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Report No.: 0041/17/ED/0357A

Monthly EM&A Report August 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/0357A

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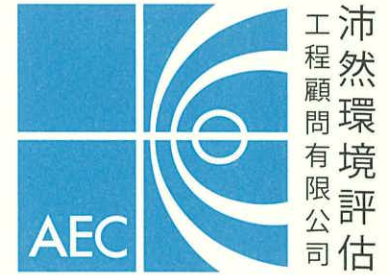
Certified by:

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

Colin K. L. Yung
Environmental Team Leader
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Our Ref: 1458/18-0156

3 October 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 (AUGUST 2018)**

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for August 2018 (Report No.: 0041/17/ED/0357A) received from the Environmental Team (ET), Messrs. Fugro Technical Services Ltd., on 28 September 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)
AECOM

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

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



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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. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis of H₂S), in addition, water quality monitoring, sediment quality monitoring, benthic survey, Chinese White Dolphin (CWD) monitoring and waste management are the key environmental concern of the Project.

This is the thirteenth Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 August 2018 to 31 August 2018 (the “reporting period”).

Breaches of Action and Limit Levels

Air quality monitoring (i.e. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis), was 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 21 August 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.

**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 H₂S measurement and olfactometry analysis were considered as unsuitable methods to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to 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 H₂S 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 Engineer for the Project. Allied Environmental Consultants Limited (AEC) was commissioned by DSD as the Independent Environmental Checker (IEC) in the operation phase of the Project. FTS was appointed as the ET by DSD to implement the EM&A programme for the operation phase of the Project including air quality monitoring, water quality monitoring, sediment quality and benthic survey and 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 H₂S Concentration Monitoring

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

Table 2.1 Equipment used for H₂S Concentration Monitoring

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

2.2 Methodology of Odour Patrol Monitoring

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

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

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



Table 2.2 Categories of Odour Intensity

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

2.3 Methodology of Odour Sampling and Olfactometry Analysis

- 2.3.1 Odour gas samples were collected in a Nalophan sampling bag placed inside a vacuum air-tight sampler using passive sampling technique. Approximately 60 liter of gas sample was collected at each sampling. All samples collected on the sampling day were returned to laboratory for olfactometry analysis within 24 hours and analyzed within 2 hours upon receiving.
- 2.3.2 ALS Technichem (HK) Pty Ltd. (HOKLAS Reg. No. 066), was 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 H₂S 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 H₂S concentration measurement, odour patrolling and odour sampling are summarized in **Table 2.3** below.

Table 2.3 Durations and Frequencies of Air Quality Monitoring Programme

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

Remark:

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



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

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

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

2.6 Event and Action Plan

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

Table 2.4 Action and Limit Levels for Air Quality Monitoring

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

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

2.7 Quality Assurance and Quality Control

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

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

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

2.8 Monitoring Results and Observations

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

2.8.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). Due to non-ideal wind direction or domination of non-target smell during the measurements conducted between August 2017 and May 2018, inadequacy of representative data was result between August 2017 and May 2018. Current H₂S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to 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 H₂S 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)	<i>E. coli</i> (cfu/100ml)
Temperature (degree Celsius)	5-day BOD (mg/l)
pH value	Suspended Solids (mg/l)
Water depth (m)	Ammonia as N (mg/l)
Salinity (ppt)	Nitrate as N (mg/l)
Turbidity (NTU)	Nitrite as N (mg/l)
Current Speed (m/s)	Total inorganic nitrogen (mg/l)
Current Direction (degree magnetic)	Total phosphorus (soluble and particulate) (mg/l)



3.2.2 Apart from the parameters listed in the **Table 3.2**, other relevant supplementary information such as monitoring location, time, weather conditions and any special phenomena 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 H₂S 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*, BOD₅, Suspended Solids, NH₃-N, NO₃-N, NO₂-N, Total inorganic nitrogen, Total phosphorus (soluble and particulate).

3.4 Laboratory Measurement and Analysis

3.4.1 ALS Technichem (HK) Pty Ltd (HOKLAS Reg. No. 066), is 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
<i>E. coli</i>	DoE Section 7.8, 7.9.4.2& 7.9.4.4 plus in situ urease test	1 cfu/100mL
5-day Biochemical Oxygen Demand	APHA 5210B	1 mg/L
Total Suspended Solid	APHA 2540D	0.5 mg/L
Ammonia as N	APHA 4500 NH3: G	0.005 mg/L
Nitrate as N	APHA 4500 NO3: I	0.005 mg/L

Analysis Description	Method	Reporting limits
Nitrite as N	APHA 4500 NO ₂ 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 21 August 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	4.44	29.20	8.22	20.48	2.9	0.10	178.2
		S 1	4.37	29.10	8.21	20.43	2.9	0.15	178.4
		M 8.5	3.40	28.70	8.17	26.47	3.0	0.21	163.3
		M 8.5	3.41	28.70	8.17	26.22	2.9	0.23	170.7
		B 16	2.75	28.10	8.16	29.81	4.9	0.53	236.6
		B 16	2.75	28.10	8.16	29.74	5.5	0.50	244.4
B	14	S 1	4.04	29.09	8.20	22.18	2.9	0.08	129.8
		S 1	4.03	29.08	8.20	22.29	3.0	0.09	127.0
		M 7	3.39	28.60	8.17	26.79	2.9	0.41	223.3
		M 7	3.37	28.70	8.17	27.18	2.8	0.40	223.2
		B 13	2.88	28.20	8.16	29.16	2.8	0.32	238.0
		B 13	3.00	28.30	8.16	29.14	2.8	0.30	236.4
C	12	S 1	4.51	29.20	8.24	20.22	3.2	0.08	183.5
		S 1	4.42	29.30	8.23	20.18	3.2	0.11	207.5
		M 6	3.57	29.00	8.17	24.80	2.9	0.22	194.1
		M 6	3.53	29.10	8.20	24.70	3.0	0.20	188.3
		B 11	2.49	28.90	8.14	30.70	3.5	0.33	242.7
		B 11	2.37	28.30	8.13	30.30	3.5	0.33	249.1
D	13	S 1	4.44	29.51	8.23	20.54	3.0	0.23	144.4
		S 1	4.42	29.45	8.23	20.71	3.1	0.21	144.0
		M 6.5	3.96	29.21	8.20	22.54	3.1	0.19	152.6
		M 6.5	3.90	29.18	8.19	22.91	2.9	0.19	152.2
		B 12	2.15	27.95	8.13	31.50	10.0	0.31	221.0
		B 12	2.08	27.87	8.14	31.71	11.8	0.31	217.4
E	16	S 1	4.56	31.24	8.25	19.84	4.2	0.19	151.8
		S 1	4.57	30.80	8.26	20.37	4.4	0.18	151.5
		M 8	3.99	29.56	8.19	23.49	5.0	0.29	200.6
		M 8	3.87	29.49	8.19	23.60	5.0	0.17	200.4
		B 15	3.35	29.01	8.15	26.49	8.1	0.27	258.2
		B 15	3.04	28.92	8.14	27.08	8.8	0.20	230.9
F	23	S 1	4.80	29.62	8.28	21.04	5.5	0.23	160.5
		S 1	4.81	29.62	8.28	21.03	5.0	0.21	157.5
		M 11.5	4.12	29.29	8.21	23.11	4.2	0.32	185.3
		M 11.5	4.13	29.29	8.21	23.24	5.2	0.34	186.2
		B 22	3.70	28.98	8.19	25.23	5.1	0.20	181.7
		B 22	3.64	28.94	8.19	25.40	5.9	0.24	165.4
G	22	S 1	4.64	29.66	8.29	22.00	5.2	0.18	161.9
		S 1	4.65	29.61	8.28	21.95	5.1	0.22	166.4
		M 11	4.27	29.33	8.24	23.04	4.4	0.34	220.7

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Monitoring Station	Water Depth (m)	Sampling Depth (m)	Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
		M 11	4.24	29.30	8.24	23.06	4.3	0.38	231.2
		B 21	3.01	28.56	8.16	29.43	6.5	0.48	243.3
		B 21	2.79	28.45	8.16	29.67	6.8	0.46	245.9
H	19	S 1	4.70	29.57	8.29	21.95	4.9	0.26	143.4
		S 1	4.74	29.58	8.29	21.85	4.5	0.27	144.9
		M 9.5	4.23	29.25	8.24	23.10	4.7	0.33	189.6
		M 9.5	4.23	29.23	8.24	23.12	4.4	0.35	186.2
		B 18	2.76	28.19	8.17	29.60	7.2	0.53	189.7
		B 18	2.77	28.19	8.17	29.55	8.4	0.55	191.6

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	5.23	29.38	8.34	23.01	3.1	0.28	197.7
		S 1	5.19	29.49	8.32	23.06	3.2	0.22	174.3
		M 7.5	3.93	29.17	8.21	27.36	4.3	0.26	147.8
		M 7.5	4.01	29.15	8.22	27.33	4.3	0.26	167.1
		B 14	2.62	28.57	8.14	28.70	7.8	0.24	157.3
		B 14	2.71	28.58	8.14	28.05	8.1	0.26	150.2
B	14	S 1	4.70	29.11	8.28	24.98	2.5	0.29	217.3
		S 1	4.25	29.02	8.25	25.28	2.9	0.34	244.1
		M 7	3.54	28.74	8.21	26.92	3.1	0.25	141.2
		M 7	3.50	28.71	8.20	27.16	3.1	0.23	136.3
		B 13	2.16	27.90	8.14	31.32	14.3	0.10	112.3
		B 13	2.12	27.84	8.14	31.33	13.9	0.17	157.3
C	12	S 1	5.77	29.43	8.40	22.72	2.9	0.25	234.4
		S 1	5.72	29.42	8.39	22.76	3.1	0.08	252.3
		M 6	2.06	28.06	8.12	30.85	5.2	0.51	223.4
		M 6	2.01	27.99	8.12	30.91	5.1	0.34	200.3
		B 11	1.94	27.50	8.14	32.24	14.9	0.12	156.4
		B 11	1.95	27.43	8.14	32.24	15.5	0.08	184.4
D	14	S 1	4.88	29.08	8.32	24.05	2.9	0.20	238.8
		S 1	4.88	29.14	8.32	24.05	3.0	0.15	267.7
		M 7	3.84	28.73	8.18	28.22	5.0	0.61	232.0
		M 7	3.79	28.24	8.13	29.89	6.0	0.65	233.8
		B 13	2.00	27.47	8.15	32.53	19.5	0.21	222.7
		B 13	1.97	27.36	8.15	32.57	19.6	0.22	203.3
E	14	S 1	4.89	28.88	8.32	24.92	3.3	0.21	151.3
		S 1	4.90	29.01	8.32	24.50	3.2	0.13	138.8
		M 7	2.87	28.12	8.17	29.95	5.0	0.15	114.1
		M 7	2.84	28.15	8.18	29.34	6.1	0.10	106.3
		B 13	2.59	27.72	8.18	30.61	3.7	0.06	159.2
		B 13	2.60	27.72	8.18	30.57	3.6	0.09	192.3
F	18	S 1	5.24	29.12	8.26	23.94	3.1	0.34	232.0
		S 1	5.23	29.21	8.33	23.96	3.3	0.42	241.5
		M 9	2.93	28.27	8.29	29.39	5.4	0.23	185.9
		M 9	2.75	28.20	8.22	29.44	5.2	0.20	234.0



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	2.27	27.44	8.44	32.00	4.7	0.55	220.4
		B 17	2.23	27.33	8.60	32.21	4.0	0.49	230.9
G	13	S 1	4.77	29.16	8.29	24.15	2.8	0.10	142.8
		S 1	4.77	29.18	8.29	24.19	3.1	0.08	159.2
		M 6.5	3.46	28.60	8.20	27.16	3.4	0.07	188.4
		M 6.5	3.45	28.59	8.20	27.17	3.4	0.10	184.1
		B 12	2.52	27.83	8.16	30.95	5.3	0.09	210.9
		B 12	2.39	27.74	8.16	31.06	4.5	0.06	219.7
H	19	S 1	5.00	29.20	8.29	23.74	4.9	0.13	197.8
		S 1	4.97	29.23	8.29	23.75	5.0	0.13	174.0
		M 9.5	4.35	29.06	8.22	24.85	6.7	0.21	175.8
		M 9.5	4.20	29.05	8.22	24.88	6.2	0.18	173.3
		B 18	2.76	28.22	8.14	29.43	15.8	0.19	227.9
		B 18	2.63	28.10	8.14	29.64	16.3	0.20	218.2

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	2.8	0.093	0.225	0.885	1.200	160	0.05	1.0
		S 1	3.1	0.020	0.217	0.893	1.130	200	0.05	<1.0
		M 8.5	3.2	0.022	0.226	0.864	1.110	70	0.05	1.1
		M 8.5	3.2	0.045	0.221	0.879	1.140	90	0.06	<1.0
		B 16	4.4	0.023	0.159	0.595	0.777	60	0.04	<1.0
		B 16	4.0	0.024	0.174	0.668	0.866	30	0.04	<1.0
B	14	S 1	3.2	0.052	0.193	0.857	1.100	430	0.04	<1.0
		S 1	2.8	0.063	0.196	0.864	1.120	370	0.05	<1.0
		M 7	3.6	0.079	0.198	0.852	1.130	30	0.05	<1.0
		M 7	3.6	0.055	0.194	0.856	1.100	50	0.05	1.1
		B 13	4.7	0.061	0.186	0.760	1.010	100	0.04	<1.0
		B 13	5.5	0.041	0.183	0.810	1.030	140	0.05	<1.0
C	12	S 1	5.2	0.066	0.218	1.020	1.300	220	0.06	1.2
		S 1	5.8	0.050	0.225	1.000	1.280	170	0.06	<1.0
		M 6	5.0	0.082	0.225	0.994	1.300	150	0.06	<1.0
		M 6	5.5	0.068	0.197	0.912	1.180	110	0.05	<1.0
		B 11	5.7	0.066	0.199	0.841	1.100	260	0.05	<1.0
		B 11	6.0	0.048	0.194	0.804	1.040	200	0.05	<1.0
D	13	S 1	2.7	0.091	0.196	0.948	1.240	1100	0.06	<1.0
		S 1	2.9	0.078	0.222	0.913	1.210	950	0.06	1.2
		M 6.5	2.6	0.114	0.198	0.956	1.270	530	0.05	1.1
		M 6.5	2.9	0.084	0.215	0.928	1.230	610	0.05	1.2
		B 12	3.5	0.030	0.182	0.739	0.951	280	0.05	<1.0
		B 12	3.7	0.034	0.200	0.900	1.130	230	0.05	1.2
E	16	S 1	2.0	0.035	0.187	0.833	1.050	110	0.04	1.1

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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)
		S 1	2.0	0.028	0.178	0.852	1.060	170	0.04	1.1
		M 8	2.4	0.044	0.154	0.834	1.030	140	0.04	1.3
		M 8	2.1	0.042	0.165	0.834	1.040	80	0.04	1.4
		B 15	2.3	0.042	0.183	0.755	0.980	40	0.04	<1.0
		B 15	2.1	0.039	0.175	0.742	0.957	90	0.04	<1.0
F	23	S 1	2.3	0.061	0.182	0.778	1.020	390	0.05	<1.0
		S 1	2.3	0.059	0.169	0.726	0.954	320	0.05	<1.0
		M 11.5	2.2	0.042	0.186	0.824	1.050	30	0.05	1.2
		M 11.5	2.0	0.039	0.182	0.858	1.080	70	0.04	1.4
		B 22	3.4	0.060	0.176	0.725	0.962	130	0.04	1.1
		B 22	3.4	0.055	0.178	0.862	1.100	90	0.04	1.0
G	22	S 1	2.3	0.033	0.190	0.812	1.030	240	0.05	1.1
		S 1	1.8	0.046	0.186	0.811	1.040	200	0.04	1.1
		M 11	2.4	0.039	0.182	0.814	1.030	180	0.04	1.2
		M 11	2.2	0.059	0.185	0.813	1.060	230	0.05	1.1
		B 21	2.6	0.060	0.183	0.810	1.050	170	0.04	1.0
		B 21	2.4	0.044	0.186	0.806	1.040	130	0.04	1.0
H	19	S 1	2.7	0.043	0.174	0.810	1.030	140	0.05	1.0
		S 1	2.3	0.036	0.177	0.814	1.030	190	0.06	<1.0
		M 9.5	2.6	0.045	0.181	0.792	1.020	250	0.04	1.0
		M 9.5	2.6	0.044	0.182	0.791	1.020	190	0.05	<1.0
		B 18	3.4	0.048	0.183	0.819	1.050	540	0.05	<1.0
		B 18	3.1	0.026	0.182	0.813	1.020	660	0.05	<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	5.1	0.028	0.184	0.793	1.000	630	0.04	1.7
		S 1	5.0	0.020	0.177	0.800	0.996	720	0.06	1.6
		M 7.5	4.6	0.051	0.180	0.795	1.030	650	0.06	1.6
		M 7.5	5.0	0.039	0.165	0.804	1.010	540	0.06	1.2
		B 14	5.2	0.042	0.176	0.798	1.010	1200	0.06	1.6
		B 14	4.9	0.032	0.177	0.792	1.000	1500	0.05	1.6
B	14	S 1	3.6	0.041	0.152	0.791	0.984	120	0.04	2.0
		S 1	3.4	0.066	0.156	0.793	1.010	160	0.05	1.7
		M 7	6.0	0.038	0.155	0.791	0.984	60	0.04	1.8
		M 7	6.3	0.065	0.159	0.791	1.020	40	0.04	2.0
		B 13	6.4	0.081	0.148	0.797	1.030	80	0.06	2.0
		B 13	5.7	0.043	0.153	0.791	0.987	120	0.04	1.9
C	12	S 1	4.9	0.047	0.149	0.823	1.020	150	0.05	2.0
		S 1	5.4	0.026	0.159	0.812	0.997	90	0.05	1.9
		M 6	4.9	0.046	0.156	0.818	1.020	140	0.06	1.7
		M 6	4.7	0.030	0.151	0.824	1.000	110	0.05	1.8
		B 11	6.9	0.042	0.159	0.816	1.020	80	0.05	1.7
		B 11	6.8	0.049	0.157	0.849	1.050	50	0.06	2.0
D	14	S 1	5.0	0.034	0.148	0.795	0.977	40	0.04	1.7
		S 1	5.4	0.022	0.158	0.790	0.970	60	0.04	1.6
		M 7	6.8	0.042	0.158	0.784	0.983	100	0.05	1.5
		M 7	7.0	0.024	0.152	0.786	0.962	70	0.04	1.5

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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)
		B 13	8.8	0.029	0.161	0.768	0.958	30	0.04	1.6
		B 13	9.4	0.025	0.155	0.784	0.963	50	0.05	1.6
E	14	S 1	6.3	0.022	0.123	0.738	0.883	90	0.05	2.2
		S 1	6.0	0.021	0.129	0.741	0.892	50	0.05	2.0
		M 7	8.3	0.017	0.122	0.748	0.888	70	0.03	2.0
		M 7	8.5	0.022	0.129	0.738	0.889	130	0.03	2.1
		B 13	10.4	0.022	0.132	0.739	0.893	160	0.06	2.1
		B 13	10.0	0.022	0.117	0.748	0.886	120	0.06	2.1
F	18	S 1	7.9	0.052	0.129	0.705	0.886	170	0.05	1.5
		S 1	8.3	0.048	0.137	0.698	0.883	130	0.05	1.0
		M 9	9.0	0.032	0.133	0.701	0.866	630	0.04	1.3
		M 9	8.8	0.052	0.135	0.701	0.888	540	0.03	1.4
		B 17	10.1	0.058	0.131	0.704	0.893	260	0.05	1.3
		B 17	9.6	0.019	0.134	0.701	0.853	210	0.05	1.3
G	13	S 1	5.5	0.053	0.157	0.721	0.931	250	0.05	2.0
		S 1	5.1	0.059	0.160	0.704	0.923	330	0.03	1.1
		M 6.5	6.5	0.053	0.154	0.720	0.927	240	0.05	1.5
		M 6.5	6.4	0.050	0.155	0.720	0.926	160	0.05	1.6
		B 12	7.0	0.045	0.156	0.717	0.918	190	0.05	1.3
		B 12	6.8	0.052	0.154	0.724	0.931	230	0.05	2.6
H	19	S 1	4.6	0.105	0.150	0.756	1.010	30	0.05	1.6
		S 1	4.9	0.063	0.159	0.742	0.964	70	0.04	1.3
		M 9.5	6.0	0.069	0.163	0.735	0.966	380	0.05	1.2
		M 9.5	6.4	0.040	0.153	0.740	0.933	310	0.04	1.4
		B 18	6.3	0.091	0.152	0.740	0.984	340	0.05	1.4
		B 18	5.9	0.067	0.152	0.738	0.957	260	0.04	1.3

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 affected 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)		
21 August 2018	30.2	28.3	26.7	86	25.7

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 $\pm 1\text{m}$ 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 21 August 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	8.5	9.4	840	409	<0.10	31.9	23.7	30.1	0.06	18.1	85.6	11.2	0.21
B	8.4	3.2	960	504	0.15	51.8	69.6	50.7	0.15	28.7	123	15.9	0.46
C	8.4	11.6	1300	569	0.13	50.6	38.5	44.4	0.17	29.1	136	14.0	0.35
D	8.4	9.8	1250	537	0.11	50.4	39.8	45.0	0.15	29.9	135	14.0	0.32
E	8.4	12.6	1060	445	<0.10	49.4	40.9	42.6	0.10	28.6	131	12.1	0.36
F	8.4	30.1	270	600	<0.10	50.4	41.9	45.0	0.14	30.1	136	12.9	0.51
G	8.6	4.5	50	107	<0.10	24.7	40.9	24.2	<0.05	13.7	77.5	6.9	0.18
H	8.4	11.0	<10	49	0.11	46.3	46.2	40.1	0.11	26.9	121	12.7	0.33

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	0.76	2	25	42	31	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
B	0.86	1	18	49	32	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
C	0.86	0	3	61	36	Dark grey, slightly sandy SILT/CLAY
D	0.90	0	9	51	40	Dark grey, slightly sandy SILT/CLAY
E	1.08	0	5	59	36	Dark grey, slightly sandy SILT/CLAY with shell fragments
F	1.10	0	2	61	37	Dark grey, slightly sandy SILT/CLAY
G	0.88	0	12	54	34	Dark grey, slightly sandy SILT/CLAY with shell fragments
H	0.77	0	6	56	38	Dark grey, slightly sandy SILT/CLAY with shell fragments

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

4.10.3 Heavy marine traffic was observed nearby the Project site and its vicinity and affected the water 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)		
21 August 2018	30.2	28.3	26.7	86	25.7

Source: Hong Kong Observatory

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

Table 4.7 Summary of benthic survey data on 14 June 2018

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	28	22.18	20	2.92	0.97
B	20	3.16	16	2.72	0.98
C	27	6.70	17	2.64	0.93
D	25	1.34	13	2.40	0.93
E	39	12.11	20	2.74	0.91
F	27	9.31	14	2.44	0.92
G	40	4.97	21	2.76	0.91
H	17	4.22	11	2.26	0.94
TOTAL	223	63.99	52		

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

i) Abundance

A total of 223 macrobenthic organisms were collected from the eight monitoring stations during the August 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 26 individuals (ind.) compared to the June 2018 monitoring results. Macrobenthic abundance showed decreasing trend since the wet season (August 2004) baseline monitoring albeit insignificant (p -value = 0.38 ; F crit = 2.94 ; 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 and August 2018 monitoring periods. Wave action 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 substantially affected by these disturbances as shown in their decreasing abundance since April 2018 monitoring period.

Across monitoring stations, the distribution of macrobenthic abundance is significantly variable (p -value = 0.03 ; F crit = 2.42 ; α = 0.05). As previously reported, the number of macrobenthic organisms might be correlated with the particle or grain size distribution as relatively higher abundances were recorded in stations with moderately sorted sediments and lower abundances in well-sorted sediments. Well-sorted sediments can only provide a smaller range of grain sizes and of interstitial spaces limiting the niches for benthic organisms (Gray 1974); thus, the lower abundances at stations with relatively homogenous grain size distribution. However, for the present monitoring period, no clear correlation between the abundances and sediment characteristics was observed which might due to the constant re-working of sediments brought about by the series of weather disturbances affecting the sampling stations.

ii) Biomass

The total wet biomass for all the eight monitoring stations during the August 2018 monitoring period was 63.99g, which is less than the biomass recorded during the

previous monitoring periods. The decrease in total wet biomass (from April 2018 to August 2018) might be attributed to the parallel decline in the abundance of bivalves brought about by the series of weather disturbances that have impacted the sampling stations week(s) before the sampling activities.

The highest biomass continued to be observed in Station A (22.18g) and the lowest this present monitoring period is at the impact station, Station D (1.34g). Highest biomass remained at Station A because of the bivalves, *Ruditapes philippinarum* and *Paphia undulata*, remained to contribute significantly to the total wet biomass due to their larger sizes despite the decline in their abundance. Biomass generally decreased in all stations except at Station C and Station F due to the shift in the macrobenthic assemblage, which is currently dominated by smaller organisms (i.e. annelids).

iii) Taxonomic Composition

A total of seven phyla comprised of 37 families and 52 taxa were identified during the August 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 65.02% of the sampled population. The intermediate disturbance in the form of wave action generated by the weather disturbances, as previously reported, might have cleared existing habitats providing opportunities for smaller benthic organisms such as polychaetes to colonize the area. A study shows that disturbance generated by episodic strong currents ("benthic storms") was linked to high species dominance by polychaetes (58-64% ampharetids), bivalves, isopods and tanaids (Thistle et al.1985).

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

Station G remained to have the highest number of taxa (21) identified, followed by Station A and Station E both each have 20 taxa. The relatively higher number of taxa identified were mainly contributed by the species of polychaetes recorded at these stations. Station H had the lowest number (11) of taxa identified. Interestingly, the number of taxa in the impact stations (Station C and Station D) is increasing since April 2018 monitoring period.

iv) Diversity

Diversity indices (H') for the August 2018 monitoring period ranged from low (2.26 at Station H) to moderate (2.92 at Station A). Compared to the baseline and previous monitoring periods, increase in diversity in all stations (except at Station G) was observed. This increase might be due to the colonization of opportunistic species (i.e. annelids) of the new habitats made available by wave actions caused by weather disturbances. The increase in diversity consequently increase homogeneity of the benthic communities as showed by their high Evenness (J) Index.

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

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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 21 August 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 H₂S measurement and olfactometry analysis were considered as unsuitable method to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to 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 H₂S 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. H₂S concentration monitoring, odour patrol monitoring and olfactometry analysis, was temporary suspended and no monitoring was carried out in the reporting period. No exceedances of Action/Limit levels at ASR were recorded as no complaint was received during the reporting period.
- 11.1.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). Due to non-ideal wind direction or domination of non-target smell during the measurements conducted between August 2017 and May 2018, inadequacy of representative data was result between August 2017 and May 2018. Current H₂S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H₂S concentration (ppb) with the odour unit (OU/m³). In order to assess whether SHWSTW is the major H₂S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H₂S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval. Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspended until alternative methods of correlation study was approved by EPD. The temporary suspension was approved by EPD's memo dated 14 May 2018.
- 11.1.3 Water quality monitoring, sediment quality monitoring and benthic survey were conducted on 21 August 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 was observed nearby the Project site and its vicinity and affected the water 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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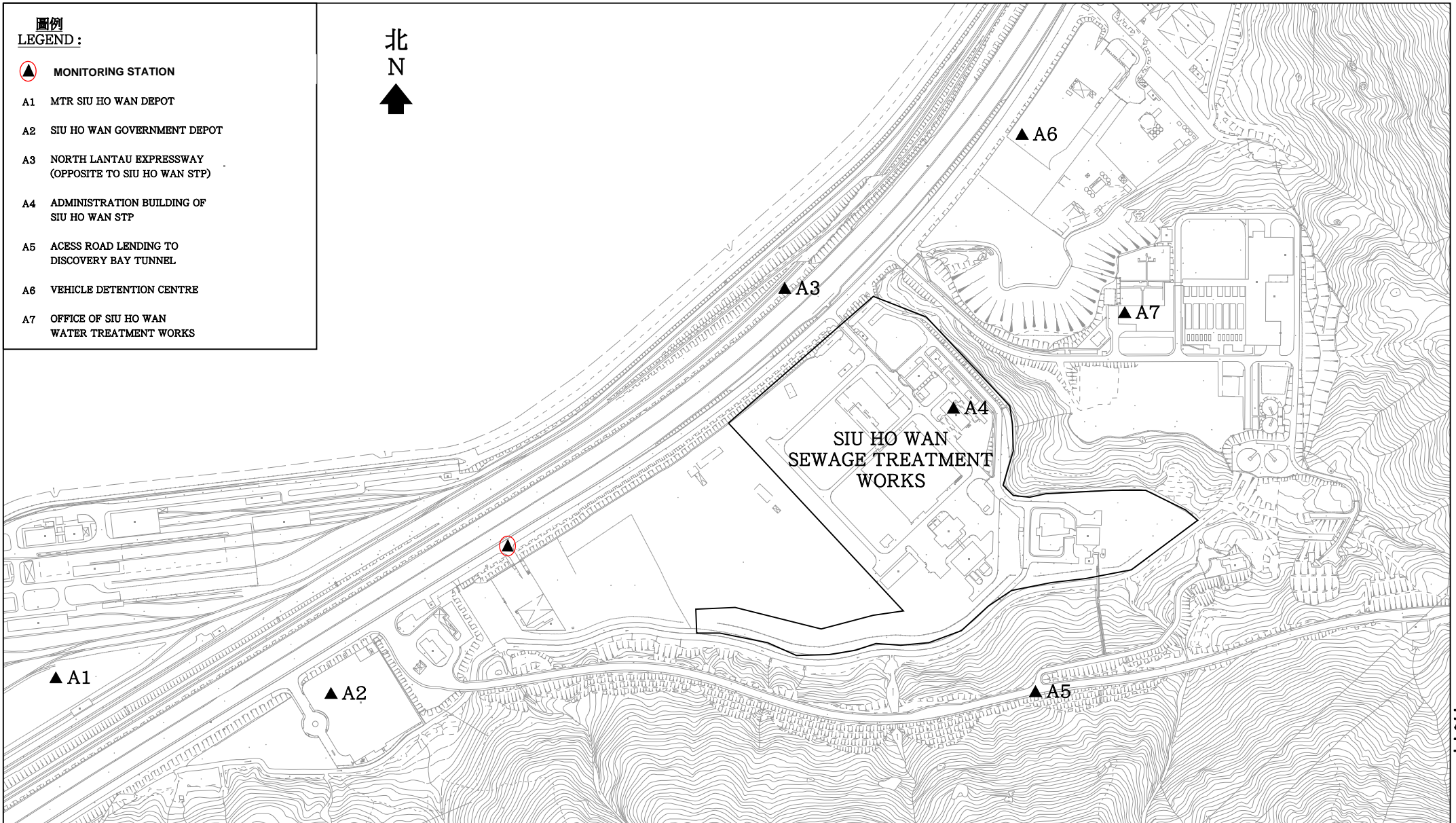
Report No.: 0041/17/ED/0357A


Figure 1

Monitoring Stations of Air Sensitive Receivers

圖例
LEGEND :

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



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

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Figure 2

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



816000E

818000E

820000E

822000E

822000N

大小磨刀
BROTHERS

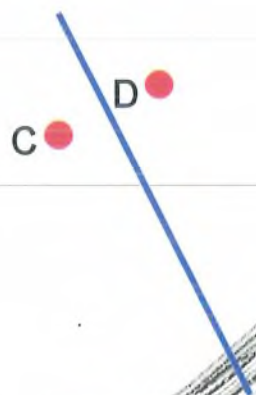
820000N

CO-ORDINATES OF CONTROL STATIONS :

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

CO-ORDINATES OF IMPACT STATIONS :

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

圖例
LEGEND :

- IMPACT STATION
- ⊕ CONTROL STATION
- SUBMARINE OUTFALL

圖則名稱 drawing title

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

繪畫 drawn

H.K. LAI

日期 date
06-02-2004

核對 checked

C.K. LAM

日期 date
04-03-2004

批核 approved

S.K. WONG

日期 date
04-03-2004

部門 office

顧問工程管理部

CONSULTANTS MANAGEMENT DIVISION

圖則編號 drawing no.

DCM/2004/002

比例 scale

N.T.S.

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DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION

FUGRO TECHNICAL SERVICES LIMITED

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Report No.: 0041/17/ED/0357A

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

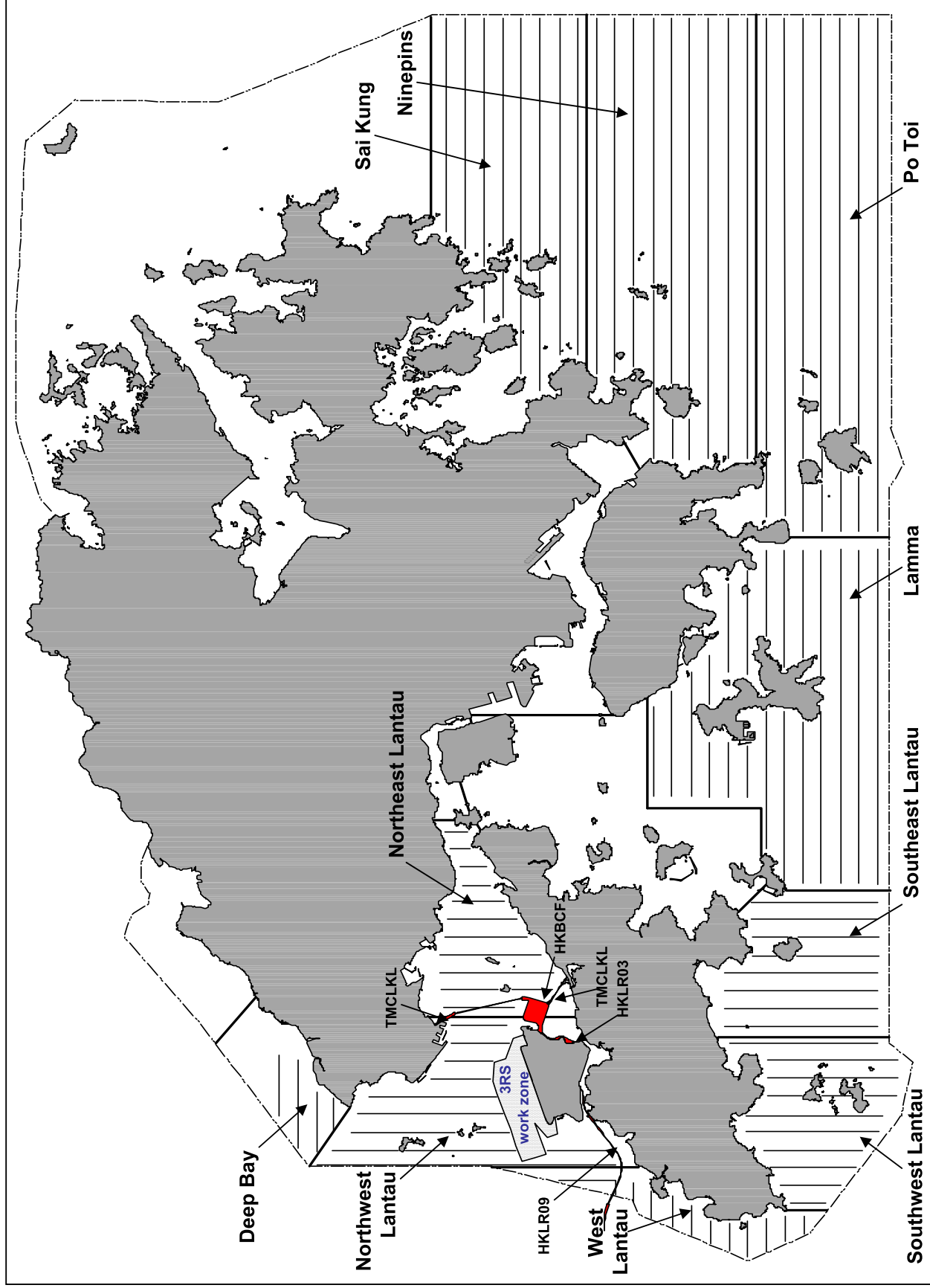


Figure 4. Ten Line-Transect Survey Areas within the Study Area for the 2017-18 Monitoring Study

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

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Appendix A Project Organization Chart

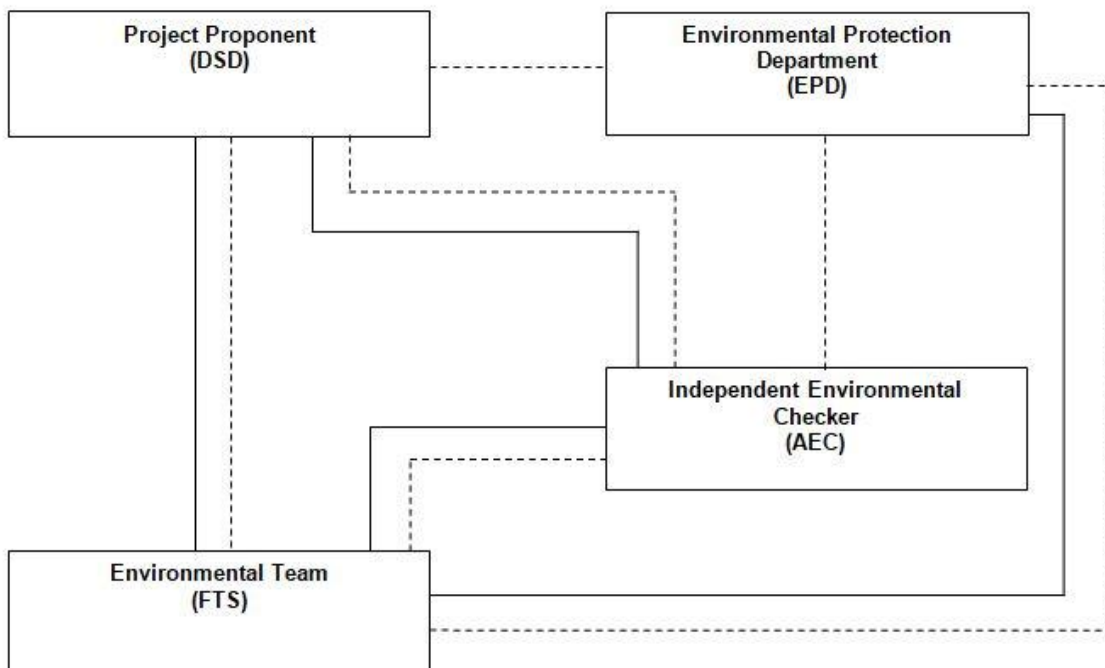
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Legend:
— Line of Reporting
- - - Line of Communication

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Appendix B

Monitoring Schedule for Present and Next Reporting Period

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Monitoring Schedule for the Present Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
			1 August	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Ebb (09:33) Mid-Flood (17:05)	22	23	24	25
26	27	28	29	30	31	

Remarks

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

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Report No.: 0041/17/ED/0357A

Monitoring Schedule for the Next Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
						1 September
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

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

Report No. : 142626WA181114(1)



Page 1 of 3

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

Information Supplied by Client

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

Laboratory Information

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

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

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Website : www.fugro.com



Report No. : 142626WA181114(1)

Page 2 of 3

Results :**A. pH calibration**

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

B. Salinity calibration

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

C. Dissolved Oxygen calibration

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

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

Certified by : 

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

Date : 10/7/2018

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

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MaterialLab

Report No. : 142626WA181114(1)

Page 3 of 3

Results :

D. Temperature calibration

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

E. Turbidity calibration

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

Certified by : 

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

Date : 10/7/2018

** End of Report **

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

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MaterialLab

Report No. : 142626WA181114



Page 1 of 3

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

Information Supplied by Client

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

Laboratory Information

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

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

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Report No. : 142626WA181114

Page 2 of 3

Results :

A. pH calibration

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

B. Salinity calibration

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

C. Dissolved Oxygen calibration

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

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

Certified by : 

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

Date : 10/7/2018

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

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Report No. : 142626WA181114

Page 3 of 3

Results :


D. Temperature calibration

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

E. Turbidity calibration

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

Certified by :


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

Date

: 10/7/2018

** End of Report **

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



a xylem brand

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

Certificate of Calibration

TEST REPORT

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

POWER TEST

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

NOISE TEST

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

VERIFICATION

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

OPTIONS

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

Verified by: **ainthasane**

This report was generated on 5/24/2017.

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

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

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

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

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

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

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

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Appendix E

Results and Graphical Presentation of Water Quality Monitoring

Water Quality Monitoring Data

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 (soluble 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	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:04	17	S	1	1	8.22	20.48	29.20	65.9	4.44	2.9	0.10	178.2	2.8	0.093	0.225	0.885	1.200	160	0.05	1.0
A	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:04	17	S	1	2	8.21	20.43	29.10	64.9	4.37	2.9	0.15	178.4	3.1	0.020	0.217	0.893	1.130	200	0.05	<1.0
A	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:04	17	M	8.5	1	8.17	26.47	28.70	51.7	3.40	3.0	0.21	163.3	3.2	0.022	0.226	0.864	1.110	70	0.05	1.1
A	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:04	17	M	8.5	2	8.17	26.22	28.70	51.9	3.41	2.9	0.23	170.7	3.2	0.045	0.221	0.879	1.140	90	0.06	<1.0
A	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:04	17	B	16	1	8.16	29.81	28.10	42.2	2.75	4.9	0.53	236.6	4.4	0.023	0.159	0.595	0.777	60	0.04	<1.0
A	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:04	17	B	16	2	8.16	29.74	28.10	42.0	2.75	5.5	0.50	244.4	4.0	0.024	0.174	0.668	0.866	30	0.04	<1.0
B	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:38	14	S	1	1	8.20	22.18	29.09	60.7	4.04	2.9	0.08	129.8	3.2	0.052	0.193	0.857	1.100	430	0.04	<1.0
B	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:38	14	S	1	2	8.20	22.29	29.08	60.5	4.03	3.0	0.09	127.0	2.8	0.063	0.196	0.864	1.120	370	0.05	<1.0
B	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:38	14	M	7	1	8.17	26.79	28.60	51.6	3.39	2.9	0.41	223.3	3.6	0.079	0.198	0.852	1.130	30	0.05	<1.0
B	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:38	14	M	7	2	8.17	27.18	28.70	51.4	3.37	2.8	0.40	223.2	3.6	0.055	0.194	0.856	1.100	50	0.05	1.1
B	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:38	14	B	13	1	8.16	29.16	28.20	44.1	2.88	2.8	0.32	238.0	4.7	0.061	0.186	0.760	1.010	100	0.04	<1.0
B	21/8/2018	Mid-Ebb	Cloudy	Moderate	8:38	14	B	13	2	8.16	29.14	28.30	45.8	3.00	2.8	0.30	236.4	5.5	0.041	0.183	0.810	1.030	140	0.05	<1.0
C	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:03	12	S	1	1	8.24	20.22	29.20	66.8	4.51	3.2	0.08	183.5	5.2	0.066	0.218	1.020	1.300	220	0.06	1.2
C	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:03	12	S	1	2	8.23	20.18	29.30	65.6	4.42	3.2	0.11	207.5	5.8	0.050	0.225	1.000	1.280	170	0.06	<1.0
C	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:03	12	M	6	1	8.17	24.80	29.00	54.1	3.57	2.9	0.22	194.1	5.0	0.082	0.225	0.994	1.300	150	0.06	<1.0
C	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:03	12	M	6	2	8.20	24.70	29.10	53.4	3.53	3.0	0.20	188.3	5.5	0.068	0.197	0.912	1.180	110	0.05	<1.0
C	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:03	12	B	11	1	8.14	30.70	28.90	38.7	2.49	3.5	0.33	242.7	5.7	0.066	0.199	0.841	1.100	260	0.05	<1.0
C	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:03	12	B	11	2	8.13	30.30	28.30	38.6	2.37	3.5	0.33	249.1	6.0	0.048	0.194	0.804	1.040	200	0.05	<1.0
D	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:16	13	S	1	1	8.13	20.54	29.51	66.0	4.44	3.0	0.23	144.4	2.7	0.091	0.196	0.948	1.240	1100	0.06	<1.0
D	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:16	13	S	1	2	8.23	20.71	29.45	65.8	4.42	3.1	0.21	144.0	2.9	0.078	0.222	0.913	1.210	950	0.06	1.2
D	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:16	13	M	6.5	1	8.20	22.54	29.21	59.4	3.96	3.1	0.19	152.6	2.6	0.114	0.198	0.956	1.270	530	0.05	1.1
D	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:16	13	M	6.5	2	8.19	22.91	29.18	58.7	3.90	2.9	0.19	152.2	2.9	0.084	0.215	0.928	1.230	610	0.05	1.2
D	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:16	13	B	12	1	8.13	31.50	27.95	33.2	2.15	10.0	0.31	221.0	3.5	0.030	0.182	0.739	0.951	280	0.05	<1.0
D	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:16	13	B	12	2	8.14	31.71	27.87	32.1	2.08	11.8	0.31	217.4	3.7	0.034	0.200	0.900	1.130	230	0.05	1.2
E	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:46	16	S	1	1	8.25	19.84	31.24	69.5	4.56	4.2	0.19	151.8	2.0	0.035	0.187	0.833	1.050	110	0.04	1.1
E	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:46	16	S	1	2	8.26	20.37	30.80	69.5	4.57	4.4	0.18	151.5	2.0	0.028	0.178	0.852	1.060	170	0.04	1.1
E	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:46	16	M	8	1	8.19	23.49	29.56	60.4	3.99	5.0	0.29	200.6	2.4	0.044	0.154	0.834	1.030	140	0.04	1.3
E	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:46	16	M	8	2	8.19	23.60	29.49	58.7	3.87	5.0	0.17	200.4	2.1	0.042	0.165	0.834	1.040	80	0.04	1.4
E	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:46	16	B	15	1	8.15	26.49	29.01	51.3	3.35	8.1	0.27	258.2	2.3	0.042	0.183	0.755	0.980	40	0.04	<1.0
F	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:46	16	B	15	2	8.14	27.08	28.92	46.6	3.04	8.8	0.20	230.9	2.1	0.039	0.175	0.742	0.957	90	0.04	<1.0
F	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:52	23	S	1	1	8.28	21.04	29.62	71.8	4.80	5.5	0.23	160.5	2.3	0.061	0.182	0.778	1.020	390	0.05	<1.0
F	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:52	23	S	1	2	8.28	21.03	29.62	71.9	4.81	5.0	0.21	157.5	2.3	0.059	0.169	0.726	0.954	320	0.05	<1.0
F	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:52	23	M	11.5	1	8.21	23.11	29.29	62.0	4.12	4.2	0.32	185.3	2.2	0.042	0.186	0.824	1.050	30	0.05	1.2
F	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:52	23	M	11.5	2	8.21	23.24	29.29	62.2	4.13	5.2	0.34	186.2	2.0	0.039	0.182	0.858	1.080	70	0.04	1.4
F	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:52	23	B	22	1	8.19	25.23	28.98	56.1	3.70	5.1	0.20	181.7	3.4	0.060	0.176	0.725	0.962	130	0.04	1.1
F	21/8/2018	Mid-Ebb	Cloudy	Moderate	9:52	23	B	22	2	8.19	25.40	28.94	55.2	3.64	5.9	0.24	165.4	3.4	0.055	0.178	0.862	1.100	90	0.04	1.0
G	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:22	22	S	1	1	8.29	22.00	29.66	69.9	4.64	5.2	0.18	161.9	2.3	0.033	0.190	0.812	1.030	240	0.05	1.1
G	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:22	22	S	1	2	8.28	21.95	29.61	69.8	4.65	5.1	0.22	166.4	1.8	0.046	0.186	0.811	1.040	200	0.04	1.1
G	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:22	22	M	11	1	8.24	23.04	29.33	64.3	4.27	4.4	0.34	220.7	2.4	0.039	0.182	0.814	1.030	180	0.04	1.2
G	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:22	22	M	11	2	8.24	23.06	29.30	63.8	4.24	4.3	0.38	231.2	2.2	0.059	0.185	0.813	1.060	230	0.05	1.1
G	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:22	22	B	21	1	8.16	29.43	28.56	46.5	3.01	6.5	0.48	243.3	2.6	0.060	0.183	0.810	1.050	170	0.04	1.0
G	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:22	22	B	21	2	8.16	29.67	28.45	43.2	2.79	6.8	0.46	245.9	2.4	0.044	0.186	0.806	1.040	130	0.04	1.0
H	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:30	19	S	1	1	8.29	21.95	29.57	70.6	4.70	4.9	0.26	143.4	2.7	0.043	0.174	0.810	1.030	140	0.05	1.0
H	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:30	19	S	1	2	8.29	21.85	29.58	71.2	4.74	4.5	0.27	144.9	2.3	0.036	0.177	0.814	1.030	190	0.06	<1.0
H	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:30	19	M	9.5	1	8.24	23.10	29.25	63.6	4.23	4.7	0.33	189.6	2.6	0.045	0.181	0.792	1.020	250	0.04	1.0
H	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:30	19	M	9.5	2	8.24	23.12	29.23	63.6	4.23	4.4	0.35	186.2	2.6	0.044	0.182	0.791	1.020	190	0.05	<1.0
H	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:30	19	B	18	1	8.17	29.60	28.19	42.5	2.76	7.2	0.53	189.7	3.4	0.048	0.183	0.819	1.050	540	0.05	<1.0
H	21/8/2018	Mid-Ebb	Cloudy	Moderate	10:30	19	B	18	2	8.17	29.55	28.19	42.6	2.77	8.4	0.55	191.6	3.1	0.026	0.182	0.813	1.020	660	0.05	<1.0

Water Quality Monitoring Data

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 (soluble 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	21/8/2018	Mid-Flood	Cloudy	Moderate	17:50	15	S	1	1	8.34	23.01	29.38	78.8	5.23	3.1	0.28	197.7	5.1	0.028	0.184	0.793	1.000	630	0.04	1.7
A	21/8/2018	Mid-Flood	Cloudy	Moderate	17:50	15	S	1	2	8.32	23.06	29.49	78.4	5.19	3.2	0.22	174.3	5.0	0.020	0.177	0.800	0.996	720	0.06	1.6
A	21/8/2018	Mid-Flood	Cloudy	Moderate	17:50	15	M	7.5	1	8.21	27.36	29.17	60.5	3.93	4.3	0.26	147.8	4.6	0.051	0.180	0.795	1.030	650	0.06	1.6
A	21/8/2018	Mid-Flood	Cloudy	Moderate	17:50	15	M	7.5	2	8.22	27.33	29.15	61.3	4.01	4.3	0.26	167.1	5.0	0.039	0.165	0.804	1.010	540	0.06	1.2
A	21/8/2018	Mid-Flood	Cloudy	Moderate	17:50	15	B	14	1	8.14	28.70	28.57	40.4	2.62	7.8	0.24	157.3	5.2	0.042	0.176	0.798	1.010	1200	0.06	1.6
A	21/8/2018	Mid-Flood	Cloudy	Moderate	17:50	15	B	14	2	8.14	28.05	28.58	41.6	2.71	8.1	0.26	150.2	4.9	0.032	0.177	0.792	1.000	1500	0.05	1.6
B	21/8/2018	Mid-Flood	Cloudy	Moderate	17:36	14	S	1	1	8.28	24.98	29.11	71.4	4.70	2.5	0.29	217.3	3.6	0.041	0.152	0.791	0.984	120	0.04	2.0
B	21/8/2018	Mid-Flood	Cloudy	Moderate	17:36	14	S	1	2	8.25	25.28	29.02	64.5	4.25	2.9	0.34	244.1	3.4	0.066	0.156	0.793	1.010	160	0.05	1.7
B	21/8/2018	Mid-Flood	Cloudy	Moderate	17:36	14	M	7	1	8.21	26.92	28.74	54.0	3.54	3.1	0.25	141.2	6.0	0.038	0.155	0.791	0.984	60	0.04	1.8
B	21/8/2018	Mid-Flood	Cloudy	Moderate	17:36	14	M	7	2	8.20	27.16	28.71	53.5	3.50	3.1	0.23	136.3	6.3	0.065	0.159	0.791	1.020	40	0.04	2.0
B	21/8/2018	Mid-Flood	Cloudy	Moderate	17:36	14	B	13	1	8.14	31.32	27.90	33.5	2.16	14.3	0.10	112.3	6.4	0.081	0.148	0.797	1.030	80	0.06	2.0
B	21/8/2018	Mid-Flood	Cloudy	Moderate	17:36	14	B	13	2	8.14	31.33	27.84	32.7	2.12	13.9	0.17	157.3	5.7	0.043	0.153	0.791	0.987	120	0.04	1.9
C	21/8/2018	Mid-Flood	Cloudy	Moderate	17:14	12	S	1	1	8.40	22.72	29.43	86.8	5.77	2.9	0.25	234.4	4.9	0.047	0.149	0.823	1.020	150	0.05	2.0
C	21/8/2018	Mid-Flood	Cloudy	Moderate	17:14	12	S	1	2	8.39	22.76	29.42	86.1	5.72	3.1	0.08	252.3	5.4	0.026	0.159	0.812	0.997	90	0.05	1.9
C	21/8/2018	Mid-Flood	Cloudy	Moderate	17:14	12	M	6	1	8.12	30.85	28.06	31.9	2.06	5.2	0.51	223.4	4.9	0.046	0.156	0.818	1.020	140	0.06	1.7
C	21/8/2018	Mid-Flood	Cloudy	Moderate	17:14	12	M	6	2	8.12	30.91	27.99	31.1	2.01	5.1	0.34	200.3	4.7	0.030	0.151	0.824	1.000	110	0.05	1.8
C	21/8/2018	Mid-Flood	Cloudy	Moderate	17:14	12	B	11	1	8.14	32.24	27.50	30.1	1.94	14.9	0.12	156.4	6.9	0.042	0.159	0.816	1.020	80	0.05	1.7
C	21/8/2018	Mid-Flood	Cloudy	Moderate	17:14	12	B	11	2	8.14	32.24	27.43	30.1	1.95	15.5	0.08	184.4	6.8	0.049	0.157	0.849	1.050	50	0.06	2.0
D	21/8/2018	Mid-Flood	Cloudy	Moderate	17:05	14	S	1	1	8.32	24.05	29.08	73.6	4.88	2.9	0.20	238.8	5.0	0.034	0.148	0.795	0.977	40	0.04	1.7
D	21/8/2018	Mid-Flood	Cloudy	Moderate	17:05	14	S	1	2	8.32	24.05	29.14	73.7	4.88	3.0	0.15	267.7	5.4	0.022	0.158	0.790	0.970	60	0.04	1.6
D	21/8/2018	Mid-Flood	Cloudy	Moderate	17:05	14	M	7	1	8.18	28.22	28.73	59.1	3.84	5.0	0.61	232.0	6.8	0.042	0.158	0.784	0.983	100	0.05	1.5
D	21/8/2018	Mid-Flood	Cloudy	Moderate	17:05	14	M	7	2	8.13	29.89	28.24	58.2	3.79	6.0	0.65	233.8	7.0	0.024	0.152	0.786	0.962	70	0.04	1.5
D	21/8/2018	Mid-Flood	Cloudy	Moderate	17:05	14	B	13	1	8.15	32.53	27.47	30.9	2.00	19.5	0.21	222.7	8.8	0.029	0.161	0.768	0.958	30	0.04	1.6
D	21/8/2018	Mid-Flood	Cloudy	Moderate	17:05	14	B	13	2	8.15	32.57	27.36	30.5	1.97	19.6	0.22	203.3	9.4	0.025	0.155	0.784	0.963	50	0.05	1.6
E	21/8/2018	Mid-Flood	Cloudy	Moderate	16:43	14	S	1	1	8.32	24.92	28.88	73.9	4.89	3.3	0.21	151.3	6.3	0.022	0.123	0.738	0.883	90	0.05	2.2
E	21/8/2018	Mid-Flood	Cloudy	Moderate	16:43	14	S	1	2	8.32	24.50	29.01	74.0	4.90	3.2	0.13	138.8	6.0	0.021	0.129	0.741	0.892	50	0.05	2.0
E	21/8/2018	Mid-Flood	Cloudy	Moderate	16:43	14	M	7	1	8.17	29.95	28.12	44.2	2.87	5.0	0.15	114.1	8.3	0.017	0.122	0.748	0.888	70	0.03	2.0
E	21/8/2018	Mid-Flood	Cloudy	Moderate	16:43	14	M	7	2	8.18	29.34	28.15	43.5	2.84	6.1	0.10	106.3	8.5	0.022	0.129	0.738	0.889	130	0.03	2.1
E	21/8/2018	Mid-Flood	Cloudy	Moderate	16:43	14	B	13	1	8.18	30.61	27.72	39.8	2.59	3.7	0.06	159.2	10.4	0.022	0.132	0.739	0.893	160	0.06	2.1
F	21/8/2018	Mid-Flood	Cloudy	Moderate	16:43	14	B	13	2	8.18	30.57	27.72	39.9	2.60	3.6	0.09	192.3	10.0	0.022	0.117	0.748	0.886	120	0.06	2.1
F	21/8/2018	Mid-Flood	Cloudy	Moderate	16:36	18	S	1	1	8.26	23.94	29.12	79.0	5.24	3.1	0.34	232.0	7.9	0.052	0.129	0.705	0.886	170	0.05	1.5
F	21/8/2018	Mid-Flood	Cloudy	Moderate	16:36	18	S	1	2	8.33	23.96	29.21	79.0	5.23	3.3	0.42	241.5	8.3	0.048	0.137	0.698	0.883	130	0.05	1.0
F	21/8/2018	Mid-Flood	Cloudy	Moderate	16:36	18	M	9	1	8.29	29.39	28.27	45.1	2.93	5.4	0.23	185.9	9.0	0.032	0.133	0.701	0.866	630	0.04	1.3
F	21/8/2018	Mid-Flood	Cloudy	Moderate	16:36	18	M	9	2	8.22	29.44	28.20	42.3	2.75	5.2	0.20	234.0	8.8	0.052	0.135	0.701	0.888	540	0.03	1.4
F	21/8/2018	Mid-Flood	Cloudy	Moderate	16:36	18	B	17	1	8.44	32.00	27.44	35.1	2.27	4.7	0.55	220.4	10.1	0.058	0.131	0.704	0.893	260	0.05	1.3
F	21/8/2018	Mid-Flood	Cloudy	Moderate	16:36	18	B	17	2	8.60	32.21	27.33	34.4	2.23	4.0	0.49	230.9	9.6	0.019	0.134	0.701	0.853	210	0.05	1.3
G	21/8/2018	Mid-Flood	Cloudy	Moderate	16:16	13	S	1	1	8.29	24.15	29.16	72.1	4.77	2.8	0.10	142.8	5.5	0.053	0.157	0.721	0.931	250	0.05	2.0
G	21/8/2018	Mid-Flood	Cloudy	Moderate	16:16	13	S	1	2	8.29	24.19	29.18	72.2	4.77	3.1	0.08	159.2	5.1	0.059	0.160	0.704	0.923	330	0.03	1.1
G	21/8/2018	Mid-Flood	Cloudy	Moderate	16:16	13	M	6.5	1	8.20	27.16	28.60	52.8	3.46	3.4	0.07	188.4	6.5	0.053	0.154	0.720	0.927	240	0.05	1.5
G	21/8/2018	Mid-Flood	Cloudy	Moderate	16:16	13	M	6.5	2	8.20	27.17	28.59	52.6	3.45	3.4	0.10	184.1	6.4	0.050	0.155	0.720	0.926	160	0.05	1.6
G	21/8/2018	Mid-Flood	Cloudy	Moderate	16:16	13	B	12	1	8.16	30.95	27.83	38.9	2.52	5.3	0.09	210.9	7.0	0.045	0.156	0.717	0.918	190	0.05	1.3
G	21/8/2018	Mid-Flood	Cloudy	Moderate	16:16	13	B	12	2	8.16	31.06	27.74	36.9	2.39	4.5	0.06	219.7	6.8	0.052	0.154	0.724	0.931	230	0.05	2.6
H	21/8/2018	Mid-Flood	Cloudy	Moderate	16:06	19	S	1	1	8.29	23.74	29.20	75.4	5.00	4.9	0.13	197.8	4.6	0.105	0.150	0.756	1.010	30	0.05	1.6
H	21/8/2018	Mid-Flood	Cloudy	Moderate	16:06	19	S	1	2	8.29	23.75	29.23	75.1	4.97	5.0	0.13	174.0	4.9	0.063	0.159	0.742	0.864	70	0.04	1.3
H	21/8/2018	Mid-Flood	Cloudy	Moderate	16:06	19	M	9.5	1	8.22	24.85	29.06	65.9	4.35	6.7	0.21	175.8	6.0	0.069	0.163	0.735	0.866	380	0.05	1.2
H	21/8/2018	Mid-Flood	Cloudy	Moderate	16:06	19	M	9.5	2	8.22	24.88	29.05	63.6	4.20	6.2	0.18	173.3	6.4	0.040	0.153	0.740	0.833	310	0.04	1.4
H	21/8/2018	Mid-Flood	Cloudy	Moderate	16:06	19	B	18	1	8.14	29.43	28.22	42.4	2.76	15.8	0.19	227.9	6.3	0.091	0.152	0.740	0.884	340	0.05	1.4
H	21/8/2018	Mid-Flood	Cloudy	Moderate	16:06	19	B	18	2	8.14	29.64	28.10	40.5	2.63	16.3	0.20	218.2	5.9	0.067	0.152	0.738	0.957	260	0.04	1.3



CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 28
Contact	: MR CYRUS LAI	Contact	: Richard Fung	Work Order	: HK1843485
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	: 21-Aug-2018		
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 04-Sep-2018
C-O-C number	: —			No. of samples received	: 96
Site	: —			No. of samples analysed	: 96

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

<i>Signatories</i>	<i>Position</i>	<i>Authorised results for</i>
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 21-Aug-2018 to 04-Sep-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: HK1843485

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 19:45. Microbiological sample(s), in 125mL plastic bottle labelled sterile, with addition of sodium thiosulfate solution.

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

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



Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				A/S/E	A/S/E/Dup	A/M/E	A/M/E/Dup	A/B/E
				21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-001	HK1843485-002	HK1843485-003	HK1843485-004	HK1843485-005
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	2.8	3.1	3.2	3.2	4.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.093	0.020	0.022	0.045	0.023
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.225	0.217	0.226	0.221	0.159
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.885	0.893	0.864	0.879	0.595
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.20	1.13	1.11	1.14	0.777
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.06	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.03	0.03	0.03	0.04
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.0	<1.0	1.1	<1.0	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	160	200	70	90	60



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-006	HK1843485-007	HK1843485-008	HK1843485-009	HK1843485-010	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.0	3.2	2.8	3.6	3.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.024	0.052	0.063	0.079	0.055	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.174	0.193	0.196	0.198	0.194	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.668	0.857	0.864	0.852	0.856	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.866	1.10	1.12	1.13	1.10	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	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	<1.0	<1.0	<1.0	1.1	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	30	430	370	30	50	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-011	HK1843485-012	HK1843485-013	HK1843485-014	HK1843485-015	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.7	5.5	5.2	5.8	5.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.061	0.041	0.066	0.050	0.082	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.186	0.183	0.218	0.225	0.225	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.760	0.810	1.02	1.00	0.994	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.01	1.03	1.30	1.28	1.30	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.06	0.06	0.06	
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	1.2	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	100	140	220	170	150	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-016	HK1843485-017	HK1843485-018	HK1843485-019	HK1843485-020	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.5	5.7	6.0	2.7	2.9	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.068	0.066	0.048	0.091	0.078	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.197	0.199	0.194	0.196	0.222	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.912	0.841	0.804	0.948	0.913	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.18	1.10	1.04	1.24	1.21	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.06	0.06	
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	1.2	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	110	260	200	1100	950	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-021	HK1843485-022	HK1843485-023	HK1843485-024	HK1843485-025	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	2.6	2.9	3.5	3.7	2.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.114	0.084	0.030	0.034	0.035	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.198	0.215	0.182	0.200	0.187	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.956	0.928	0.739	0.900	0.833	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.27	1.23	0.951	1.13	1.05	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	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	1.1	1.2	<1.0	1.2	1.1	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	530	610	280	230	110	



Sub-Matrix: WATER				Client sample ID	E/S/E/Dup	E/M/E	E/M/E/Dup	E/B/E	E/B/E/Dup
				Client sampling date / time	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-026	HK1843485-027	HK1843485-028	HK1843485-029	HK1843485-030	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	2.0	2.4	2.1	2.3	2.1	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.028	0.044	0.042	0.042	0.039	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.178	0.154	0.165	0.183	0.175	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.852	0.834	0.834	0.755	0.742	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.06	1.03	1.04	0.980	0.957	
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	1.1	1.3	1.4	<1.0	<1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	170	140	80	40	90	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-031	HK1843485-032	HK1843485-033	HK1843485-034	HK1843485-035	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	2.3	2.3	2.2	2.0	3.4	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.061	0.059	0.042	0.039	0.060	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.182	0.169	0.186	0.182	0.176	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.778	0.726	0.824	0.858	0.725	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.02	0.954	1.05	1.08	0.962	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	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	1.2	1.4	1.1	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	390	320	30	70	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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-036	HK1843485-037	HK1843485-038	HK1843485-039	HK1843485-040	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.4	2.3	1.8	2.4	2.2	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.055	0.033	0.046	0.039	0.059	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.178	0.190	0.186	0.182	0.185	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.862	0.812	0.811	0.814	0.813	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.10	1.03	1.04	1.03	1.06	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.04	0.04	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.03	0.03	0.03	0.03	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.0	1.1	1.1	1.2	1.1	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	90	240	200	180	230	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-041	HK1843485-042	HK1843485-043	HK1843485-044	HK1843485-045	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	2.6	2.4	2.7	2.3	2.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.060	0.044	0.043	0.036	0.045	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.183	0.186	0.174	0.177	0.181	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.810	0.806	0.810	0.814	0.792	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.05	1.04	1.03	1.03	1.02	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.05	0.06	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	170	130	140	190	250	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-046	HK1843485-047	HK1843485-048	HK1843485-049	HK1843485-050	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	2.6	3.4	3.1	5.1	5.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.044	0.048	0.026	0.028	0.020	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.182	0.183	0.182	0.184	0.177	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.791	0.819	0.813	0.793	0.800	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.02	1.05	1.02	1.00	0.996	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.04	0.06	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	1.7	1.6	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	190	540	660	630	720	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-051	HK1843485-052	HK1843485-053	HK1843485-054	HK1843485-055	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.6	5.0	5.2	4.9	3.6	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.051	0.039	0.042	0.032	0.041	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.180	0.165	0.176	0.177	0.152	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.795	0.804	0.798	0.792	0.791	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.03	1.01	1.01	1.00	0.984	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.06	0.05	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	1.2	1.6	1.6	2.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	650	540	1200	1500	120	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-056	HK1843485-057	HK1843485-058	HK1843485-059	HK1843485-060	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.4	6.0	6.3	6.4	5.7	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.066	0.038	0.065	0.081	0.043	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.156	0.155	0.159	0.148	0.153	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.793	0.791	0.791	0.797	0.791	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.01	0.984	1.02	1.03	0.987	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.04	0.06	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	0.01	0.02	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.7	1.8	2.0	2.0	1.9	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	160	60	40	80	120	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-061	HK1843485-062	HK1843485-063	HK1843485-064	HK1843485-065	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.9	5.4	4.9	4.7	6.9	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.047	0.026	0.046	0.030	0.042	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.149	0.159	0.156	0.151	0.159	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.823	0.812	0.818	0.824	0.816	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.02	0.997	1.02	1.00	1.02	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.06	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.0	1.9	1.7	1.8	1.7	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	150	90	140	110	80	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-066	HK1843485-067	HK1843485-068	HK1843485-069	HK1843485-070	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.8	5.0	5.4	6.8	7.0	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.049	0.034	0.022	0.042	0.024	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.157	0.148	0.158	0.158	0.152	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.849	0.795	0.790	0.784	0.786	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.05	0.977	0.970	0.983	0.962	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.04	0.04	0.05	0.04	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.01	0.01	0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.0	1.7	1.6	1.5	1.5	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	50	40	60	100	70	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-071	HK1843485-072	HK1843485-073	HK1843485-074	HK1843485-075	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.8	9.4	6.3	6.0	8.3	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.029	0.025	0.022	0.021	0.017	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.161	0.155	0.123	0.129	0.122	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.768	0.784	0.738	0.741	0.748	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.958	0.963	0.883	0.892	0.888	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.05	0.05	0.03	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.01	<0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	1.6	2.2	2.0	2.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	30	50	90	50	70	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-076	HK1843485-077	HK1843485-078	HK1843485-079	HK1843485-080	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.5	10.4	10.0	7.9	8.3	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.022	0.022	0.022	0.052	0.048	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.129	0.132	0.117	0.129	0.137	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.738	0.739	0.748	0.705	0.698	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.889	0.893	0.886	0.886	0.883	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.06	0.06	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	0.02	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.1	2.1	2.1	1.5	1.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	130	160	120	170	130	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-081	HK1843485-082	HK1843485-083	HK1843485-084	HK1843485-085	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.0	8.8	10.1	9.6	5.5	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.032	0.052	0.058	0.019	0.053	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.133	0.135	0.131	0.134	0.157	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.701	0.701	0.704	0.701	0.721	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.866	0.888	0.893	0.853	0.931	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.3	1.4	1.3	1.3	2.0	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	630	540	260	210	250	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-086	HK1843485-087	HK1843485-088	HK1843485-089	HK1843485-090	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.1	6.5	6.4	7.0	6.8	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.059	0.053	0.050	0.045	0.052	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.160	0.154	0.155	0.156	0.154	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.704	0.720	0.720	0.717	0.724	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.923	0.927	0.926	0.918	0.931	
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.05	0.05	0.05	0.05	
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.01	0.02	0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	1.5	1.6	1.3	2.6	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	330	240	160	190	230	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843485-091	HK1843485-092	HK1843485-093	HK1843485-094	HK1843485-095	
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.6	4.9	6.0	6.4	6.3	
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.105	0.063	0.069	0.040	0.091	
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.150	0.159	0.163	0.153	0.152	
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.756	0.742	0.735	0.740	0.740	
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.01	0.964	0.966	0.933	0.984	
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	<0.01	<0.01	<0.01	<0.01	<0.01	
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	1.3	1.2	1.4	1.4	
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL	30	70	380	310	340	



Sub-Matrix: WATER				Client sample ID	H/B/F/Dup	---	---	---	---
				Client sampling date / time	21-Aug-2018	---	---	---	---
Compound	CAS Number	LOR	Unit	HK1843485-096	---	---	---	---	---
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	---	0.5	mg/L	5.9	---	---	---	---	---
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.067	---	---	---	---	---
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.152	---	---	---	---	---
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.738	---	---	---	---	---
EK063A: Inorganic Nitrogen as N	---	0.010	mg/L	0.957	---	---	---	---	---
EK067P: Total Phosphorus as P	---	0.01	mg/L	0.04	---	---	---	---	---
EK067P: Total Phosphorus - Filtered	---	0.01	mg/L	<0.01	---	---	---	---	---
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	---	1.0	mg/L	1.3	---	---	---	---	---
EM: Microbiological Testing									
EM002: E. coli	---	1	CFU/100mL	260	---	---	---	---	---



Laboratory Duplicate (DUP) Report

Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1889428)								
HK1843485-001	A/S/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	2.8	3.0	4.90
HK1843485-011	B/B/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	4.7	5.0	6.17
EA/ED: Physical and Aggregate Properties (QC Lot: 1889429)								
HK1843485-021	D/M/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	2.6	3.0	14.1
HK1843485-031	F/S/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	2.3	2.0	11.8
EA/ED: Physical and Aggregate Properties (QC Lot: 1889430)								
HK1843485-041	G/B/E	EA025: Suspended Solids (SS)	----	0.5	mg/L	2.6	2.2	15.4
HK1843485-051	A/M/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	4.6	4.9	5.97
EA/ED: Physical and Aggregate Properties (QC Lot: 1889431)								
HK1843485-061	C/S/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	4.9	5.3	7.80
HK1843485-071	D/B/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	8.8	9.0	2.24
EA/ED: Physical and Aggregate Properties (QC Lot: 1889432)								
HK1843485-081	F/M/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	9.0	8.8	1.57
HK1843485-091	H/S/F	EA025: Suspended Solids (SS)	----	0.5	mg/L	4.6	4.8	4.24
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889942)								
HK1843485-020	D/S/E/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.222	0.223	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889944)								
HK1843485-040	G/M/E/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.185	0.190	2.78
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889946)								
HK1843485-060	B/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.153	0.159	4.03
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889948)								
HK1843485-080	F/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.137	0.138	1.09
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889950)								
HK1843485-096	H/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.152	0.163	6.73
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890133)								
HK1843485-020	D/S/E/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.078	0.074	5.14
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890134)								
HK1843485-040	G/M/E/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.059	0.052	13.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890135)								
HK1843485-060	B/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.043	0.038	12.3



Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890136)								
HK1843485-080	F/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.048	0.050	4.27
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890137)								
HK1843485-096	H/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.067	0.067	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893323)								
HK1843485-010	B/M/E/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893324)								
HK1843485-010	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: 1893325)								
HK1843485-030	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: 1893326)								
HK1843485-030	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: 1893327)								
HK1843485-050	A/S/F/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893328)								
HK1843485-050	A/S/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893329)								
HK1843485-070	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: 1893330)								
HK1843485-070	D/M/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893331)								
HK1843485-090	G/B/F/Dup	EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893332)								
HK1843485-090	G/B/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.02	0.00

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

Matrix: WATER				Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)		
						LCS	DCS	Low	High	Value	Control Limit	
EA/ED: Physical and Aggregate Properties (QC Lot: 1889428)												
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	102	----	85	115	----	----	
EA/ED: Physical and Aggregate Properties (QC Lot: 1889429)												



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number					LCS	DCS	Low	High	Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 1889429) - Continued											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	98.5	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1889430)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	99.5	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1889431)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	101	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1889432)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	100	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889942)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	99.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889944)											
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: 1889946)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	109	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889948)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	112	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889950)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	105	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890133)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	91.8	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890134)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	94.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890135)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	86.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890136)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	87.8	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890137)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	93.6	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893323)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.0	----	90	104	----	----



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
		LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
Method: Compound	CAS Number					LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893324)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	107	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893325)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	96.0	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893326)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	99.7	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893327)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	96.0	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893328)											
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: 1893329)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	96.0	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893330)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893331)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	96.0	----	90	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893332)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	94.0	----	85	115	----	----
EP: Aggregate Organics (QC Lot: 1889993)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	96.2	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1889994)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	93.2	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1889995)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	85.8	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1889996)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	89.2	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1889997)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	87.9	----	81	115	----	----



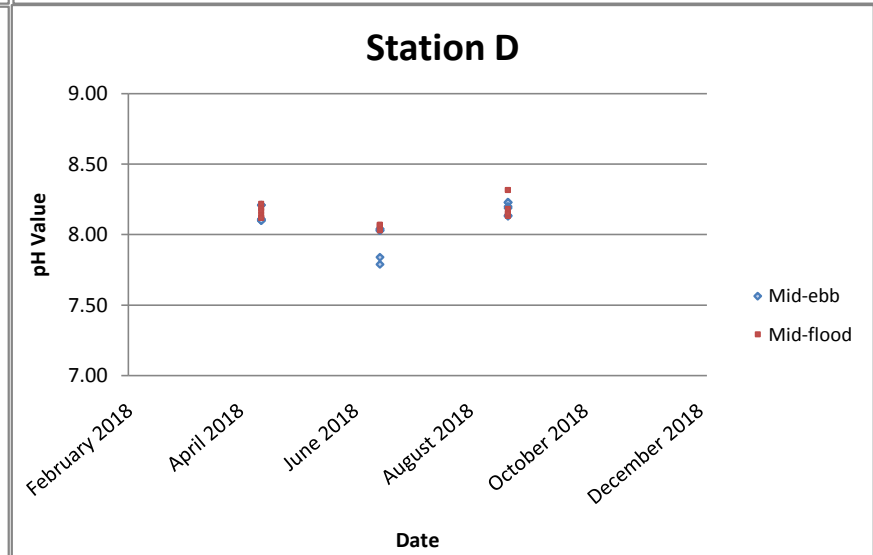
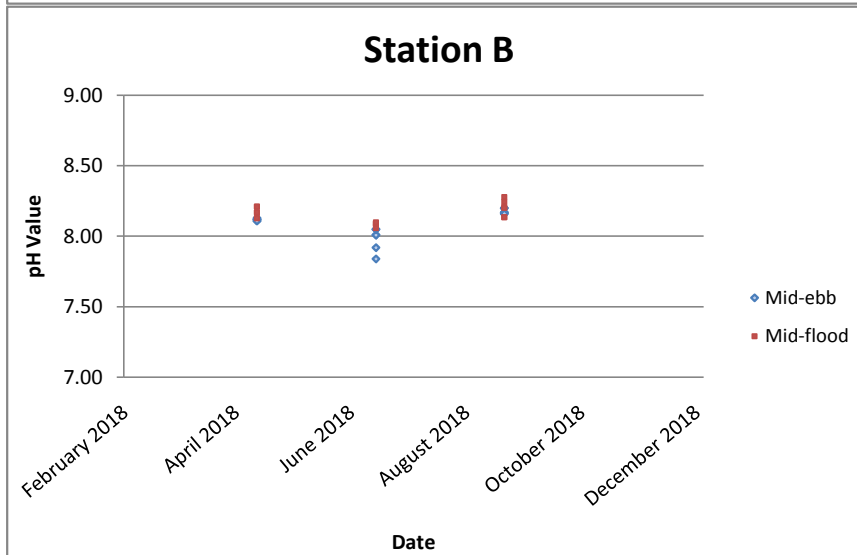
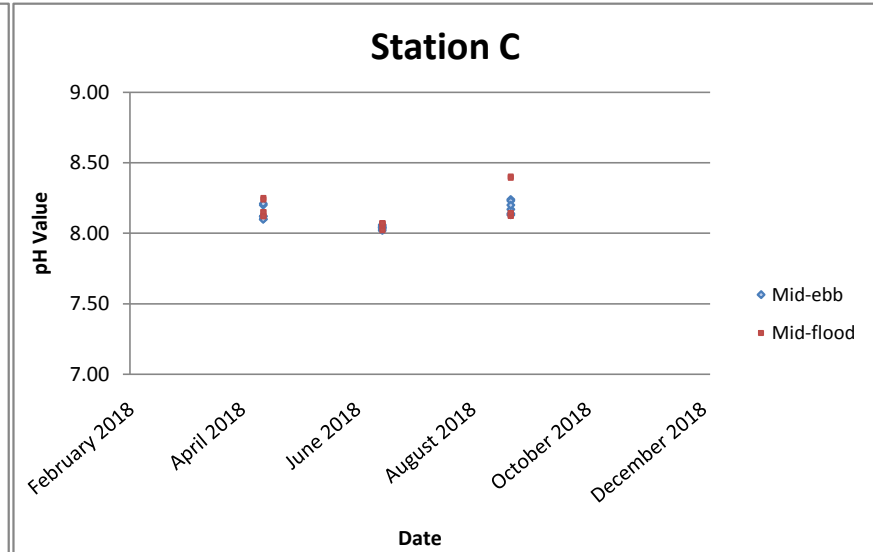
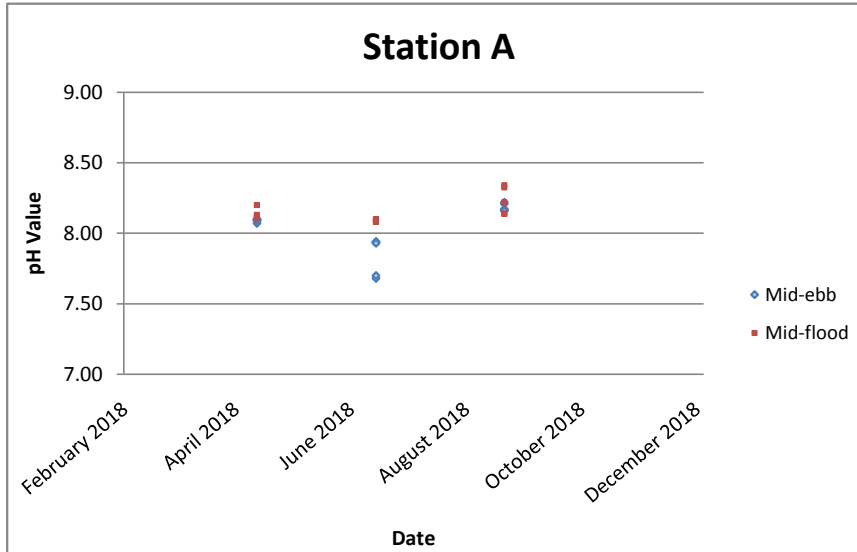
Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: WATER					Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889942)										
HK1843485-020	D/S/E/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	102	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889944)										
HK1843485-040	G/M/E/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	107	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889946)										
HK1843485-060	B/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	109	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889948)										
HK1843485-080	F/S/F/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	106	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1889950)										
HK1843485-096	H/B/F/Dup	EK057A: Nitrite as N	14797-65-0	0.5 mg/L	106	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890133)										
HK1843485-020	D/S/E/Dup	EK055A: Ammonia as N	7664-41-7	0.05 mg/L	107	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890134)										
HK1843485-040	G/M/E/Dup	EK055A: Ammonia as N	7664-41-7	0.05 mg/L	106	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890135)										
HK1843485-060	B/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.05 mg/L	110	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890136)										
HK1843485-080	F/S/F/Dup	EK055A: Ammonia as N	7664-41-7	0.05 mg/L	118	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1890137)										
HK1843485-096	H/B/F/Dup	EK055A: Ammonia as N	7664-41-7	0.05 mg/L	103	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893323)										
HK1843485-010	B/M/E/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	94.3	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893324)										

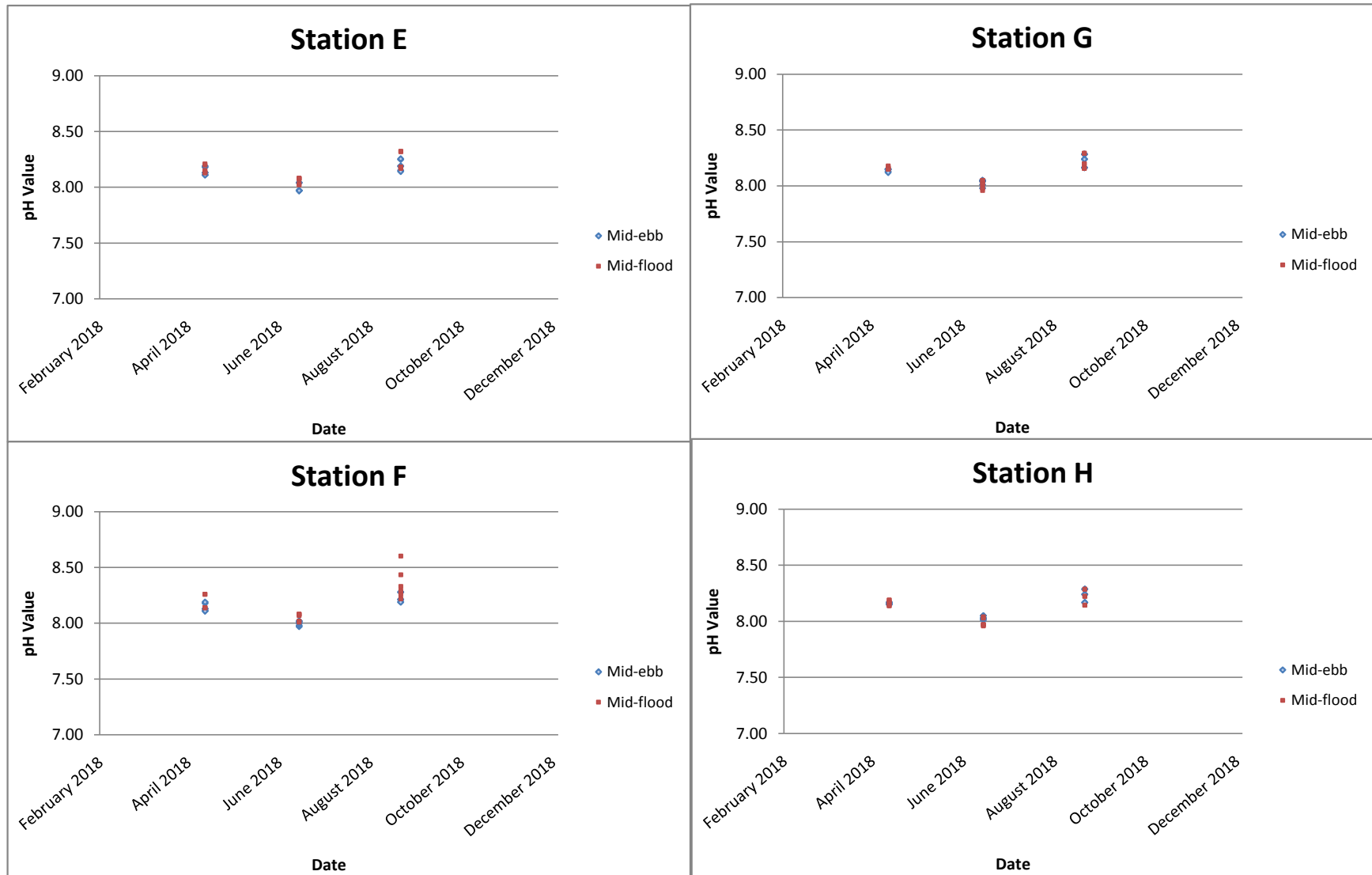


Matrix: WATER				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893324) - Continued										
HK1843485-010	B/M/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	89.4	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893325)										
HK1843485-030	E/B/E/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	94.0	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893326)										
HK1843485-030	E/B/E/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	88.5	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893327)										
HK1843485-050	A/S/F/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	89.2	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893328)										
HK1843485-050	A/S/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	89.6	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893329)										
HK1843485-070	D/M/F/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	90.9	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893330)										
HK1843485-070	D/M/F/Dup	EK067P: Total Phosphorus - Filtered	----	0.5 mg/L	88.9	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893331)										
HK1843485-090	G/B/F/Dup	EK067P: Total Phosphorus as P	----	0.5 mg/L	96.1	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1893332)										
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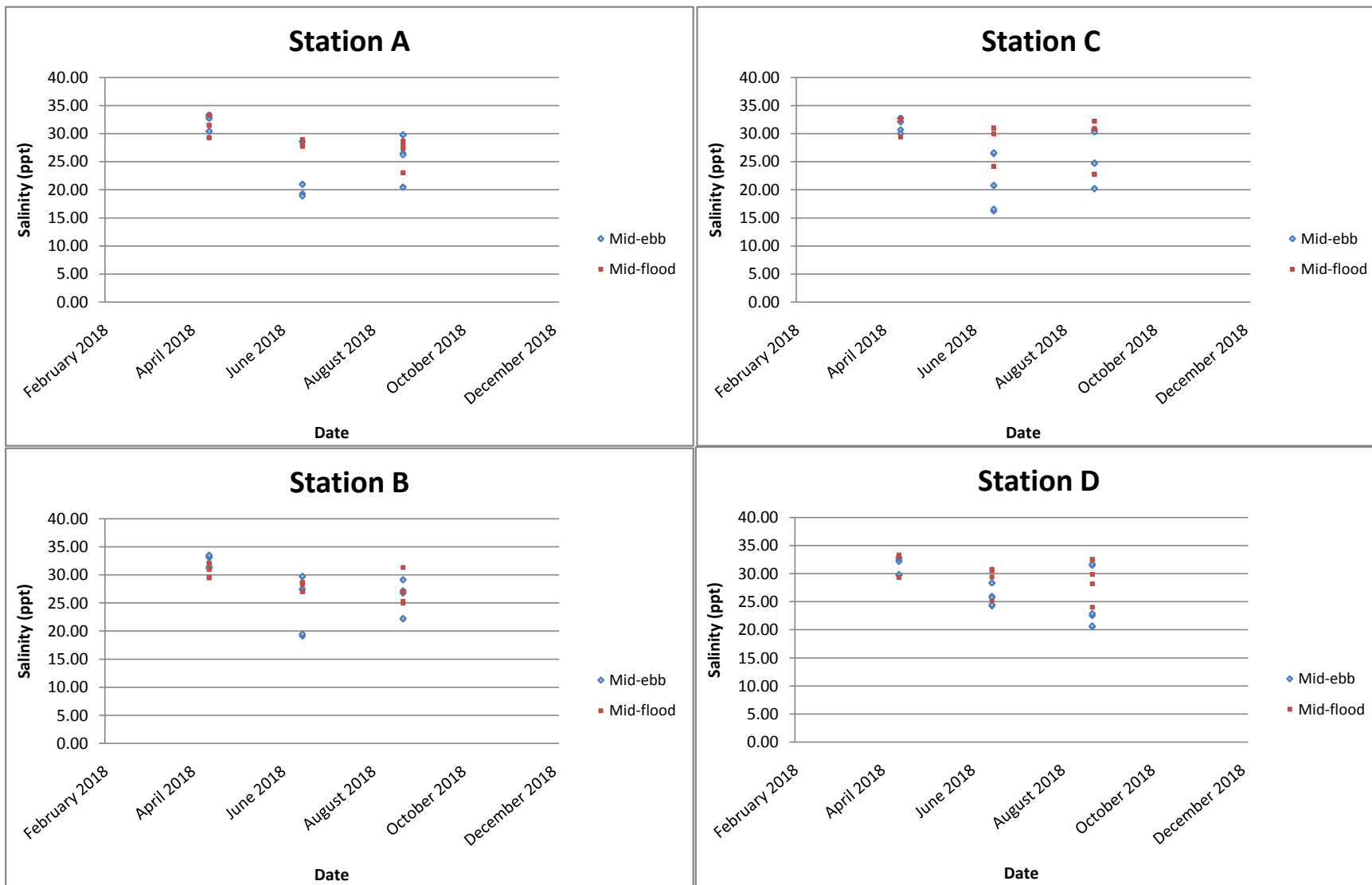
pH value



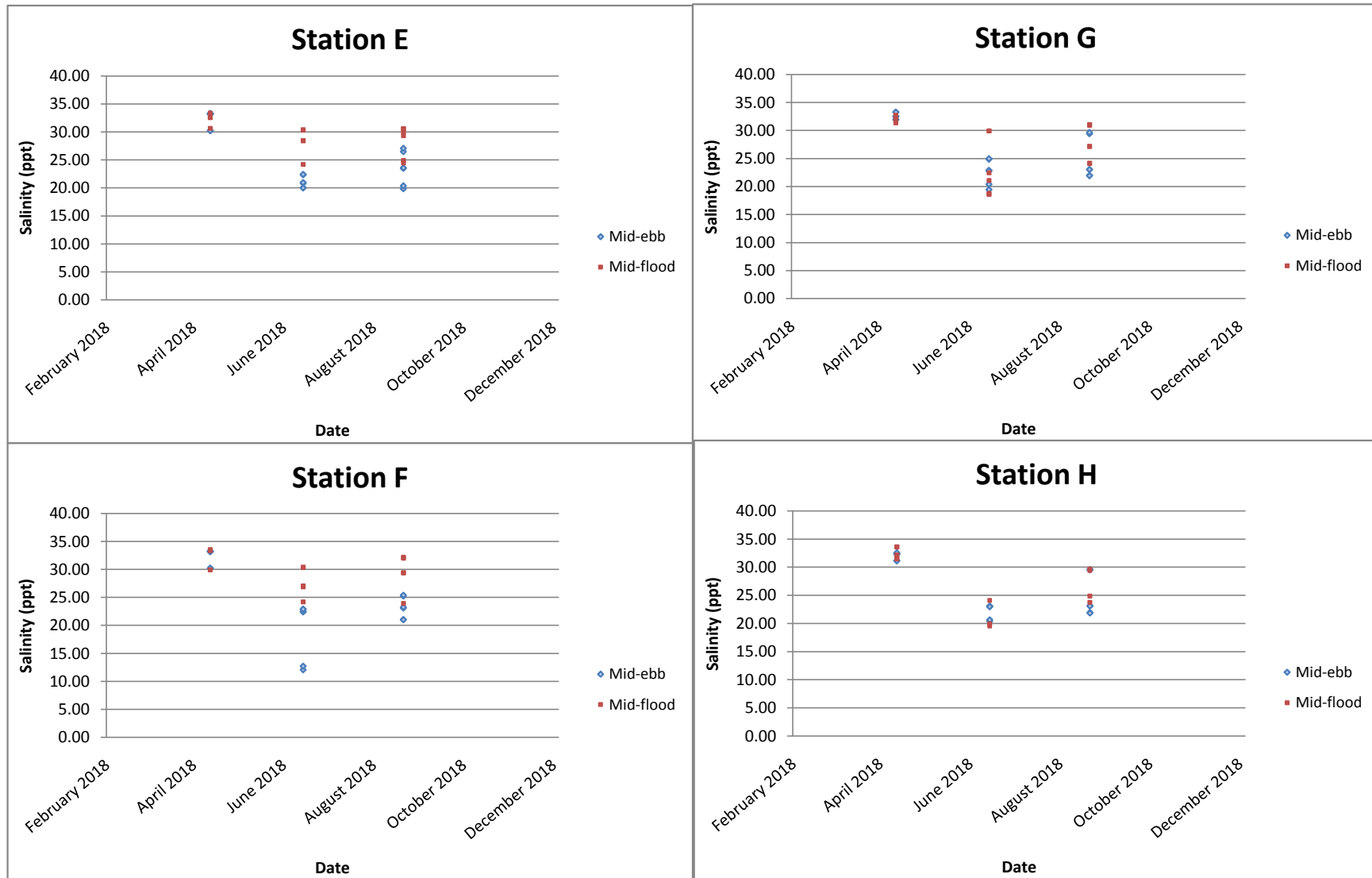
pH value



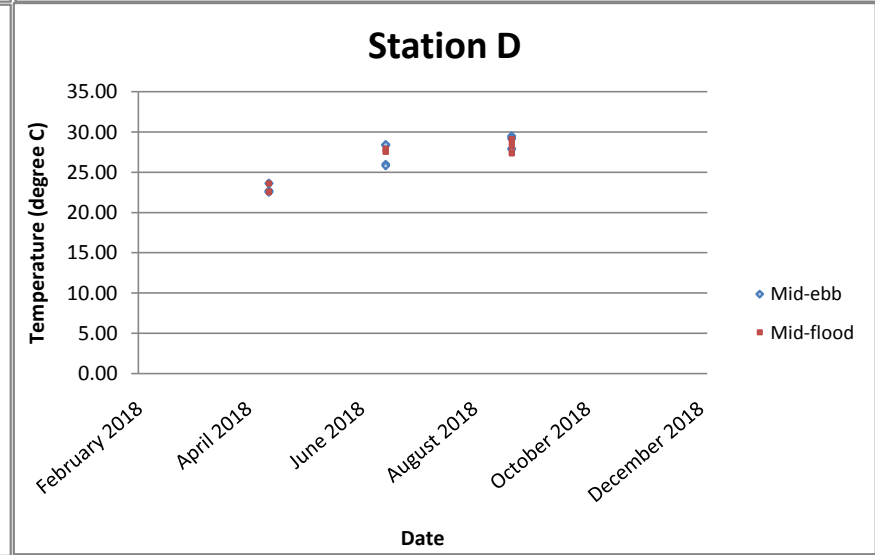
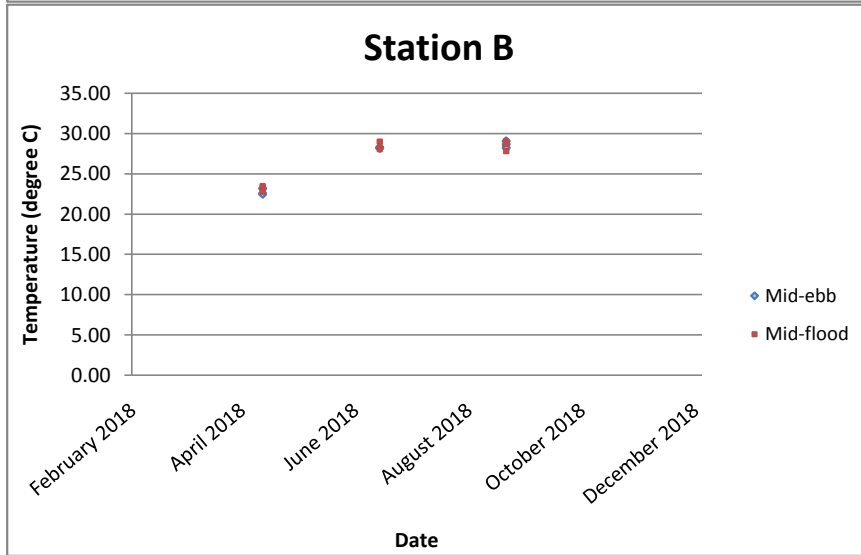
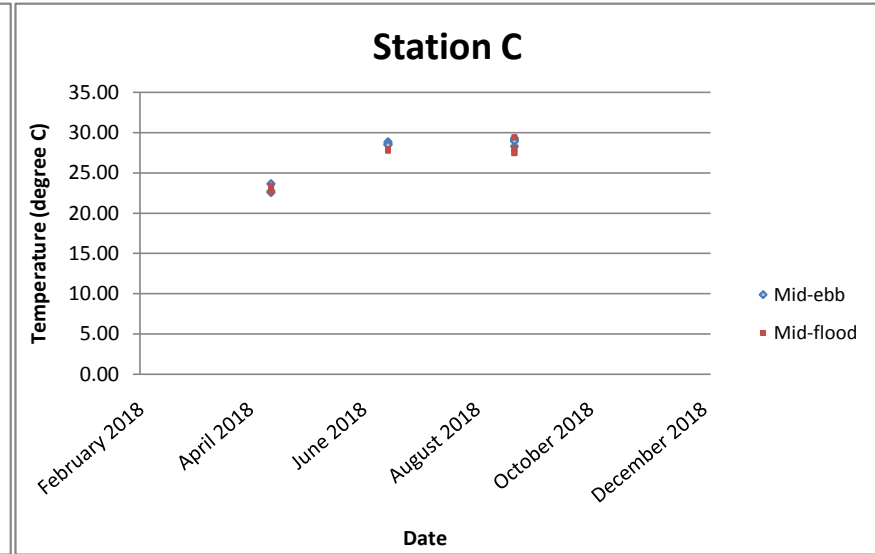
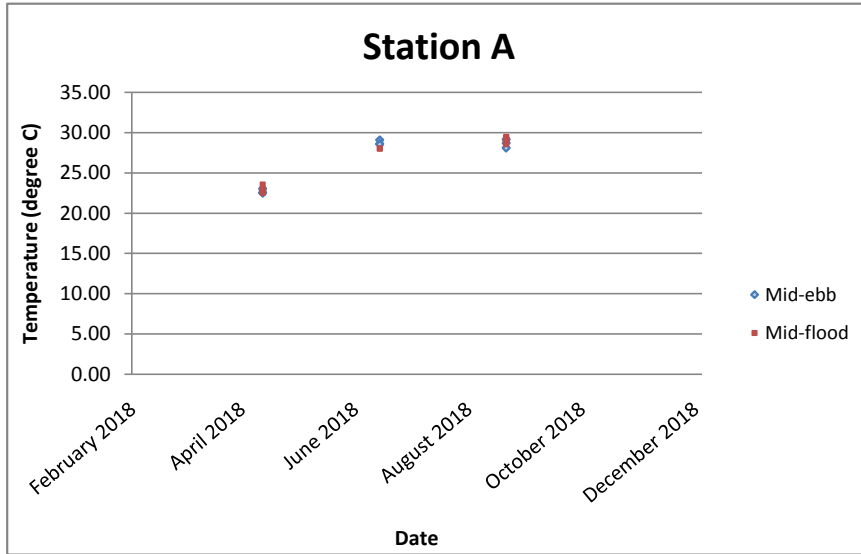
Salinity (ppt)



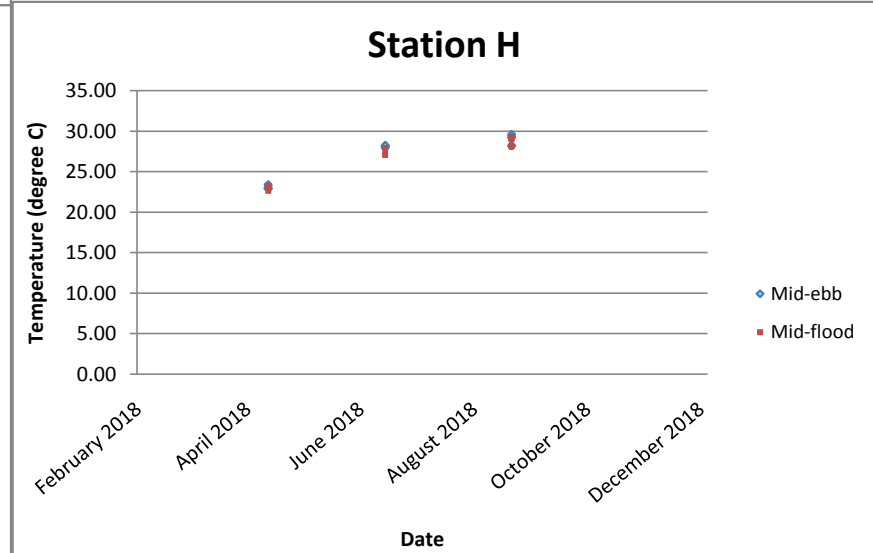
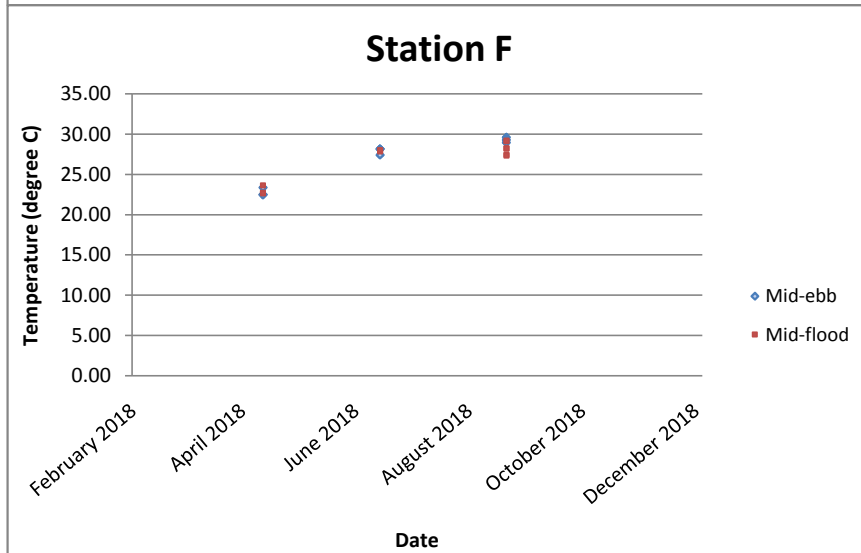
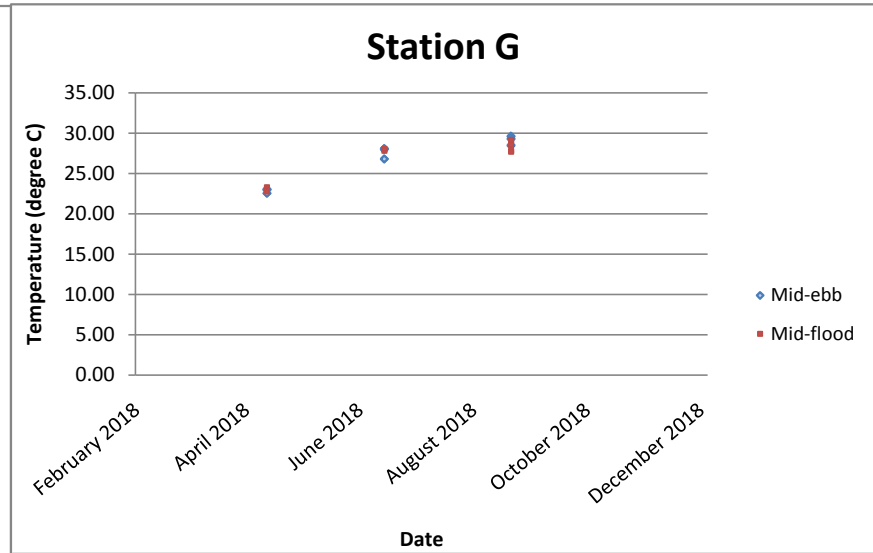
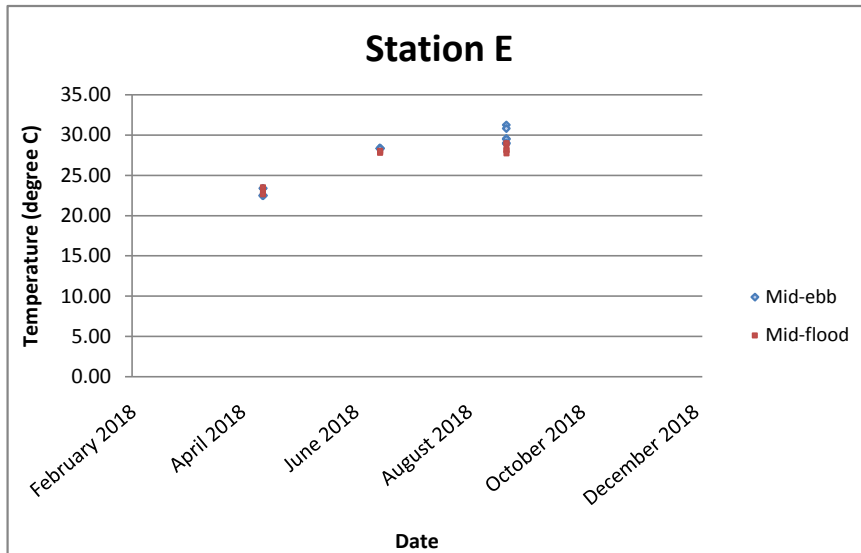
Salinity (ppt)



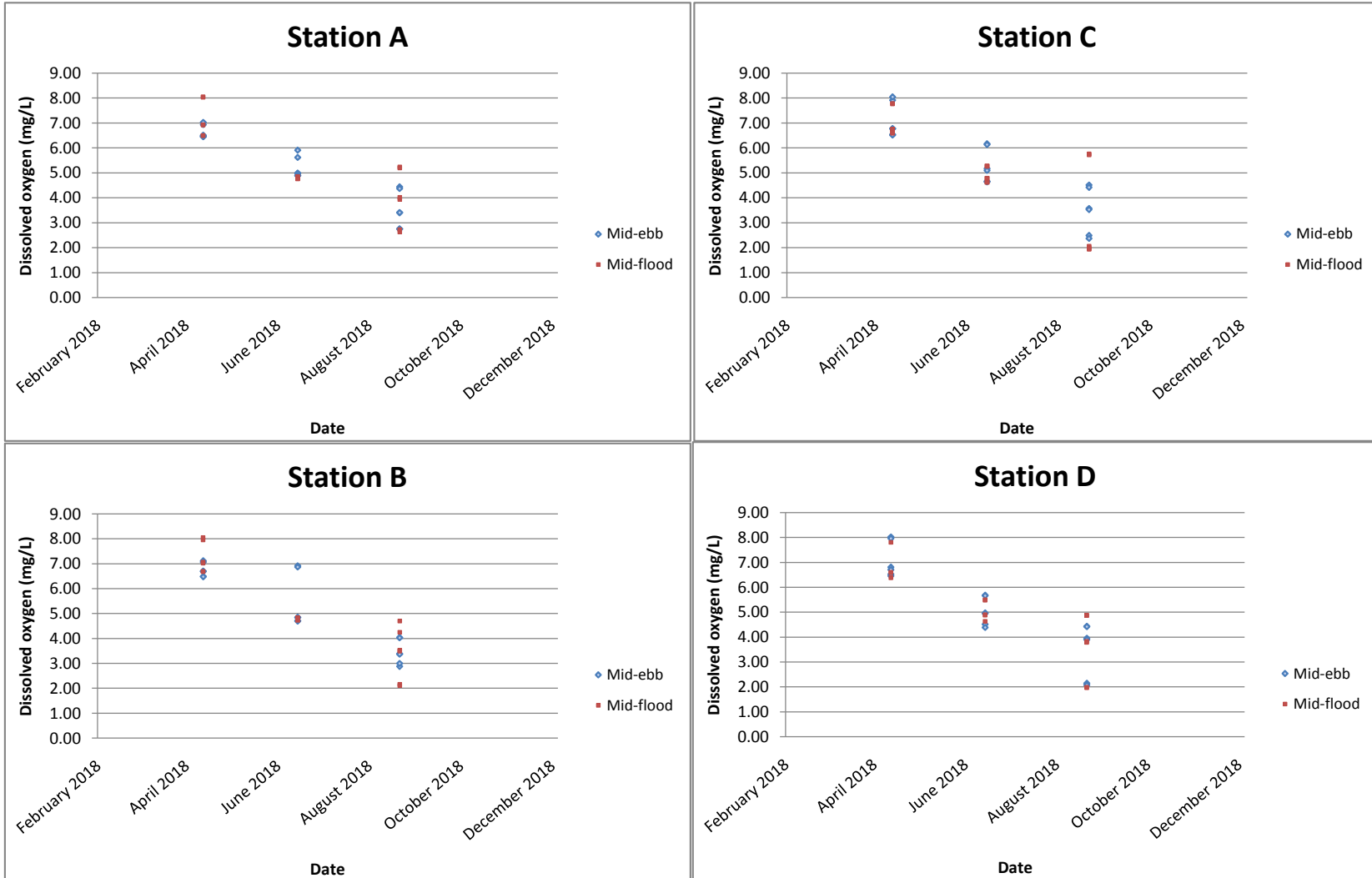
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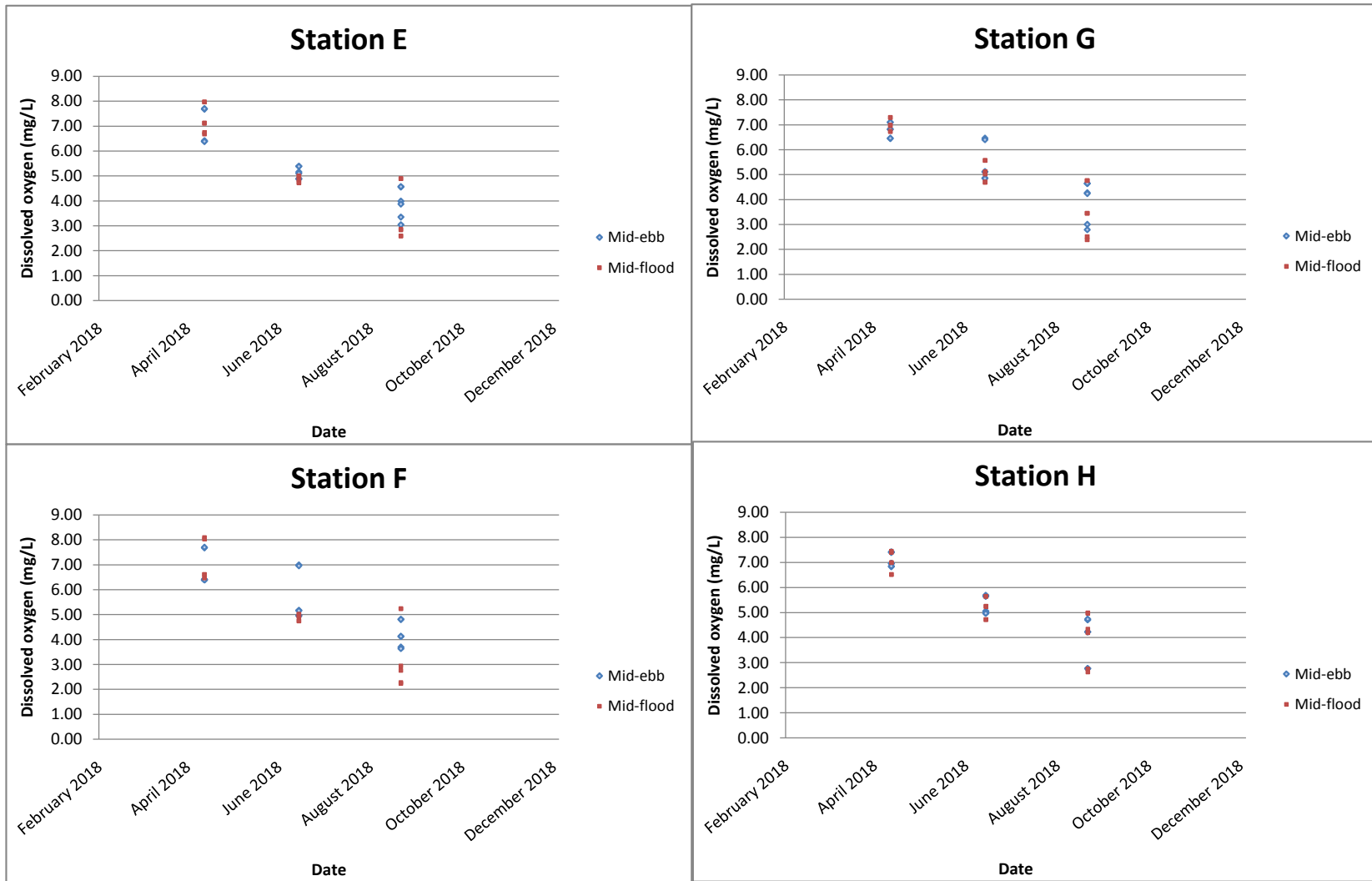
Temperature (degree C)



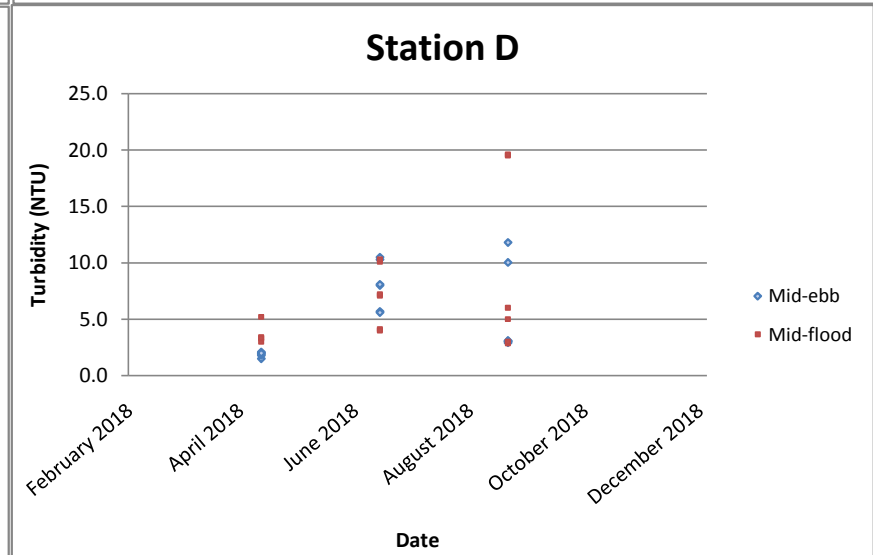
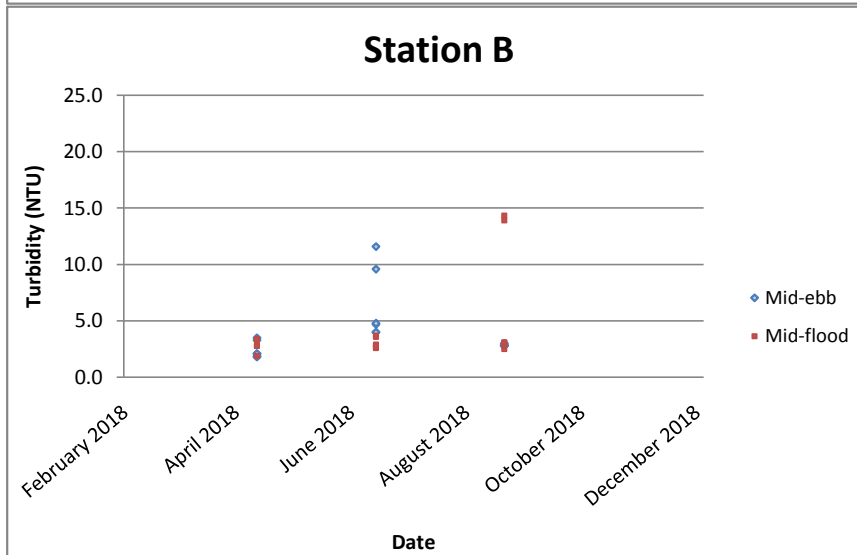
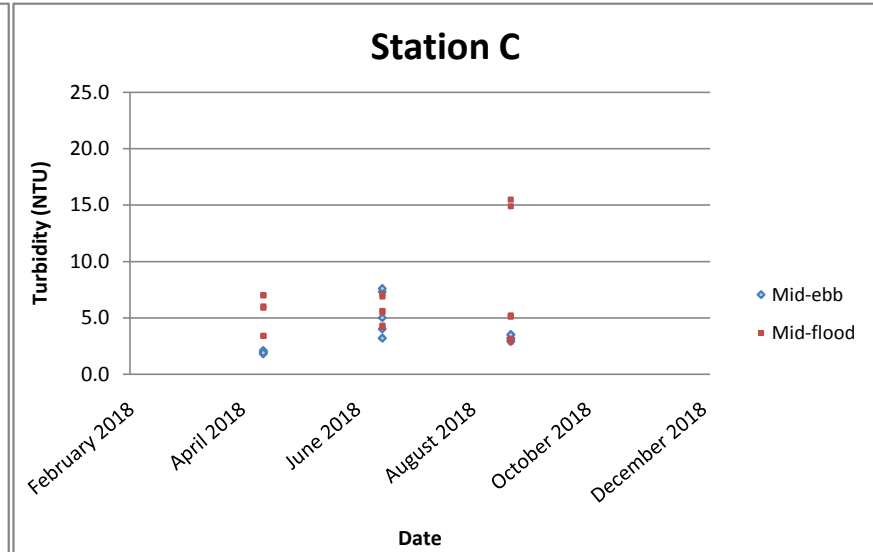
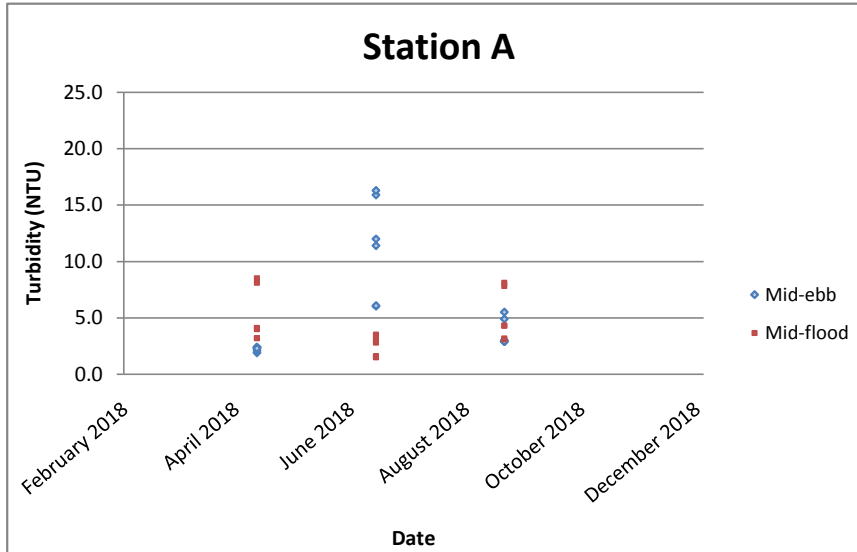
Dissolved oxygen (mg/L)



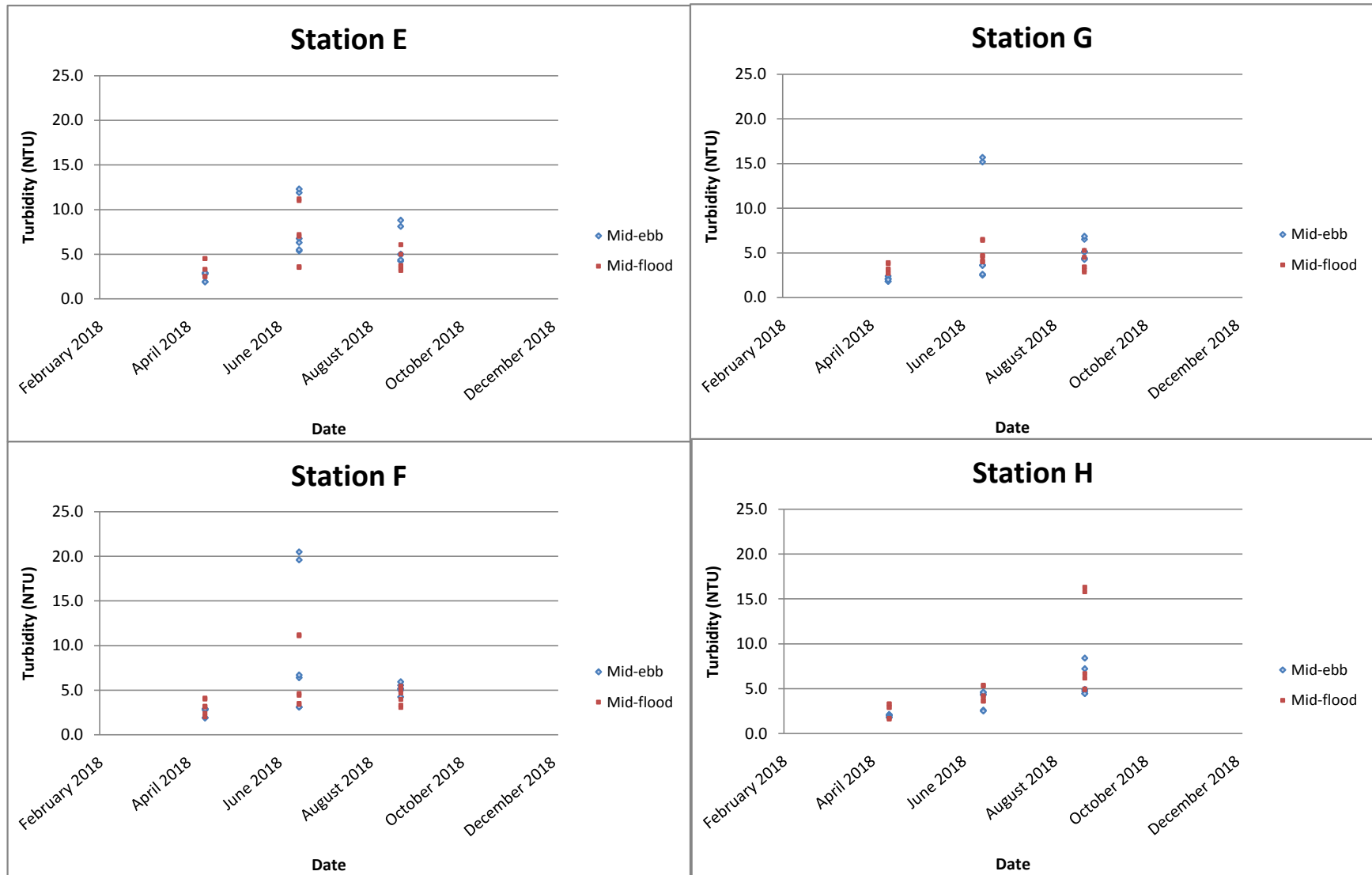
Dissolved oxygen (mg/L)



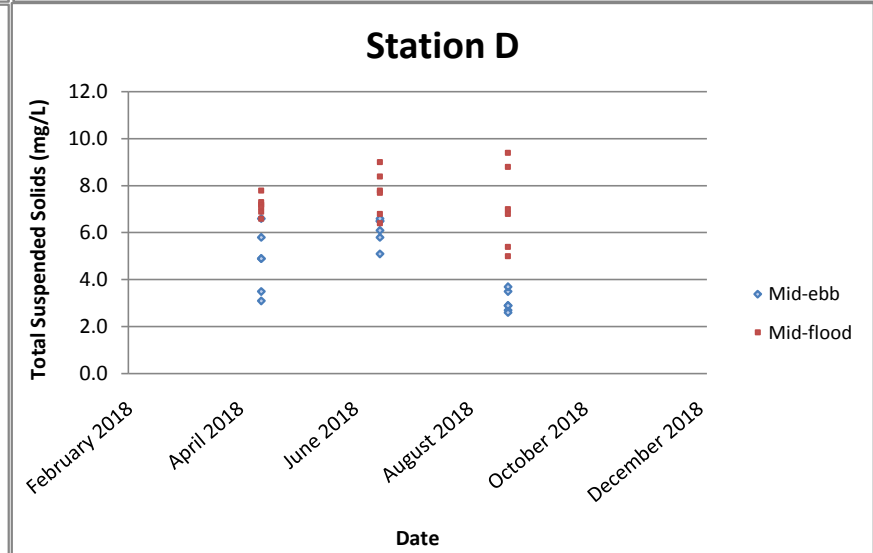
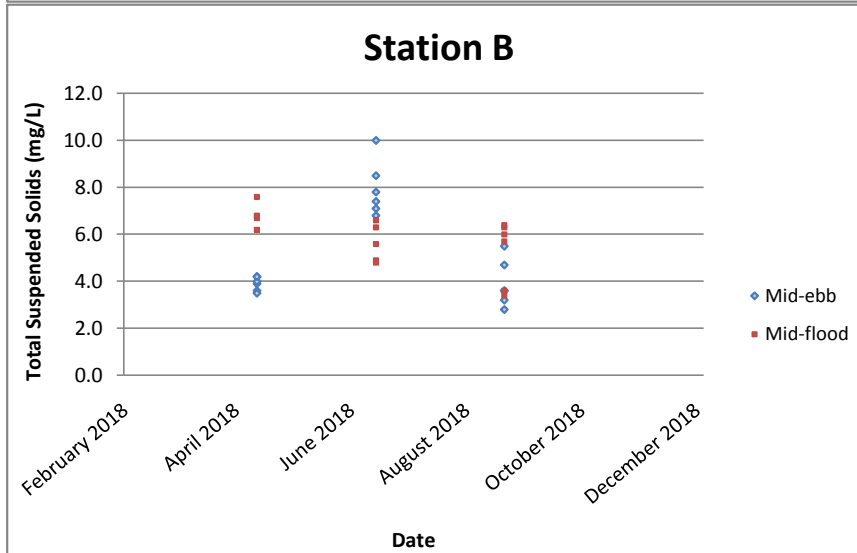
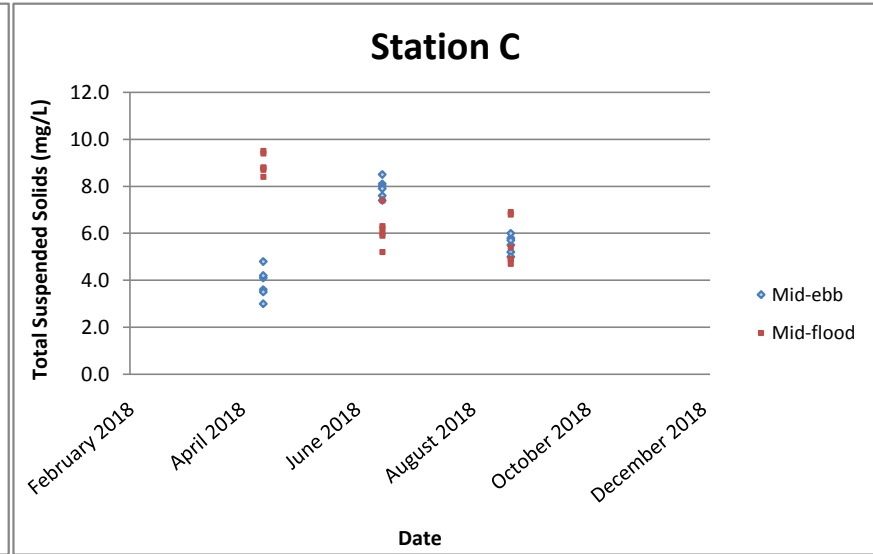
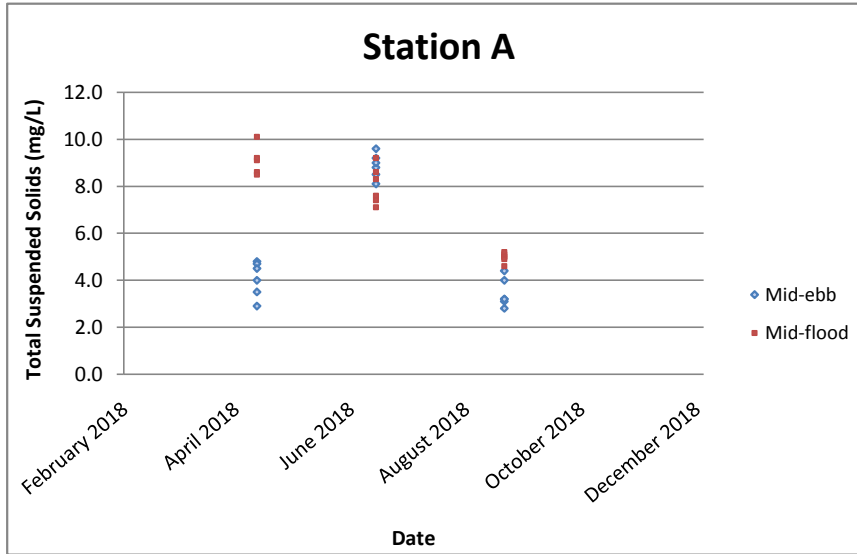
Turbidity (NTU)



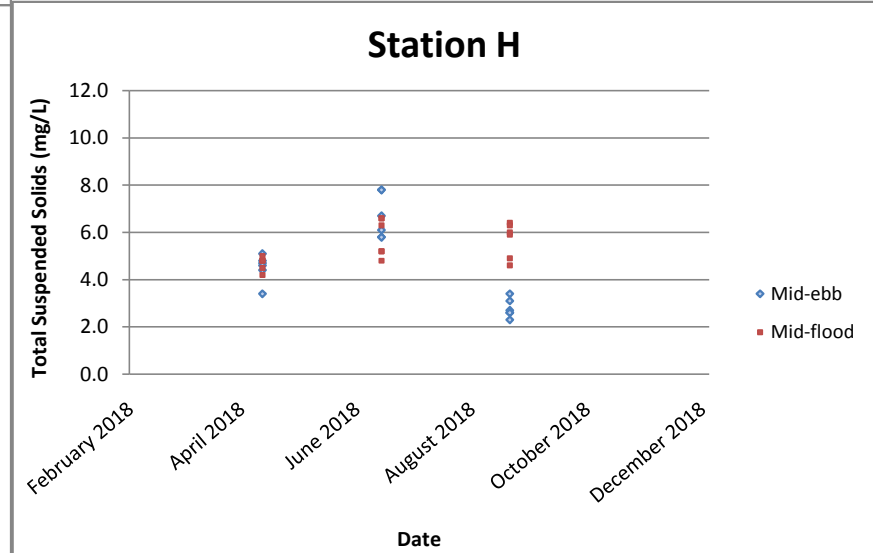
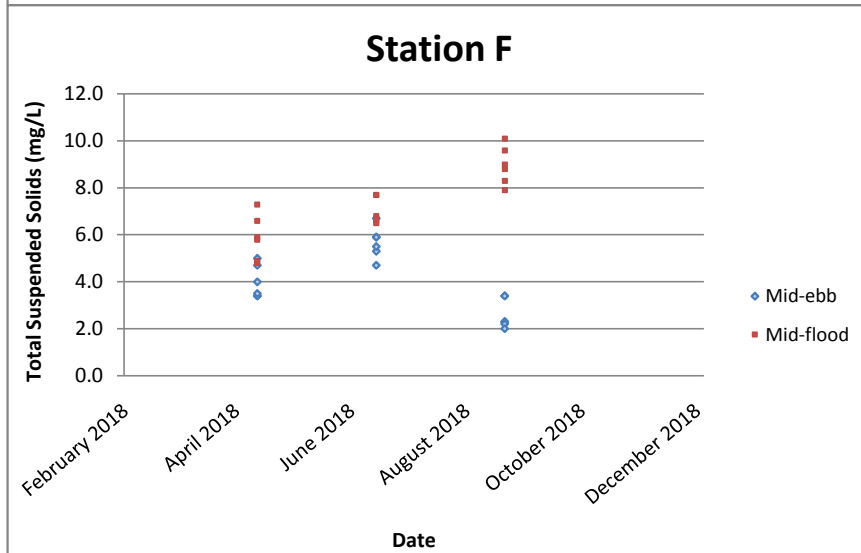
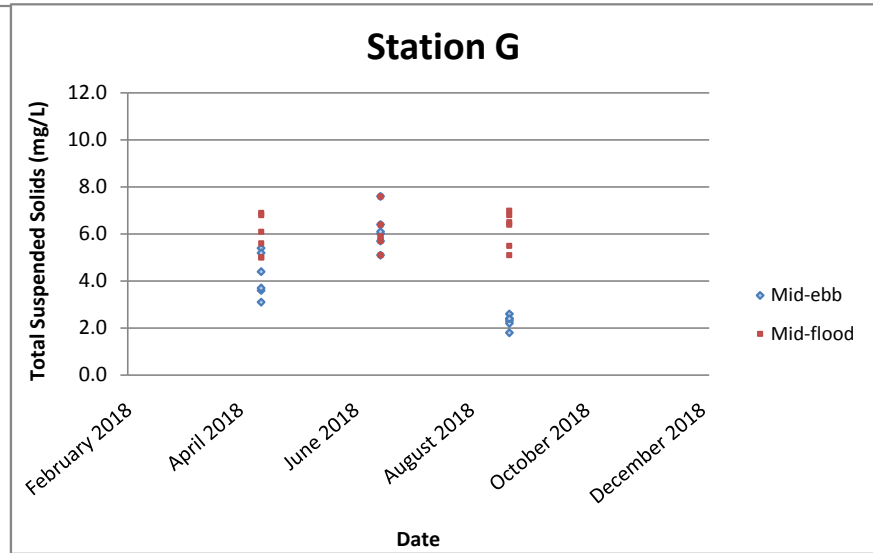
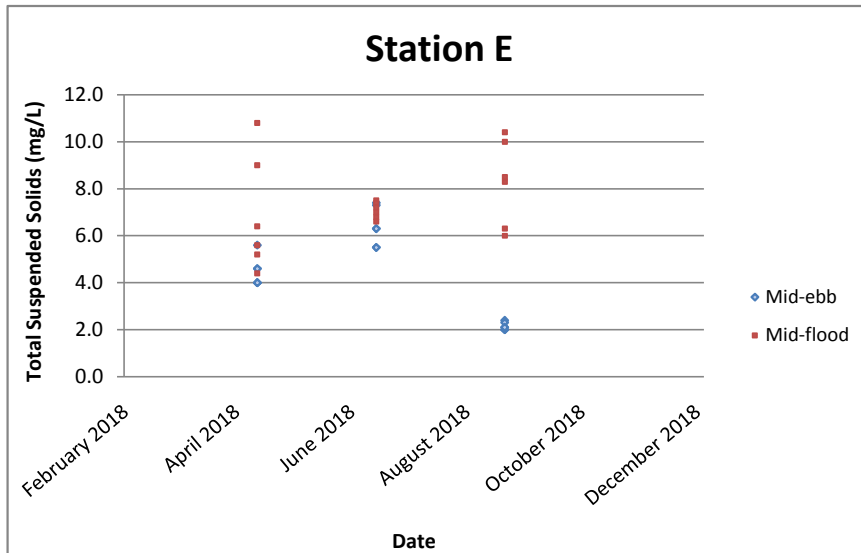
Turbidity (NTU)



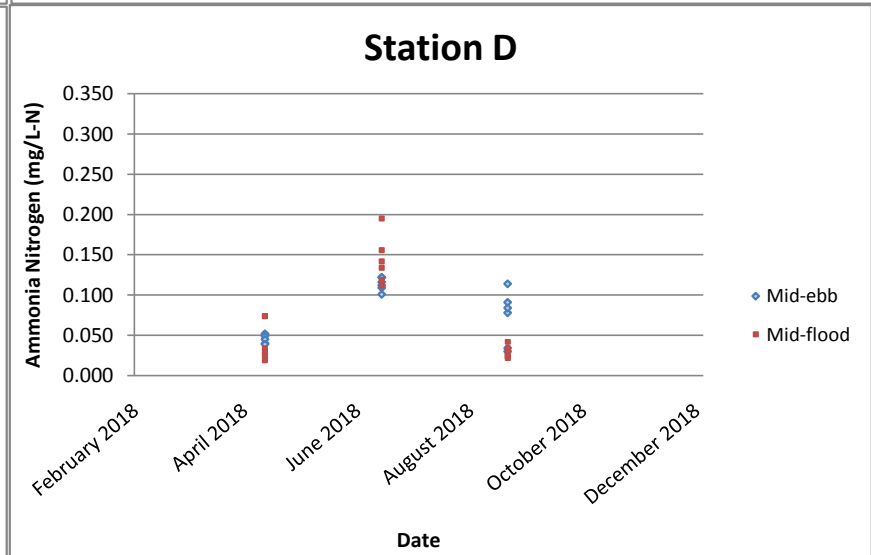
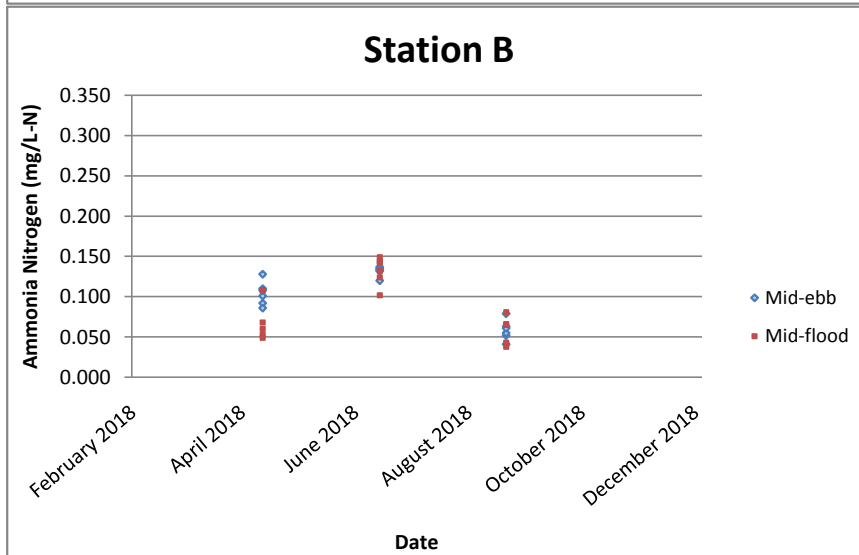
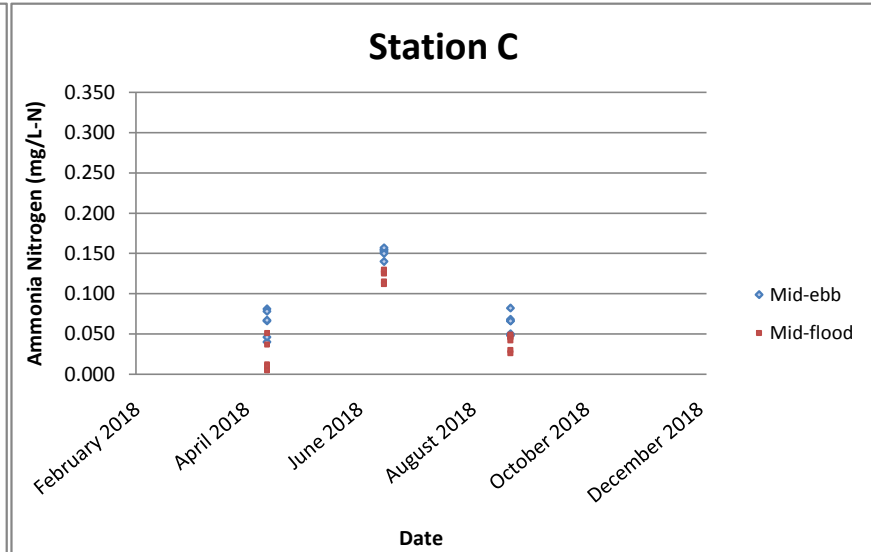
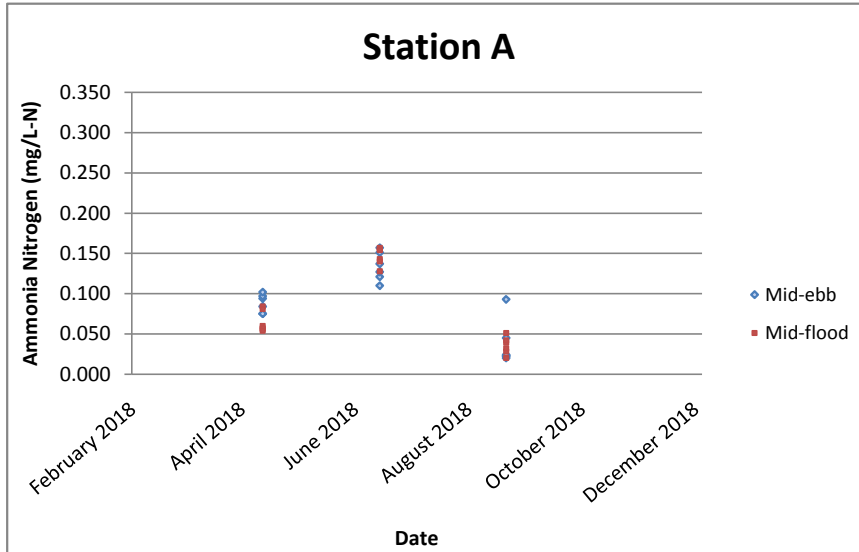
Total Suspended Solids (mg/L)



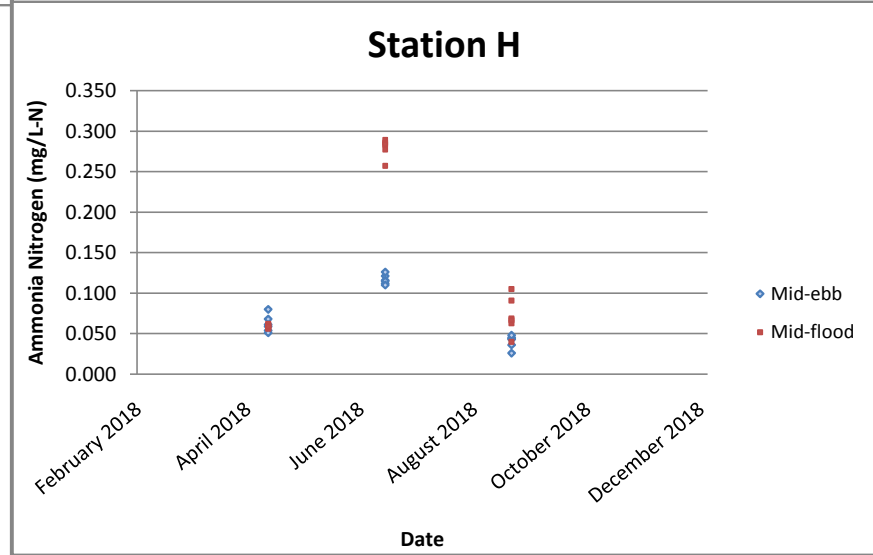
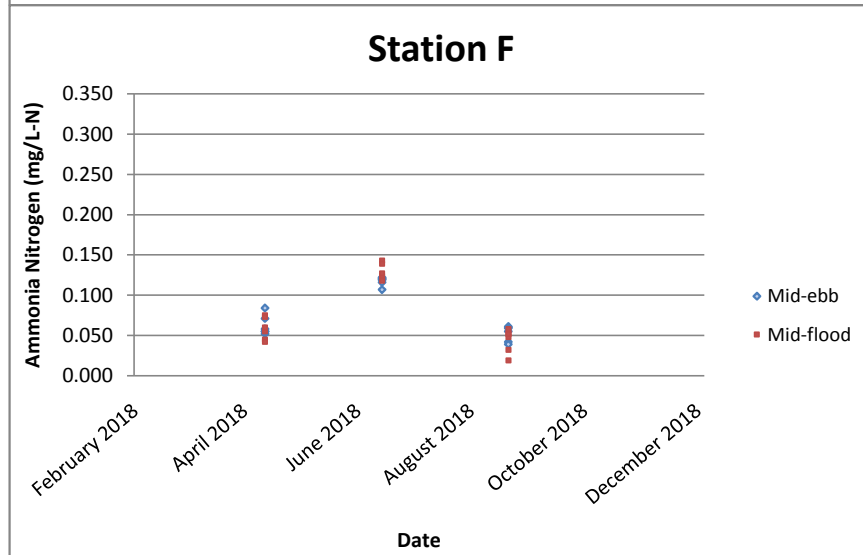
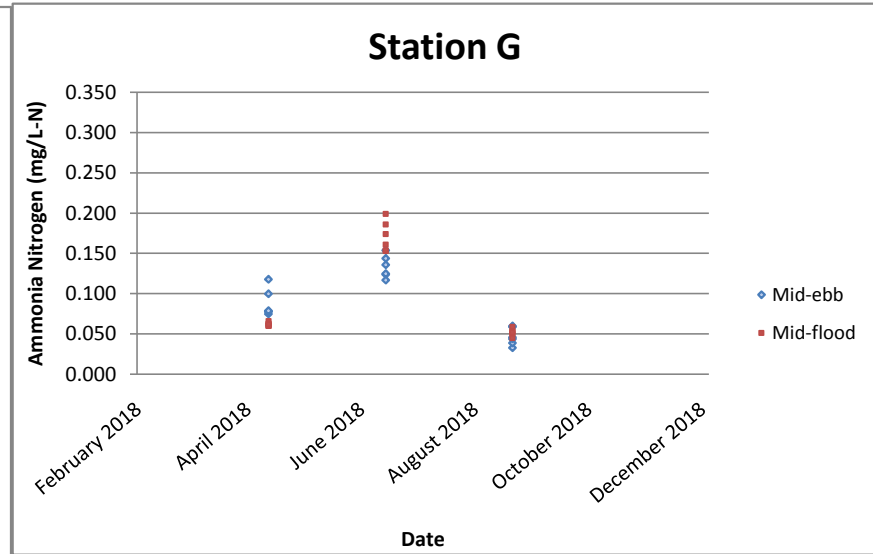
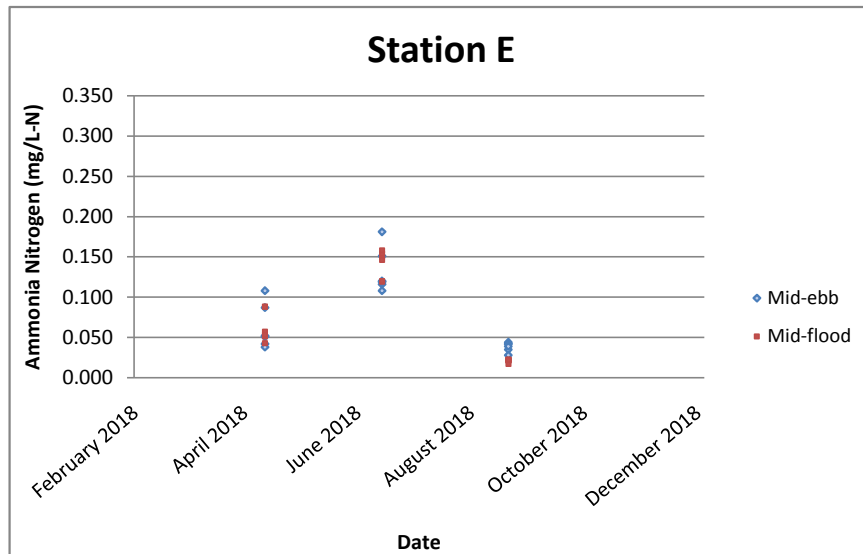
Total Suspended Solids (mg/L)



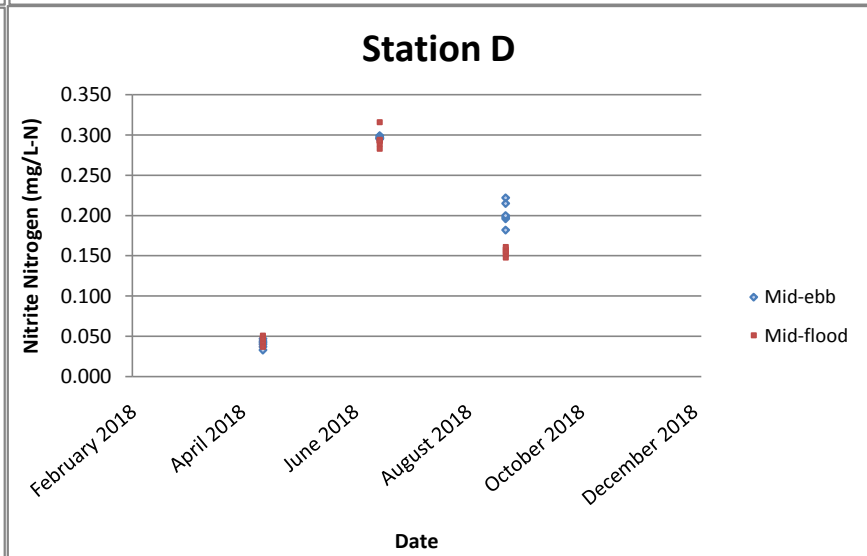
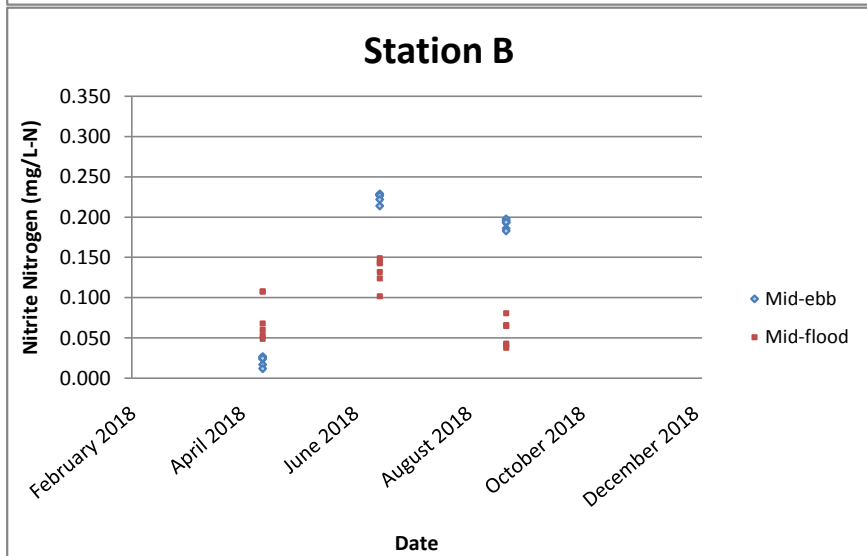
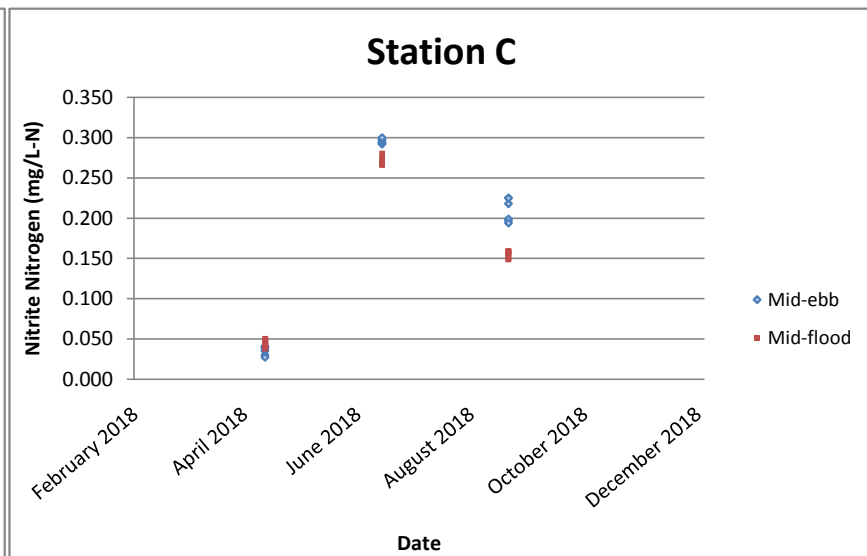
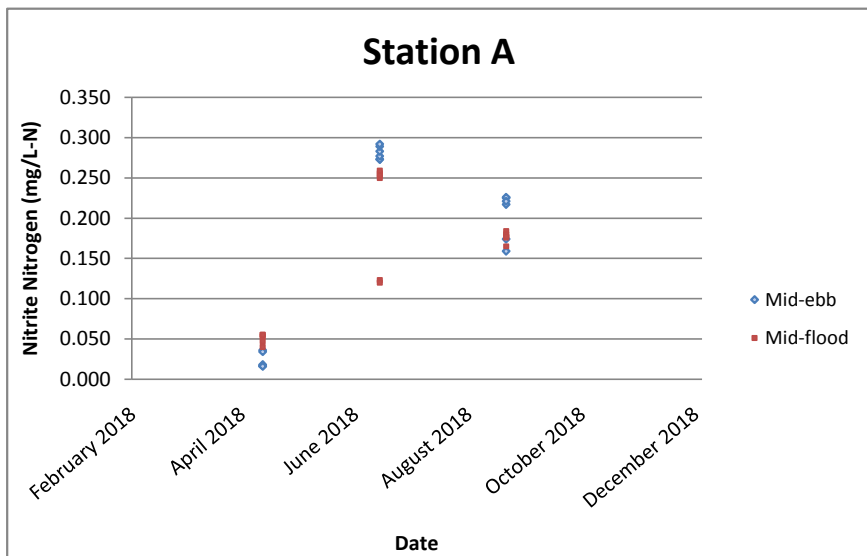
Ammonia Nitrogen (mg/L-N)



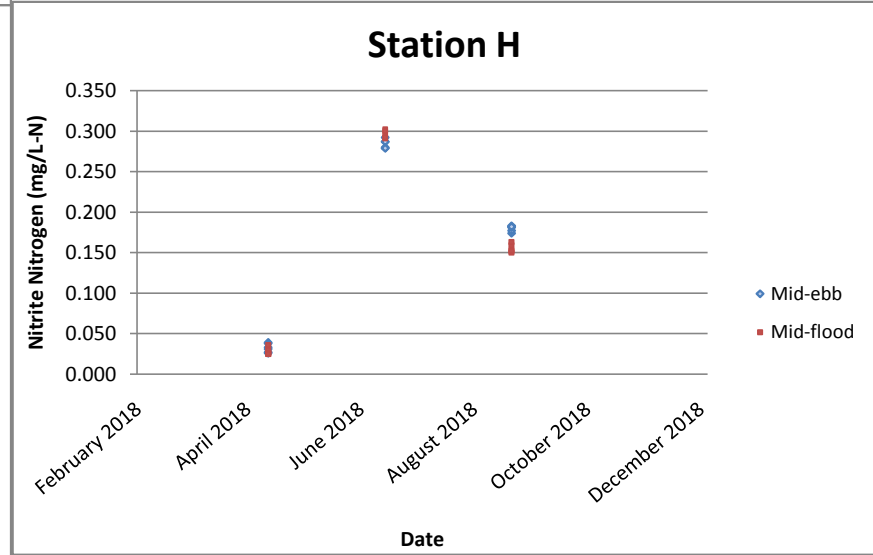
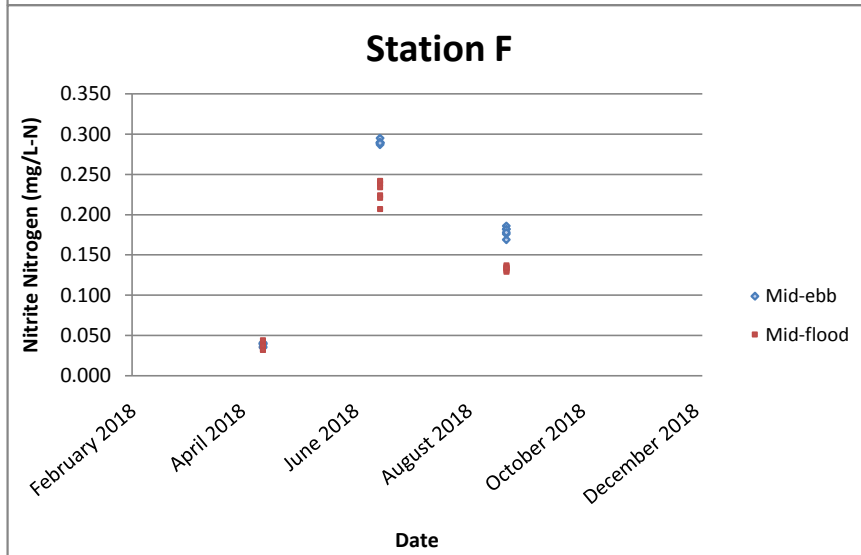
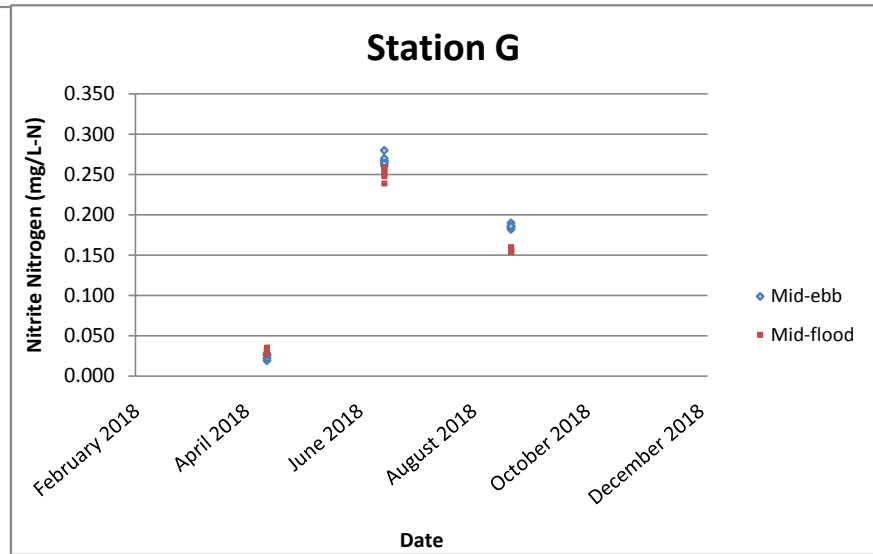
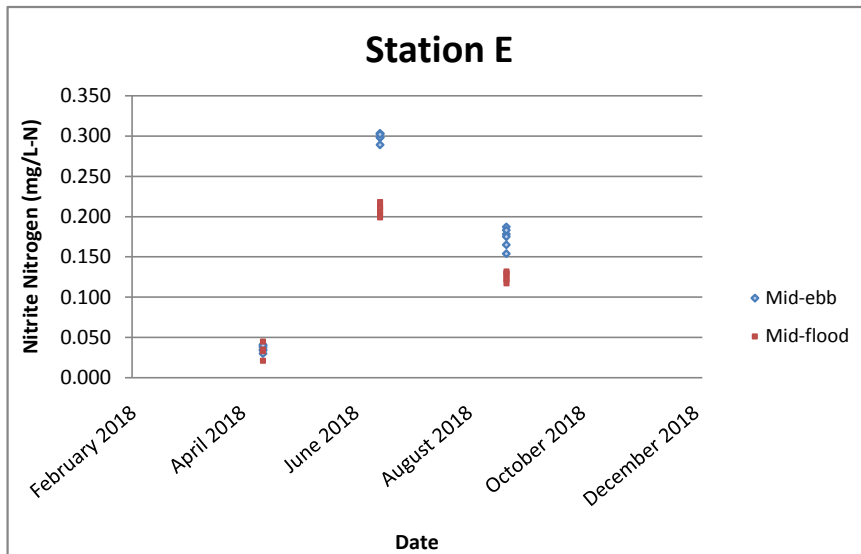
Ammonia Nitrogen (mg/L-N)



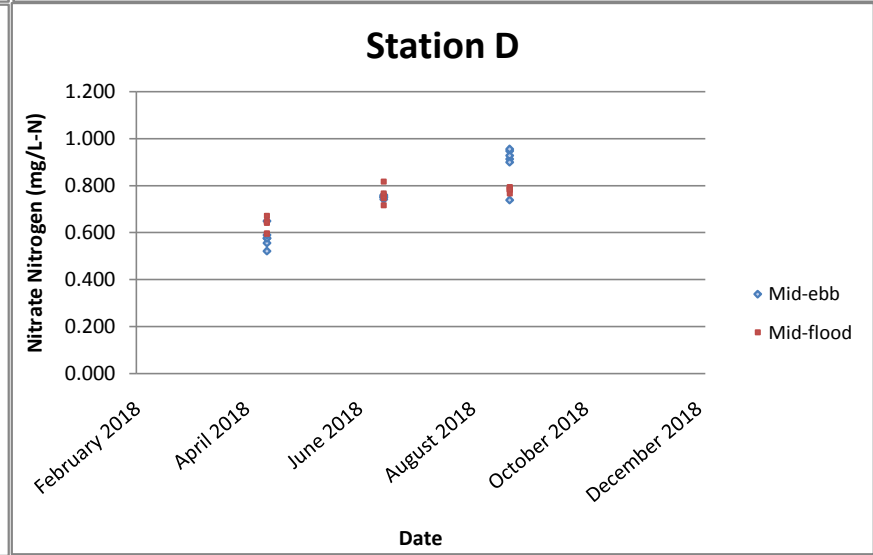
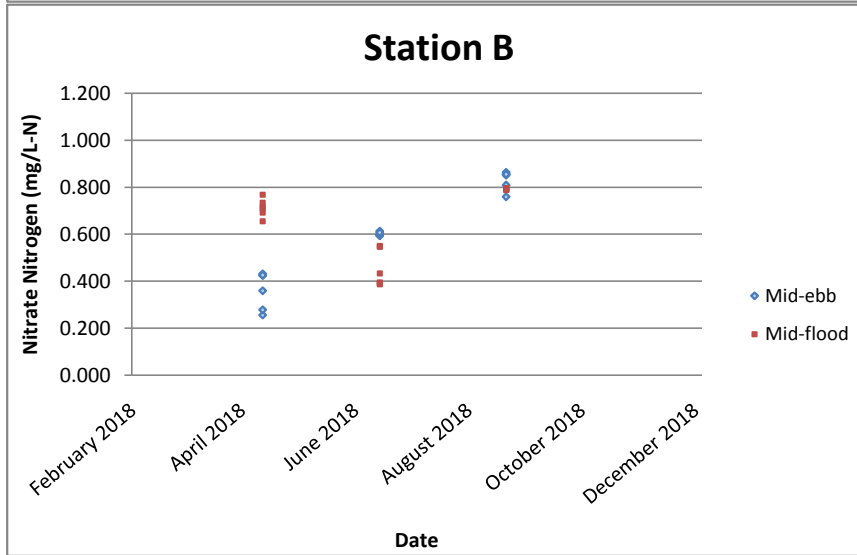
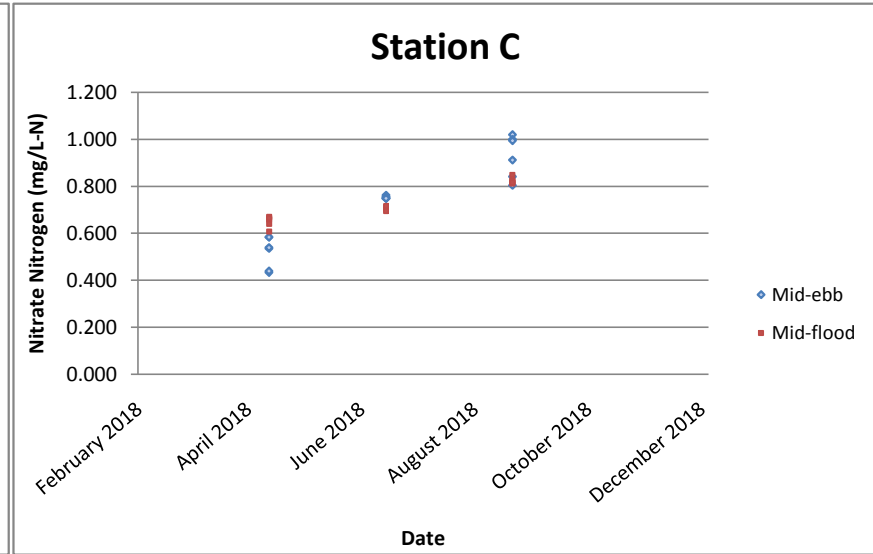
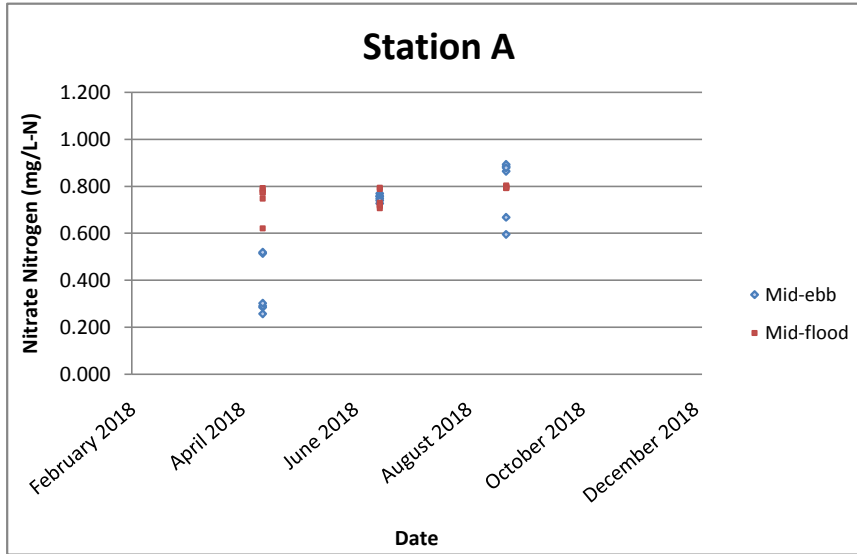
Nitrite Nitrogen (mg/L-N)



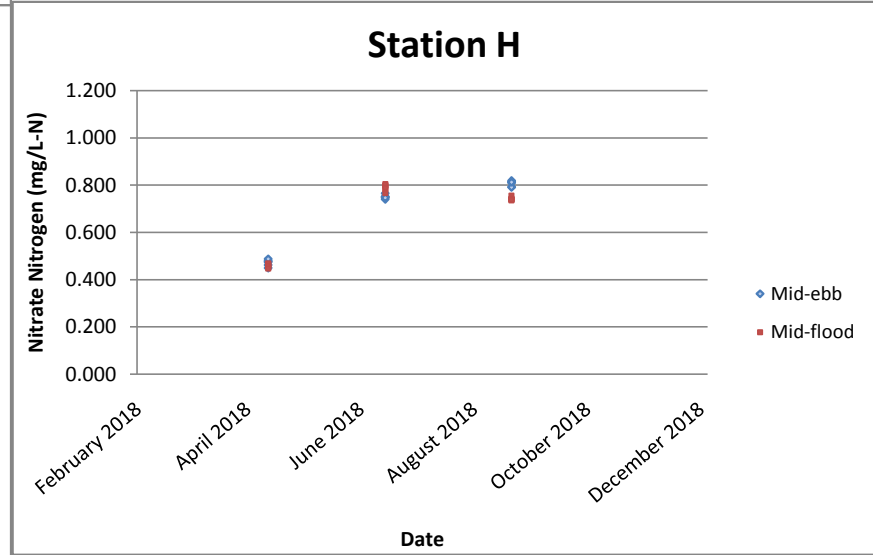
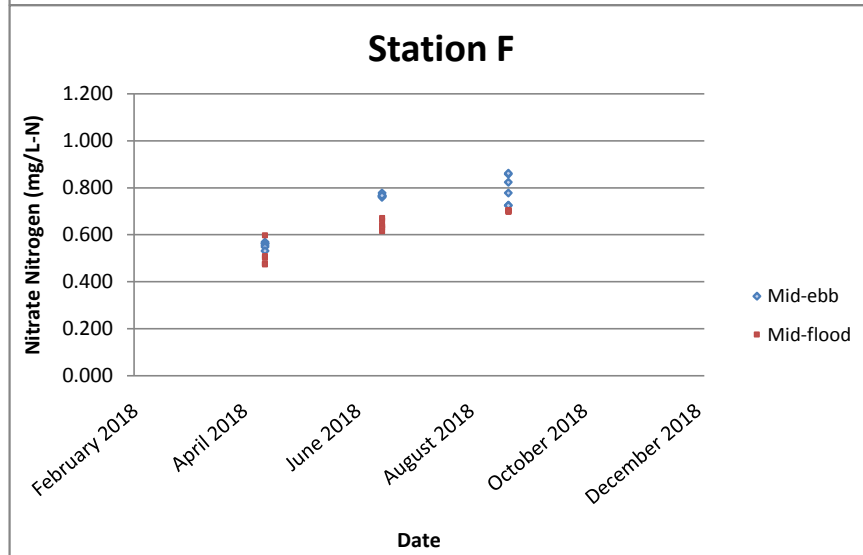
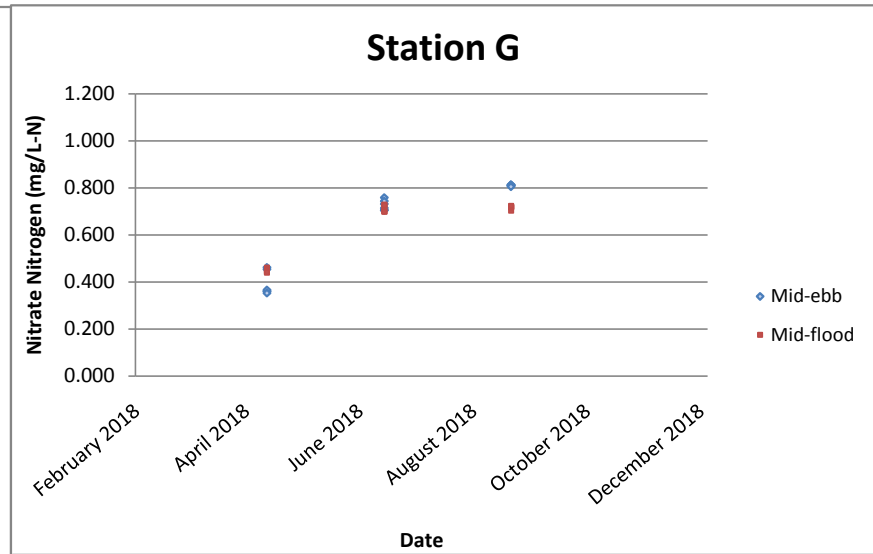
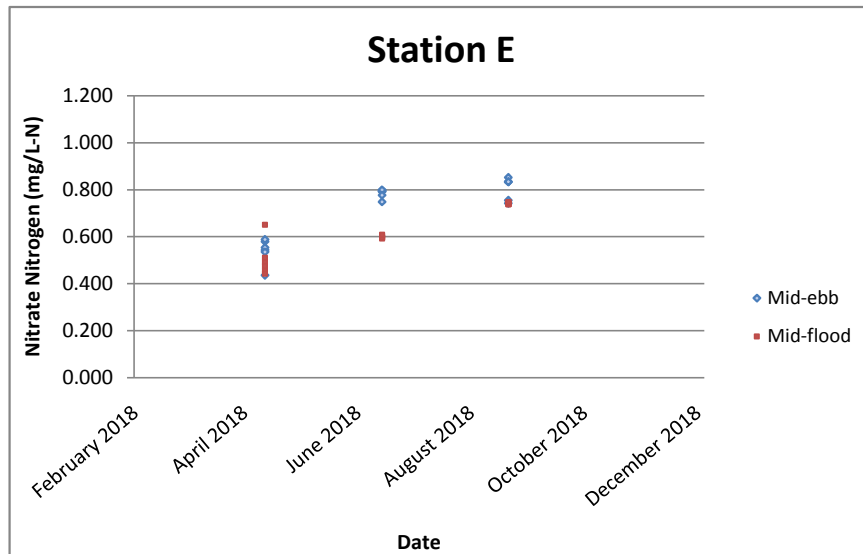
Nitrite Nitrogen (mg/L-N)



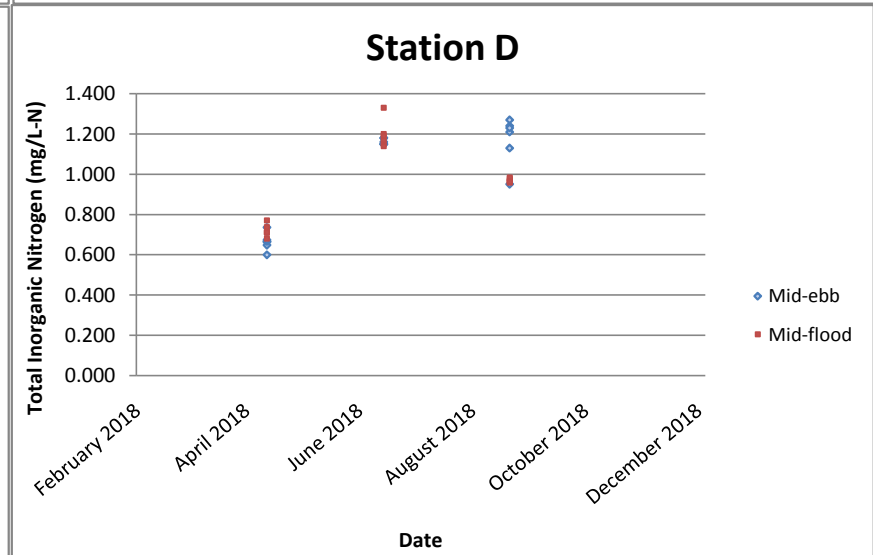
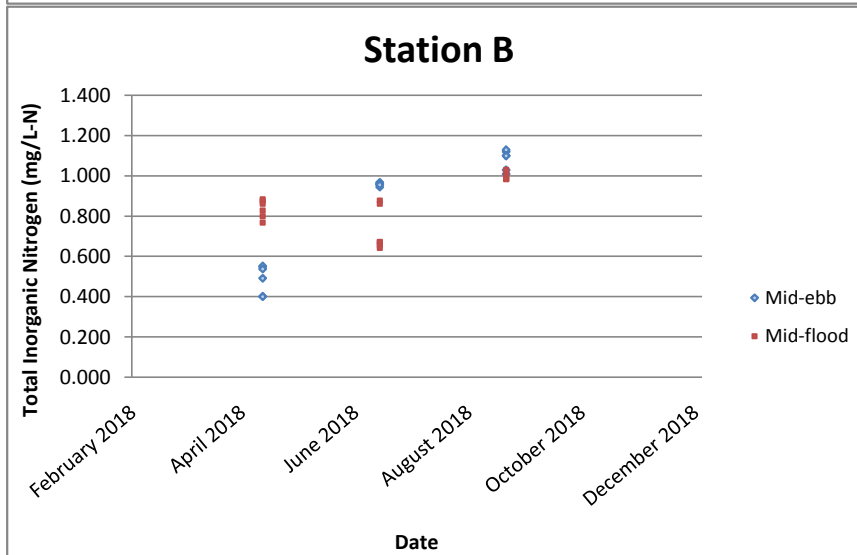
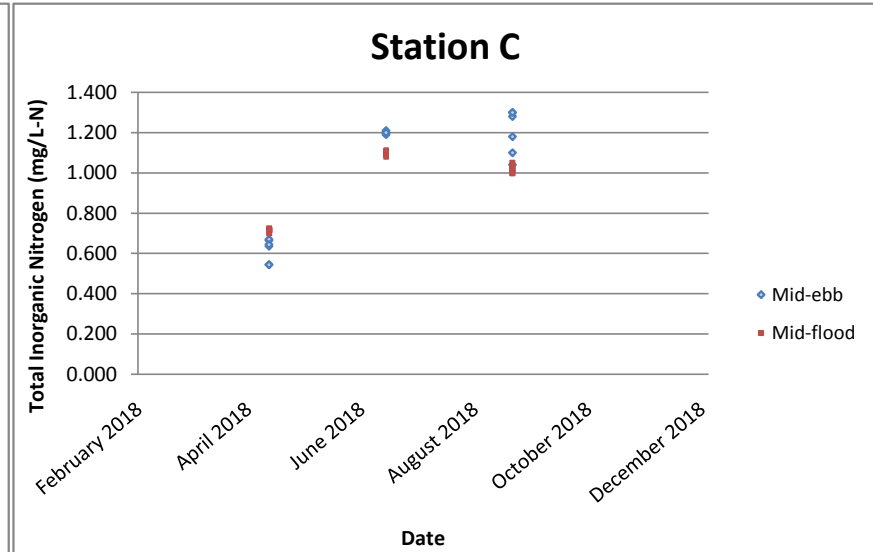
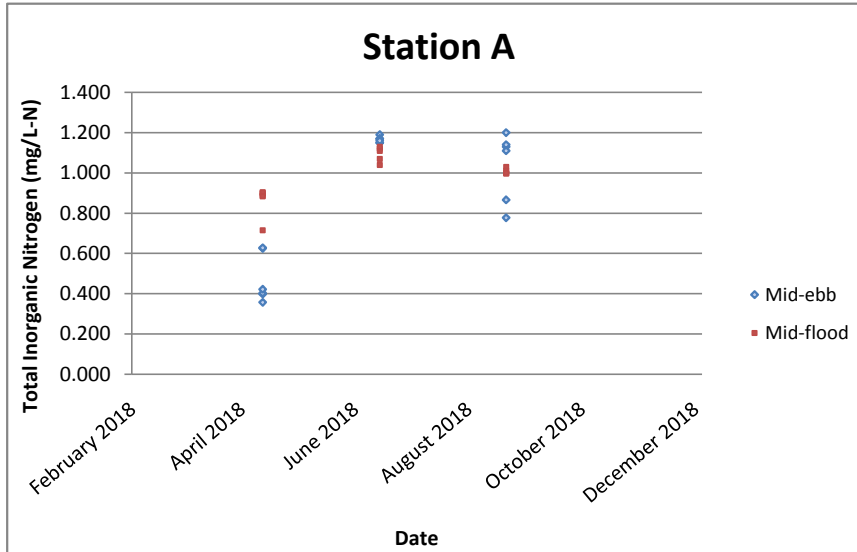
Nitrate Nitrogen (mg/L-N)



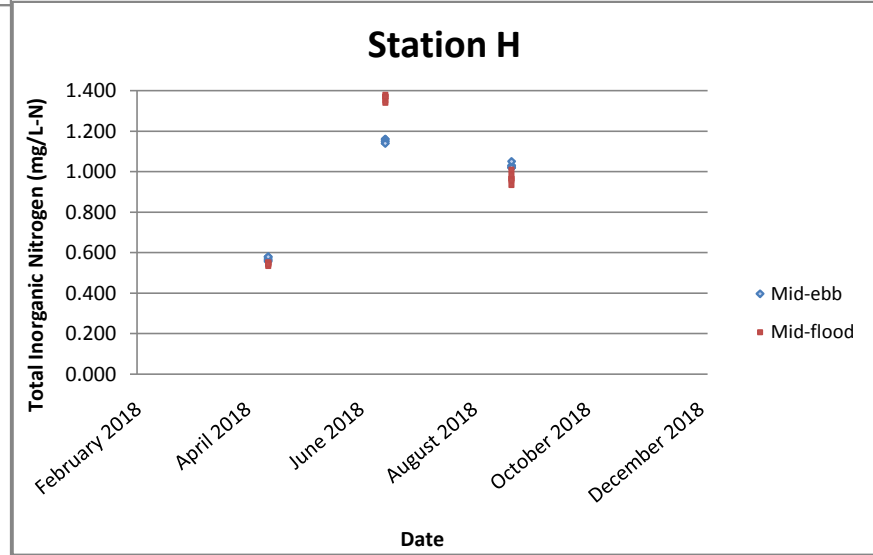
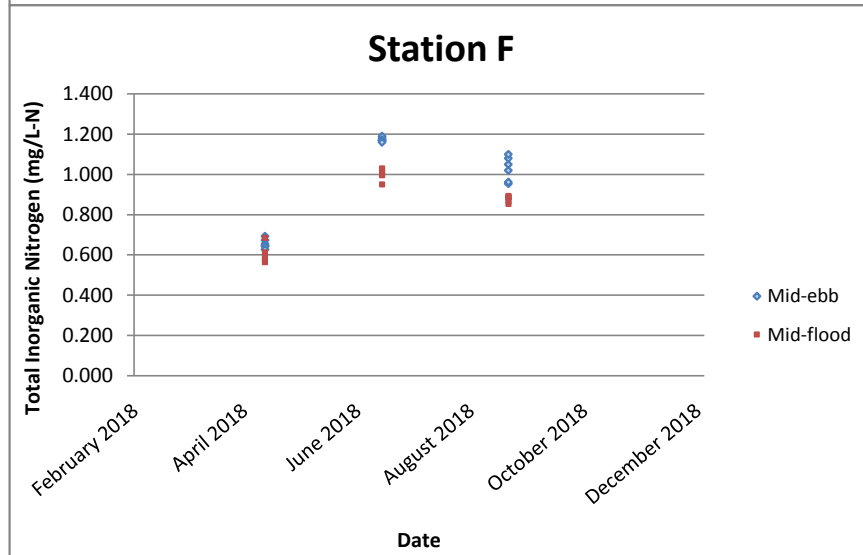
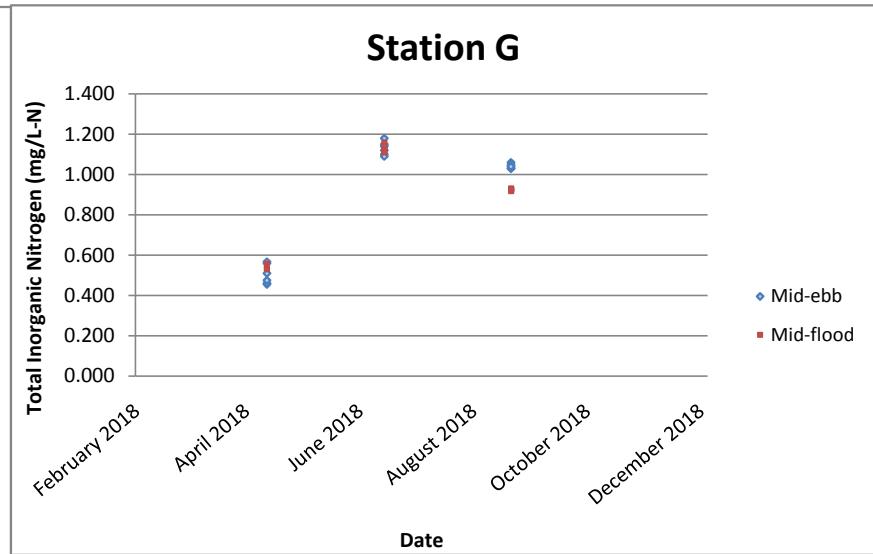
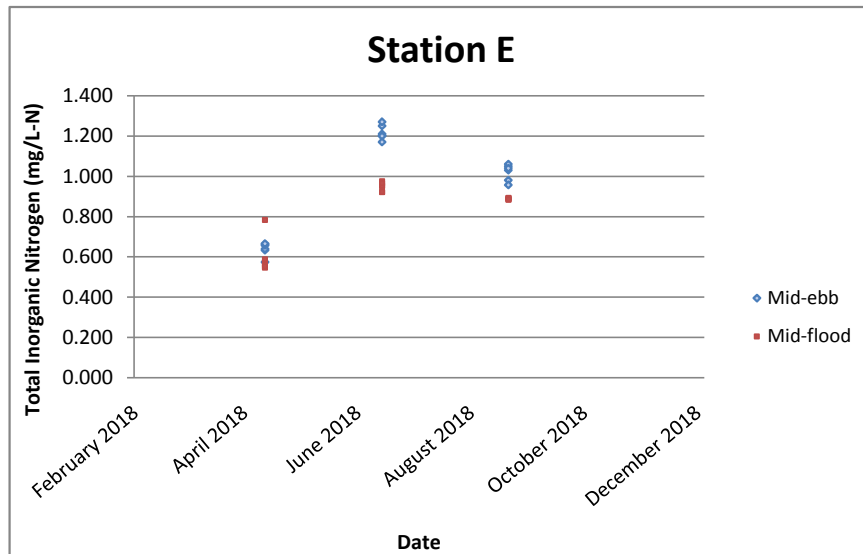
Nitrate Nitrogen (mg/L-N)



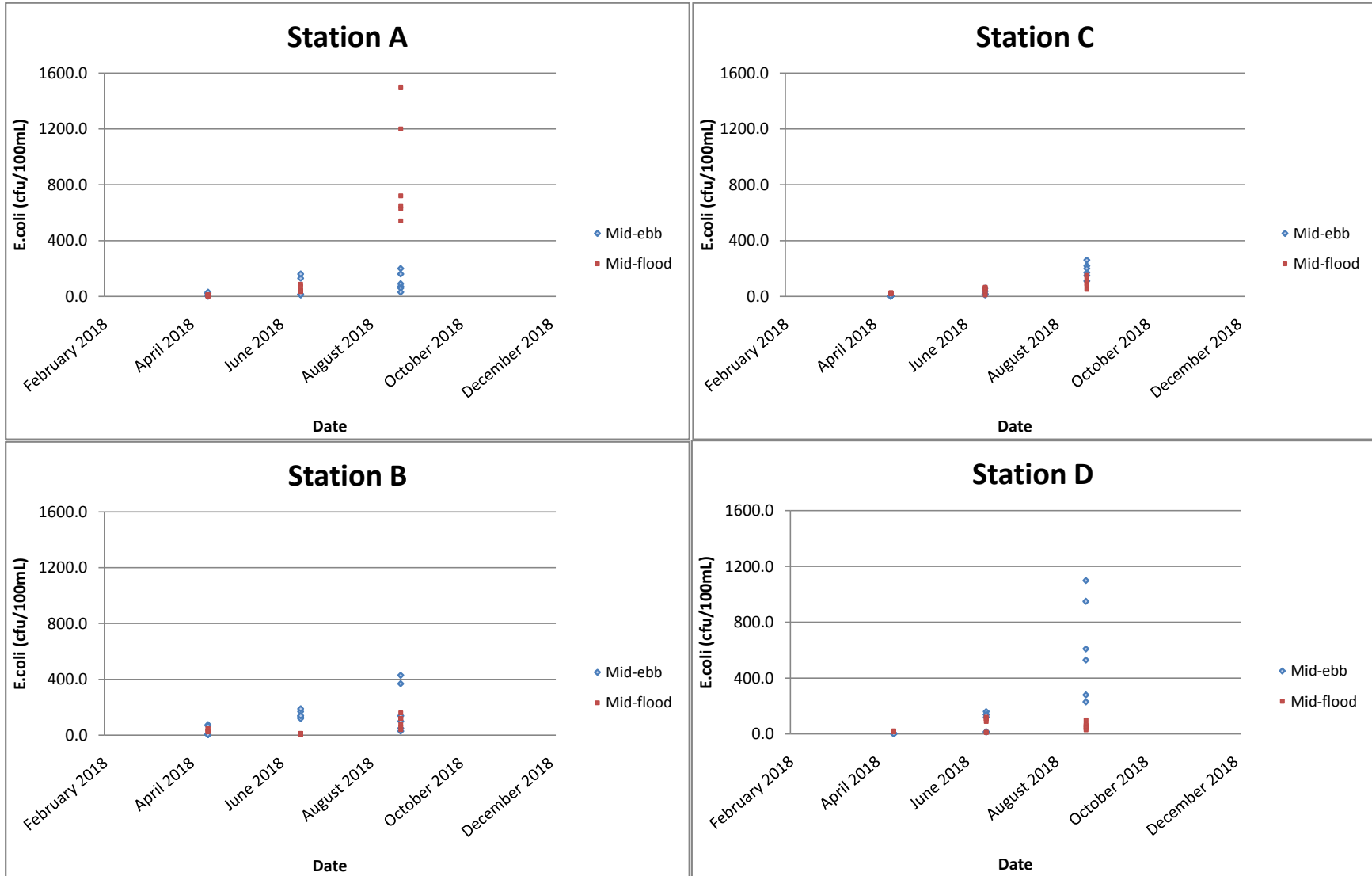
Total Inorganic Nitrogen (mg/L-N)



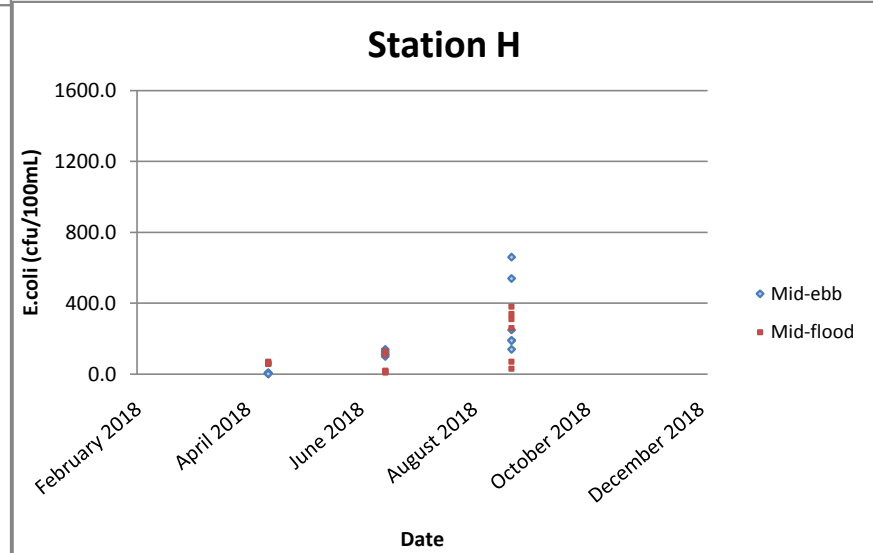
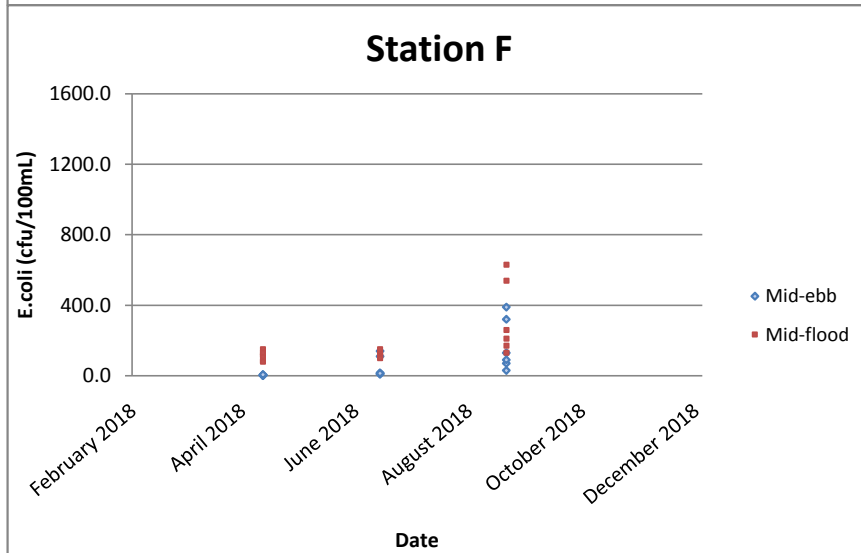
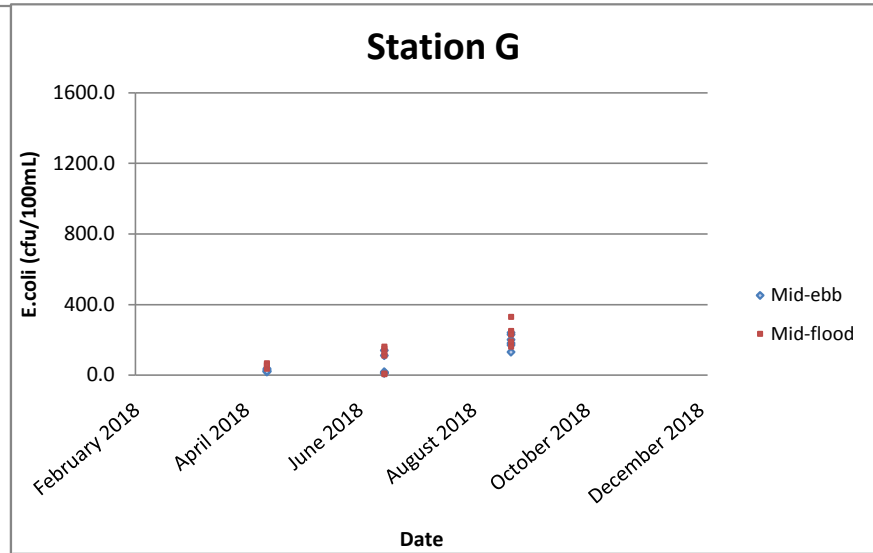
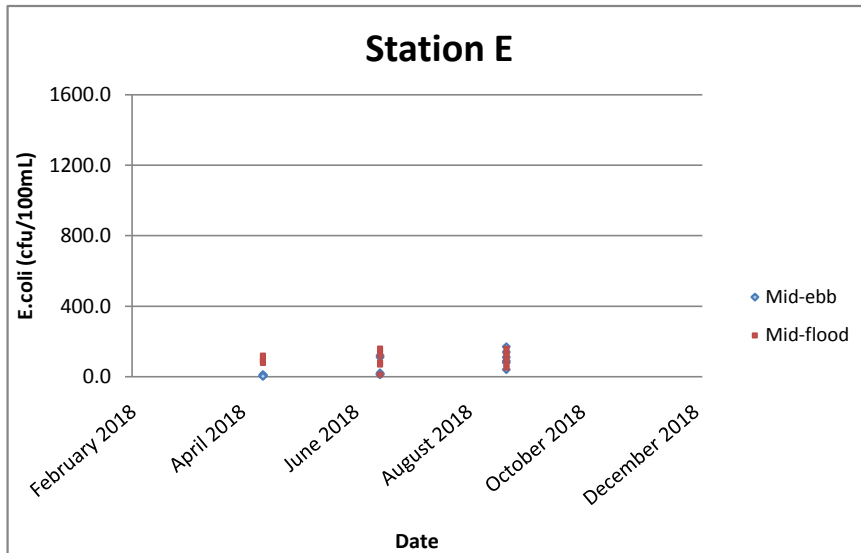
Total Inorganic Nitrogen (mg/L-N)



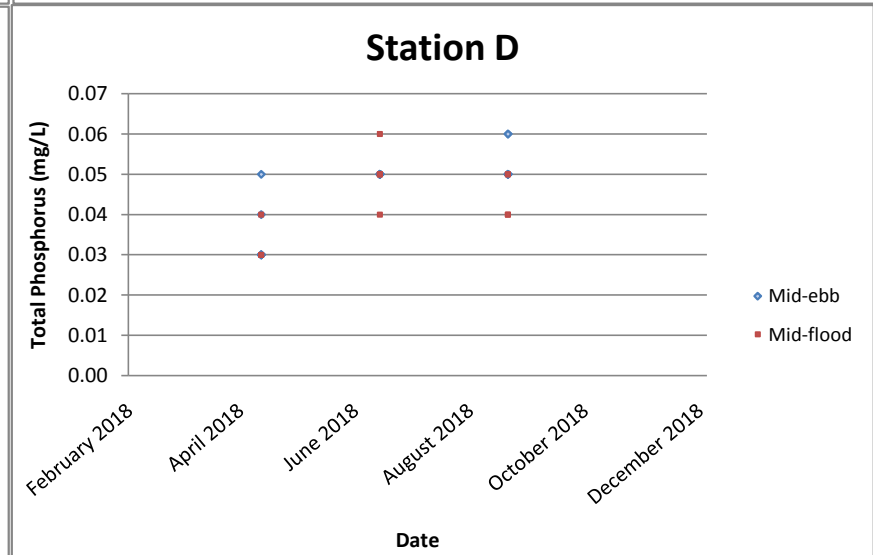
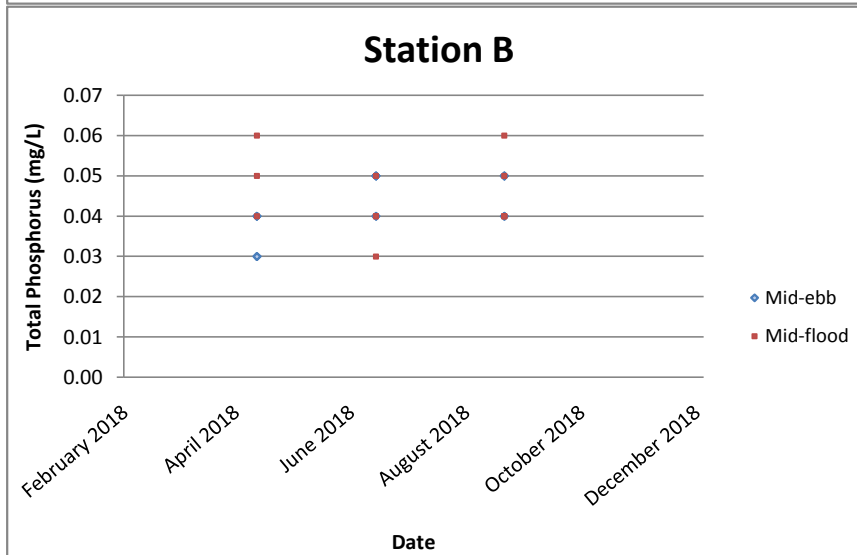
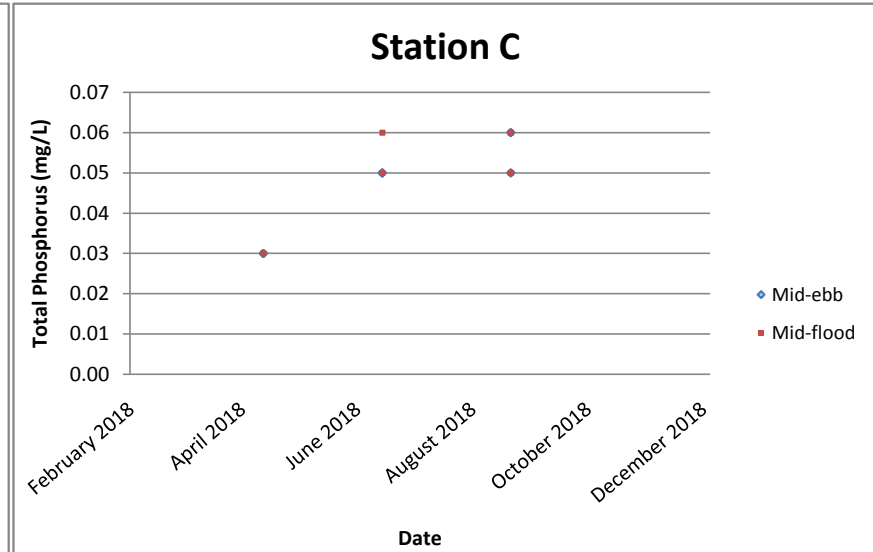
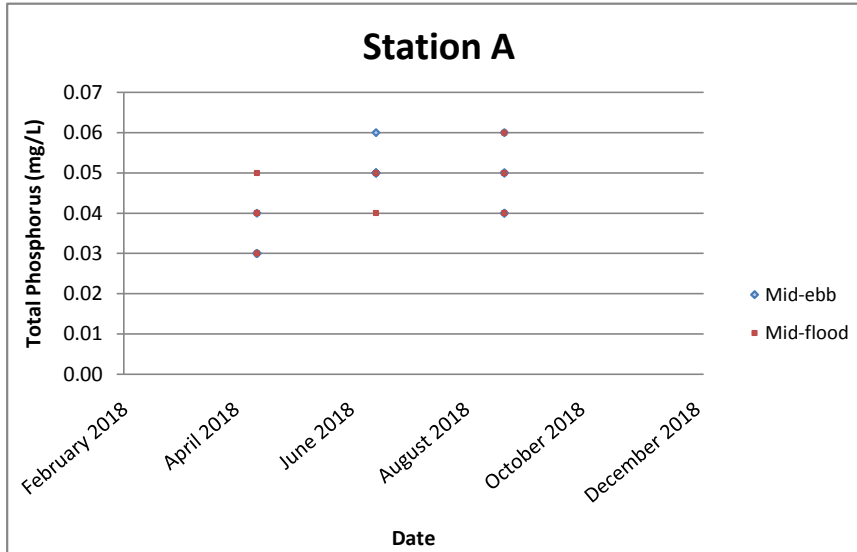
E.coli (cfu/100mL)



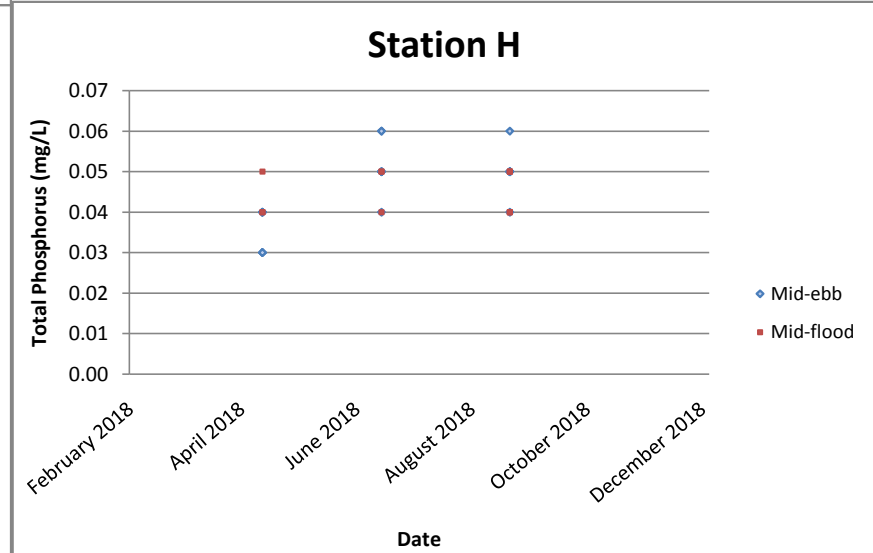
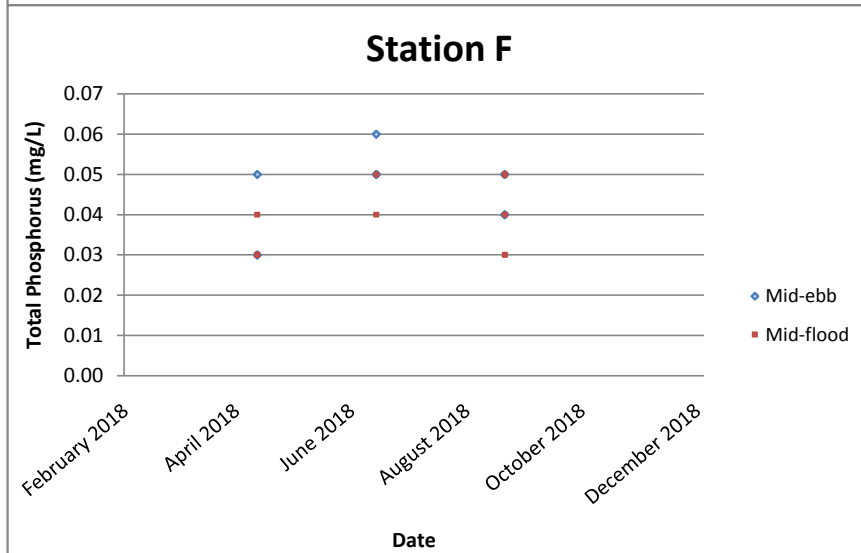
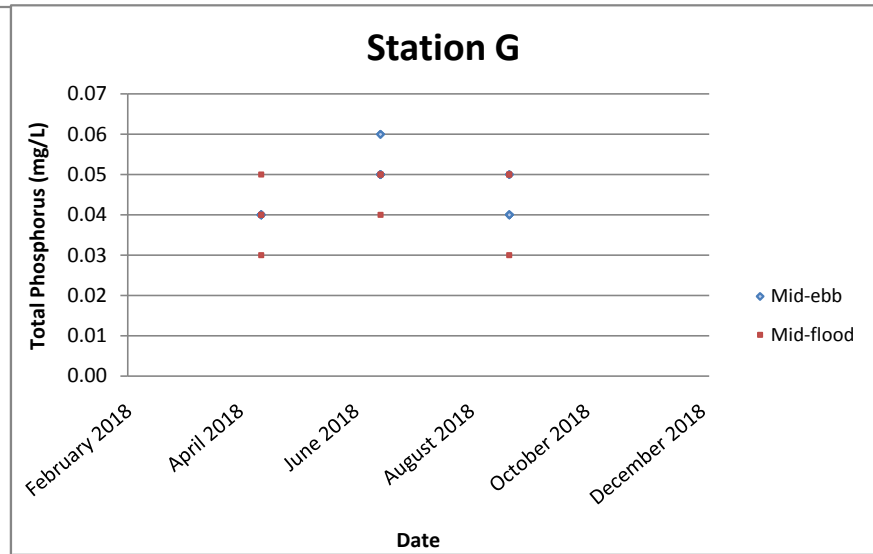
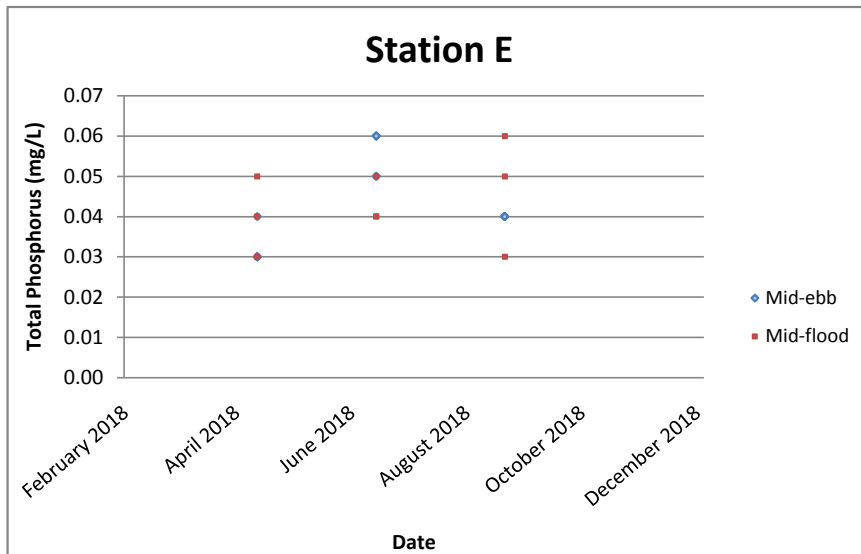
E.coli (cfu/100mL)



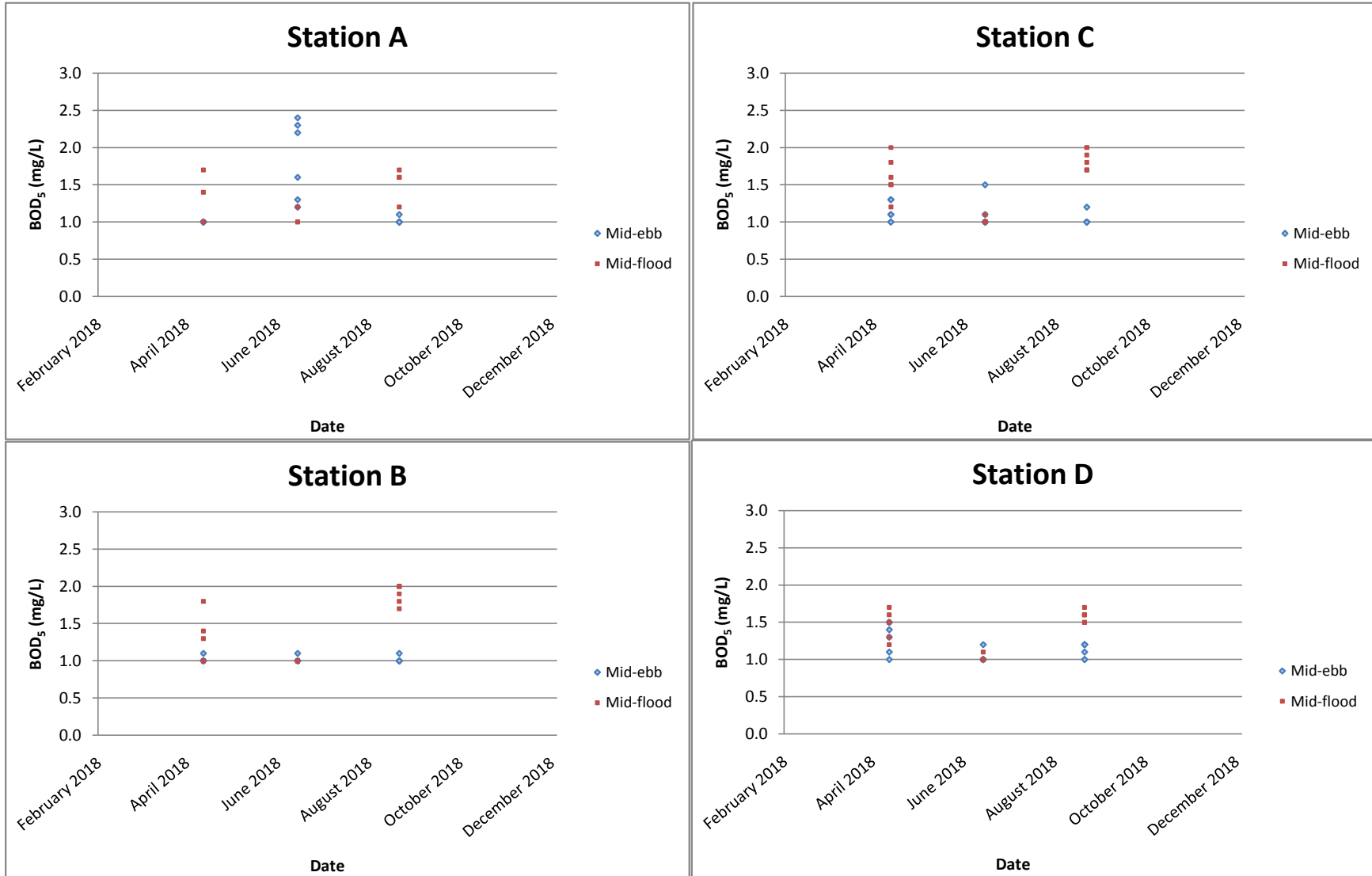
Total Phosphorus (soluble and particulate) (mg/L)



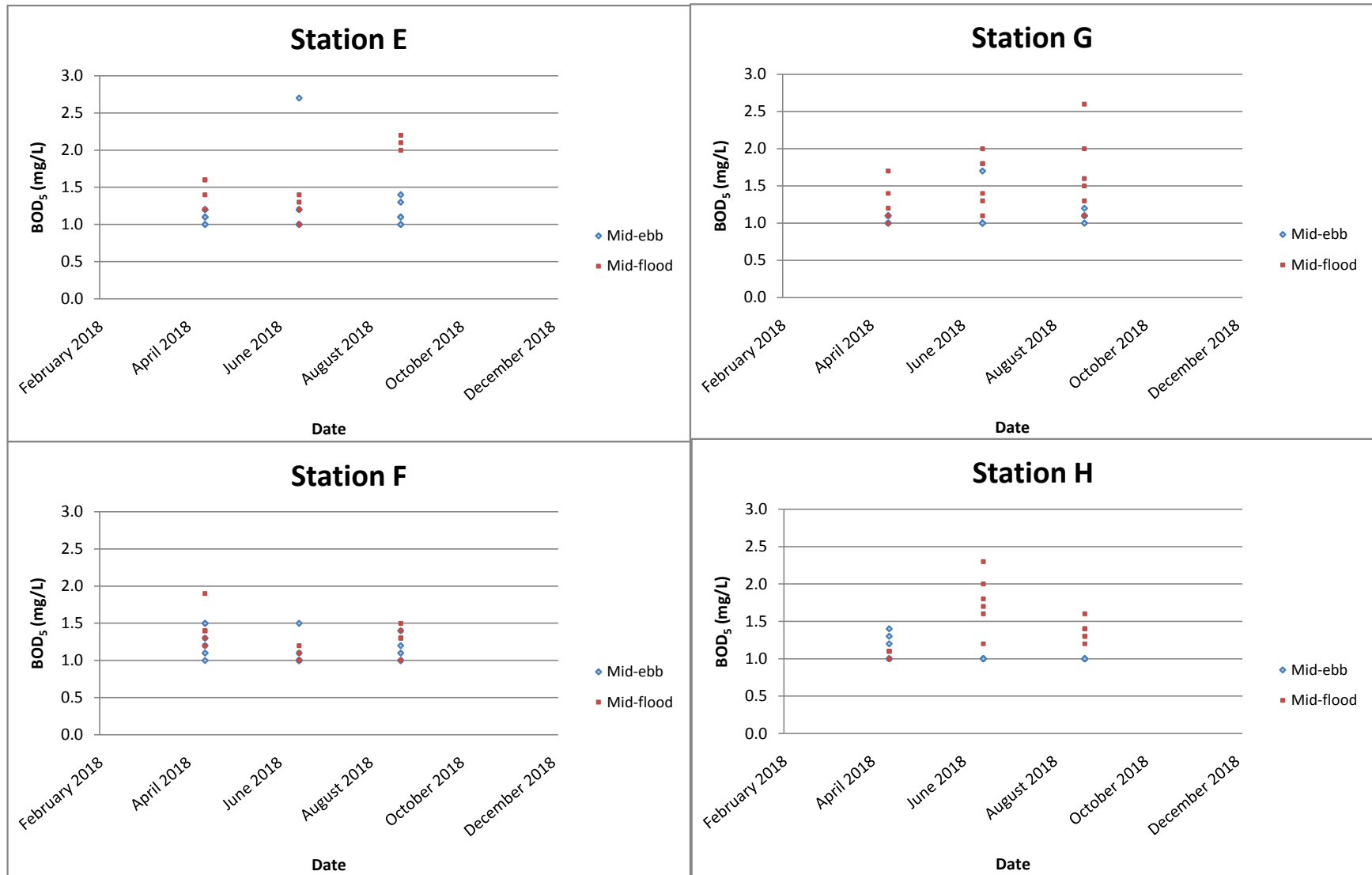
Total Phosphorus (soluble and particulate) (mg/L)



BOD₅ (mg/L)



BOD₅ (mg/L)



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Appendix F

Tidal Data obtained from Ma Wan Marine Traffic Station

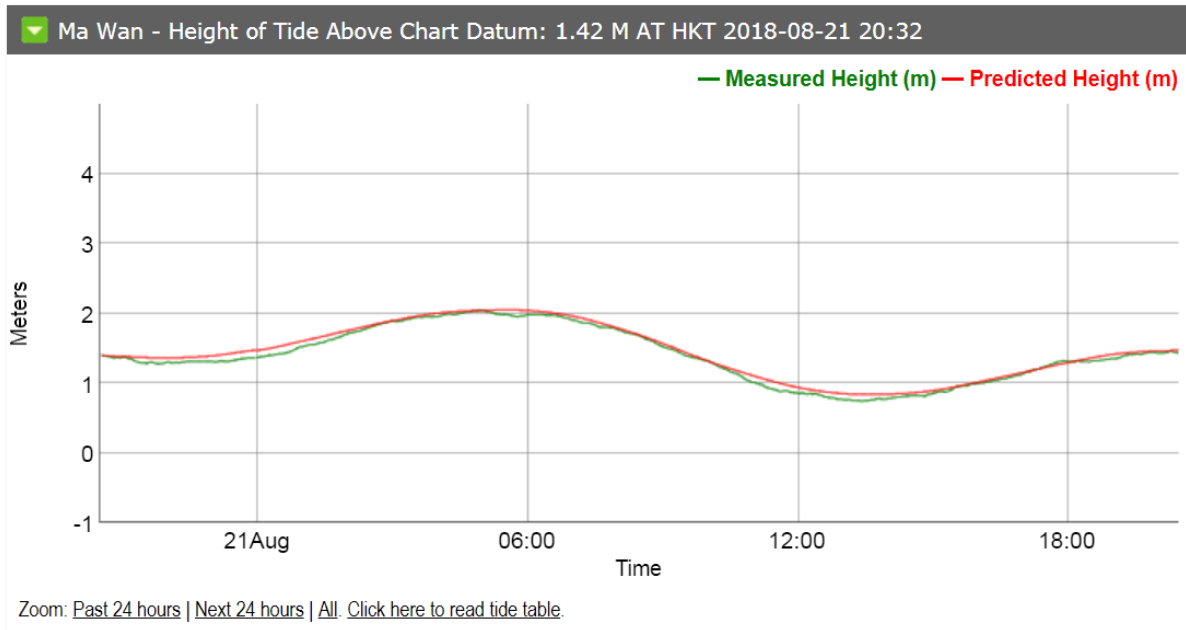
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Report No.: 0041/17/ED/0357A

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	21/8/2018	Cloudy	Moderate	11:27	8.5	9.4	840	409	<0.10	31.9	23.7	30.1	0.06	18.1	85.6	11.2	0.21
B	21/8/2018	Cloudy	Moderate	11:46	8.4	3.2	960	504	0.15	51.8	69.6	50.7	0.15	28.7	123	15.9	0.46
C	21/8/2018	Cloudy	Moderate	12:08	8.4	11.6	1300	569	0.13	50.6	38.5	44.4	0.17	29.1	136	14.0	0.35
D	21/8/2018	Cloudy	Moderate	12:22	8.4	9.8	1250	537	0.11	50.4	39.8	45.0	0.15	29.9	135	14.0	0.32
E	21/8/2018	Cloudy	Moderate	12:50	8.4	12.6	1060	445	<0.10	49.4	40.9	42.6	0.10	28.6	131	12.1	0.36
F	21/8/2018	Cloudy	Moderate	13:06	8.4	30.1	270	600	<0.10	50.4	41.9	45.0	0.14	30.1	136	12.9	0.51
G	21/8/2018	Cloudy	Moderate	13:32	8.6	4.5	50	107	<0.10	24.7	40.9	24.2	<0.05	13.7	77.5	6.9	0.18
H	21/8/2018	Cloudy	Moderate	13:51	8.4	11.0	<10	49	0.11	46.3	46.2	40.1	0.11	26.9	121	12.7	0.33

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distribution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	21/8/2018	Cloudy	Moderate	11:27	0.76	2	25	42	31
B	21/8/2018	Cloudy	Moderate	11:46	0.86	1	18	49	32
C	21/8/2018	Cloudy	Moderate	12:08	0.86	0	3	61	36
D	21/8/2018	Cloudy	Moderate	12:22	0.90	0	9	51	40
E	21/8/2018	Cloudy	Moderate	12:50	1.08	0	5	59	36
F	21/8/2018	Cloudy	Moderate	13:06	1.10	0	2	61	37
G	21/8/2018	Cloudy	Moderate	13:32	0.88	0	12	54	34
H	21/8/2018	Cloudy	Moderate	13:51	0.77	0	6	56	38



CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 12
Contact	: MR CYRUS LAI	Contact	: Richard Fung	Work Order	: HK1843496
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	: 21-Aug-2018		
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 07-Sep-2018
C-O-C number	: —	No. of samples received	: 24		
Site	: —	No. of samples analysed	: 24		

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

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



General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 21-Aug-2018 to 30-Aug-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: HK1843496

Sample(s) were received in chilled condition.

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

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

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

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

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.



Analytical Results

Sub-Matrix: SEDIMENT

Client sample ID

Client sampling date / time

				A/Sediment	B/Sediment	C/Sediment	D/Sediment	E/Sediment
				21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843496-001	HK1843496-002	HK1843496-003	HK1843496-004	HK1843496-005
EA/ED: Physical and Aggregate Properties								
EA002: pH Value	----	0.1	pH Unit	8.5	8.4	8.4	8.4	8.4
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	41.0	52.7	59.1	61.2	60.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055: Ammonia as N	7664-41-7	0.5	mg/kg	9.4	3.2	11.6	9.8	12.6
EK062A: Total Nitrogen as N	----	10	mg/kg	840	960	1300	1250	1060
EK067A: Total Phosphorus as P	----	10	mg/kg	409	504	569	537	445
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	0.5	mg/kg	11.2	15.9	14.0	14.0	12.1
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	0.15	0.13	0.11	<0.10
EG020: Chromium	7440-47-3	0.5	mg/kg	31.9	51.8	50.6	50.4	49.4
EG020: Copper	7440-50-8	0.20	mg/kg	23.7	69.6	38.5	39.8	40.9
EG020: Lead	7439-92-1	0.20	mg/kg	30.1	50.7	44.4	45.0	42.6
EG020: Mercury	7439-97-6	0.05	mg/kg	0.06	0.15	0.17	0.15	0.10
EG020: Nickel	7440-02-0	0.20	mg/kg	18.1	28.7	29.1	29.9	28.6
EG020: Silver	7440-22-4	0.10	mg/kg	0.21	0.46	0.35	0.32	0.36
EG020: Zinc	7440-66-6	0.5	mg/kg	85.6	123	136	135	131



Sub-Matrix: SEDIMENT				Client sample ID	F/Sediment	G/Sediment	H/Sediment	A/Benthic Survey	B/Benthic Survey
				Client sampling date / time	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843496-006	HK1843496-007	HK1843496-008	HK1843496-009	HK1843496-010	
EA/ED: Physical and Aggregate Properties									
EA002: pH Value	----	0.1	pH Unit	8.4	8.6	8.4	---	---	
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	64.2	38.4	56.9	51.9	53.2	
ED/EK: Inorganic Nonmetallic Parameters									
EK055: Ammonia as N	7664-41-7	0.5	mg/kg	30.1	4.5	11.0	---	---	
EK062A: Total Nitrogen as N	----	10	mg/kg	270	50	<10	---	---	
EK067A: Total Phosphorus as P	----	10	mg/kg	600	107	49	---	---	
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg	12.9	6.9	12.7	---	---	
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	<0.10	0.11	---	---	
EG020: Chromium	7440-47-3	0.5	mg/kg	50.4	24.7	46.3	---	---	
EG020: Copper	7440-50-8	0.20	mg/kg	41.9	40.9	46.2	---	---	
EG020: Lead	7439-92-1	0.20	mg/kg	45.0	24.2	40.1	---	---	
EG020: Mercury	7439-97-6	0.05	mg/kg	0.14	<0.05	0.11	---	---	
EG020: Nickel	7440-02-0	0.20	mg/kg	30.1	13.7	26.9	---	---	
EG020: Silver	7440-22-4	0.10	mg/kg	0.51	0.18	0.33	---	---	
EG020: Zinc	7440-66-6	0.5	mg/kg	136	77.5	121	---	---	
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%	---	---	---	0.76	0.86	



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	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018	21-Aug-2018
Compound	CAS Number	LOR	Unit	HK1843496-011	HK1843496-012	HK1843496-013	HK1843496-014	HK1843496-015	HK1843496-015
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	63.3	55.3	60.1	63.6	55.6	
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%	0.86	0.90	1.08	1.10	0.88	



Sub-Matrix: SEDIMENT				Client sample ID	H/Benthic Survey	---	---	---	---
				Client sampling date / time	21-Aug-2018	---	---	---	---
Compound	CAS Number	LOR	Unit	HK1843496-016	---	---	---	---	---
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	---	0.1	%	55.1	---	---	---	---	---
EP: Aggregate Organics									
EP005: Total Organic Carbon	---	0.05	%	0.77	---	---	---	---	---



Sub-Matrix: WATER				Client sample ID	F/Rinsate Blank	G/Rinsate Blank	H/Rinsate Blank	---	---
				Client sampling date / time	21-Aug-2018	21-Aug-2018	21-Aug-2018	---	---
Compound	CAS Number	LOR	Unit	HK1843496-022	HK1843496-023	HK1843496-024	---	---	
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	<1	<1	---	---	
EG020: Copper	7440-50-8	1	µg/L	<1	<1	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 Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1889706)								
HK1843496-001	A/Sediment	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	41.0	40.7	0.739
HK1843496-011	C/Benthic Survey	EA055: Moisture Content (dried @ 103°C)	----	0.1	%	63.3	63.5	0.436
EA/ED: Physical and Aggregate Properties (QC Lot: 1889741)								
HK1843496-001	A/Sediment	EA002: pH Value	----	0.1	pH Unit	8.5	8.5	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1895846)								
HK1845281-001	Anonymous	EK055: Ammonia as N	7664-41-7	1	mg/kg	14000	14400	2.92
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1901777)								
HK1843496-001	A/Sediment	EK067A: Total Phosphorus as P	----	10	mg/kg	409	471	13.9
EG: Metals and Major Cations (QC Lot: 1889491)								
HK1843496-002	B/Sediment	EG020: Cadmium	7440-43-9	0.01	mg/kg	0.15	0.15	0.00
		EG020: Mercury	7439-97-6	0.02	mg/kg	0.15	0.15	0.00
		EG020: Copper	7440-50-8	0.05	mg/kg	69.6	66.5	4.64
		EG020: Lead	7439-92-1	0.05	mg/kg	50.7	48.2	5.04
		EG020: Nickel	7440-02-0	0.05	mg/kg	28.7	27.5	4.38
		EG020: Silver	7440-22-4	0.05	mg/kg	0.46	0.45	2.98
		EG020: Arsenic	7440-38-2	0.5	mg/kg	15.9	15.2	4.79
		EG020: Chromium	7440-47-3	0.5	mg/kg	51.8	50.5	2.62
		EG020: Zinc	7440-66-6	0.5	mg/kg	123	119	2.82
EP: Aggregate Organics (QC Lot: 1893089)								
HK1843496-010	B/Benthic Survey	EP005: Total Organic Carbon	----	0.05	%	0.86	0.72	17.2
Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1889474)								
HK1843496-018	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	<1	<1	0.00
		EG020: Copper	7440-50-8	1	µg/L	2	2	0.00
		EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.00
		EG020: Nickel	7440-02-0	1	µg/L	2	2	0.00



Matrix: WATER				Laboratory Duplicate (DUP) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1889474) - Continued								
HK1843496-018	B/Rinsate Blank	EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.00
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.00
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.00

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

Matrix: SOIL				Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)		
						LCS	DCS	Low	High	Value	Control Limit	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1895846)												
EK055: Ammonia as N	7664-41-7	1	mg/kg	<1	10 mg/kg	99.9	----	85	119	----	----	
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1901777)												
EK067A: Total Phosphorus as P	----	10	mg/kg	<10	695 mg/kg	87.3	----	85	115	----	----	
EG: Metals and Major Cations (QC Lot: 1889491)												
EG020: Arsenic	7440-38-2	0.5	mg/kg	<0.5	5 mg/kg	88.7	----	80	110	----	----	
EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.01	5 mg/kg	98.4	----	84	115	----	----	
EG020: Chromium	7440-47-3	0.5	mg/kg	<0.5	5 mg/kg	96.6	----	80	120	----	----	
EG020: Copper	7440-50-8	0.05	mg/kg	<0.05	5 mg/kg	100	----	85	114	----	----	
EG020: Lead	7439-92-1	0.05	mg/kg	<0.05	5 mg/kg	102	----	87	118	----	----	
EG020: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	106	----	84	124	----	----	
EG020: Nickel	7440-02-0	0.05	mg/kg	<0.05	5 mg/kg	98.2	----	85	115	----	----	
EG020: Silver	7440-22-4	0.05	mg/kg	<0.05	5 mg/kg	99.0	----	85	115	----	----	
EG020: Zinc	7440-66-6	0.5	mg/kg	<0.5	5 mg/kg	110	----	80	120	----	----	
EP: Aggregate Organics (QC Lot: 1893089)												
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	101	----	92	105	----	----	

Matrix: WATER				Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)		
						LCS	DCS	Low	High	Value	Control Limit	
EG: Metals and Major Cations - Total (QC Lot: 1889474)												
EG020: Arsenic	7440-38-2	10	µg/L	<10	100 µg/L	97.1	----	83	110	----	----	



Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
						LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1889474) - Continued											
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	100 µg/L	97.1	----	85	109	----	----
EG020: Chromium	7440-47-3	1	µg/L	<1	100 µg/L	99.5	----	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	102	----	89	111	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	101	----	80	118	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	100 µg/L	102	----	87	110	----	----
EG020: Silver	7440-22-4	----	µg/L	----	100 µg/L	94.8	----	80	114	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	100 µg/L	104	----	86	114	----	----



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

Matrix: SOIL

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Spike Concentration</i>	<i>Spike Recovery (%)</i>		<i>Recovery Limits (%)</i>		<i>RPD (%)</i>	
					<i>MS</i>	<i>MSD</i>	<i>Low</i>	<i>High</i>	<i>Value</i>	<i>Control Limit</i>
EG: Metals and Major Cations (QC Lot: 1889491)										
HK1843496-001	A/Sediment	EG020: Arsenic	7440-38-2	5 mg/kg	97.8	----	75	125	----	----
		EG020: Cadmium	7440-43-9	5 mg/kg	101	----	75	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	89.3	----	75	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	85.2	----	75	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	75.0	----	75	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	97.8	----	75	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	85.2	----	75	125	----	----
		EG020: Silver	7440-22-4	5 mg/kg	96.6	----	75	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75	125	----	----
EP: Aggregate Organics (QC Lot: 1893089)										
HK1843496-009	A/Benthic Survey	EP005: Total Organic Carbon	----	40 %	109	----	75	125	----	----

Matrix: WATER

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Spike Concentration</i>	<i>Spike Recovery (%)</i>		<i>Recovery Limits (%)</i>		<i>RPD (%)</i>	
					<i>MS</i>	<i>MSD</i>	<i>Low</i>	<i>High</i>	<i>Value</i>	<i>Control Limit</i>
EG: Metals and Major Cations - Total (QC Lot: 1889474)										
HK1843496-017	A/Rinsate Blank	EG020: Arsenic	7440-38-2	100 µg/L	90.5	----	75	125	----	----
		EG020: Cadmium	7440-43-9	100 µg/L	88.5	----	75	125	----	----
		EG020: Chromium	7440-47-3	100 µg/L	87.6	----	75	125	----	----
		EG020: Copper	7440-50-8	100 µg/L	85.2	----	75	125	----	----
		EG020: Lead	7439-92-1	100 µg/L	82.4	----	75	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	86.8	----	75	125	----	----
		EG020: Nickel	7440-02-0	100 µg/L	75.7	----	75	125	----	----
		EG020: Silver	7440-22-4	100 µg/L	92.4	----	75	125	----	----
		EG020: Zinc	7440-66-6	100 µg/L	82.6	----	75	125	----	----



ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: MR CYRUS LAI	WORK ORDER	: HK1843496
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	: 21-AUG-2018
		DATE OF ISSUE	: 7-SEP-2018
PROJECT	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT	NO. OF SAMPLES	: 24
		CLIENT ORDER	: 0041/17

General Comments

- Sample(s) were received in chilled condition.
- Water sample(s) analysed and reported on as received basis.
- Sediment sample(s) analysed on an as received basis. Result(s) reported on dry weight basis.
- pH determined and reported on a 1:5 soil / water extract.
- Water sample(s) digested by In-house method E-3005 prior to the determination of total metals. The In-house method is developed based on USEPA method 3005.
- 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.

Signatories

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

Signatories	Position
Richard Fung 	General Manager

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

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

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

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 : HK1843496
 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.
HK1843496-001	A/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-002	B/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-003	C/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-004	D/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-005	E/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-006	F/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-007	G/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-008	H/Sediment	SEDIMENT	21-Aug-2018	
HK1843496-009	A/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-010	B/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-011	C/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-012	D/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-013	E/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-014	F/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-015	G/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-016	H/Benthic Survey	SEDIMENT	21-Aug-2018	J2999-272.34
HK1843496-017	A/Rinsate Blank	WATER	21-Aug-2018	
HK1843496-018	B/Rinsate Blank	WATER	21-Aug-2018	
HK1843496-019	C/Rinsate Blank	WATER	21-Aug-2018	
HK1843496-020	D/Rinsate Blank	WATER	21-Aug-2018	
HK1843496-021	E/Rinsate Blank	WATER	21-Aug-2018	
HK1843496-022	F/Rinsate Blank	WATER	21-Aug-2018	
HK1843496-023	G/Rinsate Blank	WATER	21-Aug-2018	
HK1843496-024	H/Rinsate Blank	WATER	21-Aug-2018	

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



Customer : A.L.S. Technichem (HK) Pty Ltd

Job No. : J2999

Report No. : J2999-272.34

Works Order No. : 272

Project : -

Contract No. :

Date : 24/08/2018

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		
	No.	Type								Depth (m)	# Test Method	Gravel (%)			Sand (%)	Silt Clay (%)
HK 1843496-009	A/Benthic Survey	D								1,5,7	2	25	42	31	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	- †
HK 1843496-010	B/Benthic Survey	D								1,5,7	1	18	49	32	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	- †
HK 1843496-011	C/Benthic Survey	D								1,5,7	0	3	61	36	Dark grey, slightly sandy SILT/CLAY	- †
HK 1843496-012	D/Benthic Survey	D								1,5,7	0	9	51	40	Dark grey, slightly sandy SILT/CLAY	- †
HK 1843496-013	E/Benthic Survey	D								1,5,7	0	5	59	36	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK 1843496-014	F/Benthic Survey	D								1,5,7	0	2	61	37	Dark grey, slightly sandy SILT/CLAY	- †
HK 1843496-015	G/Benthic Survey	D								1,5,7	0	12	54	34	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †
HK 1843496-016	H/Benthic Survey	D								1,5,7	0	6	56	38	Dark grey, slightly sandy SILT/CLAY with shell fragments	- †

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

Symbols : U - Undisturbed Sample; P - Piston Sample; N.P. - Non Plastic; A.D. - Air Dried;
 LB - Large Disturbed Sample; M - Mazier Sample; A.R. - As Received; O.D. - Oven Dried;
 BLK - Block Sample; D - Small Disturbed Sample; H.P. - Hand Picked; W.S. - Wet Sieved;
 SPTL - SPT Split-Barrel Sample; PT - Portable triple tube Sample; PT - Moisture Content for A.L. Test

Notes : IS - Insufficient Sample, TF - To Follow on supplementary Report.

Checked by : T K Lam

Approved By : Chung Hei Wing
 Principal Laboratory Officer

Date : 05/09/2018

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Technology Centre

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

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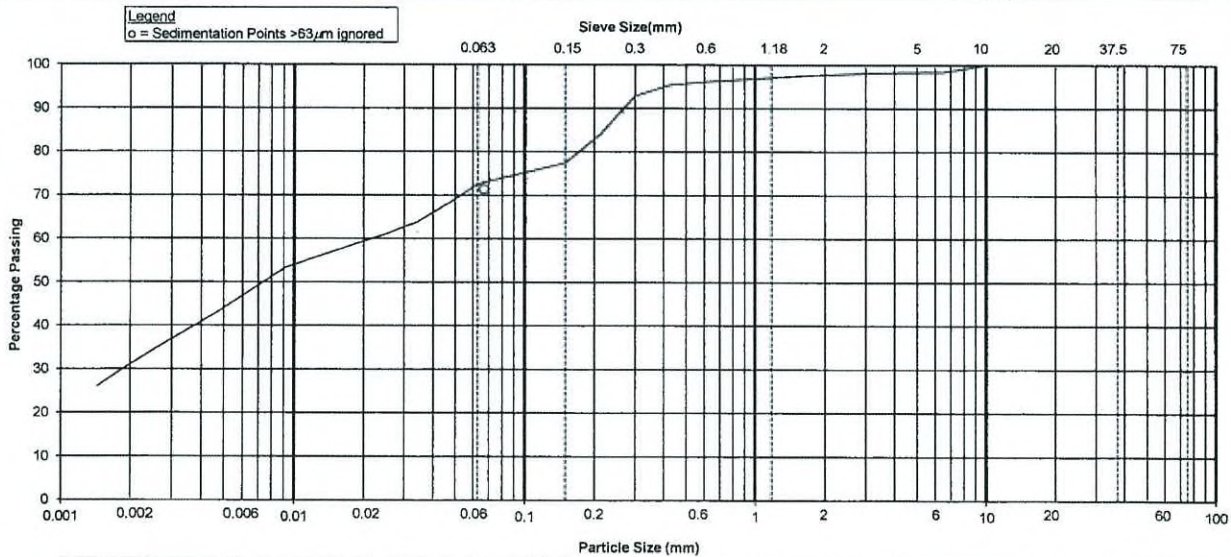
Form : GESS001 / Jun.30.13 / Issue 1 / Rev 3

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



Job No. : J2999 Contract No. :
 Customer : ALS Technichem (HK) Pty Ltd Works Order No. : 272
 Project : - Sample ID No. : HK1843496-009
 Date Received : 24/08/2018 Sample No. : A/Benthic Survey
 Tested Date : 25/08/2018 Sample Depth (m) :
 Specimen Depth (m) :
 Description : Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments Sample Type : Small Disturbed
 Sieve Method : Method A * Upon request * Delete as appropriate Sample Origin : -
 † Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
100.0 mm	100	-	-	0.0666	-	71	-
75.0 mm	100	-	-	0.0476	-	69	-
63.0 mm	100	-	-	0.0342	-	64	-
50.0 mm	100	-	-	0.0244	-	61	-
37.5 mm	100	-	-	0.0174	-	58	-
28.0 mm	100	-	-	0.0091	-	53	-
20.0 mm	100	-	-	0.0047	-	43	-
14.0 mm	100	-	-	0.0024	-	34	-
10.0 mm	100	-	-	0.0014	-	26	-
6.30 mm	98	-	-	SUMMARY : Gravel (%) : 2 Sand (%) : 25 Silt (%) : 42 Clay (%) : 31			
5.00 mm	98	-	-				
3.35 mm	98	-	-				
2.00 mm	98	-	-				
1.18 mm	97	-	-				
600 µm	96	-	-				
425 µm	95	-	-				
300 µm	93	-	-				
212 µm	84	-	-				
150 µm	78	-	-				
63 µm	73	-	-				
0 µm	0	-	-				



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

Technician : K Y Sun Checked By : T K Lam Approved By : Chung Hei Wing
 Date : 25/08/2018 Date : 05/09/2018 Date : 05/09/2018

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

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



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

Contract No. :

Report No. : J2999-272.34

Works Order No. : 272
 Sample ID No. : HK1843496-010
 Sample No. : B/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : ‡

Date Received : 24/08/2018
 Tested Date : 25/08/2018

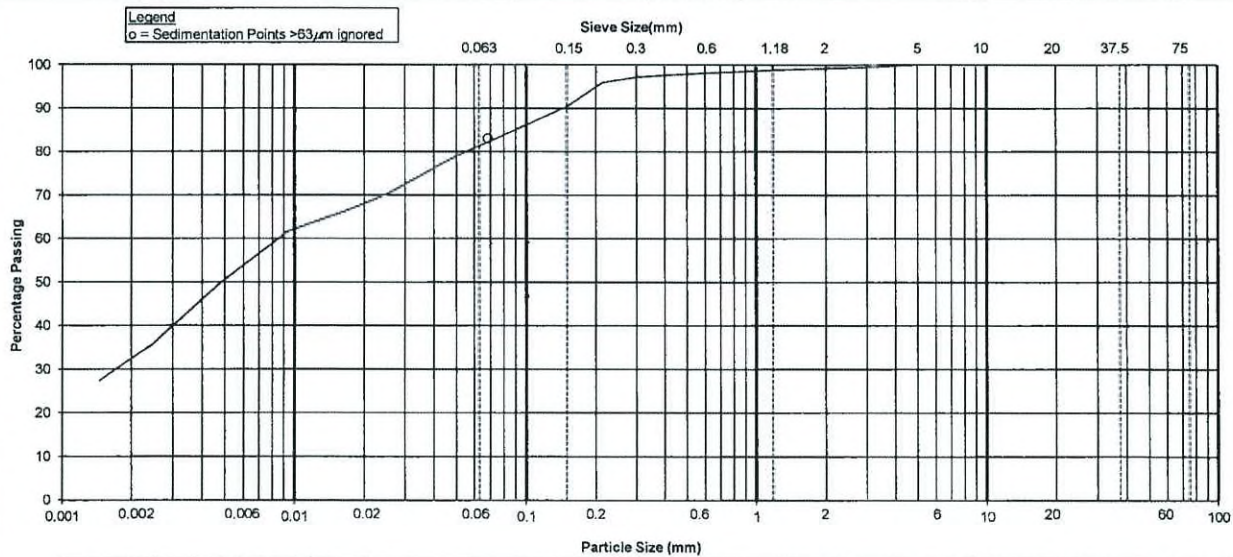
Description : Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
 Sieve Method : Method A ^ Upon request * Delete as appropriate

‡ Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS																																										
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :	Dispersant Details :	Sampling History :	The presence of any visible organic matter in the soil :																																							
100.0 mm	100	-	-	2.65 #	Sodium hexametaphosphate, Sodium carbonate	As received	None																																							
75.0 mm	100	-	-	<table border="1"> <thead> <tr> <th>Particle Diameter (mm)</th> <th>^Expanded Uncertainty of the Particle Diameter (mm)</th> <th>% Finer than D K (%)</th> <th>^Expanded Uncertainty of % finer than D (%)</th> </tr> </thead> <tbody> <tr><td>0.0681</td><td>-</td><td>83</td><td>-</td></tr> <tr><td>0.0487</td><td>-</td><td>79</td><td>-</td></tr> <tr><td>0.0348</td><td>-</td><td>75</td><td>-</td></tr> <tr><td>0.0249</td><td>-</td><td>70</td><td>-</td></tr> <tr><td>0.0177</td><td>-</td><td>67</td><td>-</td></tr> <tr><td>0.0093</td><td>-</td><td>62</td><td>-</td></tr> <tr><td>0.0048</td><td>-</td><td>50</td><td>-</td></tr> <tr><td>0.0025</td><td>-</td><td>36</td><td>-</td></tr> <tr><td>0.0014</td><td>-</td><td>27</td><td>-</td></tr> </tbody> </table>	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)	0.0681	-	83	-	0.0487	-	79	-	0.0348	-	75	-	0.0249	-	70	-	0.0177	-	67	-	0.0093	-	62	-	0.0048	-	50	-	0.0025	-	36	-	0.0014	-	27	-		
Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)																																											
0.0681	-	83	-																																											
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0.0177	-	67	-																																											
0.0093	-	62	-																																											
0.0048	-	50	-																																											
0.0025	-	36	-																																											
0.0014	-	27	-																																											
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	99	-	-																																											
600 µm	98	-	-																																											
425 µm	98	-	-																																											
300 µm	97	-	-																																											
212 µm	96	-	-																																											
150 µm	91	-	-																																											
63 µm	81	-	-																																											
0 µm	0	-	-																																											

SUMMARY :

Gravel (%)	: 1
Sand (%)	: 18
Silt (%)	: 49
Clay (%)	: 32



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

Technician : K Y Sun
 Date : 25/08/2018

Checked By : TK Lam
 Name : TK Lam
 Date : 05/09/2018

Approved By : Chung Ho Wing
 Signatory : Chung Ho Wing
 Date : 05/09/2018

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

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



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

Report No. : J2999-272.34

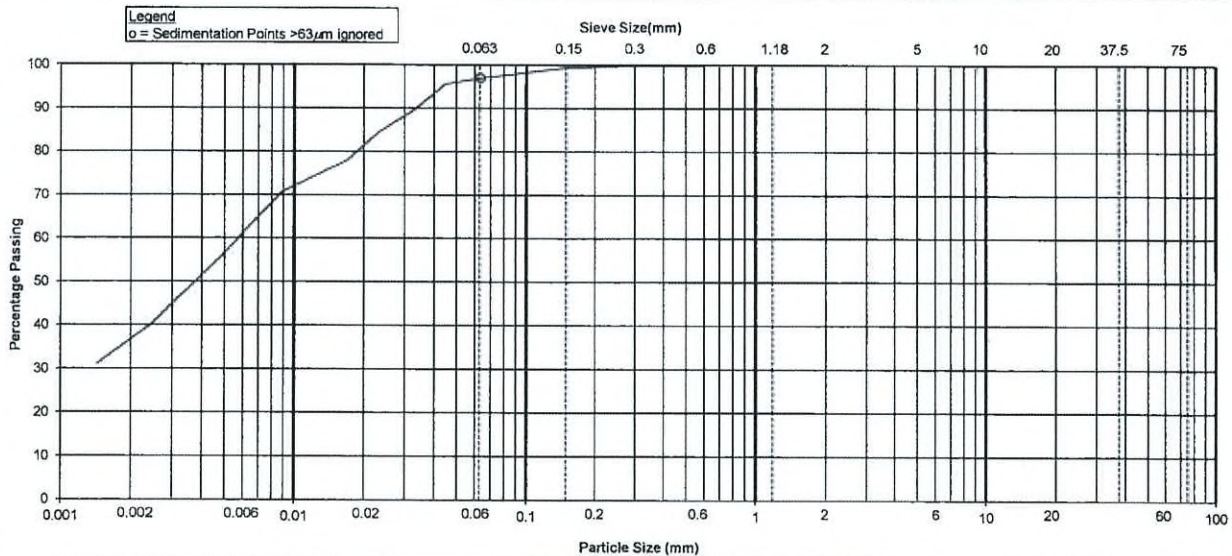
Date Received : 24/08/2018
 Tested Date : 25/08/2018

Works Order No. : 272
 Sample ID No. : HK1843496-011
 Sample No. : C/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				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	*Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0631	-	97	-
20.0 mm	100	-	-	0.0449	-	96	-
14.0 mm	100	-	-	0.0324	-	89	-
10.0 mm	100	-	-	0.0233	-	85	-
6.30 mm	100	-	-	0.0168	-	78	-
5.00 mm	100	-	-	0.0089	-	71	-
3.35 mm	100	-	-	0.0046	-	55	-
2.00 mm	100	-	-	0.0024	-	40	-
1.18 mm	100	-	-	0.0014	-	31	-
600 µm	100	-	-	SUMMARY :			
425 µm	100	-	-	Gravel (%) :	0		
300 µm	100	-	-	Sand (%) :	3		
212 µm	100	-	-	Silt (%) :	61		
150 µm	99	-	-	Clay (%) :	36		
63 µm	97	-	-				
0 µm	0	-	-				



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

Technician : K Y Sun

Checked By : T K Lam
 Name : T K Lam
 Date : 05/09/2018

Approved By : Chung Hen Wing
 Signatory : Chung Hen Wing
 Date : 05/09/2018

Date : 25/08/2018

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

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



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

Report No. : J2999-272.34

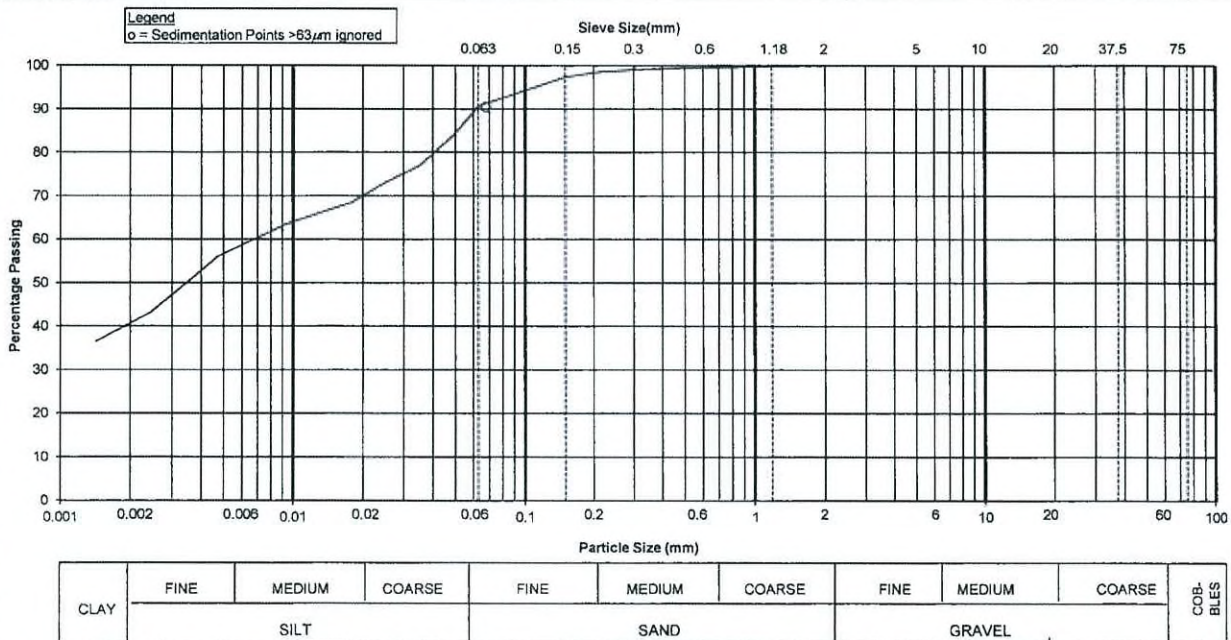
Date Received : 24/08/2018
 Tested Date : 25/08/2018

Works Order No. : 272
 Sample ID No. : HK1843496-012
 Sample No. : D/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : ‡

Description : Dark grey, slightly sandy SILT/CLAY

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

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	~Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details : Sodium hexametaphosphate, Sodium carbonate			
63.0 mm	100	-	-	Sampling History : As received			
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0675	-	91	-
20.0 mm	100	-	-	0.0486	-	84	-
14.0 mm	100	-	-	0.0349	-	77	-
10.0 mm	100	-	-	0.0249	-	73	-
6.30 mm	100	-	-	0.0178	-	69	-
5.00 mm	100	-	-	0.0093	-	64	-
3.35 mm	100	-	-	0.0047	-	56	-
2.00 mm	100	-	-	0.0024	-	43	-
1.18 mm	100	-	-	0.0014	-	37	-
600 µm	100	-	-	SUMMARY :			
425 µm	99	-	-	Gravel (%) :	0		
300 µm	99	-	-	Sand (%) :	9		
212 µm	99	-	-	Silt (%) :	51		
150 µm	97	-	-	Clay (%) :	40		
63 µm	91	-	-				
0 µm	0	-	-				



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

Technician : K Y Sun
 Date : 25/08/2018

Checked By : TK Lam
 Name : TK Lam
 Date : 05/09/2018

Approved By : Chung Ho Wing
 Signatory : Chung Ho Wing
 Date : 05/09/2018

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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. : J2999-272.34

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

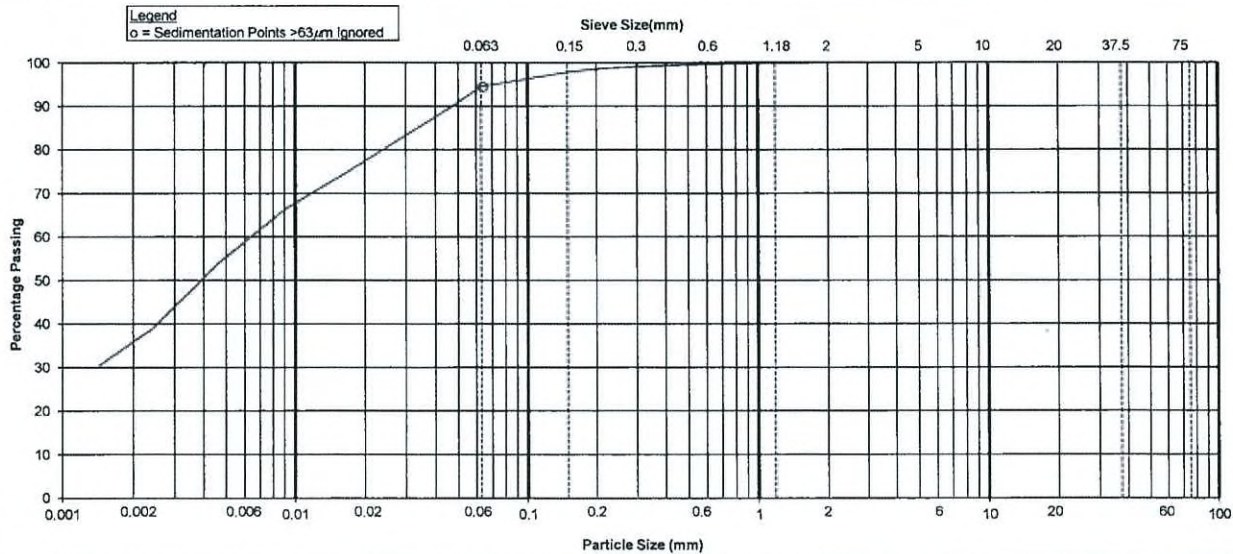
Works Order No. : 272
 Sample ID No. : HK1843496-013
 Sample No. : E/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : †

Date Received : 24/08/2018
 Tested Date : 25/08/2018

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

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

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	Expanded Uncertainty of the Percent Passing (%)	Cumulative Percent Passing with Expanded Uncertainty (%)	Particle Diameter (mm)	Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	Expanded Uncertainty of % finer than D (%)
100.0 mm	100	-	-				
75.0 mm	100	-	-				
63.0 mm	100	-	-				
50.0 mm	100	-	-				
37.5 mm	100	-	-				
28.0 mm	100	-	-				
20.0 mm	100	-	-				
14.0 mm	100	-	-	0.0640	-	95	-
10.0 mm	100	-	-	0.0460	-	90	-
6.30 mm	100	-	-	0.0330	-	85	-
5.00 mm	100	-	-	0.0237	-	80	-
3.35 mm	100	-	-	0.0170	-	75	-
2.00 mm	100	-	-	0.0090	-	66	-
1.18 mm	100	-	-	0.0047	-	54	-
600 µm	100	-	-	0.0024	-	39	-
425 µm	99	-	-	0.0014	-	31	-
300 µm	99	-	-	SUMMARY :			
212 µm	99	-	-	Gravel (%)	:	0	
150 µm	98	-	-	Sand (%)	:	5	
63 µm	95	-	-	Silt (%)	:	59	
0 µm	0	-	-	Clay (%)	:	36	



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COB- BLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun

Checked By : T K Lam
 Name : T K Lam
 Date : 05/09/2018

Approved By : Chung Hoi Wing
 Signatory : Chung Hoi Wing
 Date : 05/09/2018

Date : 25/08/2018

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

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)



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

Report No. : J2999-272.34

Date Received : 24/08/2018
 Tested Date : 25/08/2018

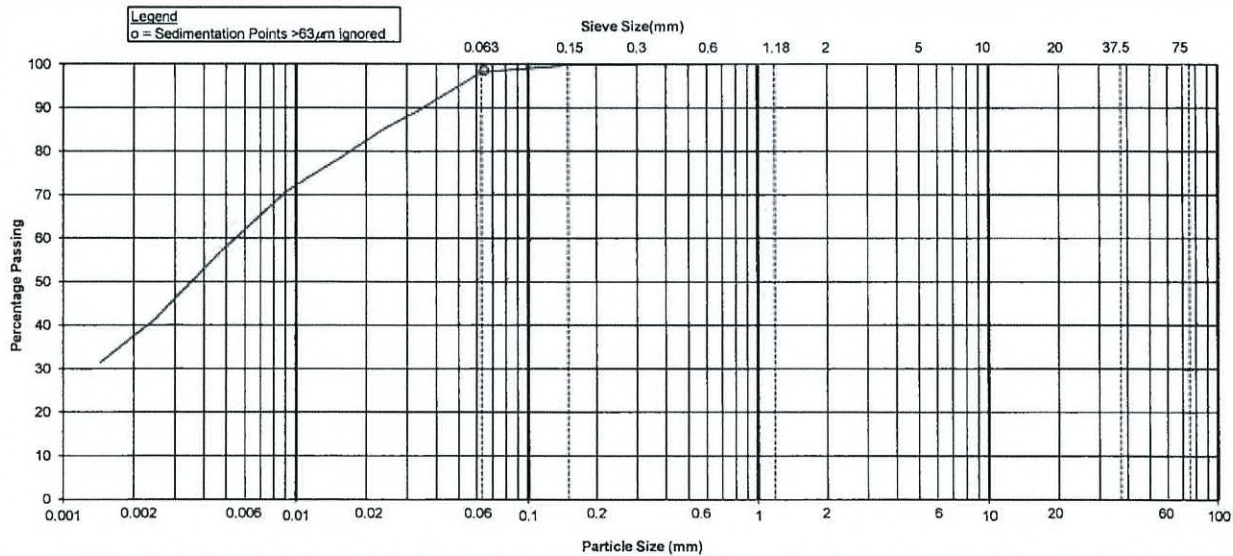
Works Order No. : 272
 Sample ID No. : HK1843496-014
 Sample No. : F/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : ‡

Description : Dark grey, slightly sandy SILT/CLAY

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

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
100.0 mm	100	-	-				
75.0 mm	100	-	-				
63.0 mm	100	-	-				
50.0 mm	100	-	-				
37.5 mm	100	-	-				
28.0 mm	100	-	-				
20.0 mm	100	-	-	0.0644	-	99	-
14.0 mm	100	-	-	0.0462	-	94	-
10.0 mm	100	-	-	0.0331	-	89	-
6.30 mm	100	-	-	0.0237	-	85	-
5.00 mm	100	-	-	0.0170	-	80	-
3.35 mm	100	-	-	0.0090	-	71	-
2.00 mm	100	-	-	0.0047	-	57	-
1.18 mm	100	-	-	0.0024	-	41	-
600 µm	100	-	-	0.0014	-	31	-
425 µm	100	-	-				
300 µm	100	-	-				
212 µm	100	-	-				
150 µm	100	-	-				
63 µm	98	-	-				
0 µm	0	-	-				

Specific Gravity (# if assumed) : 2.65 #			
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate			
Sampling History : As received			
The presence of any visible organic matter in the soil : None			
SUMMARY :			
Gravel (%)	:	0	
Sand (%)	:	2	
Silt (%)	:	61	
Clay (%)	:	37	



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

Technician : K Y Sun

Checked By : *[Signature]*

Approved By : *[Signature]*

Date : 25/08/2018

Name : T K Lam
 Date : 05/09/2018

Signatory : Chung Hei Wing
 Date : 05/09/2018

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

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



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

Contract No. :

Report No. : J2999-272.34

Date Received : 24/08/2018
 Tested Date : 25/08/2018

Works Order No. : 272
 Sample ID No. : HK1843496-015
 Sample No. : G/Benthic Survey
 Sample Depth (m) :
 Specimen Depth (m) :
 Sample Type : Small Disturbed
 Sample Origin : -

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

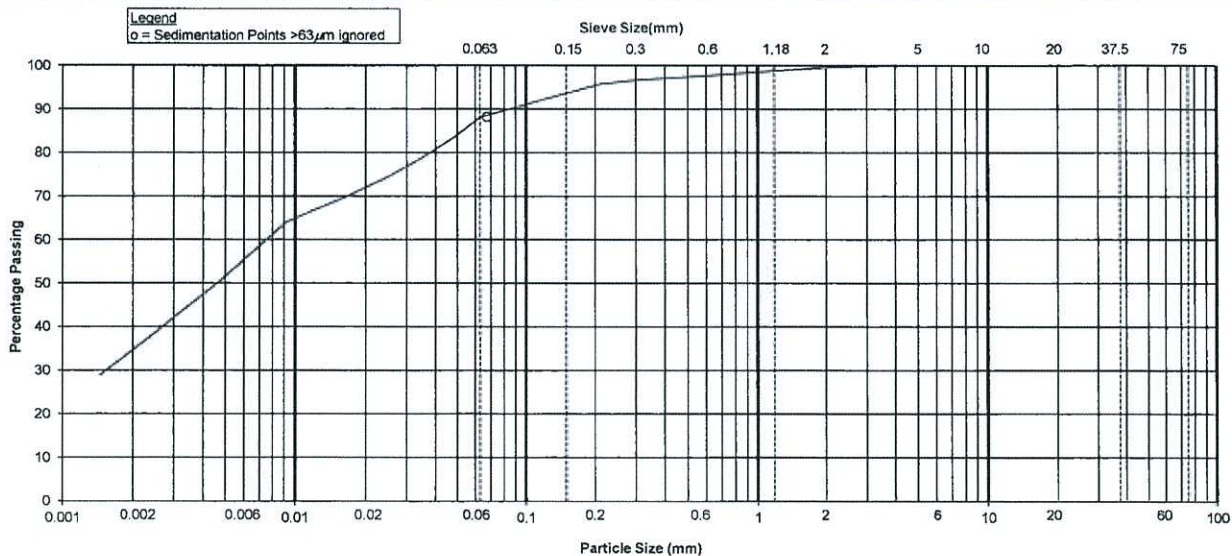
Sieve Method : Method A

^ Upon request

* Delete as appropriate

‡ Information provided by customer

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^ Expanded Uncertainty of the Percent Passing (%)	^ Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details :	Sodium hexametaphosphate, Sodium carbonate		
63.0 mm	100	-	-	Sampling History :	As received		
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	^ Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^ Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0671	-	88	-
20.0 mm	100	-	-	0.0481	-	83	-
14.0 mm	100	-	-	0.0344	-	79	-
10.0 mm	100	-	-	0.0246	-	74	-
6.30 mm	100	-	-	0.0176	-	71	-
5.00 mm	100	-	-	0.0092	-	64	-
3.35 mm	100	-	-	0.0048	-	51	-
2.00 mm	100	-	-	0.0024	-	39	-
1.18 mm	99	-	-	0.0014	-	29	-
600 µm	98	-	-	SUMMARY :			
425 µm	97	-	-	Gravel (%)	:	0	
300 µm	97	-	-	Sand (%)	:	12	
212 µm	96	-	-	Silt (%)	:	54	
150 µm	94	-	-	Clay (%)	:	34	
63 µm	88	-	-				
0 µm	0	-	-				



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COB- BLES
	SILT			SAND			GRAVEL			

Technician : K Y Sun

Checked By : *[Signature]*

Approved By : *[Signature]*

Date : 25/08/2018

Name : T K Lam
 Date : 05/09/2018

Signatory : Chung Hei Wing
 Date : 05/09/2018

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

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



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

Report No. : J2999-272.34

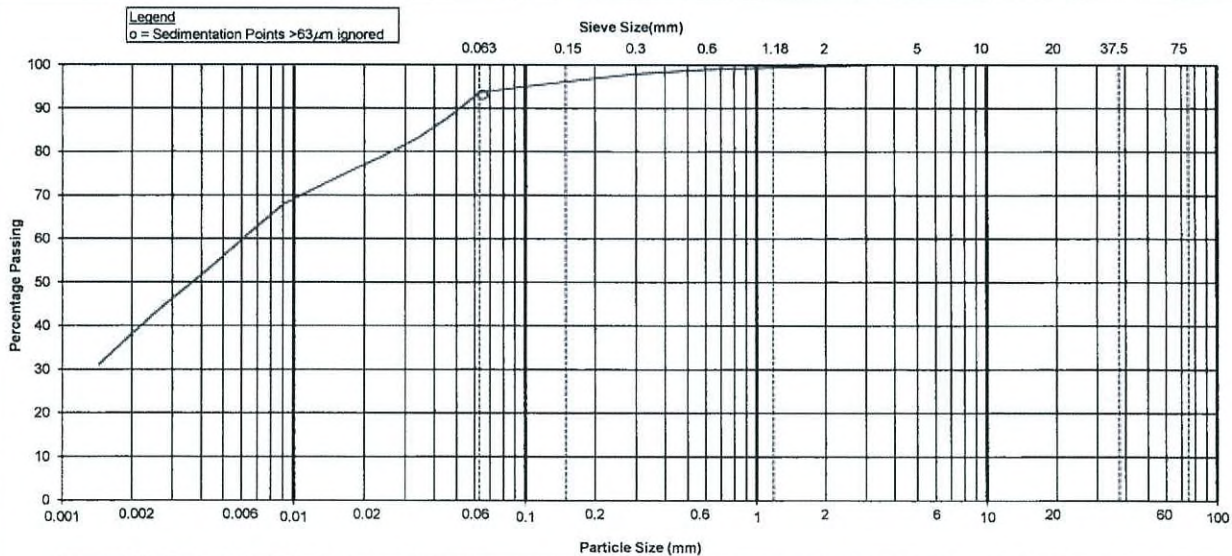
Date Received : 24/08/2018
Tested Date : 25/08/2018

Works Order No. : 272
Sample ID No. : HK1843496-016
Sample No. : H/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : ‡

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

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

SIEVE ANALYSIS				SEDIMENTATION ANALYSIS			
Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)	Specific Gravity (# if assumed) :			
100.0 mm	100	-	-	2.65 #			
75.0 mm	100	-	-	Dispersant Details : Sodium hexametaphosphate, Sodium carbonate			
63.0 mm	100	-	-	Sampling History : As received			
50.0 mm	100	-	-	The presence of any visible organic matter in the soil : None			
37.5 mm	100	-	-	Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
28.0 mm	100	-	-	0.0650	-	93	-
20.0 mm	100	-	-	0.0467	-	88	-
14.0 mm	100	-	-	0.0335	-	83	-
10.0 mm	100	-	-	0.0240	-	79	-
6.30 mm	100	-	-	0.0171	-	76	-
5.00 mm	100	-	-	0.0090	-	68	-
3.35 mm	100	-	-	0.0047	-	55	-
2.00 mm	100	-	-	0.0024	-	42	-
1.18 mm	99	-	-	0.0014	-	31	-
600 µm	99	-	-	SUMMARY :			
425 µm	99	-	-	Gravel (%)	:	0	
300 µm	98	-	-	Sand (%)	:	6	
212 µm	97	-	-	Silt (%)	:	56	
150 µm	96	-	-	Clay (%)	:	38	
63 µm	94	-	-				
0 µm	0	-	-				



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COB- BLES
	SILT			SAND			GRAVEL			

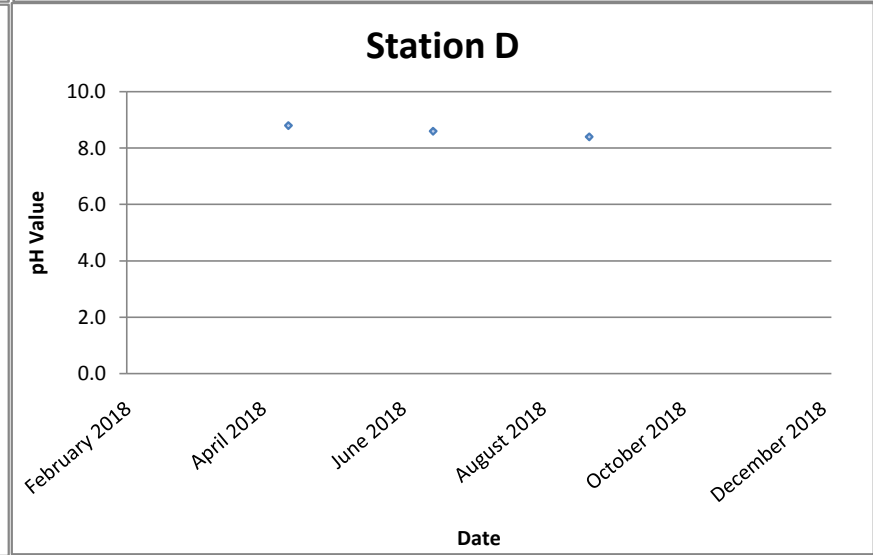
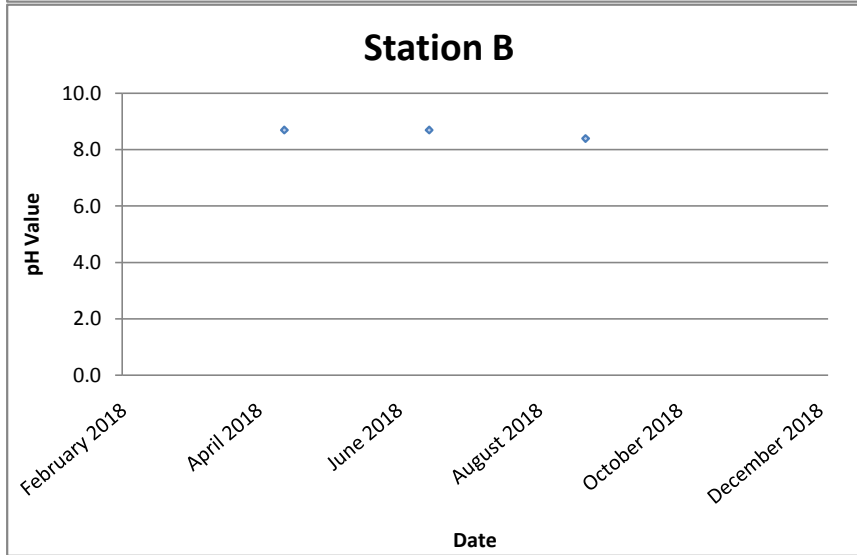
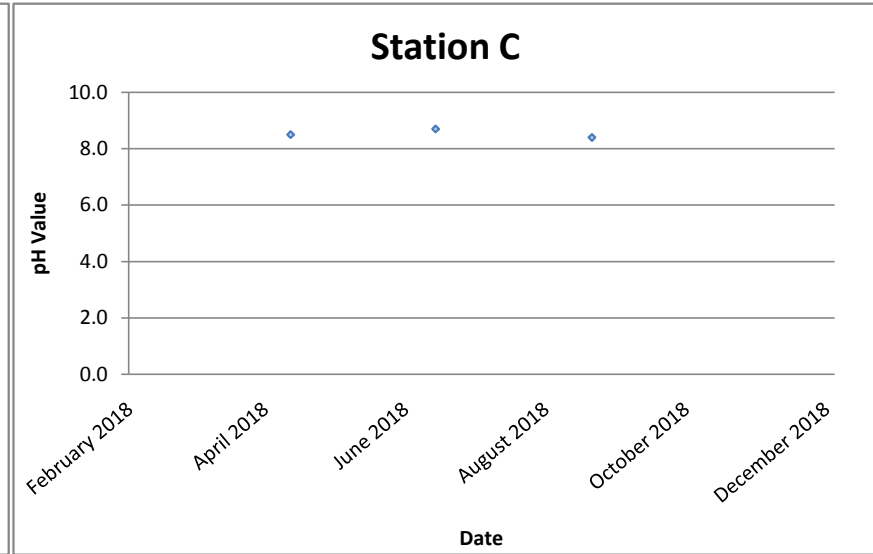
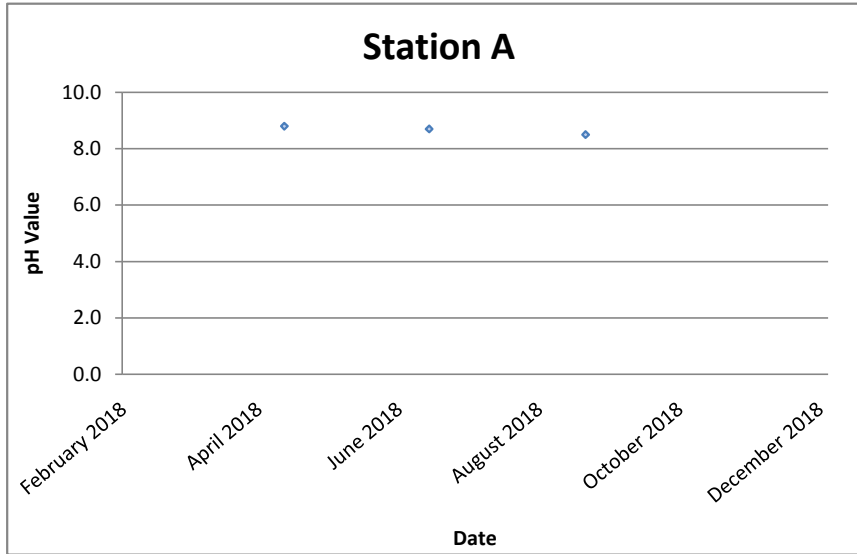
Technician : K Y Sun
Date : 25/08/2018

Checked By : T K Lam
Name : T K Lam
Date : 05/09/2018

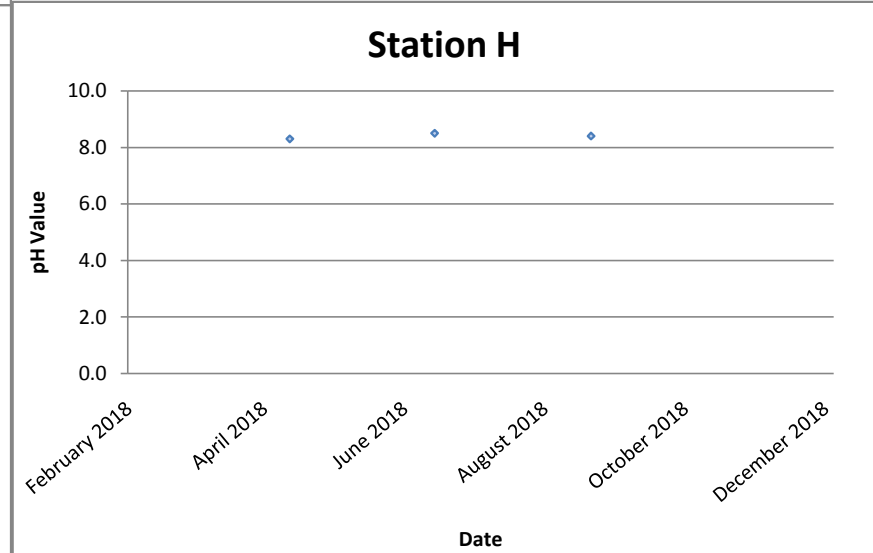
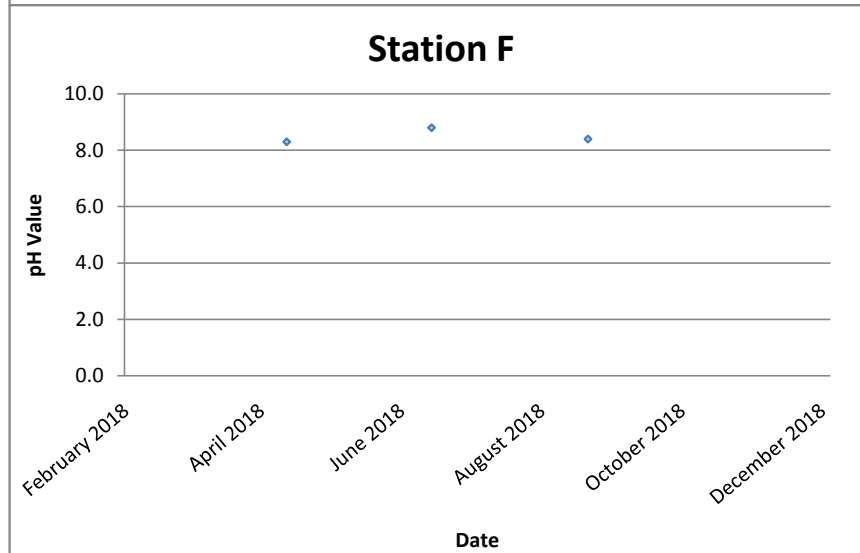
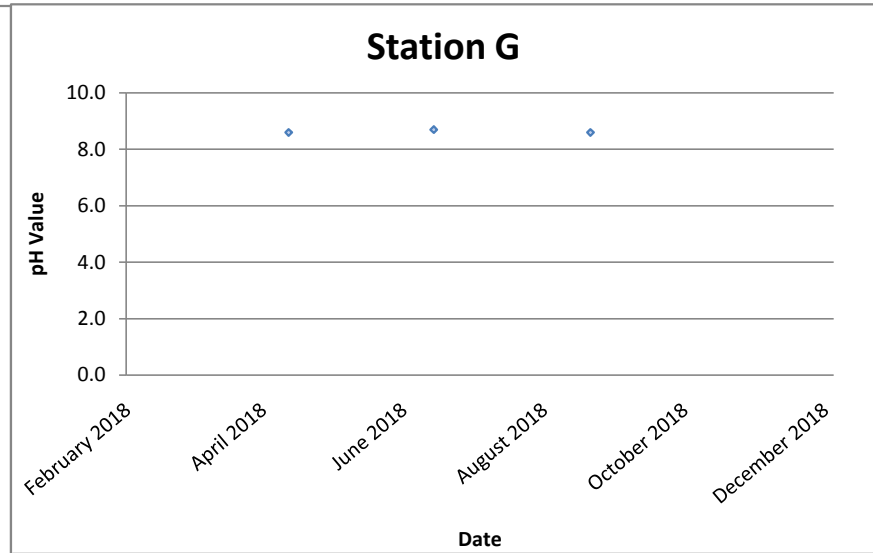
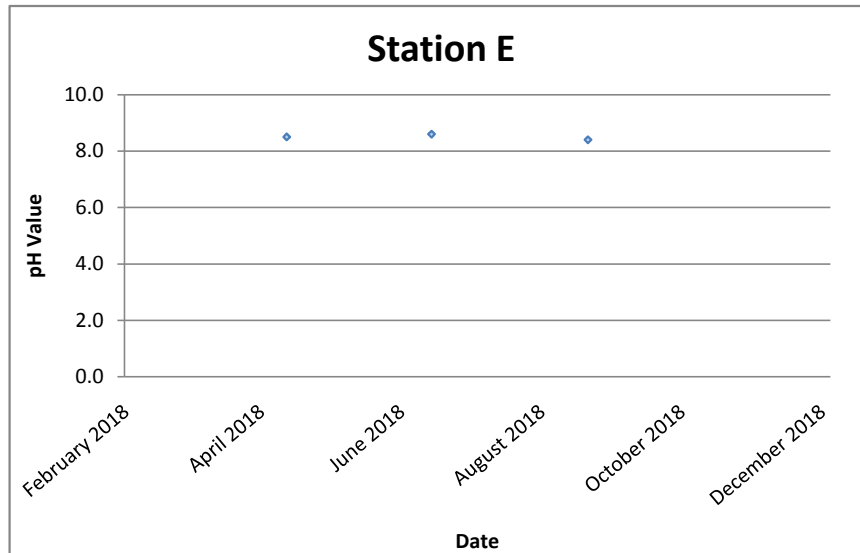
Approved By : Chung Hei Wing
Signatory : Chung Hei Wing
Date : 05/09/2018

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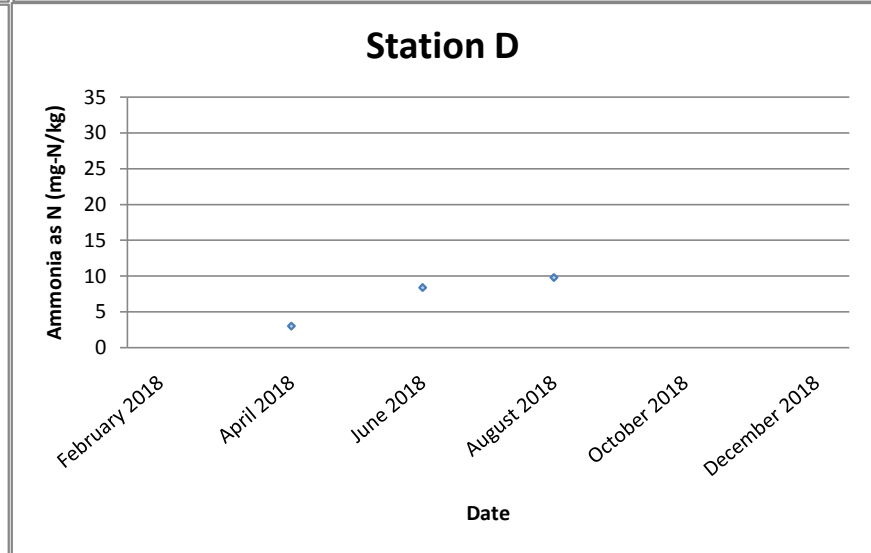
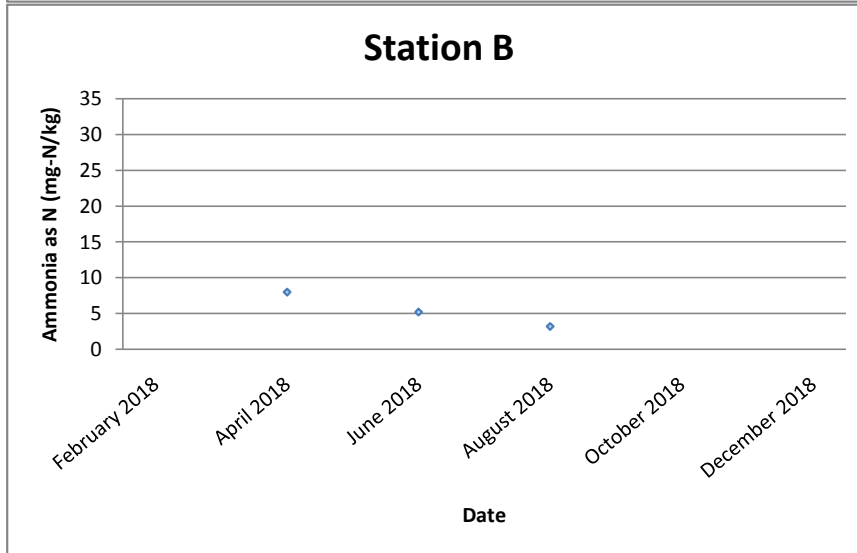
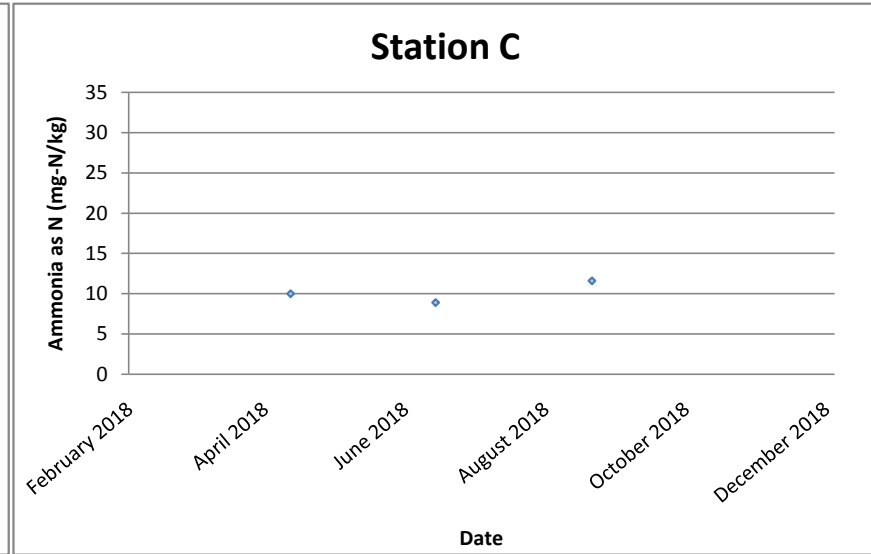
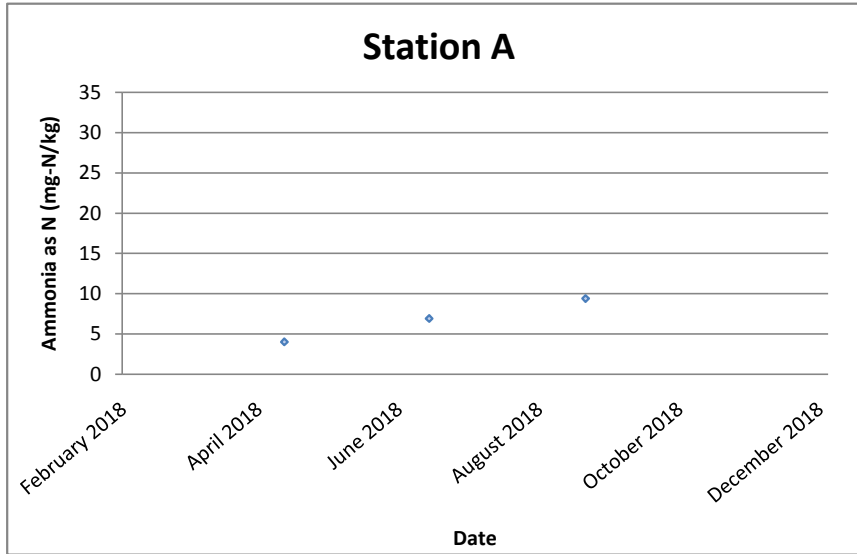
pH value



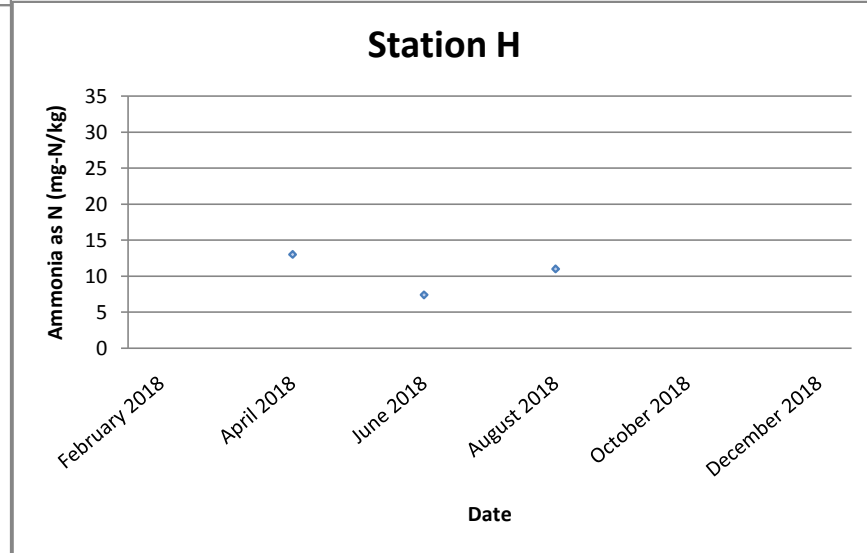
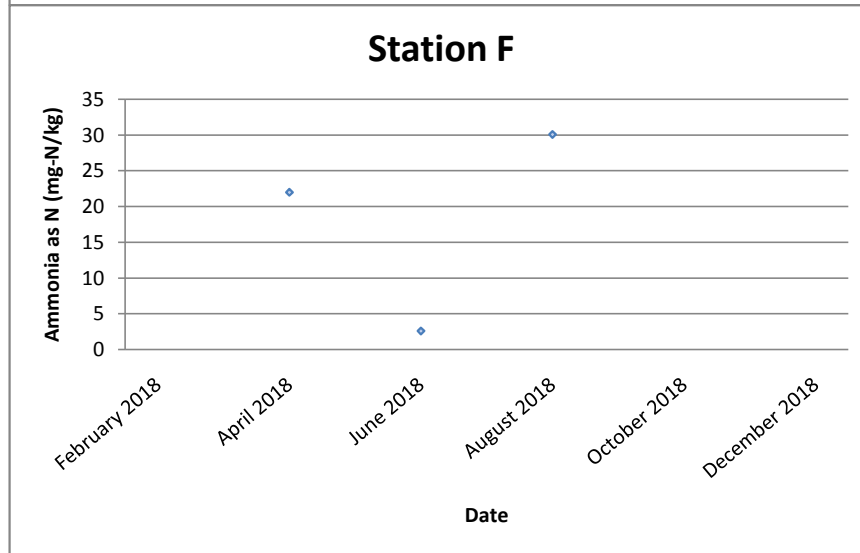
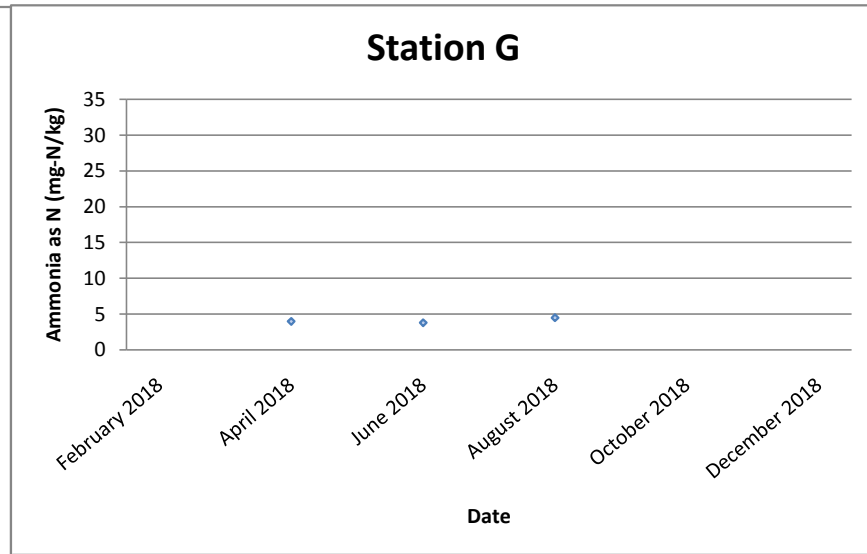
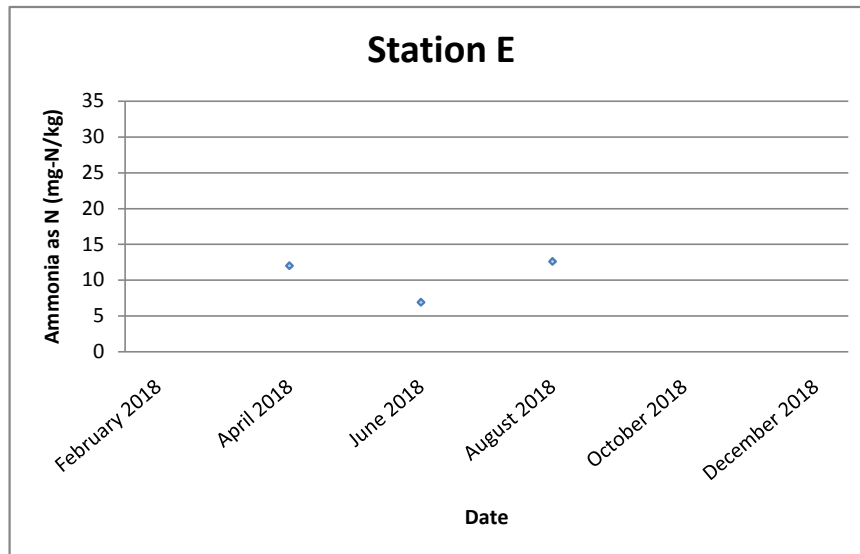
pH value



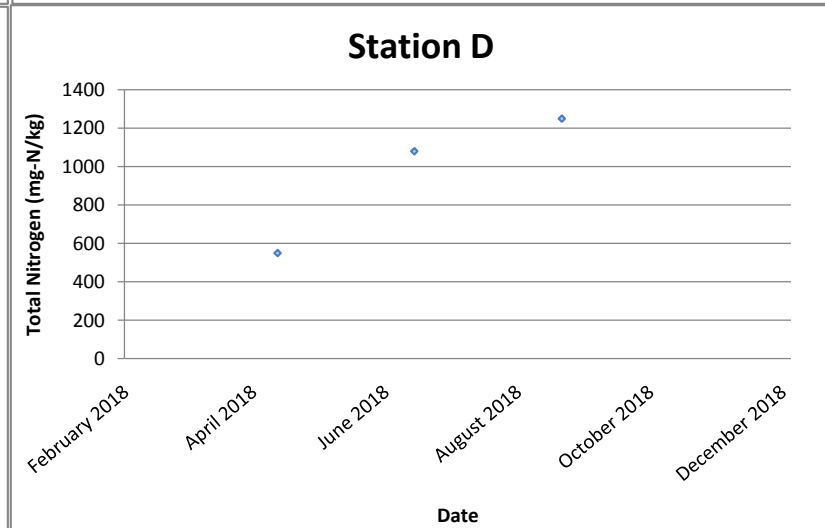
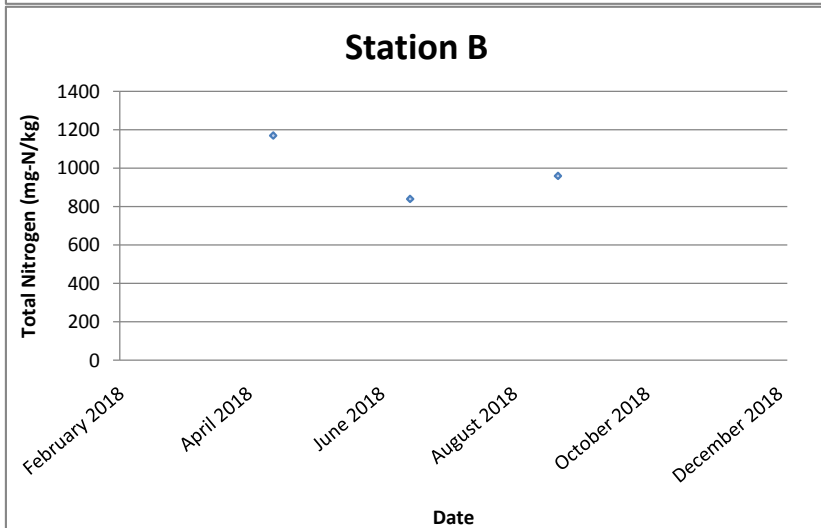
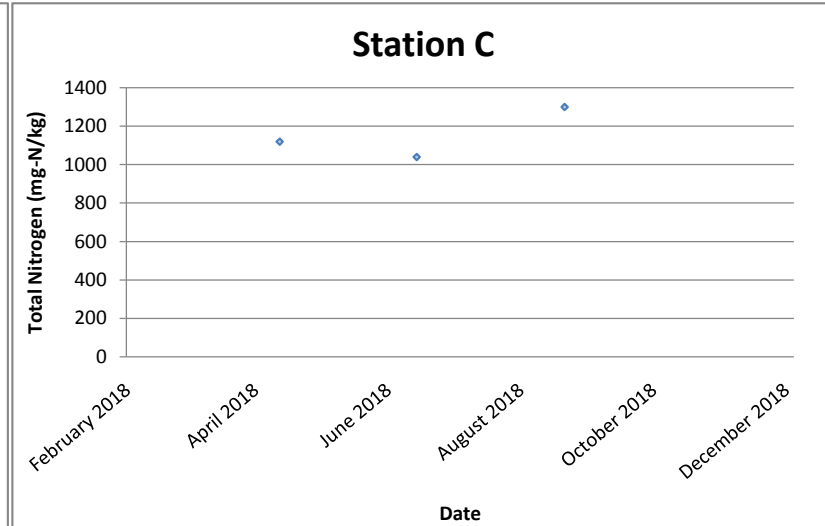
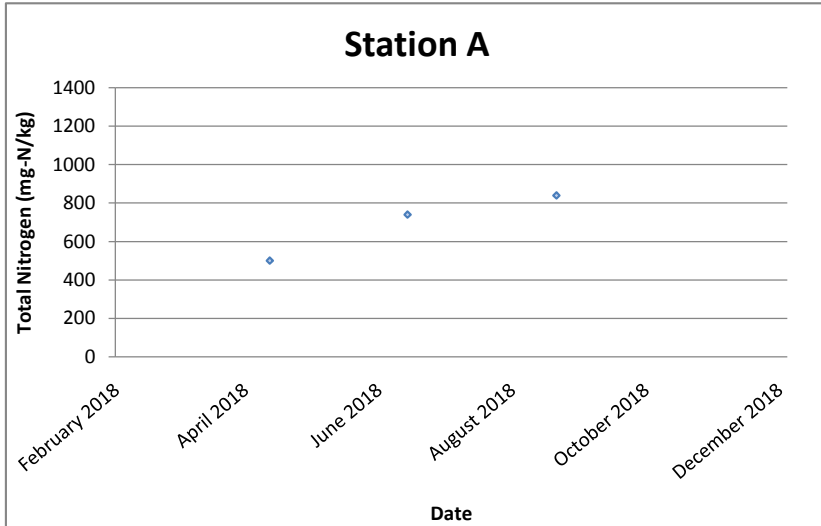
Ammonia Nitrogen (mg-N/kg)



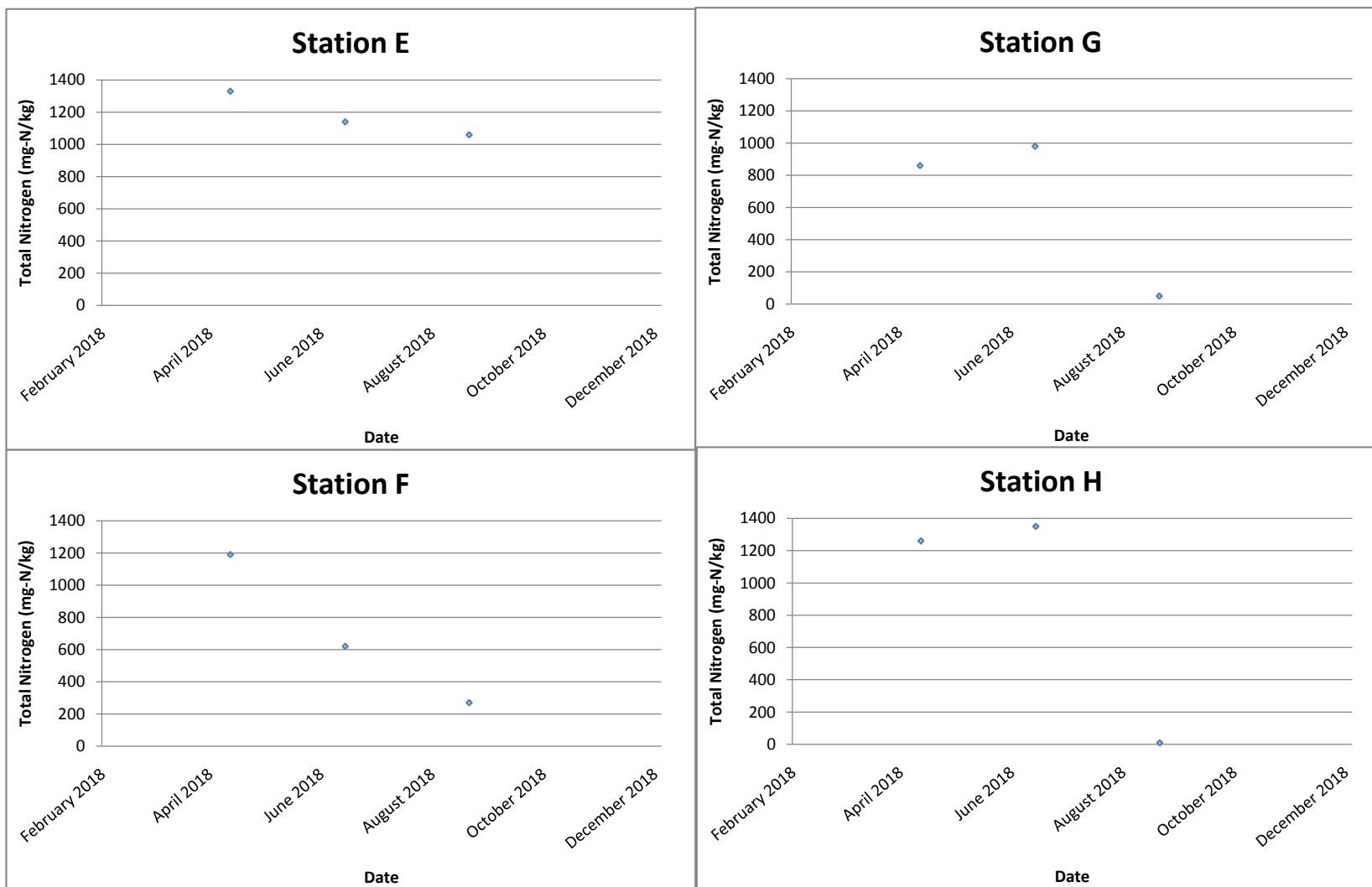
Ammonia Nitrogen (mg-N/kg)



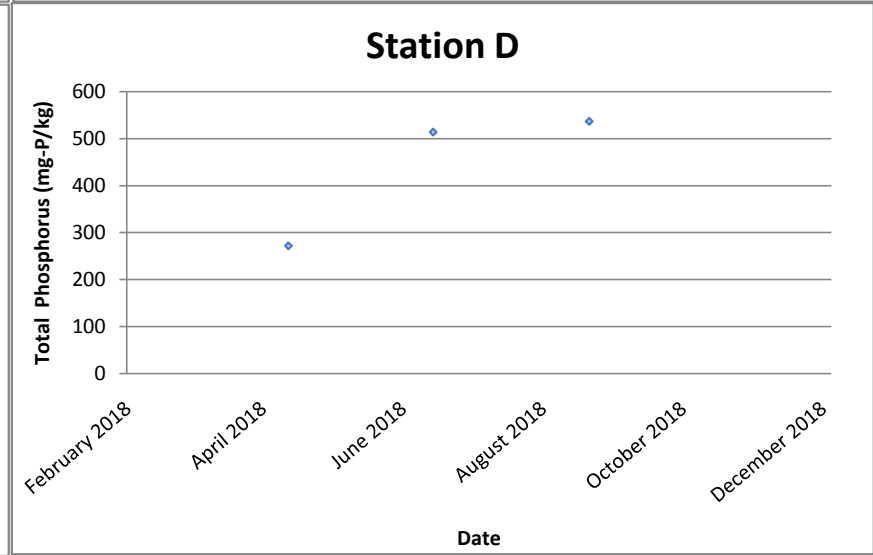
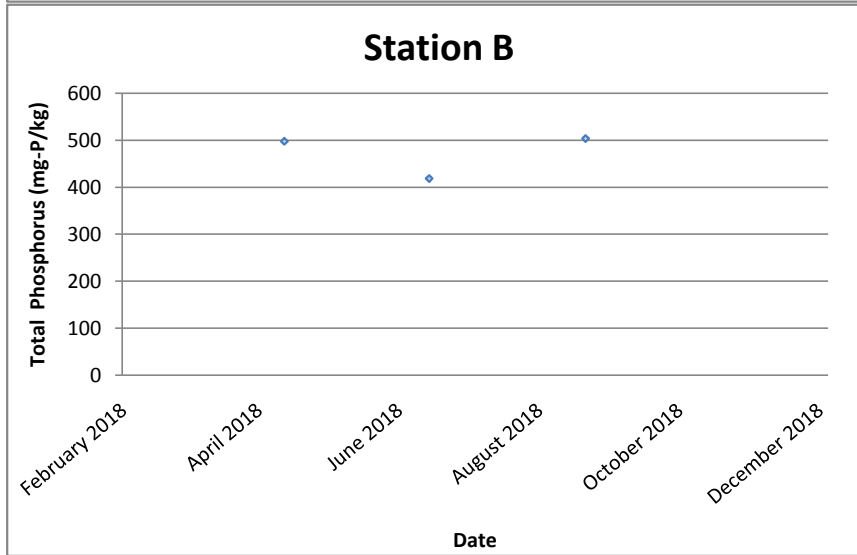
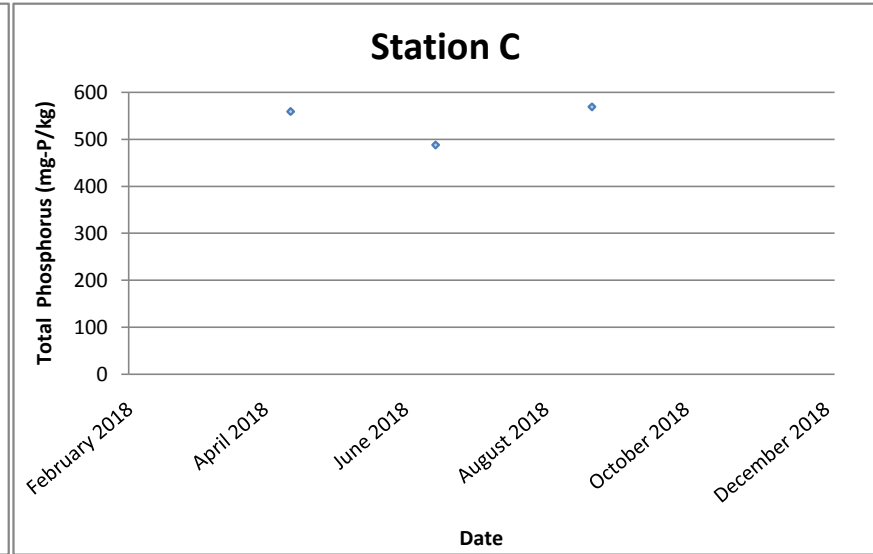
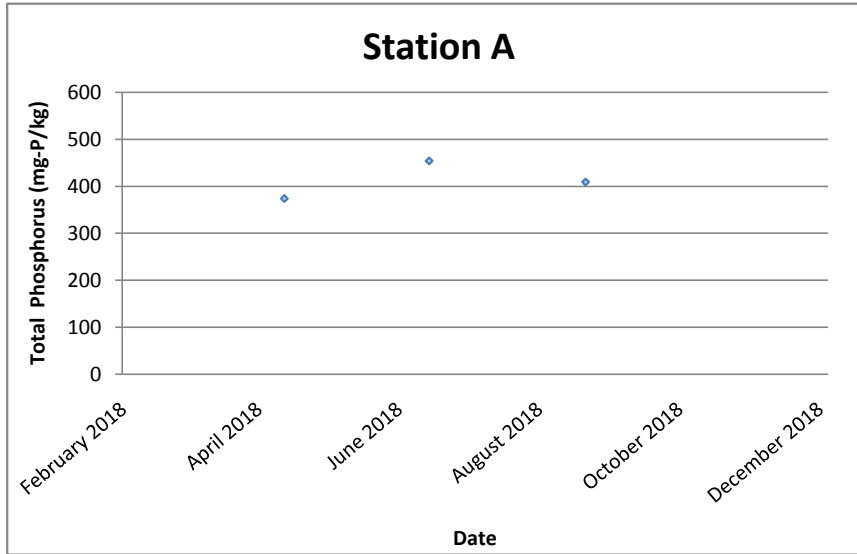
Total Nitrogen (mg-N/kg)



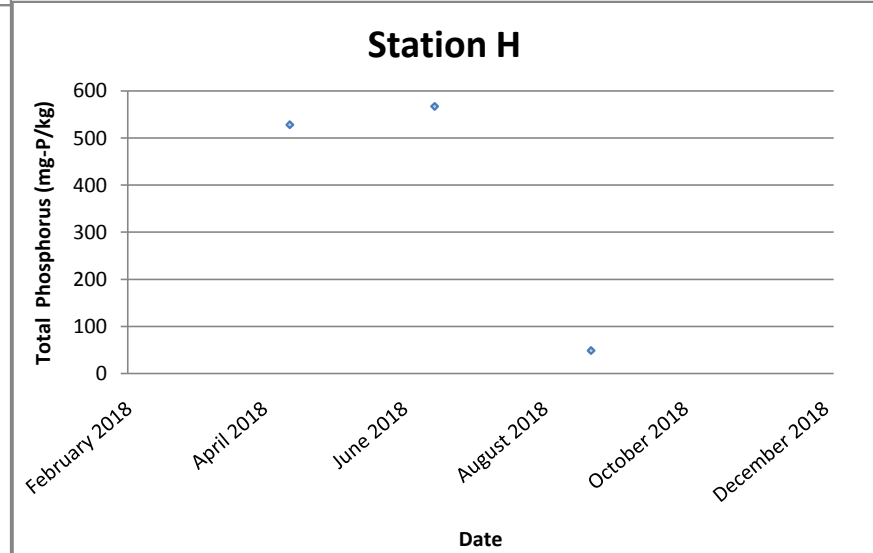
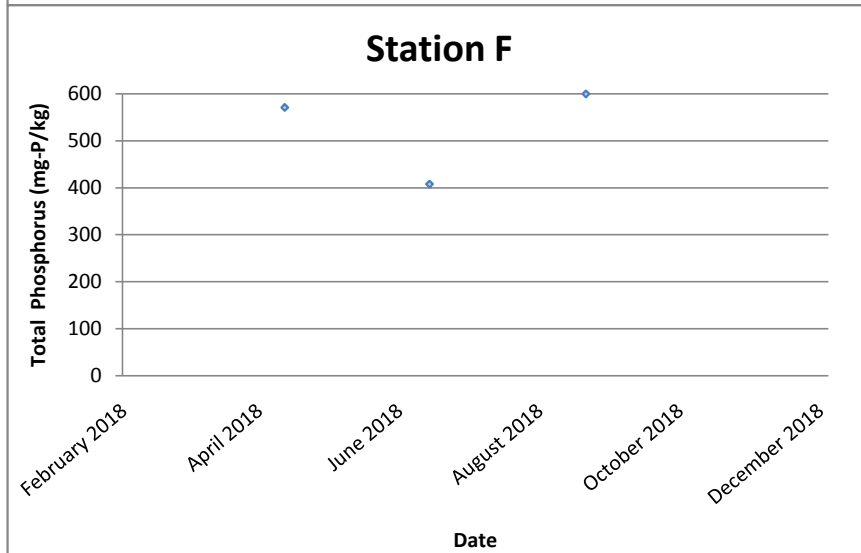
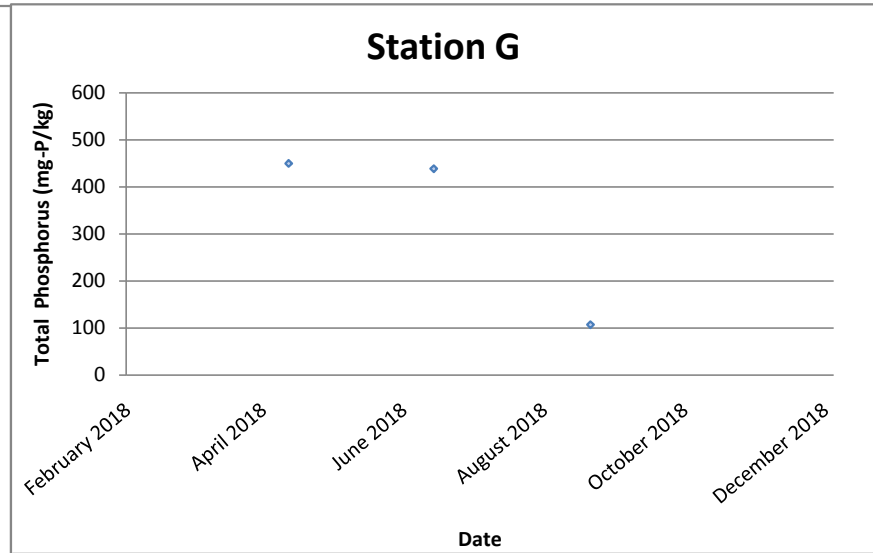
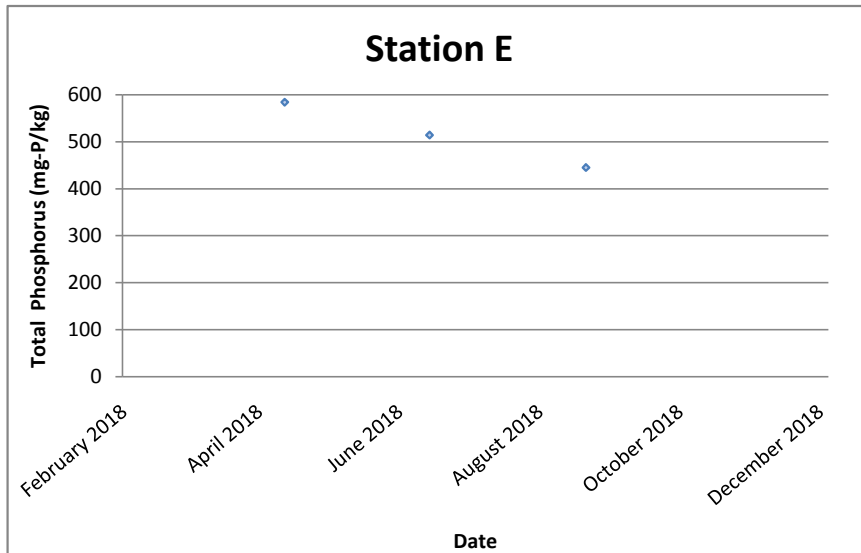
Total Nitrogen (mg-N/kg)



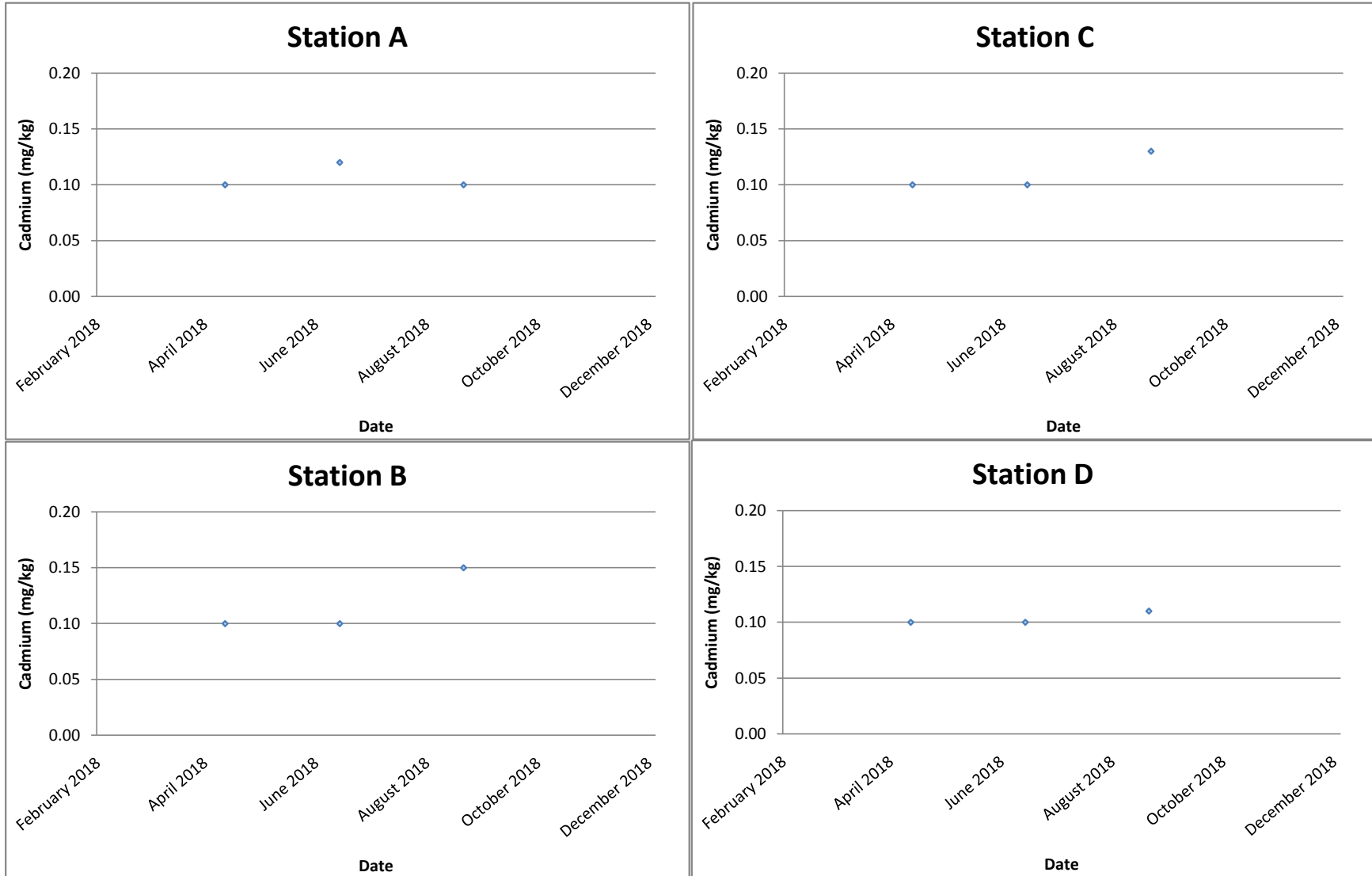
Total Phosphorus (mg-P/kg)



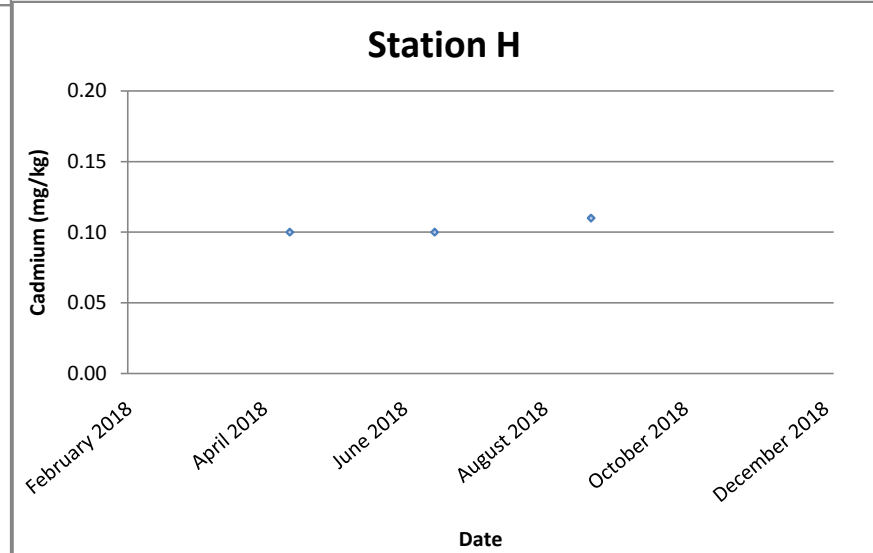
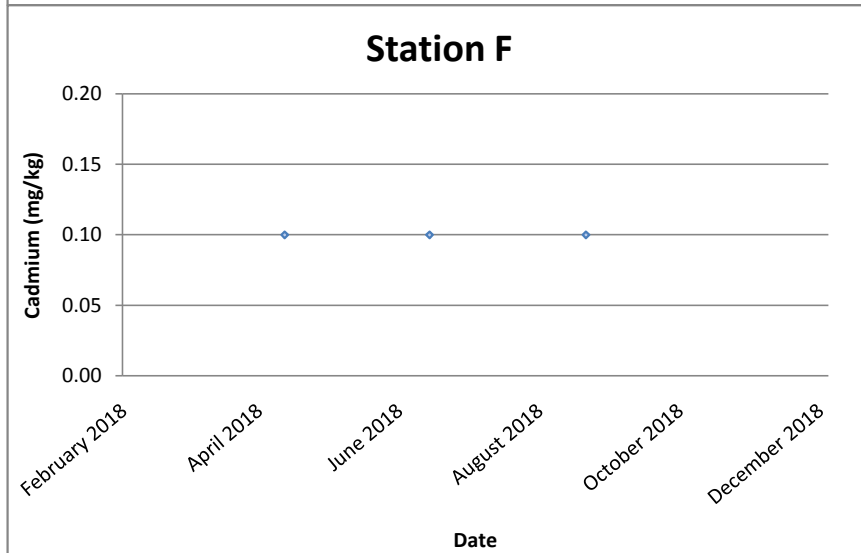
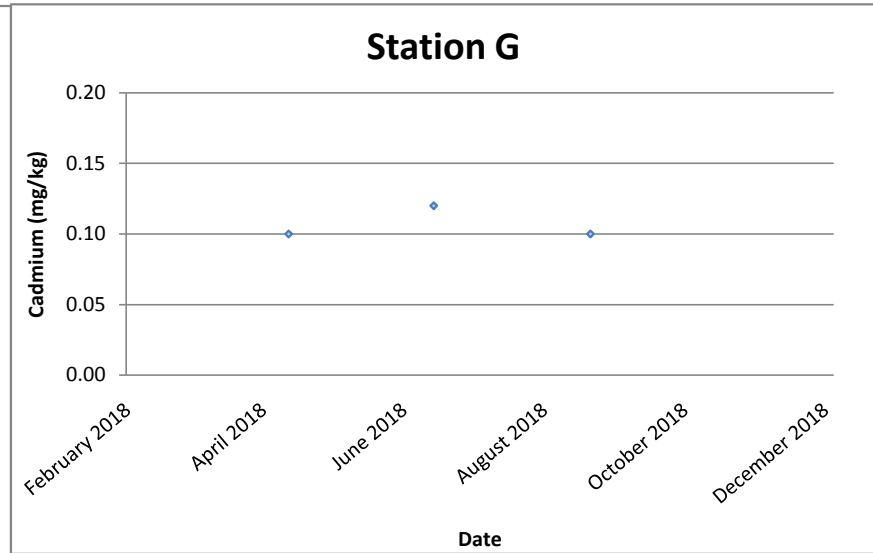
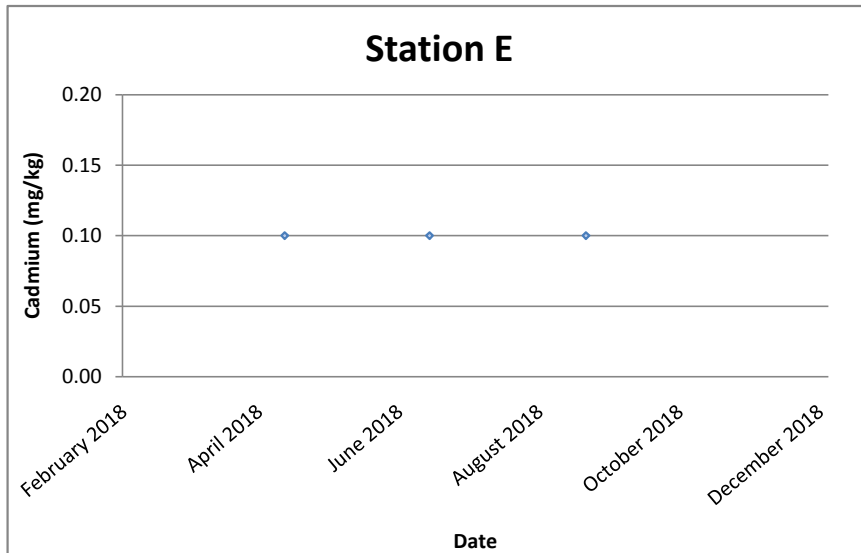
Total Phosphorus (mg-P/kg)



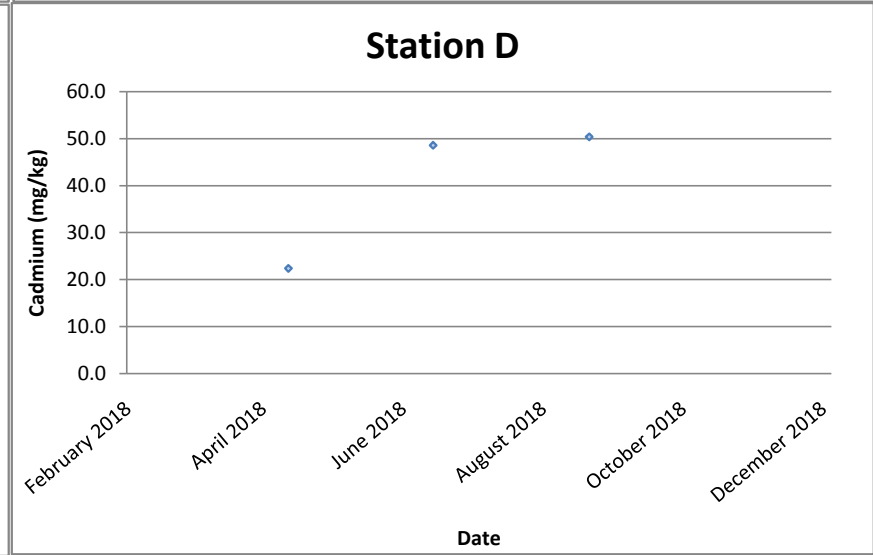
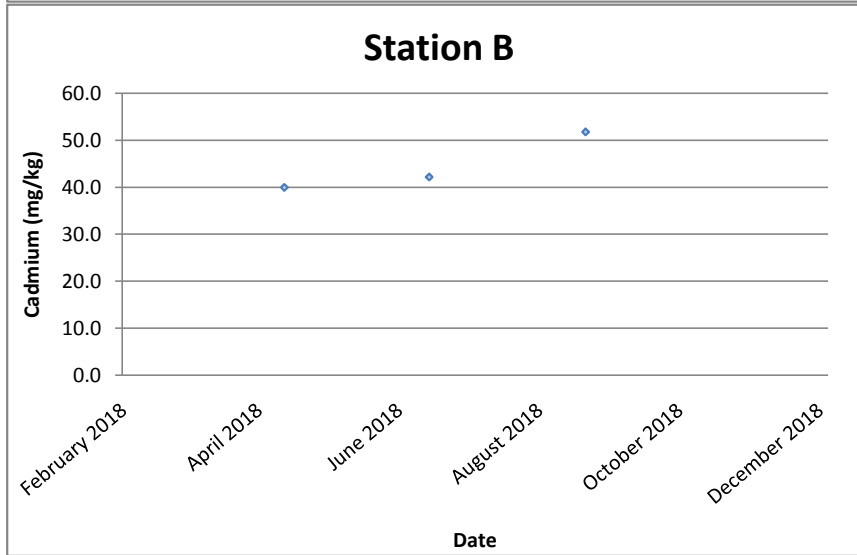
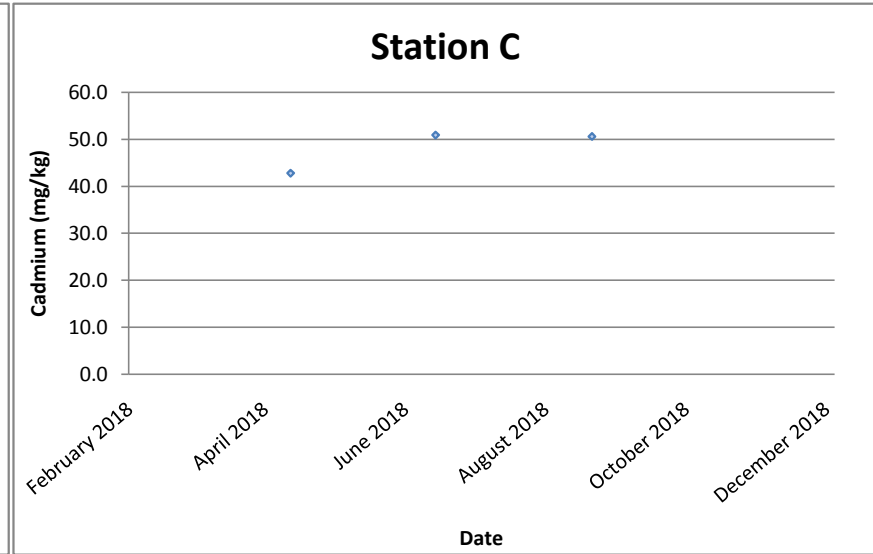
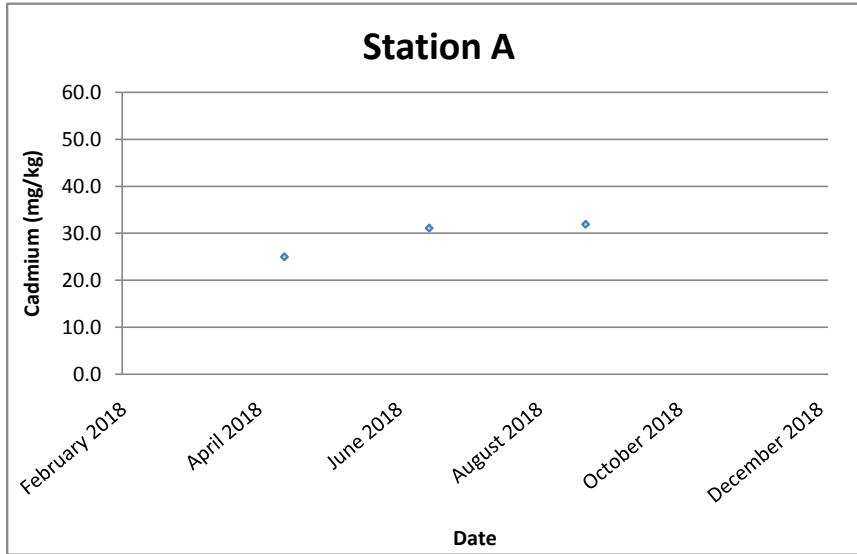
Cadmium (mg/kg)



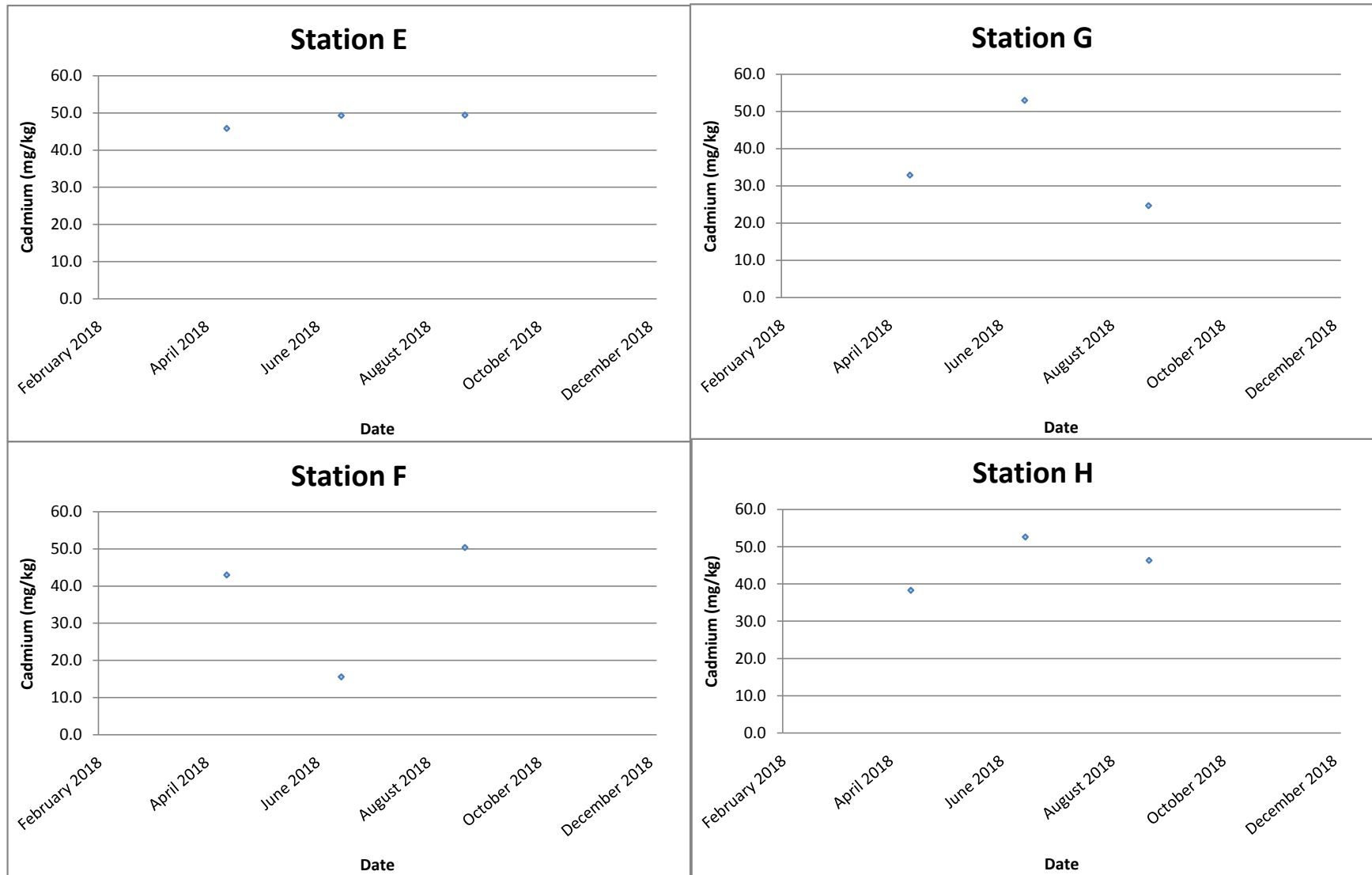
Cadmium (mg/kg)



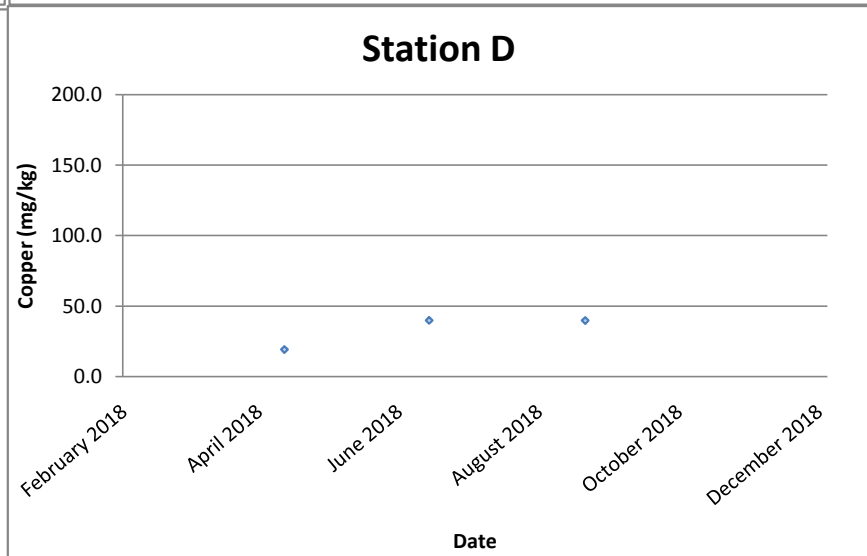
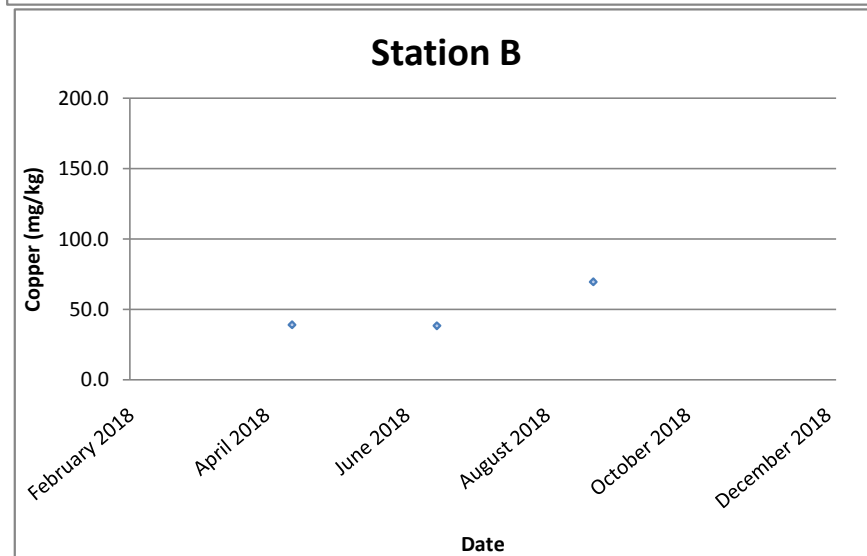
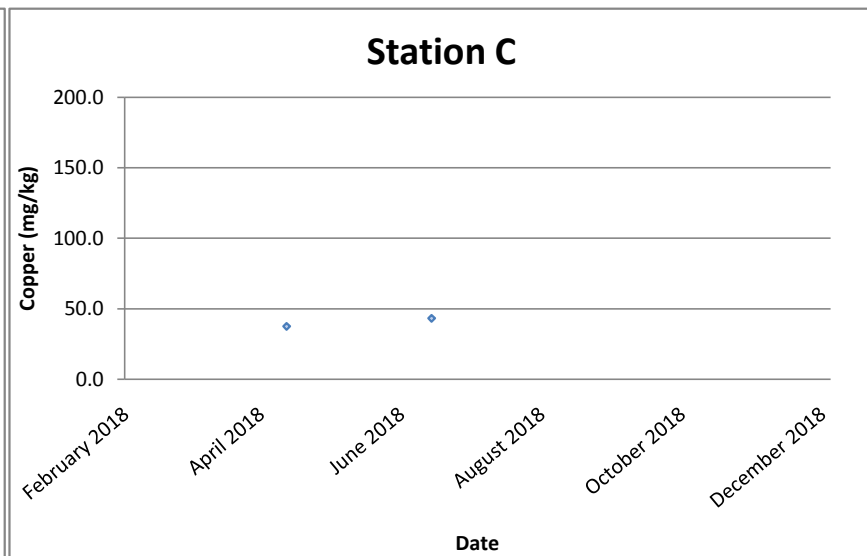
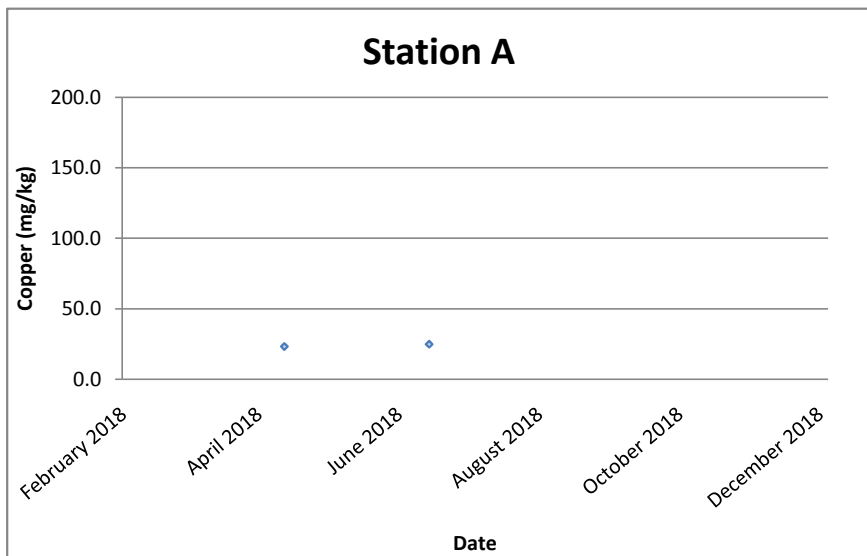
Chromium (mg/kg)



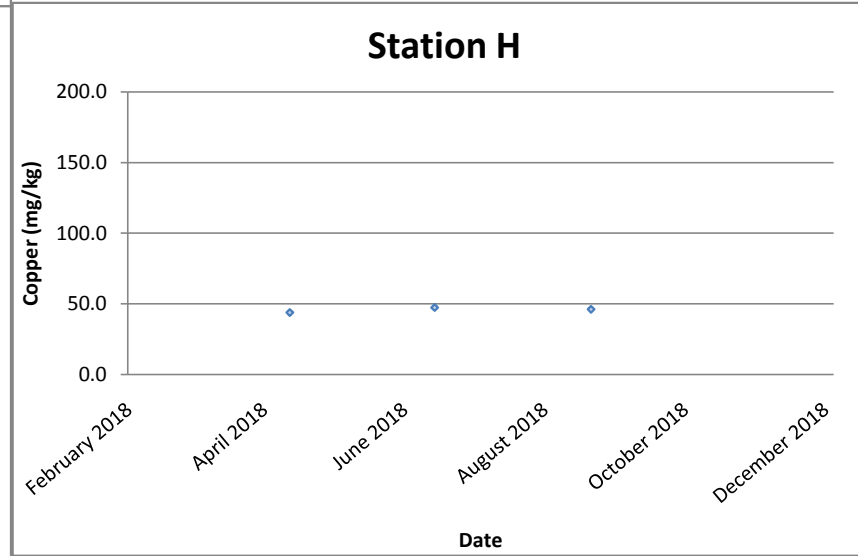
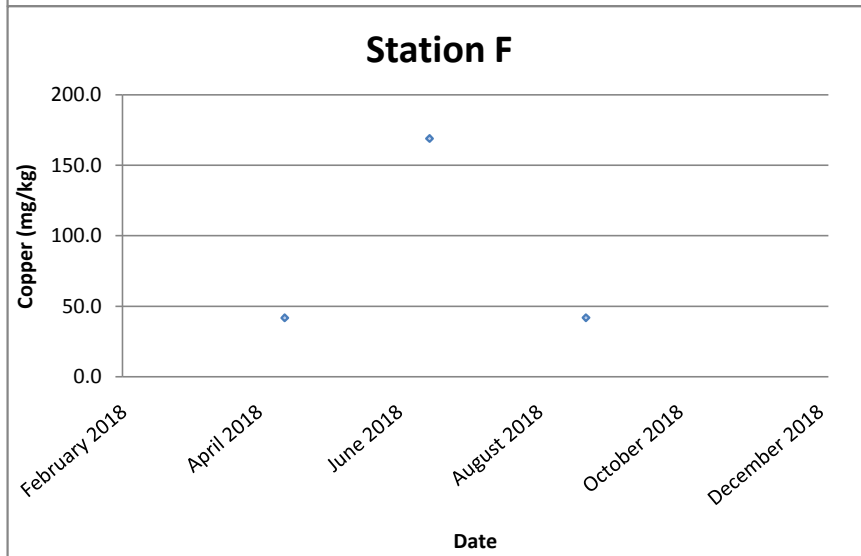
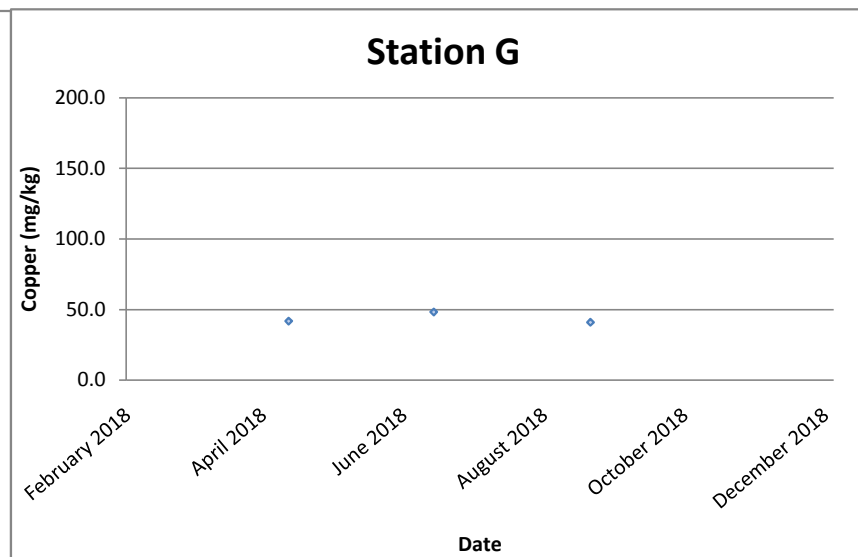
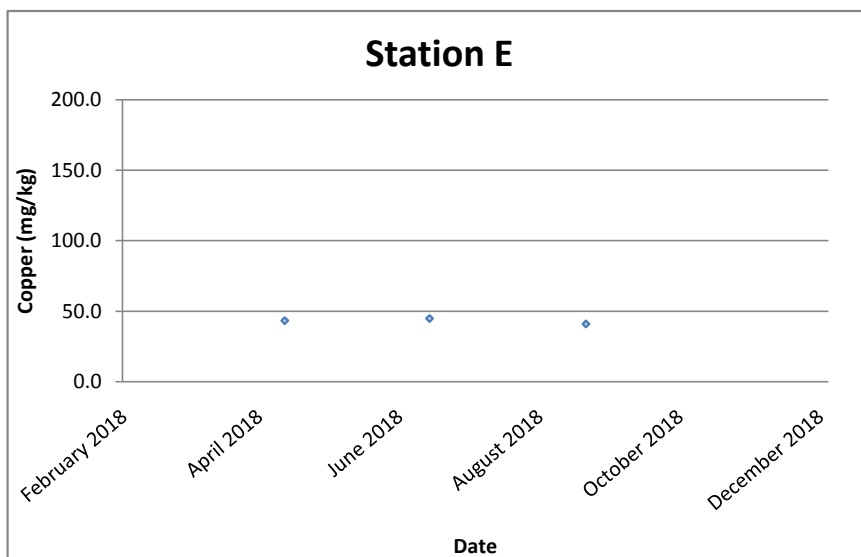
Chromium (mg/kg)



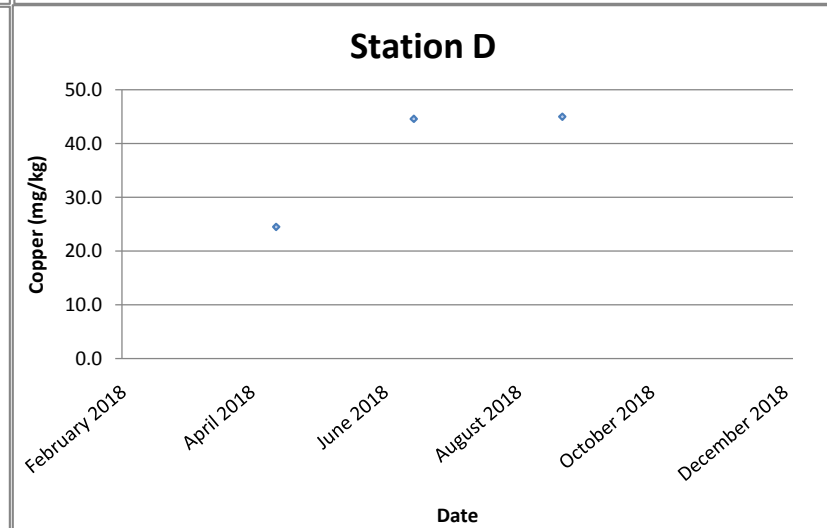
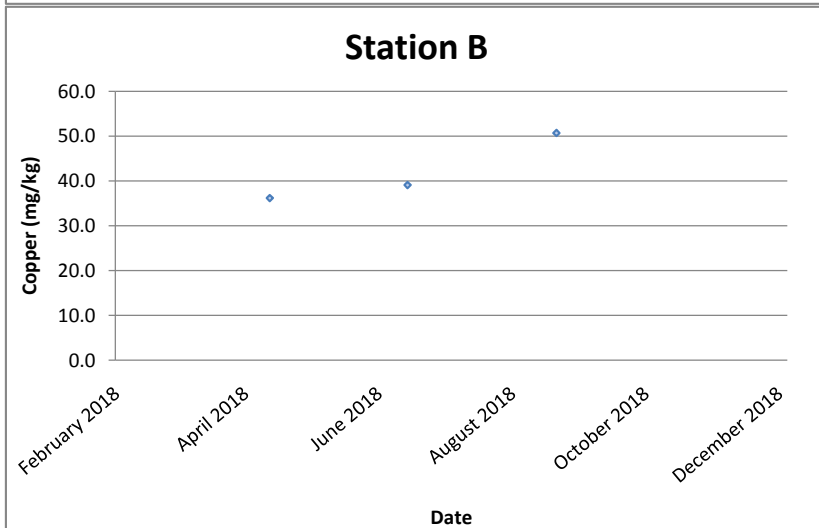
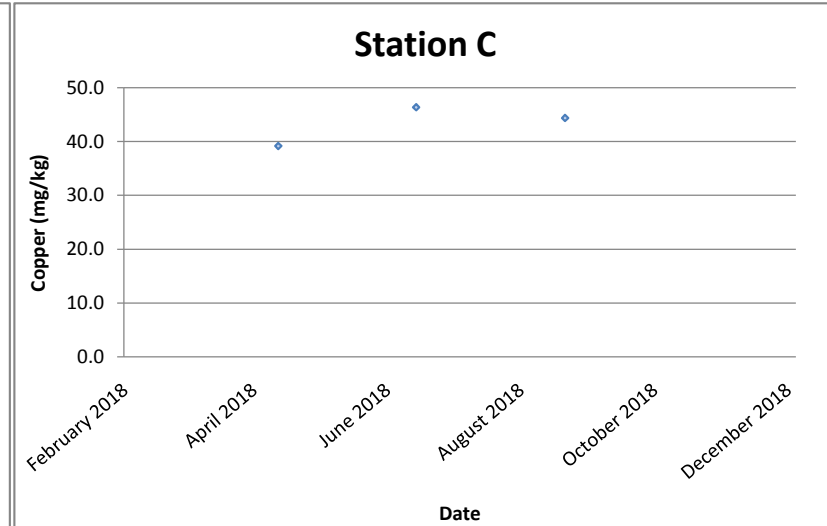
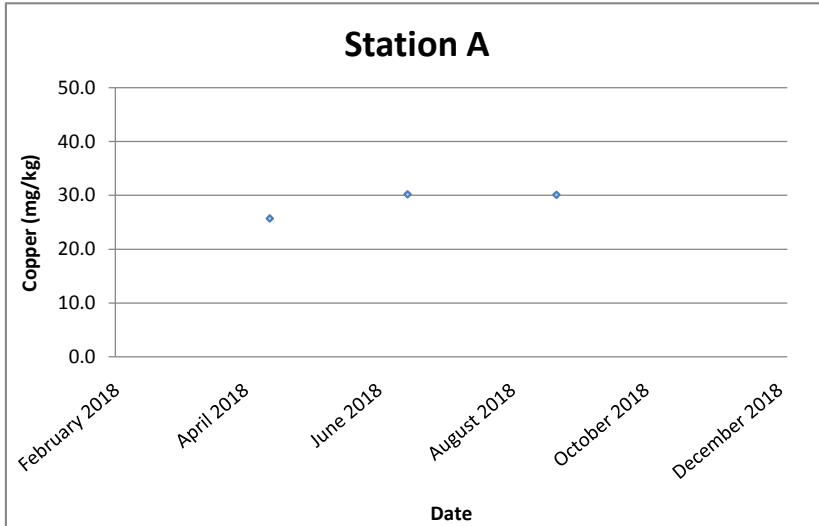
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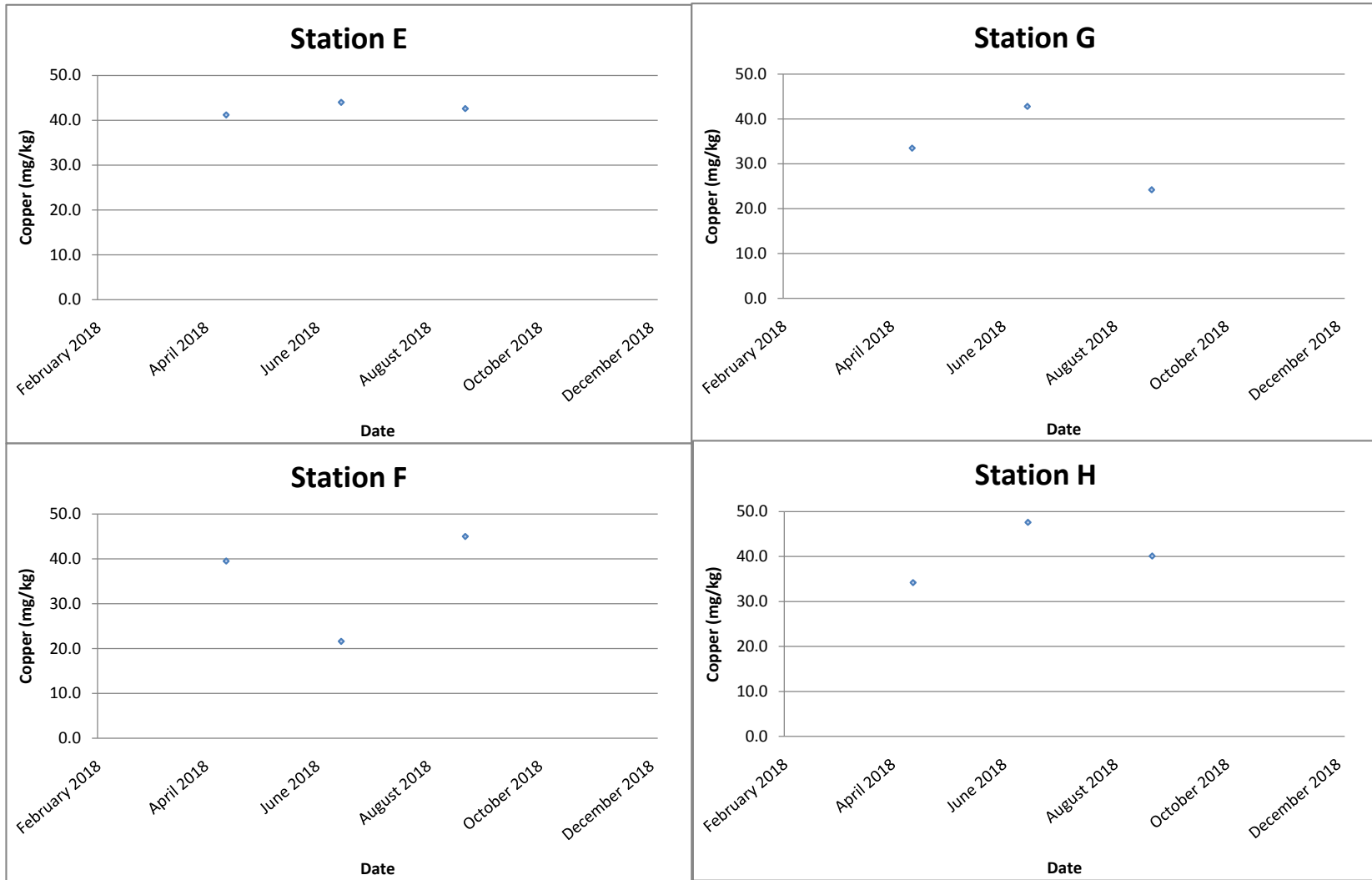
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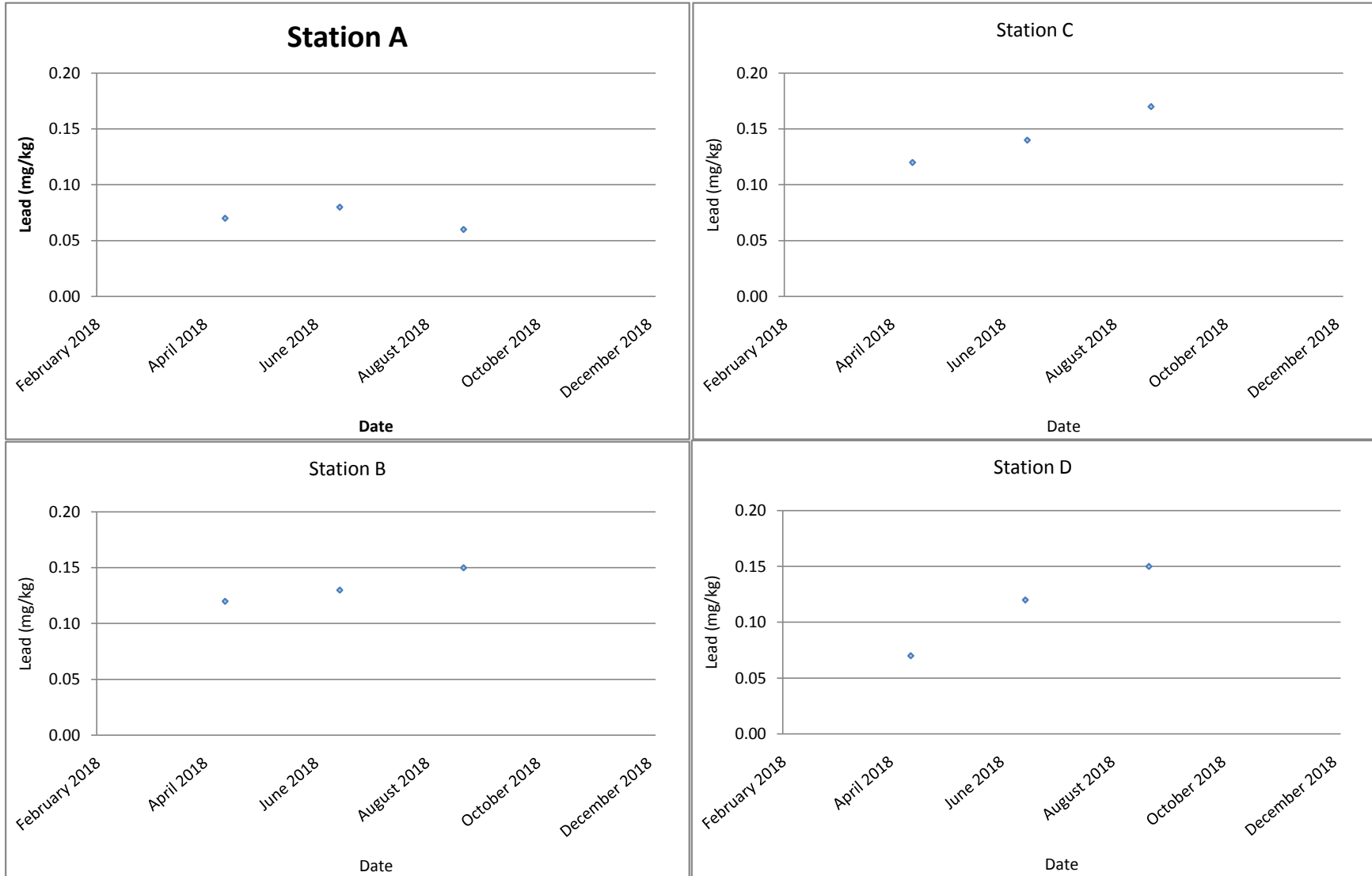
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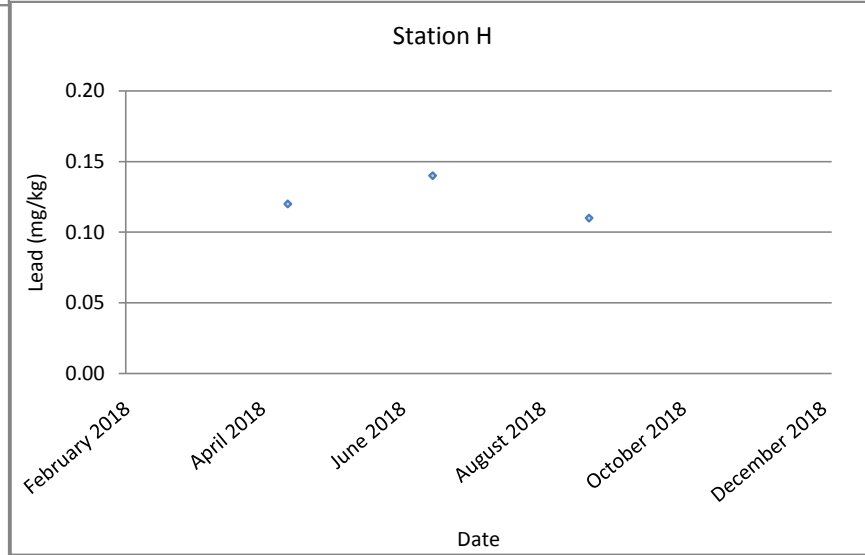
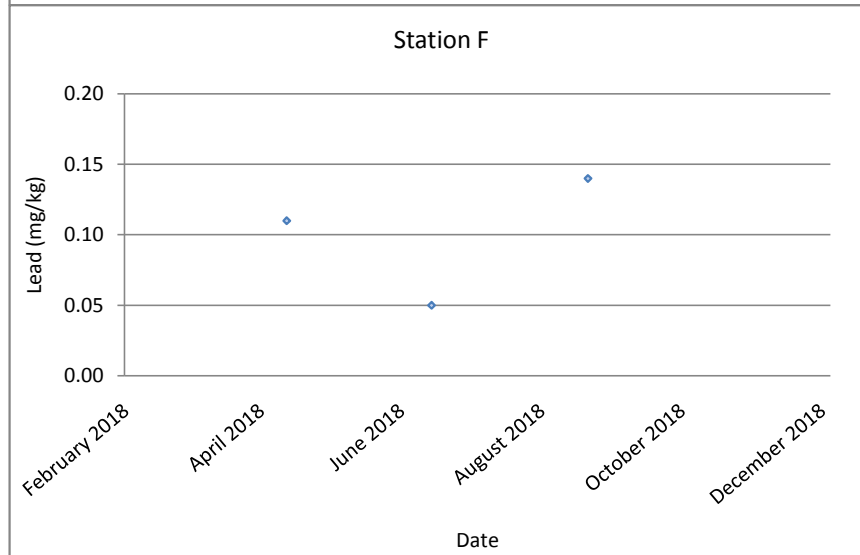
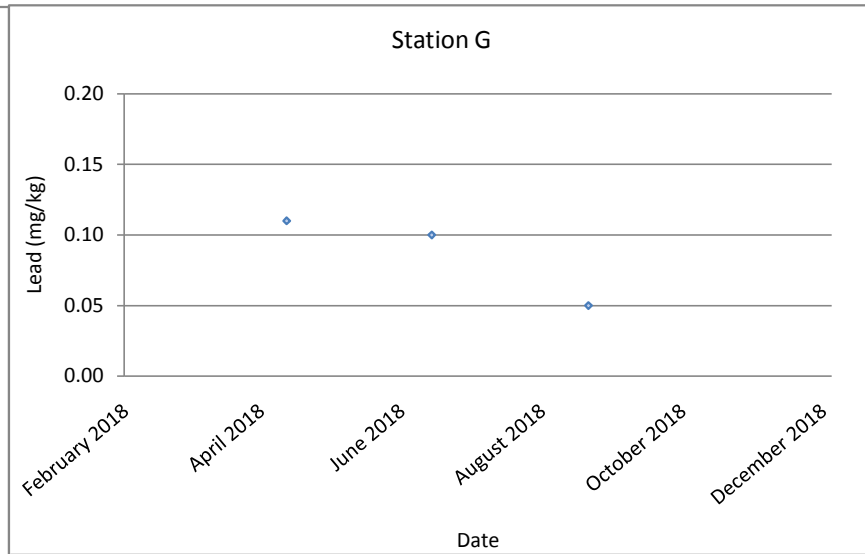
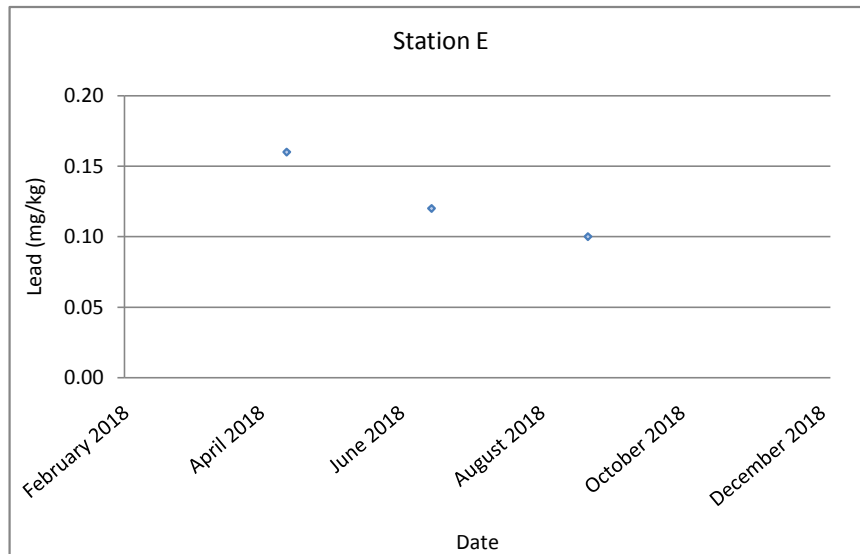
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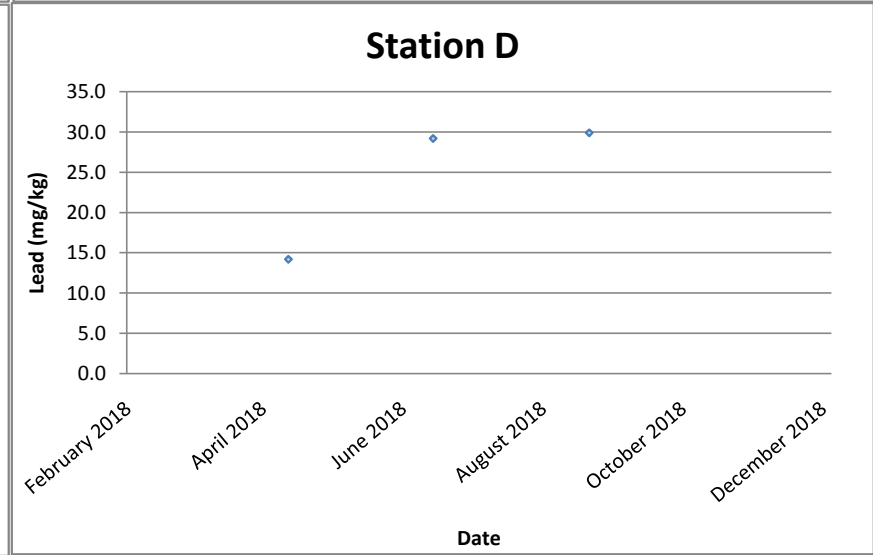
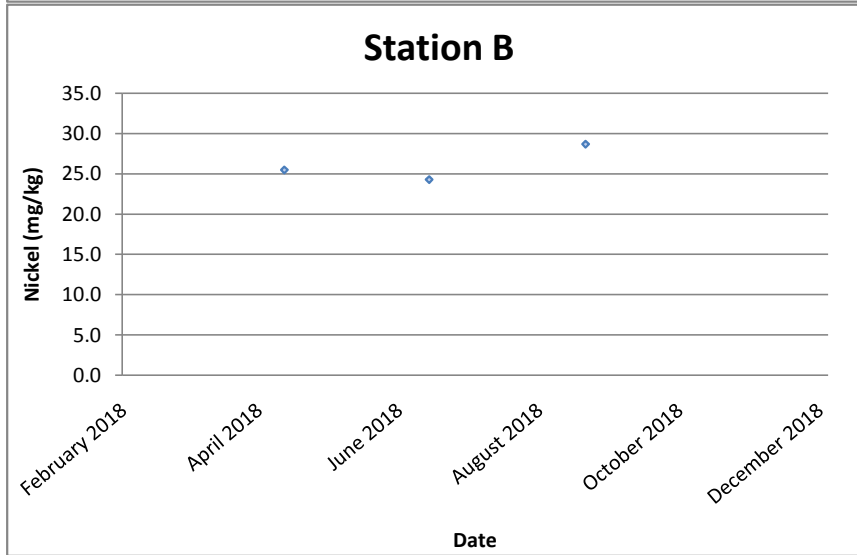
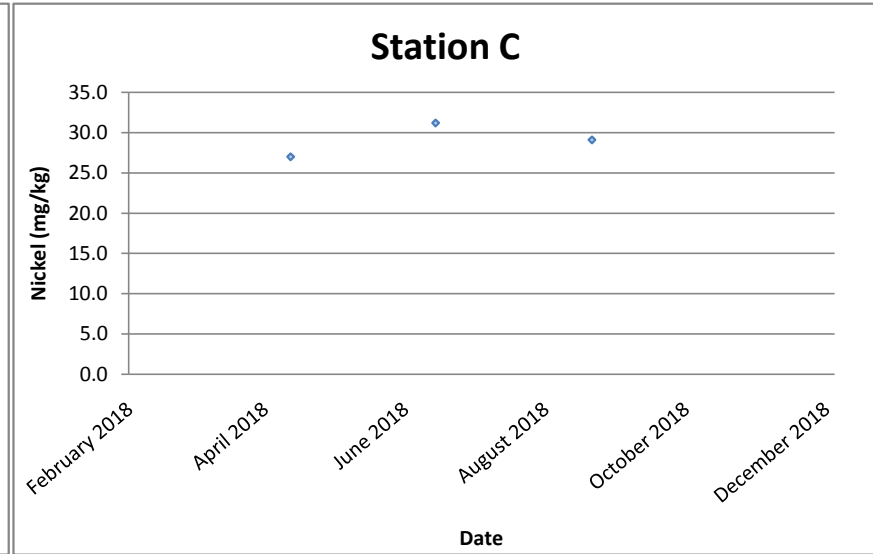
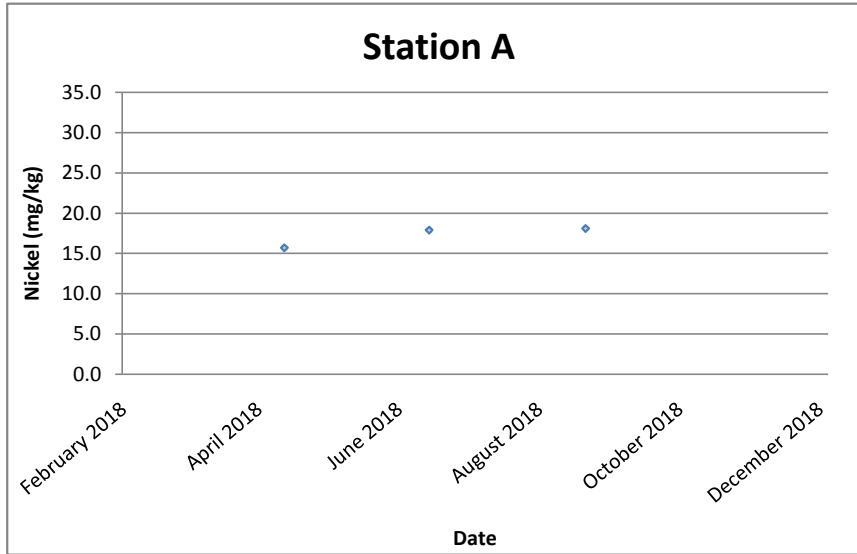
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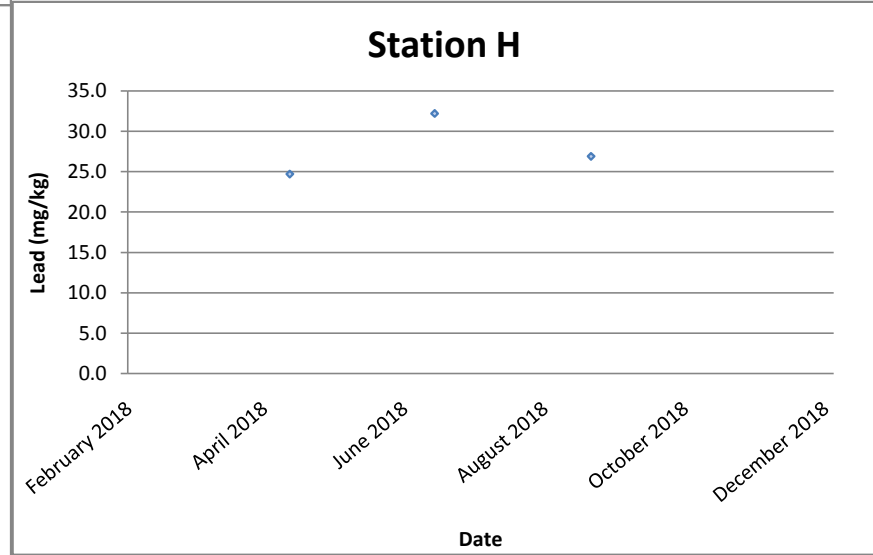
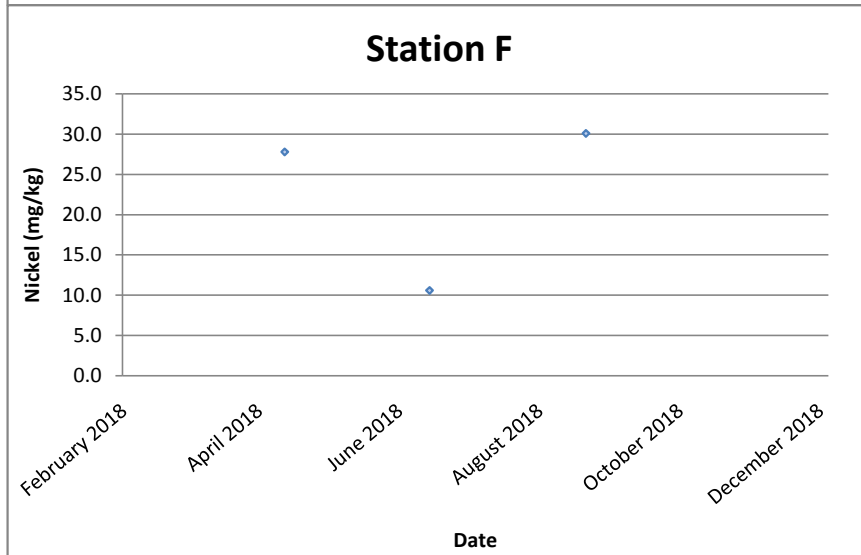
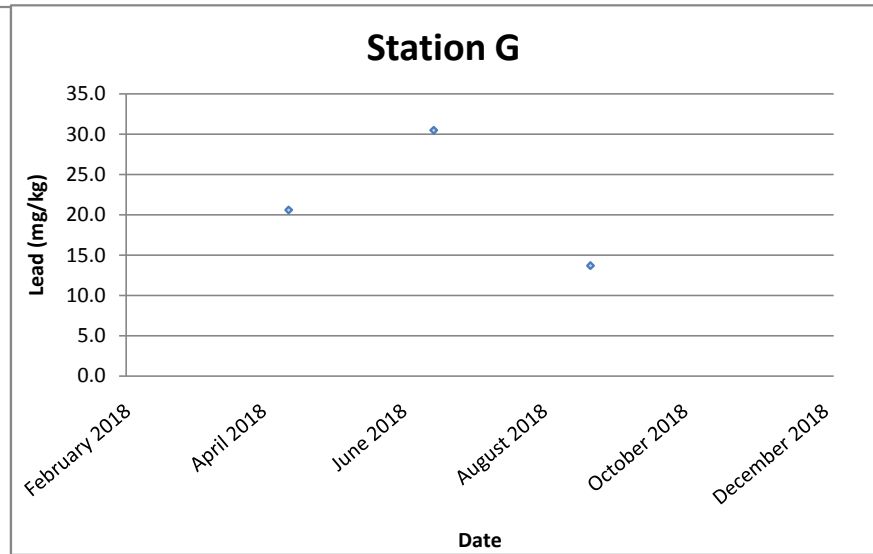
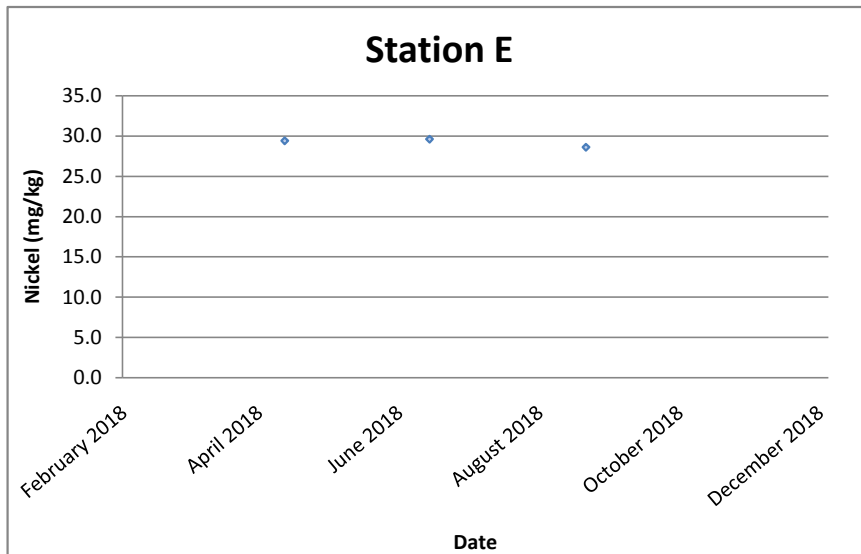
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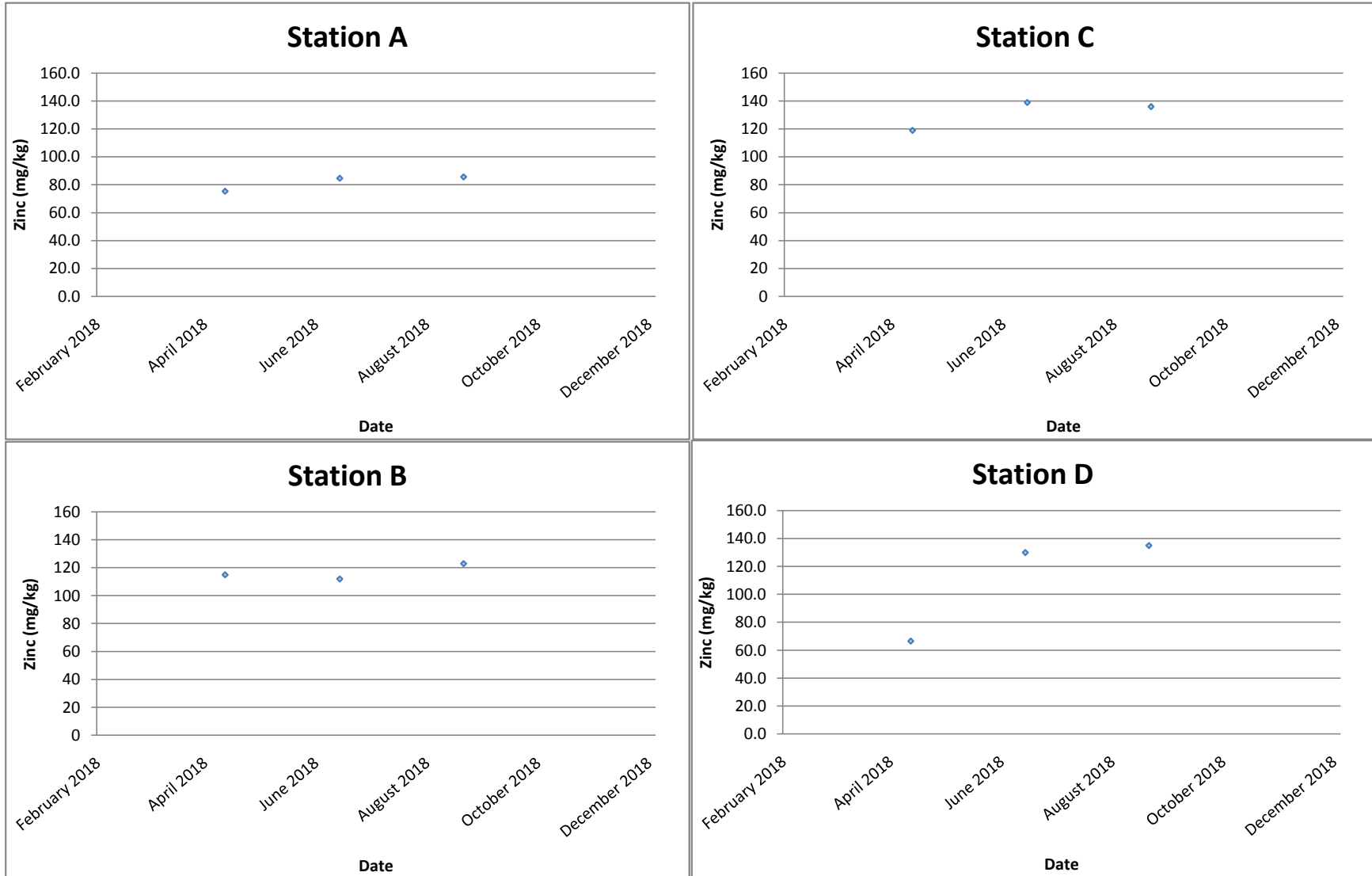
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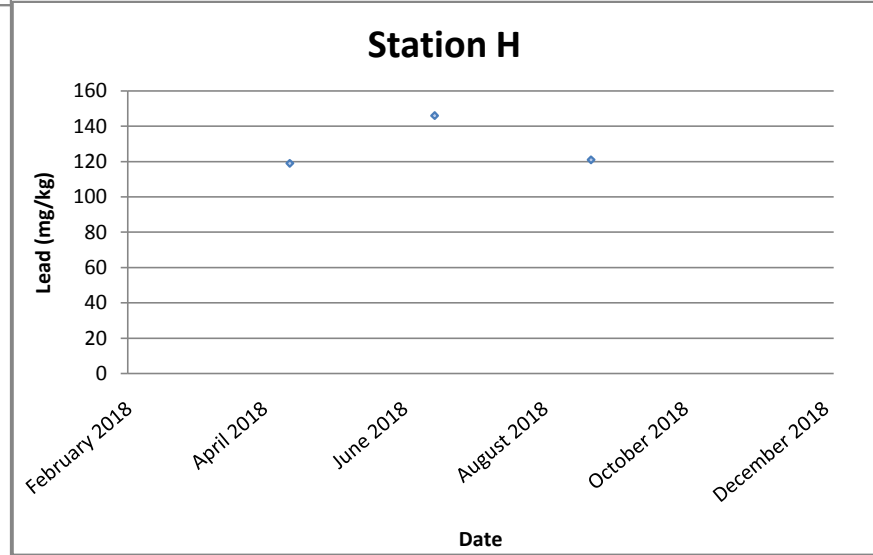
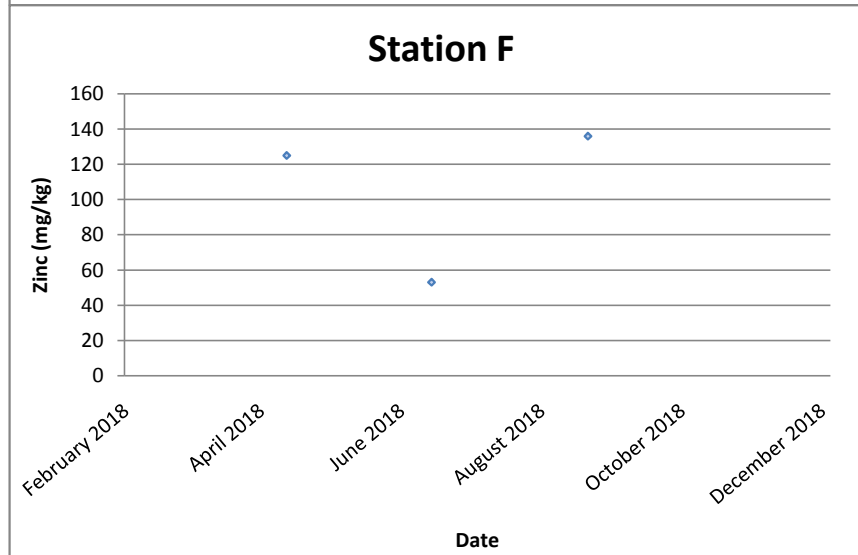
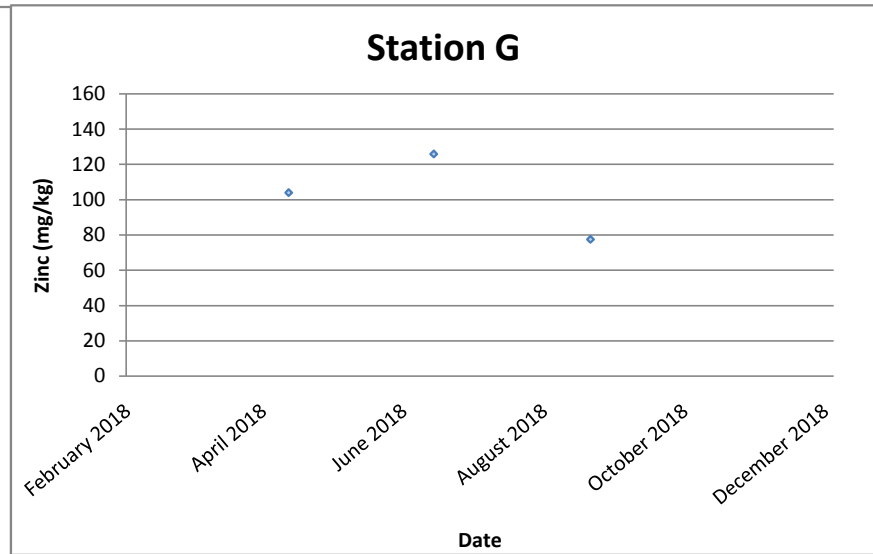
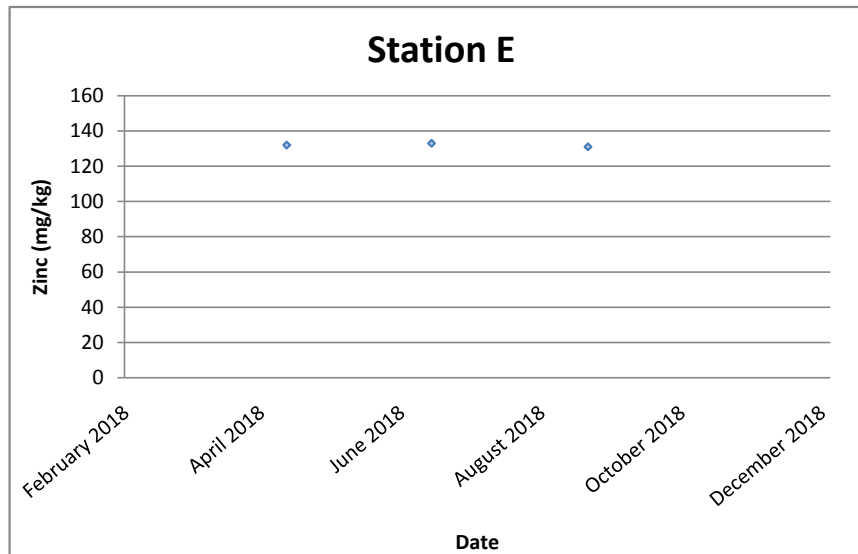
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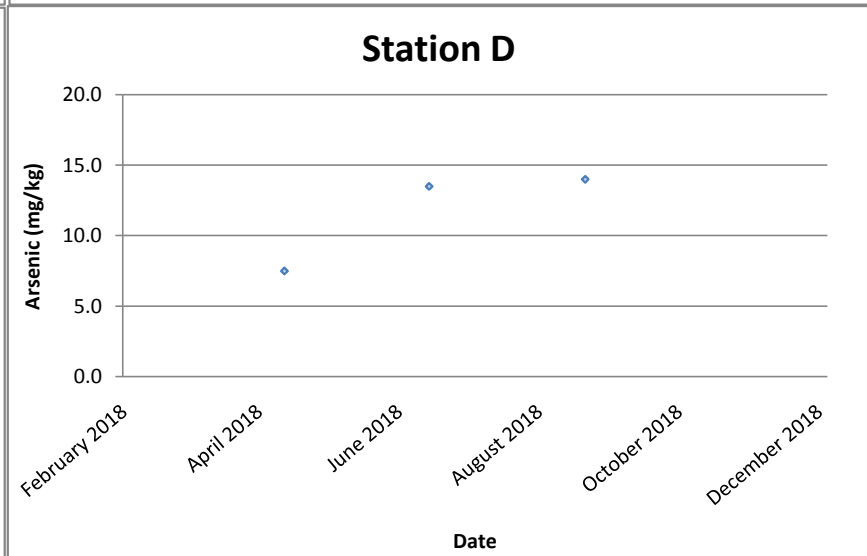
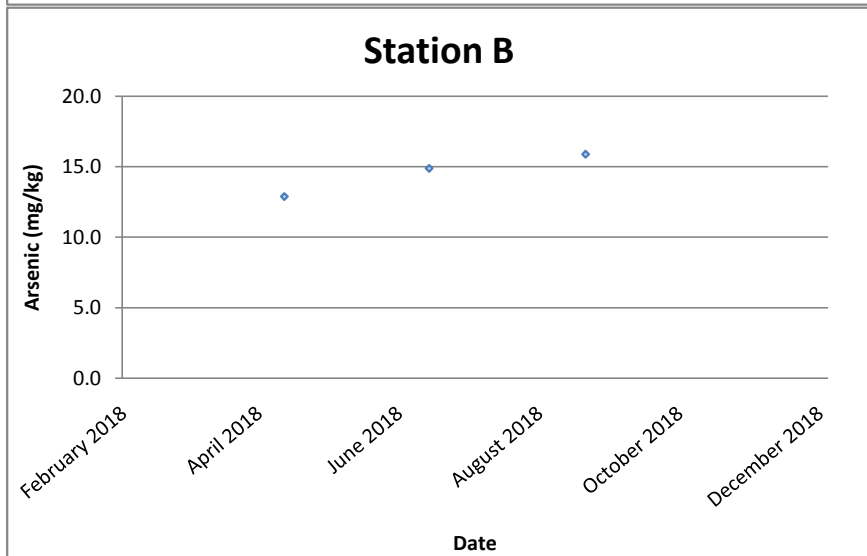
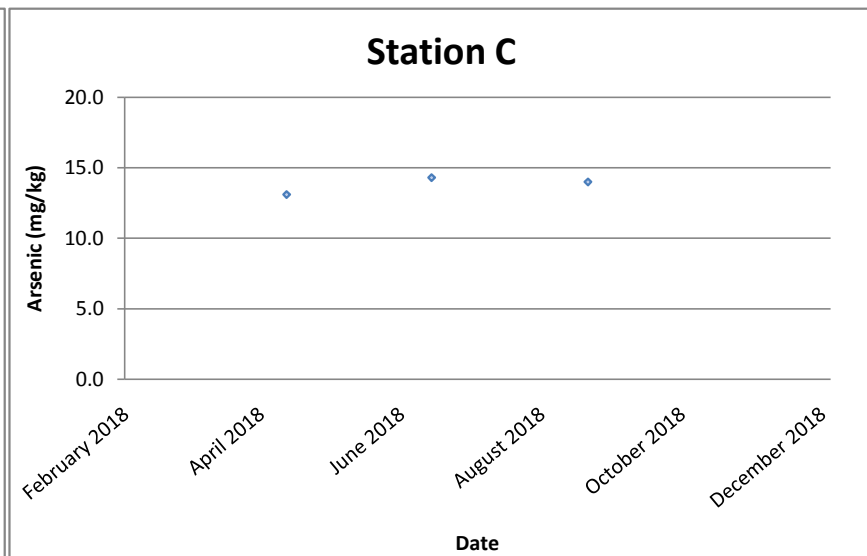
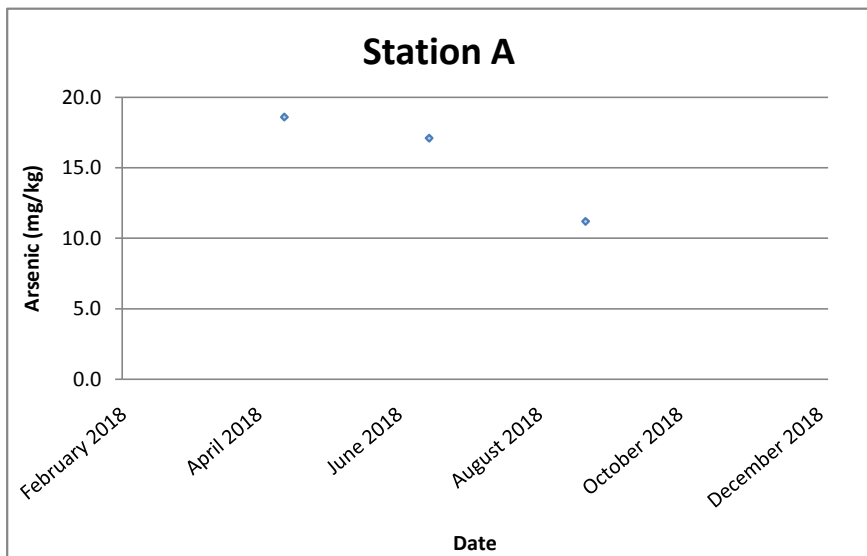
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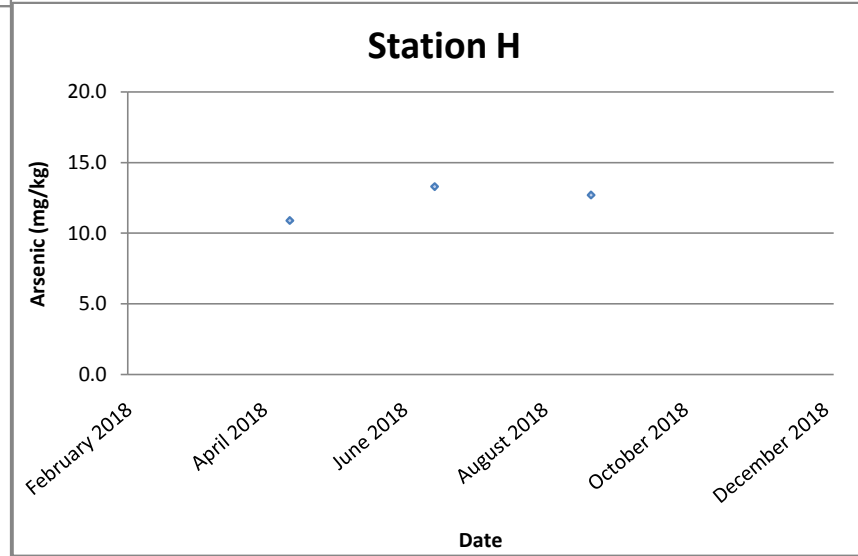
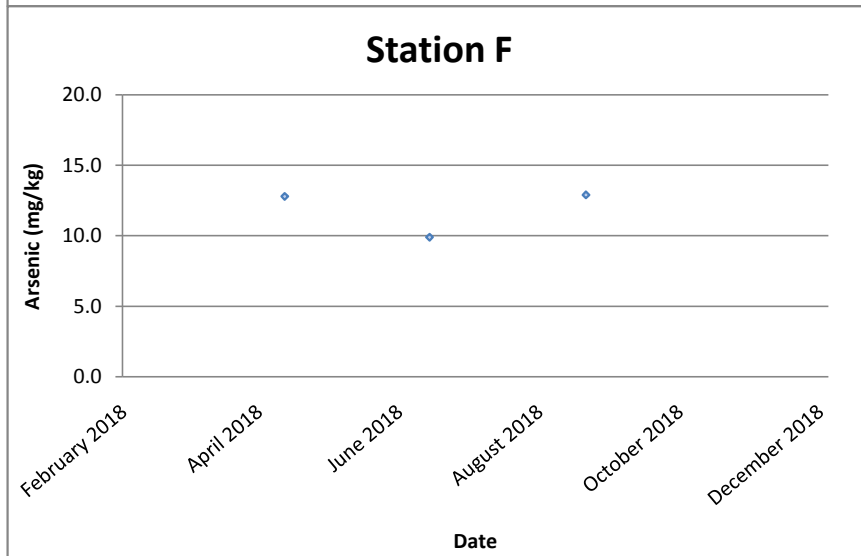
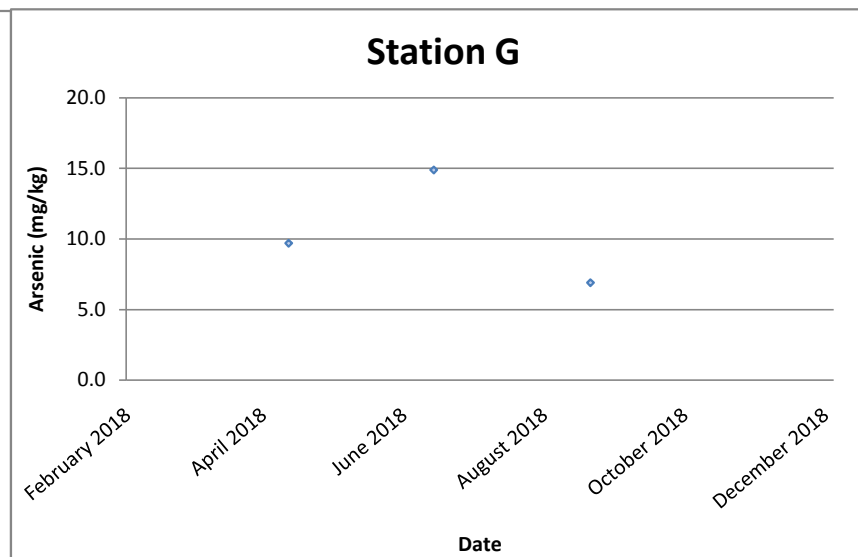
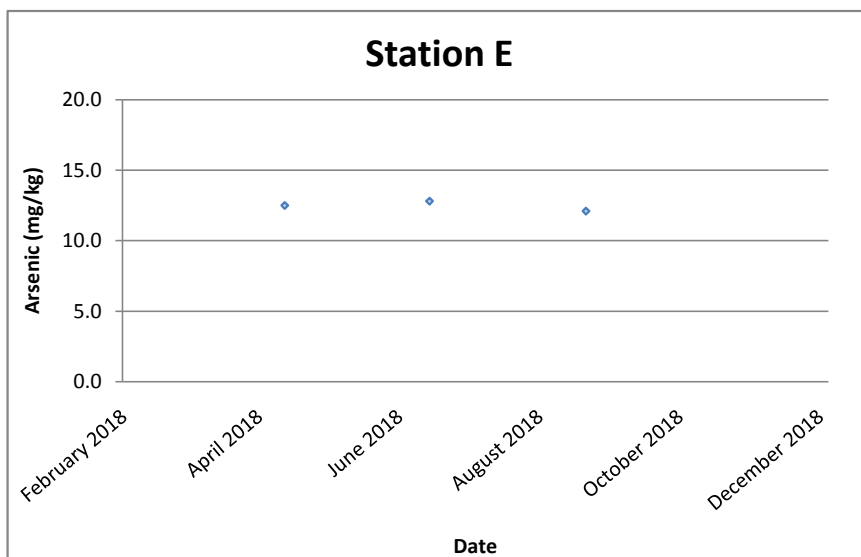
Zinc (mg/kg)



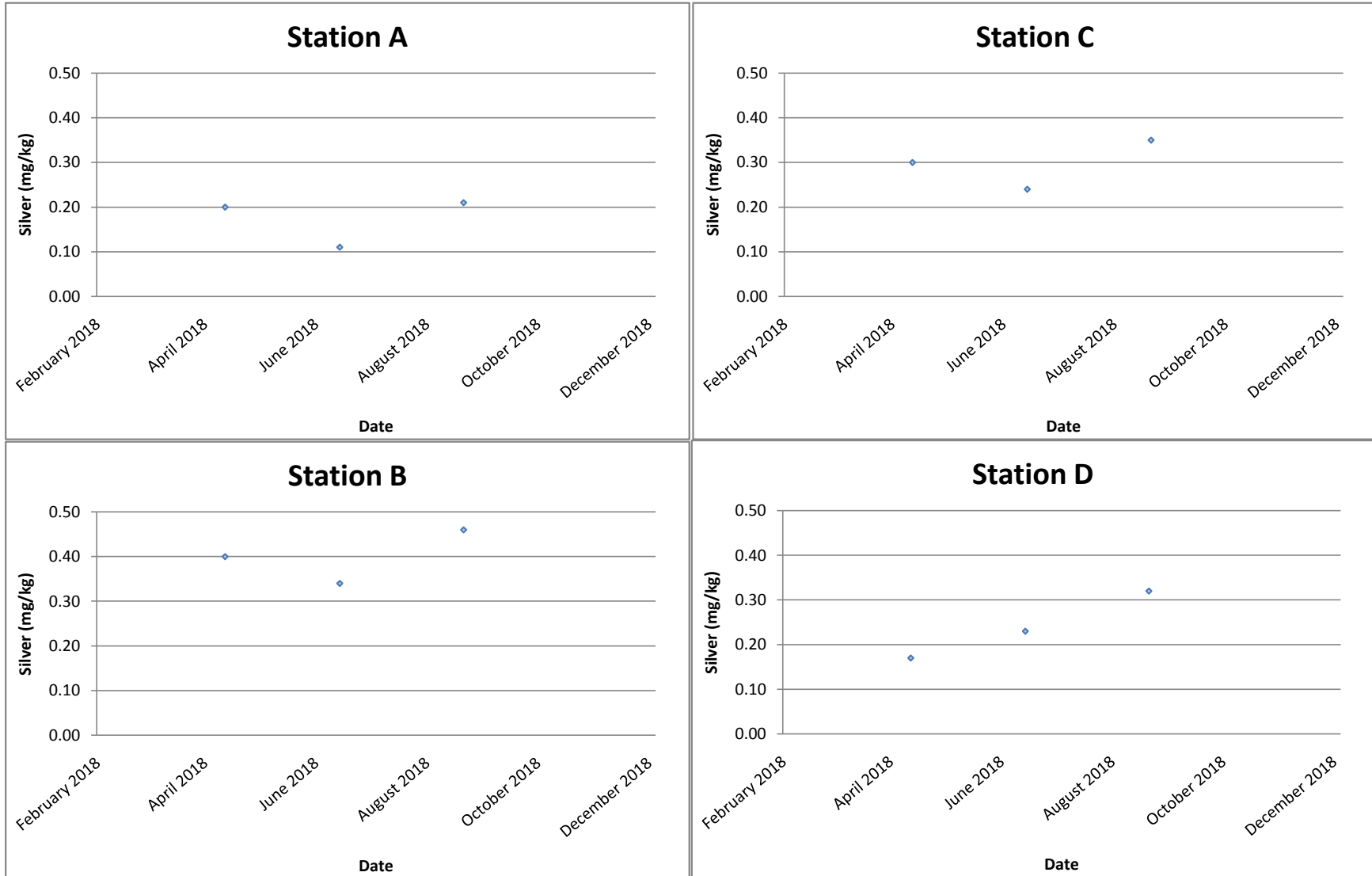
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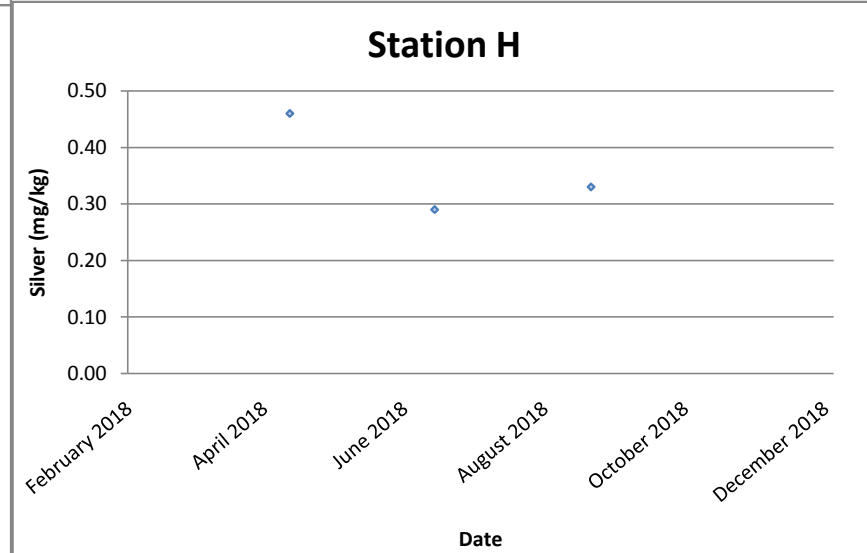
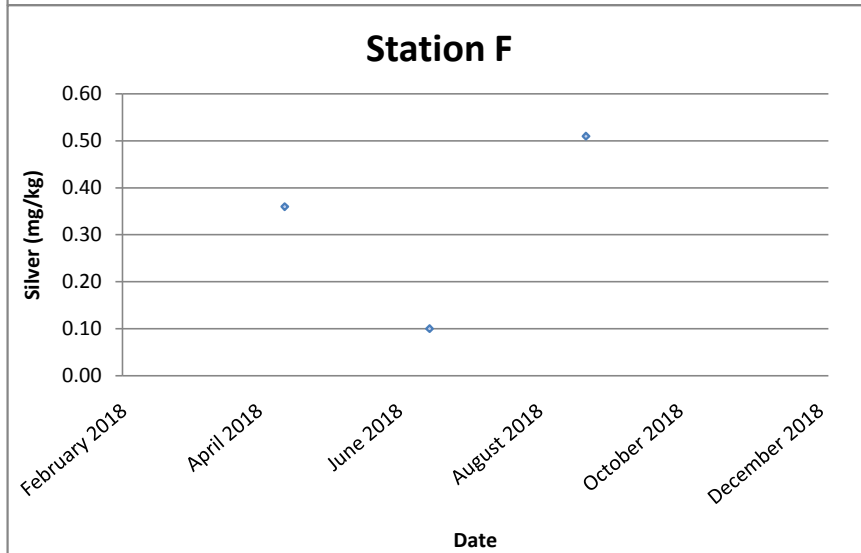
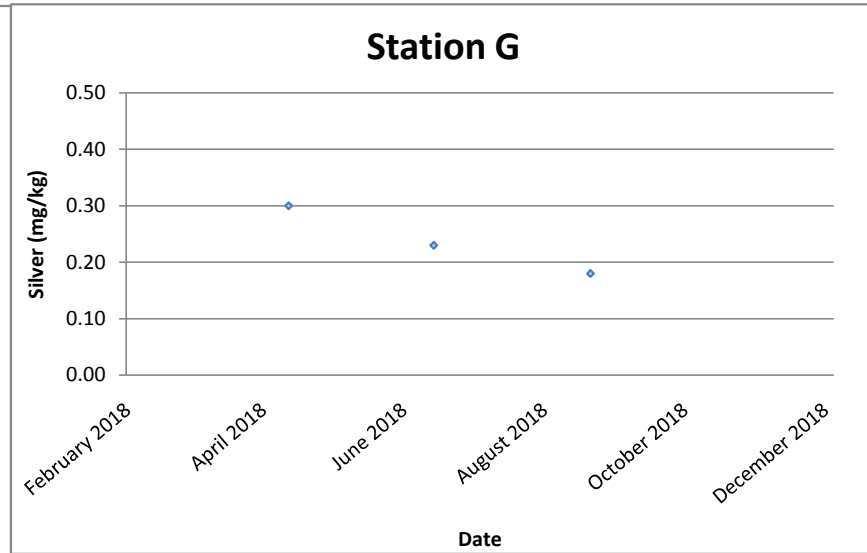
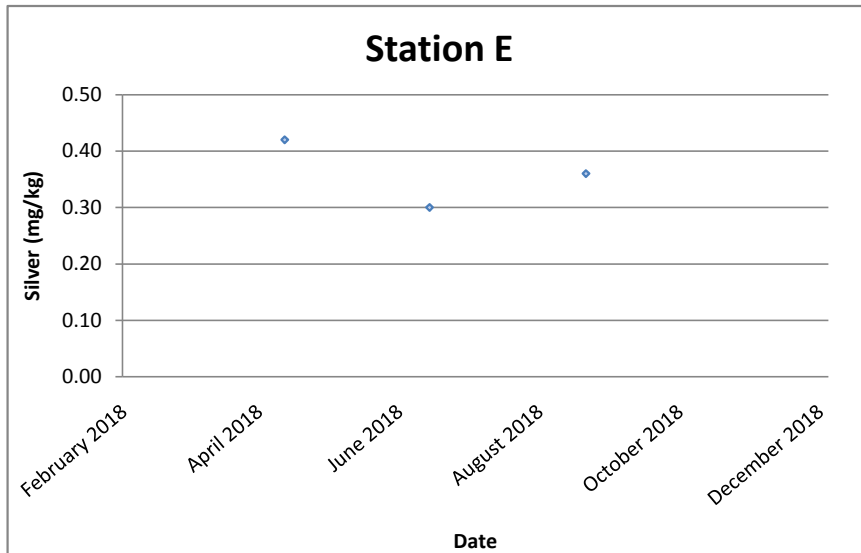
Arsenic (mg/kg)



Silver (mg/kg)



Silver (mg/kg)



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Report No.: 0041/17/ED/0357A

Appendix H Benthic Survey Report



Benthic Faunal Monitoring

Conducted in August 2018

Summary Report

Abundance

A total of 223 macrobenthic organisms were collected from the eight monitoring stations during the August 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 26 individuals (ind.) compared to the June 2018 monitoring results. Macrobenthic abundance showed decreasing trend since the wet season (August 2004) baseline monitoring albeit insignificant (p -value = 0.38 ; F crit = 2.94 ; 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 and August 2018 monitoring periods. Wave action 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 substantially affected by these disturbances as shown in their decreasing abundance since April 2018 monitoring period.

Across monitoring stations, the distribution of macrobenthic abundance is significantly variable (p -value = 0.03 ; F crit = 2.42 ; α = 0.05). As previously reported, the number of macrobenthic organisms might be correlated with the particle or grain size distribution as relatively higher abundances were recorded in stations with moderately sorted sediments and lower abundances in well-sorted sediments. Well-sorted sediments can only provide a smaller range of grain sizes and of interstitial spaces limiting the niches for benthic organisms (Gray 1974); thus, the lower abundances at stations with relatively homogenous grain size distribution. However, for the present monitoring period, no clear correlation between the abundances and sediment characteristics was observed which might due to the constant re-working of sediments brought about by the series of weather disturbances affecting the sampling stations.

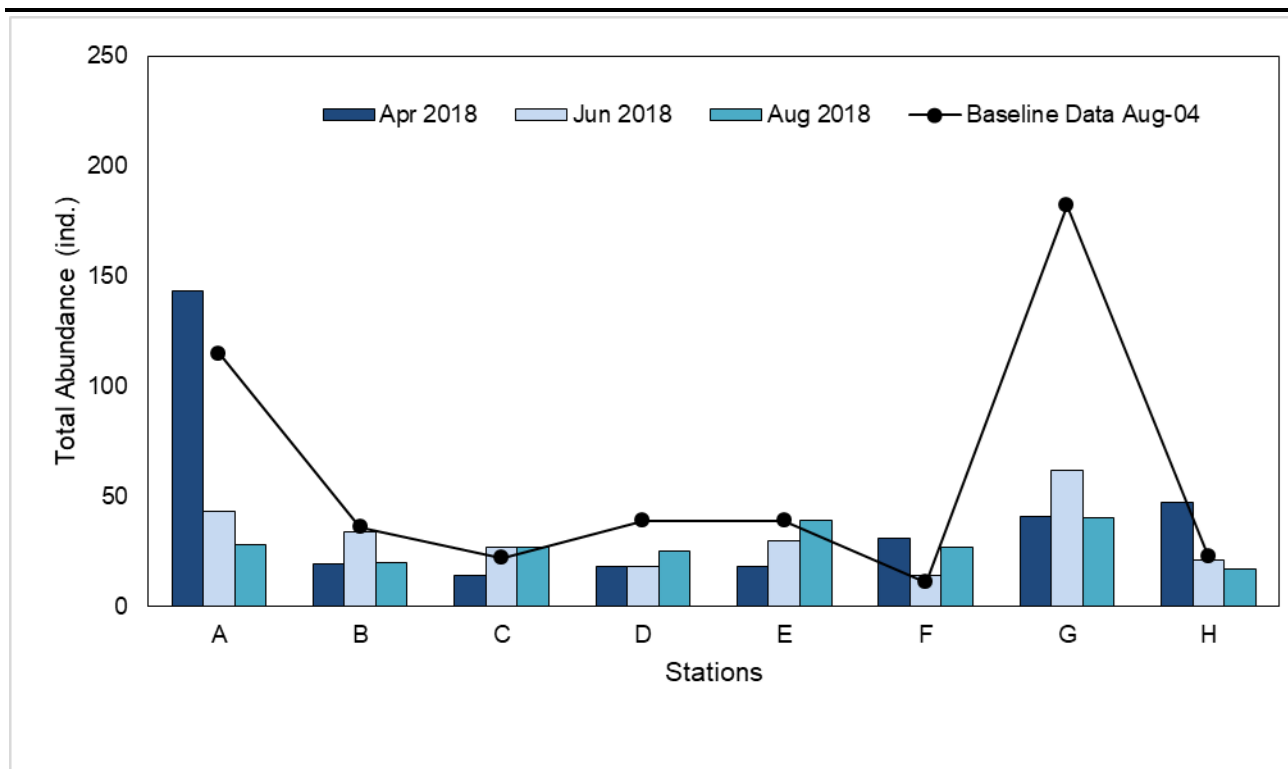


Figure 1. Total abundance (ind.) of benthic organisms

Biomass

The total wet biomass for all the eight monitoring stations during the August 2018 monitoring period was 63.99g, which is less than the biomass recorded during the previous monitoring periods. Figure 2 shows the biomass distribution across monitoring periods and stations. The decrease in total wet biomass (from April 2018 to August 2018) might be attributed to the parallel decline in the abundance of bivalves brought about by the series of weather disturbances that have impacted the sampling stations week(s) before the sampling activities.

The highest biomass continued to be observed in Station A (22.18g) and the lowest this present monitoring period is at the impact station, Station D (1.34g). Highest biomass remained at Station A because of the bivalves, *Ruditapes philippinarum* and *Paphia undulata*, remained to contribute significantly to the total wet biomass due to their larger sizes despite the decline in their abundance. Biomass generally decreased in all stations except at Station C and Station F due to the shift in the macrobenthic assemblage, which is currently dominated by smaller organisms (i.e. annelids).

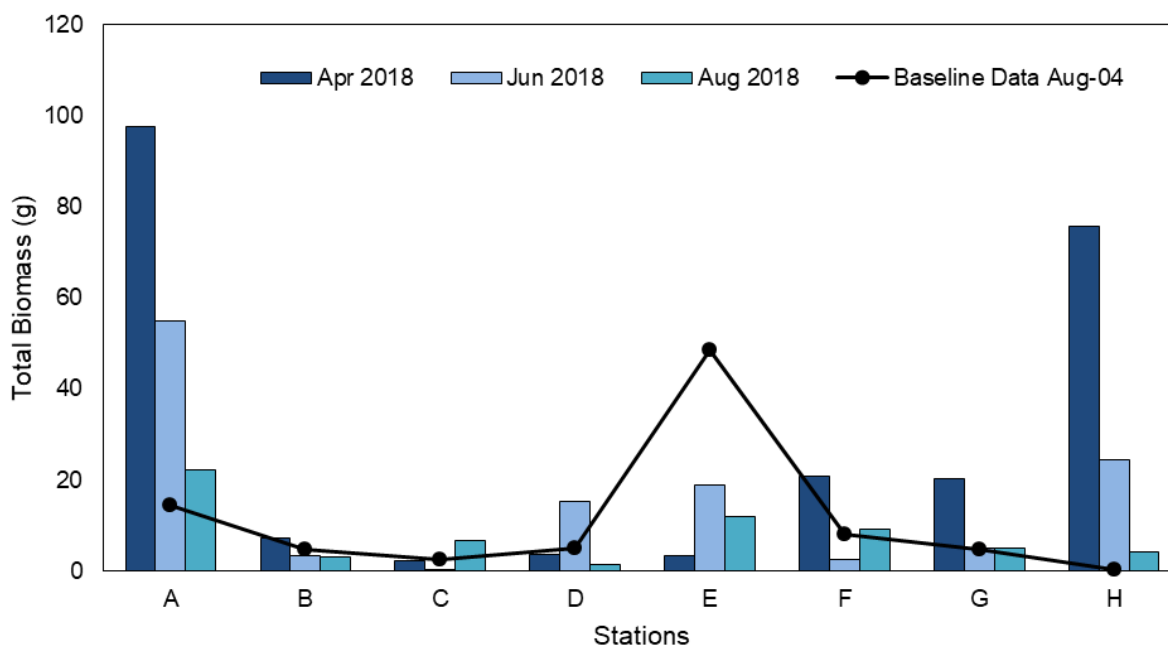


Figure 2. Total biomass (g) of benthic organisms

Taxonomic Composition

A total of seven phyla comprised of 37 families and 52 taxa were identified during the August 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 65.02% of the sampled population (Figure 3). The intermediate disturbance in the form of wave action generated by the weather disturbances, as previously reported, might have cleared existing habitats providing opportunities for smaller benthic organisms such as polychaetes to colonize the area. A study shows that disturbance generated by episodic strong currents (“benthic storms”) was linked to high species dominance by polychaetes (58-64% ampharetids), bivalves, isopods and tanaids (Thistle et al.1985).

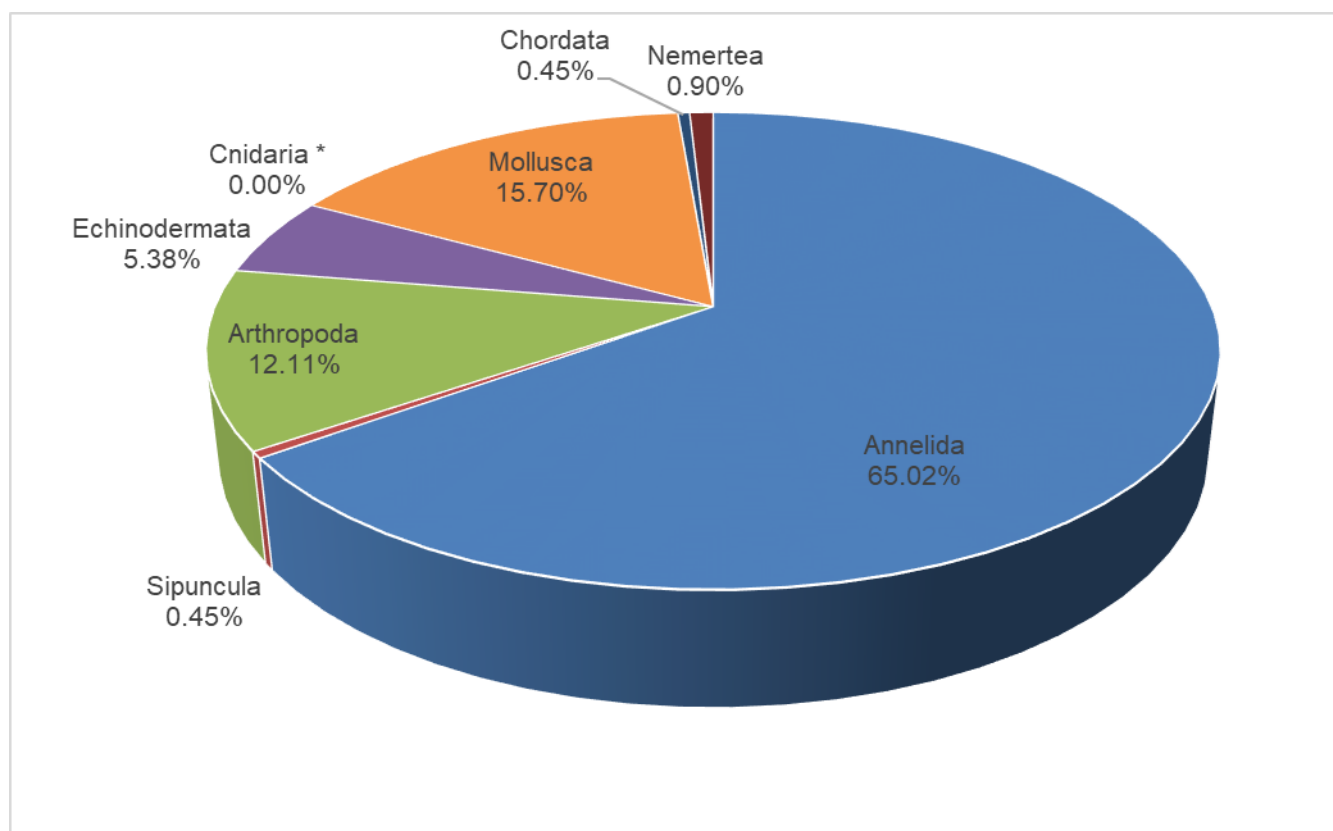


Figure 3. Percent composition of benthic organisms collected in the eight monitoring stations, August 2018

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

Station G remained to have the highest number of taxa (21) identified, followed by Station A and Station E both each have 20 taxa. The relatively higher number of taxa identified were mainly contributed by the species of polychaetes recorded at these stations. Station H had the lowest number (11) of taxa identified. Interestingly, the number of taxa in the impact stations (Station C and Station D) is increasing since April 2018 monitoring period.

Diversity

Diversity indices (H') for the August 2018 monitoring period ranged from low (2.26 at Station H) to



moderate (2.92 at Station A). Compared to the baseline and previous monitoring periods, increase in diversity in all stations (except at Station G) was observed. This increase might be due to the colonization of opportunistic species (i.e. annelids) of the new habitats made available by wave actions caused by weather disturbances. The increase in diversity consequently increase homogeneity of the benthic communities as showed by their high Evenness (J) Index.

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

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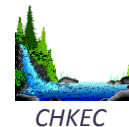
Approved by Supervisor

Name of Consultant : China Hong Kong Ecology Consultants Ltd.

Signature of Supervisor :

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

Date: September 5, 2018



Appendix A: Data Summaries

Summary of Benthic Survey Data (August 2018)

Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	28	22.18	20	2.92	0.97
B	20	3.16	16	2.72	0.98
C*	27	6.70	17	2.64	0.93
D*	25	1.34	13	2.40	0.93
E	39	12.11	20	2.74	0.91
F	27	9.31	14	2.44	0.92
G	40	4.97	21	2.76	0.91
H	17	4.22	11	2.26	0.94
TOTAL	223	63.99	52 (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
Annelida	73.29	31.12	53.01	65.02
Sipuncula	0.21	0.30	0.80	0.45
Arthropoda	18.80	13.60	15.66	12.11
Echinodermata	3.63	15.11	4.82	5.38
Cnidaria *	0.43	0.60	0.40	0
Mollusca	3.42	50.45	21.29	15.69
Chordata	0.21	2.11	0.80	0.45
Nemertea	0	0.30	3.21	0.90

Taxonomic Composition (abundance) of Benthic Survey

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

*referred to as Coelentera in the baseline monitoring



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

Phylum	Class	Order	Family	Genus	Monitoring Stations								% Composition
					A	B	C	D	E	F	G	H	
Annelida	Polychaeta	Aciculata	Glyceridae	<i>Glycera</i>	1	0	0	0	0	0	1	0	0.90
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella(C.capitata)</i>	0	2	0	2	3	6	8	4	11.21
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella</i>	2	0	0	0	1	1	1	1	2.69
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Mediomastus</i>	2	2	0	0	1	0	5	2	5.38
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Notomastus</i>	1	1	1	1	2	2	2	0	4.48
Annelida	Polychaeta	Errantia	Phyllodocidae	<i>Phyllodoce</i>	0	0	0	0	0	0	1	0	0.45
Annelida	Polychaeta	Eunicida	Eunicidae	<i>Eunice(E. indica)</i>	0	1	1	0	1	0	0	0	1.35
Annelida	Polychaeta	Eunicida	Lumbrineridae	<i>Lumbrinereis</i>	0	0	0	0	0	1	0	0	0.45
Annelida	Polychaeta	Phyllodocimorpha	Goniadidae	<i>Glycinde</i>	1	0	0	0	0	0	0	0	0.45
Annelida	Polychaeta	-	Cossuridae	<i>Cossurella(C. aciculata)</i>	0	1	0	0	0	0	0	0	0.45
Annelida	Polychaeta	Phyllodocida	Hesionidae	<i>Hesione(H. intertexta)</i>	0	1	0	0	1	0	0	0	0.90
Annelida	Polychaeta	Phyllodocida	Nereidae	<i>Nereis</i>	1	0	0	2	0	0	1	1	2.24
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	<i>Paralacydonia (P. paradoxa)</i>	0	0	0	1	0	0	1	0	0.90
Annelida	Polychaeta	Phyllodocida	Pilargidae	<i>Sigambra (c.f. S. hanaokai)</i>	0	0	0	0	0	0	1	0	0.45
Annelida	Polychaeta	Phyllodocida	Polynoidae	<i>Gattyana</i>	0	0	0	0	0	1	2	0	1.35
Annelida	Polychaeta	-	Maldanidae	<i>Maldanella</i>	0	1	0	0	0	0	0	0	0.45



Phylum	Class	Order	Family	Genus	Monitoring Stations								% Composition
					A	B	C	D	E	F	G	H	
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> (<i>A. dibranchis</i>)	1	0	2	0	1	0	0	0	1.79
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> (<i>A. lyrochaeta</i>)	0	1	0	2	0	1	1	0	2.24
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Nephtys</i>	1	0	5	5	6	0	0	2	8.52
Annelida	Polychaeta	Scolecida	Orbiniidae	<i>Naineris</i>	0	0	0	0	0	0	2	1	1.35
Annelida	Polychaeta	Spionida	Poecilochaetidae	<i>Poecilochaetus</i>	2	0	1	4	0	4	4	1	7.17
Annelida	Polychaeta	Spionida	Spionidae	<i>Laonice</i> (<i>L. cirrata</i>)	0	0	0	0	1	0	0	0	0.45
Annelida	Polychaeta	Spionida	Spionidae	<i>Polydora</i>	0	0	0	0	0	0	1	0	0.45
Annelida	Polychaeta	Spionida	Spionidae	<i>Prionospio</i>	1	2	0	0	0	0	1	0	1.79
Annelida	Polychaeta	Sternaspida	Sternaspidae	<i>Sternaspis</i> (<i>S. scutata</i>)	0	1	1	1	0	2	1	0	2.69
Annelida	Polychaeta	Terebellida	Ampharetidae	<i>Isolda</i>	1	0	0	0	0	0	0	0	0.45
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Amaeana</i>	0	1	1	0	0	0	0	0	0.90
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Loimia</i> (<i>L. loimia</i>)	0	1	0	0	0	0	0	1	0.90
Annelida	Polychaeta	Terebellida	Trichobanchidae	<i>Terebellides</i> (<i>T. stroemii</i>)	0	0	2	0	0	0	0	0	0.90
Annelida	Oligochaeta	Sabellida	Sabellidae	<i>Sabella</i>	2	0	0	0	1	0	0	0	1.35
Annelida Total					16	15	14	18	18	18	33	13	65.02
N					12	12	8	8	10	8	16	8	30
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	<i>Sipunculus sp.1</i>	0	0	0	0	1	0	0	0	0.45
Sipuncula Total					0	0	0	0	1	0	0	0	0.45
N					0	0	0	0	1	0	0	0	1



Phylum	Class	Order	Family	Genus	Monitoring Stations								% Composition
					A	B	C	D	E	F	G	H	
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0	1	0	1	0	0	0	2	1.79
Arthropoda	Crustacea	Decapoda	Alpheidae	<i>Alpheus</i>	1	0	0	0	0	0	0	0	0.45
Arthropoda	Crustacea	Decapoda	Pilumnidae	<i>Typhlocarcinus</i>	1	0	1	0	0	0	0	0	0.90
Arthropoda	Crustacea	Decapoda	Goneplacidae	<i>Scalopidia (S. spinosipes)</i>	0	0	1	0	0	0	0	0	0.45
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus sp.1</i>	0	0	0	0	1	0	1	0	0.90
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus sp.2</i>	0	1	2	2	6	2	2	0	6.73
Arthropoda	Maxillopoda	Sessilia	Balanidae	<i>Balanus</i>	0	2	0	0	0	0	0	0	0.90
Arthropoda Total					2	4	4	3	7	2	3	2	12.11
N					2	3	3	2	2	1	2	1	7
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	<i>Amphioplus</i>	0	0	4	2	3	1	1	1	5.38
Echinodermata Total					0	0	4	2	3	1	1	1	5.38
N					0	0	1	1	1	1	1	1	1
Mollusca	Bivalvia	Ostreoida	Ostreidae	<i>Talonostrea (T. talonata)</i>	0	0	0	0	0	0	1	0	0.45
Mollusca	Bivalvia	Veneroida	Tellinidae	<i>c.f. Augulus</i>	0	0	1	1	3	2	0	0	3.14
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Chione (C. isabellina)</i>	0	0	0	0	0	0	0	1	0.45
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Circe (C. scripta)</i>	1	0	0	0	1	0	0	0	0.90
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Paphia (P. undulata)</i>	0	0	1	0	3	2	2	0	3.59
Mollusca	Bivalvia	Veneroida	Veneridae	<i>c.f. Phylloda foliacea</i>	1	1	0	1	1	1	0	0	2.24
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Ruditapes (R. philippinarum)</i>	2	0	0	0	0	0	0	0	0.90
Mollusca	Bivalvia	Veneroida	Veneridae	Bivalve juvenile	0	0	1	0	1	1	0	0	1.35



Phylum	Class	Order	Family	Genus	Monitoring Stations								% Composition
					A	B	C	D	E	F	G	H	
Mollusca	Gastropoda	Buccinoidea	Nassariidae	<i>Nassarius</i>	2	0	0	0	0	0	0	0	0.90
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	<i>Turritella (T.javana)</i>	3	0	0	0	0	0	0	0	1.35
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	<i>Turritella (T.terebra)</i>	0	0	1	0	0	0	0	0	0.45
Mollusca Total					9	1	4	2	9	6	3	1	15.70
N					5	1	4	2	5	4	2	1	11
Chordata	Actinopterygii	Perciformes	Gobiidae	UNID goby	1	0	0	0	0	0	0	0	0.45
Chordata Total					1	0	0	0	0	0	0	0	0.45
N					1	0	0	0	0	0	0	0	1
Nemertea	Enopla	-	-	UNID 1	0	0	1	0	1	0	0	0	0.90
Nemertea Total					0	0	1	0	1	0	0	0	0.90
N					0	0	1	0	1	0	0	0	1
Grand Total					28	20	27	25	39	27	40	17	100.00
TOTAL N					20	16	17	13	20	14	21	11	52



Biomass of Benthic Communities

August 2018

Phylum	Class	Order	Family	Genus	Biomass (g)							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Aciculata	Glyceridae	<i>Glycera</i>	0.004	0	0	0	0	0	0.004	0
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella(C.capitata)</i>	0	0.007	0	0.008	0.010	0.037	0.054	0.011
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Capitella</i>	0.003	0	0	0	0.001	0.001	0.001	0.001
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Mediomastus</i>	0.005	0.008	0	0	0.002	0	0.009	0.003
Annelida	Polychaeta	Capitellida	Capitellidae	<i>Notomastus</i>	0.001	0.002	0.003	0.002	0.001	0.003	0.002	0
Annelida	Polychaeta	Errantia	Phyllodocidae	<i>Phyllodoce</i>	0	0	0	0	0	0	0.009	0
Annelida	Polychaeta	Eunicida	Eunicidae	<i>Eunice(E. indica)</i>	0	0.002	0.002	0	0.002	0	0	0
Annelida	Polychaeta	Eunicida	Lumbrineridae	<i>Lumbrinereis</i>	0	0	0	0	0	0.001	0	0
Annelida	Polychaeta	Phyllodocimorpha	Goniadidae	<i>Glycinde</i>	0.002	0	0	0	0	0	0	0
Annelida	Polychaeta	-	Cossuridae	<i>Cossurella(C. aciculata)</i>	0	0.001	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Hesionidae	<i>Hesion(H. intertexta)</i>	0	0.001	0	0	0.001	0	0	0
Annelida	Polychaeta	Phyllodocida	Nereidae	<i>Nereis</i>	0.001	0	0	0.002	0	0	0.002	0.002
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	<i>Paralacydonia (P. paradoxa)</i>	0	0	0	0.001	0	0	0.001	0
Annelida	Polychaeta	Phyllodocida	Pilargidae	<i>Sigambra (c.f. S. hanaokai)</i>	0	0	0	0	0	0	0.003	0
Annelida	Polychaeta	Phyllodocida	Polynoidae	<i>Gattyana</i>	0	0	0	0	0	0.001	0.002	0



Phylum	Class	Order	Family	Genus	Biomass (g)							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	-	Maldanidae	<i>Maldanella</i>	0	0.001	0	0	0	0	0	0
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> (<i>A. dibranchis</i>)	0.007	0	0.021	0	0.006	0	0	0
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Aglaophamus</i> (<i>A. lyrochaeta</i>)	0	0.013	0	0.010	0	0.016	0.007	0
Annelida	Polychaeta	Nereidida	Nephtyidae	<i>Nephtys</i>	0.001	0	0.008	0.012	0.011	0	0	0.004
Annelida	Polychaeta	Scolecida	Orbiniidae	<i>Naineris</i>	0	0	0	0	0	0	0.003	0.001
Annelida	Polychaeta	Spionida	Poecilochaetidae	<i>Poecilochaetus</i>	0.105	0	0.007	0.015	0	0.005	0.045	0.007
Annelida	Polychaeta	Spionida	Spionidae	<i>Laonice</i> (<i>L. cirrata</i>)	0	0	0	0	0.001	0	0	0
Annelida	Polychaeta	Spionida	Spionidae	<i>Polydora</i>	0	0	0	0	0	0	0.002	0
Annelida	Polychaeta	Spionida	Spionidae	<i>Prionospio</i>	0.002	0.002	0	0	0	0	0.002	0
Annelida	Polychaeta	Sternaspida	Sternaspidae	<i>Sternaspis</i> (<i>S. scutata</i>)	0	0.009	0.004	0.009	0	0.019	0.010	0
Annelida	Polychaeta	Terebellida	Ampharetidae	<i>Isolda</i>	0.001	0	0	0	0	0	0	0
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Amaeana</i>	0	0.001	0.001	0	0	0	0	0
Annelida	Polychaeta	Terebellida	Terebellidae	<i>Loimia</i> (<i>L. loimia</i>)	0	0.002	0	0	0	0	0	0.002
Annelida	Polychaeta	Terebellida	Trichobranchidae	<i>Terebellides</i> (<i>T. stroemii</i>)	0	0	0.011	0	0	0	0	0
Annelida	Oligochaeta	Sabellida	Sabellidae	<i>Sabella</i>	0.005	0	0	0	0.003	0	0	0
Annelida Total					0.137	0.049	0.057	0	0.038	0.083	0.156	0.031
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	<i>Sipunculus sp.1</i>	0	0	0	0	0.001	0	0	0
Sipuncula Total					0	0	0	0	0.001	0	0	0



Phylum	Class	Order	Family	Genus	Biomass (g)							
					A	B	C	D	E	F	G	H
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0	0.015	0	0.008	0	0	0	0.298
Arthropoda	Crustacea	Decapoda	Alpheidae	<i>Alpheus</i>	3.335	0	0	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Pilumnidae	<i>Typhlocarcinus</i>	3.013	0	0.021	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Goneplacidae	<i>Scalopidia (S. spinosipes)</i>	0	0	0.003	0	0	0	0	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus sp.1</i>	0	0	0	0	T	0	0.001	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	<i>Gammarus sp.2</i>	0	T	0.001	0.001	0.002	0.001	T	0
Arthropoda	Maxillopoda	Sessilia	Balanidae	<i>Balanus</i>	0	1.300	0	0	0	0	0	0
Arthropoda Total					6.348	1.315	0.025	0	0.002	0.001	0.001	0.298
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	<i>Amphioplus</i>	0	0	0.366	0.029	0.112	0.509	0.115	0.138
Echinodermata Total					0	0	0.366	0	0.112	0.509	0.115	0.138
Mollusca	Bivalvia	Ostreoida	Ostreidae	<i>Talonostrea(T. talonata)</i>	0	0	0	0	0	0	1.100	0
Mollusca	Bivalvia	Veneroida	Tellinidae	<i>c.f. Augulus</i>	0	0	0.009	0.010	0.033	0.022	0	0
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Chione (C. isabellina)</i>	0	0	0	0	0	0	0	3.750
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Circe (C. scripta)</i>	1.100	0	0	0	0.041	0	0	0
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Paphia (P. undulata)</i>	0	0	5.035	0	9.400	5.700	3.600	0
Mollusca	Bivalvia	Veneroida	Veneridae	<i>c.f. Phylloda foliacea</i>	1.008	1.793	0	1.235	1.763	2.985	0	0
Mollusca	Bivalvia	Veneroida	Veneridae	<i>Ruditapes (R. philippinarum)</i>	6.100	0	0	0	0	0	0	0
Mollusca	Bivalvia	Veneroida	Veneridae	Bivalve juvenile	0	0	0.003	0	0.021	0.009	0	0
Mollusca	Gastropoda	Buccinoidea	Nassariidae	<i>Nassarius</i>	2.800	0	0	0	0	0	0	0



Phylum	Class	Order	Family	Genus	Biomass (g)							
					A	B	C	D	E	F	G	H
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	<i>Turritella (T.javana)</i>	4.600	0	0	0	0	0	0	0
Mollusca	Gastropoda	Sorbeoconcha	Turritellidae	<i>Turritella (T.terebra)</i>	0	0	1.200	0	0	0	0	0
Mollusca Total					15.608	1.793	6.247	1	11.258	8.716	4.700	3.750
Chordata	Actinopterygii	Perciformes	Gobiidae	UNID goby	0.085	0	0	0	0	0	0	0
Chordata Total					0.085	0	0	0	0	0	0	0
Nemertea	Enopla	-	-	UNID 1	0	0	0.002	0	0.703	0	0	0
Nemertea Total					0	0	0.002	0	0.703	0	0	0
Grand Total					22.18	3.16	6.70	1.34	12.11	9.31	4.97	4.22

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

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

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

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

Appendix B: Representative Taxa Identified



A) The bivalve, *Turritella javana*



B) The bivalve, *Circe scripta*



C) Three species of Polychaeta, *Poecilochaetus sp.*, *Sternaspis scutata* and *Phyllodoce 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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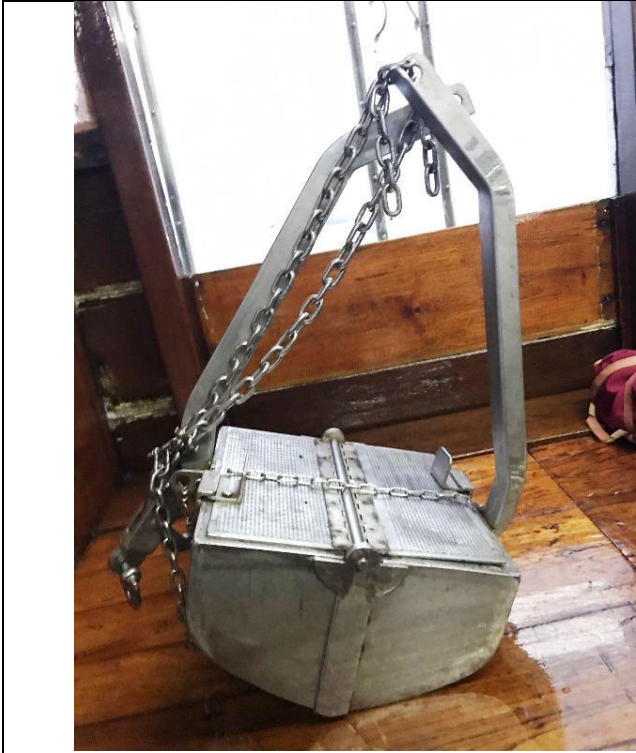


Photo 1. A modified Van Veen grab sampler



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 should be followed, i.e. solid content of sludge waste should be more than 30%.	SHWSTW	Implemented
NA	NA	5.02	The disposal of grit & debris (if any) generated during primary screening works should follow the requirement set in the WMP Section 4.05.	SHWSTW	Implemented
NA	NA	5.03	The wet sludge should be temporarily stored at the sludge buffer tank. It should then be transported to the centrifuge building for dewatering and discharged to the container for disposal. The whole process should be managed by the automatic electronic electronic system and monitored by the operators during operation.	SHWSTW	Implemented
NA	NA	5.04	The other solid waste material such as sediment and grit, refuse containers or collection bags should be temporarily stored in slips at designated area. Operators should ensure sufficient space is identified and provided for temporary storage of waste materials to facilitate collection. Storage of waste material on site will be kept to a minimum to avoid nuisance to local residents.	SHWSTW	Implemented
NA	NA	5.05	Chemical wastes which likely to be generated by activities arise from the maintenance, shall followed the Waste Disposal (Chemical Waste) (General) Regulation, includes Schedule 1 of the Regulation.	SHWSTW	Implemented
NA	NA	5.06	In case of unlikely occurred chemical spillage, procedures should be followed as according to the WMP Section 5.06.	SHWSTW	Implemented
NA	NA	5.07	Temporary storage areas should be identify and provided for the temporary storage of general	SHWSTW	Implemented

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

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

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