PROJECT NO.: TCS/00512/09

DSD CONTRACT NO. DC/2009/13
CONSTRUCTION OF SEWAGE TREATMENT WORKS AT YUNG SHUE WAN AND SOK KWU WAN

YUNG SHUE WAN PORTION AREA QUARTERLY ENVIRONMENTAL MONITORING AND AUDIT (EM&A) REPORT FOR POST COMMISSIONING – FEBRUARY TO APRIL 2015

PREPARED FOR
LEADER CIVIL ENGINEERING CORPORATION LIMITED

Quality Index

Date	Reference No.	Prepared By	Approved By
20 October 2015	TCS00512/09/600/R0901v2		
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Version	Date	Description
1	21 August 2015	First Submission
2	20 October 2015	Amended against the IEC's comment on 27 August 2015

AECOM CDM Joint Venture

Chief Engineer/Harbour Area Treatment Scheme
Drainage Services Department
5/F, Western Magistracy
2A, Pok Fu Lam Road
Hong Kong

Your reference:

Our reference: 05117/6/16/448329

Date: 23 November 2015

BY FAX

Attention: Mr P.F. Ma

Dear Sir,

Contract No. DC/2009/13
Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwu Wan
Yung Shue Wan Portion Area
Quarterly EM&A Report for Post Commissioning – February to April 2015

We refer to the Environmental Permit (EP-282/2007/A) and the email from the Environmental Team, Action-United Environmental Services and Consulting (AUES), with the revised report for the captioned project, dated 20 October 2015. We have no comment and have verified the captioned report.

Yours faithfully
AECOM CDM JOINT VENTURE

Rodney Ip
Independent Environmental Checker

ICWR/DCYO/wwsc

Encl

cc Leader Civil Engineering (Attn: Mr Ron Hung)
AUES (Attn: Mr T.W. Tam)
ER/LAMMA (Attn: Mr Kenneth Kwong)
CDM (Attn: Mr Sylvester Hsu)

EXECUTIVE SUMMARY

ES.01. The Leader Civil Engineering Corporation Limited (Leader) has been awarded the *Contract DC/2009/13 - Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwu Wan* (the Project) by the Drainage Services Department (DSD) on 4 May 2010. This Project is part of an overall plan approved under a statutory EIA for Outlying Islands Sewerage Stage 1 Phase 2 Package J – Sok Kwu Wan Sewage Collection and Treatment (Register No. AEIAR-075/2003) and Disposal Facilities and Outlying Islands Sewerage Stage 1 Phase 1 Package C – Yung Shue Wan Sewage Treatment Works and Outfall (Register No. EIA-124/BC). The Environmental Permit (No. EP-281/2007/A and EP-282/2007) for the Project have been obtained by the DSD on 29 June 2007 for the relevant works.

ES.02. For ease of reporting, the EM&A report under the Project is separated two stand-alone parts:
(a) Sok Kwu Wan (under EP No. 281/2007/A);
(b) Yung Shue Wan (under EP No. 282/2007).

ES.03. According to the construction information provided by the Contractor, the Yung Shue Wan Sewage Treatment Works (YSW STW) has been handed over to maintenance authority Drainage Services Department (DSD/ST2) for operation on 31 December 2014. As agreed by the Contractor, IEC and RE, the construction phase EM&A programme was terminated on 31 December 2014 and the EM&A Programme has been proceeded to operation phase on 1 January 2015. In this regards, an associated letter ref. TCS0052/10/300/L0856 date 20 January 2015 has been issued to EPD for approval. To avoid absent of monitoring data before the proposal get agreed by the EPD, the impact monitoring under EM&A programme is ongoing until 31 January 2015.

ES.04. According to the EM&A Manual Section 4.9 of Yung Shue Wan, Operation Phase Monitoring shall be conducted during Sewage Treatment Work (STW) commissioning for a year period. Upon completion of the construction phase of the project, commissioning of the STW of Yung Shue Wan was commenced on 1 February 2015.

ES.05. The main objective of the post-commissioning monitoring work is to ensure that the water quality in Yung Shue Wan due to outfall discharge is more or less in line with the EIA prediction (i.e. no deterioration in local water quality.

ES.06. According to the EM&A Manual Section 12.5.1, a total of four quarterly summary reports for the post-commissioning monitoring should be prepared with appropriate statistical analyses to show the water quality changes before and after the commissioning the outfall.

ES.07. This is the 1st Quarterly Post- Commissioning Monitoring Report prepared for Operation Phase of Yung Shue Wan Sewage Treatment Plant for the period of 1 February to 30 April 2015 (Reporting Period).

ES.08. In the Reporting Period, marine water quality monitoring was conducted on 14 and 25 February, 10 and 24 March and 14 and 27 April 2015 at the designated monitoring locations. Statistical analysis for the monitoring result was made to compare to the baseline monitoring data. Overall, all the monitoring result obtained during operation phase is similar to the baseline data.

ES.09. Odour monitoring was performed by the Contractor by odour sensor automatically taking reading at the inlet and outlet of vent pipe of STP. As advised by the Contractor, the monitoring system during the period February to April 2015 at YSWSTW was still under installation and testing, therefore, no monitoring results were presented in this Reporting Period.

ES.10. In the Reporting Period, a total of 4 Limit Level exceedances of Ammonia-N were recorded at WY1, WY2 and WY3 in February 2015. In view of the measurement result, high value of Ammonia-N was also at control station on the same day. It is considered that exceedance was due to natural variation. No deterioration in local water quality related to the project was found which in line with the prediction to the EIA prediction.

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1 INTRODUCTION

PROJECT BACKGROUND

1.01 The *Contract DC/2009/13 - Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwu Wan* (the Project) is part of an overall plan approved under a statutory EIA for Outlying Islands Sewerage Stage 1 Phase 2 Package J – Sok Kwu Wan Sewage Collection and Treatment (Register No. AEIAR-075/2003) and Disposal Facilities and Outlying Islands Sewerage Stage 1 Phase 1 Package C – Yung Shue Wan Sewage Treatment Works and Outfall (Register No. EIA-124/BC). The Environmental Permit (EP) No. EP-281/2007A and EP-282/2007 for the Project have been obtained by the DSD for the relevant works. The site layout plan for the captioned work under the Project is showing in ***Appendix A.***

1.02 Action-United Environmental Services and Consulting (AUES) has been commissioned by Leader as the ET to implement the relevant EM&A programme including Construction (Impact and Post- Construction Monitoring) and Operation (Post- Commissioning Monitoring) Phases.

1.03 For ease of reporting, the EM&A report under the Project is separated two stand-alone parts:
(a) Sok Kwu Wan (under EP No. 281/2007/A);
(b) Yung Shue Wan (under EP No. 282/2007).

1.04 The construction of Sok Kwu Wan and Yung Shue Wan were respectively commenced on ***27 July 2010*** and ***14 September 2010***. Moreover, all the construction works at Yung Shue Wan completed on ***31 December 2014*** but Sok Kwu Wan still ongoing. A termination of Construction Phase EM&A Programme has issued to notify EPD on ***20 January 2015***.

1.05 According to the EM&A Manual Section 4.9 of Yung Shue Wan, Operation Phase Monitoring shall be conducted during Sewage Treatment Work (STW) commissioning for a year period. Upon completion of the construction phase of the project, commissioning of the STW of Yung Shue Wan was commenced on 1 February 2015.

1.06 The main objective of the post-commissioning monitoring work is to ensure that the water quality in Yung Shue Wan due to outfall discharge is more or less in line with the EIA prediction (i.e. no deterioration in local water quality)

1.07 This is the 1st Quarterly Post- Commissioning Monitoring Report prepared for Operation Phase of Yung Shue Wan Sewage Treatment Plant for the period of 1 February to 30 April 2015 (Reporting Period).

REPORT STRUCTURE

1.08 The Post- Commissioning Environmental Monitoring and Audit (EM&A) Report – Yung Shue Wan structures into the following sections:-

SECTION 1 **INTRODUCTION**
SECTION 2 **POST- COMMISSIONING MONITORING REQUIREMENTS**
SECTION 3 **WATER QUALITY MONITORING RESULTS**
SECTION 4 **ODOUR MONITORING RESULTS**
SECTION 5 **CONCLUSIONS**

2 POST- COMMISSIONING MONITORING REQUIREMENTS

ENVIRONMENTAL ASPECT

2.01 The post-commissioning EM&A programme only included the marine water quality monitoring. The detailed monitoring requirement is presented in the following sub-sections.

2.02 A summary of the Marine Water monitoring parameters is listed in ***Table 2-1***:

Table 2-1 Summary of the Marine Water monitoring parameters of EM&A Requirements

Measurement	Parameters
In-situ	• Dissolved Oxygen Concentration (mg/L); • Dissolved Oxygen Saturation (%); • Turbidity (NTU); • pH unit; • Salinity (ppt); • Water depth (m); and • Temperature (ºC).
Laboratory Analysis	• Suspended Solids (mg/L) • Ammonia-Nitrogen (mg/L) • Total Inorganic Nitrogen as N (mg/L) • E Coli (cfu/100mL)

MONITORING LOCATIONS

2.03 The marine water quality monitoring stations were adopted as recommended in the *EM&A Manual Section 4.5.1*. Two control stations (CY1 and CY2) were identified at locations representative of the project site in its undisturbed condition. Three impact stations (WY1, WY2 and WY3) were identified in the vicinity of sensitive receivers (the coral colonies in the vicinity of Yung Shue Wan, and secondary contact recreation subzone). Details of the marine water monitoring stations are described in ***Table 2-2***. The graphical of marine water quality monitoring stations is shown in ***Appendix B.***

Table 2-2 Location of the Marine Water Quality Monitoring Station

Monitoring Station	Description	Coordinates	
		Easting	Northing
WY1	Coral Station on seawall at STW Site	829 170	809 550
WY2	Coral colonies at Shek Kok Tsui	829 000	810 400
WY3	Coral colonies at O Tsai (headland N of YSW ferry pier)	829 200	809 850
CY1 (flood)	Control Station	828 400	810 800
CY2 (ebb)	Control Station	828 000	808 800

MONITORING FREQUENCY AND PERIOD

2.04 The post-commissioning monitoring was basically carried out in accordance with the requirements in the EM&A Manual Sections 4.9. The marine water quality monitoring requirements are listed as follows:

Parameters:	Duplicate in-situ measurements: water depth, temperature, Dissolved Oxygen, pH, turbidity and salinity; HOKLAS-accredited laboratory analysis: Suspended Solids, Ammonia as N (NH_3-N), Total Inorganic Nitrogen (TIN) and *E-coli*.
Frequency:	2 occasions per month (mid-ebb and mid-flood tides)
Sampling Depth	Two depths: 1m below water surface and 1m above sea bottom
Duration:	One year monitoring upon the STW commissioning

MONITORING EQUIPMENT

2.05 The monitoring equipments adopted for the EM&A program was proposed by ET. The equipments used for monitoring is listed in ***Table 2-3*** as below.

Table 2-3 Monitoring Equipments Used in EM&A Program

Marine Water quality	
A Digital Global Positioning System	GPS12 Garmin
Water Depth Detector	Eagle Sonar
Water Sampler	A 2-litre transparent PVC cylinder with latex cups at both ends
Thermometer & DO meter	YSI Model 6820 Multi-parameter Water Quality Monitoring System or YSI 550A DO Meter
pH meter	YSI Model 6820 Multi-parameter Water Quality Monitoring System or Hanna HI 98128
Turbidimeter	YSI Model 6820 Multi-parameter Water Quality Monitoring System or Hach 2100p
Salinometer	YSI Model 6820 Multi-parameter Water Quality Monitoring System or ATAGO Hand Refractometer.
Sample Container	High density polythene bottles (provided by laboratory)
Storage Container	'Willow' 33-litter plastic cool box with Ice pad
Suspended Solids; Ammonia as N (NH_3-N), Total Inorganic Nitrogen (TIN) and *E-coli*	HOKLAS-accredited laboratory (ALS Technichem (HK) Pty Ltd)

i. **Dissolved Oxygen and Temperature Measuring Equipment** – The instrument should be a portable and weatherproof dissolved oxygen (DO) measuring instrument complete with cable, sensor and a DC power source. The equipment should be capable of measuring as a DO level in the range of 0 – 20mg L-1 and 0 – 200% saturation; and a temperature of 0 – 45 degree Celsius.

ii. **pH Meter** – The instrument should consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It should be readable to 0.1 pH in arrange of 0 to 14.

iii. **Turbidity (NTU) Measuring Equipment** – The instrument should be a portable and weatherproof turbidity measuring instrument using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU.

iv. **Water Sampling Equipment** – A water sampler should comprise a transparent PVC cylinder with a capacity not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.

v. **Water Depth Detector** – A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat.

vi. **Salinity Measuring Equipment** – A portable salinometer capable of measuring salinity in the range of 0 - 40 parts per thousand (ppt) should be provided for measuring salinity of the water at each monitoring location.

vii. **Sample Containers and Storage** – Water samples for Suspended Solids should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen).

viii. **Monitoring Position Equipment** - A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication and Radio Technical Commission for maritime (RTCM) Type 16 error message 'screen pop-up' facilities (for real-time auto-display of error messages and DGPS corrections from the Hong Kong Hydrographic Office), or other equipment instrument of similar accuracy, should be provided and used during marine water monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

ix. **Suspended Solids, Ammonia-Nitrogen, Total Inorganic Nitrogen** and ***E.Coli* Analysis** – Analysis of those parameters shall be carried out in a HOKLAS or other international accredited laboratory following the analytical methods listed in ***Table 2-4.***

Table 2-4 Analytical Methods to be applied to Marine Water Quality Samples.

Determinant	Standard	Detection Limit
SS (mg/L)	APHA 2540D	0.5mg/L
NH3-N (mg/L)	ASTM D3590-89 B(FIA)	0.005mg/L
E-Coli	In-house method, membrane filtration with CHRIMagar Liquid E.coli-coliform culture	1cfu/100mL

MONITORING PROCEDURES

2.06 The marine water quality monitoring was conducted at the five designated locations at Yung Shue Wan. The sampling procedure including the in-situ monitoring are presented as below:

2.07 A Digital Global Positioning System (GPS) was used to identify the designated monitoring stations prior water sampling. A portable, battery-operated echo sounder was used for the determination of water depth at each station. At each station, marine water samples were collected at two depths: 1m below water surface and 1m above sea bottom.

2.08 The marine water sampler was lowered into the water body at the predetermined depth. The trigger system of the sampler was activated with a messenger. The opening ends of the sampler then were closed accordingly and water samples were collected.

2.09 The sample container was rinsed with a portion of the water sample. The water sample then was transferred to the high-density polythene bottles as provided by the laboratory, labeled with a unique sample number and sealed with a screw cap.

2.10 Before commencement of the sampling, general information such as the date and time of sampling, weather condition and tidal condition as well as the personnel responsible for the monitoring were be recorded on the monitoring field data sheet.

2.11 A 'Willow' 33-liter plastic cool box packed with ice was used to preserve the collected water samples prior to arrival at the laboratory for chemical determination. The water temperature of the cool box was maintained at a temperature as close to 40C as possible without being frozen. Samples collected were delivered to the laboratory upon collection.

In-situ Measurement

Positioning of Monitoring Locations

2.12 A digital Global Positioning System (GPS) was used during marine water monitoring to ensure the monitoring vessel is at the correct location when taking measurement and samples.

Depth, Dissolved Oxygen (DO), Temperature, Turbidity, Salinity and pH value

2.13 The YSI Model 6820 Multi-parameter Water Quality Monitoring System was used for marine water in-situ measurement, which automates the measurements and data logging of depth, temperature, dissolved oxygen, dissolved oxygen saturation, turbidity, pH and salinity simultaneously. Before each round of monitoring, the dissolved oxygen probe was calibrated by the wet bulb method and the turbidity and salinity probes checked with distilled water.

2.14 The laboratory has be comprehensive quality assurance and quality control programme. For QA/QC procedures, one duplicate samples of every batch of 20 samples is analyzed as followed the HOKLAS accredited requirement.

EQUIPMENT CALIBRATION

2.15 The Multi-parameter Water Quality Monitoring System will be calibrated by HOKLAS accredited laboratory of three month intervals. The available calibration certificate will be issued to ensure the performance of Multi-parameter Water Quality Monitoring System to use for in-situ measurement.

2.16 Valid calibration certificates of the monitoring equipment used for EM&A program in the Reporting Period would be attached in ***Appendix C***.

DATA MANAGEMENT AND DATA QA/QC CONTROL

2.17 The monitoring data are handled by the ET's systematic data recording and management, which complies with in-house Quality Management System. Standard Field Data Sheets (FDS) are used in the monitoring programme.

2.18 The monitoring data recorded in Multi-parameter Water Quality Monitoring System, are downloaded directly from the equipments at the end of each monitoring day. The downloaded monitoring data are input into a computerized database properly maintained by the ET. The laboratory results are input directly into the computerized database and QA/QC checked by personnel other than those who input the data. For monitoring activities require laboratory analysis, the local laboratory follows the QA/QC requirements as set out under the HOKLAS scheme for all laboratory testing.

DETERMINATION OF ACTION/LIMIT (A/L) LEVELS

2.19 The baseline marine water quality monitoring was carried out from 29 July 2010 to 28 December 2010 for consecutive six months. Based on the baseline monitoring data, the proposed Action and Limit Levels for water quality was determined and they are shown in ***Table 2-5.***

Table 2-5 Action and Limit Levels of Water Quality Monitoring during Operation Stage of the STP

Parameter	Performance Criteria	Impact Station		
		WY1	WY2	WY3
DO Concentration (Surface and Middle) (mg/L)	Action Level	3.63	3.53	3.61
	Limit Level	3.32	3.47	3.42
DO Concentration (Bottom) (mg/L)	Action Level	3.33	2.92	3.36
	Limit Level	3.23	2.63	3.14
Turbidity (Depth-Average) (NTU)	Action Level	10.94	14.16	14.99
	Limit Level	17.35	15.20	16.21
Suspended Solids (Depth-Average) (mg/L)	Action Level	17.52	14.23	14.52
	Limit Level	25.62	16.51	16.88
Ammonia as N (Depth – Average) (mg/L)	Action Level	0.098	0.090	0.095
	Limit Level	0.104	0.095	0.099
Total Inorganic Nitrogen as N (Depth-Average) (mg/L)	Action Level	0.603	0.578	0.605
	Limit Level	0.673	0.659	0.683
E. coli Depth-Average (1cfu/100ml)	Action Level	28	31	44
	Limit Level	610	610	610

Notes:

- *The proposed Action/Limit Levels of DO are adopted to be used 5%-ile/1%-ile of baseline data;*
- *The proposed Action/Limit Levels of Turbidity, SS, Ammonia and TIN are adopted to be used 95%-ile/99%-ile of baseline data;*
- *E-coli performance criteria of Action and Limit Levels are respectively proposed to use 95%-ile baseline data and 610 cfu/100mL geometric mean; and*
- *All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered necessary.*

3 POST-COMMISSIONING WATER QUALITY MONITORING RESULTS

3.01 The Operation Phase EM&A Programme was commenced on 1 February 2015. In this reporting period, 6 monitoring events have been carried out at the designated locations. The monitoring results including in-situ measurements and laboratory testing results are provided in ***Appendix D*** and the graphical plots of monitoring results are shown in ***Appendix E***.

Monitoring Result

3.02 In the Reporting Period, water Monitoring was carried out on 14 and 25 February, 10 and 24 March and 14 and 27 April 2015. Monitoring results of key parameters: dissolved oxygen (DO), turbidity, suspended solids, Ammonia-N, TIN and E.coli are summarized in ***Tables 3-1*** to ***3-8***.

Table 3-1 Summary of Water Quality Results – Mid-ebb Tides (Dissolved Oxygen)

Sampling date	DO conc. of Depth Ave. of Surf. and Mid Layer (mg/L)					DO conc. of Depth Ave. of Bottom Layer (mg/L)				
	WY1	WY2	WY3	CY1	CY2	WY1	WY2	WY3	CY1	CY2
14-Feb-15	7.46	7.26	7.48	7.73	7.40	7.92	7.72	7.74	8.17	7.49
25-Feb-15	7.83	7.15	7.14	6.98	7.70	7.69	7.14	7.24	6.76	7.18
10-Mar-15	6.61	6.83	6.67	6.71	7.26	6.75	7.00	6.59	6.59	7.08
24-Mar-15	6.77	6.55	6.38	6.61	7.04	6.68	6.41	6.62	6.55	6.93
14-Apr-15	5.73	5.68	5.46	6.04	5.70	5.98	5.98	5.56	6.50	5.89
27-Apr-15	6.98	6.95	6.77	7.10	7.07	6.72	6.80	6.59	6.96	6.66

Table 3-2 Summary of Water Quality Results – Mid-ebb Tides (Turbidity & Suspended Solids)

Sampling date	Turbidity Depth Ave. (NTU)					SS Depth Ave. (mg/L)				
	WY1	WY2	WY3	CY1	CY2	WY1	WY2	WY3	CY1	CY2
14-Feb-15	1.24	1.43	1.45	0.42	2.28	4.50	4.50	7.50	4.00	7.50
25-Feb-15	2.53	2.70	2.98	0.56	0.58	5.50	3.00	5.00	2.00	<2
10-Mar-15	2.53	2.58	2.90	1.38	1.38	2.50	3.50	4.50	2.00	3.00
24-Mar-15	4.58	4.73	5.05	2.45	4.05	6.50	5.00	3.50	2.00	3.00
14-Apr-15	4.85	4.10	6.93	2.43	4.95	4.50	3.50	7.00	3.50	3.50
27-Apr-15	1.03	0.63	0.53	0.48	1.05	6.00	5.00	4.50	4.00	4.50

Table 3-3 Summary of Water Quality Results – Mid-ebb Tides (Ammonia –N and TIN)

Sampling date	Ammonia-N(mg/L)					TIN (mg/L)				
	WY1	WY2	WY3	CY1	CY2	WY1	WY2	WY3	CY1	CY2
14-Feb-15	0.04	0.03	0.03	0.13	0.02	0.12	0.09	0.11	0.23	0.08
25-Feb-15	0.07	0.04	0.08	0.08	0.03	0.20	0.16	0.22	0.21	0.14
10-Mar-15	0.03	0.02	0.03	0.02	0.08	0.08	0.05	0.07	0.06	0.12
24-Mar-15	0.02	0.03	0.03	0.07	0.02	0.07	0.08	0.09	0.18	0.07
14-Apr-15	0.04	0.04	0.04	0.05	0.03	0.08	0.08	0.09	0.09	0.07
27-Apr-15	0.03	0.03	0.02	0.03	0.02	0.20	0.15	0.18	0.24	0.10

Table 3-4 Summary of Water Quality Results – Mid-ebb Tides (E.coli)

Sampling date	E.coli (CFU/100ml)				
	WY1	WY2	WY3	CY1	CY2
14-Feb-15	Not Detected	Not Detected	Not Detected	Not Detected	7.00
25-Feb-15	3.00	1.00	6.00	Not Detected	1.00
10-Mar-15	Not Detected	1.00	2.00	Not Detected	Not Detected
24-Mar-15	1.00	2.00	24.00	0.50	Not Detected
14-Apr-15	1.00	2.00	5.00	1.00	Not Detected
27-Apr-15	1.00	1.00	1.00	Not Detected	Not Detected

Table 3-5 Summary of Water Quality Results – Mid-flood Tides (Dissolved Oxygen)

Sampling date	DO conc. of Depth Ave. of Surf. and Mid Layer (mg/L)					DO conc. of Depth Ave. of Bottom Layer (mg/L)				
	WY1	WY2	WY3	CY1	CY2	WY1	WY2	WY3	CY1	CY2
14-Feb-15	7.55	7.73	7.39	7.47	7.52	7.87	7.55	7.76	7.32	7.25
25-Feb-15	6.82	7.01	7.07	7.66	6.90	6.66	6.77	6.96	6.77	6.43
10-Mar-15	6.59	6.58	6.68	6.97	6.46	6.71	6.56	6.73	6.91	6.39
24-Mar-15	6.40	6.71	6.71	6.80	6.32	6.30	6.71	6.71	6.74	6.18
14-Apr-15	5.30	5.67	5.49	5.69	5.88	5.57	5.87	6.01	5.96	5.98
27-Apr-15	6.66	6.78	6.30	6.90	7.02	6.52	6.50	6.47	6.73	6.68

Table 3-6 Summary of Water Quality Results – Mid- flood Tides (Turbidity & Suspended Solids)

Sampling date	Turbidity Depth Ave. (NTU)					SS Depth Ave. (mg/L)				
	WY1	WY2	WY3	CY1	CY2	WY1	WY2	WY3	CY1	CY2
14-Feb-15	1.48	2.70	2.55	1.79	1.88	6.00	5.50	5.50	3.50	3.50
25-Feb-15	2.15	1.70	1.73	1.17	0.77	3.00	3.00	3.50	3.50	5.00
10-Mar-15	2.65	2.30	3.10	2.30	1.63	4.00	3.50	5.00	4.00	2.00
24-Mar-15	3.50	3.53	3.53	3.68	3.75	4.00	4.00	4.50	4.50	3.50
14-Apr-15	6.10	3.20	3.63	3.88	3.98	4.00	3.00	5.50	3.50	4.00
27-Apr-15	0.73	0.23	1.30	0.35	1.43	5.50	4.00	5.00	5.50	4.50

Table 3-7 Summary of Water Quality Results – Mid- flood Tides (Ammonia –N and TIN)

Sampling date	Ammonia-N(mg/L)					TIN (mg/L)				
	WY1	WY2	WY3	CY1	CY2	WY1	WY2	WY3	CY1	CY2
14-Feb-15	**0.12**	0.02	0.03	0.04	0.09	0.19	0.07	0.09	0.13	0.16
25-Feb-15	**0.12**	**0.11**	**0.10**	0.10	0.05	0.29	0.28	0.26	0.27	0.18
10-Mar-15	0.04	0.04	0.04	0.14	0.01	0.11	0.10	0.10	0.20	0.05
24-Mar-15	0.06	0.04	0.06	0.05	0.03	0.16	0.12	0.17	0.13	0.10
14-Apr-15	0.03	0.02	0.04	0.03	0.02	0.09	0.06	0.09	0.08	0.06
27-Apr-15	0.02	0.04	0.05	0.12	0.05	0.18	0.14	0.17	0.21	0.12

Note:
1. Bolded and underlined indicated Limit Level exceedance.

Table 3-8 Summary of Water Quality Results – Mid- flood Tides (E.coli)

Sampling date	E.coli (CFU/100ml)				
	WY1	WY2	WY3	CY1	CY2
14-Feb-15	6.00	Not Detected	Not Detected	Not Detected	Not Detected
25-Feb-15	2.00	1.00	1.00	1.00	Not Detected
10-Mar-15	1.00	2.00	Not Detected	Not Detected	1.00
24-Mar-15	10.00	24.00	17.00	1.00	Not Detected
14-Apr-15	Not Detected	Not Detected	1.00	1.00	1.00
27-Apr-15	Not Detected	Not Detected	6.00	Not Detected	1.00

3.03 Statistical analysis for the monitoring result was made to compare to the baseline monitoring data. Overall, all the monitoring result obtained during operation phase is fall within and similar to the baseline data. The comparison of operation phase and baseline monitoring result is presented in ***Tables 3-9***. Moreover, a summary of exceedances for the key parameters are shown in ***Table 3-10***.

Table3-9 Fluctuation Ranges for the Monitored Operation Phase Water Quality Parameters

Parameter		WY1	WY2	WY3	CY1	CY2
DO (mg/L)	Surface + Middle	5.30 – 7.83 (2.65 – 6.99)	5.67 – 7.73 (3.02 – 7.41)	5.46 – 7.48 (3.27 – 7.77)	5.69 – 7.73 (3.46 –9.87)	5.70 – 7.70 (3.40 – 9.36)
	Bottom	5.57 – 7.92 (1.58 – 7.65)	5.87 – 7.72 (1.79 – 6.71)	5.56 – 7.76 (3.21 – 7.65)	5.96 – 8.17 (2.55 – 7.47)	5.89 – 7.49 (3.09 – 7.50)
Turbidity (NTU)		0.73 – 6.10 (2.00 – 10.83)	0.23 – 4.73 (2.27 – 10.57)	0.53 – 6.93 (2.28 – 19.18)	0.35 – 3.88 (2.03 – 15.32)	0.58 – 4.95 (2.38 – 16.30)
SS (mg/L)		2.50 – 6.50 (1.77 – 15.50)	3.00 – 5.50 (2.13 – 10.77)	3.50 – 7.50 (3.05 – 27.95)	2.00 – 5.50 (2.13 – 17.17)	2.00 – 7.50 (2.40 – 17.50)
Ammonia-N (mg/L)		0.02 – 0.12 (0.005 – 0.100)	0.02 – 0.11 (0.005 – 0.090)	0.02 – 0.10 (0.005 – 0.105)	0.02 – 0.14 (0.005 – 0.095)	0.01 – 0.09 (0.005 – 0.099)
TIN (mg/L)		0.07 – 0.29 (0.047 – 0.643)	0.05 – 0.28 (0.018 – 0.653)	0.07 – 0.26 (0.060 – 0.690)	0.06 – 0.27 (0.060 – 0.680)	0.05 – 0.18 (0.065 – 0.705)
E.coli (CFU/100ml)		1.00 – 10.00 (1 – 30)	1.00 – 24.00 (1 – 42)	1.00 – 24.00 (1 – 44)	0.50 – 1.00 (1 – 43)	1.00 – 7.00 (1 – 47)

Note:
1. The numbers in brackets denote the range of baseline monitoring result.

Table 3-10 Summary of Exceedances of Marine Water Quality

Station	DO (Ave of surf. & mid-depth)		DO (Ave. of Bottom Layer)		Turbidity (Depth Ave)		SS (Depth Ave)		Ammonia – N (Depth Ave)		TIN (Depth Ave)		E.coli (Depth Ave)	
	A	L	A	L	A	L	A	L	A	L	A	L	A	L
Mid-Ebb														
WY1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WY2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WY3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mid-Flood														
WY1	0	0	0	0	0	0	0	0	0	**2**	0	0	0	0
WY2	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0
WY3	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0
No. of exceed.	0	0	0	0	0	0	0	0	0	**4**	0	0	0	0

3.04 According to the monitoring result, a total of four (4) Limit Level exceedances of Ammonia-N were recorded at WY1, WY2 and WY3 in February 2015. In view of the measurement result, high value of Ammonia-N was also at control station on the same day. It is considered that exceedance was due to natural variation. No deterioration in local water quality related to the project was found which in line with the prediction to the EIA prediction.

4 ODOUR MONITORING RESULTS

4.01 As presented in the EIA Report and subsequent Review Report on EIA Study, it was predicted that air quality at the ASRs would satisfy the odour criteria with the proposed mitigation measures. Nevertheless, monitoring would be carried out during the operation phase to monitor the performance of the deodorization facilities.

4.02 In order to minimize the odour nuisance, all proposed MBR feed pump station and sludge dewatering room would be enclosed and the outlet air from these facilities would be properly treated by deodorization facility.

4.03 According to the EM&A Manual, there is no specific requirement and methodology for odour monitoring for operation phase. In order to check the performance of the deodorization facilities of the STP, the Contractor has installed two odour sensors at the inlet and outlet of the vent pipes to perform the odour monitoring. .The location for the odour sensor is illustrated in ***Appendix B***.

Methodology

4.04 The odour samples of air were collected at the inlet and outlet in accordance with ISC 3rd edition, Method 701 "Determination of Hydrogen Sulphide Content of the Atmosphere".

4.05 Hydrogen sulfide (H_2S), as an odourous indicator gas in this odour removal efficiency test for the deodorizer, was generated by mixing sodium sulfide hydrates and concentrated sulfuric acid at the inlet of the deodorizer. The generation rate of gaseous of H_2S was kept constant by controlling the delivery rate of concentrated sulfuric acid from the dropping funnel. Gaseous sample containing H_2S was withdrawn from each sampling port (inlet and outlet) at a flow rate of 2 L/min., using a sampling pump. H_2S present in the gas stream was collected in the impinger which contained 10 – 15 mL absorbing solution. Sampling time was about 10 minutes to avoid overloading of the absorbing solution while ensuring a large enough sample was collected.

4.06 Colorimetric analytical method (ISC 3rd edition, Method 701 "Determination of Hydrogen Sulphide Content of the Atmosphere") was used to determine the concentration of H_2S in the deodorizer odour removal test.

4.07 H_2S will be injected in the inlet as per following table, one sample of inlet H2S concentration and one sample of outlet H_2S concentration will be measured and the removal efficiency of the deodorizer will be calculated as :-

4.08 Efficiency = (1-outlet concentration/inlet concentration) x 100%.

Injection H2S concentration	Location
At least 7 ppm	YSWSTW

Result

4.09 As advised by the Contractor, the monitoring system during the period February to April 2015 at YSWSTW was still under installation and testing, therefore, no monitoring results were presented in this Reporting Period.

5 CONCLUSIONS

5.01 This is the 1st Quarterly Post- Commissioning Monitoring Report prepared for Operation Phase of Yung Shue Wan Sewage Treatment Plant for the period of 1 February to 30 April 2015 (Reporting Period).

5.02 In the Reporting Period, marine water quality monitoring was conducted on 14 and 25 February, 10 and 24 March and 14 and 27 April 2015 at the designated monitoring locations. Statistical analysis for the monitoring result was made to compare to the baseline monitoring data. Overall, all the monitoring result obtained during operation phase is similar to the baseline data.

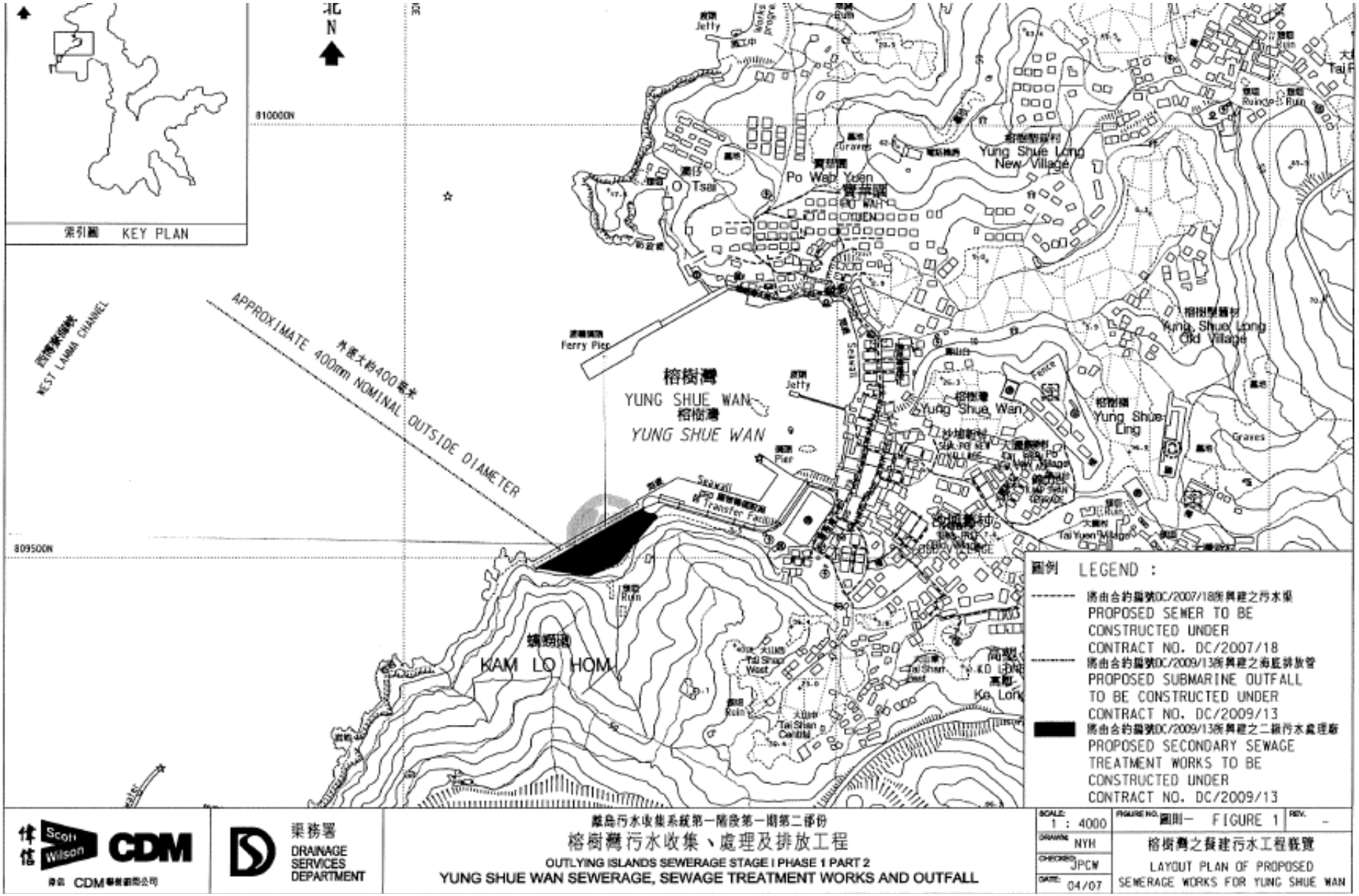
5.03 In the Reporting Period, a total of 4 Limit Level exceedances of Ammonia-N were recorded at WY1, WY2 and WY3 in February 2015. In view of the measurement result, high value of Ammonia-N was also at control station on the same day. It is considered that exceedance was due to natural variation. No deterioration in local water quality related to the project was found which in line with the prediction to the EIA prediction.

5.04 Odour monitoring was performed by the Contractor by odour sensor automatically taking reading at the inlet and outlet of vent pipe of STP. As advised by the Contractor, the monitoring system during the period February to April 2015 at YSWSTW was still under installation and testing, therefore, no monitoring results were presented in this Reporting Period.

.

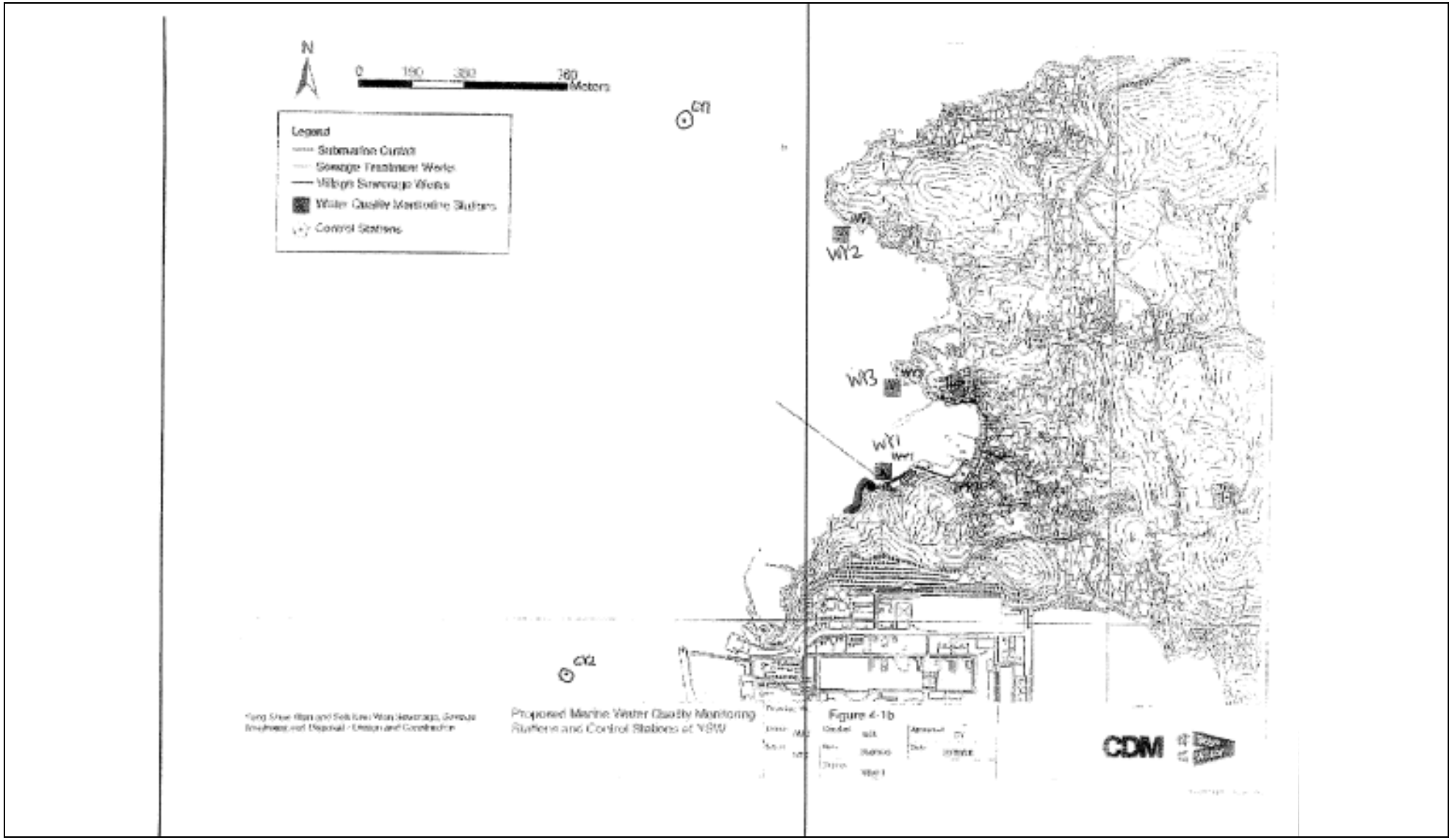
Appendix A

Site Layout Plan – Yung Shue Wan Portion Area


KEY PLAN
N
810000N
809500N
APPROXIMATE 400mm NOMINAL OUTSIDE DIAMETER
外徑大約400毫米
WEST LAMMA CHANNEL
榕樹灣
YUNG SHUE WAN
榕樹灣
YUNG SHUE WAN
KAM LO HOM
Yung Shue Long New Village
Yung Shue Long Old Village
Yung Shue Wan
Yung Shue Ling
Ferry Pier
Jetty
Pier
Seawall
Transfer Facility
Graves
Ruins
LEGEND :
PROPOSED SEWER TO BE CONSTRUCTED UNDER CONTRACT NO. DC/2007/18
PROPOSED SUBMARINE OUTFALL TO BE CONSTRUCTED UNDER CONTRACT NO. DC/2009/13
PROPOSED SECONDARY SEWAGE TREATMENT WORKS TO BE CONSTRUCTED UNDER CONTRACT NO. DC/2009/13
Scott Wilson
CDM
DRAINAGE SERVICES DEPARTMENT
離島污水收集系統第一階段第一期第二部份
榕樹灣污水收集、處理及排放工程
OUTLYING ISLANDS SEWERAGE STAGE I PHASE 1 PART 2
YUNG SHUE WAN SEWERAGE, SEWAGE TREATMENT WORKS AND OUTFALL
SCALE: 1 : 4000
DRAWING NYH
CHECKED JPCW
DATE 04/07
FIGURE NO. 圖則一 FIGURE 1
REV. -
榕樹灣之擬建污水工程概覽
LAYOUT PLAN OF PROPOSED SEWERAGE WORKS FOR YUNG SHUE WAN

Appendix B

Location of Monitoring Stations (Water Quality)


N
0
190
380
760
Meters
Legend
Submarine Outfall
Sewage Treatment Works
Village Sewerage Works
Water Quality Monitoring Stations
Control Stations
CR1
CR2
WY2
WY3
WY1
Proposed Marine Water Quality Monitoring Stations and Control Stations at YSW
Figure 4-1b
CDM

H2S SENSOR (HD-1005)
AT E.L. 4.5mPD
O2 SENSOR (XD-1005)
AT E.L. 5.7mPD
CH4 SENSOR (JD-1005)
AT E.L. 8.8mPD

LOCAL CONTROL PANEL
WASHPACTOR No.1

LEVEL ELECTRODE
LE-1005, LE-1006

LOCAL CONTROL PANEL
WASHPACTOR No.2

LEVEL ELECTRODE
LE-1007, LE-1008

HYDROSTATIC LEVEL SENSOR
LD-1013
HYDROSTATIC LEVEL TRANSMITTER
LTI-1013
AT E.L. 6.7mPD

LEVEL ELECTRODE
LE-1012, LE-1013, LE-1014

LOCAL CONTROL STATION
WASHPACTOR No.1
ROTOR MOTOR

LCS GRIT CHAMBER
MIXER No.2

LCS GRIT
PUMP No.2

ULTRASONIC LEVEL SENSOR
LD-1016

ULTRASONIC LEVEL TRANSMITTER
LTI-1016
AT E.L. 6.7mPD

HYDROSTATIC LEVEL SENSOR
HYDROSTATIC LEVEL TRANSMITTER
LTI-1012
AT E.L. 6.7mPD

LCS GRIT
PUMP No.1

LCS GRIT CHAMBER
MIXER No.1

LEVEL ELECTRODE
LE-1021, LE-1022, LE-1023

LEVEL ELECTRODE
LE-1009, LE-1010, LE-1011

LEVEL ELECTRODE
LE-1018, LE-1019, LE-1020

ULTRASONIC LEVEL TRANSMITTER
LTI-1009, LTI-1010, LTI-1011
AT E.L. 6.8mPD

ULTRASONIC LEVEL SENSOR
LD-1010

ULTRASONIC LEVEL SENSOR
LD-1011

ULTRASONIC LEVEL SENSOR
LD-1015

ULTRASONIC LEVEL TRANSMITTER
LTI-1015
AT E.L. 6.7mPD

LOCAL CONTROL STATION
FINE SCREEN No.1

ULTRASONIC LEVEL SENSOR
LD-1006

LOCAL CONTROL STATION
FINE SCREEN No.2

ULTRASONIC LEVEL SENSOR
LD-1007

LOCAL CONTROL STATION
FINE SCREEN No.3

ULTRASONIC LEVEL SENSOR
LD-1008

EMF SENSOR
FD-1001

ULTRASONIC LEVEL TRANSMITTER
LTI-1006, LTI-1007, LTI-1008
AT E.L. 6.8mPD

LEVEL ELECTRODE
LE-1003, LE-1004

LEVEL ELECTRODE
LE-1025, LE-1026

LEVEL ELECTRODE
LE-1015, LE-1016, LE-1017

LEVEL ELECTRODE
LE-1051, LE-1052,
LE-1053, LE-1054

ULTRASONIC LEVEL TRANSMITTER
LTI-1014
AT E.L. 6.7mPD

ULTRASONIC LEVEL SENSOR
LD-1014

EMF TRANSMITTER
FTI-1014, FTI-1015, FTI-1016
AT E.L. 6.7mPD

ULTRASONIC LEVEL TRANSMITTER
LTI-1031, LTI-1032
AT E.L. 6.7mPD

EMF SENSOR
FD-1015

ULTRASONIC LEVEL SENSOR
LD-1018

ULTRASONIC LEVEL SENSOR
LD-1017

H2S SENSOR (HD-1005)
AT E.L. 5.5mPD
O2 SENSOR (XD-1005)
AT E.L. 6.7mPD
CH4 SENSOR (JD-1005)
AT E.L. 8.8mPD

LEVEL ELECTRODE
LE-1027, LE-1028

LEVEL ELECTRODE
LE-1029, LE-1030

LOCAL CONTROL STATION
DEODORIZER No.2

LOCAL CONTROL STATION
DEODORIZER No.1

H2S SENSOR (HD-1005)
AT E.L. 5.5mPD
O2 SENSOR (XD-1005)
AT E.L. 6.7mPD
CH4 SENSOR (JD-1005)
AT E.L. 12.75mPD

LOCAL CONTROL STATION
DEHUMIDIFIER No.1

H2S SENSOR (HD-1006)
AT E.L. 5.5mPD
O2 SENSOR (XD-1006)
AT E.L. 6.7mPD
CH4 SENSOR (JD-1006)
AT E.L. 12.75mPD

H2S Sensor for Discharge Pipe

H2S Sensor for Suction Pipe

NO.	DATE	DESCRIPTION	REVISED BY
1	17/02/15	AS-BUILT	ATAL
0	18/07/11	FIRST SUBMISSION	PHC

REVISION

	NAME	INITIAL	DATE
DESIGNED	ATAL	ATAL	17/02/15
DRAWN	ATAL	ATAL	17/02/15
CHECKED	SHL	SHL	17/02/15
APPROVED	KSC	KSC	17/02/15

CONTRACT

Contract No. DC/2009/13
CONSTRUCTION OF
SEWAGE TREATMENT WORKS AT
YUNG SHUE WAN AND SOK KWU WAN

DRAWING TITLE

YUNG SHUE WAN
SEWAGE TREATMENT WORKS –
INSTRUMENT LAYOUT
IN PRIMARY TREATMENT AREA

EMPLOYER

DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION

CONSULTANT

URS CDM

URS CDM JOINT VENTURE

MAIN CONTRACTOR

LEADER

CONTRACTOR

ATAL Engineering Ltd.
安樂工程有限公司
13/F., ISLAND PLACE TOWER,
NO. 510 KING'S ROAD, NORTH POINT,
HONG KONG. TEL : 852-2561-8278

DRAWING NO.	REV	SCALE
SS134-EI-1102	1	NTS

Appendix C

Monitoring Equipments Calibration Certificate

ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
1-3 Wing Yip Street
Kwai Chung, N.T., Hong Kong
T: +852 2610 1044
F: +852 2610 2021
www.alsglobal.com

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR BEN TAM	**WORK ORDER:**	HK1503234
CLIENT:	ACTION UNITED ENVIRO SERVICES	**SUB-BATCH:**	0
ADDRESS:	RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T., HONG KONG	**LABORATORY:**	HONG KONG
		DATE RECEIVED:	23/01/2015
		DATE OF ISSUE:	02/02/2015

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, Turbidity and Temperature
Description:	Multifunctional Meter
Brand Name:	YSI
Model No.:	6820 / 650MD
Serial No.:	02J0912/02K0788 AA
Equipment No.:	--
Date of Calibration:	28 January, 2015

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 Fung Lim Chee, Richard
General Manager
Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1503234
Sub-batch: 0
Date of Issue: 02/02/2015
Client: ACTION UNITED ENVIRO SERVICES

Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 / 650MD
Serial No.: 02J0912/02K0788 AA
Equipment No.: --
Date of Calibration: 28 January, 2015 Date of next Calibration: 28 April, 2015

Parameters:

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.86	4.04	+0.18
6.00	6.20	+0.20
9.00	8.90	-0.10
	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	3.92	-0.08
7.0	6.94	-0.06
10.0	9.92	-0.08
	Tolerance Limit (pH unit)	±0.20

Turbidity **Method Ref: APHA 21st Ed. 2130B**

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.0	--
4	3.9	-2.5
40	37.3	-6.8
80	72.8	-9.0
400	384.2	-4.0
800	768.9	-3.9
	Tolerance Limit (%)	±10.0

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

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)
11.5	11.39	-0.1
22.0	21.76	-0.2
39.0	38.55	-0.5
	Tolerance Limit (°C)	±2.0

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

Mr Fung Lim Chee, Richard
General Manager
Greater China & Hong Kong

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR BEN TAM	**WORK ORDER:**	HK1503234
CLIENT:	ACTION UNITED ENVIRO SERVICES	**SUB-BATCH:**	1
ADDRESS:	RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T., HONG KONG	**LABORATORY:**	HONG KONG
		DATE RECEIVED:	23/01/2015
		DATE OF ISSUE:	02/02/2015

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:	Salinity
Description:	Multifunctional Meter
Brand Name:	YSI
Model No.:	6820 / 650MD
Serial No.:	02J0912/02K0788 AA
Equipment No.:	--
Date of Calibration:	28 January, 2015

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 Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1503234
Sub-batch: 1
Date of Issue: 02/02/2015
Client: ACTION UNITED ENVIRO SERVICES

Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 / 650MD
Serial No.: 02J0912/02K0788 AA
Equipment No.: --
Date of Calibration: 28 January, 2015 Date of next Calibration: --

Parameters:

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	14.13	+41.3
20	25.62	+28.1
30	35.97	+19.9
	Tolerance Limit (%)	±10.0

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

Mr Fung Lim Chee, Richard
General Manager
Greater China & Hong Kong

ALS Technichem (HK) Pty Ltd
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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR BEN TAM
CLIENT:	ACTION UNITED ENVIRO SERVICES
ADDRESS:	RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T., HONG KONG.

WORK ORDER:	HK1509486
SUB-BATCH:	0
LABORATORY:	HONG KONG
DATE RECEIVED:	18/03/2015
DATE OF ISSUE:	25/03/2015

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, Temperature and Turbidity
Equipment Type:	YSI Sonde/ Multifunctional Meter
Brand Name:	YSI
Model No.:	YSI 6820/ 650MDS
Serial No.:	02J0912/02K0788 AA
Equipment No.:	--
Date of Calibration:	25 March, 2015

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. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1509486
Sub-Batch: 0
Date of Issue: 25/03/2015
Client: ACTION UNITED ENVIRO SERVICES

Equipment Type: YSI Sonde/ Multifunctional Meter
Brand Name: YSI
Model No.: YSI 6820/ 650MDS
Serial No.: 02J0912/02K0788 AA
Equipment No.: --
Date of Calibration: 25 March, 2015 Date of next Calibration: 25 June, 2015

Parameters:

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
4.15	4.18	+0.03
6.24	6.44	+0.20
8.94	8.98	+0.04
	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	4.04	+0.04
7.0	7.01	+0.01
10.0	9.96	-0.04
	Tolerance Limit (pH unit)	±0.20

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	10.90	+9.0
20	21.95	+9.8
30	31.87	+6.2
	Tolerance Limit (%)	±10.0

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

Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1509486
Sub-Batch: 0
Date of Issue: 25/03/2015
Client: ACTION UNITED ENVIRO SERVICES

Equipment Type: YSI Sonde/ Multifunctional Meter
Brand Name: YSI
Model No.: YSI 6820/ 650MDS
Serial No.: 02J0912/02K0788 AA
Equipment No.: --
Date of Calibration: 25 March, 2015 Date of next Calibration: 25 June, 2015

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)
10.0	10.06	+0.1
20.0	18.54	-1.5
40.0	38.06	-1.9
	Tolerance Limit (°C)	±2.0

Turbidity

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.2	--
4	3.9	-2.5
40	38.4	-4.0
80	79.1	-1.1
400	390.2	-2.5
800	761.5	-4.8
	Tolerance Limit (%)	±10.0

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

Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

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

ALS TECHNICHEM (HK) PTY LIMITED

11/F., Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, New Territories, Hong Kong
香港新界葵涌永業街1-3號忠信針織中心11樓

has been accepted by the HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a
為香港認可處執行機關根據認可諮詢委員會建議而接受的

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 – General requirements for the competence of testing and calibration laboratories and it has been accredited for performing specific tests or calibrations as listed in the HOKLAS Directory of Accredited Laboratories within the test category of
此實驗所符合ISO / IEC 17025 : 2005 –《測試及校正實驗所能力的通用規定》所訂的要求，獲認可進行載於香港實驗所認可計劃《認可實驗所名冊》內下述測試類別中的指定測試或校正工作

Environmental Testing
環境測試

This laboratory is accredited in accordance with the recognised International Standard ISO / IEC 17025 : 2005.
本實驗所乃根據公認的國際標準 ISO / IEC 17025 : 2005 獲得認可。
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (see joint IAF-ILAC-ISO Communiqué).
這項認可資格演示在指定範疇所需的技術能力及實驗所質量管理體系的運作（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
香港認可處根據認可處執行機關的權限在此蓋上通用印章

CHAN Sing Sing, Terence, Executive Administrator
執行幹事 陳成城
Issue Date : 5 May 2009
簽發日期：二零零九年五月五日

Registration Number : HOKLAS 066
註冊號碼：

Date of First Registration : 15 September 1995
首次註冊日期：一九九五年九月十五日

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 000552

Appendix D

Monitoring Data Sheet

Contract No. DC/2009/13

Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwn Wan

AUES

Yung Shue Wan Post-commissioning Martine Water Monitoring Programme

Date 14-Feb-15

Date / Time	Location	Tide	Co-ordinates		Water Depth	Sampling Depth	Temp	DO Conc	DO Saturation	Turbidity	Salinity	pH	SS	Ammonia N	TIN	E.coli
			East	North	m	m	℃	mg/L	%	NTU	ppt	unit	mg/l	mg/l	mg/l	1CFU/100ml
2015/2/14 09:54:00	WY1	ME	829187	809557	5.3	1.00	18.42	7.5	97.8	1.2	29.1	8.84	4	0.05	0.14	Not Detected
						1.00	18.42	7.42	97	0.87	29.3	8.85				
						4.30	18.4	7.79	101.7	1.7	29.3	8.87	5	0.02	0.09	Not Detected
						4.30	18.42	8.05	105.1	1.2	29.3	8.86				
2015/2/14 09:30:00	WY2	ME	8288991	810386	6.2	1.00	18.45	7.27	95	0.9	29.3	8.82	5	0.03	0.11	Not Detected
						1.00	18.46	7.25	94.7	1	29.2	8.82				
						5.20	18.33	7.7	100.4	1.9	29.3	8.85	4	<0.01	0.07	Not Detected
						5.20	18.33	7.74	100.9	1.9	29.3	8.85				
2015/2/14 09:43:00	WY3	ME	829187	809859	5.1	1.00	18.4	7.44	96.9	1.7	28.9	8.81	7	0.02	0.1	Not Detected
						1.00	18.4	7.52	97.9	1.4	28.9	8.82				
						4.10	18.4	7.82	102	1.2	29	8.86	8	0.03	0.11	Not Detected
						4.10	18.41	7.66	99.8	1.5	29.1	8.84				
2015/2/14 09:14:00	CY1	ME	828406	810813	11.2	1.00	18.36	7.73	100.7	0.36	29.1	8.8	3	0.08	0.19	Not Detected
						1.00	18.36	7.72	100.6	0.38	29.1	8.8				
						10.20	18.35	8.2	106.9	0.51	29.2	8.82	5	0.17	0.27	Not Detected
						10.20	18.34	8.13	106	0.44	29.2	8.82				
2015/2/14 10:14:00	CY2	ME	828017	808792	16.1	1.00	19.33	7.42	98.5	2.7	29.3	8.87	8	<0.01	0.06	Not Detected
						1.00	19.35	7.37	97.9	2.3	29.2	8.87				
						15.10	18.31	7.45	97.1	1.7	29.3	8.86	7	0.02	0.09	14
						15.10	18.28	7.53	98.1	2.4	29.3	8.86				
2015/2/14 12:36:00	WY1	MF	829161	809563	5.5	1.00	18.45	7.56	98.8	1.4	29.3	8.86	6	0.03	0.11	12
						1.00	18.45	7.54	98.4	0.9	29.3	8.87				
						4.50	18.41	7.82	102.1	1.3	29.3	8.87	6	0.21	0.27	Not Detected
						4.50	18.43	7.92	103.4	2.3	29.3	8.87				
2015/2/14 12:57:00	WY2	MF	828987	810411	6.6	1.00	18.62	7.67	100.6	2.4	29.3	8.87	5	<0.01	0.05	Not Detected
						1.00	18.61	7.79	102.1	3.2	29.3	8.87				
						5.60	18.34	7.52	98.1	2.5	29.3	8.87	6	0.02	0.09	Not Detected
						5.60	18.33	7.58	98.9	2.7	29.3	8.87				
2015/2/14 12:47:00	WY3	MF	829207	809866	5.4	1.00	18.53	7.4	96.8	2.4	29.2	8.85	6	0.02	0.09	Not Detected
						1.00	18.52	7.38	96.6	3.1	29.2	8.85				
						4.00	18.43	7.77	101.5	2.6	29.3	8.87	5	0.04	0.09	Not Detected
						4.00	18.43	7.75	101.2	2.1	29.3	8.88				
2015/2/14 13:12:00	CY1	MF	828416	810790	12.1	1.00	18.48	7.46	97.6	0.62	29.3	8.85	3	0.03	0.12	Not Detected
						1.00	18.48	7.47	97.6	0.92	29.2	8.85				
						11.10	18.3	7.35	95.7	2.9	29.3	8.82	4	0.05	0.14	Not Detected
						11.10	18.29	7.29	95	2.7	29.3	8.81				
2015/2/14 12:17:00	CY2	MF	817992	808806	16.7	1.00	19.31	7.52	99.8	1.4	29.3	8.87	3	0.15	0.22	Not Detected
						1.00	19.32	7.52	99.8	1.7	29.2	8.87				
						15.70	18.29	7.26	94.6	2	29.3	8.86	4	0.02	0.09	Not Detected
						15.70	18.3	7.24	94.3	2.4	29.3	8.86				

Remarks: MF - Middle Flood tida
ME - Middle Ebb tida

Contract No. DC/2009/13

Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwn Wan

AUES

Yung Shue Wan Post-commissioning Martine Water Monitoring Programme

Date 25-Feb-15

Date / Time	Location	Tide	Co-ordinates		Water Depth	Sampling Depth	Temp	DO Conc	DO Saturation	Turbidity	Salinity	pH	SS	Ammonia N	TIN	E.coli
			East	North	m	m	℃	mg/L	%	NTU	ppt	unit	mg/l	mg/l	mg/l	1CFU/100ml
2015/2/25 17:06:00	WY1	ME	829151	809563	4.8	1.00	19.75	7.88	105.2	1.5	28.9	8.83	5	0.08	0.22	4
						1.00	19.69	7.78	103.8	1.6	28.9	8.83				
						3.80	19.24	7.69	101.9	3.7	29.2	8.85	6	0.05	0.18	1
						3.80	19.25	7.69	101.8	3.3	29.2	8.85				
2015/2/25 17:52:00	WY2	ME	828992	810386	6.4	1.00	19.53	7.16	95.4	2.6	29.2	8.83	3	0.04	0.16	1
						1.00	19.38	7.14	94.8	2.8	29.2	8.83				
						5.40	19.01	7.14	94.1	2.6	29.2	8.83	3	0.04	0.16	1
						5.40	19	7.13	94	2.8	29.2	8.83				
2015/2/25 17:41:00	WY3	ME	829197	819832	4.6	1.00	19.61	7.16	95.4	3.3	29	8.81	5	0.08	0.22	3
						1.00	19.59	7.11	94.7	3.3	29	8.81				
						3.60	19.3	7.21	95.6	2.9	29.1	8.83	5	0.08	0.22	8
						3.60	19.3	7.26	96.3	2.4	29.1	8.82				
2015/2/25 18:04:00	CY1	ME	828408	810811	11.9	1.00	19.64	7.05	93.8	0.59	29	8.79	2	0.1	0.24	Not Dectected
						1.00	19.58	6.91	91.9	0.67	28.9	8.8				
						10.90	18.89	6.77	89.1	0.34	29.2	8.83	<2	0.05	0.18	Not Dectected
						10.90	18.89	6.74	88.8	0.62	29.2	8.84				
2015/2/25 17:22:00	CY2	ME	828009	808787	16.6	1.00	19.56	7.75	103.2	1	29.1	8.84	<2	0.04	0.15	Not Dectected
						1.00	19.59	7.65	102	0.84	29.1	8.84				
						15.60	18.89	7.18	94.6	0.3	29.4	8.86	<2	0.02	0.13	1
						15.60	18.89	7.18	94.6	0.18	29.4	8.86				
2015/2/25 11:39:00	WY1	MF	829154	809559	5.2	1.00	19.62	6.86	91.1	1.6	28.5	8.76	3	0.13	0.31	Not Dectected
						1.00	19.66	6.77	89.9	1.8	28.5	8.76				
						4.20	19.39	6.66	88.1	2.5	28.7	8.78	3	0.1	0.27	3
						4.20	19.39	6.65	88	2.7	28.7	8.78				
2015/2/25 11:13:00	WY2	MF	828989	810392	6.5	1.00	19.62	7.01	93.2	1.3	28.7	8.77	<2	0.12	0.29	Not Dectected
						1.00	19.58	7	93	1.3	28.7	8.77				
						5.50	19.34	6.73	89.2	2.5	28.9	8.79	3	0.1	0.26	2
						5.50	19.31	6.8	90.1	1.7	29	8.79				
2015/2/25 11:25:00	WY3	MF	829195	809849	4.8	1.00	19.72	7.11	94.8	1.1	29	8.78	3	0.12	0.28	1
						1.00	19.7	7.03	93.7	1.2	29	8.79				
						3.80	19.5	6.95	92.4	2.3	29.1	8.8	4	0.08	0.23	Not Dectected
						3.80	19.46	6.96	92.5	2.3	29.1	8.8				
2015/2/25 10:56:00	CY1	MF	828404	810802	11.8	1.00	19.7	7.68	102.1	0.55	28.6	8.79	3	0.1	0.27	Not Dectected
						1.00	19.57	7.64	101.4	0.62	28.7	8.8				
						10.80	19.05	6.81	89.8	1.7	29.1	8.82	4	0.1	0.27	1
						10.80	19.02	6.73	88.8	1.8	29.1	8.82				
2015/2/25 11:57:00	CY2	MF	828003	808791	16.8	1.00	20.22	6.91	93.1	1	29.1	8.8	6	0.05	0.18	Not Dectected
						1.00	20.25	6.88	92.7	0.83	29.1	8.8				
						15.80	18.86	6.41	84.4	0.67	29.3	8.84	4	0.05	0.17	Not Dectected
						15.80	18.86	6.45	84.8	0.57	29.3	8.83				

Remarks: MF - Middle Flood tida
ME - Middle Ebb tida

Contract No. DC/2009/13

Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwn Wan

AUES

Yung Shue Wan Post-commissioning Martine Water Monitoring Programme

Date 10-Mar-15

Date / Time	Location	Tide	Co-ordinates		Water Depth	Sampling Depth	Temp	DO Conc	DO Saturation	Turbidity	Salinity	pH	SS	Ammonia N	TIN	E.coli
			East	North	m	m	℃	mg/L	%	NTU	ppt	unit	mg/l	mg/l	mg/l	1CFU/100ml
2015/3/10 15:01:00	WY1	ME	829156	809562	5.3	1.00	20.34	6.59	89.6	2.7	30.1	8.83	3	0.04	0.09	Not Dectected
						1.00	20.36	6.62	90	2.3	30.1	8.83				
						4.30	20.39	6.65	90.5	2.6	30.2	8.84	2	0.02	0.07	Not Dectected
						4.30	20.4	6.84	93.1	2.5	30.2	8.84				
2015/3/10 15:22:00	WY2	ME	828992	810403	7.1	1.00	20.35	6.8	92.3	3.1	29.8	8.86	4	0.02	0.06	Not Dectected
						1.00	20.37	6.86	93	2.9	29.6	8.86				
						6.10	20.22	6.95	94.3	2.2	30.3	8.86	3	<0.01	0.04	1
						6.10	20.22	7.05	95.8	2.1	30.3	8.86				
2015/3/10 15:13:00	WY3	ME	829190	809853	4.9	1.00	20.4	6.67	90.8	3	30.2	8.82	4	0.02	0.06	2
						1.00	20.41	6.67	90.8	2.9	30.2	8.82				
						3.90	20.37	6.64	90.3	2.9	30.2	8.84	5	0.03	0.08	1
						3.90	20.38	6.53	88.8	2.8	30.2	8.84				
2015/3/10 15:36:00	CY1	ME	828403	810796	2.2	1.00	20.24	6.72	91.2	1.6	30.2	8.84	2	0.02	0.07	Not Dectected
						1.00	20.25	6.69	90.9	1.4	30.2	8.85				
						1.20	20.4	6.5	88.6	1.2	30.3	8.86	<2	0.01	0.05	Not Dectected
						1.20	20.4	6.67	90.9	1.3	30.3	8.87				
2015/3/10 14:39:00	CY2	ME	828014	808806	17.3	1.00	21.34	7.19	99.5	1.7	30.3	8.87	3	0.13	0.17	Not Dectected
						1.00	21.15	7.32	101.1	1.4	30.2	8.87				
						16.30	20.15	7.05	95.6	1.3	30.3	8.9	3	0.02	0.06	Not Dectected
						16.30	20.14	7.11	96.4	1.1	30.3	8.9				
2015/3/10 09:17:00	WY1	MF	829162	809547	4.7	1.00	20.4	6.59	89.5	2.5	29.9	8.84	4	0.05	0.12	Not Dectected
						1.00	20.45	6.58	89.5	2.4	29.9	8.85				
						3.70	20.49	6.78	92.3	3.1	30	8.86	4	0.03	0.09	1
						3.70	20.44	6.64	90.4	2.6	30.1	8.86				
2015/3/10 08:52:00	WY2	MF	829006	810406	6.7	1.00	20.33	6.56	89.2	1.9	30.1	8.83	3	0.04	0.1	1
						1.00	20.38	6.59	89.6	1.7	30.1	8.84				
						5.70	20.41	6.53	88.9	2.7	30.1	8.84	4	0.03	0.09	3
						5.70	20.42	6.58	89.6	2.9	30.1	8.84				
2015/3/10 09:04:00	WY3	MF	829201	809868	4.8	1.00	20.55	6.69	91.2	2.6	30.1	8.87	6	0.04	0.1	Not Dectected
						1.00	20.55	6.66	90.9	2.8	30.1	8.87				
						3.80	20.58	6.7	91.3	3.2	30	8.85	4	0.04	0.1	Not Dectected
						3.80	20.57	6.75	92	3.8	30	8.85				
2015/3/10 08:35:00	CY1	MF	828409	810807	12.8	1.00	20.64	6.95	95	1.9	30.1	8.85	<	0.19	0.25	Not Dectected
						1.00	20.65	6.98	95.4	1.8	30.1	8.85				
						11.80	20.24	6.85	93	2.8	30.2	8.86	4	0.08	0.14	Not Dectected
						11.80	20.23	6.97	94.6	2.7	30.2	8.87				
2015/3/10 09:33:00	CY2	MF	828014	808806	17.5	1.00	21.35	6.45	89.4	1.9	30.3	8.86	2	0.01	0.06	1
						1.00	21.43	6.47	89.8	2.3	30.3	8.86				
						16.50	20.03	6.41	86.7	1.1	30.4	8.91	2	<0.01	0.03	Not Dectected
						16.50	20.03	6.37	86.3	1.2	30.4	8.91				

Remarks: MF - Middle Flood tida
ME - Middle Ebb tida

Contract No. DC/2009/13

Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwn Wan

Yung Shue Wan Post-commissioning Martine Water Monitoring Programme

Date 24-Mar-15

Date / Time	Location	Tide	Co-ordinates		Water Depth	Sampling Depth	Temp	DO Conc	DO Saturation	Turbidity	Salinity	pH	SS	Ammonia N	TIN	E.coli
			East	North	m	m	℃	mg/L	%	NTU	ppt	unit	mg/l	mg/l	mg/l	1CFU/100ml
2015/3/24 15:03:00	WY1	ME	829180	809553	4.8	1.00	21.52	6.76	93.7	4.4	30.1	8.86	4	0.02	0.08	Not Dectected
						1.00	21.53	6.77	94	4.4	30.1	8.85				
						3.80	21.43	6.76	93.8	5	30.3	8.86	9	0.02	0.06	1
						3.80	21.49	6.59	91.6	4.5	30.5	8.85				
2015/3/24 15:24:00	WY2	ME	828988	810401	7	1.00	21.51	6.6	91.7	4.8	30.4	8.87	4	0.03	0.08	Not Dectected
						1.00	21.52	6.49	90.1	4.8	30.4	8.87				
						6.00	21.38	6.34	87.9	4.8	30.4	8.87	6	0.03	0.08	2
						6.00	21.34	6.48	89.8	4.5	30.4	8.87				
2015/3/24 15:12:00	WY3	ME	829208	809855	4.7	1.00	21.82	6.42	89.5	5	30.2	8.81	4	0.04	0.12	47
						1.00	21.84	6.34	88.5	5.3	30.2	8.82				
						3.70	21.61	6.61	91.9	5	30.4	8.84	3	0.02	0.06	1
						3.70	21.58	6.63	92.3	4.9	30.4	8.85				
2015/3/24 15:35:00	CY1	ME	828411	810802	11.4	1.00	21.53	6.61	91.5	2.1	29.8	8.81	2	0.08	0.2	1
						1.00	21.55	6.61	91.5	2	29.8	8.82				
						10.40	21.72	6.47	90.2	2.7	30.3	8.86	<2	0.05	0.15	Not Dectected
						10.40	21.7	6.63	92.3	3	30.4	8.87				
2015/3/24 14:43:00	CY2	ME	828004	808813	16.6	1.00	23.08	7.04	100.6	3.4	30.6	8.85	3	0.01	0.06	Not Dectected
						1.00	23.09	7.03	100.4	3.4	30.6	8.85				
						15.60	21.33	6.9	95.7	4.7	30.6	8.88	3	0.03	0.07	Not Dectected
						15.60	21.33	6.95	96.4	4.7	30.6	8.88				
2015/3/24 09:21:00	WY1	MF	829161	809562	5.1	1.00	21.55	6.4	88.7	3.5	29.8	8.82	4	0.06	0.17	19
						1.00	21.55	6.39	88.5	3.4	29.8	8.82				
						4.10	21.59	6.17	85.6	3.7	30	8.82	4	0.05	0.15	1
						4.10	21.58	6.43	89.3	3.4	30	8.83				
2015/3/24 08:57:00	WY2	MF	828992	810403	6.8	1.00	21.58	6.71	93	2.4	30	8.81	2	0.05	0.15	48
						1.00	21.59	6.71	93.1	2.5	29.9	8.82				
						5.80	21.43	6.75	93.5	4.6	30.3	8.85	6	0.03	0.09	Not Dectected
						5.80	21.42	6.67	92.4	4.6	30.3	8.85				
2015/3/24 09:11:00	WY3	MF	829187	809861	5.3	1.00	21.58	6.71	93	2.4	30	8.81	3	0.05	0.16	26
						1.00	21.59	6.71	93.1	2.5	29.9	8.82				
						4.30	21.43	6.75	93.5	4.6	30.3	8.85	6	0.06	0.18	8
						4.30	21.42	6.67	92.4	4.6	30.3	8.85				
2015/3/24 08:39:00	CY1	MF	828403	810807	10.9	1.00	21.53	6.81	94.2	3	29.7	8.82	3	0.06	0.18	1
						1.00	21.53	6.78	93.9	2.4	29.7	8.81				
						9.90	21.29	6.73	93.2	4.4	30.5	8.87	6	0.03	0.07	Not Dectected
						9.90	21.3	6.74	93.3	4.9	30.5	8.87				
2015/3/24 09:37:00	CY2	MF	828006	808792	16.9	1.00	22.53	6.32	89.4	3.6	30.4	8.84	4	0.03	0.1	Not Dectected
						1.00	22.53	6.31	89.1	3.8	30.4	8.84				
						15.90	21.33	6.17	85.7	3.8	30.7	8.89	3	0.03	0.09	Not Dectected
						15.90	21.33	6.19	85.9	3.8	30.7	8.89				

Remarks: MF - Middle Flood tida
ME - Middle Ebb tida

Contract No. DC/2009/13

Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwn Wan

AUES

Yung Shue Wan Post-commissioning Martine Water Monitoring Programme

Date 14-Apr-15

Date / Time	Location	Tide	Co-ordinates		Water Depth	Sampling Depth	Temp	DO Conc	DO Saturation	Turbidity	Salinity	pH	SS	Ammonia N	TIN	E.coli
			East	North	m	m	℃	mg/L	%	NTU	ppt	unit	mg/l	mg/l	mg/l	1CFU/100ml
2015/4/14 09:06:00	WY1	ME	829156	809863	4.9	1.00	23.75	5.67	82.1	4.6	30.8	8.82	5	0.03	0.08	1
						1.00	23.79	5.78	83.6	4.2	30.8	8.85				
						3.90	23.62	5.98	86.4	5.2	30.8	8.86	4	0.04	0.08	Not Dectected
						3.90	23.62	5.98	86.4	5.4	30.8	8.86				
2015/4/14 08:45:00	WY2	ME	828991	810403	6.4	1.00	23.71	5.69	82.1	3.9	30.6	8.9	2	0.03	0.07	2
						1.00	23.74	5.66	81.8	3.2	30.5	8.9				
						5.40	23.5	5.97	85.8	4.7	30.4	8.91	5	0.05	0.09	1
						5.40	23.5	5.98	85.9	4.6	30.5	8.91				
2015/4/14 08:56:00	WY3	ME	829187	809843	5.1	1.00	23.65	5.43	78.4	6.6	30.7	8.87	7	0.04	0.09	4
						1.00	23.65	5.49	79.2	6.5	30.7	8.87				
						4.10	23.63	5.6	80.7	7.3	30.6	8.85	7	0.04	0.09	6
						4.10	23.63	5.52	79.5	7.3	30.6	8.85				
2015/4/14 08:30:00	CY1	ME	828402	810812	11.3	1.00	23.87	6.04	87.5	2.7	30.8	8.95	3	0.04	0.08	Not Dectected
						1.00	23.86	6.04	87.4	2.2	30.7	8.98				
						10.30	23.65	6.51	94	2.4	30.8	8.99	4	0.05	0.09	1
						10.30	23.65	6.49	93.7	2.4	30.8	8.99				
2015/4/14 09:23:00	CY2	ME	828006	808804	16.8	1.00	24.42	5.72	83.6	4.5	30.8	8.86	2	0.03	0.07	Not Dectected
						1.00	24.59	5.67	83.2	3.9	30.8	8.86				
						15.80	23.37	5.92	85.2	5.6	30.9	8.89	5	0.03	0.07	Not Dectected
						15.80	23.36	5.86	84.2	5.8	30.9	8.9				
2015/4/14 13:52:00	WY1	MF	829160	809859	4.3	1.00	24.26	5.28	76.9	6	30.7	8.83	5	0.03	0.09	Not Dectected
						1.00	24.32	5.31	77.5	5.8	30.7	8.84				
						3.30	23.87	5.54	80.3	6.6	30.7	8.87	3	0.03	0.08	Not Dectected
						3.30	23.83	5.6	81	6	30.7	8.87				
2015/4/14 14:04:00	WY2	MF	828987	810406	6.6	1.00	24.92	5.67	83.6	3	30.7	8.87	4	0.02	0.06	Not Dectected
						1.00	24.96	5.66	83.4	3	30.7	8.88				
						5.60	25.06	5.92	87.4	3.9	30.7	8.88	2	0.02	0.06	Not Dectected
						5.60	25.05	5.82	86	2.9	30.7	8.88				
2015/4/14 13:42:00	WY3	MF	829192	809841	5.1	1.00	24.4	5.5	80.4	3.8	30.7	8.88	5	0.04	0.09	Not Dectected
						1.00	24.45	5.48	80.2	3.3	30.7	8.88				
						4.10	24	5.97	86.5	3.7	30.4	8.9	6	0.03	0.09	1
						4.10	23.93	6.04	87.4	3.7	30.4	8.9				
2015/4/14 14:17:00	CY1	MF	828413	810807	10.8	1.00	24.67	5.64	82.7	3.1	30.7	8.9	3	0.02	0.07	Not Dectected
						1.00	24.71	5.73	84.1	3	30.7	8.94				
						9.80	23.6	5.95	85.9	4.6	30.8	9.03	4	0.04	0.08	1
						9.80	23.59	5.96	85.9	4.8	30.8	9.03				
2015/4/14 13:24:00	CY2	MF	827983	808795	17.1	1.00	25.1	5.9	87.1	3.8	30.7	8.84	5	0.02	0.06	Not Dectected
						1.00	25.12	5.86	86.5	3.8	30.7	8.84				
						16.10	23.48	5.96	85.9	4.2	30.8	8.87	3	0.02	0.06	2
						16.10	23.46	5.99	86.2	4.1	30.8	8.87				

Remarks: MF - Middle Flood tida
ME - Middle Ebb tida

Contract No. DC/2009/13

Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwn Wan

AUES

Yung Shue Wan Post-commissioning Martine Water Monitoring Programme

Date 27-Apr-15

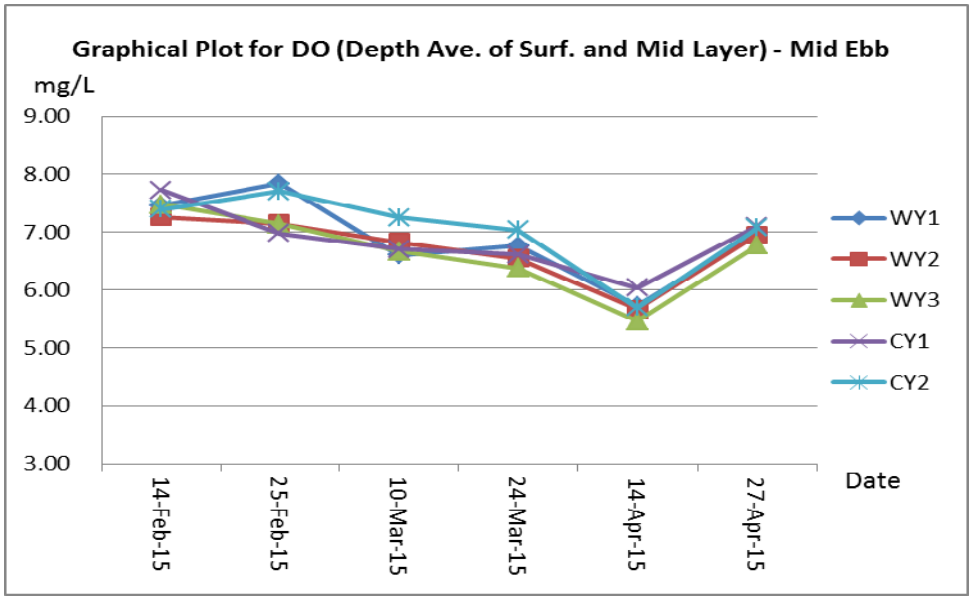
Date / Time	Location	Tide	Co-ordinates		Water Depth	Sampling Depth	Temp	DO Conc	DO Saturation	Turbidity	Salinity	pH	SS	Ammonia N	TIN	E.coli
			East	North	m	m	℃	mg/L	%	NTU	ppt	unit	mg/l	mg/l	mg/l	1CFU/100ml
2015/4/27 17:19:00	WY1	ME	829166	819537	5	1.00	25.43	6.98	96.9	0.9	31.32	6.9	4	0.03	0.22	Not Dectected
						1.00	25.46	6.97	96.4	0.7	32.26	6.9				
						4.00	23.67	6.72	93.7	1.2	33.49	6.59	8	0.02	0.18	2
						4.00	23.68	6.72	93.6	1.3	32.7	6.55				
2015/4/27 17:38:00	WY2	ME	828996	810413	6.8	1.00	25.21	6.96	96.3	0.2	31.7	6.69	4	<0.01	0.14	Not Dectected
						1.00	25.26	6.94	96	0.2	32.49	6.7				
						5.80	23.46	6.81	95.3	1	33.8	6.89	6	0.03	0.15	1
						5.80	23.37	6.79	94.8	1.1	33.87	6.9				
2015/4/27 17:30:00	WY3	ME	829187	809863	4.8	1.00	25.15	6.78	94.2	0.3	32.46	6.69	4	0.02	0.18	1
						1.00	25.16	6.76	93.8	0.2	32.45	6.68				
						3.80	24.69	6.57	90.4	0.7	32.8	6.71	5	0.01	0.17	1
						3.80	24.54	6.6	91.2	0.9	32.92	6.7				
2015/4/27 17:49:00	CY1	ME	828404	810813	10.5	1.00	24.13	7.11	104.2	0.4	31.75	6.75	4	0.03	0.3	Not Dectected
						1.00	24.04	7.09	103.2	0.2	31.89	6.71				
						9.50	23.13	6.97	96.6	0.7	33.91	6.78	4	0.02	0.18	Not Dectected
						9.50	23.13	6.95	96.2	0.6	33.91	6.79				
2015/4/27 17:04:00	CY2	ME	828004	808811	17.6	1.00	26.47	7.08	101.1	1.2	33.3	6.87	4	0.03	0.17	Not Dectected
						1.00	26.65	7.06	100.5	1.1	32.93	6.94				
						16.60	23.1	6.66	92.4	1	34.03	7	5	0.01	0.03	Not Dectected
						16.60	23.1	6.65	92.2	0.9	34.03	6.99				
2015/4/27 12:24:00	WY1	MF	829160	809541	5.3	1.00	24.87	6.64	92.4	0.6	32.43	6.93	6	0.02	0.19	Not Dectected
						1.00	24.5	6.67	93	0.6	32.65	6.89				
						4.30	24.14	6.51	90.2	0.8	32.85	6.95	5	0.02	0.17	Not Dectected
						4.30	24.13	6.52	90.5	0.9	32.86	6.95				
2015/4/27 12:03:00	WY2	MF	828984	810403	7.2	1.00	24.83	6.78	94.3	0.1	32.57	7.01	4	<0.01	0.13	Not Dectected
						1.00	24.82	6.77	94.1	0.1	32.57	6.99				
						6.20	23.88	6.49	89.8	0.4	33.16	6.93	4	0.04	0.14	Not Dectected
						6.20	23.87	6.51	90.1	0.3	33.16	6.93				
2015/4/27 12:13:00	WY3	MF	829206	808864	4.8	1.00	24.76	6.3	94	0.9	32.78	7.11	6	0.03	0.16	1
						1.00	24.8	6.29	93.1	0.8	32.76	7.12				
						3.80	24.04	6.45	89.1	1.9	33.1	7.19	4	0.06	0.18	10
						3.80	24.16	6.48	89.7	1.6	33.04	7.21				
2015/4/27 11:48:00	CY1	MF	828406	810811	11.8	1.00	24.28	6.97	96.7	0.1	32.16	7.65	6	0.12	0.37	Not Dectected
						1.00	24.3	6.83	95.4	0.1	32.15	7.65				
						10.80	23.23	6.72	93.2	0.6	33.95	7.54	5	<0.01	0.04	Not Dectected
						10.80	23.2	6.73	93.6	0.6	33.97	7.53				
2015/4/27 12:40:00	CY2	MF	828013	808819	18.2	1.00	27.18	7.02	97.8	2	32.83	7	6	0.02	0.06	Not Dectected
						1.00	27.17	7.01	97.4	1	33.2	7				
						17.20	23.06	6.71	93	1.3	34.05	6.88	3	0.08	0.17	1
						17.20	23.05	6.65	92.4	1.4	34.09	6.89				

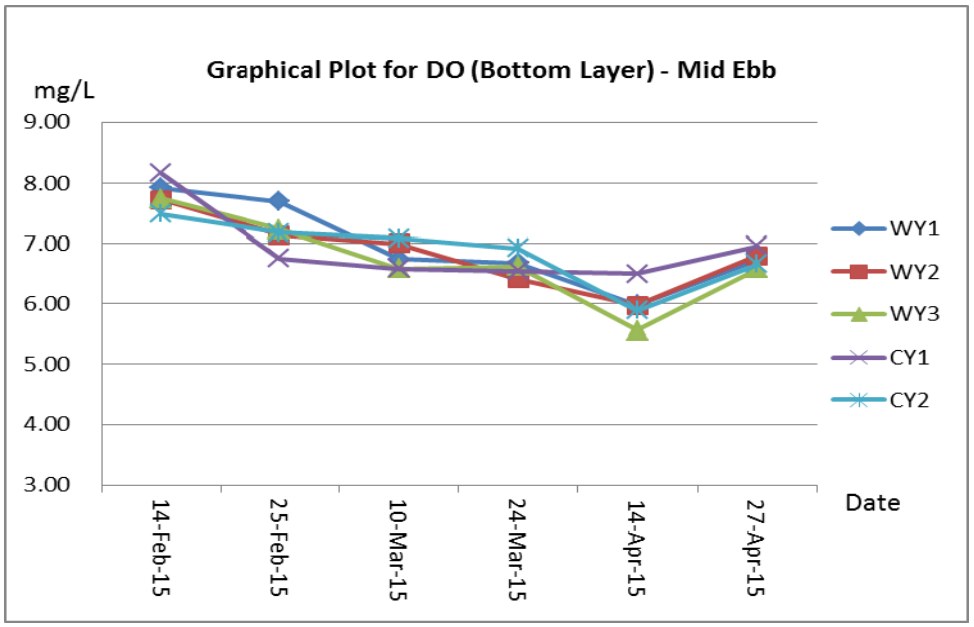
Remarks: MF - Middle Flood tida
ME - Middle Ebb tida

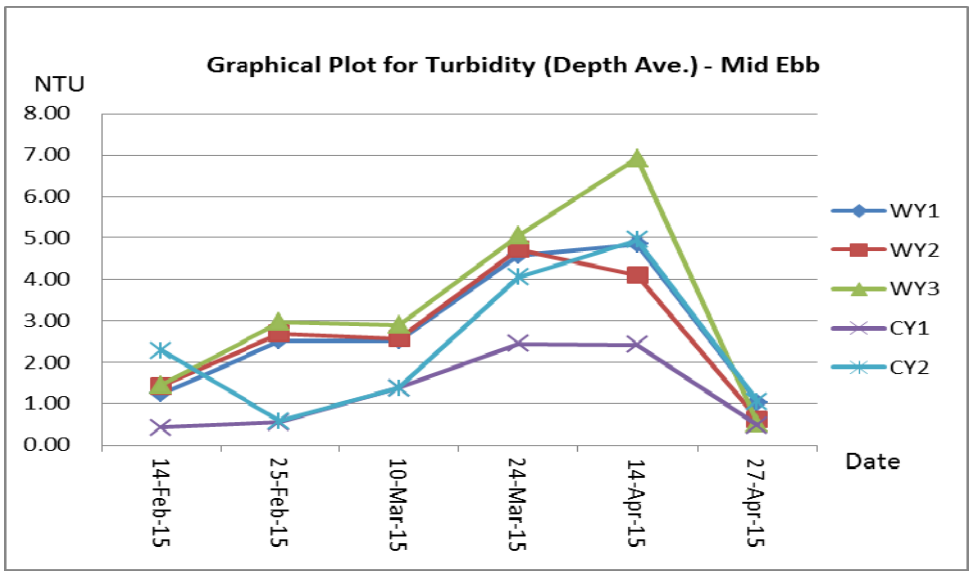
Appendix E

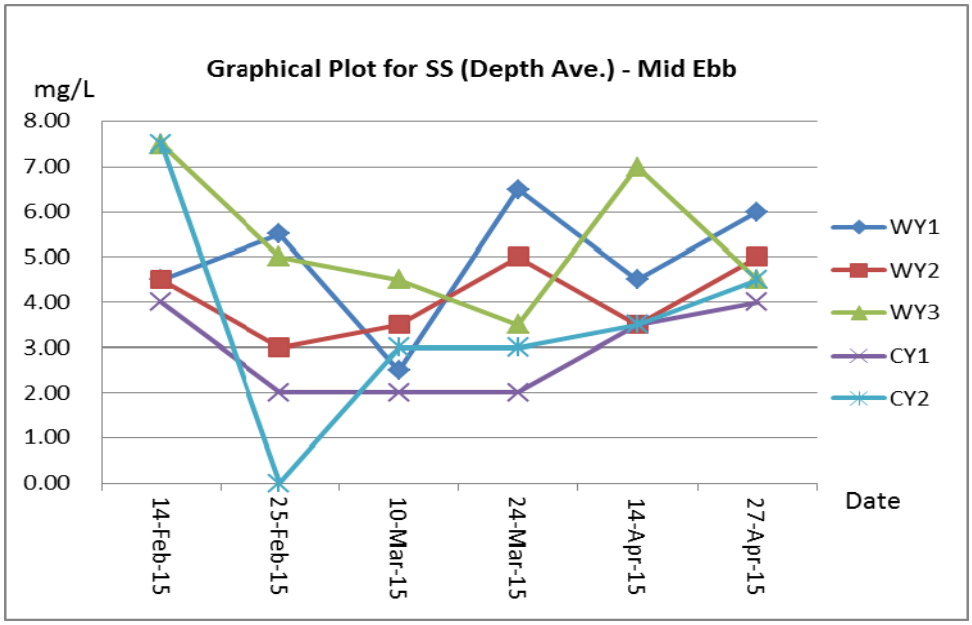
Graphical Plots of Monitoring Results

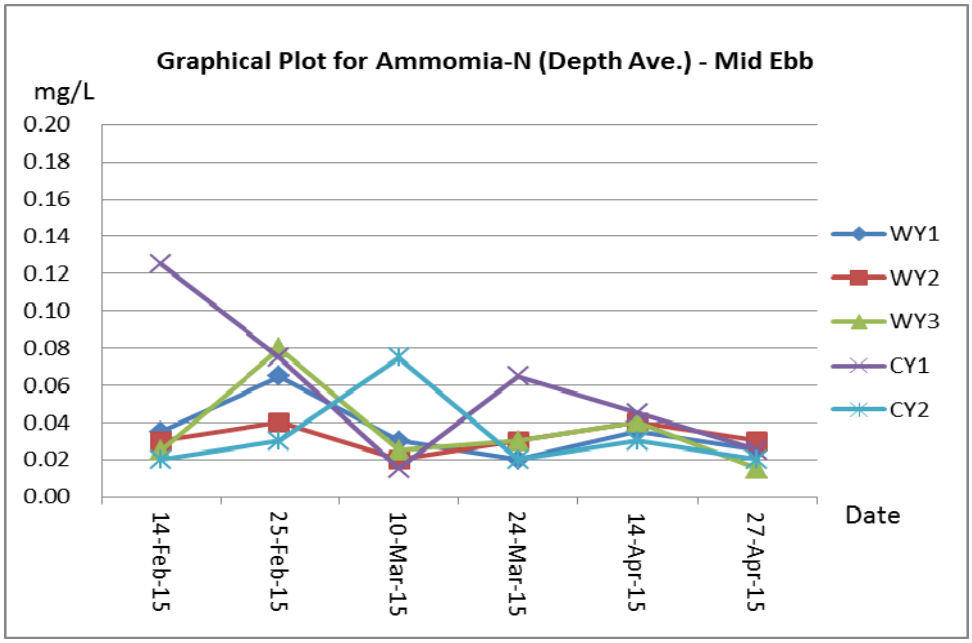
Water Quality Monitoring Result – Mid Ebb

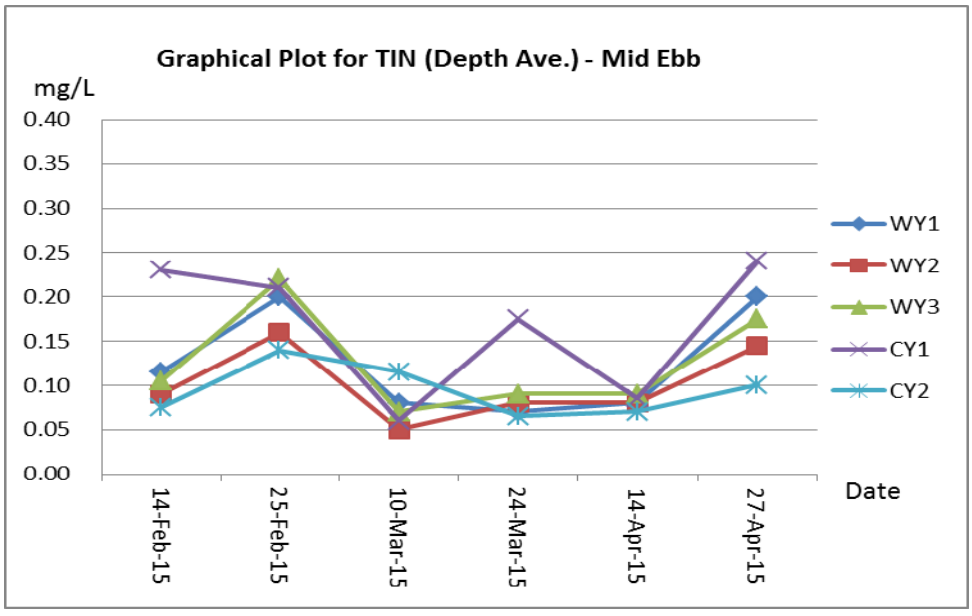


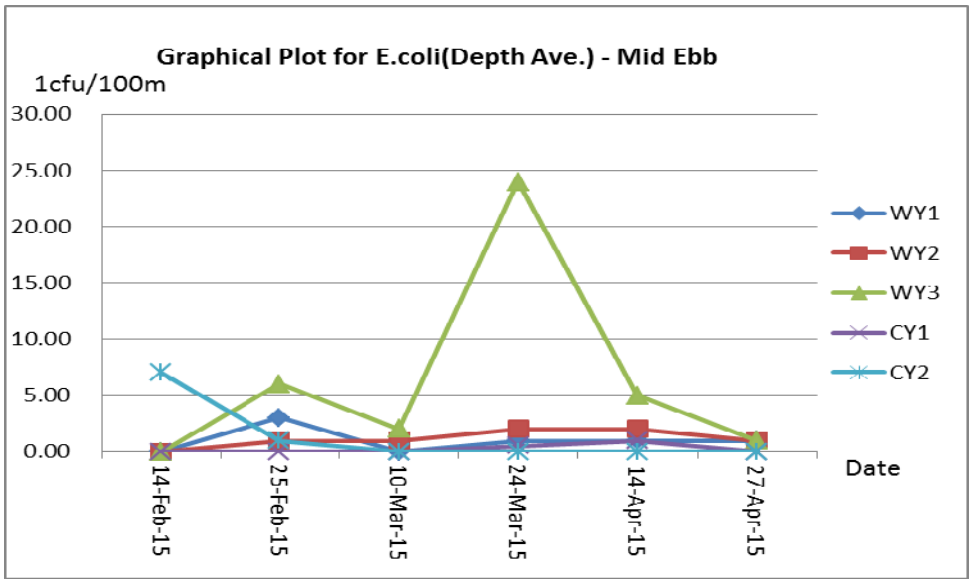




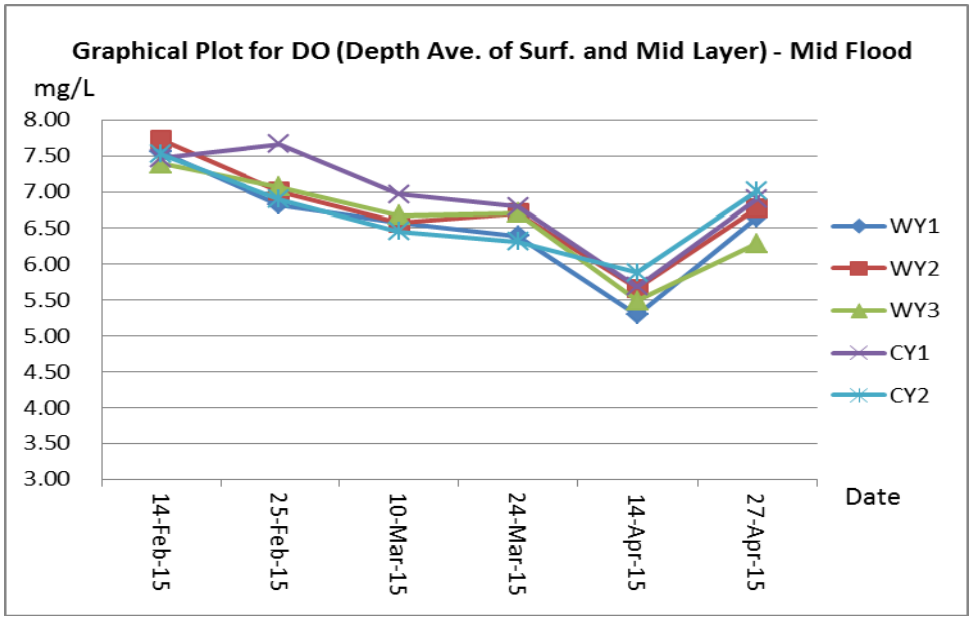

Graphical Plot for SS (Depth Ave.) - Mid Ebb
mg/L
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2

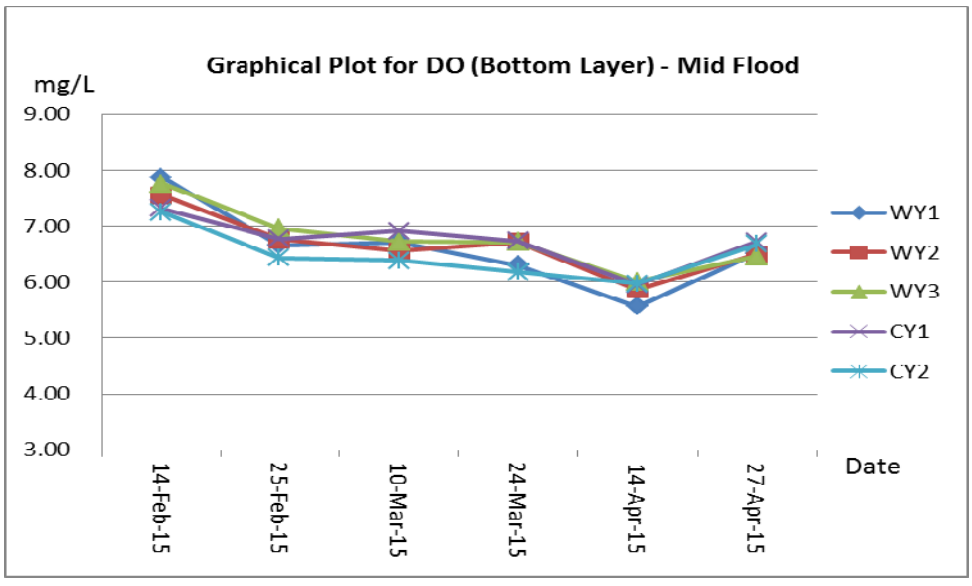

Graphical Plot for Ammomia-N (Depth Ave.) - Mid Ebb
mg/L
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2

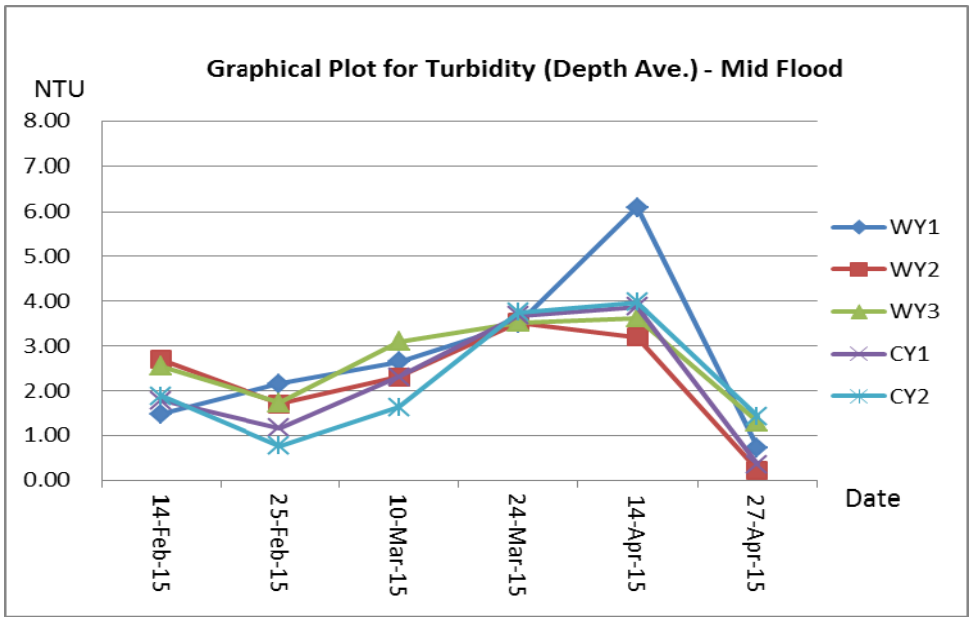

Graphical Plot for TIN (Depth Ave.) - Mid Ebb
mg/L
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2

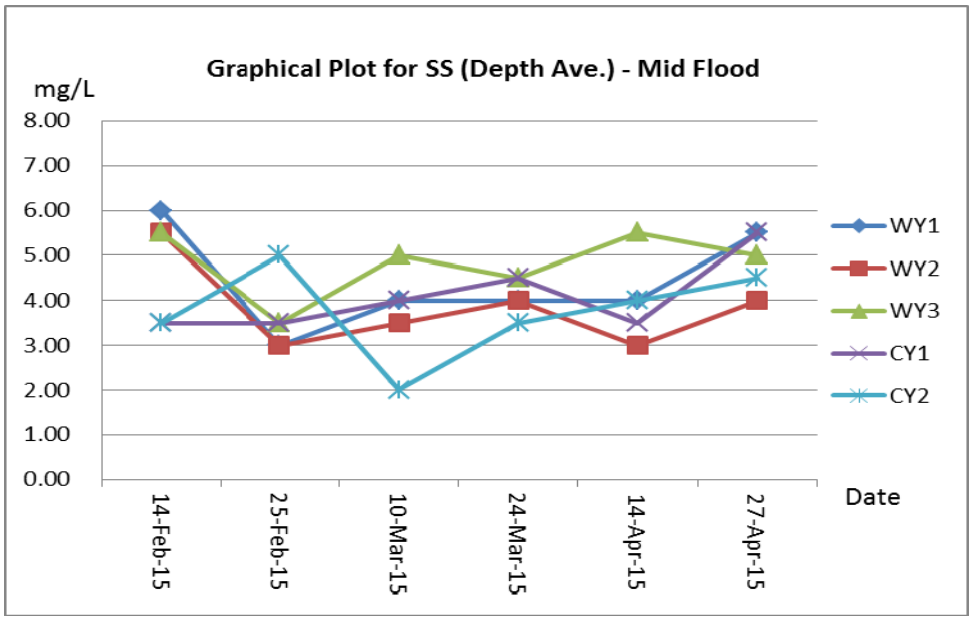


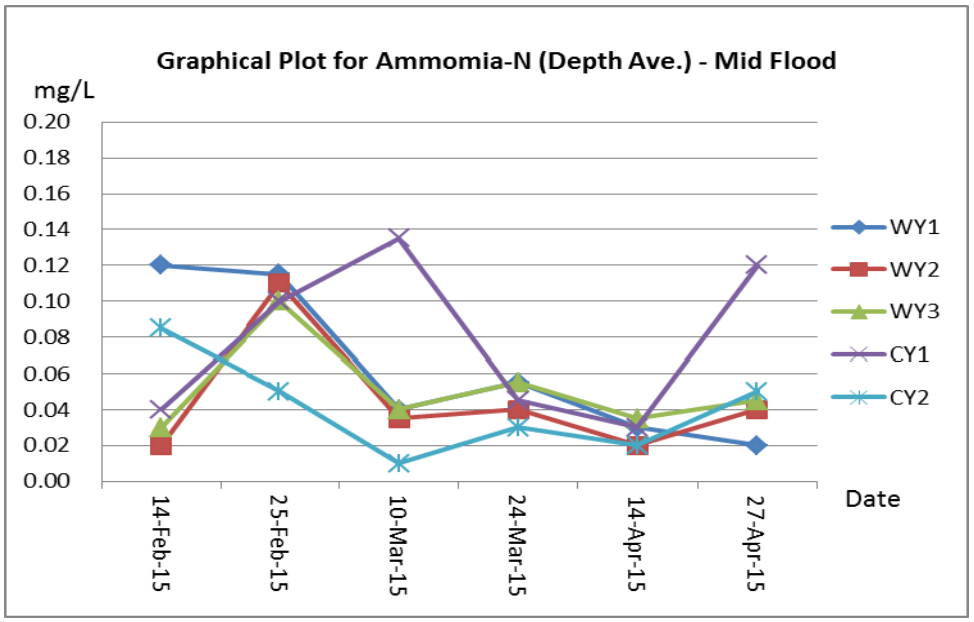
Water Quality Monitoring Result – Mid Flood

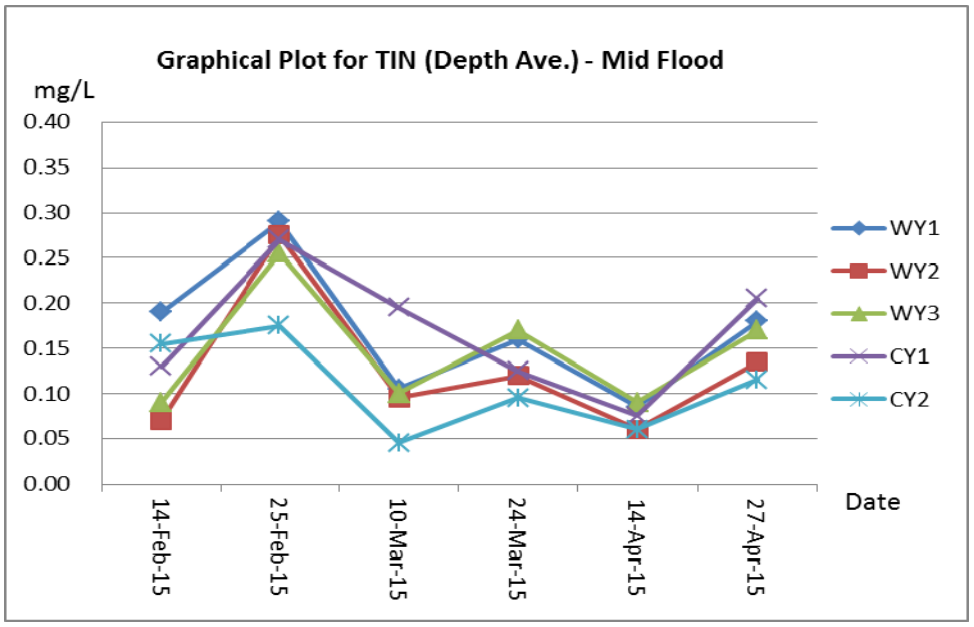


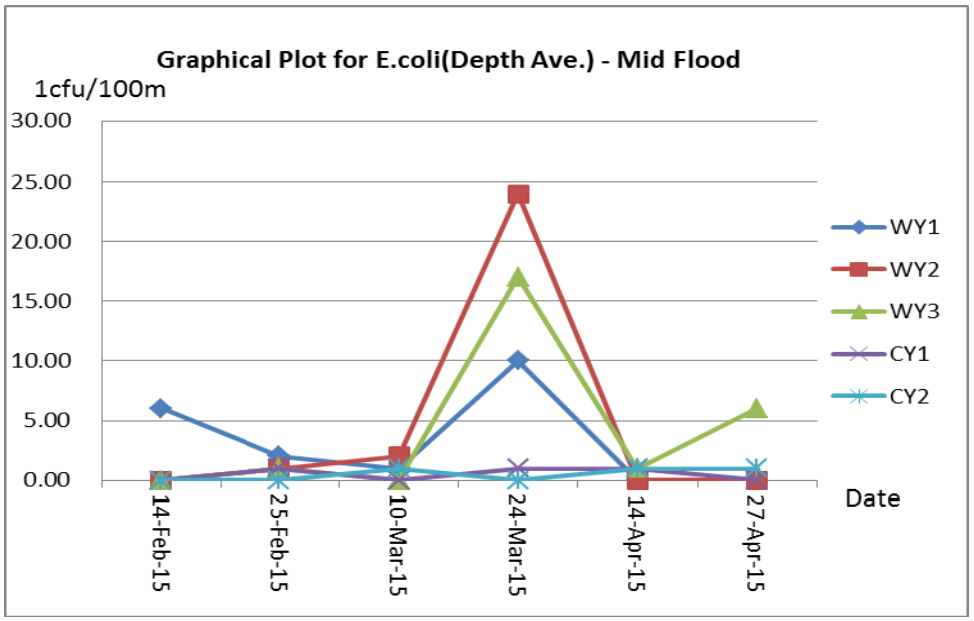



Graphical Plot for Turbidity (Depth Ave.) - Mid Flood
NTU
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2


Graphical Plot for SS (Depth Ave.) - Mid Flood
mg/L
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2


Graphical Plot for Ammomia-N (Depth Ave.) - Mid Flood
mg/L
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2


Graphical Plot for TIN (Depth Ave.) - Mid Flood
mg/L
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2


Graphical Plot for E.coli(Depth Ave.) - Mid Flood
1cfu/100m
30.00
25.00
20.00
15.00
10.00
5.00
0.00
14-Feb-15
25-Feb-15
10-Mar-15
24-Mar-15
14-Apr-15
27-Apr-15
Date
WY1
WY2
WY3
CY1
CY2