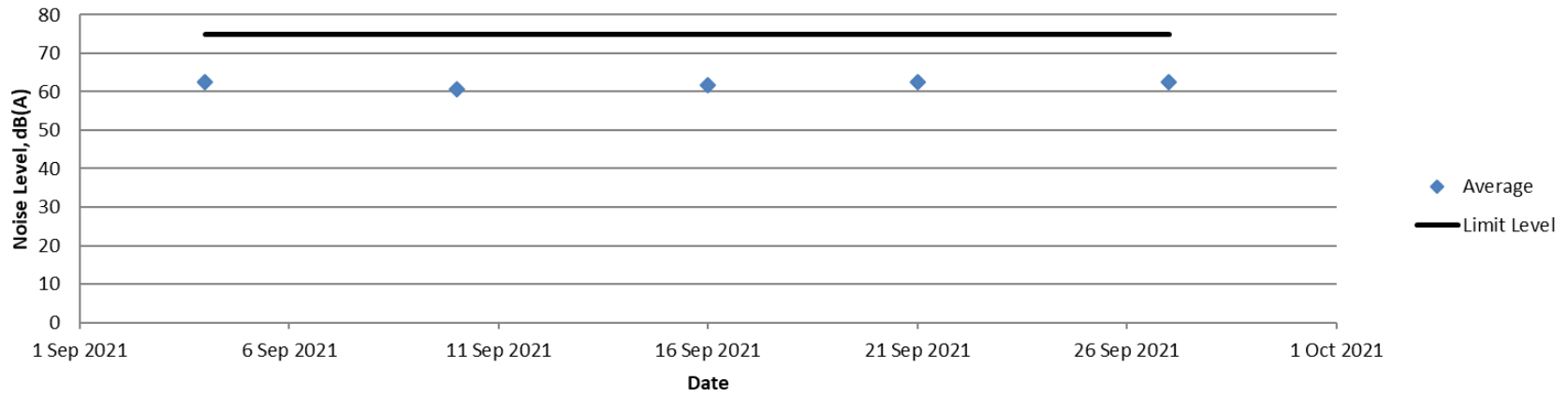
Please note, these specifications are valid for all Kestrel 4400 products and all other Kestrel 4000 series with a serial number higher than 659340. If your product has a lower serial number, please reference the previous version of the specifications.

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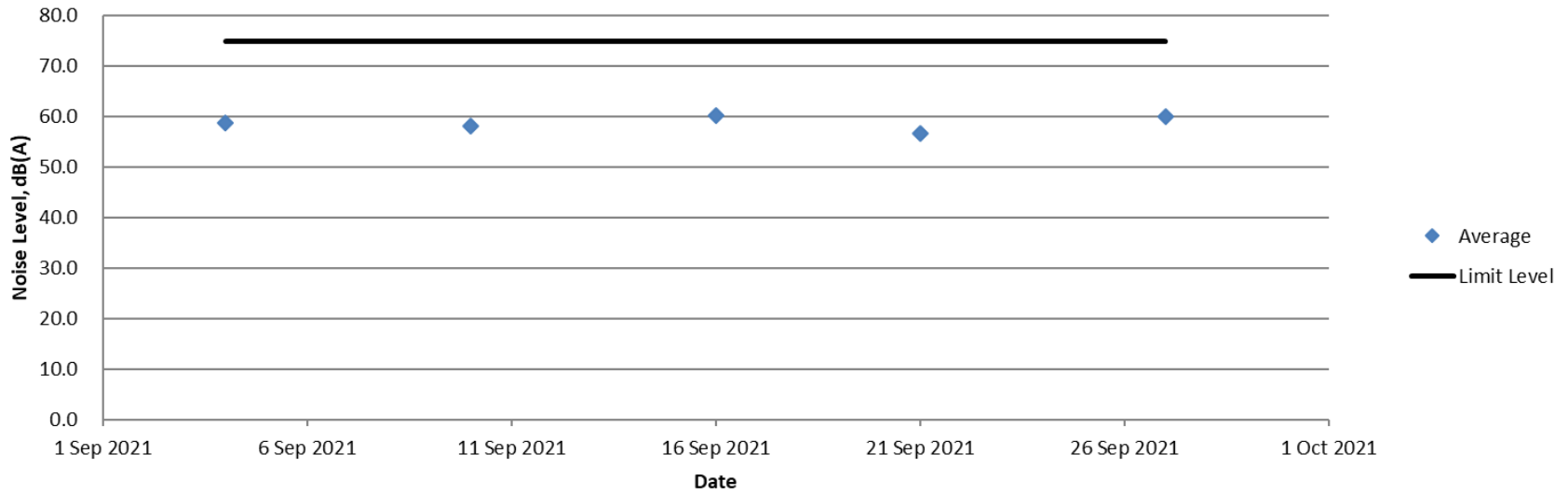
Appendix N

Impact Noise Monitoring Results and Graphical Presentation

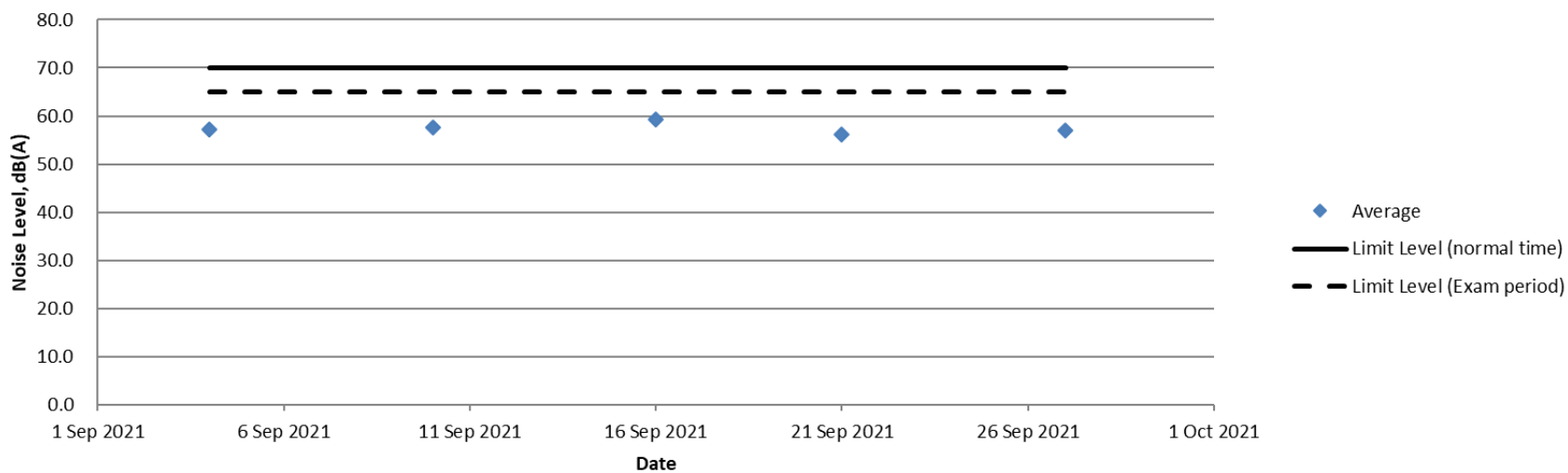
Noise Level Results at NM1 -The L Louey (South)



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

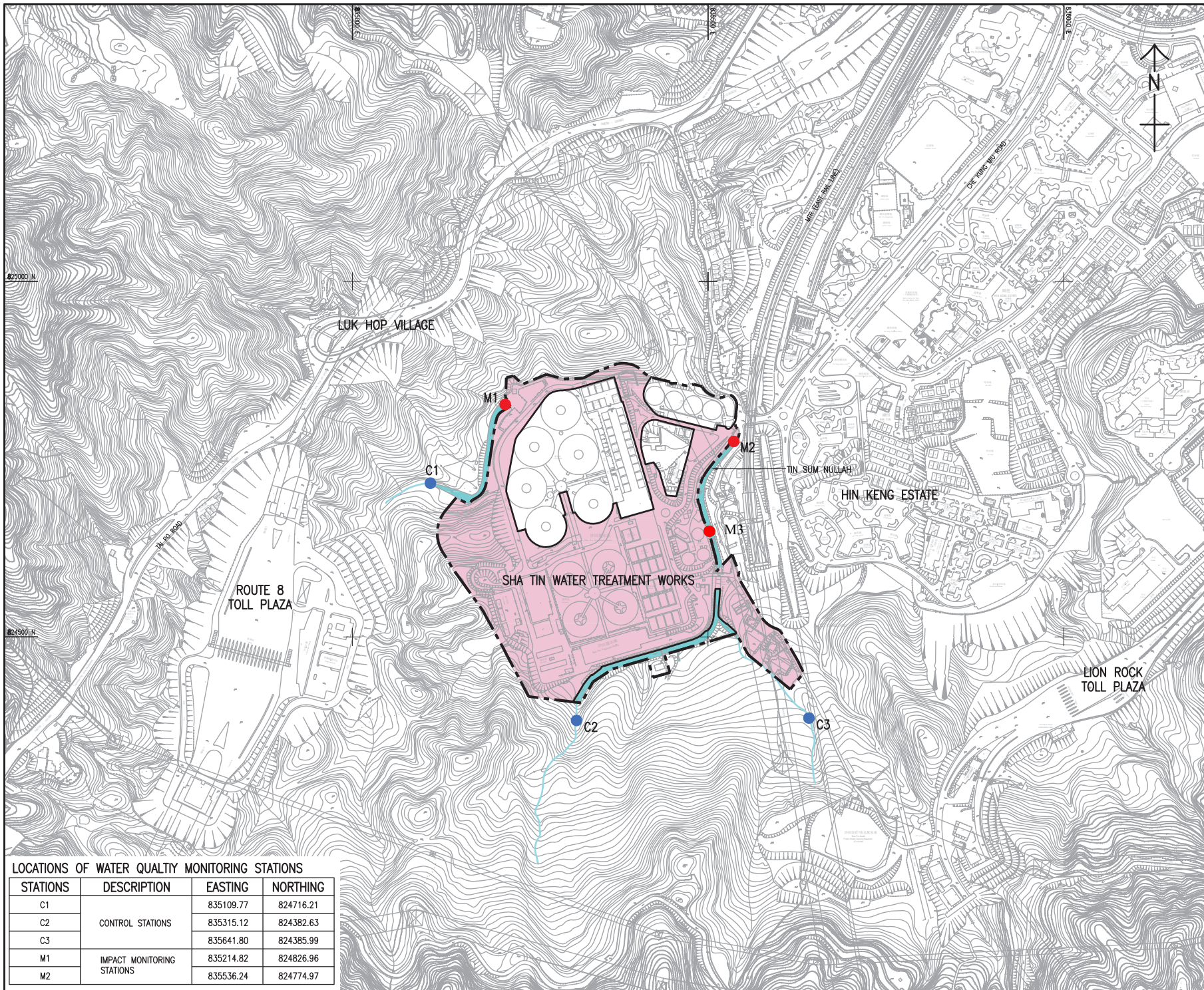


Noise Level Results at NM3 -C.U.H.K.F.A.A. Thomas Cheung School



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
 SCALE
 METRES
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Appendix P

Calibration Certificate (Water Quality)



REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Report No. : BA070136
Date of Issue : 04 August 2021
Page No. : 1 of 2

PART A – CUSTOMER INFORMATION

Acuity Sustainability Consulting Limited
Unit C, 11/F, Ford Glory Plaza
37-39 Wing Hong Street
Cheung Sha Wan, Kowloon, Hong Kong
Attn: Mr. Nelson TSUI

PART B – DESCRIPTION

Name of Equipment : Multi Water Quality Checker U-53
Manufacturer : Horiba
Serial Number : UHB5F2BB
Date of Received : Jul 28, 2021
Date of Calibration : Aug 04, 2021
Date of Next Calibration^(a) : Nov 03, 2021

PART C – REFERENCE METHODS/ DOCUMENTS FOR THE CALIBRATION

Parameter	Reference Method
pH at 25°C	APHA 21e 4500-H ⁺ B
Dissolved Oxygen	APHA 21e 4500-O G
Salinity	APHA 21e 2520 B
Turbidity	APHA 21e 2130 B
Temperature	Section 6 of international Accreditation New Zealand Technical Guide no. 3 Second edition March 2008: Working Thermometer Calibration Procedure.
Oxidation-Reduction Potential	APHA 22e 2580 B

PART D – CALIBRATION RESULTS^(b,c)

(1) pH at 25°C

Target (pH unit)	Displayed Reading ^(d) (pH Unit)	Tolerance ^(e) (pH Unit)	Results
4.00	4.04	0.04	Satisfactory
7.42	7.46	0.04	Satisfactory
10.01	10.06	0.05	Satisfactory

Tolerance of pH should be less than ± 0.20 (pH unit)

(2) Temperature

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)	Results
16	15.53	-0.47	Satisfactory
25	24.69	-0.31	Satisfactory
30.5	30.29	-0.21	Satisfactory

Tolerance limit of temperature should be less than ± 2.0 (°C)

~ CONTINUED ON NEXT PAGE ~

Remark(s): -

- ^(a) The "Date of Next Calibration" is recommended according to best practice principals as practiced by QPT or quoted form relevant international standards.
^(b) The results relate only to the calibrated equipment as received
^(c) The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
^(d) "Displayed Reading" denotes the figure shown on item under calibration/ checking regardless of equipment precision or significant figures.
^(e) The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted form relevant international standards.

LEE Chun-ning
Senior Chemist



REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

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PART D – CALIBRATION RESULTS (Cont'd)

(3) Dissolved Oxygen

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)	Results
1.49	1.24	-0.25	Satisfactory
4.31	4.14	-0.17	Satisfactory
6.02	5.81	-0.21	Satisfactory
8.32	8.17	-0.15	Satisfactory

Tolerance limit of dissolved oxygen should be less than ± 0.50 (mg/L)

(4) Salinity

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)	Results
10	10.31	3.10	Satisfactory
20	20.55	2.75	Satisfactory
30	31.14	3.80	Satisfactory

Tolerance limit of salinity should be less than ± 10.0 (%)

(5) Turbidity

Expected Reading (NTU)	Displayed Reading ^(f) (NTU)	Tolerance ^(g) (%)	Results
0	0.09	--	Satisfactory
10	9.68	-3.2	Satisfactory
20	19.5	-2.5	Satisfactory
100	97.4	-2.6	Satisfactory
800	792	-1.0	Satisfactory

Tolerance limit of turbidity should be less than ± 10.0 (%)

(6) Oxidation-Reduction Potential

Expected Reading (mV)	Displayed Reading (mV)	Tolerance (mV) ^(g)	Results
229	230	+1	Satisfactory

Tolerance limit of Oxidation-Reduction Potential should be less than ± 10 (mV)

~ END OF REPORT ~

Remark(s): -

^(f) "Displayed Reading" presents the figures shown on item under calibration/ checking regardless of equipment precision or significant figures.

^(g) The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted from relevant international standards.

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	Sample Depth	Temp.		DO con.		Turbidity		pH		SS
				East	North	m	m	°C		mg/L		NTU		unit		mg/L
1/9/2021	11:57	Cloudy	C1	835110	824716	0.04	0.02	29.1	29.1	8.44	8.43	2.7	2.7	7.65	7.65	3.9
	12:18	Cloudy	C2	835403	824470	0.02	0.01	29.6	29.5	8.41	8.42	2.4	2.3	7.5	7.49	3.9
	N/A	Cloudy	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
	11:15	Cloudy	M1	835215	824827	0.8	0.4	29.6	29.6	9.44	9.43	2.4	2.3	7.8	7.78	3.0
	10:30	Cloudy	M2	835536	824775	0.05	0.025	28.8	28.8	9.42	9.41	2.7	2.8	7.45	7.45	9.2
	10:47	Cloudy	M3	835501	824648	0.02	0.01	29.5	29.4	9.49	9.48	0.5	0.5	7.31	7.33	<1
3/9/2021	11:38	Fine	C1	835110	824716	0.04	0.02	29.1	29.1	8.71	8.71	2.6	2.7	7.77	7.75	3.9
	11:57	Fine	C2	835403	824470	0.02	0.01	29	29.1	8.33	8.33	2.6	2.7	7.71	7.71	3.6
	N/A	Fine	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
	11:05	Fine	M1	835215	824827	0.8	0.4	29.2	29.3	9.02	9.03	2.3	2.3	7.37	7.36	2.8
	10:22	Fine	M2	835536	824775	0.05	0.025	29.3	29.3	9.21	9.22	2.4	2.4	7.24	7.23	8.6
	10:37	Fine	M3	835501	824648	0.02	0.01	29.3	29.2	9.28	9.27	0.3	0.2	7.55	7.56	<1
6/9/2021	11:55	Sunny	C1	835110	824716	0.04	0.02	29.3	29.2	8.26	8.26	2.5	2.5	7.38	7.38	3.6
	12:19	Sunny	C2	835403	824470	0.02	0.01	29.5	29.5	8.21	8.2	2.3	2.3	7.66	7.64	3.0
	N/A	Sunny	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	11:14	Sunny	M1	835215	824827	0.8	0.4	29.3	29.4	9.45	9.45	2.6	2.7	7.47	7.48	2.5
	10:26	Sunny	M2	835536	824775	0.05	0.025	28.8	28.7	9.04	9.04	2.5	2.6	7.21	7.19	7.5
	10:38	Sunny	M3	835501	824648	0.02	0.01	29.2	29.2	9.67	9.68	0.1	0.1	7.79	7.8	<1
8/9/2021	13:23	Fine	C1	835110	824716	0.04	0.02	28.7	28.8	8.59	8.59	2.6	2.6	7.21	7.23	3.7
	13:40	Fine	C2	835403	824470	0.02	0.01	29.2	29.1	8.64	8.64	2.6	2.5	7.28	7.26	3.0
	N/A	Fine	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	12:58	Fine	M1	835215	824827	0.8	0.4	29.4	29.5	9.33	9.33	2.3	2.3	7.64	7.63	2.6
	12:18	Fine	M2	835536	824775	0.05	0.025	29.3	29.3	9.3	9.3	2.7	2.6	7.22	7.22	7.6
	12:30	Fine	M3	835501	824648	0.02	0.01	29.1	29.1	9.63	9.63	0.4	0.4	7.62	7.61	<1
10/9/2021	12:44	Fine	C1	835110	824716	0.04	0.02	29.3	29.3	8.31	8.3	2.5	2.5	7.72	7.7	3.6
	13:08	Fine	C2	835403	824470	0.02	0.01	29	28.9	8.32	8.33	2.5	2.4	7.21	7.22	3.1
	N/A	Fine	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	12:06	Fine	M1	835215	824827	0.8	0.4	28.9	28.9	9.22	9.22	2.6	2.7	7.55	7.54	2.5
	11:15	Fine	M2	835536	824775	0.05	0.025	28.7	28.6	8.97	8.96	2.7	2.6	7.51	7.51	7.8
	11:30	Fine	M3	835501	824648	0.02	0.01	29.2	29.1	9.48	9.49	0.5	0.6	7.44	7.46	<1
13/9/2021	14:43	Fine	C1	835110	824716	0.04	0.02	29	29	8.34	8.34	2.5	2.5	7.5	7.52	3.5
	15:00	Fine	C2	835403	824470	0.02	0.01	29.1	29.1	8.65	8.66	2.6	2.6	7.58	7.57	3.0
	N/A	Fine	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	14:17	Fine	M1	835215	824827	0.8	0.4	28.9	28.9	9.26	9.26	2.3	2.4	7.61	7.6	2.5
	13:26	Fine	M2	835536	824775	0.05	0.025	29	29	9.32	9.33	2.7	2.7	7.54	7.53	7.5
	13:38	Fine	M3	835501	824648	0.02	0.01	29.5	29.5	9.43	9.43	0.4	0.5	7.33	7.33	<1

15/9/2021	12:32	Cloudy	C1	835110	824716	0.04	0.02	29.3	29.4	8.75	8.76	2.6	2.7	7.27	7.26	3.9
	12:56	Cloudy	C2	835403	824470	0.02	0.01	29.1	29	8.58	8.58	2.4	2.3	7.75	7.76	3.8
	N/A	Cloudy	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
	11:59	Cloudy	M1	835215	824827	0.8	0.4	29.4	29.4	9.25	9.25	2.4	2.3	7.74	7.76	2.9
	11:12	Cloudy	M2	835536	824775	0.05	0.025	29.3	29.3	9.06	9.05	2.6	2.6	7.52	7.51	8.8
	11:24	Cloudy	M3	835501	824648	0.02	0.01	29.4	29.4	9.64	9.65	0.1	0.1	7.64	7.65	<1
17/9/2021	15:02	Fine	C1	835110	824716	0.04	0.02	29.1	29.2	8.78	8.78	2.6	2.6	7.68	7.66	3.8
	15:20	Fine	C2	835403	824470	0.02	0.01	29.5	29.6	8.67	8.66	2.3	2.2	7.71	7.7	3.8
	N/A	Fine	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
	14:26	Fine	M1	835215	824827	0.8	0.4	29.6	29.6	8.92	8.91	2.6	2.5	7.22	7.2	2.8
	13:36	Fine	M2	835536	824775	0.05	0.025	28.7	28.6	9.2	9.19	2.5	2.5	7.71	7.72	8.6
	13:49	Fine	M3	835501	824648	0.02	0.01	29.3	29.3	9.42	9.41	0.2	0.1	7.42	7.41	<1
20/9/2021	11:50	Sunny	C1	835110	824716	0.04	0.02	28.6	28.5	8.41	8.4	2.4	2.3	7.23	7.21	3.7
	12:11	Sunny	C2	835403	824470	0.02	0.01	29.3	29.2	8.69	8.69	2.8	2.7	7.55	7.53	3.7
	N/A	Sunny	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
	11:19	Sunny	M1	835215	824827	0.8	0.4	29	29.1	9.22	9.23	2.4	2.4	7.68	7.67	2.9
	10:30	Sunny	M2	835536	824775	0.05	0.025	28.8	28.8	9.23	9.22	2.6	2.7	7.72	7.74	8.7
	10:45	Sunny	M3	835501	824648	0.02	0.01	29.3	29.2	9.5	9.5	0.2	0.2	7.33	7.34	<1
23/9/2021	16:28	Sunny	C1	835110	824716	0.04	0.02	28.8	28.7	8.31	8.31	2.8	2.8	7.28	7.3	3.9
	16:44	Sunny	C2	835403	824470	0.02	0.01	28.1	28.2	8.63	8.62	2.4	2.5	7.65	7.64	3.8
	N/A	Sunny	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
	15:49	Sunny	M1	835215	824827	0.8	0.4	28.7	28.8	9.28	9.29	2.5	2.5	7.48	7.48	2.8
	14:59	Sunny	M2	835536	824775	0.05	0.025	28	28	9.23	9.24	2.8	2.8	7.74	7.72	8.6
	15:11	Sunny	M3	835501	824648	0.02	0.01	28.4	28.5	9.73	9.73	0.5	0.4	7.35	7.34	<1
25/9/2021	12:56	Fine	C1	835110	824716	0.04	0.02	29.3	29.3	8.47	8.47	2.6	2.7	7.77	7.76	3.8
	13:15	Fine	C2	835403	824470	0.02	0.01	29.5	29.5	8.64	8.64	2.7	2.8	7.31	7.31	3.6
	N/A	Fine	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
	12:15	Fine	M1	835215	824827	0.8	0.4	28.8	28.9	9.12	9.11	2.4	2.4	7.25	7.26	2.7
	11:23	Fine	M2	835536	824775	0.05	0.025	29	29	9.48	9.48	2.6	2.6	7.38	7.36	8.4
	11:38	Fine	M3	835501	824648	0.02	0.01	28.8	28.8	9.77	9.78	0.4	0.3	7.37	7.37	<1
27/9/2021	11:21	Fine	C1	835110	824716	0.04	0.02	28.7	28.8	8.35	8.35	2.6	2.7	7.25	7.23	3.6
	11:40	Fine	C2	835403	824470	0.02	0.01	29.6	29.6	8.37	8.38	2.8	2.8	7.51	7.52	3.5
	N/A	Fine	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
	10:56	Fine	M1	835215	824827	0.8	0.4	29.3	29.2	9.02	9.03	2.6	2.5	7.65	7.64	2.6
	10:07	Fine	M2	835536	824775	0.05	0.025	28.6	28.6	9.03	9.02	2.4	2.3	7.72	7.7	8.0
	10:21	Fine	M3	835501	824648	0.02	0.01	29	28.9	9.27	9.27	0.3	0.4	7.51	7.49	<1
29/9/2021	12:46	Fine	C1	835110	824716	0.04	0.02	28.8	28.7	8.34	8.35	2.4	2.5	7.55	7.55	3.5
	13:06	Fine	C2	835403	824470	0.02	0.01	29.5	29.5	8.77	8.76	2.4	2.4	7.7	7.72	3.5
	N/A	Fine	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
	12:11	Fine	M1	835215	824827	0.8	0.4	29.2	29.1	9.24	9.24	2.7	2.8	7.35	7.36	2.7
	11:18	Fine	M2	835536	824775	0.05	0.025	29.1	29	9.52	9.52	2.5	2.6	7.41	7.43	7.9
	11:34	Fine	M3	835501	824648	0.02	0.01	28.8	28.8	9.58	9.58	0	-0.1	7.8	7.8	<1

Acumen Laboratory and Testing Limited

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Test Report


Page 1 of 2

Report Number : Q210003aR211340
Job Number : R211340
Issue Date : 06/10/2021
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-3113-893
Sample Description : SS test
Laboratory ID : R211340/1-5
Date of Sampling : 01/09/2021
Date Received : 01/09/2021
Test Period : 01/09/2021 – 02/09/2021
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 : Q210003aR211340

Job Number : R211340

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211340/1	01/09/2021	C1	3.9
R211340/2	01/09/2021	C2	3.9
R211340/3	01/09/2021	M1	3.0
R211340/4	01/09/2021	M2	9.2
R211340/5	01/09/2021	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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Tel: (852) 2333 6823 Fax: (852) 2333 1316
E-mail: hthui@acumenhk.com

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Test Report


Page 1 of 2

Report Number : Q210003aR211341
Job Number : R211341
Issue Date : 06/10/2021
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-3113-894
Sample Description : SS test
Laboratory ID : R211341/1-5
Date of Sampling : 03/09/2021
Date Received : 03/09/2021
Test Period : 03/09/2021 – 04/09/2021
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 : Q210003aR211341

Job Number : R211341

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211341/1	03/09/2021	C1	3.9
R211341/2	03/09/2021	C2	3.6
R211341/3	03/09/2021	M1	2.8
R211341/4	03/09/2021	M2	8.6
R211341/5	03/09/2021	M3	<1

- Note:
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 5. NA indicates Not Applicable.

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Test Report


Page 1 of 2

Report Number : Q210003aR211342
Job Number : R211342
Issue Date : 06/10/2021
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-3113-895
Sample Description : SS test
Laboratory ID : R211342/1-5
Date of Sampling : 06/09/2021
Date Received : 06/09/2021
Test Period : 06/09/2021 – 07/09/2021
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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Tel: (852) 2333 6823 Fax: (852) 2333 1316

E-mail: htthui@acumenhk.com

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Lot 12, Tam Kon Shan Road, Tsing Yi (N), Hong Kong
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Test Report

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Report Number : Q210003aR211342

Job Number : R211342

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211342/1	06/09/2021	C1	3.6
R211342/2	06/09/2021	C2	3.0
R211342/3	06/09/2021	M1	2.5
R211342/4	06/09/2021	M2	7.5
R211342/5	06/09/2021	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 : Q210003aR211343
Job Number : R211343
Issue Date : 06/10/2021
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-3113-896
Sample Description : SS test
Laboratory ID : R211343/1-5
Date of Sampling : 08/09/2021
Date Received : 08/09/2021
Test Period : 08/09/2021 – 09/09/2021
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 : Q210003aR211343

Job Number : R211343

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211343/1	08/09/2021	C1	3.7
R211343/2	08/09/2021	C2	3.0
R211343/3	08/09/2021	M1	2.6
R211343/4	08/09/2021	M2	7.6
R211343/5	08/09/2021	M3	<1

- Note:
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 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 : Q210003aR211344
Job Number : R211344
Issue Date : 06/10/2021
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-3113-897
Sample Description : SS test
Laboratory ID : R211344/1-5
Date of Sampling : 10/09/2021
Date Received : 10/09/2021
Test Period : 10/09/2021 – 11/09/2021
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 : Q210003aR211344
Job Number : R211344
Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211344/1	10/09/2021	C1	3.6
R211344/2	10/09/2021	C2	3.1
R211344/3	10/09/2021	M1	2.5
R211344/4	10/09/2021	M2	7.8
R211344/5	10/09/2021	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 : Q210003aR211345
Job Number : R211345
Issue Date : 06/10/2021
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-3113-898
Sample Description : SS test
Laboratory ID : R211345/1-5
Date of Sampling : 13/09/2021
Date Received : 13/09/2021
Test Period : 13/09/2021 – 14/09/2021
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 : Q210003aR211345

Job Number : R211345

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211345/1	13/09/2021	C1	3.5
R211345/2	13/09/2021	C2	3.0
R211345/3	13/09/2021	M1	2.5
R211345/4	13/09/2021	M2	7.5
R211345/5	13/09/2021	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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E-mail: hthui@acumcnhk.com

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Test Report


Page 1 of 2

Report Number : Q210003aR211346
Job Number : R211346
Issue Date : 06/10/2021
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-3113-899
Sample Description : SS test
Laboratory ID : R211346/1-5
Date of Sampling : 15/09/2021
Date Received : 15/09/2021
Test Period : 15/09/2021 – 16/09/2021
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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E-mail: hthui@acumenhk.com

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Test Report

Page 2 of 2

Report Number : Q210003aR211346

Job Number : R211346

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211346/1	15/09/2021	C1	3.9
R211346/2	15/09/2021	C2	3.8
R211346/3	15/09/2021	M1	2.9
R211346/4	15/09/2021	M2	8.8
R211346/5	15/09/2021	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 : Q210003aR211347
Job Number : R211347
Issue Date : 06/10/2021
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-3113-900
Sample Description : SS test
Laboratory ID : R211347/1-5
Date of Sampling : 17/09/2021
Date Received : 17/09/2021
Test Period : 17/09/2021 – 18/09/2021
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 : Q210003aR211347

Job Number : R211347

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211347/1	17/09/2021	C1	3.8
R211347/2	17/09/2021	C2	3.8
R211347/3	17/09/2021	M1	2.8
R211347/4	17/09/2021	M2	8.6
R211347/5	17/09/2021	M3	<1

- Note:
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 4. > indicates more than.
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Test Report


Page 1 of 2

Report Number : Q210003aR211348
Job Number : R211348
Issue Date : 06/10/2021
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-3113-901
Sample Description : SS test
Laboratory ID : R211348/1-5
Date of Sampling : 20/09/2021
Date Received : 20/09/2021
Test Period : 20/09/2021 – 21/09/2021
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:



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Laboratory Manager
Chemical Division

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Test Report

Page 2 of 2

Report Number : Q210003aR211348
Job Number : R211348
Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211348/1	20/09/2021	C1	3.7
R211348/2	20/09/2021	C2	3.7
R211348/3	20/09/2021	M1	2.9
R211348/4	20/09/2021	M2	8.7
R211348/5	20/09/2021	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 : Q210003aR211349
Job Number : R211349
Issue Date : 06/10/2021
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-3113-902
Sample Description : SS test
Laboratory ID : R211349/1-5
Date of Sampling : 23/09/2021
Date Received : 23/09/2021
Test Period : 23/09/2021 – 24/09/2021
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:



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Laboratory Manager
Chemical Division

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Test Report

Page 2 of 2

Report Number : Q210003aR211349
Job Number : R211349
Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211349/1	23/09/2021	C1	3.9
R211349/2	23/09/2021	C2	3.8
R211349/3	23/09/2021	M1	2.8
R211349/4	23/09/2021	M2	8.6
R211349/5	23/09/2021	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 : Q210003aR211350
Job Number : R211350
Issue Date : 06/10/2021
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-3113-903
Sample Description : SS test
Laboratory ID : R211350/1-5
Date of Sampling : 25/09/2021
Date Received : 25/09/2021
Test Period : 25/09/2021 – 26/09/2021
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 : Q210003aR211350

Job Number : R211350

Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211350/1	25/09/2021	C1	3.8
R211350/2	25/09/2021	C2	3.6
R211350/3	25/09/2021	M1	2.7
R211350/4	25/09/2021	M2	8.4
R211350/5	25/09/2021	M3	<1

- Note:
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 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 : Q210003aR211351
Job Number : R211351
Issue Date : 06/10/2021
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-3113-904
Sample Description : SS test
Laboratory ID : R211351/1-5
Date of Sampling : 27/09/2021
Date Received : 27/09/2021
Test Period : 27/09/2021 – 28/09/2021
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 : Q210003aR211351
Job Number : R211351
Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211351/1	27/09/2021	C1	3.6
R211351/2	27/09/2021	C2	3.5
R211351/3	27/09/2021	M1	2.6
R211351/4	27/09/2021	M2	8.0
R211351/5	27/09/2021	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 : Q210003aR211352
Job Number : R211352
Issue Date : 06/10/2021
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-3113-905
Sample Description : SS test
Laboratory ID : R211352/1-5
Date of Sampling : 29/09/2021
Date Received : 29/09/2021
Test Period : 29/09/2021 – 30/09/2021
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 : Q210003aR211352
Job Number : R211352
Issue Date : 06/10/2021

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R211352/1	29/09/2021	C1	3.5
R211352/2	29/09/2021	C2	3.5
R211352/3	29/09/2021	M1	2.7
R211352/4	29/09/2021	M2	7.9
R211352/5	29/09/2021	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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Appendix S (1)

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.85

September 2021

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3. MONITORING METHODOLOGY 3

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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 Tree Report presents data collected on 30 September 2021. It contains the following information:
 - Introduction (Section 1)
 - Description of Tree Monitoring Area (Section 2)
 - Monitoring Methodology (Section 3)
 - Result (Section 4)
 - Mitigation Measures (Section 5)
 - Summary (Section 6)

- Photos (Annex I)
- Summary table (Annex II)
- Typhoon information (Annex III)

2. DESCRIPTION OF TREE MONITORING SITE

- 2.1 Incense Tree (*Aquilaria sinensis*) and Ailanthus (*Ailanthus fordii*) trees was transplanted within existing Sha Tin Water Treatment Works (STWTW) where it is the extended compensatory plantation area. The area was flat and without covering with concrete.
- 2.2 Lamb of Tartary (*Cibotium barometz*) will be transplanted to the Sha Tin South Fresh Water Service Reservoir (STSFWSR). Plough is required before planting on to this open corner of short grassland.
- 2.3 Other compensatory trees have been planted at STWTW and STSFWSR.

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 is classified as **good**;
 - Transplanted vegetation with few or no visible defects or health problems are classified as being **fair**;
 - Transplanted vegetation was 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 inspections were conducted on 30 September 2021. Three trees TA572, TA326 and TA327 were transplanted to tree compensation area within the Sha Tin Water Treatment Works (STWTW) on 20 June 2016.
- 4.2 The condition of TA572 was observed in poor condition due to the damage of two main trunks. TA327 was also in poor condition. The already dead tree TA326 collapsed due to big hit by the Signal No.10 typhoon Mangkhut on 16 September 2018. Tree guying cables have been installed to provide external support to the remaining two transplanted trees.
- 4.3 The joint site meeting with our ecologist, Project Manager, Contractor and Landscape Contractor on 20 October 2020 revealed that the designated recipient site at STSFWSR was under excessive exposure of direct sunlight, strong winds, far from riparian zone/ moist valley and low in soil moisture. This was not a favourable microhabitat for *Cibotium barometz* to be transplanted back. Two best portions within this recipient site would be a corner with shading canopy from trees on a man-made feature nearby; as well as understory zone of an existing tree. Mitigation measures are proposed in Section 5 to enhance a sustainable survival of *Cibotium barometz* during the post-transplantation stage.
- 4.4 All 27 nos. of *Cibotium barometz* transplanted from the nursery at Shui Mei Tsuen, Kam Tin are generally in fair condition at their current location at STSFWSR.
- 4.5 The Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016.
- 4.6 Transplantation of the 27 nos. of *Cibotium barometz*; and compensatory planting of TA326 and the climber *Artabotrys hongkongensis* have been conducted as detailed in Section 5 during this monitoring month.

5. MITIGATION MEASURE

- 5.1 In order to compensate for the loss of transplanted *Artabotrys hongkongensis* which is in climber growing form, it is recommended to plant an individual of native climber species at compensatory planting site together with compensatory tree planting. Recommended list of species is given in the Table 1 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 1. Table for Recommended climber 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
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>	蒼白秤鈎風	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-flowered Honeysuckle	<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

- 5.2 *Desmos chinensis* has been finalized as the candidate. Two individuals were planted at Wall C in STWTW on 1 April 2021 (Annex I).
- 5.3 Under proper maintenance in the nursery, with provision of sufficient shelter and irrigation spray head, all 27 nos. Lamb of Tartary (*Cibotium barometz*) are generally in fair condition. They are at acceptable condition to be transplanted back to the designated recipient site at STSFWSR in accordance with Project Programme.
- 5.4 All 27 nos. Lamb of Tartary (*Cibotium barometz*) were transplanted successfully back to Portion E of STSFWSR on 23 April 2021 (Annex I). In order to enhance a sustainable survival during the post-transplantation stage, a shelter (such as 遮光網) has been installed to reduce intensity of direct sunlight received and avoid direct hit of rainstorm/ typhoon.
- 5.5 Transplanted *Cibotium barometz* shall be watered at least once in the morning and once in the afternoon; before irrigation spray head has been installed to facilitate watering frequency whenever necessary.
- 5.6 Robust fencing has been set up to enclose the 27 nos. transplanted *Cibotium barometz* (in groups when planted together) to avoid unnecessary disturbance/ damage to them. Any collapsed shelter and fencing shall be rectified promptly.

- 5.7 Weeding within the two protection zones of *Cibotium barometz* shall only be conducted by hand-held tools rather than grass cutting machine. No fire/ chemical weeding shall be allowed.
- 5.8 The 27 nos. transplanted *Cibotium barometz* shall be maintained with proposed mitigated measures mentioned for 12 months for establishment. A 12-month post-transplantation monitoring period helps to assess their survival during the establishment period.
- 5.9 Any dead individuals/ those in poor condition before transplant back to STSFWSR or during the post-transplantation period shall be replaced by planting healthy individuals of *Cibotium barometz*. Other possible fern candidate such as *Brainea insignis*, which is more adaptive to more exposed habitat under direct sunlight, can be sourced for compensatory planting.
- 5.10 Root ball of TA572 and TA327 tree should be kept moisture especially during non-raining day.
- 5.11 Incense Tree (*Aquilaria sinensis*) tagged as TA326 was observed dead during inspection on 10 August 2017. Its DBH was measured as 346cm. In according to the Tree Preservation, Development Bureau Technical Circular (Works) No. 7/2015, the compensatory planting will try to achieve the compensatory planting ratio of 1:1 in terms of aggregated DBH.
- 5.12 In total, 3 individual of native tree species with heavy standard size will be planted with 2.5-3 meters (center to center) spacing at compensatory planting site. Recommended list of species is given in the Table 2 below. It is suggested that at least 1 tree species 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 2. Table for recommended tree species list to be planted

<u>Native Tree Species</u>			
Common Name	Latin Name	Chinese Name	Growing Form
Ivy Tree	<i>Schefflera heptaphylla</i>	鴨腳木	Tree
Levine’s Syzygium	<i>Syzygium levinei</i>	山蒲桃	Tree
Chekiang Machilus	<i>Machilus chekiangensis</i>	浙江潤楠	Tree
Aporusa	<i>Aporusa dioica</i>	銀柴	Tree
Mountain Tallow Tree	<i>Sapium discolor</i>	山烏柏	Tree
Fragrant Litsea	<i>Litsea cubeba</i>	山蒼樹	Tree
Chinese Apea Ear-ring	<i>Archidendron lucidum</i>	亮葉猴耳環	Tree
Chinese Hackberry	<i>Celtis sinensis</i>	朴樹	Tree
Turn-in-the-wind	<i>Mallotus paniculatus</i>	白楸	Tree
Acronychia	<i>Acronychia pedunculata</i>	降真香	Tree

- 5.13 Based on the Tree Survey Report, the following trees transplanted under Contract No. 3/WSD/15 were found dead. In accordance with GS 3.97 (3), replacement planting of TB0054, B0056, TB0101 and TC0138 has been completed on 25 March 2021 (Annex I).
- 5.14 Two *Syzygium levinei* and one *Schefflera heptaphylla* have been chosen from Table 2 as compensation for the loss of TA0326.
- 5.15 However, the two native *Syzygium levinei* (山蒲桃) were mis-planted by two exotic *Syzygium jambos* (蒲桃), of which both of their Chinese names and Scientific names are different by one word.
- 5.16 The two mis-planted *Syzygium jambos* was replaced by another native tree species *Celtis sinensis* chosen from Table 2 due to market availability at this moment. Replacement works was conducted on 31 May 2021.

Table 3. Summary table compensatory planting.

Tree No.	Species	Compensatory/ Replacement Planting
TA0326	<i>Aquilaria sinensis</i> 土沉香	Compensated by 1 no. of <i>Schefflera heptaphylla</i> and 2 nos. of <i>Celtis sinensis</i>

- 5.17 With completion of compensatory planting for the loss of *Artabotrys hongkongensis* and TA0326 (*Aquilaria sinensis*), survival is monitored for the replaced species from now on (i.e. 2 nos. of *Desmos chinensis*; 1 no. of *Schefflera heptaphylla* and 2 nos. of *Celtis sinensis*).
- 5.18 Survival of the 27 nos. of Lamb of Tartary (*Cibotium barometz*) transplanted back to STSFWSR is monitored too. No more individual is stored at the nursery.
- 5.19 Health condition and survival rate (started from 100% in this monitoring month) is shown in Annex II.

6. SUMMARY

- 6.1 The condition of TA572 was observed in poor condition due to broken of main trunk. TA327 was also in poor condition; while already dead TA326 collapsed under Signal No. 10 typhoon Mangkhut in September 2018. Tree guying cables have been installed to provide external support to the two remaining transplanted trees.
- 6.2 Compensatory planting of TA326 has been completed on 25 March 2020 by planting two *Syzygium levinei* and one *Schefflera heptaphylla*. However, the two native *Syzygium levinei* were mis-planted by two exotic *Syzygium jambos*, which has been replaced by another native tree species *Celtis sinensis* on 31 May 2021.
- 6.3 *Desmos chinensis* has been finalized as the candidate to compensate the loss of *Artabotrys hongkongensis*. Two individuals were planted at Wall C in STWTW on 1 April 2021.
- 6.4 All Lamb of Tartary (*Cibotium barometz*) previously stored at the nursery have been severely damaged by Typhon Wipha on 30-31 July 2019. During the monitoring in December 2020, all are dehydrated without foliage in poor condition; however, 27 nos. new individuals are propagated from previously collected spores since then.
- 6.5 They are at acceptable condition to be transplanted back at Portion E of STSFWSR on 23 April 2021.
- 6.6 In order to enhance a sustainable survival during the post-transplantation stage, a shelter (such as 遮光網) has been installed to reduce intensity of direct sunlight received and avoid direct hit of rainstorm/ typhoon to the 27 nos. *Cibotium barometz*.
- 6.7 Regular irrigation, set up of protection zone and weeding by hand held tools within protection zone, shall also be provided to the transplanted/ compensated plants in order to sustain their survival during the post-transplantation (establishment) stage.
- 6.8 Root ball of TA572 and TA327 tree should be kept moisture especially during dry and non-raining day.

ANNEX I
Photo



Photo 1. Excessive grass and invasive trees have been removed



Photo 2. Collapsed fencing has been rectified



Photo 3. The shelter effectively reduced the amount of direct sunlight to *Cibotium barometz*



Photo 4. *Cibotium barometz* under the shelter



Photo 5. Collapsed fencing to be rectified



Photo 6. Shelter coverage shall be enlarged for this planting zone.

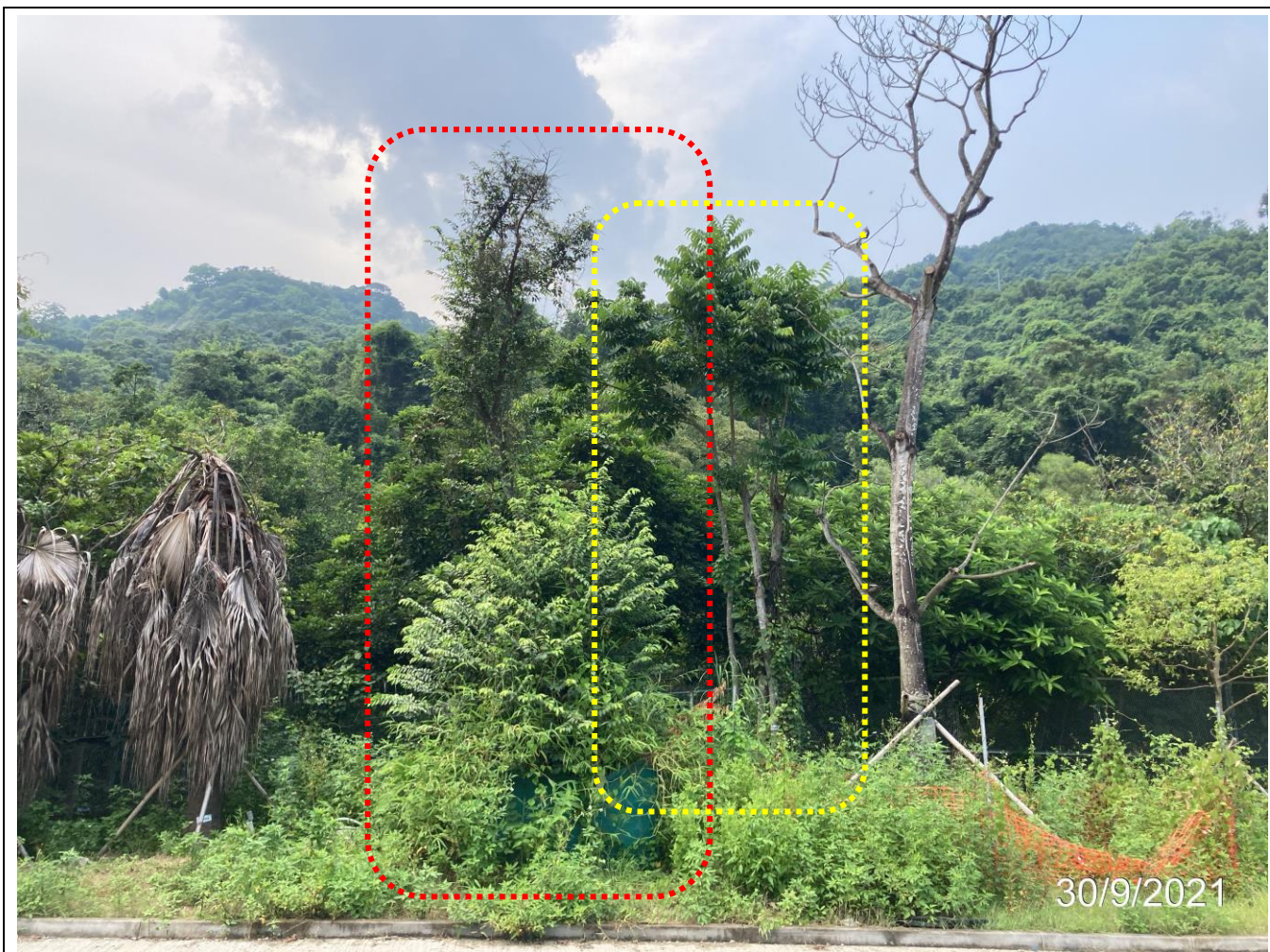


Photo 7. Transplanted Incense Tree (*Aquilaria sinensis*) – TA327 (left); and Ailanthus (*Ailanthus fordii*) – TA572 (right)



Photo 8. Weeding around TA327 shall be conducted.



Photo 9. Weak crown and two broken trunks of TA572.



Photo 10. Collapsed fencing to be rectified. The climbers and weeds shall be cleared.

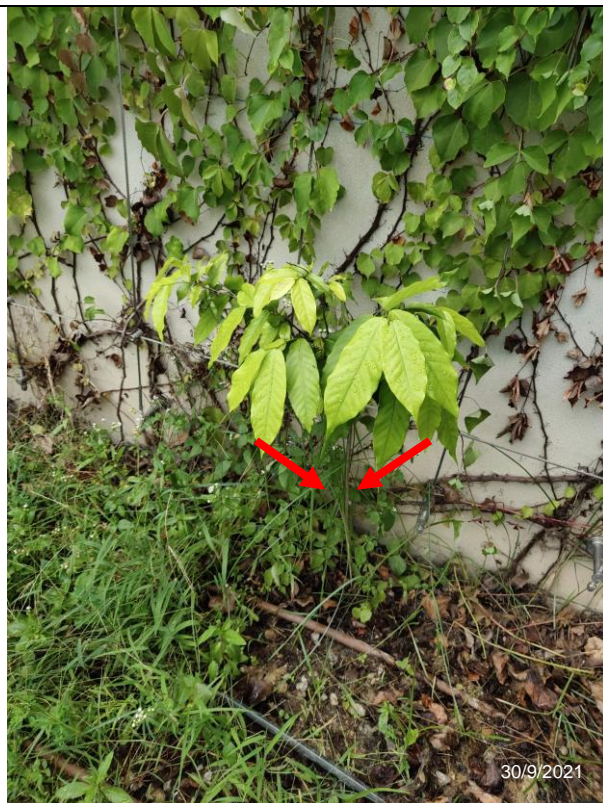


Photo 11. *Desmos chinensis* as compensatory planting of *Artabotrys hongkongensis*

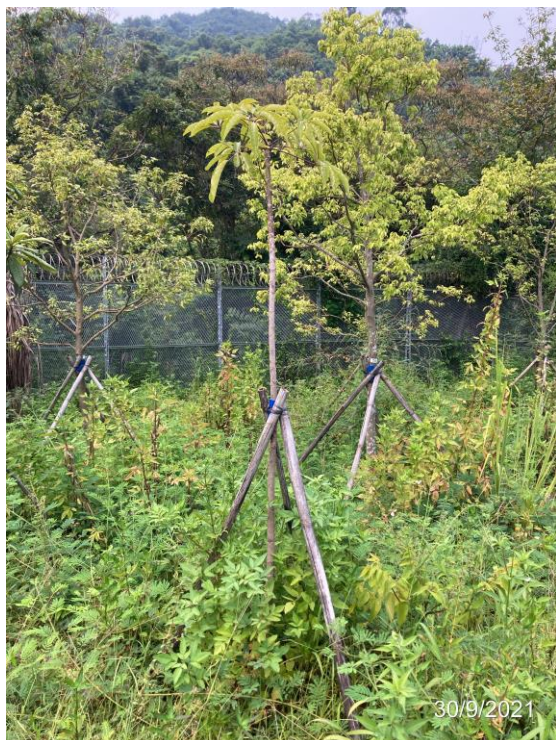
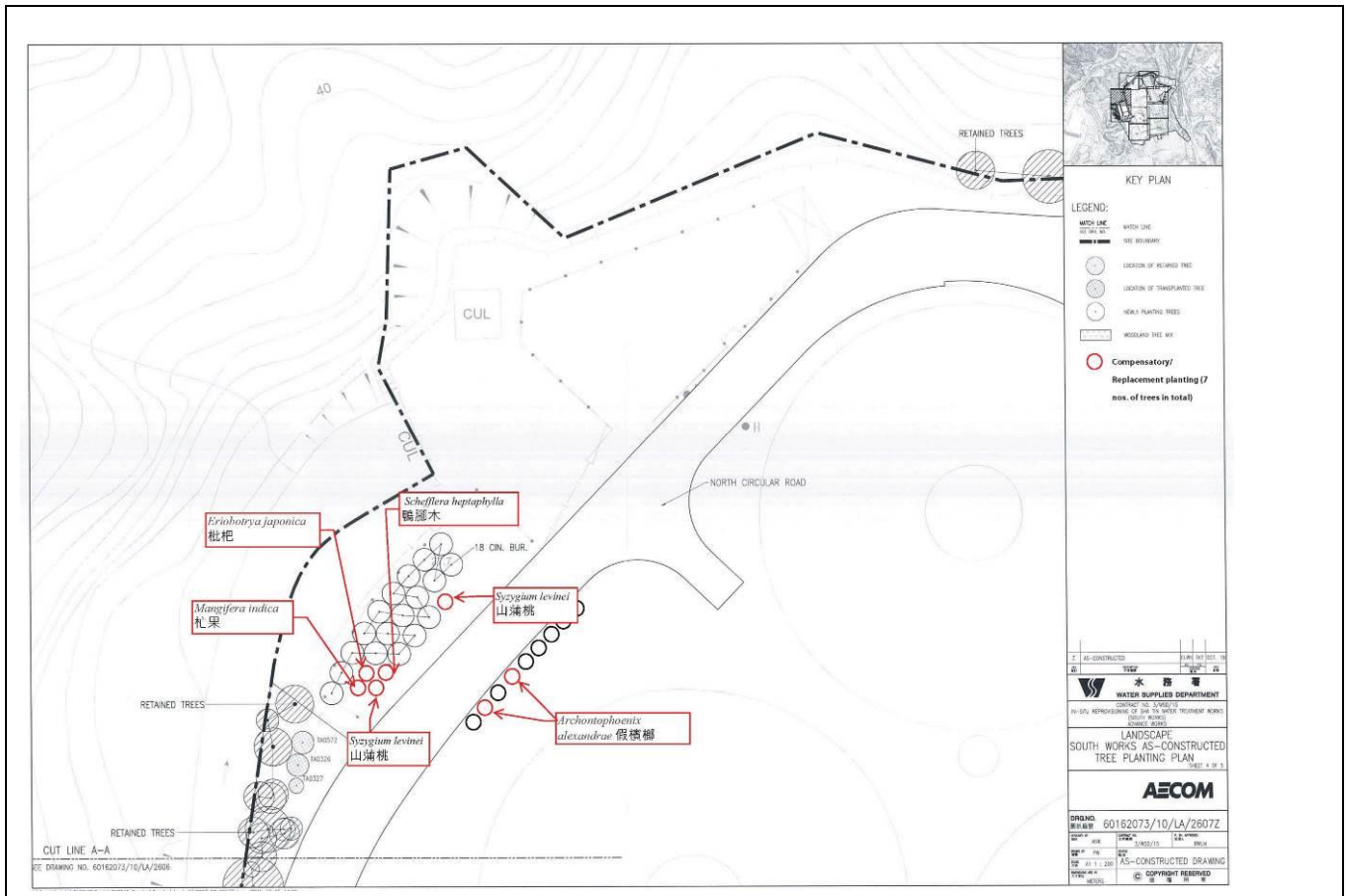


Photo 12. *Schefflera heptaphylla* as compensatory planting of TA326;

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Photo 13 & 14. The two exotic *Syzygium jambos* (mis-treated as the native *Syzygium levinei*) are replaced by another native tree *Celtis sinensis* (due to market availability at this moment) as compensatory planting of TA326.



Indicative location of compensatory planting

ANNEX 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	27 individuals are transplanted back to STSFWSR on 23 April 2021.
2	<i>Cibotium barometz</i>	Fair	Alive	
3	<i>Cibotium barometz</i>	Fair	Alive	
4	<i>Cibotium barometz</i>	Fair	Alive	
5	<i>Cibotium barometz</i>	Fair	Alive	
6	<i>Cibotium barometz</i>	Fair	Alive	
7	<i>Cibotium barometz</i>	Fair	Alive	
8	<i>Cibotium barometz</i>	Fair	Alive	
9	<i>Cibotium barometz</i>	Fair	Alive	
10	<i>Cibotium barometz</i>	Fair	Alive	
11	<i>Cibotium barometz</i>	Fair	Alive	
12	<i>Cibotium barometz</i>	Fair	Alive	
13	<i>Cibotium barometz</i>	Fair	Alive	
14	<i>Cibotium barometz</i>	Fair	Alive	
15	<i>Cibotium barometz</i>	Fair	Alive	
16	<i>Cibotium barometz</i>	Fair	Alive	
17	<i>Cibotium barometz</i>	Fair	Alive	
18	<i>Cibotium barometz</i>	Fair	Alive	
19	<i>Cibotium barometz</i>	Fair	Alive	
20	<i>Cibotium barometz</i>	Fair	Alive	
21	<i>Cibotium barometz</i>	Fair	Alive	
22	<i>Cibotium barometz</i>	Fair	Alive	
23	<i>Cibotium barometz</i>	Fair	Alive	
24	<i>Cibotium barometz</i>	Fair	Alive	
25	<i>Cibotium barometz</i>	Fair	Alive	
26	<i>Cibotium barometz</i>	Fair	Alive	
27	<i>Cibotium barometz</i>	Fair	Alive	
The shelter (such as 遮光網) has been set up to provide shading and against direct hit of rainstorm/ typhoon on the plants.				
28	<i>Desmos chinensis</i>	Fair	Alive	Two individuals were planted at Wall C in STWTW on 1 April 2021
Survival rate (%)			100%	

Transplanted/ compensatory Trees

No.	Species	Condition	Alive/Dead	Remark
TA572	<i>Ailanthus fordii</i>	Poor	Alive	Two main trunks were broken during typhoon on 23 August 2017. Cracks and wounds observed in one of the trunks. Weak canopy formed only by sprouts.
TA327	<i>Aquilaria sinensis</i>	Poor	Alive	Tree crown of TA327 was thinner after transplantation. Water sprouts, cracks on tree bark and wound at trunk base observed.
N/A	<i>Celtis sinensis</i>	Fair	Alive	Compensate for TA326; <i>Syzygium jambos</i> replaced by <i>Celtis sinensis</i> on 31 May 2021.
N/A	<i>Celtis sinensis</i>	Fair	Alive	Compensate for TA326; <i>Syzygium jambos</i> replaced by <i>Celtis sinensis</i> on 31 May 2021.
N/A	<i>Schefflera heptaphylla</i>	Fair	Alive	Compensate for TA326; old leaved replaced by new leaf buds
Survival rate (%)			100%	

Appendix S (2)

Post-Transplantation Monitoring of Woodland Compensation - Quarterly Report

Post-Transplantation Monitoring of Woodland Compensation - Quarterly Report

for Agreement No. CE 13/2009 (WS); Contract No. 3/WSD/15 and 1/WSD/19
IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS – SOUTH WORKS

Report No.1

September 2021



	NAME	SIGNATURE
PREPARED BY	MR. WAN PAK HO ECOLOGIST	
APPROVED BY	MR. WONG TL VEGA ENVIRONMENTAL TEAM LEADER (ETL)	

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1. INTRODUCTION

- 1.1 In compliance with Section 3 of the Woodland Compensation Plan (WCP; Rev. 5) drafted in August 2021, this quarterly report summarizes the species, size, quantity, overall health condition, survival rate, and control of weedy plant under the post-planting monitoring and maintenance programme.
- 1.2 This report presents data collected on 30 September 2021. The quarterly monitoring will last for at least 6 years since then.
- 1.3 The establishment date for 3/WSD/19 was November 2019 and 1/WSD/19 was August 2021 (tentatively).

2. DESCRIPTION OF TREE MONITORING SITE

- 2.1 Up till September 2021, a total of 548 nos. of compensatory trees were plant at four designated planting sites under the Contract 3/WSD/15 and 1/WSD/19.
 - 216 nos. of tree seedlings at Wall C & D of Sha Tin Water Treatment Works (STWTW);
 - 12 light standard and 18 heavy standard trees at STWTW;
 - 96 light standard trees at Sha Tin South Fresh Water Service Reservoir (STSFWSR), i.e., Portion E of the Works Site; and
 - 206 light standard/ whip trees at Sha Tin West Service Reservoir (STWSR); i.e., Portion D of the Works Site
- 2.2 According to WCP Rev. 5, a total of 731 nos. of trees are required for compensation planting, therefore at least 183 nos. (assuming no lost/ dead of planted trees mentioned in Section 2.1 above) will be planted according to the master work programme.

3. MONITORING METHODOLOGY

- 3.1 Site inspection will be carried out by walking through the four transplantation sites. Health condition and survival rate will be observed during inspection.
- 3.4 Health condition of all transplanted trees including trees was evaluated according to the following criteria:
 - Transplanted vegetation with good health is classified as **good**;
 - Transplanted vegetation with few or no visible defects or health problems are classified as being **fair**;
 - Transplanted vegetation was 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 trees species at each site will be calculated based on site observation.

4. RESULT

4.1 Monitoring inspections were conducted on 30 September 2021. Monitoring results of compensatory trees are summarized in the Table 1 below:

Table 1.

Tag No.	Species	Health condition (Good (G), Fair (F), and Poor (P))	No. of alive individuals	Quantity to be planted	Survival Rate (%)	Remark
Sha Tin Water Treatment Works (STWTW)						
T1-T12	<i>Aquilaria sinensis</i>	F	12	12	100	
T1-T18	<i>Cinnamomum burmannii</i>	F	18	18	100	
TOTAL				30		
Sha Tin South Freshwater Service Reservoir (STSFWSR)						
T1-T10	<i>Cyclobalanopsis myrsinifolia</i>	G	10	10	100	
T11-T20	<i>Cratoxylum cochinchinense</i>	G	10	10	100	
T21-T30	<i>Bridelia tomentosa</i>	G	9	10	90	T28 Dead
T31-T40	<i>Reevesia thyrsoidea</i>	F	10	10	100	T35 T36 in poor health condition
T41-T50	<i>Melicope pteleifolia</i>	F	4	10	40	6 Dead, tagged lost
T51-T60	<i>Phyllanthus emblica</i>	G	10	10	100	
T61-T70	<i>Polyspora axillaris</i>	F	10	10	100	
T71, T72, T74 -T77, T93-T96	<i>Rhus succedanea</i>	F	10	10	100	
T73, T78-T86	<i>Sterculia lanceolata</i>	G	10	10	100	
T87-T92	<i>Mallotus paniculatus</i> (instead of <i>Mallotus apelta</i>)	F	5	6	83.3	T88 Dead
TOTAL				96		
Sha Tin West Service Reservoir (STWSR/ Portion D)						

IN-SITU REPROVISIONING OF SHA TIN WATER TREATMENT WORKS – SOUTH WORKS–Post-Transplantation Monitoring Report

NT-046 - NT-058 & NT-116 - NT-132	<i>Aquilaria sinensis</i>	F	30	30	100	NT-127, NT-129, NT-125, NT-116, NT-117, NT-057, NT-055, NT-118, NT-119 in poor health condition
NT-018 - NT-030 & NT-158 - NT-170 & NT-193 - NT-194	<i>Bischofia javanica</i>	G	28	28	100	
NT-031 - NT-045 & NT-137 - NT-151	<i>Cinnamomum burmannii</i>	G	30	30	100	NT-151, NT-035, NT-115 in poor health condition
NT-001 - NT-017 & NT-102 - NT-115	<i>Cinnamomum camphora</i>	F	31	31	100	NT-114, NT-113, NT-111, NT-107, NT-032, NT-038, NT-015, NT-010, NT-013, NT-011, NT-104, NT-106, NT-109, NT-108 in poor health condition
NT-152 - NT-157	<i>Hibiscus tiliaceus</i>	G	6	6	100	
NT-074 - NT-086	<i>Liquidambar formosana</i>	G	13	13	100	
NT-059 - NT-073 & NT-133 - NT-136 & NT-173 - NT-177	<i>Polyspora axillaris</i>	F	24	24	100	NT-133, NT-134, NT-173, NT-070, NT-175, NT-177, NT-176, NT-174 in poor health condition
NT-087 - NT-101	<i>Reevesia thyrsoides</i>	F	14	14	100	NT-098, NT-100, NT-096, NT-097, NT-087, NT-088, NT-091, NT-101, NT-094, NT-089, NT-090, NT-093 in poor health condition

NT-178 - NT-192	<i>Schefflera heptaphylla</i>	F	15	15	100	NT-188, NT-189, NT-192, NT-187, NT-184, NT-183, NT-179, NT-186, NT-161, NT-190 in poor health condition
NT-195 - NT-206	<i>Sterculia lanceolata</i>	F	12	12	100	NT-201, NT-206, NT-200, NT-202, NT-203, NT-199, NT-182, NT-181 in poor health condition
TOTAL			206			

- 4.2 At the STWTW site, all 12 light standard *Aquilaria sinensis* and 18 heavy standard *Cinnamomum burmannii* have grown in fair condition with a 100% survival rate. Invasive weeds and *Leucaena leucocephala* (銀合歡) at the site shall be removed properly, including the roots, flowers and fruits.
- 4.3 At the STSFWSR, 7 out of 10 planted trees species have 100% survival rate in good to fair condition. They are *Cyclobalanopsis myrsinifolia*, *Cratoxylum cochinchinense*, *Reevesia thyrsoidea*, *Phyllanthus emblica*, *Polyspora axillaris*, *Rhus succedanea* and *Sterculia lanceolata*.
- 4.4 For *Reevesia thyrsoidea*, T35 and T36 were in poor health condition.
- 4.5 The designated *Zanthoxylum avicennae* was replaced by *Sterculia lanceolata*, which is also in the recommended list of candidate of the WCP.
- 4.6 *Bridelia tomentosa* has a 90% survival rate as T28 was found dead; while 6 out of 10 *Melicope pteleifolia* were dead, resulting a 40% survival rate. All planted ‘*Mallotus apelta*’ were actually another native pioneer tree species *Mallotus paniculatus*. It is acceptable to use this species. As 5 out of 6 survived (T88 dead), this species has a survival rate of 83.3%.
- 4.7 Among the 10 tree species planted at the STWSR, *Bischofia javanica*, *Cinnamomum burmannii*, *Hibiscus tiliaceus* and *Liquidambar formosana* performed better than the others; while *Schefflera heptaphylla*, *Cinnamomum camphora* and *Reevesia thyrsoidea* were overall in poor condition. However, all compensatory trees in this portion were recorded as alive with a 100% survival at this first quarterly monitoring. The next few monitoring will be critical for assessing their adaption at the planting site and recovery progress.

4.8 Monitoring results of compensatory tree seedlings planted at Wall C and Wall D are summarized in the Table 2 below:

Table 2.

Species	Health condition (Good (G), Fair (F), and Poor (P))	No. of alive individuals	Quantity to be planted	Survival Rate (%)	Remark
Sha Tin Water Treatment Works (Wall C & D at STWTW)					
<i>Cyclobalanopsis myrsinifolia</i>	P	6	22	27.27	T108, T169, T165, T001, T002, T003 Dead
<i>Cratoxylum cochichinense</i>	F	10	22	45.45	T019, T021, T22 Dead
<i>Bridelia tomentosa</i>	F	16	22	72.73	
<i>Reevesia thyrsoidea</i>	F	14	22	63.64	1 Dead with no tag
<i>Melicope pteleifolia</i>	F	10	22	45.45	T177, T178 Dead
<i>Phyllanthus emblica</i>	F	15	22	68.18	T194, T91 Dead
<i>Polyspora axillaris</i>	F	16	21	76.19	T105, T108 Dead
<i>Rhus succedanea</i>	F	12	21	57.14	T201 Dead
<i>Zanthoxylum avicennae</i>	P	7	21	33.33	T205, T206 Dead
<i>Mallotus paniculatus (instead of Mallotus apelta)</i>	P	7	21	33.33	T181, T183, T152, T153 Dead
<i>Dalbergia odorifera</i>	F	19	N/A	N/A	additional exotic species

TOTAL 216

- 4.9 Establishment of tree seedlings are more challenging. Survival rate ranging from the lowest for *Cyclobalanopsis myrsinifolia* (27.27%) to the highest for *Polyspora axillaris* (76.19%), with an overall survival rate at 52.31%.
- 4.10 On top of the 10 designated native species, an exotic 11th species *Dalbergia odorifera* were also planted. They were observed in fair condition. Since there is no original planned quantity, survival rate for this species is not calculated. From their greater height in general, they can serve as providing a semi-shaded layer for other native seedlings along the establishment period.
- 4.11 Excessive weeds shall be cleared by hand-held tools from time to time but precautions shall be made to avoid damaging the similar-looking thin stems of tree seedlings. Some tags on the thin stem were either lost or written in wrong number, despite exact tag number is not too critical during this early establishment period with a high dynamic of dead/ recovery. Tags may be resumed during a mid-term assessment when their survival rate has relatively stabilized.

5. SUMMARY

- 5.1 During this first quarterly monitoring, a total of 548 nos. of compensatory trees were plant at four designated planting sites under the Contract 3/WSD/15 and 1/WSD/19.
- 216 nos. of tree seedlings at Wall C & D of Sha Tin Water Treatment Works (STWTW);
 - 12 light standard and 18 heavy standard trees at STWTW;
 - 96 light standard trees at Sha Tin South Fresh Water Service Reservoir (STSFWSR), i.e., Portion E of the Works Site; and
 - 206 light standard/ whip trees at Sha Tin West Service Reservoir (STWSR); i.e., Portion D of the Works Site
- 5.2 All light standard and heavy stand compensatory tree species have a satisfactory survival rate over 80%, except *Melicope pteleifolia* (40%) at STSFWSR; while survival rate of tree seedlings ranging from 27.27% to 76.19%, with an overall survival rate of 52.31%. It is acceptable for such fluctuation in seedlings their establishment is more challenging against environmental stress.
- 5.3 All planted ‘*Mallotus apelta*’ were actually another native pioneer tree species *Mallotus paniculatus*, which is acceptable. On top of the 10 designated native species, an exotic 11th species *Dalbergia odorifera* were also planted at Wall C and D. They can serve as providing a semi-shaded layer for other native seedlings along the establishment period.
- 5.4 Invasive weeds and *Leucaena leucocephala* (銀合歡) at all planting sites shall be removed properly, including the roots, flowers and fruits.
- 5.5 The next few monitoring would be critical to assess recovery of the species with poor condition and plan the replanting schedule.

ANNEX I
Photo

Sha Tin Water Treatment Works (STWTW)



The 12 nos. of *Aquilaria sinensis* in fair condition at STWTW



The 18 nos. of *Cinnamomum burmannii* in fair condition at STWTW

Sha Tin South Freshwater Service Reservoir (STSFWSR)



Invasive weeds and *Leucaena leucocephala* (銀合歡) at the *Cinnamomum burmannii* site shall be removed properly, including the roots, flowers and fruits.

All planted '*Mallotus apelta*' were actually another native pioneer tree species *Mallotus paniculatus*.



T88 was dead



Mallotus paniculatus



Sterculia lanceolata



Rhus succedanea



Polyspora axillaris



Phyllanthus emblica



Melicope pteleifolia



Reevesia thyrsoidea



Bridelia tomentosa



Cratoxylum cochinchinense



Cyclobalanopsis myrsinifolia



Some dead individuals at STSFWSR

Sha Tin West Service Reservoir (STWSR)



Overview



Overview



Cinnamomum camphora



Cinnamomum camphora in poor condition



Aquilaria sinensis



Aquilaria sinensis in poor condition



Cinnamomum burmannii



Polyspora axillaris



Hibiscus tiliaceus



Bischofia javanica



Schefflera heptaphylla, overall in poor condition



Reevesia thyrsoides



Liquidambar formosana



Sterculia lanceolata

Wall C & D at Sha Tin Water Treatment Works (STWTW)



Overview of Wall C



Overview of Wall D



Overview of planting site at the crest of Wall C



Overview of planting site at the crest of Wall D



Cratogeomys cochichinense



Cyclobalanopsis myrsinifolia



Zanthoxylum avicennae



Phyllanthus emblica



Rhus succedanea



Bridelia tomentosa



Polyspora axillaris



Melicope pteleifolia



Mallotus paniculatus



Reevesia thyrsoides



Dalbergia odorifera

ANNEX II

Curriculum Vitae of the Qualified Ecologist

CURRICULUM VITAE

MR. PAK-HO WAN, JAY

Position: Ecologist

Ecological Experience: 13 years

Language: Cantonese (Native), English (Fluent), Mandarin (Fluent)

Email address: jayconservation@gmail.com

FIELDS OF COMPETENCE

Ecological Impact Assessment (EcoIA), Landscape & Visual Impact Assessment (LVIA), Preliminary Environmental Review (PER), EM&A, Tree Risk Assessment, Tree Preservation & Removal Proposal (TPRP), BEAM Plus SA5 Ecological Impact Assessment, Mammalogy, Camera Trapping, Aquatic Fauna Survey, Herpetology, Wildlife Management, Terrestrial Ecology, Environmental Education, Conservation

PROFESSIONAL SERVICE

Member, IUCN Species Survival Commission Small Mammal Specialist Group 2013 – present
Regional Implementation Team, Critical Ecosystem Partnership Fund in Indo-Burma Hotspot (CEPF). May 2013 – September 2014

Certified Arborist (HK-1269A) of International Society of Arboriculture 2015

ISA Qualified TRAQ 2017 – 2022

ISA Headquarters & Hong Kong Chapter Member 2017 –2018

KEY QUALIFICATIONS

Jay is a professional ecologist specializing in mammalogy and plant-animal interaction. He has over 13 years of experience in ecological studies in Hong Kong and overseas. Apart local ecological consultancy, he has conducted extensive *in-situ* ecological studies and managed conservation programmes across wider Austroasiatic region, including tropical and karst region in South and Southwest China, Singapore, Laos, Malaysia (Sarawak), Indonesia (Bali, Sumatra) and Australia.

Jay helps several national-class nature reserves to reinforce conservation mitigations, wildlife monitoring and habitat management. In 2013, he organized the first international workshop of its kind in Hainan, China on camera trapping for wildlife conservation and monitoring, in collaboration with Hainan Wildlife Conservation Bureau and Hainan Provincial Forestry Department. As one of the key conservation team members of Kadoorie Farm & Botanic Garden (KFGB) since 2008, he made significant contributions in conserving critically endangered mammal and reptiles in South China and Hong Kong through field surveys and educational programmes. In 2014-2015, he co-organized and conducted wildlife surveys with an international ecology team for the Cross Island Line railway contracted by Land Transport Authority, Government of Singapore.

Recently Jay has based in Hong Kong, focusing on ecological surveys, assessments, audits; and providing recommendations at different scales, from CEDD's Landslip Prevention and Mitigation Programme (LPMitP), EPD's EcoIA, PER and Project Profiles, AFCD's biodiversity consultancy, to ecological impact of BEAM Plus (SA5) to private clients.

Jay is also a front-line conservationist who has organized various scientific workshops, warden trainings and public awareness raising outreach. He has been managing a 3-million grant for various conservation projects in the Regional Implementation Team of Critical Ecosystem Partnership Fund at Indo-Burma Hotspot.

EDUCATION

MPhil in Terrestrial Ecology and Mammalogy, 2008, Department of Ecology & Biodiversity, The University of Hong Kong
BSc (Hons), Environmental Life Science, 2006, Department of Ecology & Biodiversity, The University of Hong Kong

WORKING EXPERIENCES

1. **Ecologist** (July 2017 – present), Acumen Environmental Engineering & Technologies Co. Ltd. Provide ecological consultancy and survey service, participating in ecological assessment under green building certification scheme and carrying out ecological investigation.
2. **Independent Ecologist** (May 2015 – present) Manage ecological research and education programme, provide environmental/ ecological consultancy in Hong Kong and Overseas.
3. **Consultant** (October 2014 – April 2015), Landscape & Ecology Team, ERM (HK) Ltd. Provide consultancy services of EcoIA, LVIA, EM&A and IEC. Act as a key terrestrial ecologist for environmental projects in HK and SE Asia. Design and conduct field surveys on various wildlife groups.
4. **Surveyor** (April 2015 – present), Hong Kong Bird Watching Society. Conduct night surveys for herpetofauna in wetland at the NW New Territories, Hong Kong.
5. **Conservation Officer** (September 2008 – September 2014), Kadoorie Conservation China, Kadoorie Farm and Botanic Garden. Manage herpetofauna and mammal conservation projects. Conduct ecological research and biodiversity surveys in China. Provide training of forest and wetland survey techniques.
6. **Surveyor and report writer** (February 2009 – February 2010), Conservancy Association. Conduct surveys and write reports for parts of mammals and herpetofauna in Long Valley and Ho Sheung Heung, Hong Kong.
7. **Trainee** (February 2008), Ocean Park Conservation Foundation, Hong Kong. University Student Sponsorship Programme – Abundance and Distribution of Tiger and Prey, and Prey Selection by Large Carnivores in a Montane Tropical Forest of Northern Lao PDR. Conduct camera trapping and scat analysis of tiger and occupancy survey of prey.
8. **Vessel surveyor** (2006 – 2007), BMT Asia Pacific Ltd. Conduct vessel survey of marine mammals in the project ‘Hong Kong Offshore Wind Farm in Southeastern Waters’.
9. **Research Assistant** (June – July 2005), Department of Ecology and Biodiversity, The University of Hong Kong. Conducted a 3000-cuttings outdoor experiment at a native tree nursery
10. **Trainee** (January – February 2005) General Education Unit, The University of Hong Kong, Eco-Education & Resources Centre, Peking University – Biodiversity Research Institute. Study tour of White Headed Langur (*Trachypithecus poliocephalus leucocephalus*) conservation in Chongzuo, Guangxi
11. **Trainee** (July – August 2004) Agriculture, Fisheries and Conservation Department and Hong Kong Dolphin Conservation Society. Dolphin Conservation Ambassador Training Program.

ORGANIZER OR MAIN FACILITATOR OF WORKSHOP

International Conservation Planning Workshop for the Hainan Gibbon, Boao, Hainan, China. (16 – 20 March 2014).

Supporting organizer of Zoological Society of London together with IUCN SCC Conservation Breeding Specialist Group and Fauna & Flora International

Camera Trap Workshop for Wildlife Conservation and Monitoring, Yinggeling Nature Reserve, Hainan, China (4 – 8 March, 2013).

In collaboration with Hainan Wildlife Conservation Bureau, Hainan Provincial Forestry Department; 70 delegates from nature reserves in 6 provinces, with experts from Malaysia, Beijing, Hong Kong and Taiwan.

CONFERENCES PRESENTATIONS

1. Association for Tropical Biology & Conservation (ATBC) Asia-Pacific Chapter Meeting 2008 (Kuching), 2010 (Bali), 2013 (Sumatra).
2. Conservation of Asian Tortoises and Freshwater Turtles Workshop 2011 - Setting Priorities for the Next Ten Years, Singapore
3. China Primate Specialist Group: International Workshop for the Gibbon Conservation in China 2012. Yunnan, China

PREVIOUS RESEARCH WORK

Rehabilitation of degraded landscape through hardwood and semi-hardwood stem cuttings of native tree species and medium-large mammal seed dispersers in Hong Kong, by means of *in-situ* and manipulated experiments.

SELECTED PUBLICATIONS

1. **Wan, J.P.H.**, B.P.L. Chan, C. Liao, H. Mi, M.W.L. Lau, F. Li, H. Wang and Y.H. Sung. 2015. Conservation Status of Freshwater Turtles in Hainan Island, China: Interviews and Field Surveys at Yinggeling Nature Reserve. *Chelonian Conservation and Biology* 14(1):100–103.
2. **Wan, J.P.H.**, B.P.L. Chan and H. Wang. 2014. Intake of an ethnomedical shrub by Yellow-bellied Weasel *Mustela kathiah*. *Small Carnivore Conservation* 51: 34–37.
3. Sung Y.H., T. Chen, F. Li, **J.P.H. Wan**, Y. Meng, J.H. Yang. 2014. *Bubo nipalensis* found in Nonggang, Guangxi. *Chinese Journal of Zoology* 6: 903.
4. Chen T., Y.H. Sung, B.P.L. Chan, Y. Meng, **P.H. Wan (corresponding author)**. 2013. Influence of surface water availability on mammal distributions in Nonggang National Nature Reserve, Guangxi, China. *Zoological Research* 34(3): 145–151.

Selected Recent Job References of Jay Wan

1. **Agreement No. GE/2013/27 Landslip Prevention and Mitigation Programme, 2011, Package A Landslip Prevention and Mitigation Works in Hong Kong Island Batch B - (2017)**

Transplantation Work - Need for transplantation of species of conservation importance is identified under this Agreement and this project requires botanists for minimize the ecological impact to the Works Area.

Ecological Advisor & Botanist: responsible for the preparation of Orchid Transplantation Protocol and transplantation of species of conservation importance. Supervise and monitor the native seedlings planted for ecological restoration at disturbed area.

Post-transplantation Work & Ecological Restoration Plantation - Provide guidance and monitoring of recommended native tree and shrub seedlings planted in disturbed area to restore ecological function as a mitigation measure.

Ecological Advisor & Botanist: responsible for post-transplantation monitoring of the transplanted individuals and individuals retained *in-situ*; also responsible for preparation of Ecological Restoration Planting Proposal, on-site supervision, and monitoring of planted seedlings.

2. **Agreement No. CE 37/2013 (GE) Study of Landslides Occurring in Hong Kong Island and Outlying Islands in 2014 and 2015 - Feasibility Study -(2016)** This project involves a plant survey with special focus on rare and precious species at natural hillside above Po Shan Road, Hong Kong Island; and a man-made feature at Shek Pik, Lantau Island.

Botanist: responsible for the plant survey and reporting.

3. **Contract No. HY/2017/03 Preventive Maintenance Programme of Roadside Man-made Slopes/ Retaining Walls in Urban Region (Package B) - (2017)**

Ecological Survey - Special focus on species of conservation importance on a feature located within Lion Rock Country Park or Conservation Area.

Ecologist: responsible for day and night-time on various taxa groups, habitat and vegetation survey, reporting and providing recommendations.

4. **Project No.: 2016-826NB(M), Proposed Composite Re-Development at No. 74, 74 A-C Waterloo Road & No. 15-25 Yau Moon Street, Kowloon, Hong Kong - BEAM Plus New Building Version 1.2 - Ecological Impact (SA5) - (2017)**

Ecologist: responsible for ecological field survey under the BEAM Plus Scheme, completion of SA5 Form and prepare an ecological survey report as a supporting document.

5. **Contract No. GE/2016/01, Landslip Prevention and Mitigation Programme, 2016, Package K, Landslip Prevention Works in Hong Kong Island, Kowloon, New Territories and Outlying Islands - (2017)**

Ecological Survey - Special focus on species of conservation importance on two features located within Tai Tam Country Park or Conservation Area.

Ecologist: responsible for day and night-time on various taxa groups, habitat and vegetation survey, reporting and providing recommendations.

6. **Agreement No. CE45/2014 (GE) Landslip Prevention and Mitigation Programme, 2014, Package B, Landslip Prevention and Mitigation Works and Provision of Emergency Works Services for Natural Terrain Landslides Occuring in Mainland West (South) - Investigation,**

Design and Construction Feature Nos. 6NE-C/C91, 6NE-C/FR34, 6SW-C/CR587, 6SW-D/FR163 and 11NW-A/C271 (2016)

Form 2 Detailed Tree Risk Assessor and Botanist: responsible for the tree survey, species identification, risk assessment and reporting.

7. **Application No. A/H18/75 Planning Application in Support of Proposed Extension of the Academic Building and Residential Institution of the Swire Institute of Marine Science (SWIMS) at Cape D' Aguilar, Shek O (2017 –ongoing)**

Ecologist: responsible for Environmental Monitoring and Audit (EM&A) based on the Project Profile and direct EP conditions on Ecology as part of the Environmental Team (ET).

8. **Agreement No. DC/2014/01 - Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage – (2015 – ongoing)** This project involves Ecological and Landscape & Visual EM&A of a sewage pumping station.

Ecologist: responsible for Ecological and LV EM&A in the Environmental Team (ET).

9. **Agreement No. CE 48/2014(GE), Landslip Prevention and Mitigation Programme, 2014, Package E, Landslip Prevention and Mitigation Works – Investigation, Design and Construction – (2017)**

TPRP –Tree Preservation and Removal Proposal for six man-made features with (TRA) Tree Risk Assessment (Form 1) for selected feature.

Arborist: responsible for inspection, endorsement, reporting and auditing.

Ecological Survey – Special focus on species of conservation importance on Feature No. 11SE-D/C104 and 11SE-D/C669

Ecologist: responsible for day and night-time on various taxa group, habitat and vegetation survey, reporting and providing recommendations.

10. **Agreement No. CE 50/2014 (GE) Landslip Prevention and Mitigation Programme, 2014, Package G, Landslip Prevention and Mitigation Works – Investigation, Design and Construction (2015 –2017)**

Special Task: A study with site trial on the hydroseeding specification for slopes – This project aims at studying and investigating the enhancement of hydroseeding specification for slopes in Hong Kong, with a site trial experiment.

Botanist: responsible for slopes inspections, implementation and evaluation of site trial experiment.

11. **Agreement No. CE 51/2014 (GE) Landslip Prevention and Mitigation Programme, 2014, Package H, Landslip Prevention and Mitigation Works – Investigation, Design and Construction (2015 –2017)**

Special Task: A study on the performance assessment of the proprietary greening techniques on slopes with hard cover – This project aims at evaluating the vegetation performance after the application of proprietary greening techniques on slopes with hard cover.

Botanist: responsible for preparation of technical proposal, vegetation performance evaluation and survey; and preparation of study report.

Appendix T

Monthly Summary of Waste Flow Table

Monthly Summary Waste Flow Table for 2021

Contract No.: 1/WSD/19

Contract Title: **In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works)
-Water Treatment Works and Ancillary Facilities**

Month	Actual Quantities of Inert C&D Materials Generated / Imported (in '000m ³)						Actual Quantities of C&D Wastes Generated				
	Total Quantity Generated	Broken Concrete (including rock for recycling into aggregates)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported C&D Material	Metals	Paper/ cardboard packaging	Plastics (bottles/containers, plastic sheets/foam package material)	Chemical Waste	Others, e.g. general refuse
	(a+b+c+d)	(a)	(b)	(c)	(d)		(in '000kg)	(in '000kg)	(in '000kg)	(in '000m ³)	(in '000m ³)
Jan	0.122	0.000	0.000	0.000	0.122	0.000	4.300	0.000	0.000	0.000	0.004
Feb	0.128	0.000	0.017	0.000	0.111	0.000	0.000	0.000	0.000	0.000	0.004
Mar	0.365	0.032	0.000	0.000	0.333	0.000	6.300	0.000	0.000	0.000	0.015
Apr	0.033	0.009	0.000	0.000	0.024	0.000	16.600	0.000	0.000	0.000	0.019
May	0.098	0.011	0.000	0.000	0.087	0.026	7.460	0.000	0.000	0.000	0.016
Jun	0.066	0.008	0.000	0.000	0.058	0.039	27.820	0.000	0.000	0.000	0.020
Sub-total	0.812	0.060	0.017	0.000	0.734	0.065	62.480	0.000	0.000	0.000	0.077
Jul	0.403	0.024	0.252	0.000	0.127	0.042	8.480	0.037	0.000	0.000	0.020
Aug	4.855	0.005	4.733	0.000	0.117	0.038	124.520	0.000	0.000	0.000	0.024
Sep	10.576	0.000	10.554	0.000	0.022	0.209	47.330	0.000	0.000	0.000	0.019
Oct											
Nov											
Dec											
Total	16.646	0.090	15.556	0.000	1.001	0.354	242.810	0.037	0.000	0.000	0.140

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									
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	Complaint Nature	Cumulative
1 September - 30 September 2021	0	N/A	4

Statistical Summary of Environmental Summons

Reporting Period	Environmental Summons Statistics		
	Frequency	Details	Cumulative
1 September - 30 September 2021	0	N/A	0

Statistical Summary of Environmental Prosecution

Reporting Period	Environmental Prosecution Statistics		
	Frequency	Details	Cumulative
1 September - 30 September 2021	0	N/A	0

Appendix W

Tentative Schedule of Impact Monitoring

Tentative Impact Monitoring Schedule for STWTW

Oct-21						
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 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	5	6 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	7	8 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	9
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 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	16
17	18 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	19 Impact Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	20 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	21	22 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	23
24	25 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	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	30 Impact Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3
31						

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

Dec 21						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
			1 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	2	3 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	4 Impact Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3
5	6 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	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	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	16 Impact Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	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	21	22 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2	23	24 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	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	29	30 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	31	