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Report No.: 0041/17/ED/0330A

Monthly EM&A Report June 2018

Client : Drainage Services Department

Project : Contract No. CM 14/2016
Environmental Team for Operational
Environmental Monitoring and Audit for Siu
Ho Wan Sewage Treatment Works

Report No.: : 0041/17/ED/0330A

Prepared by: Andy K. H. Choi

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Certified by:

A handwritten signature in black ink, appearing to be "Colin K. L. Yung", written over a horizontal line.

Colin K. L. Yung
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Our Ref: 1458/18-0118

20 July 2018

By Post and E-mail

Drainage Service Department
Projects and Development Branch
Consultants Management Division
42/F, Revenue Tower,
5 Gloucester Road
Wan Chai, Hong Kong

Attn: Mr. CHUNG Ching Hong, Romeo (E/CM9)

Dear Sir,

RE: CONTRACT NO. CM 13/2016
INDEPENDENT ENVIRONMENTAL CHECKER FOR OPERATIONAL ENVIRONMENTAL
MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT WORKS (SHWSTW)
MONTHLY ENVIRONMENTAL MONITORING AND AUDIT (EM&A) REPORT (JUNE 2018)

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for June 2018 (Report No.: 0041/17/ED/0330A) received from the Environmental Team (ET), Messrs. Fugro Technical Services Ltd., on 19 July 2018 via email.

We would like to inform you that we have no adverse comment on the captioned submission and hereby verify the same in accordance with Condition 4.3 of the Environmental Permit (EP) for the captioned Project (Permit No.: EP-076/2000).

Should you have any queries, please feel free to contact the undersigned, or our Mr. Rodney IP at 2815 7028.

Yours faithfully,

For and on behalf of
Allied Environmental Consultants Ltd.

Grace M. H. KWOK
Independent Environmental Checker

GK/ri/rc

c.c. Fugro Technical Service (ET Leader)
AECOM

Attn: Mr. Colin YUNG
Attn: Ms. Joanne TSOI

(By E-mail)
(By E-mail)

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Report No.: 0041/17/ED/0330A

TABLE OF CONTENTS

	EXECUTIVE SUMMARY	1
1.	INTRODUCTION.....	3
2.	AIR QUALITY MONITORING	5
3.	WATER QUALITY MONITORING	10
4.	SEDIMENT QUALITY MONITORING AND BENTHIC SURVEY	18
5.	CHINESE WHITE DOLPHIN MONITORING	26
6.	ADVICE ON IMPLEMENTATION STATUS OF ENVIRONMENTAL MITGATION MEASURES	27
7.	ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS	28
8.	SUMMARY OF EXCEEDANCE OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS	29
9.	SUMMARY OF ENVIRONMENTAL COMPLAINTS	30
10.	FUTURE KEY ISSUES	31
11.	CONCLUSION	32

FIGURE

- Figure 1 Monitoring Location of Air Sensitive Receiver**
- Figure 2 Monitoring Locations of Water Quality Monitoring, Sediment Quality Monitoring and Benthic Survey**
- Figure 3 Location of the Tide Gauge**
- Figure 4 Location of Survey Areas of Chinese White Dolphins**

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Report No.: 0041/17/ED/0330A

APPENDICES

- Appendix A Project Organization Chart**
- Appendix B Monitoring Schedule for Present and Next Reporting Period**
- Appendix C Event and Action Plan for Air Quality Monitoring**
- Appendix D Copy of the Calibration Certificates for Water Quality Monitoring Equipment**
- Appendix E Results and Graphical Presentation of Water Quality Monitoring**
- Appendix F Tidal Data obtained from Ma Wan Marine Traffic Station**
- Appendix G Results and Graphical Presentation of Laboratory Analysis for Sediment Quality Monitoring and Benthic Survey**
- Appendix H Benthic Survey Report**
- Appendix I Photos of Grab Samplers**
- Appendix J Environmental Mitigation Implementation Schedule (EMIS)**



EXECUTIVE SUMMARY

This Monthly Environmental Monitoring and Audit (EM&A) Report is prepared for Contract No. CM 14/2016 – “Environmental Monitoring and Audit for Operation of Siu Ho Wan Sewage Treatment Works” (hereafter referred to as “the Contract”) for the Drainage Services Department (DSD) of Hong Kong Special Administrative Region. Fugro Technical Services Limited (hereafter referred to as “FTS”) was appointed as the Environmental Team (ET) by DSD, to implement the Environmental Monitoring & Audit (EM&A) programme in accordance with the Operational EM&A Plan of the Contract.

The Contract is part of the “Upgrading of Siu Ho Wan Sewage Treatment Works” (hereinafter referred as “the Project”) which was classified as “Designated Project” under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap 499) and Environmental Impact Assessment (EIA) Report (Register No. EIAR-124BC) was completed in September 1997. The current Environmental Permit (EP) No. EP-076/2000 was issued in August 2000 to DSD.

In accordance with the EP, an approved operational EM&A Plan was submitted. According to the approved EM&A plan, air quality monitoring i.e. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis of H₂S, in addition, water quality monitoring, sediment quality monitoring, benthic survey, Chinese White Dolphin (CWD) monitoring and waste management are the key environmental concern of the Project.

This is the eleventh Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 June 2018 to 30 June 2018 (the “reporting period”).

Breaches of Action and Limit Levels

Air quality monitoring i.e. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis, was temporary suspended and no monitoring was carried out in the reporting period. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASR) were recorded and no non-compliance of odour monitoring at ASR were recorded in the reporting period.

Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 14 June 2018. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

Compliant Log

There was no complaint received in relation to the environmental impact during the report period.

Notifications of Summons and Successful Prosecutions

There were no notifications of summons or prosecutions received during the reporting period.

Summary of the Environmental Mitigations Measures

Mitigation measures specified in the EP and EIA Report such as aeration, chemical dosing system, covering or enclosing the pressing and sludge thickening facilities and ventilating air to a biological treatment unit prior to stack exhaust was implemented during the reporting period.

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Report No.: 0041/17/ED/0330A

Page 2

Future Key Issues

The key issues to be considered in the coming reporting month include:

Potential environmental impacts arising from the operation of Siu Ho Wan Sewage Treatment Works (SHWSTW) are mainly associated with air quality, water quality, sediment quality, benthic ecology, waste management and distribution and abundance of CWDs.

Due to inadequacy of representative data collect between August 2017 and May 2018, current H₂S measurement and olfactometry analysis was considered as unsuitable way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H₂S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspended until alternative methods of correlation study was approved by EPD. The temporary suspension was approved by EPD's memo dated 14 May 2018.



1. INTRODUCTION

1.1 Background

- 1.1.1 The Project “Upgrading of Siu Ho Wan Sewage Treatment Works” is to upgrade SHWSTW from the preliminary treatment level to Chemically Enhanced Primary Treatment (CEPT) level with Ultraviolet (UV) disinfection facilities. The Project is required to comply with the Environmental Permit (EP) in respect of the construction and operation phases of the Plant.
- 1.1.2 Under the EIAO, the Project was classified as “Designated Project”. The Environmental Impact Assessment (EIA) study was completed in September 1997 with the EIA Report of Register No. EIAR-124BC, Operational Environmental Monitoring and Audit (EM&A) Plan and the EP of No. EP-076/2000 was issued in August 2000 to Drainage Services Department (DSD).
- 1.1.3 The CEPT part has been completed and was put into operation in March 2005. The UV disinfection works were substantially completed in December 2006. It is considered that the operation of the Project shall be deemed to start when the UV disinfection facilities have been completely installed and tested.

1.2 Project Description

- 1.2.1 The project proponent was DSD. AECOM was commissioned by DSD as the Engineer for the Project. Allied Environmental Consultants Limited (AEC) was commissioned by DSD as the Independent Environmental Checker (IEC) in the operation phase of the Project. FTS was appointed as the ET by DSD to implement the EM&A programme for the operation phase of the Project including air quality monitoring, water quality monitoring, sediment quality and benthic survey and CWD monitoring.

1.3 Project Organization

- 1.3.1 The project organization for environmental works is shown in **Appendix A**. The contact person and telephone numbers of key personnel for the captioned project are shown in **Table 1.1**.

Table 1.1 Contact Persons and Telephone Numbers of Key Personnel

Organization	Role	Contact Person	Telephone No.	Fax No.
DSD	Project Proponent Representative	Mr. Romeo Chung	2594 7266	3104 6426
AECOM	Engineer Representative (ER)	Ms. Joanne Tsoi	3922 9423	3922 9797
AEC	Independent Environmental Checker (IEC)	Ms. Grace Kwok	2815 7028	2815 5399
FTS	ET Leader (ETL)	Mr. Colin Yung	3565 4114	2450 8032

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Report No.: 0041/17/ED/0330A

Page 4

1.4 Work Undertaken during the Report Period

1.4.1 During this reporting period, the principal work activities included:

- Perform comprehensive operation and maintenance services for the electrical, mechanical and electronic systems/equipment at SHWSTW.
- Alleviate as far as practicable the impact that the facilities and sewage systems imposed on the environment of Hong Kong.

2. AIR QUALITY MONITORING

2.1 Methodology of H₂S Concentration Monitoring

2.1.1 15-min H₂S concentration was measured using a Jerome 631-X analyzer. This analyzer is capable of measuring H₂S concentration in the range of 1 ppb to 50 ppm with a resolution of 1 ppb and operates within a temperature range of 0°C to 40°C at an air flow rate of 0.15 L/min. Odour gas samples were drawn by built-in a suction pump of the analyzer and passed through a gold film sensor. The trace level of H₂S of the samples were determined electrochemically on the gold film sensor. Meteorological conditions including temperature, wind speed, wind direction and relative humidity were also measured at the time of the monitoring. Table 2.1 summarizes the equipment used in H₂S monitoring.

Table 2.1 Equipment used for H₂S Concentration Monitoring

Equipment	Manufacturer / Model	Serial Number	Sensor Number
Gold Film Hydrogen Sulphide Analyzer	JEROME X631 0003	2966	14-11-23-R2D

2.2 Methodology of Odour Patrol Monitoring

2.2.1 Odour patrol monitoring was carried out in accordance with the European Standard method: BS EN13725, to ensure the odour sensitivities of all patrol members are within 20-80 ppb/V. Environmental conditions were record as follows:

- i. Prevailing Weather Condition;
- ii. Wind Direction;
- iii. Wind Speed;
- iv. Location where Odour is detected;
- v. Source of Odour detected;
- vi. Perceived intensity of Odour detected;
- viii. Duration of Odour detected; and
- ix. Characteristics of Odour detected

The perceived intensity is classified into 5 categories as shown in **Table 2.2** below.



Table 2.2 Categories of Odour Intensity

Odour Level	Odour Intensity	Classification Criteria
0	Not detected	No odour perceives or an odour so weak that it cannot be readily characterised or described
1	Slight	Identifiable odour, barely noticeable
2	Noticeable	Identifiable odour, noticeable
3	Strong	Identifiable odour, strong
4	Extreme	Severe odour

2.3 Methodology of Odour Sampling and Olfactometry Analysis

- 2.3.1 Odour gas samples were collected in a Nalophan sampling bag placed inside a vacuum air-tight sampler using passive sampling technique. Approximately 60 liter of gas sample was collected at each sampling. All samples collected on the sampling day were returned to laboratory for olfactometry analysis within 24 hours and analyzed within 2 hours upon receiving.
- 2.3.2 ALS Technichem (HK) Pty Ltd. (HOKLAS Reg. No. 066), was appointed to be the laboratory for olfactometry analysis of the gas sample.
- 2.3.3 The odour concentration of the samples were determined by Forced-choice Dynamic Olfactometer in accordance with the European Standard Method: BS EN13725. Testing were also performed by a panel of six members who have been trained to comply with the requirement of European Standard Method: BS EN13725. All testing were completed within 24 hours upon sampling.

2.4 Monitoring Location

- 2.4.1 H₂S concentration monitoring, odour patrol monitoring and odour sampling were carried out at ASR, Cheung Tung Road near the Bus Repot at the west of the Siu Ho Wan Treatment Plant. The location of ASR is shown in **Figure 1**.

2.5 Monitoring Frequency and Duration

The durations and frequencies of H₂S concentration measurement, odour patrolling and odour sampling are summarized in **Table 2.3** below.

Table 2.3 Durations and Frequencies of Air Quality Monitoring Programme

	Duration	Frequency
H ₂ S concentration monitoring	15 minutes	¹ Weekly basis for 6 months during the initial operation stage
Odour patrol		
Odour sampling for olfactometry analysis	³ 15 minutes	² First week of the odour patrol monitoring

Remark:

- 1) In case excessive odour nuisance was detected during the odour patrol monitoring or the standard of the 5 odour units cannot be complied with during the odour panel monitoring, the odour patrol monitoring and H₂S concentration monitoring shall be extended for a period of three months to cater for the warm-up period of the functioning of the additional mitigation measures.

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2) In case the relationship between H₂S concentration (ppb) with the odour unit (OU/m³) cannot conclude from the correlation study carried out at the first week of the odour patrol monitoring due to invalid data, additional odour sampling for olfactometry analysis shall be carried out for the correlation study.

3) Sufficient air samples (approximate 60L) may be collected in less than 15 minutes during odour sampling.

2.5.1 The monitoring schedule for the present and next reporting period is provided in **Appendix B**.

2.6 Event and Action Plan

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

Table 2.4 Action and Limit Levels for Air Quality Monitoring

Parameter	Action	Limit
Odour	One complaint received for specific odour event	Two or more independent complaints receive for specific odour event

2.6.2 The event and action plan for air quality monitoring is provided in **Appendix C**.

2.7 Quality Assurance and Quality Control

2.7.1 A control sample was collected by purging odour-free nitrogen gas from a certified gas cylinder on site at each sampling.

2.7.2 Calibration of the analyzer is conducted every year at the laboratory of the manufacturer.

2.7.3 In order to ensure the analyzer is functioning properly, manual sensor regeneration and zero adjustment were performed before each set of odour monitoring.

2.8 Monitoring Results and Observations

2.8.1 Air quality monitoring i.e. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis, was temporary suspended and no monitoring was carried out in the reporting period.

2.8.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). Due to non-ideal wind direction or domination of non-target smell during the measurements conducted between August 2017 and May 2018, inadequacy of representative data was result between August 2017 and May 2018. Current H₂S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H₂S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

2.8.3 No exceedances of Action/Limit levels at ASR were recorded as no complaint was received during the reporting period.

2.8.4 Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspended until alternative methods of correlation study was approved by EPD. The temporary suspension was approved by EPD's memo dated 14 May 2018.

2.8.5 Odour mitigation measures such as aeration, chemical dosing system, covering or enclosing the pressing and sludge thickening facilities and ventilating air to a biological treatment unit prior to stack exhaust were implemented during the reporting period.



3. WATER QUALITY MONITORING

3.1 Monitoring Location

3.1.1 In accordance with Section 5 of the EM&A Plan, water quality monitoring should be carried out at 8 designated monitoring locations (2 impact stations and 6 control stations) during the first five years of the operational phase of the Project. The monitoring locations shall be the same monitoring locations that were used for the baseline monitoring programme and have been approved by EPD. The coordinates of the monitoring location is shown in **Table 3.1**. The monitoring locations of water quality monitoring are also shown in **Figure 2**.

Table 3.1 Location of Water Quality Monitoring

Sampling Location		Easting	Northing
A	The Brothers, Control Station	816 100	822 500
B	The Brothers, Control Station	816 680	822 440
C	Siu Ho Wan Outfall, Impact Station	816 800	820 180
D	Siu Ho Wan Outfall, Impact Station	817 160	820 360
E	Cheung Sok, Control Station	819 817	821 655
F	Cheung Sok, Control Station	820 158	821 922
G	Tai Ching Chau, Control Station	822 214	822 692
H	Tai Ching Chau, Control Station	822 494	822 939

3.2 Monitoring Parameter

3.2.1 The monitoring parameters for water quality monitoring are summarized in **Table 3.2**.

Table 3.2 Parameters for Water Quality Monitoring

Monitoring Parameters	
In-situ Measurement	Laboratory Analysis
Dissolved oxygen (mg/L)	<i>E. coli</i> (cfu/100ml)
Temperature (degree Celsius)	5-day BOD (mg/l)
pH value	Suspended Solids (mg/l)
Water depth (m)	Ammonia as N (mg/l)
Salinity (ppt)	Nitrate as N (mg/l)
Turbidity (NTU)	Nitrite as N (mg/l)
Current Speed (m/s)	Total inorganic nitrogen (mg/l)
Current Direction (degree magnetic)	Total phosphorus (soluble and particulate) (mg/l)



3.2.2 Apart from the parameters listed in the **Table 3.2**, other relevant supplementary information such as monitoring location, time, weather conditions and any special phenomena shall be also recorded.

3.2.3 The tidal data will be obtained from the tide gauge installed in Ma Wan Marine Traffic Station, managed by the Hydrographic Office of Marine Department. Location of the tide gauge is shown in **Figure 3**.

3.3 Monitoring Equipment

3.3.1 A multifunctional meter (YSI 6920 V2/ Aqua TROLL 600) was used to measure dissolved oxygen (DO), concentration, DO saturation, temperature, salinity, pH and turbidity, simultaneously at the same location and water depth. An Acoustic Doppler Current Profiler (ADCP) which integrated with echo sounder function was used to measure water depth, current velocity (speed and direction). The measured data by ADCP will then be downloaded on site to computer on board. The measured water depth data by ADCP shall be electronically logged and available for output. All measurement data from the multiparameter monitoring device and ADCP will be integrated with the GPS data from the DGPS logging device, so that data collected at a specific time and location can be shown. The water sampler shall be tied with the multiparameter monitoring device (with water depth probe to determine the exact sampling depth at which a sample is collected). The equipment employed for the monitoring and sampling and their specifications are presented in **Table 3.3**.

Table 3.3 Water Quality Monitoring and Sampling Equipment

Parameter	Equipment	Model	Range	Equipment Accuracy
Temperature, Dissolved Oxygen, salinity, pH, Turbidity, Sampling Depth	Water Quality Monitoring Device	1) YSI 6920V2-2-M Sonde 2) Aqua TROLL 600 Multiparameter Sonde	Temp: -5 to 50°C DO: 0-50mg/L DO%: 0-500% Sal: 0 to 70 ppt pH: 0 to 14 pH units Turb: 0-1000NTU Depth: 0-61 meters	Temp: ±0.15°C DO: ±0.1mg/L or 1% (whichever greater) for 0-20mg/L; ±15% for 20-50mg/L (with correction for salinity and temperature) Sal: ±1% or 0.1ppt (whichever greater) pH: ±0.2 units Turb: ±2% or 0.3NTU (whichever greater) Depth: ±0.12m
Water Depth, Current Speed, Current Direction	Acoustic Doppler Current Profiler	RiverSurveyor M9	Water Depth: 0-80m	Water Depth: 1% Current speed: ±0.25% of measured velocity or ±0.2cm/s Current direction: ±2degree magnetic
Positioning	DGPS	Simrad MX521B Smart Antenna with Simrad MX610 CDU	NA	GPS: ±1m
Water Sampling	Water Sampler	Aquatic Research Transparent PC Vertical Water Sampler 2.2L / 3L / 5L	NA	NA



3.3.2 Apart from the equipment mentioned in Section 3.3.1, a Class III commercially licensed vessel was used as survey vessel. DGPS logging device with accuracy $\pm 1\text{m}$ at 95% confidence level shall be installed on the survey vessel to ascertain that measurement can be made accurately on the specific transects. All GPS data collected during the whole survey shall be automatically and electronically logged. Powered winch shall be used on-board the Survey Vessel to assist the monitoring. Experienced supervisor was present throughout the monitoring exercise on the Survey Vessel.

3.3.3 Water samples were collected by water sampler and stored in high density polythene bottles and sterilized glass bottles (for bacterial analysis), packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory on the same day of collection for analysis. All sampling bottles were pre-rinsed with the same water samples. The sampling bottles were then taken to a HOKLAS accredited laboratory for analysis of *E. coli*, BOD₅, Suspended Solids, NH₃-N, NO₃-N, NO₂-N, Total inorganic nitrogen, Total phosphorus (soluble and particulate).

3.4 Laboratory Measurement and Analysis

3.4.1 ALS Technichem (HK) Pty Ltd (HOKLAS Reg. No. 066), is appointed to be the laboratory for analysis of water samples. The methods adopted by the laboratories and the reporting limits are detailed in **Table 3.4**.

Table 3.4 Laboratory Measurement/Analysis Methods and Reporting Limits

Analysis Description	Method	Reporting limits
<i>E. coli</i>	DoE Section 7.8, 7.9.4.2& 7.9.4.4 plus in situ urease test	1 cfu/100mL
5-day Biochemical Oxygen Demand	APHA 5210B	1 mg/L
Total Suspended Solid	APHA 2540D	0.5 mg/L
Ammonia as N	APHA 4500 NH3: G	0.005 mg/L
Nitrate as N	APHA 4500 NO3: I	0.005 mg/L
Nitrite as N	APHA 4500 NO2 B&H	0.005 mg/L
Total Inorganic Nitrogen	By Calculation	0.01 mg/L
Total phosphorus (soluble and particulate)	APHA 4500 P: J	0.01 mg/L

3.5 Monitoring Frequency and Duration

- 3.5.1 The water quality monitoring programmed shall be carried out once per two months for a period of five years of the operational phase of the Project.
- 3.5.2 Water quality monitoring for two tides at 8 designated locations will be carried out for each monitoring event. For each location at each tide, duplicate samples for in-situ parameter and laboratory analysis at 3 designated water depths (1 m below water surface, mid-depth and 1 m above the seabed) will be taken and analyzed.
- 3.5.3 The monitoring schedule for the present and next reporting period is provided in **Appendix B**.

3.6 Quality Assurance / Quality Control

- 3.6.1 The equipment is in compliance with the requirements set out in the EM&A plan. All in-situ monitoring instruments were calibrated by a HOKLAS-accredited laboratory or by standard solutions. Calibration of temperature, DO, salinity, pH and turbidity is conducted in three month interval. Copies of calibration certificates for the water quality monitoring equipment are attached in **Appendix D**.
- 3.6.2 During the measurements of DO concentration, DO saturation, salinity, turbidity, pH and temperature, duplicate readings were taken. If the difference between the first and second readings of DO or turbidity was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.
- 3.6.3 The laboratory incorporates a variety of QA/QC monitoring programme into their testing system. Where applicable or available, the quality of the analysis will be monitored by conducting the following QC analysis:

For each batch of 20 samples:

- A minimal of 1 laboratory method blank will be analyzed;
- A minimal of 1 sample duplicate will be analyzed;
- A minimal of 1 sample matrix spike will be analyzed.

3.7 Event and Action Plan

- 3.7.1 Since the purpose of the water quality monitoring is to collect data for future propose, no specific event and action has to be followed.



3.8 Monitoring Results and Observations

3.8.1 Water quality monitoring is carried out on 14 June 2018. A summary of the in-situ water quality monitoring results are presented in **Table 3.5** (Mid-ebb) and **Table 3.6** (Mid-flood) respectively. The complete record and graphical presentation of the in-situ water quality monitoring results is given in **Appendix E**.

Table 3.5 Summary of In-situ Monitoring Results (Mid-ebb)

Monitoring Station	Water Depth (m)	Sampling Depth (m)	Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	20	S 1	5.91	29.09	7.68	19.30	11.4	0.04	251.9
		S 1	5.62	29.06	7.70	18.89	12.0	0.04	253.9
		M 10	4.99	28.62	7.94	20.98	6.0	0.29	219.3
		M 10	4.98	28.61	7.94	20.98	6.1	0.31	221.4
		B 19	4.89	28.56	7.93	28.56	15.9	0.92	265.7
		B 19	4.89	28.55	7.93	28.56	16.3	0.84	266.2
B	13	S 1	6.92	28.20	7.84	19.13	11.6	0.11	114.8
		S 1	6.87	28.20	7.92	19.50	9.6	0.12	121.5
		M 6.5	4.85	28.31	8.01	27.49	4.7	0.61	255.1
		M 6.5	4.84	28.31	8.01	27.47	4.8	0.66	248.8
		B 12	4.71	28.26	8.05	29.72	4.0	0.60	268.1
		B 12	4.70	28.26	8.05	29.78	4.0	0.54	267.3
C	13	S 1	6.17	28.85	8.02	16.20	3.2	0.08	119.5
		S 1	6.14	28.84	8.03	16.54	3.2	0.08	177.5
		M 6.5	5.17	28.63	8.05	20.76	4.0	0.12	165.3
		M 6.5	5.10	28.56	8.06	20.77	5.0	0.11	165.7
		B 12	4.66	28.47	8.04	26.43	7.3	0.26	236.6
		B 12	4.64	28.47	8.04	26.61	7.6	0.29	255.1
D	13	S 1	5.68	28.36	8.04	28.36	5.7	0.24	159.0
		S 1	5.67	28.36	8.04	28.36	5.6	0.24	147.4
		M 6.5	4.97	28.43	8.03	24.27	8.0	0.13	142.6
		M 6.5	4.95	28.43	8.03	24.46	8.1	0.17	150.2
		B 12	4.52	26.00	7.79	25.99	10.3	0.48	234.2
		B 12	4.39	25.80	7.84	25.79	10.5	0.50	231.4
E	16	S 1	5.39	28.36	8.04	20.00	5.4	0.22	126.3
		S 1	5.39	28.36	8.04	20.00	5.5	0.21	139.8
		M 8	5.16	28.36	7.97	20.82	6.8	0.28	166.1
		M 8	5.10	28.33	7.97	20.97	6.3	0.12	174.2
		B 15	4.89	28.30	7.97	22.35	11.9	0.16	258.0
		B 15	4.88	28.31	7.97	22.41	12.3	0.09	200.1
F	23	S 1	6.99	27.42	7.97	12.07	6.4	0.21	197.5
		S 1	6.96	27.42	7.98	12.71	6.7	0.11	191.6
		M 11.5	5.17	28.15	8.02	22.41	3.1	0.18	233.6
		M 11.5	5.16	28.16	8.02	22.47	3.1	0.20	234.9
		B 22	4.96	28.17	8.00	22.89	19.6	0.16	228.4
		B 22	4.95	28.17	8.01	22.90	20.5	0.16	205.9
G	22	S 1	6.46	26.81	7.98	19.45	2.5	0.18	146.3
		S 1	6.40	26.82	8.01	20.40	2.6	0.21	151.4
		M 11	5.12	28.02	8.05	22.90	3.6	0.36	215.9

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Monitoring Station	Water Depth (m)	Sampling Depth (m)	Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
		M 11	5.11	28.03	8.05	22.81	3.6	0.42	224.7
		B 21	4.86	28.10	8.04	24.89	15.2	0.59	266.8
		B 21	4.85	28.10	8.04	24.98	15.7	0.62	276.1
H	19	S 1	5.69	27.96	8.01	20.40	2.6	0.32	166.3
		S 1	5.64	27.98	8.02	20.65	2.5	0.37	173.4
		M 9.5	5.05	28.20	8.05	23.05	4.3	0.34	222.8
		M 9.5	5.04	28.20	8.05	23.07	4.4	0.35	216.2
		B 18	4.97	28.23	8.03	23.00	4.6	0.65	241.9
		B 18	4.97	28.23	8.03	23.00	4.6	0.66	238.1

Table 3.6 Summary of In-situ Monitoring Results (Mid-flood)

Monitoring Station	Water Depth (m)	Sampling Depth (m)	Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	15	S 1	4.83	28.07	8.09	27.71	1.6	0.26	235.2
		S 1	4.85	28.05	8.10	27.73	1.5	0.25	233.8
		M 7.5	4.81	28.05	8.09	28.06	2.8	0.55	242.1
		M 7.5	4.82	28.07	8.10	28.04	2.9	0.51	245.9
		B 14	4.76	28.02	8.08	28.97	3.5	0.58	204.4
		B 14	4.75	28.03	8.08	28.96	3.3	0.54	214.0
B	11	S 1	4.75	29.04	8.06	27.01	2.6	0.14	257.9
		S 1	4.74	29.01	8.07	27.06	2.7	0.15	258.4
		M 5.5	4.79	28.24	8.09	28.32	2.9	0.33	263.6
		M 5.5	4.80	28.21	8.09	28.34	2.8	0.35	258.7
		B 10	4.84	28.07	8.09	28.70	3.6	0.27	269.9
		B 10	4.82	28.08	8.10	28.68	3.7	0.29	276.2
C	12	S 1	5.28	27.77	8.03	24.18	4.2	0.12	243.3
		S 1	5.27	27.78	8.02	24.14	4.3	0.13	239.7
		M 6	4.79	27.85	8.07	30.93	5.6	0.19	225.7
		M 6	4.78	27.88	8.07	31.07	5.5	0.19	217.4
		B 11	4.63	27.96	8.06	29.96	6.9	0.42	264.6
		B 11	4.62	27.97	8.07	29.98	7.1	0.45	278.2
D	15	S 1	5.51	27.56	8.03	25.24	4.1	0.17	219.0
		S 1	5.49	27.59	8.04	25.25	4.0	0.17	194.5
		M 7.5	4.91	27.82	8.06	30.54	7.1	0.39	268.6
		M 7.5	4.89	27.83	8.07	30.83	7.2	0.34	268.1
		B 14	4.64	27.94	8.07	29.44	10.1	0.63	243.4
		B 14	4.64	27.94	8.07	29.46	10.3	0.69	244.8
E	19	S 1	5.01	27.84	8.02	24.21	3.5	0.18	210.6
		S 1	5.00	27.82	8.03	24.23	3.6	0.17	219.9
		M 9.5	4.89	28.01	8.07	28.44	7.0	0.49	226.2
		M 9.5	4.85	28.02	8.08	28.49	7.2	0.50	222.4
		B 18	4.74	28.03	8.08	30.33	11.0	0.41	252.5
		B 18	4.72	28.05	8.08	30.41	11.2	0.42	254.3
F	22	S 1	5.01	27.84	8.02	24.20	3.5	0.15	253.4
		S 1	5.00	27.96	8.01	24.23	3.4	0.15	266.8
		M 11	4.91	27.97	8.07	26.90	4.4	0.32	241.2
		M 11	4.93	27.96	8.08	27.06	4.6	0.39	235.2



Monitoring Station	Water Depth (m)	Sampling Depth (m)	Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
		B 21	4.75	28.03	8.08	30.32	11.1	0.31	224.3
		B 21	4.74	28.01	8.08	30.41	11.2	0.37	235.0
G	14	S 1	5.58	27.82	7.96	18.76	4.1	0.21	104.5
		S 1	5.57	27.83	7.98	18.60	4.0	0.23	101.2
		M 7	5.12	27.99	8.01	21.11	4.6	0.34	191.2
		M 7	5.02	27.98	8.02	22.46	4.7	0.37	198.6
		B 13	4.69	28.07	8.05	29.95	6.5	0.36	173.1
		B 13	4.70	28.09	8.05	29.94	6.4	0.37	181.1
H	22	S 1	5.66	27.72	7.96	19.84	3.6	0.25	166.5
		S 1	5.64	27.74	7.97	19.53	3.6	0.24	192.4
		M 11	5.26	27.94	7.97	19.85	4.2	0.35	139.6
		M 11	5.24	27.93	7.97	19.92	4.0	0.36	142.1
		B 21	4.73	27.08	8.04	24.08	5.3	0.56	164.5
		B 21	4.72	27.07	8.03	24.09	5.4	0.62	171.0

3.8.2 Results of laboratory analysis of water quality are presented in **Table 3.7** (Mid-ebb) and **Table 3.8** (Mid-flood) respectively. The complete record and graphical presentation of laboratory analysis results are given in **Appendix E**.

Table 3.7 Summary of Laboratory Analysis Results (Mid-ebb)

Monitoring Station	Water Depth (m)	Sampling Depth (m)	TSS (mg/L)	NH ₃ as N (mg/L)	NO ₂ ⁻ as N (mg/L)	NO ₃ ⁻ as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD ₅ (mg/L)
A	20	S 1	8.5	0.151	0.273	0.727	1.150	11.0	0.05	2.4
		S 1	8.8	0.157	0.273	0.758	1.190	13.0	0.05	2.2
		M 10	9.2	0.121	0.277	0.769	1.170	14.0	0.06	2.3
		M 10	9.6	0.110	0.283	0.757	1.150	12.0	0.05	1.6
		B 19	9	0.137	0.289	0.747	1.170	130.0	0.05	1.3
		B 19	8.1	0.127	0.292	0.739	1.160	160.0	0.05	1.2
B	13	S 1	6.8	0.137	0.227	0.601	0.965	170.0	0.04	<1.0
		S 1	7.8	0.120	0.228	0.597	0.945	190.0	0.05	1.1
		M 6.5	7.4	0.133	0.229	0.594	0.956	130.0	0.05	<1.0
		M 6.5	7.1	0.135	0.227	0.598	0.960	140.0	0.05	<1.0
		B 12	8.5	0.132	0.222	0.614	0.968	120.0	0.04	<1.0
		B 12	10	0.134	0.214	0.608	0.956	140.0	0.05	<1.0
C	13	S 1	8.1	0.155	0.292	0.754	1.200	36.0	0.05	1.5
		S 1	8.5	0.154	0.293	0.762	1.210	11.0	0.05	1.1
		M 6.5	8	0.152	0.294	0.754	1.200	18.0	0.05	1.0
		M 6.5	7.9	0.157	0.297	0.749	1.200	14.0	0.05	<1.0
		B 12	7.6	0.140	0.298	0.748	1.190	59.0	0.05	<1.0
		B 12	7.4	0.150	0.300	0.749	1.200	12.0	0.05	<1.0
D	13	S 1	5.1	0.109	0.295	0.751	1.150	16.0	0.05	<1.0
		S 1	5.8	0.112	0.299	0.742	1.150	14.0	0.05	<1.0
		M 6.5	6.1	0.101	0.299	0.753	1.150	140.0	0.05	<1.0
		M 6.5	6.5	0.116	0.297	0.750	1.160	120.0	0.05	1.0
		B 12	6.5	0.122	0.296	0.760	1.180	160.0	0.05	<1.0
		B 12	6.6	0.122	0.296	0.757	1.180	140.0	0.05	1.2
E	16	S 1	7.3	0.116	0.298	0.792	1.210	110.0	0.05	1.2

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Report No.: 0041/17/ED/0330A

Page 16

Monitoring Station	Water Depth (m)	Sampling Depth (m)	TSS (mg/L)	NH ₃ as N (mg/L)	NO ₂ ⁻ as N (mg/L)	NO ₃ ⁻ as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD ₅ (mg/L)
		S 1	6.3	0.108	0.303	0.793	1.200	120.0	0.05	<1.0
		M 8	6.3	0.151	0.298	0.798	1.250	21.0	0.06	<1.0
		M 8	7.4	0.181	0.289	0.799	1.270	14.0	0.06	2.7
		B 15	5.5	0.119	0.303	0.777	1.200	11.0	0.06	1.2
		B 15	5.5	0.120	0.302	0.748	1.170	15.0	0.06	<1.0
F	23	S 1	5.9	0.120	0.289	0.768	1.180	110.0	0.06	1.1
		S 1	5.3	0.122	0.289	0.778	1.190	140.0	0.05	<1.0
		M 11.5	5.9	0.119	0.295	0.760	1.170	16.0	0.05	<1.0
		M 11.5	4.7	0.121	0.290	0.764	1.170	11.0	0.06	<1.0
		B 22	5.5	0.116	0.287	0.764	1.170	9.0	0.05	1.5
		B 22	6.7	0.107	0.289	0.767	1.160	14.0	0.05	<1.0
G	22	S 1	6	0.154	0.267	0.759	1.180	110.0	0.05	1.7
		S 1	6.1	0.144	0.261	0.715	1.120	140.0	0.05	<1.0
		M 11	5.1	0.136	0.280	0.732	1.150	12.0	0.06	1.0
		M 11	5.7	0.124	0.266	0.706	1.100	13.0	0.05	<1.0
		B 21	6.4	0.125	0.270	0.744	1.140	18.0	0.06	<1.0
		B 21	7.6	0.117	0.264	0.706	1.090	10.0	0.05	<1.0
H	19	S 1	6.1	0.112	0.279	0.748	1.140	100.0	0.05	1.0
		S 1	7.8	0.121	0.280	0.752	1.150	110.0	0.06	<1.0
		M 9.5	7.8	0.116	0.279	0.765	1.160	120.0	0.06	<1.0
		M 9.5	6.7	0.126	0.287	0.750	1.160	110.0	0.05	<1.0
		B 18	5.8	0.115	0.292	0.740	1.150	140.0	0.05	<1.0
		B 18	5.8	0.110	0.287	0.746	1.140	130.0	0.04	<1.0

Table 3.8 Summary of Laboratory Analysis Results (Mid-flood)

Monitoring Station	Water Depth (m)	Sampling Depth (m)	TSS (mg/L)	NH ₃ as N (mg/L)	NO ₂ ⁻ as N (mg/L)	NO ₃ ⁻ as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD ₅ (mg/L)
A	15	S 1	7.6	0.143	0.256	0.716	1.110	86.0	0.05	<1.0
		S 1	7.1	0.155	0.259	0.707	1.120	33.0	0.05	1.0
		M 7.5	7.4	0.140	0.250	0.730	1.120	49.0	0.04	<1.0
		M 7.5	8.3	0.157	0.253	0.720	1.130	40.0	0.05	1.2
		B 14	8.6	0.128	0.123	0.789	1.040	70.0	0.05	<1.0
		B 14	9.2	0.154	0.120	0.794	1.070	35.0	0.05	<1.0
B	11	S 1	6.3	0.144	0.183	0.551	0.878	2.0	0.04	<1.0
		S 1	6.3	0.132	0.183	0.547	0.862	6.0	0.05	<1.0
		M 5.5	4.9	0.149	0.132	0.388	0.669	11.0	0.04	<1.0
		M 5.5	4.8	0.143	0.134	0.396	0.673	12.0	0.03	<1.0
		B 10	5.6	0.102	0.120	0.434	0.656	14.0	0.03	<1.0
		B 10	6.6	0.124	0.127	0.392	0.643	13.0	0.03	<1.0
C	12	S 1	5.2	0.125	0.267	0.703	1.090	59.0	0.05	<1.0
		S 1	6.2	0.115	0.275	0.696	1.080	65.0	0.05	<1.0
		M 6	6.3	0.126	0.271	0.713	1.110	47.0	0.05	<1.0
		M 6	6.0	0.112	0.266	0.711	1.090	54.0	0.05	<1.0
		B 11	7.4	0.128	0.280	0.695	1.100	32.0	0.05	1.1
		B 11	5.9	0.130	0.268	0.717	1.110	10.0	0.06	<1.0
D	15	S 1	6.8	0.112	0.293	0.747	1.150	110.0	0.05	<1.0
		S 1	8.4	0.119	0.289	0.759	1.170	90.0	0.04	<1.0
		M 7.5	6.4	0.156	0.294	0.754	1.200	11.0	0.05	<1.0
		M 7.5	7.8	0.195	0.316	0.818	1.330	12.0	0.06	<1.0



Monitoring Station	Water Depth (m)	Sampling Depth (m)	TSS (mg/L)	NH ₃ as N (mg/L)	NO ₂ ⁻ as N (mg/L)	NO ₃ ⁻ as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD ₅ (mg/L)
		B 14	9.0	0.142	0.283	0.717	1.140	120.0	0.06	1.1
		B 14	7.7	0.134	0.293	0.767	1.190	110.0	0.05	<1.0
E	19	S 1	7.5	0.119	0.203	0.599	0.921	140.0	0.04	<1.0
		S 1	7.4	0.120	0.212	0.592	0.924	120.0	0.04	<1.0
		M 9.5	7.2	0.150	0.206	0.596	0.952	81.0	0.04	<1.0
		M 9.5	6.8	0.154	0.218	0.604	0.976	13.0	0.04	1.4
		B 18	6.6	0.146	0.211	0.596	0.953	160.0	0.05	1.2
		B 18	7.0	0.158	0.199	0.609	0.966	69.0	0.04	1.3
F	22	S 1	7.7	0.143	0.234	0.638	1.020	110.0	0.05	<1.0
		S 1	6.6	0.120	0.224	0.662	1.010	120.0	0.05	<1.0
		M 11	6.8	0.118	0.239	0.639	0.996	130.0	0.05	<1.0
		M 11	6.7	0.139	0.221	0.671	1.030	110.0	0.04	1.2
		B 21	7.7	0.124	0.242	0.630	0.996	150.0	0.04	1.1
		B 21	6.5	0.127	0.207	0.616	0.950	100.0	0.04	<1.0
G	14	S 1	5.7	0.153	0.239	0.730	1.120	110.0	0.05	1.4
		S 1	5.8	0.174	0.255	0.702	1.130	130.0	0.05	1.8
		M 7	5.1	0.161	0.251	0.721	1.130	150.0	0.04	1.1
		M 7	5.9	0.199	0.259	0.700	1.160	160.0	0.05	1.8
		B 13	6.4	0.186	0.248	0.727	1.160	4.0	0.05	1.3
		B 13	7.6	0.154	0.259	0.700	1.110	9.0	0.05	2.0
H	22	S 1	5.2	0.277	0.291	0.799	1.370	14.0	0.05	1.8
		S 1	4.8	0.289	0.297	0.767	1.350	19.0	0.05	1.2
		M 11	6.6	0.283	0.302	0.782	1.370	110.0	0.04	1.7
		M 11	6.3	0.257	0.292	0.796	1.340	130.0	0.04	2.3
		B 21	5.2	0.286	0.292	0.804	1.380	8.0	0.05	1.6
		B 21	6.6	0.284	0.300	0.788	1.370	16.0	0.05	2.0

3.8.3 The tidal data is obtained from the tide gauge installed in Ma Wan Marine Traffic Station, managed by Hydrographic Office of Marine Department. The predicted tidal data is present in **Appendix F**.

3.8.4 No special phenomena were observed during water quality monitoring on 14 June 2018. The weather condition is summarized and presented in **Table 3.9**.

Table 3.9 Weather condition of water quality monitoring

Date	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
	Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
14 June 2018	28.6	26.8	25.4	82	1.3

Source: Hong Kong Observatory

4. SEDIMENT QUALITY MONITORING AND BENTHIC SURVEY

4.1 Monitoring Location

4.1.1 In accordance with Section 6 of the EM&A Plan, sediment quality monitoring and benthic survey should be carried out at 8 designated monitoring locations (2 impact stations and 6 control stations) during the first five years of the operational phase of the Project. The proposed monitoring locations shall be the same monitoring locations that were used for the baseline monitoring programme and have been approved by EPD. The coordinates of the monitoring location is shown in **Table 4.1**. The monitoring locations of sediment quality monitoring and benthic survey are also shown in **Figure 2**.

Table 4.1 Location of Sediment Quality Monitoring and Benthic Survey

Sampling Location		Easting	Northing
A	The Brothers, Control Station	816 100	822 500
B	The Brothers, Control Station	816 680	822 440
C	Siu Ho Wan Outfall, Impact Station	816 800	820 180
D	Siu Ho Wan Outfall, Impact Station	817 160	820 360
E	Cheung Sok, Control Station	819 817	821 655
F	Cheung Sok, Control Station	820 158	821 922
G	Tai Ching Chau, Control Station	822 214	822 692
H	Tai Ching Chau, Control Station	822 494	822 939

4.2 Monitoring Parameter

4.2.1 The monitoring parameters for sediment quality monitoring and benthic survey are summarized in **Table 4.2**.

Table 4.2 Parameters for Sediment Quality Monitoring and Benthic Survey

Monitoring Parameters	
Sediment Quality Monitoring	Rinsate Blank for Benthic Survey
Grain size profile* (i.e. Particle Size Distribution) (%)	Cadmium (µg/L)
Total organic carbon* (%)	Chromium (µg/L)
pH value	Copper (µg/L)
Ammonia as N (mg-N/kg)	Lead (µg/L)
Total nitrogen (mg-N/kg)	Mercury ((µg/L)
Total phosphorus (mg-N/kg)	Nickel (µg/L)
Cadmium (mg/kg)	Zinc (µg/L)
Chromium (mg/kg)	Arsenic (µg/L)
Copper (mg/kg)	Silver (µg/L)
Lead (mg/kg)	
Mercury (mg/kg)	
Nickel (mg/kg)	
Zinc (mg/kg)	
Arsenic (mg/kg)	



Monitoring Parameters	
Sediment Quality Monitoring	Rinsate Blank for Benthic Survey
Silver (mg/kg)	

*Grain size profile and total organic carbon is determined from the sediment sampled collected for benthic survey.

4.2.2 Apart from the parameters listed in the Table 4.2, other relevant supplementary information such as monitoring location, time, weather conditions and any special phenomena shall be also recorded.

4.2.3 The tidal data will be obtained from the tide gauge installed in Ma Wan Marine Traffic Station, managed by the Hydrographic Office of Marine Department. Location of the tide gauge is shown in **Figure 3**.

4.3 Sampling Equipment

4.3.1 Ponar grab sampler (capacity of ~ 1 litre) shall be used for collection of samples for sediment analysis. The grab shall be capable of collecting sufficient amount of surficial (top 5 cm) sediment for the required analysis in a single deployment at each sampling location. The grab shall be constructed with non-contaminating material to prevent sample contamination. Photos of ponar grab sampler are shown in **Appendix I**.

4.3.2 A modified Van Veen grab sampler (capacity of ~ 11.3 litres) shall be used for collecting sediment samples for benthic survey. The top of the grab shall have openings to allow the easy flow of water through the grab as it descends. The openings shall be covered with 0.5 mm mesh to prevent the loss of any benthic fauna once a sediment sample is taken. In addition the top openings shall be sealable by movable flaps which shall close when the grab is hauled to surface. Photos of modified Van Veen grab sampler are shown in **Appendix I**.

4.3.3 Class III commercially licensed vessel was used as survey vessel. DGPS logging device in the ADCP with accuracy ±1m at 95% confidence level shall be installed on the survey vessel to ascertain that measurement can be made accurately on the specific transects. All GPS data collected during the whole survey shall be automatically and electronically logged. Powered winch shall be used on-board the Survey Vessel to assist the monitoring. 4 fixed sieve stations shall be equipped on Survey Vessel. Experienced supervisor was present throughout the monitoring exercise on the Survey Vessel.

4.4 Sampling Procedure

Benthic Survey, Particle Size Distribution and TOC Analysis

4.4.1 A modified Van Veen grab sampler (capacity of ~ 11.3 litres) shall be deployed at each of the benthic survey locations to collect single grab sample at each location. The grab sampler should be lowered through the water column slowly at a constant rate (approximately 30 cm/s) to prevent the formation of a pressure wave that may disturb surficial deposits. The grab will then be retrieved and evaluated on board of the survey vessel. Any sample showing uneven penetration or only partially filled with sediment shall be rejected. Samples will be placed in a plastic box with an identification card. Sub-samples (approximately 1 kg) should be splitted up for analysis of particle size distribution and TOC. The remaining sediment samples should be washed gently to separate the benthic organisms and the sediment using a watering hose with marine seawater supply, by a sieve stack (comprising 1 mm and 0.5 mm meshes). Benthic organisms remaining on the sieve should be removed into pre-labeled ziplock plastic



bags. A 10% solution of buffered formalin containing Rose Bengal in seawater will be added to the bag to ensure tissue preservation. Samples will be sealed in plastic containers for transport to the laboratory for sorting and identification of benthic organisms.

Sediment Quality Monitoring (Except Particle Size Distribution and TOC Analysis)

- 4.4.2 Ponar grab sampler (capacity of ~ 1 litres) shall be deployed at each of the benthic survey locations to collect single grab sample at each location. The grab sampler should be lowered through the water column slowly at a constant rate (approximately 30 cm/s) to prevent the formation of a pressure wave that may disturb surficial deposits. The grab will then be retrieved and evaluated on board of the survey vessel. Any sample showing uneven penetration or only partially filled with sediment shall be rejected. Samples will be placed in a plastic box with an identification card. Sediment samples will be then transferred into brand new soil jars with QA/QC monitoring for laboratory analysis. Samples shall be preserved and stored in accordance with approved SOP of HOKLAS accredited laboratory and the recommendations stipulated in ETWB TC (W) No. 34/2002.
- 4.4.3 Sediment samples shall be collected and packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory on the same day of collection for analysis.

4.5 Laboratory Measurement and Analysis

- 4.5.1 ALS Technichem (HK) Pty Ltd (HOKLAS Reg. No. 066), is appointed to be the laboratory for analysis of sediment samples. The methods adopted by the laboratories and the reporting limits are detailed in **Table 4.3**.

Table 4.3 Laboratory Measurement/Analysis Methods and Reporting Limits

Analysis Description	Method	Reporting limits
Particle Size Distribution	Geospec 3: 2001 Test method 8.1, 8.5 and 8,7 (Wet Sieve and Hydrometer Method)	1%
Total Organic Carbon	APHA 5310B	0.05%
pH value	APHA 4500H: B	0.1 pH unit
Ammonia as N	APHA 4500 NH3: B&G	0.5 mg/kg
Total Nitrogen	APHA 4500 Norg: D & APHA 4500 NO3: I	10 mg/kg
Total Phosphorus	APHA 4500P: B&H	10 mg/kg
Cadmium	USEPA 6020A Digestion method: 3051A	0.1 mg/kg
Chromium		0.5 mg/kg
Copper		0.2 mg/kg
Lead		0.2 mg/kg
Mercury		0.05 mg/kg
Nickel		0.2 mg/kg
Zinc		0.5 mg/kg
Arsenic		0.5 mg/kg
Silver		0.1 mg/kg

4.6 Taxonomic Identification of Benthic Organism

- 4.6.1 Taxonomic identification of benthic organisms will be performed using stereo dissecting and high-power compound microscopes where it is necessary. Benthic organisms will be counted

and identified to lower taxonomic levels as far as practicable with biomass (wet weight, to 0.01gram) of each individual recorded. If breakage of soft-bodied organism occurs, only anterior portions of fragments will be counted, although all fragments will be retained and weighted for biomass determinations (wet weight, to 0.01gram). Data of species abundance and biomass will be recorded.

4.6.2 Data collected during surveys will be presented and summarized in tables and graphics. Species/taxon richness and abundance of marine benthic fauna communities will be analyzed by Shannon-Weiner diversity and Pielou's Evenness.

4.7 Monitoring Frequency and Duration

4.7.1 The sediment quality monitoring and benthic survey programmed shall be carried out once per two months for a period of five years of the operational phase of the Project. Since the purpose of the sediment quality monitoring and benthic survey is to collect data for future reference, only a single round of sediment quality monitoring and benthic survey at 8 designated locations will be carried out for each monitoring event. For each location, only a single sample will be taken and analyzed.

4.8 Quality Assurance / Quality Control

4.8.1 A rinsate blank shall be collected in each monitoring location before each sediment sampling for benthic survey, so as to monitor the effectiveness of field decontamination procedure.

4.8.2 The laboratory incorporates a variety of QA/QC monitoring programme into their testing system. Where applicable or available, the quality of the analysis will be monitored by conducting the following QC analysis:

For each batch of 20 samples:

- A minimal of 1 laboratory method blank will be analyzed;
- A minimal of 1 sample duplicate will be analyzed;
- A minimal of 1 sample matrix spike will be analyzed.

4.9 Event and Action Plan

4.9.1 Since the purpose of the sediment quality monitoring and benthic survey is to collect data for future propose, no specific event and action has to be followed.

4.10 Monitoring Results and Observations

4.10.1 Sediment quality monitoring and benthic survey is carried out on 14 June 2018. A summary of laboratory analysis results for the sediment quality monitoring and benthic survey are presented in **Table 4.4** and **Table 4.5** respectively. The complete record and graphical presentation of the sediment quality monitoring results is given in **Appendix G**.

Table 4.4 Summary of laboratory analysis results for sediment monitoring

Monitoring Station	pH value	NH ₃ as N (mg/L)	Total N (mg-N/kg)	Total P (mg-P/kg)	Cd (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	As (mg/kg)	Ag (mg/kg)
A	8.7	6.9	740	454	0.12	31.1	24.8	30.2	0.08	17.9	84.6	17.1	0.11
B	8.7	5.2	840	419	<0.10	42.2	38.4	39.1	0.13	24.3	112	14.9	0.34
C	8.7	8.9	1040	488	<0.10	50.9	43.2	46.4	0.14	31.2	139	14.3	0.24
D	8.6	8.4	1080	514	<0.10	48.6	39.9	44.6	0.12	29.2	130.0	13.5	0.23
E	8.6	6.9	1140	514	<0.10	49.3	44.8	44.0	0.12	29.6	133	12.8	0.30
F	8.8	2.6	620	408	<0.10	15.6	169.0	21.6	<0.05	10.6	53.1	9.9	<0.10
G	8.7	3.8	980	439	0.12	53.0	48.2	42.8	0.10	30.5	126	14.9	0.23
H	8.5	7.4	1350	567	<0.10	52.6	47.4	47.6	0.14	32.2	146	13.3	0.29

Table 4.5 Summary of laboratory analysis results for benthic survey

Monitoring Station	Total organic carbon (%)	Grain size profile (%)				Description
		Gravel	Sand	Silt	Clay	
A	0.79	1	14	49	36	Dark grey, slightly sandy SILT/CLAY with shell fragments
B	0.70	1	23	48	28	Dark grey, slightly sandy SILT/CLAY with shell fragments
C	0.86	0	4	61	35	Dark grey, slightly sandy SILT/CLAY with shell fragments
D	0.69	0	14	53	33	Dark grey, slightly sandy SILT/CLAY with shell fragments
E	0.97	0	5	58	37	Dark grey, slightly sandy SILT/CLAY with shell fragments
F	1.03	0	3	60	37	Dark grey, slightly sandy SILT/CLAY with shell fragments
G	0.47	21	36	23	20	Dark grey, sandy SILT/CLAY with shell fragments
H	0.84	0	11	53	36	Dark grey, slightly sandy SILT/CLAY with shell fragments

4.10.2 Rinsate blank was collected for chemical analysis. The laboratory data results are provided in **Appendix G**.

4.10.3 No special phenomena were observed during water quality monitoring on 14 June 2018. The weather condition is summarized and presented in **Table 4.6**.

Table 4.6 Weather condition of water quality monitoring

Date	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
	Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
14 June 2018	28.6	26.8	25.4	82	1.3

Source: Hong Kong Observatory



4.10.4 The benthic survey data are summarized and presented in **Table 4.7**.

Table 4.7 Summary of benthic survey data on 14 June 2018

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	43	55.00	12	1.53	0.62
B	34	3.33	13	2.20	0.86
C	27	0.35	13	2.39	0.93
D	18	15.44	11	2.27	0.95
E	30	18.80	19	2.64	0.90
F	14	2.64	10	2.17	0.94
G	62	5.05	26	2.88	0.88
H	21	24.48	10	2.15	0.93
TOTAL	249	125.104	53		

4.10.5 The benthic survey results are analyzed and presented as below:

i) Abundance

A total of 249 macrobenthic organisms were collected from the eight monitoring stations during the June 2018 monitoring period. Results of the current monitoring remained to be lower compared to the baseline data (August 2004) and showed a decrease in total abundance by 82 individuals (ind.) compared to the April 2018 monitoring results. The current decrease might be attributed to tropical storm Ewinia that hit Hong Kong about one week before the sampling activities. Wave action brought about by the typhoon might have caused intermediate disturbance in the sampling stations, particularly that these are characteristically shallow waters (11m to 23m) as wave action may affect bottom sediments up to 50m in depth based on studies conducted by Coleman et al. (1997). Bivalves in this monitoring were specifically affected by the perturbations as shown in the significant decrease in their abundance from 167 ind. (April 2018) to only 47 ind. (June 2018).

Highest abundance (62 ind.) was recorded at Station G while the lowest (14 ind.) was at Station F. Relatively high abundance at Station G might be attributed to the moderately sorted sediments characterized by the varying grain sizes at this station. Varying percentages of gravel (21%), sand (36%), silt (23%), and clay (20%) can provide a wide range of niches for benthic organisms to exploit. Furthermore, moderately sorted sediments were observed at Station A where high abundance (43 ind.) was also recorded. On the other hand, the relatively low abundance observed at Station F might be due to the high percentages of silt (60%) and clay (37%) in the substrate indicative of well-sorted sediments. Well-sorted sediments can only offer a smaller range of grain sizes and of interstitial spaces limiting the niches for benthic organisms (Gray 1974); thus, the lower abundances at stations with relatively homogenous grain size distribution. The impact stations (Station C and Station D) remained to have lower abundances compared to the reference stations except for Station F. Similar to Station F, sediments in Stations C and D were characterized by higher percentages of silt and clay.

ii) Biomass

The total wet biomass for all the eight monitoring stations during the June 2018 monitoring period was 125.11 g, which is 106.06 g less than the biomass recorded

during the April 2018 monitoring period but remained higher compared to the baseline data. The decrease in biomass (from April 2018 to June 2018) might be attributed to the parallel decline in the abundance of bivalves.

The highest and lowest total biomass continued to be observed in Station A (55.00 g) and Station C (0.35 g), respectively. Highest biomass remained at Station A because the bivalve, *Ruditapes philippinarum*, continued to contribute significantly in the total biomass due to their larger sizes despite the decline in their abundance. Biomass at impact stations (Stations C and D) remained to be low together with Station F (2.6 g), Station B (3.3 g), and Station G (5.1 g) as these stations were dominated by smaller organisms (i.e. annelids).

iii) Taxonomic Composition

A total of eight phyla comprised of 41 families and 53 taxa were identified during the June 2018 monitoring period. Compared to the April 2018 monitoring period, there was an increase (12 taxa) in the total number of taxa identified. This can be attributed to the increase in the number of annelid species that have been identified. With the increase in the number of their species and abundance and the decrease in the abundance of bivalves, annelids (polychaetes) dominated the current benthic assemblages comprising about 53.01% of sampled population (Figure 3). The intermediate disturbance in the form of wave action generated by the typhoon might have cleared existing habitats providing opportunities for smaller benthic organisms such as polychaetes to colonize the area. A study shows that disturbance generated by episodic strong currents ('benthic storms') was linked to high species dominance by polychaetes (58-64% ampharetids), bivalves, isopods and tanaids (Thistle et al.1985).

The current benthic assemblage is observed to be similar with the baseline data (August 2004) which were both dominated by polychaetes. However, during the baseline study capitellid and cirratulid were the dominant polychaetes which indicates unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000). For the present monitoring period Nepthyidae were the most abundant group.

Station G had the highest number of taxa (26) identified and the most number of polychaete taxa. As aforementioned, the more distributed grain sizes in this station provided a wide range of habitat for the organisms to colonize, particularly after an intermediate disturbance. Impact stations (Station C and D) remained to harbour relatively fewer taxa.

iv) Diversity

Diversity indices (H') for the June 2018 monitoring period ranged from very low (1.53 at Station A) to moderate (2.88 at Station G). Compared to the baseline and April 2018 monitoring periods, increase in diversity was observed. The slight improvement in diversity as aforementioned might be due to the colonization of opportunistic species of the cleared habitats due to the natural disturbance brought about by the typhoon.

Station G showed moderate diversity as it has the most variable substrate type which can support a diverse benthic community as shown by the highest number of taxa identified in this station. Station E also exhibited moderate diversity. The very low

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diversity, on the other hand in Station A, might be attributed to the dominance of the bivalve, *R. philippinarum*, which also explains the low Evenness (J) index at this station. *R. philippinarum* was most abundant in Station A as this species prefers sandy substrate, which is the natural characteristic of this station prior to the re-working of sediments of typhoon Ewinar. The remaining stations, including the impact Stations C and D, remained to have low diversity. Furthermore, all stations but Station A showed homogenous benthic communities as showed by their high Evenness (J) Index.

The detailed benthic survey results are provided in **Appendix H**.

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Report No.: 0041/17/ED/0330A

Page 26

5. CHINESE WHITE DOLPHIN MONITORING

5.1 Data Interpretation

- 5.1.1 In accordance with Section 4.1 of the EM&A Plan, relevant information on the distribution and abundance of CWDs in Hong Kong should be obtained from the Agriculture, Fisheries and Conservation Department (AFCD), and be reviewed on a bimonthly basis during the operational phase of the Project for a period of 5 years.
- 5.1.2 The latest AFCD's report, "*Monitoring of Marine Mammals in Hong Kong Waters (2016-17)*", in terms of the distribution and abundance of CWDs, was reviewed in the Monthly EM&A report in August 2017. According to the advice from AFCD, the data of distribution and abundance of CWDs would only be available in the annual reports for Monitoring of Marine Mammals In Hong Kong Waters which cover monitoring data from 1 April to 31 March (next year). The updated status of the distribution and abundance of CWDs will be provided once the annual report (2017-18) is uploaded to AFCD's webpage.

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Report No.: 0041/17/ED/0330A

Page 27

6. ADVICE ON IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

6.1 Implementation Status

- 6.1.1 Although no site inspection is prescribed during the operation of the Plant in accordance with the approved EM&A Plan, SHWSTW is reminded to fully and properly implement mitigation measures specified in the EP and EIA Report. Mitigation measures such as aeration, chemical dosing system, covering or enclosing the pressing and sludge thickening facilities and ventilating air to a biological treatment prior to stack exhaust was implemented in the reporting period. A summary of mitigation measures implementation schedule is provided in **Appendix J**.



7. ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS

7.1.1 SHWSTW is reminded to fully comply with EP conditions. All measures and recommendations in the EP, EIA Report and approved waste management plan shall be fully and properly implemented. During the reporting period, following measures in related to solid and liquid waste management was implemented:

- The influent of waste water shall be treated by CEPT with UV disinfection;
- Trip-ticket system shall be implemented for sludge and sediment;
- The acceptance criteria for Landfill disposal should be followed;
- Chemical waste should be properly handled and stored 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.

7.1.2 A summary of mitigation measures implementation schedule is provided in **Appendix J**.

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Report No.: 0041/17/ED/0330A

Page 29

8. SUMMARY OF EXCEEDANCE OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

- 8.1.1 Air quality monitoring i.e. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis, was temporary suspended and no monitoring was carried out in the reporting period. No exceedances of Action/Limit levels at ASR were recorded.
- 8.1.2 Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 14 June 2018. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

9. SUMMARY OF ENVIRONMENTAL COMPLAINTS

9.1.1 No complaint (written or verbal), inspection notice, notification of summons or prosecution was received in relation to the environmental impact during the report period. Summaries of complaints, notification of summons and successful prosecutions are presented in **Table 9.1** and **Table 9.2**.

Table 9.1 Cumulative Statistics on Complaints

Environmental Parameters	Cumulative No. Brought Forward	No. of Complaints This Month	Cumulative Project-to-Date
Air	0	0	0
Noise	0	0	0
Water	0	0	0
Waste	0	0	0
Others	0	0	0
Total	0	0	0

Table 9.2 Cumulative Statistics on Notification of Summons and Successful Prosecutions

Environmental Parameters	Cumulative No. Brought Forward	No. of Notification of Summons and Prosecutions This Month	Cumulative Project-to-Date
Air	0	0	0
Noise	0	0	0
Water	0	0	0
Waste	0	0	0
Others	0	0	0
Total	0	0	0



10. FUTURE KEY ISSUES

10.1.1 The key issues to be considered in the coming reporting month include:

- i. Potential environmental impacts arising from the operation of SHWSTW are mainly associated with air quality, water quality, sediment quality, benthic ecology, waste management and distribution and abundance of CWDs.
- ii. Due to inadequacy of representative data collect between August 2017 and May 2018, current H₂S measurement and olfactometry analysis was considered as unsuitable way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H₂S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.
- iii. Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspended until alternative methods of correlation study was approved by EPD. The temporary suspension was approved by EPD's memo dated 14 May 2018.

11. CONCLUSION

- 11.1.1 Air quality monitoring i.e. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis, was temporary suspended and no monitoring was carried out in the reporting period. No exceedances of Action/Limit levels at ASR were recorded as no complaint was received during the reporting period.
- 11.1.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). Due to non-ideal wind direction or domination of non-target smell during the measurements conducted between August 2017 and May 2018, inadequacy of representative data was result between August 2017 and May 2018. Current H₂S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H₂S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval. Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspended until alternative methods of correlation study was approved by EPD. The temporary suspension was approved by EPD's memo dated 14 May 2018.
- 11.1.3 Water quality monitoring, sediment quality monitoring and benthic survey were conducted on 14 June 2018 to collect data for future reference in accordance with Section 5.5 and 6.5 of the Operational EM&A Plan. The details of methodology and results collected of the monitoring were presented in Section 3 and Section 4. No special phenomena were observed during the monitoring.
- 11.1.4 The latest AFCD's report, "*Monitoring of Marine Mammals in Hong Kong Waters (2016-17)*", in terms of the distribution and abundance of CWDs, was reviewed in the Monthly EM&A report in August 2017. According to the advice from AFCD, the data of distribution and abundance of CWDs would only be available in the annual reports for Monitoring of Marine Mammals In Hong Kong Waters which cover monitoring data from 1 April to 31 March (next year). The updated status of the distribution and abundance of CWDs will be provided once the annual report (2017-18) is uploaded to AFCD's webpage.
- 11.1.5 SHWSTW is reminded to fully *comply with EP conditions*. All *environmental mitigation measures* and recommendations in the EP, EIA Report and approved waste management plan shall be fully and properly implemented.
- 11.1.6 No complaint (written or verbal), inspection notice, notification of summons or prosecution was received in relation to the environmental impact during the report period.

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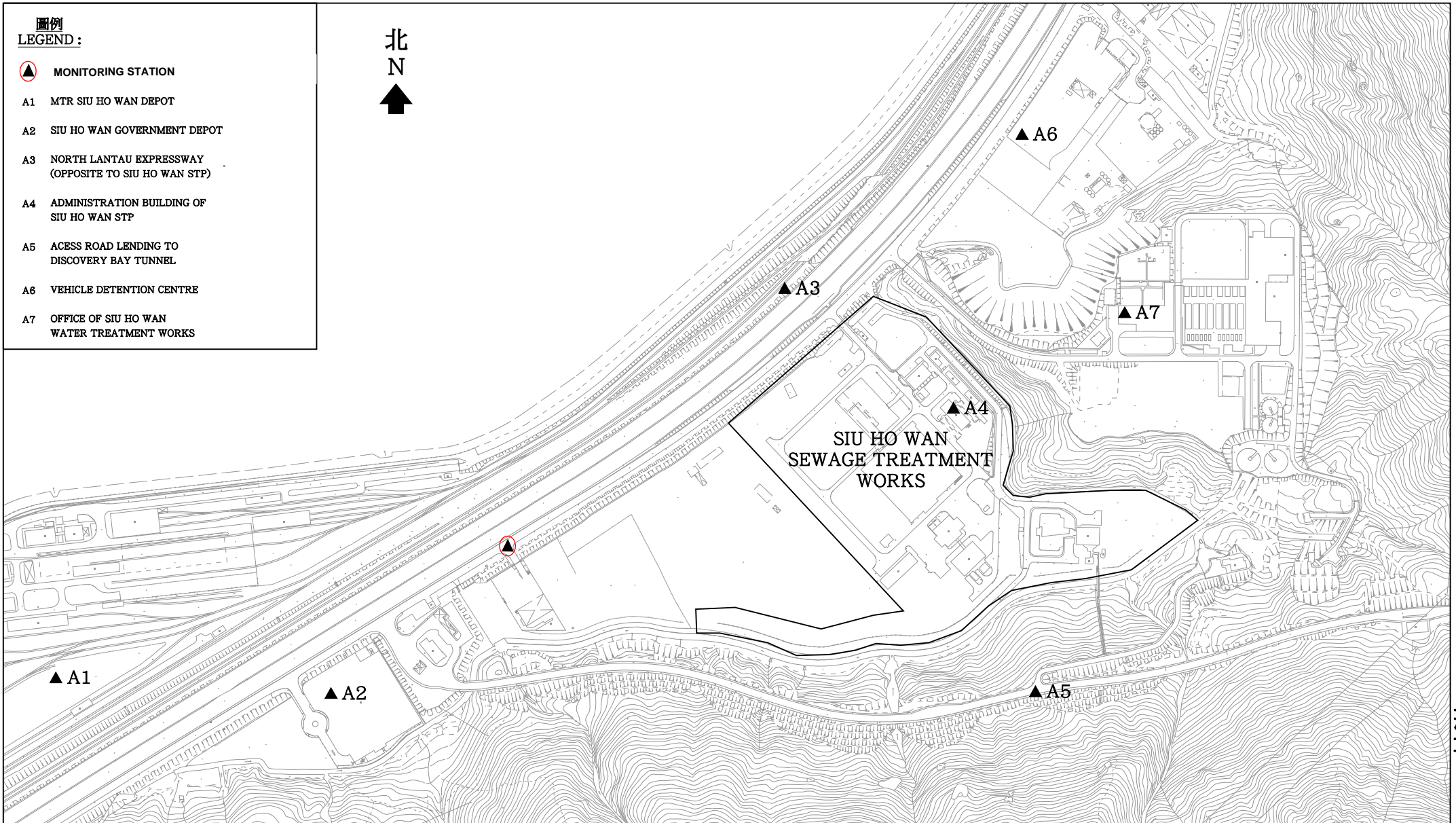
Report No.: 0041/17/ED/0330A


Figure 1

Monitoring Location of Air Sensitive Receiver

圖例
LEGEND :

-  **MONITORING STATION**
- A1** MTR SIU HO WAN DEPOT
- A2** SIU HO WAN GOVERNMENT DEPOT
- A3** NORTH LANTAU EXPRESSWAY
(OPPOSITE TO SIU HO WAN STP)
- A4** ADMINISTRATION BUILDING OF
SIU HO WAN STP
- A5** ACCESS ROAD LENDING TO
DISCOVERY BAY TUNNEL
- A6** VEHICLE DETENTION CENTRE
- A7** OFFICE OF SIU HO WAN
WATER TREATMENT WORKS



<p>圖則名稱 drawing title</p> <p style="text-align: center;">UPGRADING OF SIU HO WAN SEWAGE TREATMENT PLANT OPTIONAL ENVIRONMENTAL MONITORING AND AUDIT PLAN ODOUR PATROL MONITORING STATIONS</p>	繪畫 drawn	日期 date	圖則編號 drawing no.	比例 scale	
	C.W. CHAN	16-08-2006	DCM/2006/063	N.T.S.	
	核對 checked	日期 date	保留版權 COPYRIGHT RESERVED		
	C.K. LAM	16-08-2006	 <p style="font-size: small; margin: 0;">香港特別行政區政府渠務署 DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION</p>		
批核 approved	日期 date				
S.K. WONG	16-08-2006	部門 office			
顧問工程管理部		CONSULTANTS MANAGEMENT DIVISION			

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Report No.: 0041/17/ED/0330A

Figure 2

Monitoring Locations of Water Quality Monitoring, Sediment Quality Monitoring and Benthic Survey



816000E

818000E

820000E

822000E

822000N

大小磨刀
BROTHERS

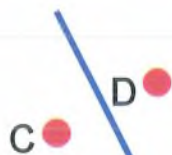
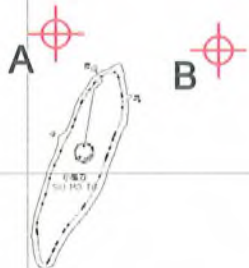
820000N




CO-ORDINATES OF CONTROL STATIONS :

CONTROL STATION No.	CO-ORDINATES	
	NORTHING	EASTING
A	822500	816100
B	822440	816680
E	821655	819817
F	821922	820158
G	822692	822214
H	822939	822494

CO-ORDINATES OF IMPACT STATIONS :

IMPACT STATION No.	CO-ORDINATES	
	NORTHING	EASTING
C	820180	816800
D	820360	817160

圖例
LEGEND :

-  IMPACT STATION
-  CONTROL STATION
-  SUBMARINE OUTFALL

圖則名稱 drawing title

UPGRADING OF SIU HO WAN SEWAGE TREATMENT PLANT
BASELINE MONITORING - LOCATION OF MONITORING STATIONS

繪畫 drawn

H.K. LAI

日期 date

06-02-2004

核對 checked

C.K. LAM

日期 date

04-03-2004

批核 approved

S.K. WONG

日期 date

04-03-2004

部門 office

顧問工程管理部

CONSULTANTS MANAGEMENT DIVISION

圖則編號 drawing no.

DCM/2004/002

比例 scale

N.T.S.

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香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION

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Report No.: 0041/17/ED/0330A

Figure 3

Location of the Tide Gauge

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Figure 2 - Location of the Tide Gauge

Source: Google Maps

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Figure 4

Location of Survey Areas of Chinese White Dolphins

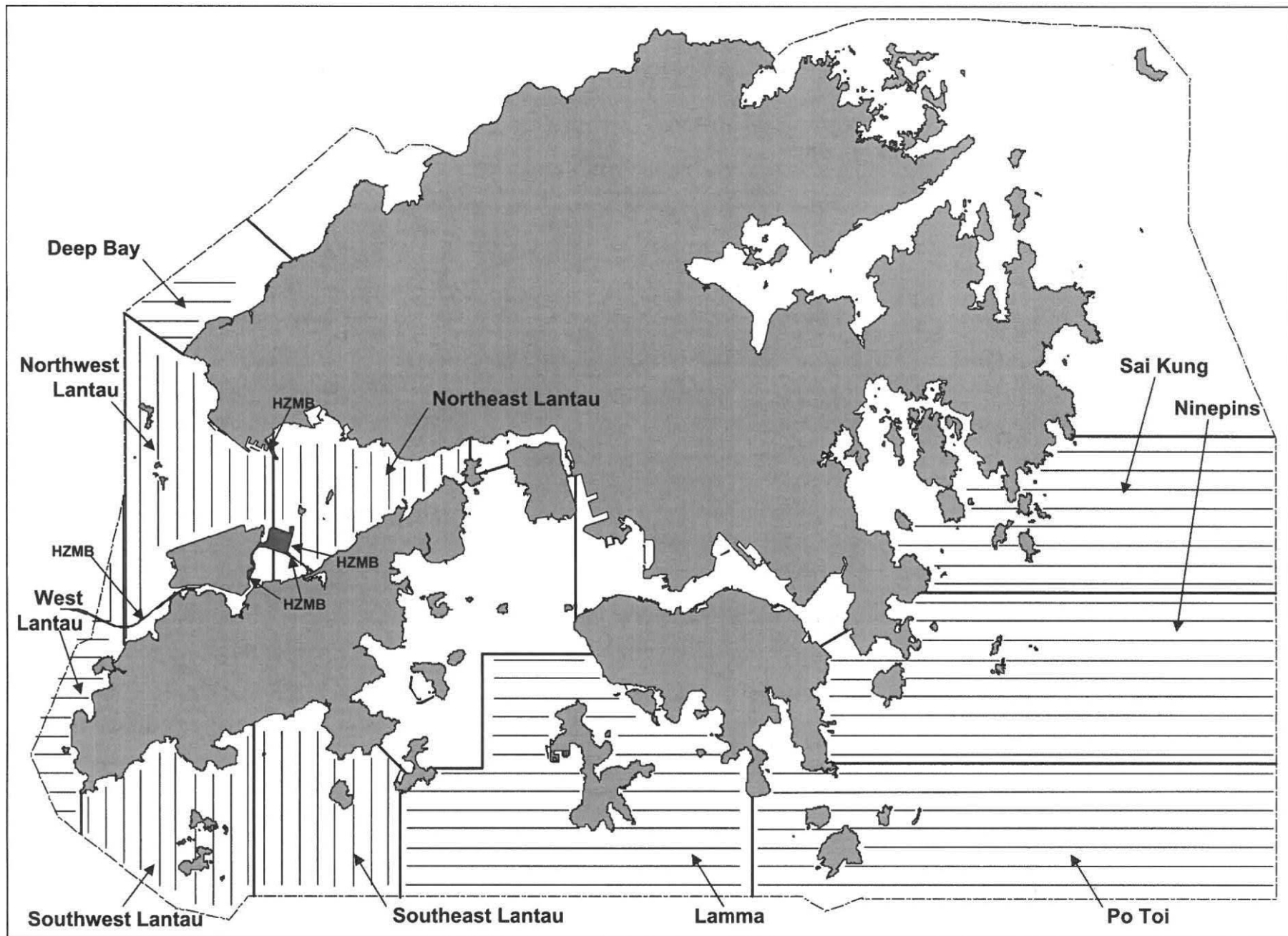


Figure 2 Ten Line-Transect Survey Areas within the Study Area chosen for the Present Monitoring Study (2016-17)

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Appendix A Project Organization Chart

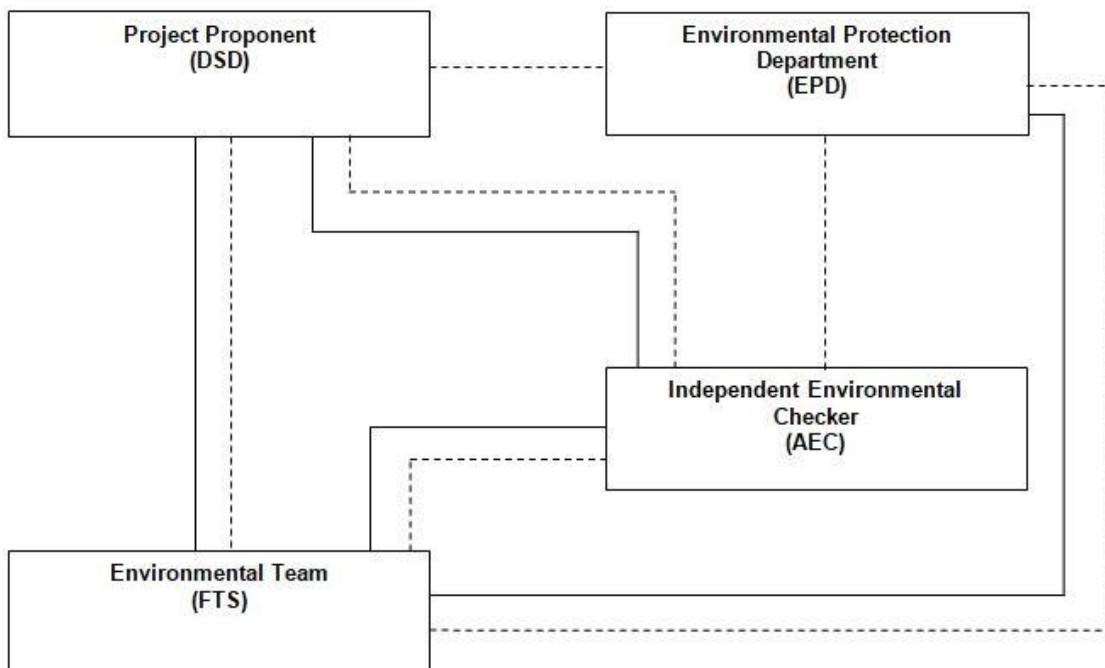
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Legend:
— Line of Reporting
- - - Line of Communication

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Appendix B

Monitoring Schedule for Present and Next Reporting Period

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Report No.: 0041/17/ED/0330A

Monitoring Schedule for Present Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
					1 June	2
3	4	5	6	7	8	9
10	11	12	13	14 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Flood (06:02) Mid-Ebb (12:52)	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Remarks

1. Actual monitoring will be subjected to change due to any safety concern or adverse weather condition.

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Report No.: 0041/17/ED/0330A

Monitoring Schedule for Next Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Remarks

1. Actual monitoring will be subjected to change due to any safety concern or adverse weather condition.

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Appendix C

Event and Action Plan for Air Quality Monitoring

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Report No.: 0041/17/ED/0330A

EVENT	ACTION		
	ET	IEC	*Operator
Action Level			
One complaint received for specific odour event	<ol style="list-style-type: none"> 1. Check Operator's working methods; 2. Discuss with Operator on required remedial actions 	<ol style="list-style-type: none"> 1. Discuss with ET and Operator on the possible remedial actions; 2. Advise the Operator on the effectiveness of the proposed remedial measures; 3 Supervise implementation of remedial measures 	<ol style="list-style-type: none"> 1. Identify/ confirm source with ET; 2. Discuss with ET for remedial actions required; 3. Ensure remedial actions properly implemented 4. Rectify any unacceptable practice; 5. Amend operation methods if appropriate
Limit Level			
More than one complaint	<ol style="list-style-type: none"> 1. Investigated the causes of complaint; 2. Check Operator's working methods; 3. Carry out analysis of Operator's working procedures to determine possible mitigation to be implemented; 4. Arrange meeting with ET and EPD to discuss the remedial actions to be taken; 5. Discuss with EPD and the Operator on the required remedial actions; 6. Submit proposals for remedial actions within 3 working days of notification; 7. Assess effectiveness of Operator's remedial actions and keep EPD informed of the results; 8. Amend proposal if appropriate; 9. Resubmit proposal if problem still not under control 	<ol style="list-style-type: none"> 1. Discuss amongst ET and the Operator on the potential remedial actions; 2. Review the proposed remedial actions whenever necessary to assure their effectiveness and advise the Operator accordingly; 3. Supervise implementation of remedial measures 	<ol style="list-style-type: none"> 1. Identify/ confirm source with ET; 2. Confirm receipt of notification of failure in writing; 3. Inform ET, IEC and EPD; 4. Discuss with EPD and ET on the required remedial actions; 5. Ensure remedial actions properly implemented; 6. Take immediate action to avoid further exceedance; 7. Implement the agreed proposals

* The operator who is the constructor responsible for the operation during the maintenance period.

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Appendix D

Copy of the Calibration Certificates for Water Quality Monitoring Equipment

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Website : www.fugro.com

MaterialLab

Report No. : 142626WA181114



Page 1 of 3

Report on Calibration of Aqua Troll 600 Multi-parameter Water Quality Meter

Information Supplied by Client

Client : Fugro Technical Services Limited (MCL)
Client's address : Rm. 723 - 726, 7/F, Profit Industrial Building, No. 1-15,
Kwai Fung Crescent, Kwai Chung, N.T.
Sample description : One Aqua Troll 600 Multi-parameter Water Quality Meter
Client sample ID : Serial No. 525120
Test required : Calibration of the Aqua Troll 600 Multi-parameter Water Quality
Meter

Laboratory Information

Lab. sample ID : WA181114/1
Date of calibration : 11/06/2018
Next calibration date : 10/09/2018
Test method used : In-house comparison method

Note : This report refers only to the sample(s) tested.

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E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report No. : 142626WA181114

Page 2 of 3

Results :

A. pH calibration

pH reading at 25°C for Q.C. solution(6.86) and at 25°C for Q.C. solution(9.18)		
Theoretical	Measured	Deviation
9.18	9.21	+0.03
6.86	6.87	+0.01

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.04	+0.04	± 0.5
20	20.17	+0.17	± 1.0
30	29.96	-0.04	± 1.5
40	39.91	-0.09	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	8.03	8.01
2	8.00	7.97
3	7.94	7.93
Average	7.99	7.97

Differences of D.O. Content between calibrated D.O. meter and D.O. meter should be less than 0.4mg/L

Certified by : 

Approved Signatory : HO Kin Man, John
Assistant General Manager – Laboratories

Date : 10/7/2018

Note : This report refers only to the sample(s) tested.

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Website : www.fugro.com

MaterialLab

Report No. : 142626WA181114

Page 3 of 3

Results :


D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
25.29	25.33

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.05	+0.05	± 0.4
8	8.10	+0.10	± 0.6
40	40.77	+0.77	± 3.0
80	81.06	+1.06	± 4.0

Certified by :


Approved Signatory : HO Kin Man, John
Assistant General Manager – Laboratories

Date

: 10/7/2018

** End of Report **

Note : This report refers only to the sample(s) tested.

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Website : www.fugro.com

MaterialLab

Report No. : 142626WA181114(1)



Page 1 of 3

Report on Calibration of Aqua Troll 600 Multi-parameter Water Quality Meter

Information Supplied by Client

Client : Fugro Technical Services Limited (MCL)
Client's address : Rm. 723 - 726, 7/F, Profit Industrial Building, No. 1-15,
Kwai Fung Crescent, Kwai Chung, N.T.
Sample description : One Aqua Troll 600 Multi-parameter Water Quality Meter
Client sample ID : Serial No. 584601
Test required : Calibration of the Aqua Troll 600 Multi-parameter Water Quality
Meter

Laboratory Information

Lab. sample ID : WA181114/2
Date of calibration : 11/06/2018
Next calibration date : 10/09/2018
Test method used : In-house comparison method

Note : This report refers only to the sample(s) tested.

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E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report No. : 142626WA181114(1)

Page 2 of 3

Results :

A. pH calibration

pH reading at 26°C for Q.C. solution(6.86) and at 25°C for Q.C. solution(9.18)		
Theoretical	Measured	Deviation
9.18	9.20	+0.02
6.86	6.82	-0.04

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.06	+0.06	± 0.5
20	20.11	+0.11	± 1.0
30	30.30	+0.30	± 1.5
40	39.84	-0.16	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	7.97	7.96
2	7.96	7.95
3	7.99	7.94
Average	7.97	7.95

Differences of D.O. Content between calibrated D.O. meter and D.O. meter should be less than 0.4mg/L

Certified by : 

Approved Signatory : HO Kin Man, John
Assistant General Manager – Laboratories

Date : 10/7/2018

Note : This report refers only to the sample(s) tested.

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E-mail : matlab@fugro.com
Website : www.fugro.com

MaterialLab

Report No. : 142626WA181114(1)

Page 3 of 3

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
26.04	25.99

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.05	+0.05	± 0.4
8	8.08	+0.08	± 0.6
40	39.92	-0.08	± 3.0
80	80.23	+0.23	± 4.0

Certified by : 
Approved Signatory : HO Kin Man, John
Assistant General Manager – Laboratories

Date : 10/7/2018

** End of Report **

Note : This report refers only to the sample(s) tested.



a xylem brand

9940 Summers Ridge Road
San Diego, CA 92121
Tel: (858) 546-8327
support@sontek.com

Certificate of Calibration

TEST REPORT

Serial Number	5906
System Type	M9
System Orientation	Down
Compass Type	Sontek
Compass Offset (degrees)	N/A
Communications Output	RS232
Recorder Size (GB)	14.9
Firmware Version	4.02
Date Tested	05/23/2017

POWER TEST

Command Mode (W):	0.17	Range : 0.00 – 0.30
Sleep Mode (W):	N/A	Range : N/A
Ping Mode - 18V (W):	2.67	Range : 1.50 – 3.50
Power Check		PASS

NOISE TEST

Beam 1 – 3.0 MHz (counts)	95
Beam 2 – 1.0 MHz (counts)	96
Beam 3 – 3.0 MHz (counts)	95
Beam 4 – 1.0 MHz (counts)	101
Beam 5 – 3.0 MHz (counts)	93
Beam 6 – 1.0 MHz (counts)	95
Beam 7 – 3.0 MHz (counts)	91
Beam 8 – 1.0 MHz (counts)	100
Beam Vertical – 500KHz (counts)	88
Noise Test	PASS

VERIFICATION

Velocity Check	PASS
Transmit Output	PASS
Sensitivity	PASS
Temperature Sensor	PASS
Compass Heading Check	PASS
Compass Level Check	PASS
Burn-in (24 hrs)	PASS
Load Default Parameters	DONE

OPTIONS

Bottom Track	Installed
SmartPulse HD TM	Enabled
Stationary	Disabled
GPS Compass Integration	Disabled
RiverSurveyor	Enabled
HydroSurveyor	Disabled

Verified by: **ainthasane**

This report was generated on 5/24/2017.

ATTENTION: New Warranty Terms as of March 4, 2013:

This system is covered under a two year limited warranty that extends to all parts and labor for any malfunction due to workmanship or errors in the manufacturing process. The warranty is valid only if you properly maintain and operate this system under normal use as outlined in the User's Manual. The warranty does not cover shortcomings that are due to the design, or any incidental damages as a result of errors in the measurements.

SonTek will repair and/or replace, at its sole option, any product established to be defective with a product of like type. CLAIMS FOR LABOR COSTS AND/OR OTHER CHARGES RESULTING FROM THE USE OF SonTek GOODS AND/OR PRODUCTS ARE NOT COVERED BY THIS LIMITED WARRANTY.

SonTek DISCLAIMS ALL EXPRESS WARRANTIES OTHER THAN THOSE CONTAINED ABOVE AND ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE. SonTek DISCLAIMS AND WILL NOT BE LIABLE, UNDER ANY CIRCUMSTANCE, IN CONTRACT, TORT OR WARRANTY, FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO LOST PROFITS, BUSINESS INTERRUPTION LOSSES, LOSS OF GOODWILL, OR LOSS OF BUSINESS OR CUSTOMER RELATIONSHIPS.

If your system is not functioning properly, first try to identify the source of the problem. If additional support is required, we encourage you to contact us immediately. We will work to resolve the problem as quickly as possible.

If the system needs to be returned to the factory, please contact SonTek to obtain a Service Request (SR) number. We reserve the right to refuse receipt of shipments without SRs. We require the system to be shipped back in the original shipping container using the original packing material with all delivery costs covered by the customer (including all taxes and duties). If the system is returned without appropriate packing, the customer will be required to cover the cost of a new packaging crate and material.

The warranty for repairs performed at an authorized SonTek Service Center is one year.

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Report No.: 0041/17/ED/0330A

Appendix E

Results and Graphical Presentation of Water Quality Monitoring



CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 28
Contact	: MR CYRUS LAI	Contact	: Richard Fung	Work Order	: HK1833568
Address	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: c.lai@fugro.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 3565 4374	Telephone	: +852 2610 1044		
Facsimile	: ---	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT	Date Samples Received	: 14-Jun-2018		
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 29-Jun-2018
C-O-C number	: ---			No. of samples received	: 96
Site	: ---			No. of samples analysed	: 96

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This document has been signed by those names that appear on this report and are the authorised signatories.

<u>Signatories</u>	<u>Position</u>	<u>Authorised results for</u>
Fung Lim Chee, Richard	General Manager	Inorganics
Ng Sin Kou, May	Assistant Laboratory Manager	Microbiology



General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 14-Jun-2018 to 29-Jun-2018.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK1833568

Sample(s) were received in chilled condition.

Water sample(s) analysed and reported on as received basis.

Total Inorganic Nitrogen is the sum of the Total Oxidizable Nitrogen and Ammonical Nitrogen.

Sample(s) arrived in the laboratory at 18:40. Microbiological sample(s), in 125mL plastic bottle labelled sterile, with addition of sodium thiosulfate solution.

NOT DETECTED denotes result(s) is (are) less than the Limit of Report (LOR).

The accredited LOR of Biochemical Oxygen Demand is 2mg/L. Results reported below 2mg/L and the decimal value of the results were for reference only.



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				A/S/E	A/S/E/Dup	A/M/E	A/M/E/Dup	A/B/E
				14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-001	HK1833568-002	HK1833568-003	HK1833568-004	HK1833568-005
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.5	8.8	9.2	9.6	9.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.151	0.157	0.121	0.110	0.137
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.273	0.273	0.277	0.283	0.289
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.727	0.758	0.769	0.757	0.747
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.15	1.19	1.17	1.15	1.17
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.06	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.03	0.03	0.04
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.4	2.2	2.3	1.6	1.3
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	11	13	14	12	130



Sub-Matrix: WATER				Client sample ID	A/B/E/Dup	B/S/E	B/S/E/Dup	B/M/E	B/M/E/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-006	HK1833568-007	HK1833568-008	HK1833568-009	HK1833568-010	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.1	6.8	7.8	7.4	7.1	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.127	0.137	0.120	0.133	0.135	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.292	0.227	0.228	0.229	0.227	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.739	0.601	0.597	0.594	0.598	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.16	0.965	0.945	0.956	0.960	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.03	0.04	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.2	<1.0	1.1	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	160	170	190	130	140	



Sub-Matrix: WATER				Client sample ID	B/B/E	B/B/E/Dup	C/S/E	C/S/E/Dup	C/M/E
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-011	HK1833568-012	HK1833568-013	HK1833568-014	HK1833568-015	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.5	10.0	8.1	8.5	8.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.132	0.134	0.155	0.154	0.152	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.222	0.214	0.292	0.293	0.294	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.614	0.608	0.754	0.762	0.754	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.968	0.956	1.20	1.21	1.20	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.02	0.03	0.03	0.03	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	1.5	1.1	1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	120	140	36	11	18	



Sub-Matrix: WATER				Client sample ID	C/M/E/Dup	C/B/E	C/B/E/Dup	D/S/E	D/S/E/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-016	HK1833568-017	HK1833568-018	HK1833568-019	HK1833568-020	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.9	7.6	7.4	5.1	5.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.157	0.140	0.150	0.109	0.112	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.297	0.298	0.300	0.295	0.299	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.749	0.748	0.749	0.751	0.742	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.20	1.19	1.20	1.15	1.15	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	14	59	12	16	14	



Sub-Matrix: WATER				Client sample ID	D/M/E	D/M/E/Dup	D/B/E	D/B/E/Dup	E/S/E
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-021	HK1833568-022	HK1833568-023	HK1833568-024	HK1833568-025	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.1	6.5	6.5	6.6	7.3	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.101	0.116	0.122	0.122	0.116	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.299	0.297	0.296	0.296	0.298	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.753	0.750	0.760	0.757	0.792	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.15	1.16	1.18	1.18	1.21	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.04	0.03	0.04	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.0	<1.0	1.2	1.2	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	140	120	160	140	110	



Sub-Matrix: WATER				Client sample ID	E/S/E/Dup	E/M/E	E/M/E/Dup	E/B/E	E/B/E/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-026	HK1833568-027	HK1833568-028	HK1833568-029	HK1833568-030	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.3	6.3	7.4	5.5	5.5	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.108	0.151	0.181	0.119	0.120	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.303	0.298	0.289	0.303	0.302	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.793	0.798	0.799	0.777	0.748	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.20	1.25	1.27	1.20	1.17	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.06	0.06	0.06	0.06	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	2.7	1.2	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	120	21	14	11	15	



Sub-Matrix: WATER				Client sample ID	F/S/E	F/S/E/Dup	F/M/E	F/M/E/Dup	F/B/E
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-031	HK1833568-032	HK1833568-033	HK1833568-034	HK1833568-035	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.9	5.3	5.9	4.7	5.5	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.120	0.122	0.119	0.121	0.116	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.289	0.289	0.295	0.290	0.287	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.768	0.778	0.760	0.764	0.764	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.18	1.19	1.17	1.17	1.17	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	0.05	0.06	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.04	0.03	0.04	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	<1.0	<1.0	<1.0	1.5	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	110	140	16	11	9	



Sub-Matrix: WATER				Client sample ID	F/B/E/Dup	G/S/E	G/S/E/Dup	G/M/E	G/M/E/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-036	HK1833568-037	HK1833568-038	HK1833568-039	HK1833568-040	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.7	6.0	6.1	5.1	5.7	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.107	0.154	0.144	0.136	0.124	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.289	0.267	0.261	0.280	0.266	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.767	0.759	0.715	0.732	0.706	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.16	1.18	1.12	1.15	1.10	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.06	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.04	0.03	0.04	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.7	<1.0	1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	14	110	140	12	13	



Sub-Matrix: WATER				Client sample ID	G/B/E	G/B/E/Dup	H/S/E	H/S/E/Dup	H/M/E
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-041	HK1833568-042	HK1833568-043	HK1833568-044	HK1833568-045	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	7.6	6.1	7.8	7.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.125	0.117	0.112	0.121	0.116	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.270	0.264	0.279	0.280	0.279	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.744	0.706	0.748	0.752	0.765	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.14	1.09	1.14	1.15	1.16	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	0.05	0.06	0.06	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.04	0.03	0.03	0.03	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	18	10	100	110	120	



Sub-Matrix: WATER				Client sample ID	H/M/E/Dup	H/B/E	H/B/E/Dup	A/S/F	A/S/F/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-046	HK1833568-047	HK1833568-048	HK1833568-049	HK1833568-050	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.7	5.8	5.8	7.6	7.1	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.126	0.115	0.110	0.143	0.155	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.287	0.292	0.287	0.256	0.259	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.750	0.740	0.746	0.716	0.707	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.16	1.15	1.14	1.11	1.12	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.04	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.02	0.04	0.04	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	110	140	130	86	33	



Sub-Matrix: WATER				Client sample ID	A/M/F	A/M/F/Dup	A/B/F	A/B/F/Dup	B/S/F
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-051	HK1833568-052	HK1833568-053	HK1833568-054	HK1833568-055	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.4	8.3	8.6	9.2	6.3	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.140	0.157	0.128	0.154	0.144	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.250	0.253	0.123	0.120	0.183	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.730	0.720	0.789	0.794	0.551	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.12	1.13	1.04	1.07	0.878	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.05	0.05	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.03	0.04	0.02	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.2	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	49	40	70	35	2	



Sub-Matrix: WATER				Client sample ID	B/S/F/Dup	B/M/F	B/M/F/Dup	B/B/F	B/B/F/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-056	HK1833568-057	HK1833568-058	HK1833568-059	HK1833568-060	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.3	4.9	4.8	5.6	6.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.132	0.149	0.143	0.102	0.124	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.183	0.132	0.134	0.120	0.127	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.547	0.388	0.396	0.434	0.392	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.862	0.669	0.673	0.656	0.643	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.03	0.03	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	6	11	12	14	13	



Sub-Matrix: WATER				Client sample ID	C/S/F	C/S/F/Dup	C/M/F	C/M/F/Dup	C/B/F
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-061	HK1833568-062	HK1833568-063	HK1833568-064	HK1833568-065	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.2	6.2	6.3	6.0	7.4	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.125	0.115	0.126	0.112	0.128	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.267	0.275	0.271	0.266	0.280	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.703	0.696	0.713	0.711	0.695	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.09	1.08	1.11	1.09	1.10	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.04	0.03	0.03	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	1.1	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	59	65	47	54	32	



Sub-Matrix: WATER				Client sample ID	C/B/F/Dup	D/S/F	D/S/F/Dup	D/M/F	D/M/F/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-066	HK1833568-067	HK1833568-068	HK1833568-069	HK1833568-070	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.9	6.8	8.4	6.4	7.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.130	0.112	0.119	0.156	0.195	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.268	0.293	0.289	0.294	0.316	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.717	0.747	0.759	0.754	0.818	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.11	1.15	1.17	1.20	1.33	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	0.04	0.05	0.06	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.04	0.04	0.04	0.04	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	10	110	90	11	12	



Sub-Matrix: WATER				Client sample ID	D/B/F	D/B/F/Dup	E/S/F	E/S/F/Dup	E/M/F
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-071	HK1833568-072	HK1833568-073	HK1833568-074	HK1833568-075	HK1833568-075
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.0	7.7	7.5	7.4	7.2	7.2
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.142	0.134	0.119	0.120	0.150	0.150
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.283	0.293	0.203	0.212	0.206	0.206
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.717	0.767	0.599	0.592	0.596	0.596
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.14	1.19	0.921	0.924	0.952	0.952
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.02	0.02	0.02	0.02
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	<1.0	<1.0	<1.0	<1.0	<1.0
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	120	110	140	120	81	81



Sub-Matrix: WATER				Client sample ID	E/M/F/Dup	E/B/F	E/B/F/Dup	F/S/F	F/S/F/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-076	HK1833568-077	HK1833568-078	HK1833568-079	HK1833568-080	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.8	6.6	7.0	7.7	6.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.154	0.146	0.158	0.143	0.120	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.218	0.211	0.199	0.234	0.224	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.604	0.596	0.609	0.638	0.662	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.976	0.953	0.966	1.02	1.01	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.04	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.03	0.03	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.4	1.2	1.3	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	13	160	69	110	120	



Sub-Matrix: WATER				Client sample ID	F/M/F	F/M/F/Dup	F/B/F	F/B/F/Dup	G/S/F
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-081	HK1833568-082	HK1833568-083	HK1833568-084	HK1833568-085	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.8	6.7	7.7	6.5	5.7	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.118	0.139	0.124	0.127	0.153	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.239	0.221	0.242	0.207	0.239	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.639	0.671	0.630	0.616	0.730	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.996	1.03	0.996	0.950	1.12	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.04	0.04	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.2	1.1	<1.0	1.4	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	130	110	150	100	110	



Sub-Matrix: WATER				Client sample ID	G/S/F/Dup	G/M/F	G/M/F/Dup	G/B/F	G/B/F/Dup
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-086	HK1833568-087	HK1833568-088	HK1833568-089	HK1833568-090	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.8	5.1	5.9	6.4	7.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.174	0.161	0.199	0.186	0.154	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.255	0.251	0.259	0.248	0.259	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.702	0.721	0.700	0.727	0.700	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.13	1.13	1.16	1.16	1.11	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.02	0.01	0.02	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.8	1.1	1.8	1.3	2.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	130	150	160	4	9	



Sub-Matrix: WATER				Client sample ID	H/S/F	H/S/F/Dup	H/M/F	H/M/F/Dup	H/B/F
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833568-091	HK1833568-092	HK1833568-093	HK1833568-094	HK1833568-095	HK1833568-095
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.2	4.8	6.6	6.3	5.2	5.2
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.277	0.289	0.283	0.257	0.286	0.286
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.291	0.297	0.302	0.292	0.292	0.292
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.799	0.767	0.782	0.796	0.804	0.804
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.37	1.35	1.37	1.34	1.38	1.38
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.04	0.04	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.03	0.02	<0.01	0.02	0.02
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.8	1.2	1.7	2.3	1.6	1.6
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	14	19	110	130	8	8



Sub-Matrix: WATER				Client sample ID	H/B/F/Dup	---	---	---	---
				Client sampling date / time	14-Jun-2018	---	---	---	---
Compound	CAS Number	LOR	Unit	HK1833568-096	---	---	---	---	---
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	---	0.5	mg/L	6.6	---	---	---	---	---
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.284	---	---	---	---	---
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.300	---	---	---	---	---
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.788	---	---	---	---	---
EK063A: Inorganic Nitrogen as N	---	0.010	mg/L	1.37	---	---	---	---	---
EK067P: Total Phosphorus as P	---	0.01	mg/L	0.05	---	---	---	---	---
EK067P: Total Phosphorus - Filtered	---	0.01	mg/L	0.01	---	---	---	---	---
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	---	1.0	mg/L	2.0	---	---	---	---	---
EM: Microbiological Testing									
EM002: E. coli	---	1	CFU/100mL	16	---	---	---	---	---



Laboratory Duplicate (DUP) Report

Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1730310)								
HK1833568-001	A/S/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	8.5	8.2	3.89
HK1833568-011	B/B/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	8.5	8.0	6.04
EA/ED: Physical and Aggregate Properties (QC Lot: 1730311)								
HK1833568-021	D/M/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	6.1	6.6	8.22
HK1833568-031	F/S/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	5.9	5.4	9.78
EA/ED: Physical and Aggregate Properties (QC Lot: 1730312)								
HK1833568-041	G/B/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	5.5	14.7
HK1833568-051	A/M/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	7.4	8.1	9.71
EA/ED: Physical and Aggregate Properties (QC Lot: 1730313)								
HK1833568-061	C/S/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	5.2	4.2	19.7
HK1833568-071	D/B/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	9.0	8.2	8.70
EA/ED: Physical and Aggregate Properties (QC Lot: 1730314)								
HK1833568-081	F/M/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	6.8	6.2	8.86
HK1833568-091	H/S/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	5.2	5.2	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730118)								
HK1833568-020	D/S/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730119)								
HK1833568-011	B/B/E	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730120)								
HK1833568-021	D/M/E	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730121)								
HK1833568-030	E/B/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730122)								
HK1833568-041	G/B/E	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.05	18.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730123)								
HK1833568-050	A/S/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730124)								
HK1833568-061	C/S/F	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730125)								
HK1833568-070	D/M/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.04	0.00



Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730126)								
HK1833568-081	F/M/F	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730127)								
HK1833568-096	H/B/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730318)								
HK1833568-001	A/S/E	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.273	0.277	1.45
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730321)								
HK1833568-030	E/B/E/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.302	0.302	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730323)								
HK1833568-050	A/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.259	0.266	2.67
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730325)								
HK1833568-080	F/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.224	0.235	4.79
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730327)								
HK1833568-090	G/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.259	0.246	5.15
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731165)								
HK1833568-001	A/S/E	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.151	0.152	0.791
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731166)								
HK1833568-030	E/B/E/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.120	0.106	12.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731167)								
HK1833568-050	A/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.155	0.146	6.03
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731168)								
HK1833568-080	F/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.120	0.113	5.92
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731169)								
HK1833568-090	G/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.154	0.154	0.00

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: WATER				Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)		
						LCS	DCS	Low	High	Value	Control Limit	
EA/ED: Physical and Aggregate Properties (QC Lot: 1730310)												
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	104	----	85	115	----	----	
EA/ED: Physical and Aggregate Properties (QC Lot: 1730311)												



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number					LCS	DCS	Low	High	Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 1730311) - Continued											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	90.0	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1730312)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	94.5	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1730313)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	102	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1730314)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	99.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730118)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.7	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730119)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	97.0	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730120)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.8	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730121)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.7	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730122)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	96.0	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730123)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.6	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730124)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	94.9	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730125)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	98.5	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730126)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	96.3	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730127)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	98.1	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730318)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	109	----	85	115	----	----

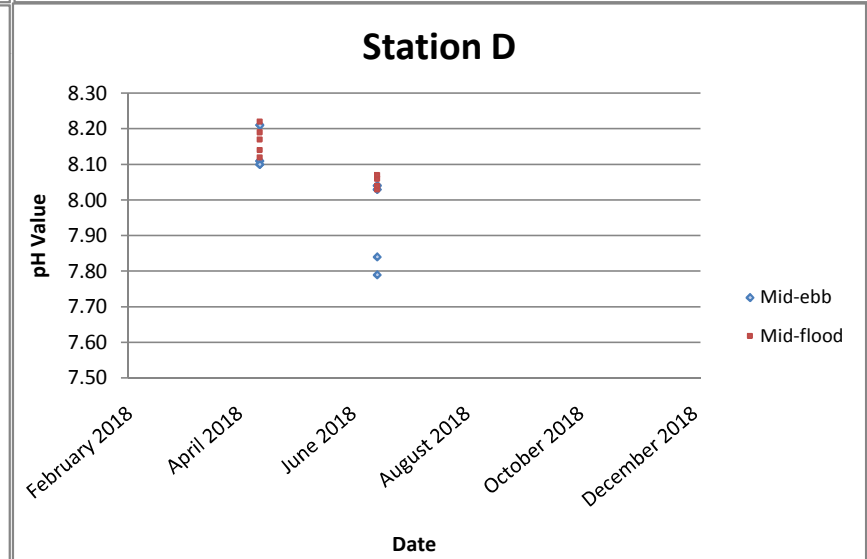
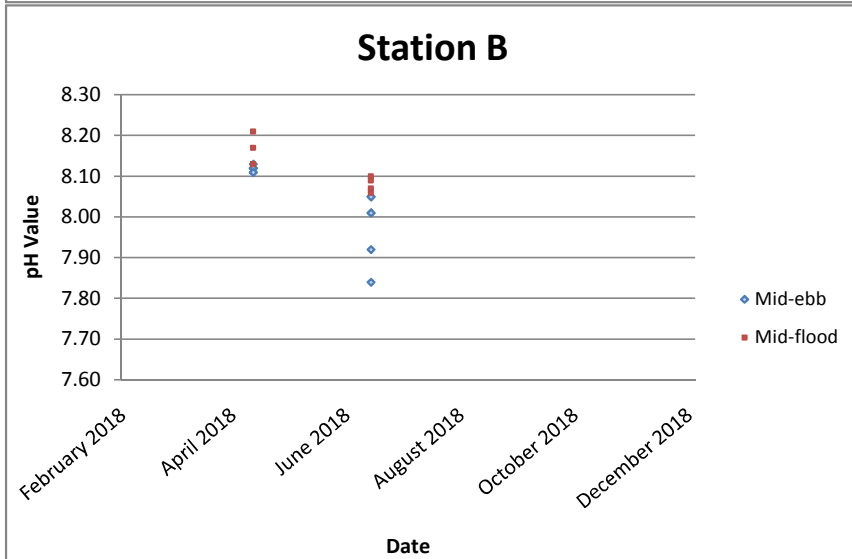
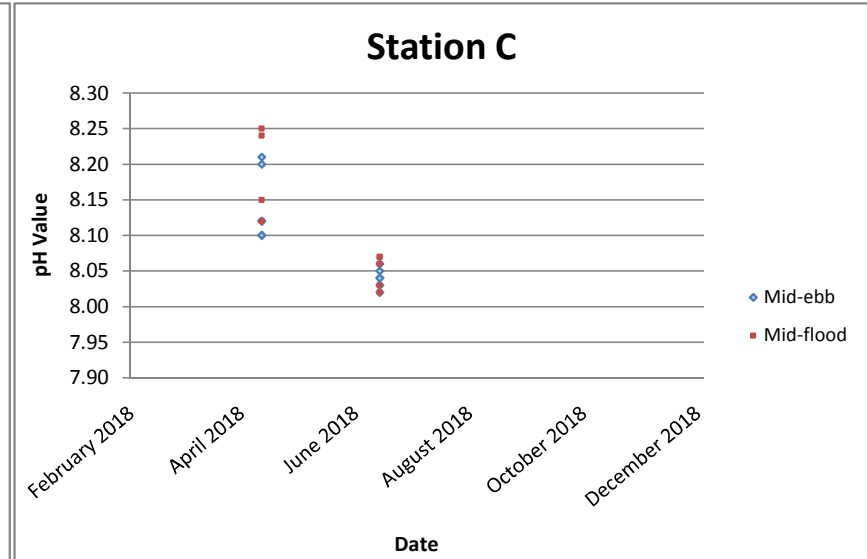
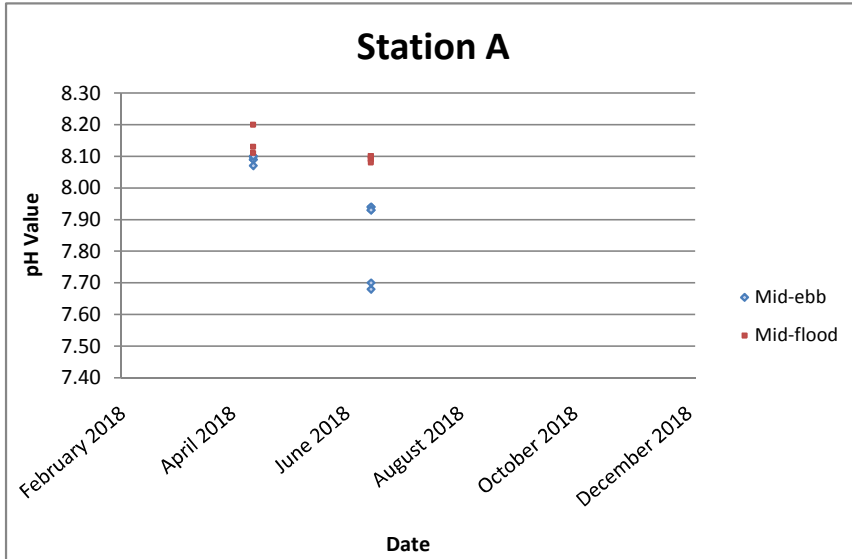


Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
Method: Compound	CAS Number										
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730321)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	87.8	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730323)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	107	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730325)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	93.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730327)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	98.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731165)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	102	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731166)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	106	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731167)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	101	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731168)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	102	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731169)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	100	----	85	115	----	----
EP: Aggregate Organics (QC Lot: 1730209)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	104	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1730210)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	94.5	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1730211)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	95.4	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1730212)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	95.8	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1730213)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	100	----	81	115	----	----

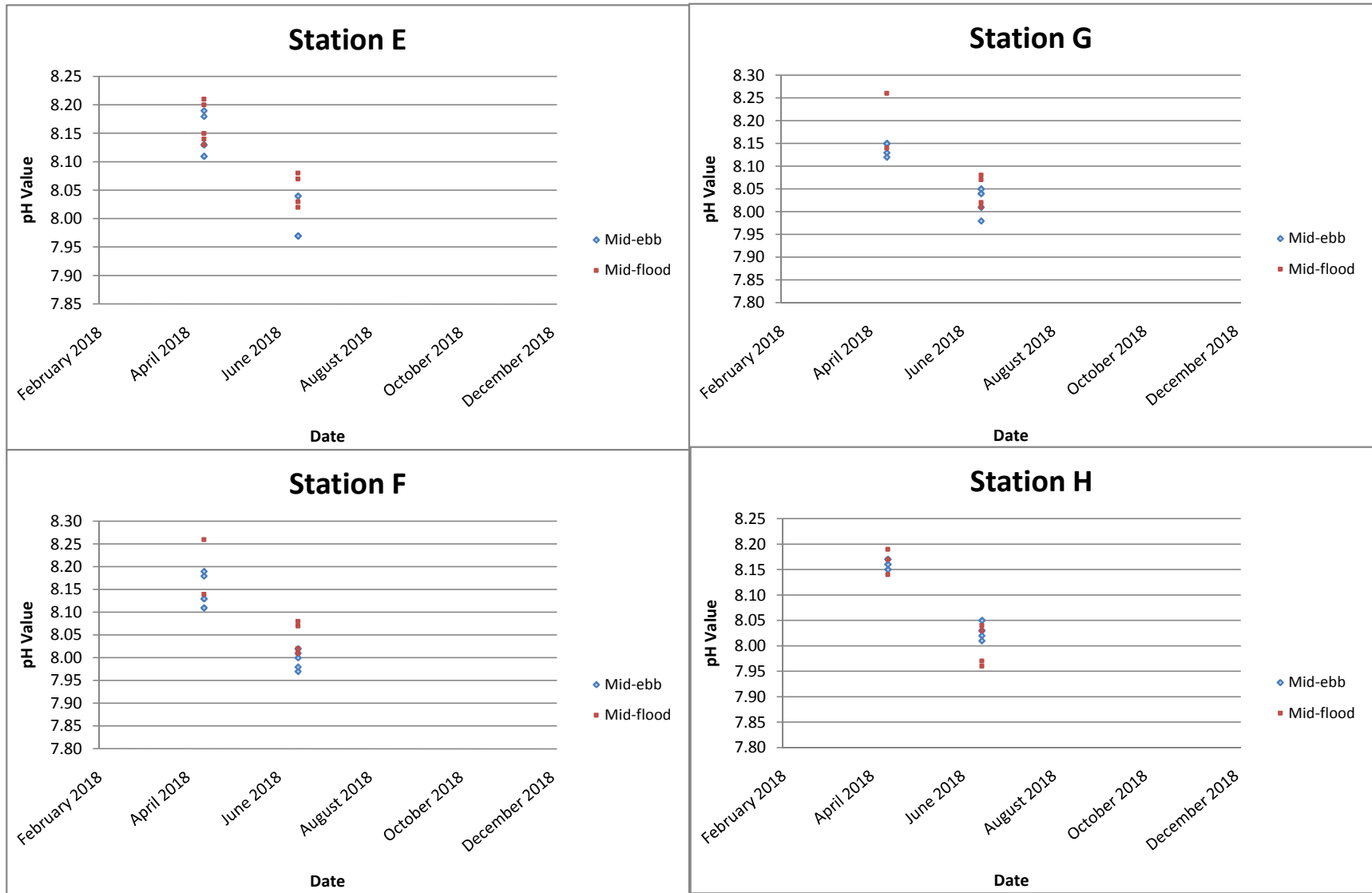


Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730323) - Continued										
HK1833568-050	A/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	105	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730325)										
HK1833568-080	F/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	104	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1730327)										
HK1833568-090	G/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	105	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731165)										
HK1833568-001	A/S/E	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	85.2	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731166)										
HK1833568-030	E/B/E/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	83.9	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731167)										
HK1833568-050	A/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	84.2	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731168)										
HK1833568-080	F/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	86.5	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1731169)										
HK1833568-090	G/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.5 mg/L	108	----	75	125	----	----

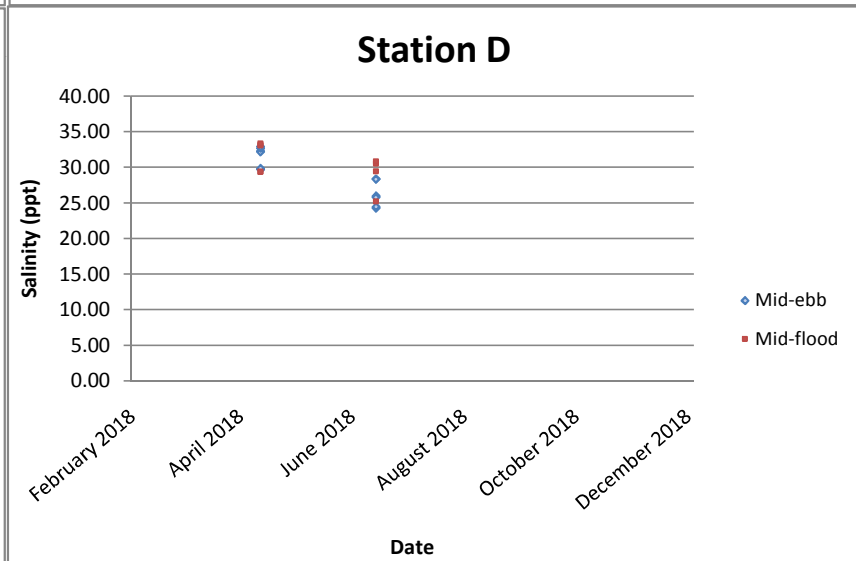
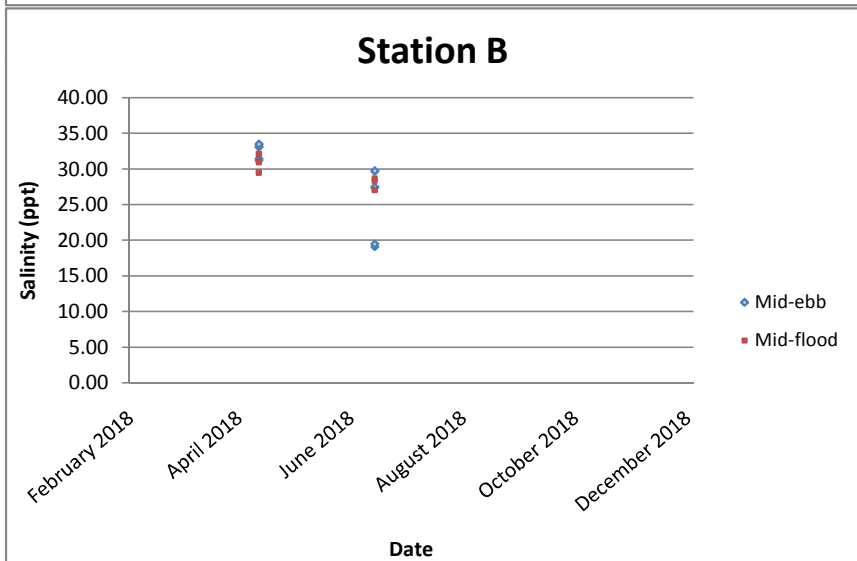
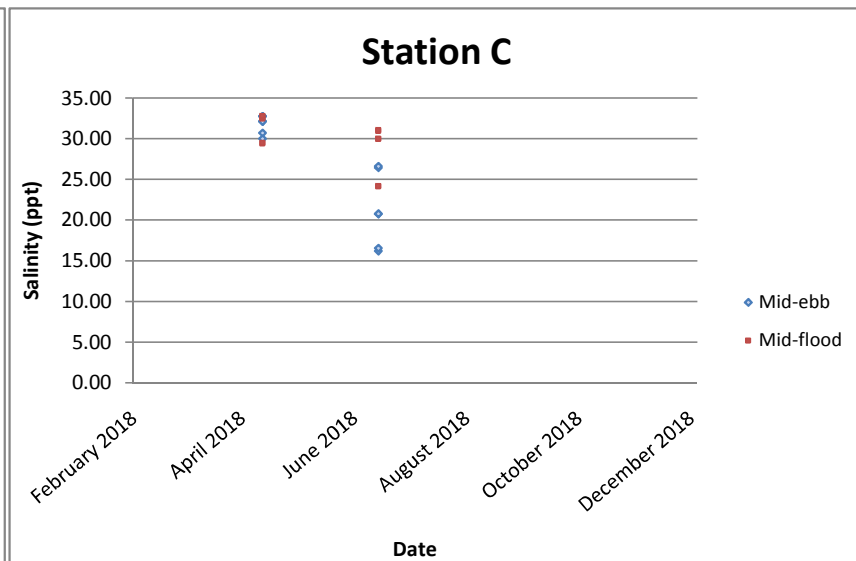
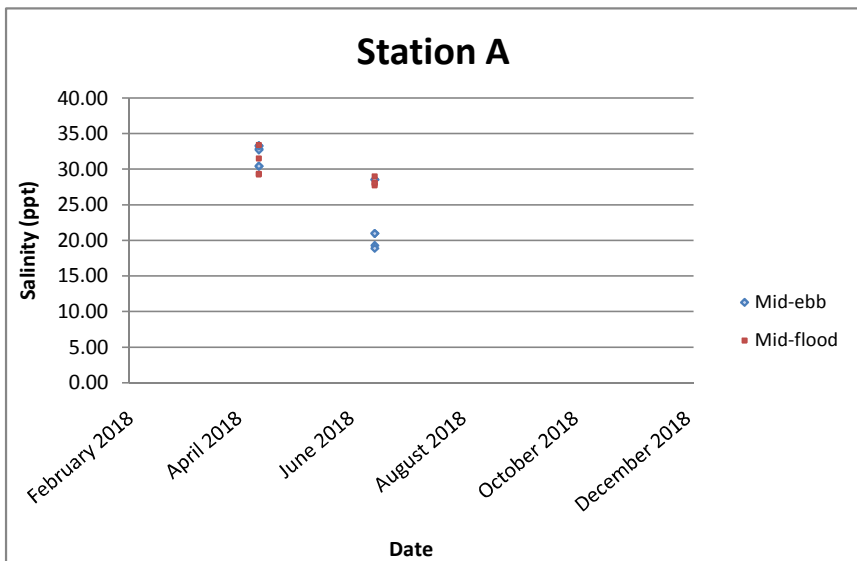
pH value



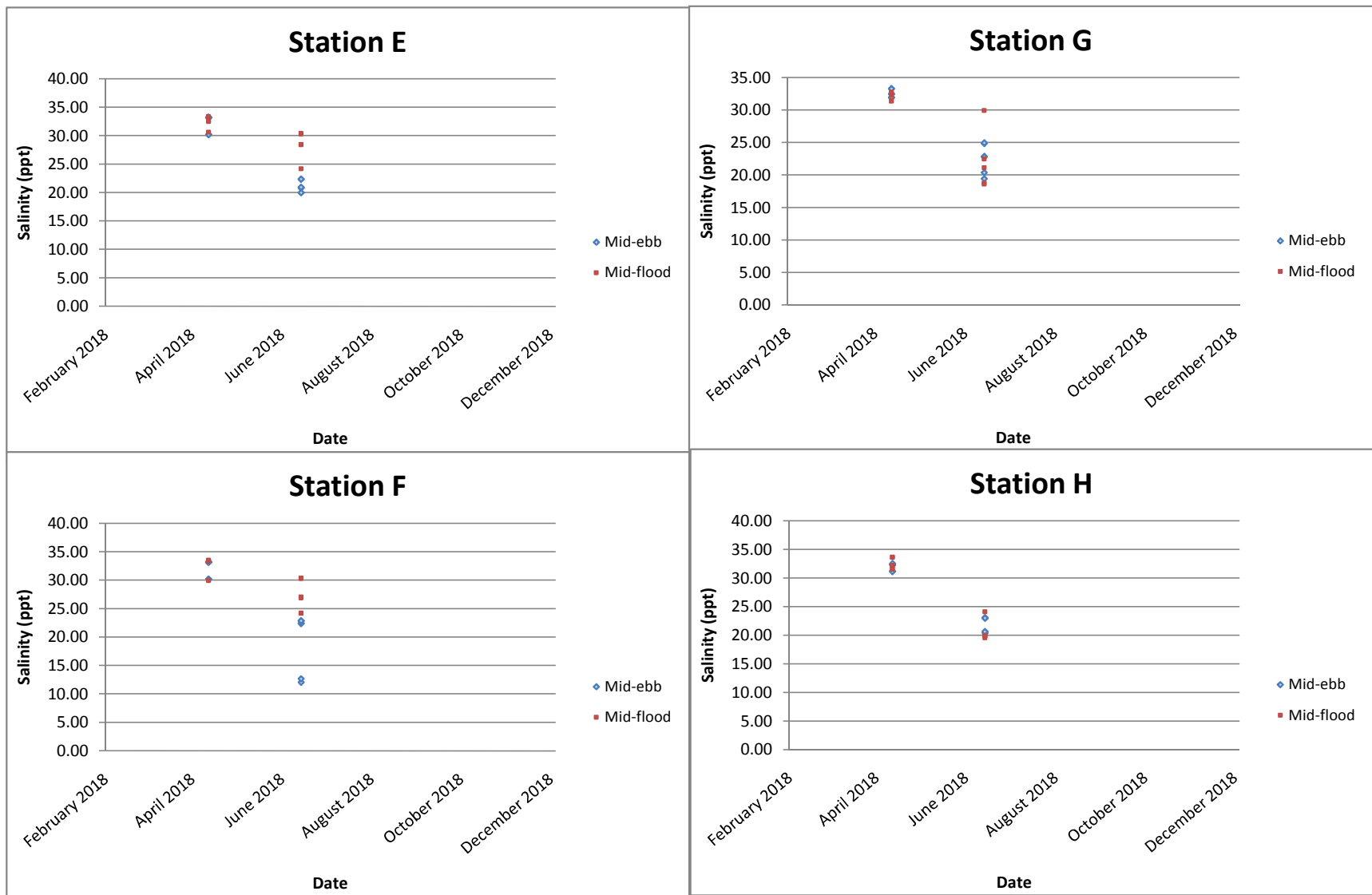
pH value



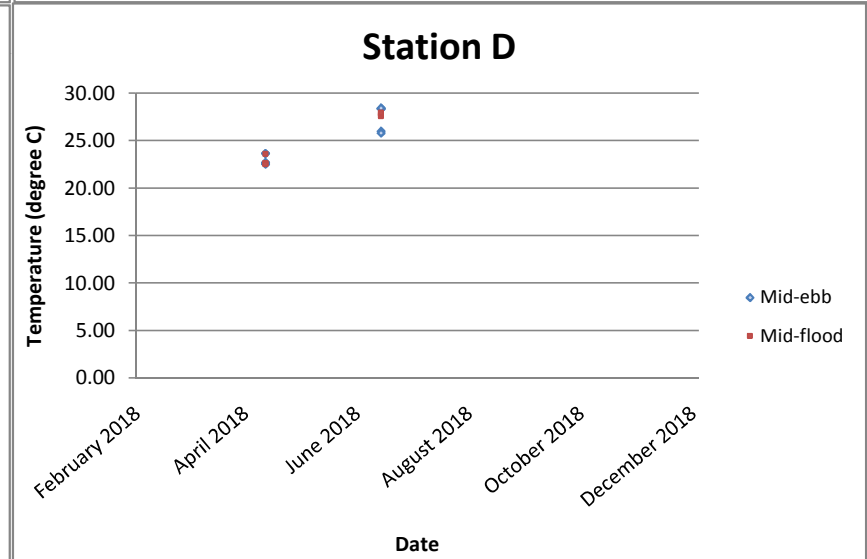
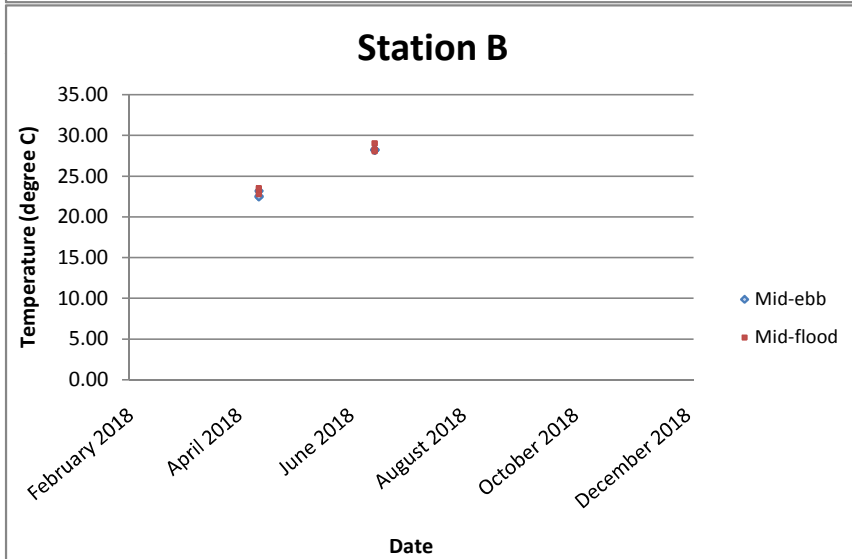
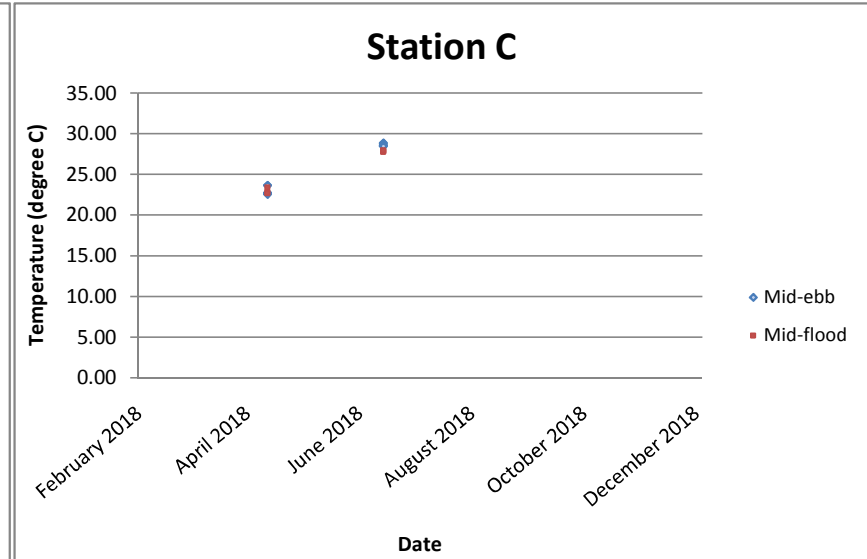
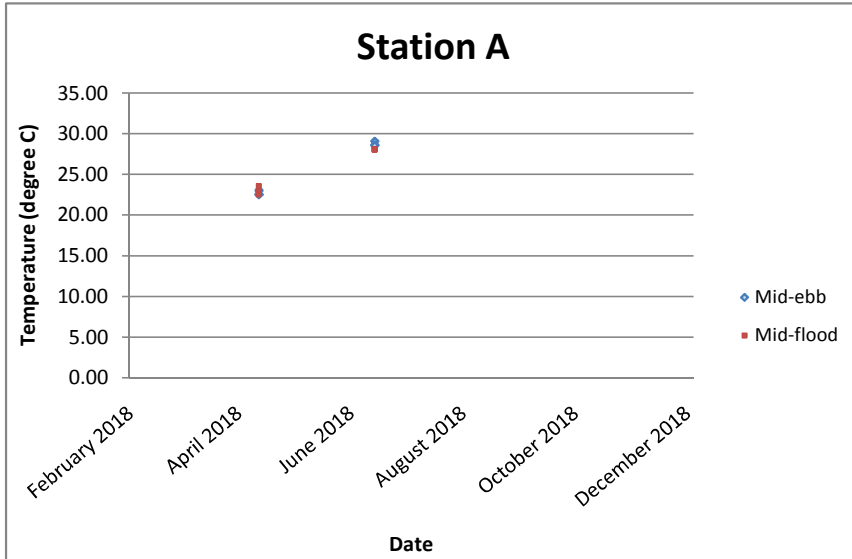
Salinity (ppt)



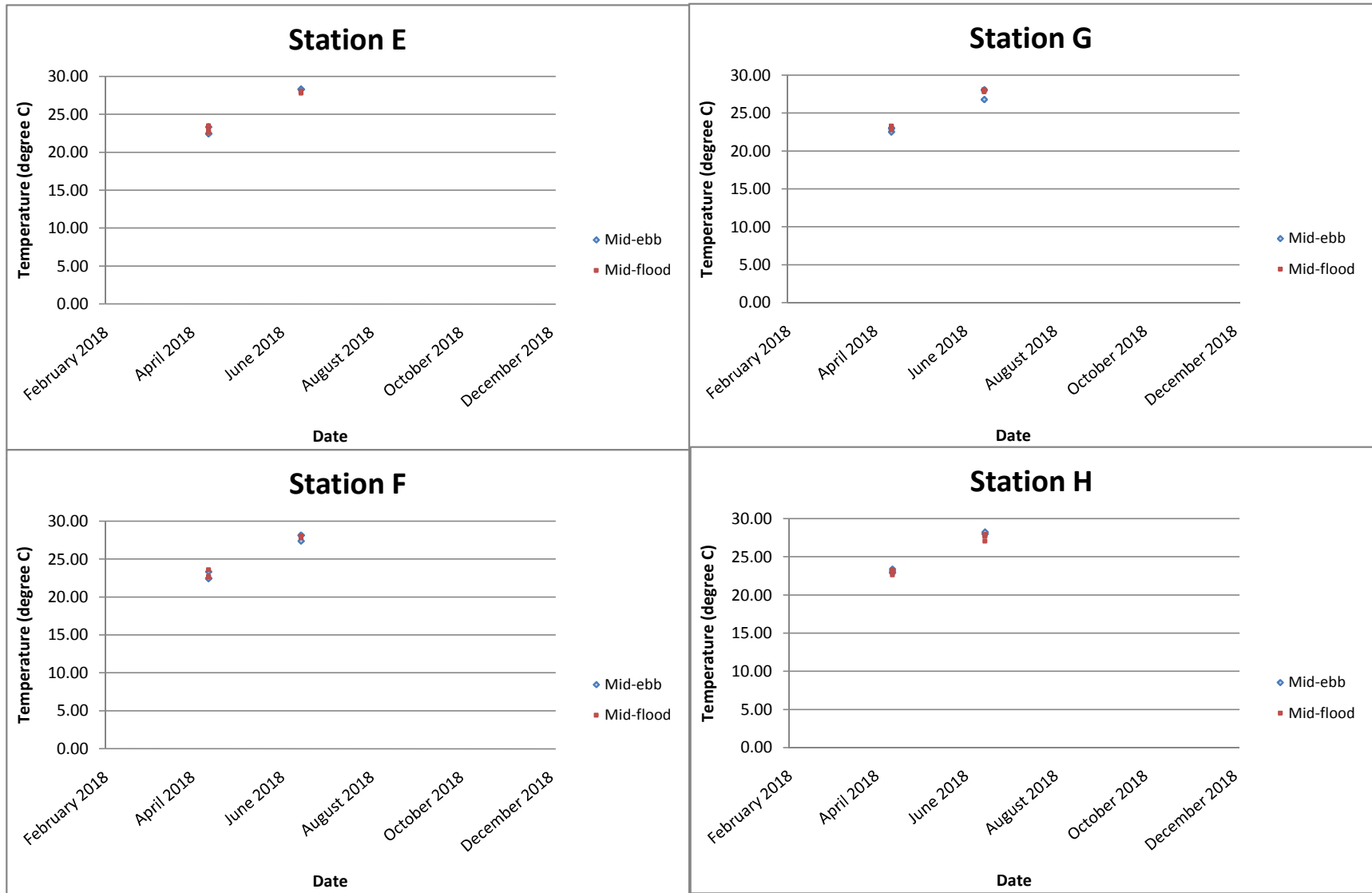
Salinity (ppt)



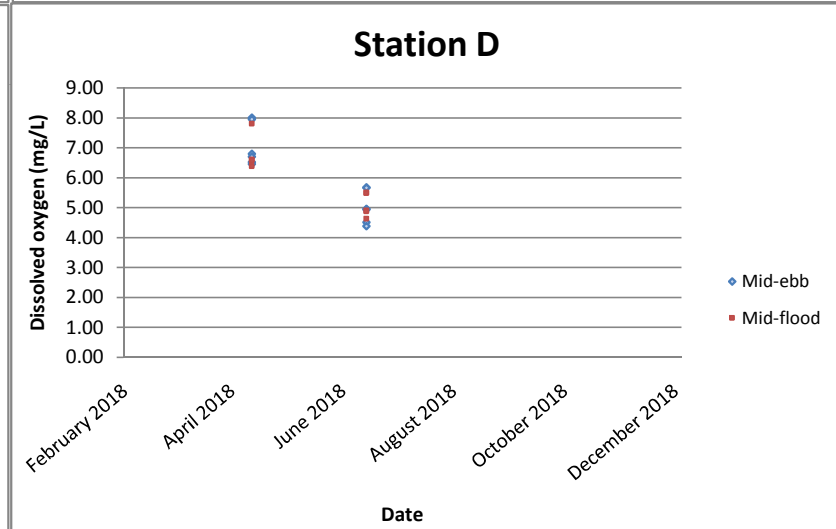
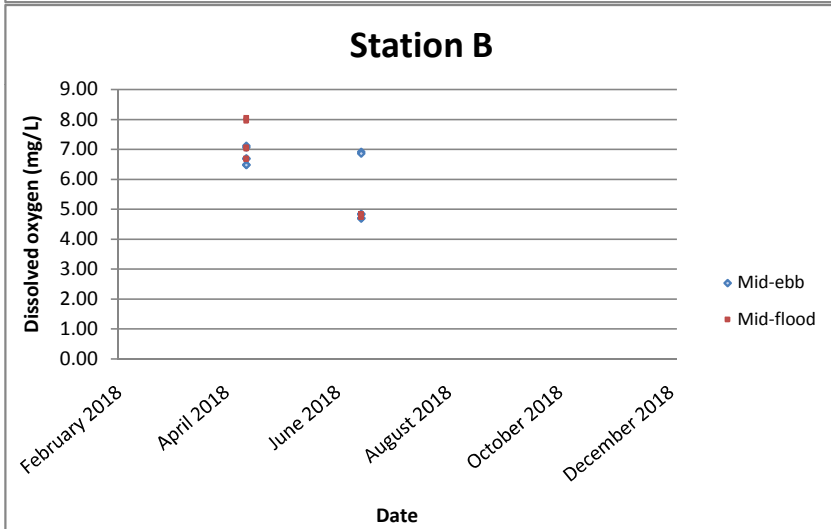
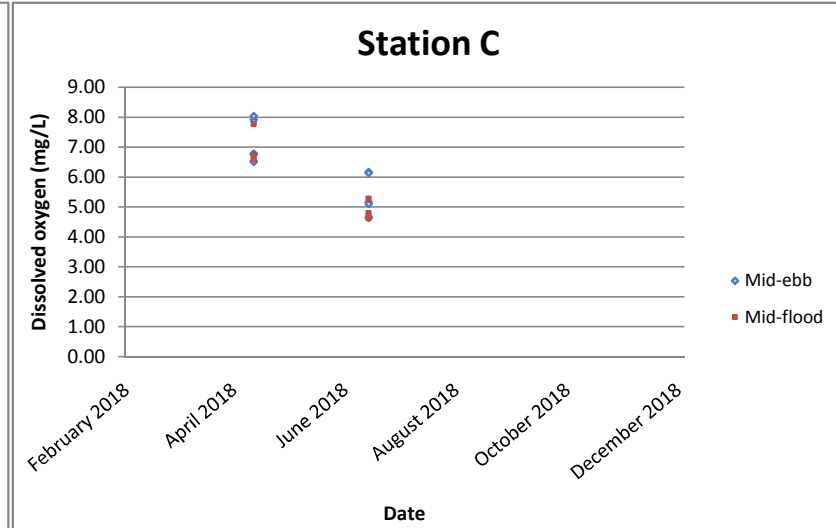
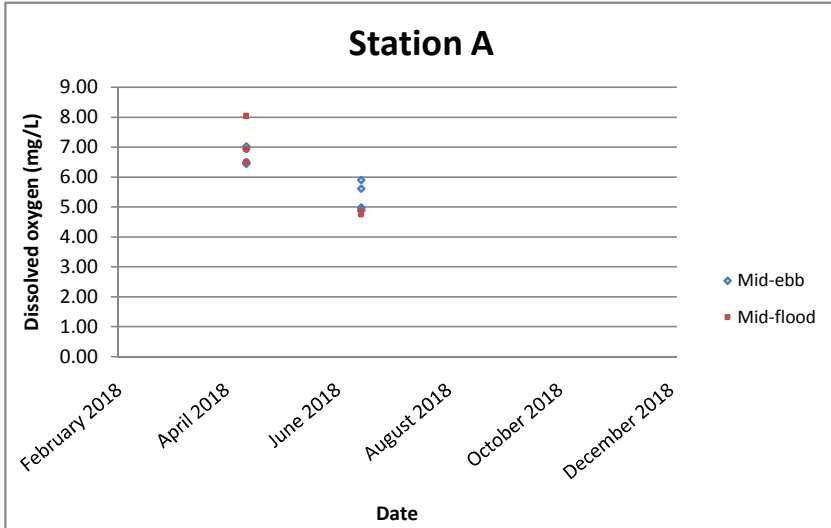
Temperature (degree C)



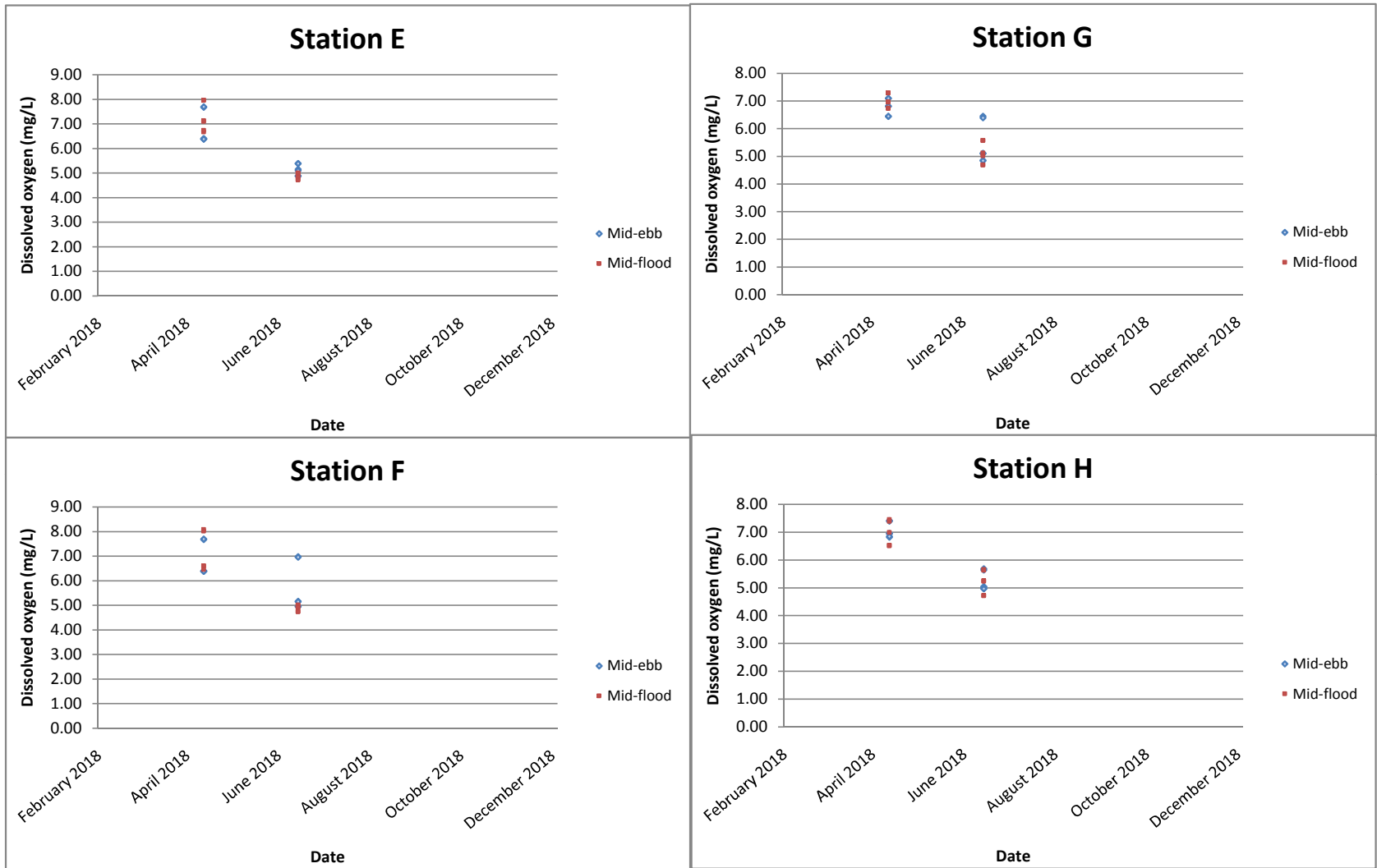
Temperature (degree C)



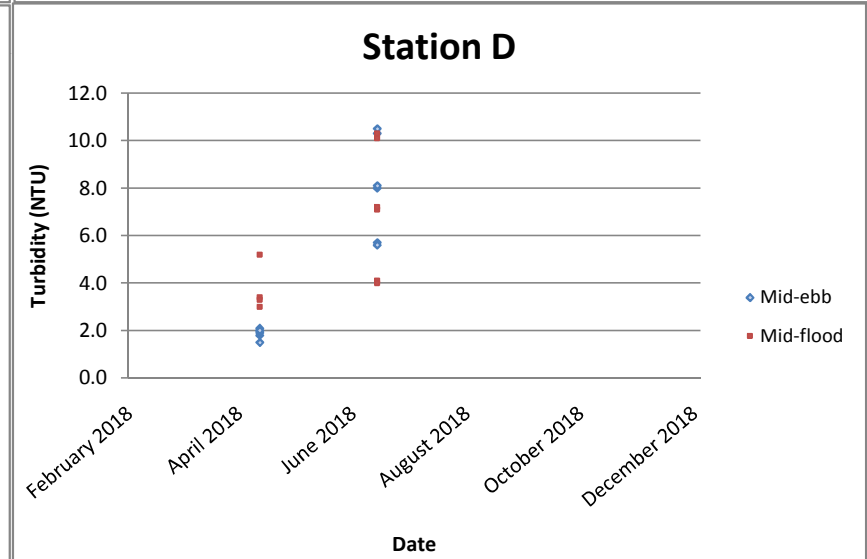
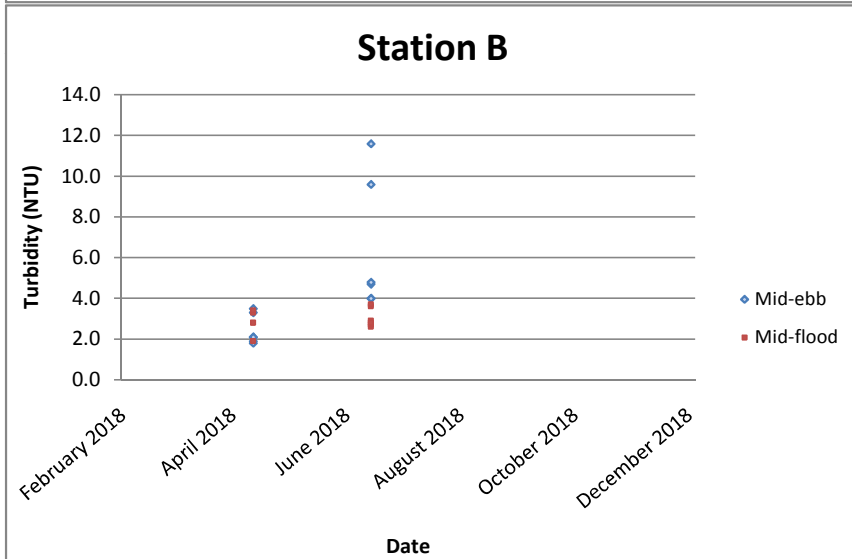
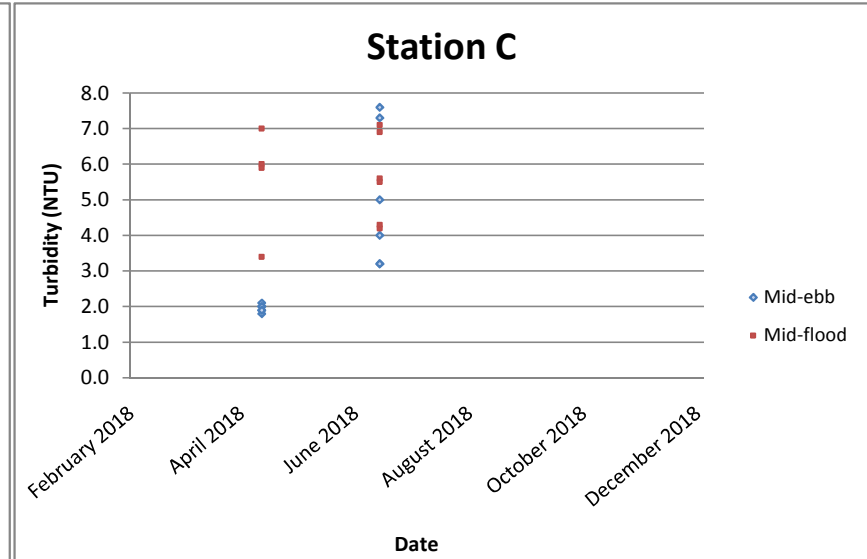
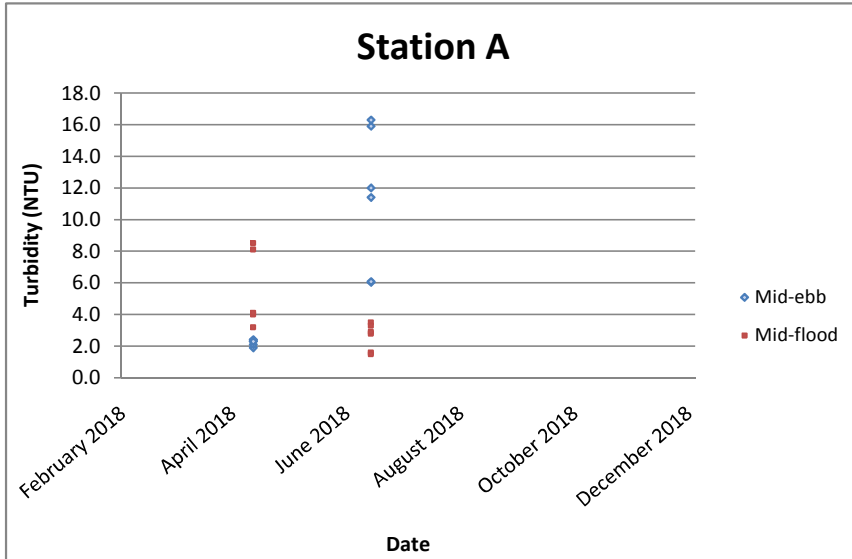
Dissolved oxygen (mg/L)



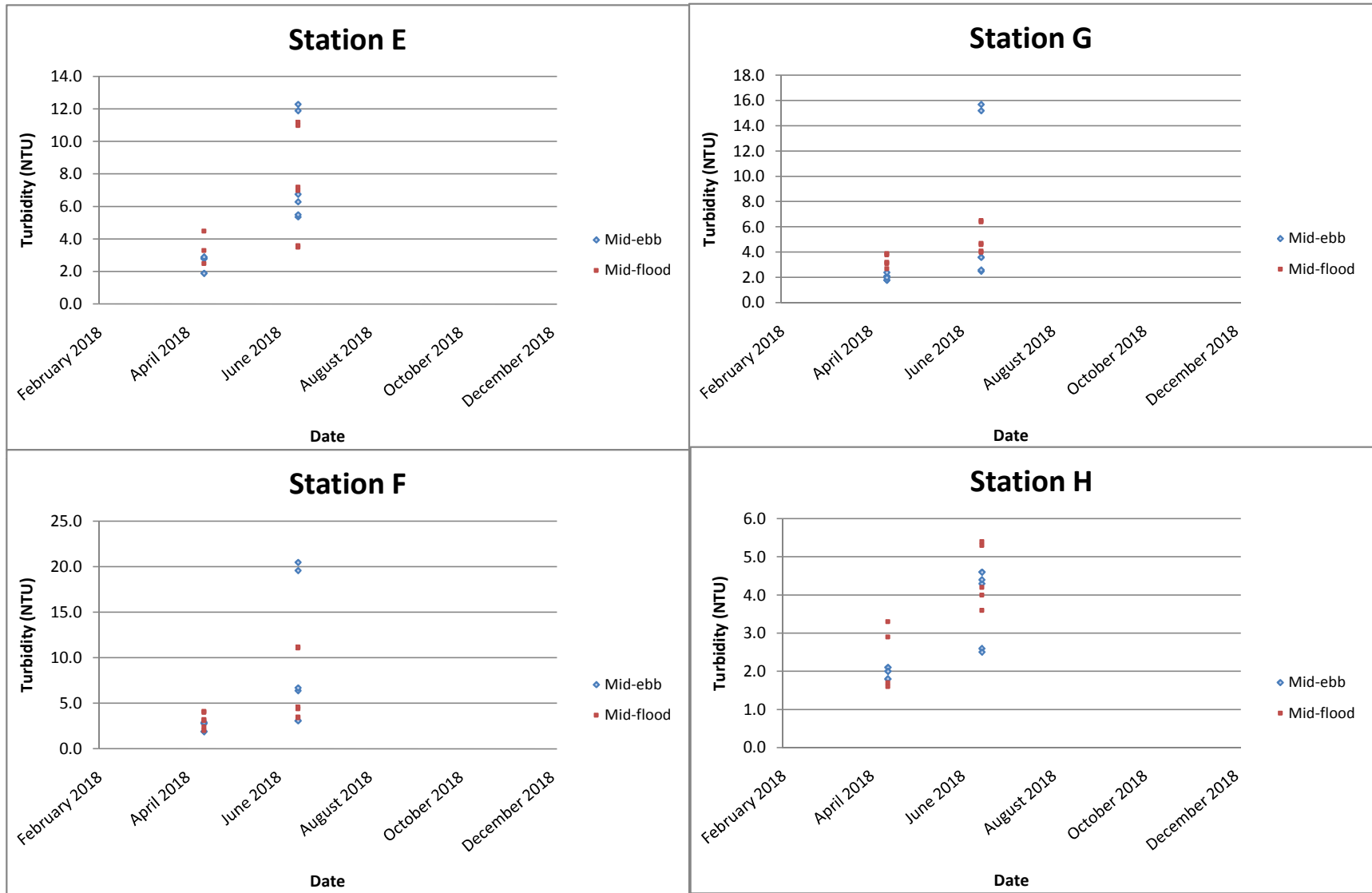
Dissolved oxygen (mg/L)



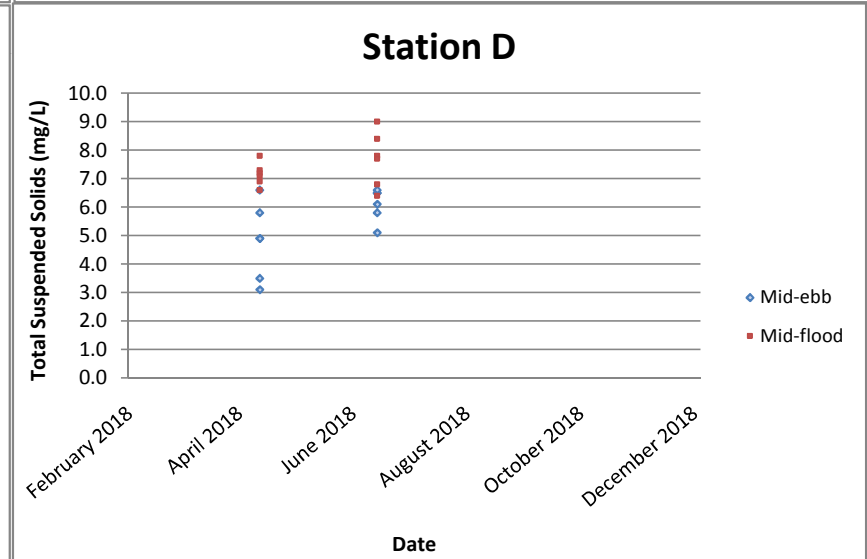
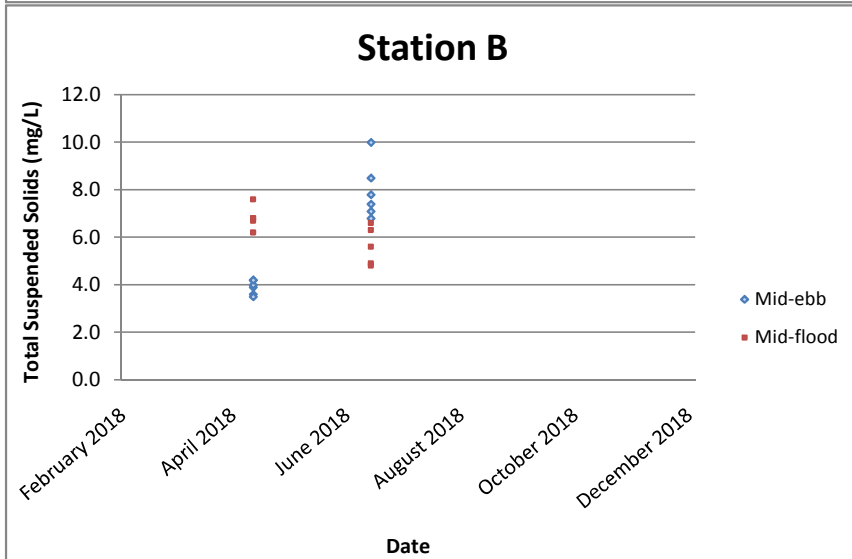
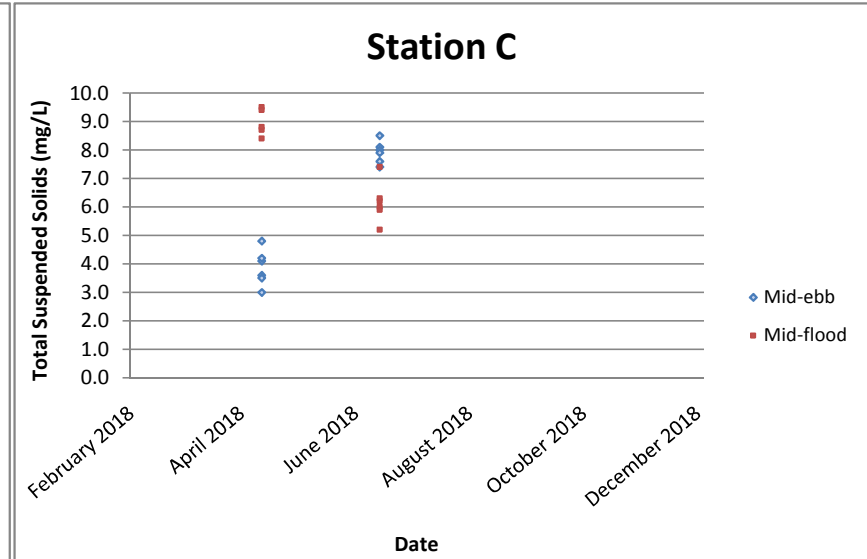
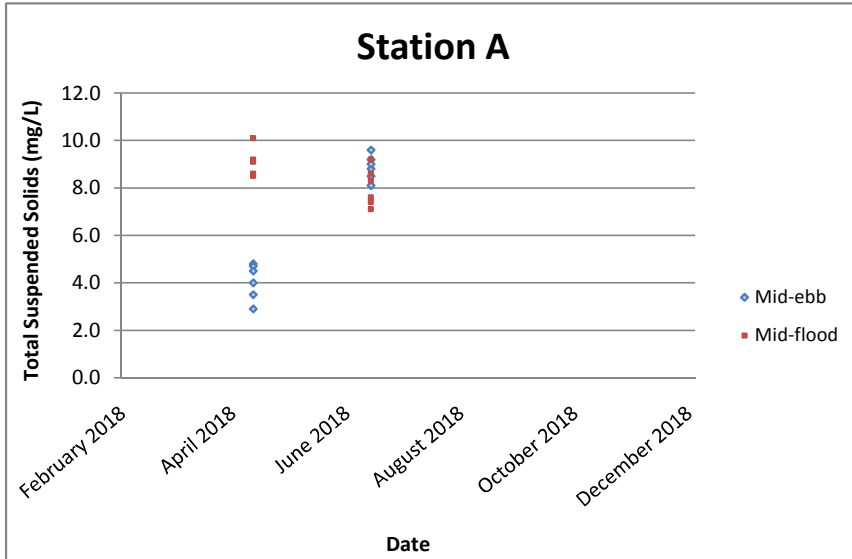
Turbidity (NTU)



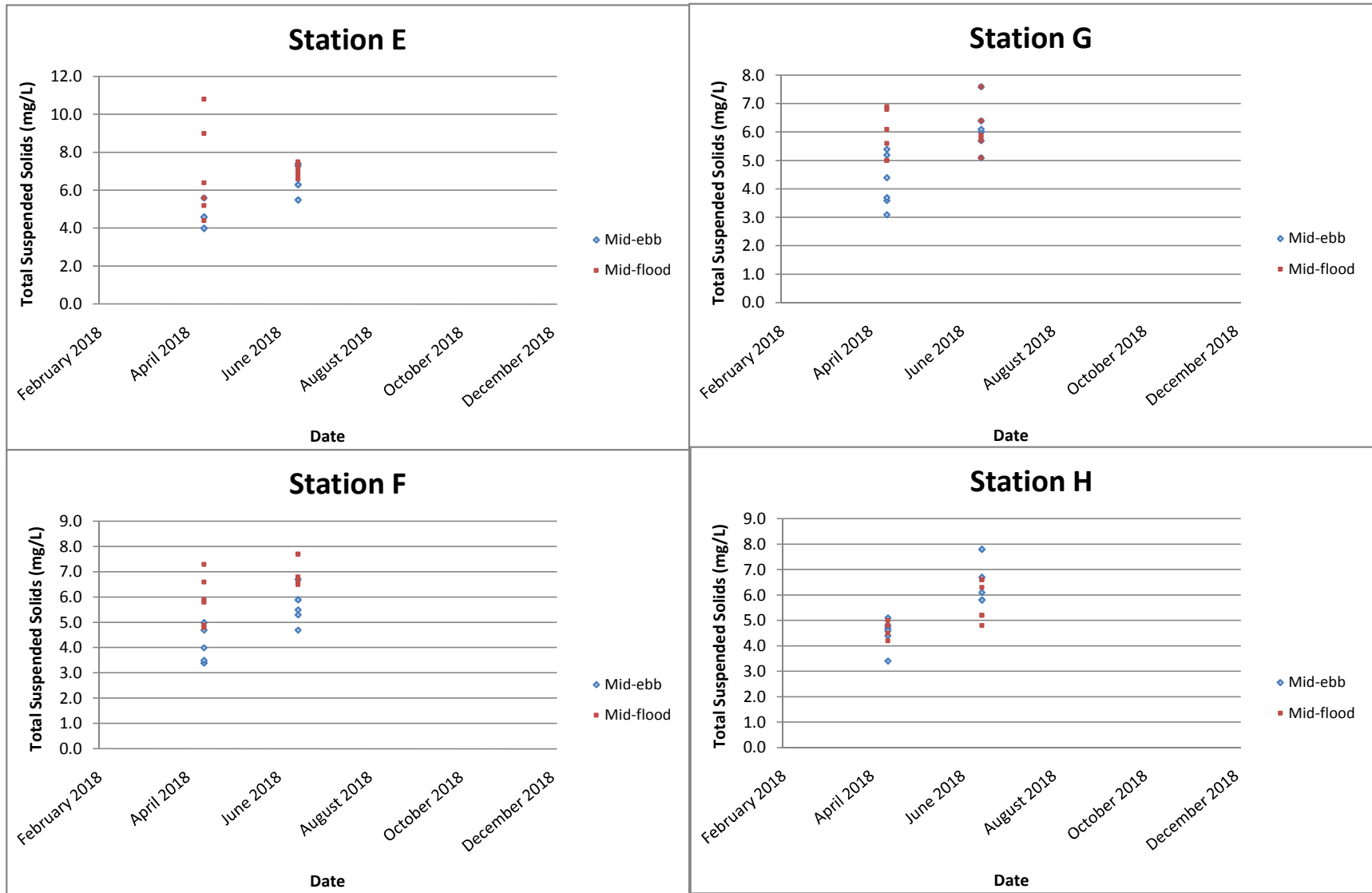
Turbidity (NTU)



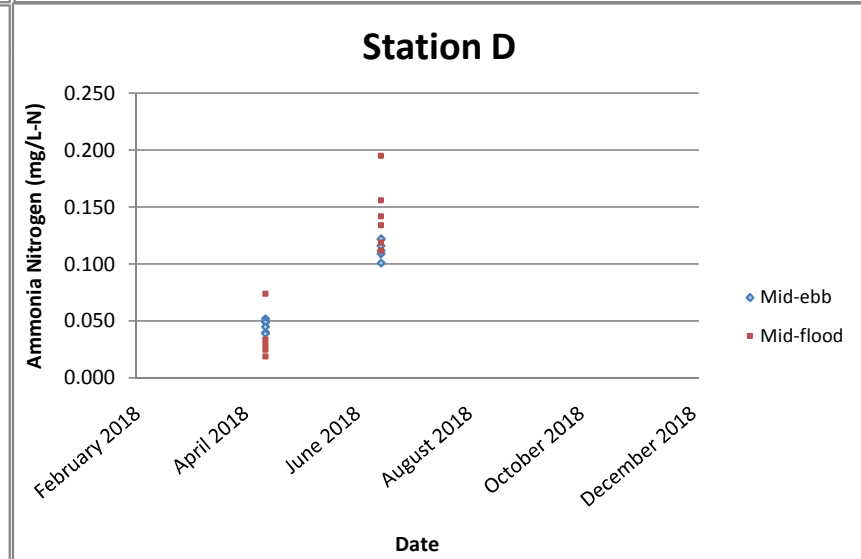
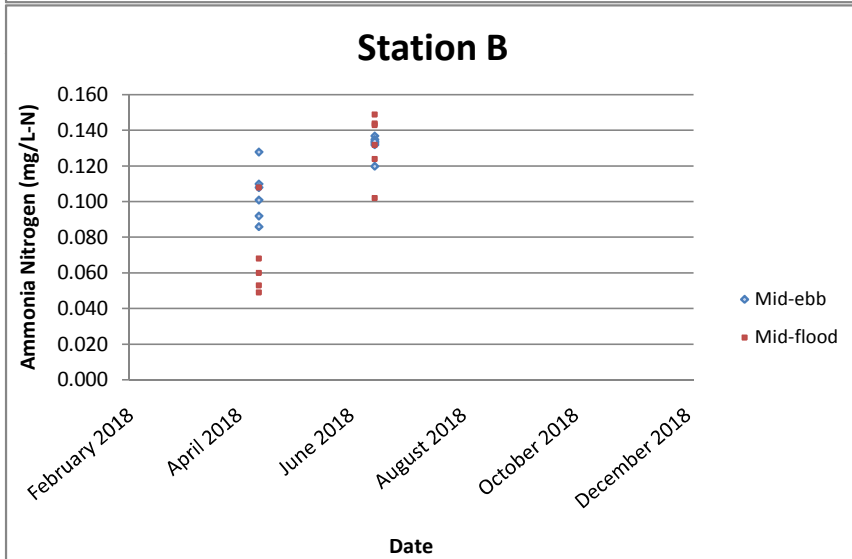
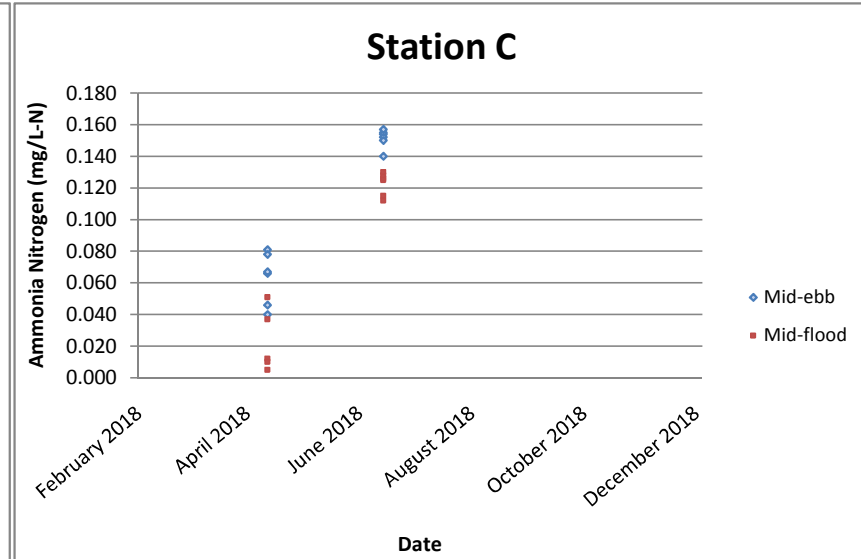
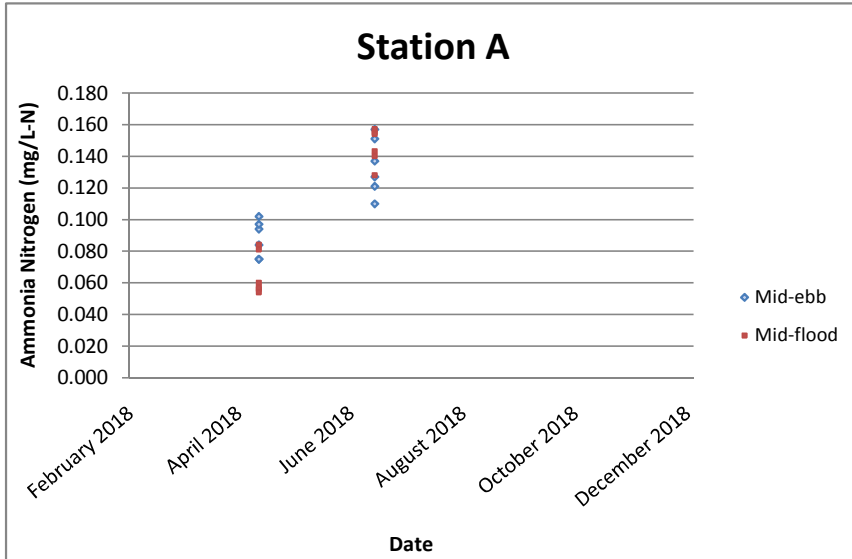
Total Suspended Solids (mg/L)



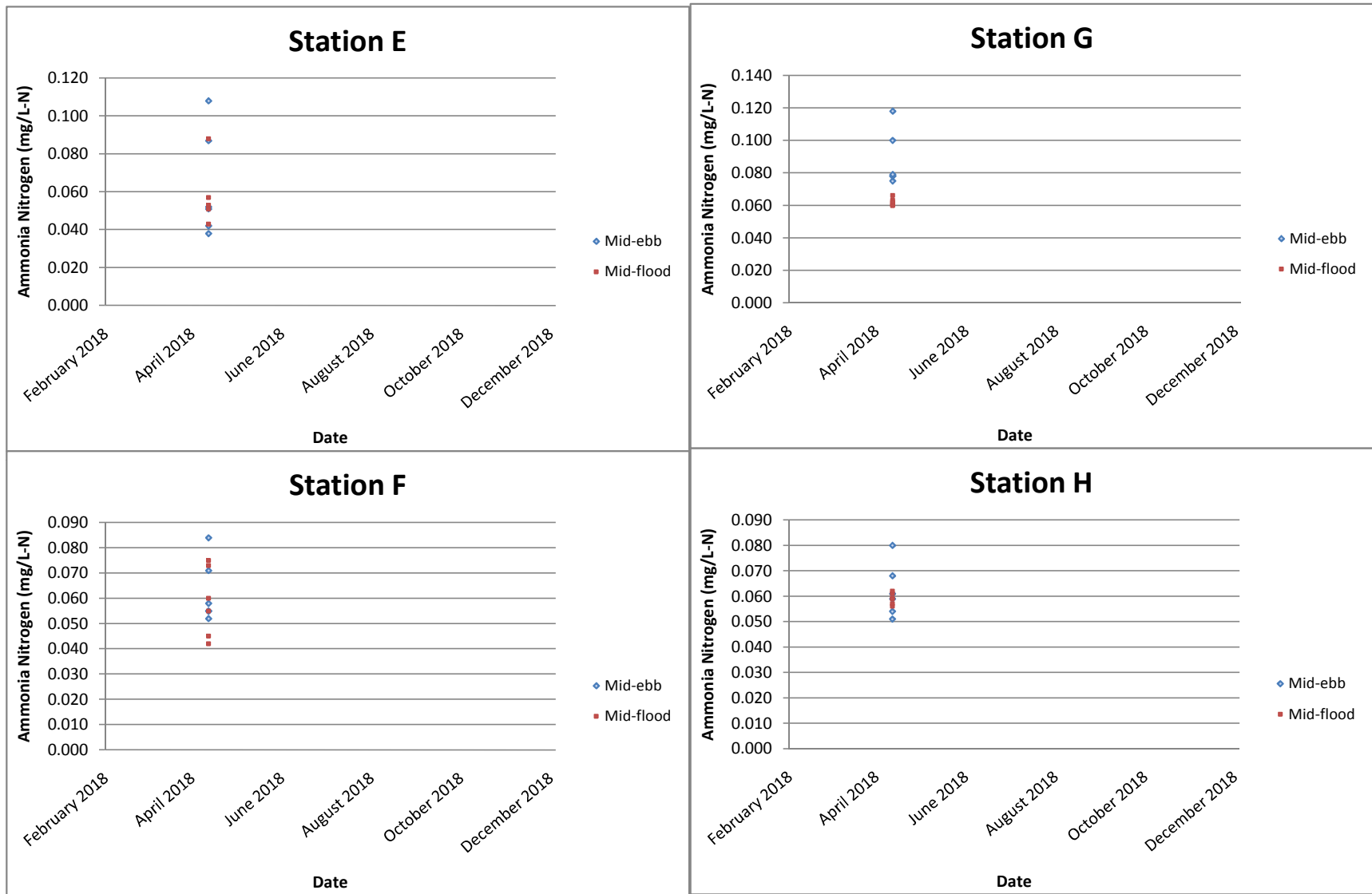
Total Suspended Solids (mg/L)



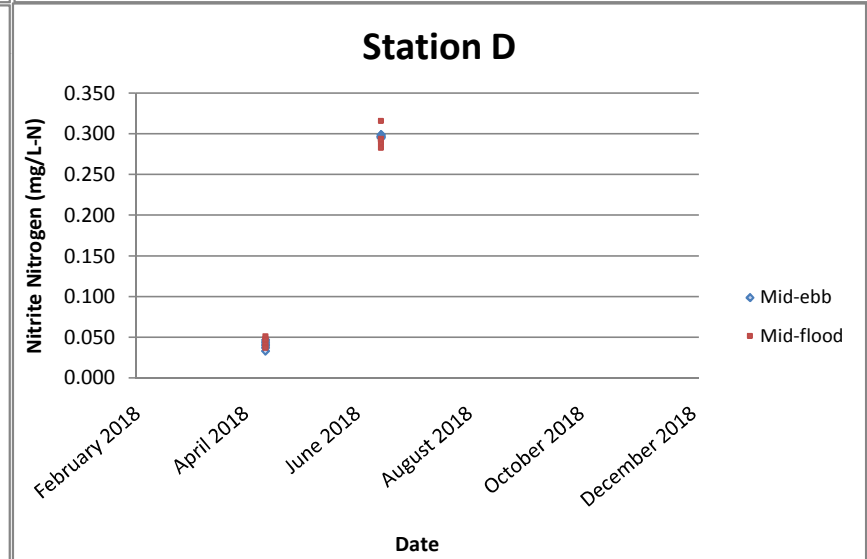
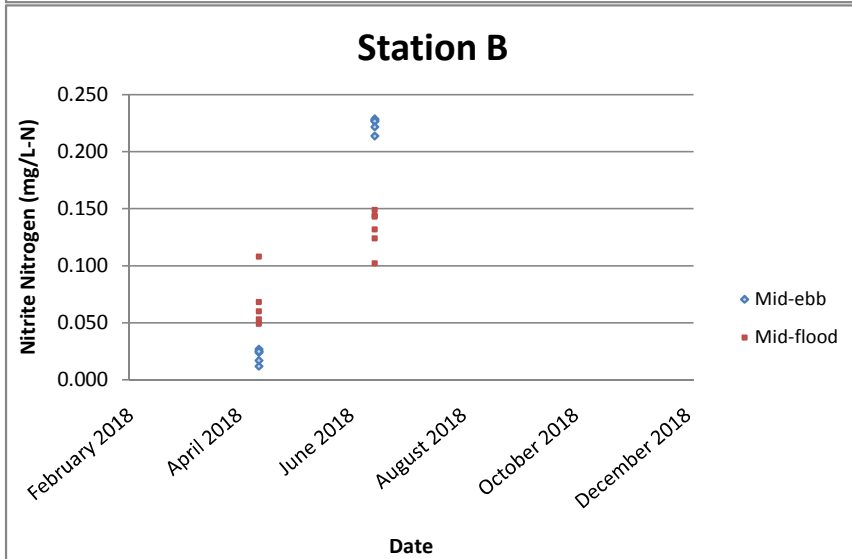
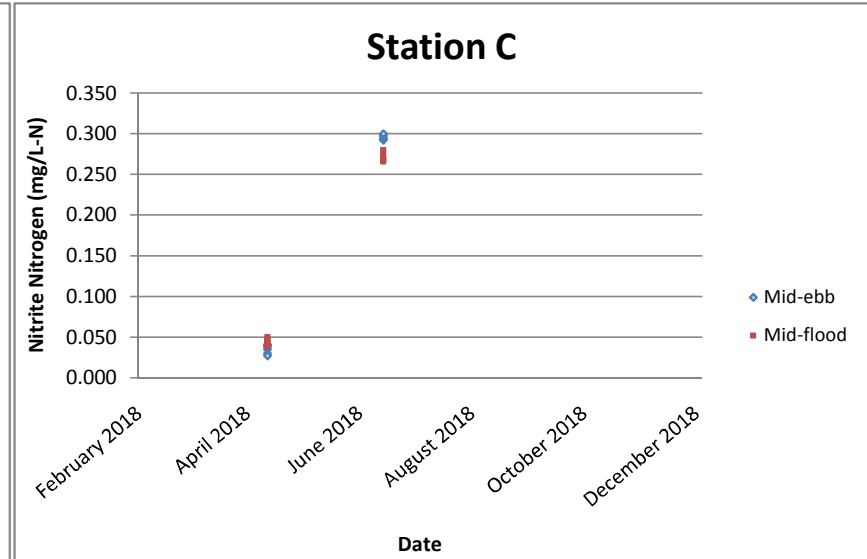
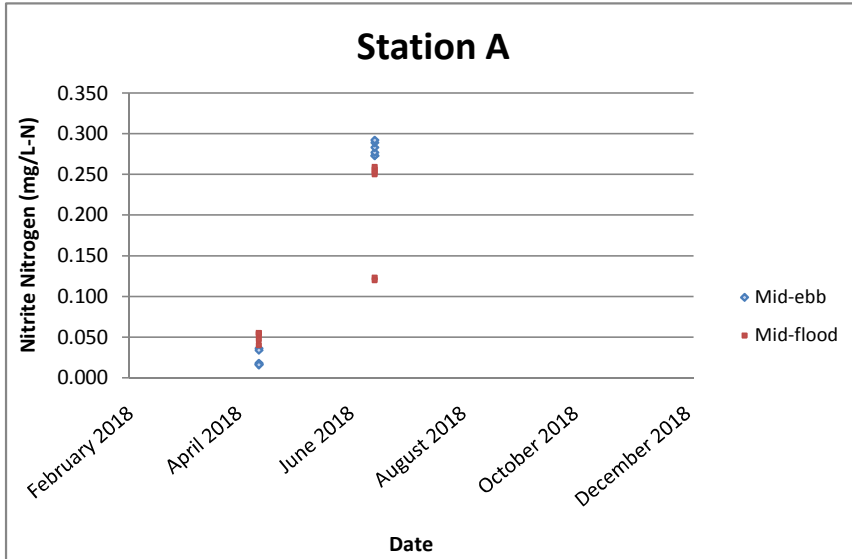
Ammonia Nitrogen (mg/L-N)



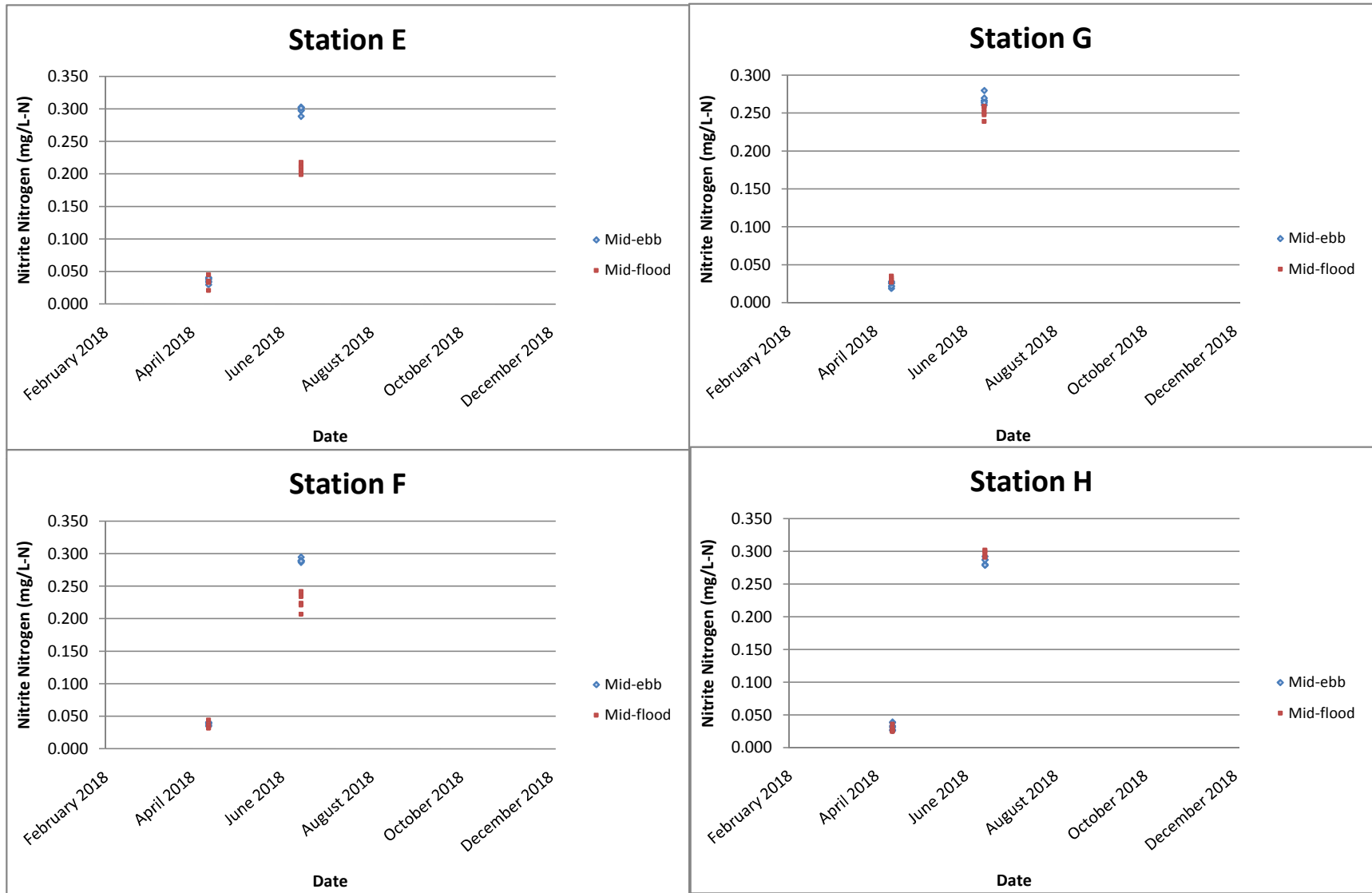
Ammonia Nitrogen (mg/L-N)



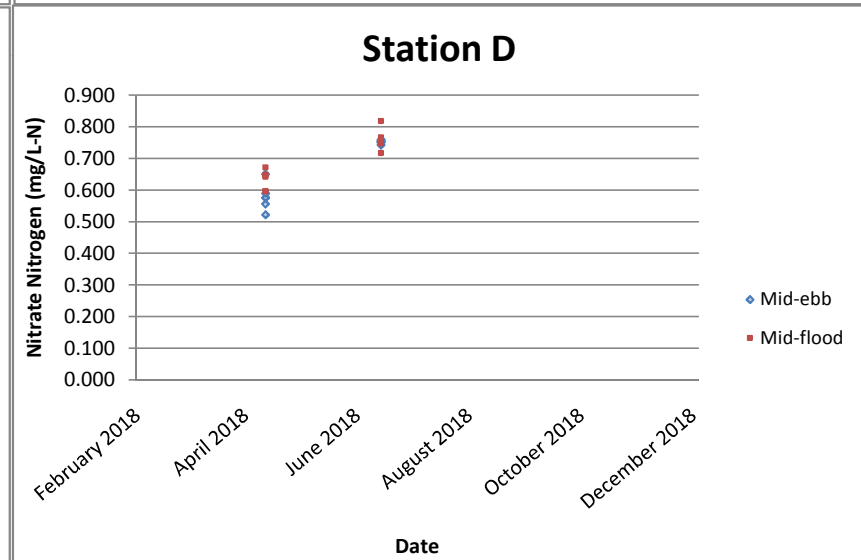
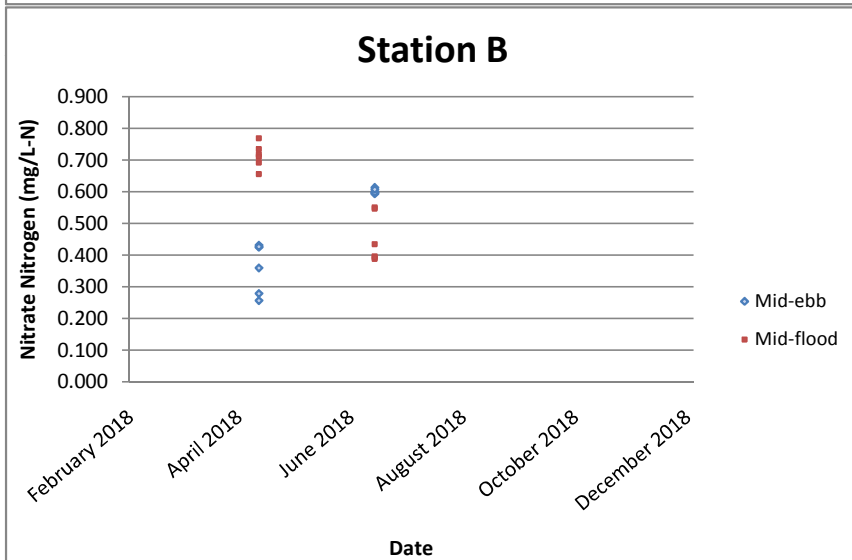
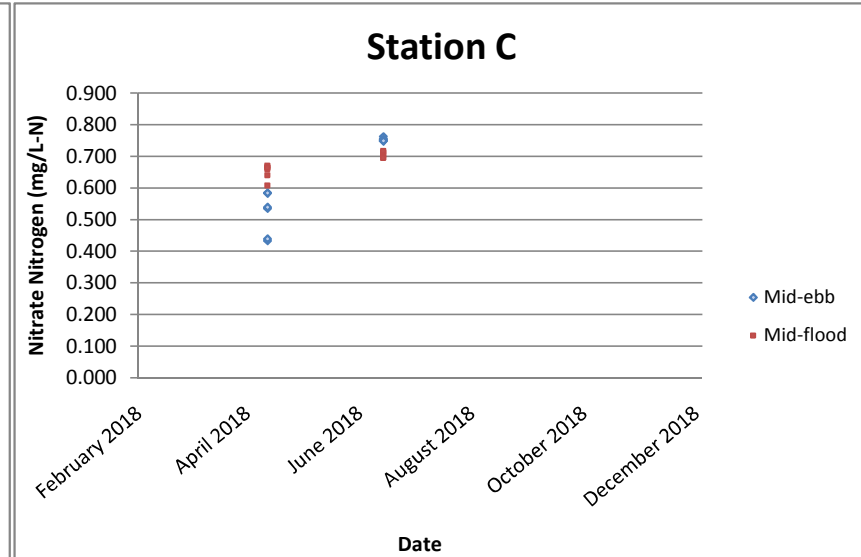
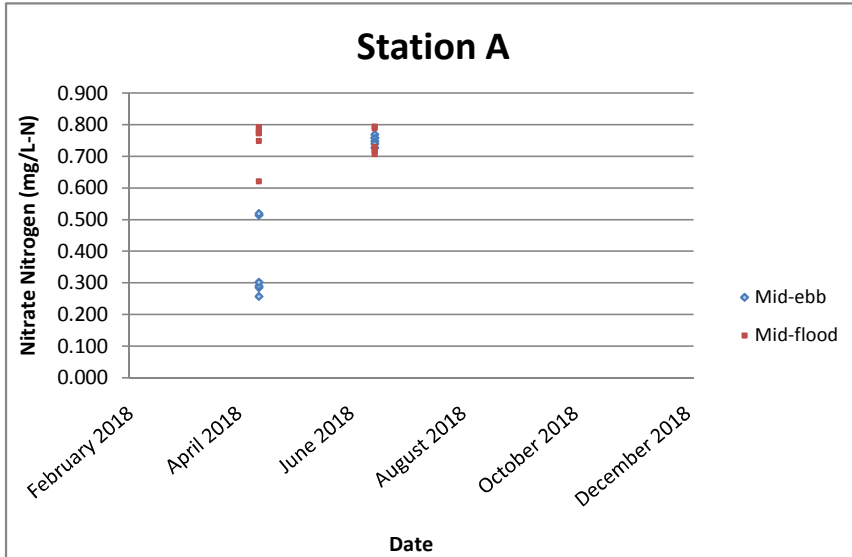
Nitrite Nitrogen (mg/L-N)



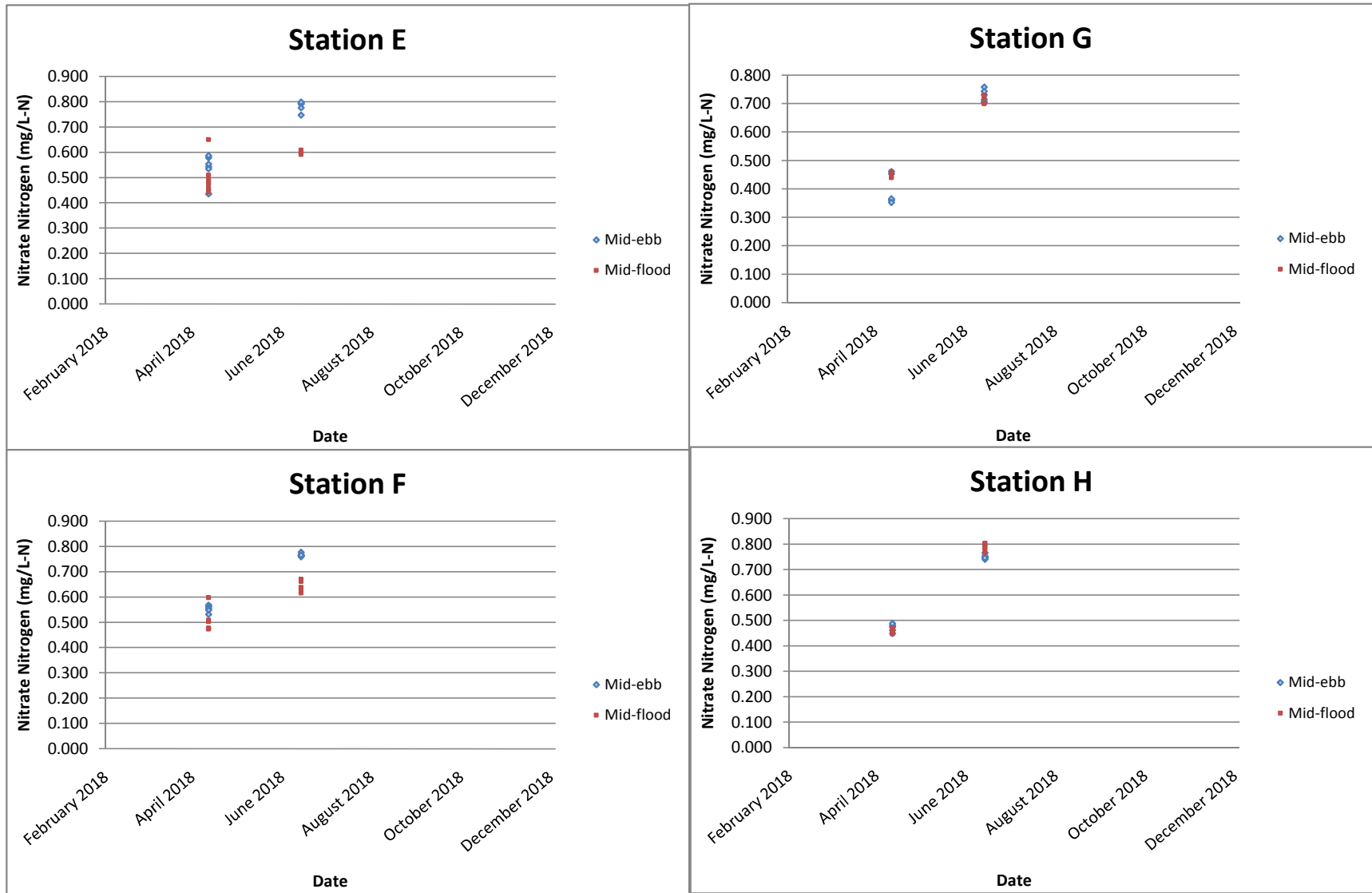
Nitrite Nitrogen (mg/L-N)



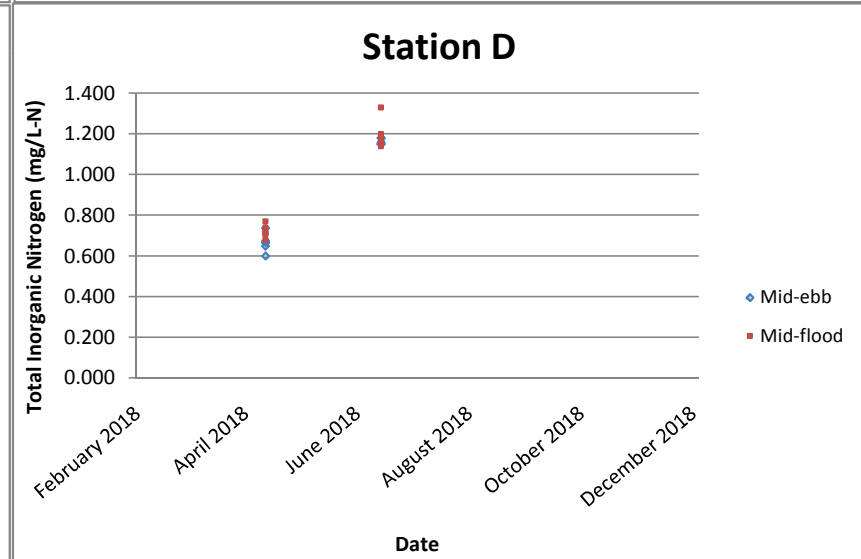
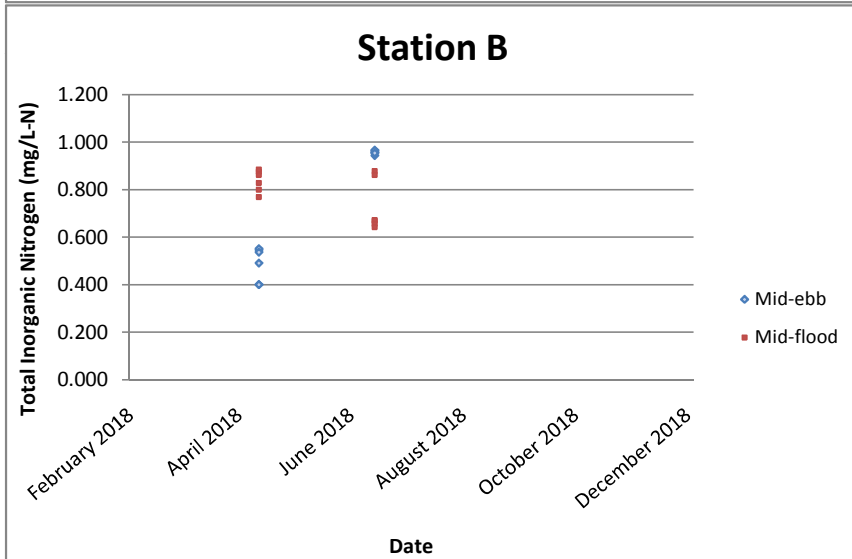
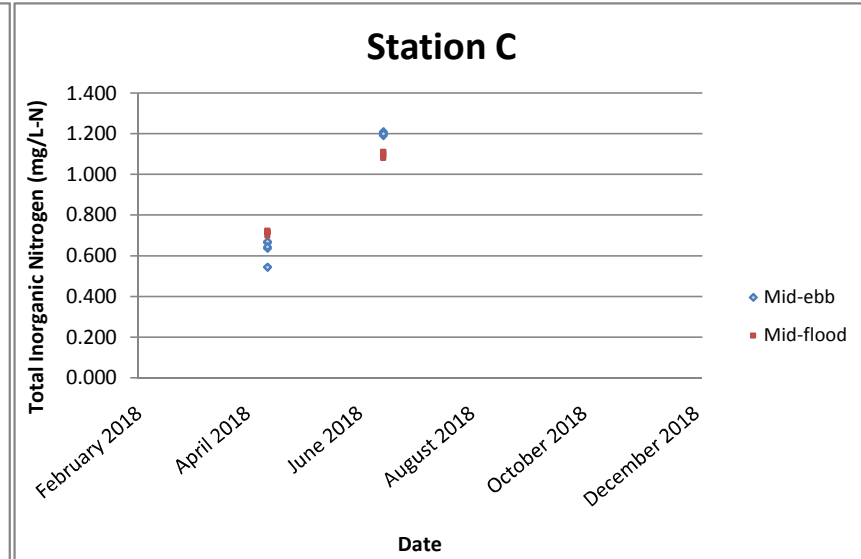
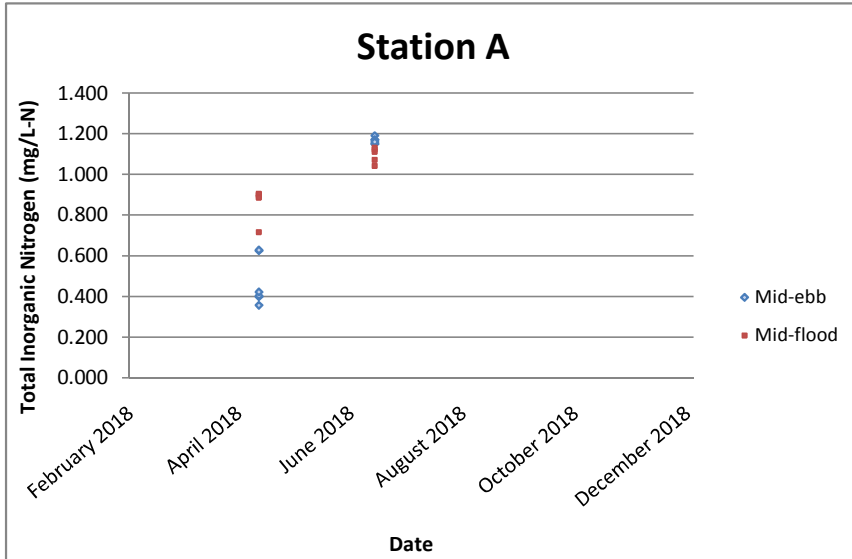
Nitrate Nitrogen (mg/L-N)



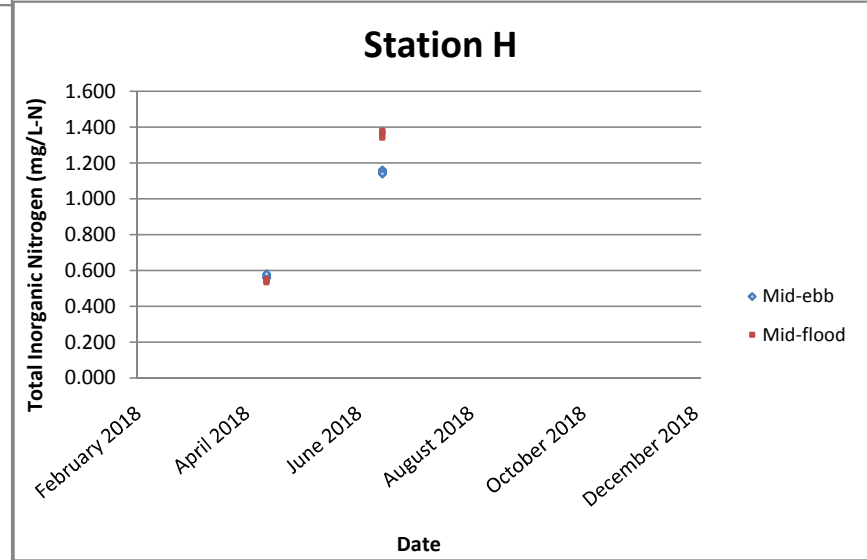
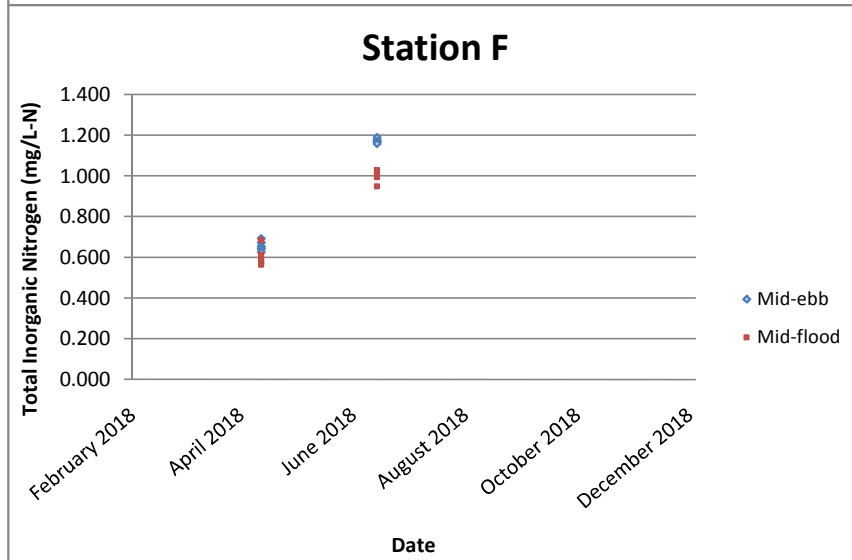
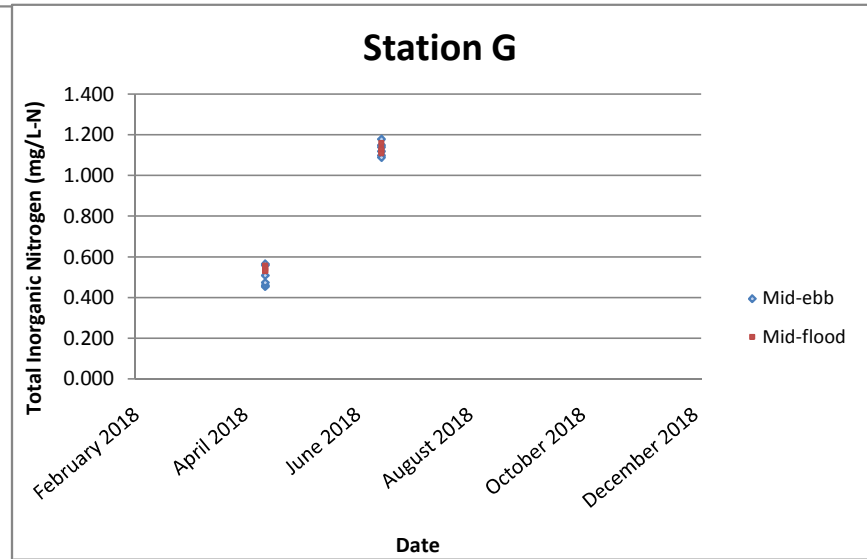
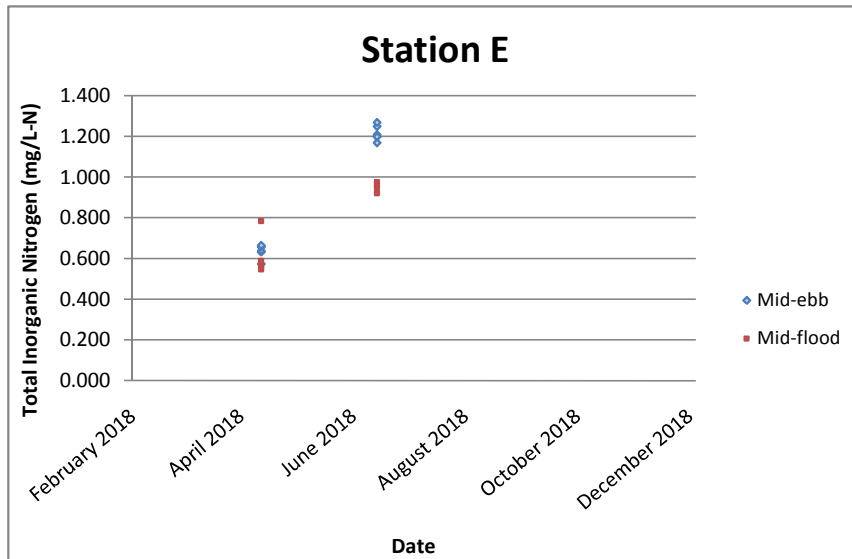
Nitrate Nitrogen (mg/L-N)



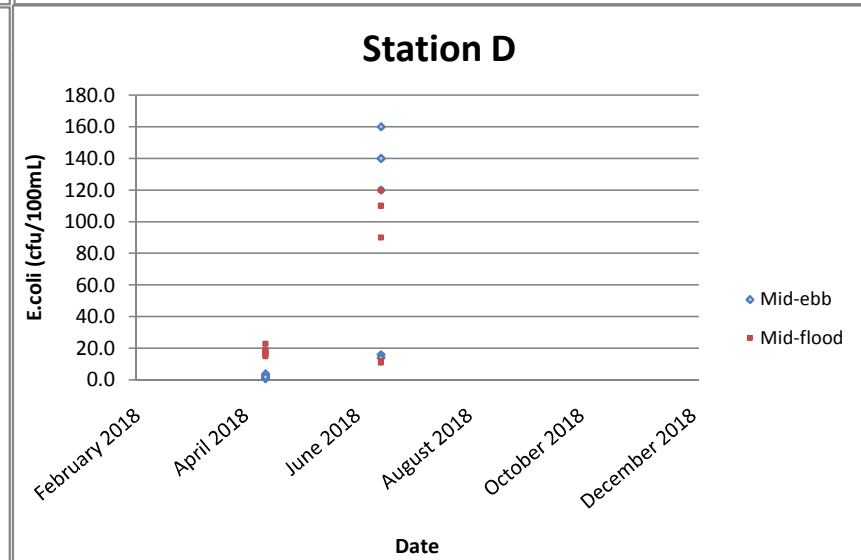
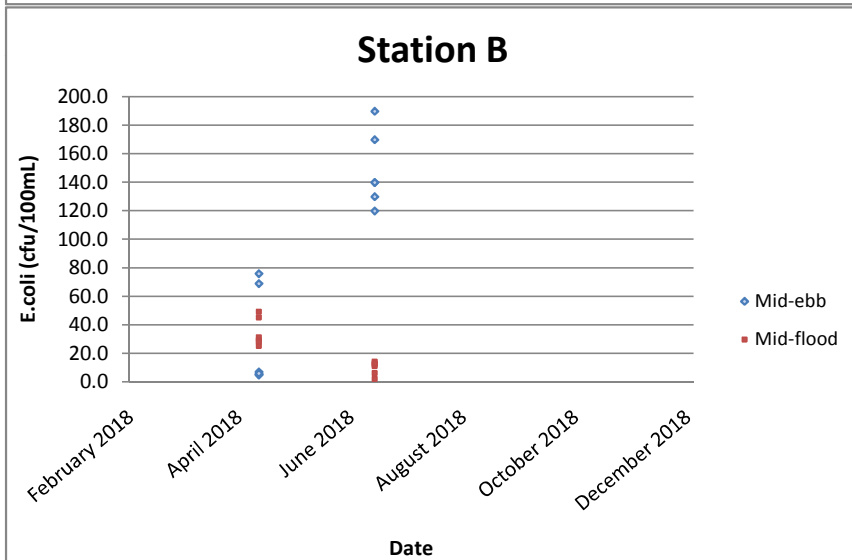
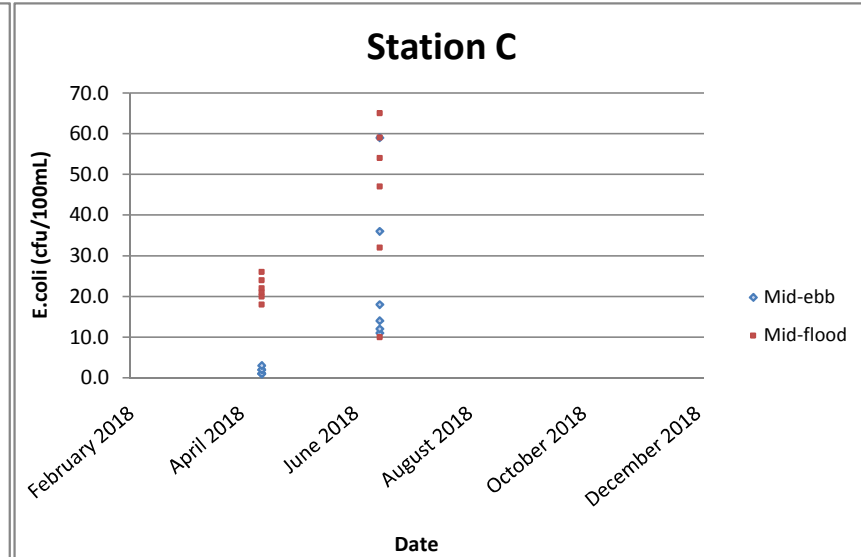
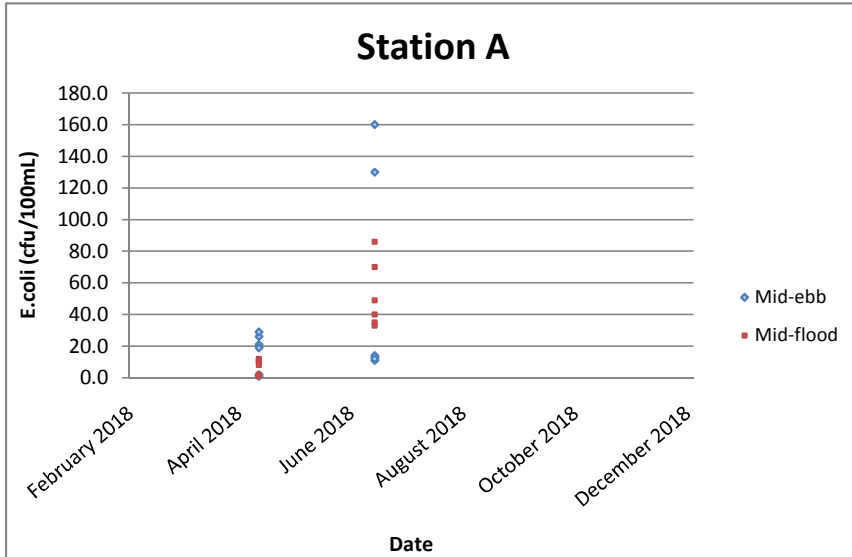
Total Inorganic Nitrogen (mg/L-N)



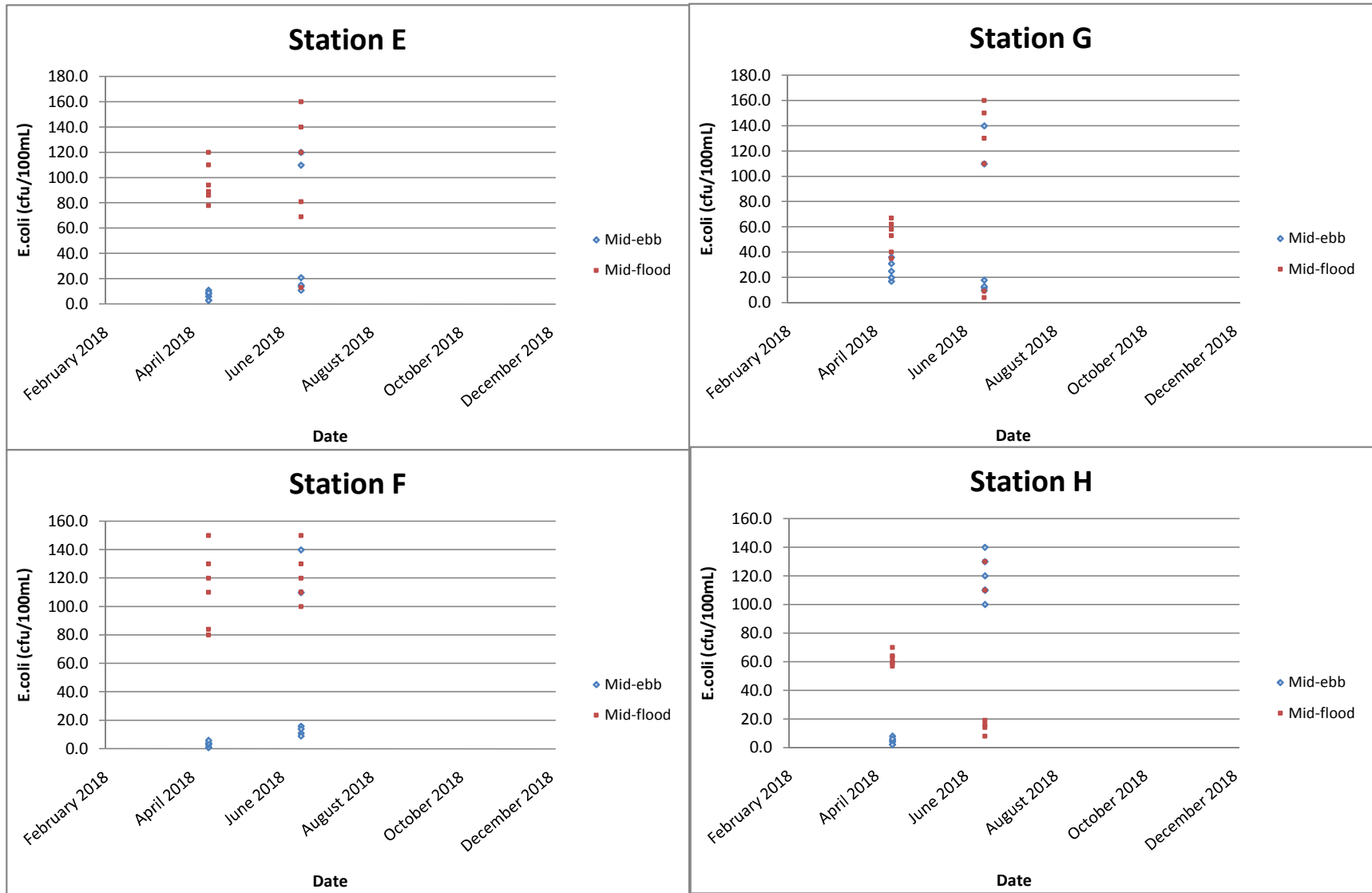
Total Inorganic Nitrogen (mg/L-N)



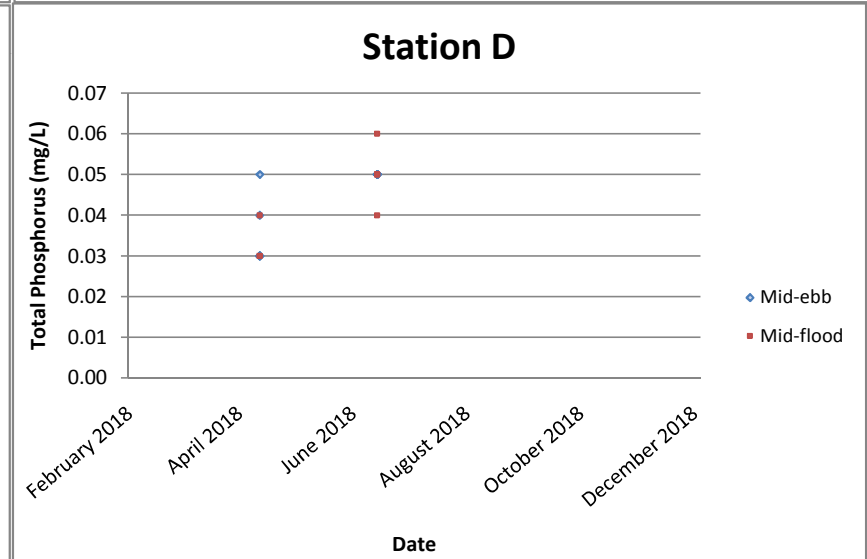
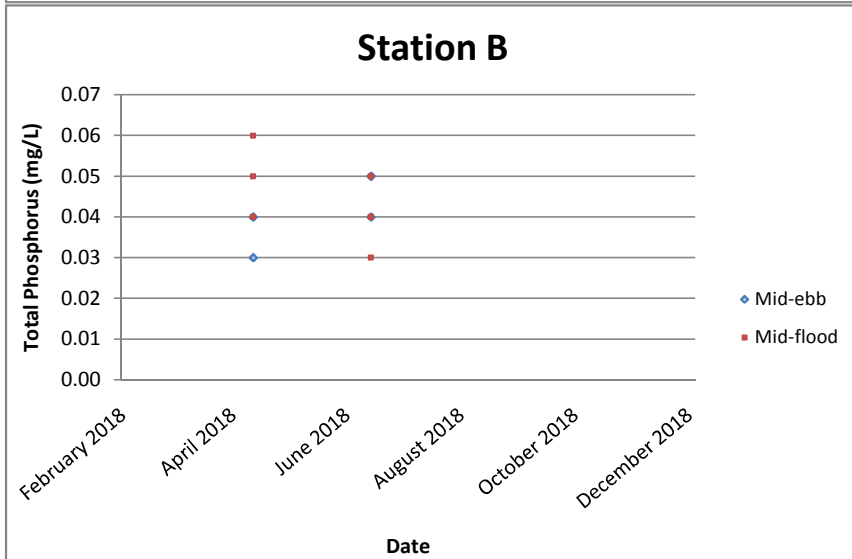
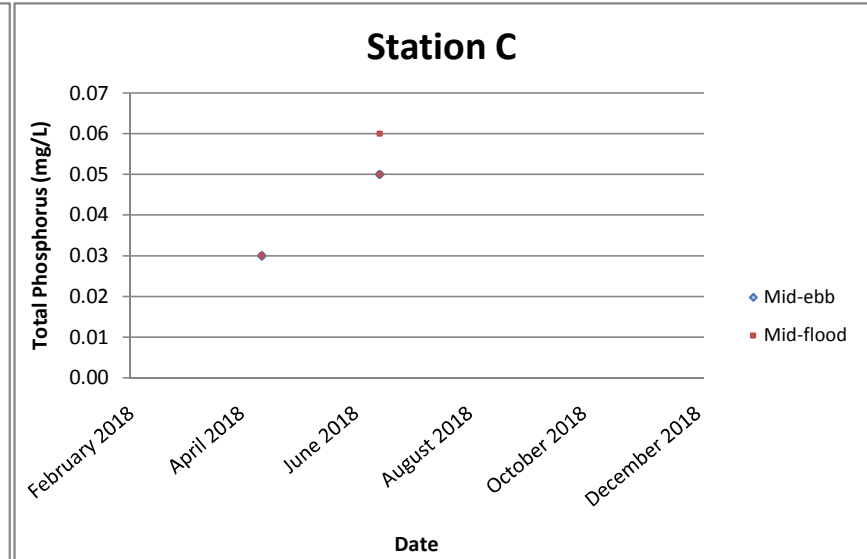
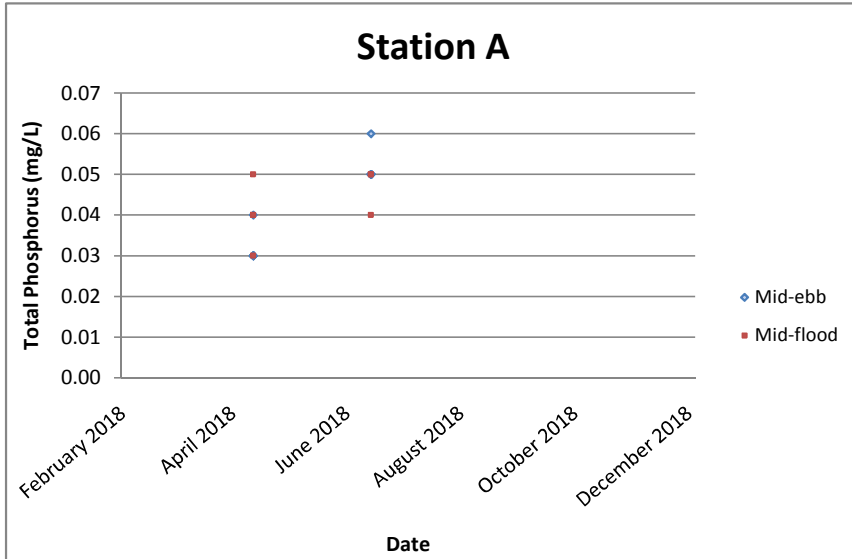
E.coli (cfu/100mL)



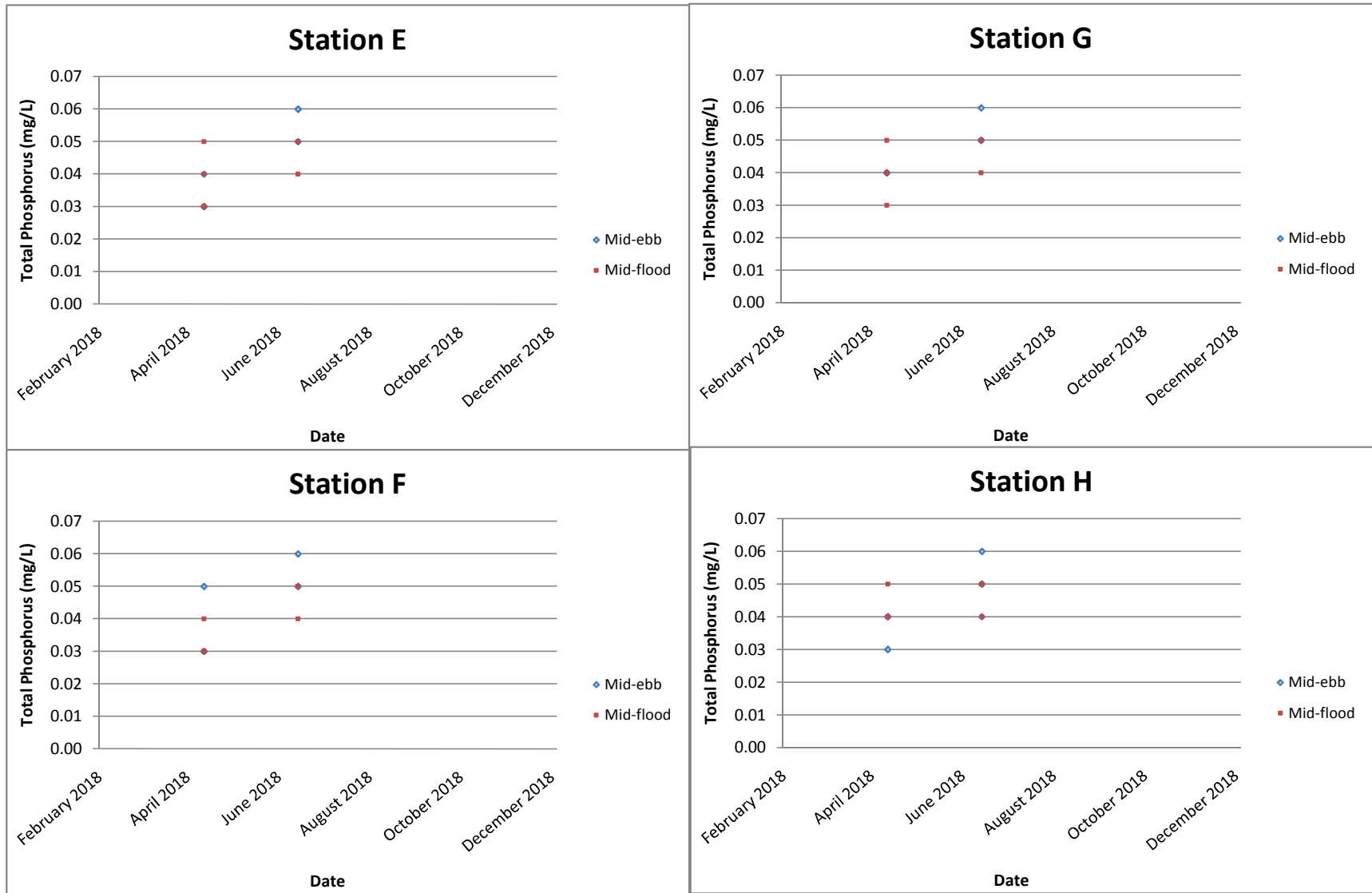
E.coli (cfu/100mL)



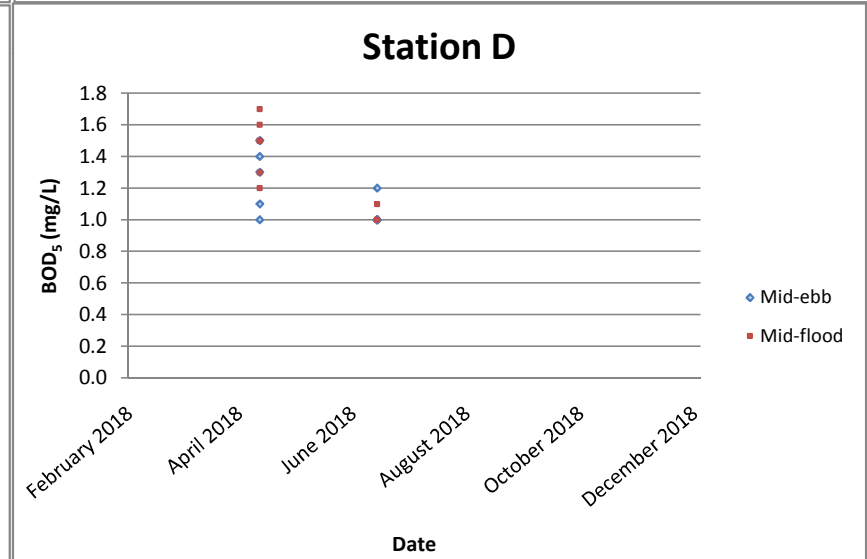
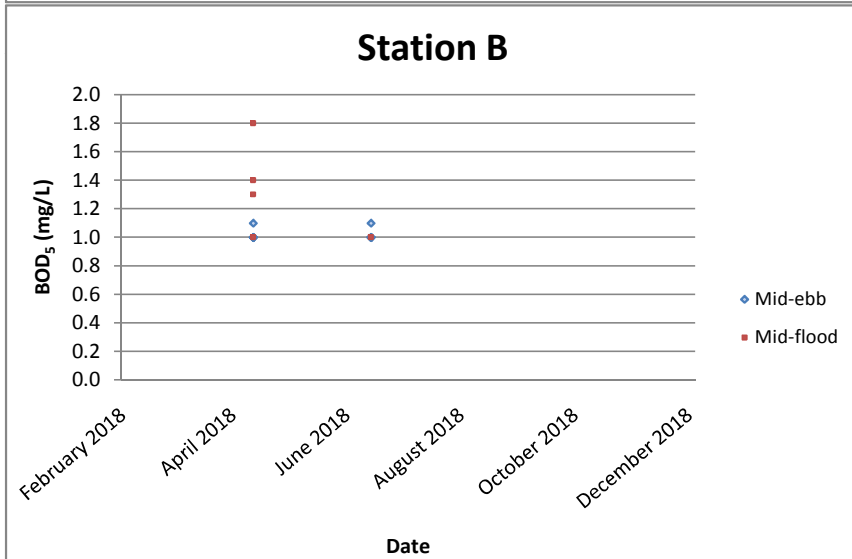
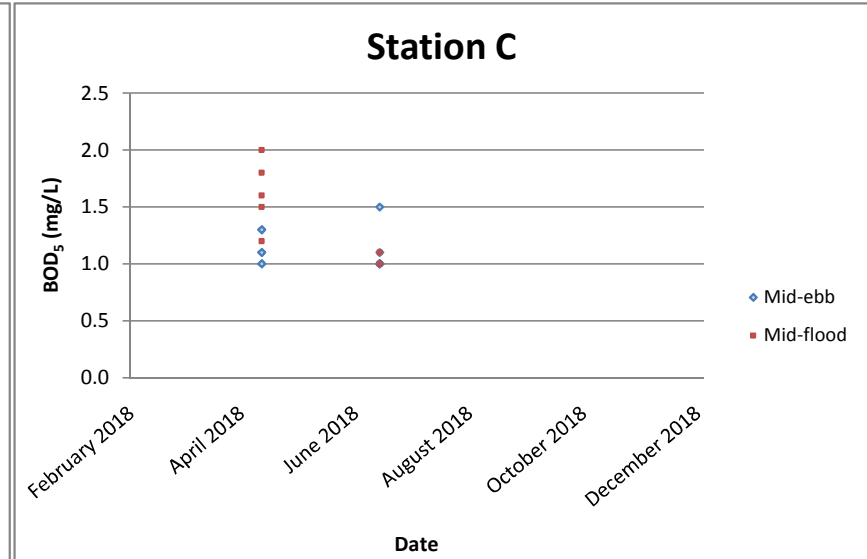
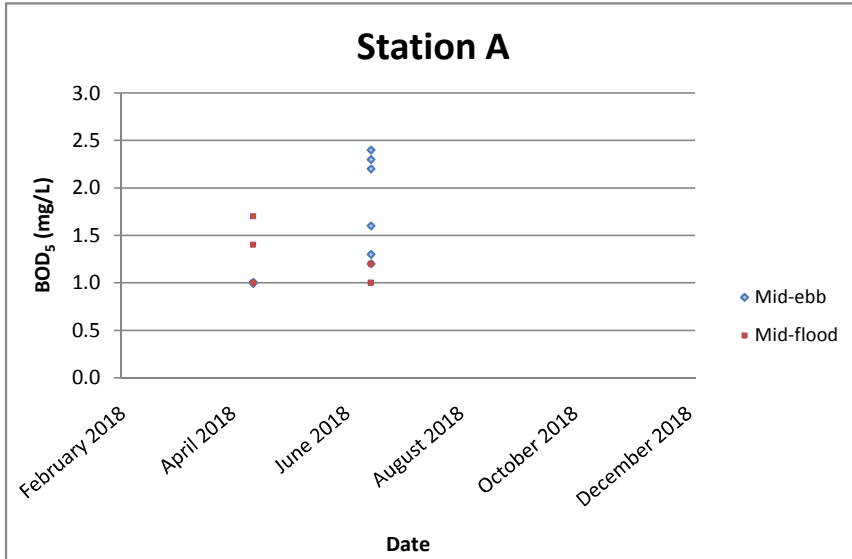
Total Phosphorus (soluble and particulate) (mg/L)



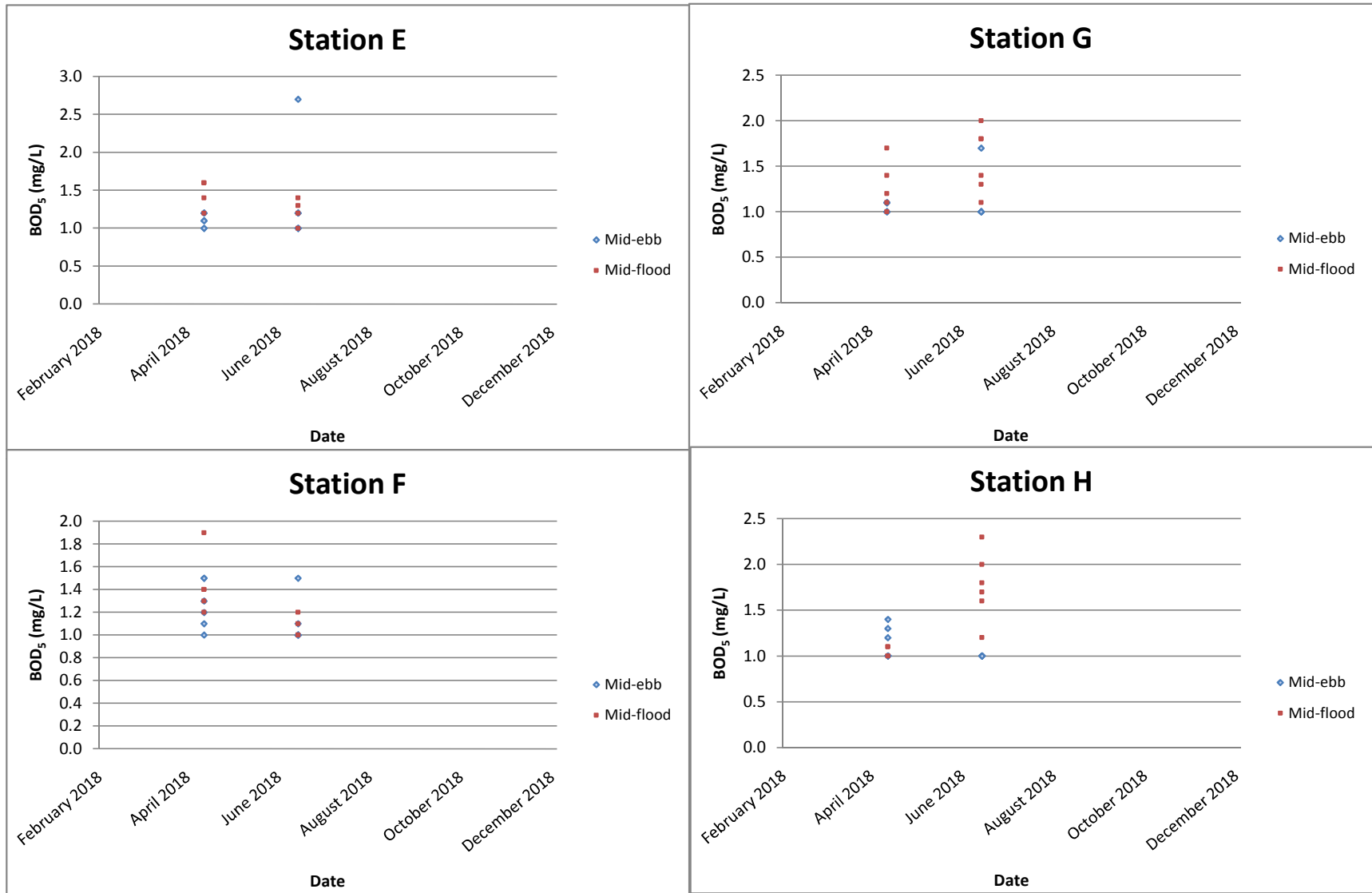
Total Phosphorus (soluble and particulate) (mg/L)



BOD₅ (mg/L)



BOD₅ (mg/L)



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Website : www.fugro.com



Report No.: 0041/17/ED/0330A

Appendix F

Predicted Tidal Data of Ma Wan Marine Traffic Station

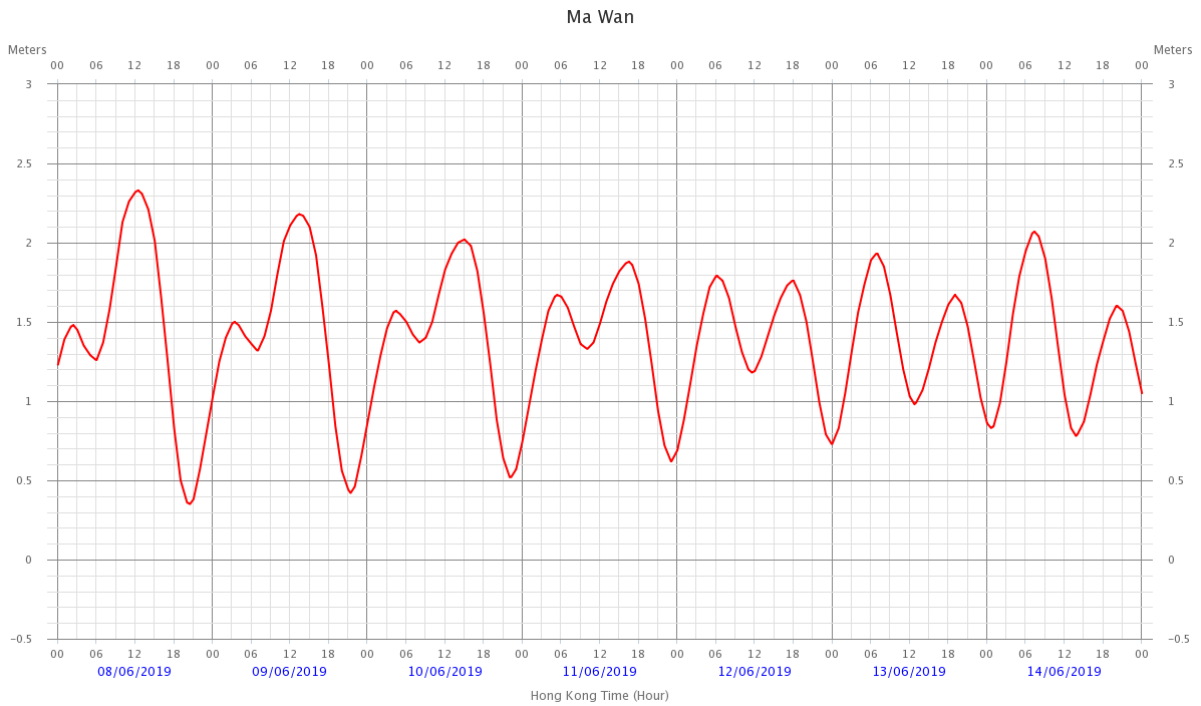
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Report No.: 0041/17/ED/0330A

Appendix G

Results and Graphical Presentation of Laboratory Analysis for Sediment Quality Monitoring and Benthic Survey

Monitoring Location	Date	Weather	Sea Condition	Time	Sediment Monitoring												
					pH	Ammonia as N (mg-N/kg)	Total Nitrogen (mg-N/kg)	Total Phosphorus (mg-P/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Arsenic (mg/kg)	Silver (mg/kg)
A	14/6/2018	Cloudy	Smooth	14:35	8.7	6.9	740	454	0.12	31.1	24.8	30.2	0.08	17.9	84.6	17.1	0.11
B	14/6/2018	Cloudy	Smooth	15:10	8.7	5.2	840	419	<0.10	42.2	38.4	39.1	0.13	24.3	112	14.9	0.34
C	14/6/2018	Cloudy	Smooth	15:35	8.7	8.9	1040	488	<0.10	50.9	43.2	46.4	0.14	31.2	139	14.3	0.24
D	14/6/2018	Cloudy	Smooth	15:45	8.6	8.4	1080	514	<0.10	48.6	39.9	44.6	0.12	29.2	130.0	13.5	0.23
E	14/6/2018	Cloudy	Smooth	16:10	8.6	6.9	1140	514	<0.10	49.3	44.8	44.0	0.12	29.6	133	12.8	0.30
F	14/6/2018	Cloudy	Smooth	16:23	8.8	2.6	620	408	<0.10	15.6	169.0	21.6	<0.05	10.6	53.1	9.9	<0.10
G	14/6/2018	Cloudy	Smooth	16:40	8.7	3.8	980	439	0.12	53.0	48.2	42.8	0.10	30.5	126	14.9	0.23
H	14/6/2018	Cloudy	Smooth	16:55	8.5	7.4	1350	567	<0.10	52.6	47.4	47.6	0.14	32.2	146	13.3	0.29

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distribution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	14/6/2018	Cloudy	Smooth	14:35	0.79	1	14	49	36
B	14/6/2018	Cloudy	Smooth	15:10	0.70	1	23	48	28
C	14/6/2018	Cloudy	Smooth	15:35	0.86	0	4	61	35
D	14/6/2018	Cloudy	Smooth	15:45	0.69	0	14	53	33
E	14/6/2018	Cloudy	Smooth	16:10	0.97	0	5	58	37
F	14/6/2018	Cloudy	Smooth	16:23	1.03	0	3	60	37
G	14/6/2018	Cloudy	Smooth	16:40	0.47	21	36	23	20
H	14/6/2018	Cloudy	Smooth	16:55	0.84	0	11	53	36



CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 13
Contact	: MR CYRUS LAI	Contact	: Richard Fung	Work Order	: HK1833586
Address	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: c.lai@fugro.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 3565 4374	Telephone	: +852 2610 1044		
Facsimile	: ---	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT	Date Samples Received	: 14-Jun-2018		
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 29-Jun-2018
C-O-C number	: ---			No. of samples received	: 24
Site	: ---			No. of samples analysed	: 24

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This document has been signed by those names that appear on this report and are the authorised signatories.

<i>Signatories</i>	<i>Position</i>	<i>Authorised results for</i>
Fung Lim Chee, Richard	General Manager	Inorganics
Fung Lim Chee, Richard	General Manager	Metals



General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 14-Jun-2018 to 28-Jun-2018.

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK1833586

Sample(s) were received in chilled condition.

Water sample(s) analysed and reported on as received basis.

Sediment sample(s) analysed on an as received basis. Result(s) reported on dry weight basis.

pH determined and reported on a 1:5 soil / water extract.

Water sample(s) digested by In-house method E-3005 prior to the determination of total metals. The In-house method is developed based on USEPA method 3005.

Soil sample(s) as received, digested by In-house method E-3051A prior to the determination of metals. The In-house method is developed based on USEPA method 3051A.

Particle Size Distribution was subcontracted to and analysed by Gammon Construction Limited.

Calibration range of pH value is 4.0 - 10.0. Results exceeding this range is for reference only.

pH value is reported as at 25°C.



Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

Client sampling date / time

				A/Sediment	B/Sediment	C/Sediment	D/Sediment	E/Sediment
				14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833586-001	HK1833586-002	HK1833586-003	HK1833586-004	HK1833586-005
EA/ED: Physical and Aggregate Properties								
EA002: pH Value	----	0.1	pH Unit	8.7	8.7	8.7	8.6	8.6
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	39.8	48.2	57.3	57.0	53.8
ED/EK: Inorganic Nonmetallic Parameters								
EK055: Ammonia as N	7664-41-7	0.5	mg/kg	6.9	5.2	8.9	8.4	6.9
EK062A: Total Nitrogen as N	----	10	mg/kg	740	840	1040	1080	1140
EK067A: Total Phosphorus as P	----	10	mg/kg	454	419	488	514	514
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	0.5	mg/kg	17.1	14.9	14.3	13.5	12.8
EG020: Cadmium	7440-43-9	0.10	mg/kg	0.12	<0.10	<0.10	<0.10	<0.10
EG020: Chromium	7440-47-3	0.5	mg/kg	31.1	42.2	50.9	48.6	49.3
EG020: Copper	7440-50-8	0.20	mg/kg	24.8	38.4	43.2	39.9	44.8
EG020: Lead	7439-92-1	0.20	mg/kg	30.2	39.1	46.4	44.6	44.0
EG020: Mercury	7439-97-6	0.05	mg/kg	0.08	0.13	0.14	0.12	0.12
EG020: Nickel	7440-02-0	0.20	mg/kg	17.9	24.3	31.2	29.2	29.6
EG020: Silver	7440-22-4	0.10	mg/kg	0.11	0.34	0.24	0.23	0.30
EG020: Zinc	7440-66-6	0.5	mg/kg	84.6	112	139	130	133



Sub-Matrix: SEDIMENT				Client sample ID	F/Sediment	G/Sediment	H/Sediment	A/Benthic Survey	B/Benthic Survey
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit	HK1833586-006	HK1833586-007	HK1833586-008	HK1833586-009	HK1833586-010	
EA/ED: Physical and Aggregate Properties									
EA002: pH Value	----	0.1	pH Unit	8.8	8.7	8.5	---	---	
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	34.3	58.1	57.0	52.7	50.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055: Ammonia as N	7664-41-7	0.5	mg/kg	2.6	3.8	7.4	---	---	
EK062A: Total Nitrogen as N	----	10	mg/kg	620	980	1350	---	---	
EK067A: Total Phosphorus as P	----	10	mg/kg	408	439	567	---	---	
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg	9.9	14.9	13.3	---	---	
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	0.12	<0.10	---	---	
EG020: Chromium	7440-47-3	0.5	mg/kg	15.6	53.0	52.6	---	---	
EG020: Copper	7440-50-8	0.20	mg/kg	169	48.2	47.4	---	---	
EG020: Lead	7439-92-1	0.20	mg/kg	21.6	42.8	47.6	---	---	
EG020: Mercury	7439-97-6	0.05	mg/kg	<0.05	0.10	0.14	---	---	
EG020: Nickel	7440-02-0	0.20	mg/kg	10.6	30.5	32.2	---	---	
EG020: Silver	7440-22-4	0.10	mg/kg	<0.10	0.23	0.29	---	---	
EG020: Zinc	7440-66-6	0.5	mg/kg	53.1	126	146	---	---	
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%	---	---	---	0.79	0.70	



Sub-Matrix: SEDIMENT				Client sample ID	C/Benthic Survey	D/Benthic Survey	E/Benthic Survey	F/Benthic Survey	G/Benthic Survey
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018	14-Jun-2018
Compound	CAS Number	LOR	Unit		HK1833586-011	HK1833586-012	HK1833586-013	HK1833586-014	HK1833586-015
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		58.8	53.4	58.1	62.0	43.5
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%		0.86	0.69	0.97	1.03	0.47



Sub-Matrix: SEDIMENT				Client sample ID	H/Benthic Survey	---	---	---	---
				Client sampling date / time	14-Jun-2018	---	---	---	---
Compound	CAS Number	LOR	Unit	HK1833586-016	---	---	---	---	---
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	---	0.1	%	56.5	---	---	---	---	---
EP: Aggregate Organics									
EP005: Total Organic Carbon	---	0.05	%	0.84	---	---	---	---	---



Sub-Matrix: WATER				Client sample ID	F/Rinsate Blank	G/Rinsate Blank	H/Rinsate Blank	---	---
				Client sampling date / time	14-Jun-2018	14-Jun-2018	14-Jun-2018	----	----
Compound	CAS Number	LOR	Unit	HK1833586-022	HK1833586-023	HK1833586-024	-----	-----	
EG: Metals and Major Cations - Total									
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	---	---	
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	---	---	
EG020: Chromium	7440-47-3	1	µg/L	3	<1	1	---	---	
EG020: Copper	7440-50-8	1	µg/L	4	1	2	---	---	
EG020: Lead	7439-92-1	1	µg/L	2	<1	<1	---	---	
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	<0.5	---	---	
EG020: Nickel	7440-02-0	1	µg/L	4	3	3	---	---	
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	---	---	
EG020: Zinc	7440-66-6	10	µg/L	10	<10	<10	---	---	



Laboratory Duplicate (DUP) Report

Matrix: SOIL				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1736998)								
HK1833586-001	A/Sediment	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	39.8	39.5	0.848
HK1833586-011	C/Benthic Survey	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	58.8	58.9	0.198
EA/ED: Physical and Aggregate Properties (QC Lot: 1737030)								
HK1833586-001	A/Sediment	EA002: pH Value	----	0.1	pH Unit	8.7	8.7	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1736379)								
HK1833586-001	A/Sediment	EK055: Ammonia as N	7664-41-7	1	mg/kg	6.9	8	17.9
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1740921)								
HK1833586-001	A/Sediment	EK067A: Total Phosphorus as P	----	20	mg/kg	454	427	6.04
EG: Metals and Major Cations (QC Lot: 1736348)								
HK1833586-002	B/Sediment	EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.10	<0.10	0.00
		EG020: Mercury	7439-97-6	0.02	mg/kg	0.13	0.13	0.00
		EG020: Copper	7440-50-8	0.05	mg/kg	38.4	39.4	2.51
		EG020: Lead	7439-92-1	0.05	mg/kg	39.1	39.4	0.831
		EG020: Nickel	7440-02-0	0.05	mg/kg	24.3	24.5	0.939
		EG020: Silver	7440-22-4	0.05	mg/kg	0.34	0.34	0.00
		EG020: Arsenic	7440-38-2	0.5	mg/kg	14.9	15.4	3.18
		EG020: Chromium	7440-47-3	0.5	mg/kg	42.2	42.1	0.268
EG020: Zinc	7440-66-6	0.5	mg/kg	112	113	1.27		
EP: Aggregate Organics (QC Lot: 1730395)								
HK1832335-003	Anonymous	EP005: Total Organic Carbon	----	0.05	%	<0.05	<0.05	0.00
HK1833685-002	Anonymous	EP005: Total Organic Carbon	----	0.05	%	1.03	1.04	1.44
EP: Aggregate Organics (QC Lot: 1744693)								
HK1833586-010	B/Benthic Survey	EP005: Total Organic Carbon	----	0.05	%	0.70	0.74	4.99

Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1736391)								
HK1833586-018	B/Rinsate Blank	EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	0.00
		EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	0.00
		EG020: Chromium	7440-47-3	1	µg/L	2	2	0.00



Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1736391) - Continued								
HK1833586-018	B/Rinsate Blank	EG020: Copper	7440-50-8	1	µg/L	3	3	0.00
		EG020: Lead	7439-92-1	1	µg/L	1	1	0.00
		EG020: Nickel	7440-02-0	1	µg/L	3	3	0.00
		EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.00
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.00
		EG020: Zinc	7440-66-6	10	µg/L	<10	10	0.00

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: SOIL		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1736379)											
EK055: Ammonia as N	7664-41-7	1	mg/kg	<1	5 mg/kg	104	----	85	119	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1740921)											
EK067A: Total Phosphorus as P	----	20	mg/kg	<20	695 mg/kg	89.8	----	85	115	----	----
EG: Metals and Major Cations (QC Lot: 1736348)											
EG020: Arsenic	7440-38-2	0.5	mg/kg	<0.5	5 mg/kg	96.0	----	85	115	----	----
EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.01	5 mg/kg	94.8	----	85	115	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	<0.5	5 mg/kg	103	----	85	115	----	----
EG020: Copper	7440-50-8	0.05	mg/kg	<0.05	5 mg/kg	104	----	85	115	----	----
EG020: Lead	7439-92-1	0.05	mg/kg	<0.05	5 mg/kg	101	----	85	115	----	----
EG020: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	96.2	----	85	115	----	----
EG020: Nickel	7440-02-0	0.05	mg/kg	<0.05	5 mg/kg	101	----	85	115	----	----
EG020: Silver	7440-22-4	0.05	mg/kg	<0.05	5 mg/kg	98.4	----	85	115	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	<0.5	5 mg/kg	103	----	85	115	----	----
EP: Aggregate Organics (QC Lot: 1730395)											
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	101	----	88	110	----	----
EP: Aggregate Organics (QC Lot: 1744693)											
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	99.3	----	88	110	----	----

Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
---------------	--	--------------------------	--	--	--	--	--	--	--	--	--



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number					LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1736391)											
EG020: Arsenic	7440-38-2	10	µg/L	<10	100 µg/L	92.6	----	79	109	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	100 µg/L	94.1	----	80	106	----	----
EG020: Chromium	7440-47-3	1	µg/L	<1	100 µg/L	106	----	77	115	----	----
EG020: Copper	7440-50-8	1	µg/L	<1	100 µg/L	99.8	----	77	113	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	100 µg/L	99.4	----	80	110	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	97.0	----	75	121	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	100 µg/L	98.8	----	78	112	----	----
EG020: Silver	7440-22-4	1	µg/L	<1	100 µg/L	93.2	----	78	104	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	100 µg/L	101	----	76	114	----	----



Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: SOIL

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 1736348)										
HK1833586-001	A/Sediment	EG020: Arsenic	7440-38-2	5 mg/kg	105	----	75	125	----	----
		EG020: Cadmium	7440-43-9	5 mg/kg	93.6	----	75	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	100	----	75	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	95.9	----	75	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	90.3	----	75	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	78.1	----	75	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	94.4	----	75	125	----	----
		EG020: Silver	7440-22-4	5 mg/kg	97.8	----	75	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75	125	----	----

EP: Aggregate Organics (QC Lot: 1730395)										
HK1832335-001	Anonymous	EP005: Total Organic Carbon	----	40 %	102	----	75	125	----	----

EP: Aggregate Organics (QC Lot: 1744693)										
HK1833586-010	B/Benthic Survey	EP005: Total Organic Carbon	----	40 %	98.0	----	75	125	----	----

Matrix: WATER

					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1736391)										
HK1833586-017	A/Rinsate Blank	EG020: Arsenic	7440-38-2	100 µg/L	110	----	75	125	----	----
		EG020: Cadmium	7440-43-9	100 µg/L	88.5	----	75	125	----	----
		EG020: Chromium	7440-47-3	100 µg/L	116	----	75	125	----	----
		EG020: Copper	7440-50-8	100 µg/L	101	----	75	125	----	----
		EG020: Lead	7439-92-1	100 µg/L	82.5	----	75	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	83.9	----	75	125	----	----
		EG020: Nickel	7440-02-0	100 µg/L	104	----	75	125	----	----
		EG020: Silver	7440-22-4	100 µg/L	83.5	----	75	125	----	----
		EG020: Zinc	7440-66-6	100 µg/L	93.3	----	75	125	----	----





SUB-CONTRACTING REPORT

CONTACT	: MR CYRUS LAI	WORK ORDER	: HK1833586
CLIENT	: FUGRO TECHNICAL SERVICES LIMITED		
ADDRESS	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	SUB-BATCH	: 1
		DATE RECEIVED	: 14-JUN-2018
		DATE OF ISSUE	: 28-JUN-2018
PROJECT	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT	NO. OF SAMPLES	: 24
		CLIENT ORDER	: 0041/17

General Comments

- Sample(s) were received in chilled condition.
- Water sample(s) analysed and reported on as received basis.
- Sediment sample(s) analysed on an as received basis. Result(s) reported on dry weight basis.
- pH determined and reported on a 1:5 soil / water extract.
- Water sample(s) digested by In-house method E-3005 prior to the determination of total metals. The In-house method is developed based on USEPA method 3005.
- Soil sample(s) as received, digested by In-house method E-3051A prior to the determination of metals. The In-house method is developed based on USEPA method 3051A.
- Particle Size Distribution was subcontracted to and analysed by Gammon Construction Limited.
- Calibration range of pH value is 4.0 - 10.0. Results exceeding this range is for reference only.
- pH value is reported as at 25°C.

Signatories

This document has been signed by those names that appear on this report and are the authorised signatories

Signatories

Position

Richard Fung  General Manager

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.

ALS Technichem (HK) Pty Ltd
Part of the **ALS Laboratory Group**

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WORK ORDER : HK1833586
 SUB-BATCH : 1
 CLIENT : FUGRO TECHNICAL SERVICES LIMITED
 PROJECT : CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL
 ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE
 TREATMENT PLANT



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK1833586-001	A/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-002	B/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-003	C/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-004	D/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-005	E/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-006	F/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-007	G/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-008	H/Sediment	SEDIMENT	14-Jun-2018	
HK1833586-009	A/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-010	B/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-011	C/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-012	D/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-013	E/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-014	F/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-015	G/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-016	H/Benthic Survey	SEDIMENT	14-Jun-2018	J2999-272.33
HK1833586-017	A/Rinsate Blank	WATER	14-Jun-2018	
HK1833586-018	B/Rinsate Blank	WATER	14-Jun-2018	
HK1833586-019	C/Rinsate Blank	WATER	14-Jun-2018	
HK1833586-020	D/Rinsate Blank	WATER	14-Jun-2018	
HK1833586-021	E/Rinsate Blank	WATER	14-Jun-2018	
HK1833586-022	F/Rinsate Blank	WATER	14-Jun-2018	
HK1833586-023	G/Rinsate Blank	WATER	14-Jun-2018	
HK1833586-024	H/Rinsate Blank	WATER	14-Jun-2018	

TEST CERTIFICATE
SUMMARY OF SOIL CLASSIFICATION TEST RESULT
GEOSPEC 3 : 2001



Report No : 12999-272.33

Works Order No : 272

Job No. : 12999

Customer : ALS Technichen (HK) Pty Ltd

Date : 20/06/2018

Contract No.:

Project : -

Sample ID	Sample		Δ Moisture Content (%)	Test Limit (%)	Test Limit (%)	Test Index (%)	Test Index (%)	Passing Test Sieve (%)	Preparation Method	Particle Size Distribution			Description	Sample Origin		
	No.	Type								Depth (m)	# Test Method	Gravel (%)			Sand (%)	Silt Clay (%)
HK1833586-009	A/Benthic Survey	D								1.5,7	1	14	49	36	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK1833586-010	B/Benthic Survey	D								1.5,7	1	23	48	28	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK1833586-011	C/Benthic Survey	D								1.5,7	0	4	61	35	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK1833586-012	D/Benthic Survey	D								1.5,7	0	14	53	33	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK1833586-013	E/Benthic Survey	D								1.5,7	0	5	58	37	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK1833586-014	F/Benthic Survey	D								1.5,7	0	3	60	37	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK1833586-015	G/Benthic Survey	D								1.5,7	21	36	23	20	Dark grey, sandy SILT/CLAY with shell fragments	- †
HK1833586-016	H/Benthic Survey	D								1.5,7	0	11	53	36	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C ± 5°C (C)
 # = Test Method in accordance with GEOSPEC 3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).

Symbols : U - Undisturbed Sample; LB - Large Disturbed Sample; BLK - Block Sample; SPTL - SPT Split-Barrel Sample; P - Piston Sample; M - Mazier Sample; D - Small Disturbed Sample; PT - Portable triple tube Sample; N.P. - Non Plastic; A.R. - As Received; H.P. - Hand Picked; - Moisture Content for A.L. Test; A.D. - Air Dried; O.D. - Oven Dried; W.S. - Wet Sieved; Sampling History - Refer the Individual Test Report; Estimated Uncertainty - Refer the Individual Test Report; † - Information provided by customer.

Notes: IS - Insufficient Sample; TI - To Follow on supplementary Report.

Checked by : T K Lam

Approved By :

Date : 27/06/2018

Chung Hei Wing
 Principal Laboratory Officer

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Form : GESS001 / Jun.30.13 / Issue 1 / Rev 3

TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)



Report No. : J2999-272.33

Job No. : J2999 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd
 Project : -

Works Order No. : 272
 Sample ID No. : HK1833586-009
 Sample No. : A/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : †

Date Received : 20/06/2018
 Tested Date : 22/06/2018

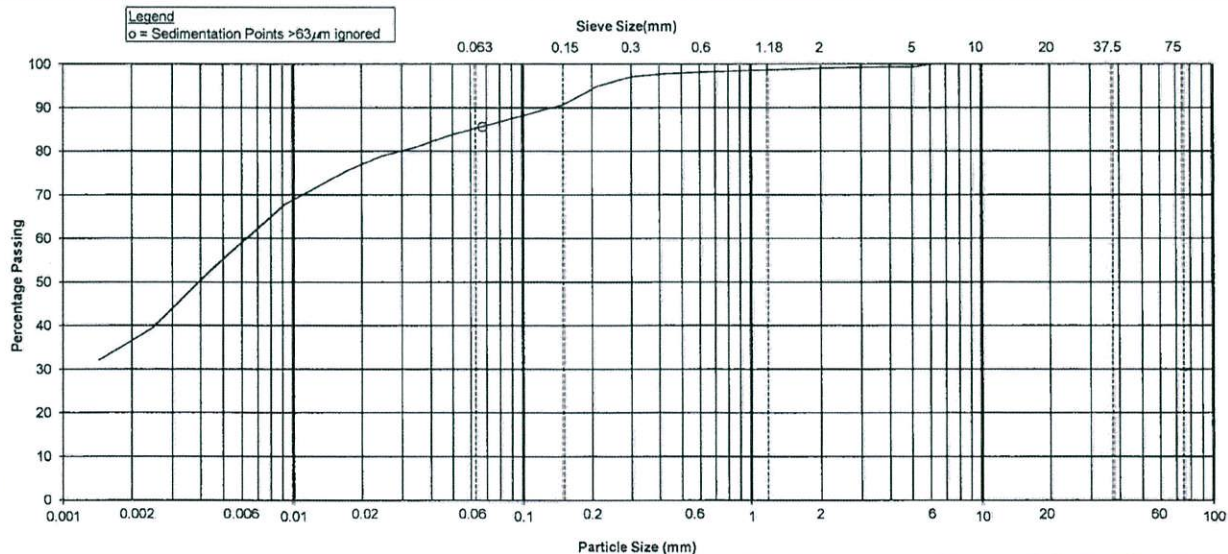
Description : Dark grey, slightly sandy SILT/CLAY with shell fragments

Sieve Method : Method A † Upon request * Delete as appropriate

† Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	Expanded Uncertainty of the Percent Passing (%)	Cumulative Percent Passing with Expanded Uncertainty (%)	Particle Diameter (mm)	Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	Expanded Uncertainty of % finer than D (%)
100.0 mm	100	-	-	0.0673	-	86	-
75.0 mm	100	-	-	0.0478	-	84	-
63.0 mm	100	-	-	0.0341	-	81	-
50.0 mm	100	-	-	0.0242	-	79	-
37.5 mm	100	-	-	0.0173	-	76	-
28.0 mm	100	-	-	0.0091	-	68	-
20.0 mm	100	-	-	0.0047	-	54	-
14.0 mm	100	-	-	0.0024	-	39	-
10.0 mm	100	-	-	0.0014	-	32	-
6.30 mm	100	-	-				
5.00 mm	99	-	-				
3.35 mm	99	-	-				
2.00 mm	99	-	-				
1.18 mm	99	-	-				
600 µm	98	-	-				
425 µm	98	-	-				
300 µm	97	-	-				
212 µm	95	-	-				
150 µm	91	-	-				
63 µm	85	-	-				
0 µm	0	-	-				

SEDIMENTATION ANALYSIS			
Specific Gravity (# if assumed) :	2.65 #		
Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
Sampling History :	As received		
The presence of any visible organic matter in the soil : None			
SUMMARY :			
Gravel (%) :	1		
Sand (%) :	14		
Silt (%) :	49		
Clay (%) :	36		



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun
 Date : 22/06/2018

Checked By : [Signature]
 Name : T K Lam
 Date : 27/06/2018

Approved By : [Signature]
 Signatory : Chung Hin Wing
 Date : 27/06/2018

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Form : GESR003.5 / Jun.30.13 / Issue 1 / Rev 2

TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)



Report No. : J2999-272.33

Job No. : J2999 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd
 Project : -

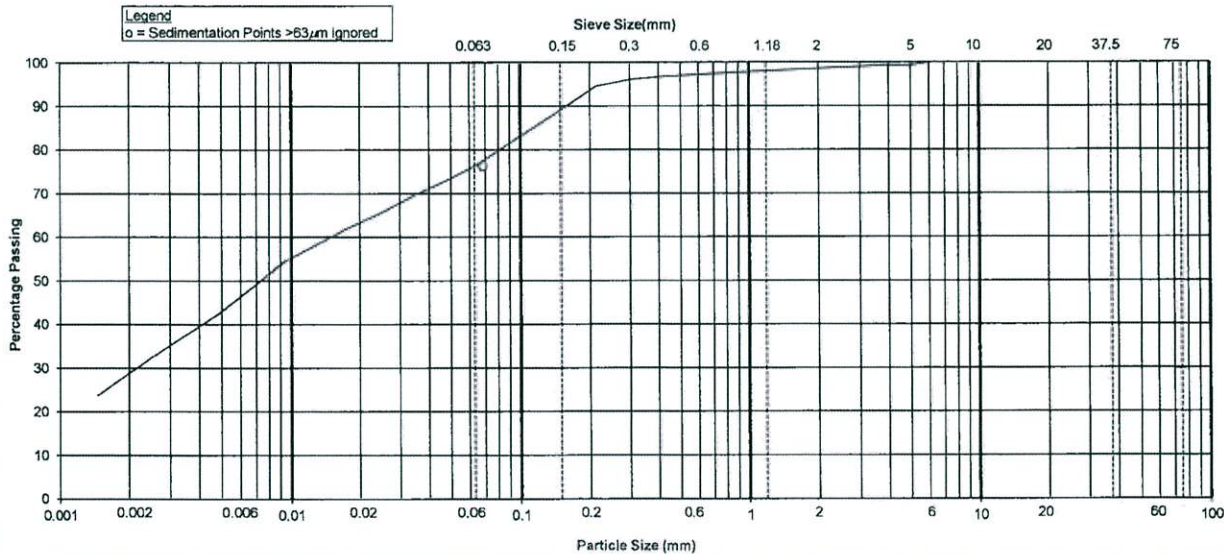
Works Order No. : 272
 Sample ID No. : HK1833586-010
 Sample No. : B/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -

Date Received : 20/06/2018
 Tested Date : 22/06/2018

Description : Dark grey, slightly sandy SILT/CLAY with shell fragments

Sieve Method : Method A ^ Upon request * Delete as appropriate † Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^ Expanded Uncertainty of the Percent Passing (%)	^ Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	^ Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^ Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0685	-	76	-
20.0 mm	100	-	-	0.0488	-	73	-
14.0 mm	100	-	-	0.0349	-	70	-
10.0 mm	100	-	-	0.0249	-	66	-
6.30 mm	100	-	-	0.0178	-	62	-
5.00 mm	99	-	-	0.0094	-	55	-
3.35 mm	99	-	-	0.0048	-	42	-
2.00 mm	99	-	-	0.0025	-	32	-
1.18 mm	98	-	-	0.0015	-	24	-
600 µm	97	-	-	SUMMARY :			
425 µm	97	-	-	Gravel (%) :	1		
300 µm	96	-	-	Sand (%) :	23		
212 µm	95	-	-	Silt (%) :	48		
150 µm	89	-	-	Clay (%) :	28		
63 µm	76	-	-				
0 µm	0	-	-				



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun

Checked By : T K Lam
 Name : T K Lam
 Date : 27/06/2018

Approved By : Chung Hoi Wing
 Signatory : Chung Hoi Wing
 Date : 27/06/2018

Date : 22/06/2018

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Form : GESR003.5 / Jun.30.13 / Issue 1 / Rev 2

TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)



Report No. : J2999-272.33

Job No. : J2999
 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd
 Project : -

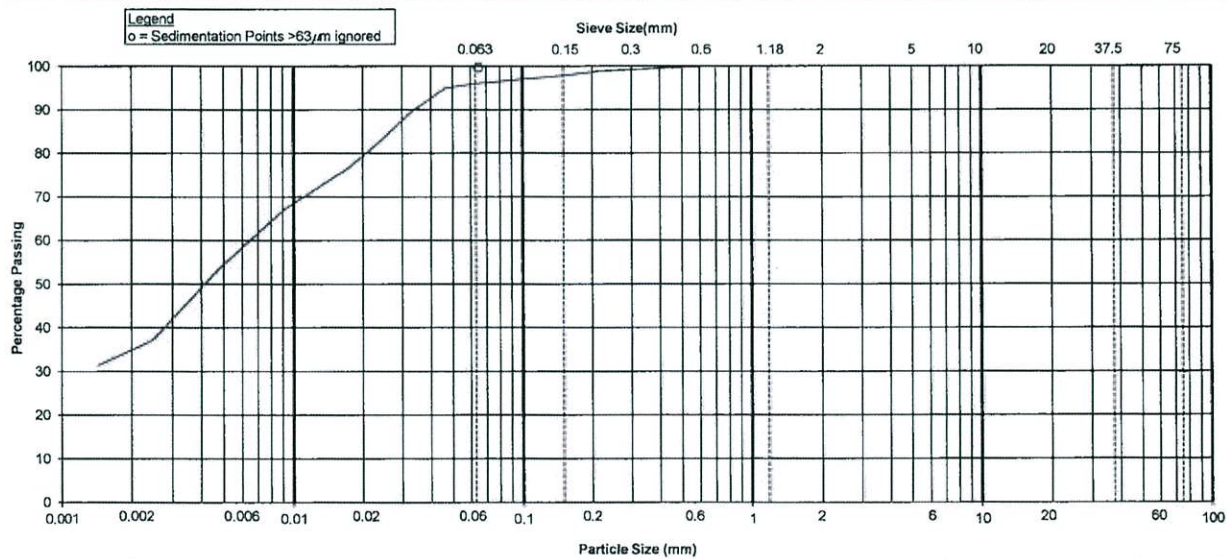
Works Order No. : 272
 Sample ID No. : HK1833586-011
 Sample No. : C/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -†

Date Received : 20/06/2018
 Tested Date : 22/06/2018

Description : Dark grey, slightly sandy SILT/CLAY with shell fragments

Sieve Method : Method A ^ Upon request * Delete as appropriate † Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details : Sodium hexametaphosphate, Sodium carbonate			
63.0 mm	100	-	-	Sampling History : As received			
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None	Particle Diameter	^Expanded Uncertainty of the Particle Diameter	% Finer than D K
37.5 mm	100	-	-		(mm)	(mm)	(%)
28.0 mm	100	-	-				^Expanded Uncertainty of % finer than D (%)
20.0 mm	100	-	-		0.0645	-	100
14.0 mm	100	-	-		0.0463	-	95
10.0 mm	100	-	-		0.0332	-	90
6.30 mm	100	-	-		0.0240	-	83
5.00 mm	100	-	-		0.0172	-	77
3.35 mm	100	-	-		0.0091	-	67
2.00 mm	100	-	-		0.0047	-	54
1.18 mm	100	-	-		0.0025	-	37
600 µm	100	-	-		0.0014	-	31
425 µm	100	-	-	SUMMARY :			
300 µm	99	-	-	Gravel (%) :	0		
212 µm	99	-	-	Sand (%) :	4		
150 µm	98	-	-	Silt (%) :	61		
63 µm	96	-	-	Clay (%) :	35		
0 µm	0	-	-				



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun

Checked By : TK Lam

Approved By : Chung Hei Wing

Date : 22/06/2018

Date : 27/06/2018

Date : 27/06/2018

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**TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)**



Report No. : J2999-272.33

Job No. : J2999
Customer : ALS Technichem (HK) Pty Ltd
Project : -

Contract No. :

Works Order No. : 272
Sample ID No. : HK1833586-012
Sample No. : D/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : ‡

Date Received : 20/06/2018
Tested Date : 22/06/2018

Description : Dark grey, slightly sandy SILT/CLAY with shell fragments

Sieve Method : Method A

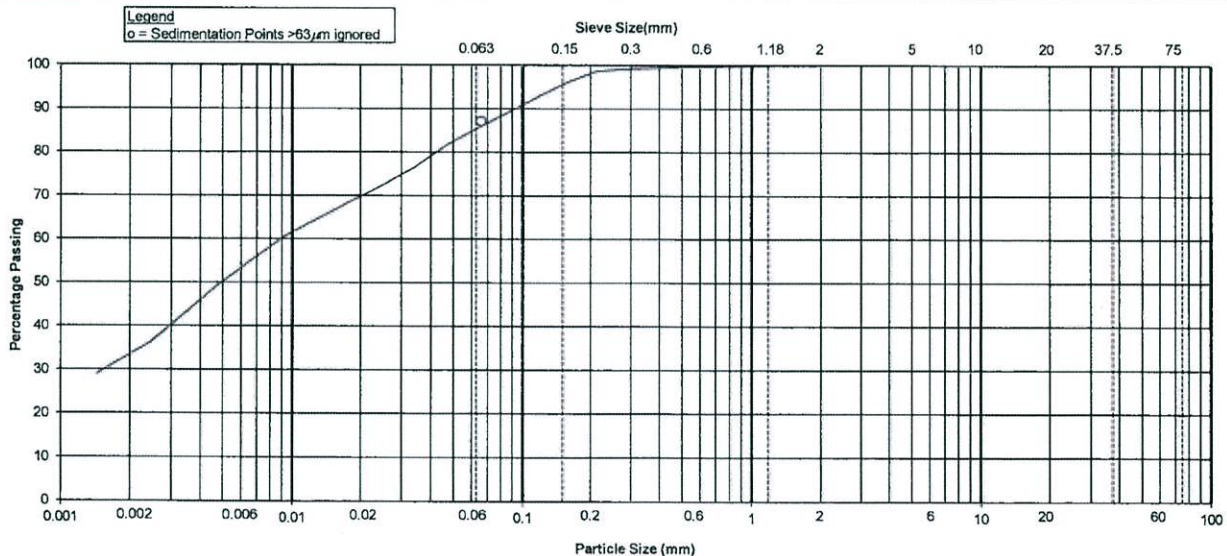
^ Upon request

* Delete as appropriate

‡ Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
100.0 mm	100	-	-				
75.0 mm	100	-	-				
63.0 mm	100	-	-				
50.0 mm	100	-	-				
37.5 mm	100	-	-				
28.0 mm	100	-	-				
20.0 mm	100	-	-	0.0655	-	87	-
14.0 mm	100	-	-	0.0471	-	82	-
10.0 mm	100	-	-	0.0339	-	77	-
6.30 mm	100	-	-	0.0243	-	72	-
5.00 mm	100	-	-	0.0174	-	68	-
3.35 mm	100	-	-	0.0092	-	61	-
2.00 mm	100	-	-	0.0047	-	49	-
1.18 mm	100	-	-	0.0024	-	36	-
600 µm	100	-	-	0.0014	-	29	-
425 µm	100	-	-				
300 µm	99	-	-				
212 µm	99	-	-				
150 µm	96	-	-				
63 µm	86	-	-				
0 µm	0	-	-				

SEDIMENTATION ANALYSIS			
Specific Gravity (# if assumed) :	2.65 #		
Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
Sampling History :	As received		
The presence of any visible organic matter in the soil : None			
SUMMARY :			
Gravel (%) :	0		
Sand (%) :	14		
Silt (%) :	53		
Clay (%) :	33		



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun

Checked By : T K Lam
Date : 27/06/2018

Approved By : Chung Hai Wing
Date : 27/06/2018

Date : 22/06/2018

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TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)



Report No. : J2999-272.33

Job No. : J2999
 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd
 Project : -

Works Order No. : 272
 Sample ID No. : HK1833586-013
 Sample No. : E/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : ‡

Date Received : 20/06/2018
 Tested Date : 22/06/2018

Description : Dark grey, slightly sandy SILT/CLAY with shell fragments

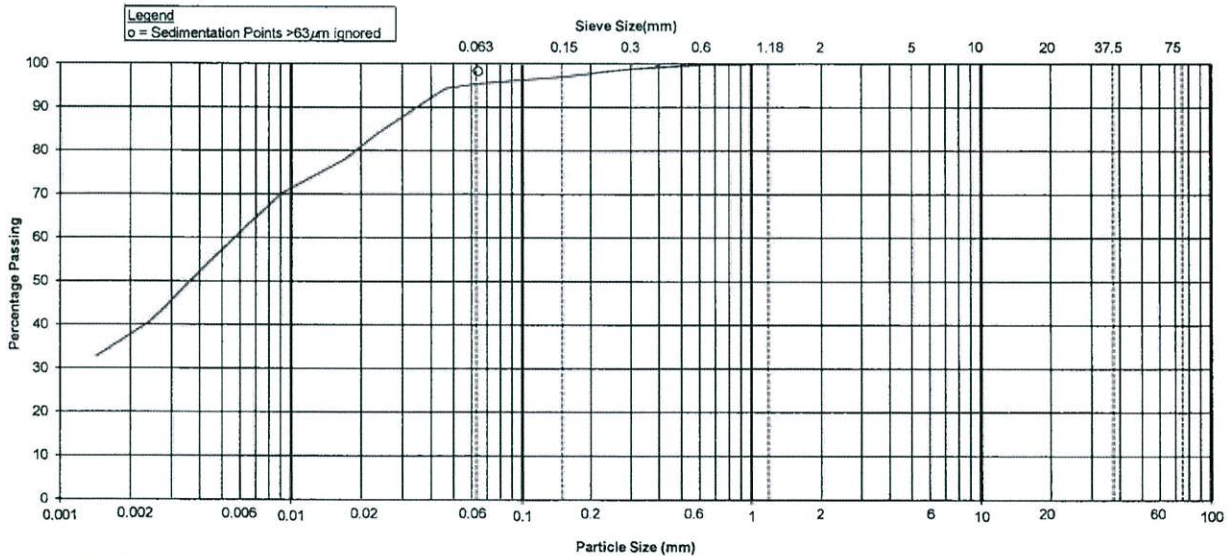
Sieve Method : Method A

^ Upon request

* Delete as appropriate

† Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	(mm)			
20.0 mm	100	-	-	0.0640	-	98	-
14.0 mm	100	-	-	0.0458	-	94	-
10.0 mm	100	-	-	0.0329	-	89	-
6.30 mm	100	-	-	0.0236	-	84	-
5.00 mm	100	-	-	0.0170	-	78	-
3.35 mm	100	-	-	0.0090	-	70	-
2.00 mm	100	-	-	0.0047	-	56	-
1.18 mm	100	-	-	0.0024	-	41	-
600 µm	100	-	-	0.0014	-	33	-
425 µm	99	-	-	SUMMARY :			
300 µm	99	-	-	Gravel (%)	:	0	
212 µm	98	-	-	Sand (%)	:	5	
150 µm	97	-	-	Silt (%)	:	58	
63 µm	95	-	-	Clay (%)	:	37	
0 µm	0	-	-				



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun

Checked By : T K Lam

Approved By : Chung Hei Wing

Date : 22/06/2018

Date : 27/06/2018

Date : 27/06/2018

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Form : GESR003.5 / Jun.30.13 / Issue 1 / Rev 2

TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)



Report No. : J2999-272.33

Job No. : J2999
 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd
 Project : -

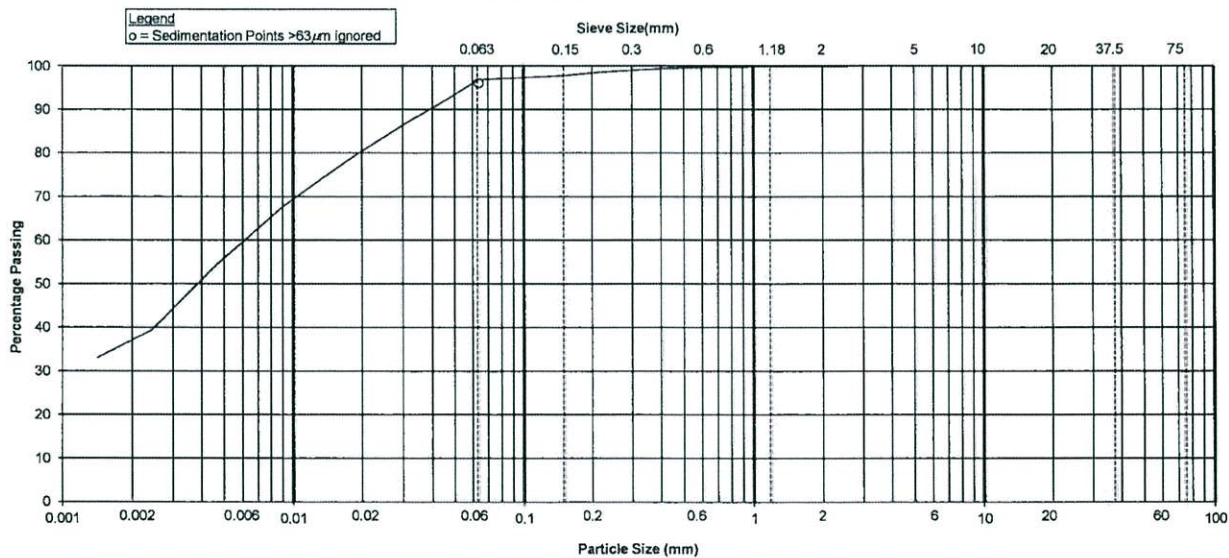
Works Order No. : 272
 Sample ID No. : HK1833586-014
 Sample No. : F/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : †

Date Received : 20/06/2018
 Tested Date : 22/06/2018

Description : Dark grey, slightly sandy SILT/CLAY with shell fragments

Sieve Method : Method A ^ Upon request * Delete as appropriate † Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^ Expanded Uncertainty of the Percent Passing (%)	^ Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	^ Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^ Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0638	-	96	-
20.0 mm	100	-	-	0.0457	-	92	-
14.0 mm	100	-	-	0.0328	-	88	-
10.0 mm	100	-	-	0.0235	-	83	-
6.30 mm	100	-	-	0.0169	-	78	-
5.00 mm	100	-	-	0.0090	-	68	-
3.35 mm	100	-	-	0.0047	-	55	-
2.00 mm	100	-	-	0.0024	-	40	-
1.18 mm	100	-	-	0.0014	-	33	-
600 µm	100	-	-	SUMMARY :			
425 µm	99	-	-	Gravel (%) :	0		
300 µm	99	-	-	Sand (%) :	3		
212 µm	99	-	-	Silt (%) :	60		
150 µm	98	-	-	Clay (%) :	37		
63 µm	97	-	-				
0 µm	0	-	-				



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun

Checked By : T K Lam
 Date : 27/06/2018

Approved By : Chung Hei Wing
 Signatory :
 Date : 27/06/2018

Date : 22/06/2018

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TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)



Report No. : J2999-272.33

Job No. : J2999
 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd
 Project : -

Works Order No. : 272
 Sample ID No. : HK1833586-015
 Sample No. : G/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -[‡]

Date Received : 20/06/2018
 Tested Date : 22/06/2018

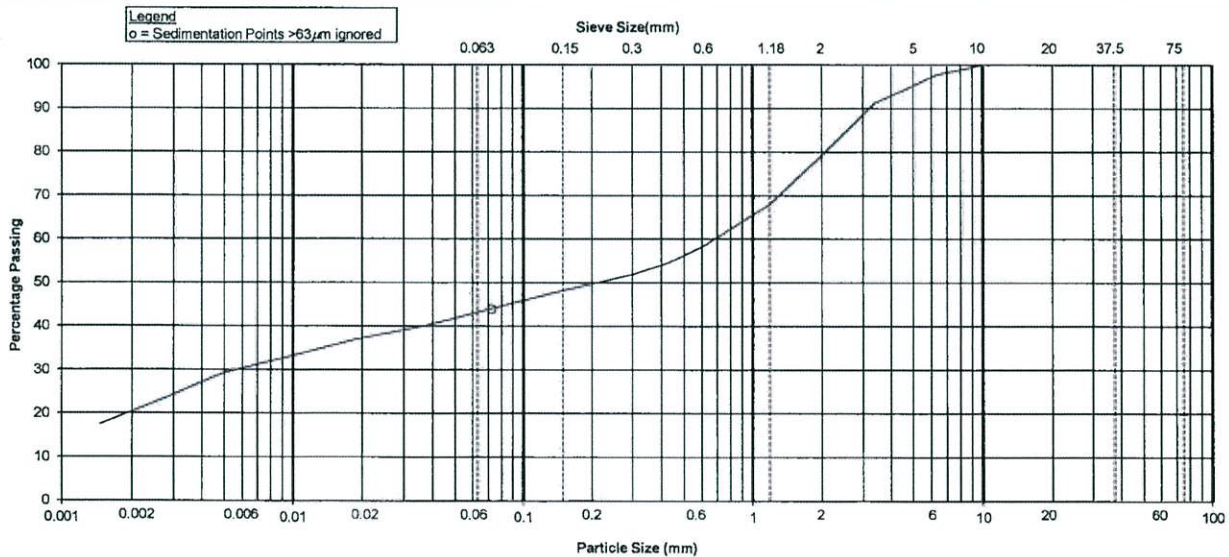
Description : Dark grey, sandy SILT/CLAY with shell fragments

Sieve Method : Method A [^]Upon request * Delete as appropriate ‡ Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	[^] Expanded Uncertainty of the Percent Passing (%)	[^] Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details : Sodium hexametaphosphate, Sodium carbonate			
63.0 mm	100	-	-	Sampling History : As received			
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None	Particle Diameter	[^] Expanded Uncertainty of the Particle Diameter	% Finer than D K
37.5 mm	100	-	-		(mm)	(mm)	(%)
28.0 mm	100	-	-		0.0721	-	44
20.0 mm	100	-	-		0.0513	-	42
14.0 mm	100	-	-		0.0365	-	40
10.0 mm	100	-	-		0.0260	-	39
6.30 mm	98	-	-		0.0184	-	37
5.00 mm	95	-	-		0.0096	-	33
3.35 mm	91	-	-		0.0049	-	29
2.00 mm	79	-	-		0.0025	-	23
1.18 mm	68	-	-		0.0015	-	18
600 µm	58	-	-				
425 µm	55	-	-				
300 µm	52	-	-				
212 µm	50	-	-				
150 µm	48	-	-				
63 µm	43	-	-				
0 µm	0	-	-				

SUMMARY :

Gravel (%)	: 21
Sand (%)	: 36
Silt (%)	: 23
Clay (%)	: 20



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun
 Date : 22/06/2018

Checked By : T K Lam
 Date : 27/06/2018

Approved By : Chung Hei Wing
 Date : 27/06/2018

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TEST REPORT
DETERMINATION OF
PARTICLE SIZE DISTRIBUTION
GEOSPEC 3 : 2001 Test Method 8.1 / 8.2*, 8.5 / 8.6* and 8.7
(Wet Sieve and Hydrometer Method)



Job No. : J2999
 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd
 Project : -

Report No. : J2999-272.33

Date Received : 20/06/2018
 Tested Date : 22/06/2018

Works Order No. : 272
 Sample ID No. : HK1833586-016
 Sample No. : H/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : ‡

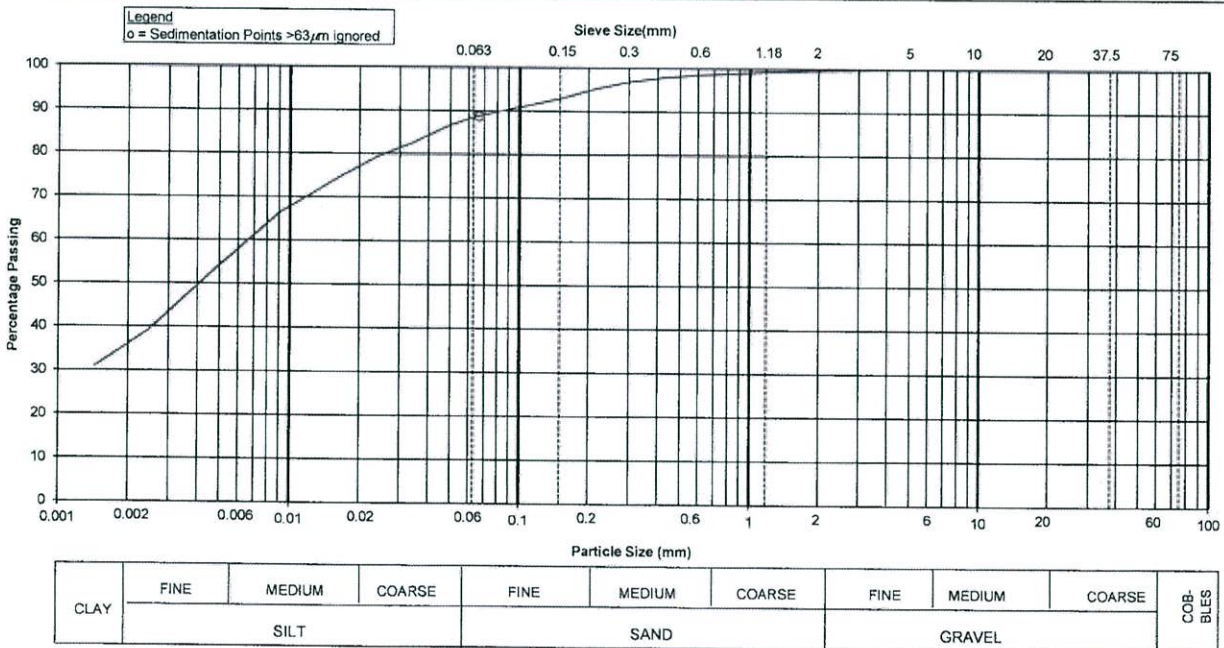
Description : Dark grey, slightly sandy SILT/CLAY with shell fragments

Sieve Method : Method A ^ Upon request * Delete as appropriate

‡ Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
100.0 mm	100	-	-	0.0664	-	89	-
75.0 mm	100	-	-	0.0473	-	86	-
63.0 mm	100	-	-	0.0338	-	83	-
50.0 mm	100	-	-	0.0241	-	80	-
37.5 mm	100	-	-	0.0172	-	75	-
28.0 mm	100	-	-	0.0091	-	67	-
20.0 mm	100	-	-	0.0047	-	53	-
14.0 mm	100	-	-	0.0024	-	39	-
10.0 mm	100	-	-	0.0014	-	31	-
6.30 mm	100	-	-				
5.00 mm	100	-	-				
3.35 mm	100	-	-				
2.00 mm	100	-	-				
1.18 mm	99	-	-				
600 µm	99	-	-				
425 µm	98	-	-				
300 µm	97	-	-				
212 µm	95	-	-				
150 µm	93	-	-				
63 µm	89	-	-				
0 µm	0	-	-				

Specific Gravity (# if assumed) : 2.65 #			
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate			
Sampling History : As received			
The presence of any visible organic matter in the soil : None			
SUMMARY :			
Gravel (%)	:	0	
Sand (%)	:	11	
Silt (%)	:	53	
Clay (%)	:	36	



Form : GESR003.5 / Jun.30.13 / Issue 1 / Rev 2

Technician : K Y Sun
 Date : 22/06/2018

Checked By : TK Lam
 Date : 27/06/2018

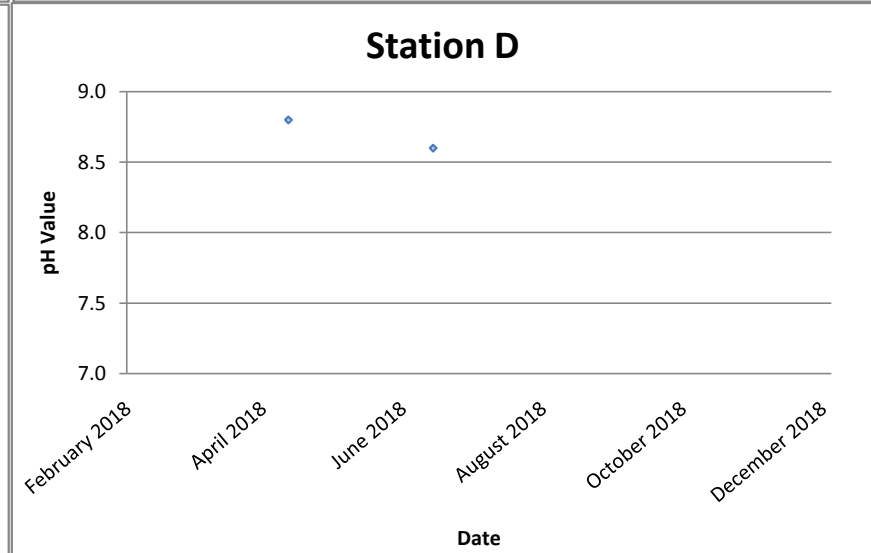
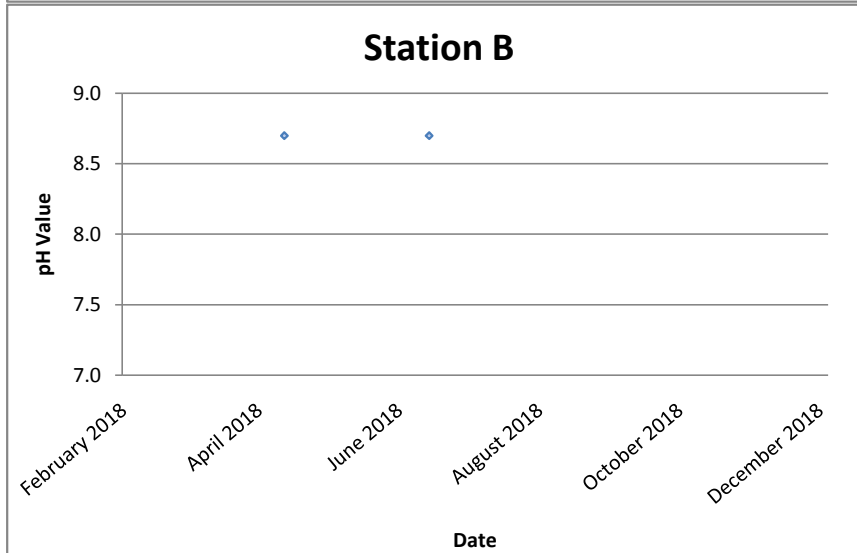
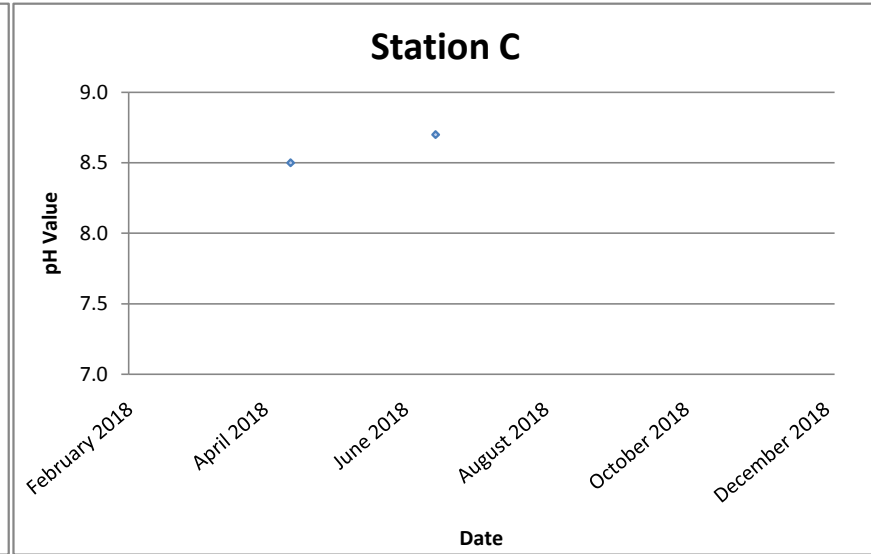
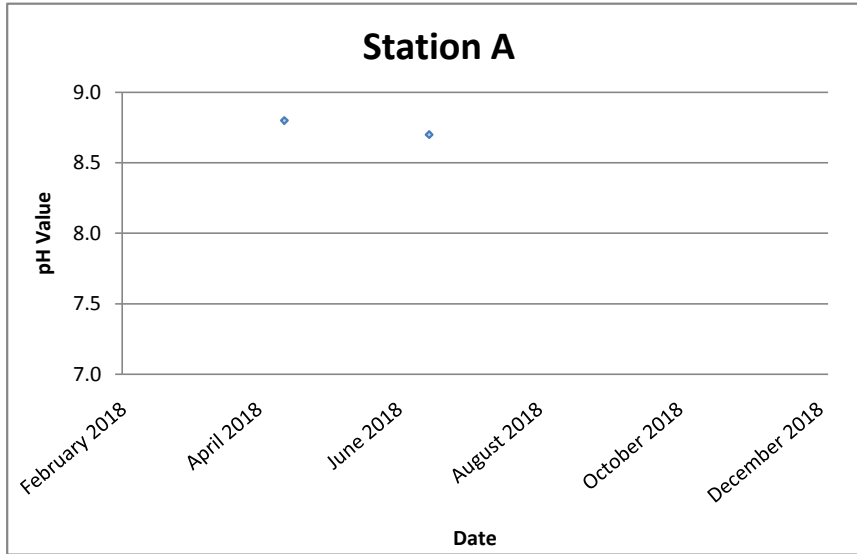
Approved By : Chung Hei Wing
 Date : 27/06/2018

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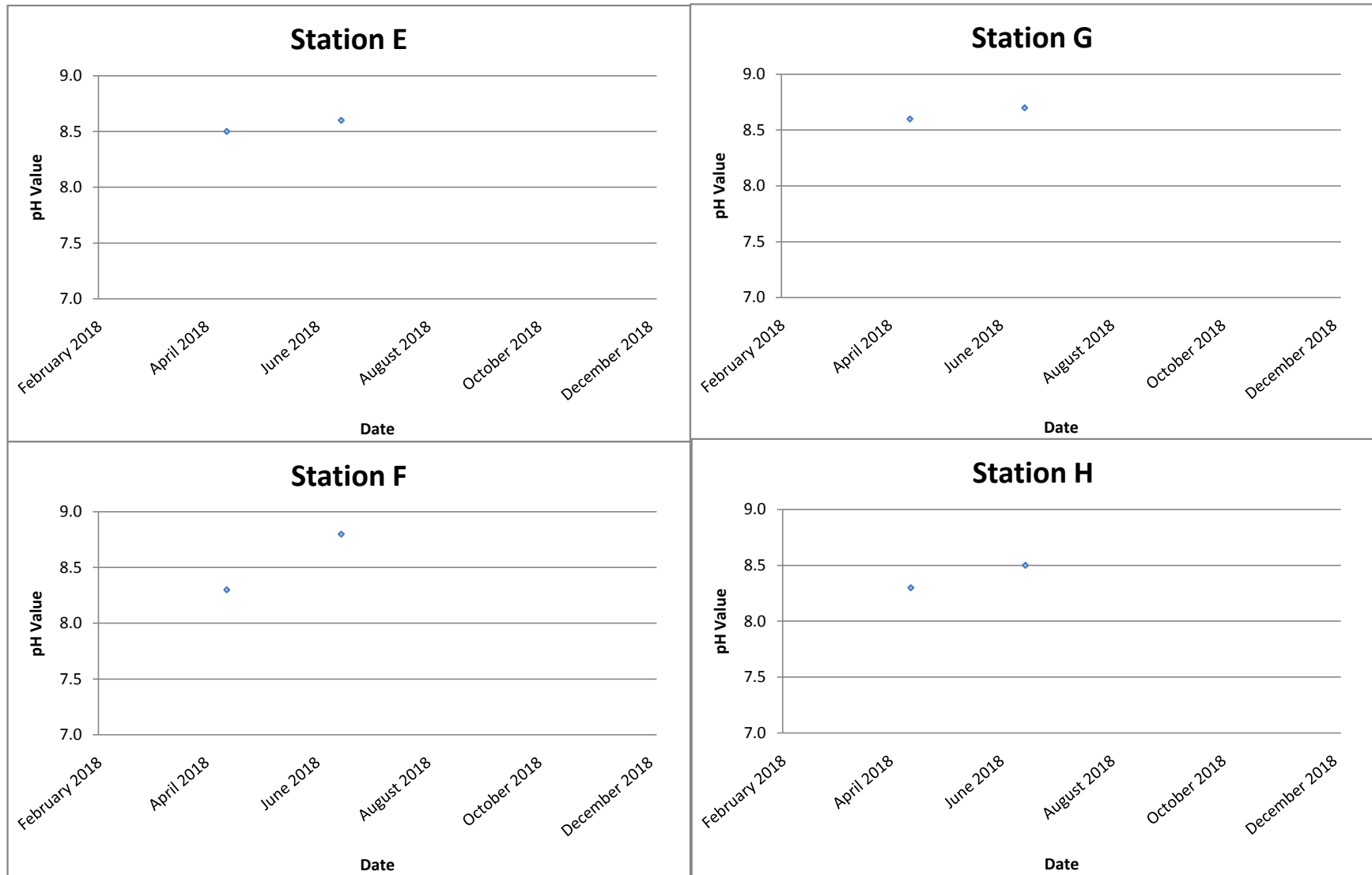
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 21 Chun Wang Street, Tseung Kwan O Industrial Estate,
 Tseung Kwan O, N.T. Tel : 26991980, Fax : 26917547

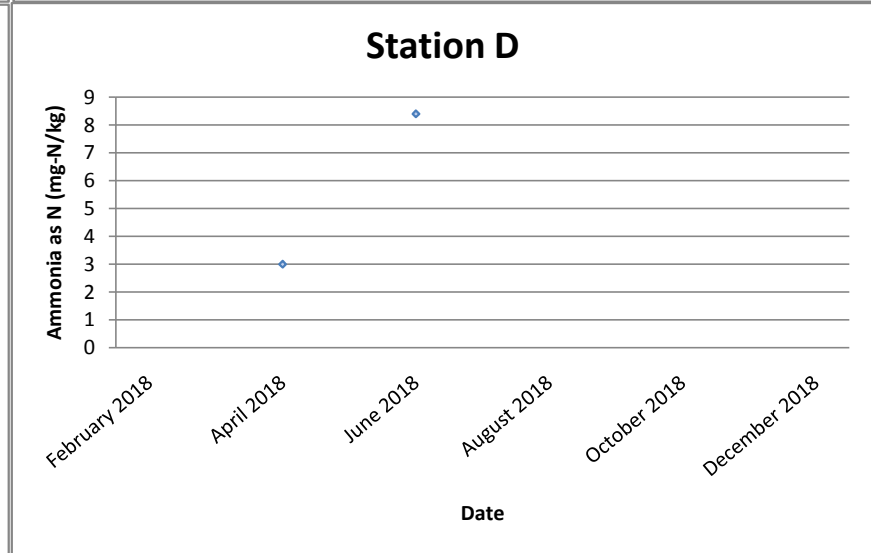
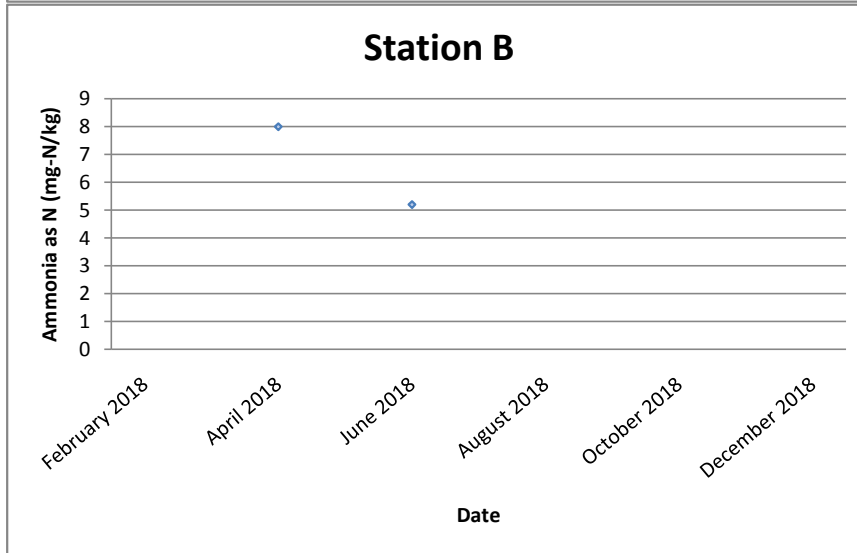
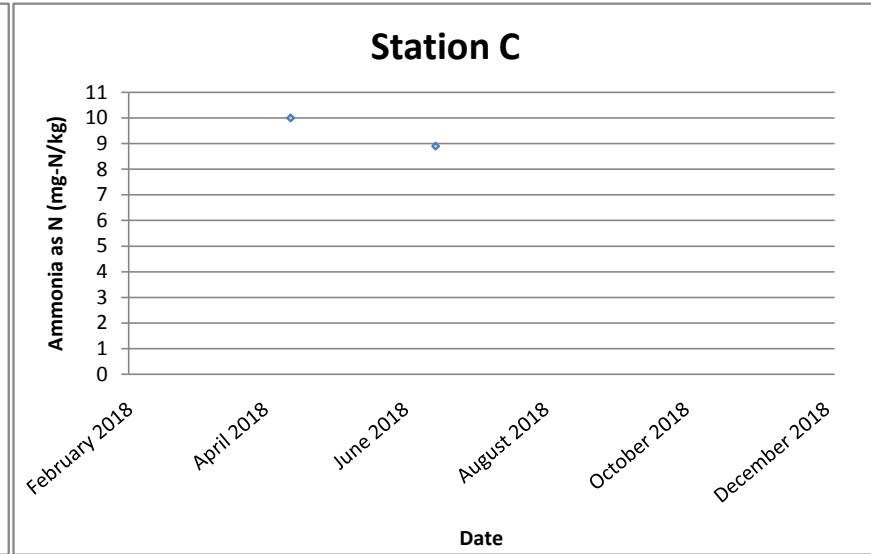
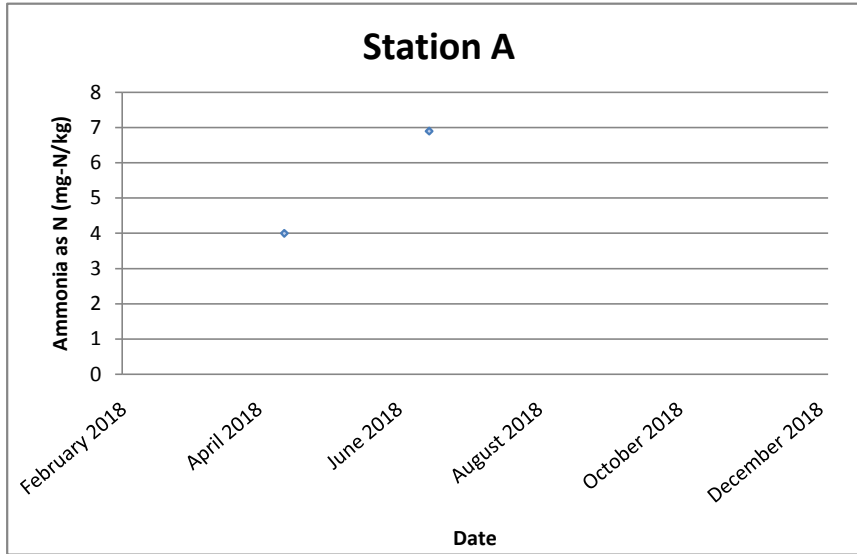
pH value



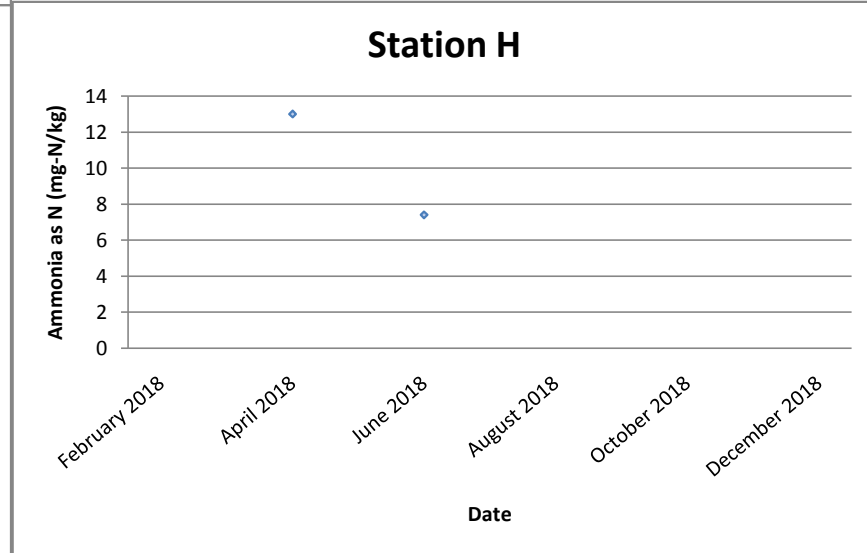
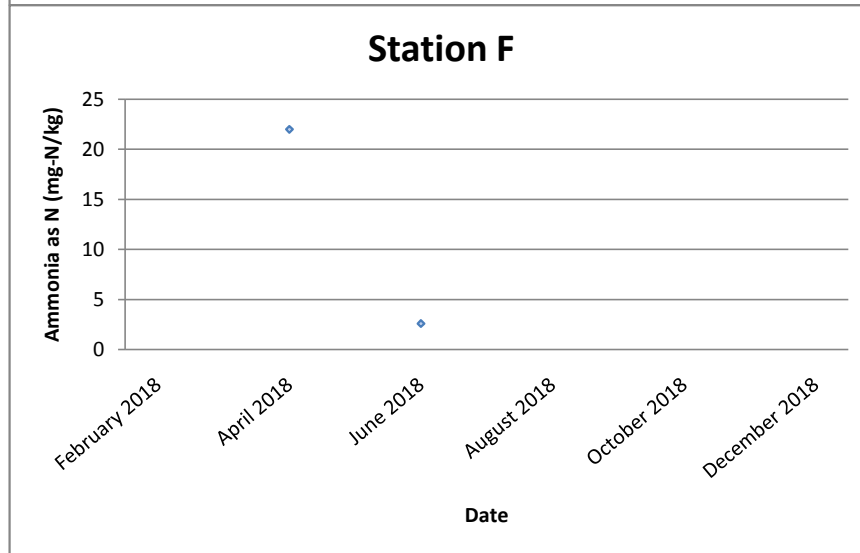
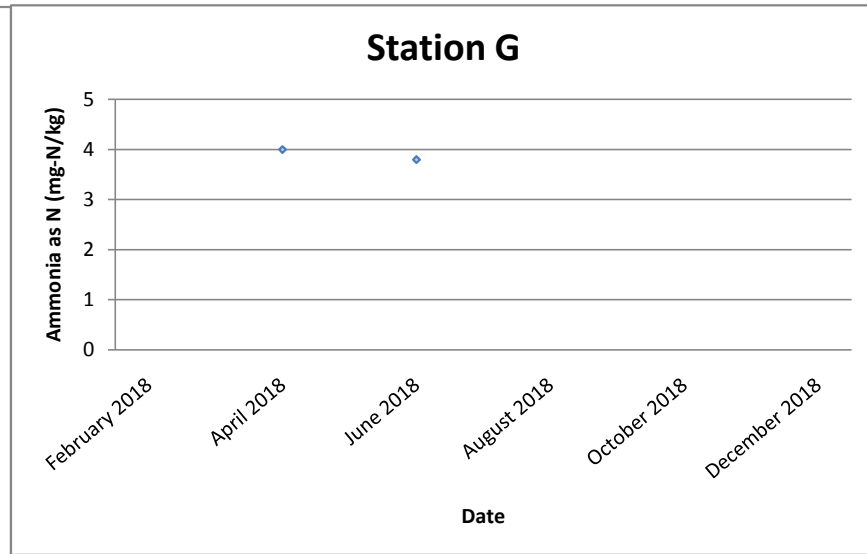
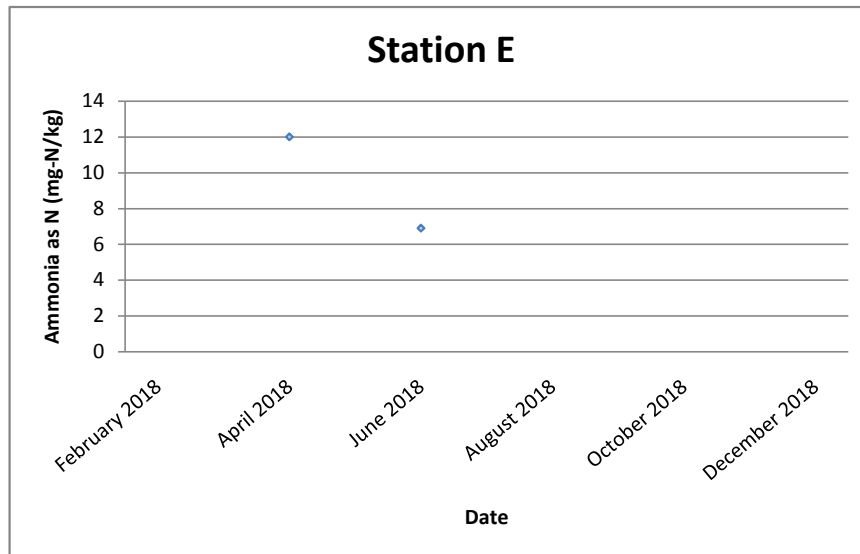
pH value



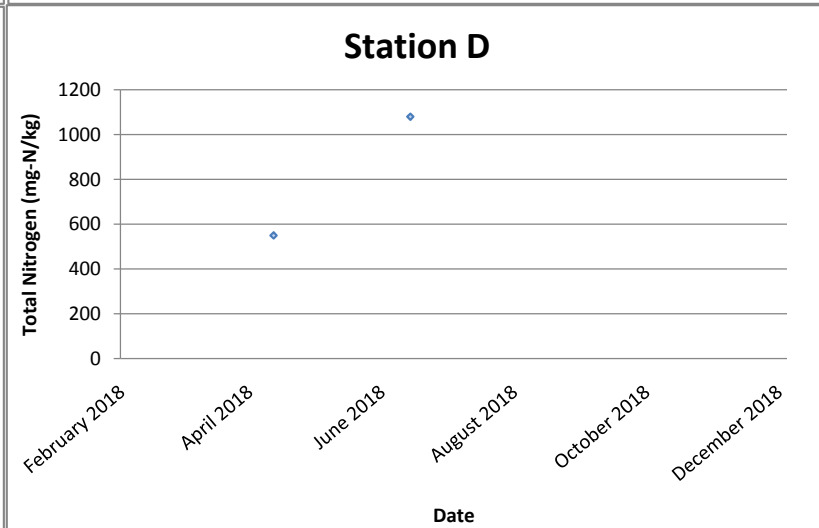
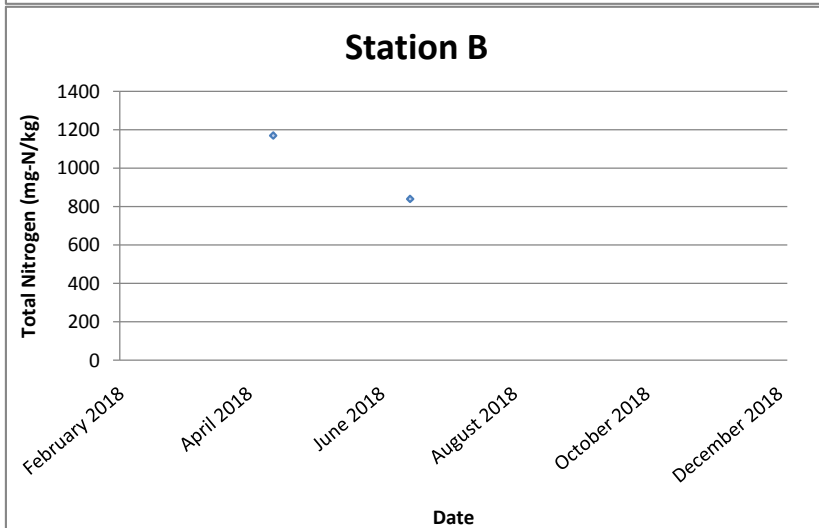
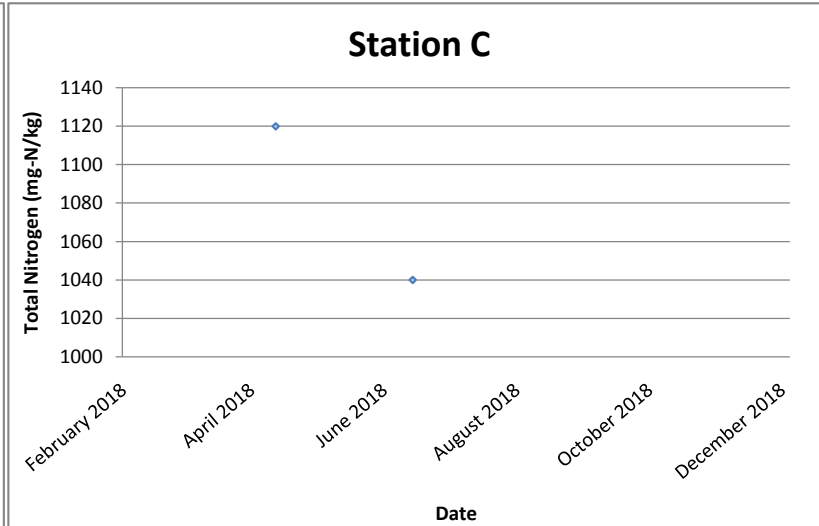
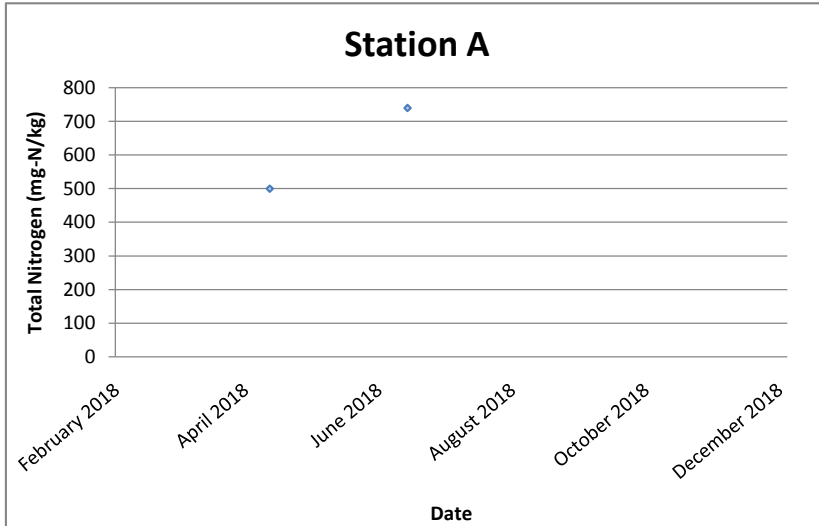
Ammonia Nitrogen (mg-N/kg)



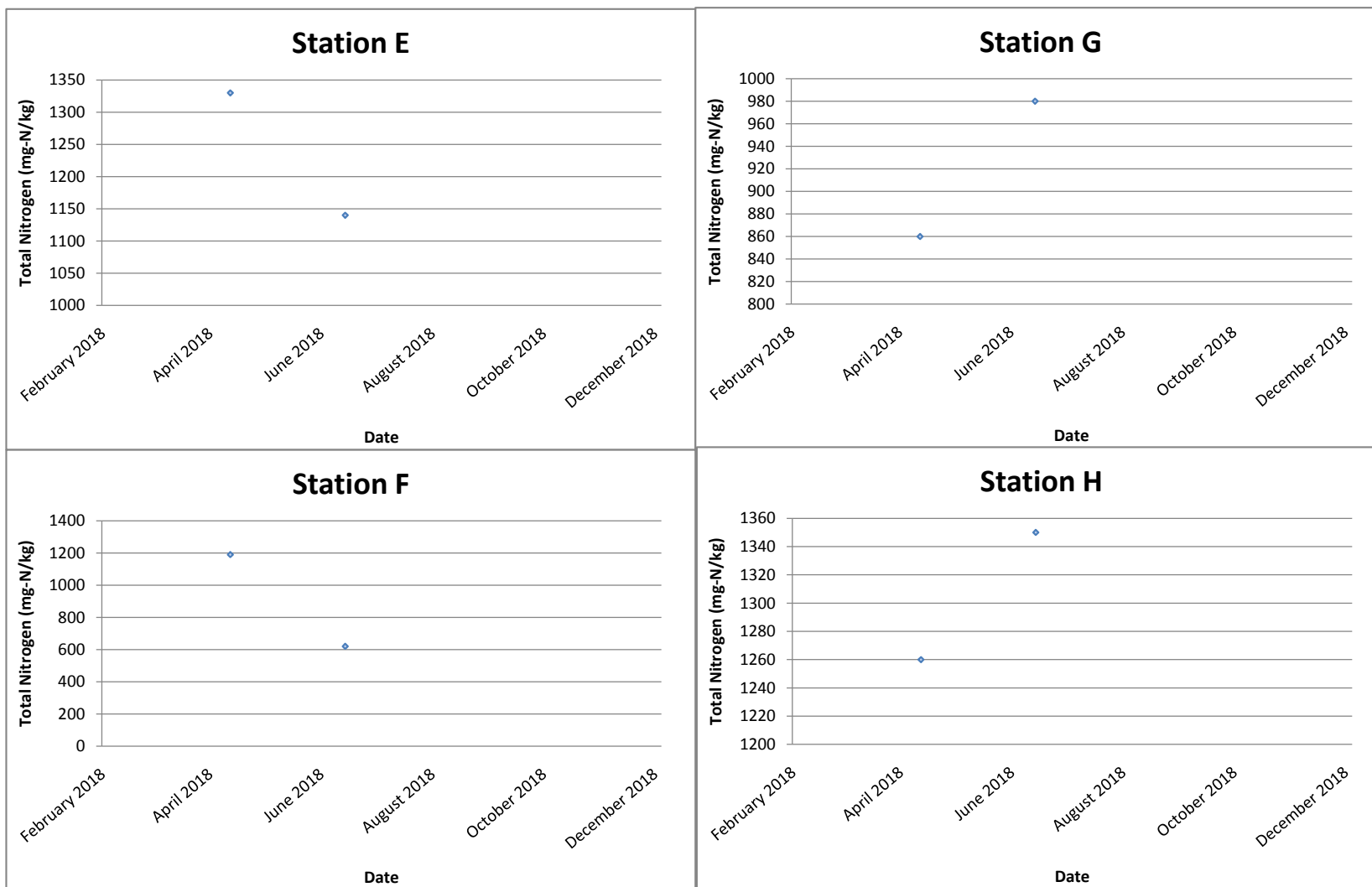
Ammonia Nitrogen (mg-N/kg)



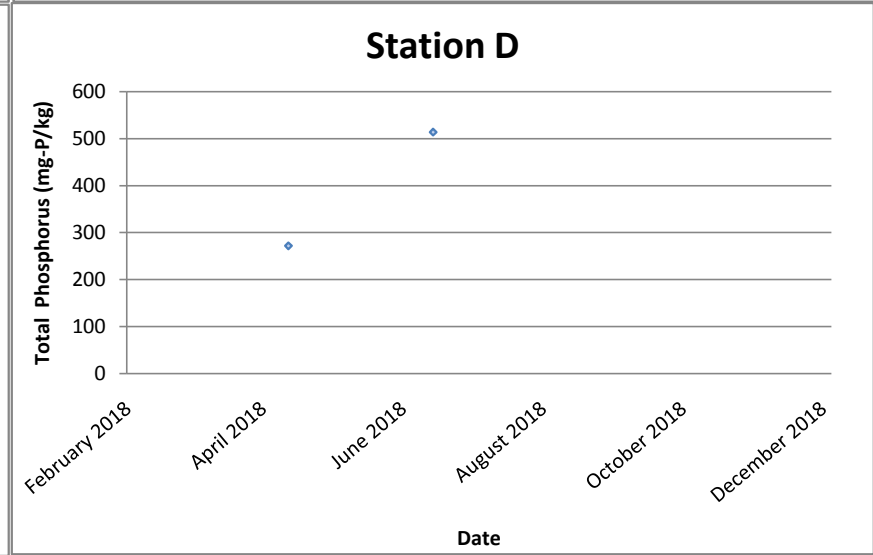
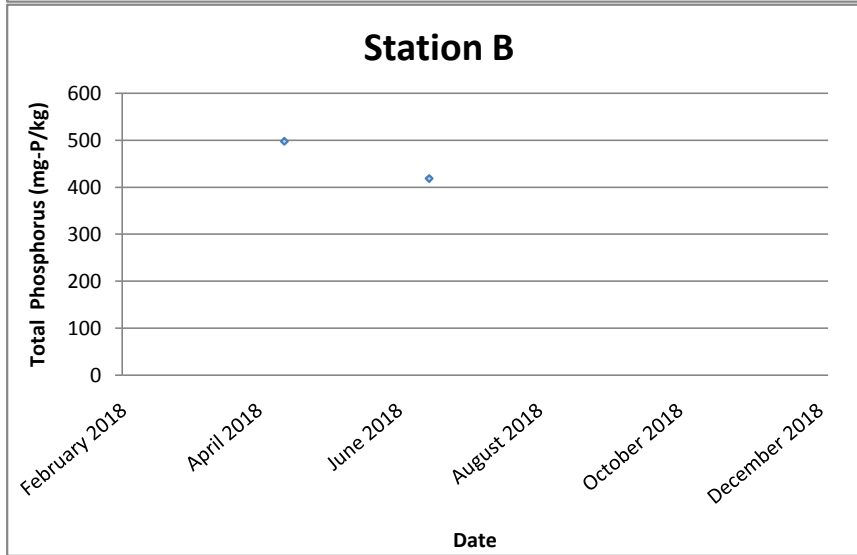
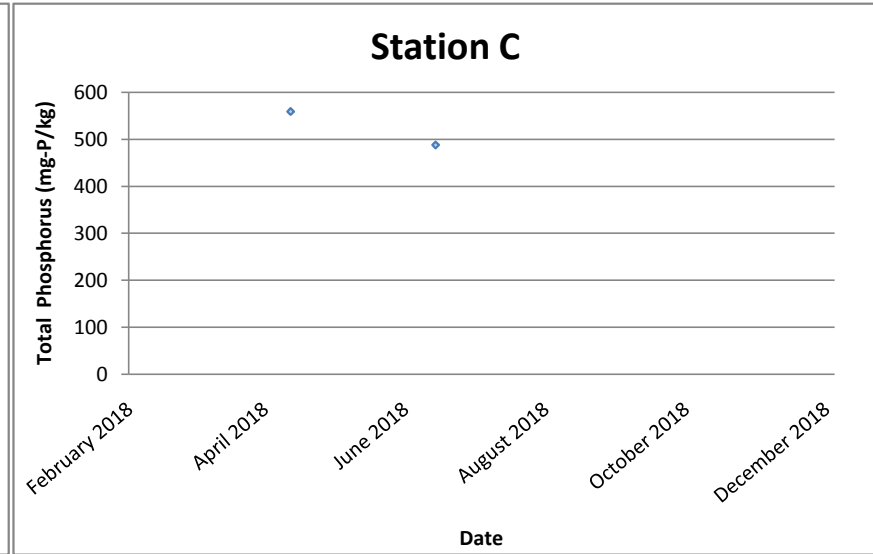
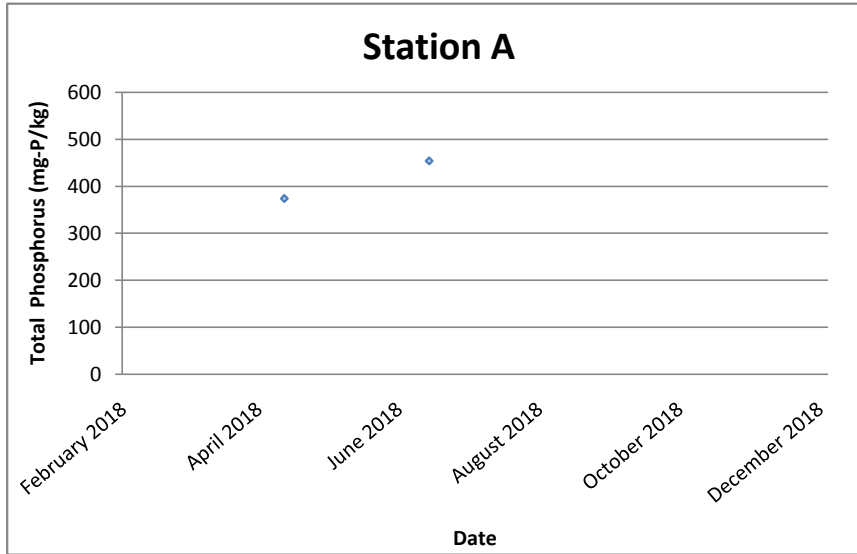
Total Nitrogen (mg-N/kg)



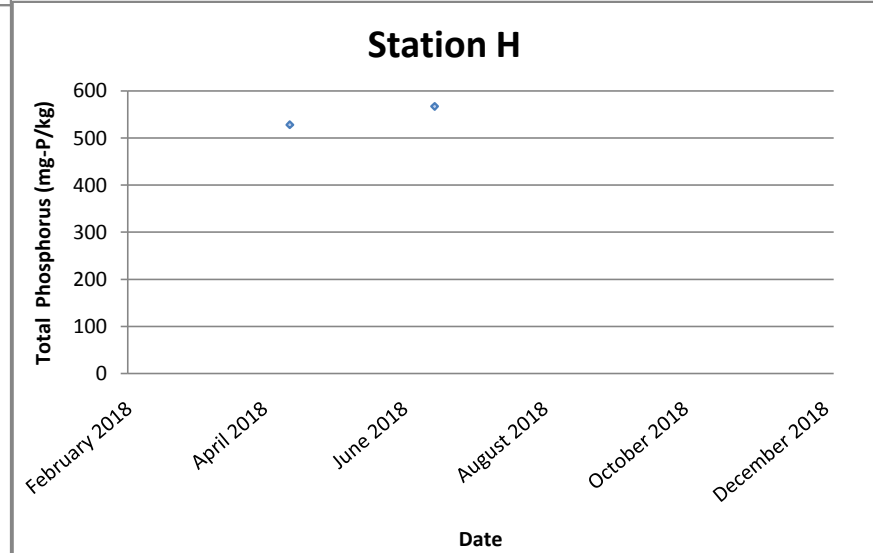
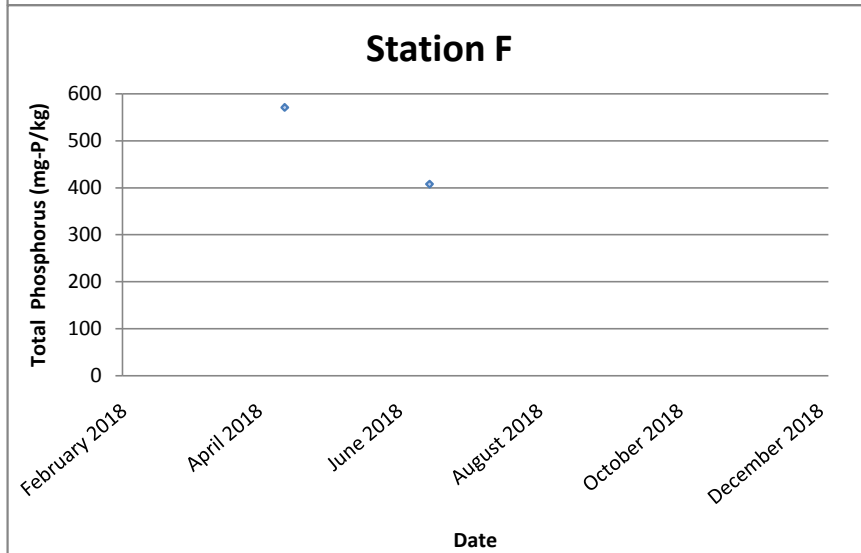
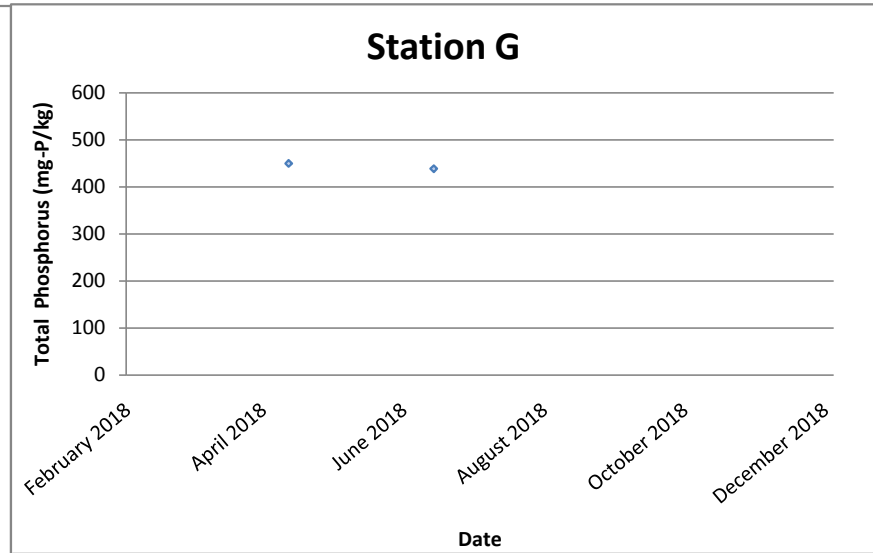
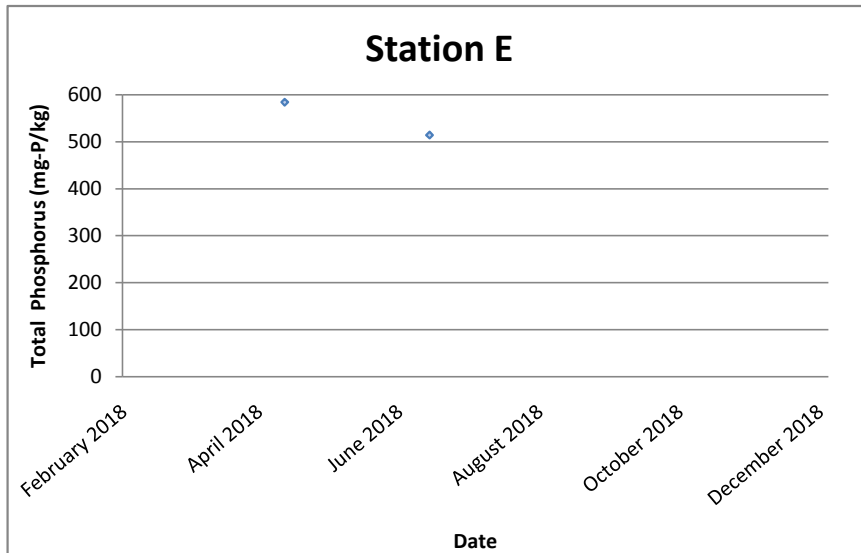
Total Nitrogen (mg-N/kg)



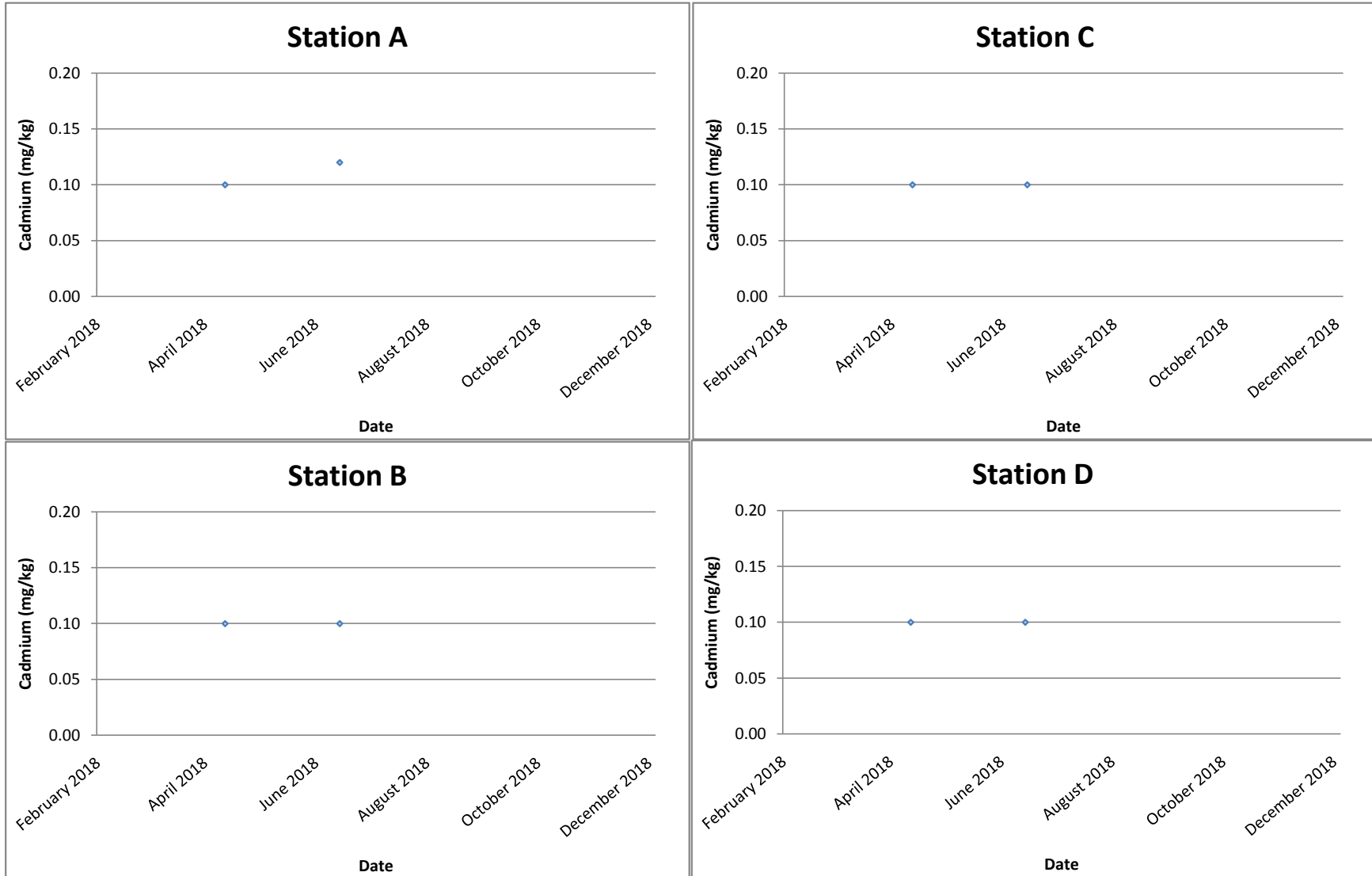
Total Phosphorus (mg-P/kg)



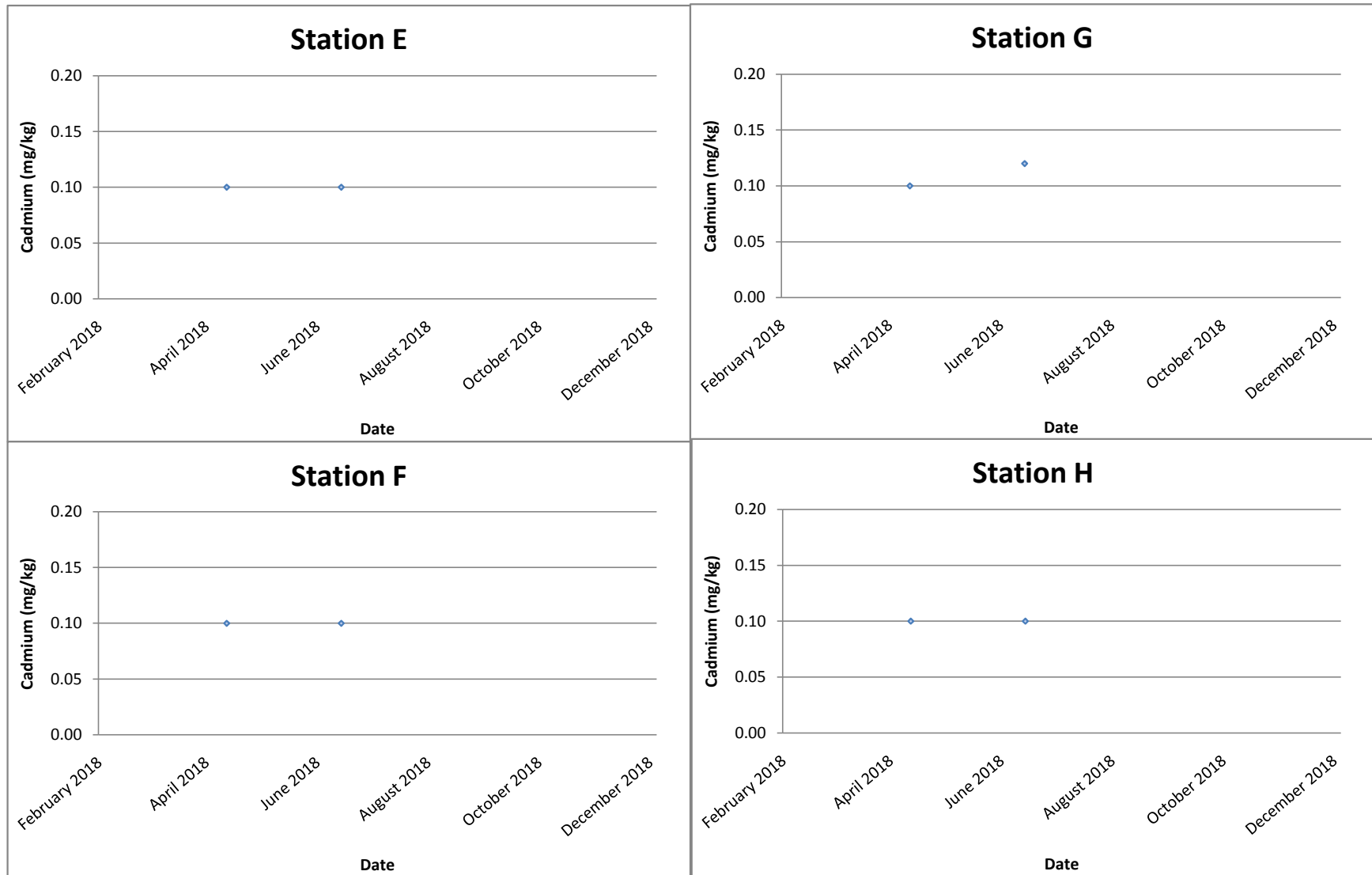
Total Phosphorus (mg-P/kg)



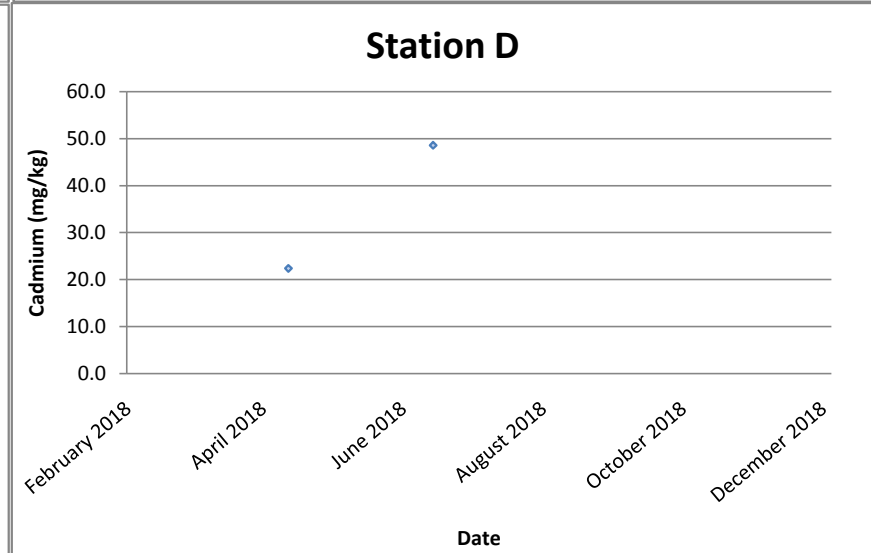
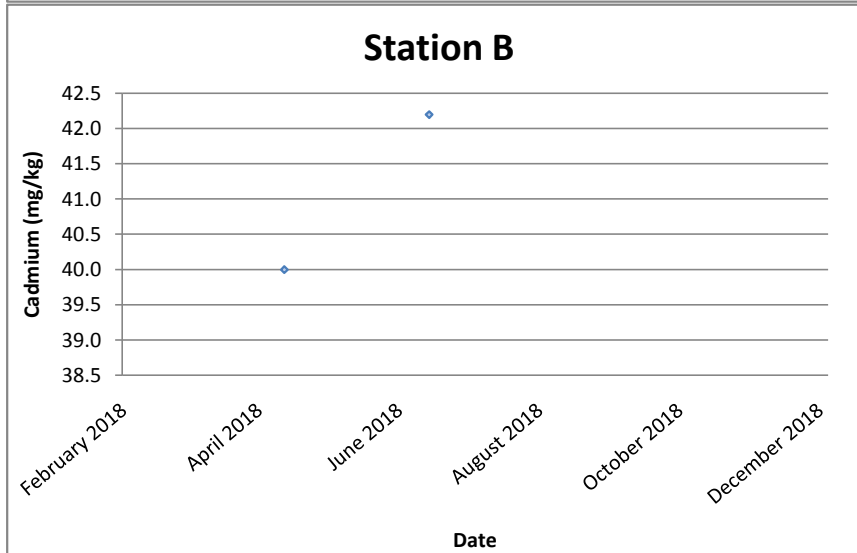
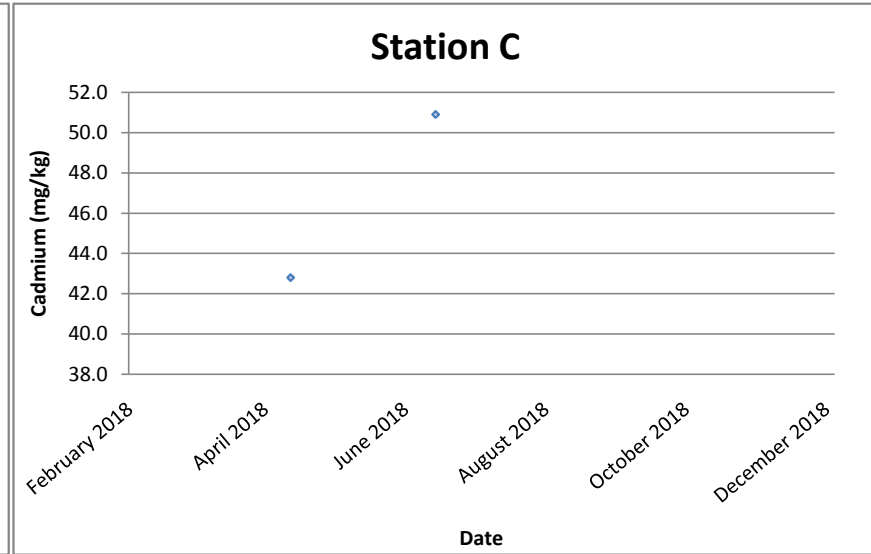
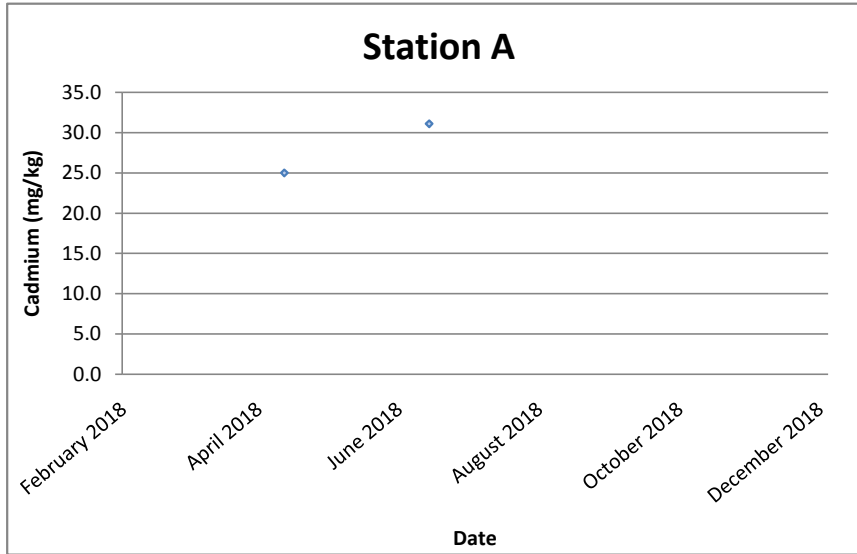
Cadmium (mg/kg)



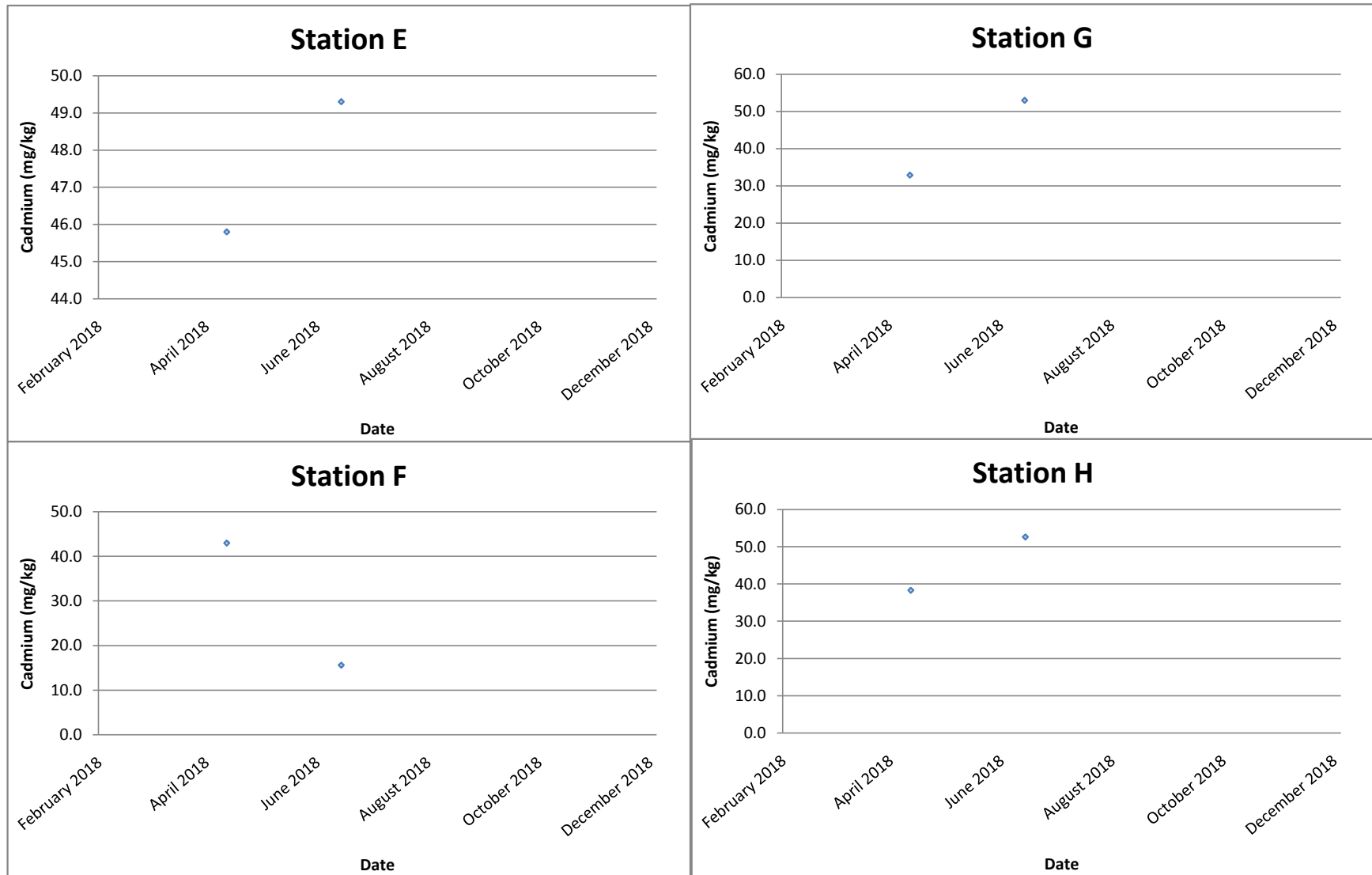
Cadmium (mg/kg)



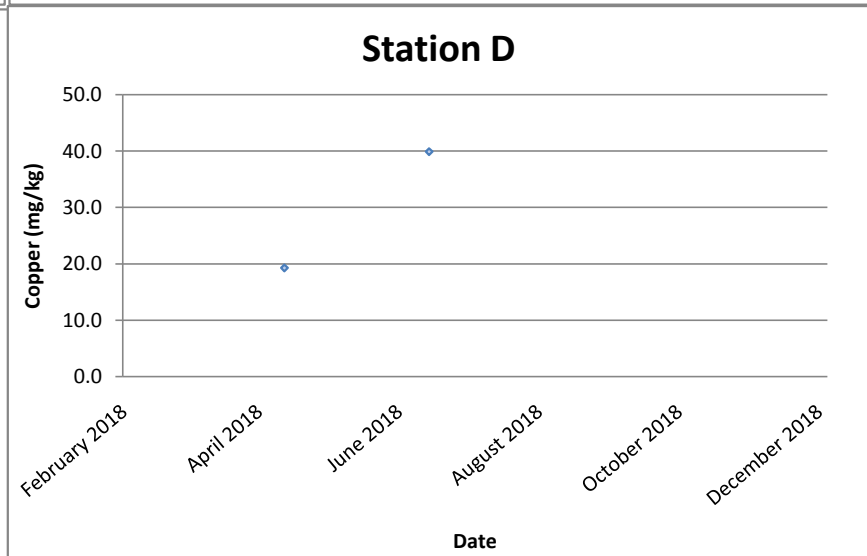
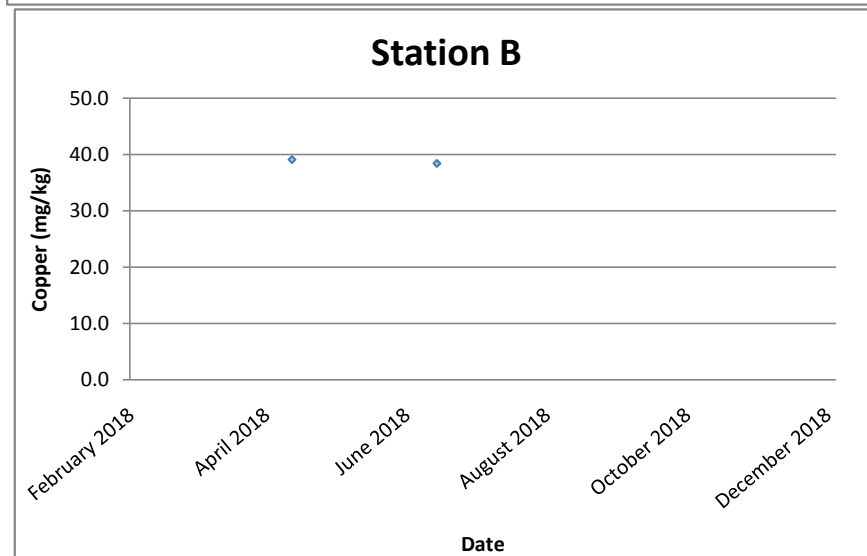
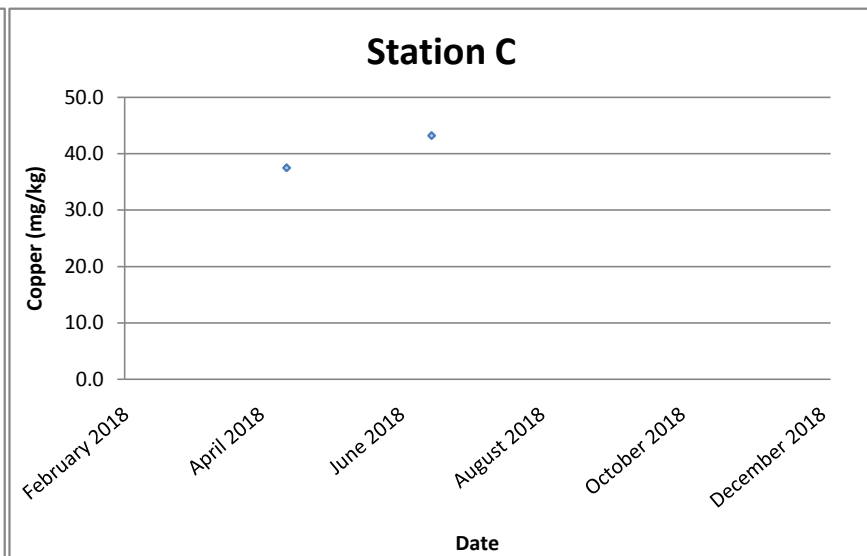
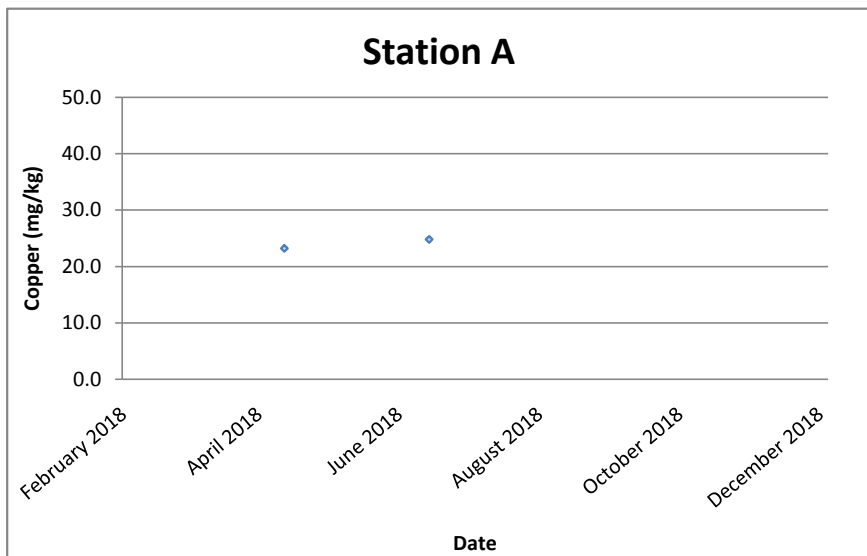
Chromium (mg/kg)



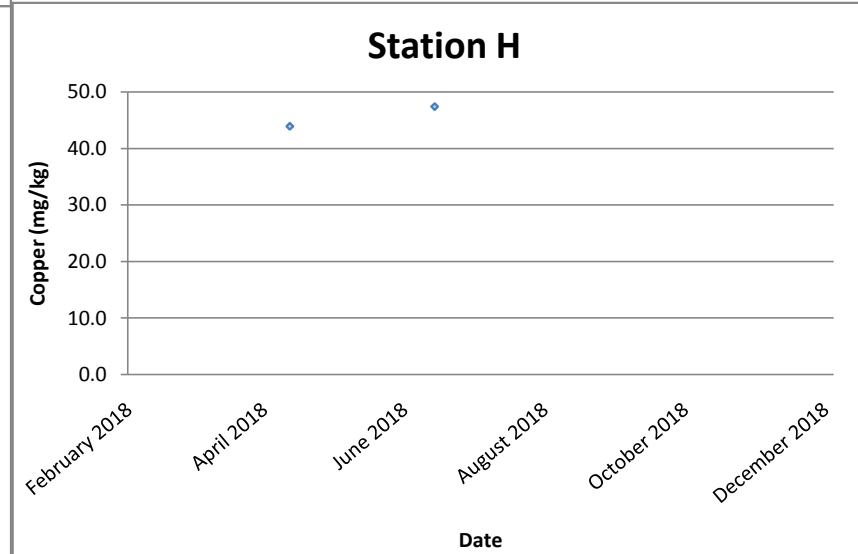
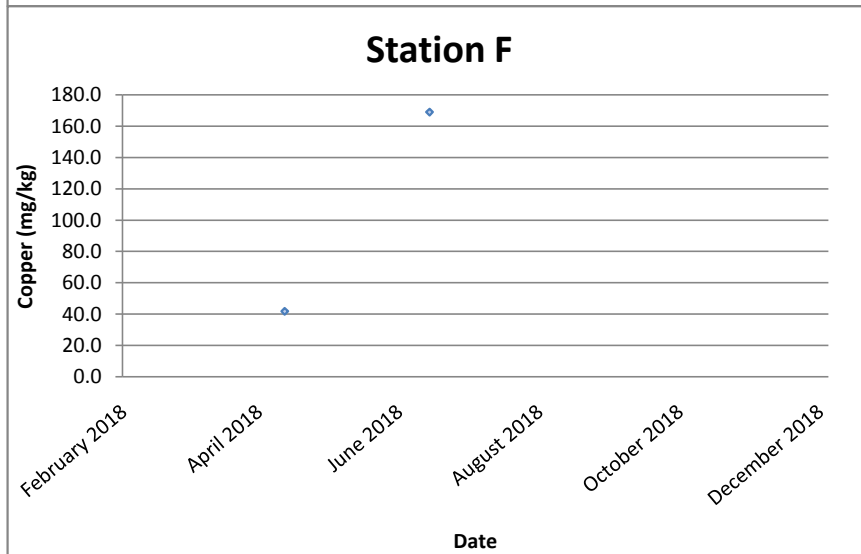
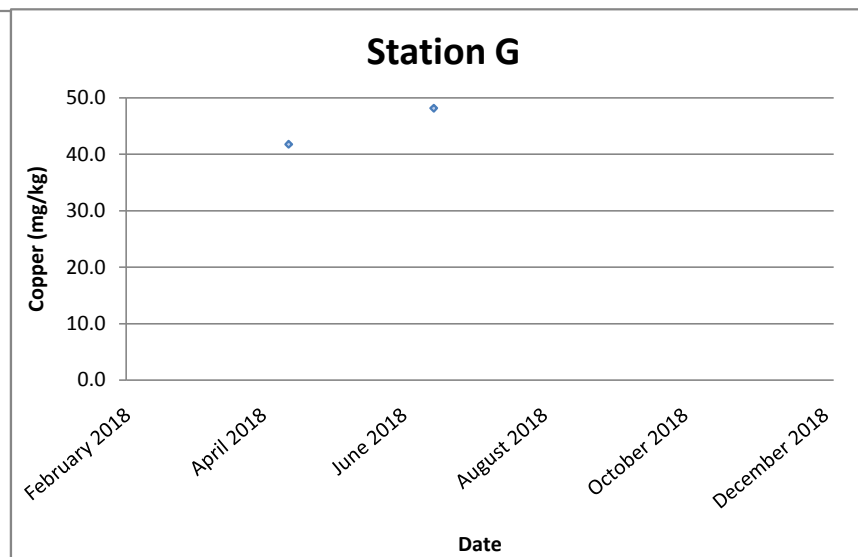
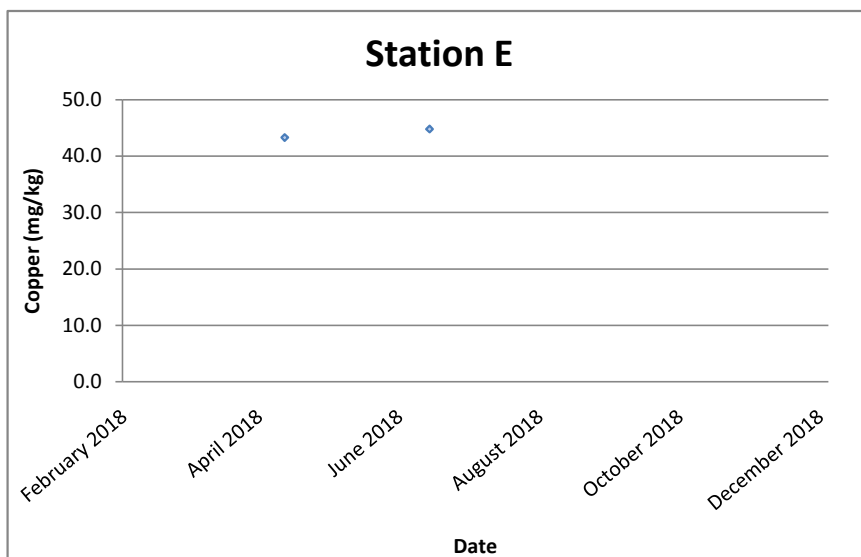
Chromium (mg/kg)



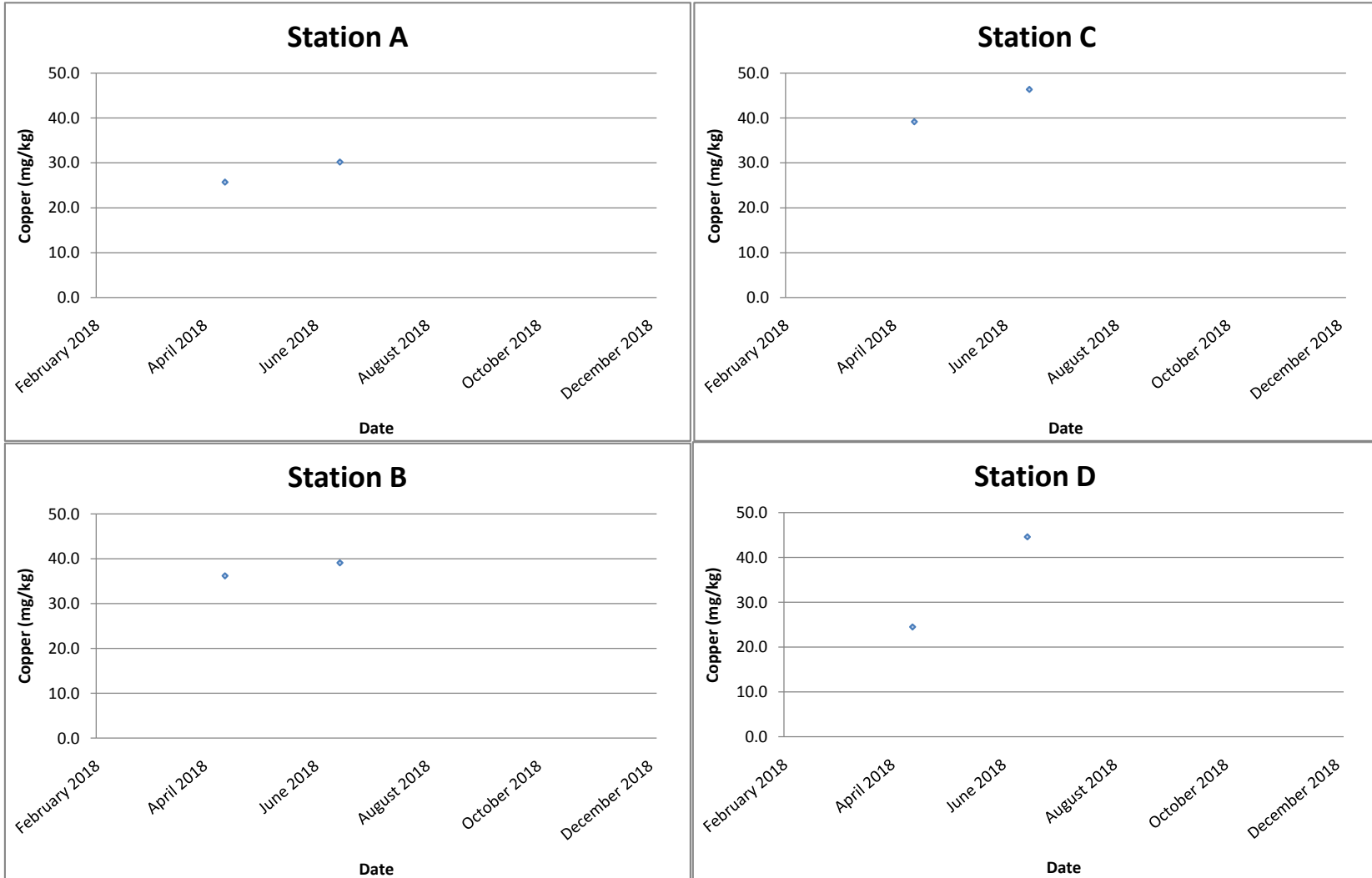
Copper (mg/kg)



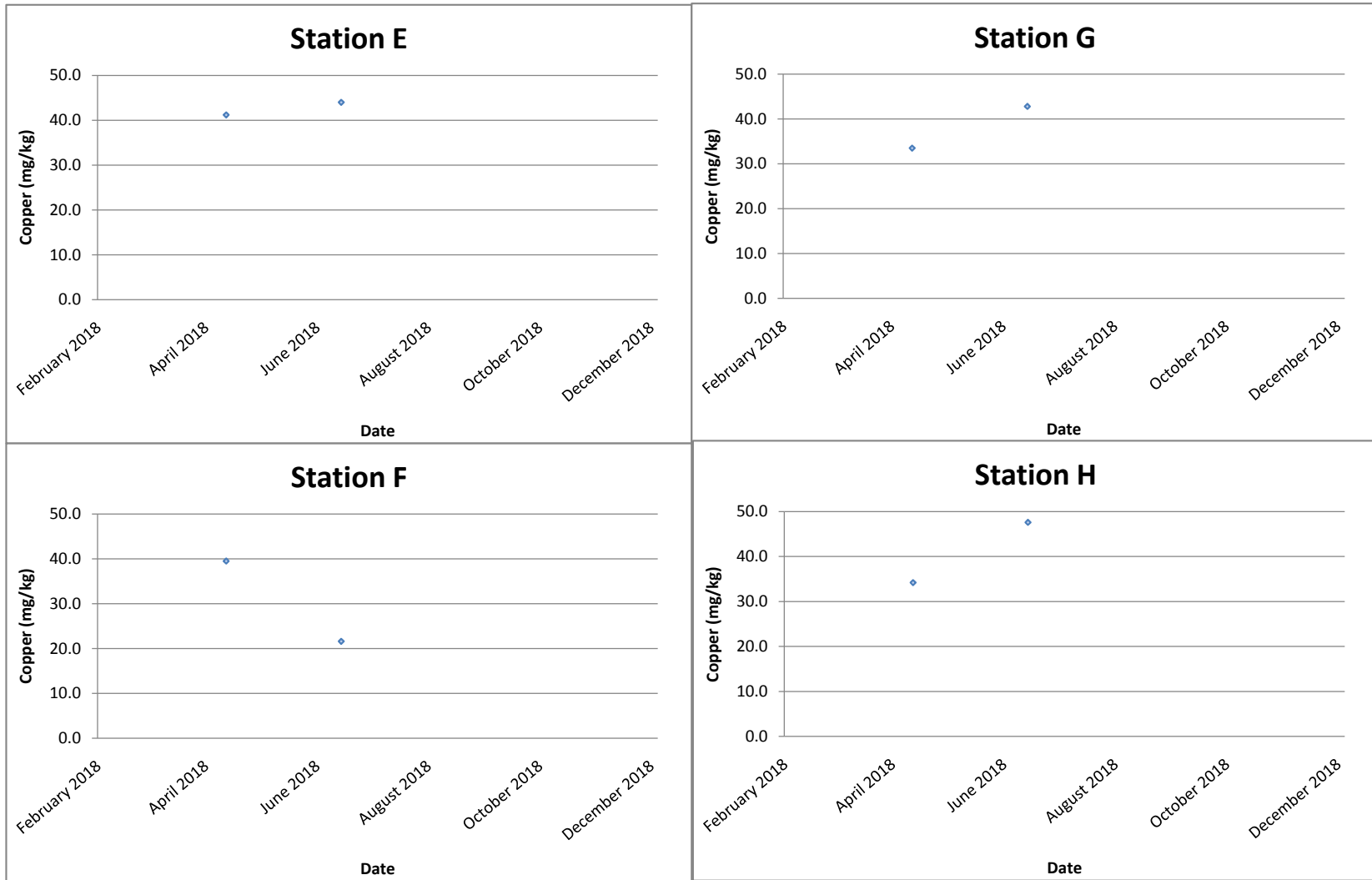
Copper (mg/kg)



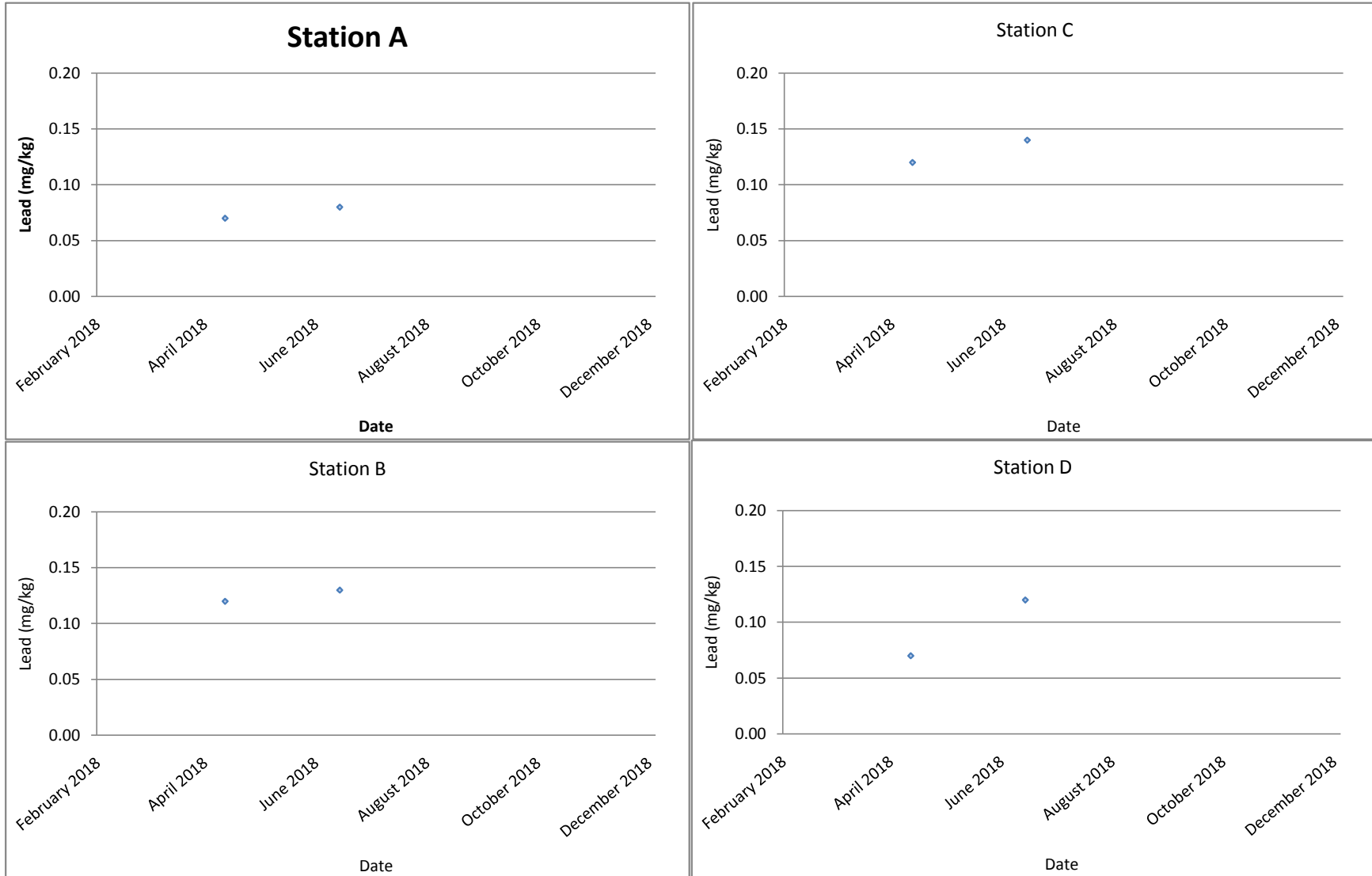
Lead (mg/kg)



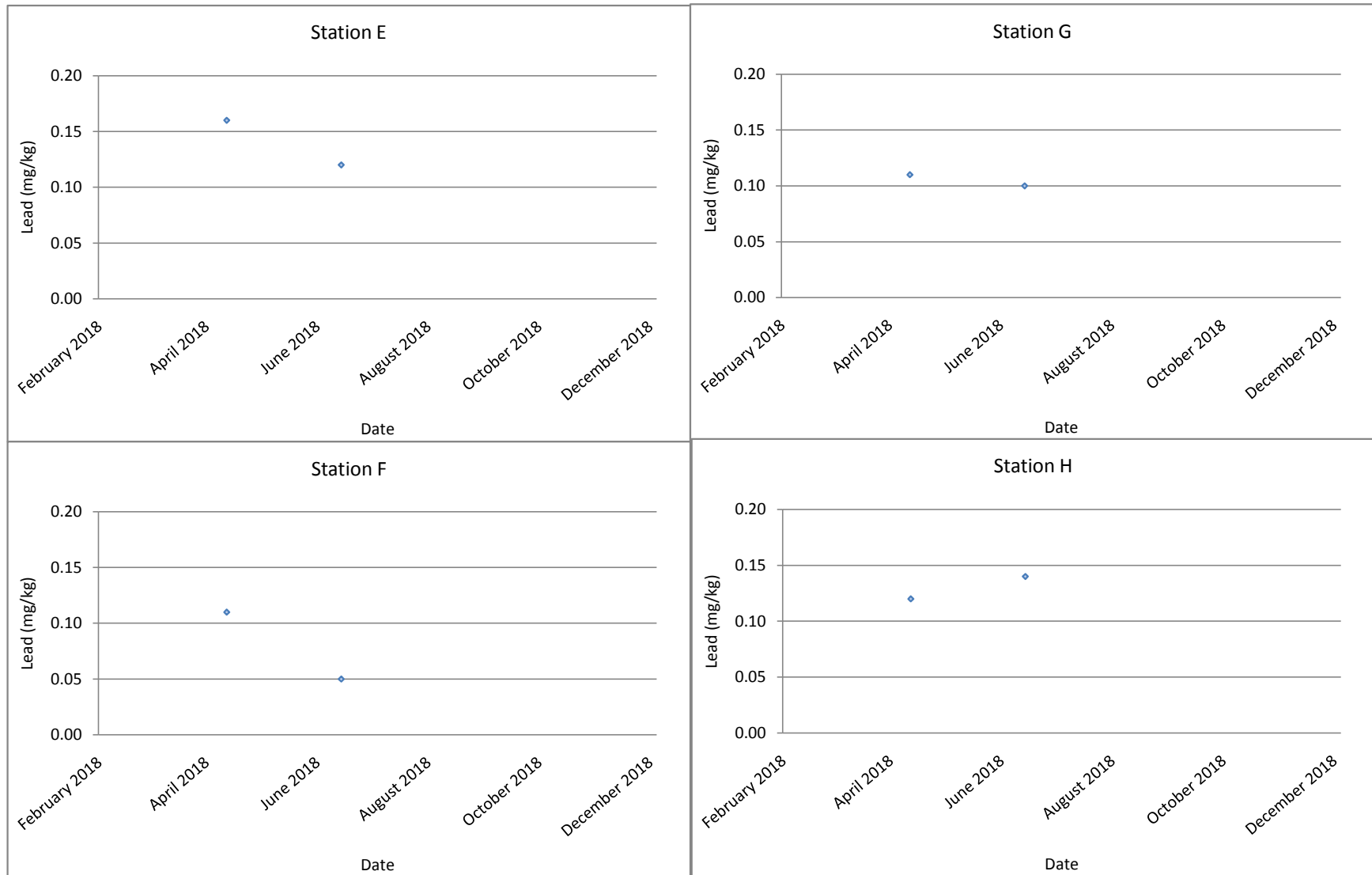
Lead (mg/kg)



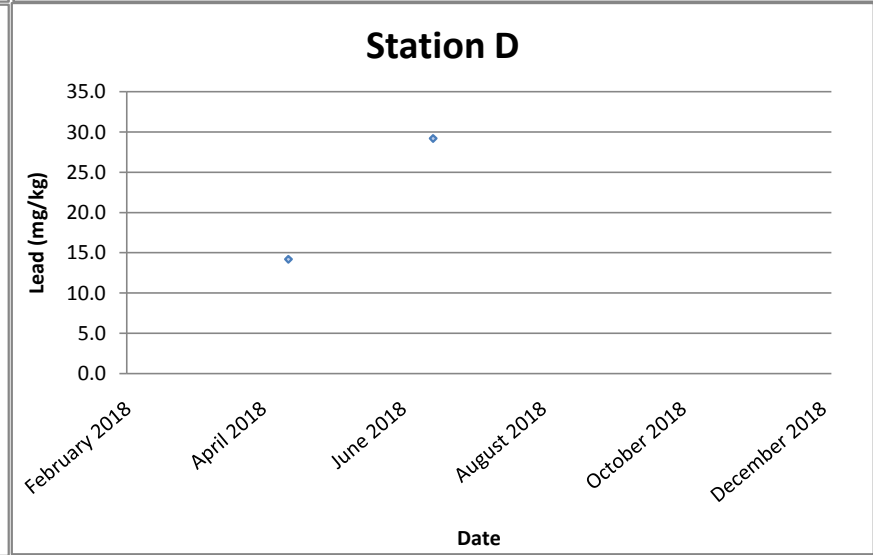
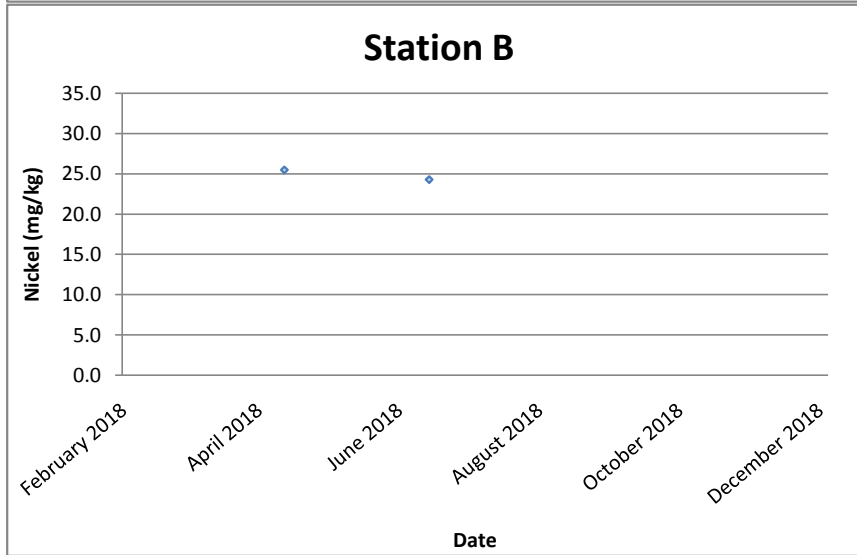
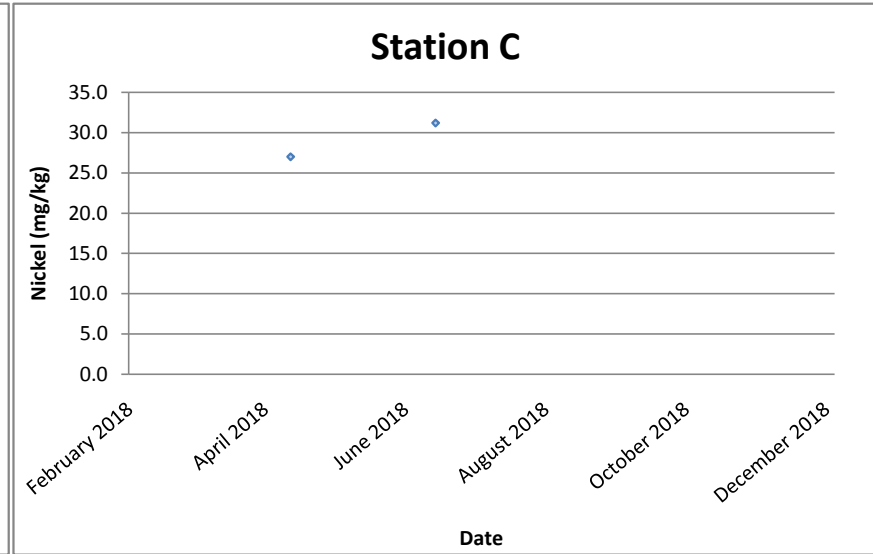
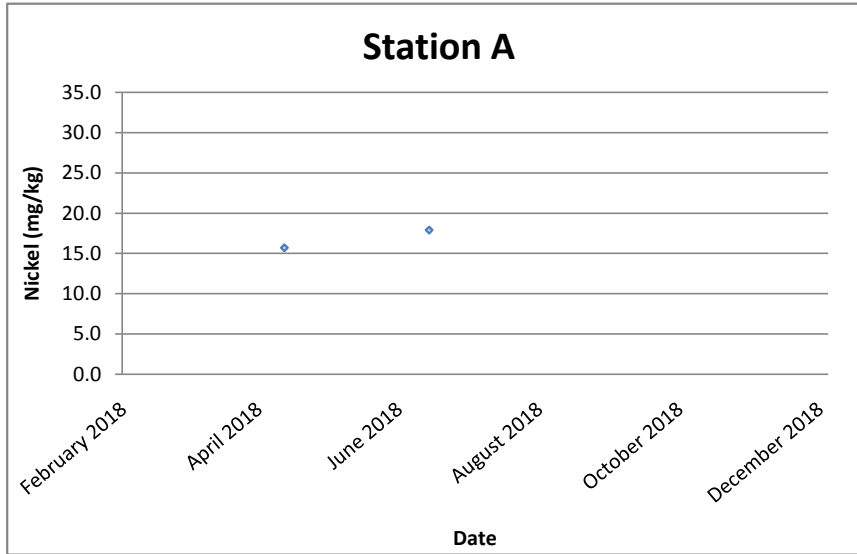
Mercury (mg/kg)



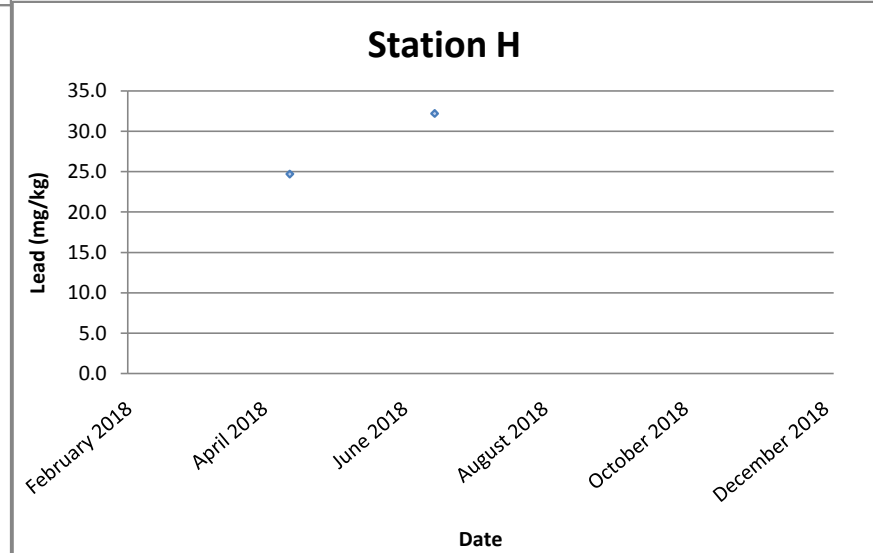
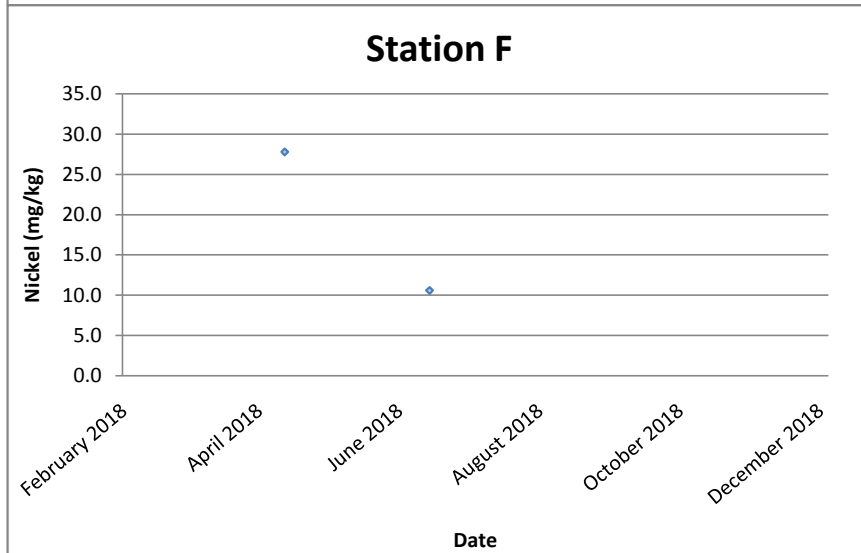
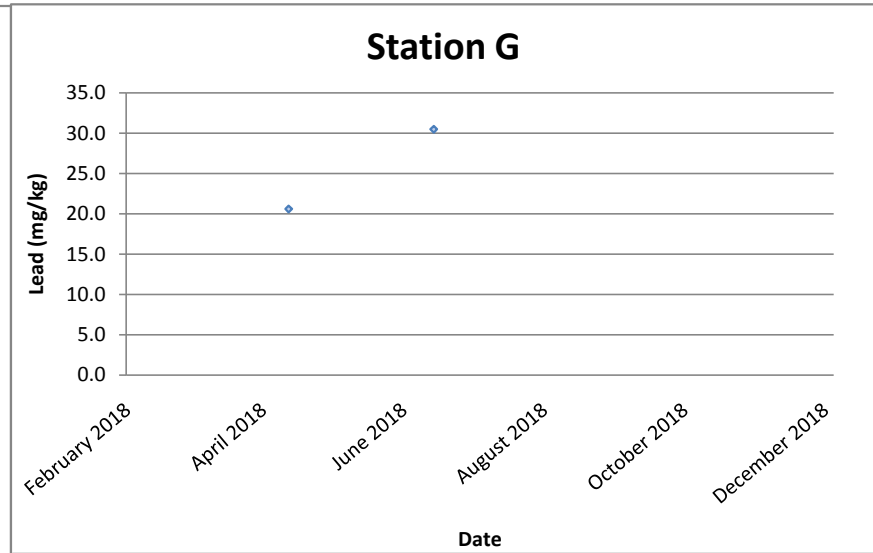
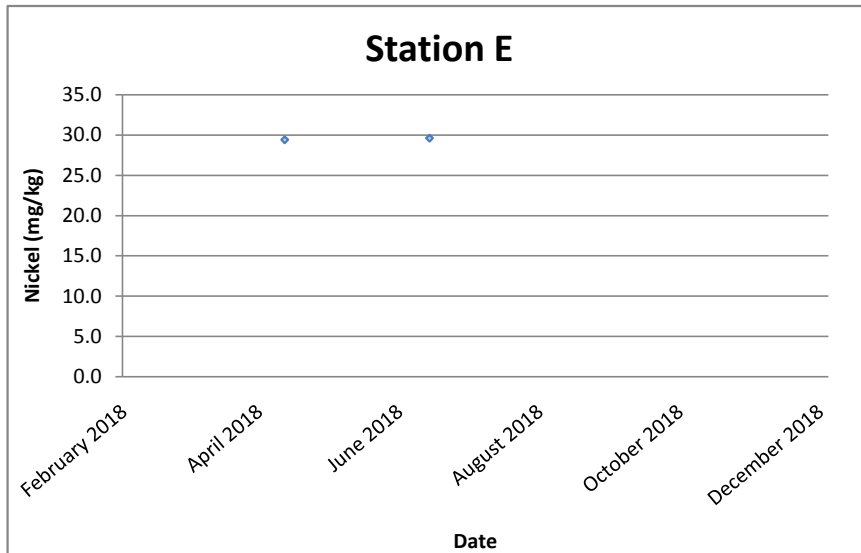
Mercury (mg/kg)



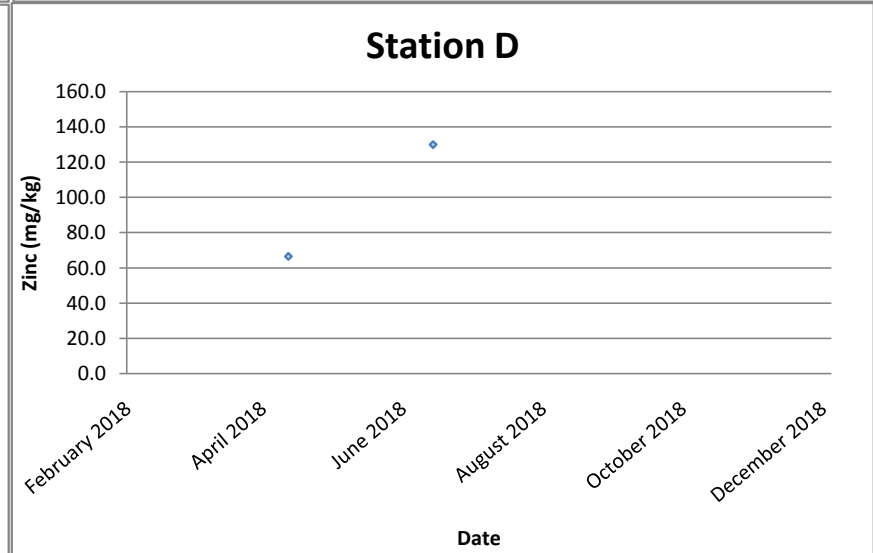
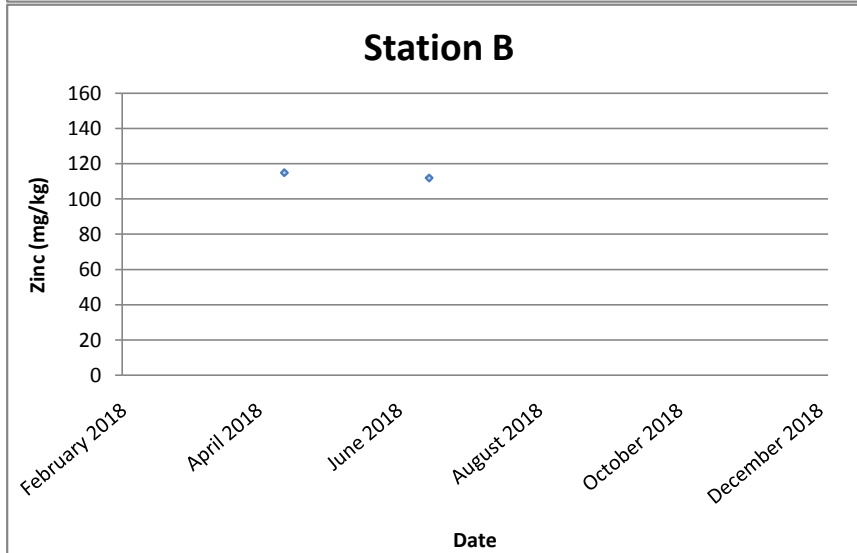
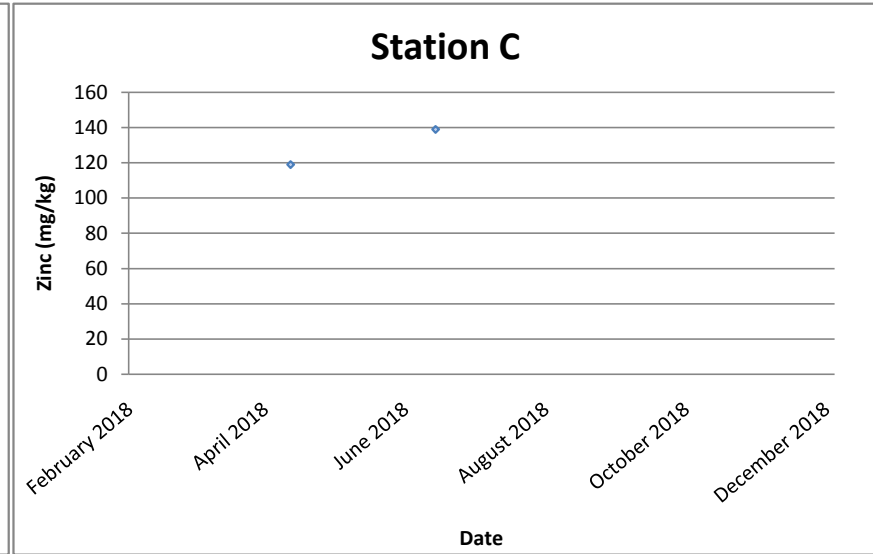
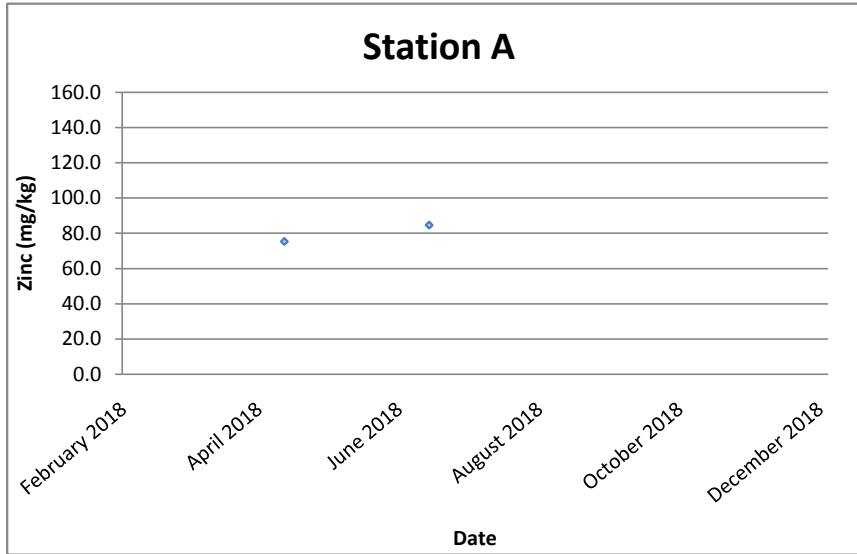
Nickel (mg/kg)



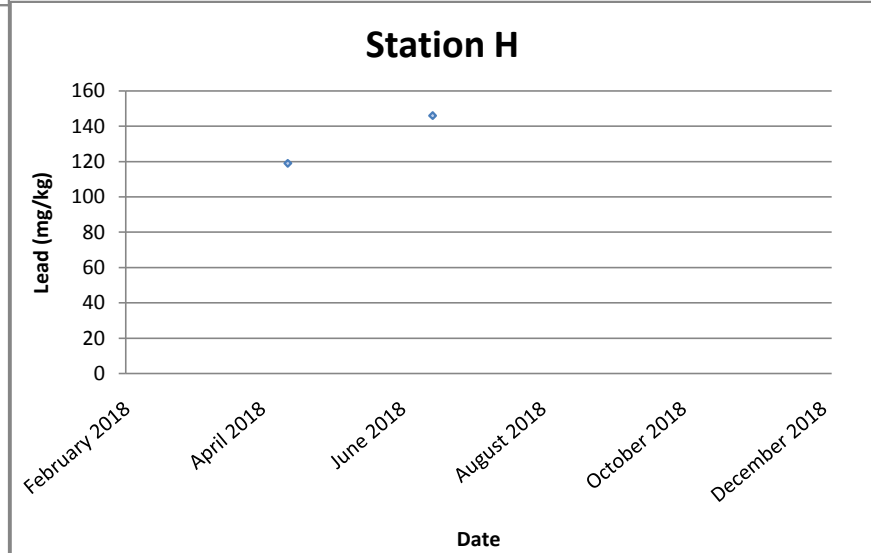
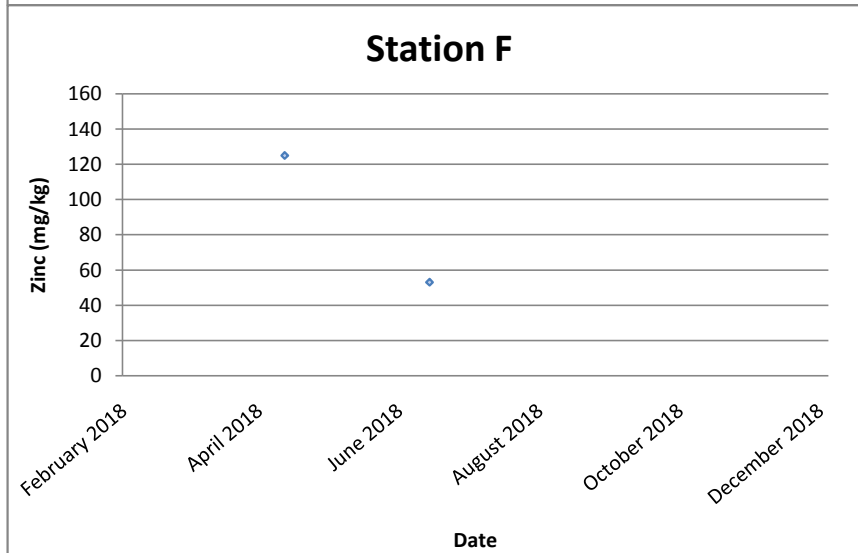
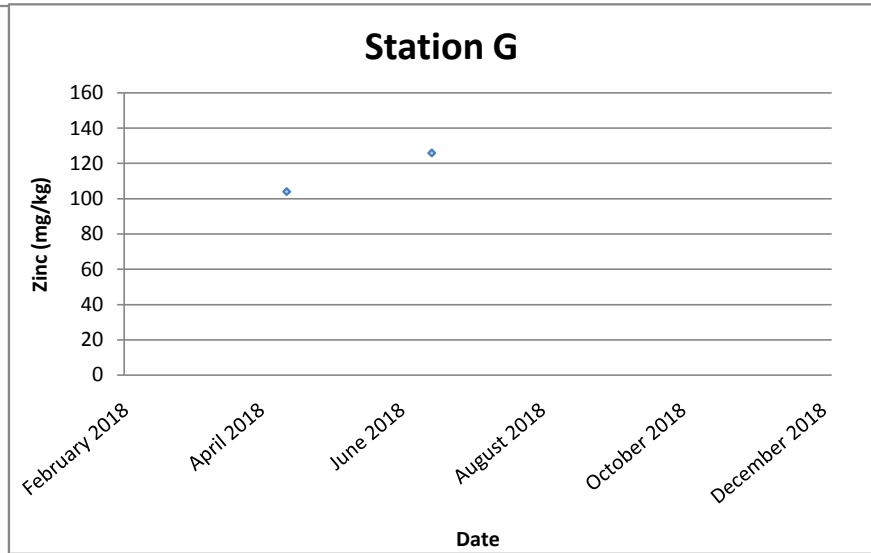
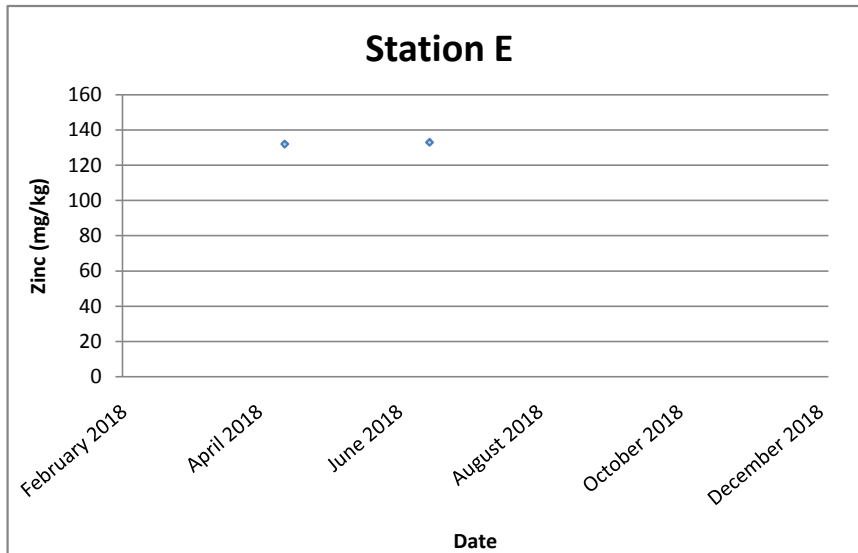
Nickel (mg/kg)



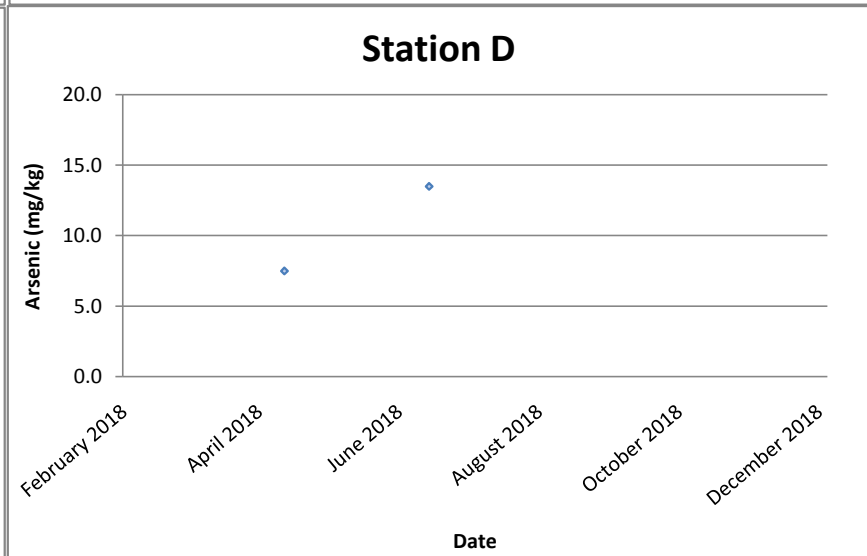
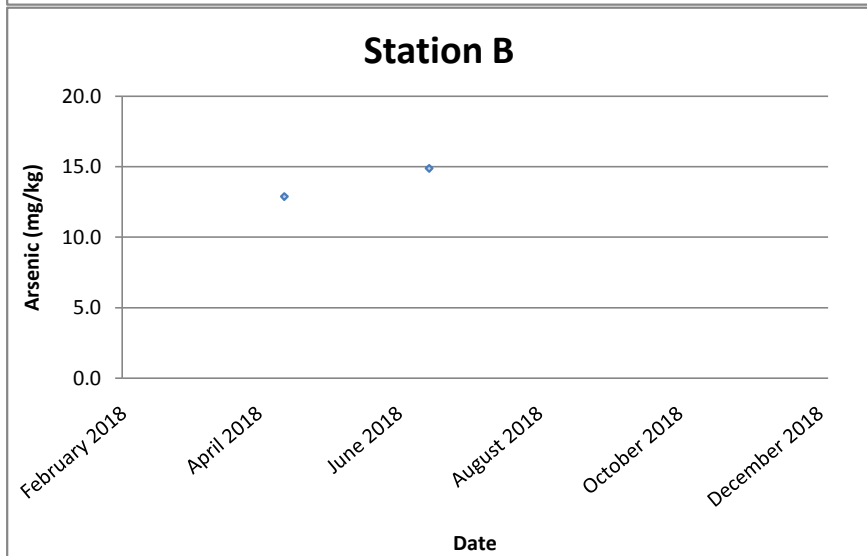
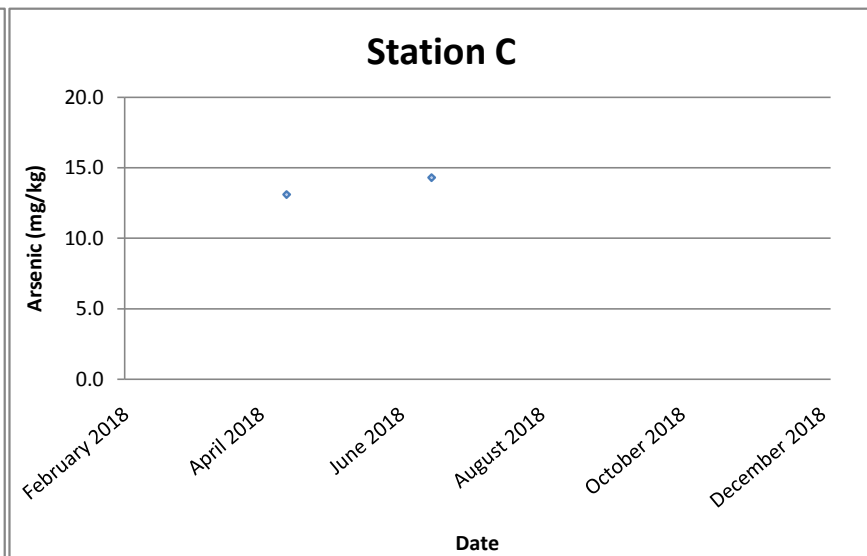
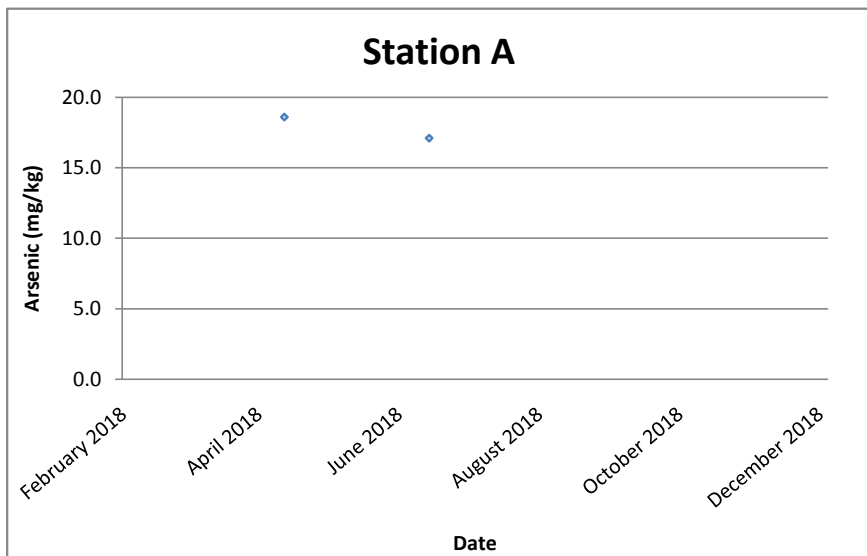
Zinc (mg/kg)



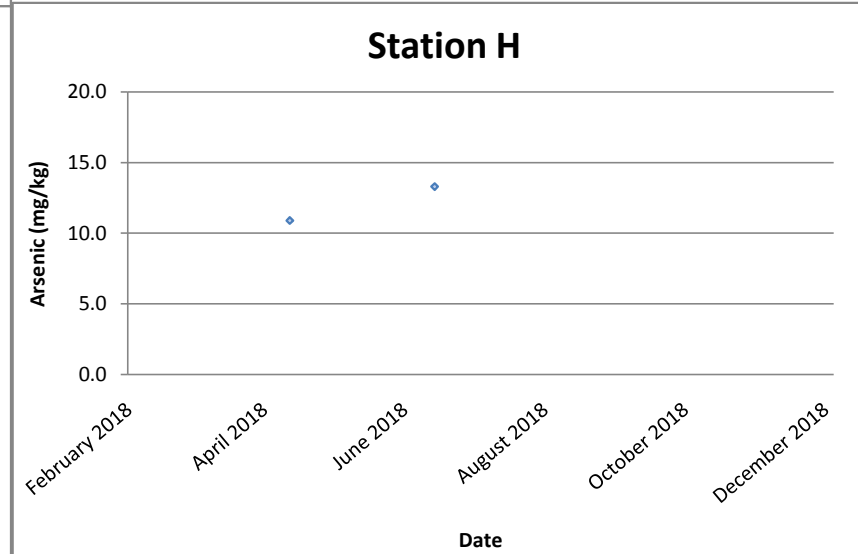
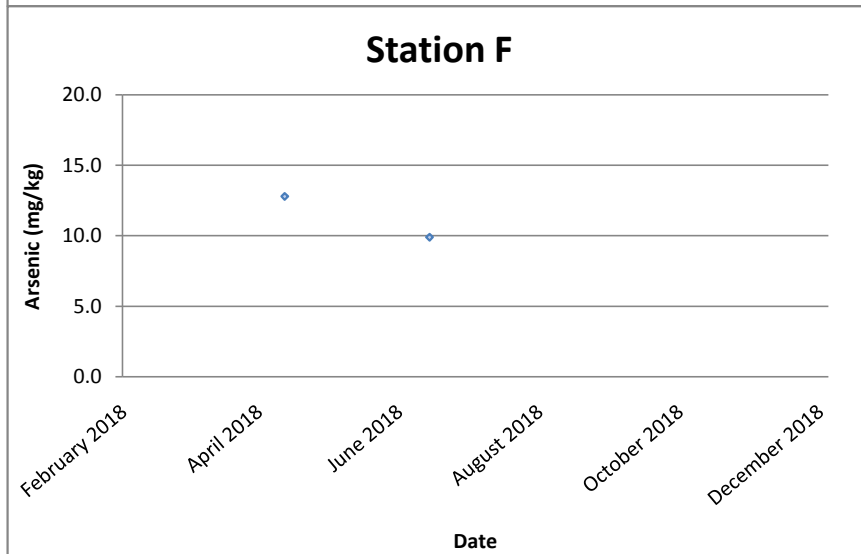
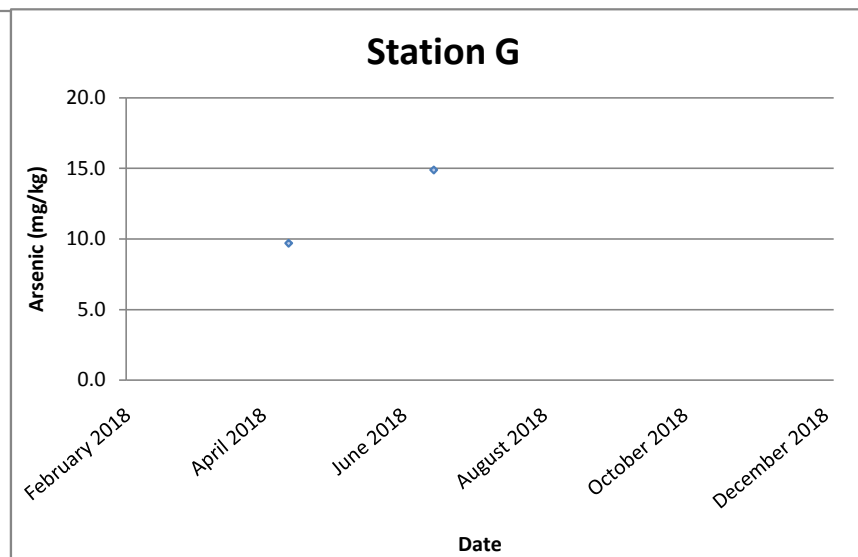
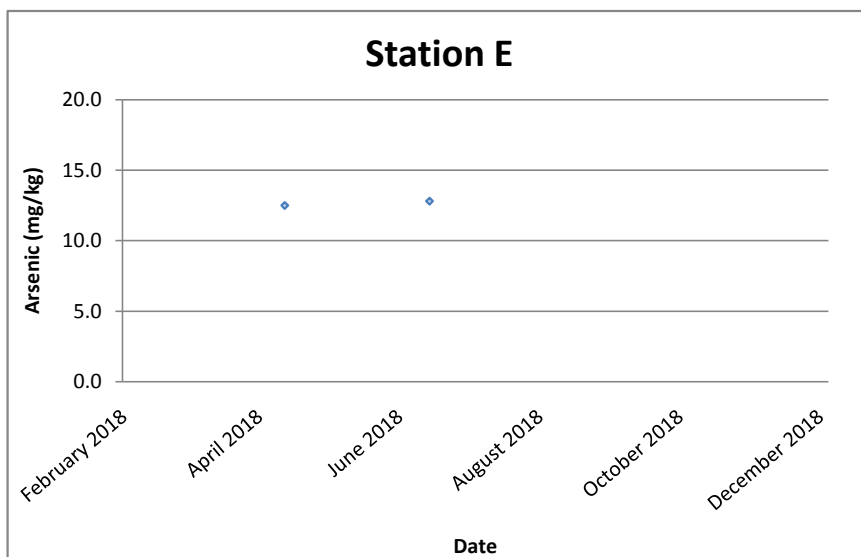
Zinc (mg/kg)



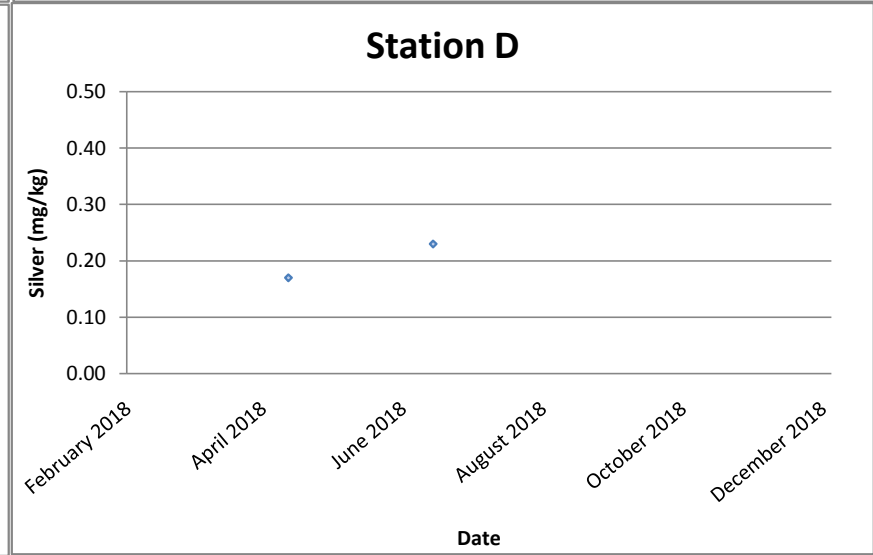
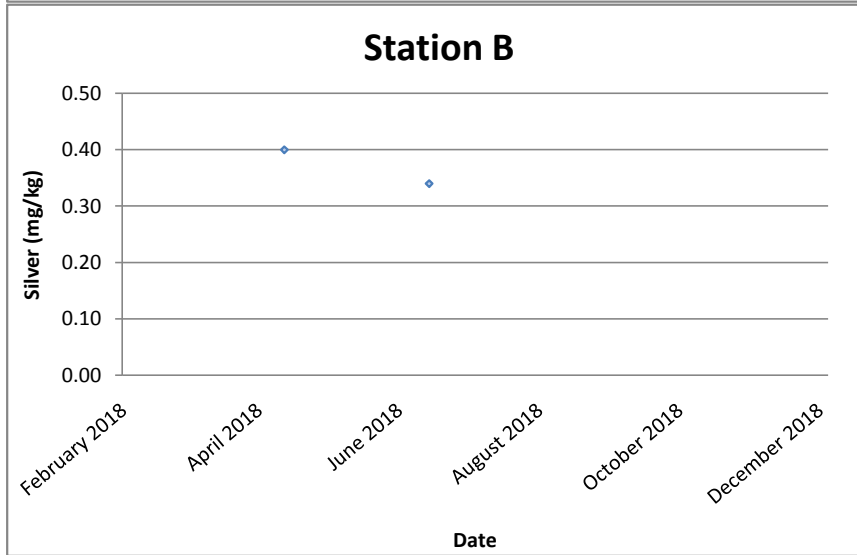
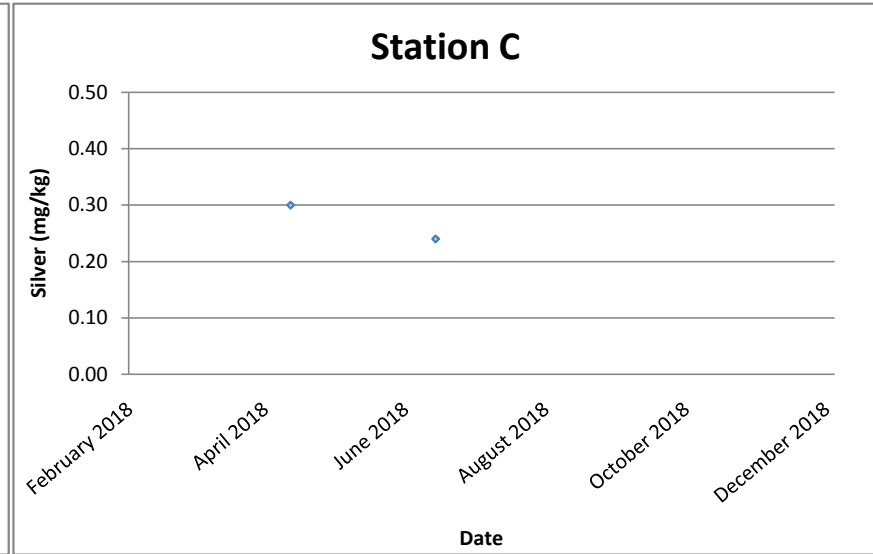
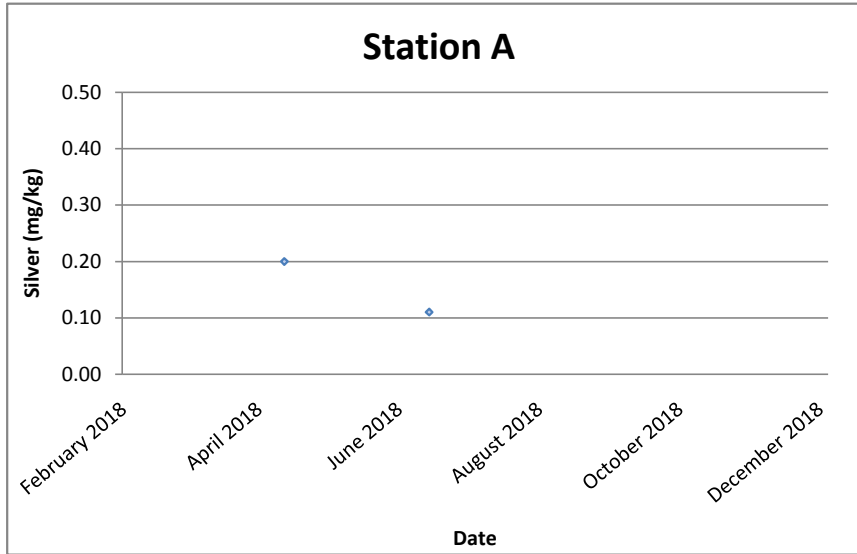
Arsenic (mg/kg)



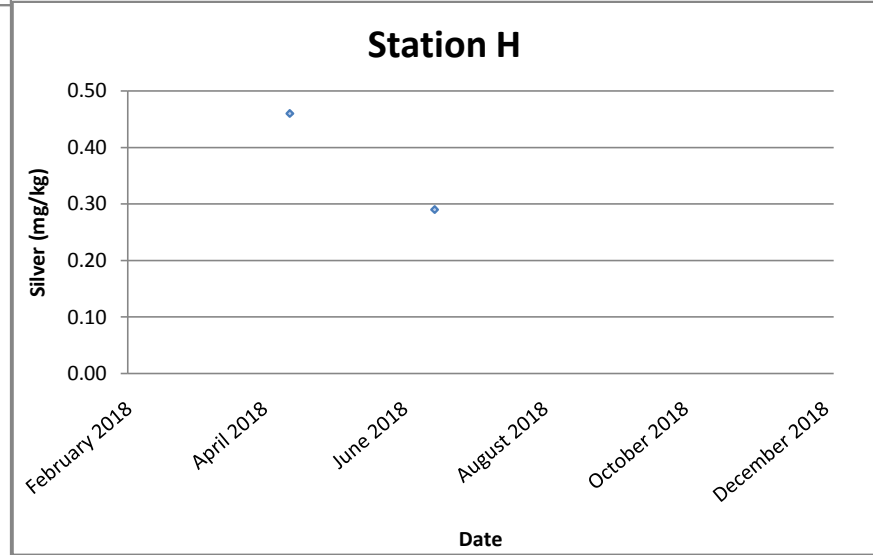
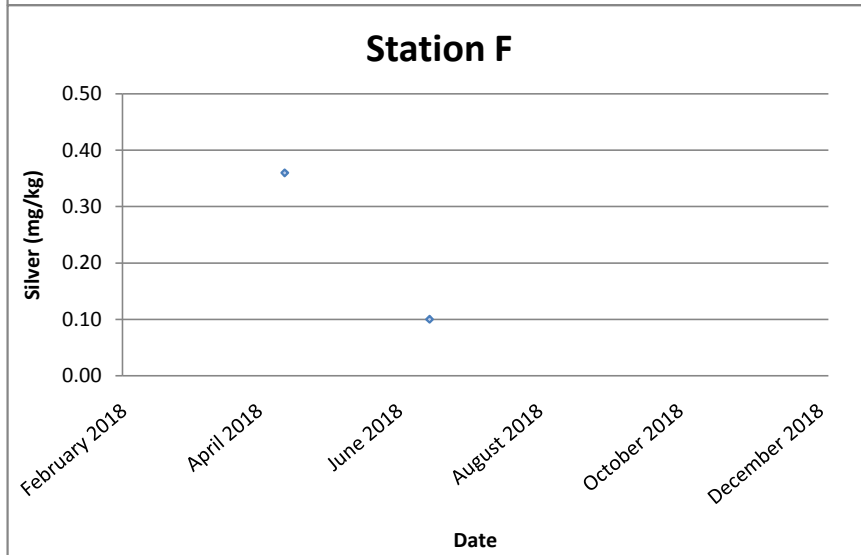
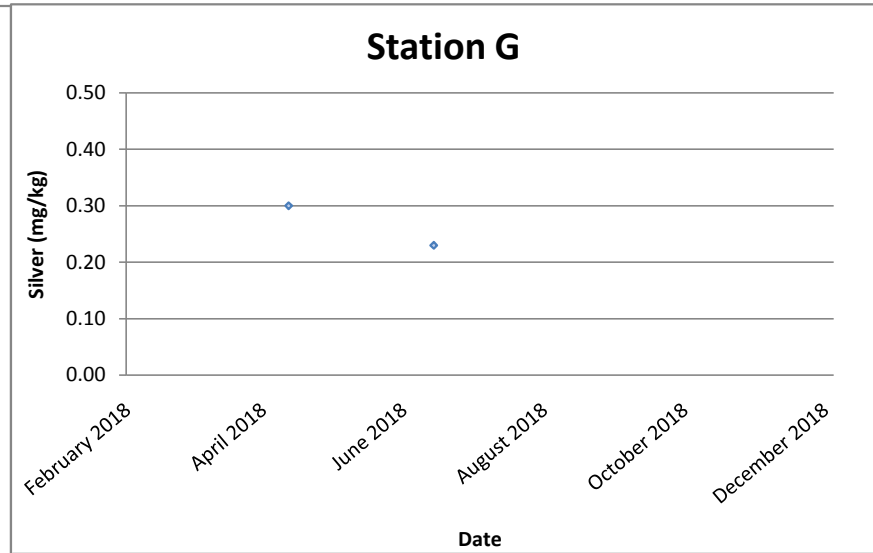
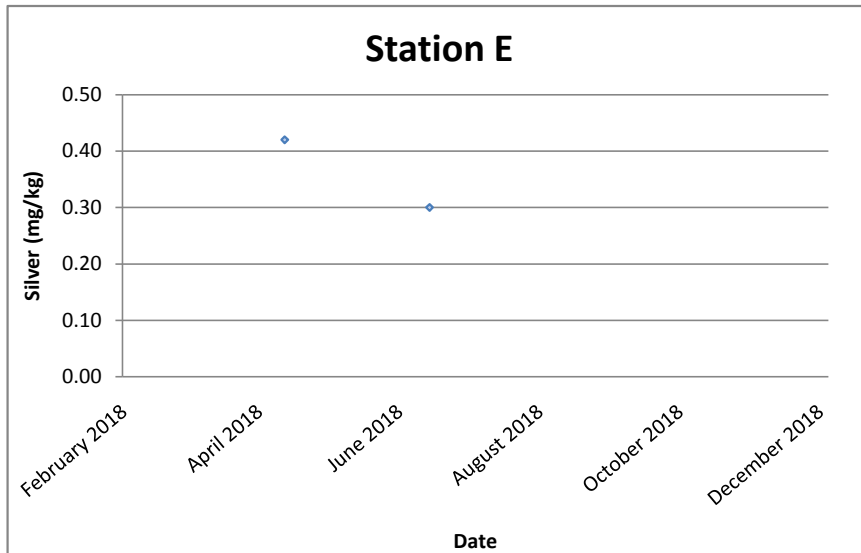
Arsenic (mg/kg)



Silver (mg/kg)



Silver (mg/kg)



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5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
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Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com



Report No.: 0041/17/ED/0330A

Appendix H Benthic Survey Report



Benthic Faunal Monitoring

Conducted in June 2018

Summary Report

Abundance

A total of 249 macrobenthic organisms were collected from the eight monitoring stations during the June 2018 monitoring period. Figure 1 shows the abundance distribution across monitoring periods and stations. Results of the current monitoring remained to be lower compared to the baseline data (August 2004) and showed a decrease in total abundance by 82 individuals (ind.) compared to the April 2018 monitoring results. The current decrease might be attributed to tropical storm Ewiniar that hit Hong Kong about one week before the sampling activities. Wave action brought about by the typhoon might have caused intermediate disturbance in the sampling stations, particularly that these are characteristically shallow waters (11m to 23m) as wave action may affect bottom sediments up to 50m in depth based on studies conducted by Coleman et al. (1997). Bivalves in this monitoring were specifically affected by the perturbations as shown in the significant decrease in their abundance from 167 ind. (April 2018) to only 47 ind. (June 2018).

Highest abundance (62 ind.) was recorded at Station G while the lowest (14 ind.) was at Station F. Relatively high abundance at Station G might be attributed to the moderately sorted sediments characterized by the varying grain sizes at this station. Varying percentages of gravel (21%), sand (36%), silt (23%), and clay (20%) can provide a wide range of niches for benthic organisms to exploit. Furthermore, moderately sorted sediments were observed at Station A where high abundance (43 ind.) was also recorded. On the other hand, the relatively low abundance observed at Station F might be due to the high percentages of silt (60%) and clay (37%) in the substrate indicative of well-sorted sediments. Well-sorted sediments can only offer a smaller range of grain sizes and of interstitial spaces limiting the niches for benthic organisms (Gray 1974); thus, the lower abundances at stations with relatively homogenous grain size distribution. The impact stations (Station C and Station D) remained to have lower abundances compared to the reference stations except for Station F. Similar to Station F, sediments in Stations C and D were characterized by higher percentages of silt and clay.

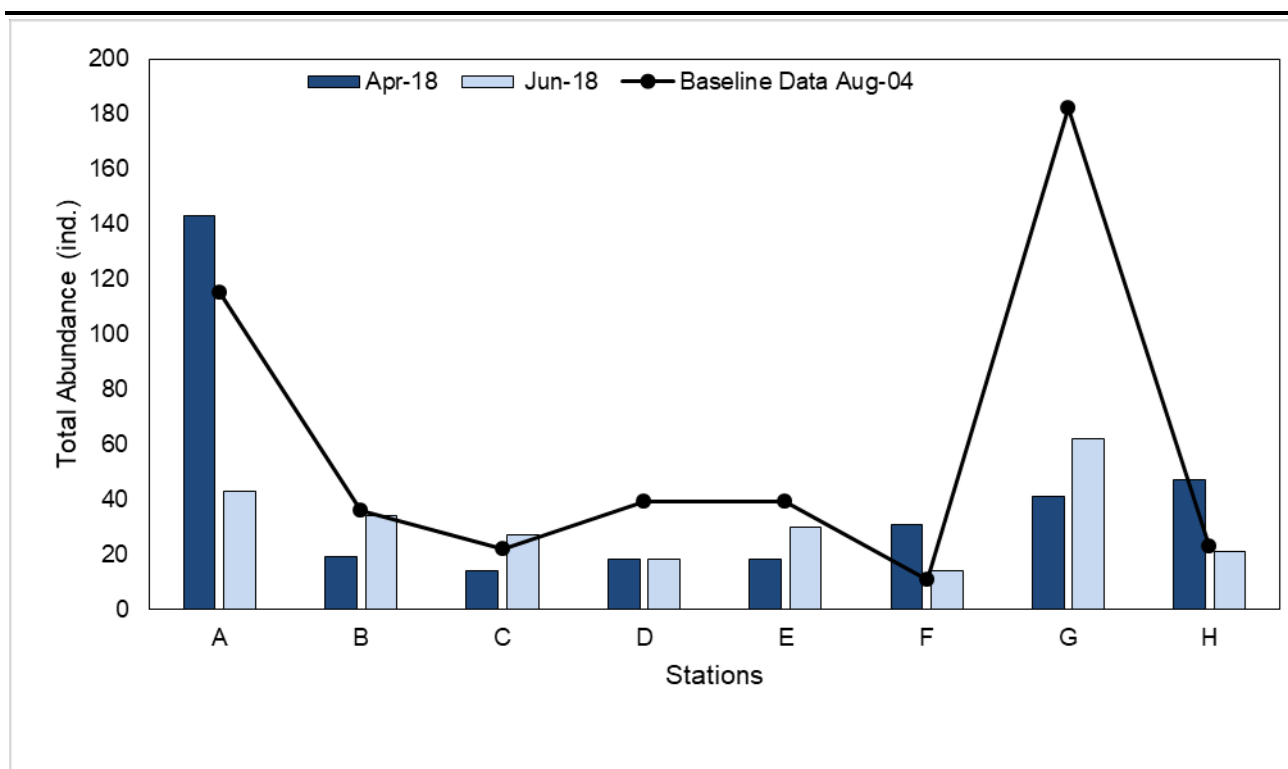


Figure 1. Total abundance (ind.) of benthic organisms

Biomass

The total wet biomass for all the eight monitoring stations during the June 2018 monitoring period was 125.11 g, which is 106.06 g less than the biomass recorded during the April 2018 monitoring period but remained higher compared to the baseline data. Figure 2 shows the biomass distribution across monitoring periods and stations. The decrease in biomass (from April 2018 to June 2018) might be attributed to the parallel decline in the abundance of bivalves.

The highest and lowest total biomass continued to be observed in Station A (55.00 g) and Station C (0.35 g), respectively. Highest biomass remained at Station A because the bivalve, *Ruditapes philippinarum*, continued to contribute significantly in the total biomass due to their larger sizes despite the decline in their abundance. Biomass at impact stations (Stations C and D) remained to be low together with Station F (2.6 g), Station B (3.3 g), and Station G (5.1 g) as these stations were dominated by smaller organisms (i.e. annelids).

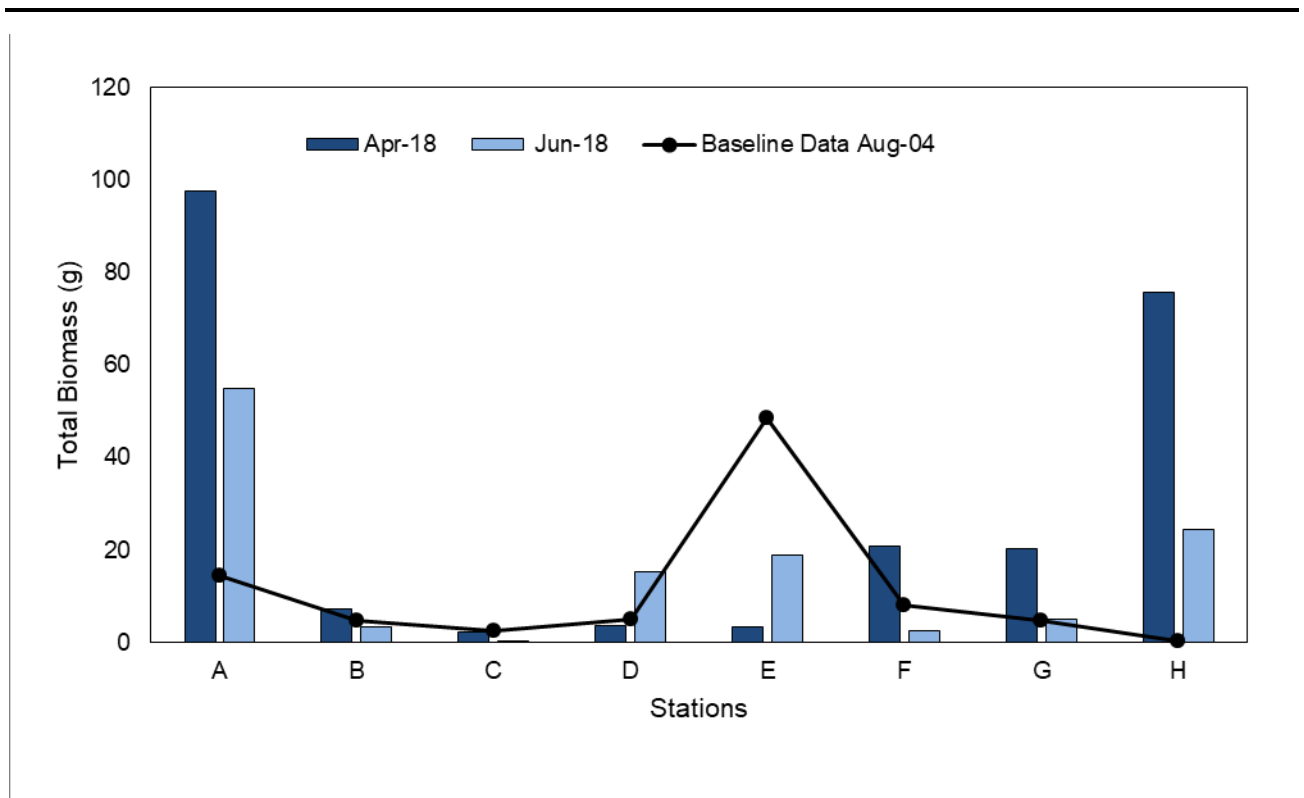


Figure 2. Total biomass (g) of benthic organisms

Taxonomic Composition

A total of eight phyla comprised of 41 families and 53 taxa were identified during the June 2018 monitoring period. Compared to the April 2018 monitoring period, there was an increase (12 taxa) in the total number of taxa identified. This can be attributed to the increase in the number of annelid species that have been identified. With the increase in the number of their species and abundance and the decrease in the abundance of bivalves, annelids (polychaetes) dominated the current benthic assemblages comprising about 53.01% of sampled population (Figure 3). The intermediate disturbance in the form of wave action generated by the typhoon might have cleared existing habitats providing opportunities for smaller benthic organisms such as polychaetes to colonize the area. A study shows that disturbance generated by episodic strong currents ('benthic storms') was linked to high species dominance by polychaetes (58-64% ampharetids), bivalves, isopods and tanaids (Thistle et al.1985).

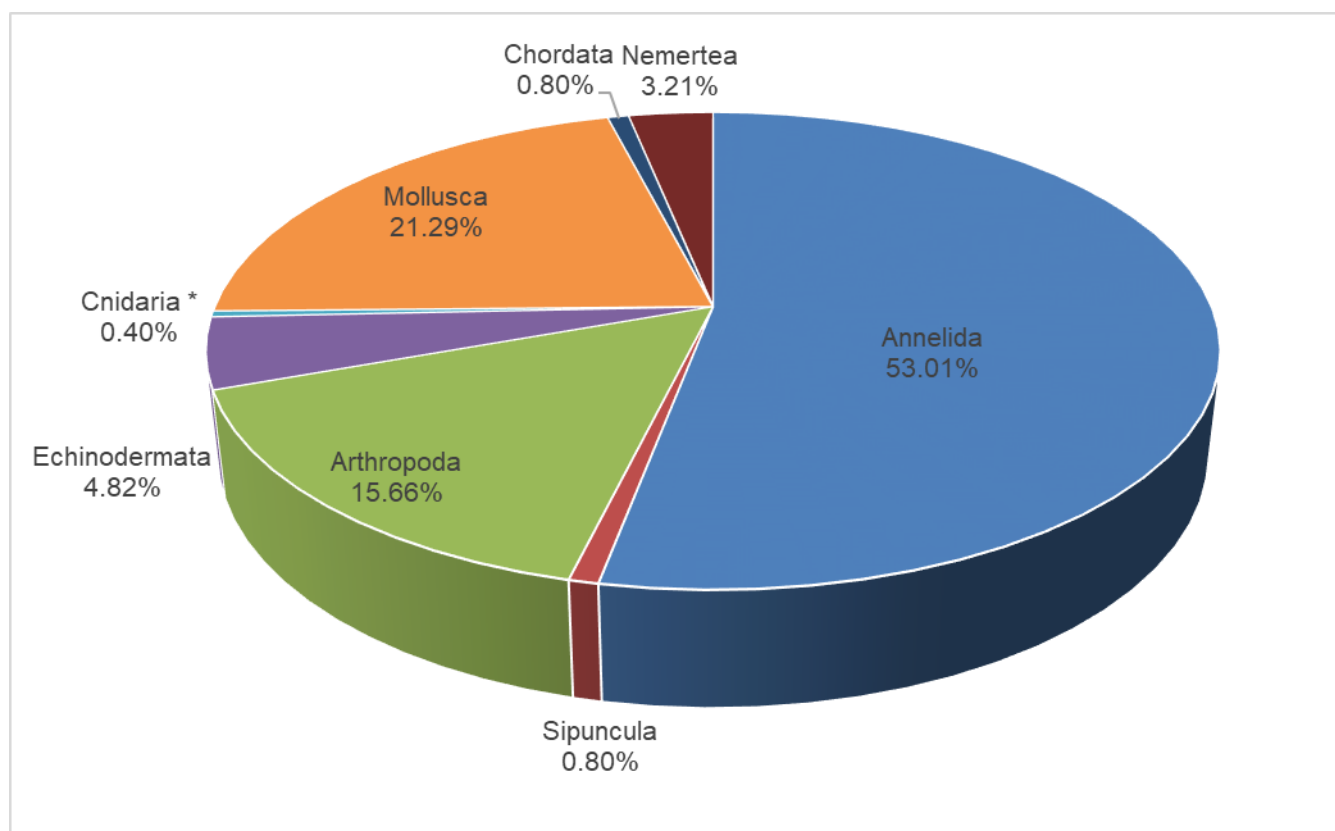


Figure 3. Percent composition of benthic organisms collected in the eight monitoring stations, June 2018

The current benthic assemblage is observed to be similar with the baseline data (August 2004) which were both dominated by polychaetes. However, during the baseline study capitellid and cirratulid were the dominant polychaetes which indicates unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000). For the present monitoring period Nephyidae were the most abundant group.

Station G had the highest number of taxa (26) identified and the most number of polychaete taxa. As aforementioned, the more distributed grain sizes in this station provided a wide range of habitat for the organisms to colonize, particularly after an intermediate disturbance. Impact stations (Station C and D) remained to harbour relatively fewer taxa.

Diversity

Diversity indices (H') for the June 2018 monitoring period ranged from very low (1.53 at Station A) to moderate (2.88 at Station G). Compared to the baseline and April 2018 monitoring periods, increase

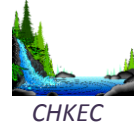
in diversity was observed. The slight improvement in diversity as aforementioned might be due to the colonization of opportunistic species of the cleared habitats due to the natural disturbance brought about by the typhoon.

Station G showed moderate diversity as it has the most variable substrate type which can support a diverse benthic community as shown by the highest number of taxa identified in this station. Station E also exhibited moderate diversity. The very low diversity, on the other hand in Station A, might be attributed to the dominance of the bivalve, *R. philippinarum*, which also explains the low Evenness (J) index at this station. *R. philippinarum* was most abundant in Station A as this species prefers sandy substrate, which is the natural characteristic of this station prior to the re-working of sediments of typhoon Ewiniar. The remaining stations, including the impact Stations C and D, remained to have low diversity. Furthermore, all stations but Station A showed homogenous benthic communities as showed by their high Evenness (J) Index.

Data summaries are shown in Appendix A and representatives of taxa identified are in Appendix B.

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Approved by Supervisor

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Signature of Supervisor : 

Name and Position of Supervisor: Dr. Mark Shea, Senior Ecology Consultant

Date: June 30, 2018



Appendix A: Data Summaries

Summary of Benthic Survey Data (June 2018)

Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	43	55.00	12	1.53	0.62
B	34	3.33	13	2.20	0.86
C*	27	0.35	13	2.39	0.93
D*	18	15.44	11	2.27	0.95
E	30	18.80	19	2.64	0.90
F	14	2.64	10	2.17	0.94
G	62	5.05	26	2.88	0.88
H	21	24.48	10	2.15	0.93
TOTAL	249	125.11	53		

*Impact Sites

Summary of Benthic Survey Baseline Data (August 2004)

Stations	Abundance	Total Biomass	Number of Taxa	Diversity (H')
A	115	14.56	24	0.93
B	36	4.76	14	0.89
C*	22	2.66	13	0.80
D*	39	5.07	11	0.62
E	39	48.69	16	0.89
F	11	8.07	9	0.68
G	182	4.91	31	1.10
H	23	0.49	11	0.81

*Impact Sites

Taxonomic Composition (%) of Benthic Survey

Taxonomic Composition	Aug-04	Apr-18	Jun-18
Annelida	73.29	31.12	53.01
Sipuncula	0.21	0.30	0.80
Arthropoda	18.80	13.60	15.66
Echinodermata	3.63	15.11	4.82
Cnidaria *	0.43	0.60	0.40
Mollusca	3.42	50.45	21.29
Chordata	0.21	2.11	0.80
Nemertea	0	0.30	3.21

Taxonomic Composition (abundance) of Benthic Survey

Taxonomic Composition	Aug-04	Apr-18	Jun-18
Annelida	343	103	132
Sipuncula	1	1	2
Arthropoda	88	45	39
Echinodermata	17	5	12
Cnidaria *	2	2	1
Mollusca	16	167	53
Chordata	1	7	2
Nemertea	-	1	8
Grand total	468	331	249



Composition, Abundance, and Percent Composition of Benthic Communities June 2018

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations									
					Abundance								Total	% Composition
					A	B	C	D	E	F	G	H		
Annelida	Polychaeta	Aciculata	Glyceridae	<i>Glycera</i>	0	0	0	0	1	0	0	2	3	1.20
Annelida	Polychaeta	Canalipalpata	Chaetopteridae	<i>Chaetopterus</i>	0	0	1	0	0	0	0	0	1	0.40
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella(C.capitata)</i>	2	0	1	0	2	1	5	0	11	4.42
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella</i>	0	0	0	0	0	1	0	0	1	0.40
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Mediomastus</i>	0	3	3	0	0	0	1	0	7	2.81
Annelida	Polychaeta	Eunicida	Eunicidae	<i>Eunice(E. indica)</i>	0	0	0	0	0	0	1	0	1	0.40
Annelida	Polychaeta	Eunicida	Lumbrineridae	<i>Lumbrinereis</i>	0	0	0	0	0	1	1	0	2	0.80
Annelida	Polychaeta	Phyllodocimorpha	Goniadidae	<i>Glycinde</i>	0	0	0	0	0	0	0	2	2	0.80
Annelida	Polychaeta	-	Cossuridae	<i>Cossurella(C. aciculata)</i>	0	1	2	0	0	0	0	0	3	1.20
Annelida	Polychaeta	Phyllodocida	Acoetidae	<i>Polyodontes (P. melanonotus)</i>	0	0	0	1	0	0	0	0	1	0.40
Annelida	Polychaeta	Phyllodocida	Hesionidae	<i>Hesion(H. intertexta)</i>	0	0	0	0	1	0	1	0	2	0.80
Annelida	Polychaeta	Phyllodocida	Nereidae	<i>Nereis</i>	1	0	0	0	1	0	0	0	2	0.80
Annelida	Polychaeta	Phyllodocida	Nereididae	<i>Leonnates persica</i>	0	1	0	0	0	0	5	1	7	2.81
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	<i>Paralacydonia</i>	0	0	0	0	0	0	1	0	1	0.40



Phylum	Class	Order	Family	Genus	SHW-Benthic Stations								Total	% Composition
					Abundance									
					A	B	C	D	E	F	G	H		
				<i>(P. paradoxa)</i>										
Annelida	Polychaeta	Phyllodocida	Pilargidae	<i>Sigambra</i> <i>(c.f. S. hanaokai)</i>	0	0	0	0	1	0	1	0	2	0.80
Annelida	Polychaeta	Phyllodocida	Polynoidae	<i>Gattyana</i>	0	0	0	0	0	1	0	0	1	0.40
Annelida	Polychaeta	Phyllodocida	Polynoidae	<i>Lepidonotus(L. cirratus)</i>	0	0	0	1	0	0	0	0	1	0.40
Annelida	Polychaeta	-	Maldanidae	<i>Maldanella</i>	0	0	0	1	0	0	1	0	2	0.80
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> <i>(A. dibranchis)</i>	0	11	5	0	2	0	0	5	23	9.24
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> <i>(A. lyrochaeta)</i>	0	0	0	0	0	3	2	0	5	2.01
Annelida	Polychaeta	Scolecida	Orbiniidae	<i>Naineris</i>	0	0	0	0	0	0	1	0	1	0.40
Annelida	Polychaeta	Spionida	Poecilochaetidae	<i>Poecilochaetus</i>	0	2	4	2	1	3	0	2	14	5.62
Annelida	Polychaeta	Spionida	Spionidae	<i>Laonice(L. cirrata)</i>	0	0	0	0	1	0	0	0	1	0.40
Annelida	Polychaeta	Spionida	Spionidae	<i>Polydora</i>	0	0	0	0	0	0	1	0	1	0.40
Annelida	Polychaeta	Spionida	Spionidae	<i>Prionospio</i> <i>(P. malongerani)</i>	2	0	2	0	0	0	2	1	7	2.81
Annelida	Polychaeta	Spionida	Spionidae	<i>Prionospio</i> <i>(c.f. P. saccifera)</i>	0	0	0	0	1	0	0	0	1	0.40
Annelida	Polychaeta	Sternaspida	Sternaspidae	<i>Sternaspis(S. scutata)</i>	0	5	1	4	1	0	0	0	11	4.42



Phylum	Class	Order	Family	Genus	SHW-Benthic Stations									
					Abundance								Total	% Composition
					A	B	C	D	E	F	G	H		
Annelida	Polychaeta	Terebellida	Ampharetidae	<i>Isolda</i>	2	0	0	0	0	0	0	0	2	0.80
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Amaeana</i>	0	1	0	0	0	0	9	0	10	4.02
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Loimia(L.loimia)</i>	0	1	0	0	0	0	3	0	4	1.61
Annelida	Polychaeta	Terebellida	Trichobranchidae	<i>Terebellides(T. stroemii)</i>	0	0	0	1	0	0	1	0	2	0.80
Subtotal					7	25	19	10	12	10	36	13	132	53.01
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	<i>Sipunculus sp.1</i>	0	0	0	0	1	0	0	0	1	0.40
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	<i>Sipunculus sp.2</i>	0	0	0	0	1	0	0	0	1	0.40
Subtotal					0	0	0	0	2	0	0	0	2	0.80
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	1	3	1	0	1	0	2	3	11	4.42
Arthropoda	Crustacea	Decapoda	Alpheidae	<i>Alpheus</i>	1	0	0	0	1	0	1	0	3	1.20
Arthropoda	Crustacea	Decapoda	Pilumnidae	<i>Typhlocarcinus</i>	1	0	0	0	0	0	2	0	3	1.20
Arthropoda	Crustacea	Decapoda	Portunidae	<i>Charybdis</i>	0	0	0	0	0	0	3	0	3	1.20
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus</i>	0	2	1	0	0	0	2	0	5	2.01
Arthropoda	Malacostraca	Stomatopoda	-	Mantis shrimp juvenile	2	0	1	0	0	0	0	0	3	1.20
Arthropoda	Maxillopoda	Sessilia	Balanidae	<i>Balanus</i>	0	0	0	0	0	0	11	0	11	4.42
Subtotal					5	5	3	0	2	0	21	3	39	15.66
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	<i>Amphioplus</i>	1	0	3	2	3	1	1	1	12	4.82
Subtotal					1	0	3	2	3	1	1	1	12	4.82
Cnidaria	Anthozoa	Alcyonacea	Melithaeinae	<i>Acabaria(A. harbereri)</i>	0	0	0	0	0	0	0	1	1	0.40



Phylum	Class	Order	Family	Genus	SHW-Benthic Stations								Total	% Composition
					Abundance									
					A	B	C	D	E	F	G	H		
Subtotal					0	0	0	0	0	0	0	1	1	0.40
Mollusca	Bivalvia	Mytiloidea	Mytilidae	<i>Modiolus(M. elongatus)</i>	0	0	0	0	1	0	0	0	1	0.40
Mollusca	Bivalvia	Ostreoida	Ostreidae	<i>Talonostrea(T. talonata)</i>	0	0	0	0	0	0	1	0	1	0.40
Mollusca	Bivalvia	Veneroida	Tellinidae	<i>c.f. Augulus</i>	0	0	0	1	0	0	0	0	1	0.40
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Paphia (P. undulata)</i>	1	2	0	0	8	1	0	3	15	6.02
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Ruditapes (R. philippinarum)</i>	27	0	0	0	0	1	0	0	28	11.24
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Timoclea (T. scabra)</i>	0	1	0	0	0	0	0	0	1	0.40
Mollusca	Gastropoda	Thecosomata	Cavoliniidae	<i>Cavolinia</i>	0	0	0	0	0	0	2	0	2	0.80
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	<i>Turritella (T. terebra)</i>	0	0	0	2	0	0	0	0	2	0.80
Mollusca	Scaphopoda	Dentalioidea	Episiphonidae	<i>c.f. Episiphon (E. kiaochowwanensis)</i>	0	0	0	2	0	0	0	0	2	0.80
Subtotal					28	3	0	5	9	2	3	3	53	21.29
Chordata	Actinopterygii	Perciformes	Gobiidae	UNID goby	0	1	0	0	1	0	0	0	2	0.80
Subtotal					0	1	0	0	1	0	0	0	2	0.80
Nemertea	Enopla	-	-	UNID 1	2	0	2	1	1	1	1	0	8	3.21
Subtotal					2	0	2	1	1	1	1	0	8	3.21



Biomass of Benthic Communities

June 2018

Phylum	Class	Order	Family	Genus	Biomass (g)								Total
					A	B	C	D	E	F	G	H	
Annelida	Polychaeta	Aciculata	Glyceridae	<i>Glycera</i>	0	0	0	0	0.009	0	0	0.006	0.015
Annelida	Polychaeta	Canalipalpata	Chaetopteridae	<i>Chaetopterus</i>	0	0	0.005	0	0	0	0	0	0.005
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella(C. capitata)</i>	0.011	0	0.001	0	0.012	0.008	0.036	0	0.068
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella</i>	0	0	0	0	0	0.010	0	0	0.01
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Mediomastus</i>	0	0.011	0.027	0	0	0	0.001	0	0.039
Annelida	Polychaeta	Eunicida	Eunicidae	<i>Eunice(E. indica)</i>	0	0	0	0	0	0	0.002	0	0.002
Annelida	Polychaeta	Eunicida	Lumbrineridae	<i>Lumbrinereis</i>	0	0	0	0	0	0.002	0.002	0	0.004
Annelida	Polychaeta	Phyllodocimorpha	Goniadidae	<i>Glycinde</i>	0	0	0	0	0	0	0	0.005	0.005
Annelida	Polychaeta	-	Cossuridae	<i>Cossurella(C. aciculata)</i>	0	0.005	0.008	0	0	0	0	0	0.013
Annelida	Polychaeta	Phyllodocida	Acoetidae	<i>Polyodontes (P. melanonotus)</i>	0	0	0	0.678	0	0	0	0	0.678
Annelida	Polychaeta	Phyllodocida	Hesionidae	<i>Hesione(H. intertexta)</i>	0	0	0	0	0.002	0	0.002	0	0.004
Annelida	Polychaeta	Phyllodocida	Nereidae	<i>Nereis</i>	0.003	0	0	0	0.002	0	0	0	0.005
Annelida	Polychaeta	Phyllodocida	Nereididae	<i>Leonnates persica</i>	0	0.002	0	0	0	0	0.049	0.009	0.06
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	<i>Paralacydonia (P. paradoxa)</i>	0	0	0	0	0	0	0.002	0	0.002



Phylum	Class	Order	Family	Genus	Biomass (g)								Total
					A	B	C	D	E	F	G	H	
Annelida	Polychaeta	Phyllodocida	Pilargidae	<i>Sigambra</i> (c.f. <i>S. hanaokai</i>)	0	0	0	0	0.001	0	0.001	0	0.002
Annelida	Polychaeta	Phyllodocida	Polynoidae	<i>Gattyana</i>	0	0	0	0	0	0.004	0	0	0.004
Annelida	Polychaeta	Phyllodocida	Polynoidae	<i>Lepidonotus</i> (<i>L. cirratus</i>)	0	0	0	0.001	0	0	0	0	0.001
Annelida	Polychaeta	-	Maldanidae	<i>Maldanella</i>	0	0	0	0.002	0	0	0.001	0	0.003
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> (<i>A. dibranchis</i>)	0	0.234	0.044	0	0.008	0	0	0.103	0.389
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> (<i>A. lyrochaeta</i>)	0	0	0	0	0	0.077	0.021	0	0.098
Annelida	Polychaeta	Scolecida	Orbiniidae	<i>Naineris</i>	0	0	0	0	0	0	0.001	0	0.001
Annelida	Polychaeta	Spionida	Poecilochaetidae	<i>Poecilochaetus</i>	0	0.006	0.178	0.151	0.015	0.069	0	0.003	0.422
Annelida	Polychaeta	Spionida	Spionidae	<i>Laonice</i> (<i>L. cirrata</i>)	0	0	0	0	0.001	0	0	0	0.001
Annelida	Polychaeta	Spionida	Spionidae	<i>Polydora</i>	0	0	0	0	0	0	0.003	0	0.003
Annelida	Polychaeta	Spionida	Spionidae	<i>Prionospio</i> (<i>P. malongereni</i>)	0.003	0	0.001	0	0	0	0.003	0.001	0.008
Annelida	Polychaeta	Spionida	Spionidae	<i>Prionospio</i> (c.f. <i>P. saccifera</i>)	0	0	0	0	0.001	0	0	0	0.001
Annelida	Polychaeta	Sternaspida	Sternaspidae	<i>Sternaspis</i> (<i>S. scutata</i>)	0	0.052	0.004	0.046	0.003	0	0	0	0.105
Annelida	Polychaeta	Terebellida	Ampharetidae	<i>Isolda</i>	0.006	0	0	0	0	0	0	0	0.006
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Amaeana</i>	0	0.003	0	0	0	0	0.368	0	0.371



Phylum	Class	Order	Family	Genus	Biomass (g)								Total
					A	B	C	D	E	F	G	H	
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Loimia(L.loimia)</i>	0	0.072	0	0	0	0	0.004	0	0.076
Annelida	Polychaeta	Terebellida	Trichobranchidae	<i>Terebellides(T. stroemii)</i>	0	0	0	0.019	0	0	0.011	0	0.03
Subtotal					0.023	0.385	0.268	0.897	0.054	0.17	0.507	0.127	2.431
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	<i>Sipunculus sp.1</i>	0	0	0	0	0.001	0	0	0	0.001
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	<i>Sipunculus sp.2</i>	0	0	0	0	0.001	0	0	0	0.001
Subtotal					0	0	0	0	0.002	0	0	0	0.002
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0.082	0.046	0.001	0	0.094	0	0.181	0.798	1.202
Arthropoda	Crustacea	Decapoda	Alpheidae	<i>Alpheus</i>	0.004	0	0	0	0.005	0	0.009	0	0.018
Arthropoda	Crustacea	Decapoda	Pilumnidae	<i>Typhlocarcinus</i>	0.005	0	0	0	0	0	0.017	0	0.022
Arthropoda	Crustacea	Decapoda	Portunidae	<i>Charybdis</i>	0	0	0	0	0	0	0.291	0	0.291
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus</i>	0	0.002	0.001	0	0	0	0.001	0	0.004
Arthropoda	Malacostraca	Stomatopoda	-	Mantis shrimp juvenile	0.035	0	0.007	0	0	0	0	0	0.042
Arthropoda	Maxillopoda	Sessilia	Balanidae	<i>Balanus</i>	0	0	0	0	0	0	2.200	0	2.2
Subtotal					0.126	0.048	0.009	0	0.099	0	2.699	0.798	3.779
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	<i>Amphioplus</i>	0.007	0	0.023	0.030	0.119	0.001	0.813	0.166	1.159
Subtotal					0.007	0	0.023	0.03	0.119	0.001	0.813	0.166	1.159
Cnidaria	Anthozoa	Alcyonacea	Melithaeinae	<i>Acabaria(A. harbereri)</i>	0	0	0	0	0	0	0	16.592	16.592
Subtotal					0	0	0	0	0	0	0	16.592	16.592
Mollusca	Bivalvia	Mytiloidea	Mytilidae	<i>Modiolus(M. elongatus)</i>	0	0	0	0	0.665	0	0	0	0.665
Mollusca	Bivalvia	Ostreoidea	Ostreidae	<i>Talonostrea(T. talonata)</i>	0	0	0	0	0	0	0.800	0	0.8



Phylum	Class	Order	Family	Genus	Biomass (g)								Total
					A	B	C	D	E	F	G	H	
Mollusca	Bivalvia	Veneroida	Tellinidae	<i>c.f. Augulus</i>	0	0	0	0.008	0	0	0	0	0.008
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Paphia (P. undulata)</i>	1.925	2.794	0	0	17.854	2.458	0	6.794	31.825
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Ruditapes (R. philippinarum)</i>	52.880	0	0	0	0	0.012	0	0	52.892
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Timoclea (T. scabra)</i>	0	0.057	0	0	0	0	0	0	0.057
Mollusca	Gastropoda	Thecosomata	Cavoliniidae	<i>Cavolinia</i>	0	0	0	0	0	0	0.216	0	0.216
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	<i>Turritella (T. terebra)</i>	0	0	0	14.500	0	0	0	0	14.5
Mollusca	Scaphopoda	Dentalioida	Episiphonidae	<i>c.f. Episiphon (E. kiaochowwanensis)</i>	0	0	0	0.003	0	0	0	0	0.003
Subtotal					54.805	2.851	0	14.511	18.519	2.47	1.016	6.794	100.966
Chordata	Actinopterygii	Perciformes	Gobiidae	UNID goby	0	0.047	0	0	0.006	0	0	0	0.053
Subtotal					0	0.047	0	0	0.006	0	0	0	0.053
Nemertea	Enopla	-	-	UNID 1	0.041	0	0.053	0.004	0.006	0.003	0.017	0	0.124
Subtotal					0.041	0	0.053	0.004	0.006	0.003	0.017	0	0.124
Grand total					55.00	3.33	0.35	15.44	18.81	2.64	5.05	24.48	

Benthic Species Recorded during the Baseline Study August 2004





Upgrading of Siu Ho Wan Sewage Treatment Plant									
Benthic Species Recorded In August 2004									
ID	Station	Number	Mass (g)	Phylum	Class	Order	Family	Genus	Species
1	A1	2	0.0108	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
2	A1	2	0.2632	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
3	A1	3	0.0031	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
4	A1	1	0.0008	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice indica
5	A1	1	0.0092	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
6	A1	1	0.0012	Annelida	Polychaeta	Phyllodocida	Hesionidae	Micropodarke	Micropodarke dubia
7	A1	1	0.0203	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
8	A1	3	0.0027	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
9	A1	1	0.0193	Annelida	Polychaeta	Terebellida	Terebellidae	Pista	Pista cristata
10	A1	9	0.0598	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio queenslandica
11	A1	1	0.0097	Annelida	Polychaeta	Sternaspida	Sternaspidae	Sternaspis	Sternaspis sculata
12	A2	1	0.1911	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
13	A2	1	0.0003	Annelida	Polychaeta	Capitellida	Capitellidae	Capitella	Capitella capitata
14	A2	1	9.2414	Coelentera	Anthozoa	Pennatulacea	Veretillidae	Cavernularia	Cavernularia sp.
15	A2	15	0.0536	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
16	A2	1	0.0028	Mollusca	Bivalvia	Veneroida	Ungulinidae	Cycladicama	Cycladicama sp.
17	A2	3	0.0392	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice indica
18	A2	3	0.3728	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
19	A2	1	0.0064	Annelida	Polychaeta	Phyllodocida	Hesionidae	Leocrates	Leocrates chinensis
20	A2	2	0.0448	Annelida	Polychaeta	Phyllodocida	Polynoidae	Lepidonotus	Lepidonotus sp.
21	A2	3	0.968	Annelida	Polychaeta	Terebellida	Terebellidae	Loimia	Loimia medusa
22	A2	1	0.0051	Annelida	Polychaeta	Phyllodocida	Hesionidae	Micropodarke	Micropodarke dubia
23	A2	5	2.0379	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
24	A2	35	0.3411	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
25	A2	2	0.0408	Annelida	Polychaeta	Spionida	Poecilochaetidae	Poecilochaetus	Poecilochaetus serpens
26	A2	5	0.0136	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio queenslandica
27	A2	4	0.6328	Arthropoda	Crustacea	Decapoda	Porcellanidae	Raphidopus	Raphidopus ciliatus
28	A2	3	0.0292	Mollusca	Bivalvia	Veneroida	Veneridae	Ruditapes	Ruditapes philippinarum
29	A2	1	0.0059	Annelida	Polychaeta	Orbiniida	Orbiniidae	Scoloplos	Scoloplos sp.
30	A2	1	0.0012	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
31	A2	1	0.0014	Annelida	Polychaeta	Phyllodocida	Syllidae	Syllis	Syllis sp.
32	A2	1	0.1345	Coelentera	Anthozoa	Pennatulacea	Virgulariidae	Virgularia	Virgularia gustaviana
33	B1	1	0.0234	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
34	B1	1	0.0235	Annelida	Polychaeta	Amphinomida	Amphinomidae	Amphinome	Amphinome rostrata
35	B1	1	0.0009	Echinodermata	Stellerioidea	Ophiurida	Amphiuridae	Amphiodia	Amphiodia sp.
36	B1	4	0.0063	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
37	B1	2	4.0772	Echinodermata	Echinoldea	Spatangoida	Loveniidae	Lovenia	Lovenia subcarinata
38	B1	1	0.0346	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
39	B1	2	0.2395	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
40	B1	1	0.007	Mollusca	Bivalvia	Veneroida	Tellinidae	Nitidotellina	Nitidotellina minuta

Upgrading of Siu Ho Wan Sewage Treatment Plant									
Benthic Species Recorded In August 2004									
ID	Station	Number	Mass (g)	Phylum	Class	Order	Family	Genus	Species
41	B1	4	0.0139	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
42	B1	1	0.0042	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
43	B1	1	0.0163	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio multipinnata
44	B2	3	0.0054	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
45	B2	3	0.1089	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
46	B2	1	0.0384	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
47	B2	1	0.0028	Mollusca	Bivalvia	Veneroida	Tellinidae	Nitidotellina	Nitidotellina minuta
48	B2	5	0.0158	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
49	B2	2	0.0006	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio cirrifera
50	B2	1	0.0008	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
51	B2	1	0.1426	Arthropoda	Crustacea	Decapoda	Pilumnidae	Typhlocarcinus	Typhlocarcinus nudus
52	C1	3	0.0152	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
53	C1	1	0.0123	Annelida	Polychaeta	Capitellida	Maldanidae	Eudymene	Eudymene sp.
54	C1	2	0.0348	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
55	C1	2	0.4967	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
56	C1	3	0.0418	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
57	C1	1	1.6743	Mollusca	Bivalvia	Veneroida	Veneridae	Paphia	Paphia undulata
58	C1	2	0.0017	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
59	C1	1	0.009	Mollusca	Bivalvia	Veneroida	Semelidae	Theora	Theora lata
60	C1	1	0.0503	Arthropoda	Crustacea	Decapoda	Pilumnidae	Typhlocarcinus	Typhlocarcinus nudus
61	C2	2	0.0099	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
62	C2	1	0.0243	Annelida	Polychaeta	Amphinomida	Amphinomidae	Amphinome	Amphinome rostrata
63	C2	1	0.285	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
64	C2	1	0.0049	Arthropoda	Crustacea	Decapoda	Goneplacidae	Hexapus	Hexapus granuliferus
65	C2	1	0.0012	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
66	D1	2	0.0065	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
67	D1	1	0.0106	Annelida	Polychaeta	Capitellida	Maldanidae	Eudymene	Eudymene sp.
68	D1	1	0.5246	Arthropoda	Crustacea	Decapoda	Goneplacidae	Eucrate	Eucrate haswelli
69	D1	3	0.4472	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
70	D1	2	0.254	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
71	D1	8	0.0887	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
72	D1	2	0.0648	Annelida	Polychaeta	Opheliida	Opheliidae	Ophelia	Ophelia grandis
73	D1	1	3.3726	Mollusca	Bivalvia	Veneroida	Veneridae	Paphia	Paphia undulata
74	D1	2	0.0092	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
75	D1	1	0.0514	Mollusca	Bivalvia	Nuculoida	Nuculanidae	Saccella	Saccella sp.
76	D1	1	0.0021	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
77	D2	12	0.155	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
78	D2	1	0.0797	Annelida	Polychaeta	Opheliida	Opheliidae	Ophelia	Ophelia grandis
79	D2	1	0.0031	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
80	D2	1	0.0012	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai

Upgrading of Siu Ho Wan Sewage Treatment Plant									
Benthic Species Recorded In August 2004									
ID	Station	Number	Mass (g)	Phylum	Class	Order	Family	Genus	Species
81	E1	3	0.0423	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
82	E1	1	0.0014	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
83	E1	10	41.4922	Echinodermata	Echinoidea	Spatangoida	Loveniidae	Lovenia	Lovenia subcarinata
84	E1	2	0.0572	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
85	E1	1	0.0171	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
86	E1	2	0.013	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
87	E1	1	0.0098	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio multipinnata
88	E1	1	0.0021	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
89	E1	1	0.0203	Annelida	Polychaeta	Sternaspida	Sternaspidae	Sternaspis	Sternaspis sculata
90	E1	1	0.006	Mollusca	Bivalvia	Veneroidea	Semellidae	Theora	Theora lata
91	E1	1	0.0823	Arthropoda	Crustacea	Decapoda	Pilumnidae	Typhlocarcinus	Typhlocarcinus nudus
92	E2	2	0.023	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
93	E2	1	0.0083	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
94	E2	1	0.0016	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
95	E2	1	0.0171	Annelida	Polychaeta	Eunicida	Onuphidae	Diopatra	Diopatra sp.
96	E2	1	0.0062	Annelida	Polychaeta	Phyllodocida	Hesionidae	Leocrates	Leocrates chinensis
97	E2	1	0.446	Annelida	Polychaeta	Terebellida	Terebellidae	Loimia	Loimia medusa
98	E2	2	6.348	Echinodermata	Echinoidea	Spatangoida	Loveniidae	Lovenia	Lovenia subcarinata
99	E2	1	0.0067	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
100	E2	1	0.0336	Mollusca	Bivalvia	Veneroidea	Tellinidae	Nitidotellina	Nitidotellina minuta
101	E2	4	0.0477	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
102	F1	1	0.0162	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
103	F1	1	0.4824	Mollusca	Gastropoda	Neogastropoda	Nassaridae	Nassarius	Nassarius sp.
104	F1	1	0.0088	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
105	F1	1	0.0046	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
106	F1	1	0.0018	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
107	F1	1	0.0126	Annelida	Polychaeta	Sternaspida	Sternaspidae	Sternaspis	Sternaspis sculata
108	F2	1	0.0284	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
109	F2	2	7.2811	Echinodermata	Echinoidea	Spatangoida	Loveniidae	Lovenia	Lovenia subcarinata
110	F2	1	0.0222	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
111	F2	1	0.2073	Annelida	Polychaeta	Ophellida	Ophellidae	Ophelia	Ophelia grandis
112	G1	7	0.1547	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
113	G1	1	0.0003	Arthropoda	Crustacea	Tanaidacea	Apseudidae	Apseudes	Apseudes sp.
114	G1	1	0.0414	Arthropoda	Crustacea	Decapoda	Callinassidae	Callinassa	Callinassa sp.
115	G1	3	0.0024	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
116	G1	4	0.0033	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
117	G1	9	0.3983	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice indica
118	G1	1	0.0397	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
119	G1	2	0.0173	Arthropoda	Crustacea	Decapoda	Goneplacidae	Hexapus	Hexapus granuliforus
120	G1	1	0.0245	Annelida	Polychaeta	Phyllodocida	Polynoidae	Lepidonotus	Lepidonotus sp.

Upgrading of Siu Ho Wan Sewage Treatment Plant									
Benthic Species Recorded In August 2004									
ID	Station	Number	Mass (g)	Phylum	Class	Order	Family	Genus	Species
121	G1	3	0.819	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenopthalmus	Neoxenopthalmus obscurus
122	G1	4	0.0108	Annelida	Polychaeta	Phyllodocida	Nereidae	Nereis	Nereis sp.
123	G1	20	0.0822	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
124	G1	1	0.0005	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio ehlersi
125	G1	2	0.0053	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio queenslandica
126	G1	1	0.094	Arthropoda	Crustacea	Decapoda	Porcellanidae	Raphidopus	Raphidopus ciliatus
127	G1	2	0.0006	Annelida	Polychaeta	Phyllodocida	Syllidae	Syllis	Syllis sp.
128	G2	1	0.0027	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
129	G2	2	0.108	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
130	G2	1	0.0028	Arthropoda	Crustacea	Tanaidacea	Apeuididae	Apeudes	Apeudes sp.
131	G2	3	0.0058	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
132	G2	1	0.2476	Arthropoda	Crustacea	Decapoda	Goneplacidae	Eucrate	Eucrate haswelli
133	G2	2	0.063	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice Indica
134	G2	1	0.0169	Annelida	Polychaeta	Terebellida	Terebellidae	Lanice	Lanice sp.
135	G2	1	0.0645	Mollusca	Bivalvia	Veneroidea	Dreissenidae	Mytilopsis	Mytilopsis sallei
136	G2	2	0.0017	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
137	G2	1	0.0059	Annelida	Polychaeta	Ophelida	Ophelidae	Ophelia	Ophelia grandis
138	G2	7	0.0211	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio queenslandica
139	G2	5	0.3769	Arthropoda	Crustacea	Decapoda	Porcellanidae	Raphidopus	Raphidopus ciliatus
140	G2	1	0.0002	Annelida	Polychaeta	Phyllodocida	Syllidae	Syllis	Syllis sp.
141	G2	1	0.0026	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
142	G2	7	0.0952	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
143	G2	1	0.0469	Annelida	Polychaeta	Terebellida	Terebellidae	Amatea	Amatea sp.
144	G2	1	0.0008	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
145	G2	7	0.0042	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
146	G2	8	0.1768	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice Indica
147	G2	1	0.0025	Annelida	Polychaeta	Phyllodocida	Polynoidae	Gattyana	Gattyana sp.
148	G2	4	0.0105	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
149	G2	1	0.0162	Arthropoda	Crustacea	Decapoda	Goneplacidae	Hexapus	Hexapus granuliferus
150	G2	1	0.0019	Annelida	Polychaeta	Phyllodocida	Nereidae	Nereis	Nereis sp.
151	G2	7	0.0485	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
152	G2	1	0.0084	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
153	G2	1	0.0012	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Phyllodoce	Phyllodoce sp.
154	G2	1	0.1746	Arthropoda	Crustacea	Decapoda	Porcellanidae	Raphidopus	Raphidopus ciliatus
155	G2	1	0.0453	Chordata	Osteichthyes	Perciformes	Taenioididae	Trypauchen	Trypauchen vagina
156	G2	2	0.0161	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
157	G2	3	0.4835	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
158	G2	1	0.0032	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
159	G2	3	0.0444	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice Indica
160	G2	2	0.0351	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis

Appendix B: Representative Taxa Identified

	
A) The bivalve, <i>Modiolus elongatus</i>	B) The bivalve, <i>Ruditapes philippinarum</i>
	
C) The Polychaeta, <i>Polyodontes melanonotus</i>	D) The sea pen, <i>Acabaria harbereri</i>

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Report No.: 0041/17/ED/0330A

Appendix I Photos of Grab Samplers

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Photo 1. A polar grab sampler



Photo 2. Grab dimension 1



Photo3. Grab dimension 2



Photo4. Grab dimension 3

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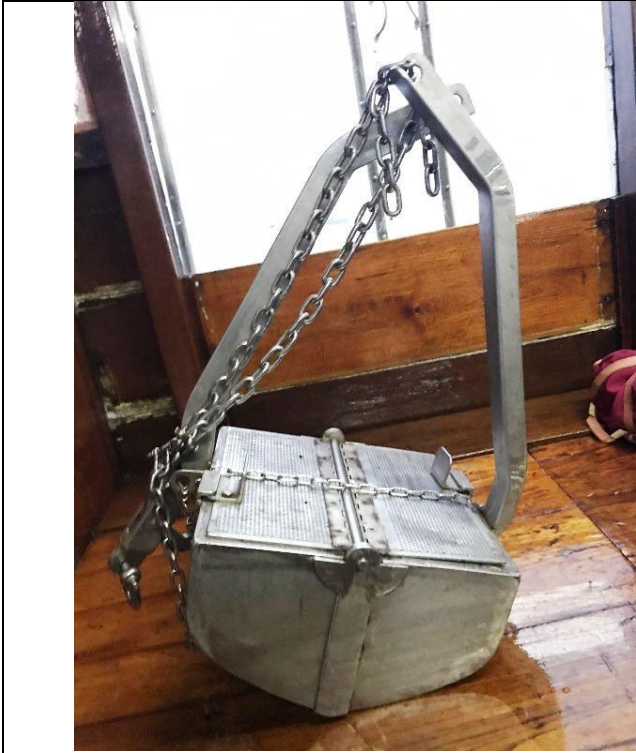


Photo 1. A modified Van Veen grab sampler



Photo 2. Grab dimension 1



Photo3. Grab dimension 2



Photo4. Grab dimension 3

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Appendix J

Environmental Mitigation Implementation Schedule (EMIS)

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EP Ref.	EIA Ref.	WMP Ref.	Environmental Protection Measures	Location of the measures	Implementation Status
Air Quality					
NA	4.5	NA	Odour reduction measures like aeration, chemical dosing system shall be implemented to reduce any odour impacts to an acceptable level.	SHWSTW	Implemented
3.4	4.5	NA	Sewage treatment works including sludge thickening tanks, the sludge pump house and sludge press house shall be completely enclosed.	SHWSTW	Implemented
3.4	4.5	NA	Exhaust air shall be ventilated to an odour scrubber prior to discharge. Ventilating air to a biological treatment unit with 95% odour removal efficiency prior to stack exhaust shall be implemented	SHWSTW	Implemented
Water Quality					
3.3	NA	4.01	To avoid impacts on the marine ecology due to effluent discharge, the disinfection facility as in Part B of the EP shall be equipped with an UV disinfection system capable of removing at least 99.9% of E.coli from the sewage	SHWSTW	Implemented
Waste Management					
3.6	NA	NA	Transportation of sludge shall be carried out in fully enclosed containers, or be placed in sludge skips with tarpaulin covers	SHWSTW	Implemented
NA	NA	5.02	Trip-ticket system mentioned shall be implemented. Trip-ticket is required for each truckload delivered to the landfills facilities according to WBTC No. 31/2004.	SHWSTW	Implemented
NA	NA	5.02	The acceptance criteria for Landfill disposal should be followed, i.e. solid content of sludge waste should be more than 30%.	SHWSTW	Implemented
NA	NA	5.02	The disposal of grit & debris (if any) generated during primary screening works should follow the requirement set in the WMP Section 4.05.	SHWSTW	Implemented
NA	NA	5.03	The wet sludge should be temporarily stored at the sludge buffer tank. It should then be transported to the centrifuge building for dewatering and discharged to the container for disposal. The whole process should be managed by the automatic electronic electronic system and monitored by the operators during operation.	SHWSTW	Implemented
NA	NA	5.04	The other solid waste material such as sediment and grit, refuse containers or collection bags should be temporarily stored in slips at designated area. Operators should ensure sufficient space is identified and provided for temporary storage of waste materials to facilitate collection. Storage of waste material on site will be kept to a minimum to avoid nuisance to local residents.	SHWSTW	Implemented
NA	NA	5.05	Chemical wastes which likely to be generated by activities arise from the maintenance, shall followed the Waste Disposal (Chemical Waste) (General) Regulation, includes Schedule 1 of the Regulation.	SHWSTW	Implemented
NA	NA	5.06	In case of unlikely occurred chemical spillage, procedures should be followed as according to the WMP Section 5.06.	SHWSTW	Implemented
NA	NA	5.07	Temporary storage areas should be identify and provided for the temporary storage of general	SHWSTW	Implemented

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EP Ref.	EIA Ref.	WMP Ref.	Environmental Protection Measures	Location of the measures	Implementation Status
			refuse to facilitate collection		
NA	NA	5.07	Domestics wastes refuse generated on-site will be stored in enclosed bins or compaction units separately	SHWSTW	Implemented
NA	NA	5.07	Sufficient dustbins should be provided for domestic waste if required.	SHWSTW	Implemented
NA	NA	5.07	Domestics wastes should be cleared daily and will be disposed off to the nearest licensed landfill or refuse transfer station.	SHWSTW	Implemented
NA	NA	5.07	Spearate labeled bins should be provided to segregate the waste generated by workforce. Waste recycle collector should be employed to collect the segregated waste	SHWSTW	Implemented
NA	NA	5.07	Cardboard and paper packaging (for plant, equipment and materials) should be recovered on site, properly stockpiled in dry condition and covered to prevent cross contamination by other materials.	SHWSTW	Implemented
NA	NA	5.07	Office waste should be minimized through using papers on both sides. Communication by electronic means should be used as far as possible.	SHWSTW	Implemented
NA	NA	5.07	The burning of refuse on-site is prohibited by law and shall not be undertaken	SHWSTW	Implemented
NA	NA	5.07	Toilet wastewater shall be transported to the STW for treatment	SHWSTW	Implemented
NA	NA	5.07	Arrangement for collection of recyclable materials by recycling contractors should be followed as according to the WMP Section 5.07.	SHWSTW	Implemented
NA	NA	5.08	All recycling materials removed by the recycling contractors should be properly recorded before the removal. The natures and quantities of the recycling materials, the date of removal and the name of the recycling contractor should be recorded.	SHWSTW	Implemented
NA	NA	5.09	To maintain the site in a clean and tidy condition during the operation, general measures specified in the WMP should be implemented on site at all times. Regular site inspections shall be undertaken by the management team to ensure the measures are implemented.	SHWSTW	Implemented
NA	NA	5.10	Daily cleaning should be performed daily after work within the plant and the public areas immediately next to the site.	SHWSTW	Implemented
NA	NA	5.11	The work officer in charge of the corresponding area should perform daily inspection on the items mentioned in the WMP Section 5.10. If observations were discovered, the work officer should record the result of the inspection on an inspection checklist with photos taken and submitted to the inspectors or Chief Technical Officer for review on the following day. Any deficiency should be rectified promptly.	SHWSTW	Implemented
NA	NA	5.12	Weekly tidying should be performed weekly within the site.	SHWSTW	Implemented
NA	NA	5.13	The inspector should perform Weekly Inspection on the items mentioned in the WMP Section 5.12. If observations were discovered, the work officer should record the result on an inspection checklist and submitted to the Chief Technical Officer for review on the following day. Any deficiency should be rectified promptly.	SHWSTW	Implemented

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EP Ref.	EIA Ref.	WMP Ref.	Environmental Protection Measures	Location of the measures	Implementation Status
NA	NA	5.14	All wastes generated through the operational phase will be managed in accordance with the protocols set out in the WMP Section 5.14.	SHWSTW	Implemented

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