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Monthly EM&A Report
October 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/0378B

Prepared by: Andy K. H. Choi

Reviewed by: Cyrus C. Y. Lai

Certified by: _____

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沛然環境評估工程顧問有限公司

Our Ref: 1458/18-0178

28 November 2018

By Post and E-mail

Drainage Services 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 (OCTOBER 2018)

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for October 2018 (Report No.: 0041/17/ED/0378B) from the Environmental Team (ET), Messrs. Fugro Technical Services Ltd., received on 27 November 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).

Notwithstanding, please be reminded that the ET shall strictly follow Condition 4.3 of the EP to submit monthly EM&A report within two weeks after the completion of each reporting period and the report shall be certified by the Independent Environmental Checker (IEC) before depositing with the Environmental Protection Department.

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) Attn: Mr. Colin YUNG (By E-mail)
AECOM Attn: Ms. Joanne TSOI (By E-mail)

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APPENDICES

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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. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis of H_2S), 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 fifteenth Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 October 2018 to 31 October 2018 (the "reporting period").

Breaches of Action and Limit Levels

Air quality monitoring (i.e. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis), was temporarily suspended and no monitoring was carried out in the reporting period. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASRs) were recorded and no non-compliance of odour monitoring at ASRs were recorded in the reporting period.

Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 12 October 2018. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

Complaint Log

There were no complaints received in relation to environmental impact during the reporting 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 were implemented during the reporting period.

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Future Key Issues

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

Potential environmental impacts arising from the operations 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 Chinese White Dolphins (CWDs).

Due to inadequacy of representative data collected between August 2017 and May 2018, current H_2S measurement and olfactometry analysis were considered as unsuitable methods to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m3). In order to assess whether SHWSTW is the major H_2S source to ASRs, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASRs are not the appropriate locations for the correlation study as the change of both odour level and H_2S concentrations at ASRs 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 is 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 Egineer 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 CWDs 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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1.4 Works Undertaken during the Reporting 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 H_2S Concentration Monitoring

2.1.1 15-min H_2S concentration was measured using a Jerome 631-X analyzer. This analyzer is capable of measuring H_2S concentration in the range of 1 ppb to 50 ppm with a resolution of 1 ppb and operates within a temperature range of 0ºC to 40ºC 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 H_2S 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 H_2S monitoring.

Table 2.1 Equipment used for H_2S 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 the appointed 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 H_2S concentration monitoring, odour patrol monitoring and odour sampling were carried out at ASR, Cheung Tung Road near the Bus Depot 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 H_2S 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_2S 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 H_2S 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.

2) In case the relationship between H_2S 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 H_2S concentration (ppb) with the odour unit (OU/m^3). 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 H_2S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). In order to assess whether SHWSTW is the major H2S source to ASRs, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASRs are not the appropriate locations for the correlation study as the change of both odour level and H_2S concentrations at ASRs 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 Station

3.1.1 In accordance with Section 5 of the EM&A Plan, water quality monitoring should be carried out at eight designated monitoring stations (two impact stations and six control stations) during the first five years of the operational phase of the Project. The monitoring stations shall be the same monitoring stations that were used for the baseline monitoring programme and have been approved by EPD. The coordinates of the monitoring stations are shown in **Table 3.1** and their locations are 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)	*E. coli* (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 will 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) will be 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) integrated with echo sounder function will be used to measure water depth, current velocity (speed and direction). The data measured by ADCP will then be downloaded on site to computer on-board. The water depth data measured by the 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 will be equipped with a 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 3.4** summarizes the equipment used in water quality monitoring.

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

Table 3.4 Equipment used for H_2S Concentration Monitoring

Equipment	Manufacturer / Model	Serial Number
Water Quality Monitoring Device	Aqua TROLL 600 Multiparameter Sonde	584601
		525120
Acoustic Doppler Current Profiler	RiverSurveyor M9	5906

3.3.2 Apart from the equipment mentioned in Section 3.3.1, a Class III commercially licensed vessel will be used as survey vessel. DGPS logging device with accuracy of ±1m at 95% confidence level will 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 will be automatically and electronically logged. Powered winch will be used on-board the Survey Vessel to assist the monitoring. Experienced supervisor will be present all throughout the monitoring activities on-board the survey vessel.

3.3.3 Water samples will be 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 will be pre-rinsed with the same water samples. The sampling bottles will then be taken to a HOKLAS accredited laboratory for analysis of *E. coli*, BOD_5, Suspended Solids, NH_3-N, NO_3-N, NO_2-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 the appointed laboratory for analysis of water samples. The methods adopted by the laboratory and the reporting limits are detailed in **Table 3.5**.

Table 3.5 Laboratory Measurement/Analysis Methods and Reporting Limits

Analysis Description	Method	Reporting limits
E. coli	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 programme will 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 eight designated stations will be carried out for each monitoring event. For each station at each tide, duplicate samples for in-situ parameter and laboratory analysis at three 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.

3.6.2 During the measurements of DO concentration, DO saturation, salinity, turbidity, pH and temperature, duplicate readings will be taken. If the difference between the first and second readings of DO or turbidity is more than 25% of the value of the first reading, the reading was discarded and further readings will be 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 12 October 2018. A summary of the in-situ water quality monitoring results are presented in **Table 3.6** (Mid-ebb) and **Table 3.7** (Mid-flood) respectively. The complete record and graphical presentation of the in-situ water quality monitoring results is given in **Appendix E.**

Table 3.6 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	17	S	1	7.20	26.83	8.33	31.90	5.1	0.20	119.5
		S	1	7.15	26.85	8.34	31.96	5.3	0.24	254.3
		M	8.5	7.14	26.87	8.35	32.27	5.5	0.34	163.8
		M	8.5	7.10	26.88	8.35	32.45	5.5	0.35	177.5
		B	16	7.01	26.91	8.36	32.64	6.4	0.46	191.1
		B	16	6.99	26.91	8.36	32.60	5.6	0.46	182.2
B	14	S	1	7.15	26.84	8.38	32.57	7.7	0.25	107.2
		S	1	7.07	26.86	8.38	32.58	7.0	0.26	105.4
		M	7	7.01	26.94	8.39	32.72	5.8	0.09	190.2
		M	7	6.99	26.94	8.39	32.73	5.8	0.09	95.3
		B	13	7.01	26.98	8.39	32.91	5.4	0.19	186.7
		B	13	7.01	26.98	8.39	32.90	5.2	0.16	185.3
C	12	S	1	8.34	26.36	8.71	31.50	4.8	0.15	208.7
		S	1	8.01	26.45	8.72	31.39	4.5	0.17	243.8
		M	6	7.57	26.65	8.65	32.59	6.4	0.14	174.3
		M	6	7.16	26.75	8.62	32.80	6.9	0.19	167.1
		B	11	6.86	26.84	8.55	32.87	9.5	0.03	204.2
		B	11	6.84	26.84	8.54	32.89	9.5	0.07	214.1
D	13	S	1	8.00	26.52	8.47	31.83	4.4	0.15	127.4
		S	1	7.70	26.61	8.46	31.52	4.7	0.14	96.9
		M	6.5	7.07	26.84	8.42	32.79	6.4	0.17	164.3
		M	6.5	6.94	26.86	8.42	32.77	6.6	0.14	153.1
		B	12	6.88	26.87	8.42	32.98	7.1	0.10	200.0
		B	12	6.89	26.87	8.43	32.96	7.1	0.08	209.6
E	16	S	1	7.62	26.46	8.44	33.52	4.2	0.18	121.0
		S	1	7.30	26.56	8.44	33.46	4.2	0.12	156.8
		M	8	6.99	26.72	8.43	33.55	4.2	0.18	204.9
		M	8	6.96	26.74	8.43	33.55	4.0	0.18	201.9
		B	15	6.87	26.82	8.42	33.63	4.3	0.20	184.9
		B	15	6.86	26.83	8.42	33.64	4.6	0.19	227.0
F	23	S	1	7.38	26.44	8.44	33.25	3.8	0.18	114.2
		S	1	7.18	26.54	8.44	33.17	4.0	0.19	115.1
		M	11.5	6.97	26.75	8.43	33.30	4.3	0.21	152.8
		M	11.5	6.96	26.78	8.43	33.33	4.3	0.27	151.3
		B	22	6.90	26.82	8.42	33.37	4.3	0.15	168.6
		B	22	6.89	26.84	8.42	33.34	4.2	0.16	184.2
G	22	S	1	7.84	26.40	8.43	33.27	5.8	0.13	133.1
		S	1	7.54	26.51	8.44	33.24	5.0	0.19	138.1
		M	11	7.21	26.75	8.44	33.09	4.6	0.17	162.1

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	7.17	26.75	8.43	33.18	4.7	0.18	177.2
		B	21	7.00	26.81	8.43	33.30	4.9	0.22	231.2
		B	21	6.98	26.82	8.43	33.32	5.2	0.28	213.6
H	19	S	1	8.03	26.41	8.46	33.02	5.0	0.20	100.2
		S	1	7.59	26.62	8.44	32.93	5.1	0.14	144.2
		M	9.5	7.20	26.79	8.43	33.11	4.4	0.14	126.7
		M	9.5	7.12	26.80	8.43	33.17	4.3	0.16	138.0
		B	18	7.00	26.87	8.43	33.15	4.6	0.18	224.4
		B	18	7.00	26.88	8.43	33.18	4.5	0.13	249.8

Table 3.7 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	7.41	27.45	8.41	31.65	4.5	0.12	130.7
		S	1	7.29	27.32	8.42	31.56	4.6	0.08	114.7
		M	7.5	6.94	27.18	8.41	32.23	7.3	0.15	145.9
		M	7.5	6.95	27.18	8.41	32.27	7.4	0.13	107.1
		B	14	6.88	27.11	8.41	32.75	9.5	0.22	261.4
		B	14	6.87	27.11	8.41	32.85	9.4	0.20	244.5
B	14	S	1	7.62	27.24	8.42	32.39	6.6	0.29	179.5
		S	1	7.27	27.16	8.42	32.45	7.6	0.33	181.3
		M	7	6.91	27.04	8.42	32.72	10.2	0.22	169.3
		M	7	6.90	27.03	8.42	32.73	11.9	0.25	234.5
		B	13	6.89	26.99	8.42	32.93	16.0	0.21	172.3
		B	13	6.89	26.99	8.42	32.95	15.4	0.18	222.6
C	12	S	1	7.62	26.96	8.41	31.59	5.1	0.12	116.9
		S	1	7.49	26.95	8.41	31.63	5.4	0.13	237.7
		M	6	7.10	26.95	8.40	32.06	8.1	0.11	137.7
		M	6	7.06	26.95	8.40	32.08	8.3	0.11	90.7
		B	11	6.90	26.97	8.39	32.32	11.4	0.20	107.3
		B	11	6.90	26.97	8.39	32.33	11.3	0.28	129.7
D	14	S	1	8.15	27.44	8.41	31.31	5.1	0.19	98.5
		S	1	7.83	27.41	8.40	31.32	4.8	0.16	106.4
		M	7	7.43	27.17	8.40	31.56	5.3	0.26	105.5
		M	7	7.31	27.12	8.40	31.58	5.4	0.27	112.7
		B	13	7.06	27.08	8.39	32.19	13.2	0.33	91.1
		B	13	6.99	27.07	8.39	32.17	12.8	0.38	98.1
E	14	S	1	7.15	26.76	8.40	32.38	8.5	0.14	140.2
		S	1	7.12	26.77	8.40	32.36	8.4	0.19	141.0
		M	7	7.05	26.83	8.40	32.59	8.0	0.14	187.4
		M	7	7.03	26.85	8.40	32.73	8.1	0.11	161.4
		B	13	6.95	26.92	8.40	33.01	7.6	0.22	185.7
		B	13	6.95	26.92	8.40	32.99	6.4	0.22	180.1
F	18	S	1	7.41	26.98	8.40	32.45	8.6	0.09	146.7
		S	1	7.26	26.97	8.40	32.38	8.7	0.13	153.8
		M	9	7.02	26.98	8.39	32.84	6.7	0.05	201.0
		M	9	7.00	26.98	8.39	32.84	7.0	0.08	220.4

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	17	6.97	26.98	8.39	32.97	6.0	0.08	224.2
		B	17	6.95	26.98	8.39	33.00	5.9	0.05	249.1
G	13	S	1	6.95	26.82	8.37	32.21	6.8	0.28	170.2
		S	1	6.95	26.82	8.37	32.18	6.8	0.27	158.3
		M	6.5	6.91	26.82	8.36	32.30	8.7	0.31	171.4
		M	6.5	6.92	26.82	8.37	32.30	8.8	0.39	177.3
		B	12	6.90	26.86	8.37	32.72	9.5	0.44	186.0
		B	12	6.90	26.86	8.37	32.62	10.0	0.39	170.3
H	19	S	1	7.22	26.00	8.35	32.90	7.1	0.18	128.5
		S	1	7.15	26.10	8.34	32.79	6.8	0.16	123.7
		M	9.5	6.96	26.57	8.35	32.64	9.9	0.33	133.9
		M	9.5	6.97	26.60	8.35	32.58	9.2	0.35	124.0
		B	18	6.93	26.69	8.36	32.73	10.7	0.28	118.2
		B	18	6.93	26.70	8.36	32.73	11.3	0.27	108.0

3.8.2 Results of laboratory analysis of water quality are presented in **Table 3.8** (Mid-ebb) and **Table 3.9** (Mid-flood) respectively. The complete record and graphical presentation of laboratory analysis results are given in **Appendix E**.

Table 3.8 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	17	S	1	10.5	0.039	0.090	0.302	0.431	NOT DETECTED	0.04	<1.0
		S	1	10.2	0.012	0.093	0.302	0.407	NOT DETECTED	0.04	<1.0
		M	8.5	7.5	0.024	0.094	0.298	0.416	NOT DETECTED	0.04	<1.0
		M	8.5	6.2	0.032	0.097	0.296	0.425	NOT DETECTED	0.04	<1.0
		B	16	7.6	0.035	0.094	0.299	0.428	NOT DETECTED	0.04	<1.0
		B	16	8.7	0.013	0.096	0.292	0.401	NOT DETECTED	0.04	<1.0
B	14	S	1	9.9	0.019	0.086	0.263	0.369	NOT DETECTED	0.04	<1.0
		S	1	11.0	0.017	0.088	0.264	0.370	NOT DETECTED	0.04	<1.0
		M	7	10.1	0.041	0.084	0.267	0.392	NOT DETECTED	0.04	<1.0
		M	7	10.6	0.023	0.086	0.269	0.378	NOT DETECTED	0.04	<1.0
		B	13	12.4	0.021	0.088	0.262	0.371	NOT DETECTED	0.04	<1.0
		B	13	12.1	0.022	0.078	0.276	0.375	NOT DETECTED	0.04	<1.0
C	12	S	1	14.7	<0.005	0.080	0.314	0.394	NOT	0.04	<1.0

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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)
									DETECTED		
		S	1	14.9	0.010	0.080	0.313	0.403	NOT DETECTED	0.04	<1.0
		M	6	9.5	0.008	0.090	0.302	0.400	NOT DETECTED	0.04	<1.0
		M	6	8.6	<0.005	0.081	0.308	0.388	NOT DETECTED	0.04	<1.0
		B	11	8.0	0.017	0.084	0.312	0.413	NOT DETECTED	0.04	2.4
		B	11	8.0	0.029	0.089	0.303	0.421	NOT DETECTED	0.04	2.5
D	13	S	1	12.0	0.020	0.084	0.298	0.402	NOT DETECTED	0.04	3.0
		S	1	12.4	0.011	0.097	0.340	0.448	NOT DETECTED	0.04	<1.0
		M	6.5	11.3	0.016	0.086	0.300	0.402	NOT DETECTED	0.04	3.0
		M	6.5	11.5	<0.005	0.077	0.308	0.385	NOT DETECTED	0.04	3.0
		B	12	13.9	0.008	0.084	0.302	0.393	NOT DETECTED	0.04	3.0
		B	12	13.1	0.011	0.090	0.295	0.397	NOT DETECTED	0.04	3.0
E	16	S	1	15.5	0.052	0.079	0.250	0.381	290	0.04	<1.0
		S	1	16.1	0.036	0.079	0.244	0.360	260	0.04	<1.0
		M	8	12.1	0.049	0.082	0.251	0.382	310	0.04	<1.0
		M	8	11.9	0.043	0.073	0.248	0.364	270	0.04	<1.0
		B	15	9.3	0.042	0.086	0.240	0.368	190	0.04	<1.0
		B	15	10.1	0.032	0.085	0.245	0.362	150	0.04	<1.0
F	23	S	1	12.6	0.046	0.088	0.249	0.383	200	0.04	<1.0
		S	1	11.8	0.055	0.085	0.249	0.389	250	0.04	<1.0
		M	11.5	12.5	0.044	0.085	0.246	0.374	160	0.04	<1.0
		M	11.5	12.2	0.048	0.080	0.255	0.382	180	0.04	<1.0
		B	22	12.1	0.047	0.077	0.258	0.382	130	0.04	<1.0
		B	22	12.4	0.040	0.078	0.255	0.373	160	0.04	<1.0
G	22	S	1	19.6	0.036	0.073	0.238	0.346	180	0.04	<1.0
		S	1	19.9	0.036	0.075	0.234	0.345	140	0.04	<1.0
		M	11	9.3	0.036	0.078	0.233	0.347	92	0.04	<1.0
		M	11	9.5	0.039	0.077	0.236	0.352	85	0.04	<1.0
		B	21	11.4	0.038	0.076	0.237	0.351	170	0.04	<1.0
		B	21	11.2	0.032	0.076	0.236	0.344	220	0.04	1.1
H	19	S	1	10.2	0.021	0.076	0.266	0.364	280	0.04	<1.0
		S	1	11.2	0.032	0.088	0.257	0.377	260	0.04	<1.0
		M	9.5	9.1	0.037	0.085	0.259	0.381	180	0.04	<1.0
		M	9.5	8.5	0.039	0.085	0.259	0.384	150	0.04	<1.0
		B	18	8.4	0.033	0.085	0.255	0.372	280	0.04	<1.0
		B	18	9.0	0.027	0.085	0.258	0.370	310	0.04	<1.0

Table 3.9 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	10.7	0.014	0.098	0.318	0.430	43	0.04	1.0
		S	1	10.0	0.009	0.104	0.325	0.438	35	0.04	<1.0
		M	7.5	11.0	0.022	0.103	0.311	0.436	1	0.04	<1.0
		M	7.5	10.6	0.010	0.102	0.313	0.424	4	0.04	<1.0
		B	14	11.6	<0.005	0.097	0.318	0.415	1	0.04	<1.0
		B	14	12.6	0.008	0.093	0.319	0.420	2	0.04	<1.0
B	14	S	1	17.3	0.044	0.079	0.232	0.355	27	0.04	<1.0
		S	1	17.9	0.039	0.080	0.236	0.355	31	0.04	<1.0
		M	7	17.0	0.056	0.078	0.239	0.373	17	0.04	<1.0
		M	7	16.7	0.056	0.073	0.242	0.371	13	0.04	<1.0
		B	13	24.8	0.039	0.073	0.244	0.357	68	0.04	<1.0
		B	13	24.6	0.038	0.080	0.237	0.356	58	0.04	<1.0
C	12	S	1	9.0	0.034	0.101	0.300	0.436	13	0.04	<1.0
		S	1	8.3	0.025	0.099	0.300	0.424	10	0.04	<1.0
		M	6	5.8	0.046	0.098	0.300	0.445	10	0.04	<1.0
		M	6	6.9	0.030	0.090	0.307	0.427	10	0.04	<1.0
		B	11	8.7	0.037	0.090	0.306	0.433	17	0.04	<1.0
		B	11	9.0	0.055	0.098	0.300	0.453	12	0.04	<1.0
D	14	S	1	9.3	0.018	0.100	0.299	0.417	45	0.04	<1.0
		S	1	8.0	0.023	0.096	0.303	0.422	58	0.04	<1.0
		M	7	7.1	0.022	0.095	0.299	0.416	51	0.04	<1.0
		M	7	7.3	0.026	0.100	0.299	0.425	63	0.04	<1.0
		B	13	4.6	0.013	0.097	0.299	0.409	28	0.04	<1.0
		B	13	4.9	0.010	0.098	0.297	0.405	39	0.04	<1.0
E	14	S	1	11.5	0.065	0.091	0.298	0.454	53	0.04	<1.0
		S	1	12.0	0.036	0.099	0.294	0.429	60	0.04	<1.0
		M	7	11.3	0.057	0.089	0.302	0.448	42	0.04	<1.0
		M	7	11.6	0.045	0.098	0.294	0.438	33	0.04	<1.0
		B	13	11.2	0.037	0.092	0.300	0.429	26	0.04	<1.0
		B	13	11.1	0.030	0.094	0.299	0.422	21	0.04	<1.0
F	18	S	1	17.6	0.049	0.090	0.254	0.394	470	0.05	<1.0
		S	1	20.9	0.032	0.085	0.255	0.372	620	0.05	<1.0
		M	9	14.3	0.024	0.091	0.254	0.369	280	0.05	<1.0
		M	9	15.3	0.027	0.087	0.255	0.369	370	0.04	<1.0
		B	17	13.8	0.075	0.085	0.253	0.414	340	0.05	<1.0
		B	17	13.5	0.053	0.090	0.252	0.396	430	0.04	1.1
G	13	S	1	19.9	0.046	0.083	0.278	0.407	68	0.05	<1.0
		S	1	20.0	0.026	0.090	0.270	0.387	71	0.05	<1.0
		M	6.5	15.4	0.027	0.090	0.271	0.387	80	0.05	1.1
		M	6.5	15.3	0.023	0.097	0.267	0.387	88	0.05	<1.0
		B	12	15.8	0.018	0.095	0.268	0.380	160	0.05	<1.0
		B	12	16.5	0.025	0.094	0.269	0.387	120	0.05	<1.0
H	19	S	1	21.8	0.054	0.090	0.262	0.406	150	0.05	1.1
		S	1	20.0	0.032	0.093	0.262	0.387	140	0.05	1.2
		M	9.5	18.8	0.033	0.091	0.263	0.387	73	0.05	1.1
		M	9.5	20.8	0.033	0.086	0.269	0.388	62	0.06	1.1
		B	18	18.2	0.021	0.087	0.262	0.370	100	0.05	1.0
		B	18	18.5	0.033	0.085	0.270	0.388	140	0.05	1.2

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. Tidal data obtained from Ma Wan Marine Traffic Station is present in **Appendix F**.

3.8.4 Heavy marine traffic was observed nearby the Project site and its vicinity and may affect the water quality. The above conditions may affect monitoring results. The weather condition is summarized and presented in **Table 3.10**.

Table 3.10 Weather condition of water quality monitoring

Date	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
	Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
12 October 2018	27.1	23.8	22.0	73	0.3

Source: Hong Kong Observatory

4. SEDIMENT QUALITY MONITORING AND BENTHIC SURVEY

4.1 Monitoring Station

4.1.1 In accordance with Section 6 of the EM&A Plan, sediment quality monitoring and benthic survey should be carried out at eight designated monitoring stations (two impact stations and six control stations) during the first five years of the operational phase of the Project. The proposed monitoring stations shall be the same monitoring stations that were used for the baseline monitoring programme and have been approved by EPD. The coordinates of the monitoring stations are shown in **Table 4.1** and their locations are 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)	
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 will 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) will be used for collection of samples for sediment analysis. The grab will 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 will 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) will be used for collecting sediment samples for benthic survey. The top of the grab will have openings to allow the easy flow of water through the grab as it descends. The openings will be covered with 0.5 mm mesh to prevent the loss of any benthic fauna once sediment samples are taken. In addition the top openings will be sealable by movable flaps which will 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 will be used as survey vessel. DGPS logging device in the ADCP with accuracy of ±1m at 95% confidence level will 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 will be automatically and electronically logged. Powered winch will be used on-board the survey vessel to assist the monitoring. 4 fixed sieve stations will be equipped on survey vessel. Experienced supervisor will be present all throughout the monitoring activity on-board 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) will be deployed using a winch at each of the benthic survey stations to collect single grab sample at each station. The grab sampler will 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) will be splitted up for analysis of particle size distribution and TOC. The remaining sediment samples will 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 will 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) will be deployed at each of the benthic survey stations to collect single grab sample at each station. 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 will 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 will 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 the appointed laboratory for analysis of sediment samples. The methods adopted by the laboratory 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 will 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 purpose, 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 12 October 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	8.3	1.7	1240	602	<0.10	76.4	31.7	42.5	0.14	26.4	106	18.2	0.21
B	8.5	2.2	1280	576	<0.10	35.2	31.3	34.8	0.11	21.0	96.5	9.9	0.23
C	8.2	6.7	1520	671	0.12	47.0	37.9	42.5	0.12	28.5	121	13.9	0.26
D	8.2	6.8	1510	622	0.11	47.1	38.5	42.6	0.13	28.6	126	12.7	0.29
E	8.2	16.2	2240	734	0.11	50.7	44.0	45.0	0.15	30.6	135	12.3	0.34
F	8.3	14.6	1950	729	0.11	51.0	44.7	45.8	0.21	31.0	136	12.4	0.34
G	8.6	1.7	930	537	<0.10	14.2	15.0	18.8	<0.05	8.3	38.3	6.1	<0.10
H	8.3	2.2	1490	744	0.16	52.4	61.7	46.2	0.13	31.5	152	14.4	0.68

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	0.88	1	18	41	40	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
B	0.80	5	22	42	31	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
C	0.94	0	5	55	40	Dark grey, slightly sandy SILT/CLAY
D	1.02	0	6	54	40	Dark grey, slightly sandy SILT/CLAY with shell fragments
E	1.16	0	4	56	40	Dark grey, slightly sandy SILT/CLAY with shell fragments
F	1.16	2	8	51	39	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
G	0.96	2	12	46	40	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
H	0.87	0	2	58	40	Dark grey, slightly sandy SILT/CLAY

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

4.10.3 Construction works from expansion of Hong Kong International Airport was observed nearby the Project site and its vicinity and may affect the sediment quality. The above conditions may affect monitoring results. 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)		
12 October 2018	27.1	23.8	22.0	73	0.3

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 12 October 2018

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	18	19.44	12	2.37	0.95
B	18	4.72	10	2.25	0.98
C	16	4.84	9	1.98	0.90
D	19	0.05	9	1.76	0.80
E	30	27.92	18	2.73	0.94
F	28	18.91	13	2.15	0.84
G	46	7.79	22	2.83	0.91
H	27	15.22	19	2.78	0.96
TOTAL	**202**	**98.89**	**(50 N)**		

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

i) Abundance

A total of 202 macrobenthic organisms were collected from the eight stations during the October 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 21 individuals (ind.) compared to the August 2018 results. Macrobenthic abundance showed decreasing trend this wet season (April 2018 to October 2018) monitoring albeit insignificant (p-value = 0.30; F crit = 2.64; α = 0.05). The decreasing trend might be attributed to weather disturbances (i.e. tropical storms) that hit Hong Kong week(s) before the sampling activities for June 2018, August 2018, and October 2018 monitoring periods. Wave actions brought about by these weather disturbances might have caused intermediate disturbances in the sampling stations, particularly that these stations are characteristically shallow waters (11m to 23m). Wave action may affect bottom sediments up to 50m in depth based on studies conducted by Coleman et al. (1997). Molluscs, particularly bivalves, were significantly affected by these disturbances as shown in their decreasing abundance since April 2018 monitoring period.

Across monitoring stations, the distribution of macrobenthic abundance remained to be significantly variable (p-value = 0.03; F crit = 2.31; α = 0.05). Relatively higher abundances were recorded in the reference Stations E (30 ind.), F (28 ind.), G (46 ind.), and H (27 ind.) while lower abundances were recorded in the impact Stations C (16 ind.) and D (19 ind.) and reference Stations A and B, both have 18 ind. In correlation with particle grain size distribution, it can be observed that relatively higher abundances were noted in stations with slightly higher slit/clay percentages. Silt/clay substrates are preferred by annelids, the most abundant and ubiquitous groups during in this monitoring period.

ii) Biomass

The total wet biomass for all the eight stations during the October 2018 monitoring period was 98.89g, which is relatively higher than the biomass recorded during the August 2018 monitoring period. The increase in total wet biomass from August 2018 to October 2018 might be attributed to the larger sizes of bivalves collected during this monitoring period despite their relatively lower and decreasing abundances.

The highest biomass was observed in Station E (27.92g) and A (19.44g) and the lowest remained to be at the impact station, Station D (0.05g). Highest biomass remained at Station E and A because of the bivalves, *Ruditapes philippinarum* and *Paphia undulata*, continued to contribute significantly to the total wet biomass due to their larger sizes despite the decline in their abundance. Biomass decreased in Station A, Station C and Station D compared to the August 2018 monitoring period, which may be due to the shift in the macrobenthic assemblage, which is currently dominated by smaller organisms (i.e. annelids).

iii) Taxonomic Composition

A total of five phyla comprised of 36 families and 50 taxa were identified in the eight stations during the October 2018 monitoring period. With the previous increase in the number of annelid species and abundance and the decrease in the abundance of bivalves, annelids (i.e. polychaetes) remained to dominate the current benthic assemblages comprising about 65.35% of the sampled population. The shift in benthic assemblage from the April 2018 monitoring period might be attributed to wave actions generated by the series of typhoons which 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 wet season 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 capitellid and nepthyid were the most abundant group.

Same as with abundance distribution, relatively higher numbers of taxa identified were recorded in the reference Stations E (18), F (13), G (22), and H (19) while lower abundances were recorded in reference Stations A (12) and B (10) and impact Stations C and D, both have 9 ind. The relatively higher number of taxa identified were mainly contributed by the species of polychaetes recorded at these stations.

iv) Diversity

Diversity indices (H') for the October 2018 monitoring period ranged from very low (1.76 at Station D and 1.98 at Station C) to moderate (2.83 at Station G). Compared to the August 2018 monitoring periods, decrease in diversity in majority of stations (except station G and H) was observed. This decrease might be due to the dominance of the annelids in the new habitats made available by wave actions caused by weather disturbances. The decrease in diversity consequently lowered the heterogeneity of the benthic communities as showed by their decreased Evenness (J) Index.

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

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 dated 10 July 2018, "*Monitoring of Marine Mammals in Hong Kong Waters (2017-18)*", in terms of the distribution and abundance of CWDs, was reviewed in the Monthly EM&A report in July 2018. 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 (2018-19) is uploaded to AFCD's webpage.

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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 the 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 (WMP) shall be fully and properly implemented. During the reporting period, following measures in related to solid and liquid waste management were 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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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 ASRs were recorded.

8.1.2 Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 12 October 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 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 collected between August 2017 and May 2018, current H_2S measurement and olfactometry analysis were considered as unsuitable method to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m3). In order to assess whether SHWSTW is the major H_2S source to ASRs, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR are not appropriate locations for the correlation study as the change of both odour level and H_2S concentrations at ASRs 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. H_2S 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 H_2S concentration (ppb) with the odour unit (OU/m^3). 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 H_2S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). 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 H_2S 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 12 October 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. Heavy marine traffic and construction works from expansion of Hong Kong International Airport were observed nearby the Project site and its vicinity and may affect the water and sediment quality The above conditions may affect monitoring results.

11.1.4 The latest AFCD's report dated 10 July 2018, "*Monitoring of Marine Mammals in Hong Kong Waters (2017-18)*" in terms of the distribution and abundance of CWDs was reviewed in the Monthly EM&A report in July 2018. 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 (2018-19) 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 environmental impact during the report period.

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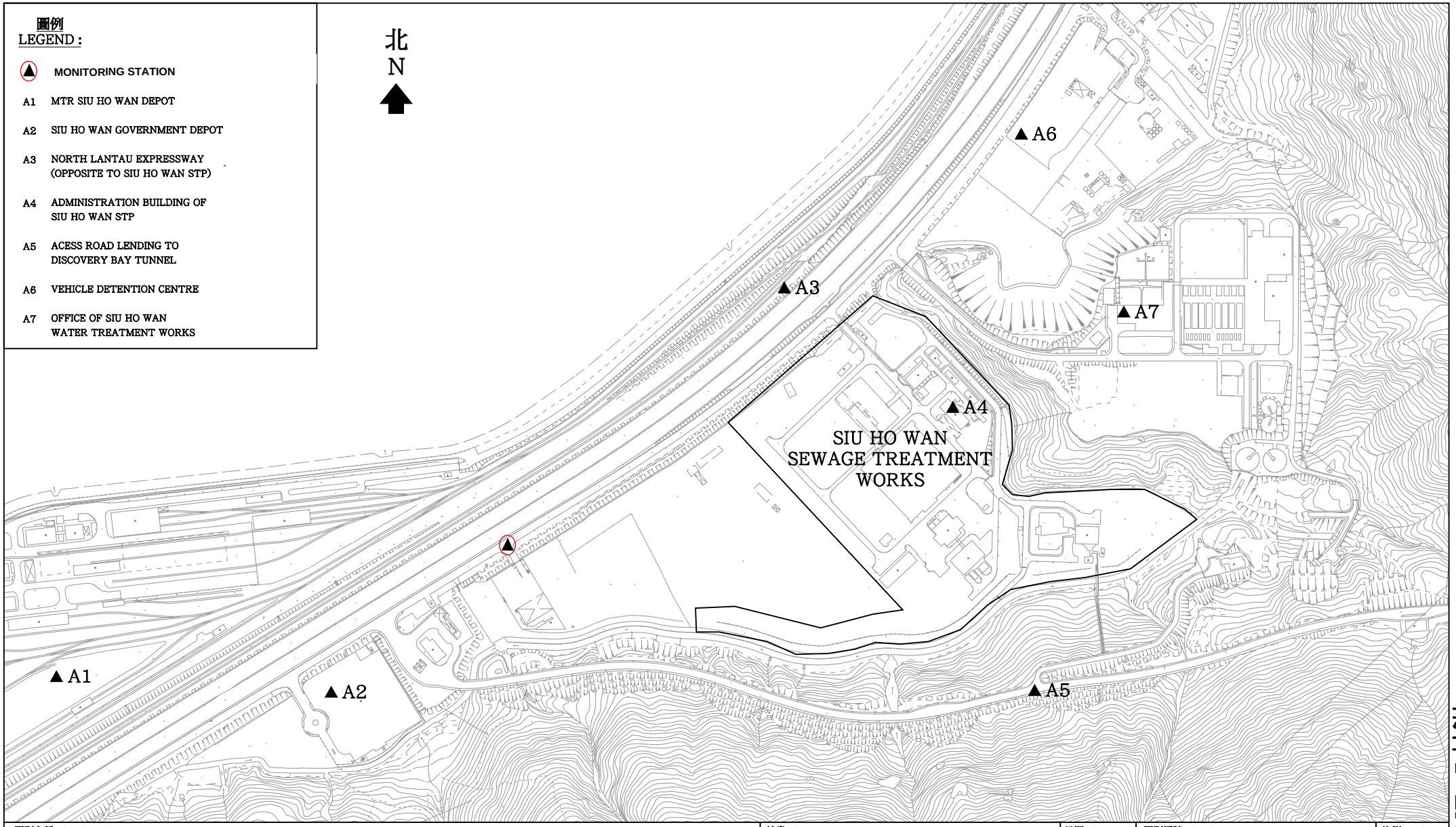
Figure 1

Monitoring Stations of Air Sensitive Receivers



圖則名稱 drawing title

UPGRADING OF SIU HO WAN SEWAGE TREATMENT PLANT
OPTIONAL ENVIRONMENTAL MONITORING AND AUDIT PLAN
ODOUR PATROL MONITORING STATIONS

繪畫 drawn	C.W. CHAN	日期 date 16-08-2006
核對 checked	C.K. LAM	日期 date 16-08-2006
批核 approved	S.K. WONG	日期 date 16-08-2006
部門 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION	

圖則編號 drawing no. DCM/2006/063

比例 scale N.T.S.

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

附件1 ENCLOSURE 1

FUGRO TECHNICAL SERVICES LIMITED

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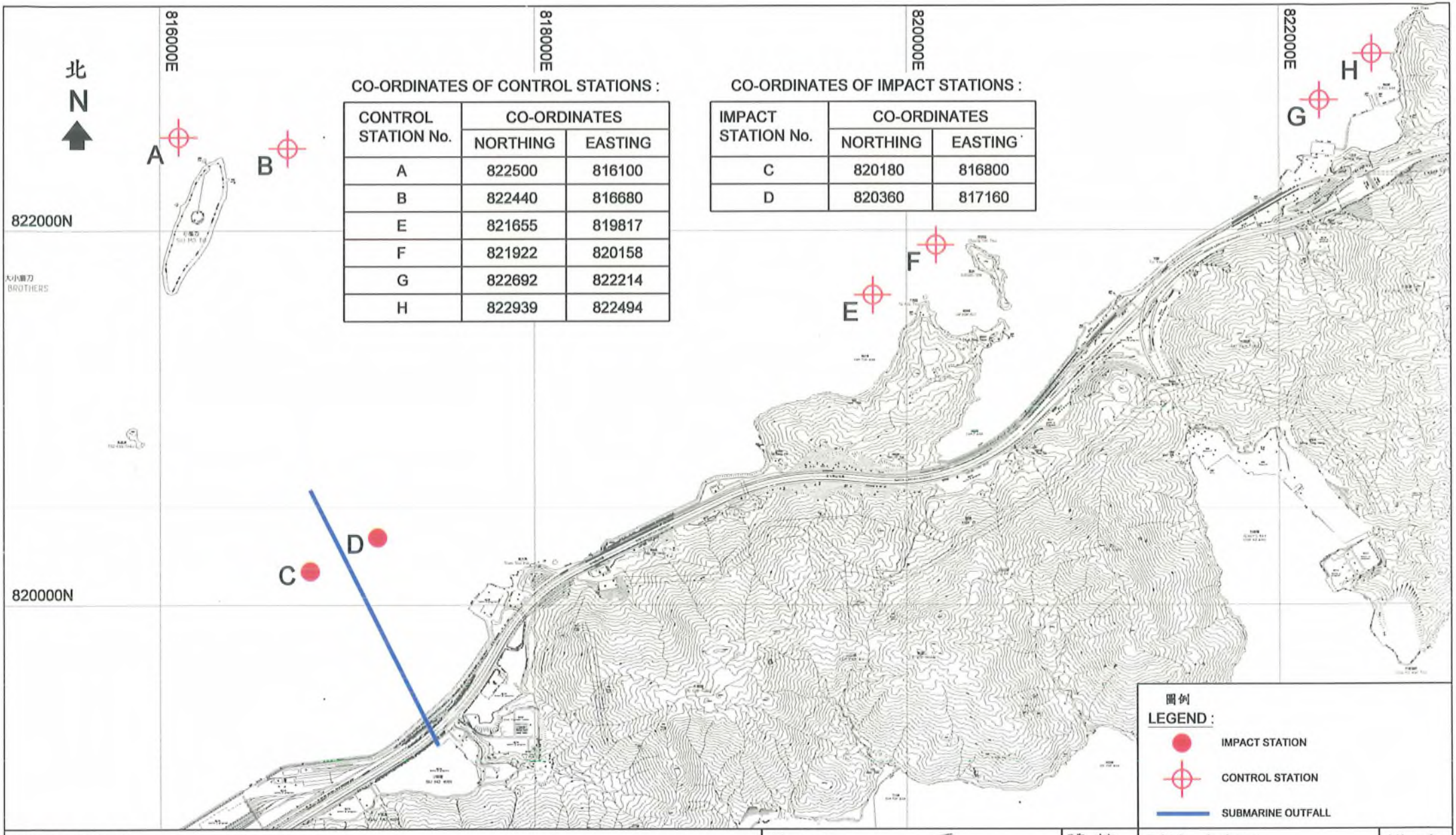
Figure 2

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



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.

香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
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Figure 3

Location of the Tide Gauge

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Location of the Tide Gauge

Source: Google Maps

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Figure 4

Location of Survey Areas of Chinese White Dolphins

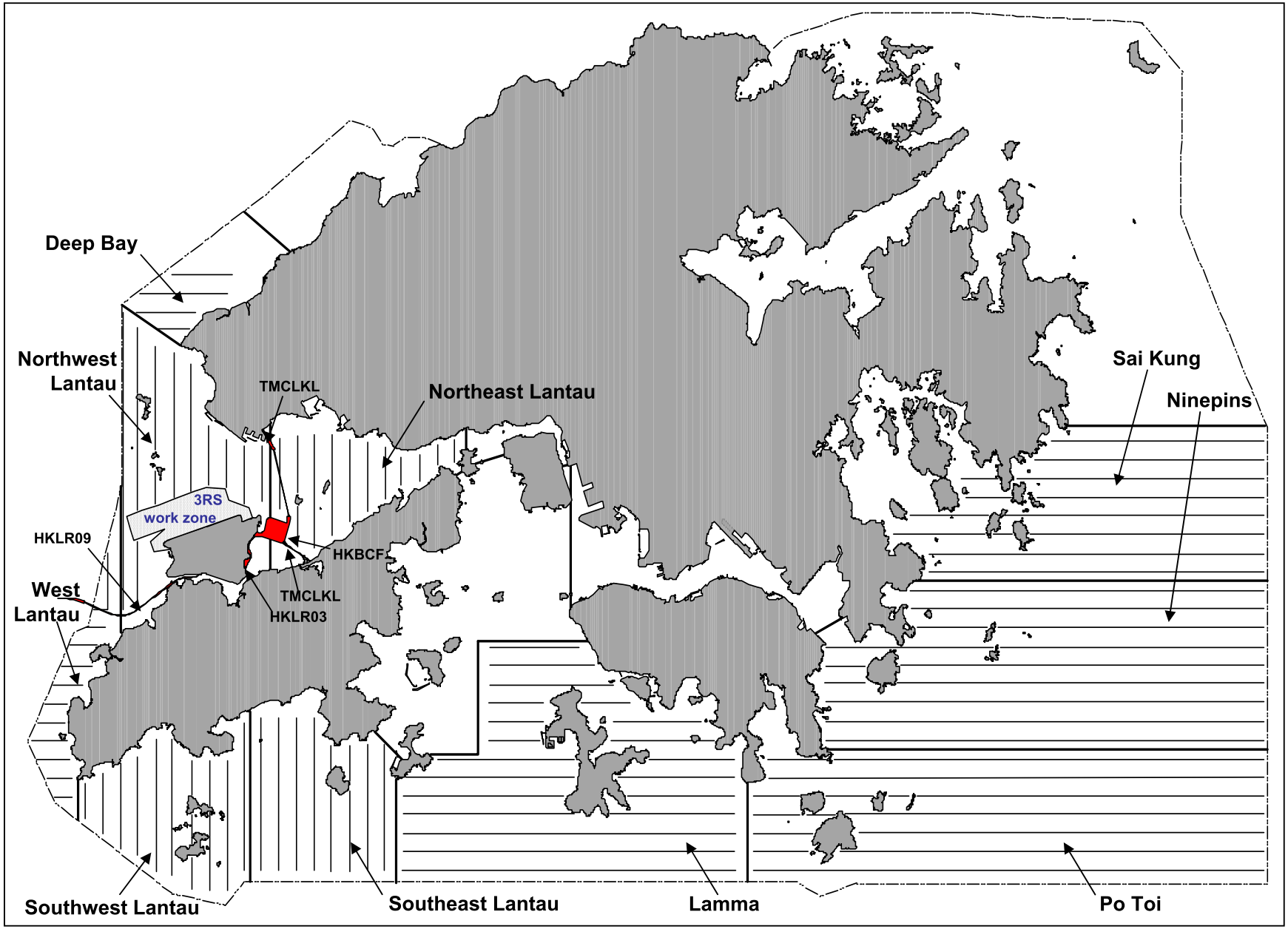

Figure 4. Ten Line-Transect Survey Areas within the Study Area for the 2017-18 Monitoring Study

Source: Monitoring of Marine Mammals in Hong Kong Waters (2017-18), AFCD

FUGRO TECHNICAL SERVICES LIMITED

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Appendix A

Project Organization Chart

FUGRO TECHNICAL SERVICES LIMITED

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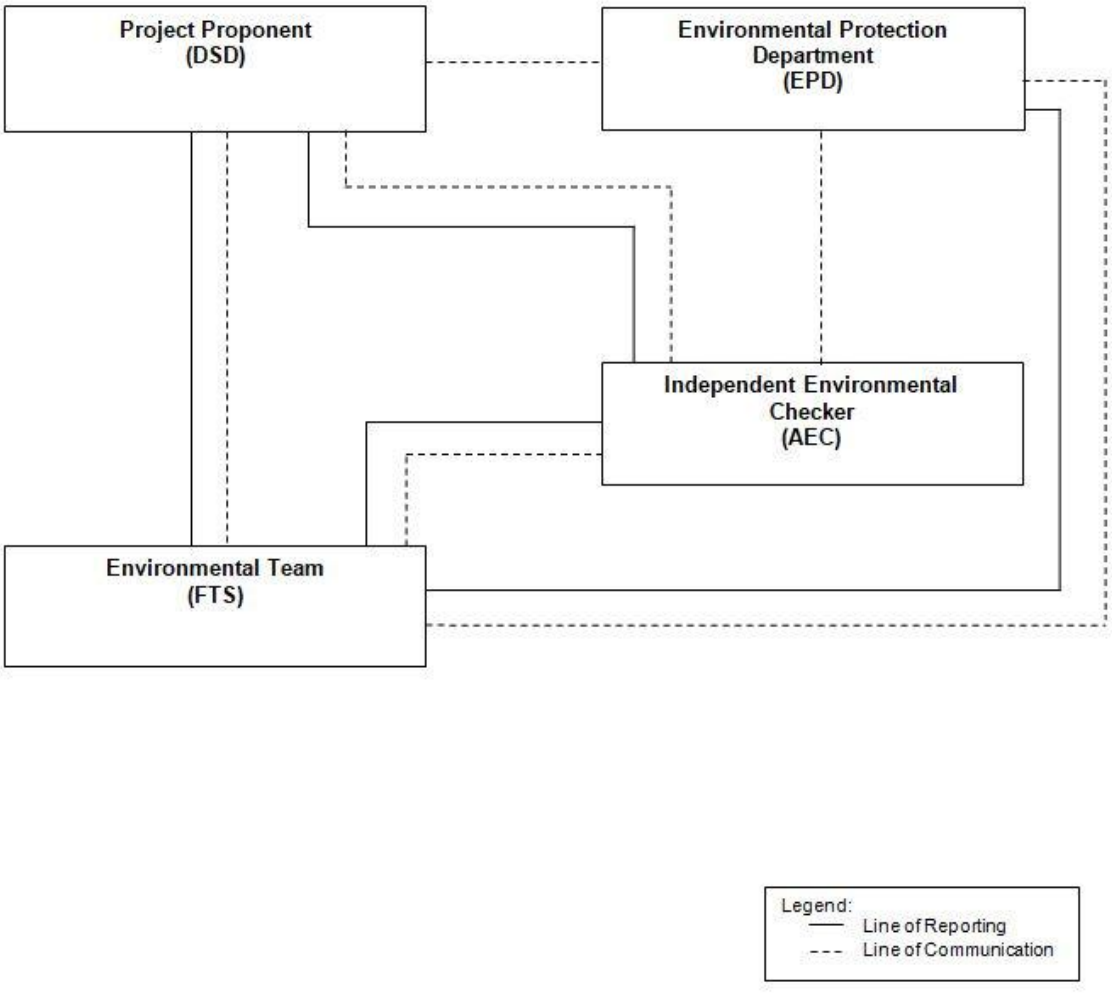

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Appendix B

Monitoring Schedule for Present and Next Reporting Period

FUGRO TECHNICAL SERVICES LIMITED

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Website : www.fugro.com

Report No.: 0041/17/ED/0378B

Monitoring Schedule for the Present Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
	1 October	2	3	4	5	6
7	8	9	10	11	12 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Flood (08:35) Mid-Ebb (14:32)	13
14	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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Website : www.fugro.com

Monitoring Schedule for the Next Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
				1 November	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	

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

FUGRO TECHNICAL SERVICES LIMITED
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EVENT	ACTION		
	ET	IEC	*Operator
Action Level			
One complaint received for specific odour event	1. Check Operator's working methods; 2. Discuss with Operator on required remedial actions	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	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	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	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	1. Indentify/ 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

MateriaLab

Report No. : 142626WA181891(1)

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	:	WA181891/2
Date of calibration	:	28/09/2018
Next calibration date	:	27/12/2018
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

MateriaLab

Report No. : 142626WA181891(1)

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	6.88	+0.02

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.07	+0.07	± 0.5
20	20.06	+0.06	± 1.0
30	30.11	+0.11	± 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	8.09	8.08
2	8.14	8.12
3	8.11	8.09
Average	8.11	8.10

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 : 23/10/2018

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

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

MateriaLab

Report No. : 142626WA181891(1)

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
25.25	25.30

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.08	+0.08	± 0.4
8	8.08	+0.08	± 0.6
40	40.79	+0.79	± 3.0
80	80.98	+0.98	± 4.0

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

Date : 23/10/2018

** End of Report **

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

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

MateriaLab

Report No. : 142626WA181891

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	:	WA181891/1
Date of calibration	:	28/09/2018
Next calibration date	:	27/12/2018
Test method used	:	In-house comparison method

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

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Website : www.fugro.com

MateriaLab

Report No. : 142626WA181891

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	9.22	+0.04
6.86	6.86	±0.00

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.04	+0.04	± 0.5
20	20.06	+0.06	± 1.0
30	30.14	+0.14	± 1.5
40	39.96	-0.04	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	8.10	8.11
2	8.07	8.06
3	8.09	8.08
Average	8.09	8.08

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 : 23/10/2018

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

FUGRO TECHNICAL SERVICES LIMITED
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Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MateriaLab

Report No. : 142626WA181891

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
25.26	25.31

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.07	+0.07	± 0.4
8	8.05	+0.05	± 0.6
40	40.76	+0.76	± 3.0
80	80.96	+0.96	± 4.0

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

Date : 23/10/2018

** End of Report **

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

SonTek
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 ™	Enabled
Stationary	Disabled
GPS Compass Integration	Disabled
RiverSurveyor	Enabled
HydroSurveyor	Disabled

Verified by: **ainthasane**

This report was generated on 5/24/2017.

FUGRO TECHNICAL SERVICES LIMITED

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Appendix E

Results and Graphical Presentation of Water Quality Monitoring

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (solube and particulate) (mg/L)	BOD_5 (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:05	17	S	1	1	8.33	31.90	26.83	113.3	7.20	5.1	0.20	119.5	10.5	0.039	0.090	0.302	0.431	ND	0.04	<1.0
A	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:05	17	S	1	2	8.34	31.96	26.85	112.6	7.15	5.3	0.24	254.3	10.2	0.012	0.093	0.302	0.407	ND	0.04	<1.0
A	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:05	17	M	8.5	1	8.35	32.27	26.87	112.6	7.14	5.5	0.34	163.8	7.5	0.024	0.094	0.298	0.416	ND	0.04	<1.0
A	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:05	17	M	8.5	2	8.35	32.45	26.88	111.9	7.10	5.5	0.35	177.5	6.2	0.032	0.097	0.296	0.425	ND	0.04	<1.0
A	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:05	17	B	16	1	8.36	32.64	26.91	110.5	7.01	6.4	0.46	191.1	7.6	0.035	0.094	0.299	0.428	ND	0.04	<1.0
A	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:05	17	B	16	2	8.36	32.60	26.91	110.2	6.99	5.6	0.46	182.2	8.7	0.013	0.096	0.292	0.401	ND	0.04	<1.0
B	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:16	14	S	1	1	8.38	32.57	26.84	114.9	7.15	7.7	0.25	107.2	9.9	0.019	0.086	0.263	0.369	ND	0.04	<1.0
B	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:16	14	S	1	2	8.38	32.58	26.86	112.7	7.07	7.0	0.26	105.4	11.0	0.017	0.088	0.264	0.370	ND	0.04	<1.0
B	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:16	14	M	7	1	8.39	32.72	26.94	110.6	7.01	5.8	0.09	190.2	10.1	0.041	0.084	0.267	0.392	ND	0.04	<1.0
B	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:16	14	M	7	2	8.39	32.73	26.94	110.3	6.99	5.8	0.09	95.3	10.6	0.023	0.086	0.269	0.378	ND	0.04	<1.0
B	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:16	14	B	13	1	8.39	32.91	26.98	110.7	7.01	5.4	0.19	186.7	12.4	0.021	0.088	0.262	0.371	ND	0.04	<1.0
B	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:16	14	B	13	2	8.39	32.90	26.98	110.7	7.01	5.2	0.16	185.3	12.1	0.022	0.078	0.276	0.375	ND	0.04	<1.0
C	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:32	12	S	1	1	8.71	31.50	26.36	130.3	8.34	4.8	0.15	208.7	14.7	<0.005	0.080	0.314	0.394	ND	0.04	<1.0
C	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:32	12	S	1	2	8.72	31.39	26.45	125.4	8.01	4.5	0.17	243.8	14.9	0.010	0.080	0.313	0.403	ND	0.04	<1.0
C	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:32	12	M	6	1	8.65	32.59	26.65	118.9	7.57	6.4	0.14	174.3	9.5	0.008	0.090	0.302	0.400	ND	0.04	<1.0
C	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:32	12	M	6	2	8.62	32.80	26.75	112.5	7.16	6.9	0.19	167.1	8.6	<0.005	0.081	0.308	0.388	ND	0.04	<1.0
C	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:32	12	B	11	1	8.55	32.87	26.84	108.0	6.86	9.5	0.03	204.2	8.0	0.017	0.084	0.312	0.413	ND	0.04	2.4
C	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:32	12	B	11	2	8.54	32.89	26.84	107.8	6.84	9.5	0.07	214.1	8.0	0.029	0.089	0.303	0.421	ND	0.04	2.5
D	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:47	13	S	1	1	8.47	31.83	26.52	125.4	8.00	4.4	0.15	127.4	12.0	0.020	0.084	0.298	0.402	ND	0.04	3.0
D	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:47	13	S	1	2	8.46	31.52	26.61	120.9	7.70	4.7	0.14	96.9	12.4	0.011	0.097	0.340	0.448	ND	0.04	<1.0
D	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:47	13	M	6.5	1	8.42	32.79	26.84	111.3	7.07	6.4	0.17	164.3	11.3	0.016	0.086	0.300	0.402	ND	0.04	3.0
D	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:47	13	M	6.5	2	8.42	32.77	26.86	109.3	6.94	6.6	0.14	153.1	11.5	<0.005	0.077	0.308	0.385	ND	0.04	3.0
D	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:47	13	B	12	1	8.42	32.98	26.87	108.4	6.88	7.1	0.10	200.0	13.9	0.008	0.084	0.302	0.393	ND	0.04	3.0
D	12/10/2018	Mid-Ebb	Cloudy	Moderate	13:47	13	B	12	2	8.43	32.96	26.87	108.5	6.89	7.1	0.08	209.6	13.1	0.011	0.090	0.295	0.397	ND	0.04	3.0
E	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:04	16	S	1	1	8.44	33.52	26.46	119.2	7.62	4.2	0.18	121.0	15.5	0.052	0.079	0.250	0.381	290	0.04	<1.0
E	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:04	16	S	1	2	8.44	33.46	26.56	114.4	7.30	4.2	0.12	156.8	16.1	0.036	0.079	0.244	0.360	260	0.04	<1.0
E	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:04	16	M	8	1	8.43	33.55	26.72	109.9	6.99	4.2	0.18	204.9	12.1	0.049	0.082	0.251	0.382	310	0.04	<1.0
E	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:04	16	M	8	2	8.43	33.55	26.74	109.5	6.96	4.0	0.18	201.9	11.9	0.043	0.073	0.248	0.364	270	0.04	<1.0
E	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:04	16	B	15	1	8.42	33.63	26.82	108.1	6.87	4.3	0.20	184.9	9.3	0.042	0.086	0.240	0.368	190	0.04	<1.0
E	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:04	16	B	15	2	8.42	33.64	26.83	108.1	6.86	4.6	0.19	227.0	10.1	0.032	0.085	0.245	0.362	150	0.04	<1.0
F	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:16	23	S	1	1	8.44	33.25	26.44	115.5	7.38	3.8	0.18	114.2	12.6	0.046	0.088	0.249	0.383	200	0.04	<1.0
F	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:16	23	S	1	2	8.44	33.17	26.54	112.6	7.18	4.0	0.19	115.1	11.8	0.055	0.085	0.249	0.389	250	0.04	<1.0
F	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:16	23	M	11.5	1	8.43	33.30	26.75	109.7	6.97	4.3	0.21	152.8	12.5	0.044	0.085	0.246	0.374	160	0.04	<1.0
F	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:16	23	M	11.5	2	8.43	33.33	26.78	109.5	6.96	4.3	0.27	151.3	12.2	0.048	0.080	0.255	0.382	180	0.04	<1.0
F	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:16	23	B	22	1	8.42	33.37	26.82	108.4	6.90	4.3	0.15	168.6	12.1	0.047	0.077	0.258	0.382	130	0.04	<1.0
F	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:16	23	B	22	2	8.42	33.34	26.84	108.5	6.89	4.2	0.16	184.2	12.4	0.040	0.078	0.255	0.373	160	0.04	<1.0
G	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:33	22	S	1	1	8.43	33.27	26.40	122.6	7.84	5.8	0.13	133.1	19.6	0.036	0.073	0.238	0.346	180	0.04	<1.0
G	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:33	22	S	1	2	8.44	33.24	26.51	118.1	7.54	5.0	0.19	138.1	19.9	0.036	0.075	0.234	0.345	140	0.04	<1.0
G	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:33	22	M	11	1	8.44	33.09	26.75	113.4	7.21	4.6	0.17	162.1	9.3	0.036	0.078	0.233	0.347	92	0.04	<1.0
G	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:33	22	M	11	2	8.43	33.18	26.75	112.8	7.17	4.7	0.18	177.2	9.5	0.039	0.077	0.236	0.352	85	0.04	<1.0
G	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:33	22	B	21	1	8.43	33.30	26.81	110.2	7.00	4.9	0.22	231.2	11.4	0.038	0.076	0.237	0.351	170	0.04	<1.0
G	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:33	22	B	21	2	8.43	33.32	26.82	109.9	6.98	5.2	0.28	213.6	11.2	0.032	0.076	0.236	0.344	220	0.04	1.1
H	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:48	19	S	1	1	8.46	33.02	26.41	125.6	8.03	5.0	0.20	100.2	10.2	0.021	0.076	0.266	0.364	280	0.04	<1.0
H	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:48	19	S	1	2	8.44	32.93	26.62	119.0	7.59	5.1	0.14	144.2	11.2	0.032	0.088	0.257	0.377	260	0.04	<1.0
H	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:48	19	M	9.5	1	8.43	33.11	26.79	113.3	7.20	4.4	0.14	126.7	9.1	0.037	0.085	0.259	0.381	180	0.04	<1.0
H	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:48	19	M	9.5	2	8.43	33.17	26.80	112.1	7.12	4.3	0.16	138.0	8.5	0.039	0.085	0.259	0.384	150	0.04	<1.0
H	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:48	19	B	18	1	8.43	33.15	26.87	110.3	7.00	4.6	0.18	224.4	8.4	0.033	0.085	0.255	0.372	280	0.04	<1.0
H	12/10/2018	Mid-Ebb	Cloudy	Moderate	14:48	19	B	18	2	8.43	33.18	26.88	110.3	7.00	4.5	0.13	249.8	9.0	0.027	0.085	0.258	0.370	310	0.04	<1.0

Note: 1. ND: Not Detected

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (solube and particulate) (mg/L)	BOD_5 (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	12/10/2018	Mid-Flood	Cloudy	Moderate	9:52	15	S	1	1	8.41	31.65	27.45	117.9	7.41	4.5	0.12	130.7	10.7	0.014	0.098	0.318	0.430	43	0.04	1.0
A	12/10/2018	Mid-Flood	Cloudy	Moderate	9:52	15	S	1	2	8.42	31.56	27.32	115.8	7.29	4.6	0.08	114.7	10.0	0.009	0.104	0.325	0.438	35	0.04	<1.0
A	12/10/2018	Mid-Flood	Cloudy	Moderate	9:52	15	M	7.5	1	8.41	32.23	27.18	110.0	6.94	7.3	0.15	145.9	11.0	0.022	0.103	0.311	0.436	1	0.04	<1.0
A	12/10/2018	Mid-Flood	Cloudy	Moderate	9:52	15	M	7.5	2	8.41	32.27	27.18	110.1	6.95	7.4	0.13	107.1	10.6	0.010	0.102	0.313	0.424	4	0.04	<1.0
A	12/10/2018	Mid-Flood	Cloudy	Moderate	9:52	15	B	14	1	8.41	32.75	27.11	108.8	6.88	9.5	0.22	261.4	11.6	<0.005	0.097	0.318	0.415	1	0.04	<1.0
A	12/10/2018	Mid-Flood	Cloudy	Moderate	9:52	15	B	14	2	8.41	32.85	27.11	108.6	6.87	9.4	0.20	244.5	12.6	0.008	0.093	0.319	0.420	2	0.04	<1.0
B	12/10/2018	Mid-Flood	Cloudy	Moderate	9:41	14	S	1	1	8.42	32.39	27.24	120.9	7.62	6.6	0.29	179.5	17.3	0.044	0.079	0.232	0.355	27	0.04	<1.0
B	12/10/2018	Mid-Flood	Cloudy	Moderate	9:41	14	S	1	2	8.42	32.45	27.16	115.1	7.27	7.6	0.33	181.3	17.9	0.039	0.080	0.236	0.355	31	0.04	<1.0
B	12/10/2018	Mid-Flood	Cloudy	Moderate	9:41	14	M	7	1	8.42	32.72	27.04	109.3	6.91	10.2	0.22	169.3	17.0	0.056	0.078	0.239	0.373	17	0.04	<1.0
B	12/10/2018	Mid-Flood	Cloudy	Moderate	9:41	14	M	7	2	8.42	32.73	27.03	109.0	6.90	11.9	0.25	234.5	16.7	0.056	0.073	0.242	0.371	13	0.04	<1.0
B	12/10/2018	Mid-Flood	Cloudy	Moderate	9:41	14	B	13	1	8.42	32.93	26.99	108.9	6.89	16.0	0.21	172.3	24.8	0.039	0.073	0.244	0.357	68	0.04	<1.0
B	12/10/2018	Mid-Flood	Cloudy	Moderate	9:41	14	B	13	2	8.42	32.95	26.99	108.9	6.89	15.4	0.18	222.6	24.6	0.038	0.080	0.237	0.356	58	0.04	<1.0
C	12/10/2018	Mid-Flood	Cloudy	Moderate	9:22	12	S	1	1	8.41	31.59	26.96	120.3	7.62	5.1	0.12	116.9	9.0	0.034	0.101	0.300	0.436	13	0.04	<1.0
C	12/10/2018	Mid-Flood	Cloudy	Moderate	9:22	12	S	1	2	8.41	31.63	26.95	118.2	7.49	5.4	0.13	237.7	8.3	0.025	0.099	0.300	0.424	10	0.04	<1.0
C	12/10/2018	Mid-Flood	Cloudy	Moderate	9:22	12	M	6	1	8.40	32.06	26.95	112.0	7.10	8.1	0.11	137.7	5.8	0.046	0.098	0.300	0.445	10	0.04	<1.0
C	12/10/2018	Mid-Flood	Cloudy	Moderate	9:22	12	M	6	2	8.40	32.08	26.95	111.4	7.06	8.3	0.11	90.7	6.9	0.030	0.090	0.307	0.427	10	0.04	<1.0
C	12/10/2018	Mid-Flood	Cloudy	Moderate	9:22	12	B	11	1	8.39	32.32	26.97	109.0	6.90	11.4	0.20	107.3	8.7	0.037	0.090	0.306	0.433	17	0.04	<1.0
C	12/10/2018	Mid-Flood	Cloudy	Moderate	9:22	12	B	11	2	8.39	32.33	26.97	108.8	6.90	11.3	0.28	129.7	9.0	0.055	0.098	0.300	0.453	12	0.04	<1.0
D	12/10/2018	Mid-Flood	Cloudy	Moderate	9:03	14	S	1	1	8.41	31.31	27.44	129.5	8.15	5.1	0.19	98.5	9.3	0.018	0.100	0.299	0.417	45	0.04	<1.0
D	12/10/2018	Mid-Flood	Cloudy	Moderate	9:03	14	S	1	2	8.40	31.32	27.41	124.4	7.83	4.8	0.16	106.4	8.0	0.023	0.096	0.303	0.422	58	0.04	<1.0
D	12/10/2018	Mid-Flood	Cloudy	Moderate	9:03	14	M	7	1	8.40	31.56	27.17	117.6	7.43	5.3	0.26	105.5	7.1	0.022	0.095	0.299	0.416	51	0.04	<1.0
D	12/10/2018	Mid-Flood	Cloudy	Moderate	9:03	14	M	7	2	8.40	31.58	27.12	115.7	7.31	5.4	0.27	112.7	7.3	0.026	0.100	0.299	0.425	63	0.04	<1.0
D	12/10/2018	Mid-Flood	Cloudy	Moderate	9:03	14	B	13	1	8.39	32.19	27.08	111.6	7.06	13.2	0.33	91.1	4.6	0.013	0.097	0.299	0.409	28	0.04	<1.0
D	12/10/2018	Mid-Flood	Cloudy	Moderate	9:03	14	B	13	2	8.39	32.17	27.07	110.5	6.99	12.8	0.38	98.1	4.9	0.010	0.098	0.297	0.405	39	0.04	<1.0
E	12/10/2018	Mid-Flood	Cloudy	Moderate	8:52	14	S	1	1	8.40	32.38	26.76	112.5	7.15	8.5	0.14	140.2	11.5	0.065	0.091	0.298	0.454	53	0.04	<1.0
E	12/10/2018	Mid-Flood	Cloudy	Moderate	8:52	14	S	1	2	8.40	32.36	26.77	112.1	7.12	8.4	0.19	141.0	12.0	0.036	0.099	0.294	0.429	60	0.04	<1.0
E	12/10/2018	Mid-Flood	Cloudy	Moderate	8:52	14	M	7	1	8.40	32.59	26.83	111.0	7.05	8.0	0.14	187.4	11.3	0.057	0.089	0.302	0.448	42	0.04	<1.0
E	12/10/2018	Mid-Flood	Cloudy	Moderate	8:52	14	M	7	2	8.40	32.73	26.85	110.8	7.03	8.1	0.11	161.4	11.6	0.045	0.098	0.294	0.438	33	0.04	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:52	14	B	13	1	8.40	33.01	26.92	109.7	6.95	7.6	0.22	185.7	11.2	0.037	0.092	0.300	0.429	26	0.04	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:52	14	B	13	2	8.40	32.99	26.92	109.6	6.95	6.4	0.22	180.1	11.1	0.030	0.094	0.299	0.422	21	0.04	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:39	18	S	1	1	8.40	32.45	26.98	116.9	7.41	8.6	0.09	146.7	17.6	0.049	0.090	0.254	0.394	470	0.05	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:39	18	S	1	2	8.40	32.38	26.97	114.6	7.26	8.7	0.13	153.8	20.9	0.032	0.085	0.255	0.372	620	0.05	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:39	18	M	9	1	8.39	32.84	26.98	110.8	7.02	6.7	0.05	201.0	14.3	0.024	0.091	0.254	0.369	280	0.05	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:39	18	M	9	2	8.39	32.84	26.98	110.6	7.00	7.0	0.08	220.4	15.3	0.027	0.087	0.255	0.369	370	0.04	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:39	18	B	17	1	8.39	32.97	26.98	110.0	6.97	6.0	0.08	224.2	13.8	0.075	0.085	0.253	0.414	340	0.05	<1.0
F	12/10/2018	Mid-Flood	Cloudy	Moderate	8:39	18	B	17	2	8.39	33.00	26.98	109.7	6.95	5.9	0.05	249.1	13.5	0.053	0.090	0.252	0.396	430	0.04	1.1
G	12/10/2018	Mid-Flood	Cloudy	Moderate	8:20	13	S	1	1	8.37	32.21	26.82	109.5	6.95	6.8	0.28	170.2	19.9	0.046	0.083	0.278	0.407	68	0.05	<1.0
G	12/10/2018	Mid-Flood	Cloudy	Moderate	8:20	13	S	1	2	8.37	32.18	26.82	109.5	6.95	6.8	0.27	158.3	20.0	0.026	0.090	0.270	0.387	71	0.05	<1.0
G	12/10/2018	Mid-Flood	Cloudy	Moderate	8:20	13	M	6.5	1	8.36	32.30	26.82	108.9	6.91	8.7	0.31	171.4	15.4	0.027	0.090	0.271	0.387	80	0.05	1.1
G	12/10/2018	Mid-Flood	Cloudy	Moderate	8:20	13	M	6.5	2	8.37	32.30	26.82	109.0	6.92	8.8	0.39	177.3	15.3	0.023	0.097	0.267	0.387	88	0.05	<1.0
G	12/10/2018	Mid-Flood	Cloudy	Moderate	8:20	13	B	12	1	8.37	32.72	26.86	108.7	6.90	9.5	0.44	186.0	15.8	0.018	0.095	0.268	0.380	160	0.05	<1.0
G	12/10/2018	Mid-Flood	Cloudy	Moderate	8:20	13	B	12	2	8.37	32.62	26.86	108.7	6.90	10.0	0.39	170.3	16.5	0.025	0.094	0.269	0.387	120	0.05	<1.0
H	12/10/2018	Mid-Flood	Cloudy	Moderate	8:06	19	S	1	1	8.35	32.90	26.00	112.3	7.22	7.1	0.18	128.5	21.8	0.054	0.090	0.262	0.406	150	0.05	1.1
H	12/10/2018	Mid-Flood	Cloudy	Moderate	8:06	19	S	1	2	8.34	32.79	26.10	111.4	7.15	6.8	0.16	123.7	20.0	0.032	0.093	0.262	0.387	140	0.05	1.2
H	12/10/2018	Mid-Flood	Cloudy	Moderate	8:06	19	M	9.5	1	8.35	32.64	26.57	109.3	6.96	9.9	0.33	133.9	18.8	0.033	0.091	0.263	0.387	73	0.05	1.1
H	12/10/2018	Mid-Flood	Cloudy	Moderate	8:06	19	M	9.5	2	8.35	32.58	26.60	109.4	6.97	9.2	0.35	124.0	20.8	0.033	0.086	0.269	0.388	62	0.06	1.1
H	12/10/2018	Mid-Flood	Cloudy	Moderate	8:06	19	B	18	1	8.36	32.73	26.69	109.0	6.93	10.7	0.28	118.2	18.2	0.021	0.087	0.262	0.370	100	0.05	1.0
H	12/10/2018	Mid-Flood	Cloudy	Moderate	8:06	19	B	18	2	8.36	32.73	26.70	108.9	6.93	11.3	0.27	118.0	18.5	0.033	0.085	0.270	0.388	140	0.05	1.2

Note: 1. ND: Not Detected

CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 29
Contact	: MR CYRUS LAI	Contact	: Richard Fung	Work Order	: HK1853811
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	: 12-Oct-2018
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 29-Oct-2018
C-O-C number	: ----			No. of samples received	: 96
Site	: ----			No. of samples analysed	: 96

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

Signatories	*Position*	*Authorised results for*
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 12-Oct-2018 to 29-Oct-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: HK1853811

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 20:05. 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**

Compound	CAS Number	LOR	Unit	Client sample ID	A/S/E	A/S/E/Dup	A/M/E	A/M/E/Dup	A/B/E
				Client sampling date / time	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
					HK1853811-001	HK1853811-002	HK1853811-003	HK1853811-004	HK1853811-005
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		10.5	10.2	7.5	6.2	7.6
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.039	0.012	0.024	0.032	0.035
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.090	0.093	0.094	0.097	0.094
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.302	0.302	0.298	0.296	0.299
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.431	0.407	0.416	0.425	0.428
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		0.03	0.03	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		NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-006	HK1853811-007	HK1853811-008	HK1853811-009	HK1853811-010
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.7	9.9	11.0	10.1	10.6
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.013	0.019	0.017	0.041	0.023
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.096	0.086	0.088	0.084	0.086
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.292	0.263	0.264	0.267	0.269
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.401	0.369	0.370	0.392	0.378
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-011	HK1853811-012	HK1853811-013	HK1853811-014	HK1853811-015
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	12.4	12.1	14.7	14.9	9.5
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.021	0.022	<0.005	0.010	0.008
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.088	0.078	0.080	0.080	0.090
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.262	0.276	0.314	0.313	0.302
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.371	0.375	0.394	0.403	0.400
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-016	HK1853811-017	HK1853811-018	HK1853811-019	HK1853811-020
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.6	8.0	8.0	12.0	12.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.017	0.029	0.020	0.011
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.081	0.084	0.089	0.084	0.097
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.308	0.312	0.303	0.298	0.340
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.388	0.413	0.421	0.402	0.448
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	2.4	2.5	3.0	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-021	HK1853811-022	HK1853811-023	HK1853811-024	HK1853811-025
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	11.3	11.5	13.9	13.1	15.5
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.016	<0.005	0.008	0.011	0.052
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.086	0.077	0.084	0.090	0.079
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.300	0.308	0.302	0.295	0.250
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.402	0.385	0.393	0.397	0.381
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	3.0	3.0	3.0	3.0	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	290

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-026	HK1853811-027	HK1853811-028	HK1853811-029	HK1853811-030
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	16.1	12.1	11.9	9.3	10.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.036	0.049	0.043	0.042	0.032
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.079	0.082	0.073	0.086	0.085
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.244	0.251	0.248	0.240	0.245
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.360	0.382	0.364	0.368	0.362
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	260	310	270	190	150

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-031	HK1853811-032	HK1853811-033	HK1853811-034	HK1853811-035
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	12.6	11.8	12.5	12.2	12.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.046	0.055	0.044	0.048	0.047
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.088	0.085	0.085	0.080	0.077
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.249	0.249	0.246	0.255	0.258
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.383	0.389	0.374	0.382	0.382
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	200	250	160	180	130

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-036	HK1853811-037	HK1853811-038	HK1853811-039	HK1853811-040
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	12.4	19.6	19.9	9.3	9.5
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.040	0.036	0.036	0.036	0.039
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.078	0.073	0.075	0.078	0.077
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.255	0.238	0.234	0.233	0.236
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.373	0.346	0.345	0.347	0.352
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	160	180	140	92	85

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-041	HK1853811-042	HK1853811-043	HK1853811-044	HK1853811-045
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	11.4	11.2	10.2	11.2	9.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.038	0.032	0.021	0.032	0.037
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.076	0.076	0.076	0.088	0.085
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.237	0.236	0.266	0.257	0.259
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.351	0.344	0.364	0.377	0.381
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.1	<1.0	<1.0	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	170	220	280	260	180

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-046	HK1853811-047	HK1853811-048	HK1853811-049	HK1853811-050
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.5	8.4	9.0	10.7	10.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.039	0.033	0.027	0.014	0.009
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.085	0.085	0.085	0.098	0.104
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.259	0.255	0.258	0.318	0.325
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.384	0.372	0.370	0.430	0.438
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	150	280	310	43	35

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-051	HK1853811-052	HK1853811-053	HK1853811-054	HK1853811-055
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	11.0	10.6	11.6	12.6	17.3
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.022	0.010	<0.005	0.008	0.044
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.103	0.102	0.097	0.093	0.079
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.311	0.313	0.318	0.319	0.232
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.436	0.424	0.415	0.420	0.355
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	1	4	1	2	27

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-056	HK1853811-057	HK1853811-058	HK1853811-059	HK1853811-060
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	17.9	17.0	16.7	24.8	24.6
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.039	0.056	0.056	0.039	0.038
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.080	0.078	0.073	0.073	0.080
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.236	0.239	0.242	0.244	0.237
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.355	0.373	0.371	0.357	0.356
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	31	17	13	68	58

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-061	HK1853811-062	HK1853811-063	HK1853811-064	HK1853811-065
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.0	8.3	5.8	6.9	8.7
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.034	0.025	0.046	0.030	0.037
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.101	0.099	0.098	0.090	0.090
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.300	0.300	0.300	0.307	0.306
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.436	0.424	0.445	0.427	0.433
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	13	10	10	10	17

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-066	HK1853811-067	HK1853811-068	HK1853811-069	HK1853811-070
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.0	9.3	8.0	7.1	7.3
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.055	0.018	0.023	0.022	0.026
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.098	0.100	0.096	0.095	0.100
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.300	0.299	0.303	0.299	0.299
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.453	0.417	0.422	0.416	0.425
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	12	45	58	51	63

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-071	HK1853811-072	HK1853811-073	HK1853811-074	HK1853811-075
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.6	4.9	11.5	12.0	11.3
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.013	0.010	0.065	0.036	0.057
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.097	0.098	0.091	0.099	0.089
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.299	0.297	0.298	0.294	0.302
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.409	0.405	0.454	0.429	0.448
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	28	39	53	60	42

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-076	HK1853811-077	HK1853811-078	HK1853811-079	HK1853811-080
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	11.6	11.2	11.1	17.6	20.9
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.045	0.037	0.030	0.049	0.032
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.098	0.092	0.094	0.090	0.085
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.294	0.300	0.299	0.254	0.255
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.438	0.429	0.422	0.394	0.372
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	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	33	26	21	470	620

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-081	HK1853811-082	HK1853811-083	HK1853811-084	HK1853811-085
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	14.3	15.3	13.8	13.5	19.9
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.024	0.027	0.075	0.053	0.046
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.091	0.087	0.085	0.090	0.083
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.254	0.255	0.253	0.252	0.278
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.369	0.369	0.414	0.396	0.407
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.05	0.04	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	1.1	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	280	370	340	430	68

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-086	HK1853811-087	HK1853811-088	HK1853811-089	HK1853811-090
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	20.0	15.4	15.3	15.8	16.5
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.026	0.027	0.023	0.018	0.025
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.090	0.090	0.097	0.095	0.094
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.270	0.271	0.267	0.268	0.269
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.387	0.387	0.387	0.380	0.387
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	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.1	<1.0	<1.0	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	71	80	88	160	120

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit	HK1853811-091	HK1853811-092	HK1853811-093	HK1853811-094	HK1853811-095
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	21.8	20.0	18.8	20.8	18.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.054	0.032	0.033	0.033	0.021
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.090	0.093	0.091	0.086	0.087
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.262	0.262	0.263	0.269	0.262
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.406	0.387	0.387	0.388	0.370
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	0.01	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	1.2	1.1	1.1	1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	150	140	73	62	100

Sub-Matrix: WATER			Client sample ID	H/B/F/Dup	----	----	----	----
			Client sampling date / time	12-Oct-2018	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	HK1853811-096	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	18.5	----	----	----	----
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.033	----	----	----	----
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.085	----	----	----	----
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.270	----	----	----	----
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.388	----	----	----	----
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	----	----	----	----
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	----	----	----	----
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.2	----	----	----	----
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	140	----	----	----	----

Laboratory Duplicate (DUP) Report

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1981436)								
HK1853811-001	A/S/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	10.5	10.0	4.87
HK1853811-011	B/B/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	12.4	12.2	1.62
EA/ED: Physical and Aggregate Properties (QC Lot: 1981437)								
HK1853811-021	D/M/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	11.3	11.1	1.79
HK1853811-031	F/S/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	12.6	12.2	2.62
EA/ED: Physical and Aggregate Properties (QC Lot: 1981438)								
HK1853811-041	G/B/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	11.4	11.0	3.80
HK1853811-051	A/M/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	11.0	10.5	4.19
EA/ED: Physical and Aggregate Properties (QC Lot: 1981440)								
HK1853811-061	C/S/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	9.0	8.2	9.36
HK1853811-071	D/B/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	4.6	5.2	12.3
EA/ED: Physical and Aggregate Properties (QC Lot: 1981441)								
HK1853811-081	F/M/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	14.3	13.7	4.28
HK1853811-091	H/S/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	21.8	20.2	7.97
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980317)								
HK1853811-010	B/M/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.086	0.087	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980319)								
--------		**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	----	0.082	5.13
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980321)								
--------		**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	----	0.102	4.93
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980323)								
HK1853811-070	D/M/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.100	0.099	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980325)								
HK1853811-090	G/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.094	0.085	9.27
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984023)								
HK1853811-010	B/M/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.023	0.020	15.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984024)								
HK1853811-030	E/B/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.032	0.036	13.9
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984025)								
HK1853811-050	A/S/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.009	0.008	0.00

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984026)								
HK1853811-070	D/M/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.026	0.023	12.7
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984027)								
HK1853811-090	G/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.025	0.030	19.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002210)								
HK1853811-010	B/M/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002211)								
HK1853811-010	B/M/E/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002212)								
HK1853811-030	E/B/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002213)								
HK1853811-030	E/B/E/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002214)								
HK1853811-050	A/S/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002215)								
HK1853811-050	A/S/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002216)								
HK1853811-070	D/M/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002217)								
HK1853811-070	D/M/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002218)								
HK1853811-090	G/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002219)								
HK1853811-090	G/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.05	0.05	0.00

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

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 1981436)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	92.0	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1981437)											

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 1981437) - Continued											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	107	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1981438)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	102	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1981440)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	108	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1981441)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	96.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980317)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	96.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980319)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	100	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980321)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	111	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980323)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	99.4	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980325)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	97.6	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984023)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	112	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984024)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	96.8	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984025)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	97.4	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984026)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	97.4	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984027)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	99.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002210)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	99.4	----	85	115	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002211)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.4	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002212)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	98.6	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002213)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	99.2	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002214)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	99.6	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002215)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	100	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002216)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	100	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002217)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	99.6	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002218)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	99.5	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002219)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.6	----	90	104	----	----
EP: Aggregate Organics (QC Lot: 1980340)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	110	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1980495)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	100	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1980496)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	101	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1980497)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	102	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1980498)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	102	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1982422)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	104	----	81	115	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EP: Aggregate Organics (QC Lot: 1982428)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	104	----	81	115	----	----

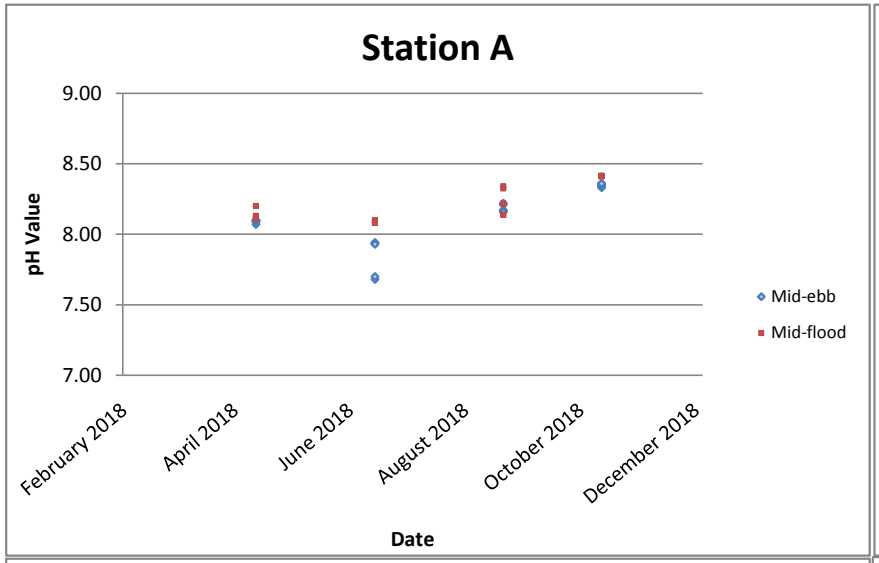
Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

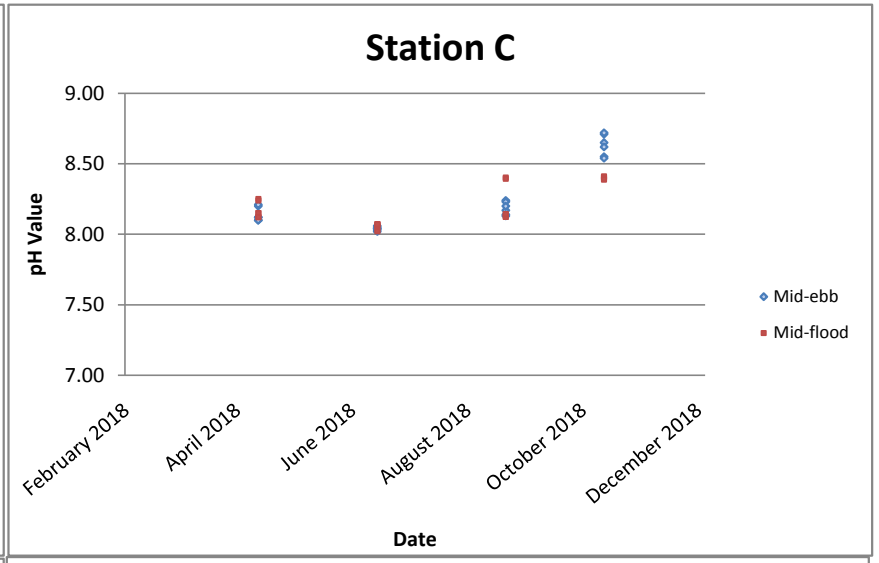
Matrix: **WATER**

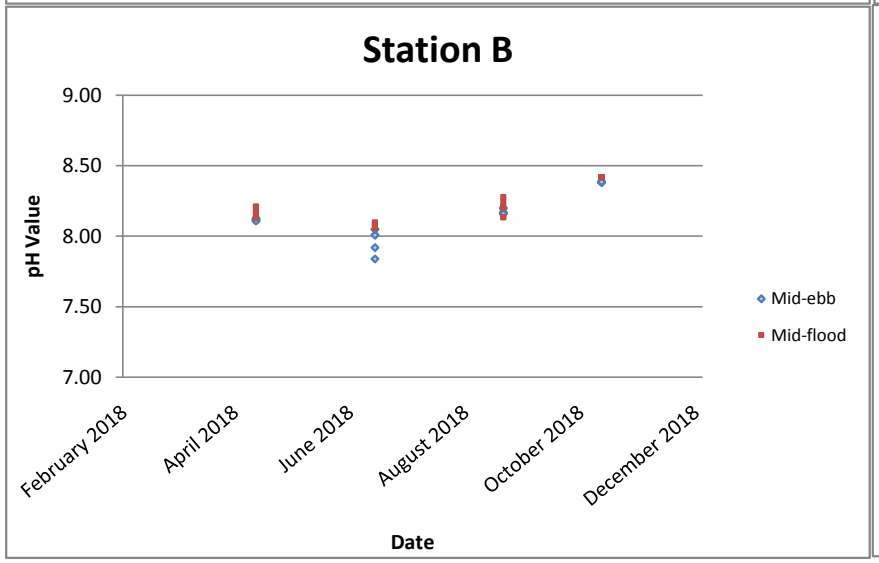
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980317)										
HK1853811-010	B/M/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	102	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980319)										
HK1853811-030	E/B/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	108	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980321)										
HK1853811-050	A/S/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	109	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980323)										
HK1853811-070	D/M/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	103	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1980325)										
HK1853811-090	G/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	108	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984023)										
HK1853811-010	B/M/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	90.1	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984024)										
HK1853811-030	E/B/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	95.3	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984025)										
HK1853811-050	A/S/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	95.5	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984026)										
HK1853811-070	D/M/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	91.9	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1984027)										
HK1853811-090	G/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	91.8	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002210)										
HK1853811-010	B/M/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	94.0	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002211)										

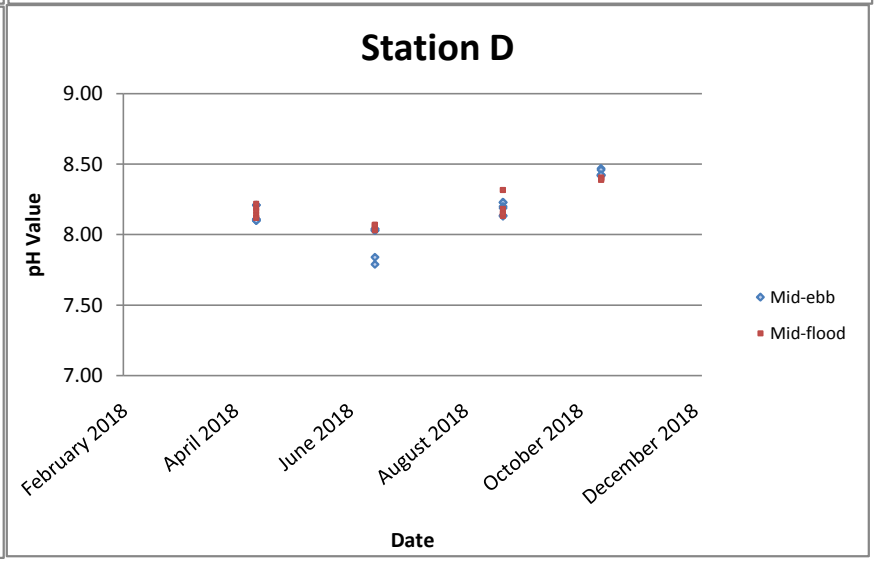
Matrix: **WATER**

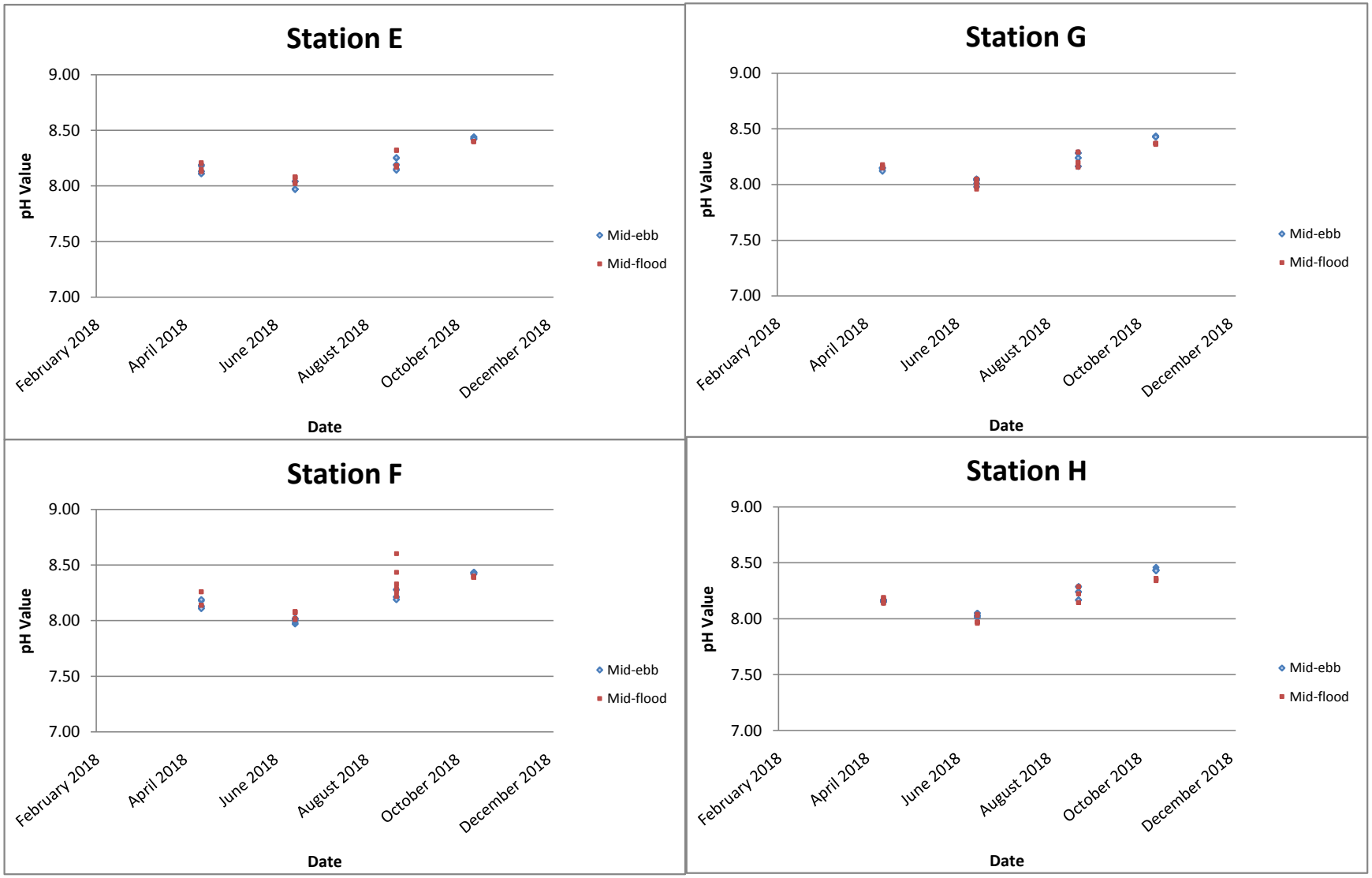
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002211) - Continued										
HK1853811-010	B/M/E/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	92.0	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002212)										
HK1853811-030	E/B/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	94.0	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002213)										
HK1853811-030	E/B/E/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	96.0	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002214)										
HK1853811-050	A/S/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	98.0	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002215)										
HK1853811-050	A/S/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	96.0	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002216)										
HK1853811-070	D/M/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	92.3	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002217)										
HK1853811-070	D/M/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	90.0	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002218)										
HK1853811-090	G/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	94.0	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2002219)										
HK1853811-090	G/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	88.5	----	75	125	----	----

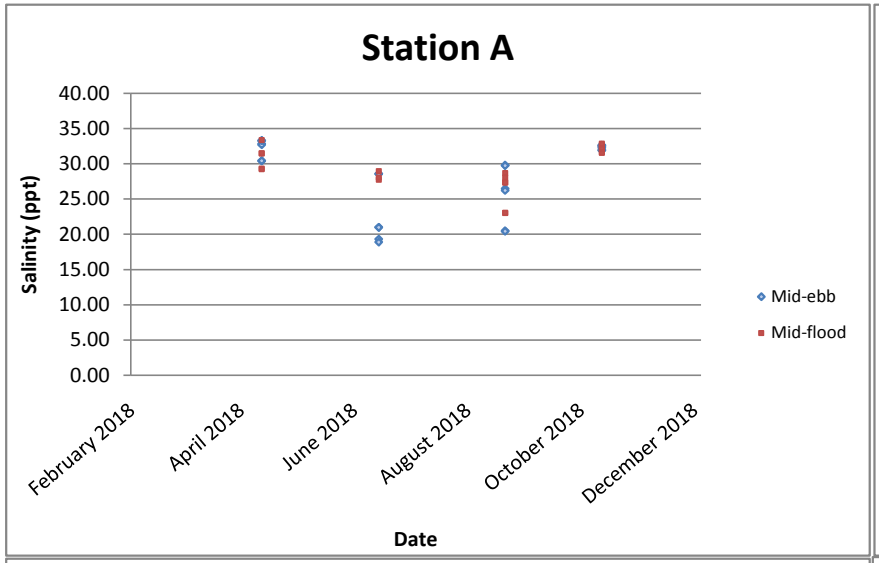

Station A
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

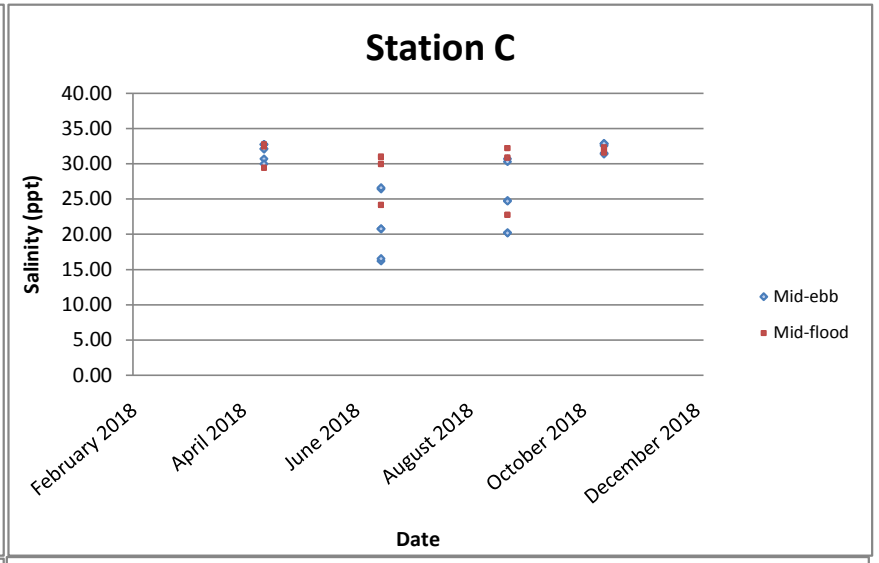

Station C
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

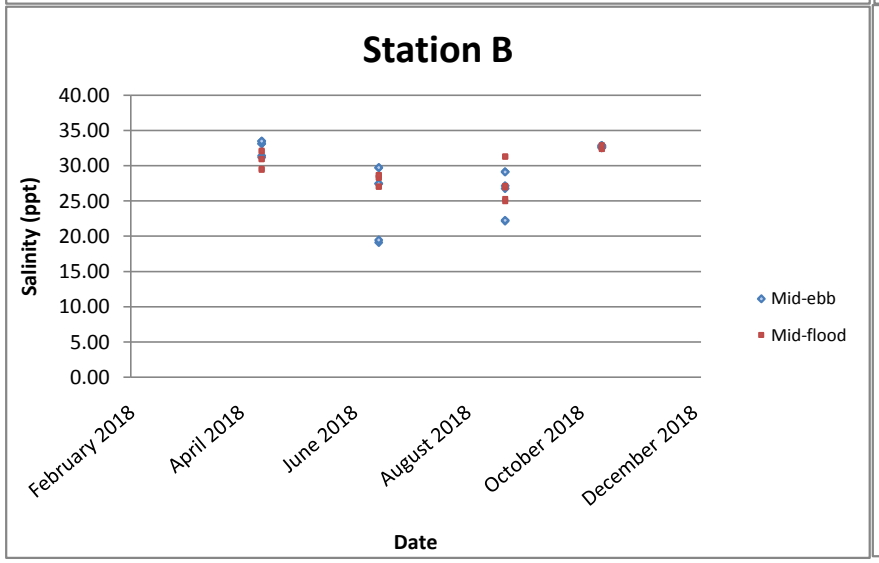

Station B
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

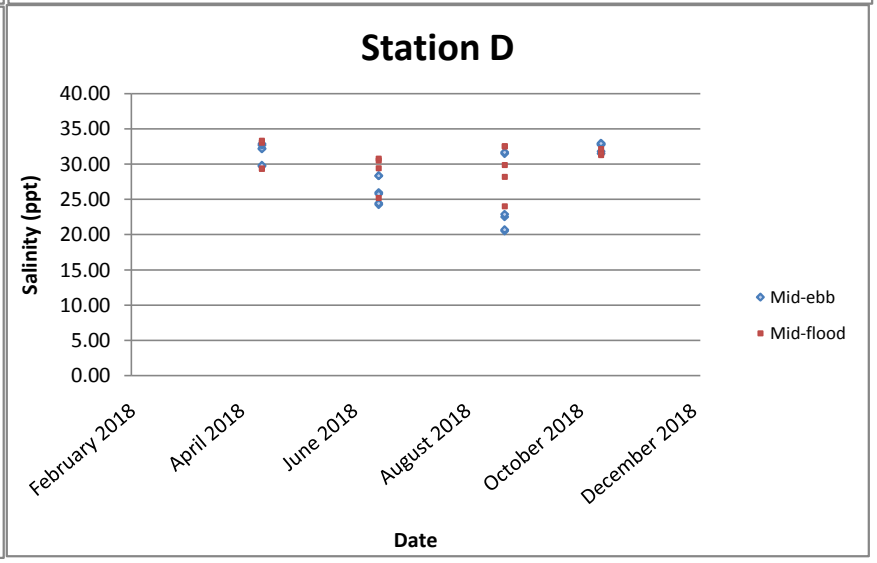

Station D
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

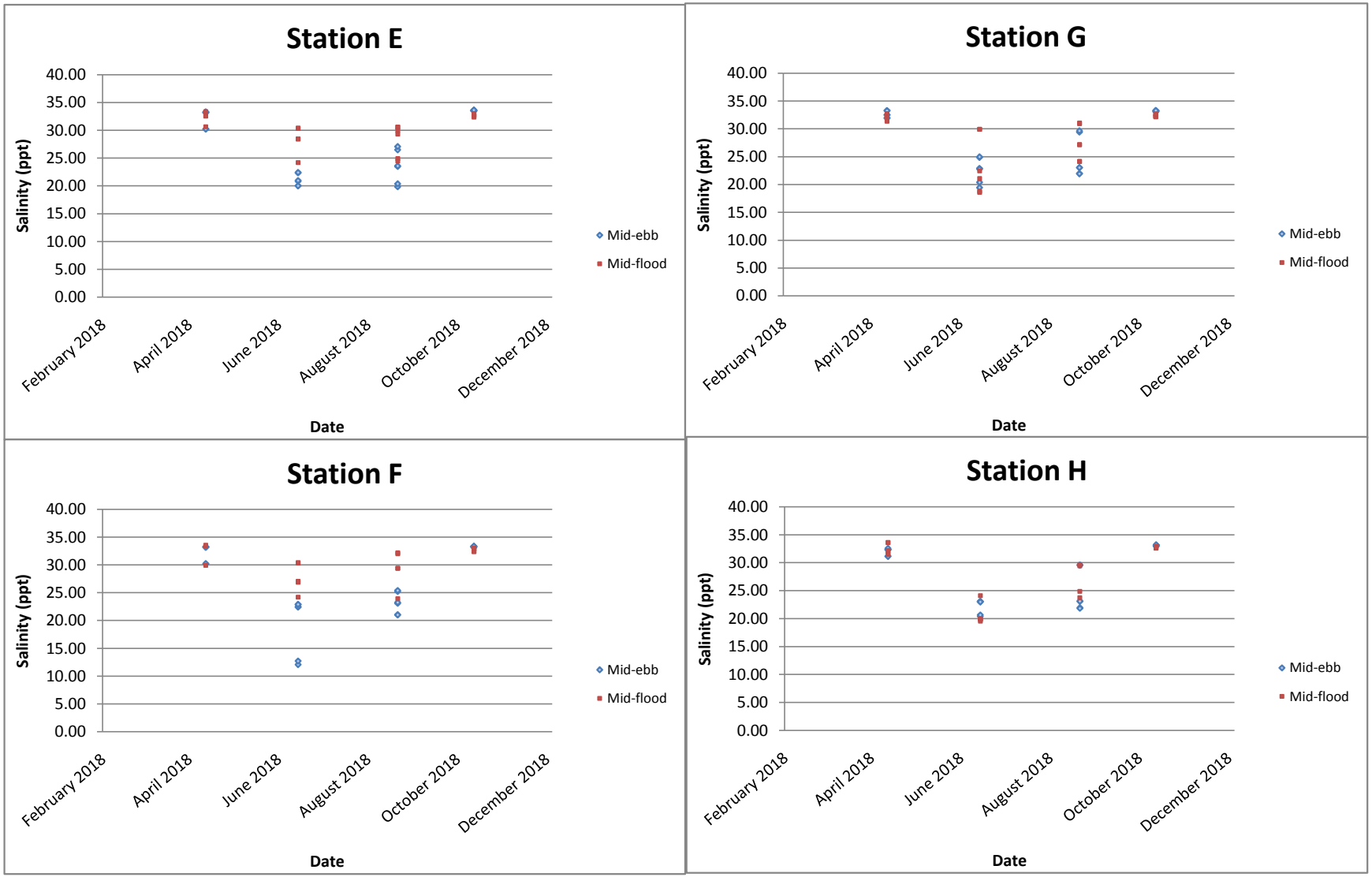

Station E
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station G
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station F
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station H
9.00
8.50
8.00
7.50
7.00
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station A
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

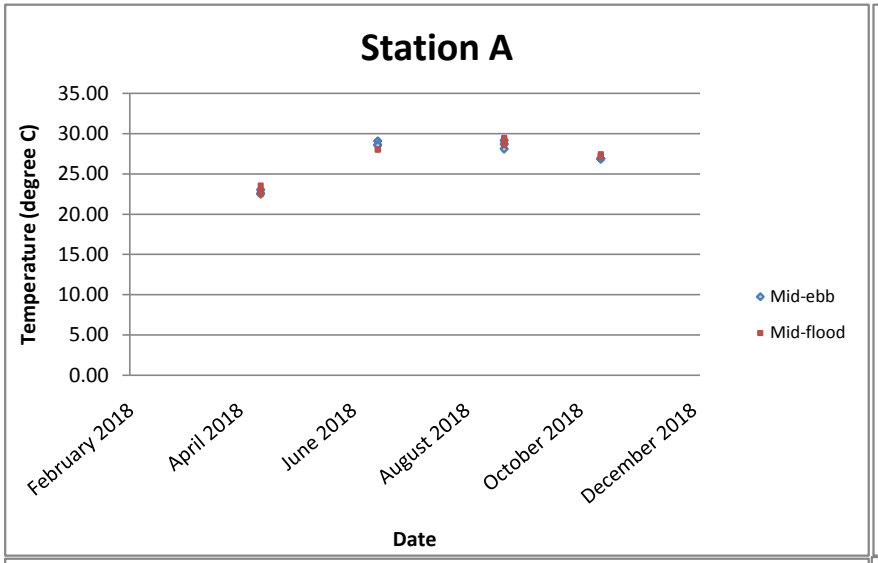

Station C
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

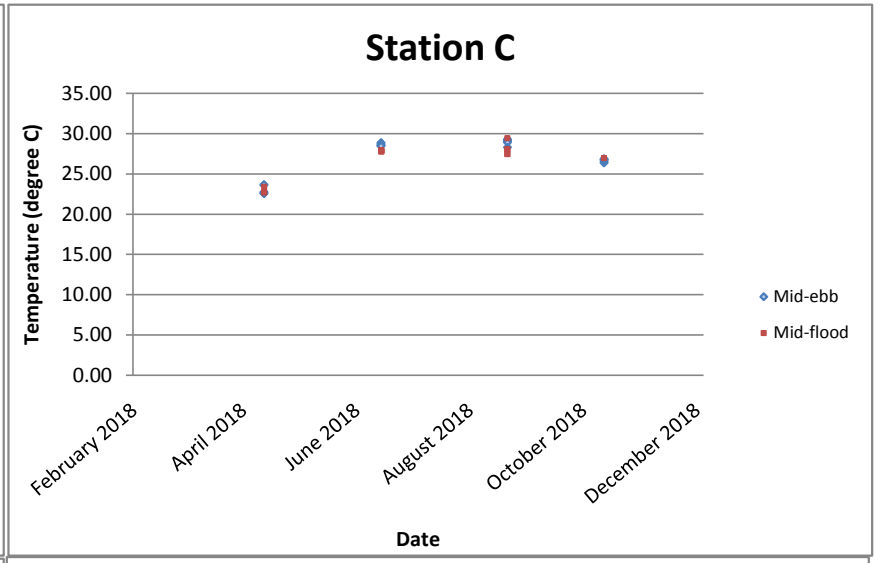

Station B
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

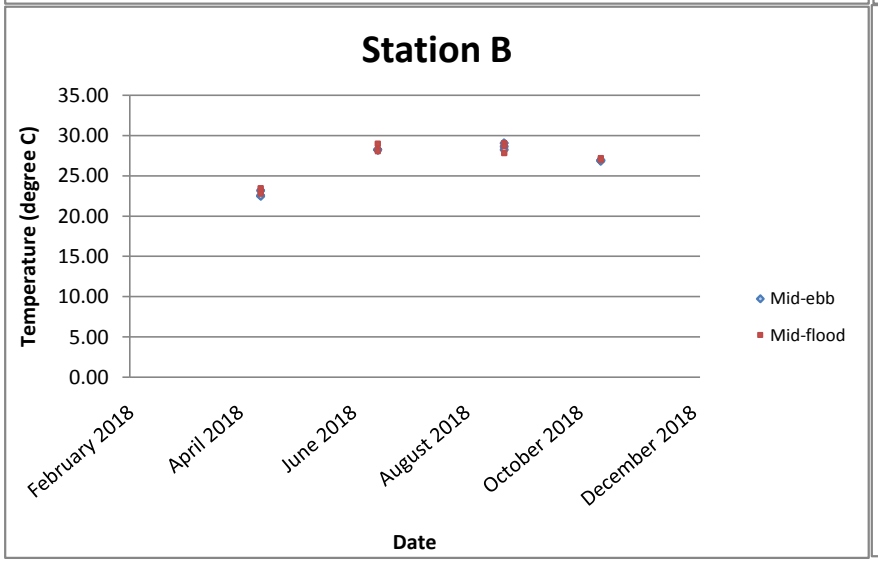

Station D
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

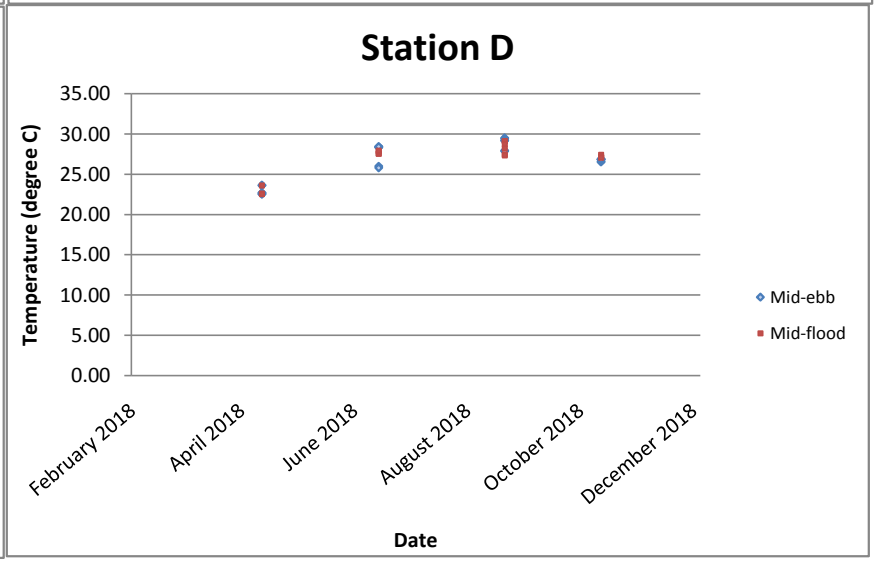

Station E
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station G
Salinity (ppt)
Date
Mid-ebb
Mid-flood
Station F
Salinity (ppt)
Date
Mid-ebb
Mid-flood
Station H
Salinity (ppt)
Date
Mid-ebb
Mid-flood

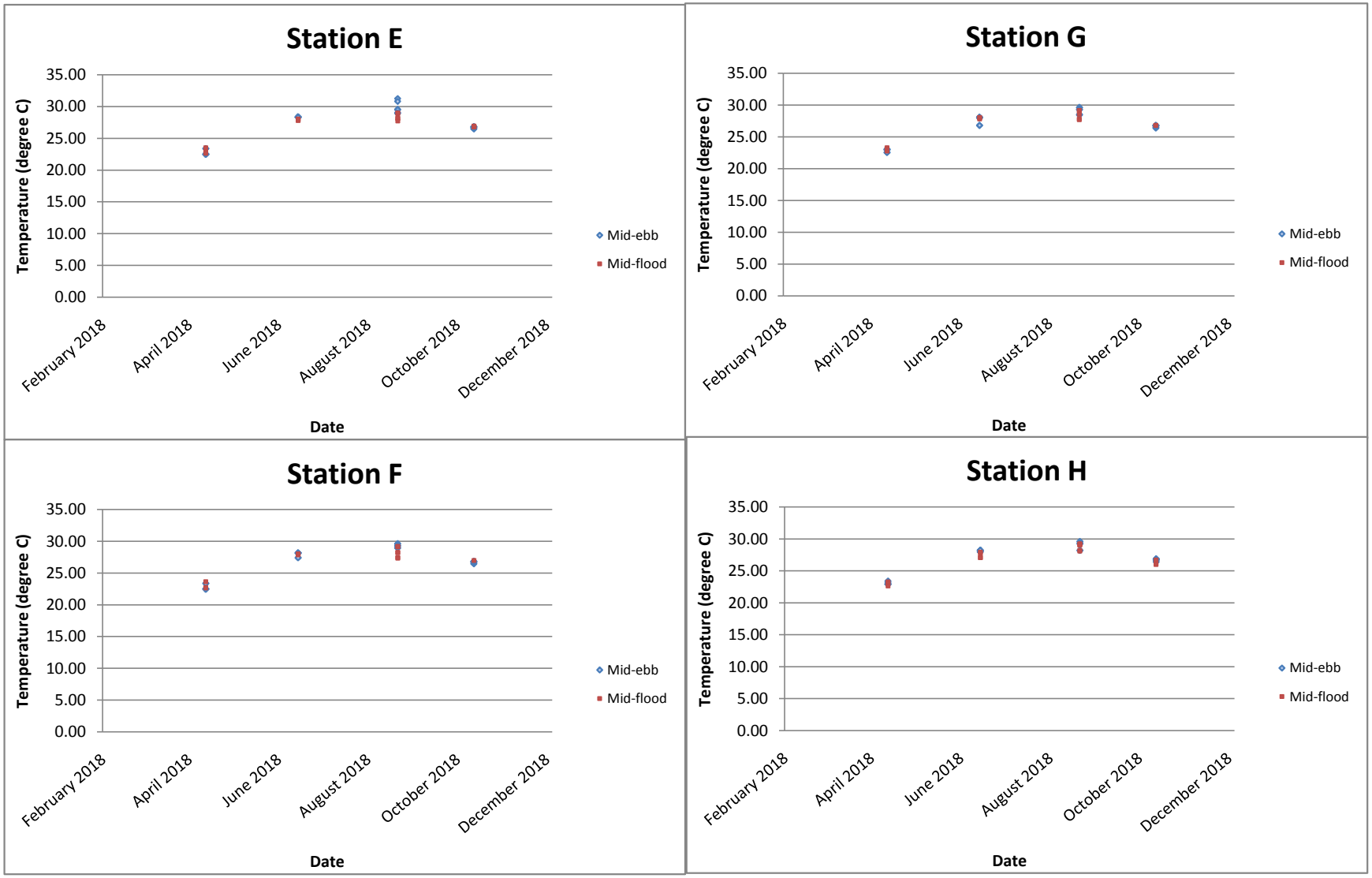
Temperature (degree C)

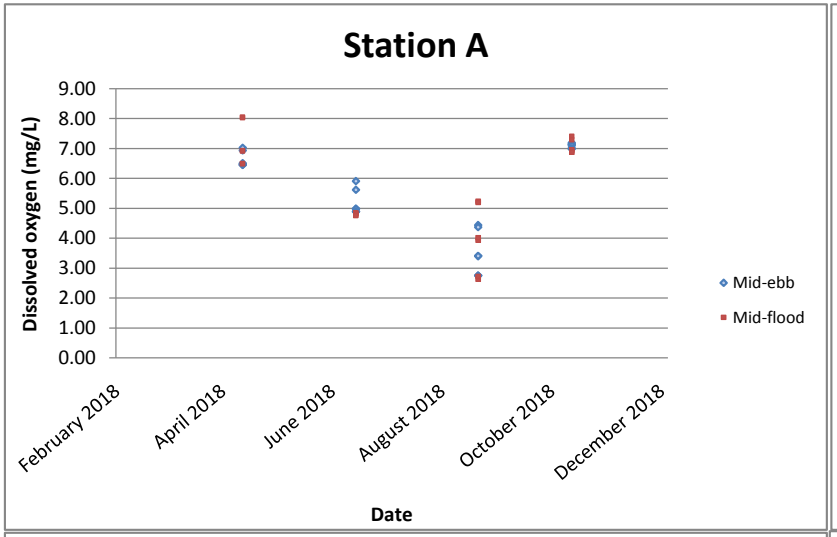


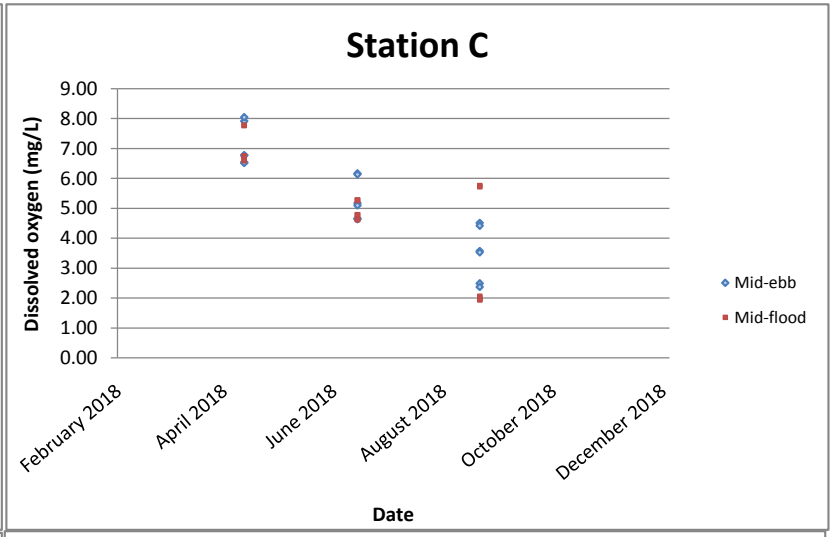


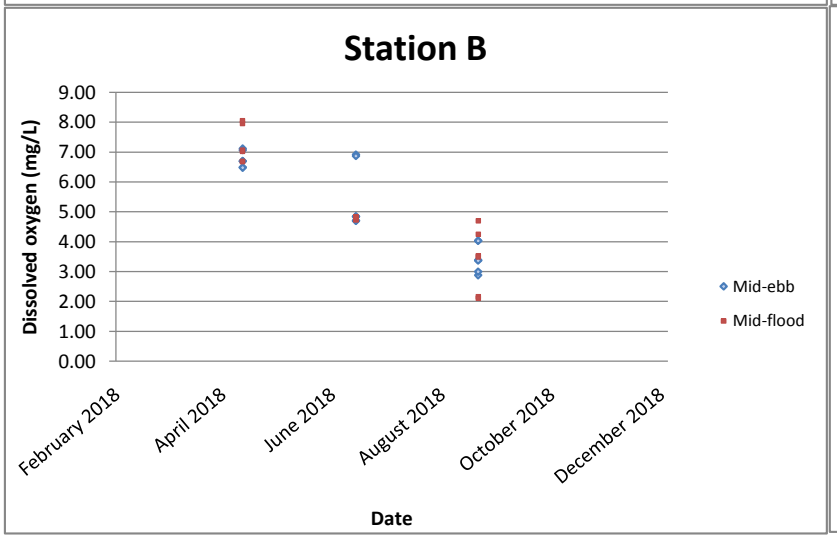


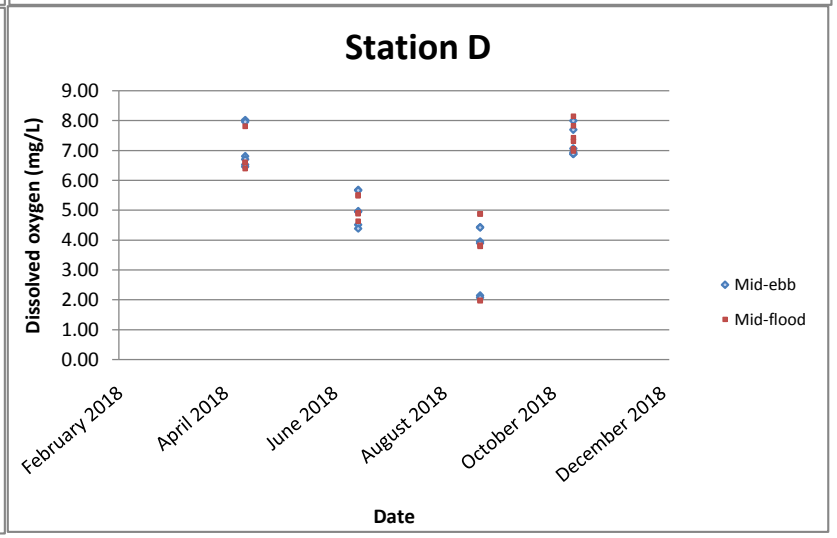


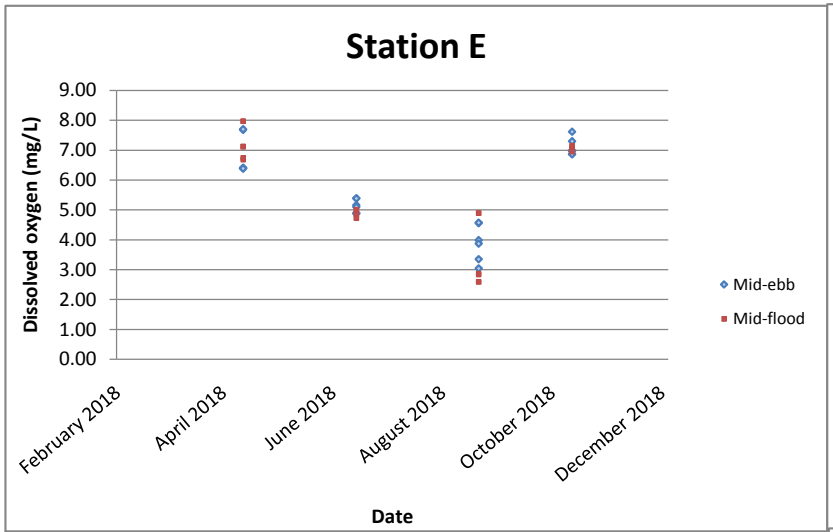

Station E
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station G
Temperature (degree C)
Date
Mid-ebb
Mid-flood
Station F
Temperature (degree C)
Date
Mid-ebb
Mid-flood
Station H
Temperature (degree C)
Date
Mid-ebb
Mid-flood

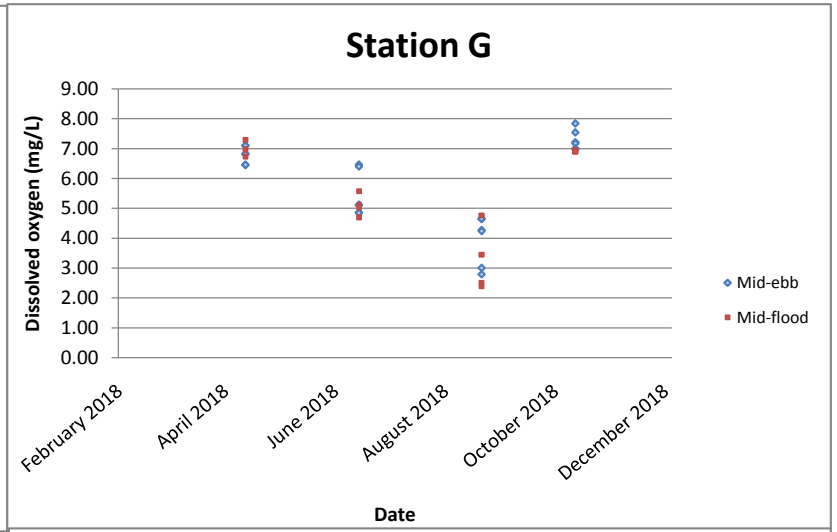

Station A
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

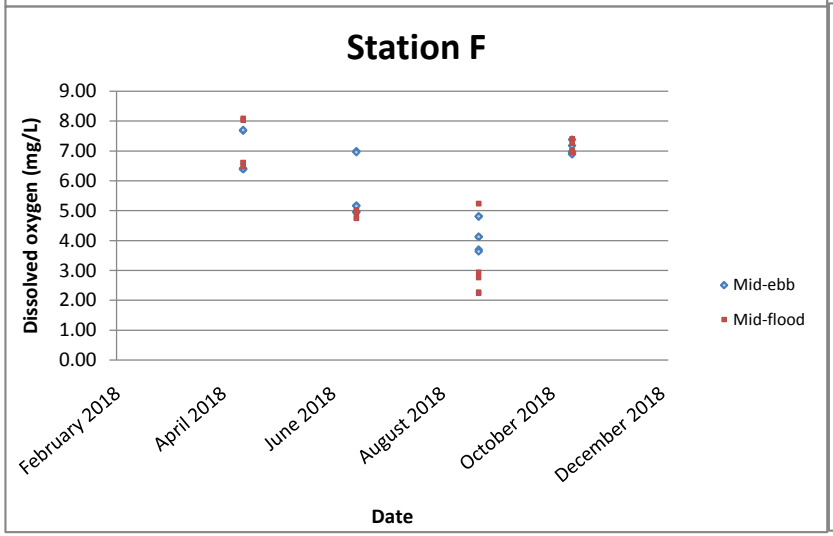

Station C
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

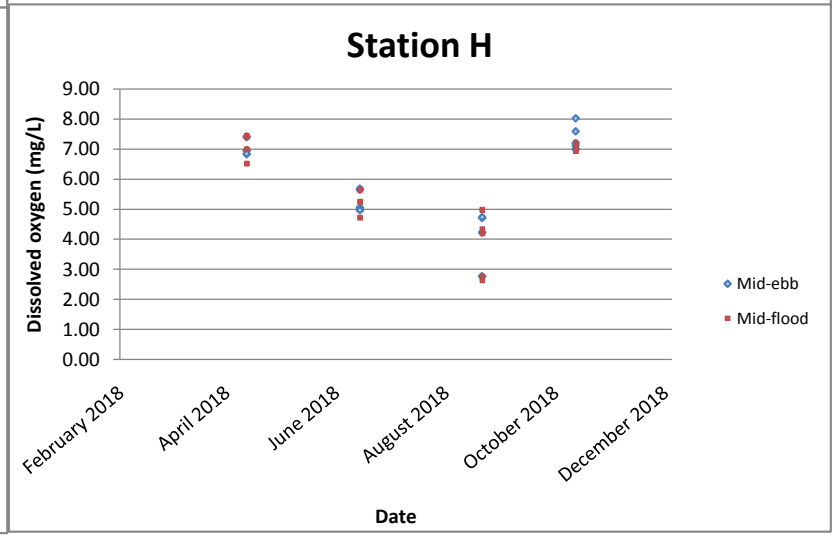

Station B
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station D
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

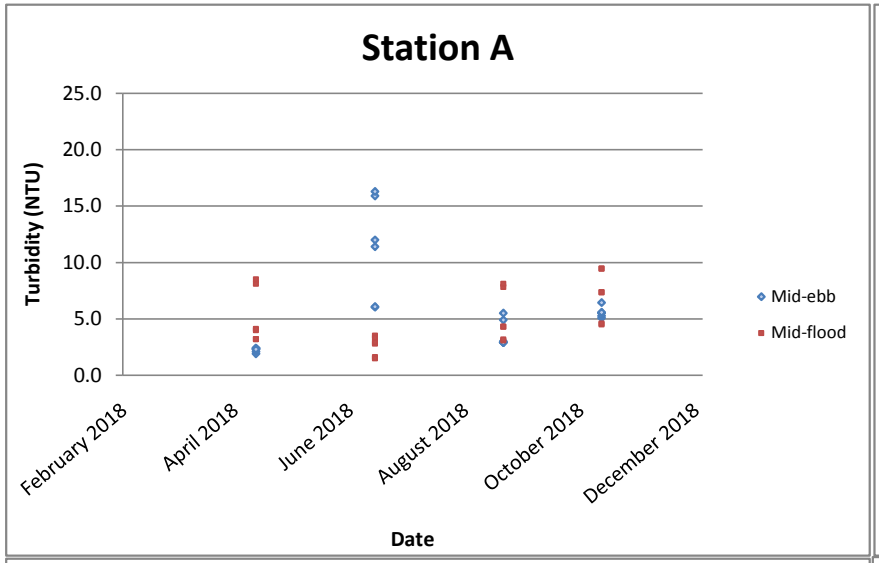

Station E
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

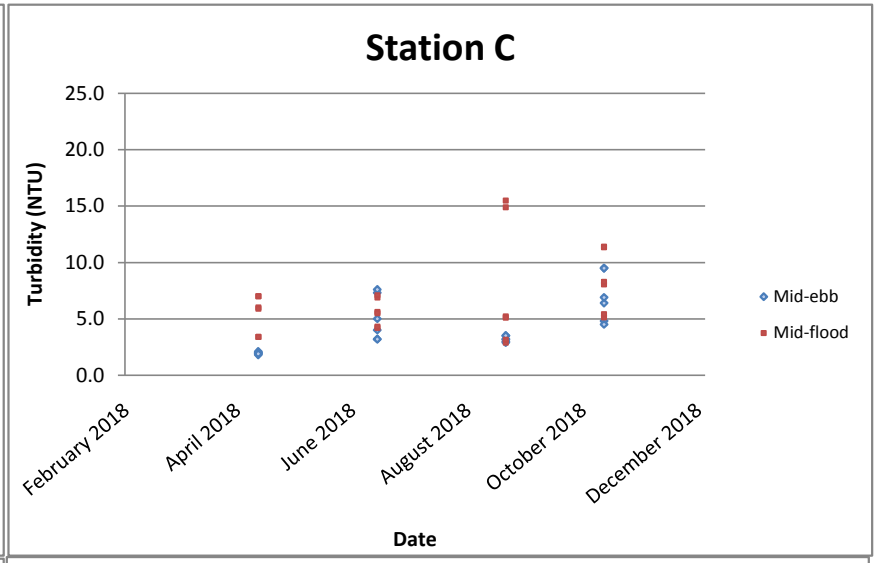

Station G
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

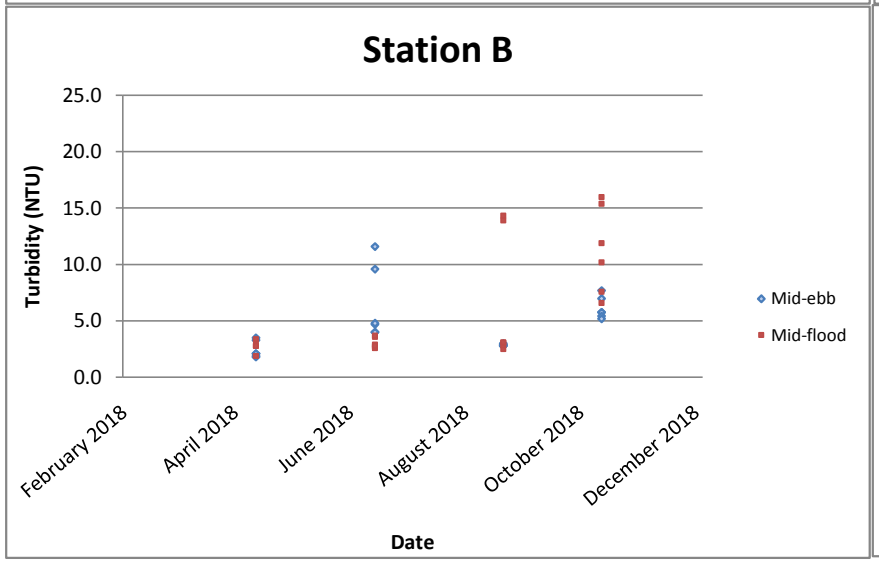

Station F
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

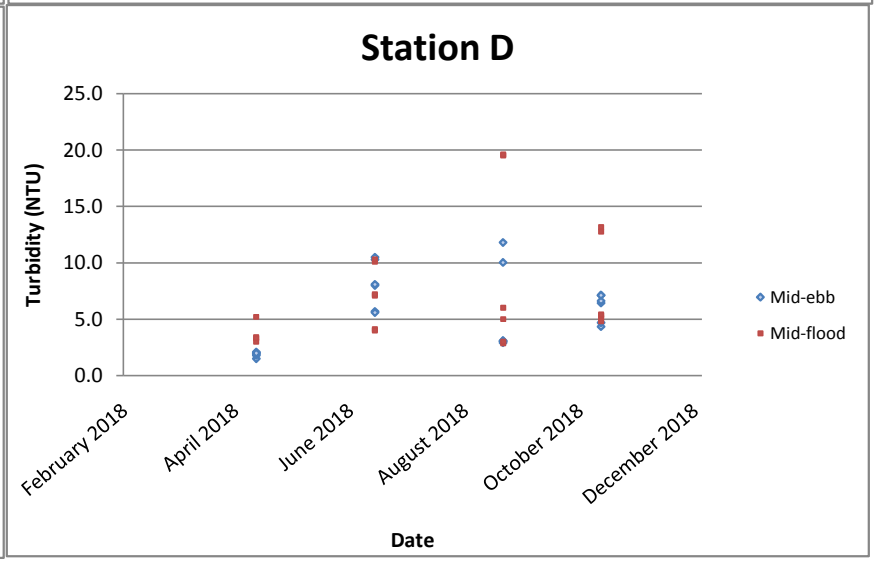

Station H
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

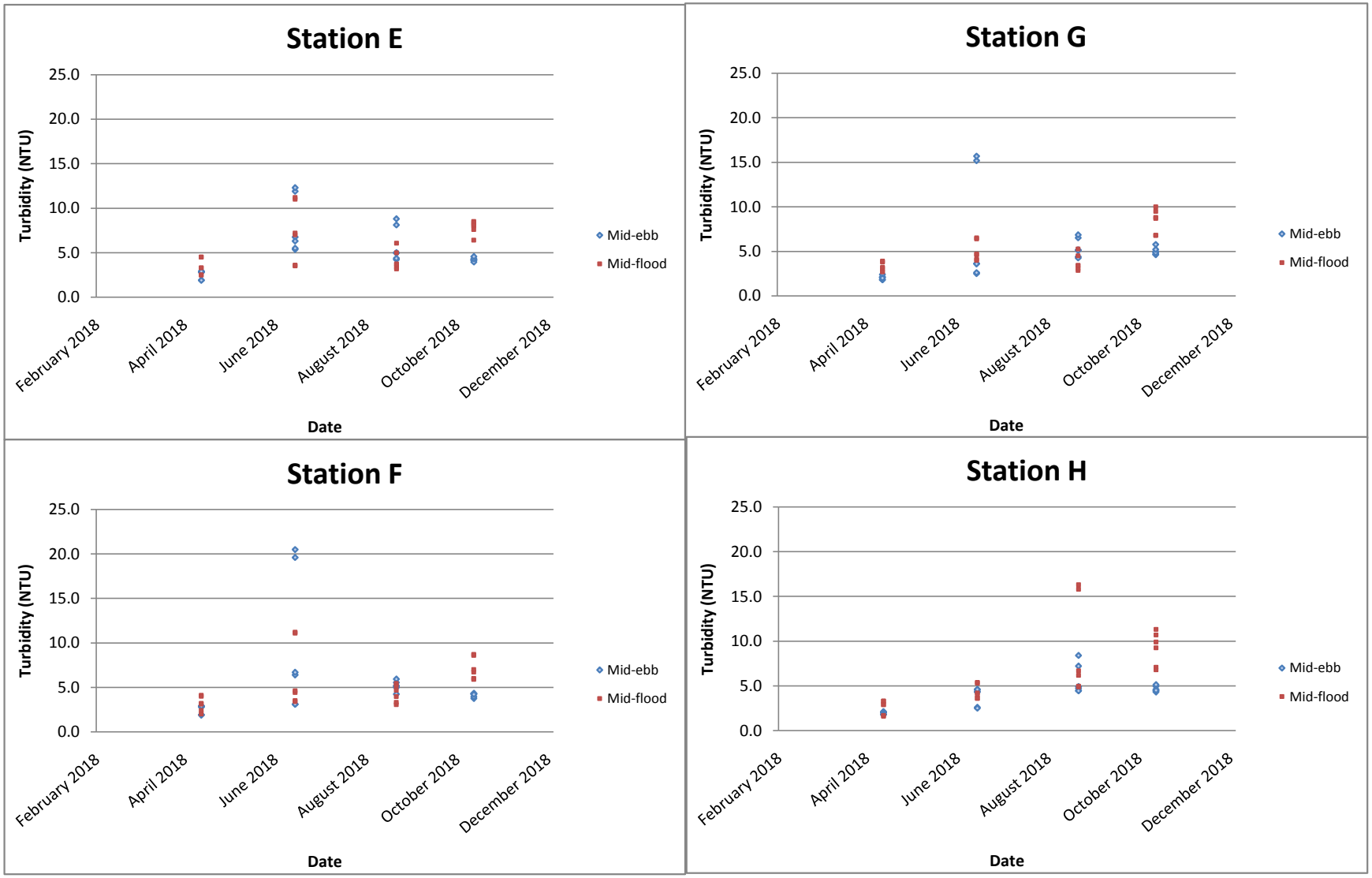
Turbidity (NTU)

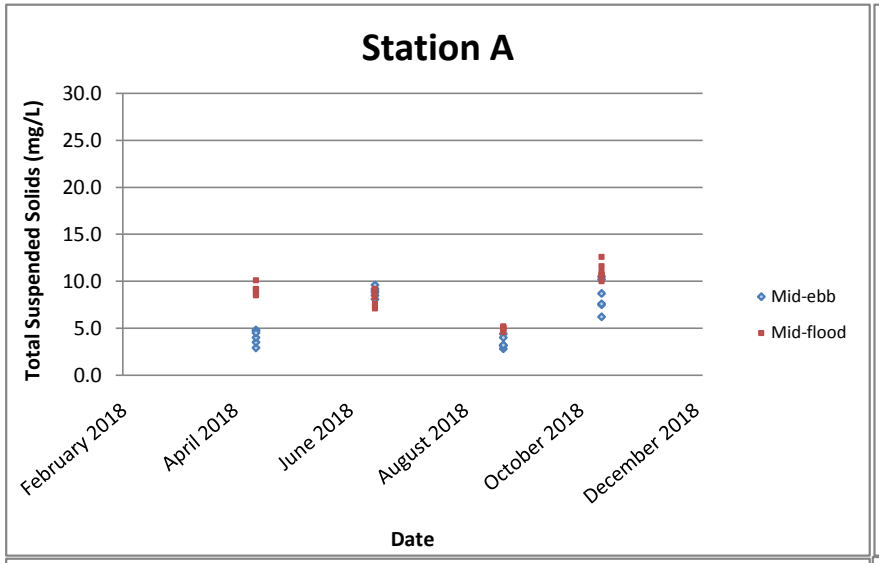


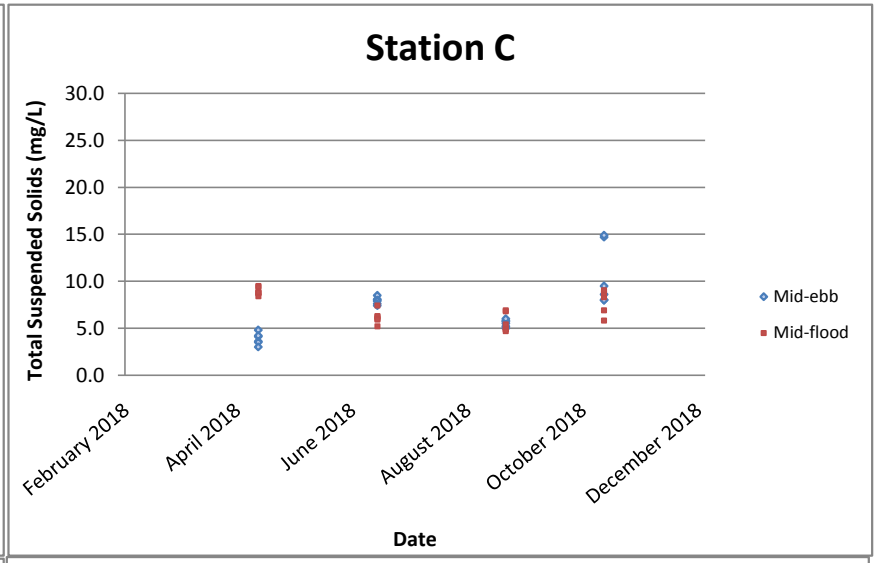


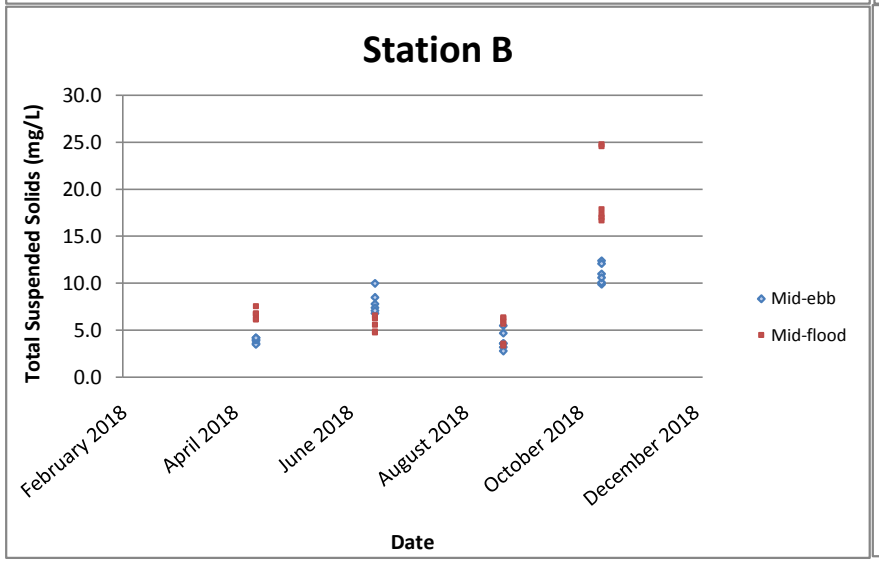


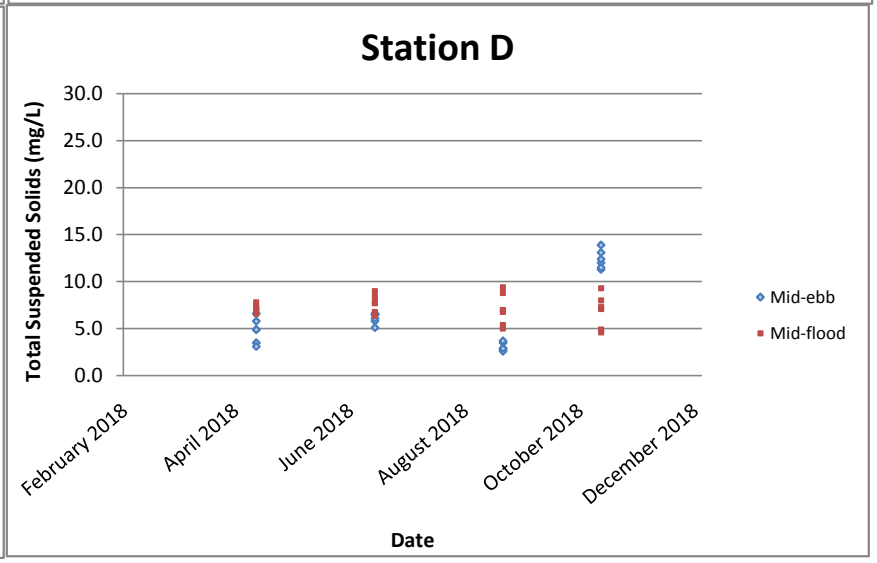


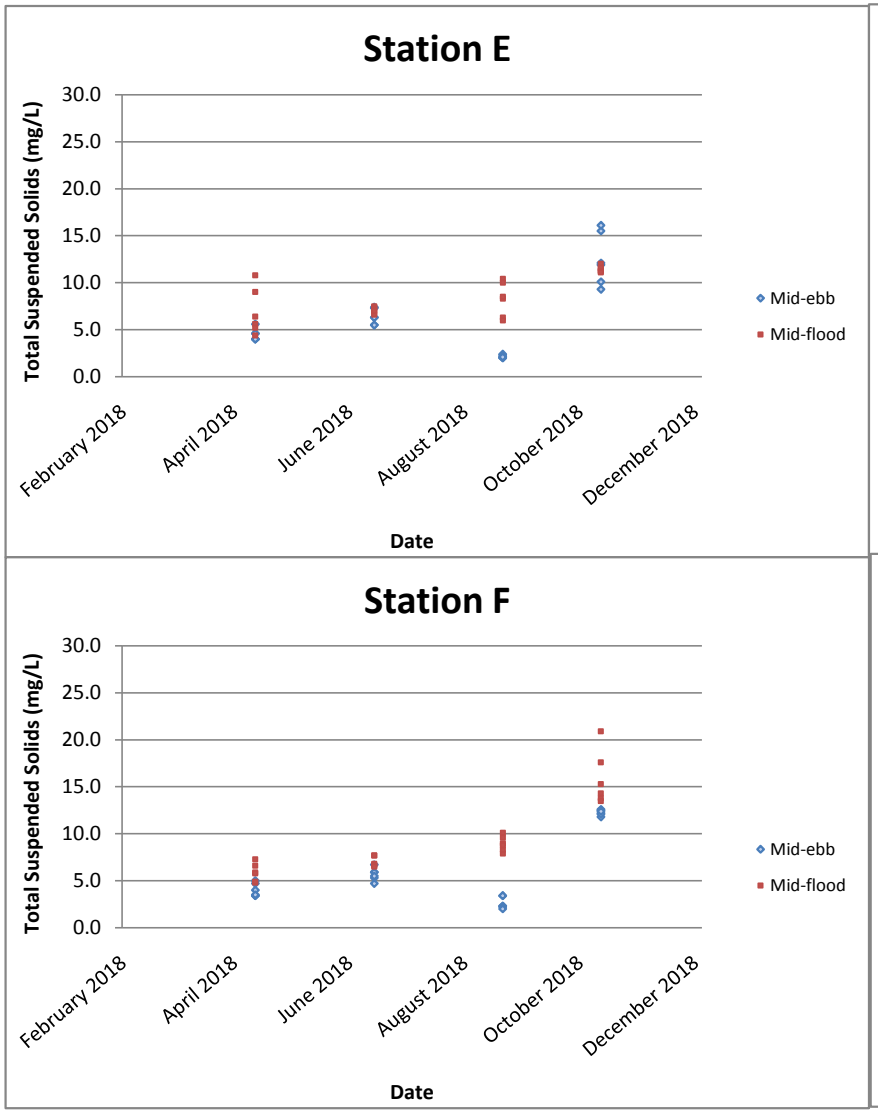

Station E
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station G
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station F
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station H
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

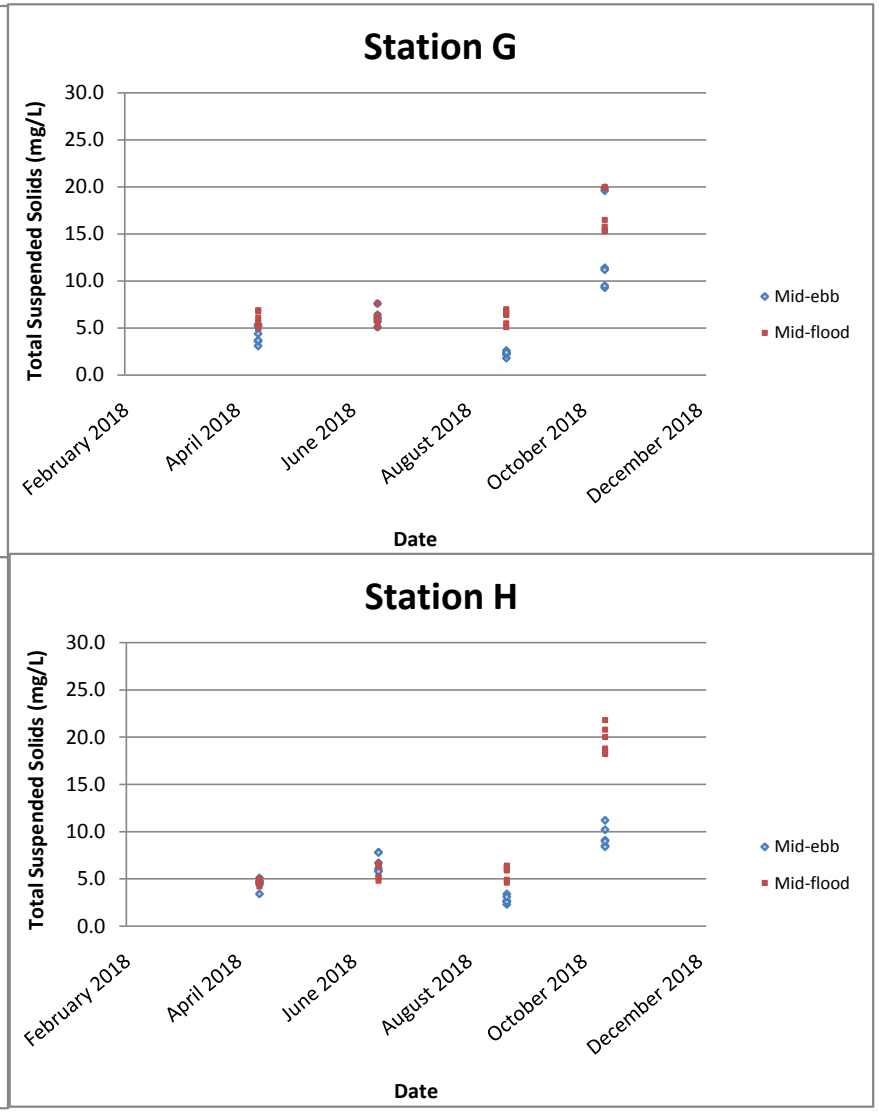

Station A
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station C
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station B
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

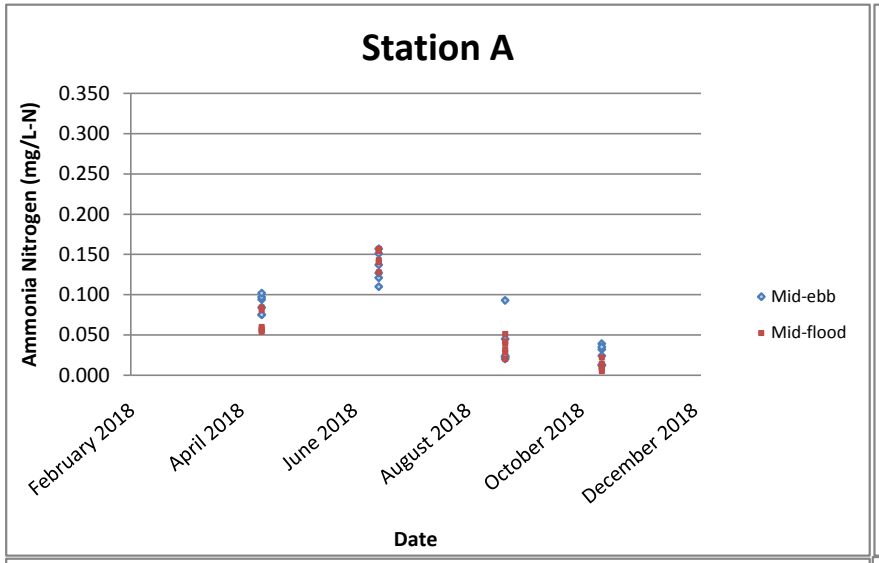

Station D
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

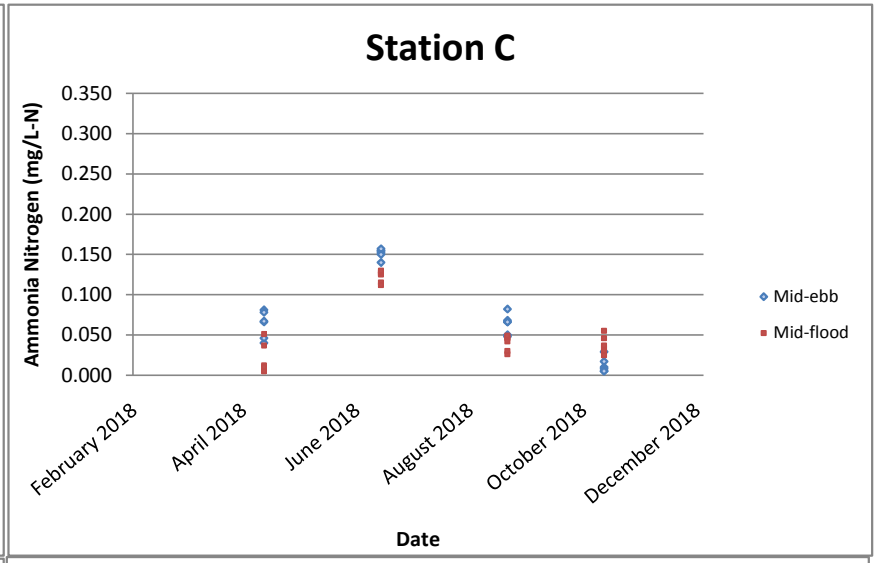

Station E
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

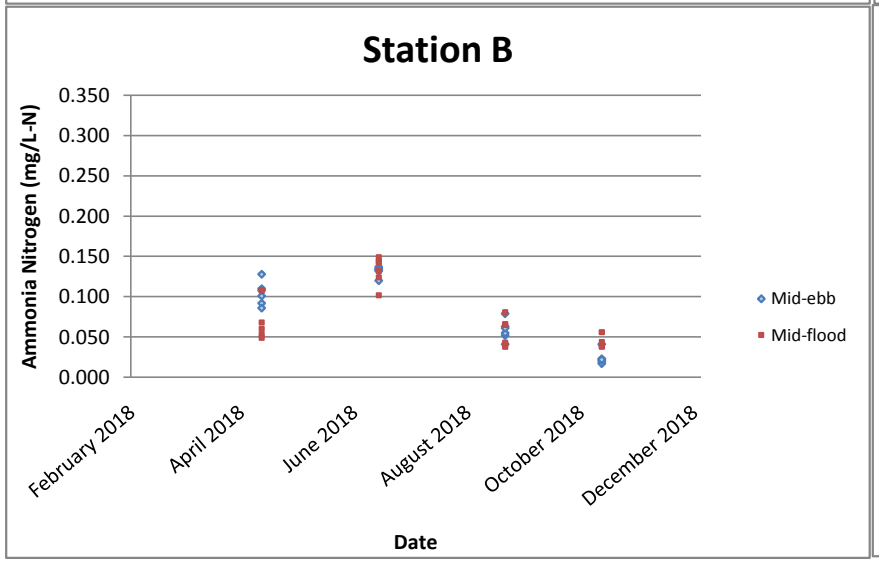

Station G
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

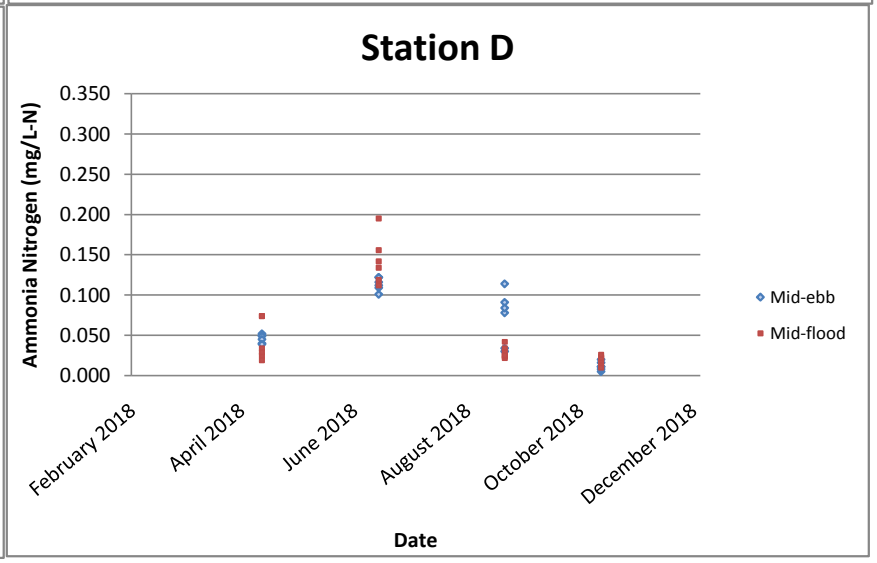
Station F
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

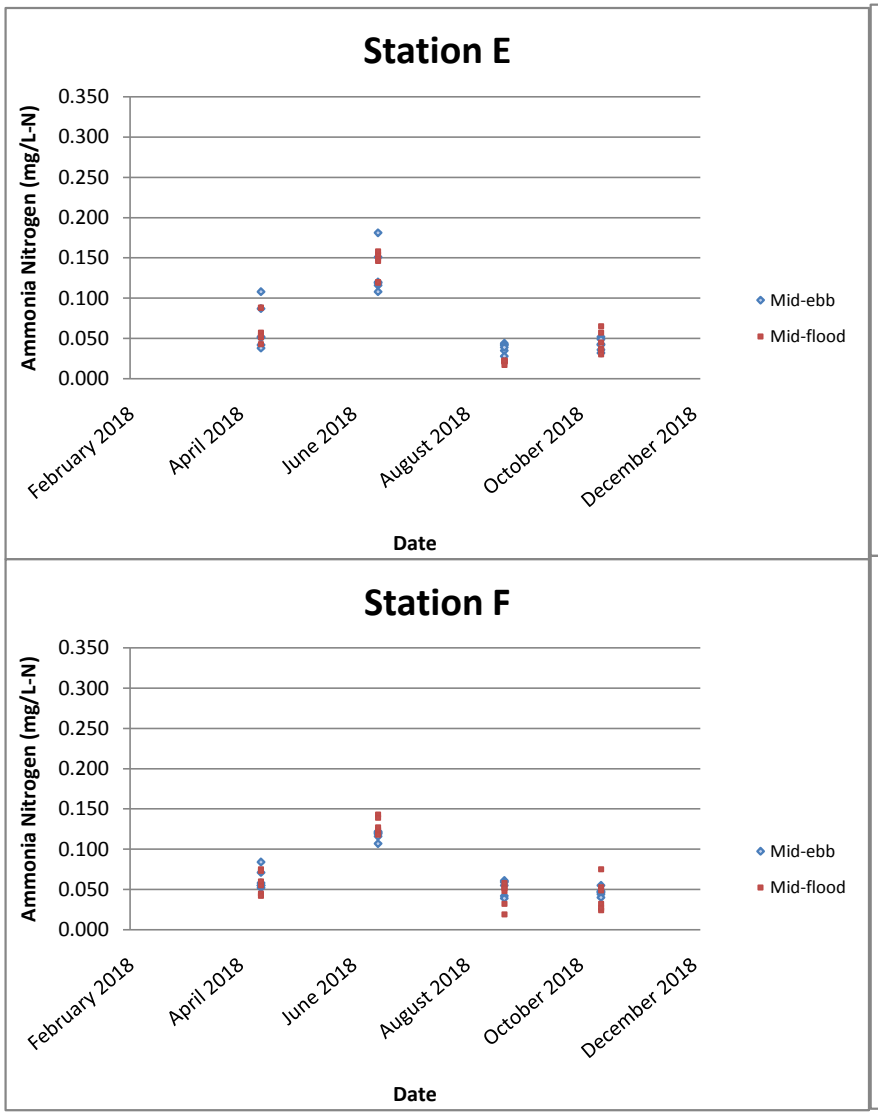
Station H
Total Suspended Solids (mg/L)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

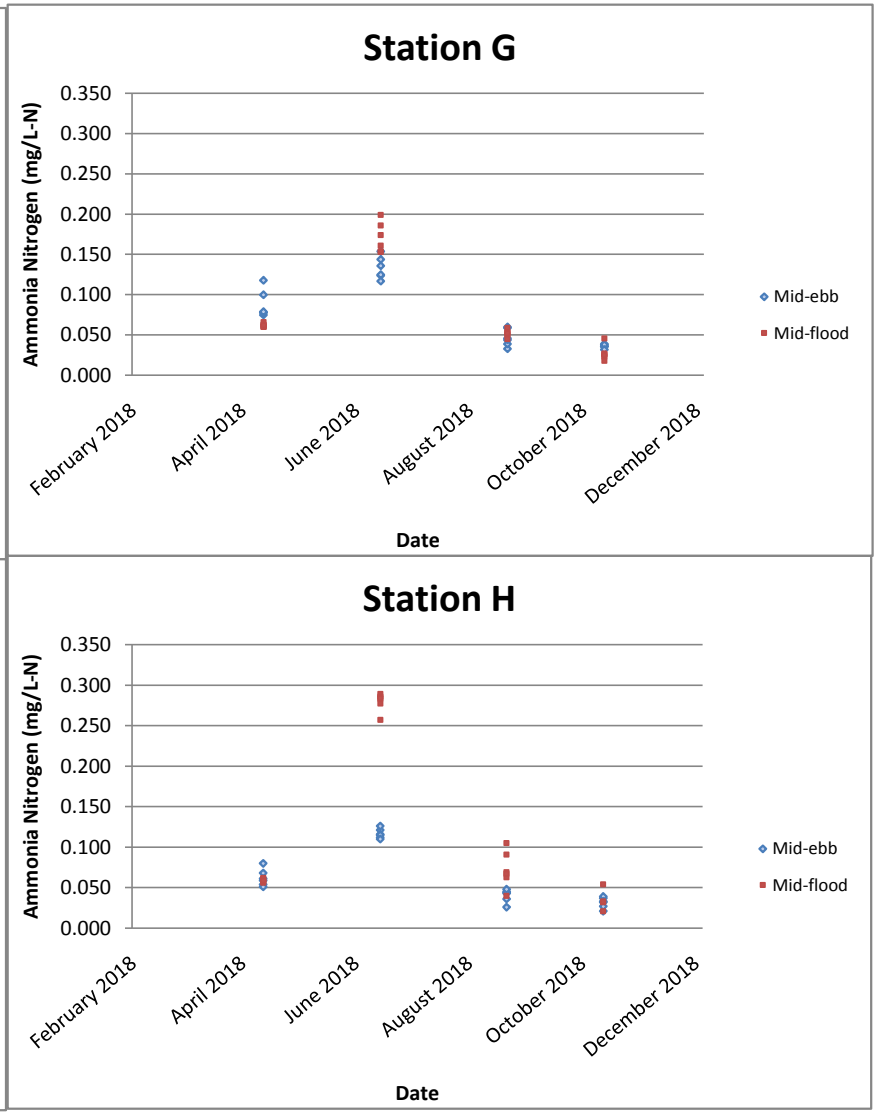

Station A
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station C
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station B
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

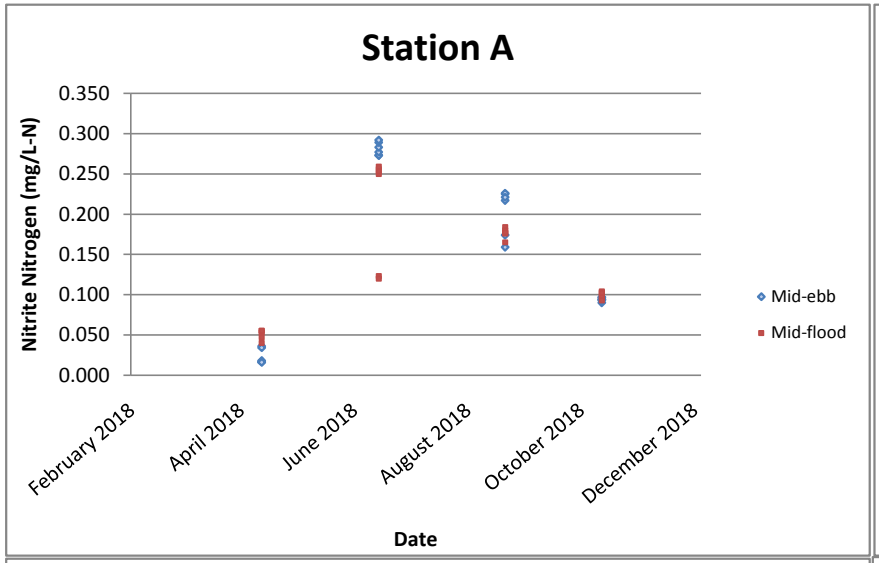

Station D
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

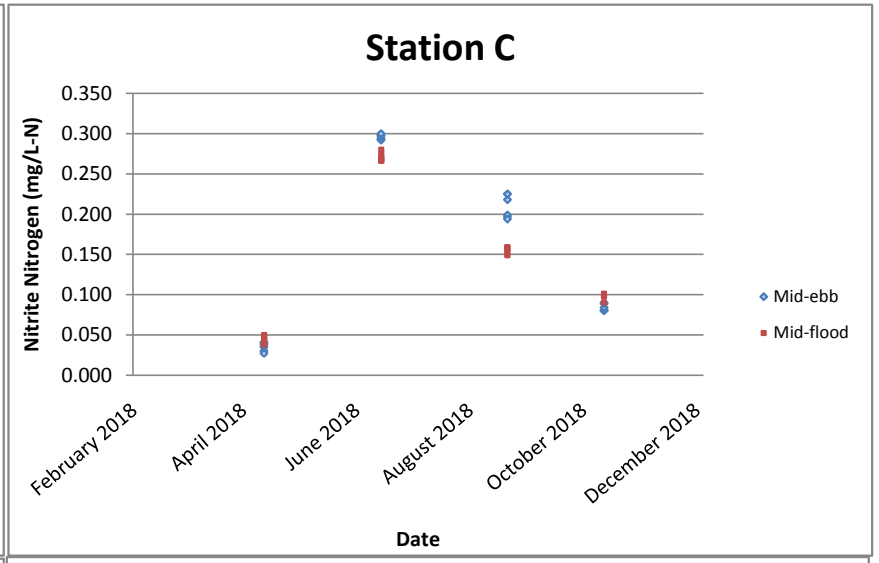

Station E
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

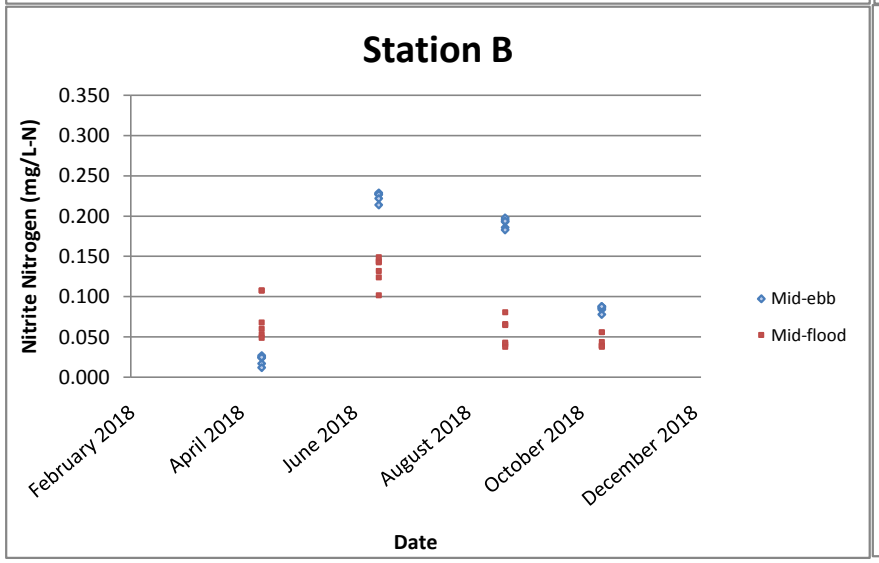

Station G
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

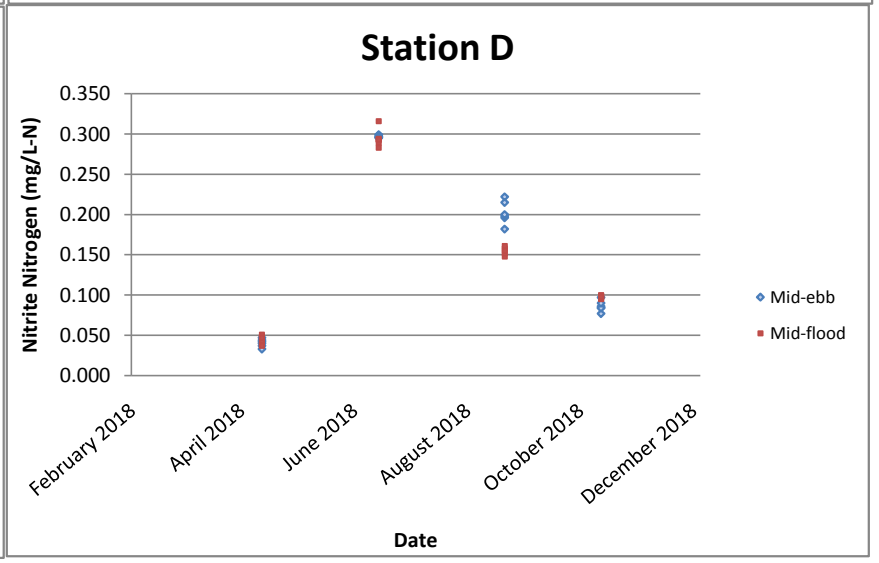
Station F
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

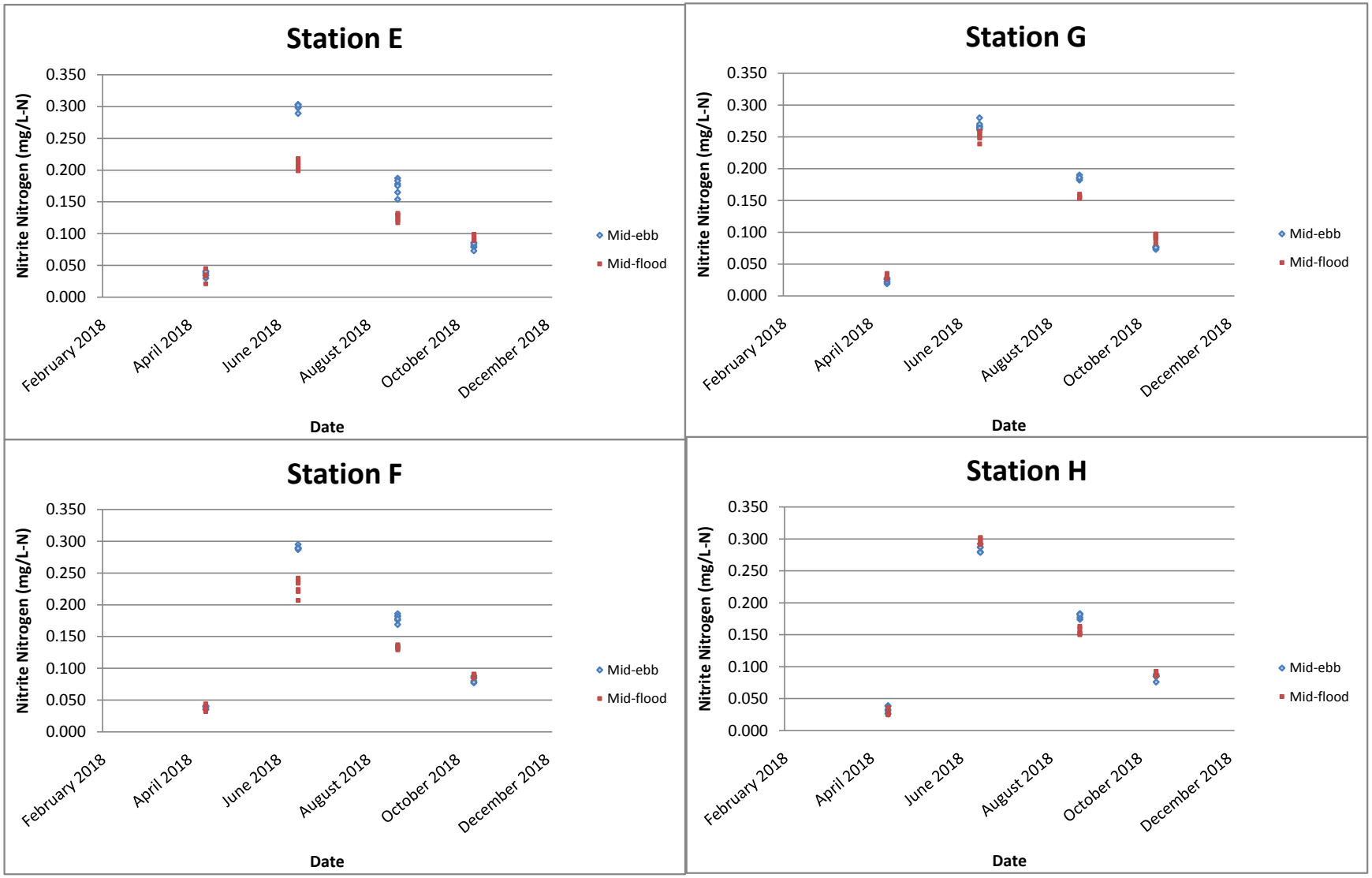
Station H
Ammonia Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

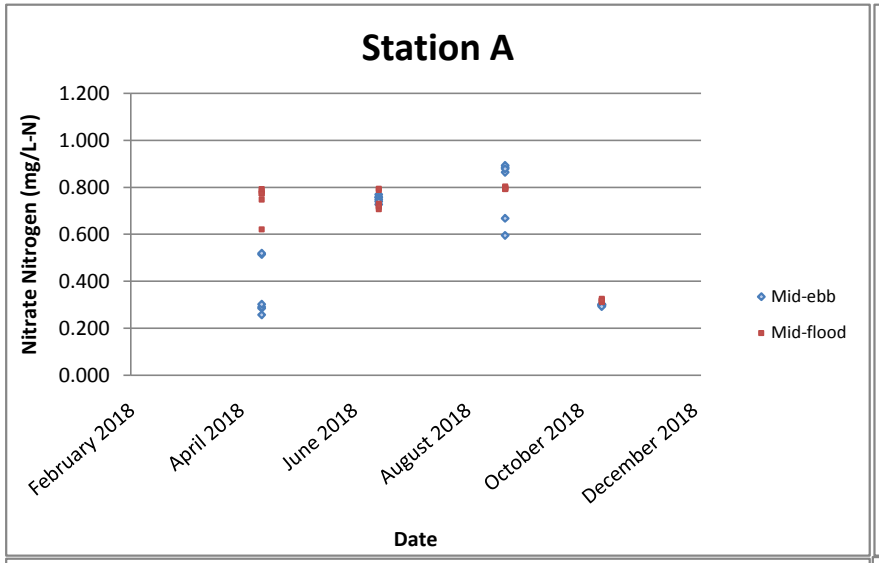

Station A
Nitrite Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

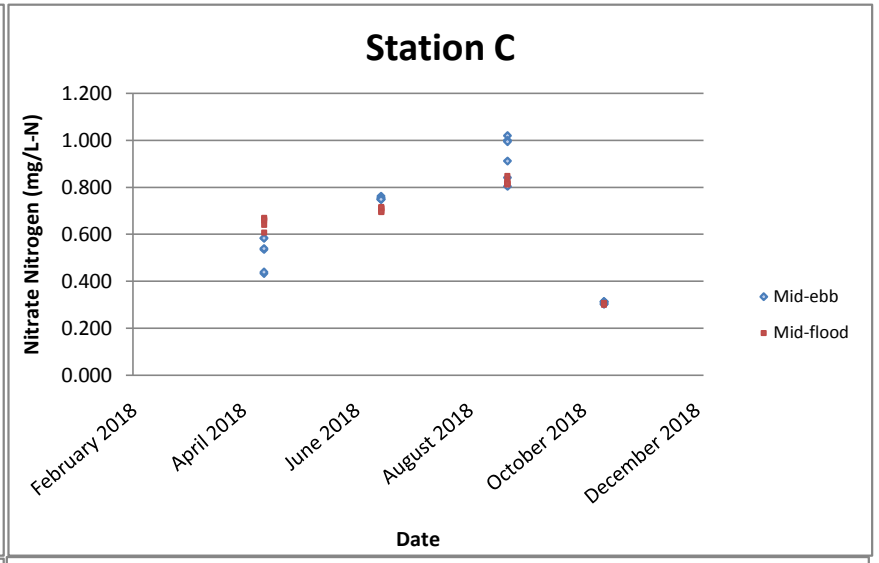

Station C
Nitrite Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

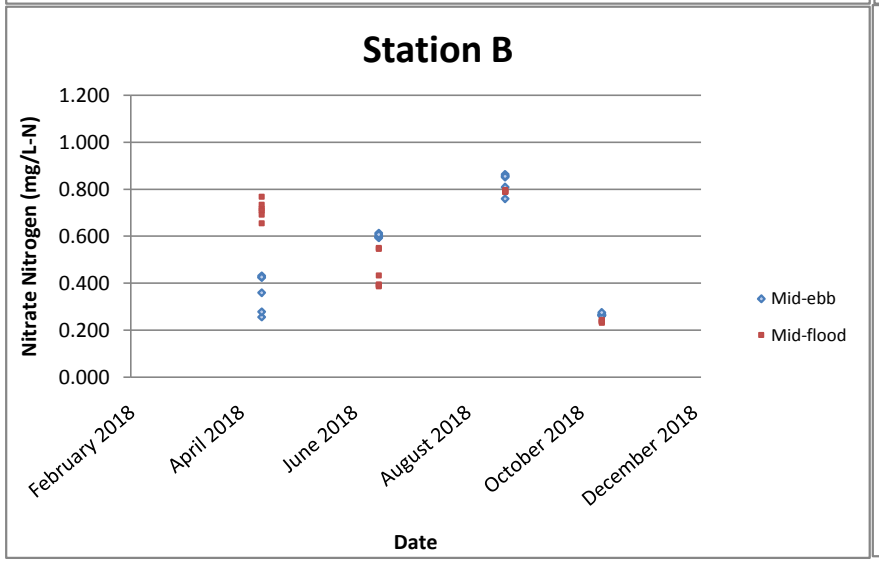

Station B
Nitrite Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

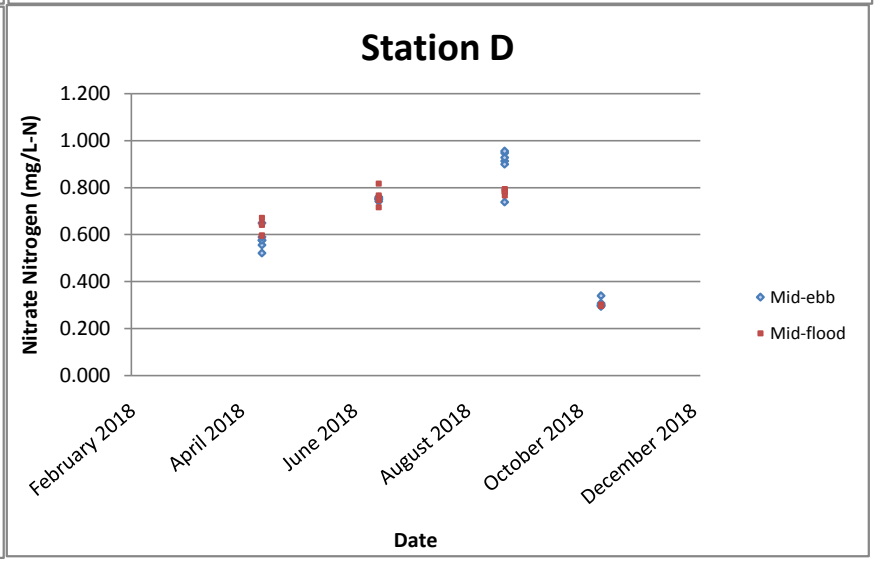

Station D
Nitrite Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

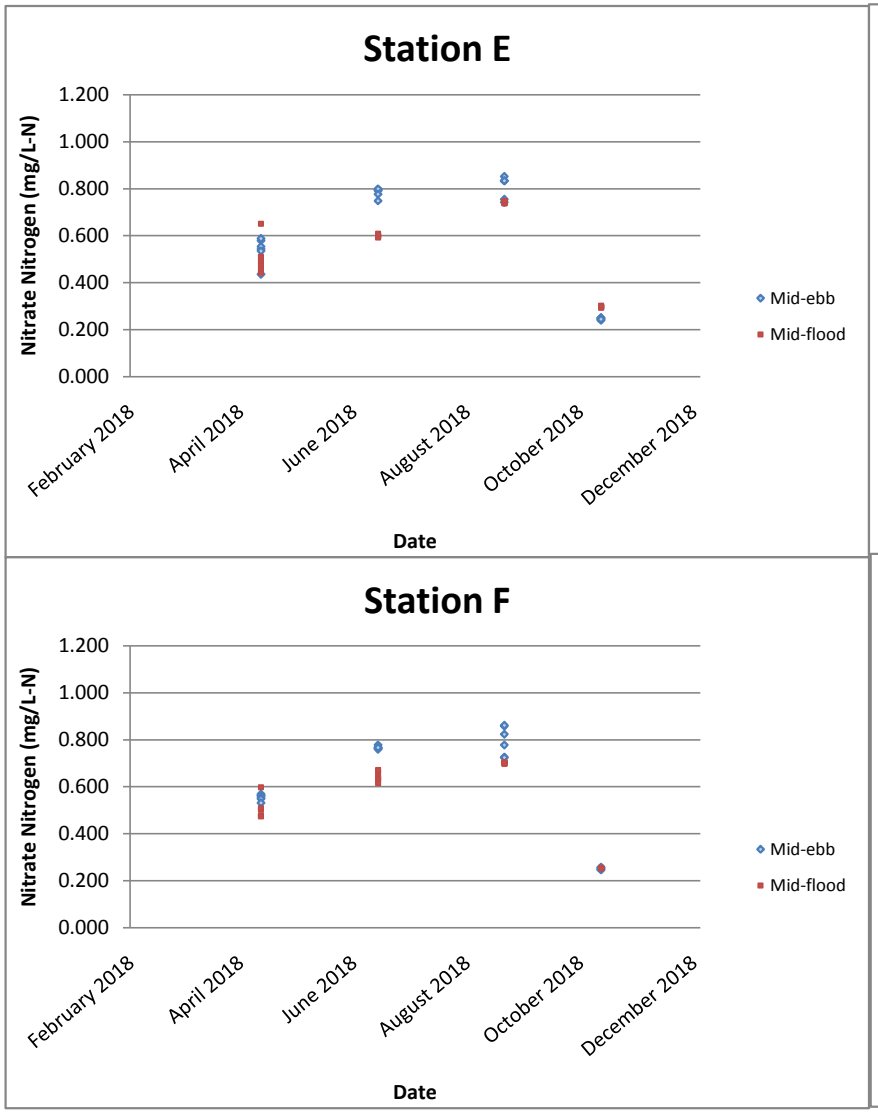

Station E
Nitrite Nitrogen (mg/L-N)
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood
Station G
Nitrite Nitrogen (mg/L-N)
Date
Mid-ebb
Mid-flood
Station F
Nitrite Nitrogen (mg/L-N)
Date
Mid-ebb
Mid-flood
Station H
Nitrite Nitrogen (mg/L-N)
Date
Mid-ebb
Mid-flood

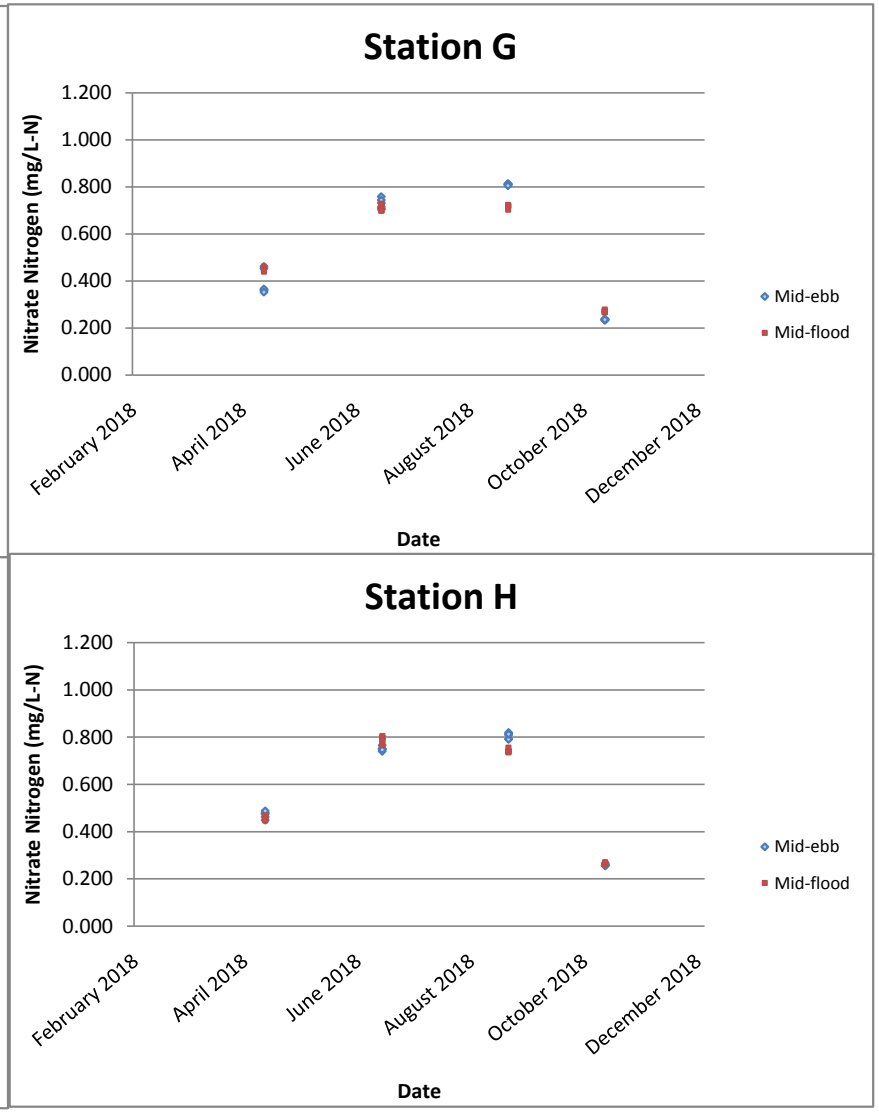

Station A
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station C
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station B
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

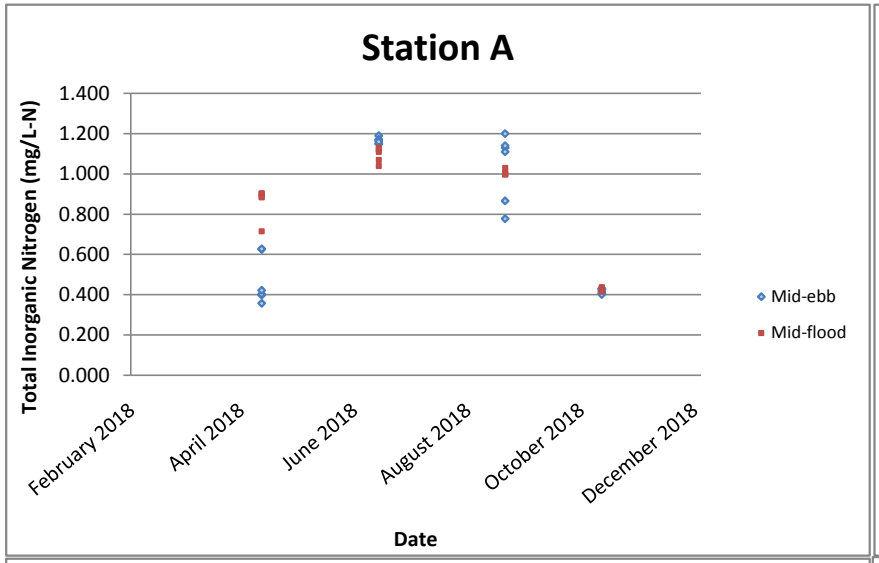

Station D
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

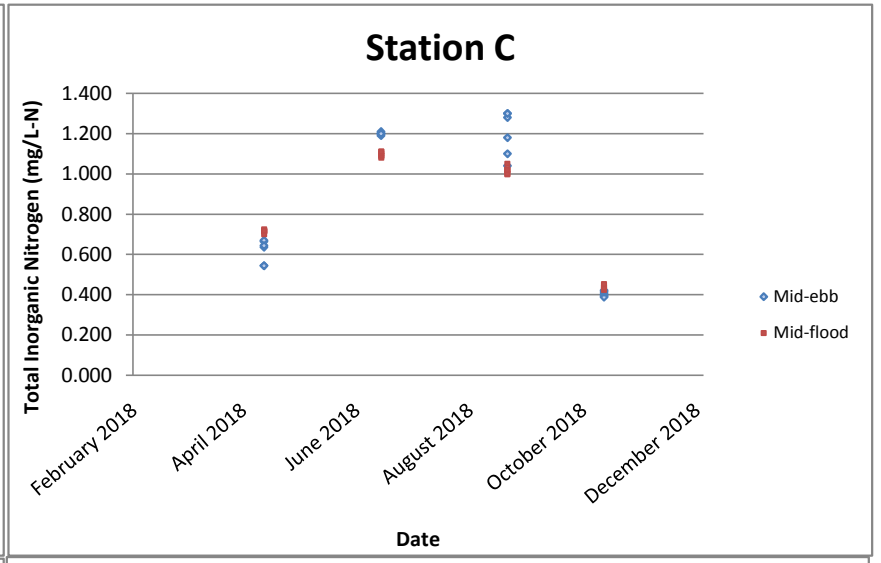

Station E
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

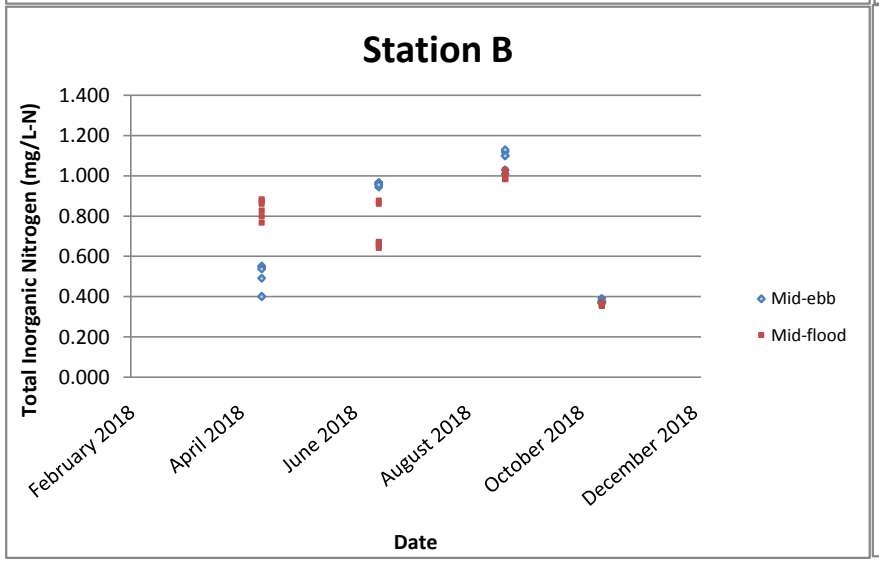

Station G
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

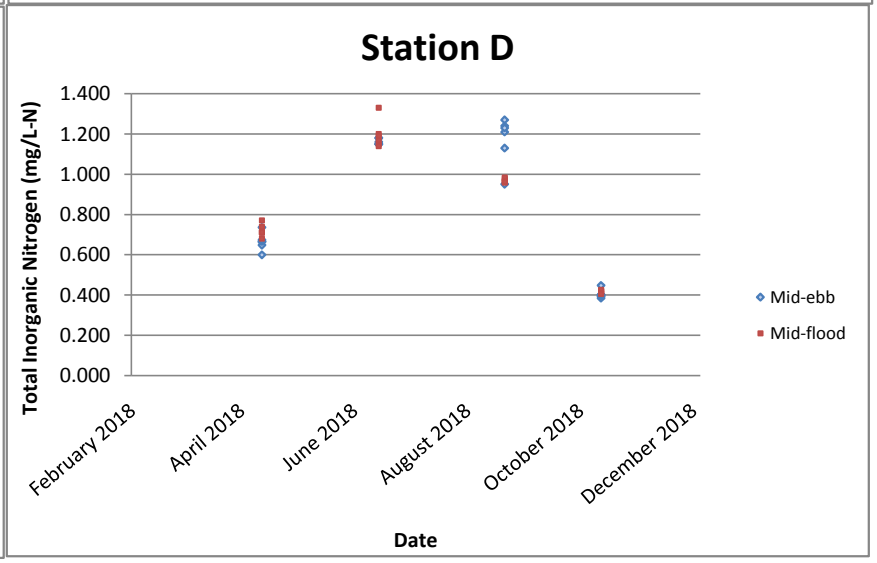
Station F
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

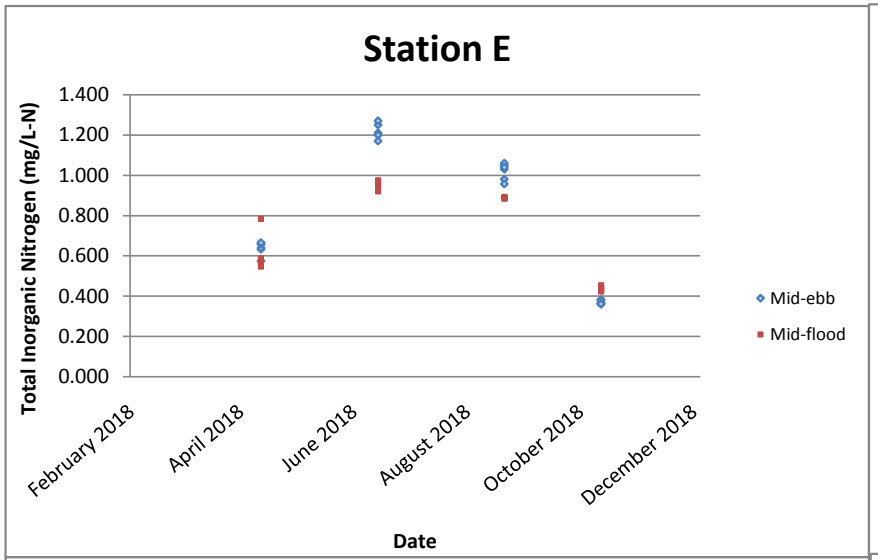
Station H
Nitrate Nitrogen (mg/L-N)
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

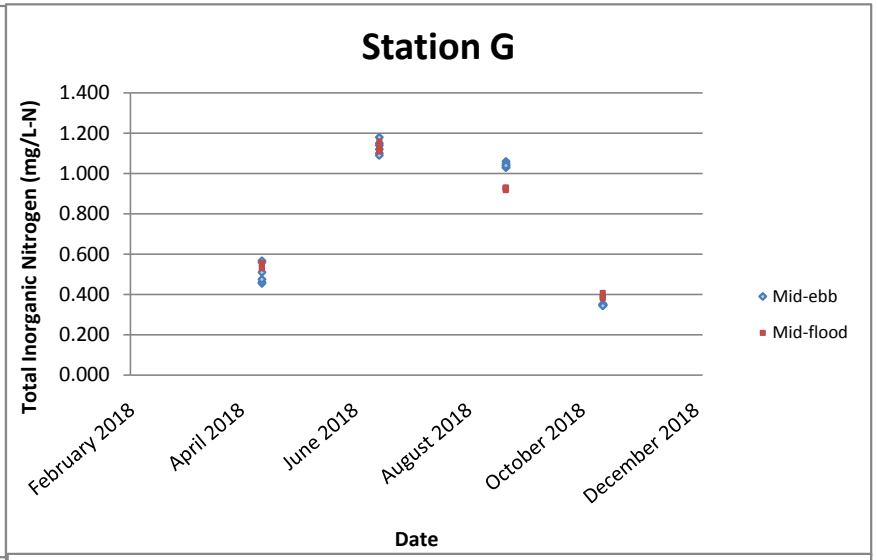

Station A
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

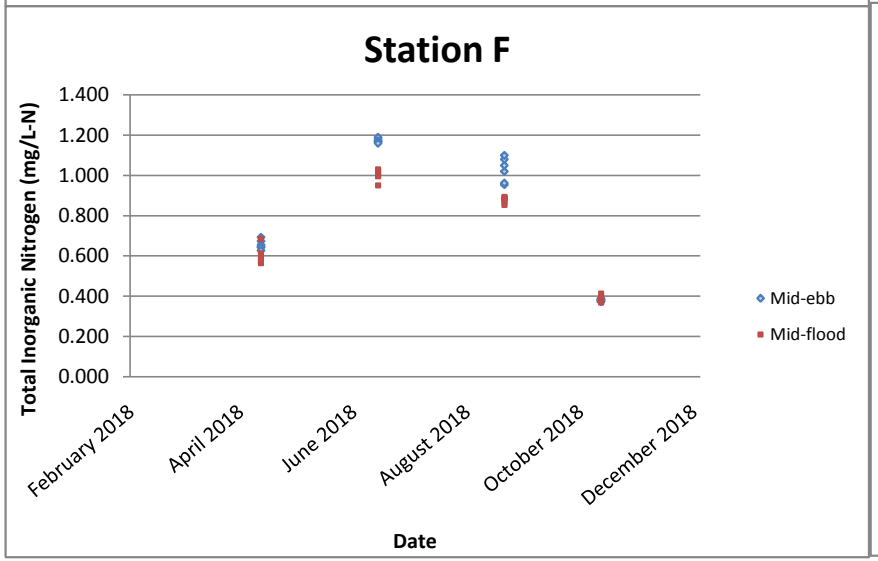

Station C
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

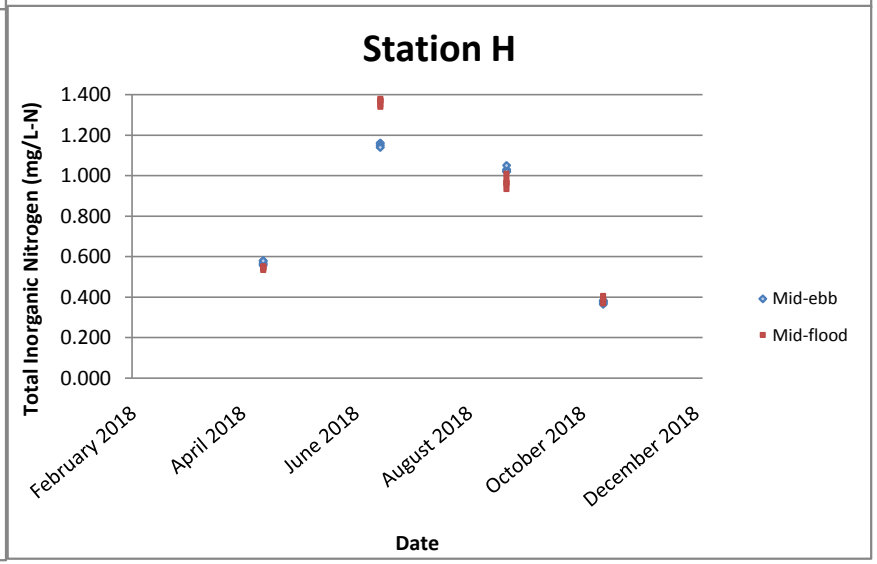

Station B
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station D
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

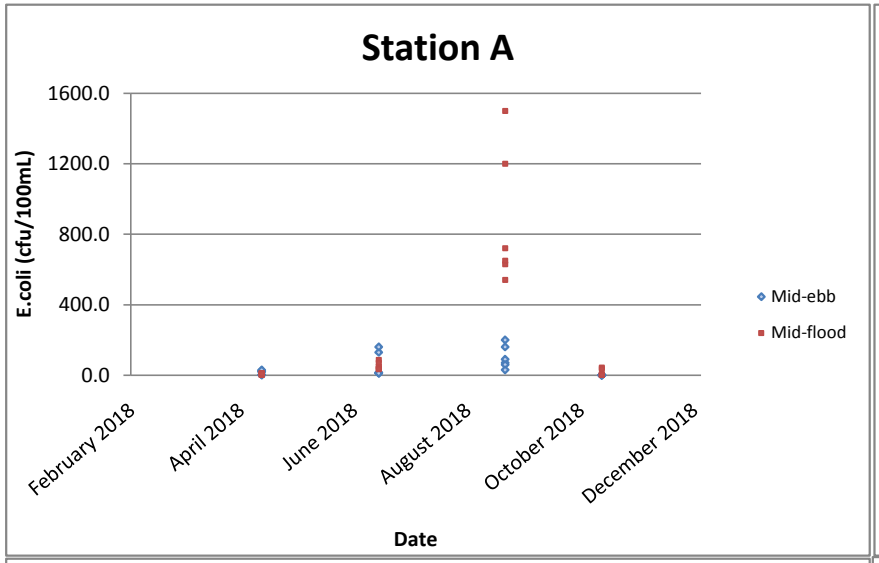

Station E
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

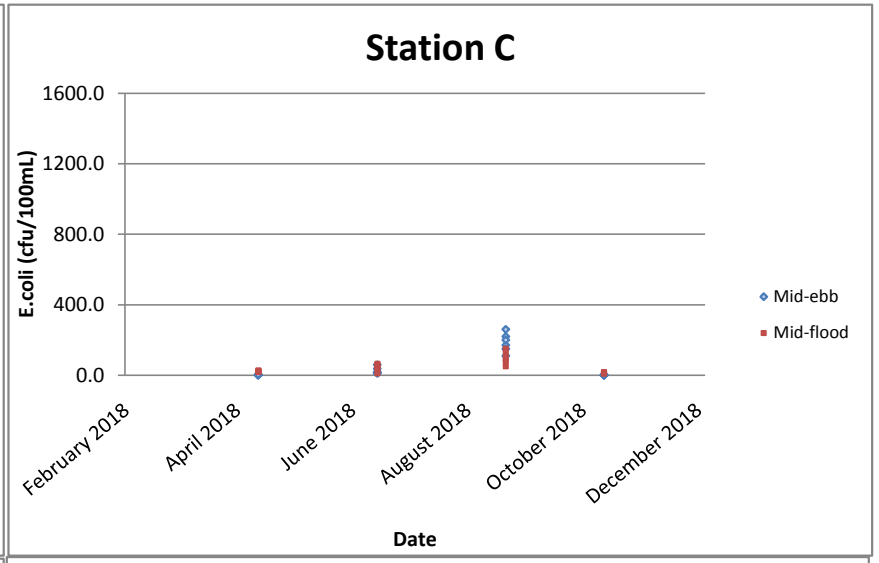

Station G
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

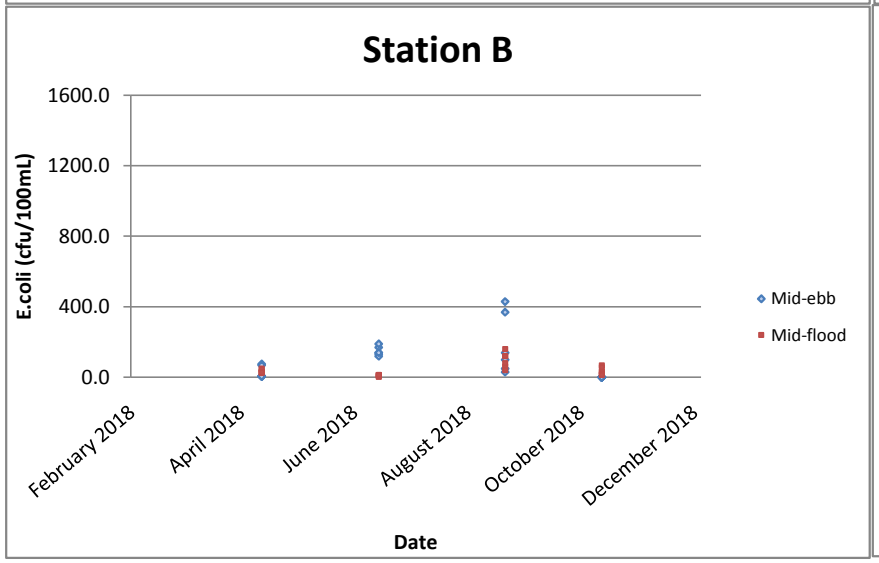

Station F
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

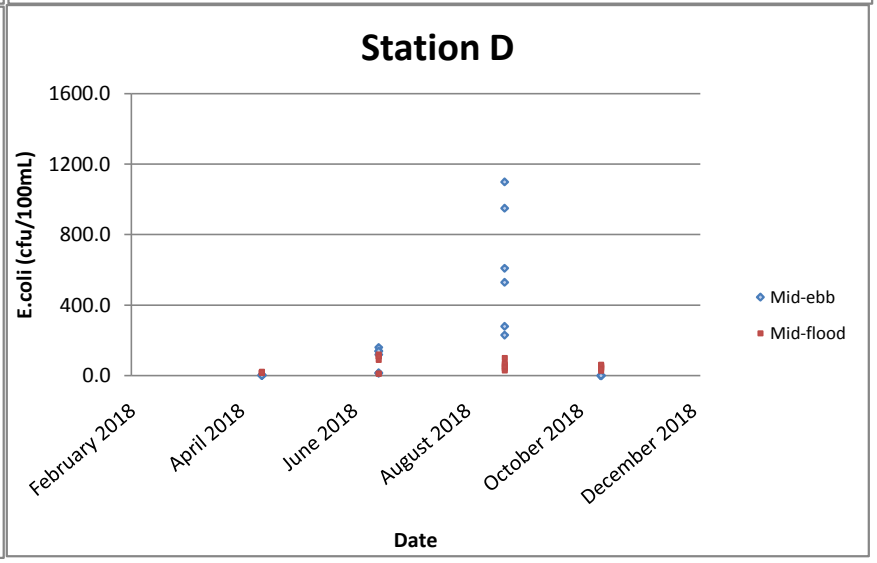

Station H
Total Inorganic Nitrogen (mg/L-N)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

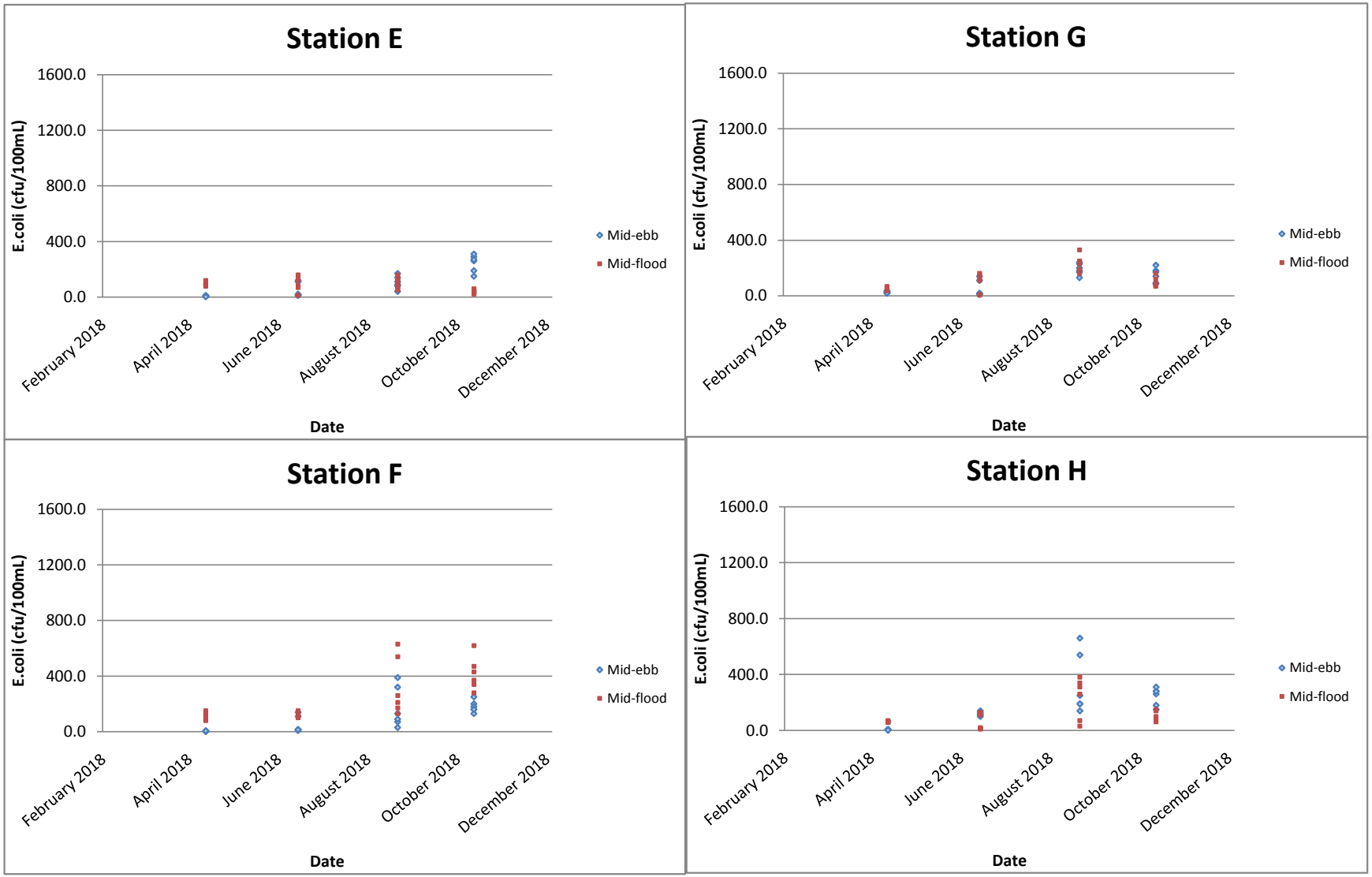
E.coli (cfu/100mL)



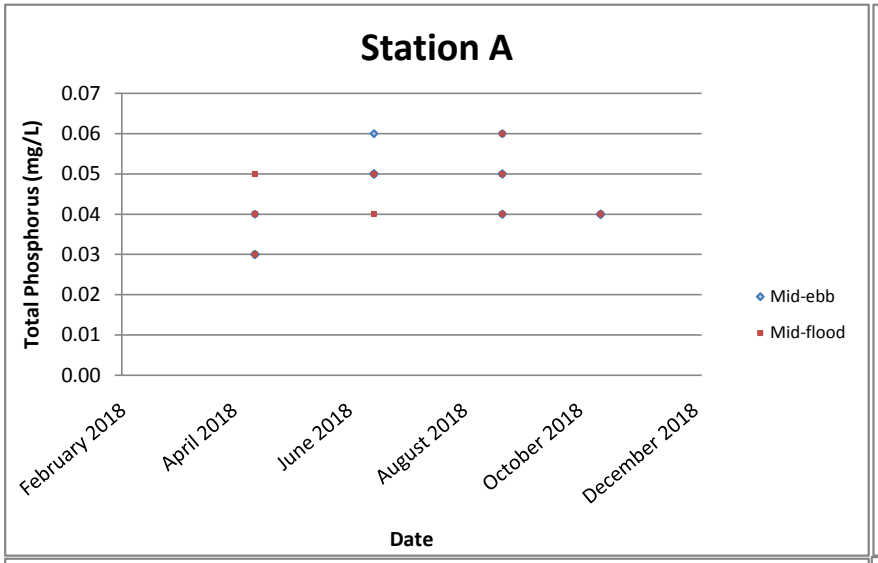


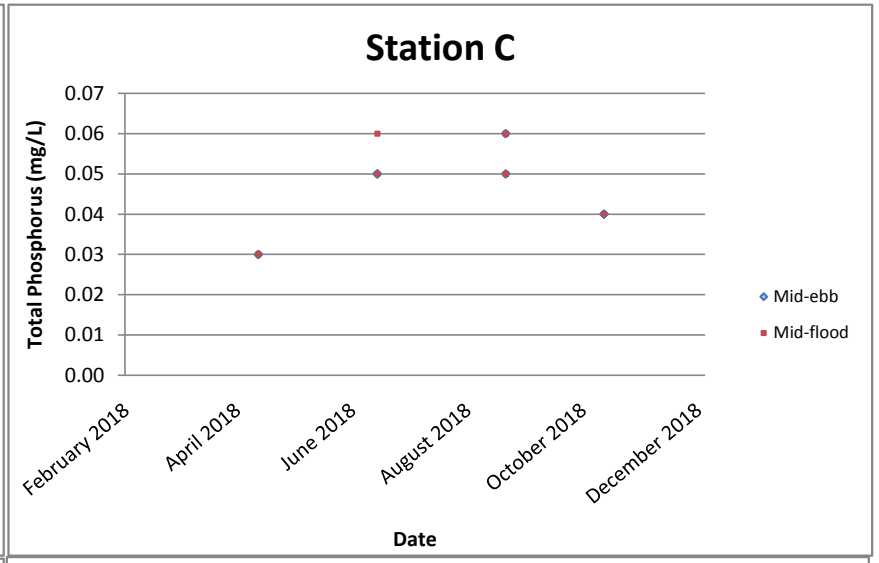


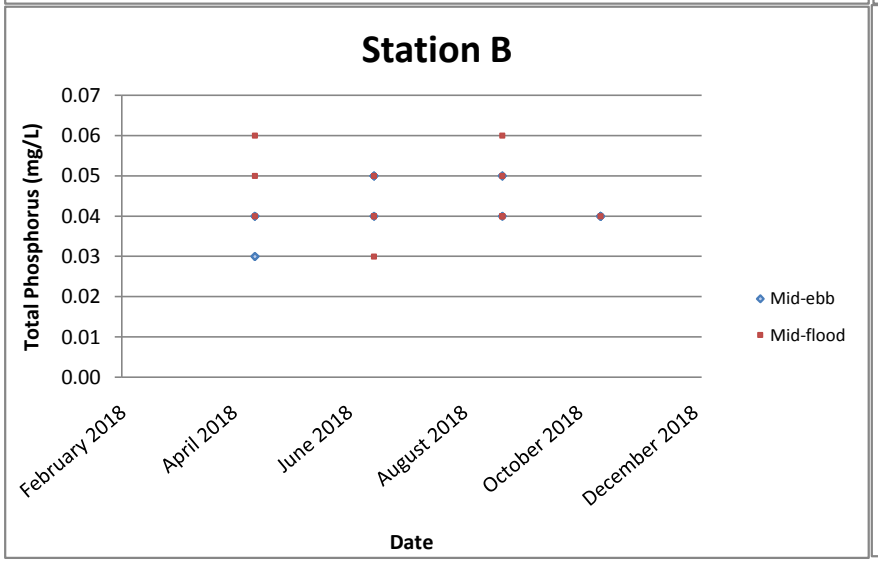


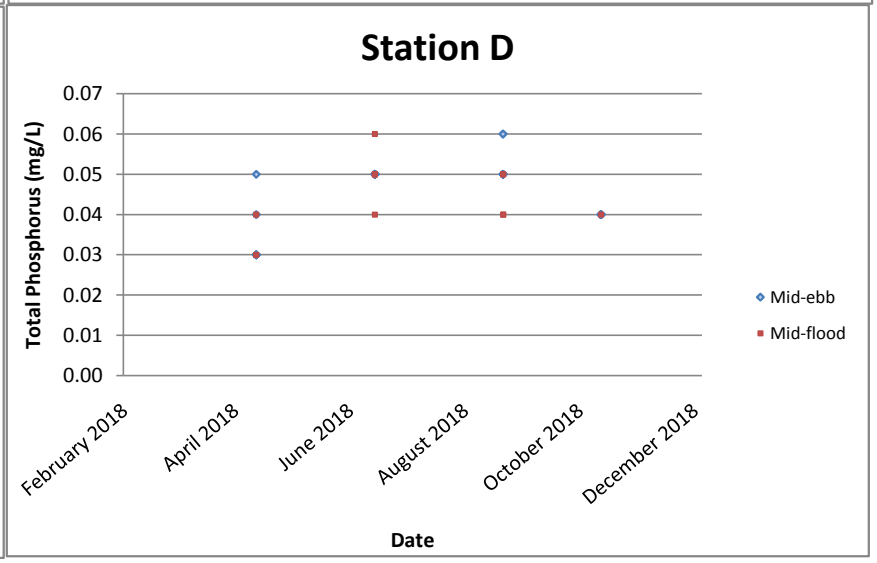

Station E
Station G
Station F
Station H
E.coli (cfu/100mL)
1600.0
1200.0
800.0
400.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

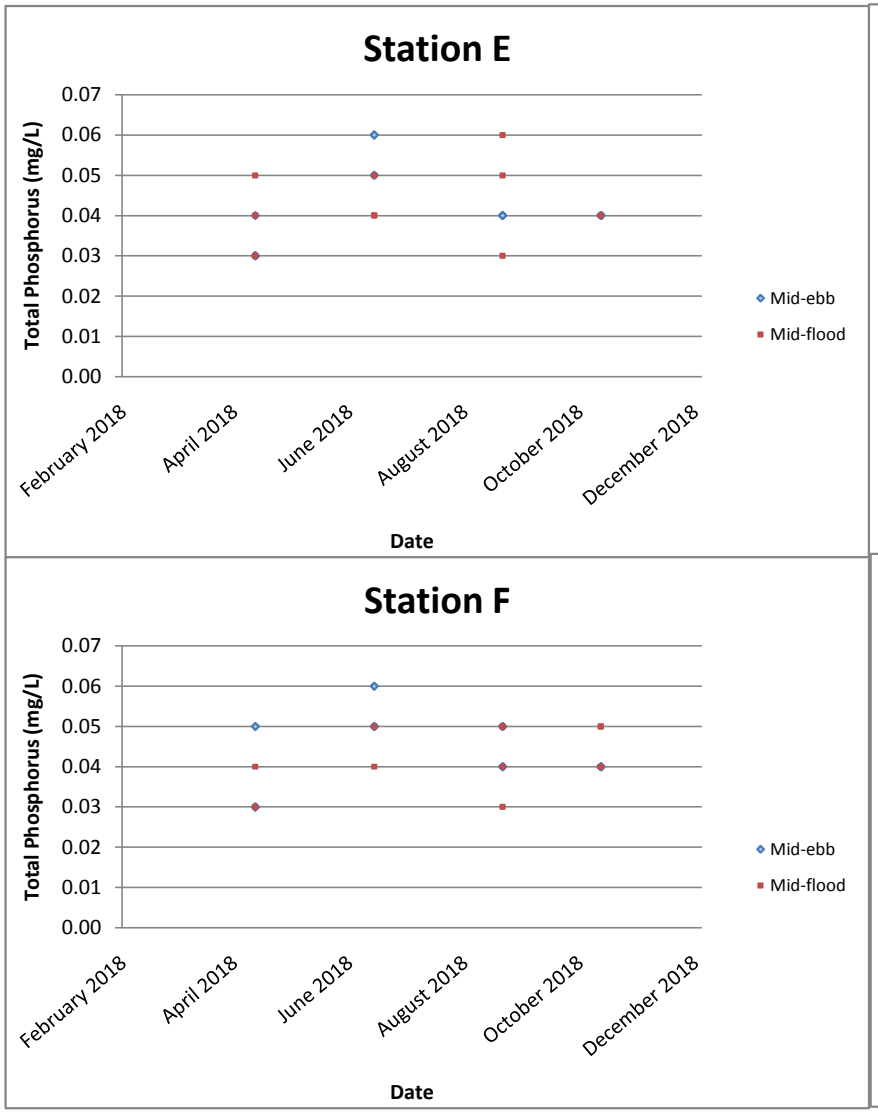
Total Phosphorus (soluble and particulate) (mg/L)

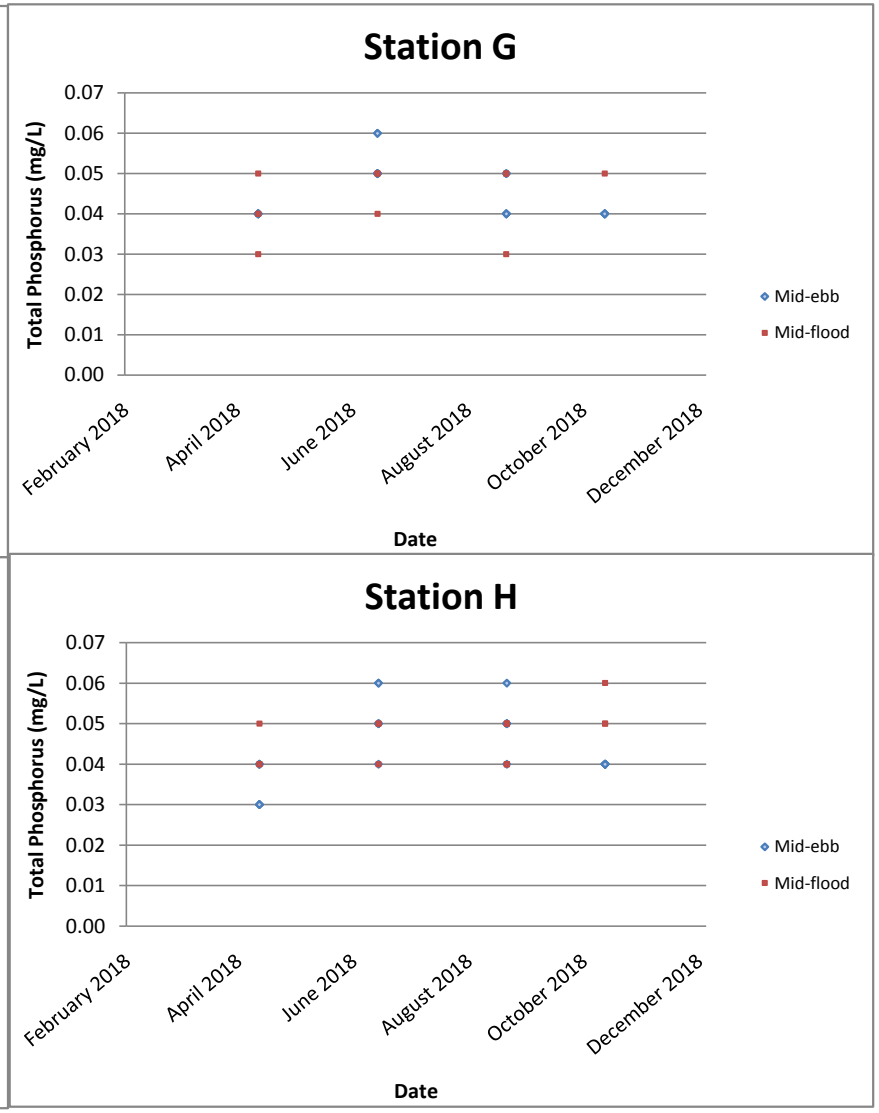








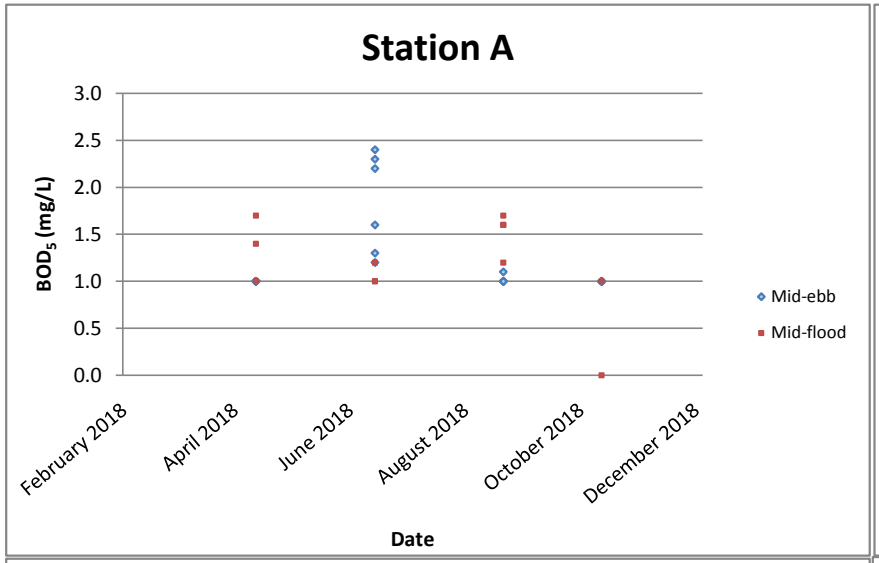

Station E
Total Phosphorus (mg/L)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

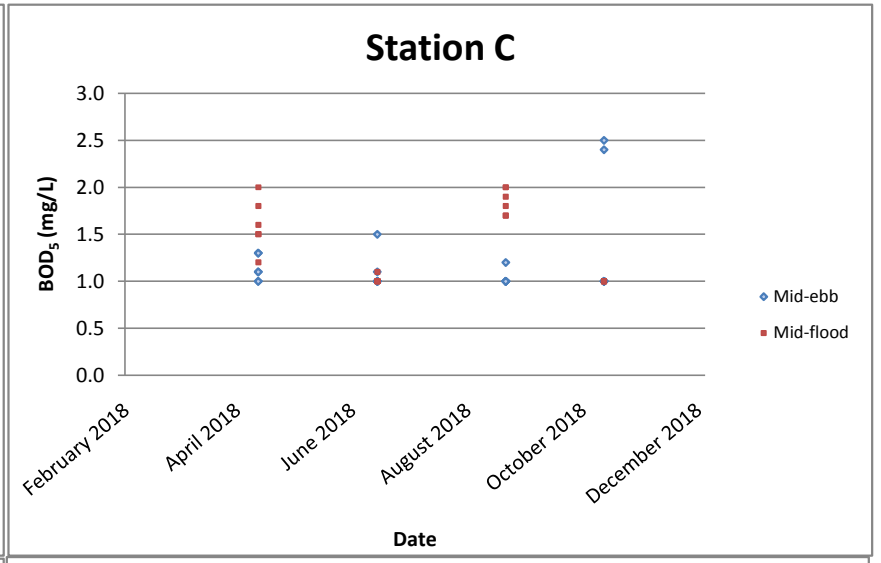

Station G
Total Phosphorus (mg/L)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

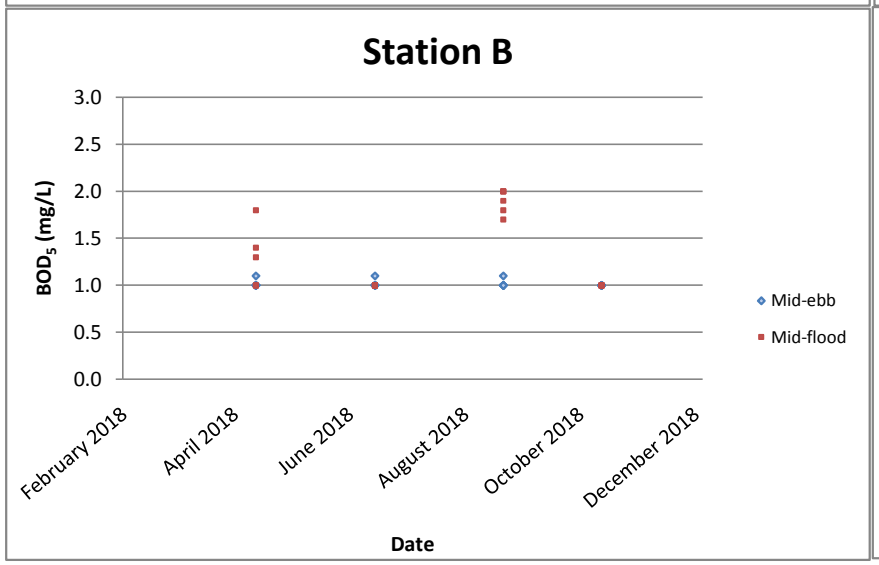
Station F
Total Phosphorus (mg/L)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

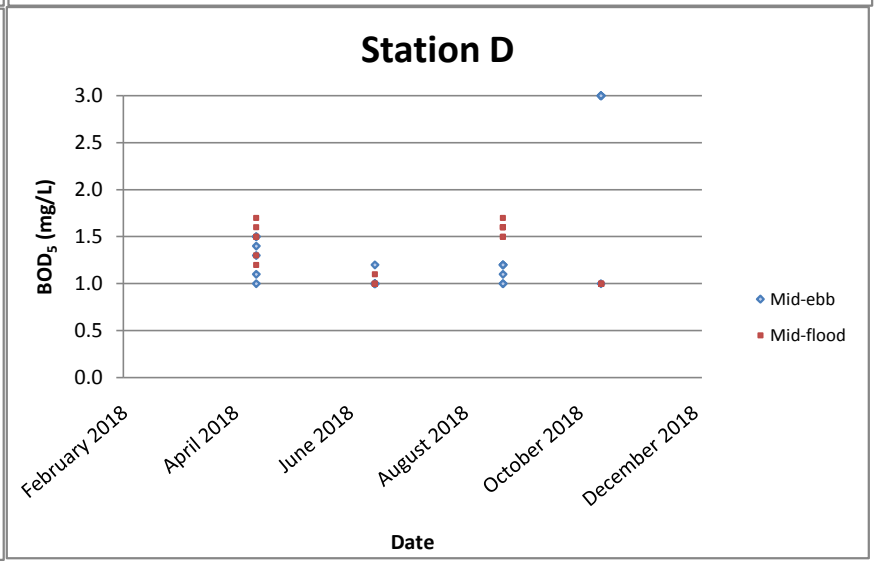
Station H
Total Phosphorus (mg/L)
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

BOD_5 (mg/L)

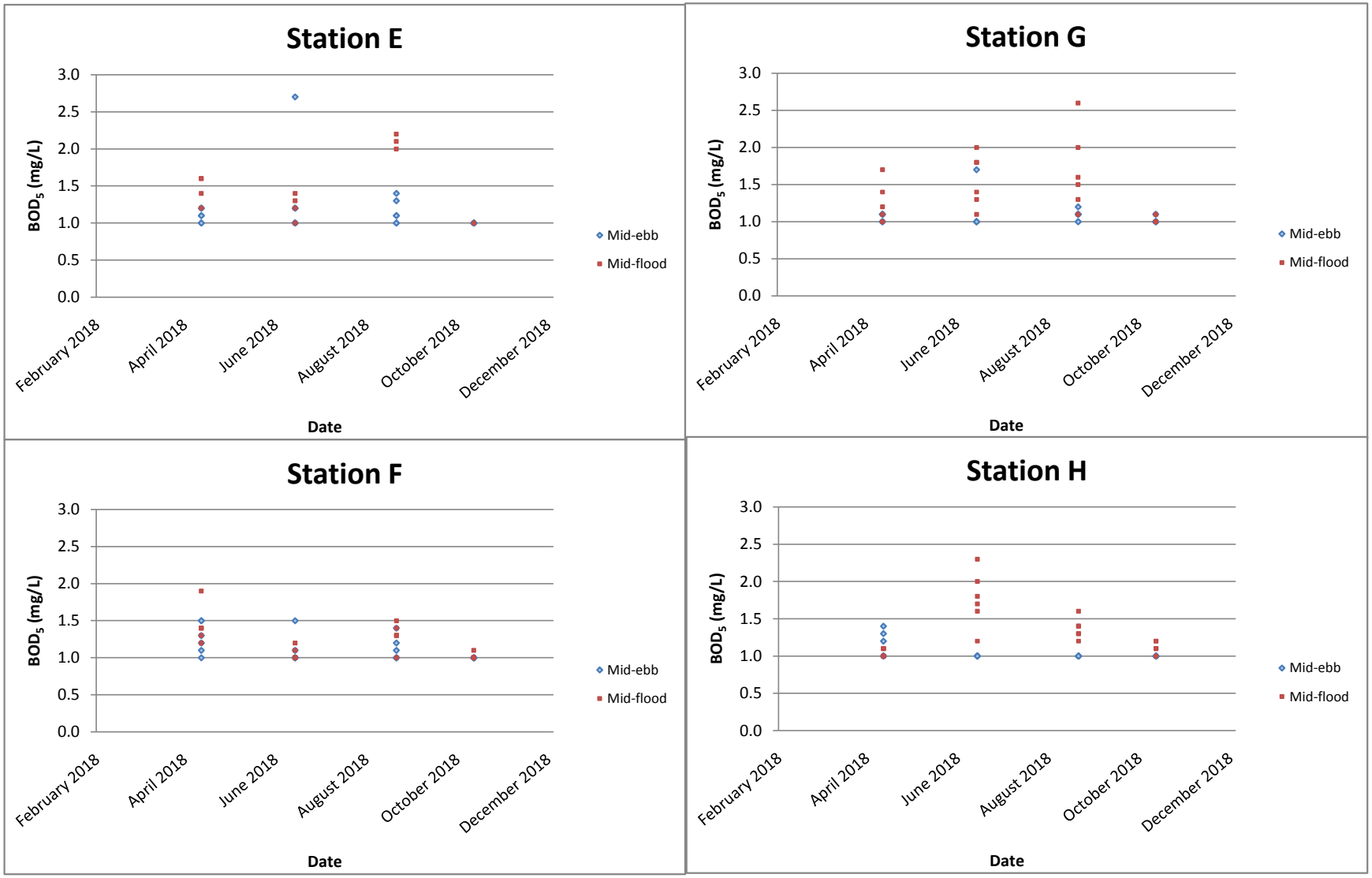

Station A
3.0
2.5
2.0
1.5
1.0
0.5
0.0
BOD5 (mg/L)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station C
3.0
2.5
2.0
1.5
1.0
0.5
0.0
BOD5 (mg/L)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station B
3.0
2.5
2.0
1.5
1.0
0.5
0.0
BOD5 (mg/L)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood


Station D
3.0
2.5
2.0
1.5
1.0
0.5
0.0
BOD5 (mg/L)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

BOD_5 (mg/L)


Station E
Station G
Station F
Station H
BOD5 (mg/L)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Mid-ebb
Mid-flood

FUGRO TECHNICAL SERVICES LIMITED

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Appendix F

Tidal Data obtained from Ma Wan Marine Tradffic Station

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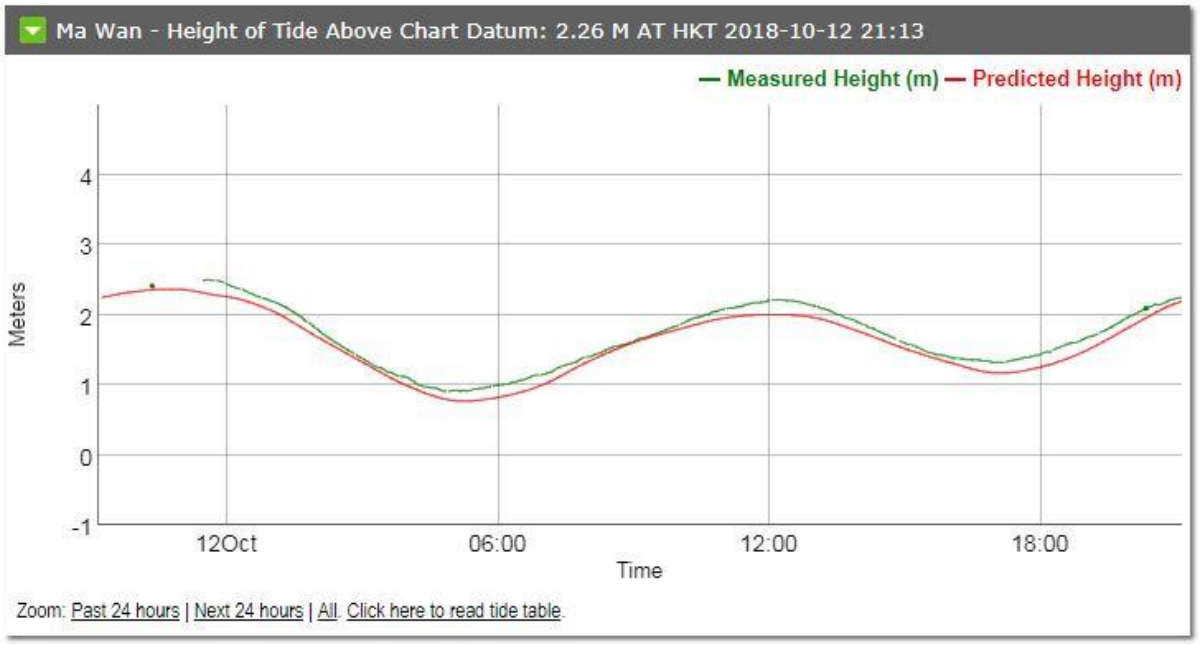
Report No.: 0041/17/ED/0378B



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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	12/10/2018	Cloudy	Moderate	15:50	8.3	1.7	1240	602	<0.10	76.4	31.7	42.5	0.14	26.4	106	18.2	0.21
B	12/10/2018	Cloudy	Moderate	16:13	8.5	2.2	1280	576	<0.10	35.2	31.3	34.8	0.11	21.0	96.5	9.9	0.23
C	12/10/2018	Cloudy	Moderate	16:35	8.2	6.7	1520	671	0.12	47.0	37.9	42.5	0.12	28.5	121	13.9	0.26
D	12/10/2018	Cloudy	Moderate	16:52	8.2	6.8	1510	622	0.11	47.1	38.5	42.6	0.13	28.6	126	12.7	0.29
E	12/10/2018	Cloudy	Moderate	17:15	8.2	16.2	2240	734	0.11	50.7	44.0	45.0	0.15	30.6	135	12.3	0.34
F	12/10/2018	Cloudy	Moderate	17:28	8.3	14.6	1950	729	0.11	51.0	44.7	45.8	0.21	31.0	136	12.4	0.34
G	12/10/2018	Cloudy	Moderate	17:38	8.6	1.7	930	537	<0.10	14.2	15.0	18.8	<0.05	8.3	38.3	6.1	<0.10
H	12/10/2018	Cloudy	Moderate	18:18	8.3	2.2	1490	744	0.16	52.4	61.7	46.2	0.13	31.5	152	14.4	0.68

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distrbution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	12/10/2018	Cloudy	Moderate	11:27	0.88	1	18	41	40
B	12/10/2018	Cloudy	Moderate	11:46	0.80	5	22	42	31
C	12/10/2018	Cloudy	Moderate	12:08	0.94	0	5	55	40
D	12/10/2018	Cloudy	Moderate	12:22	1.02	0	6	54	40
E	12/10/2018	Cloudy	Moderate	12:50	1.16	0	4	56	40
F	12/10/2018	Cloudy	Moderate	13:06	1.16	2	8	51	39
G	12/10/2018	Cloudy	Moderate	13:32	0.96	2	12	46	40
H	12/10/2018	Cloudy	Moderate	13:51	0.87	0	2	58	40

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	: HK1853822
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	: 12-Oct-2018
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 31-Oct-2018
C-O-C number	: ----			No. of samples received	: 24
Site	: ----			No. of samples analysed	: 24

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

Signatories	*Position*	*Authorised results for*
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 12-Oct-2018 to 29-Oct-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: HK1853822

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.

Results of HK1853822-1 are reference only as sample contained high amount calcareous material(broken shell).

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.

Sediment 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.

Ammonia, Nitrite and Nitrate determined and reported on a 1:5 soil / 1M KCl solution extract.

Analytical Results

Sub-Matrix: **SEDIMENT**

Compound	CAS Number	LOR	Unit	Client sample ID: A/Sediment	B/Sediment	C/Sediment	D/Sediment	E/Sediment
				Client sampling date / time: 12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
				HK1853822-001	HK1853822-002	HK1853822-003	HK1853822-004	HK1853822-005
EA/ED: Physical and Aggregate Properties								
EA002: pH Value	----	0.1	pH Unit	8.3	8.5	8.2	8.2	8.2
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	51.7	43.2	59.2	58.5	60.3
ED/EK: Inorganic Nonmetallic Parameters								
EK055: Ammonia as N	7664-41-7	0.5	mg/kg	1.7	2.2	6.7	6.8	16.2
EK062A: Total Nitrogen as N	----	10	mg/kg	1240	1280	1520	1510	2240
EK067A: Total Phosphorus as P	----	10	mg/kg	602	576	671	622	734
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	0.5	mg/kg	18.2	9.9	13.9	12.7	12.3
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	<0.10	0.12	0.11	0.11
EG020: Chromium	7440-47-3	0.5	mg/kg	76.4	35.2	47.0	47.1	50.7
EG020: Copper	7440-50-8	0.20	mg/kg	31.7	31.3	37.9	38.5	44.0
EG020: Lead	7439-92-1	0.20	mg/kg	42.5	34.8	42.5	42.6	45.0
EG020: Mercury	7439-97-6	0.05	mg/kg	0.14	0.11	0.12	0.13	0.15
EG020: Nickel	7440-02-0	0.20	mg/kg	26.4	21.0	28.5	28.6	30.6
EG020: Silver	7440-22-4	0.10	mg/kg	0.21	0.23	0.26	0.29	0.34
EG020: Zinc	7440-66-6	0.5	mg/kg	106	96.5	121	126	135

Sub-Matrix: SEDIMENT				Client sample ID	F/Sediment	G/Sediment	H/Sediment	A/Benthic Survey	B/Benthic Survey
				Client sampling date / time	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit		HK1853822-006	HK1853822-007	HK1853822-008	HK1853822-009	HK1853822-010
EA/ED: Physical and Aggregate Properties									
EA002: pH Value	----	0.1	pH Unit		8.3	8.6	8.3	----	----
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		63.5	33.0	58.1	55.0	53.8
ED/EK: Inorganic Nonmetallic Parameters									
EK055: Ammonia as N	7664-41-7	0.5	mg/kg		14.6	1.7	2.2	----	----
EK062A: Total Nitrogen as N	----	10	mg/kg		1950	930	1490	----	----
EK067A: Total Phosphorus as P	----	10	mg/kg		729	537	744	----	----
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg		12.4	6.1	14.4	----	----
EG020: Cadmium	7440-43-9	0.10	mg/kg		0.11	<0.10	0.16	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg		51.0	14.2	52.4	----	----
EG020: Copper	7440-50-8	0.20	mg/kg		44.7	15.0	61.7	----	----
EG020: Lead	7439-92-1	0.20	mg/kg		45.8	18.8	46.2	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg		0.21	<0.05	0.13	----	----
EG020: Nickel	7440-02-0	0.20	mg/kg		31.0	8.30	31.5	----	----
EG020: Silver	7440-22-4	0.10	mg/kg		0.34	<0.10	0.68	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg		136	38.3	152	----	----
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%		----	----	----	0.88	0.80

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	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	CAS Number	LOR	Unit		HK1853822-011	HK1853822-012	HK1853822-013	HK1853822-014	HK1853822-015
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		62.4	61.8	60.2	61.5	51.1
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%		0.94	1.02	1.16	1.16	0.96

Sub-Matrix: SEDIMENT				Client sample ID	H/Benthic Survey	----	----	----	----
				Client sampling date / time	12-Oct-2018	----	----	----	----
Compound	CAS Number	LOR	Unit		HK1853822-016	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		58.0	----	----	----	----
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%		0.87	----	----	----	----

Sub-Matrix: WATER			Client sample ID	A/Rinsate Blank	B/Rinsate Blank	C/Rinsate Blank	D/Rinsate Blank	E/Rinsate Blank
			Client sampling date / time	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018	12-Oct-2018
Compound	*CAS Number*	*LOR*	*Unit*	HK1853822-017	HK1853822-018	HK1853822-019	HK1853822-020	HK1853822-021
EG: Metals and Major Cations - Total								
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	**1**	**2**	**2**	**2**	**1**
EG020: Copper	7440-50-8	1	µg/L	**1**	**2**	**2**	**2**	**1**
EG020: Lead	7439-92-1	1	µg/L	<1	**2**	**1**	**1**	**1**
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EG020: Nickel	7440-02-0	1	µg/L	**1**	**2**	**2**	**1**	**1**
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	<10	<10	<10	<10

Sub-Matrix: WATER			Client sample ID	F/Rinsate Blank	G/Rinsate Blank	H/Rinsate Blank	----	----
			Client sampling date / time	12-Oct-2018	12-Oct-2018	12-Oct-2018	----	----
Compound	CAS Number	LOR	Unit	HK1853822-022	HK1853822-023	HK1853822-024	-------	-------
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	<1	2	<1	----	----
EG020: Copper	7440-50-8	1	µg/L	<1	2	<1	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	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	<1	1	<1	----	----
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 sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1981909)								
HK1853822-001	A/Sediment	**EA002: pH Value**	----	0.1	pH Unit	8.3	8.4	1.20
EA/ED: Physical and Aggregate Properties (QC Lot: 1982066)								
HK1853822-001	A/Sediment	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	51.7	52.1	0.760
HK1853822-011	C/Benthic Survey	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	62.4	62.2	0.355
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1992272)								
HK1853822-001	A/Sediment	**EK055: Ammonia as N**	7664-41-7	1	mg/kg	1.7	2	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1994444)								
HK1853668-001	Anonymous	**EK067A: Total Phosphorus as P**	----	10	mg/kg	1850	1960	5.56
EG: Metals and Major Cations (QC Lot: 1981390)								
HK1853822-002	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	0.11	0.10	0.00
		EG020: Copper	7440-50-8	0.05	mg/kg	31.3	31.4	0.387
		EG020: Lead	7439-92-1	0.05	mg/kg	34.8	34.7	0.290
		EG020: Nickel	7440-02-0	0.05	mg/kg	21.0	21.2	0.862
		EG020: Silver	7440-22-4	0.05	mg/kg	0.23	0.23	0.00
		EG020: Arsenic	7440-38-2	0.5	mg/kg	9.9	11.0	10.0
		EG020: Chromium	7440-47-3	0.5	mg/kg	35.2	35.5	0.866
		EG020: Zinc	7440-66-6	0.5	mg/kg	96.5	96.2	0.398
EP: Aggregate Organics (QC Lot: 2002472)								
HK1853822-010	B/Benthic Survey	**EP005: Total Organic Carbon**	----	0.05	%	0.80	0.80	0.00
HK1855071-003	Anonymous	**EP005: Total Organic Carbon**	----	0.05	%	8.88	8.90	0.241

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1981473)								
HK1853822-018	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
		EG020: Copper	7440-50-8	1	µg/L	2	2	0.00
		EG020: Lead	7439-92-1	1	µg/L	2	1	0.00

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1981473) - Continued								
HK1853822-018	B/Rinsate Blank	**EG020: Nickel**	7440-02-0	1	µg/L	2	1	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: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1992272)											
EK055: Ammonia as N	7664-41-7	1	mg/kg	<1	10 mg/kg	108	----	85	119	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1994444)											
EK067A: Total Phosphorus as P	----	10	mg/kg	<10	695 mg/kg	111	----	85	115	----	----
EG: Metals and Major Cations (QC Lot: 1981390)											
EG020: Arsenic	7440-38-2	0.5	mg/kg	<0.5	5 mg/kg	94.0	----	80	110	----	----
EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.01	5 mg/kg	102	----	84	115	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	<0.5	5 mg/kg	95.6	----	80	120	----	----
EG020: Copper	7440-50-8	0.05	mg/kg	<0.05	5 mg/kg	102	----	85	114	----	----
EG020: Lead	7439-92-1	0.05	mg/kg	<0.05	5 mg/kg	99.7	----	87	118	----	----
EG020: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	97.8	----	84	124	----	----
EG020: Nickel	7440-02-0	0.05	mg/kg	<0.05	5 mg/kg	98.6	----	85	115	----	----
EG020: Silver	7440-22-4	0.05	mg/kg	<0.05	5 mg/kg	87.1	----	85	115	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	<0.5	5 mg/kg	98.0	----	80	120	----	----
EP: Aggregate Organics (QC Lot: 2002472)											
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	101	----	92	105	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1981473)											

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1981473) - Continued											
EG020: Arsenic	7440-38-2	10	µg/L	<10	100 µg/L	98.7	----	83	110	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	100 µg/L	97.4	----	85	109	----	----
EG020: Chromium	7440-47-3	1	µg/L	<1	100 µg/L	99.0	----	86	111	----	----
EG020: Copper	7440-50-8	1	µg/L	<1	100 µg/L	103	----	90	111	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	100 µg/L	98.0	----	89	111	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	93.7	----	80	118	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	100 µg/L	98.1	----	87	110	----	----
EG020: Silver	7440-22-4	1	µg/L	<1	100 µg/L	95.9	----	80	114	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	100 µg/L	101	----	86	114	----	----

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

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 1981390)										
HK1853822-001	A/Sediment	**EG020: Arsenic**	7440-38-2	5 mg/kg	81.2	----	75	125	----	----
		EG020: Cadmium	7440-43-9	5 mg/kg	102	----	75	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	# Not Determined	----	75	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	82.0	----	75	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	----	75	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	83.8	----	75	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	83.4	----	75	125	----	----
		EG020: Silver	7440-22-4	5 mg/kg	96.0	----	75	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75	125	----	----
EP: Aggregate Organics (QC Lot: 2002472)										
HK1853822-009	A/Benthic Survey	**EP005: Total Organic Carbon**	----	40 %	95.4	----	75	125	----	----

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1981473)										
HK1853822-017	A/Rinsate Blank	**EG020: Arsenic**	7440-38-2	100 µg/L	89.8	----	75	125	----	----
		EG020: Cadmium	7440-43-9	100 µg/L	87.6	----	75	125	----	----
		EG020: Chromium	7440-47-3	100 µg/L	86.2	----	75	125	----	----
		EG020: Copper	7440-50-8	100 µg/L	83.8	----	75	125	----	----
		EG020: Lead	7439-92-1	100 µg/L	80.1	----	75	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	76.0	----	75	125	----	----
		EG020: Nickel	7440-02-0	100 µg/L	76.0	----	75	125	----	----
		EG020: Silver	7440-22-4	100 µg/L	84.2	----	75	125	----	----
		EG020: Zinc	7440-66-6	100 µg/L	76.8	----	75	125	----	----

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: MR CYRUS LAI	WORK ORDER	: **HK1853822**
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	: 12-OCT-2018
		DATE OF ISSUE	: 30-OCT-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.
- Results of HK1853822-1 are reference only as sample contained high amount calcareous material(broken shell).
- 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.
- Sediment 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.
- Ammonia, Nitrite and Nitrate determined and reported on a 1:5 soil / 1M KCl solution extract.

Signatories

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

Signatories	*Position*
PP 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
11/F. Chung Shun Knitting Centre 1 - 3 Wing Yip Street Kwai Chung N.T. Hong Kong
Tel. +852 2610 1044 Fax. +852 2610 2021 www.alsglobal.com

WORK ORDER	: HK1853822
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.
HK1853822-001	A/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-002	B/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-003	C/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-004	D/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-005	E/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-006	F/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-007	G/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-008	H/Sediment	SEDIMENT	12-Oct-2018	
HK1853822-009	A/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-010	B/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-011	C/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-012	D/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-013	E/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-014	F/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-015	G/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-016	H/Benthic Survey	SEDIMENT	12-Oct-2018	J2999-272.36
HK1853822-017	A/Rinsate Blank	WATER	12-Oct-2018	
HK1853822-018	B/Rinsate Blank	WATER	12-Oct-2018	
HK1853822-019	C/Rinsate Blank	WATER	12-Oct-2018	
HK1853822-020	D/Rinsate Blank	WATER	12-Oct-2018	
HK1853822-021	E/Rinsate Blank	WATER	12-Oct-2018	
HK1853822-022	F/Rinsate Blank	WATER	12-Oct-2018	
HK1853822-023	G/Rinsate Blank	WATER	12-Oct-2018	
HK1853822-024	H/Rinsate Blank	WATER	12-Oct-2018	

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

Report No : J2999-272.36

Customer : ALS Technichem (HK) Pty Ltd Job No. : J2999 Works Order No. : 272

Project : - Contract No.: Date : 16/10/2018

Sample ID	Sample			Δ Moisture Content	Test 6.1 Liquid Limit	Test 6.1 Plastic Limit	Test 6.1 Plasticity Index	Test 6.2 Liquidity Index	Passing 425μm Test Sieve	Preparation Method	Particle Size Distribution					Description	Sample Origin
											#	Percentage					
No.	No.	Type	Depth (m)	(%)	(%)	(%)	(%)		(%)		Test Method	Gravel (%)	Sand (%)	Silt (%)	Clay (%)		
HK1853822-009	A/Benthic Survey	D									1,5,7	1	18	41	40	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	-‡
HK1853822-010	B/Benthic Survey	D									1,5,7	5	22	42	31	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	-‡
HK1853822-011	C/Benthic Survey	D									1,5,7	0	5	55	40	Dark grey, slightly sandy SILT/CLAY	-‡
HK1853822-012	D/Benthic Survey	D									1,5,7	0	6	54	40	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1853822-013	E/Benthic Survey	D									1,5,7	0	4	56	40	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1853822-014	F/Benthic Survey	D									1,5,7	2	8	51	39	Dark grey, slightly gravelly, 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 GEOSPEC3 : 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, Tf - To Follow on supplementary Report.

Checked by : T K Lam Approved By : Chung Hei Wing, Principal Laboratory Officer Date : 26/10/2018

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

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

Report No : J2999-272.36

Customer : ALS Technichem (HK) Pty Ltd Job No. : J2999 Works Order No. : 272

Project : - Contract No.: Date : 16/10/2018

Sample ID	Sample			Δ Moisture Content	Test 6.1 Liquid Limit	Test 6.1 Plastic Limit	Test 6.1 Plasticity Index	Test 6.2 Liquidity Index	Passing 425μm Test Sieve	Preparation Method	Particle Size Distribution					Description	Sample Origin
											#	Percentage					
No.	No.	Type	Depth (m)	(%)	(%)	(%)	(%)		(%)		Test Method	Gravel (%)	Sand (%)	Silt (%)	Clay (%)		
HK1853822-015	G/Benthic Survey	D									1,5,7	2	12	46	40	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	- ‡
HK1853822-016	H/Benthic Survey	D									1,5,7	0	2	58	40	Dark grey, slightly sandy SILT/CLAY	- ‡

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 GEOSPEC3 : 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; Tf - To Follow on supplementary Report

Checked by : T K Lam Approved By : Chung Hei Wing, Principal Laboratory Officer Date : 26/10/2018

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Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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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 : J2999-272.36

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

Works Order No : 272
Sample ID No : HK1853822-009
Sample No. : A/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/10/2018
Tested Date : 18/10/2018

Description : Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
Sieve Method : Method A

^Upon request * Delete as appropriate ‡ Information provided by customer

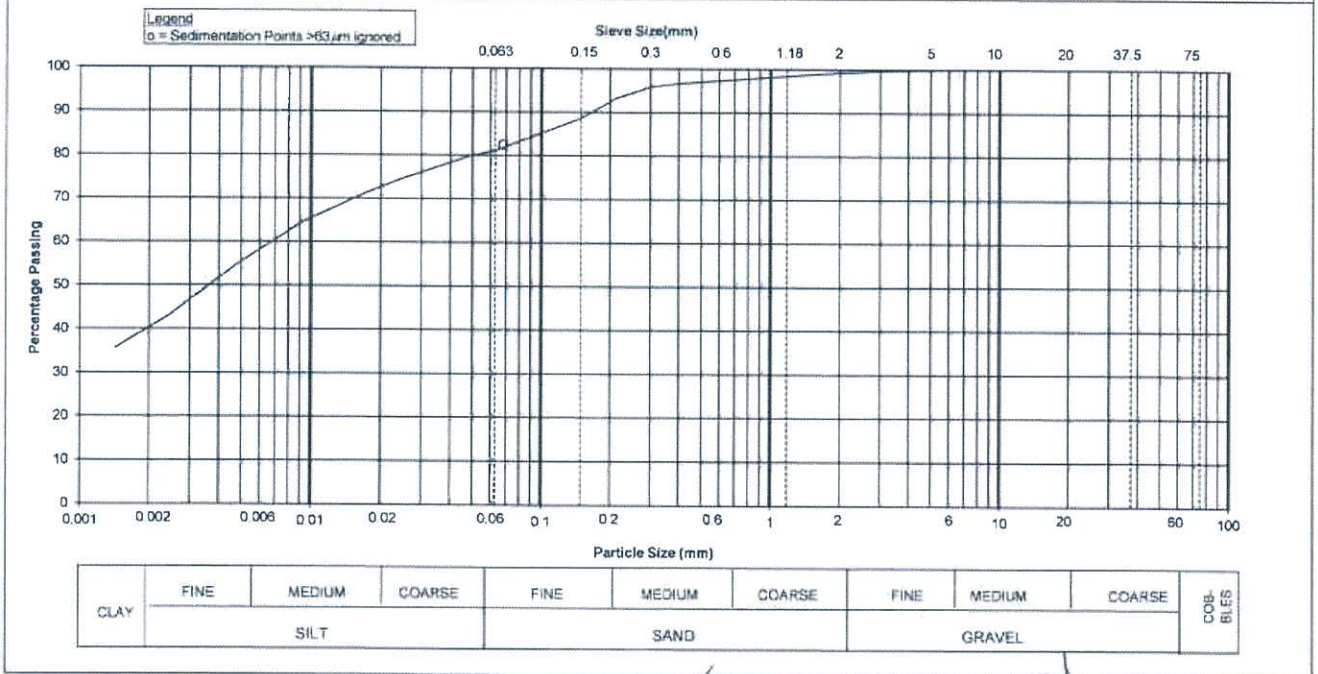
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	99	-	-
1.18 mm	98	-	-
600 µm	97	-	-
425 µm	97	-	-
300 µm	96	-	-
212 µm	93	-	-
150 µm	89	-	-
63 µm	81	-	-
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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0679	-	82	-
0.0483	-	80	-
0.0344	-	77	-
0.0245	-	75	-
0.0175	-	71	-
0.0092	-	65	-
0.0047	-	55	-
0.0024	-	43	-
0.0014	-	36	-

SUMMARY :

Gravel (%)	:	**1**
Sand (%)	:	**18**
Silt (%)	:	**41**
Clay (%)	:	**40**



Technician : Chris Chan
Date : 18/10/2018

Checked By :
Name : T K Lam
Date : 25/10/2018

Approved By :
Signatory : Chung Hay Wing
Date : 25/10/2018

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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)

Gammon

HKAS TEST CAL 055

Report No. : J2999-272.36

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

Works Order No : 272
Sample ID No : HK1853822-010
Sample No : B/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/10/2018
Tested Date : 18/10/2018

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

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

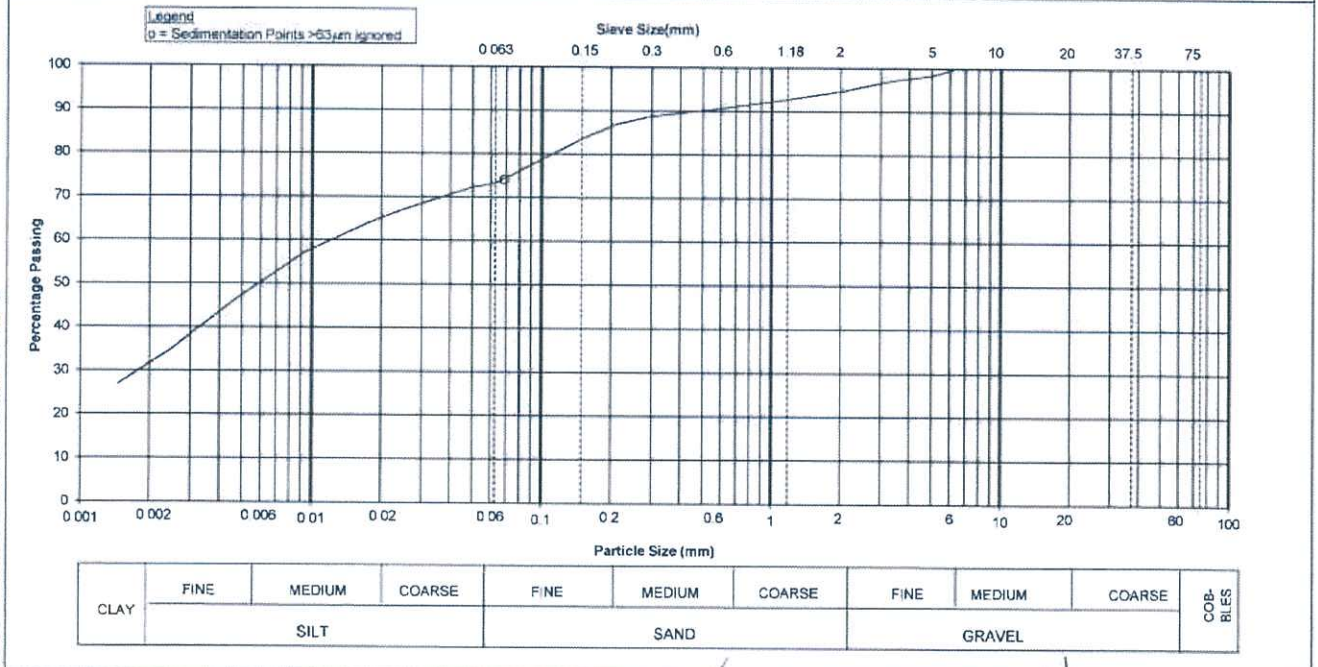
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	98	-	-
3.35 mm	97	-	-
2.00 mm	95	-	-
1.18 mm	93	-	-
600 µm	91	-	-
425 µm	90	-	-
300 µm	89	-	-
212 µm	87	-	-
150 µm	84	-	-
63 µm	73	-	-
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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0687	-	74	-
0.0488	-	72	-
0.0348	-	70	-
0.0248	-	67	-
0.0177	-	64	-
0.0093	-	57	-
0.0048	-	47	-
0.0025	-	35	-
0.0014	-	27	-

SUMMARY :

Gravel (%)	:	**5**
Sand (%)	:	**22**
Silt (%)	:	**42**
Clay (%)	:	**31**



Technician : Chris Chan
Date : 18/10/2018

Checked By :
Name : T K Lam
Date : 25/10/2018

Approved By :
Signatory : Chung Hei Wing
Date : 25/10/2018

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Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

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 : J2999-272.36

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

Works Order No. : 272
Sample ID No. : HK1853822-011
Sample No : C/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/10/2018
Tested Date : 18/10/2018

Description : Dark grey, slightly sandy SILT/CLAY
Sieve Method : Method A

ˆUpon request * Delete as appropriate ‡Information provided by customer

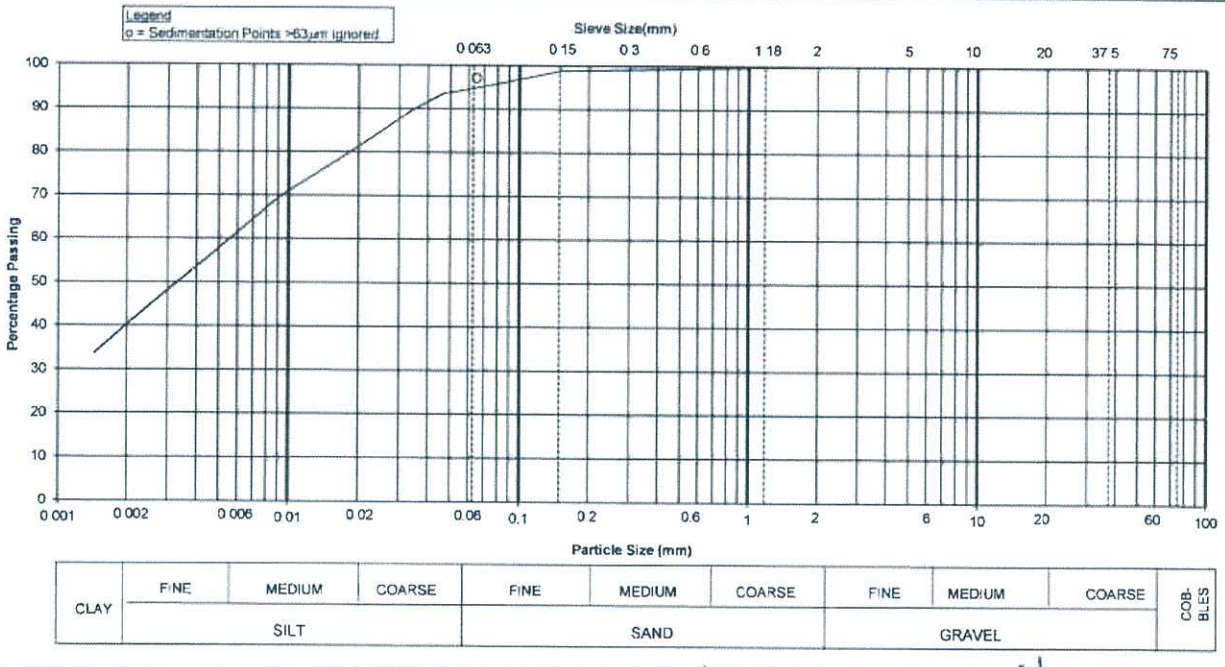
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	~~99~~	-	-
300 µm	~~99~~	-	-
212 µm	~~99~~	-	-
150 µm	~~99~~	-	-
63 µm	~~95~~	-	-
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

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0648	-	97	-
0.0463	-	93	-
0.0332	-	89	-
0.0238	-	84	-
0.0171	-	79	-
0.0091	-	70	-
0.0047	-	57	-
0.0024	-	44	-
0.0014	-	34	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**5**
Silt (%)	:	**55**
Clay (%)	:	**40**



Technician : Chris Chan
Date : 18/10/2018

Checked By :
Name : T K Lam
Date : 25/10/2018

Approved By :
Signatory : Chung Hei Wing
Date : 25/10/2018

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

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)

Gammon

HKAS TEST CAL

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

Date Received : 16/10/2018
Tested Date : 18/10/2018

Report No. : J2999-272.36

Works Order No. : 272
Sample ID No. : HK1853822-012
Sample No. : D/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

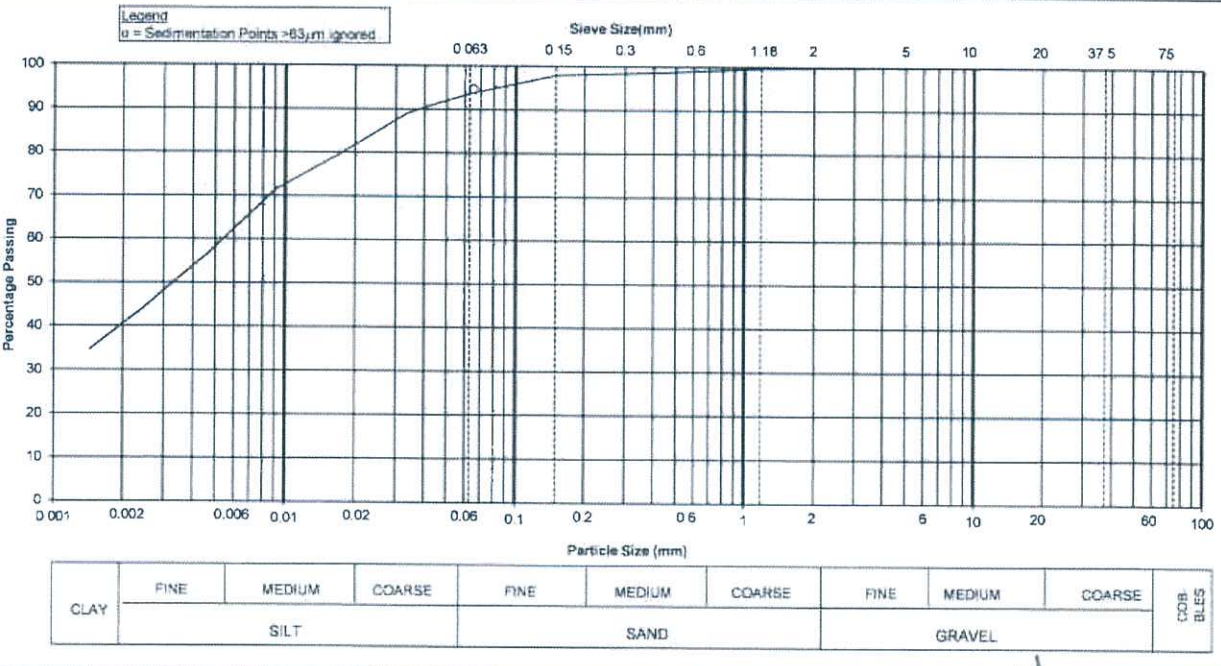
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	99	-	-
425 µm	99	-	-
300 µm	98	-	-
212 µm	98	-	-
150 µm	98	-	-
63 µm	94	-	-
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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0652	-	95	-
0.0466	-	92	-
0.0332	-	89	-
0.0238	-	84	-
0.0170	-	80	-
0.0090	-	71	-
0.0047	-	57	-
0.0024	-	44	-
0.0014	-	35	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**6**
Silt (%)	:	**54**
Clay (%)	:	**40**



Technician : Chris Chan
Date 18/10/2018

Checked By
Name : T K Lam
Date 25/10/2018

Approved By
Signatory : Chung Hei Wing
Date 25/10/2018

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

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)

Gammon

HKAS TEST CAL 055

Report No : J2999-272.36

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

Works Order No : 272
Sample ID No : HK1853822-013
Sample No. : E/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/10/2018
Tested Date : 18/10/2018

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

*Upon request * Delete as appropriate ‡Information provided by customer

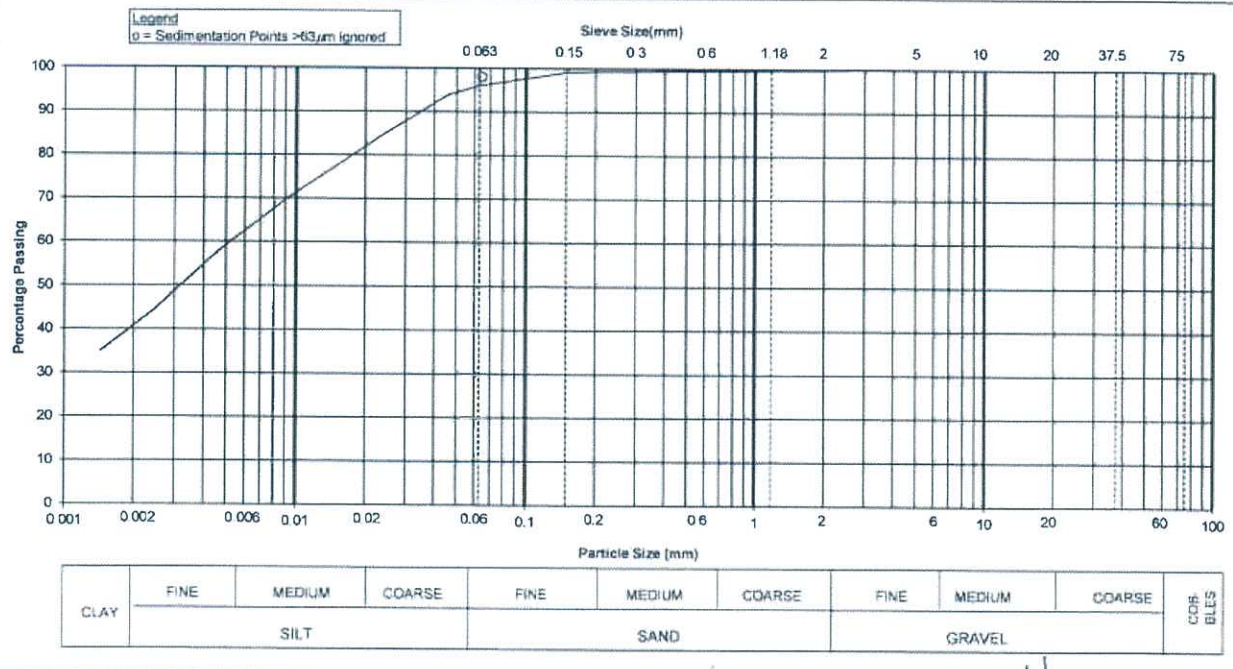
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	*Expanded Uncertainty of the Percent Passing (%)	*Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	99	-	-
212 µm	99	-	-
150 µm	99	-	-
63 µm	96	-	-
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

Particle Diameter (mm)	*Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	*Expanded Uncertainty of % finer than D (%)
0.0644	-	98	-
0.0461	-	94	-
0.0331	-	89	-
0.0237	-	85	-
0.0170	-	80	-
0.0090	-	70	-
0.0047	-	58	-
0.0024	-	44	-
0.0014	-	35	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**4**
Silt (%)	:	**56**
Clay (%)	:	**40**



Technician : Chris Chan
Date : 18/10/2018

Checked By :
Name : T K Lam
Date : 25/10/2018

Approved By
Signatory : Chung Hei Wing
Date : 25/10/2018

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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 36

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

Works Order No : 272
Sample ID No. : HK1853822-014
Sample No : F/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/10/2018
Tested Date : 18/10/2018

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

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

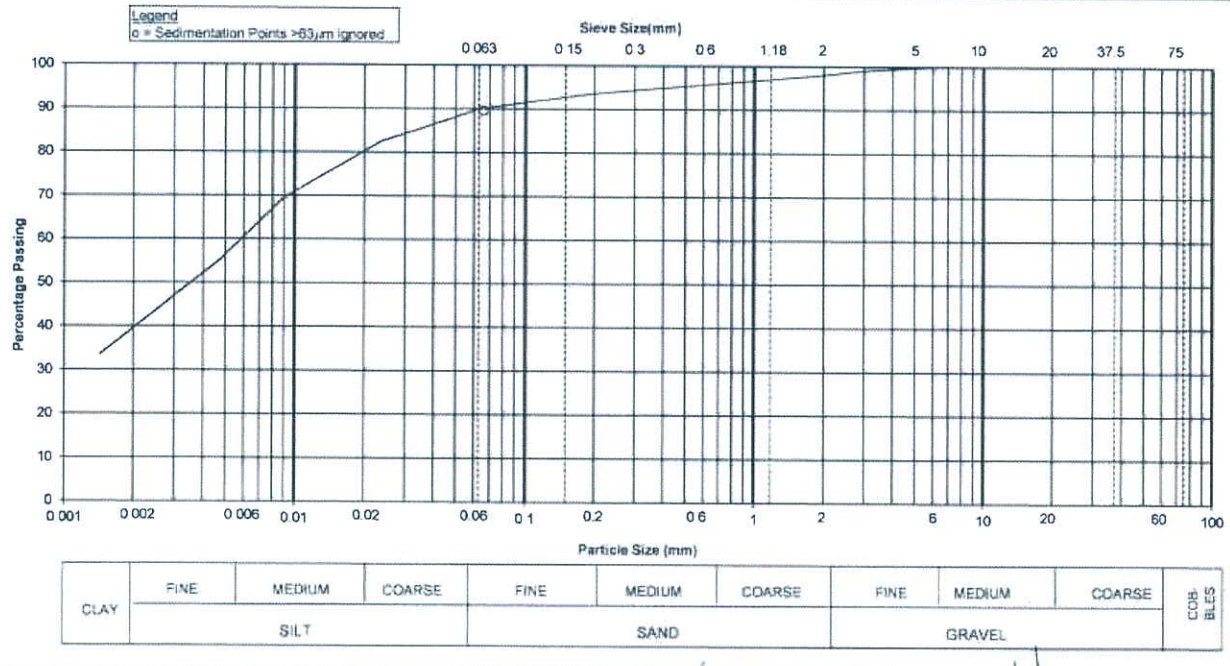
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	99	-	-
2.00 mm	98	-	-
1.18 mm	97	-	-
600 µm	96	-	-
425 µm	95	-	-
300 µm	94	-	-
212 µm	94	-	-
150 µm	93	-	-
63 µm	90	-	-
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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0656	-	90	-
0.0467	-	88	-
0.0333	-	85	-
0.0237	-	83	-
0.0170	-	78	-
0.0090	-	70	-
0.0047	-	55	-
0.0024	-	43	-
0.0014	-	34	-

SUMMARY :

Gravel (%)	:	**2**
Sand (%)	:	**8**
Silt (%)	:	**51**
Clay (%)	:	**39**



Technician Chris Chan
Date 18/10/2018

Checked By
Name T K Lam
Date 25/10/2018

Approved By
Signatory Chung Kei Wing
Date 25/10/2018

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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. J2999-272.36

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

Works Order No : 272
Sample ID No. : HK1853822-015
Sample No : G/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/10/2018
Tested Date : 18/10/2018

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

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

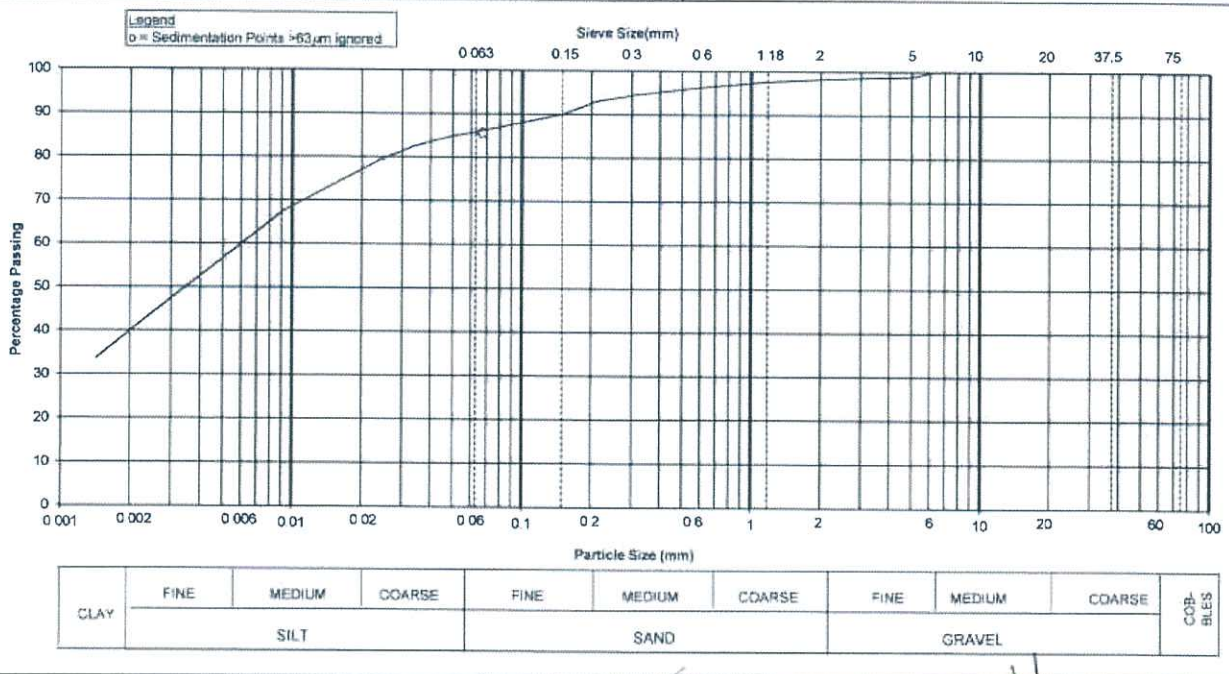
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	99	-	-
3.35 mm	99	-	-
2.00 mm	98	-	-
1.18 mm	98	-	-
600 µm	96	-	-
425 µm	95	-	-
300 µm	94	-	-
212 µm	93	-	-
150 µm	90	-	-
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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0671	-	86	-
0.0476	-	85	-
0.0338	-	83	-
0.0241	-	79	-
0.0173	-	75	-
0.0091	-	68	-
0.0047	-	56	-
0.0024	-	44	-
0.0014	-	34	-

SUMMARY :

Gravel (%)	:	**2**
Sand (%)	:	**12**
Silt (%)	:	**46**
Clay (%)	:	**40**



Technician : Chris Chan
Date : 18/10/2018

Checked By :
Name : T K Lam
Date : 25/10/2018

Approved By :
Signatory : Chung Hei Wing
Date : 25/10/2018

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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 : -

Date Received : 16/10/2018
Tested Date : 18/10/2018

Report No. : J2999-272 36

Works Order No. : 272
Sample ID No. : HK1853822-016
Sample No : H/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Description : Dark grey, slightly sandy SILT/CLAY
Sieve Method : Method A

^Upon request * Delete as appropriate ‡Information provided by customer

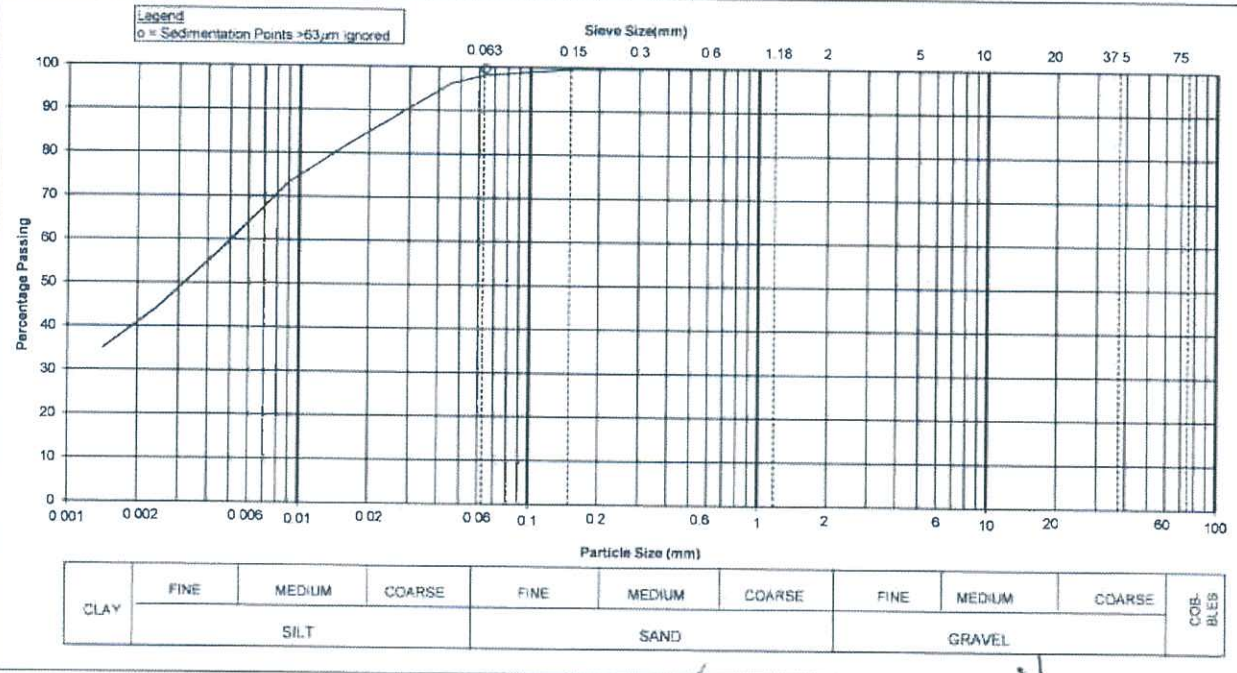
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	100	-	-
212 µm	100	-	-
150 µm	100	-	-
63 µm	98	-	-
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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0635	-	100	-
0.0455	-	96	-
0.0326	-	92	-
0.0234	-	87	-
0.0168	-	83	-
0.0089	-	73	-
0.0046	-	58	-
0.0024	-	44	-
0.0014	-	35	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**2**
Silt (%)	:	**58**
Clay (%)	:	**40**



Technician : Chris Chan
Date : 18/10/2018

Checked By :
Name : T K Lam
Date : 25/10/2018

Approved By :
Signatory : Chung Hei Wing
Date : 25/10/2018

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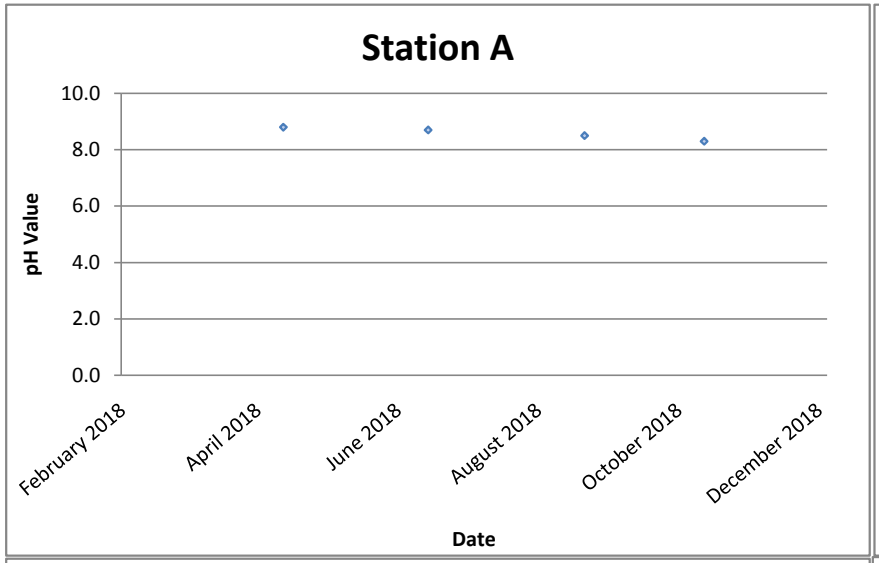
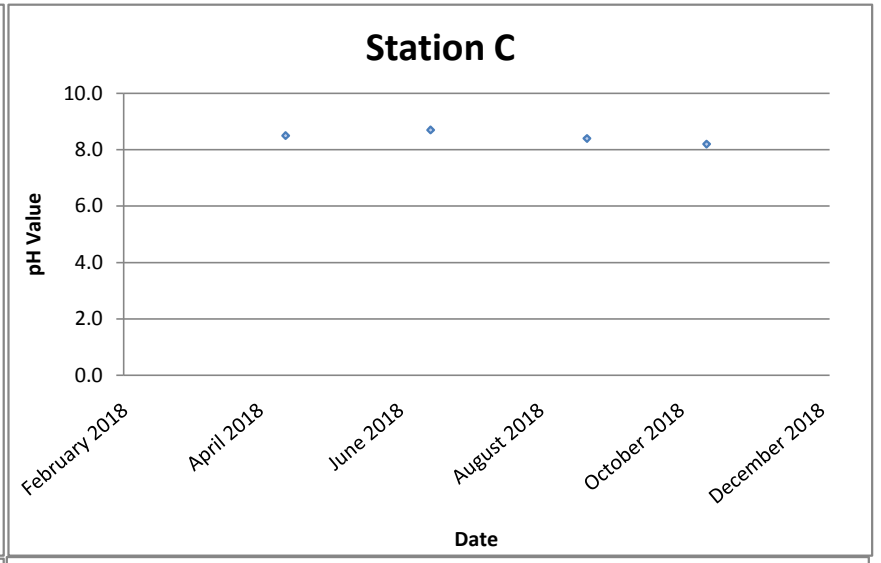
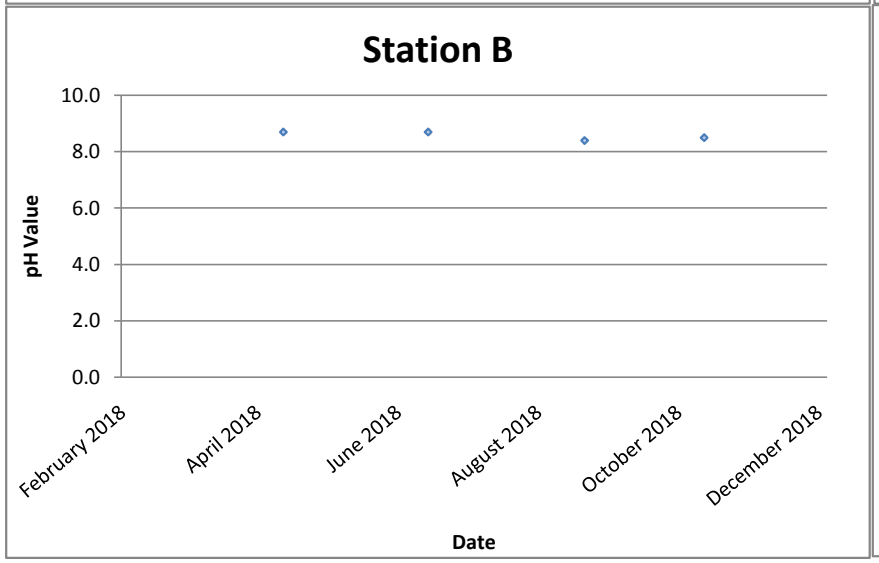
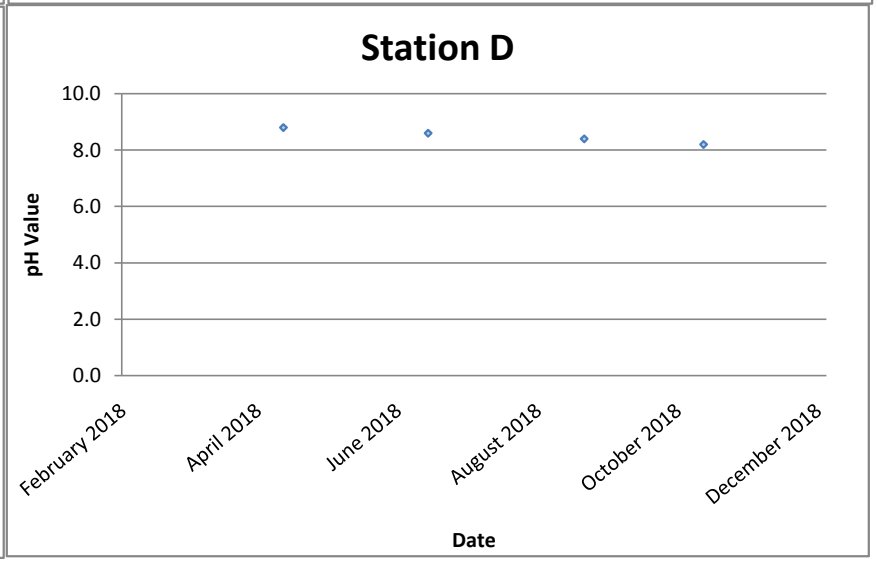
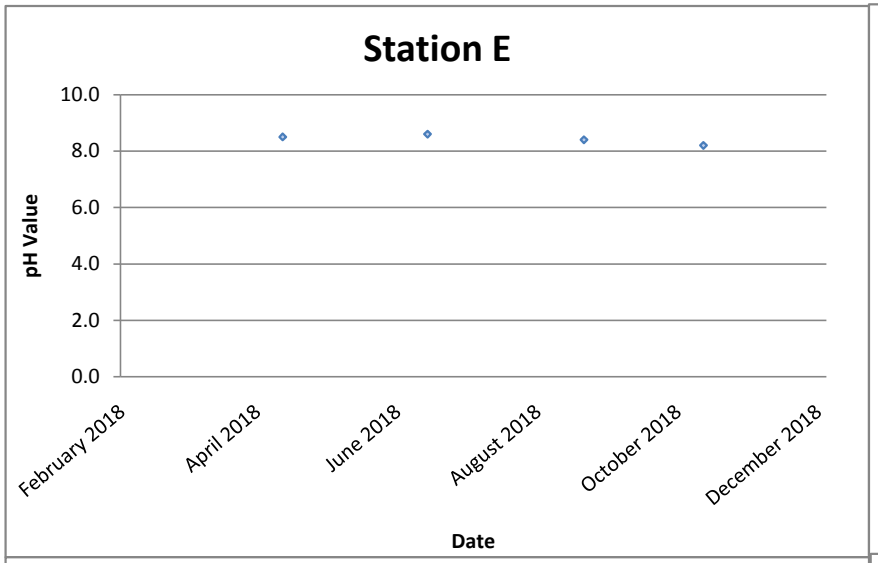
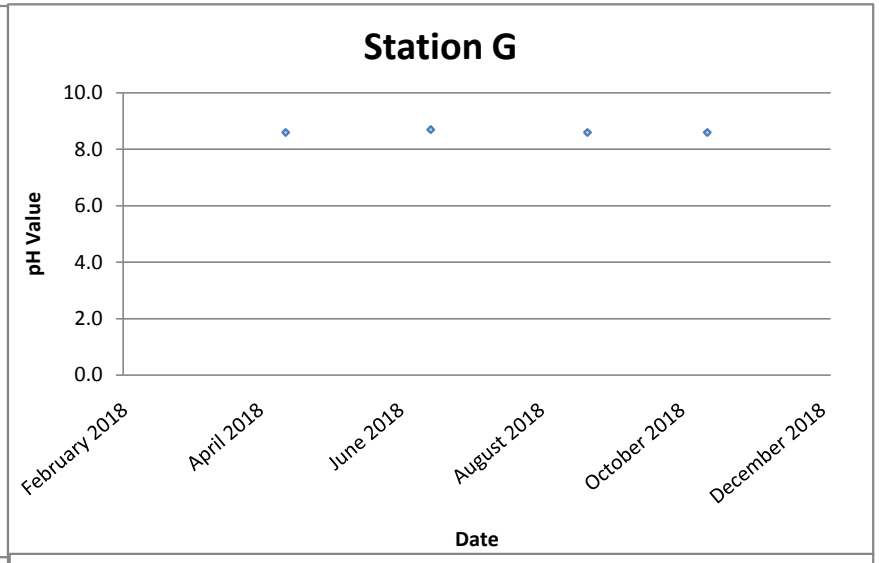

Station A
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

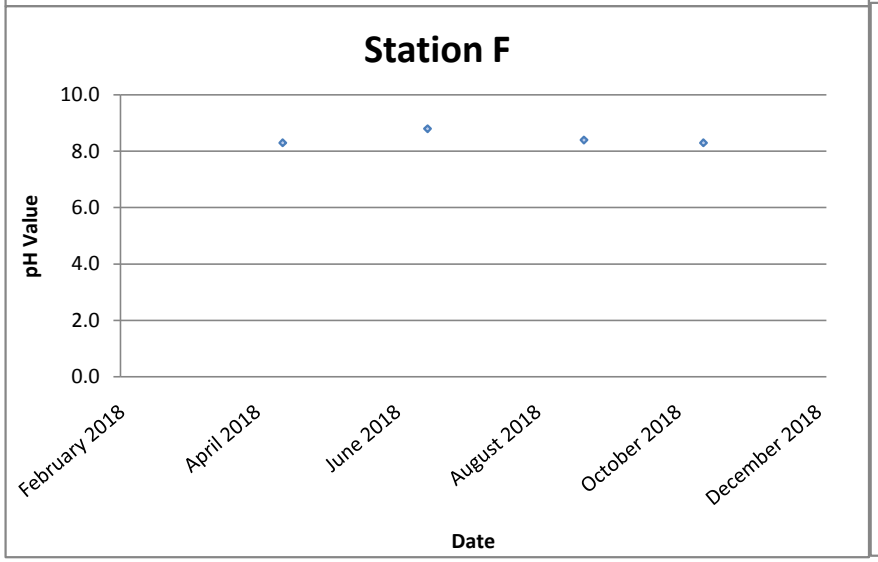

Station C
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

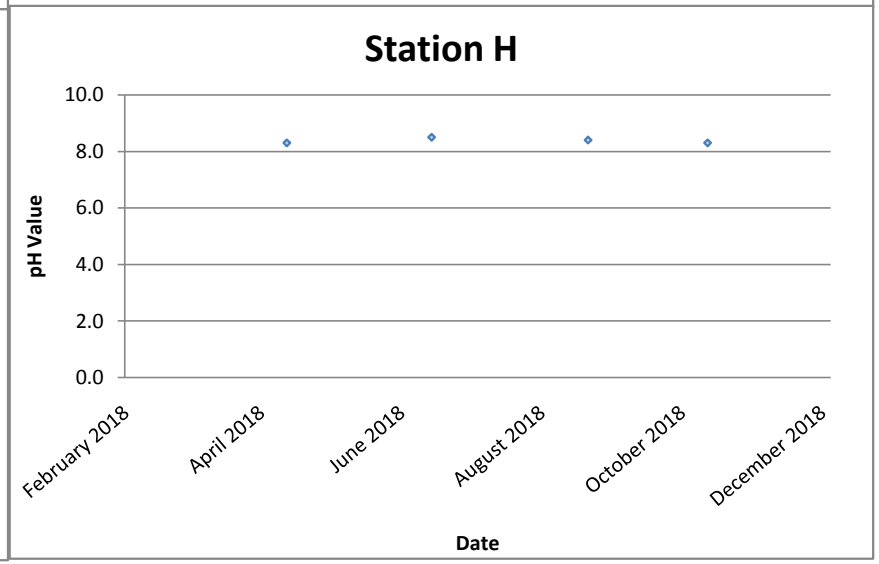

Station B
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

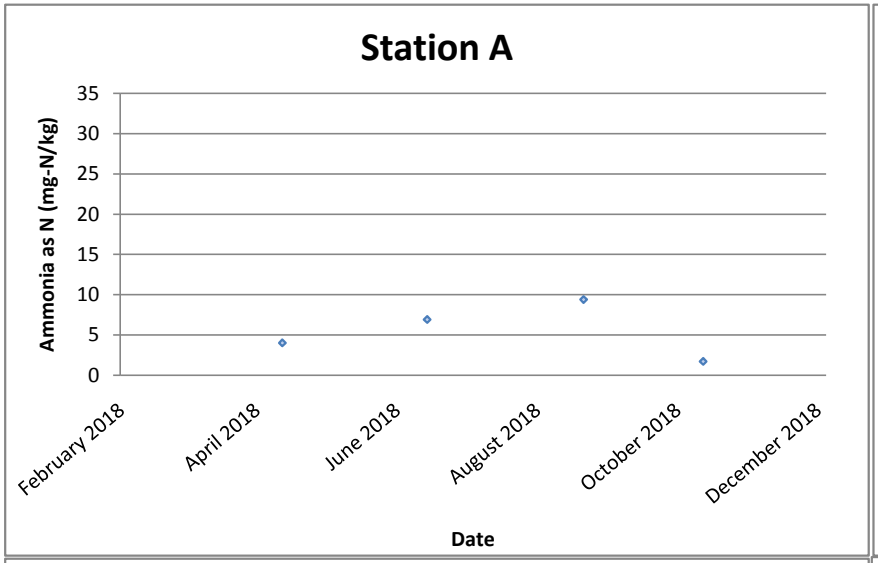

Station D
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

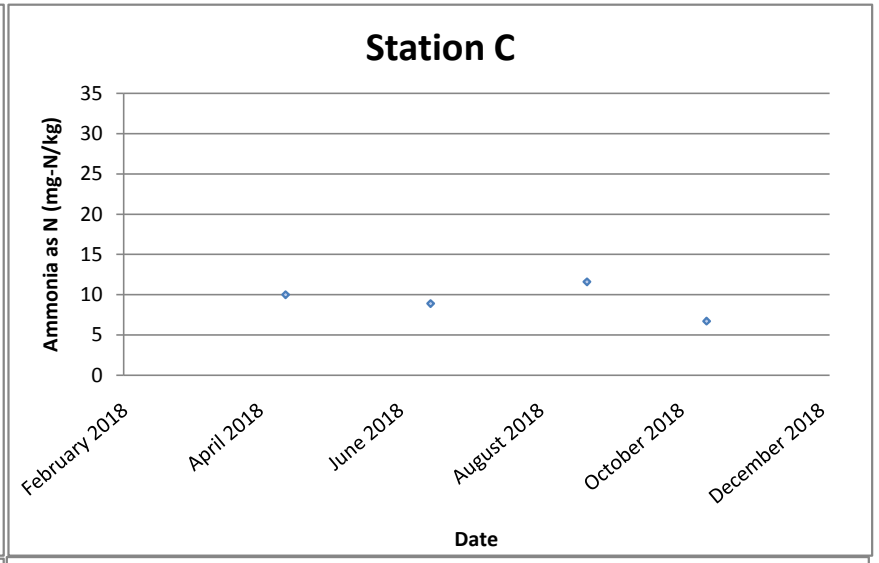

Station E
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

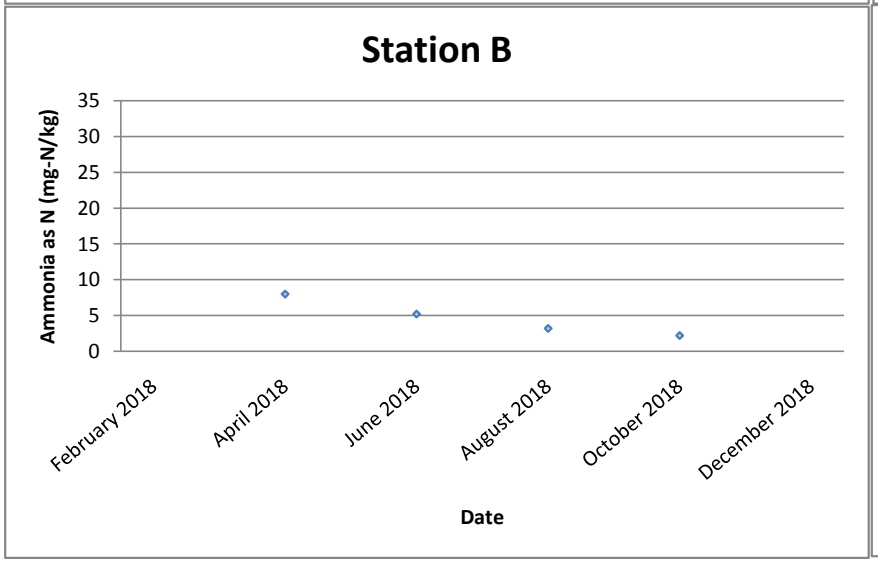

Station G
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

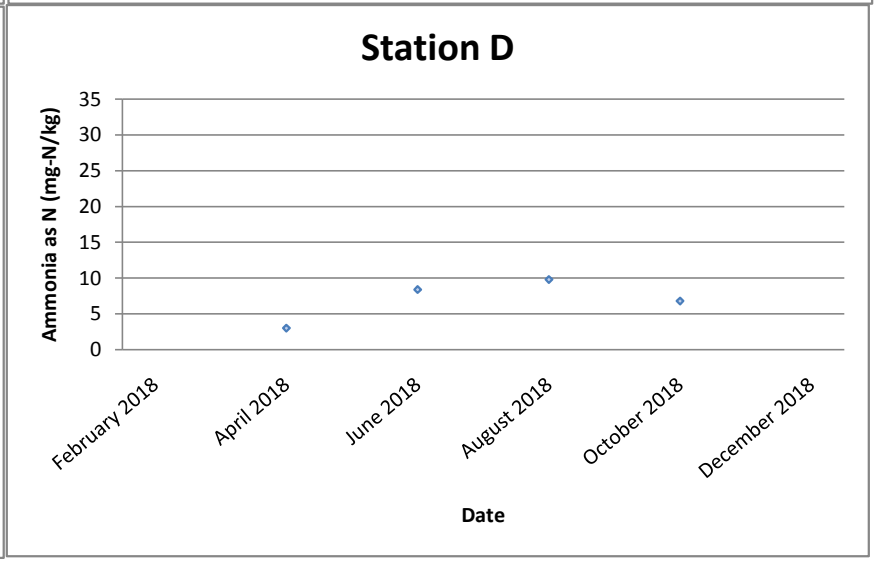

Station F
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

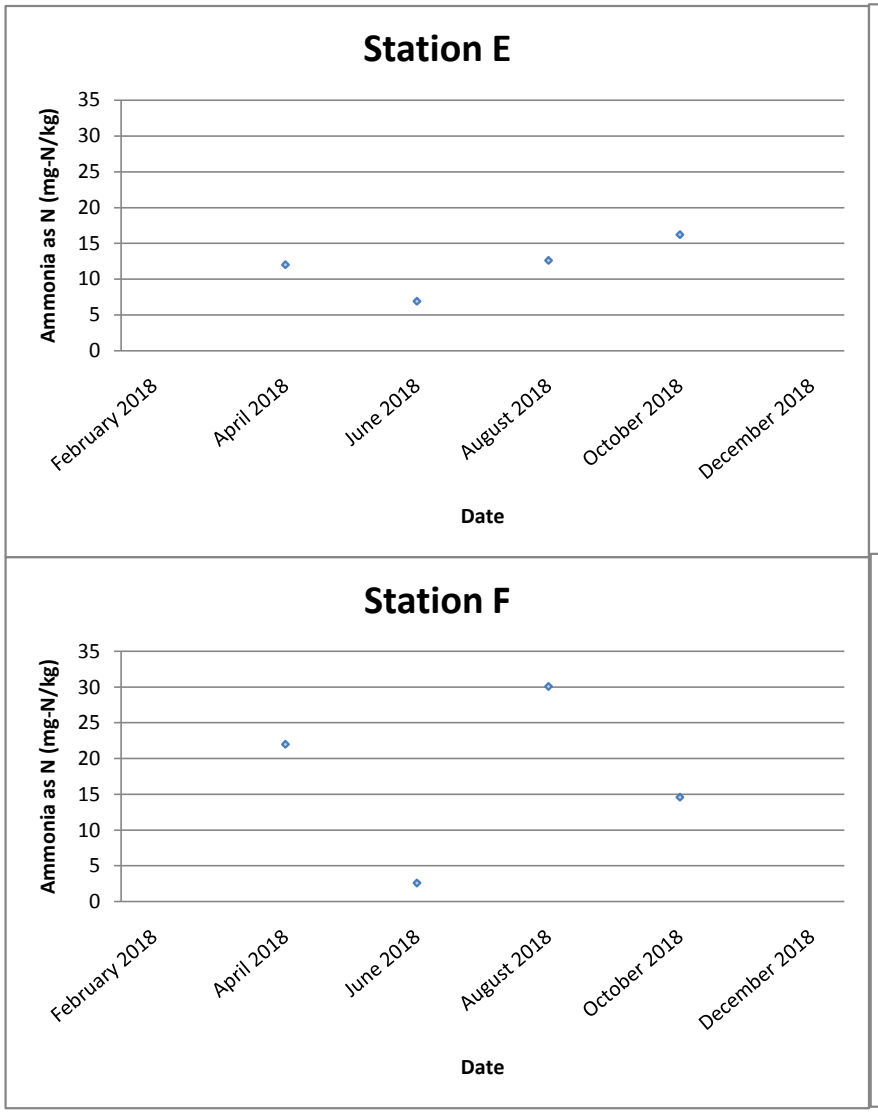

Station H
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

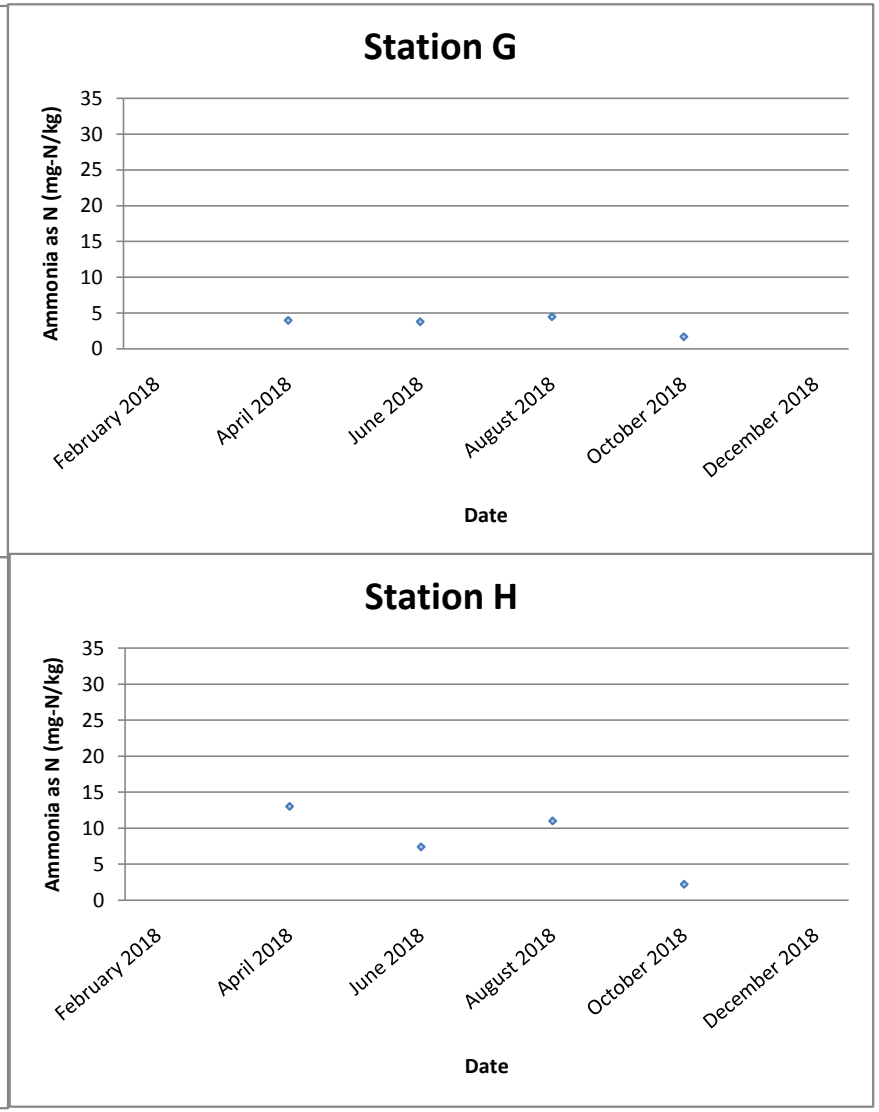

Station A
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station C
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station B
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

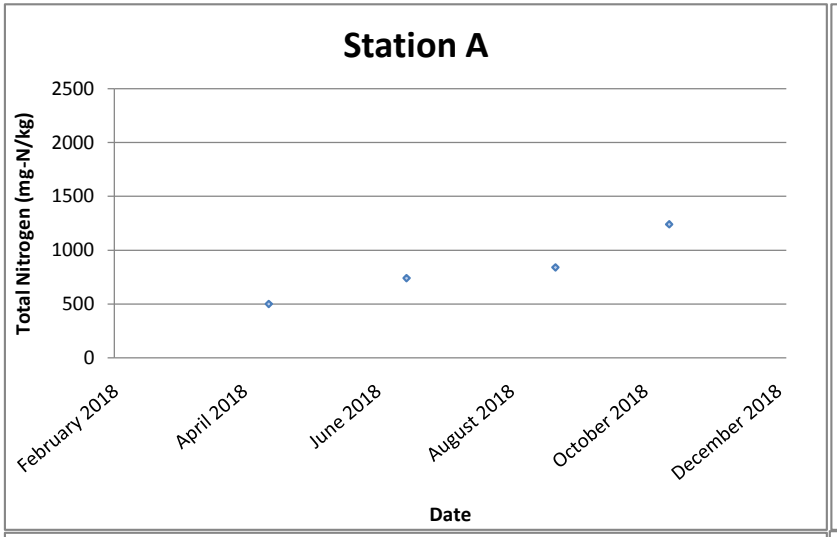

Station D
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

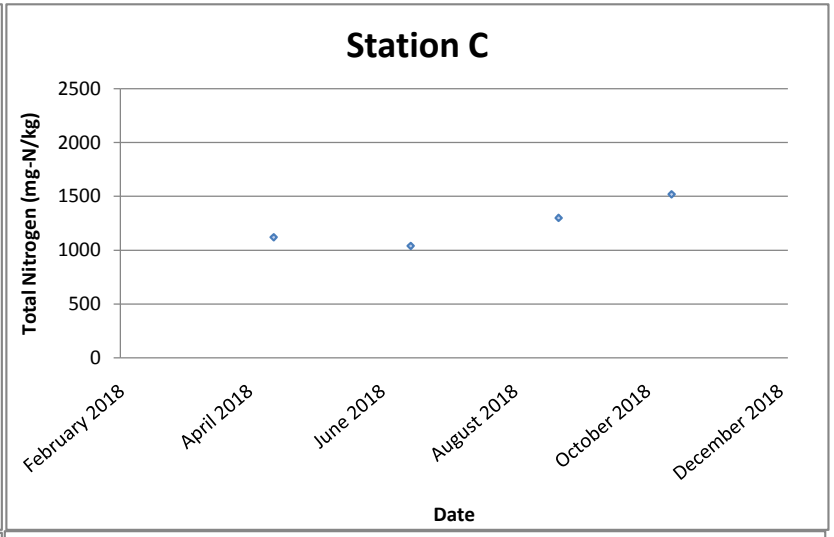

Station E
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

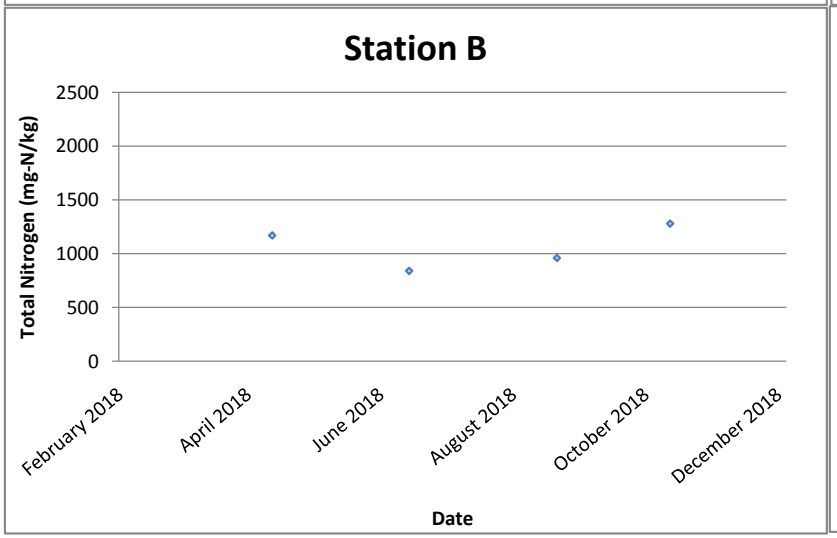

Station G
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

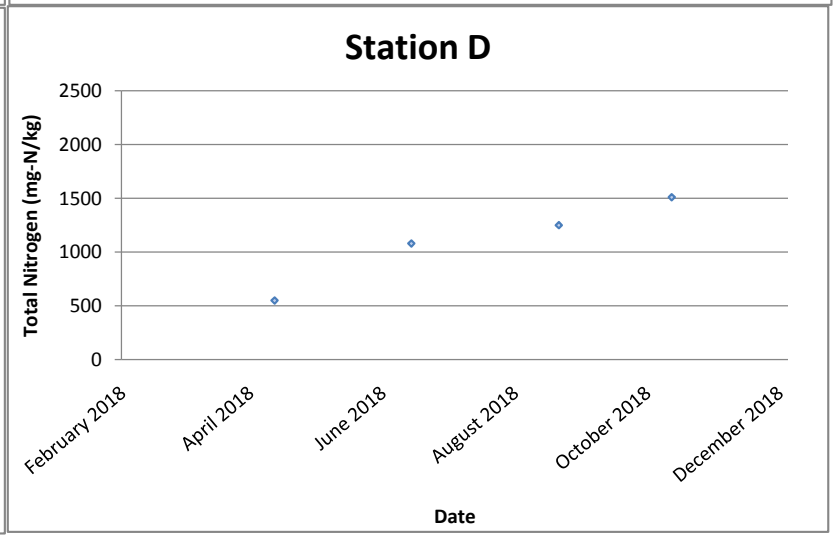
Station F
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

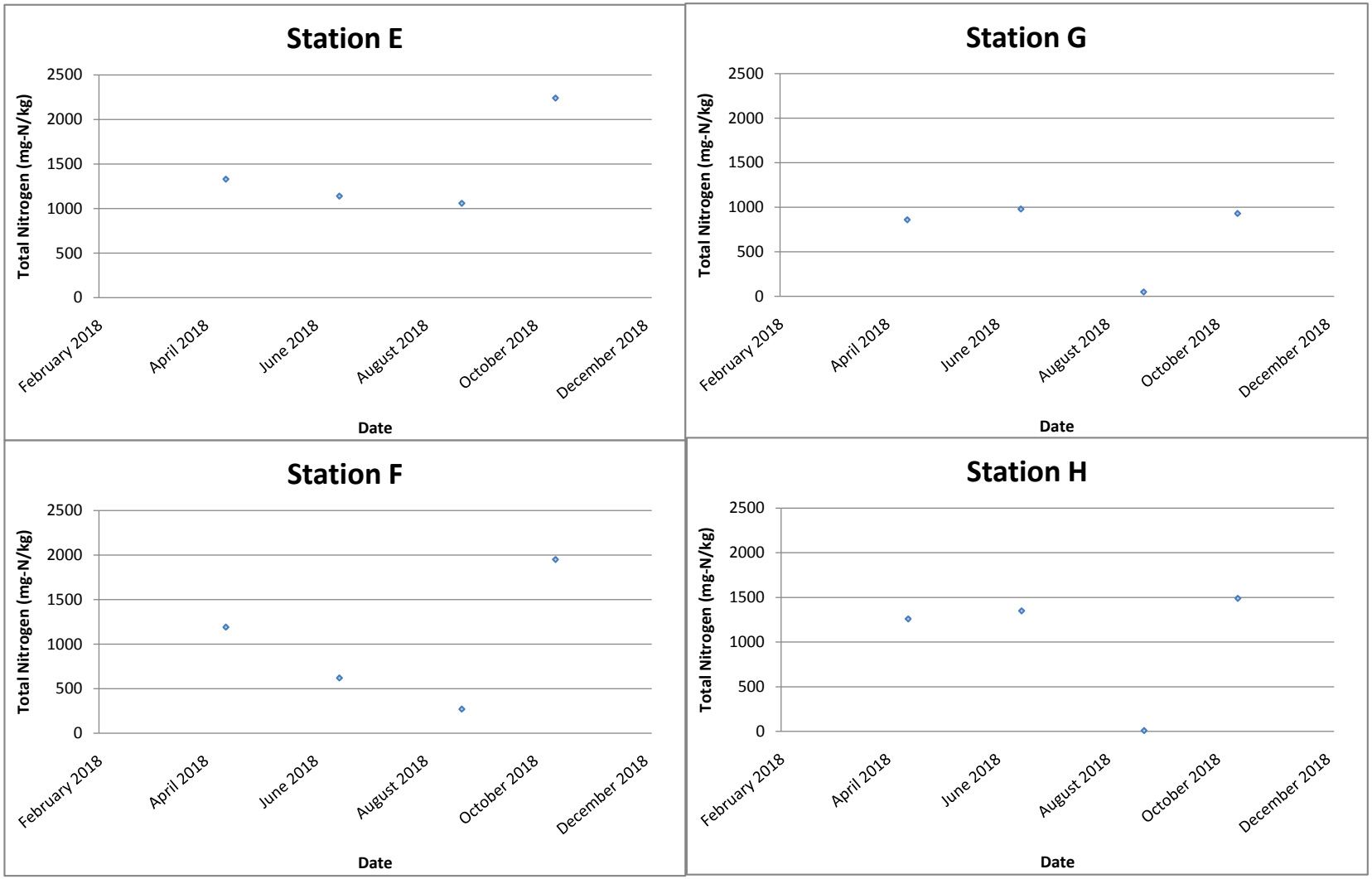
Station H
Ammonia as N (mg-N/kg)
35
30
25
20
15
10
5
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station A
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

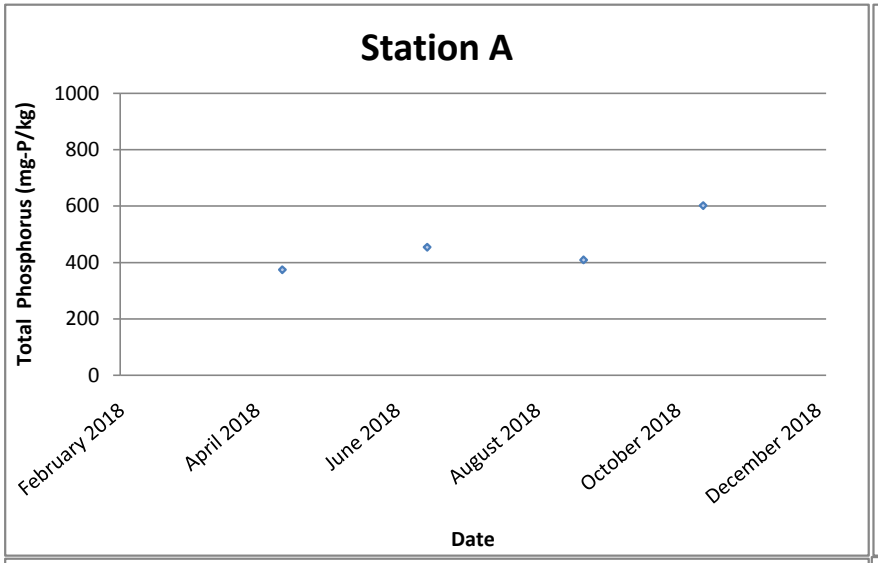

Station C
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

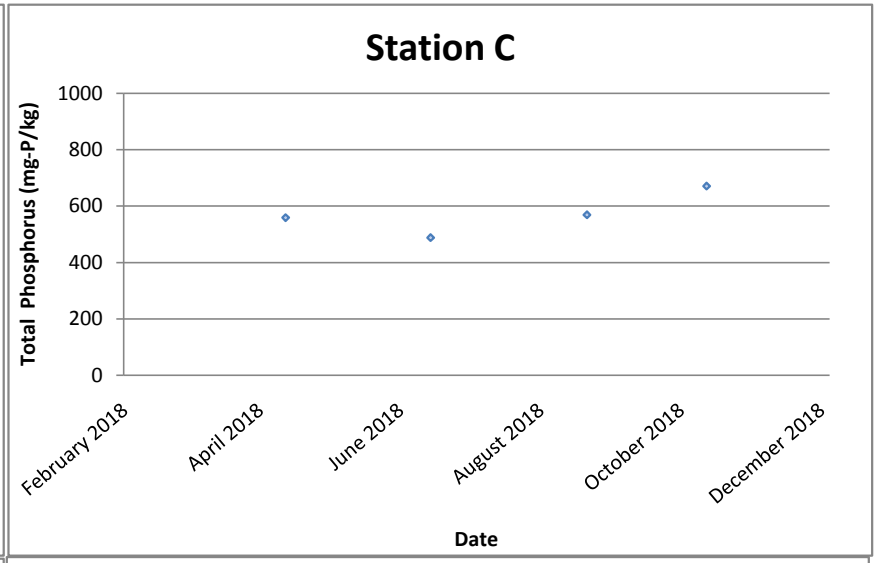

Station B
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

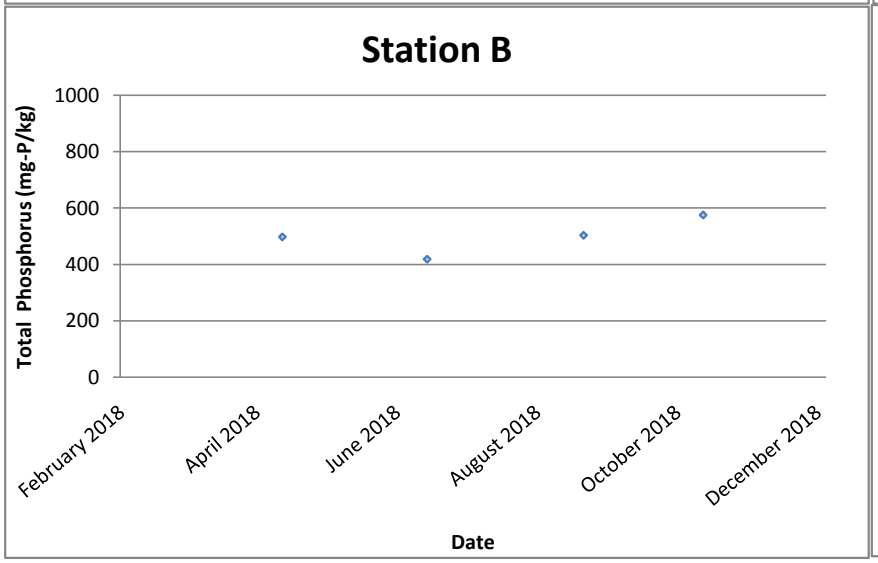

Station D
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

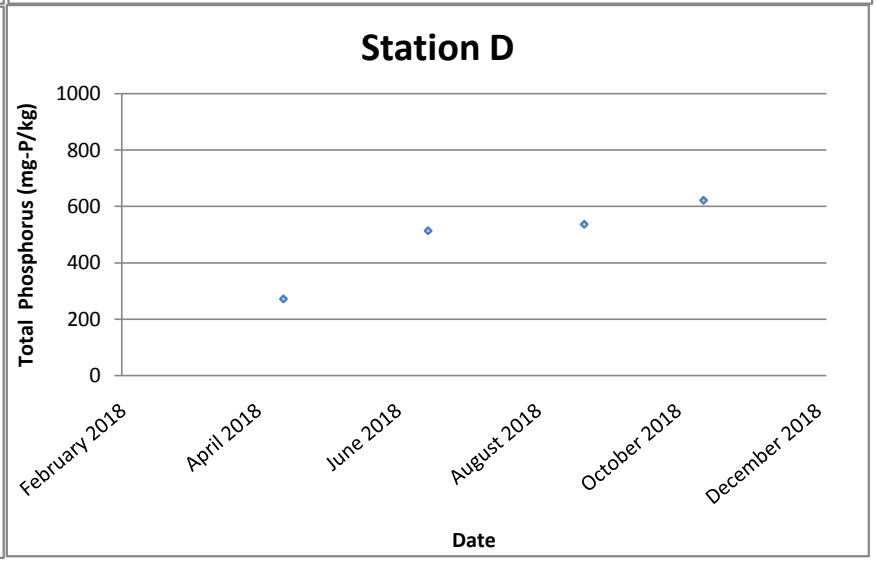

Station E
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station G
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station F
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station H
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

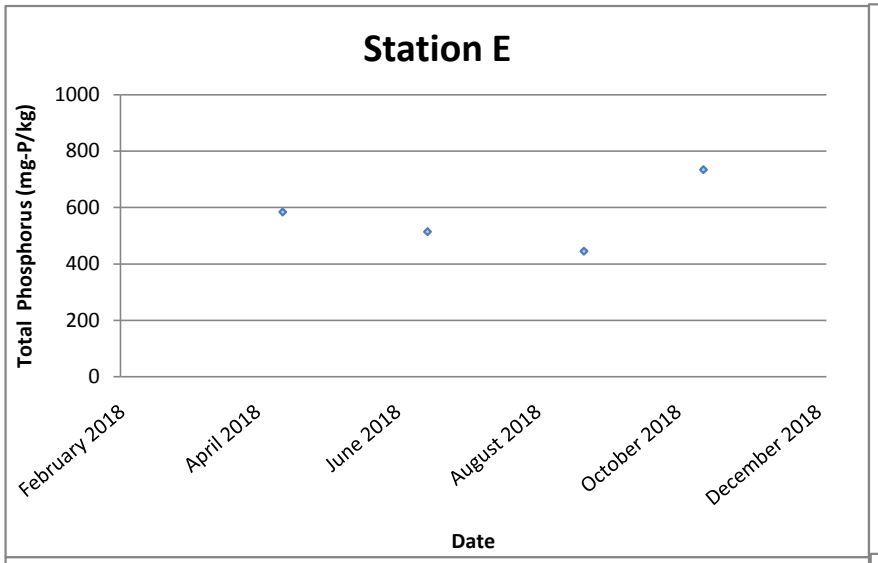
Total Phosphorus (mg-P/kg)

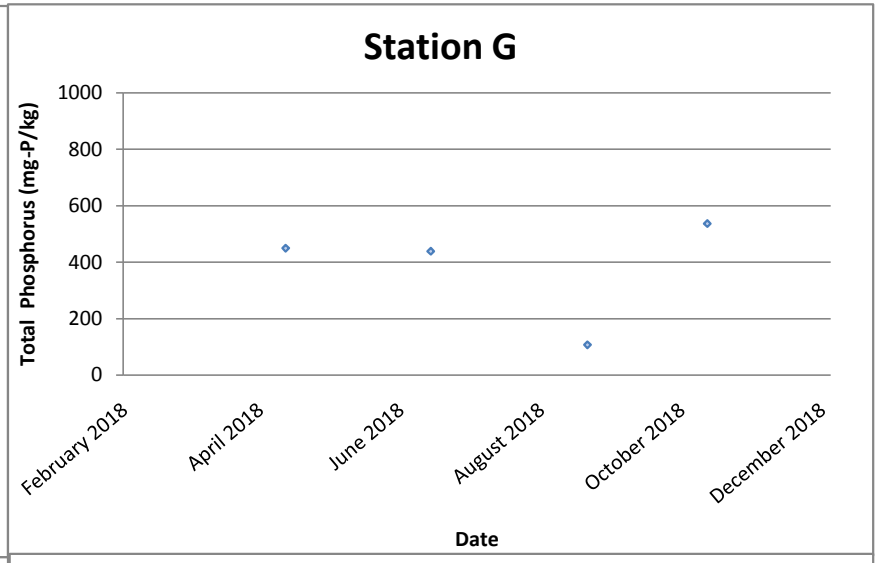


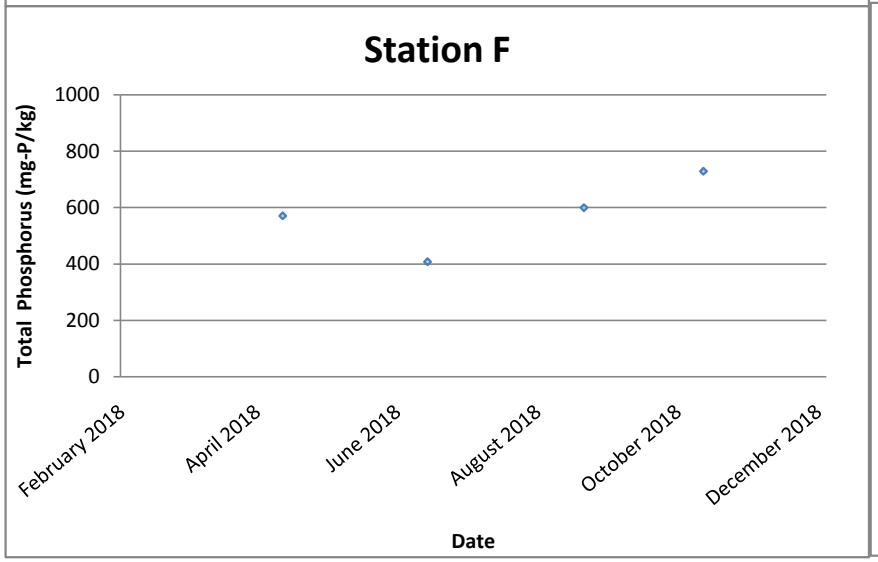


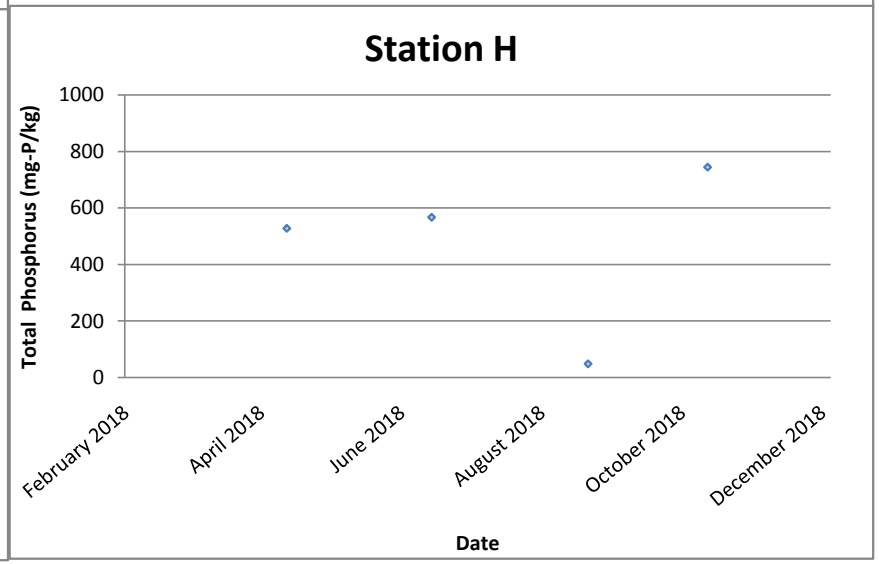


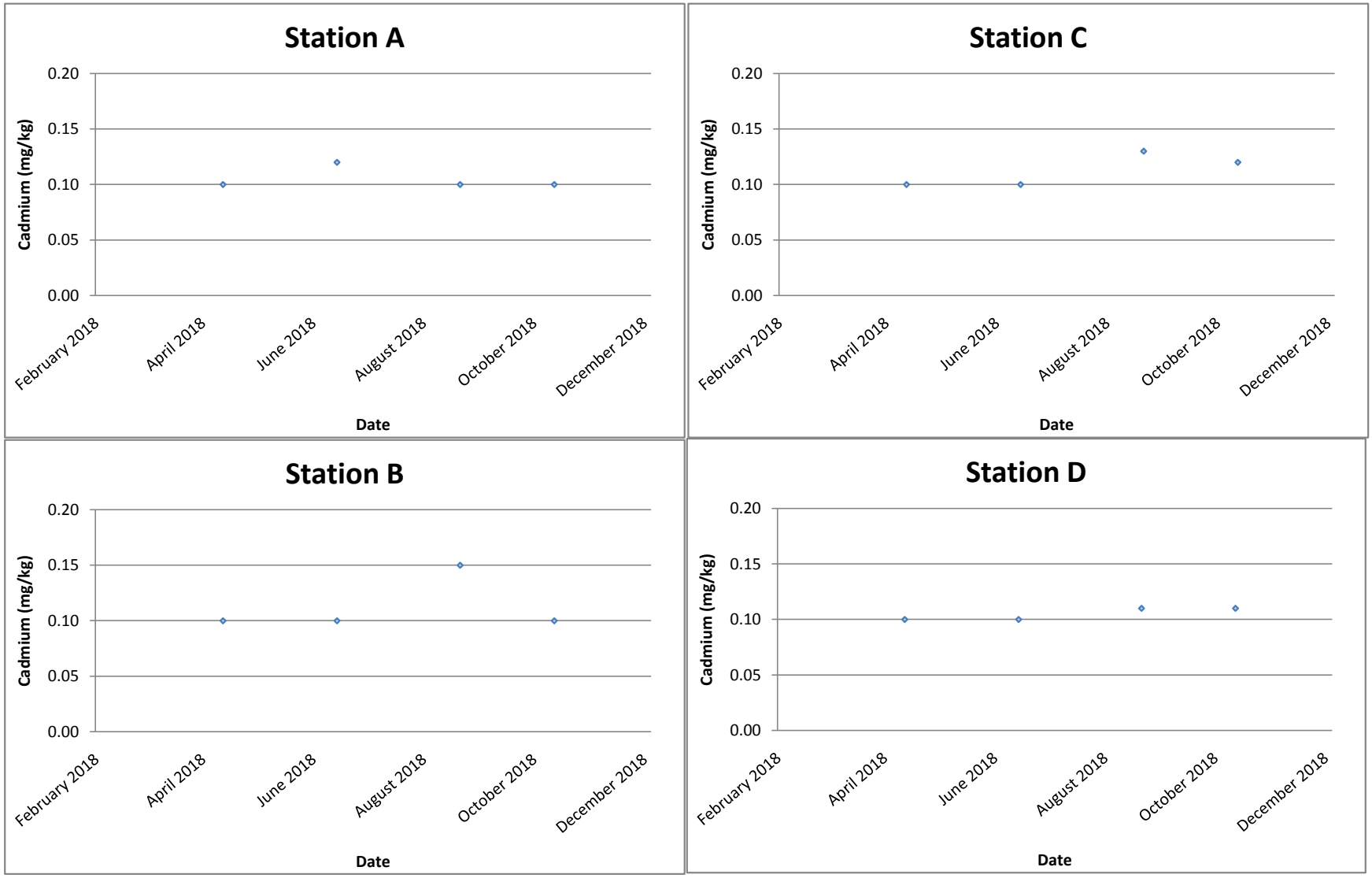


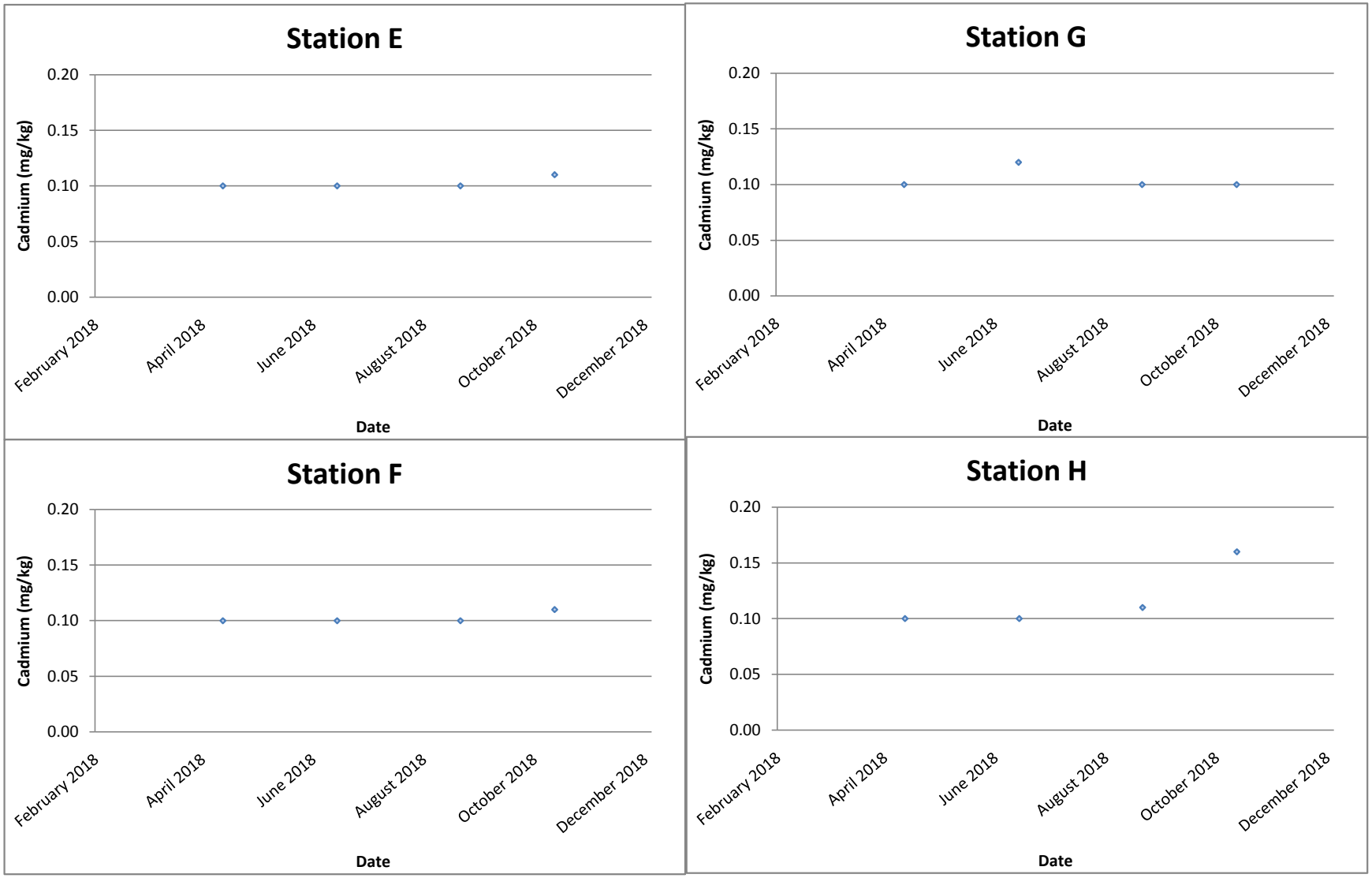

Station E
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station G
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

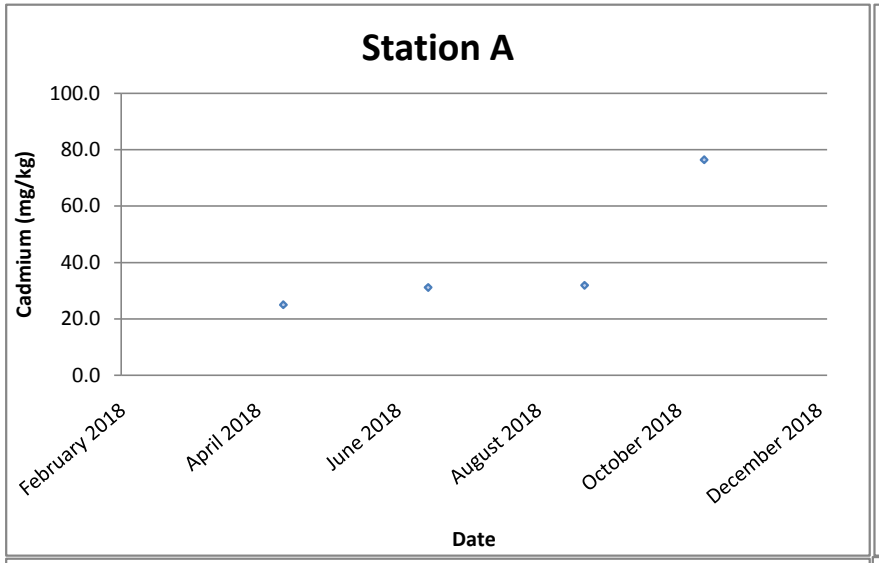

Station F
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

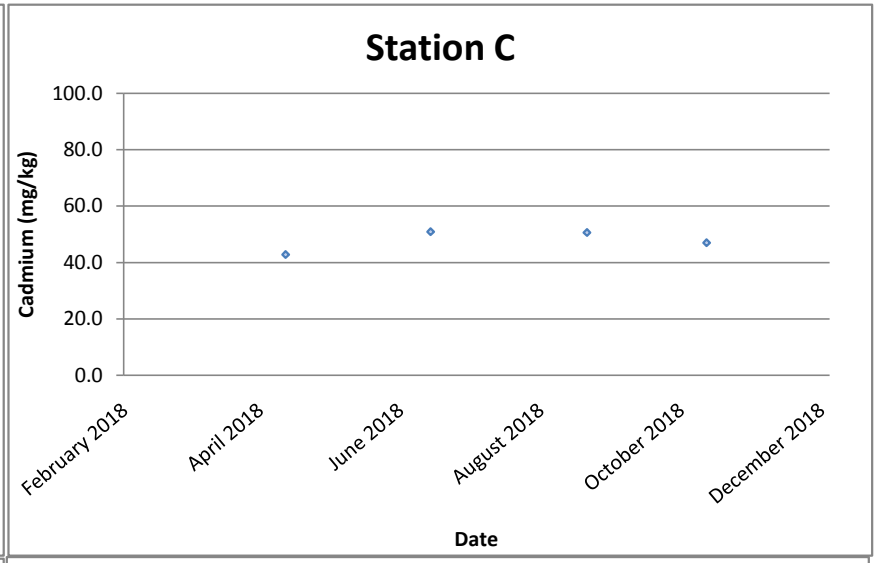

Station H
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

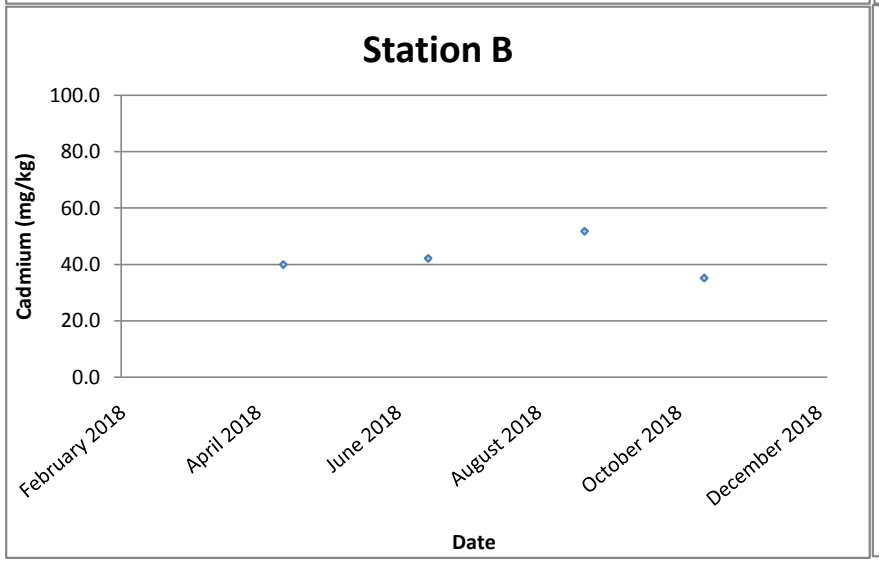

Station A
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station C
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station B
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station D
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

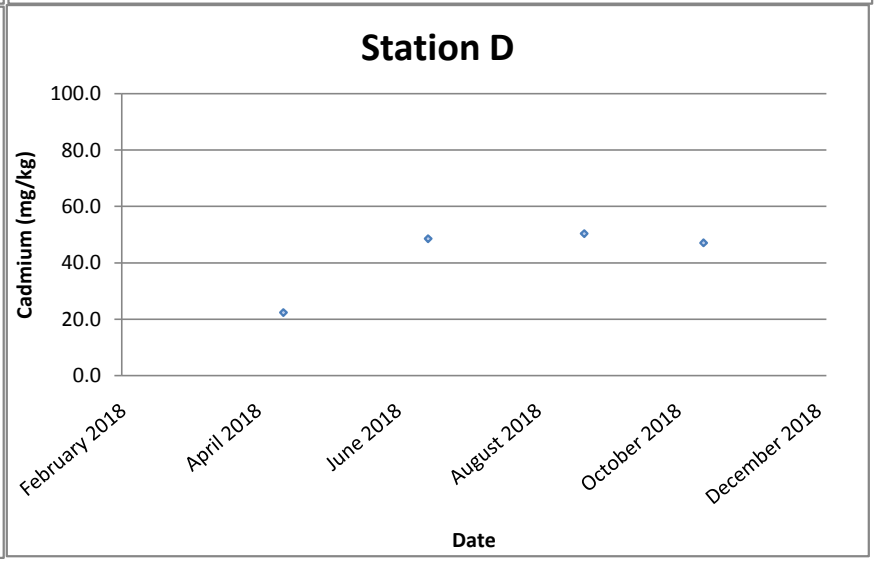

Station E
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station G
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station F
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station H
Cadmium (mg/kg)
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

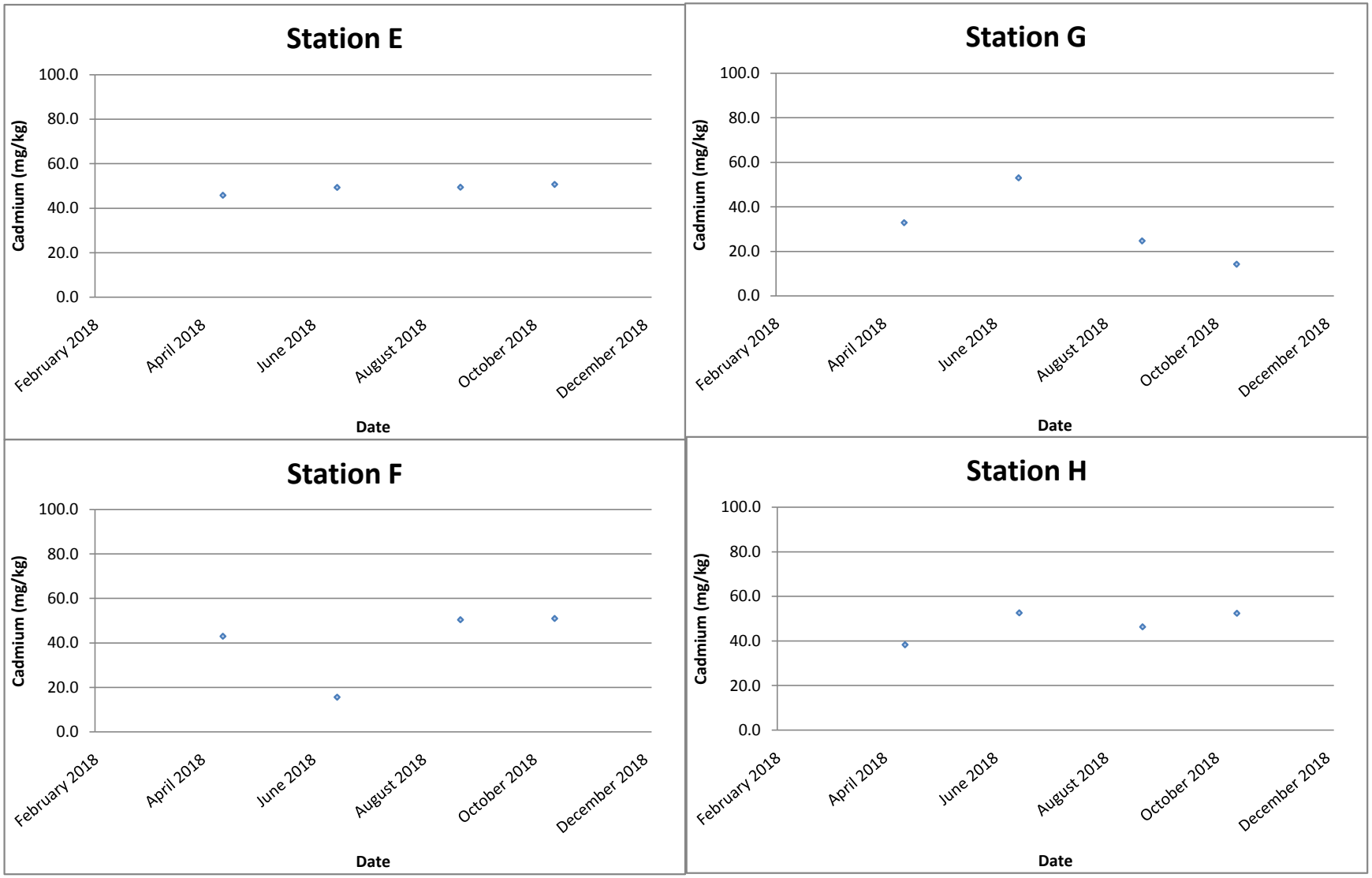
Chromium (mg/kg)

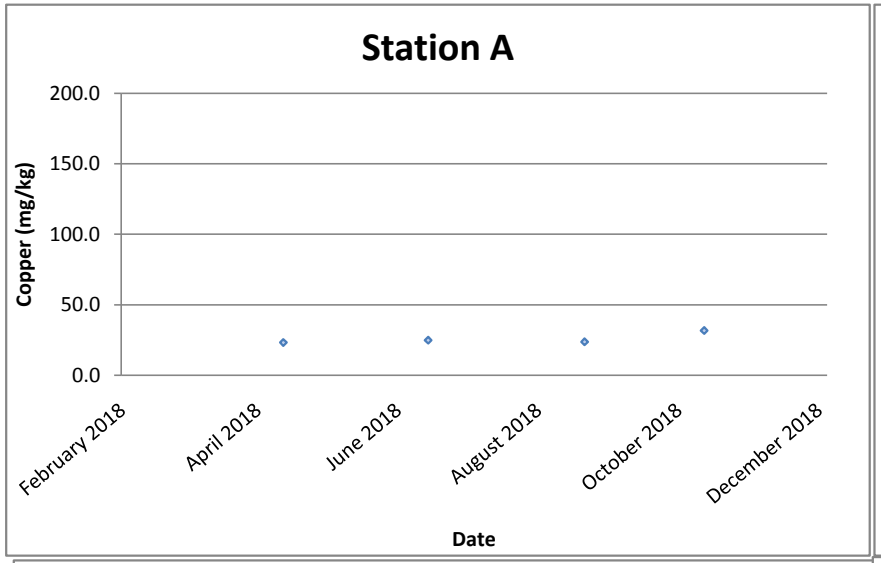


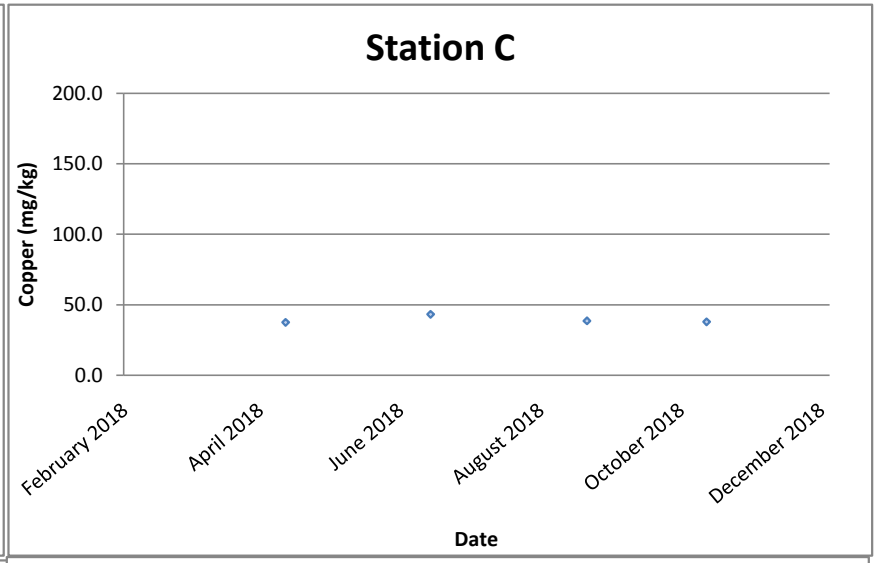


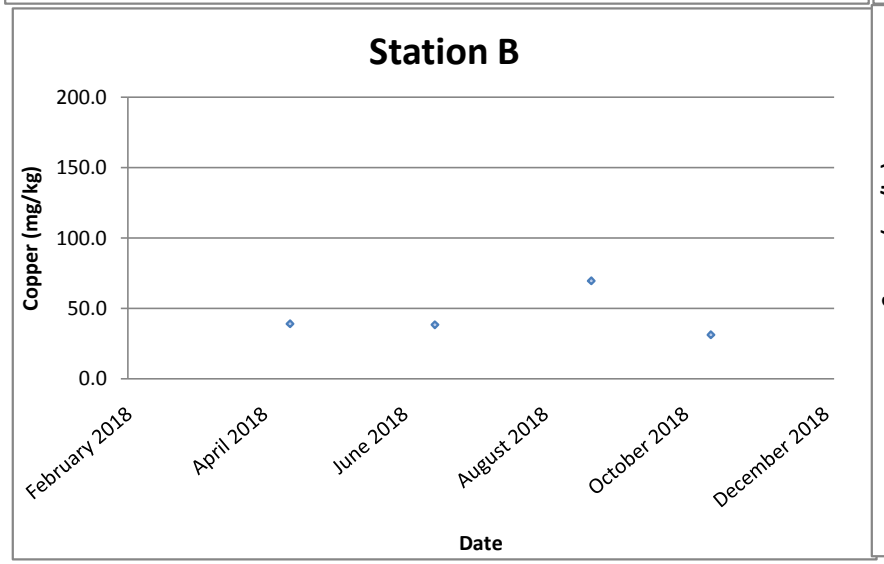


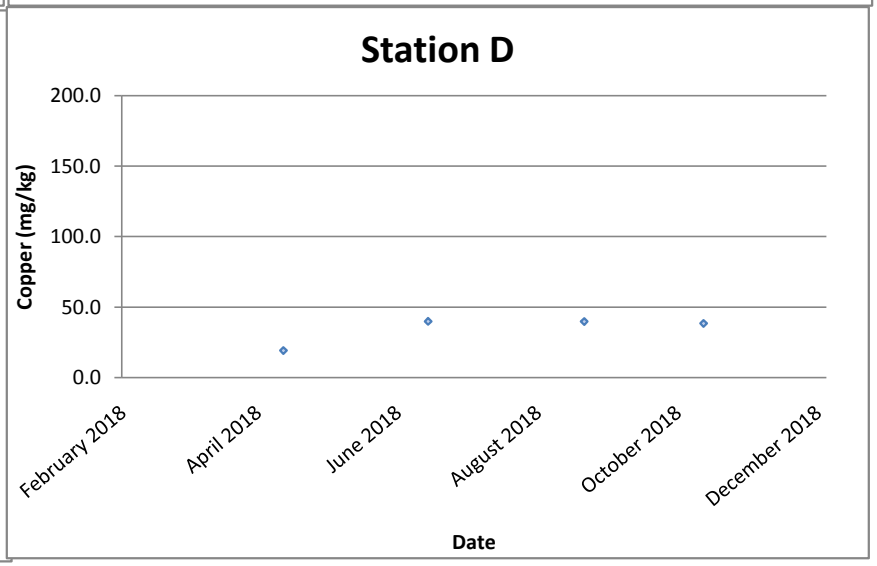


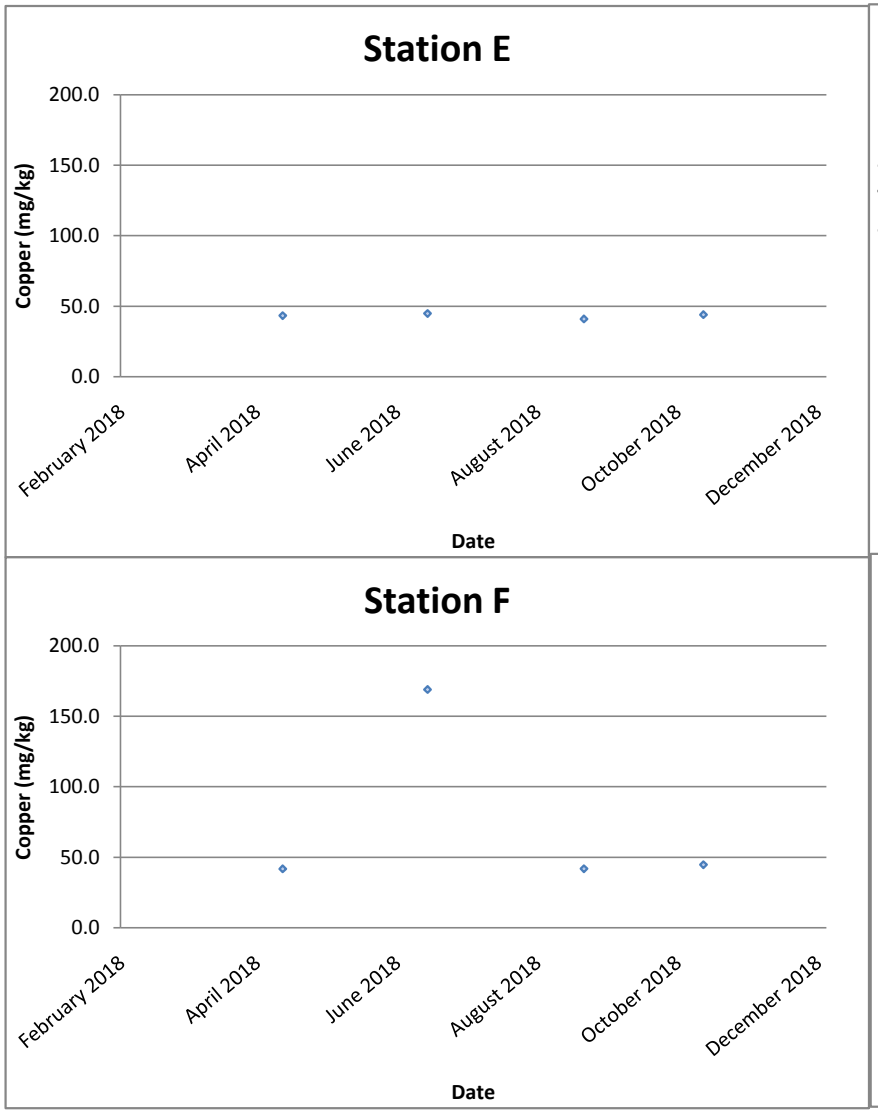

Station E
Cadmium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station G
Cadmium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station F
Cadmium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station H
Cadmium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

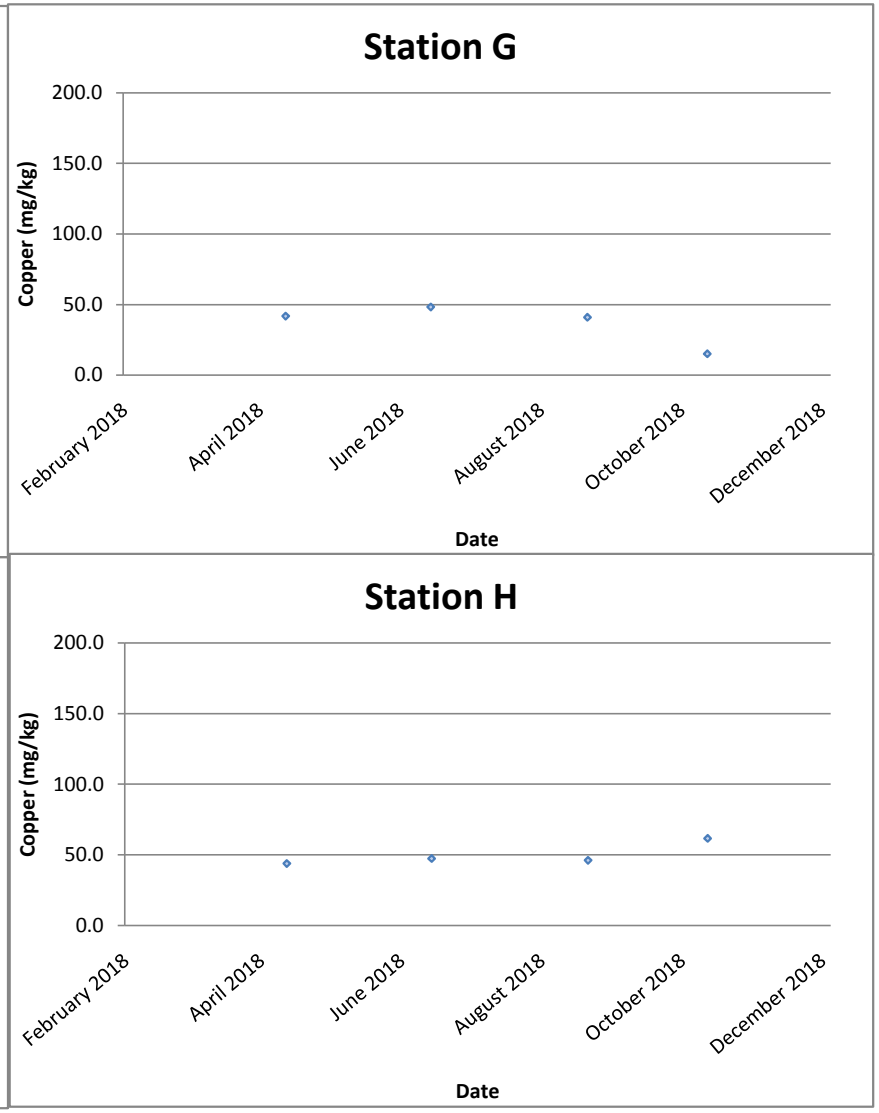

Station A
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station C
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station B
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

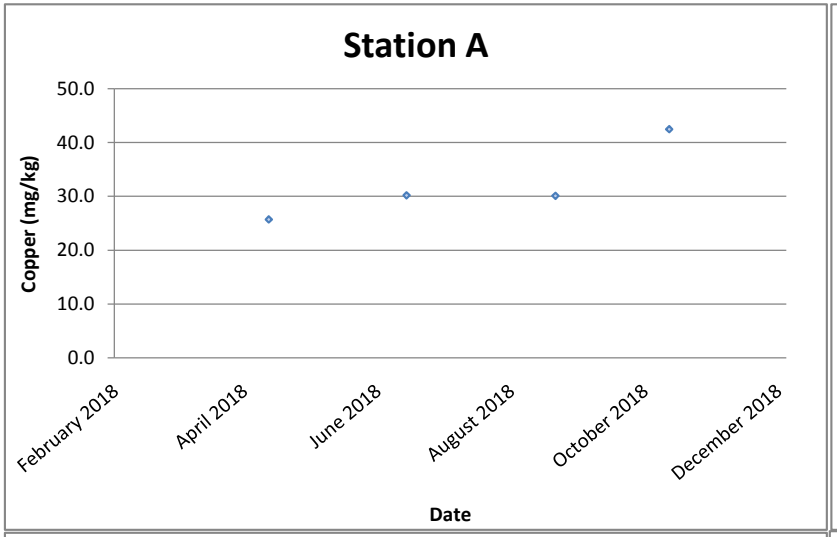

Station D
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

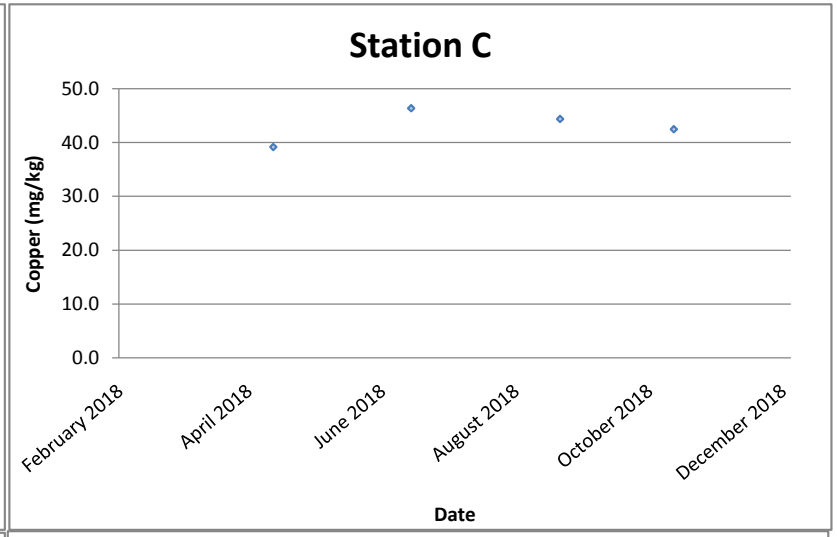

Station E
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

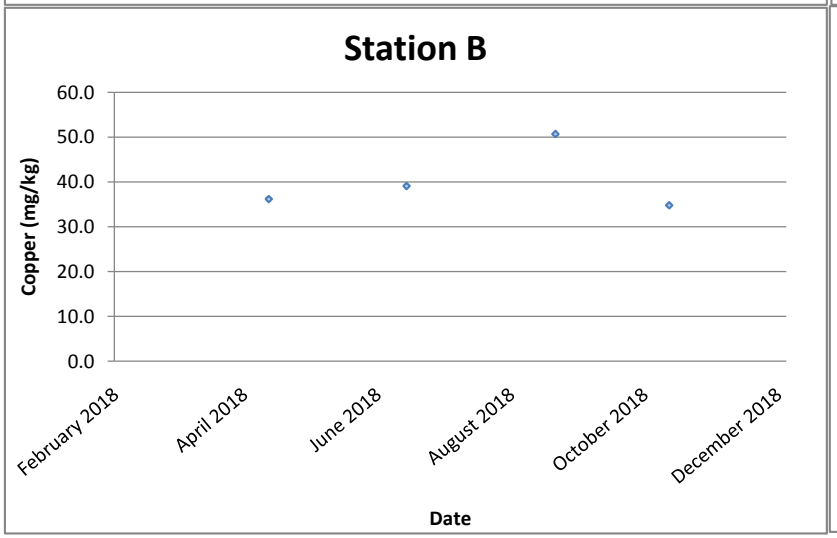

Station G
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

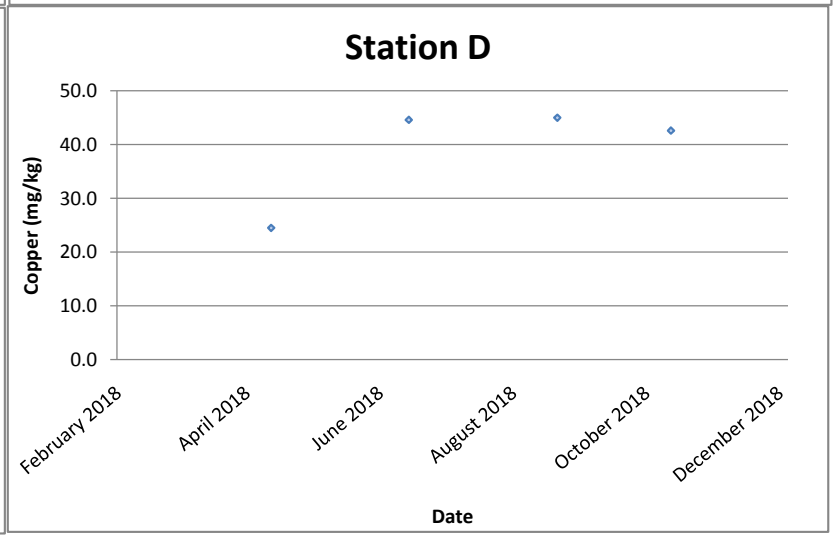
Station F
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

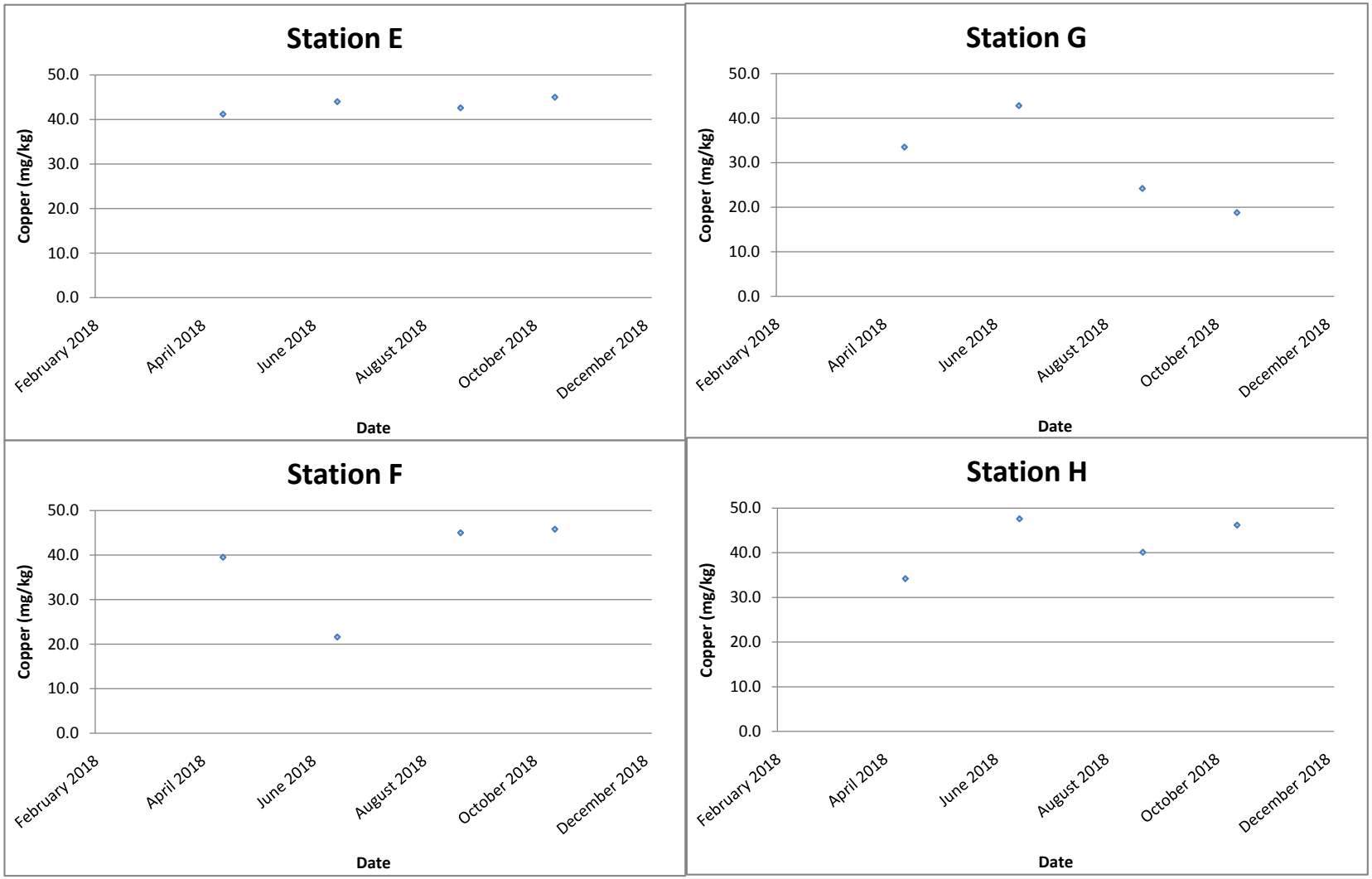
Station H
200.0
150.0
100.0
50.0
0.0
Copper (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

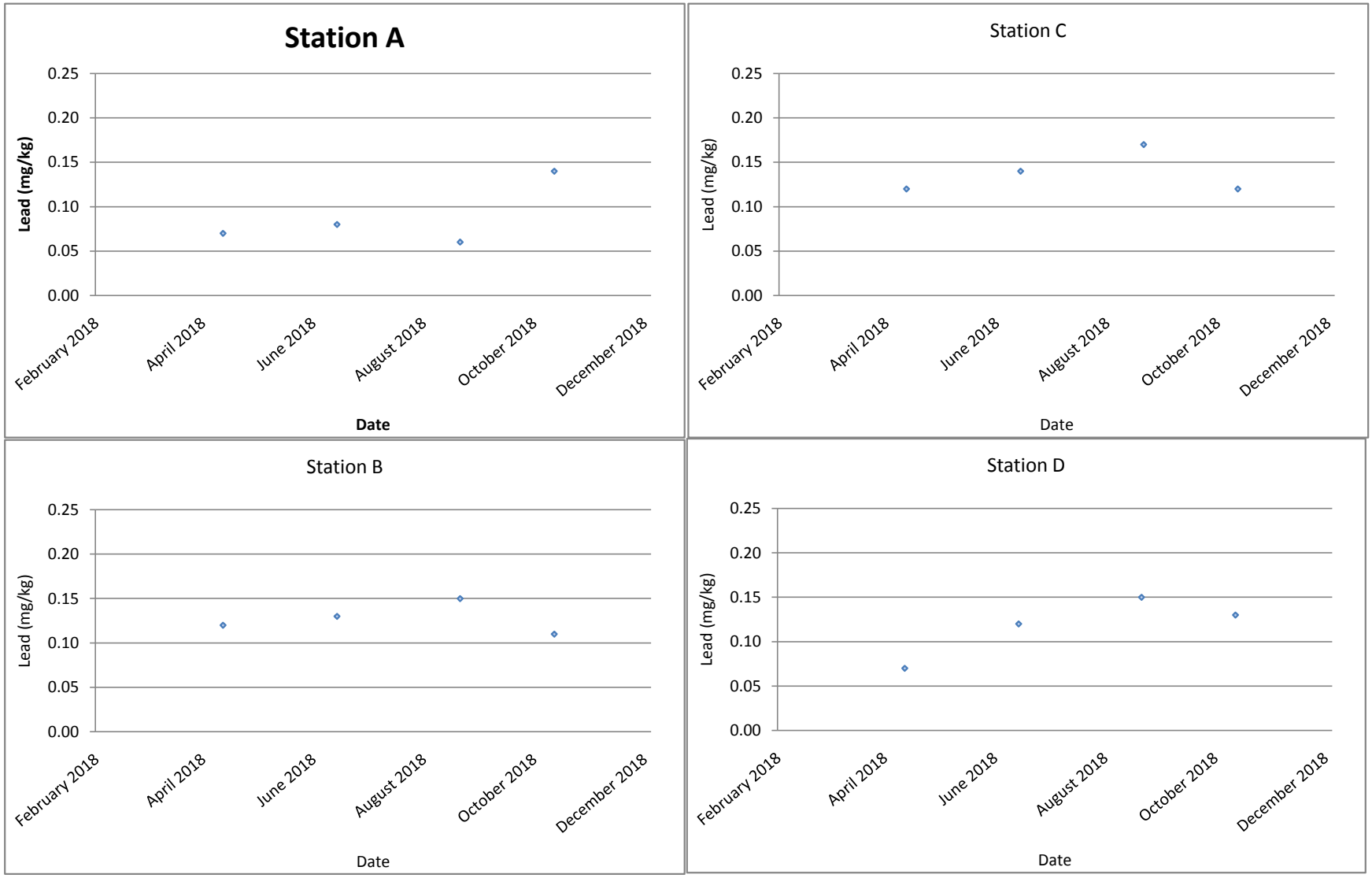

Station A
Copper (mg/kg)
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station C
Copper (mg/kg)
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

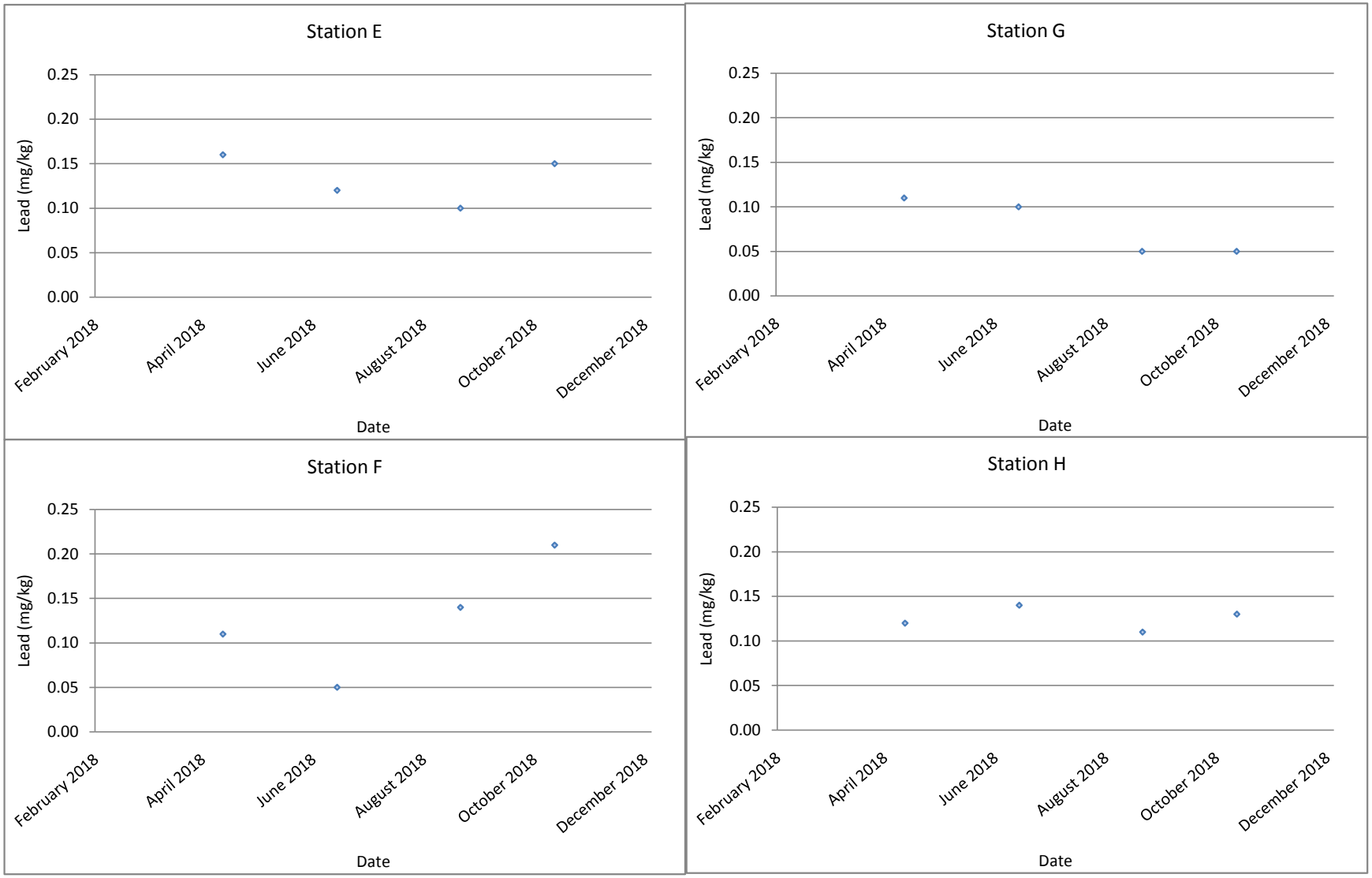

Station B
Copper (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

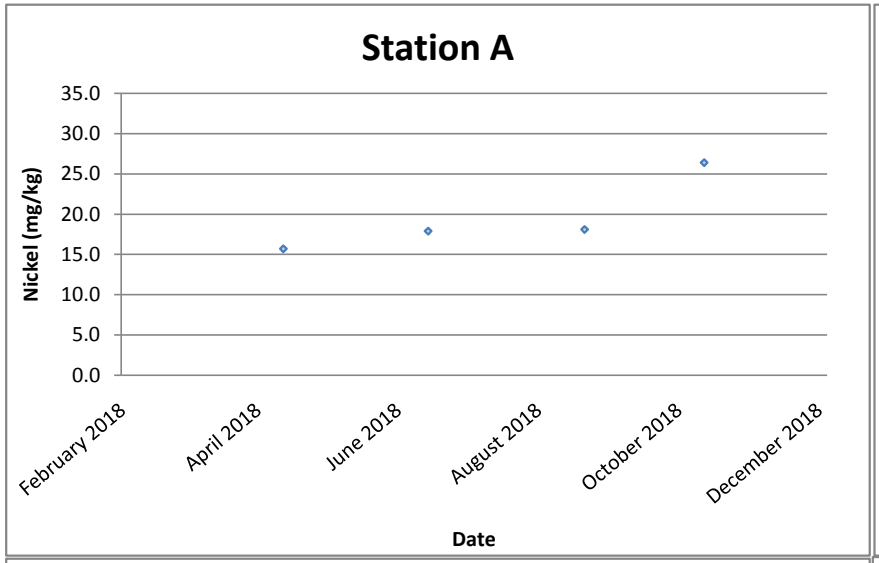

Station D
Copper (mg/kg)
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

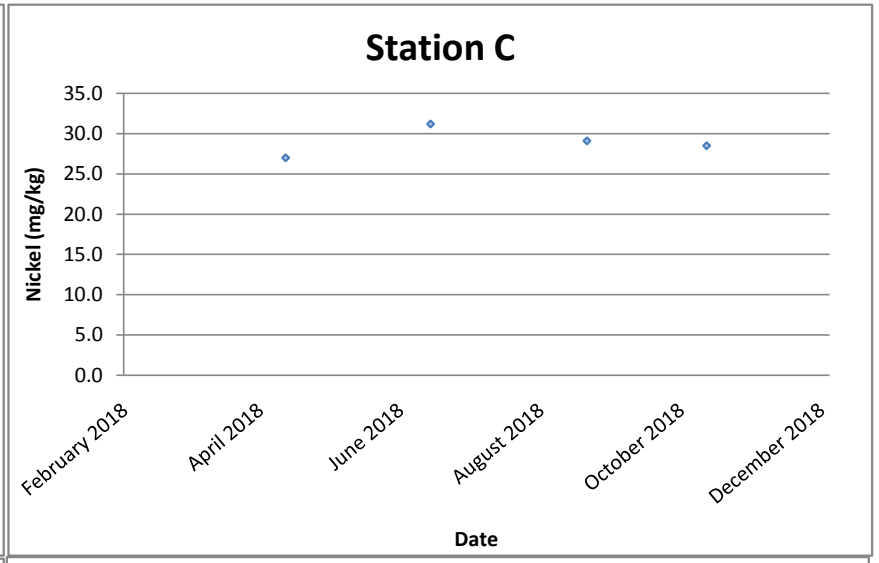

Station E
Copper (mg/kg)
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station G
Copper (mg/kg)
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station F
Copper (mg/kg)
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station H
Copper (mg/kg)
50.0
40.0
30.0
20.0
10.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

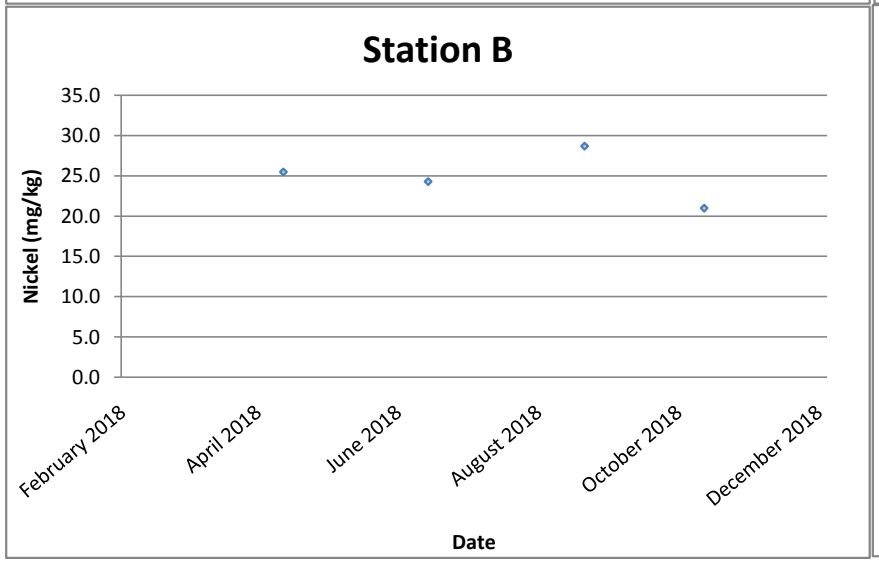

Station A
Lead (mg/kg)
0.25
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station C
Lead (mg/kg)
0.25
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station B
Lead (mg/kg)
0.25
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station D
Lead (mg/kg)
0.25
0.20
0.15
0.10
0.05
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

Mercury (mg/kg)




Station A
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station C
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station B
Nickel (mg/kg)
35.0
30.0
25.0
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15.0
10.0
5.0
0.0
February 2018
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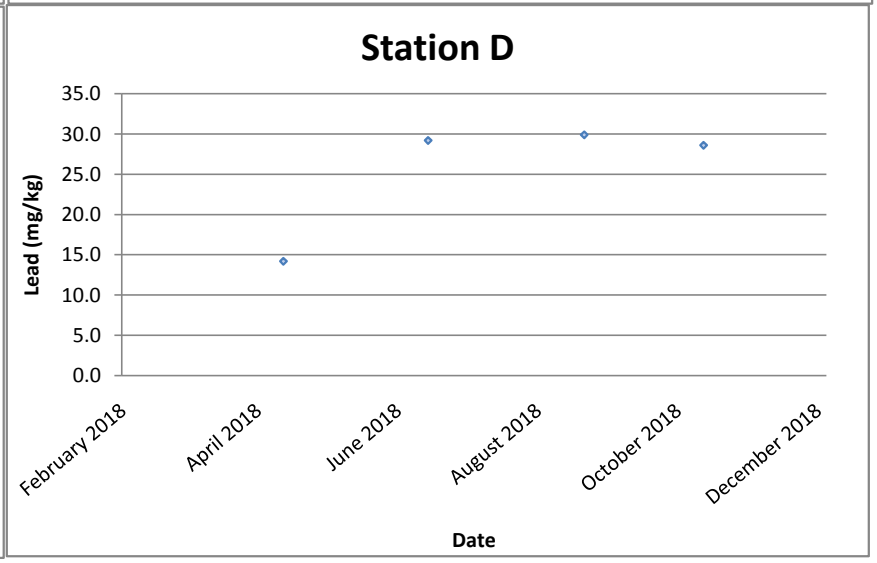
June 2018
August 2018
October 2018
December 2018
Date


Station D
Lead (mg/kg)
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25.0
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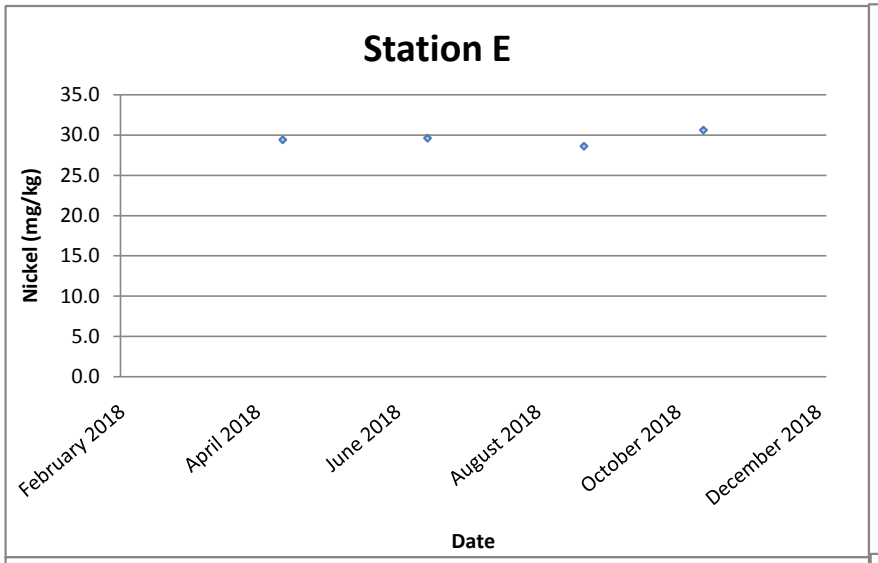
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station E
Nickel (mg/kg)
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25.0
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15.0
10.0
5.0
0.0
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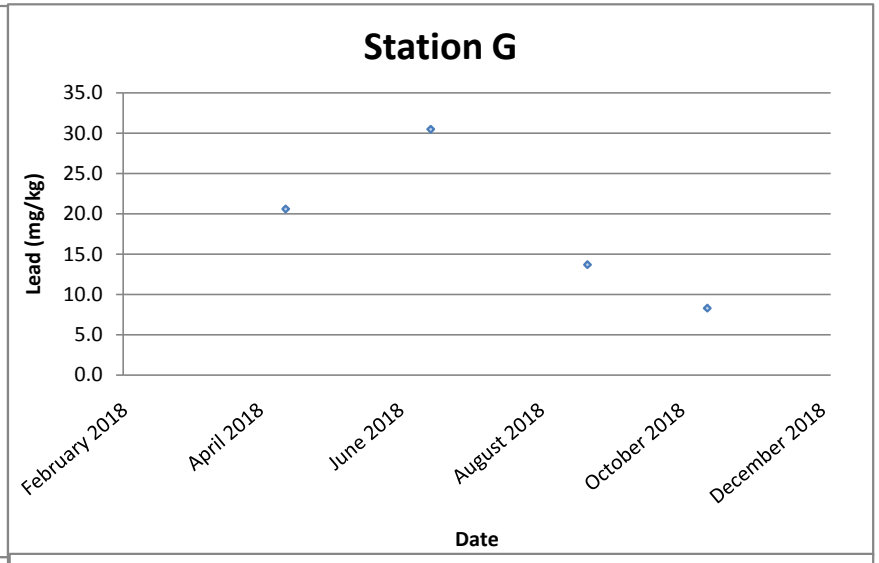
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station G
Lead (mg/kg)
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30.0
25.0
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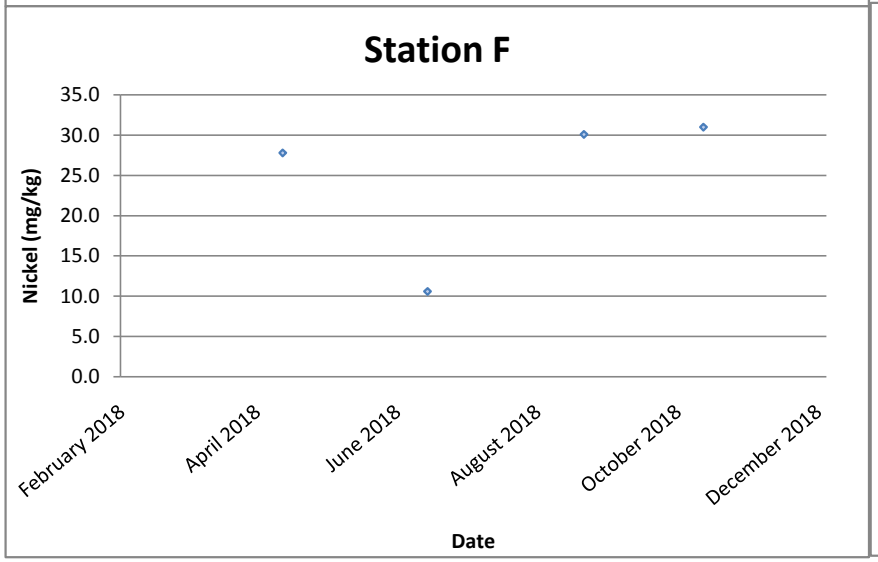
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station F
Nickel (mg/kg)
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25.0
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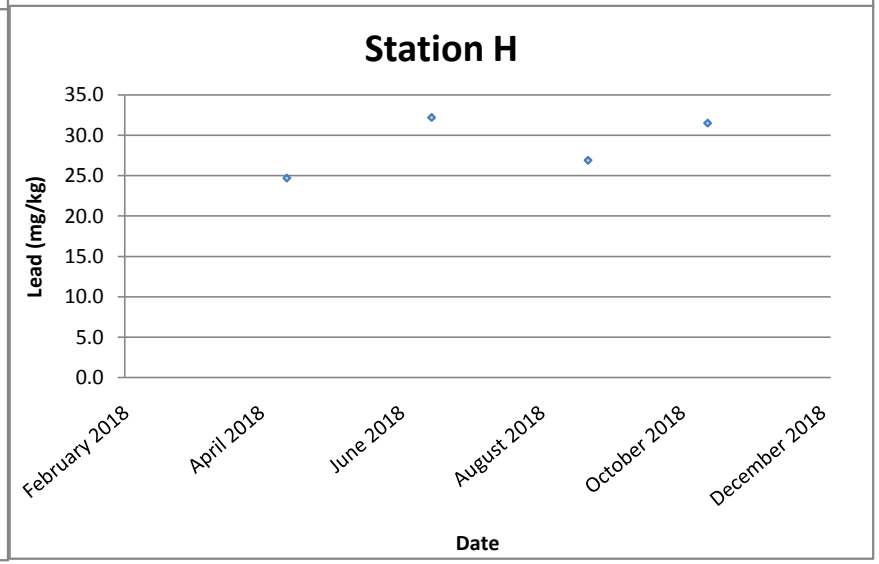
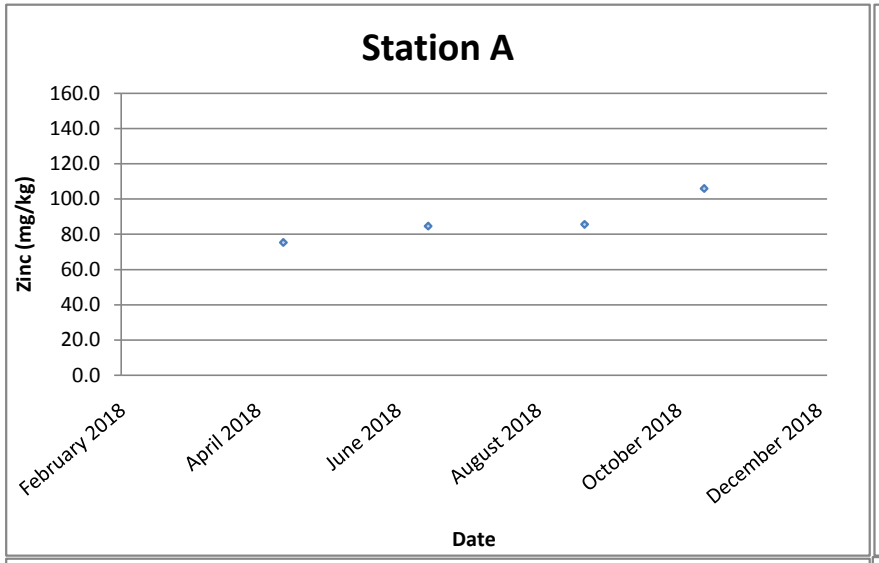
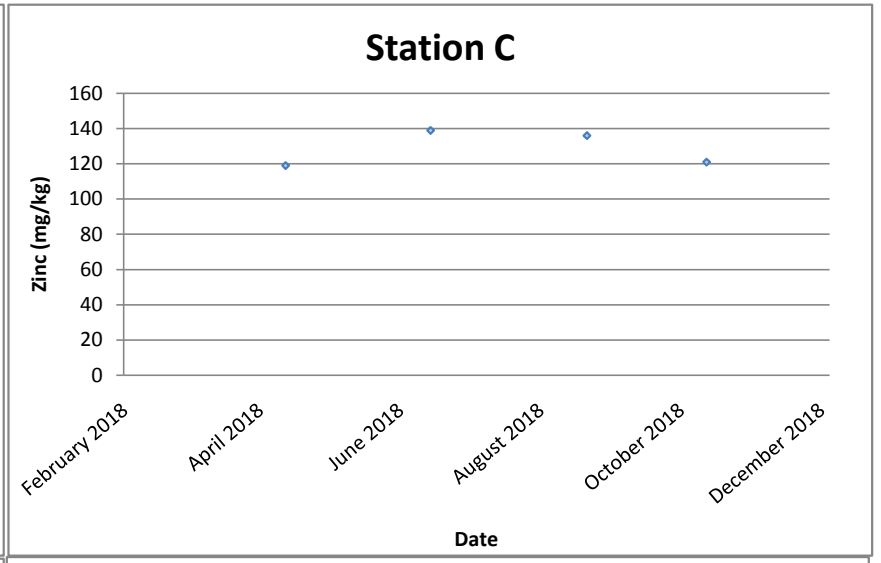
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station H
Lead (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station A
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Zinc (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station C
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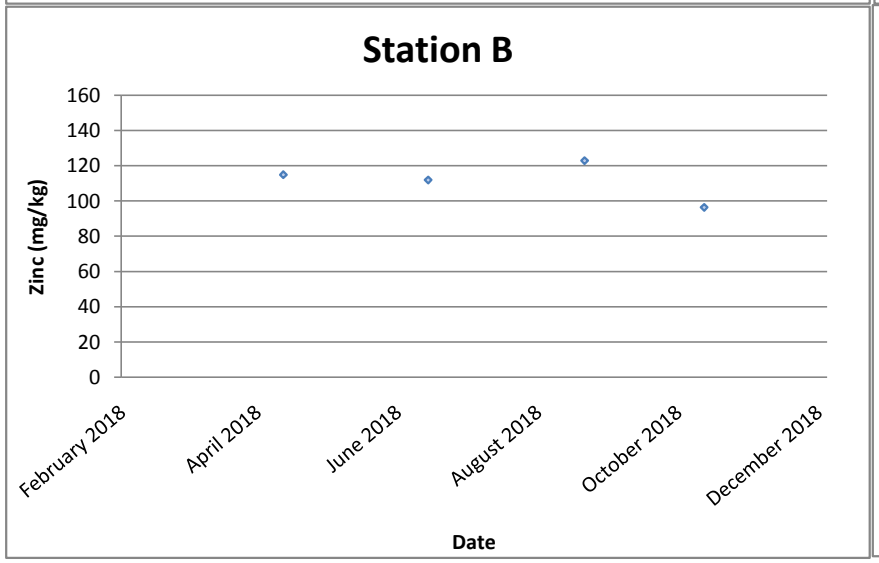
140
120
100
80
60
40
20
0
Zinc (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station B
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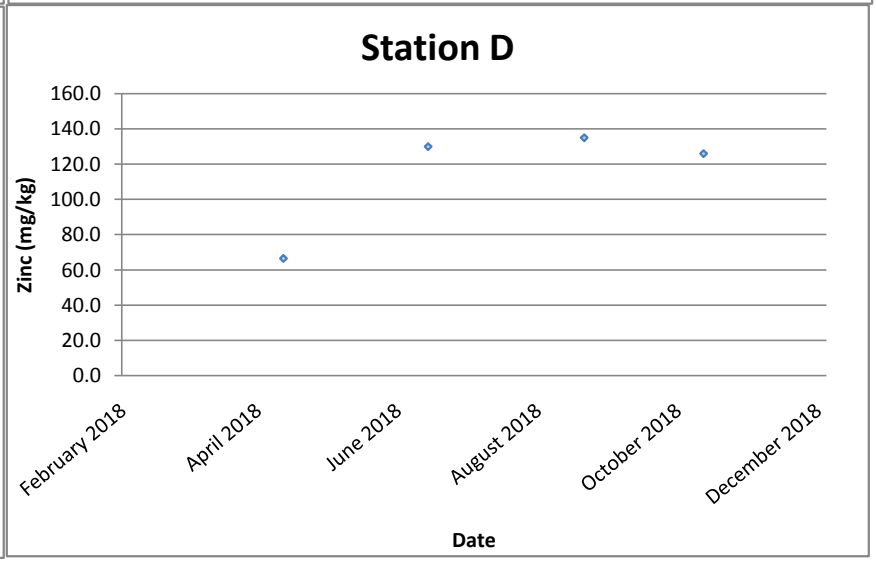
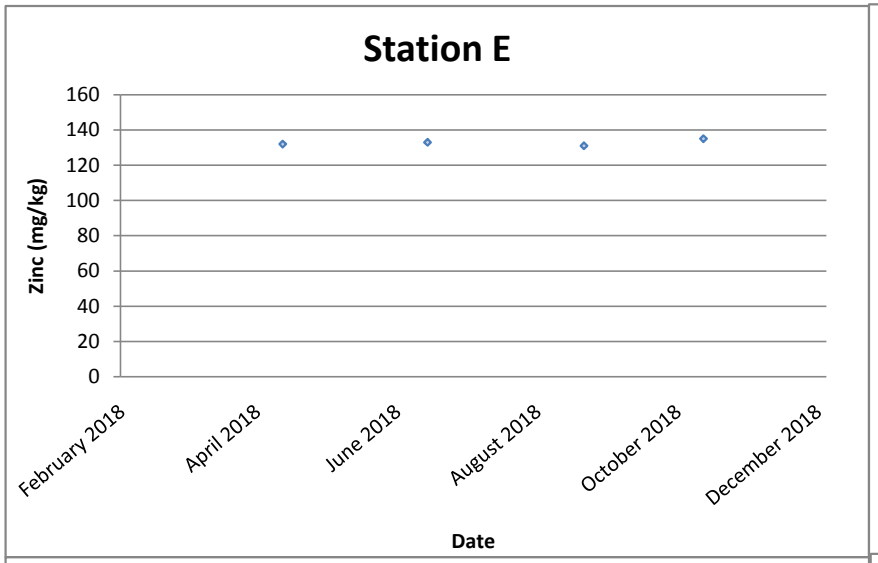
140
120
100
80
60
40
20
0
Zinc (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station D
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Zinc (mg/kg)
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station E
Zinc (mg/kg)
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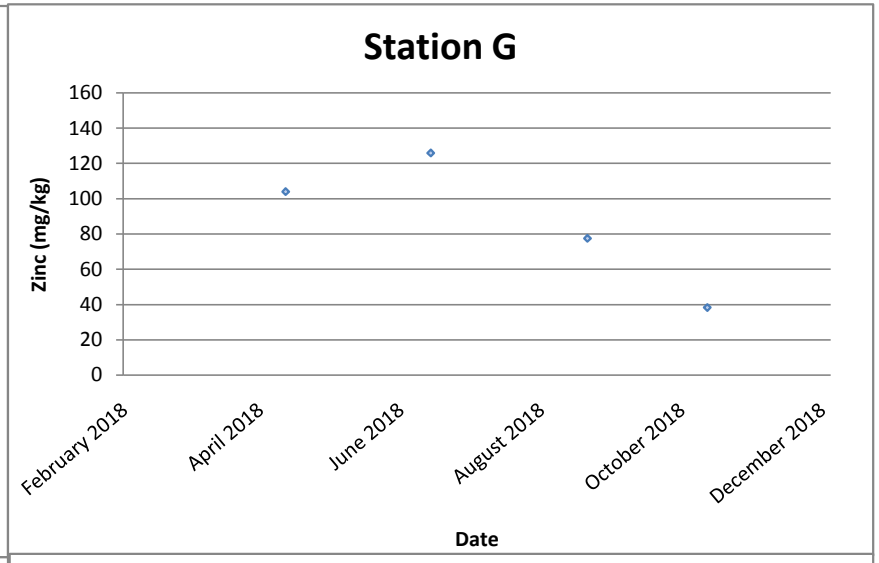
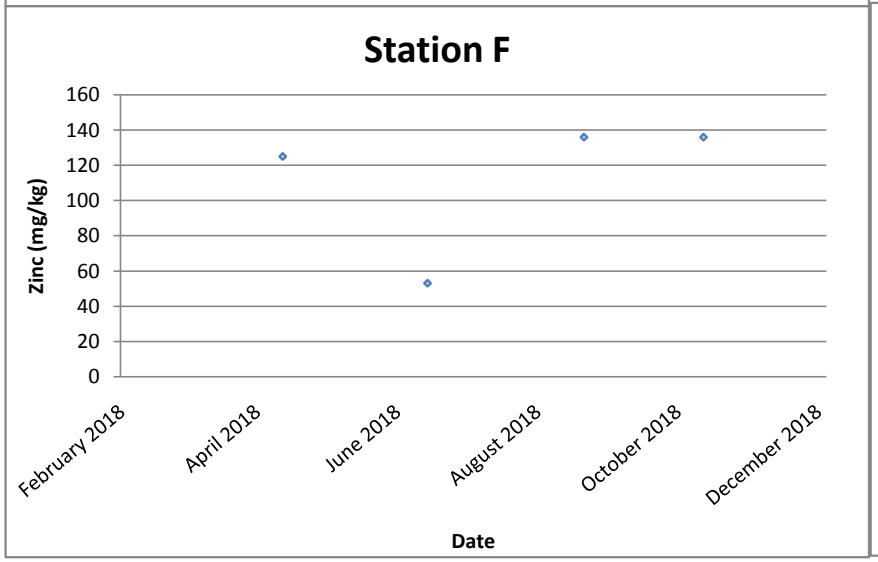
140
120
100
80
60
40
20
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station G
Zinc (mg/kg)
160
140
120
100
80
60
40
20
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station F
Zinc (mg/kg)
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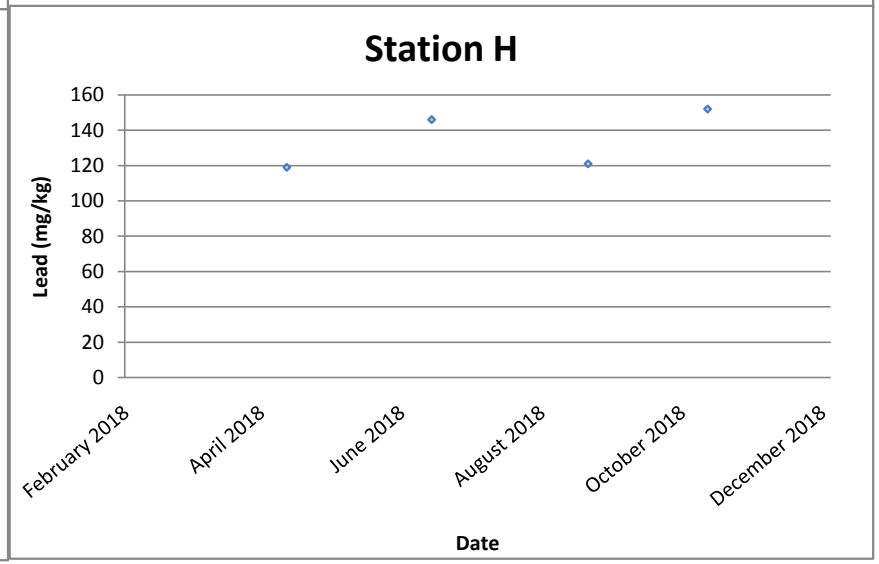
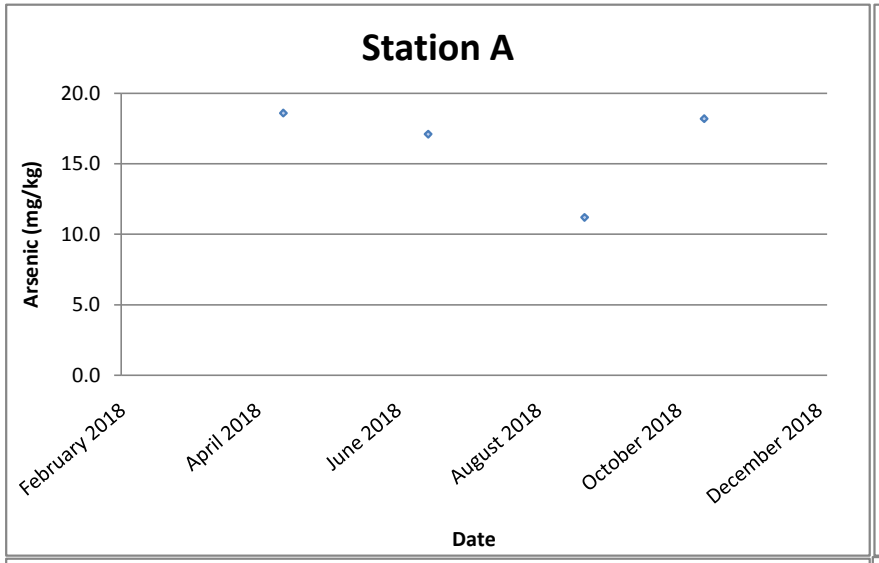
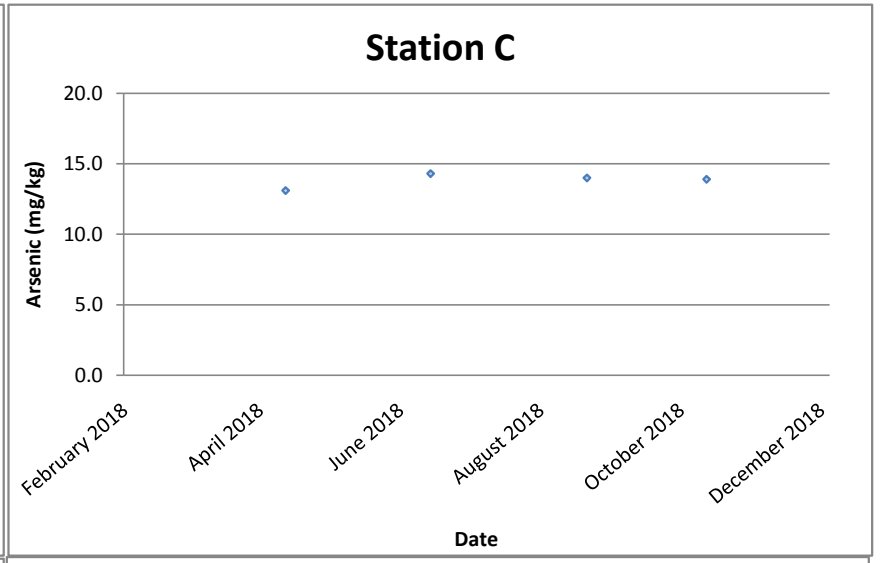
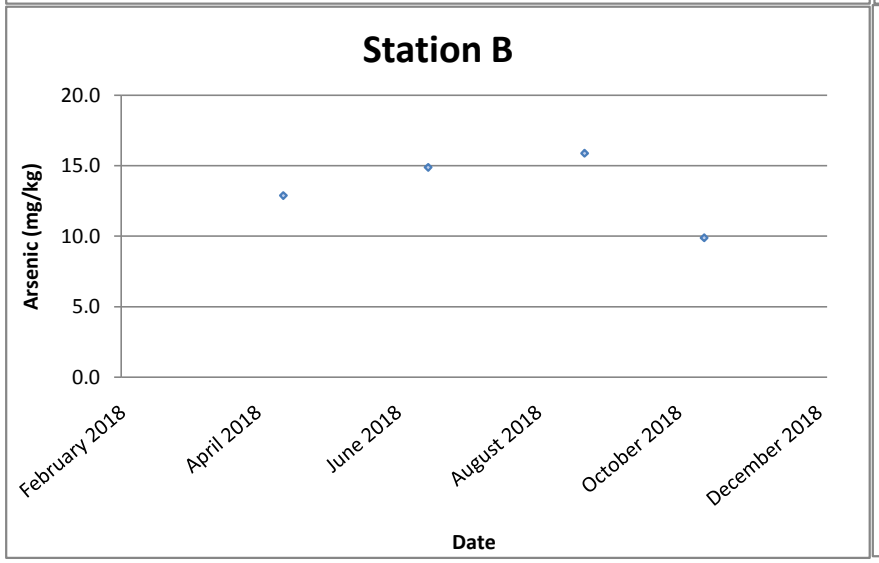
140
120
100
80
60
40
20
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

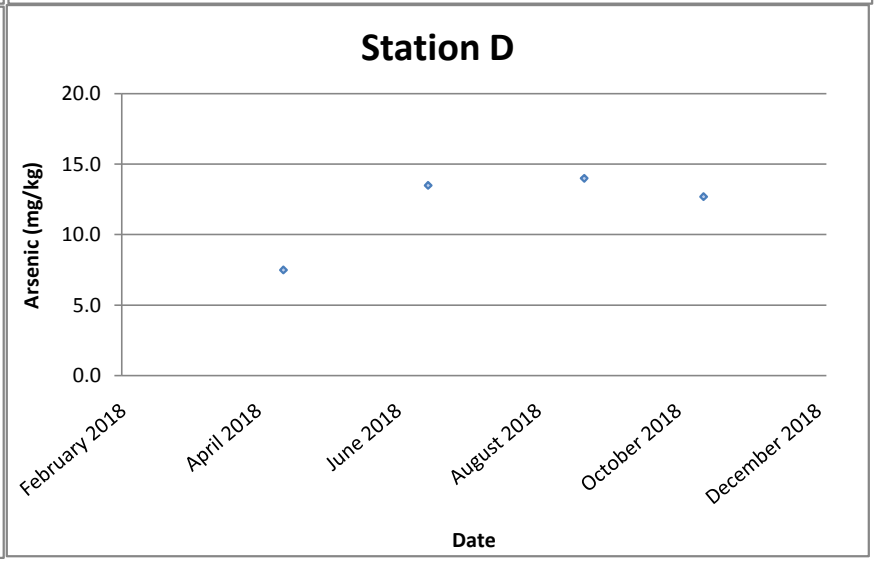

Station H
Lead (mg/kg)
160
140
120
100
80
60
40
20
0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

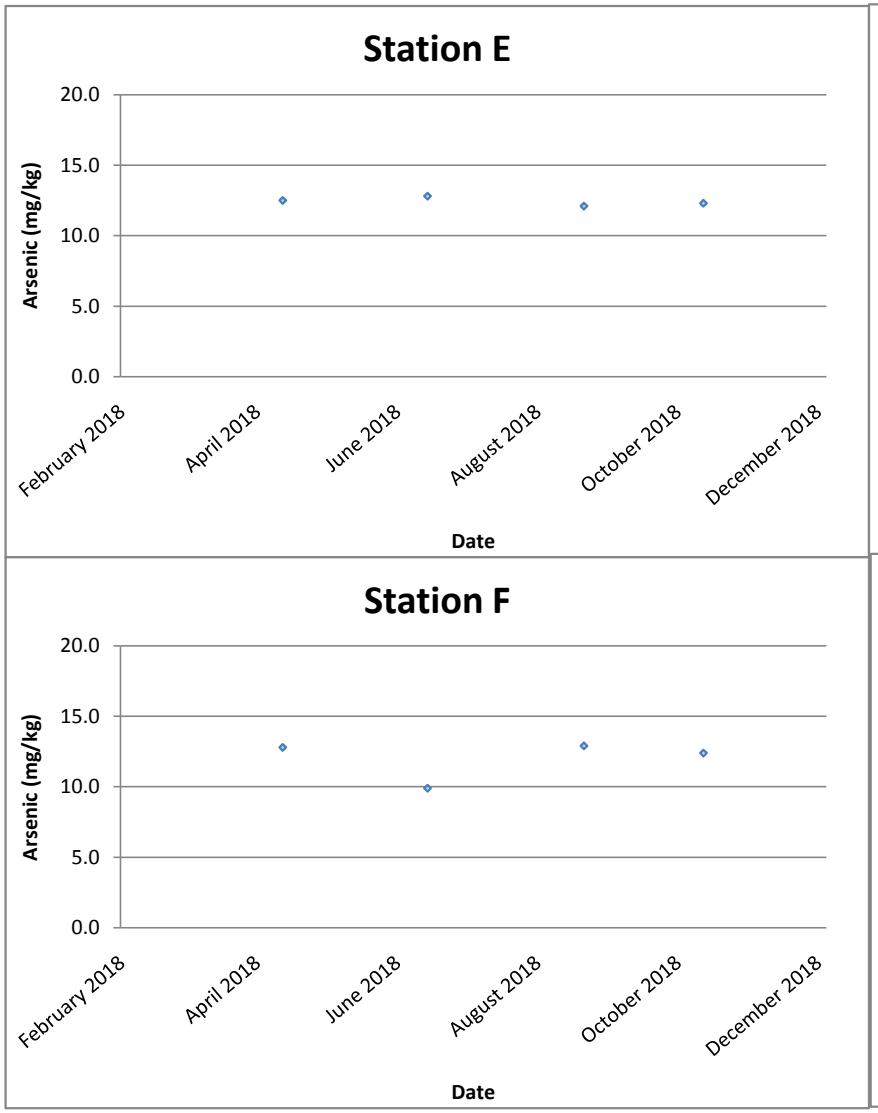
Arsenic (mg/kg)

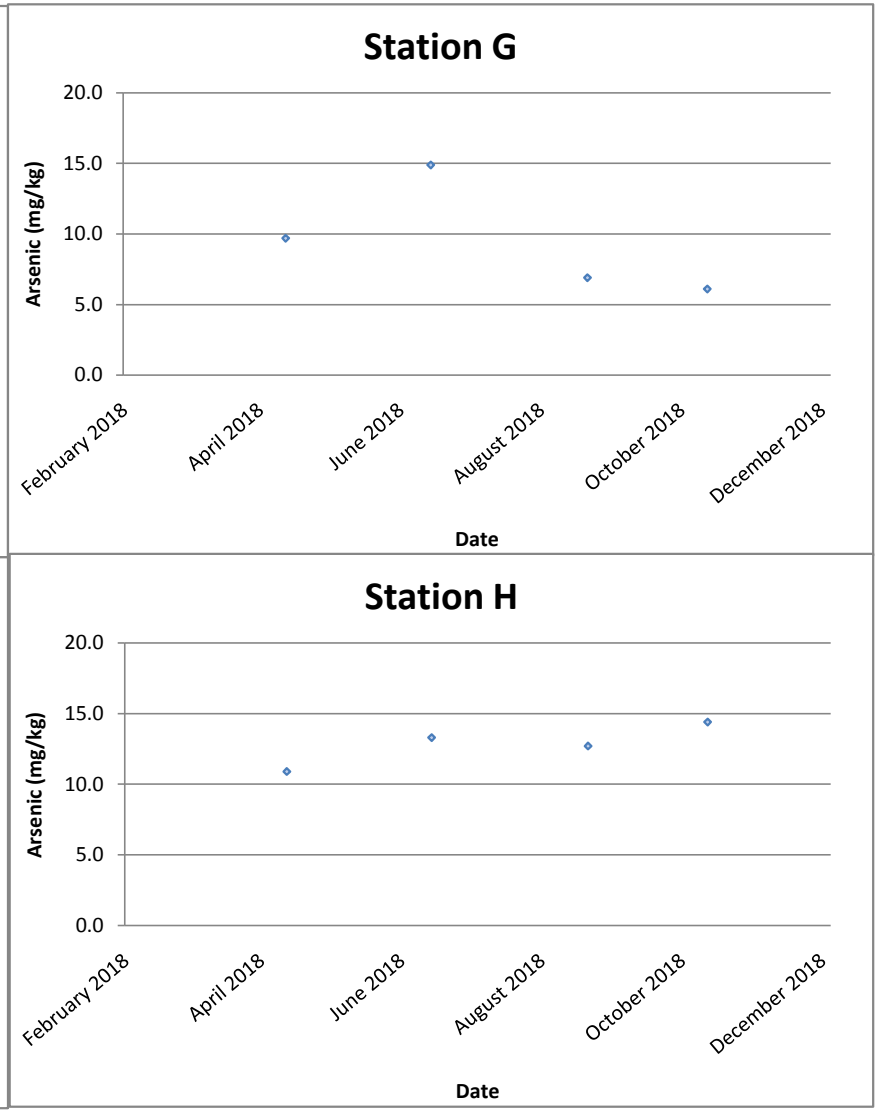






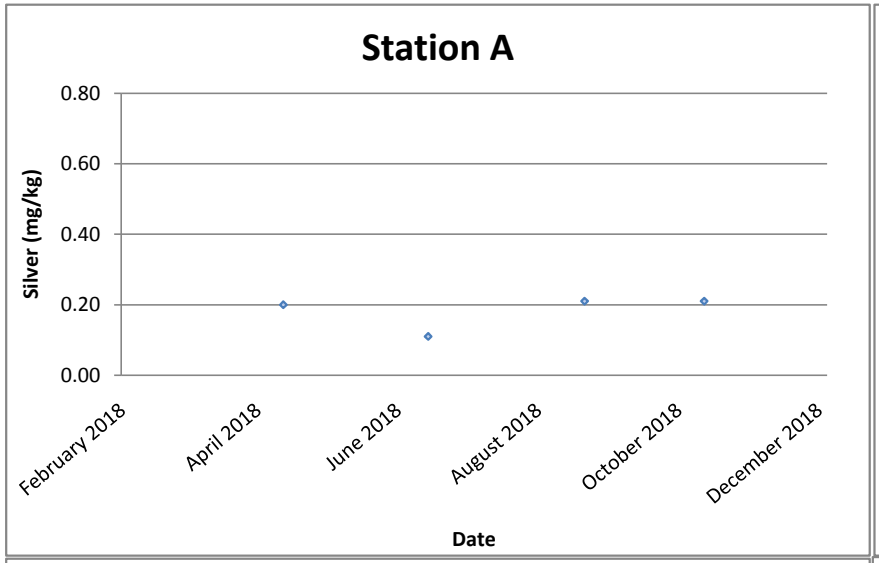


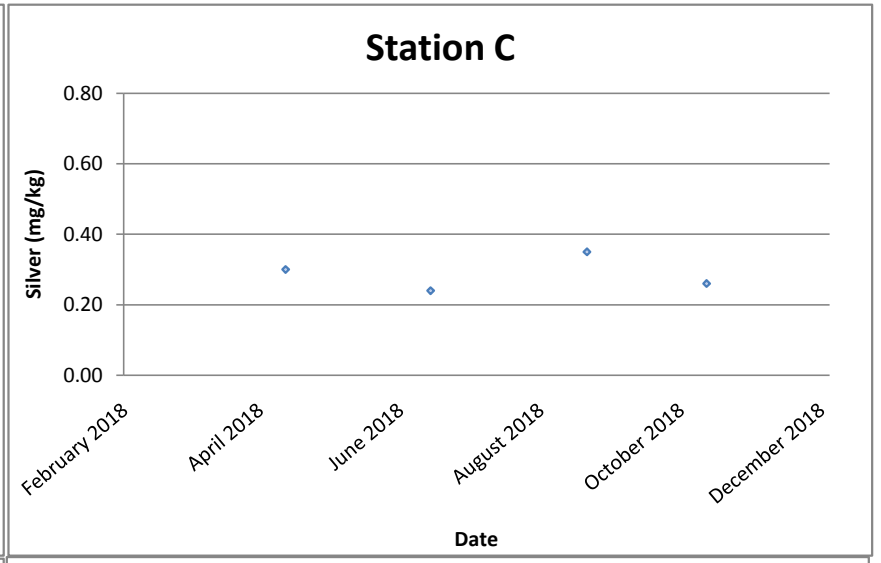

Station E
Arsenic (mg/kg)
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

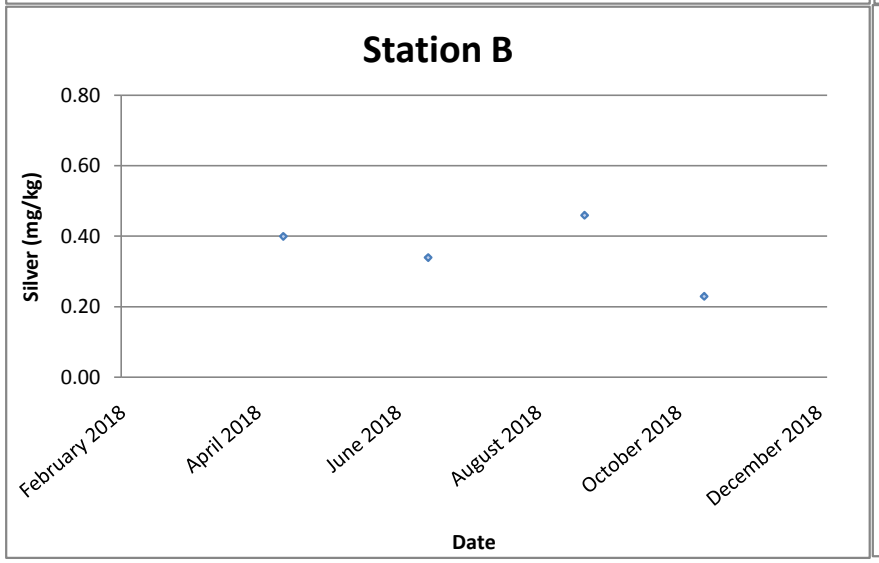

Station G
Arsenic (mg/kg)
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

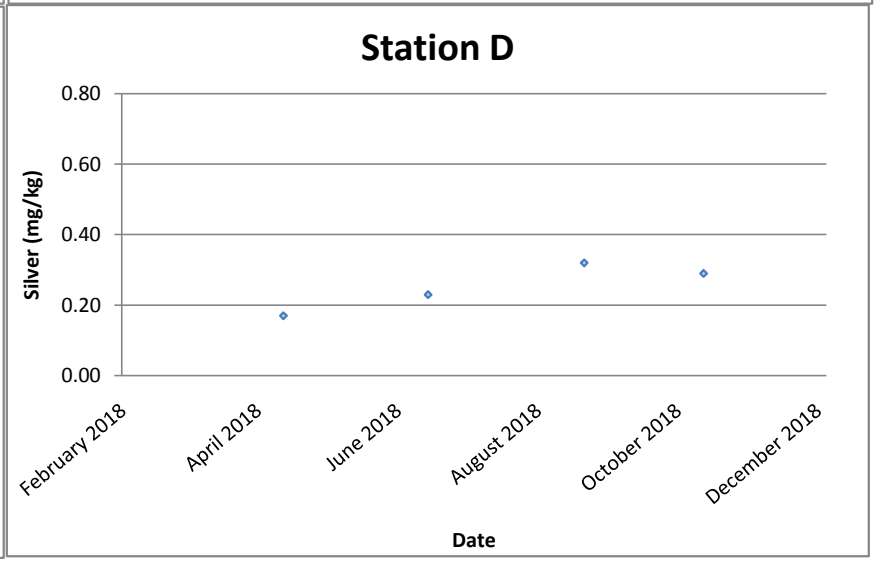
Station F
Arsenic (mg/kg)
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

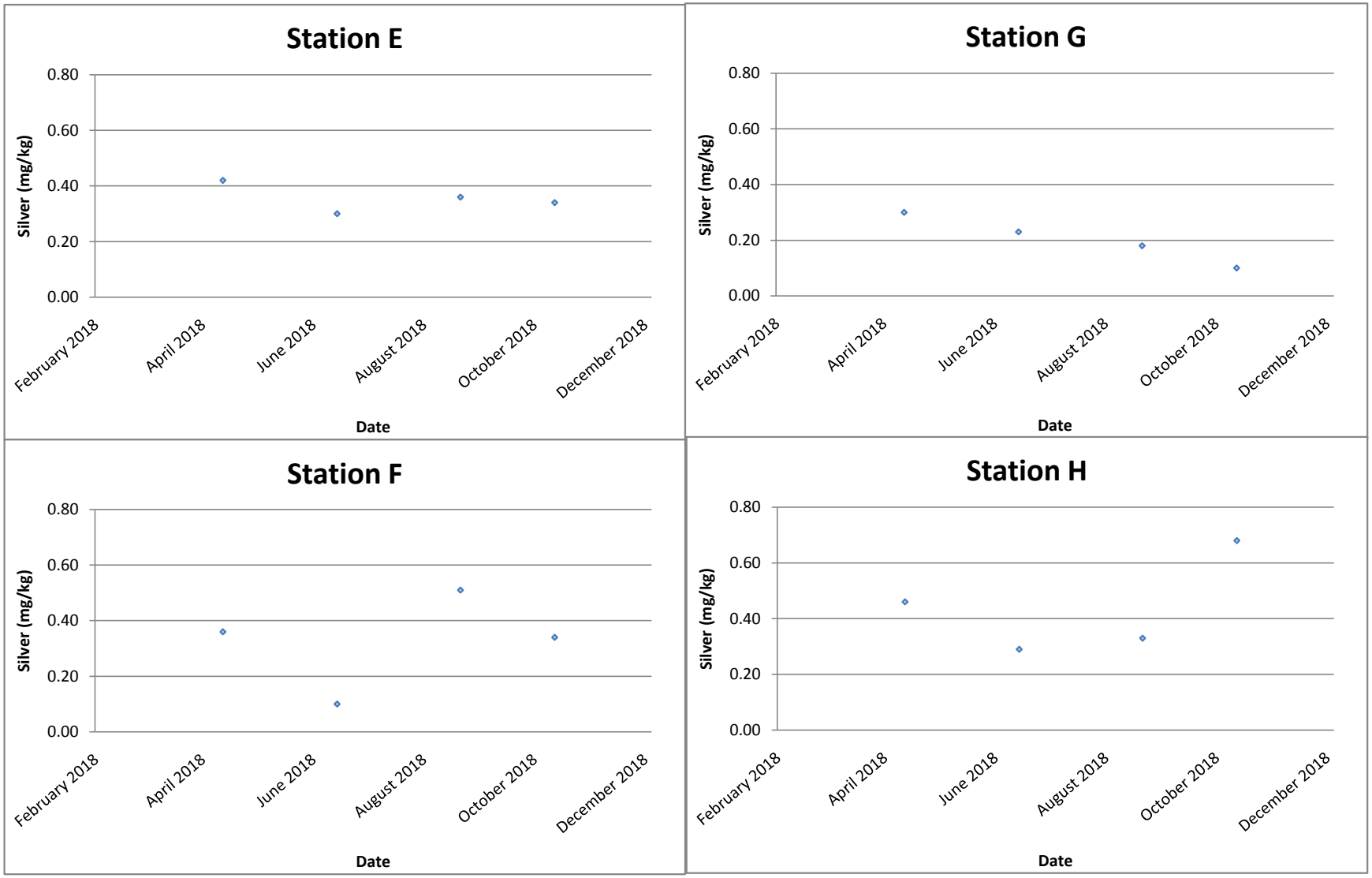
Station H
Arsenic (mg/kg)
20.0
15.0
10.0
5.0
0.0
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station A
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station C
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station B
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station D
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date


Station E
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station G
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station F
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date
Station H
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2018
April 2018
June 2018
August 2018
October 2018
December 2018
Date

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Website : www.fugro.com

Appendix H

Benthic Survey Report

Benthic Faunal Monitoring

Conducted in October 2018

Summary Report

Abundance

A total of 202 macrobenthic organisms were collected from the eight stations during the October 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 21 individuals (ind.) compared to the August 2018 results. Macrobenthic abundance showed decreasing trend this wet season (April 2018 to October 2018) monitoring albeit insignificant (p-value = 0.30; F crit = 2.64; α = 0.05). The decreasing trend might be attributed to weather disturbances (i.e. tropical storms) that hit Hong Kong week(s) before the sampling activities for June 2018, August 2018, and October 2018 monitoring periods. Wave actions brought about by these weather disturbances might have caused intermediate disturbances in the sampling stations, particularly that these stations are characteristically shallow waters (11m to 23m). Wave action may affect bottom sediments up to 50m in depth based on studies conducted by Coleman et al. (1997). Molluscs, particularly bivalves, were significantly affected by these disturbances as shown in their decreasing abundance since April 2018 monitoring period.

Across monitoring stations, the distribution of macrobenthic abundance remained to be significantly variable (p-value = 0.03; F crit = 2.31; α = 0.05). Relatively higher abundances were recorded in the reference Stations E (30 ind.), F (28 ind.), G (46 ind.), and H (27 ind.) while lower abundances were recorded in the impact Stations C (16 ind.) and D (19 ind.) and reference Stations A and B, both have 18 ind. In correlation with particle grain size distribution, it can be observed that relatively higher abundances were noted in stations with slightly higher slit/clay percentages. Silt/clay substrates are preferred by annelids, the most abundant and ubiquitous groups during in this monitoring period.

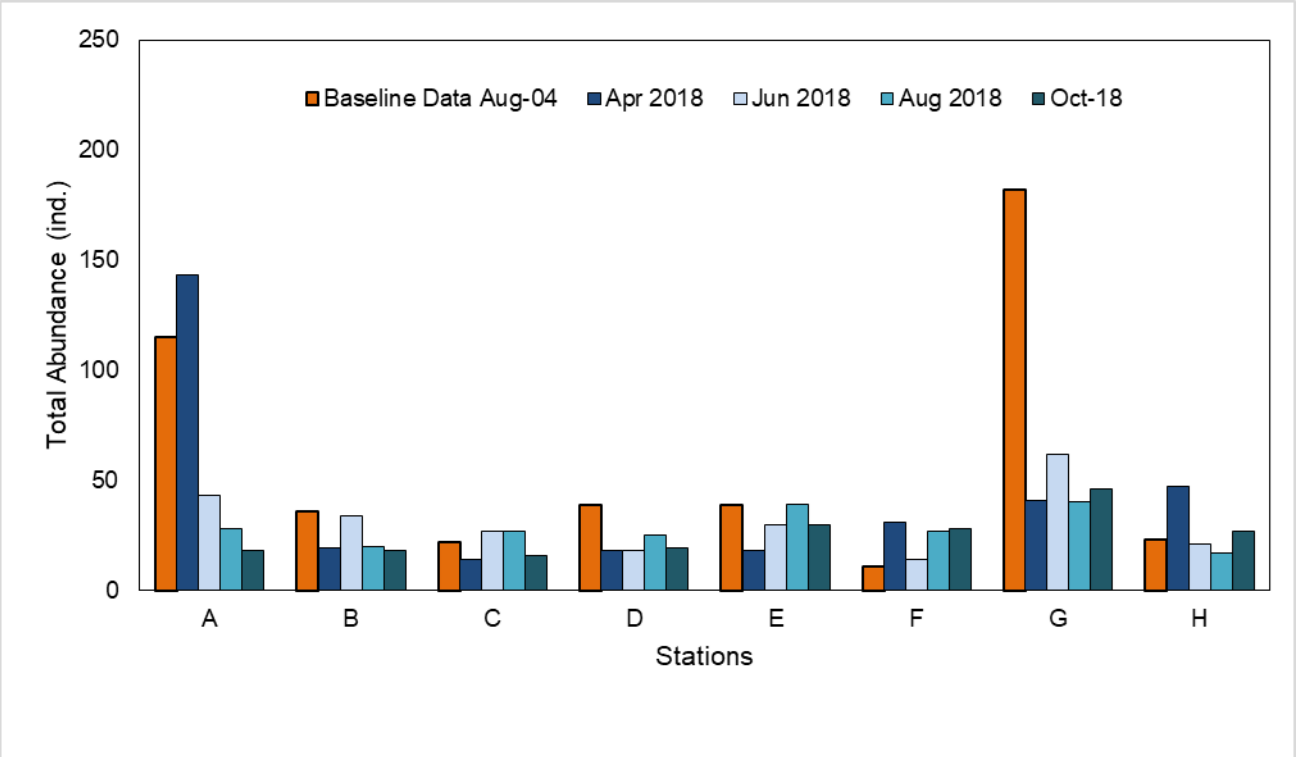

Figure 1. Total abundance (ind.) of benthic organisms

Biomass

The total wet biomass for all the eight stations during the October 2018 monitoring period was 98.89g, which is relatively higher than the biomass recorded during the August 2018 monitoring period. Figure 2 shows the biomass distribution across monitoring periods and stations. The increase in total wet biomass from August 2018 to October 2018 might be attributed to the larger sizes of bivalves collected during this monitoring period despite their relatively lower and decreasing abundances.

The highest biomass was observed in Station E (27.92g) and A (19.44g) and the lowest remained to be at the impact station, Station D (0.05g). Highest biomass remained at Station E and A because of the bivalves, *Ruditapes philippinarum* and *Paphia undulata*, continued to contribute significantly to the total wet biomass due to their larger sizes despite the decline in their abundance. Biomass decreased in Station A, Station C and Station D compared to the August 2018 monitoring period, which may be due to the shift in the macrobenthic assemblage, which is currently dominated by smaller organisms (i.e. annelids).

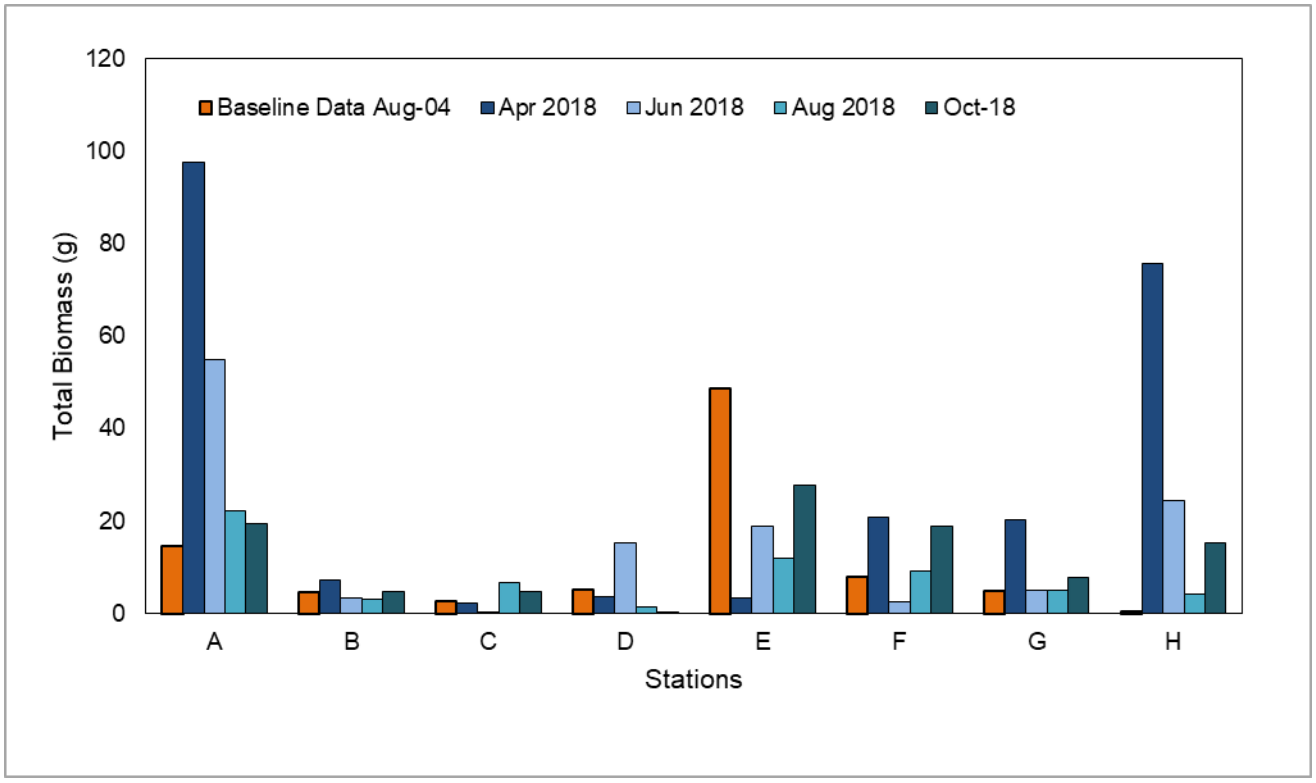

Figure 2. Total biomass (g) of benthic organisms

Taxonomic Composition

A total of five phyla comprised of 36 families and 50 taxa were identified in the eight stations during the October 2018 monitoring period. With the previous increase in the number of annelid species and abundance and the decrease in the abundance of bivalves, annelids (i.e. polychaetes) remained to dominate the current benthic assemblages comprising about 65.35% of the sampled population (Figure 3). The shift in benthic assemblage from the April 2018 monitoring period (Figure 3) might be attributed to wave actions generated by the series of typhoons which 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).

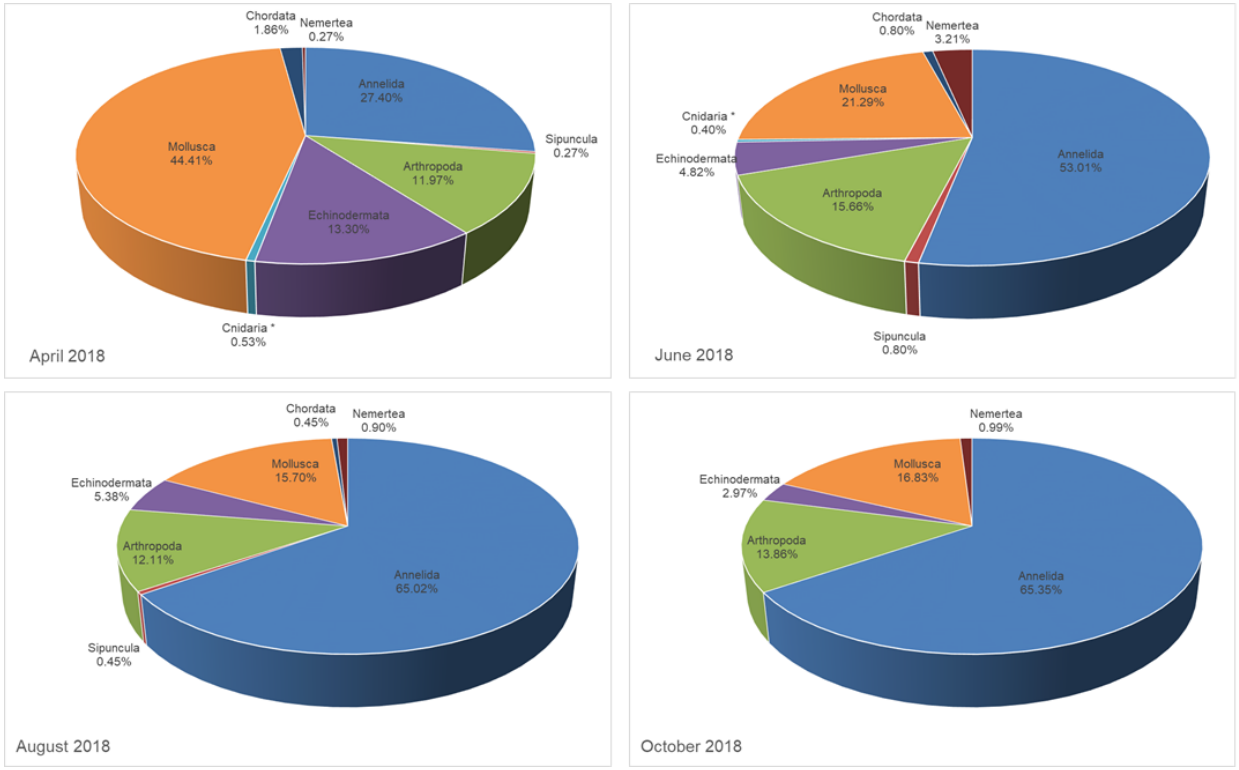

Figure 3. Percent composition of benthic organisms collected in the eight monitoring stations, April 2018 to August 2018

The current benthic assemblage is observed to be similar with the wet season 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 capitellid and nepthyid were the most abundant group.

Same as with abundance distribution, relatively higher numbers of taxa identified were recorded in the reference Stations E (18), F (13), G (22), and H (19) while lower abundances were recorded in reference Stations A (12) and B (10) and impact Stations C and D, both have 9 ind. The relatively higher number of taxa identified were mainly contributed by the species of polychaetes recorded at these stations.

Diversity

Diversity indices (H') for the October 2018 monitoring period ranged from very low (1.76 at Station D and 1.98 at Station C) to moderate (2.83 at Station G). Compared to the August 2018 monitoring periods, decrease in diversity in majority of stations (except station G and H) was observed. This

decrease might be due to the dominance of the annelids in the new habitats made available by wave actions caused by weather disturbances. The decrease in diversity consequently lowered the heterogeneity of the benthic communities as showed by their decreased Evenness (J) Index.

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

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Xu F. S. and S.P Zhang S. P. 2008.An Illustrated Bivalvia Mollusca Fauna of China Seas. Science Press (China), Beijing.

Approved by Supervisor

Name of Consultant : China Hong Kong Ecology Consultants Ltd.

Signature of Supervisor : 

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

Date: November 8, 2018

Appendix A: Data Summaries

Summary of Benthic Survey Data (October 2018)

Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	18	19.44	12	2.37	0.95
B	18	4.72	10	2.25	0.98
C*	16	4.84	9	1.98	0.90
D*	19	0.05	9	1.76	0.80
E	30	27.92	18	2.73	0.94
F	28	18.91	13	2.15	0.84
G	46	7.79	22	2.83	0.91
H	27	15.22	19	2.78	0.96
TOTAL	**202**	**98.89**	**(50 N)**		

*Impact Sites

Summary of Benthic Survey Baseline Data (August 2004, wet season)

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	Aug-18	Oct-2018
Annelida	73.29	31.12	53.01	65.02	65.35
Sipuncula	0.21	0.30	0.80	0.45	0.00
Arthropoda	18.80	13.60	15.66	12.11	13.86
Echinodermata	3.63	15.11	4.82	5.38	2.97
Cnidaria *	0.43	0.60	0.40	0	0
Mollusca	3.42	50.45	21.29	15.69	16.83
Chordata	0.21	2.11	0.80	0.45	0.00
Nemertea	0	0.30	3.21	0.90	0.99

Taxonomic Composition (abundance) of Benthic Survey

Taxonomic Composition	Aug-04	Apr-18	Jun-18	Aug-18	Oct-2018
Annelida	343	103	132	145	132
Sipuncula	1	1	2	1	0
Arthropoda	88	45	39	27	28
Echinodermata	17	5	12	12	6
Cnidaria *	2	2	1	0	0
Mollusca	16	167	53	35	34
Chordata	1	7	2	1	0
Nemertea	0	1	8	2	2
Grand total	468	331	249	223	202

*referred to as Coelentera in the baseline monitoring

Composition, Abundance, and Percent Composition of Benthic Communities

October 2018

Phylum	Class	Order	Family	Genus	Monitoring Stations								% Composition
					A	B	C	D	E	F	G	H	
Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*	0	1	0	0	0	1	2	1	2.48
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella(C.capitata)*	0	3	1	1	1	1	2	0	4.46
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	1	0	0	0	0	0	0	0	0.50
Annelida	Polychaeta	Capitellida	Capitellidae	*Mediomastus*	1	2	0	2	2	2	2	2	6.44
Annelida	Polychaeta	Capitellida	Capitellidae	*Notomastus*	0	0	0	1	2	2	1	0	2.97
Annelida	Polychaeta	Errantia	Phyllodocidae	*Phyllodoce*	0	0	0	0	1	0	1	0	0.99
Annelida	Polychaeta	Eunicida	Eunicidae	*Eunice(E. indica)*	3	0	0	0	0	0	9	0	5.94
Annelida	Polychaeta	Phyllodocimorpha	Goniadidae	*Glycinde*	0	0	0	0	0	0	2	0	0.99
Annelida	Polychaeta	Phyllodocida	Nereidae	*Nereis*	0	0	0	0	1	1	0	1	1.49
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	*Paralacydonia (P. paradoxa)*	0	0	0	0	0	0	1	0	0.50
Annelida	Polychaeta	Phyllodocida	Polynoidae	*Gattyana*	0	0	1	0	0	0	0	0	0.50
Annelida	Polychaeta	-	Maldanidae	*Maldanella*	1	0	0	1	0	0	0	0	0.99
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus (A. dibranchis)*	3	0	5	0	3	0	1	0	5.94
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus (A. lyrochaeta)*	0	0	0	0	0	2	0	2	1.98
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys*	2	2	3	9	2	2	0	1	10.40
Annelida	Polychaeta	Scolecida	Opheliidae	*Ophelia*	0	0	0	0	0	0	0	1	0.50
Annelida	Polychaeta	Scolecida	Orbiniidae	*Naineris*	0	0	0	0	0	0	2	0	0.99
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*	0	1	1	0	1	10	1	1	7.43
Annelida	Polychaeta	Spionida	Spionidae	*Laonice(L. cirrata)*	0	0	0	0	0	0	0	1	0.50
Annelida	Polychaeta	Spionida	Spionidae	*Polydora*	0	0	0	1	0	0	0	0	0.50
Annelida	Polychaeta	Spionida	Spionidae	*Prionospio*	0	0	0	0	0	0	0	1	0.50
Annelida	Polychaeta	Sternaspida	Sternaspidae	*Sternaspis(S. scutata)*	0	0	1	0	0	0	0	0	0.50
Annelida	Polychaeta	Terebellida	Ampharetidae	*Isolda*	1	0	0	0	0	0	1	0	0.99

Phylum	Class	Order	Family	Genus	Monitoring Stations								% Composition
					A	B	C	D	E	F	G	H	
Annelida	Polychaeta	Terebellida	Pectiinariidae	*Pectinaria(Lagis)*	0	0	0	0	0	0	1	0	0.50
Annelida	Polychaeta	Terebellida	Terebellidae	*Amaeana*	0	0	0	0	0	1	4	1	2.97
Annelida	Polychaeta	Terebellida	Terebellidae	*Loimia(L.loimia)*	0	0	0	0	0	0	0	1	0.50
Annelida	Polychaeta	Terebellida	Trichobranchidae	*Terebellides(T. stroemii)*	0	0	0	0	0	0	4	1	2.48
Annelida	Oligochaeta	Sabellida	Oweniidae	*Owenia*	0	0	0	0	0	0	1	0	0.50
Annelida Total					**12**	**9**	**12**	**15**	**13**	**22**	**35**	**14**	**65.35**
N					**7**	**5**	**6**	**6**	**8**	**9**	**16**	**12**	**28**
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0	2	2	0	1	0	4	2	5.45
Arthropoda	Crustacea	Decapoda	Alpheidae	*Alpheus*	0	2	0	0	0	0	0	0	0.99
Arthropoda	Crustacea	Decapoda	Paguroidea	Hermit crab	0	0	0	0	0	0	1	0	0.50
Arthropoda	Crustacea	Decapoda	Pilumnidae	*Typhlocarcinus*	1	0	0	1	2	0	1	2	3.47
Arthropoda	Crustacea	Decapoda	Portunidae	*Charybdis*	0	0	1	0	0	0	0	0	0.50
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.1*	0	0	0	1	1	0	2	0	1.98
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.2*	0	0	0	0	0	1	0	0	0.50
Arthropoda	Maxillopoda	Sessilia	Balanidae	*Balanus*	0	0	1	0	0	0	0	0	0.50
Arthropoda Total					**1**	**4**	**4**	**2**	**4**	**1**	**8**	**4**	**13.86**
N					**1**	**2**	**3**	**2**	**3**	**1**	**4**	**2**	**8**
Echinodermata	-	-	-	*UNID sp.*	0	0	0	0	0	0	1	0	0.50
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*	0	0	0	2	3	0	0	0	2.48
Echinodermata Total					**0**	**0**	**0**	**2**	**3**	**0**	**1**	**0**	**2.97**
					0	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**2**
Mollusca	Bivalvia	Ostreoida	Ostreidae	*Talonostrea(T. talonata)*	0	0	0	0	0	0	0	1	0.50
Mollusca	Bivalvia	Veneroida	Psammobiidae	*c.f. Soletellina chinensis*	1	0	0	0	0	1	0	0	0.99
Mollusca	Bivalvia	Veneroida	Tellinidae	*c.f. Augulus*	0	0	0	0	1	0	0	1	0.99
Mollusca	Bivalvia	Veneroida	Veneridae	*Circe (C. scripta)*	0	0	0	0	1	0	0	0	0.50
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*	1	2	0	0	5	3	0	2	6.44
Mollusca	Bivalvia	Veneroida	Veneridae	*c.f. Phylloda foliacea*	0	0	0	0	0	0	0	1	0.50
Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes (R. philippinarum)*	1	0	0	0	0	0	2	4	3.47

Phylum	Class	Order	Family	Genus	Monitoring Stations								% Composition
					A	B	C	D	E	F	G	H	
Mollusca	Bivalvia	Veneroida	Veneridae	Bivalve juvenile	0	0	0	0	1	0	0	0	0.50
Mollusca	Gastropoda	Buccinoidea	Nassariidae	*Nassarius(N. succinctus)*	0	0	0	0	1	0	0	0	0.50
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	*Turritella (T.terebra)*	0	1	0	0	0	0	0	0	0.50
Mollusca	Scaphopoda	-	Dentaliidae	-	2	2	0	0	0	0	0	0	1.98
Mollusca Total					**5**	**5**	**0**	**0**	**9**	**4**	**2**	**9**	**16.83**
N					**4**	**3**	**0**	**0**	**5**	**2**	**1**	**5**	**11**
Nemertea	Enopla	-	-	UNID 1	0	0	0	0	1	1	0	0	0.99
Nemertea Total					**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0.99**
N					**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**1**
				GRAND TOTAL	**18**	**18**	**16**	**19**	**30**	**28**	**46**	**27**	**202**
				TOTAL (N)	**12**	**10**	**9**	**9**	**18**	**13**	**22**	**19**	**50**

Biomass of Benthic Communities

October 2018

Phylum	Class	Order	Family	Genus	Monitoring Stations							
					A	B	C	D	E	F	G	H
Phylum	**Class**	**Order**	**Family**	**Genus**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*	0	0.003	0	0	0	0.002	0.002	0
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella(C.capitata)*	0	0.005	0.002	0.001	0.001	0.001	0.001	0
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	0.002	0	0	0	0	0.000	0	0
Annelida	Polychaeta	Capitellida	Capitellidae	*Mediomastus*	0.001	0.002	0	0.002	0.002	0.002	0.001	0.005
Annelida	Polychaeta	Capitellida	Capitellidae	*Notomastus*	0	0	0	0.001	0.003	0.001	0.003	0
Annelida	Polychaeta	Errantia	Phyllodocidae	*Phyllodoce*	0	0	0	0	0	0	0.001	0
Annelida	Polychaeta	Eunicida	Eunicidae	*Eunice(E. indica)*	0.004	0	0	0	0	0	0.011	0
Annelida	Polychaeta	Phyllodocimorpha	Goniadidae	*Glycinde*	0	0	0	0	0	0	0.004	0
Annelida	Polychaeta	Phyllodocida	Nereidae	*Nereis*	0	0	0	0	0.002	0.001	0	0.001
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	*Paralacydonia (P. paradoxa)*	0	0	0	0	0	0	0.001	0
Annelida	Polychaeta	Phyllodocida	Polynoidae	*Gattyana*	0	0	0.001	0	0	0	0	0
Annelida	Polychaeta	-	Maldanidae	*Maldanella*	0.003	0	0	0.002	0	0	0	0
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus (A. dibranchis)*	0.007	0	0.018	0	0.005	0	0.002	0
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus (A. lyrochaeta)*	0	0	0	0.000	0	0.006	0	0.018
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys*	0.002	0.001	0.002	0.012	0.002	0.002	0	0.001
Annelida	Polychaeta	Scolecida	Opheliidae	*Ophelia*	0	0	0	0	0	0	0	0.013
Annelida	Polychaeta	Scolecida	Orbiniidae	*Naineris*	0	0	0	0	0	0	0.004	0
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*	0	0.001	0.002	0	0.002	0.295	0.002	0.001
Annelida	Polychaeta	Spionida	Spionidae	*Laonice(L. cirrata)*	0	0	0	0	0	0	0	0.001
Annelida	Polychaeta	Spionida	Spionidae	*Polydora*	0	0	0	0.001	0	0	0	0
Annelida	Polychaeta	Spionida	Spionidae	*Prionospio*	0	0	0	0	0	0	0	0.002
Annelida	Polychaeta	Sternaspida	Sternaspidae	*Sternaspis(S. scutata)*	0	0	0.007	0	0	0	0.000	0

Annelida	Polychaeta	Terebellida	Ampharetidae	*Isolda*	0.001	0	0	0	0	0	0.001	0
Annelida	Polychaeta	Terebellida	Pectiinariidae	*Pectinaria(Lagis)*	0	0	0	0	0	0	0.026	0
Annelida	Polychaeta	Terebellida	Terebellidae	*Amaeana*	0	0	0	0	0	0.001	0.017	0.012
Annelida	Polychaeta	Terebellida	Terebellidae	*Loimia(L.loimia)*	0	0	0	0	0	0	0	0.001
Annelida	Polychaeta	Terebellida	Trichobranchidae	*Terebellides(T. stroemii)*	0	0	0	0	0	0	0.022	0.002
Annelida	Oligochaeta	Sabellida	Oweniidae	*Owenia*	0	0	0	0	0	0	0.002	0
Annelida Total					**0.02**	**0.012**	**0.032**	**0.019**	**0.017**	**0.311**	**0.1**	**0.057**
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0	0.012	0.013	0	0.008	0	0.028	0.138
Arthropoda	Crustacea	Decapoda	Alpheidae	*Alpheus*	0	0.351	0	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Paguroidea	Hermit crab	0	0	0	0	0	0	2.800	0
Arthropoda	Crustacea	Decapoda	Pilumnidae	*Typhlocarcinus*	2.506	0	0	0.009	0.056	0	0.031	0.034
Arthropoda	Crustacea	Decapoda	Portunidae	*Charybdis*	0	0	4.788	0	0	0	0	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.1*	0	0	0	0.001	0.001	0	0.001	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.2*	0	0	0	0	0	0.001	0	0
Arthropoda	Maxillopoda	Sessilia	Balanidae	*Balanus*	0	0.000	0.005	0	0	0	0.000	0
Arthropoda Total					**2.506**	**0.363**	**4.806**	**0.01**	**0.065**	**0.001**	**2.860**	**0.172**
Echinodermata	-	-	-	*UNID sp.*	0	0.000	0	0	0	0	1.533	0
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*	0	0	0	0.025	1.955	0	0	0
Echinodermata Total					**0**	**0**	**0**	**0.025**	**1.955**	**0**	**1.533**	**0**
Mollusca	Bivalvia	Ostreoida	Ostreidae	*Talonostrea(T. talonata)*	0.000	0	0	0	0	0	0.000	4.100
Mollusca	Bivalvia	Veneroida	Psammobiidae	*c.f. Soletellina chinensis*	8.500	0	0	0	0	8.200	0.000	0.000
Mollusca	Bivalvia	Veneroida	Tellinidae	*c.f. Augulus*	0	0	0	0.000	0.035	0	0	0.024
Mollusca	Bivalvia	Veneroida	Veneridae	*Circe (C. scripta)*	0.000	0	0	0	0.010	0	0	0
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*	4.300	3.300	0	0	24.600	10.400	0.000	7.300
Mollusca	Bivalvia	Veneroida	Veneridae	*c.f. Phylloda foliacea*	0	0	0	0	0.000	0.000	0.000	0.069
Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes (R. philippinarum)*	4.100	0	0	0	0	0	3.300	3.498
Mollusca	Bivalvia	Veneroida	Veneridae	Bivalve juvenile	0.000	0	0	0	0.032	0	0	0
Mollusca	Gastropoda	Buccinoidea	Nassariidae	*Nassarius(N. succinctus)*	0.000	0.000	0	0.000	1.200	0.000	0.000	0.000
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	*Turritella (T.terebra)*	0.000	1.033	0.000	0.000	0.000	0.000	0.000	0.000

Mollusca	Scaphopoda	-	Dentaliidae	-	0.011	0.007	0.000	0.000	0.000	0.000	0.000	0.000
Mollusca Total					**16.911**	**4.340**	**0.000**	**0.000**	**25.877**	**18.600**	**3.300**	**14.991**
Nemertea	Enopla	-	-	UNID 1	0	0	0	0	0.005	0.002	0	0
Nemertea Total					**0**	**0**	**0**	**0**	**0.005**	**0.002**	**0**	**0**
				Grand Total	**19.437**	**4.715**	**4.838**	**0.054**	**27.919**	**18.914**	**7.793**	**15.22**

Note: T means biomass <0.001 g round to 0.001g

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	Neoxenophthalmus	Neoxenophthalmus 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	Neoxenophthalmus	Neoxenophthalmus 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	Orbinlida	Orbinlidae	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	Stelleroidea	Ophiurida	Amphiuridae	Amphiodia	Amphiodia sp.
36	B1	4	0.0063	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
37	B1	2	4.0772	Echinodermata	Echinoidea	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	Neoxenophthalmus	Neoxenophthalmus 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	Neoxenophthalmus	Neoxenophthalmus 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	Pilargidae	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	Euclymene	Euclymene sp.
54	C1	2	0.0348	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
55	C1	2	0.4967	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenophthalmus	Neoxenophthalmus 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 granuliforus
65	C2	1	0.0012	Annelida	Polychaeta	Phyllodocida	Pilargidae	Sigambra	Sigambra hanaokai
66	D1	2	0.0065	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
67	D1	1	0.0106	Annelida	Polychaeta	Capitellida	Maldanidae	Euclymene	Euclymene 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	Neoxenophthalmus	Neoxenophthalmus obscurus
71	D1	8	0.0887	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
72	D1	2	0.0648	Annelida	Polychaeta	Ophellida	Ophellidae	Ophella	Ophellina 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	Pilargidae	Sigambra	Sigambra hanaokai
77	D2	12	0.155	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
78	D2	1	0.0797	Annelida	Polychaeta	Ophellida	Ophellidae	Ophella	Ophellina grandis
79	D2	1	0.0031	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
80	D2	1	0.0012	Annelida	Polychaeta	Phyllodocida	Pilargidae	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	0.0672	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
85	E1	1	0.0171	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenophthalmus	Neoxenophthalmus 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	Veneroida	Semelidae	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	Veneroida	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	Nassariidae	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	Opheliidae	Ophelia	Ophelina 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	Callianassidae	Callianassa	Callianassa 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	Neoxenophthalmus	Neoxenophthalmus 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	Apseudidae	Apseudes	Apseudes 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	Veneroida	Dreissenidae	Mytilopsis	Mytilopsis sallei
136	G2	2	0.0017	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
137	G2	1	0.0059	Annelida	Polychaeta	Ophelida	Opheliidae	Ophelia	Ophelina 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	Amaeana	Amaeana 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 granuliforus
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, family of *Psammobiidae*

B) Hermit crab

C) The species of Polychaeta, *Poecilochaetus sp.*

D) The bivalve, *Paphia undulata*

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Appendix I

Photos of Grab Samplers

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Photo 1. A ponar 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 shoula 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 aareas should be identify and provided for the temporary storage of general	SHWSTW	Implemented

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) shouid 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 deficieny 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 deficieny 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 manages in accordance with the protocols set out in the WMP Section 5.14.	SHWSTW	Implemented