

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)

9 May, 2018

Dear Sir,

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

Environmental Permit EP-494/2015

Submission of 25th monthly EM&A Report

In accordance with the Condition 3.4 of the Environmental Permit (No. EP-494/2015), we submit herewith 5 hard copies and 2 electronic copies of the 25th monthly Environmental Monitoring and Audit (EM&A) Report (Rev.0) for your processing. I certified and confirmed the submission of this monthly EM&A Report had complied with the requirements as set out in the approved Environmental Monitoring and Audit (EM&A) Manual of the EIA Report (Register No.: AEIAR-187/2015).

Yours faithfully,



Ir Dr Lam, Gabriel, C.K.

Environmental Team Leader

c.c. Independent Environmental Checker

Your Ref:
Our Ref: 60479142/C/fyw1805091

By Hand & By Email

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

Attn: Mr. H C Wong, Heinz

9 May 2018

Dear Sir,

**Contract No.3/WSD/15
In-situ reprovisioning of Sha Tin Water Treatment Works (South Works) Advance Works
Submission of 26th Monthly EM&A Report for April 2018**

Reference is made to Environmental Team (ET)'s 26th Monthly EM&A Report for April 2018 (Rev. 0) submitted on 9 May 2018.

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

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

Yours faithfully,
AECOM Asia Co. Ltd.



Y W Fung
Independent Environmental Checker

c.c. Environmental Team Leader

**MONTHLY ENVIRONMENTAL MONITORING AND AUDIT
(EM&A) REPORT (NO. 26)**

FOR

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

(Rev. 0)

**MONTHLY ENVIRONMENTAL
MONITORING AND AUDIT
(EM&A) REPORT (NO. 26) -**

FOR

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





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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1. INTRODUCTION

- 1.1 PROJECT BACKGROUND**
- 1.2 ORGANIZATION STRUCTURE**
- 1.3 SCOPE OF REPORT**
- 1.4 SUMMARY OF CONSTRUCTION WORKS**

2. EM&A RESULTS

- 2.1 EM&A BACKGROUND**
- 2.2 AIR QUALITY MONITORING**
- 2.3 NOISE MONITORING**
- 2.4 WATER QUALITY MONITORING**
- 2.5 ECOLOGY**
- 2.6 WASTE MANAGEMENT STATUS**
- 2.7 DELIVERY, STORAGE AND HANDLING OF CHLORINE**
- 2.8 EM&A SITE INSPECTIONS**
- 2.9 ENVIRONMENTAL LICENSES AND PERMITS**
- 2.10 IMPLEMENTATION OF ENVIRONMENTAL MITIGATION MEASURES**
- 2.11 SUMMARY IF EXCEEDANCES OF ENVIRONMENTAL QUALITY PERFORMANCE LIMIT**
- 2.12 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS**
- 2.13 DATA MANAGEMENT AND DATA QA/QC CONTROL**

3. FUTURE KEY ISSUES

- 3.1 CONSTRUCTION PROGRAMME FOR COMING MONTHS**
- 3.2 KEY ISSUES FOR THE COMING MONTH**
- 3.3 MONITORING SCHEDULE FOR THE COMING MONTH**

4. CONCLUSIONS AND RECOMMENDATIONS

- 4.1 SUMMARY**

LIST OF APPENDICES

Appendix A	General Layout Plan
Appendix B	Project Organization
Appendix C	Latest Construction Programme
Appendix D	Location of Construction Activities
Appendix E	Environmental Sensitive Receivers in the Vicinity of the Project
Appendix F	Summary of Action and Limit Levels
Appendix G	Event Action Plan
Appendix H	Impact Monitoring Schedules
Appendix I	Location Plan of Air Quality Monitoring Stations
Appendix J	Calibration Certificates (Air monitoring)
Appendix K	Impact Air Quality Monitoring Results and Graphical Presentation
Appendix L	Location Plan of Noise Monitoring Station
Appendix M	Calibration Certificates (Noise)
Appendix N	Impact Noise Monitoring Results and Graphical Presentation
Appendix O	Location Plan of Water Quality Monitoring Station
Appendix P	Calibration Certificate (Water Quality)
Appendix Q	The Certification of Laboratory with HOKLAS accredited Analytical Tests
Appendix R	Impact Water Quality Monitoring Results
Appendix S	Impact Monitoring report for Ecology
Appendix T	Monthly Summary of Waste Flow Table
Appendix U	Implementation Schedule of Environmental Mitigation Measures (EMIS)
Appendix V	Cumulative Statistics on Exceedances, Complaints, Notifications of Summons and Successful Prosecutions
Appendix W	Tentative schedule for environmental monitoring

EXECUTIVE SUMMARY

- A.1 Pursuant to the Environmental Impact Assessment (EIA) Ordinance, the Director of Environmental Protection (DEP) granted the Environmental Permit (No. EP- 494/2015) to the Water Supplies Department (WSD) to construct and operate the designated project for “In-situ Reprovisioning of Sha Tin Water Treatment Works - South Works” (“The Project”).
- A.2 Under Contract No. 3/WSD/15, Ming Hing - Ming Hing Civil - Vasteam Joint Venture (MMVJV) is commissioned by WSD to undertake the construction of the advance works while AECOM Asia Company Limited was appointed by WSD as the Engineer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, Acumen Environmental Engineering & Technologies Company Limited was appointed by MMVJV as the Environmental Team (ET). AECOM Asia Company Limited was also employed by the WSD as the Independent Environmental Checker (IEC).
- A.3 The construction phase of the Contract commenced on 30 October 2015 for completion by 2018. The impact monitoring of the EM&A programme, including air quality, noise, water quality monitoring as well as environmental site inspections, commenced on 17 February 2016.
- A.4 This is the 26th monthly Environmental Monitoring and Audit Report for this Contract covering the period from 1 April 2018 to 30 April 2018 (the Reporting Period). As informed by the Contractor, major activities in the reporting period included:
- Construction of Logistics Centre at Wall C.
 - Construction lagging wall and bore piles at Wall D and C
 - External finish work at North Work Temporary House
 - Modification of clarifier no.1
 - Modification of valve chamber and construction of flow meter house
 - Construction of CLP steel cable support between CLP substation and North Work Washwater Pump House
- 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	6
Noise	$L_{eq(30mins)}$ Daytime	6
Water Quality	Water Sampling	12
Inspection / Audit	ET Regular Environmental Site Inspection	4
	IEC Monthly Environmental Site Audit	1

- A.6 No exceedance of air quality, noise and water quality monitoring were recorded in this reporting period.
- A.7 No environmental complaint were received via EPD in this reporting period.
- A.8 No notification of any summons and successful prosecutions was received in this reporting period.
- A.9 No reporting change was made in this reporting period.
- A.10 There was two (2) EPD site inspection conducted in the reporting period.
- A.11 As informed by the Contractor, the major works for this Project in May 2018 will be:
- Construction of Logistics Centre at Wall C.
 - Construction lagging wall and bore piles at Wall D and C
 - External finish work at North Work Temporary House
 - Modification of clarifier no.1



- Modification of valve chamber and construction of flow meter house
- Construction of CLP steel cable support between CLP substation and North Work Washwater Pump House

A.12 EM&A monitoring for the 26th reporting period has been completed. The 27th monthly EM&A report will cover the period from 1 May 2018 to 31 May 2018.

1. INTRODUCTION

1.1. PROJECT BACKGROUND

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

1.2. ORGANIZATION STRUCTURE

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

Table 1-1: Key Personnel Contact for Environmental Works

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

1.3. SCOPE OF REPORT

1.3.1 This is the 26th monthly EM&A Report under the Contract No. 3/WSD/15 In-situ Re provisioning of Sha Tin Water Treatment Works (South Works) – Advance Works covering the period from 1 April 2018 to 30 April 2018 (the reporting period).

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

1.4. SUMMARY OF CONSTRUCTION WORKS

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

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

- Construction of Logistics Centre at Wall C.
- Construction lagging wall and bore piles at Wall D and C
- External finish work at North Work Temporary House
- Modification of clarifier no.1
- Modification of valve chamber and construction of flow meter house
- Construction of CLP steel cable support between CLP substation and North Work Washwater Pump House

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

2. EM&A RESULTS

2.1. EM&A BACKGROUND

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

Table 2-1: Summary of Impact Monitoring Programme

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

Remark: Sampling Depth for Water Quality:

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

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

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

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

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

2.2. AIR QUALITY MONITORING

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

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

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

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

Table 2-4: Air Quality Impact Monitoring Equipment

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

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

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

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

2.2.7 In this Reporting Period, a total of six (6) 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
3/4/2018	Sunny	12:06	15:06	106	100	104
9/4/2018	Sunny	11:07	14:07	94	96	123
13/4/2018	Cloudy	10:42	13:42	108	123	119
18/4/2018	Cloudy	10:09	13:09	117	136	109
23/4/2018	Fine	14:22	17:22	126	100	139
27/4/2018	Cloudy	11:41	14:41	130	103	115
Average				113.8		
Range				94-139		

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
3/4/2018	Sunny	12:14	15:14	98	96	102
9/4/2018	Sunny	11:15	14:15	82	86	89
13/4/2018	Cloudy	10:57	13:57	80	92	76
18/4/2018	Cloudy	10:16	13:16	92	99	92
23/4/2018	Fine	14:30	17:30	102	96	81
27/4/2018	Cloudy	11:47	14:47	96	83	91
Average				90.7		
Range				76-102		

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	Aco 6224 Sound Level Meter
Acoustic Calibrator	Pulsar 105 Sound Calibrator
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 six (6) 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}	
3/4/2018	12:19 - 12:49	Sunny	56.3	54.7	58.6	59.7	56.1	54.4	57.1	
9/4/2018	11:20 - 11:50	Sunny	57.8	56.4	57.2	56.6	53.9	54.5	56.3	
13/4/2018	11:03 - 11:33	Cloudy	59.9	58.6	59.4	60.6	58.4	58.2	59.3	
18/4/2018	10:22 - 10:52	Cloudy	58.0	56.9	58.2	56.9	59.0	58.9	58.1	
23/4/2018	14:35 - 15:05	Fine	58.2	57.3	58.0	57.0	56.9	57.2	57.4	
27/4/2018	11:55 - 12:25	Cloudy	56.7	56.8	58.0	56.7	57.5	57.1	57.2	
Limit Level		>75dB(A)							Average	57.7
									Range	56.3-59.3

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}	
3/4/2018	12:54 - 13:24	Sunny	54.1	53.2	51.5	53.7	55.2	57.4	54.6	
9/4/2018	11:55 - 12:25	Sunny	56.9	55.3	58.8	56.1	55.2	57.4	56.8	
13/4/2018	11:38 - 12:08	Cloudy	56.0	55.4	55.2	57.6	56.3	57.5	56.4	
18/4/2018	11:00 - 11:30	Cloudy	58.0	57.7	58.0	56.5	57.3	56.6	57.4	
23/4/2018	15:11 - 15:41	Fine	58.9	57.5	56.9	58.6	57.1	59.4	58.2	
27/4/2018	12:32 - 13:02	Cloudy	56.6	54.2	54.2	56.3	56.4	54.5	55.5	
Limit Level		>75dB(A)							Average	56.6
									Range	54.6-58.2

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}
3/4/2018	13:30 - 14:00	Sunny	52.8	51.9	52.2	51.8	52.6	53.5	52.5
9/4/2018	12:31 - 13:01	Sunny	54.9	55.1	55.7	54.3	54.8	55.2	55.0
13/4/2018	12:14 - 12:44	Cloudy	57.2	58.0	57.5	57.6	57.3	58.4	57.7
18/4/2018	11:35 - 12:05	Cloudy	53.0	54.6	54.2	55.0	55.0	54.1	54.3
23/4/2018	15:48 - 16:18	Fine	55.9	57.2	54.8	56.0	55.2	54.8	55.7
27/4/2018	13:10 - 13:40	Cloudy	57.5	56.1	55.7	56.0	57.5	57.6	56.8
Limit Level 70dB(A) during normal teaching periods and 65 dB(A) during examination periods								Average	55.7
								Range	52.5-57.7

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

2.4. WATER QUALITY MONITORING

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

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

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

Table 2-12: Details of Water Quality Monitoring Station

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

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

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

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

Remark:

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

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

Table 2-14: Summary of Water Quality Monitoring Results

Dissolved Oxygen – Mid Depth (mg/L)	C1	C2	C3	M1	M2	M3
Average	8.48	8.66	N/A	9.20	9.17	9.41
Min.	8.28	8.35	N/A	9.01	8.98	9.23
Max.	8.73	8.89	N/A	9.34	9.35	9.64
Turbidity – Mid Depth (NTU)	C1	C2	C3	M1	M2	M3
Average	2.60	2.60	N/A	2.10	1.75	0.59
Min.	2.30	2.40	N/A	1.90	1.40	0.20
Max.	2.80	2.80	N/A	2.30	2.00	0.80
Suspended Solid – Mid depth (mg/L)	C1	C2	C3	M1	M2	M3
Average	3.09	3.18	N/A	2.33	5.70	<1
Min.	3.00	3.10	N/A	2.10	3.80	<1
Max.	3.20	3.30	N/A	2.60	8.60	<1
pH value (unit)	C1	C2	C3	M1	M2	M3
Average	7.80	7.74	N/A	7.74	7.74	7.69
Min.	7.70	7.61	N/A	7.59	7.60	7.51
Max	7.88	7.89	N/A	7.88	7.88	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 Detailed Vegetation Survey Report and Woodland Compensation Plan submitted to EPD and approved on 17 February 2016. To ensure the planting works are properly implemented, bi-weekly monitoring is proposed throughout the planting phase. The frequency of monitoring is proposed to be bi-monthly during the first years of the planting stage, and then reduced to quarterly for the six (6) year post-planting period.
- 2.5.2 A 6 years post-planting review report will be submitted within a month after completion of the at least 6 years post-planting monitoring and maintenance.
- 2.5.3 Vegetation monitoring scheduled on 23 April 2018 during the Reporting Period. Detailed monitoring report (No. 44) is shown in **Appendix S**.
- 2.5.4 The condition of TA572 was observed in poor condition due to broken of main trunk. TA327 was also in poor condition while TA326 was dead. Tree guying cables have been installed to provide external support to all three transplanted trees. Transplanted Lamb of Tartary (*Cibotium barometz*) seems to be received too much sunlight. Leaves of them were observed yellowish in colour. Shelter (遮光網) was recommended to reduce the intensity of sunlight. Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. New fronds of transplanted Lamb of Tartary were observed growing out and were recovering from transplantation. Currently, Lamb of Tartary was temporally stored in a nursery garden at Wang Toi Shan, Kam Tin. It is recommended to retain them at the nursery garden under proper maintenance during current recovery stage.
- 2.5.5 In general, all transplanted Lamb of Tartary (*Cibotium barometz*) were in fair condition while Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) and one Incense Tree (*Aquilaria sinensis*) TA326 were observed dead during inspection on 20 August 2016 and on 10 August 2017 respectively. The dead tree TA326 is recommended to be removed in order to prevent tree failure.
- 2.5.6 In order to compensate for the loss of transplanted Hong Kong Eagle's Claw and Incense Tree, it is recommended to plant an individual of native climber species and 3 heavy standard native tree species at compensatory planting site. The suggested species in planting list would have certain ecological value in terms of plant ecology and the associated wildlife including birds.
- 2.5.7 After transplantation, root ball of TA572 and TA327 tree should be kept moisture especially during dry and non-raining day.

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



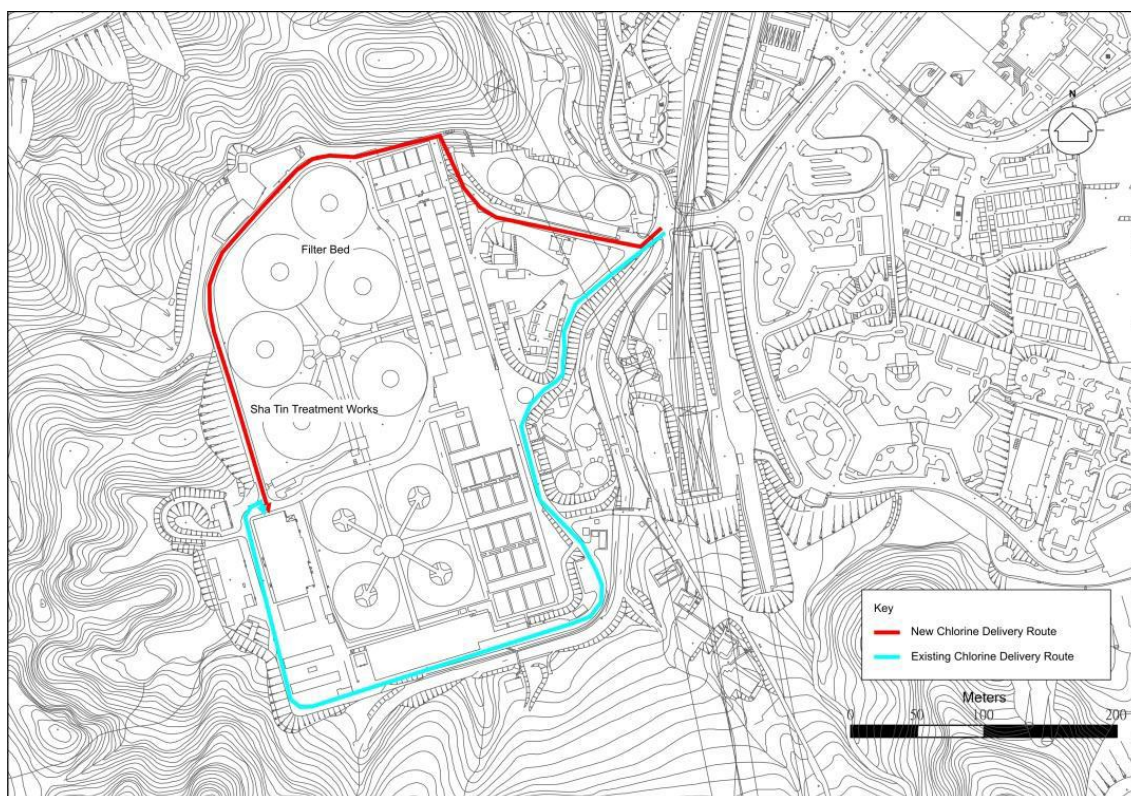
Table 2-15: Chlorine Truck Transport Route

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, four (4) site inspections were carried out on 4, 9, 20 and 25 April 2018.
- 2.8.2 One joint site inspection with IEC also undertaken on 20 April 2018. 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
4 April 2017	No environmental issue was observed during the site inspection	N/A
9 April 2017	<u>Observation(s) and Recommendation(s)</u> 1. Oil tank and other working equipment were found blocking the access to the sedimentation tank beside Wall C. 2. Blockage of ditch by mud and sand was found inside the construction area beside Wall C.	1. The surroundings of sedimentation tank beside Wall C was tidied up and made accessible. 2. Blockage of ditch was removed.
20 April 2017	<u>Observation(s) and Recommendation(s)</u> 1. Accumulated stagnant water was observed at Wall C and Wall D. The Contractor was advised to remove the retained water. 2. Accumulated sediments were found inside the drainage at Wall C. The Contractor was advised to clear the general refuse and keep the drainage clear of obstacles..	1. Stagnant water was removed 2. Sediment was removed inside the drainage. The general refuse was cleared and kept clear of obstacles for the drainage.
25 April 2017	No environmental issue was observed during the site inspection	N/A

- 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	
Registration of Chemical Waste Producer	WPN5218-759 -M2936-01	31/12/2015	N/A	MMVJV	
Trip Ticket (Chit) Account	7023723	10/12/2015	N/A	MMVJV	
Waste Water Discharge License (Wall C)	WT0023932 -2016	01/04/2016	31/03/2021	MMVJV	
Waste Water Discharge License (Wall D)	WT0024211 -2016	10/06/2016	30/06/2021	MMVJV	
Construction Noise Permit	GW-RN0791-17	06/12/2017	07/06/2018	MMVJV	
Construction Noise Permit	GW-RN0052-18	09/02/2018	13/08/2018	MMVJV	

2.10. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

2.10.1 In response to the site audit findings, the Contractors carried out corrective actions. A summary of the environmental mitigation measures implemented by the Contractor in this Reporting Period are summarized in Table 2-18.

2.10.2 The environmental mitigation measures that recommended in the Implementation Schedule for Environmental Mitigation Measures (EMIS) in the approved EM&A Manual covered the issues of dust, noise, water and waste and they are showed **Appendix U**.

Table 2-18: Environmental Mitigation Measures

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

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

2.11. SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

2.11.1 Results for 1-hour TSP, noise and water quality monitoring complied with the Action/ Limit levels in the reporting period.

2.11.2 Cumulative statistics on exceedances is provided in Appendix V.

2.12. SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND PROSECUTIONS

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

Table 2-19: Environmental Complaint Handling Procedure

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

- 2.12.2 No environmental complaint were received in the reporting period.
- 2.12.3 No notification of summons and prosecution was received in the reporting period.
- 2.12.4 EPD conducted two site inspection on 12 and 13 April 2018 for Keng Hau Road Nullah checking. No adverse comment or negative feedback was given from EPD regarding the above said location.
- 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 this Project in June 2018 to August 2018 will be:
- Construction of Logistics Centre at Wall C.
 - Construction lagging wall and bore piles at Wall D and C
 - External finish work at North Work Temporary House
 - Modification of clarifier no.1
 - Modification of valve chamber and construction of flow meter house
 - Construction of CLP steel cable support between CLP substation and North Work Washwater Pump House

3.2. KEY ISSUES FOR COMING MONTH

- 3.2.1 Potential environmental impacts arising from the above upcoming construction activities in May 2018 are mainly associated with dust, noise, water quality issues and waste management issues.
- 3.2.2 Particular issues to be considered in the coming month include:
- Implementation of dust suppression measures at all times.
 - Implementation of adequate measures to prevent discharge of site effluent to the nearby water bodies
 - Desilting tanks and catch-pits should be regularly maintained.
 - Implementation of construction noise preventative control measures.
 - Avoidance of accumulation of stagnant water
- 3.2.2 The tentative monitoring schedule for May 2018 to July 2018 can be found in **Appendix W**.

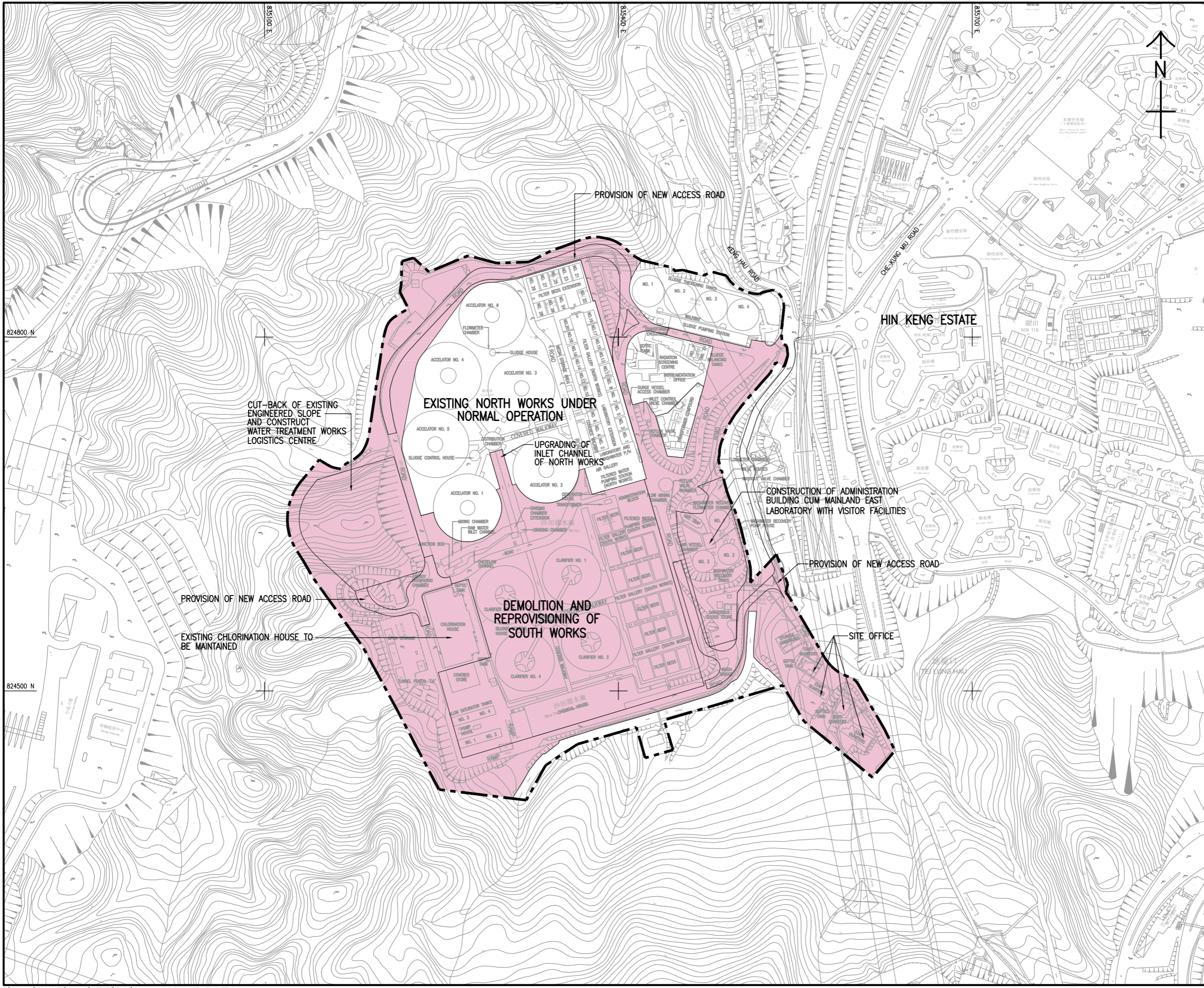
4. CONCLUSIONS AND RECOMMENDATIONS

4.1. SUMMARY

- 4.1.1 Air quality (including 1-hour TSP), noise, water quality and ecology impact monitoring were carried out in the reporting period. All monitoring results are satisfactory and no NOEs or associated corrective action was therefore issued.
- 4.1.2 Four (4nos.) environmental site inspection were conducted during the reporting period. Joint site inspection with IEC were carried out on 20 April 2018. Minor deficiencies were observed during site inspection and were rectified within the specified deadlines. The environmental performance of the Project was therefore considered satisfactory.
- 4.1.3 To control the site performance on waste management, the contractor shall ensure that all solid and liquid waste management works are fully in compliance with the relevant license/permit requirements, such as the effluent discharge licence and the chemical waste producer registration. Contractor is also reminded to implement the recommended environmental mitigation measures according to the Environmental Monitoring and Audit Manual.
- 4.1.4 No environmental complaint were received in the reporting period.
- 4.1.5 No notification of summons or prosecution was received since commencement of the Contract.
- 4.1.6 The ET will keep track on the construction works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Appendix A

General Layout Plan



LEGEND:

- SITE BOUNDARY OF SHA TIN WATER TREATMENT WORKS
- WORKS AREA

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. 圖紙編號 **60162073/EM&A/FIG 1**

DESIGNED BY 設計人	CONTRACT NO. 合約編號	P. DR. APPROVED 批准人
DRAWN BY 繪圖員	STATUS 階段	
SCALE 比例尺		
DIMENSIONS ARE IN 尺寸單位		
METRES		

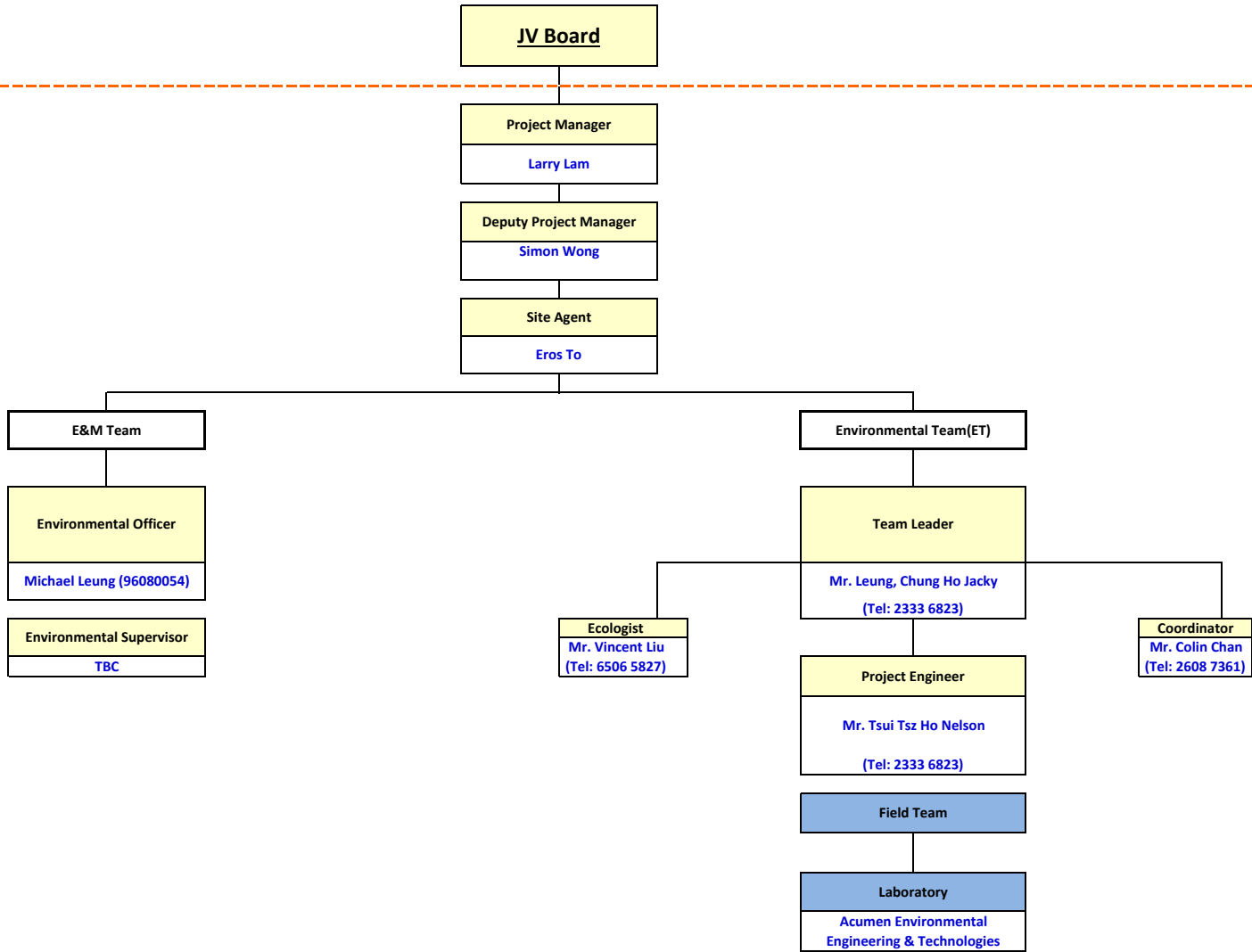
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Appendix B

Project Organization

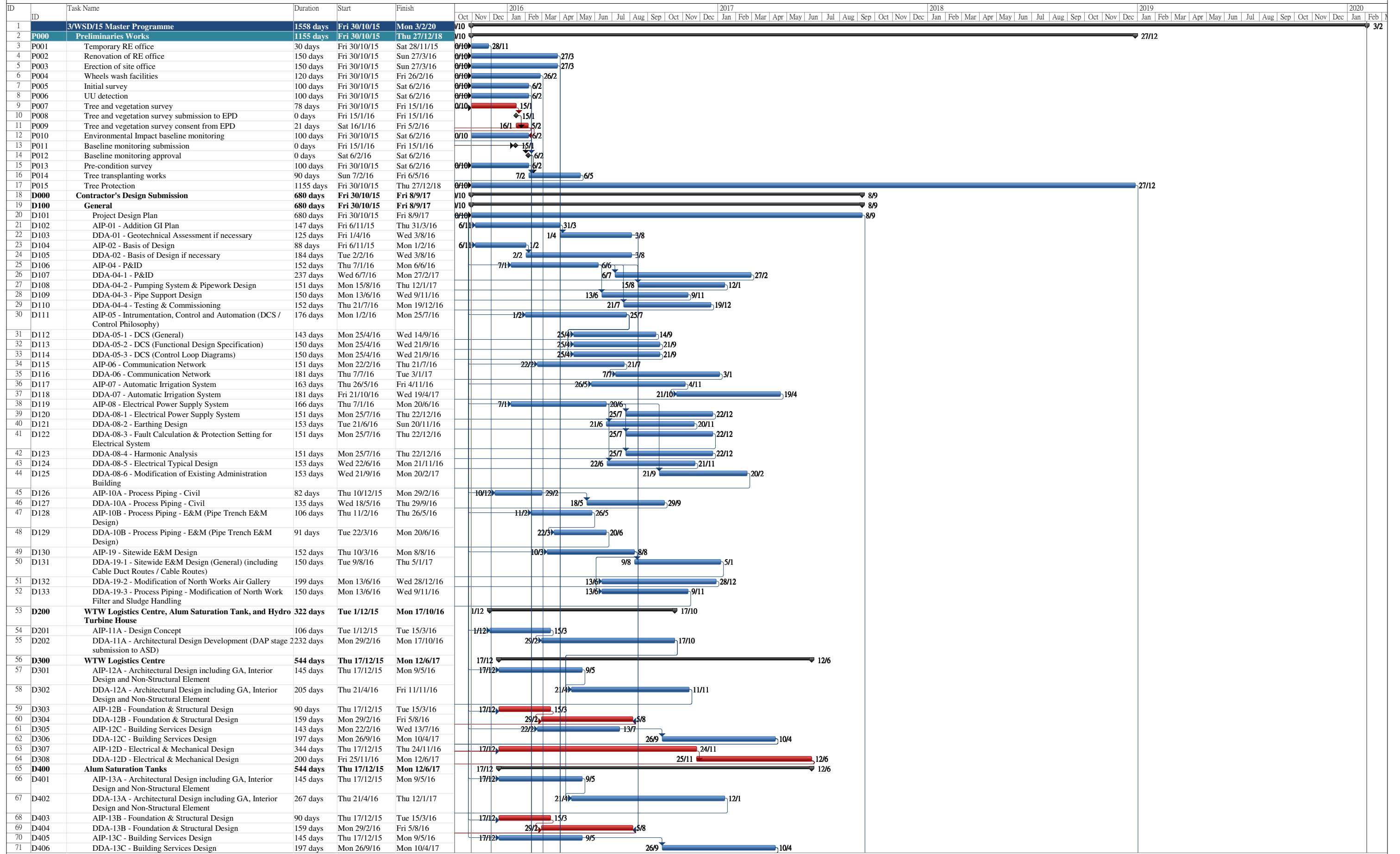
Project Organization Chart

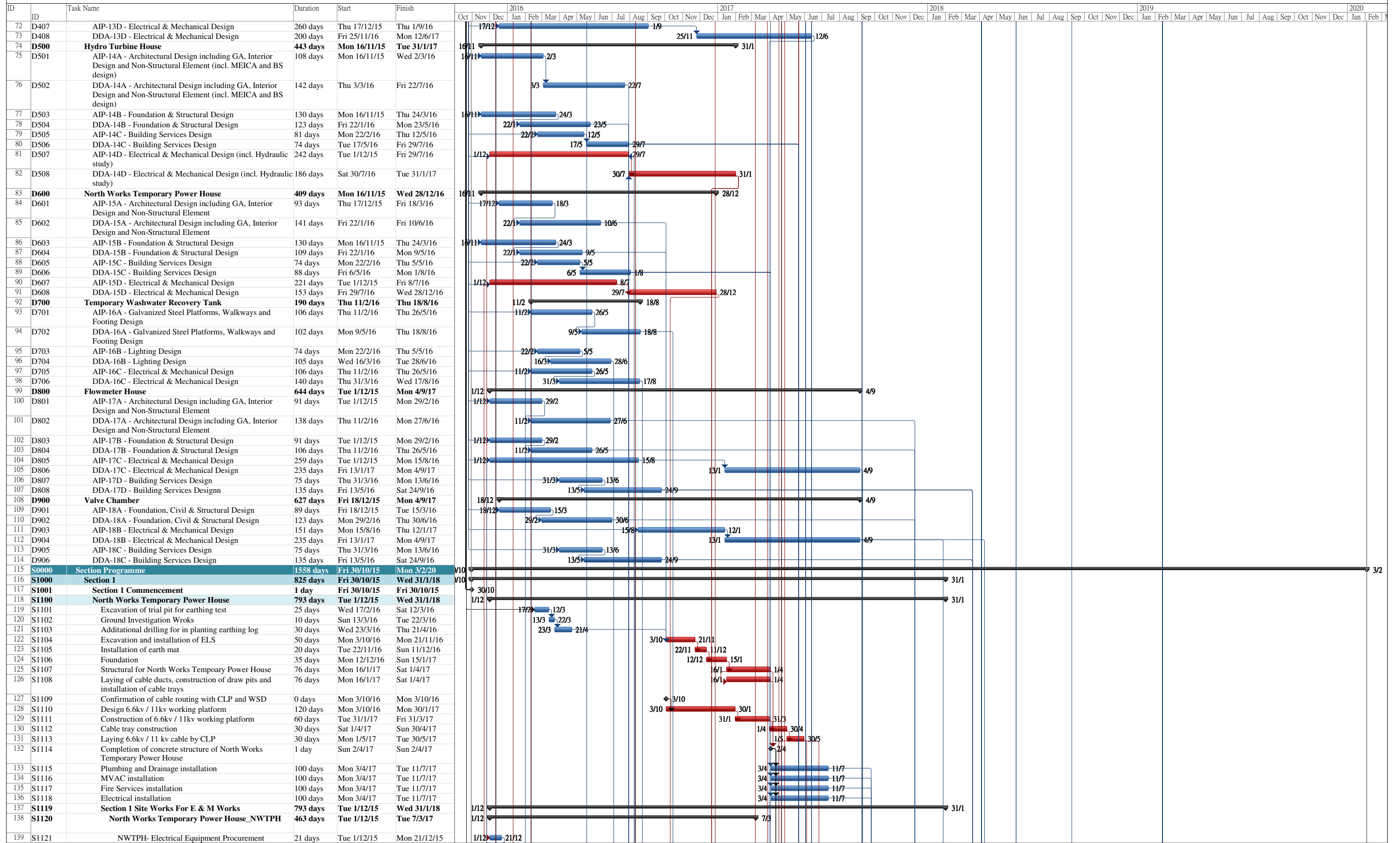
Head Office
Site Office



Appendix C

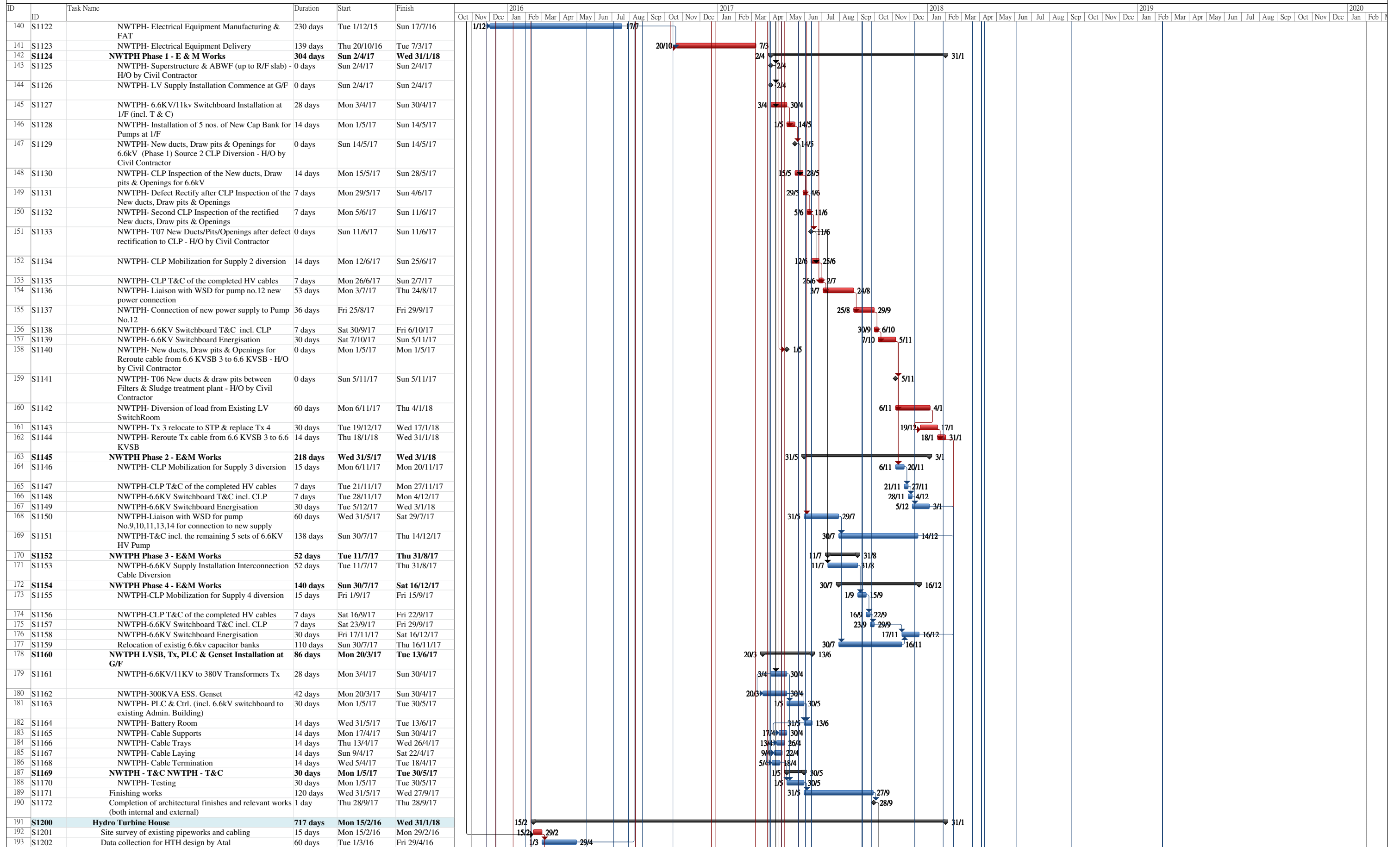
Latest Construction Programme

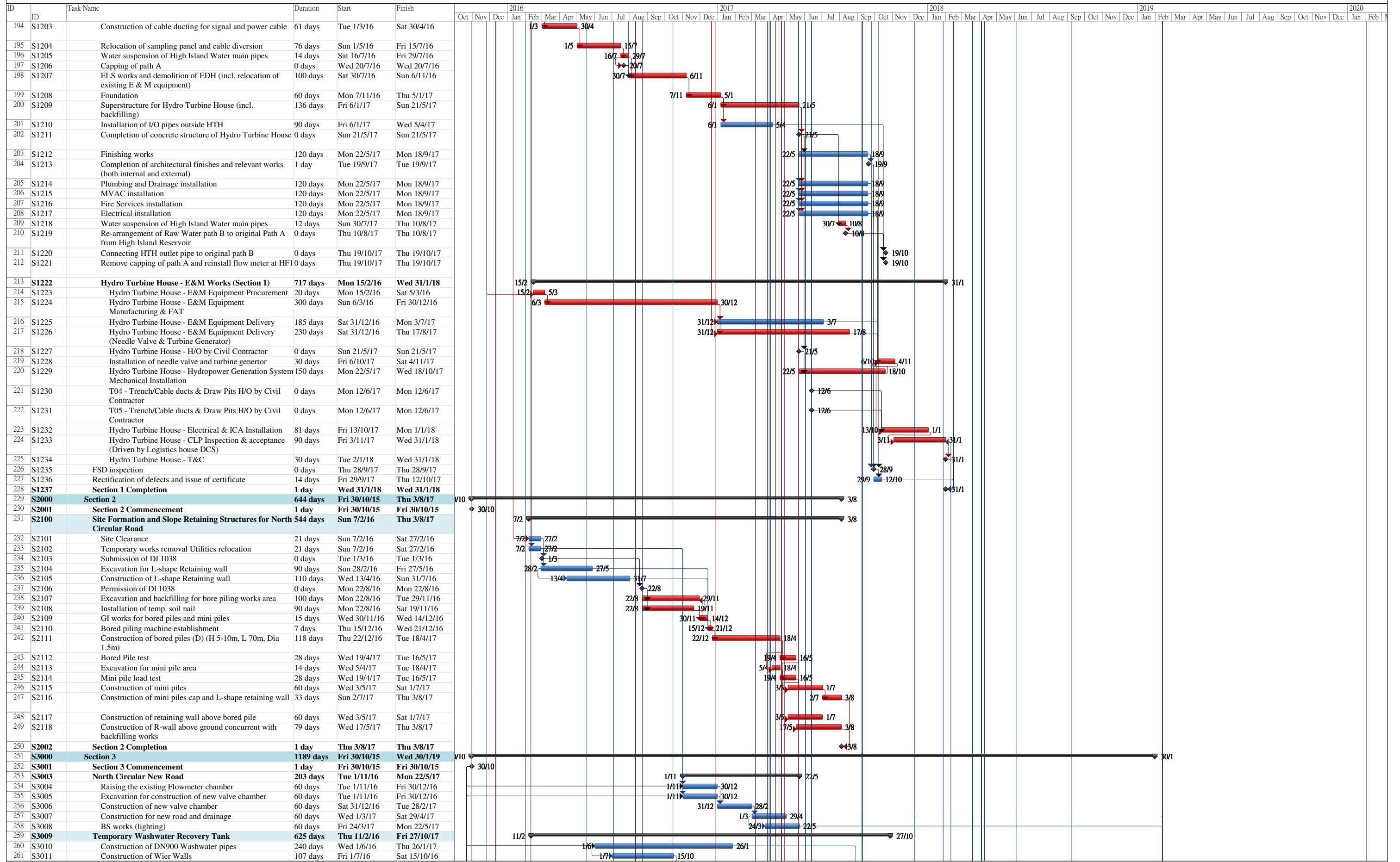


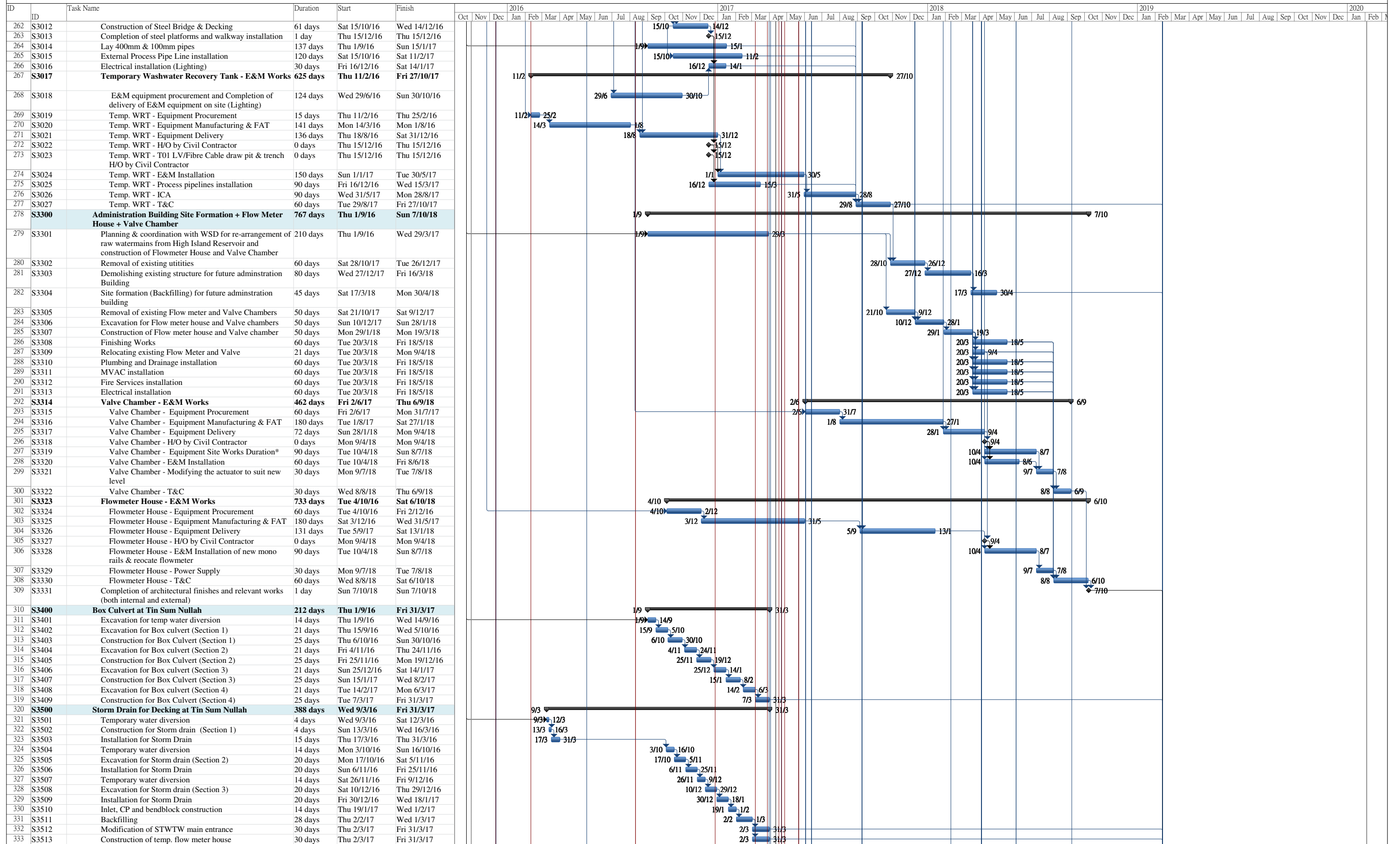


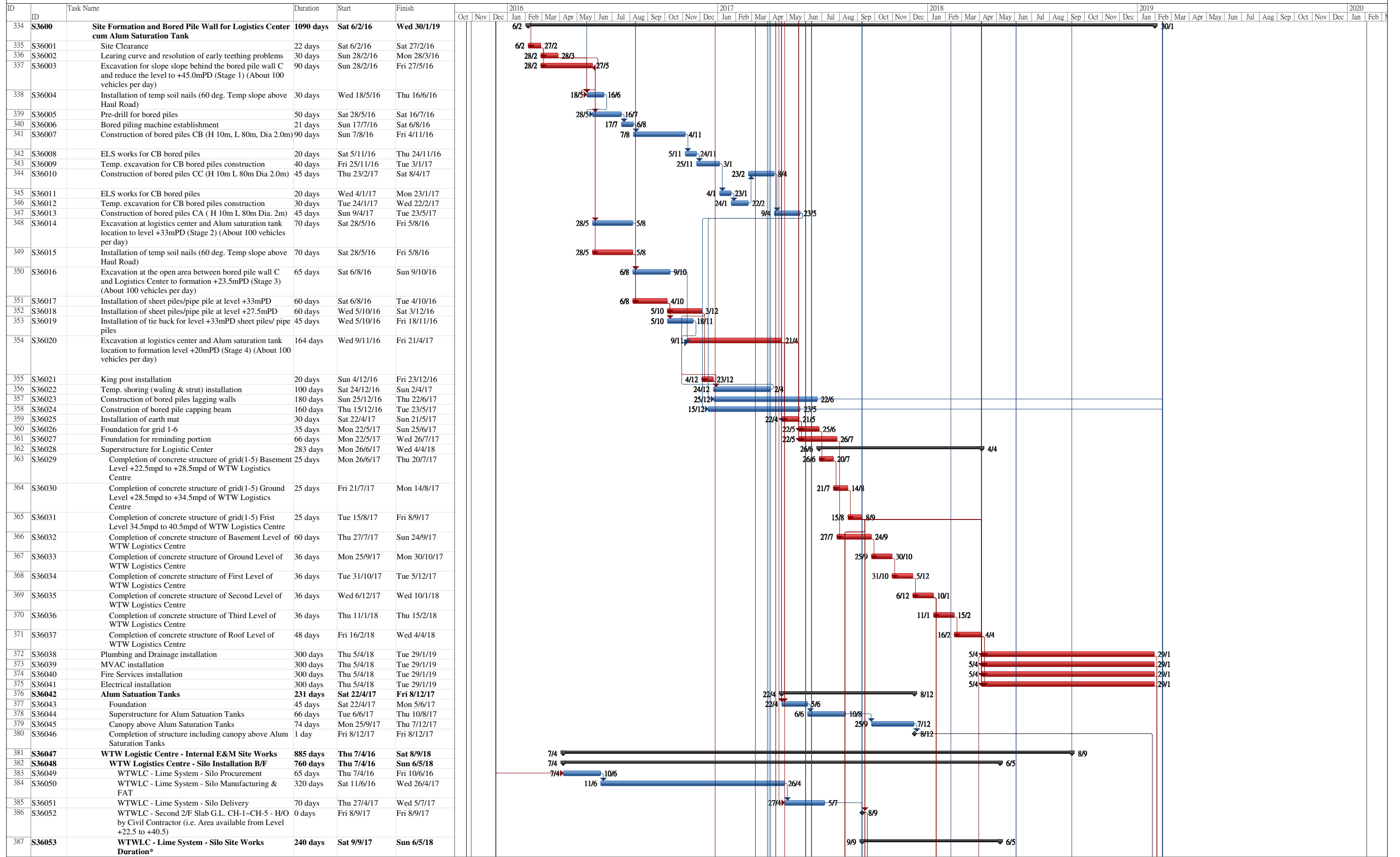
Critical Split Task Milestone Summary Manual Summary Critical

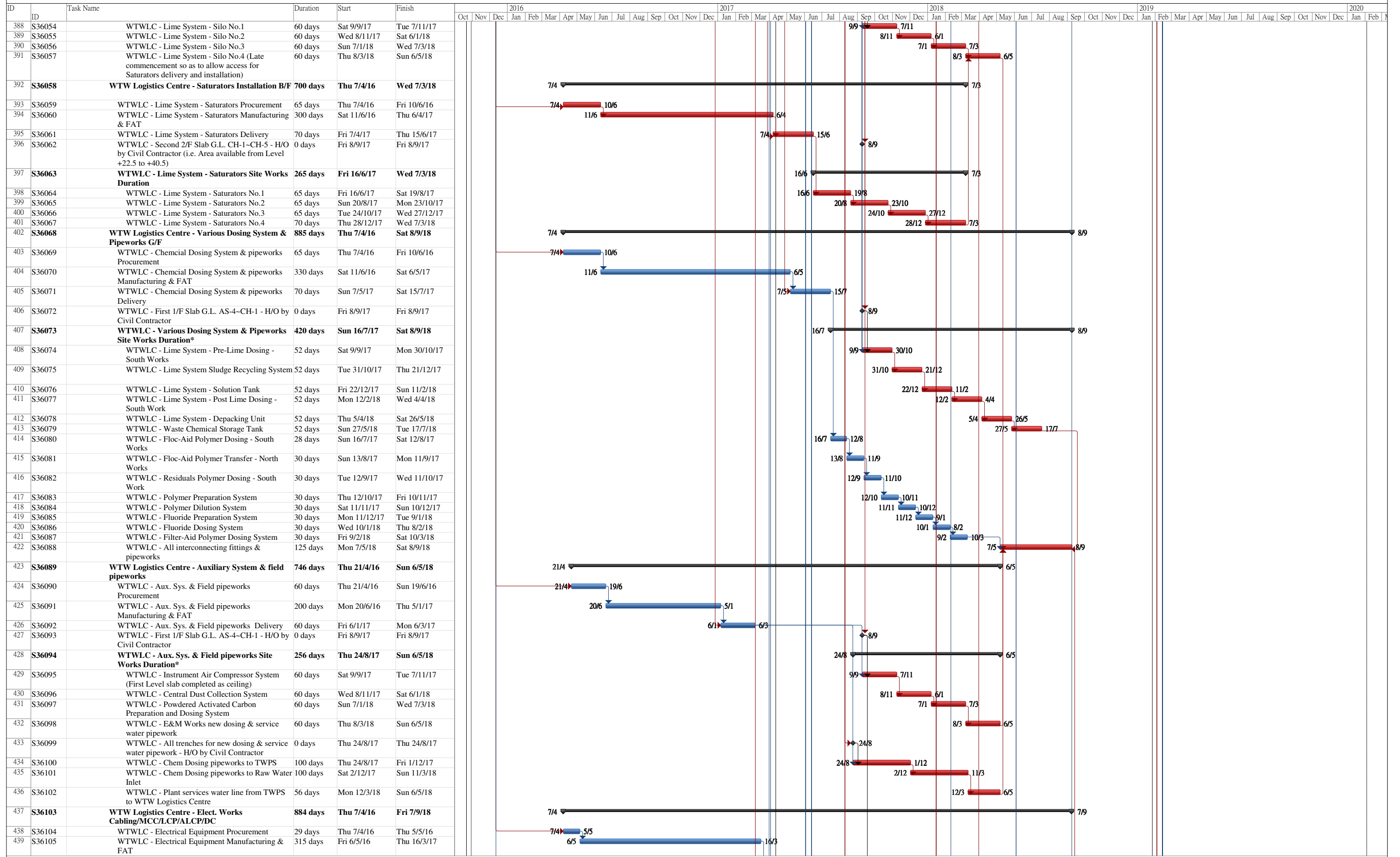


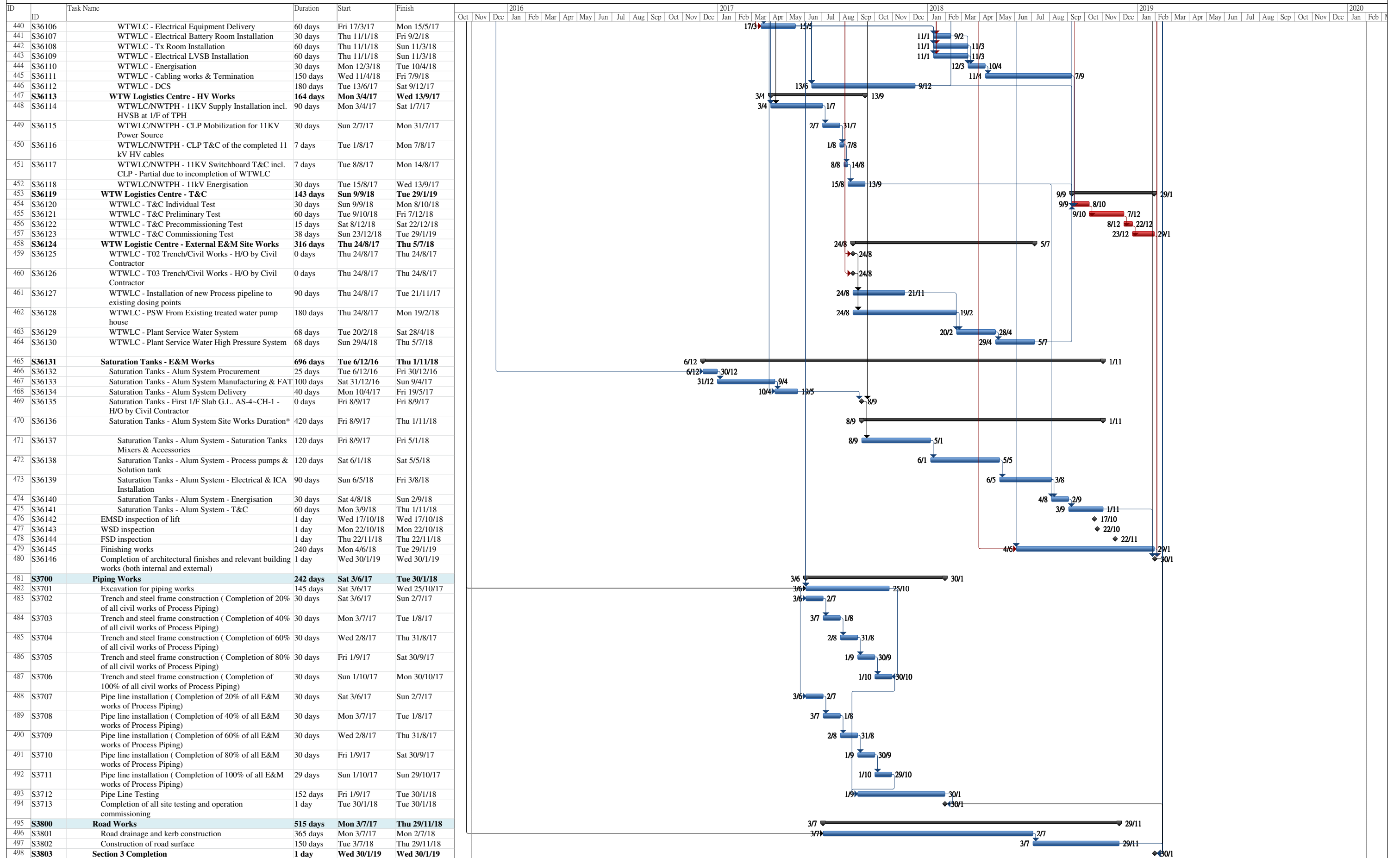


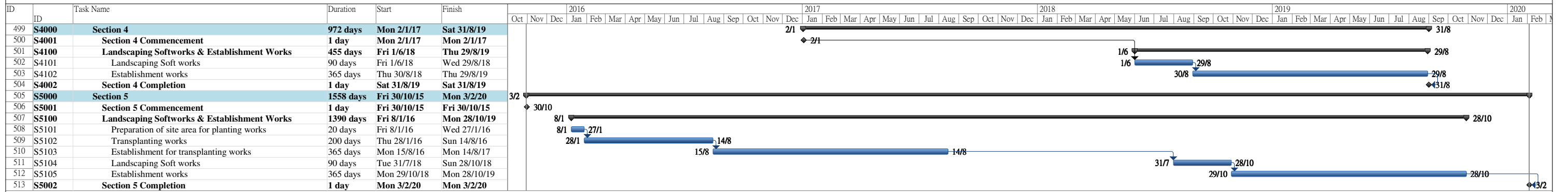








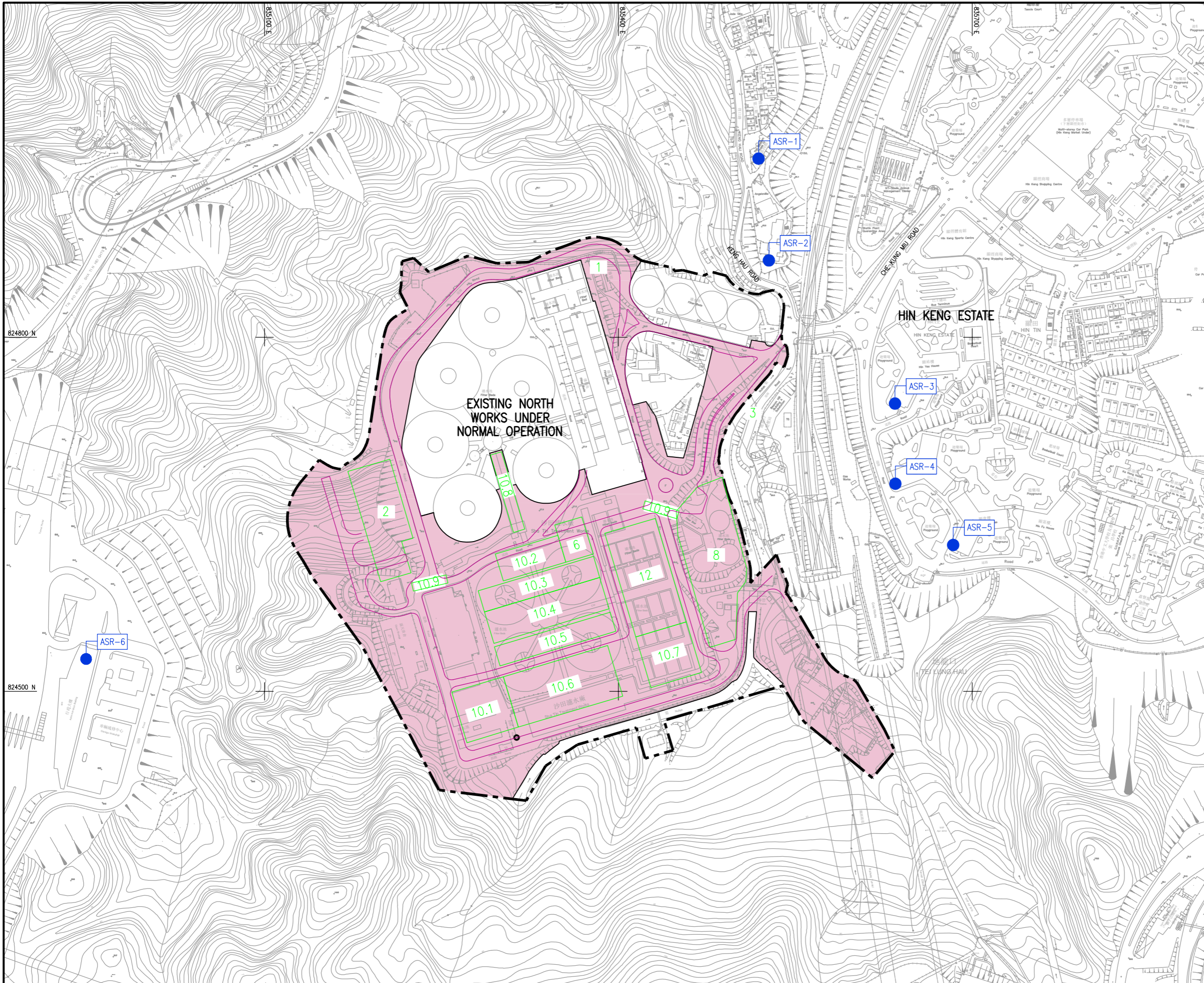




Critical Split Task Milestone Summary Manual Summary Critical

Appendix D

Location of Construction Activities



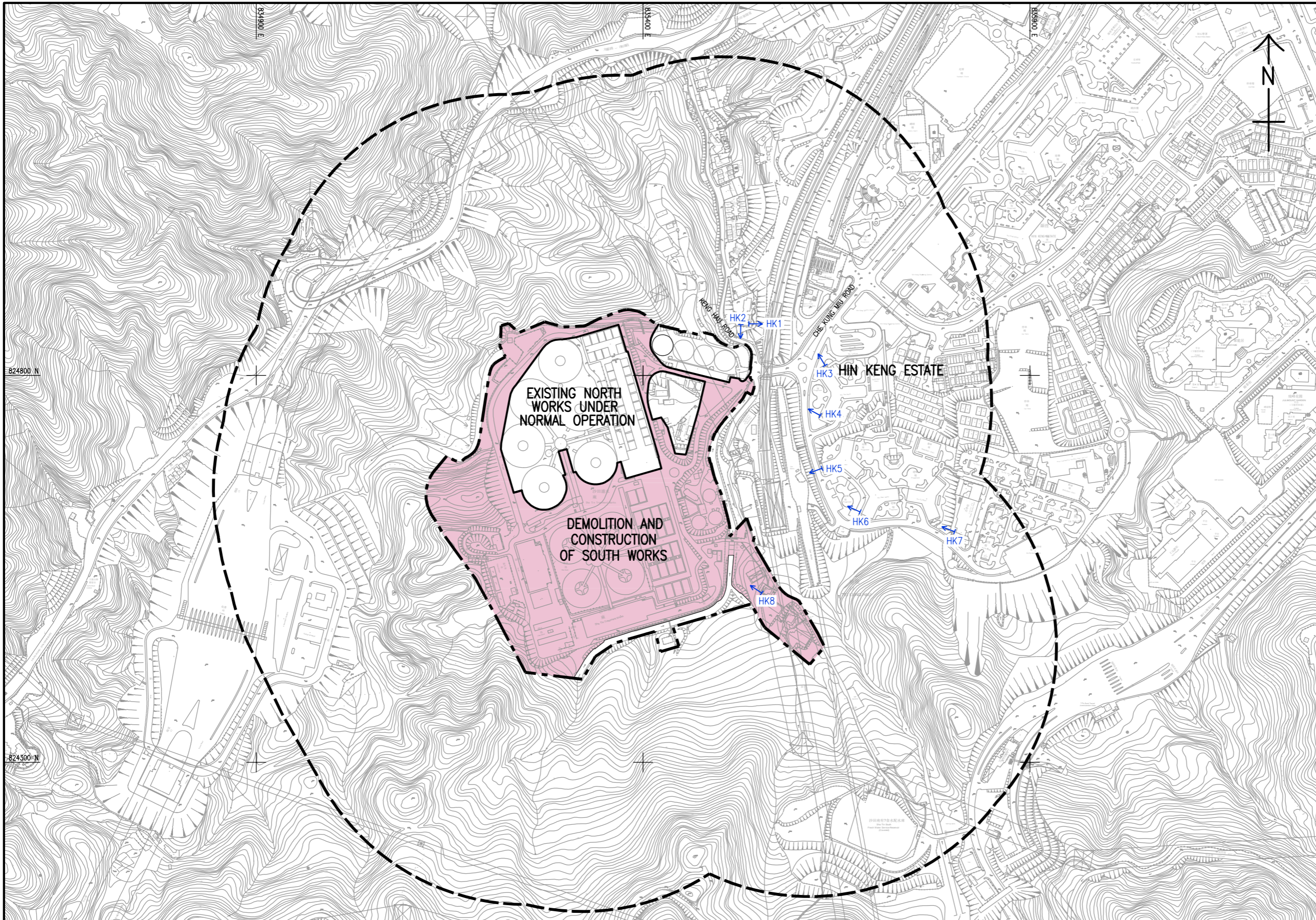
LEGEND:

	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
1	RETAINING WALL AND NEW ACCESS ROAD
2	WATER TREATMENT WORKS LOGISTICS CENTRE
3	UPGRADED MAIN ENTRY ROAD
6	WASHWATER EQUALIZATION TANKS (NORTH WORKS)
8	DEMOLITION OF EXISTING WASHWATER RECOVERY TANKS
10	CONSTRUCTION OF SOUTH WORKS
10.1	RESIDUAL MANAGEMENT FACILITIES
10.2	PRE-OZONATION HOUSE AND COAGULATION TANKS
10.3	FLOCCULATION TANKS
10.4	HIGH RATE SEDIMENTATION TANKS
10.5	INTERMEDIATE OZONATION HOUSE
10.6	STAGE 1 BIOLOGICAL FILTERS
10.7	SOUTH WORKS PUMPING STATION
10.8	INLET CHANNEL STATIC MIXERS (NORTH WORKS)
10.9	PEDESTRIAN WALKWAY
12	STAGE 2 GRANULAR MEDIA FILTERS & UV REACTORS
13	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>	<table border="1"> <tr> <td>DESIGNED BY</td> <td>CONTRACT NO.</td> <td>P. NO. APPROVED</td> </tr> <tr> <td>DRAWN BY</td> <td>REVISED</td> <td>DATE</td> </tr> <tr> <td>SCALE</td> <td colspan="2">DATE</td> </tr> <tr> <td>UNIT</td> <td colspan="2">METRES</td> </tr> </table> <p>© COPYRIGHT RESERVED</p>	DESIGNED BY	CONTRACT NO.	P. NO. APPROVED	DRAWN BY	REVISED	DATE	SCALE	DATE		UNIT	METRES	
DESIGNED BY	CONTRACT NO.	P. NO. APPROVED											
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SCALE	DATE												
UNIT	METRES												

Appendix E

Environmental Sensitive Receivers in the Vicinity of the Project

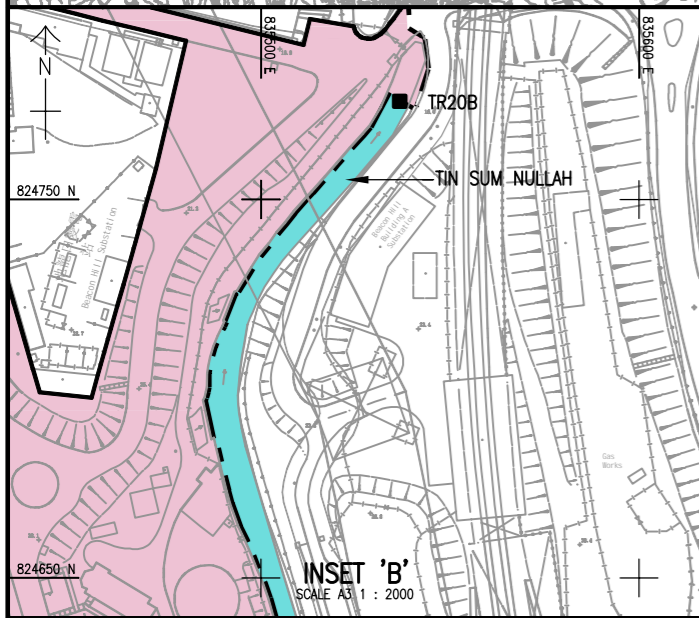
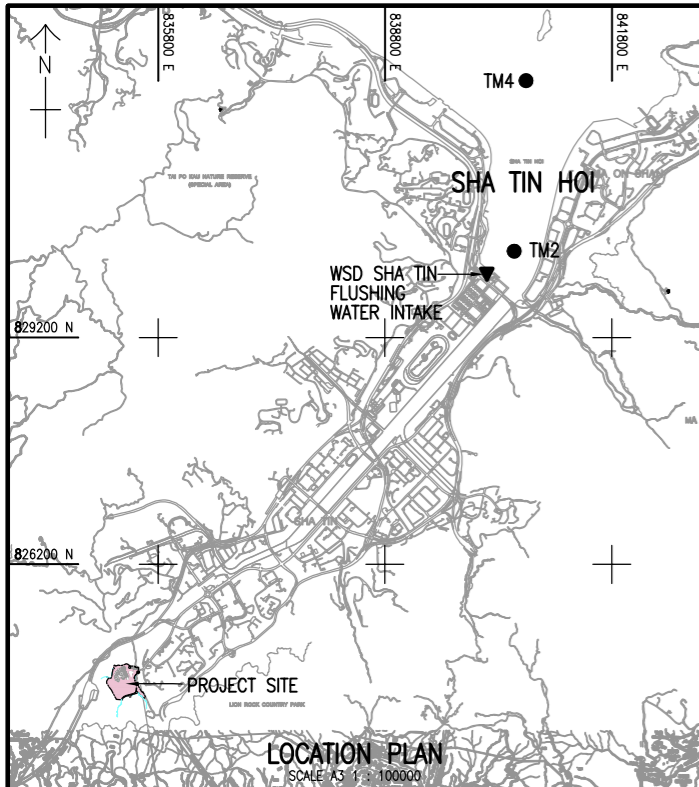
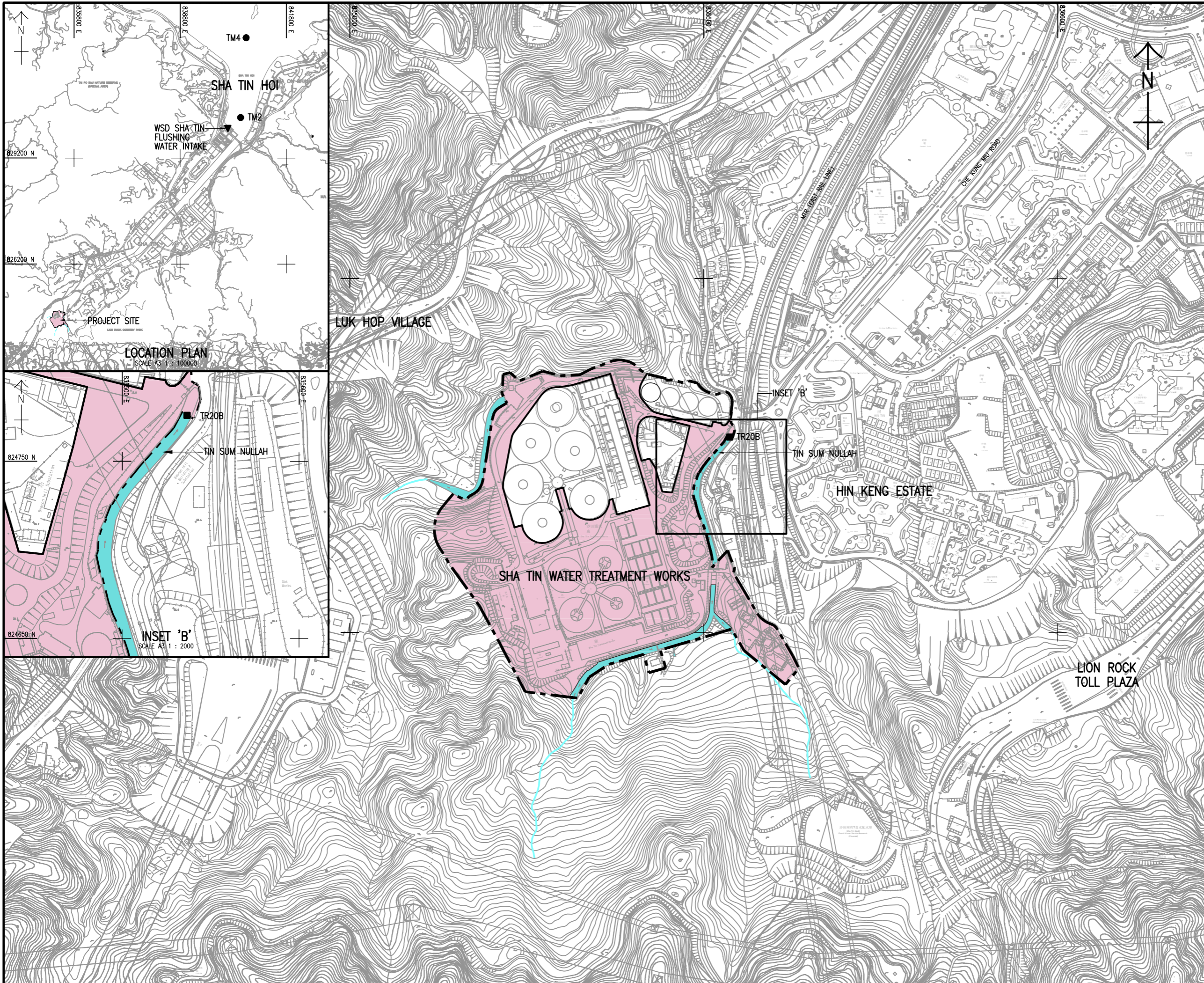


LEGEND:

- 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	水務署		
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	60162073/EIA/FIG 5.1		
DESIGNED BY	CONTRACT NO.	P. NO. APPROVED	
繪圖	合約編號	圖則	
CHECKED BY	SCALE	DATE	
校核	A3 1 : 5000		
DESIGNED AND CHECKED BY	METRES		
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- LEGEND:**
- SITE BOUNDARY OF SHATIN WATER TREATMENT WORKS
 - WORKS AREA
 - INLAND WATER COURSE
 - EPD MARINE WATER QUALITY MONITORING STATION
 - EPD RIVER WATER QUALITY MONITORING STATION
 - WSD SHA TIN FLUSHING WATER INTAKE

REV.	DESCRIPTION	BY	CHK.	DATE

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

LOCATIONS OF WATER SENSITIVE RECEIVERS



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

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Appendix F

Summary of Action and Limit Levels

Determination of Action and Limit Levels for Air Quality

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

Determination of Action and Limit Levels for Noise

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

Determination of Action and Limit Levels for Water Quality

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

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

Appendix G

Event/Action Plan

Air Quality

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
1. Exceedance for one sample	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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, 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Notify the Contractor, IEC, EPD and ER; 2. Repeat measurement to confirm findings; 3. Increase monitoring frequency; 4. Carry out analysis of 	<ol style="list-style-type: none"> 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; 	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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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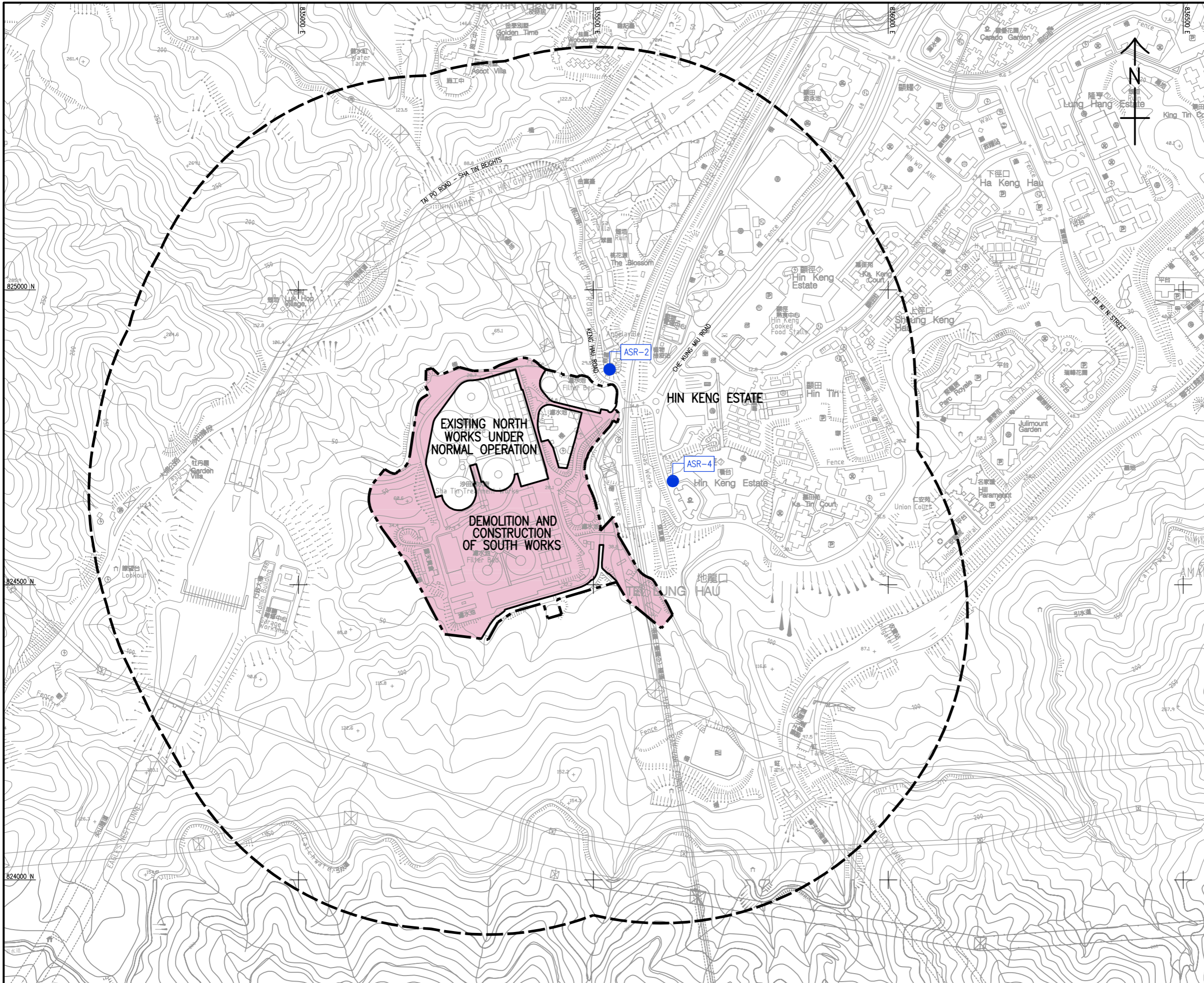
Appendix H

Impact Monitoring Schedules

Apr-18						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3			Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	
8	9	10	11	12	13	14
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	
15	16	17	18	19	20	21
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	
22	23	24	25	26	27	28
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	
29	30	*Remark: No construction works will be performed on public holiday 2/4 and 5/4				
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3					

Appendix I

Location Plan of Air Quality Monitoring Station



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

REV.	DESCRIPTION	BY	CHK.	DATE

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

LOCATIONS OF PROPOSED DUST MONITORING STATIONS

AECOM

DRG. NO. 60162073/EM&A/FIG 3
 圖紙編號

DESIGNED BY	CONTRACT NO.	P. No. APPROVED
DRAWN BY	DATE	批准人
SCALE		
CONSTRUCTION ARE IN METRES	© COPYRIGHT RESERVED 版權所有	

Appendix J

Calibration Certificates

(Air Monitoring)

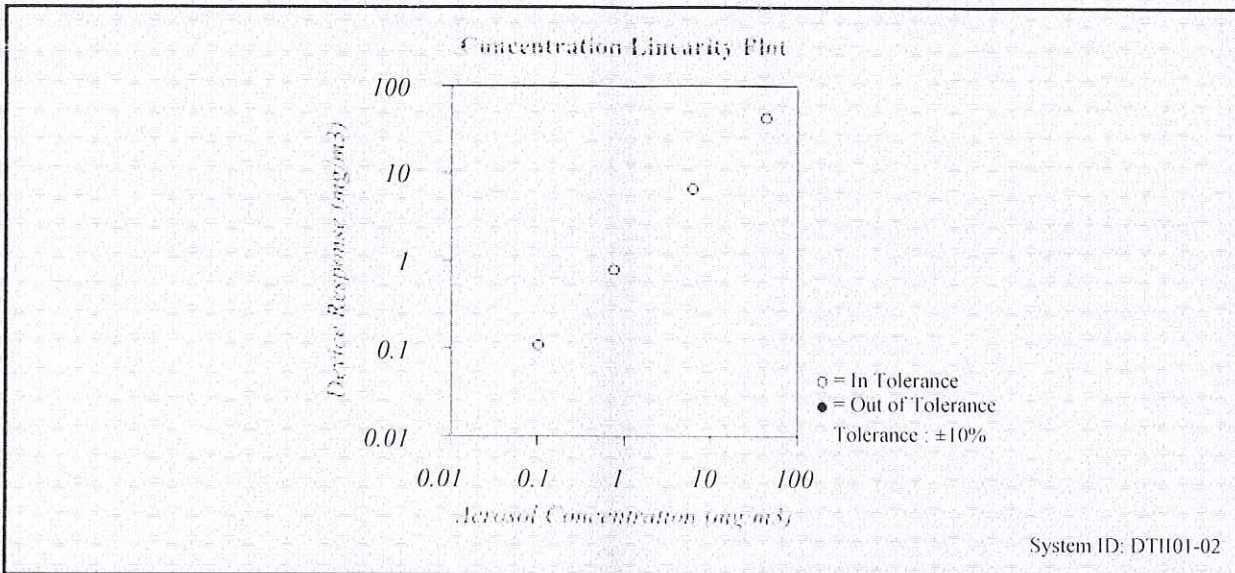


CERTIFICATE OF CALIBRATION AND TESTING

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

Environment Conditions			Model	8532
Temperature	74.9 (23.8)	°F (°C)	Serial Number	8532114409
Relative Humidity	46	%RH		
Barometric Pressure	29.08 (984.8)	inHg (hPa)		

<input checked="" type="checkbox"/> As Left	<input checked="" type="checkbox"/> In Tolerance
<input type="checkbox"/> As Found	<input type="checkbox"/> Out of Tolerance



FLOW AND PRESSURE VERIFICATION				SYSTEM DT1101-02			
Parameter	Standard	Measured	Allowable Range	Parameter	Standard	Measured	Allowable Range
Flow lpm	3.0	3.1	2.85 ~ 3.15	Pressure kPa	98.5	98.5	93.57 ~ 103.42

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

Measurement Variable	System ID	Last Cal.	Cal. Due	Measurement Variable	System ID	Last Cal.	Cal. Due
Temp/Humidity	E005409	04-26-16	10-26-17	Temp/Humidity	E005410	04-26-16	10-26-17
DC Voltage	E003314	05-03-17	05-31-18	DC Voltage	E003315	05-03-17	05-31-18
Photometer	E003319	01-16-17	07-31-17	Microbalance	M001324	11-02-16	11-30-18
1 µm PSL	679755	n/a	n/a	3 µm PSL	180387	n/a	n/a
10 µm PSL	167947	n/a	n/a	Pressure	E003511	10-11-16	10-11-17
Flowmeter	E002471	04-20-17	04-30-18				

Kurt W. Lee

 Calibrated

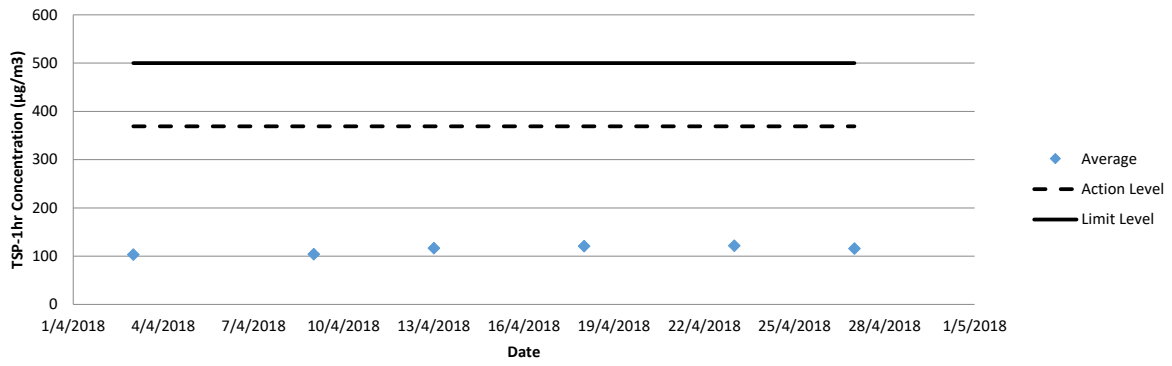
July 24, 2017

 Date

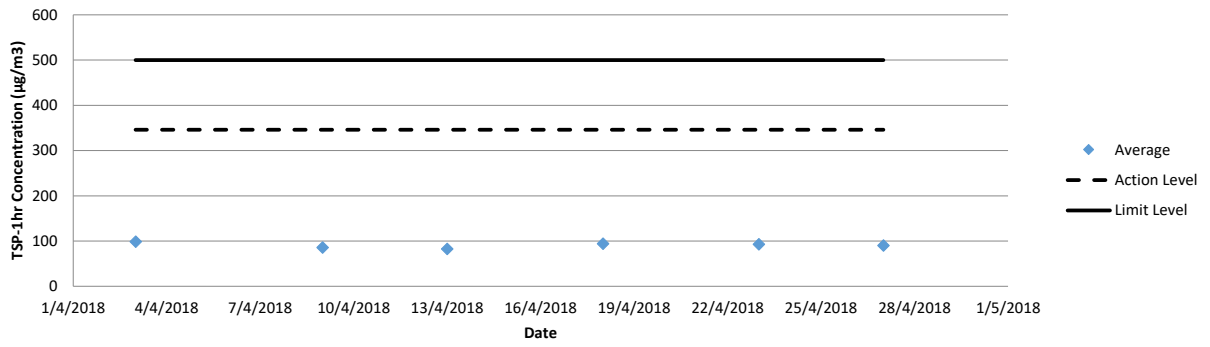
Appendix K

Impact Air Quality Monitoring Results and Graphical Presentation

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

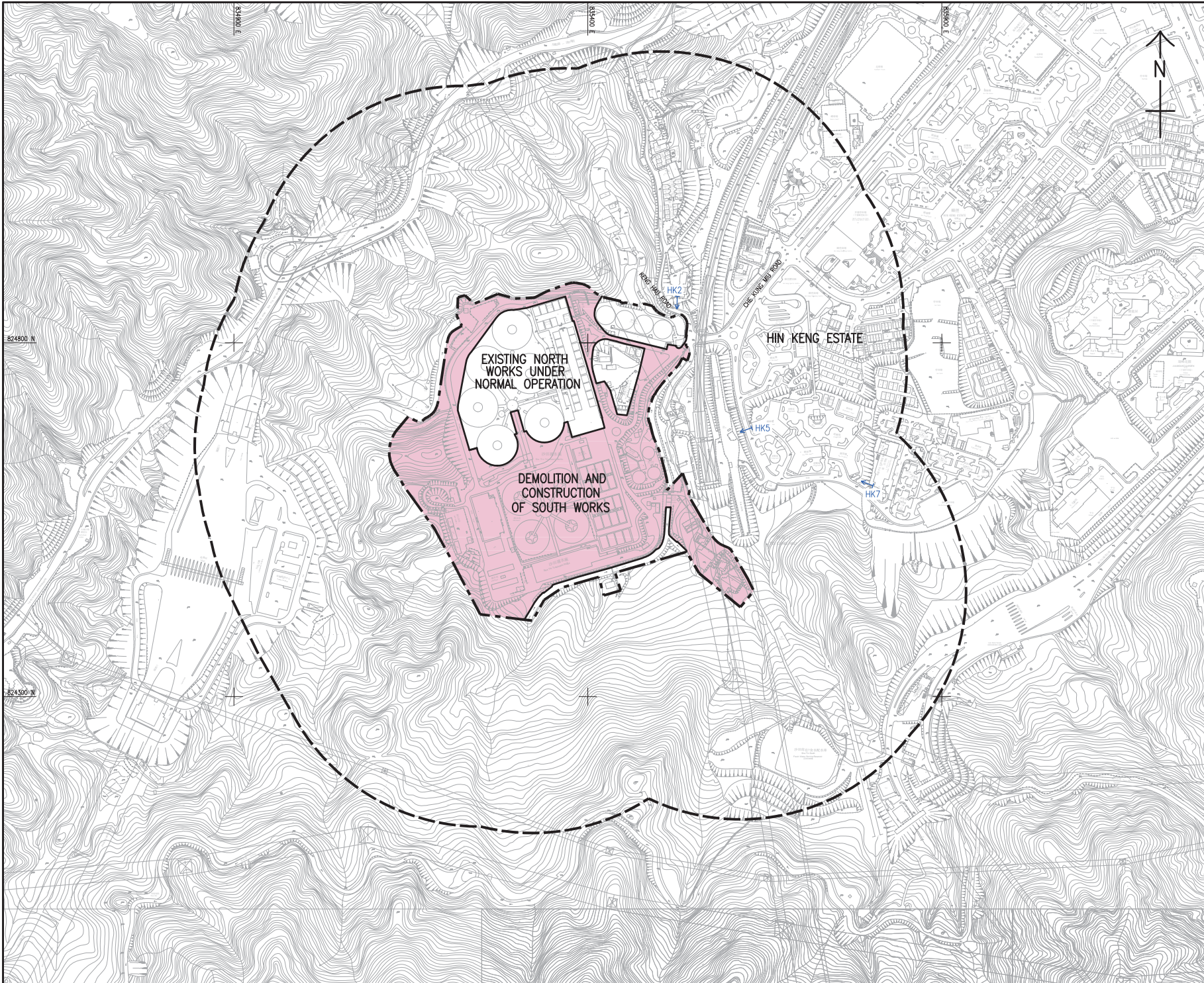


The Summary of TSP-1hr Concentration ($\mu\text{g}/\text{m}^3$) at AM2 Hin Keng Estate - Hin Wan House



Appendix L

Location Plan of Noise Monitoring Station



LEGEND:

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

積分形精密騒音計
Intergrating Precision Sound Level Meter
TYPE 6224

検査成績書
INSPECTION CERTIFICATE

本体製造番号
Serial No. of body: 171157

マイクロホン製造番号
Serial No. of Microphone: 67492

Ver : 1.6E-09-11

年月日: 平成29年8月1日
Date: August 1, 2017

承認 Approved	点検 Passed	担当 Inspected
<i>A. Nagata</i>	<i>T. Matsumoto</i>	<i>K. Kabeita</i>

株式会社 アコー
ACO CO., LTD.

1. 検査年月日 Inspection Date

平成29年8月1日 August 1, 2017

2. 検査条件 Inspection Condition

- 1) 温度 Temperature : 26 °C
 2) 湿度 Humidity : 58 %
 3) 気圧 Barometric pressure : 982 hPa

3. 検査項目及び結果 Inspection Results

1) RANGE 切換誤差検査 The RANGE Shifting Error

RANGE: 20-100dB、70dB入力基準±0.5dB以下

Within ±0.5dB of the value at 70dB input, Range 20-100dB.

RANGE (dB)	入力レベル Input level (dB)	周波数 Frequency (Hz)		
		31.5	1000	8000
40-130	100	0.0	0.0	0.1
30-120	90	0.0	-0.1	0.0
20-110	80	0.1	0.0	0.1
20-100	70	0.0	0.0	0.0
20-90	60	0.1	-0.1	0.0
20-80	50	0.1	-0.1	-0.1
判定	Passed	Pass		

2) 安定性特性検査 Stability Characteristic

RANGE: 20-100dB、1分後基準±0.5dB以下

Within ±0.5dB of the value one minute later, Range 20-100dB.

		10分後 ten minutes later
誤差	Error (dB)	0.0
判定	Passed	Pass

3) 目盛誤差特性検査 The Scale Error

RANGE: 20-110dB、65dB入力基準

Error of the value at 65dB input, Range 20-110dB.

入力 Input (dB)	規格 Standard (dB)	周波数 Frequency (Hz)		
		31.5	1000	8000
110	±0.7	0.0	0.0	0.0
105	±0.7	-0.2	-0.1	0.0
100	±0.7	0.0	0.0	-0.1
95	±0.7	-0.1	0.0	0.0
90	±0.7	0.2	0.1	0.1
85	±0.7	0.1	0.1	0.0
80	±0.7	0.1	0.0	0.0
75	±0.7	0.1	0.0	0.0
70	±0.7	0.0	-0.1	-0.1
65		0.0	0.0	0.0
60	±0.7	-0.2	0.0	0.0
55	±0.7	-0.3	-0.1	-0.1
50	±0.7	-0.1	0.0	0.0
45	±0.7	-0.2	0.1	0.1
40	±0.7	-0.2	-0.1	0.0
35	±0.7	0.0	-0.1	0.1
30	±0.7	-0.2	-0.1	-0.1
25	±0.7	0.1	0.0	0.0
判定	Passed	Pass		

4) 動特性検査 Dynamic Characteristic

RANGE: 20-100dB、1kHz、100dB入力基準

When 100dB input, Range 20-100dB at 1kHz.

	規格 Standard(dB)	測定 Measured Value(dB)
FAST	-1.0 ^{+0.5} -1.0 (dB)	-1.0
SLOW	-4.0 ±1.0 (dB)	-4.0
判定	Passed	Pass

5) 周波数特性検査 Frequency Response

RANGE: 20-100dB、95dB入力基準(マイクを含む)

When 95dB input, including Microphone value, Range 20-100dB.

周波数 Frequency (Hz)	許容差 Tolerance (dB)	A特性			C特性			FLAT(Z)特性		
		規格 Standard (dB)	レスポンス Response (dB)	偏差 Deviation (dB)	規格 Standard (dB)	レスポンス Response (dB)	偏差 Deviation (dB)	規格 Standard (dB)	レスポンス Response (dB)	偏差 Deviation (dB)
20	±3.0	-50.5	-49.0	1.5	-6.2	-5.1	1.1	0.0	-0.9	-0.9
40	±1.5	-34.6	-34.0	0.6	-2.0	-1.7	0.3	0.0	-0.1	-0.1
100	±1.0	-19.1	-18.8	0.3	-0.3	-0.2	0.1	0.0	0.1	0.1
250	±1.0	-8.6	-8.3	0.3	0.0	0.1	0.1	0.0	0.1	0.1
500	±1.0	-3.2	-3.0	0.2	0.0	0.0	0.0	0.0	0.1	0.1
1000	±1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
2000	±1.0	1.2	1.1	-0.1	-0.2	-0.3	-0.1	0.0	0.0	0.0
4000	±1.0	1.0	0.5	-0.5	-0.8	-1.1	-0.3	0.0	-0.1	-0.1
5000	±1.5	0.5	-0.1	-0.6	-1.3	-1.9	-0.6	0.0	-0.4	-0.4
6300	+1.5 -2.0	-0.1	-0.6	-0.5	-2.0	-2.3	-0.3	0.0	-0.2	-0.2
8000	+1.5 -3.0	-1.1	-1.7	-0.6	-3.0	-3.5	-0.5	0.0	-0.3	-0.3
10000	+1.5 -4.0	-2.5	-3.2	-0.7	-4.4	-5.1	-0.7	0.0	-0.9	-0.9
12500	+3.0 -6.0	-4.3	-4.0	0.3	-6.2	-5.7	0.5	0.0	-0.4	-0.4
16000								0.0	-2.7	-2.7
20000								0.0	-2.2	-2.2
判定	Passed	Pass								

6) 実効値指示誤差検査 Effective Value Error

RANGE: 20-100dB、波高率3のバースト信号に対して1.0dB以内

Within 1.0dB on the Burst signal of the peak factor 3, Range 20-100dB.

周波数 Frequency 2kHz、繰り返し周波数 Repeat frequency 40Hz

実効値指示誤差 Effective value Error (dB)	判定 Passed
0.3	Pass

7) 自己雑音特性検査 Self-noise

RANGE: 20-80dB (マイクを含む)

RANGE: 20-80dB (Including Microphone value)

RANGE : 20-80dB (Including Microphone value)	A特性	C特性	FLAT(Z)特性
規格 Standard (dB)	18以下 Below 18	29以下 Below 29	32以下 Below 32
自己雑音 Self-noise(dB)	17.1	23.8	29.7
判定	Passed		



Certificate of Calibration

校正證書

Certificate No. : C172190
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-0865) Date of Receipt / 收件日期 : 18 April 2017
Description / 儀器名稱 : Acoustic Calibrator
Manufacturer / 製造商 : Pulsar
Model No. / 型號 : 105
Serial No. / 編號 : 70396
Supplied By / 委託者 : Acumen Environmental Engineering and Technologies Co., Ltd.
Lot 11, Tam Kon Shan Road, North Tsing Yi, N.T.

TEST CONDITIONS / 測試條件

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

TEST SPECIFICATIONS / 測試規範

Calibration check


DATE OF TEST / 測試日期 : 25 April 2017


TEST RESULTS / 測試結果

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

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

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

Tested By : 
測試 : H T Wong
Technical Officer

Certified By : 
核證 : K C Lee
Project Engineer

Date of Issue : 26 April 2017
簽發日期

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

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

Certificate of Calibration

校正證書

Certificate No. : C172190
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
TST150A	Measuring Amplifier	C161175
CL130	Universal Counter	C163709
CL281	Multifunction Acoustic Calibrator	PA160023

- Test procedure : MA100N.

- Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	IEC60942:2003 Class 1 Spec.	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	93.9	± 0.4 dB	± 0.2

Mfr's Spec. : IEC60942:2003 Class 1

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000	1 kHz ± 1 %	± 1

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

Note :

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

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



Certificate of Conformity

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

Methods Used in Calibration and Testing

Wind Speed:

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

Temperature:

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

Direction / Heading

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

Relative Humidity:

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

Barometric Pressure:

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

Approved By:

Michael Naughton, Engineering Manager

SENSORS																		
SENSOR	1000	2000	2500	3000	3500	3500 DT	4000	4200	4250	4300	4400	4500	4500 HOR	ACCURACY (H+) ¹	RESOLUTION	SPECIFICATION RANGE	OPERATIONAL RANGE	NOTES
Wind Speed Air Flow	•	•	•	•	•	•	•	•	•	•	•	•	•	0.1 m/s Larger of 3% of reading, least significant digit or 20 ft/min 0.1 km/h 0.1 mph 1.2 to 77.8 knots 1 ft	0.6 to 40.0 m/s 118 to 7,874 ft/min 2.2 to 144.0 km/h 1.3 to 89.5 mph 1.2 to 116.6 knots 0 to 12 ft	0.6 to 60.0 m/s 118 to 11,811 ft/min 2.2 to 216.0 km/h 1.3 to 134.2 mph 1.2 to 116.6 knots 0 to 12 ft	1 inch/25 mm diameter impeller with precision axle and low-friction 2yell® bearings. Startup speed stated as lower limit, readings may be taken down to 0.4 m/s (78 ft/min) 1.5 km/h 0.9 mph 0.4 m/s after impeller startup. Off-axis accuracy: ±1% @ 5° off-axis; ±2% @ 10° off-axis. Calibration drift < 1% after 100 hours use at 16 MPH / 7 m/s. Replacement impeller (NK-PN-0801) field install without tools. (US Patent 5,763,753). Wind speed calibration and testing should be done with impeller located at the top front face of the Kestrel.	
Ambient Temperature	•	•	•	•	•	•	•	•	•	•	•	•	•	0.5 °F 0.1 °C	0.1 °F 0.1 °C	-20.0 to 158.0 °F -29.0 to 70.0 °C	14.0 to 131.0 °F -10.0 to 55.0 °C	Hermetically-sealed, precision thermistor mounted externally and thermally isolated (US Patent 5,939,645) for rapid response. Airflow of 2.2 m/s (1 m/s or greater) provides fastest response and reduction in insulation effect. Calibration drift negligible. Thermistor may also be used to measure temperature of water or snow by submerging thermistor portion into material - remove impeller prior to taking submerged measurements and ensure humidity sensor membrane is free of liquid water prior to taking humidity based measurements after submersion.
Globe Temperature - Tg												•	•	1 °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 1in/25 mm black powder coated copper globe converted to Tg equivalent for standard 6 in/150 mm globe. Closest equivalence obtained with airflow greater than 2.2 m/s (1 m/s).
Relative Humidity				•	•	•	•	•	•	•	•	•	•	3.0 %RH	0.1 %RH	5 to 95% non-condensing	0 to 100%	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 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 48.87 inHg 10.0 to 1,654.3 hPa/mbar 0.14 to 24.0 PSI and 14.0 to 131.0 °F -10.0 to 55.0 °C	Monolithic silicon piezoresistive pressure sensor with second-order temperature correction. Pressure sensor may be recalibrated at factory or in field. Adjustable reference altitude allows display of station pressure or barometric pressure corrected to MSL. Kestrel 4200 displays station pressure on a dedicated screen. Kestrel 2500 and 3500 display continuously updating three-hour barometric pressure trend indicator: rising rapidly, rising, steady, falling, falling rapidly. Kestrel 4000 series displays pressure trend through graphing function. PSI display on Kestrel 4000 series only.
Compass												•	•	5°	1° 1/16th Cardinal Scale	0 to 360°	0 to 360°	2-axis solid-state magnetoresistive sensor mounted perpendicular to unit plane. Accuracy of sensor dependent upon unit's vertical position. Self-calibration routine eliminates magnetic error from batteries or unit and must be run after every full power-down (battery removal or charge). Readout indicates direction to which the back of the unit is pointed when held in a vertical orientation. Declination/variation adjustable for True North readout.

CALCULATED MEASUREMENTS																		
MEASUREMENT	1000	2000	2500	3000	3500	3500 DT	4000	4200	4250	4300	4400	4500	4500 HOR	ACCURACY (H+) ¹	RESOLUTION	SPECIFICATION RANGE	SENSORS EMPLOYED	NOTES
Air Density								•	•					0.0002 lbm ³ 0.003 kg/m ³	0.001 lbm ³ 0.001 kg/m ³	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Mass of air per unit volume
Air Flow								•						6.71%	1 cfm 1 m ³ /hr 0.1 m ³ /s 1 L/s	Refer to Ranges for Sensors Employed	Air Flow User Input (Duct Shape & Size)	Volume of air flowing through an opening. Automatically calculated from Air Velocity measurement and user-specified duct shape (circle or rectangle) and dimensions (units: in, ft, 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/m ² /hr	0.01 lbm/hr 0.01 kg/m ² /hr	Refer to Ranges for Sensors Employed	Wind Speed Temperature Relative Humidity Pressure User Input (Concrete Temperature)	The rate at which moisture is lost from the surface of curing concrete. Requires user measurement and entry of concrete temperature obtained with an accurate IR or probe thermometer (°F or °C, not included). Readings should be taken 20 inches above pour surface with the thermometer shaded, and averaged for 6-10 seconds using built-in averaging function.
Heat Index				•	•	•	•	•	•	•	•	•	•	7.1 °F 4.0 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Perceived temperature resulting from the combined effect of temperature and relative humidity. Calculated based on NWS Heat Index (HI) tables. Measurement range limited by extent of published tables.
Moisture Content Humidity Ratio ("Grains")													•	3 gpp g/kg	0.1 gpp 0.01 g/kg	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Mass of water vapor in a mass of air.
Relative Air Density													•	0.3%	0.1%	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	The ratio, expressed as a percentage, of measured air density to the air density of a standard atmosphere as defined by the ICAO.
Thermal Work Limit (TWL)													•	10.9 W/m ²	0.1 W/m ²	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Estimated safe maximum continuously sustainable human metabolic rate (W/m ²) for the conditions and clothing factors. Based off of estimated metabolic output of typical human. On-screen zone warnings.
Outdoor Wet Bulb Globe Temperature (WBGT)													•	1.3 °F 0.7 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Measure of human heat stress defined as the combination of effects due to radiation, convection, and conduction. Outdoor WBGT is calculated from a weighted sum of natural wet bulb (Twb), globe temperature (Tg), and dry bulb temperature (Td). User settable on-screen warning zones.
Wet Bulb Temperature - Naturally Aspirated (Twb)													•	1.4 °F 0.8 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Similar to psychrometric wet-bulb temperature (see below). However, Twb only undergoes forced convection from the ambient air velocity. Twb is a measure of the evaporative cooling that the air will allow. This is accounted for by combining the effects of, mainly, relative humidity and windspeed.
Wet Bulb Temperature - Psychrometric													•	3.2 °F 1.8 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Temperature indicated by a sling psychrometer. Due to nature of the psychrometric ratio for a water-air system, this approximates the thermodynamic wet-bulb temperature. The thermodynamic wet-bulb temperature is the temperature a parcel of air would have if cooled adiabatically to saturation temperature via water evaporating into it.
Wind Chill													•	1.6 °F 0.9 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature	Perceived temperature resulting from combined effect of wind speed and temperature. Calculated based on the NWS Wind Chill Temperature (WCT) Index, revised 2001, with wind speed adjusted by a factor of 1.5 to yield equivalent results to wind speed measured at 10 m above ground. Measurement range limited by extent of published tables.

ADDITIONAL SPECIFICATIONS														
Display & Backlight	•	•	•	•	•	•	•	•	•	•	•	•	•	Reflective 3 1/2 digit LCD. Digit height 0.29 in / 9 mm. Aviation green electroluminescent backlight. Manual activation with auto-off.
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														Multi-function, multi-digit monochrome dot-matrix display. Choice of aviation green or visible red (NV models only) electroluminescent backlight. Automatic or manual activation.
Data Storage & Graphical 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.
Clock / Calendar	•	•	•	•	•	•	•	•	•	•	•	•	•	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.
Auto Shutdown	•	•	•	•	•	•	•	•	•	•	•	•	•	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.
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	•	•	•	•	•	•	•	•	•	•	•	•	•	Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.
Sealing	•	•	•	•	•	•	•	•	•	•	•	•	•	Requires optional PC interface (USB or RS-232) or Bluetooth data transfer option and provided software.
Operational Temperature Limits	•	•	•	•	•	•	•	•	•	•	•	•	•	Standard Models: AAA Alkaline, two, included. Average life, 400 hours of use, reduced by backlight or Bluetooth radio transmission use.
Storage Temperature	•	•	•	•	•	•	•	•	•	•	•	•	•	MIL-STD-883C, Transient Shock, Method 516.5 Procedure IV, unit only, impact may damage replaceable impeller.
Size & Weight	•	•	•	•	•	•	•	•	•	•	•	•	•	Waterproof (IP67) and NEMA-6.

* 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).

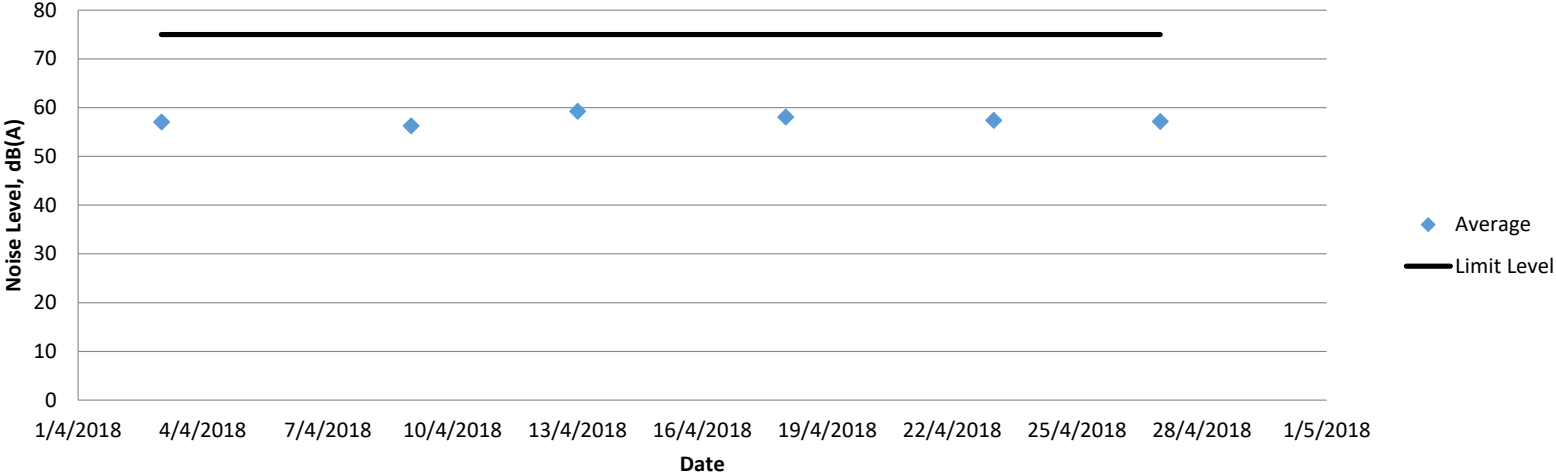
Please note, these specifications are valid for all Kestrel 4400 products and all other Kestrel 4000 series with a serial number higher than 659340. If your product has a lower serial number, please reference the previous version of the specifications.

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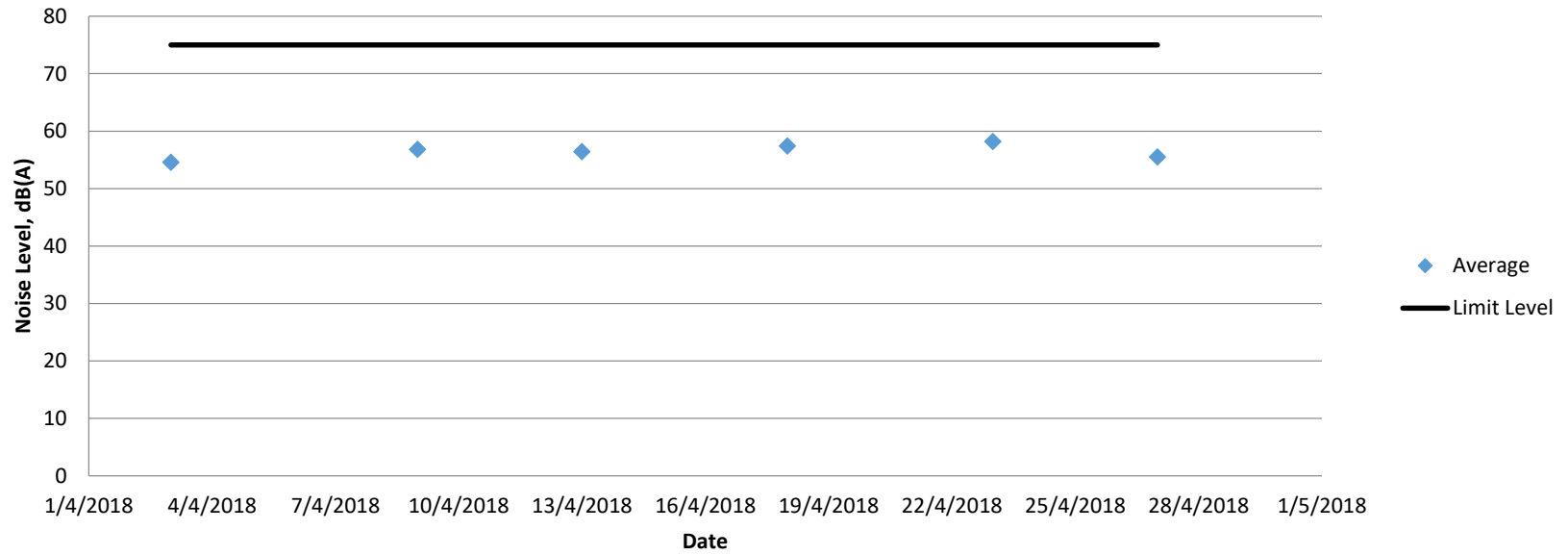
Appendix N

Impact Noise Monitoring Results and Graphical Presentation

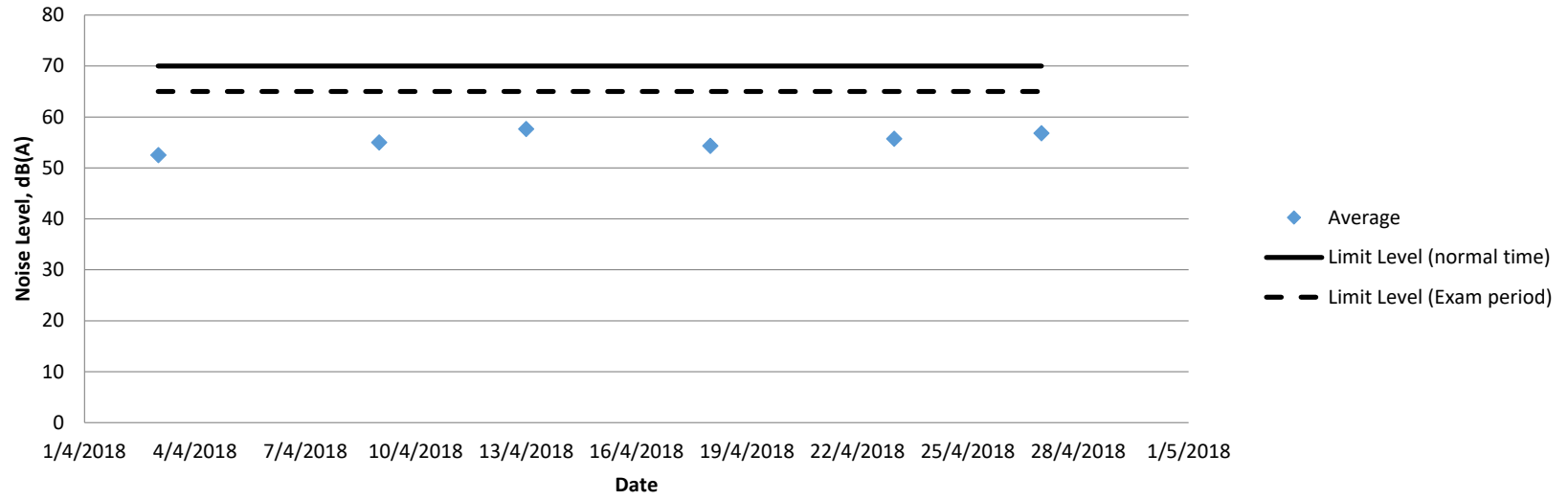
Noise Level Results at NM1 -The L Louey (South)



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

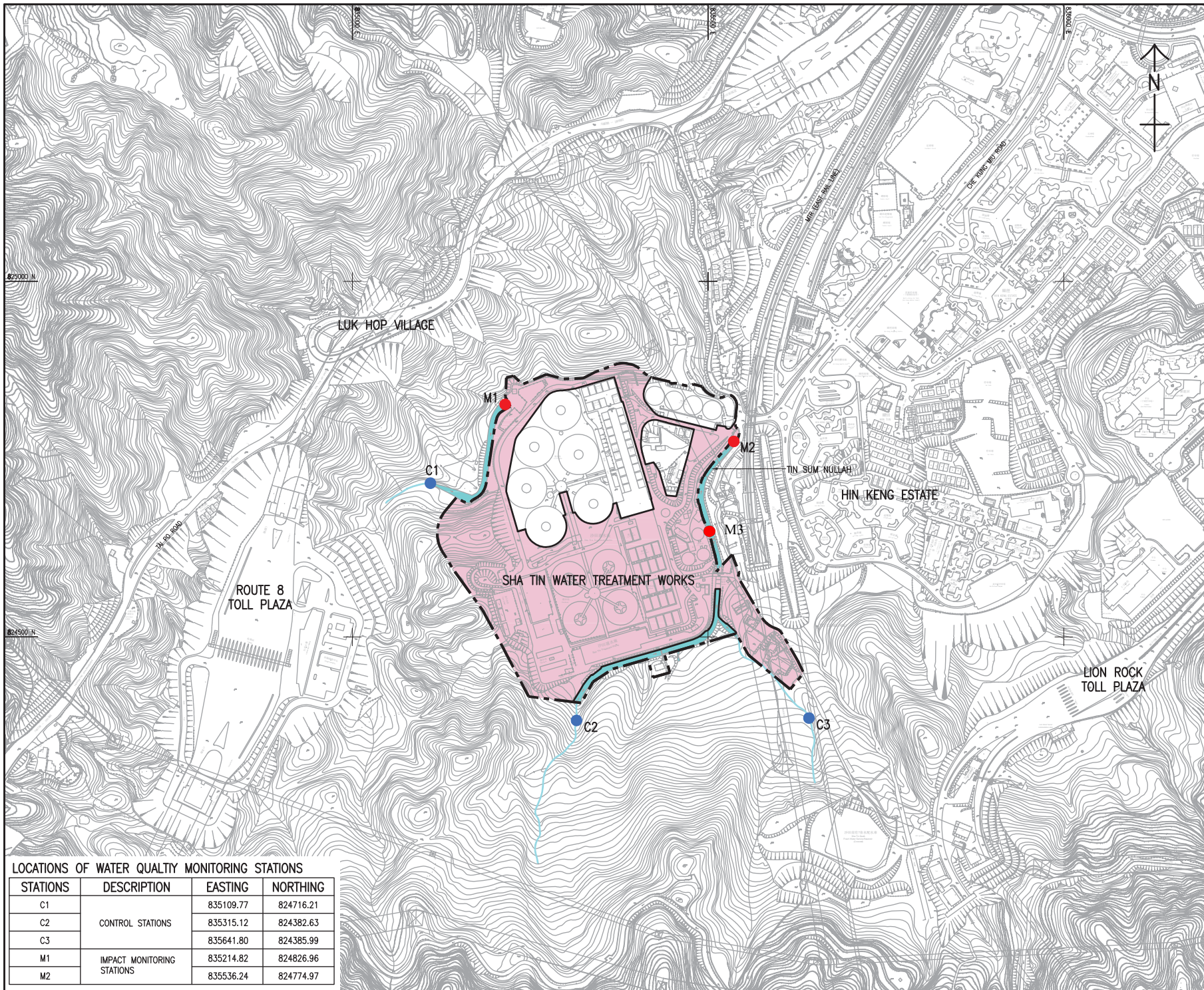


Noise Level Results at NM3 -C.U.H.K.F.A.A. Thomas Cheung School








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
 DATE: 12/11/12
 SCALE: A3 1 : 5000
 METRES
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 版權所有

Appendix P

Calibration Certificate (Water Quality)



REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: MR KENNY LOK
CLIENT: ACUMEN ENVIRONMENTAL ENG & TECH CO LTD
ADDRESS: LOT 11, TAM KON SHAN ROAD,
TSING YI,
N.T., HONG KONG.

WORK ORDER: HK1815729
SUB-BATCH: 0
LABORATORY: HONG KONG
DATE RECEIVED: 06-Feb-2018
DATE OF ISSUE: 15-Feb-2018

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principals as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test: Dissolved Oxygen, pH, Salinity, Turbidity, Redox Potential and Temperature
Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: ProDSS
Serial No.: 15M101091
Equipment No.: --
Date of Calibration: 06 February, 2018

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Mr Chan Siu Ming, Vice
Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1815729
 Sub-Batch: 0
 Date of Issue: 15-Feb-2018
 Client: ACUMEN ENVIRONMENTAL ENG & TECH CO LTD



Equipment Type: Multifunctional Meter
 Brand Name: YSI
 Model No.: ProDSS
 Serial No.: 15M101091
 Equipment No.: --
 Date of Calibration: 06 February, 2018

Date of next Calibration: 06 May, 2018

Parameters:

Dissolved Oxygen Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
9.38	9.48	+0.10
5.70	5.74	+0.04
2.89	2.95	+0.06
Tolerance Limit (mg/L)		±0.20


pH Value Method Ref: APHA 21st Ed. 4500H:B

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.01	+0.01
7.0	7.00	+0.00
10.0	10.02	+0.02
Tolerance Limit (pH unit)		±0.20

Salinity Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	9.44	-5.6
20	19.30	-3.5
30	32.63	+8.8
Tolerance Limit (%)		±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.


 Mr Chan Siu Ming, Vice
 Manager - Inorganics

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1815729
 Sub-Batch: 0
 Date of Issue: 15-Feb-2018
 Client: ACUMEN ENVIRONMENTAL ENG & TECH CO LTD



Equipment Type: Multifunctional Meter
 Brand Name: YSI
 Model No.: ProDSS
 Serial No.: 15M101091
 Equipment No.: --
 Date of Calibration: 06 February, 2018

Date of next Calibration: 06 May, 2018

Parameters:

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
10.5	11.6	+1.1
21.0	20.1	-0.9
40.0	39.6	-0.4
Tolerance Limit (°C)		±2.0

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.5	--
4	4.1	+2.5
40	40.8	+2.0
80	80.3	+0.4
400	390.2	-2.5
800	811.7	+1.5
Tolerance Limit (%)		±10.0


Redox Potential

Method Ref: APHA (21st edition), 2580B

Method Ref: Orion Research Instruction Manual and the Laboratory Manual the Environmental of Water, Wastewater and Soil (2nd edition), Rump & Krist (1992)

Expected Reading (mV)	Displayed Reading (mV)	Difference of A and B (mV)
Solution A (~234mV)	172.3	
Solution B (~300mV)	248.0	+76
Tolerance Limit (mV)		>66

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.


 Mr Chan Siu Ming, Vice
 Manager - Inorganics

Appendix Q

The Certification of Laboratory with HOKLAS accredited Analytical Tests



Hong Kong Accreditation Service
香港認可處

Certificate of Accreditation
認可證書

This is to certify that
特此證明

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

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

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

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

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

Environmental Testing

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

環境測試

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

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

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

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



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

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

L 001195

Appendix R

Impact Water Quality Monitoring Results

Date	Time	Weather	Location	Co-ordinates		Water Depth m	Sample Depth m	Temp.		DO con.		DO Saturation		Turbidity		pH		SS mg/L	
				East	North			°C	mg/L	%	NTU	unit							
03-04-18	11:01	Sunny	C1	835110	824716	0.04	0.02	24.4	24.4	8.37	8.38	93.3	93.2	2.6	2.7	7.77	7.78	3.1	
	11:26	Sunny	C2	835403	824470	0.02	0.01	24.4	24.5	8.67	8.66	92.7	92.6	2.5	2.5	7.89	7.89	3.2	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10:38	Sunny	M1	835215	824827	0.8	0.4	24.2	24.2	9.06	9.05	100.2	100.3	2.1	2.2	7.88	7.86	2.4	
	9:57	Sunny	M2	835536	824775	0.05	0.025	24.4	24.4	9.30	9.29	97.1	97.1	1.7	1.8	7.69	7.70	5.2	
	10:09	Sunny	M3	835501	824648	0.02	0.01	24.3	24.3	9.28	9.28	101.9	101.9	0.6	0.6	7.67	7.69	<1	
06-04-18	11:24	Cloudy	C1	835110	824716	0.04	0.02	21.9	21.9	8.29	8.29	94.4	94.4	2.6	2.5	7.70	7.72	3.0	
	11:43	Cloudy	C2	835403	824470	0.02	0.01	21.5	21.5	8.86	8.87	98.3	98.3	2.8	2.8	7.87	7.86	3.1	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10:48	Cloudy	M1	835215	824827	0.8	0.4	21.5	21.5	9.29	9.29	101.3	101.4	2.2	2.2	7.61	7.60	2.2	
	10:03	Cloudy	M2	835536	824775	0.05	0.025	21.9	21.8	9.02	9.02	102.2	102.2	2.0	1.9	7.62	7.62	4.9	
	10:15	Cloudy	M3	835501	824648	0.02	0.01	22.0	22.0	9.40	9.40	104.7	104.8	0.6	0.7	7.79	7.80	<1	
09-04-18	10:47	Cloudy	C1	835110	824716	0.04	0.02	21.4	21.4	8.66	8.65	99.9	100.0	2.7	2.7	7.74	7.73	3.2	
	11:30	Cloudy	C2	835403	824470	0.02	0.01	21.3	21.3	8.89	8.88	99.5	99.6	2.5	2.4	7.84	7.85	3.3	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	9:53	Cloudy	M1	835215	824827	0.8	0.4	21.9	22.0	9.20	9.20	100.7	100.6	2.0	2.0	7.61	7.59	2.5	
	9:08	Cloudy	M2	835536	824775	0.05	0.025	21.6	21.7	9.10	9.10	101.2	101.2	1.9	1.9	7.84	7.85	8.6	
	9:20	Cloudy	M3	835501	824648	0.02	0.01	21.4	21.3	9.64	9.64	102.5	102.6	0.4	0.3	7.73	7.74	<1	
11-04-18	11:09	Cloudy	C1	835110	824716	0.04	0.02	23.9	24.0	8.40	8.39	96.2	96.2	2.5	2.5	7.83	7.85	3.0	
	11:33	Cloudy	C2	835403	824470	0.02	0.01	23.9	23.8	8.35	8.35	97.0	97.0	2.8	2.7	7.72	7.71	3.2	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10:26	Cloudy	M1	835215	824827	0.8	0.4	24.4	24.4	9.25	9.25	97.0	97.0	2.2	2.3	7.88	7.88	2.3	
	9:50	Cloudy	M2	835536	824775	0.05	0.025	24.2	24.2	8.98	8.99	99.5	99.5	2.0	1.9	7.62	7.60	7.7	
	10:01	Cloudy	M3	835501	824648	0.02	0.01	24.4	24.4	9.53	9.53	99.4	99.4	0.5	0.6	7.63	7.65	<1	
13-04-18	10:32	Fine	C1	835110	824716	0.04	0.02	26.5	26.4	8.46	8.46	97.4	97.4	2.5	2.5	7.86	7.84	3.1	
	11:01	Fine	C2	835403	824470	0.02	0.01	26.5	26.5	8.61	8.61	96.8	96.7	2.6	2.6	7.86	7.88	3.1	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10:04	Fine	M1	835215	824827	0.8	0.4	26.6	26.5	9.33	9.34	98.8	98.8	2.2	2.3	7.62	7.61	2.2	
	9:22	Fine	M2	835536	824775	0.05	0.025	26.0	26.1	9.18	9.18	96.1	96.0	1.9	1.9	7.83	7.83	4.6	
	9:34	Fine	M3	835501	824648	0.02	0.01	26.7	26.6	9.44	9.44	99.5	99.5	0.6	0.7	7.77	7.75	<1	
16-04-18	10:50	Fine	C1	835110	824716	0.04	0.02	18.2	18.2	8.33	8.33	97.8	97.8	2.6	2.6	7.88	7.88	3.0	
	11:13	Fine	C2	835403	824470	0.02	0.01	17.8	17.7	8.43	8.42	99.4	99.5	2.6	2.6	7.73	7.74	3.2	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10:13	Fine	M1	835215	824827	0.8	0.4	18.3	18.4	9.26	9.26	104.1	104.0	2.1	2.2	7.67	7.67	2.1	
	9:30	Fine	M2	835536	824775	0.05	0.025	17.8	17.8	9.21	9.21	102.4	102.5	1.8	1.7	7.78	7.78	5.3	
	9:44	Fine	M3	835501	824648	0.02	0.01	18.5	18.4	9.45	9.46	105.7	105.7	0.3	0.2	7.60	7.61	<1	
18-04-18	11:08	Cloudy	C1	835110	824716	0.04	0.02	22.4	22.3	8.55	8.55	99.4	99.4	2.6	2.6	7.79	7.80	3.1	
	11:31	Cloudy	C2	835403	824470	0.02	0.01	21.9	21.9	8.68	8.69	98.7	98.6	2.6	2.6	7.63	7.61	3.2	
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10:32	Cloudy	M1	835215	824827	0.8	0.4	22.0	22.0	9.34	9.34	99.1	99.1	2.2	2.2	7.76	7.78	2.3	
	9:30	Cloudy	M2	835536	824775	0.05	0.025	22.1	22.1	9.05	9.05	99.4	99.4	1.5	1.4	7.88	7.88	6.4	
	9:40	Cloudy	M3	835501	824648	0.02	0.01	22.0	22.1	9.36	9.36	104.0	103.9	0.7	0.7	7.79	7.78	<1	

20-04-18	11:35	Cloudy	C1	835110	824716	0.04	0.02	22.8	22.8	8.48	8.49	94.0	94.0	2.6	2.6	7.75	7.74	3.2
	12:05	Cloudy	C2	835403	824470	0.02	0.01	23.0	23.1	8.87	8.88	98.5	98.5	2.4	2.4	7.61	7.61	3.2
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11:02	Cloudy	M1	835215	824827	0.8	0.4	22.4	22.5	9.12	9.13	99.4	99.3	1.9	1.9	7.76	7.75	2.4
	10:01	Cloudy	M2	835536	824775	0.05	0.025	22.6	22.5	9.25	9.26	99.3	99.2	1.5	1.6	7.68	7.68	5.0
	10:11	Cloudy	M3	835501	824648	0.02	0.01	22.5	22.6	9.45	9.45	100.6	100.5	0.8	0.8	7.53	7.51	<1
23-04-18	10:15	Cloudy	C1	835110	824716	0.04	0.02	25.7	25.8	8.60	8.60	93.0	93.1	2.4	2.3	7.79	7.81	3.2
	11:02	Cloudy	C2	835403	824470	0.02	0.01	25.7	25.8	8.71	8.71	94.1	94.1	2.7	2.6	7.73	7.72	3.3
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	9:53	Cloudy	M1	835215	824827	0.8	0.4	25.6	25.7	9.06	9.07	99.7	99.7	2.1	2.1	7.63	7.63	2.6
	9:01	Cloudy	M2	835536	824775	0.05	0.025	26.1	26.1	9.34	9.35	99.7	99.7	1.4	1.5	7.75	7.77	7.8
	9:12	Cloudy	M3	835501	824648	0.02	0.01	26.0	26.0	9.45	9.46	99.2	99.3	0.5	0.6	7.64	7.63	<1
25-04-18	12:05	Cloudy	C1	835110	824716	0.04	0.02	23.1	23.2	8.62	8.62	93.1	93.2	2.6	2.6	7.87	7.88	3.1
	13:08	Cloudy	C2	835403	824470	0.02	0.01	23.4	23.3	8.50	8.51	95.9	95.9	2.6	2.5	7.74	7.74	3.1
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11:02	Cloudy	M1	835215	824827	0.8	0.4	23.4	23.5	9.16	9.16	100.9	100.9	1.9	1.9	7.80	7.81	2.3
	10:01	Cloudy	M2	835536	824775	0.05	0.025	23.1	23.0	9.10	9.11	99.1	99.0	1.5	1.4	7.71	7.72	4.0
	10:11	Cloudy	M3	835501	824648	0.02	0.01	23.2	23.2	9.35	9.34	103.5	103.5	0.7	0.7	7.78	7.77	<1
27-04-18	10:22	Fine	C1	835110	824716	0.04	0.02	24.5	24.5	8.28	8.28	95.1	95.2	2.7	2.8	7.72	7.74	3.1
	10:49	Fine	C2	835403	824470	0.02	0.01	24.3	24.3	8.53	8.54	95.6	95.7	2.5	2.6	7.66	7.66	3.2
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	9:50	Fine	M1	835215	824827	0.8	0.4	24.1	24.2	9.02	9.01	99.9	99.9	2.0	2.0	7.77	7.77	2.4
	9:07	Fine	M2	835536	824775	0.05	0.025	24.4	24.5	9.27	9.26	99.7	99.6	1.9	1.8	7.66	7.66	5.1
	9:19	Fine	M3	835501	824648	0.02	0.01	24.6	24.5	9.35	9.35	101.3	101.4	0.7	0.7	7.78	7.77	<1
30-04-18	12:28	Fine	C1	835110	824716	0.04	0.02	25.4	25.3	8.73	8.72	97.2	97.1	2.8	2.8	7.84	7.86	3.0
	13:00	Fine	C2	835403	824470	0.02	0.01	25.7	25.7	8.80	8.80	92.4	92.4	2.7	2.7	7.64	7.64	3.1
	N/A	N/A	C3	835642	824386	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	12:00	Fine	M1	835215	824827	0.8	0.4	25.3	25.3	9.28	9.28	97.8	97.8	2.2	2.1	7.87	7.85	2.2
	11:04	Fine	M2	835536	824775	0.05	0.025	25.9	25.8	9.25	9.24	99.4	99.4	2.0	2.0	7.77	7.79	3.8
	11:13	Fine	M3	835501	824648	0.02	0.01	26.0	25.9	9.23	9.23	101.4	101.3	0.6	0.5	7.52	7.52	<1

Acumen Laboratory and Testing Limited

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

Tel: (852) 2333 6823 Fax: (852) 2333 1316

Test Report


Page 1 of 2

Report Number : Q180003aR180273
Job Number : R180273
Issue Date : 04/05/2018
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-3113-345
Sample Description : SS test
Laboratory ID : R180273/1-5
Date of Sampling : 03/04/2018
Date Received : 03/04/2018
Test Period : 03/04/2018– 04/04/2018
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

Hong Kong Accreditation Service (HKAS) has accredited Acumen Laboratory and Testing Limited (Reg. No. HOKLAS 241 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. This report is issued subject to Acumen Laboratory and Testing Limited standard TERMS AND CONDITIONS, and shall not be reproduced except in full or with written approval by Acumen Laboratory and Testing Limited. The result(s) of this report are applied to the sample(s) submitted only.

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Acumen Laboratory and Testing Limited

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Test Report

Page 2 of 2

Report Number : Q180003aR180273

Job Number : R180273

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180273/1	03/04/2018	C1	3.1
R180273/2	03/04/2018	C2	3.2
R180273/3	03/04/2018	M1	2.4
R180273/4	03/04/2018	M2	5.2
R180273/5	03/04/2018	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: htthui@acumenhk.com / jleung@acumenhk.com

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Test Report

Page 1 of 2

Report Number : Q180003aR180274
Job Number : R180274
Issue Date : 04/05/2018
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-3113-346
Sample Description : SS test
Laboratory ID : R180274/1-5
Date of Sampling : 06/04/2018
Date Received : 06/04/2018
Test Period : 06/04/2018– 07/04/2018
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 : Q180003aR180274

Job Number : R180274

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180274/1	06/04/2018	C1	3.0
R180274/2	06/04/2018	C2	3.1
R180274/3	06/04/2018	M1	2.2
R180274/4	06/04/2018	M2	4.9
R180274/5	06/04/2018	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 : Q180003aR180275
Job Number : R180275
Issue Date : 04/05/2018
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-3113-347
Sample Description : SS test
Laboratory ID : R180275/1-5
Date of Sampling : 09/04/2018
Date Received : 09/04/2018
Test Period : 09/04/2018– 10/04/2018
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 : Q180003aR180275
Job Number : R180275
Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180275/1	09/04/2018	C1	3.2
R180275/2	09/04/2018	C2	3.3
R180275/3	09/04/2018	M1	2.5
R180275/4	09/04/2018	M2	8.6
R180275/5	09/04/2018	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 : Q180003aR180276
Job Number : R180276
Issue Date : 04/05/2018
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-3113-348
Sample Description : SS test
Laboratory ID : R180276/1-5
Date of Sampling : 11/04/2018
Date Received : 11/04/2018
Test Period : 11/04/2018– 12/04/2018
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 : Q180003aR180276

Job Number : R180276

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180276/1	11/04/2018	C1	3.0
R180276/2	11/04/2018	C2	3.2
R180276/3	11/04/2018	M1	2.3
R180276/4	11/04/2018	M2	7.7
R180276/5	11/04/2018	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 : Q180003aR180277
Job Number : R180277
Issue Date : 04/05/2018
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-3113-349
Sample Description : SS test
Laboratory ID : R180277/1-5
Date of Sampling : 13/04/2018
Date Received : 13/04/2018
Test Period : 13/04/2018– 14/04/2018
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 : Q180003aR180277
Job Number : R180277
Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180277/1	13/04/2018	C1	3.1
R180277/2	13/04/2018	C2	3.1
R180277/3	13/04/2018	M1	2.2
R180277/4	13/04/2018	M2	4.6
R180277/5	13/04/2018	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 : Q180003aR180278
Job Number : R180278
Issue Date : 04/05/2018
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-3113-350
Sample Description : SS test
Laboratory ID : R180278/1-5
Date of Sampling : 16/04/2018
Date Received : 16/04/2018
Test Period : 16/04/2018– 17/04/2018
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 : Q180003aR180278
Job Number : R180278
Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180278/1	16/04/2018	C1	3.0
R180278/2	16/04/2018	C2	3.2
R180278/3	16/04/2018	M1	2.1
R180278/4	16/04/2018	M2	5.3
R180278/5	16/04/2018	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 : Q180003aR180279
Job Number : R180279
Issue Date : 04/05/2018
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-3113-351
Sample Description : SS test
Laboratory ID : R180279/1-5
Date of Sampling : 18/04/2018
Date Received : 18/04/2018
Test Period : 18/04/2018– 19/04/2018
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 : Q180003aR180279

Job Number : R180279

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180279/1	18/04/2018	C1	3.1
R180279/2	18/04/2018	C2	3.2
R180279/3	18/04/2018	M1	2.3
R180279/4	18/04/2018	M2	6.4
R180279/5	18/04/2018	M3	<1

- Note:
1. mg/L indicates milligram per liter
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 5. NA indicates Not Applicable.

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Test Report

Page 1 of 2


Report Number : Q180003aR180280
Job Number : R180280
Issue Date : 04/05/2018
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-3113-352
Sample Description : SS test
Laboratory ID : R180280/1-5
Date of Sampling : 20/04/2018
Date Received : 20/04/2018
Test Period : 20/04/2018– 21/04/2018
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 : Q180003aR180280

Job Number : R180280

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180280/1	20/04/2018	C1	3.2
R180280/2	20/04/2018	C2	3.2
R180280/3	20/04/2018	M1	2.4
R180280/4	20/04/2018	M2	5.0
R180280/5	20/04/2018	M3	<1

- Note:
1. mg/L indicates milligram per liter
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 4. > indicates more than.
 5. NA indicates Not Applicable.

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Test Report

Page 2 of 2

Report Number : Q180003aR180281
Job Number : R180281
Issue Date : 04/05/2018
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-3113-353
Sample Description : SS test
Laboratory ID : R180281/1-5
Date of Sampling : 23/04/2018
Date Received : 23/04/2018
Test Period : 23/04/2018– 24/04/2018
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 : Q180003aR180281

Job Number : R180281

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180281/1	23/04/2018	C1	3.2
R180281/2	23/04/2018	C2	3.3
R180281/3	23/04/2018	M1	2.6
R180281/4	23/04/2018	M2	7.8
R180281/5	23/04/2018	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 2 of 2


Report Number : Q180003aR180282
Job Number : R180282
Issue Date : 04/05/2018
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-3113-354
Sample Description : SS test
Laboratory ID : R180282/1-5
Date of Sampling : 25/04/2018
Date Received : 25/04/2018
Test Period : 25/04/2018– 26/04/2018
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 : Q180003aR180282

Job Number : R180282

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180282/1	25/04/2018	C1	3.1
R180282/2	25/04/2018	C2	3.1
R180282/3	25/04/2018	M1	2.3
R180282/4	25/04/2018	M2	4.0
R180282/5	25/04/2018	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 : Q180003aR180283
Job Number : R180283
Issue Date : 04/05/2018
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-3113-355
Sample Description : SS test
Laboratory ID : R180283/1-5
Date of Sampling : 27/04/2018
Date Received : 27/04/2018
Test Period : 27/04/2018– 28/04/2018
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

Test Report

Page 2 of 2

Report Number : Q180003aR180283

Job Number : R180283

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180283/1	27/04/2018	C1	3.1
R180283/2	27/04/2018	C2	3.2
R180283/3	27/04/2018	M1	2.4
R180283/4	27/04/2018	M2	5.1
R180283/5	27/04/2018	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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Acumen Laboratory and Testing Limited

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

Page 1 of 2

Report Number : Q180003aR180284
Job Number : R180284
Issue Date : 04/05/2018
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-3113-356
Sample Description : SS test
Laboratory ID : R180284/1-5
Date of Sampling : 30/04/2018
Date Received : 30/04/2018
Test Period : 30/04/2018– 01/05/2018
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 : Q180003aR180284

Job Number : R180284

Issue Date : 04/05/2018

Test Result:

Lab ID	Date of Sampling	Client Sample ID	Suspended Solids (SS), mg/L
R180284/1	30/04/2018	C1	3.0
R180284/2	30/04/2018	C2	3.1
R180284/3	30/04/2018	M1	2.2
R180284/4	30/04/2018	M2	3.8
R180284/5	30/04/2018	M3	<1

- Note:
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 5. NA indicates Not Applicable.

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Appendix S

Impact Monitoring report for Ecology

Post-Transplantation Monitoring Report

for Agreement No. CE 13/2009 (WS)

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

Report No.44

April 2018

TABLE OF CONTENTS

1. INTRODUCTION 2

2. DESCRIPTION OF TREE MONITORING SITE..... 3

3. MONITORING METHODOLOGY 3

4. RESULT..... 4

5. MITIGATION MEASURE..... 4

6. SUMMARY 6

APPENDICES

APPENDIX I- Photos.....7

APPENDIX II- Table for condition of transplanted plant.....11

1. INTRODUCTION

- 1.1 Pursuant to the Environmental Impact Assessment (EIA) Ordinance, the Director of Environmental Protection (DEP) granted the Environmental Permit (No. EP- 494/2015) to the Water Supplies Department (WSD) to construct and operate the designated project for “In-situ Reprovisioning of Sha Tin Water Treatment Works - South Works” (“The Project”).
- 1.2 Upon the requirement of the Environmental Permit, a detailed vegetation report presenting the baseline vegetation condition for flora species with conservation interest, transplanting and monitoring programme for the Project has been prepared and approved by DEP in February 2016.
- 1.3 There were 4 flora species of conservation importance were recorded in the woodland habitat within project site including Ailanthus (*Ailanthus fordii*), Incense Tree (*Aquilaria sinensis*), Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*). In total, 2 nos. of Incense Tree (*Aquilaria sinensis*), 1 no. of Ailanthus (*Ailanthus fordii*) trees, 5 colonies of Lamb of Tartary (*Cibotium barometz*) and 1 no. Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*) was recommended to be transplanted in the approved detailed vegetation survey report.
- 1.4 Detailed vegetation report was planned that Incense Tree (*Aquilaria sinensis*) and Ailanthus (*Ailanthus fordii*) trees will be transplanted within existing Sha Tin Water Treatment Works (STWTW). All other shrubs including Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*) will be transplanted to the hillside slope at Sha Tin South Fresh Water Service Reservoir (STSFWSR).
- 1.2 Upon the requirement of the Environmental Permit, a qualified Ecologist was commissioned to prepare a post-transplantation monitoring report to present the status (health condition and survival rate) of transplanted vegetation and submitted to the DEP.
- 1.3 Monitoring of transplanted flora was conducted after the transplantation. The monitoring will be conducted at twice per month during the first year and once per month during the course of planting works. The parameters to be monitoring will include the health condition and survival rate of the transplanted flora. Any observations and recommendations will be reported in monthly EM&A reports.
- 1.3 This is no. 44 Tree Report presents data collected on 23 April 2018. It contains the following information:
 - Introduction (Section 1)
 - Description Of Tree Monitoring Area (Section 2)
 - Monitoring Methodology (Section 3)
 - Result (Section 4)
 - Summary

- Photos (Appendix I)
- Summary table (Appendix II)
- Typhoon information (Appendix 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 is the extended compensatory plantation area. The area was flat and without covering with concrete.
- 2.2 Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) will be transplanted to the Sha Tin South Fresh Water Service Reservoir (STSFWSR) where is currently covered with concrete. Plough is required before planting on to this area.
- 2.3 The planting site at Sha Tin South Fresh Water Service Reservoir (STSFWSR) was still under preparation. Transplanted Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was temporally stored at a nursery garden at Wang Toi Shan, Kam Tin. Once the planting site at Sha Tin South Fresh Water Service Reservoir (STSFWSR) was prepared and temporally stored transplanted vegetation were in fair condition, all transplanted Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) will be planted at the planting site.

3. MONITORING METHODOLOGY

- 3.1 Site inspection will be carried out by walking through the transplanting area. Health condition and survival rate will be observed during inspection.
- 3.4 Health condition of all transplanted vegetation including trees/Shrubs surveyed was evaluated according to the following criteria:
 - Transplanted vegetation with good health are classified as **good**;
 - Transplanted vegetation with few or no visible defects or health problems are classified as being **fair**;
 - Transplanted vegetation 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 23 April 2018. TA572, TA326 and TA327 tree was transplanted to tree compensation area within the Sha Tin Water Treatment Works (STWTW) in 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 while TA326 was dead. Tree guying cables have been installed to provide external support to all three transplanted trees. Transplanted Lamb of Tartary (*Cibotium barometz*) seems to be received too much sunlight. Leaves of them were observed yellowish in colour. On the other hand, young foliage was growing out to replace the old one.
- 4.3 Since Sha Tin South Fresh Water Service Reservoir (STSFWSR) was still under preparation, Lamb of Tartary was still temporally stored in a nursery garden at Wang Toi Shan, Kam Tin.
- 4.4 In general, all transplanted Lamb of Tartary (*Cibotium barometz*) were in fair condition while Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. The survival rate for Lamb of Tartary (*Cibotium barometz*) and Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was 96%. The Summary table for health condition and survival rate was shown in Appendix II.
- 4.4.1 All transplanted Lamb of Tartary (*Cibotium barometz*) were under recovery stage. It is recommended to retain them at the nursery garden under proper maintenance during current recovery stage. Once their condition has recovered to acceptable level, they can be moved to the transplantation site at Sha Tin South Fresh Water Service Reservoir (STSFWSR) when the site is ready.
- 4.5 After transplantation, root ball of TA572 and TA327 tree should be kept moisture especially during non-raining day.

5. MITIGATION MEASURE

- 5.1 Hong Kong Eagle's Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. In order to compensate for the loss of transplanted Hong Kong Eagle's Claw which is in climber growing form, it is recommended to plant an individual of native climber species at compensatory planting site (Sha Tin South Fresh Water Service Reservoir (STSFWSR)) together with compensatory tree planting. Recommended list of species are given in the Table 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>	蒼白秤鈞風	Climber
Luofushan Joint-fir	<i>Gnetum luofuense</i>	羅浮買麻藤	Climber
Australian Cow-plant	<i>Gymnema sylvestre</i>	匙羹藤	Climber
Shining Hypserpa	<i>Hypserpa nitida</i>	夜花藤	Climber
Large-flowered Honeysuckle	<i>Lonicera macrantha</i>	大花忍冬	Climber
Splash-of-white	<i>Mussaenda pubescens</i>	玉葉金花	Climber
Rusty-haired Raspberry	<i>Rubus reflexus</i>	鑄毛莓	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 For yellowish color for the leave of transplanted Lamb of Tartary (*Cibotium barometz*), it is recommended to provide shelter (such as 遮光網) for them to reduce the intensity of sunlight.
- 5.3 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.
- 5.4 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 are 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. Dead Incense Tree (TA326) is recommended to be removed in order to prevent tree failure.

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

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 TA326 was dead. Tree guying cables have been installed to provide external support to all three transplanted trees. Transplanted Lamb of Tartary (*Cibotium barometz*) seems to be received too much sunlight. Leaves of them were observed yellowish in colour. Shelter (遮光網) was recommended to reduce the intensity of sunlight. Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*) was observed dead during inspection on 20 August 2016. New fronds of transplanted Lamb of Tartary were observed growing out and were recovering from transplantation. Currently, Lamb of Tartary was temporally stored in a nursery garden at Wang Toi Shan, Kam Tin. It is recommended to retain them at the nursery garden under proper maintenance during current recovery stage.
- 6.2 In general, all transplanted Lamb of Tartary (*Cibotium barometz*) were in fair condition while Hong Kong Eagle’s Claw (*Artabotrys hongkongensis*) and one Incense Tree (*Aquilaria sinensis*) TA326 were observed dead during inspection on 20 August 2016 and on 10 August 2017 respectively. The dead tree TA326 is recommended to be removed in order to prevent tree failure.
- 6.3 In order to compensate for the loss of transplanted Hong Kong Eagle’s Claw and Incense Tree, it is recommended to plant an individual of native climber species and 3 heavy standard native tree species at compensatory planting site. The suggested species in planting list would have certain ecological value in terms of plant ecology and the associated wildlife including birds.
- 6.4 After transplantation, root ball of TA572 and TA327 tree should be kept moisture especially during dry and non-raining day.

APPENDIX I

Photo



Photo 1. General view of transplanted target vegetation.



Photo 2. General view of transplanted target vegetation.



Photo 3. Healthy frond of *Cibotium barometz*.



Photo 4. New frond of *Cibotium barometz*.



Photo 5. New frond of *Cibotium barometz*.



Photo 6. Old frond going to be replaced.



Photo 7. Transplanted Incense Tree (*Aquilaria sinensis*) – TA326 (left, dead), TA327 (middle); and Ailanthus (*Ailanthus fordii*) – TA572 (right)



Photo 8. Weak crown with dead twigs observed in of TA327.



Photo 9. Old wound found at trunk base of TA327.



Photo 10. Cracks and wounds observed in one of the trunks of TA572.



Photo 11. Weak crown and broken trunks of TA572.

APPENDIX II

Table for condition of transplanted plant

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

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

Trees of Ailanthus and Incense Tree

No.	Species	Condition	Alive/Dead	Remark
TA572	<i>Ailanthus fordii</i>	Poor	Alive	Two main trunk was broken during typhoon on 23 August 2017
TA327	<i>Aquilaria sinensis</i>	Poor	Alive	Tree crown of TA327 was thinner after transplantation. Water sprouts and cracks on tree bark observed.
TA326	<i>Aquilaria sinensis</i>	Dead	Dead	
Survival rate (%)			67%	

Appendix T

Monthly Summary of Waste Flow Table

Water Supplies Department
Monthly Summary Waste Flow Table
for Contract with Environmental Management Plan under ETWB TCW No. 19/2005 and its Interim Guidance Note
Reporting Year: 2018
Contract No. 3/WSD/15

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

Month	Actual Quantities of Inert C&D Materials Generated / Imported (in '000 m ³)						Actual Quantities of Other C&D Materials / Wastes Generated				
	Total Quantities Generated [a+b+c+d]	Broken Concrete (including rock for recycling into aggregates) (a)	Reused in the Contract (b)	Reused in Other Projects (c)	Disposed as Public Fill (d)	Imported C&D Material	Metal (in '000kg)	Paper/ Cardboard Packaging (in '000kg)	Plastic (bottles/containers, plastic sheets/ foams from package material) (in '000kg)	Chemical Waste (in '000kg)	Others (e.g. General Refuse etc.) (in '000m ³)
January	0.403	0.000	0.000	0.000	0.403	0.000	0.000	0.000	0.000	0.019	
February	0.517	0.000	0.000	0.000	0.517	0.000	0.000	0.000	0.000	0.008	
March	0.174	0.000	0.000	0.000	0.174	0.000	0.000	0.000	0.000	0.016	
April	0.210	0.032	0.000	0.000	0.178	0.000	7.010	0.000	0.000	0.032	
May											
June											
Half-year total	1.304	0.032	0.000	0.000	1.272	0.000	7.010	0.000	0.000	0.075	
July											
August											
September											
October											
November											
December											
Yearly Total	1.304	0.032	0.000	0.000	1.272	0.000	7.010	0.000	0.000	0.075	

Appendix U

Implementation Schedule of Environmental Mitigation Measures (EMIS)

Environmental Mitigation and Enhancement Measure Implementation Schedule at Construction Stage

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

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

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

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

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

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

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

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

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

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

Legend

D – Design Phase

C – Construction Phase

O – Operation Phase

Y - Compliance of Mitigation Measures

N/A – Not Applicable in Reporting Period

k.i.v – Keep In View

F - Completed

Appendix V

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



Statistical Summary of Exceedances (Air Quality)

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

Statistical Summary of Environmental Complaints

Reporting Period	Environmental Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
1 Apr - 30 Apr	0	3	Water Quality

Statistical Summary of Environmental Summons

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

Statistical Summary of Environmental Prosecution

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

Appendix W

Tentative schedule for environmental monitoring

May-18						
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	7 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	8	9 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	10	11 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	12
13	14 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	15	16 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	17	18 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	19
20	21 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 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 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	26
27	28 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	29	30 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	31		

Jun-18						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
					1 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	5
3	4 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 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 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	19 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	20	21 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	22	23 Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2
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

Jul-18						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3
8	9	10	11	12	13	14
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	
15	16	17	18	19	20	21
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3	
22	23	24	25	26	27	28
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3		Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3	
29	30	31	*Remark: No construction works will be performed on public holiday 2/7			
	Impact Water Quality monitoring for C1, C2, C3, M1, M2 & M3 Air monitoring for AM1 & AM2 Noise monitoring for NM1, NM2 & NM3					