FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.
Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Monthly EM&A Report
April 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/0302B

Prepared by: Andy K. H. Choi

Reviewed by: Cyrus C. Y. Lai

Certified by: _____

Colin K. L. Yung
Environmental Team Leader
Fugro Technical Services Limited

Allied Environmental Consultants Limited
Acousticians & Environmental Engineers

19/F., Kwan Chart Tower, 6 Tonnochy Road, Wan Chai, Hong Kong
Tel.: (852) 2815 7028 Fax: (852) 2815 5399 Email: info@aechk.com

沛然環境評估工程顧問有限公司

Our Ref: 1458/18-0086

29 May 2018

By Post and E-mail

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

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

Dear Sir,

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

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for April 2018 (Report No.: 0041/17/ED/0302B) received from the Environmental Team (ET), Messrs. Fugro Technical Services Ltd., on 29 May 2018 via email.

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

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

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

Yours faithfully,

For and on behalf of
Allied Environmental Consultants Ltd.

Grace M. H. KWOK
Independent Environmental Checker

GK/ri/rc

c.c. Fugro Technical Service (ET Leader) Attn: Mr. Colin YUNG (By E-mail)
AECOM Attn: Ms. Joanne TSOI (By E-mail)

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.
Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

TABLE OF CONTENTS

FIGURE

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.
Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

APPENDICES

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

EXECUTIVE SUMMARY

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

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

In accordance with the EP, an approved operational EM&A Plan was submitted. According to the approved EM&A plan, air quality monitoring i.e. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis of H_2S, in addition, water quality monitoring, sediment quality monitoring, benthic survey, Chinese White Dolphin (CWD) monitoring and waste management are the key environmental concern of the Project.

This is the ninth Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 April 2018 to 30 April 2018 (the "reporting period").

Breaches of Action and Limit Levels

Air quality monitoring i.e. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis was carried out on 4, 9, 18 and 25 April 2018. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASR) were recorded and no non-compliance of odour monitoring at ASR were recorded in the reporting period.

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

Compliant Log

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

Notifications of Summons and Successful Prosecutions

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

Summary of the Environmental Mitigations Measures

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

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Future Key Issues

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

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

During this reporting period, H_2S data collected (total 4 measurements) could not be considered as representative data to reflect the odour impact from SHWSTW as the wind direction during the measurement was in a non-ideal direction (SE) or interfered by other dominant odour source in the surrounding environment (e.g. vegetation and gasoline). Due to inadequacy of representative data, current H2S measurement and olfactometry analysis was considered as unsuitable way to establish the relationship of H2S concentration (ppb) with the odour unit (OU/m3). In order to assess whether SHWSTW is the major H2S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H2S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, temporary suspension of air quality monitoring was proposed and submitted for EPD's approval.

1. INTRODUCTION

1.1 Background

1.1.1 The Project "Upgrading of Siu Ho Wan Sewage Treatment Works" is to upgrade SHWSTW from the preliminary treatment level to Chemically Enhanced Primary Treatment (CEPT) level with Ultraviolet (UV) disinfection facilities. The Project is required to comply with the Environmental Permit (EP) in respect of the construction and operation phases of the Plant.

1.1.2 Under the EIAO, the Project was classified as "Designated Project". The Environmental Impact Assessment (EIA) study was completed in September 1997 with the EIA Report of Register No. EIAR-124BC, Operational Environmental Monitoring and Audit (EM&A) Plan and the EP of No. EP-076/2000 was issued in August 2000 to Drainage Services Department (DSD).

1.1.3 The CEPT part has been completed and was put into operation in March 2005. The UV disinfection works were substantially completed in December 2006. It is considered that the operation of the Project shall be deemed to start when the UV disinfection facilities have been completely installed and tested.

1.2 Project Description

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

1.3 Project Organization

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

Table 1.1 Contact Persons and Telephone Numbers of Key Personnel

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

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

1.4 Work Undertaken during the Report Period

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

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

2. AIR QUALITY MONITORING

2.1 Methodology of H_2S Concentration Monitoring

2.1.1 15-min H_2S concentration was measured using a Jerome 631-X analyzer. This analyzer is capable of measuring H_2S concentration in the range of 1 ppb to 50 ppm with a resolution of 1 ppb and operates within a temperature range of 0ºC to 40ºC at an air flow rate of 0.15 L/min. Odour gas samples were drawn by built-in a suction pump of the analyzer and passed through a gold film sensor. The trace level of H_2S of the samples were determined electrochemically on the gold film sensor. Meteorological conditions including temperature, wind speed, wind direction and relative humidity were also measured at the time of the monitoring. Table 2.1 summarizes the equipment used in H_2S monitoring.

Table 2.1 Equipment used for H_2S Concentration Monitoring

Equipment	Manufacturer / Model	Serial Number	Sensor Number	Calibration Date	Next Calibration Date
Gold Film Hydrogen Sulphide Analyzer	JEROME X631 0003	2966	14-11-23-R2D	2 June 2017	1 June 2018

2.2 Methodology of Odour Patrol Monitoring

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

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

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

Table 2.2 Categories of Odour Intensity

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

2.3 Methodology of Odour Sampling and Olfactometry Analysis

2.3.1 Odour gas samples were collected in a Nalophan sampling bag placed inside a vacuum air-tight sampler using passive sampling technique. Approximately 60 liter of gas sample was collected at each sampling. All samples collected on the sampling day were returned to laboratory for olfactometry analysis within 24 hours and analyzed within 2 hours upon receiving.

2.3.2 ALS Technichem (HK) Pty Ltd. (HOKLAS Reg. No. 066), was appointed to be the laboratory for olfactometry analysis of the gas sample.

2.3.3 The odour concentration of the samples were determined by Forced-choice Dynamic Olfactometer in accordance with the European Standard Method: BS EN13725. Testing were also performed by a panel of six members who have been trained to comply with the requirement of European Standard Method: BS EN13725. All testing were completed within 24 hours upon sampling.

2.4 Monitoring Location

2.4.1 H_2S concentration monitoring, odour patrol monitoring and odour sampling were carried out at ASR, Cheung Tung Road near the Bus Repot at the west of the Siu Ho Wan Treatment Plant. The location of ASR is shown in **Figure 1**.

2.5 Monitoring Frequency and Duration

The durations and frequencies of H_2S concentration measurement, odour patrolling and odour sampling are summarized in **Table 2.3** below.

Table 2.3 Durations and Frequencies of Air Quality Monitoring Programme

	Duration	Frequency
H_2S concentration monitoring	15 minutes	[1]Weekly basis for 6 months during the initial operation stage
Odour patrol		
Odour sampling for olfactometry analysis	[3]15 minutes	[2]First week of the odour patrol monitoring

Remark:
1) In case excessive odour nuisance was detected during the odour patrol monitoring or the standard of the 5 odour units cannot be complied with during the odour panel monitoring, the odour patrol monitoring and H_2S concentration monitoring shall be extended for a period of three months to cater for the warm-up period of the functioning of the additional mitigation measures.

2) In case the relationship between H_2S concentration (ppb) with the odour unit (OU/m3) cannot conclude from the correlation study carried out at the first week of the odour patrol monitoring due to invalid data, additional odour sampling for olfactometry analysis shall be carried out for the correlation study.
3) Sufficient air samples (approximate 60L) may be collected in less than 15 minutes during odour sampling.

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

2.6 Event and Action Plan

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

Table 2.4 Action and Limit Levels for Air Quality Monitoring

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

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

2.7 Quality Assurance and Quality Control

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

2.7.2 Calibration of the analyzer is conducted every year at the laboratory of the manufacturer. The calibration certificates for the analyzers are shown in **Appendix D**.

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. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis was carried out on 4, 9, 18 and 25 April 2018.

2.8.2 The meteorological data including temperature, wind speed and direction of the reporting period at ASR is summarised in **Table 2.5**.

Table 2.5 Summary of Meteorological Data in Reporting Period

Date	Time	Temperature (° C)	Relative Humidity (%)	Wind Direction	Wind speed (km/h)
4 April 2018	10:30 – 10:45	26.0	68.0	E	1.4
9 April 2018	10:03 – 10:18	25.0	65.0	E	1.1
18 April 2018	10:03 – 10:18	21.8	81.0	E	2.4
25 April 2018	10:00 – 10:16	23.5	77.0	SE	2.6

2.8.3 The monitoring results in the reporting period are summarised in **Table 2.6**. Graphical plots of results and details of monitoring data are shown in **Appendix E**.

Table 2.6 Summary of Air Quality Monitoring Result in Reporting Period

Monitoring Location	Monitoring Parameter				
	H_2S concentration* (ppb)		Odour Patrol^ (Odour Level)	Olfactometry Analysis of odour (OU/m^3)	
	Range	Average	Range	Range	Average
ASR	1 - 20	6.0	1 - 1	15 - 19	17.5

Remark:
*The value of H_2S Concentration was taken in average of 15 min for each measurement.
^Odour Level: 0 – Not detected, 1 – Slight, 2 – Moderate, 3 – Strong, 4 – Extreme

2.8.4 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). However in the reporting period, H_2S data collected in reporting period (total 4 measurements) could not be considered as representative data to reflect the odour impact from SHWSTW. In the measurement conducted on 25 April 2018, non-ideal wind direction (SE) was recorded during the measurement. In other words, the wind direction was not from SHWSTW towards ASR.

2.8.5 For the measurements on 4, 9 and 18 April 2018, only non-target smell (vegetation & gasoline) was recorded from onsite odour patrol which indicated that no effluent smell could be recorded during the measurement and the result of olfactometry analysis to nature of odour was non-specified. Hence, the result (17 & 19 OU) from olfactometry analysis could be considered interfered and dominated by non-target smell from the surrounding environment. Therefore the measured H_2S data from the reporting period could not reflect the odour impact from SHWSTW during operational phase and correlation between the H_2S concentration and the olfactometry analysis was unable to be drawn in the reporting period.

2.8.6 Due to non-ideal wind direction (e.g. SE) or domination of non-target smell (e.g. vegetation & gasoline) during the measurements conducted in past 9 months, inadequacy of representative data was result in the past 9 months. Current H_2S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). In order to assess whether SHWSTW is the major H2S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H_2S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

2.8.7 No exceedances of Action/Limit levels at ASR were recorded as no complaint was received during the reporting period. Althought results of olfactometry analysis from the odour sampling during the reporting period exceeded the compliance of 5 odour units (based on averaging time of 5 seconds at the nearest ASR), no relationship can be drawn from the H_2S concentration and the exceeded results of the odour unit from the olfactometry analysis so far in the reporting period. Besides, based on the onsite odour patrol monitoring and the records of wind direction, the exceedances from the olfactometry analysis were not project-related. Therefore, no non-compliance of odour monitoring at ASR were recorded in the reporting period.

2.8.8 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, temporary suspension of air quality monitoring was proposed and submitted for EPD's approval.

2.8.9 In addition to the specific sources of odour (e.g. vegetation and gasoline) recorded in the reporting period that would contribute to the odour nuisance at ASR, some other odour sources in neighbouring environment such as nearby Refuse Transfer Station might also affect the results of H_2S concentration monitoring and odour monitoring.

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

3. WATER QUALITY MONITORING

3.1 Monitoring Location

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

Table 3.1 Location of Water Quality Monitoring

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

3.2 Monitoring Parameter

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

Table 3.2 Parameters for Water Quality Monitoring

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

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

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

3.3 Monitoring Equipment

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

Table 3.3 Water Quality Monitoring and Sampling Equipment

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

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

3.3.3 Water samples were collected by water sampler and stored in high density polythene bottles and sterilized glass bottles (for bacterial analysis), packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory on the same day of collection for analysis. All sampling bottles were pre-rinsed with the same water samples. The sampling bottles were then taken to a HOKLAS accredited laboratory for analysis of *E. coli*, BOD_5, Suspended Solids, NH_3-N, NO_3-N, NO_2-N, Total inorganic nitrogen, Total phosphorus (soluble and particulate).

3.4 Laboratory Measurement and Analysis

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

Table 3.4 Laboratory Measurement/Analysis Methods and Reporting Limits

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

3.5 Monitoring Frequency and Duration

3.5.1 The water quality monitoring programmed shall be carried out once per two months for a period of five years of the operational phase of the Project.

3.5.2 Water quality monitoring for two tides at 8 designated locations will be carried out for each monitoring event. For each location at each tide, duplicate samples for in-situ parameter and laboratory analysis at 3 designated water depths (1 m below water surface, mid-depth and 1 m above the seabed) will be taken and analyzed.

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

3.6 Quality Assurance / Quality Control

3.6.1 The equipment is in compliance with the requirements set out in the EM&A plan. All in-situ monitoring instruments were calibrated by a HOKLAS-accredited laboratory or by standard solutions. Calibration of temperature, DO, salinity, pH and turbidity is conducted in three month interval, Copies of calibration certificates for the water quality monitoring equipment are attached in **Appendix F**.

3.6.2 During the measurements of DO concentration, DO saturation, salinity, turbidity, pH and temperature, duplicate readings were taken. If the difference between the first and second readings of DO or turbidity was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.

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

For each batch of 20 samples:

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

3.7 Event and Action Plan

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

3.8 Monitoring Results and Observations

3.8.1 Water quality monitoring is carried out on 12 April 2018. A summary of the in-situ water quality monitoring results are presented in **Table 3.5** (Mid-ebb) and **Table 3.6** (Mid-flood) respectively. The complete record and graphical presentation of the in-situ water quality monitoring results is given in **Appendix G.**

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	17	S	1	6.94	22.97	8.07	30.42	1.9	0.20	100.5
		S	1	7.03	23.07	8.10	30.44	2.1	0.24	104.9
		M	8.5	6.51	22.54	8.09	32.86	2.3	0.12	107.2
		M	8.5	6.48	22.58	8.09	32.71	2.4	0.12	113.9
		B	16	6.45	22.50	8.10	33.27	2.4	0.16	209.5
		B	16	6.46	22.50	8.10	33.31	2.3	0.18	224.6
B	14	S	1	7.12	23.16	8.13	31.46	1.9	0.08	140.8
		S	1	7.07	23.25	8.12	31.23	1.8	0.10	136.6
		M	7	6.70	22.58	8.11	33.15	2.1	0.19	195.6
		M	7	6.70	22.58	8.12	33.17	2.1	0.17	201.6
		B	13	6.49	22.48	8.12	33.50	3.3	0.07	205.9
		B	13	6.48	22.48	8.11	33.52	3.5	0.07	205.4
C	12	S	1	7.92	23.62	8.20	30.70	2.1	0.13	245.4
		S	1	8.05	23.67	8.21	29.99	1.8	0.14	239.4
		M	6	6.78	22.73	8.12	32.12	2.0	0.36	222.9
		M	6	6.77	22.72	8.12	32.12	2.0	0.34	204.9
		B	11	6.54	22.56	8.10	32.74	1.9	0.37	244.7
		B	11	6.52	22.56	8.10	32.75	1.9	0.36	237.1
D	13	S	1	8.02	23.66	8.21	29.72	1.5	0.22	131.8
		S	1	7.96	23.62	8.21	29.86	1.8	0.19	136.6
		M	6.5	6.81	22.68	8.11	32.26	2.1	0.23	164.6
		M	6.5	6.71	22.70	8.11	32.18	1.9	0.22	158.2
		B	12	6.53	22.56	8.10	32.70	2.0	0.12	205.9
		B	12	6.46	22.53	8.10	32.90	2.0	0.12	205.4
E	17	S	1	7.68	23.37	8.18	30.21	1.9	0.16	181.2
		S	1	7.70	23.37	8.19	30.23	1.9	0.15	163.1
		M	8.5	6.41	22.51	8.13	33.17	2.8	0.35	229.1
		M	8.5	6.40	22.50	8.13	33.21	2.8	0.25	228.5
		B	16	6.39	22.46	8.11	33.28	2.9	0.40	256.4
		B	16	6.39	22.46	8.11	33.28	2.9	0.35	257.7
F	23	S	1	7.68	23.37	8.18	30.21	1.9	0.30	119.4
		S	1	7.70	23.37	8.19	30.23	1.9	0.31	117.5
		M	11.5	6.41	22.51	8.13	33.17	2.8	0.45	133.1
		M	11.5	6.40	22.50	8.13	33.21	2.8	0.47	141.5
		B	22	6.39	22.46	8.11	33.28	2.9	0.26	133.1
		B	22	6.39	22.46	8.11	33.28	2.9	0.31	128.9
G	18	S	1	7.10	23.07	8.15	31.98	2.1	0.20	179.5
		S	1	7.10	23.06	8.15	31.95	2.1	0.21	181.5
		M	9	6.82	22.98	8.15	32.50	1.8	0.36	227.4

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
		M	9	6.82	22.99	8.15	32.54	1.8	0.37	231.6
		B	17	6.45	22.55	8.13	33.31	2.4	0.35	217.8
		B	17	6.46	22.55	8.12	33.31	2.0	0.33	215.6
H	18	S	1	7.42	23.20	8.17	31.15	2.1	0.22	116.4
		S	1	7.40	23.40	8.17	31.15	2.1	0.22	114.3
		M	9	6.96	22.90	8.16	32.34	2.0	0.31	158.4
		M	9	6.96	22.90	8.16	32.34	2.0	0.33	154.2
		B	17	6.83	22.96	8.15	32.35	1.8	0.40	135.6
		B	17	6.85	22.96	8.15	32.56	1.8	0.42	139.2

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	14	S	1	8.05	23.55	8.20	29.31	3.2	0.05	252.6
		S	1	8.03	23.55	8.20	29.23	3.2	0.09	256.1
		M	7	6.93	22.91	8.13	31.46	4.0	0.29	268.4
		M	7	6.92	22.91	8.13	31.48	4.1	0.29	273.1
		B	13	6.50	22.53	8.11	33.35	8.1	0.27	246.9
		B	13	6.49	22.53	8.11	33.36	8.5	0.27	264.5
B	14	S	1	7.96	23.52	8.21	29.46	2.8	0.26	221.5
		S	1	8.05	23.44	8.21	29.56	2.8	0.22	177.5
		M	7	7.07	23.05	8.17	30.96	1.9	0.08	170.9
		M	7	7.03	23.05	8.17	30.99	1.9	0.04	136.1
		B	13	6.69	22.79	8.13	32.06	3.3	0.11	211.3
		B	13	6.68	22.79	8.13	32.16	3.4	0.10	253.8
C	12	S	1	7.77	23.39	8.25	29.40	3.4	0.08	192.6
		S	1	7.79	23.37	8.24	29.48	3.4	0.09	204.0
		M	6	6.76	22.76	8.15	32.46	6.0	0.19	243.8
		M	6	6.73	22.74	8.15	32.52	5.9	0.14	239.4
		B	11	6.63	22.68	8.12	32.75	7.0	0.23	240.4
		B	11	6.59	22.67	8.12	32.78	7.0	0.17	245.3
D	14	S	1	7.81	23.62	8.19	29.37	3.0	0.10	236.0
		S	1	7.81	23.61	8.22	29.40	3.4	0.11	232.0
		M	7	6.61	22.62	8.17	33.07	3.3	0.42	222.8
		M	7	6.59	22.61	8.14	33.14	3.3	0.38	223.8
		B	13	6.39	22.53	8.12	33.33	5.2	0.34	216.1
		B	13	6.39	22.53	8.12	33.35	5.2	0.35	221.1
E	14	S	1	7.96	23.49	8.20	30.64	3.3	0.18	175.4
		S	1	7.97	23.49	8.21	30.62	3.3	0.17	169.6
		M	7	7.11	22.96	8.15	32.58	2.5	0.46	206.0
		M	7	7.13	22.96	8.14	32.53	2.5	0.44	204.2
		B	13	6.68	22.63	8.13	33.34	4.5	0.32	165.8
		B	13	6.74	22.63	8.13	33.36	4.5	0.29	163.2
F	18	S	1	8.09	23.61	8.26	29.94	2.4	0.22	172.7
		S	1	8.03	23.62	8.26	29.94	2.0	0.20	167.5
		M	9	6.60	22.70	8.14	33.35	3.1	0.50	200.5
		M	9	6.61	22.70	8.14	33.35	3.2	0.48	189.4

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
		B	17	6.46	22.63	8.14	33.54	4.1	0.45	183.9
		B	17	6.46	22.63	8.14	33.55	4.0	0.37	183.6
G	13	S	1	7.30	23.32	8.17	31.40	2.7	0.15	266.6
		S	1	7.29	23.22	8.18	31.43	2.7	0.16	269.2
		M	6.5	6.96	23.04	8.16	32.26	3.1	0.40	230.8
		M	6.5	6.98	23.04	8.16	32.29	3.2	0.39	235.7
		B	12	6.75	22.80	8.15	32.67	3.8	0.37	240.0
		B	12	6.73	22.80	8.15	32.78	3.9	0.34	242.3
H	19	S	1	7.40	23.28	8.19	31.49	1.6	0.39	137.1
		S	1	7.46	23.28	8.19	31.55	1.7	0.34	132.7
		M	9.5	7.00	23.03	8.17	32.10	2.9	0.38	163.7
		M	9.5	7.00	23.02	8.17	32.19	2.9	0.40	166.1
		B	18	6.53	22.63	8.14	33.61	3.3	0.22	144.3
		B	18	6.52	22.63	8.14	33.64	3.3	0.24	146.9

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

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_3^- as N (mg/L)	NO_2^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
A	17	S	1	2.9	0.075	0.036	0.514	0.625	1.0	0.04	<1.0
		S	1	3.5	0.075	0.034	0.519	0.628	2.0	0.03	<1.0
		M	8.5	4.0	0.094	0.018	0.285	0.398	21.0	0.03	<1.0
		M	8.5	4.8	0.097	0.016	0.290	0.403	19.0	0.03	<1.0
		B	16	4.7	0.102	0.017	0.302	0.422	26.0	0.03	<1.0
		B	16	4.5	0.084	0.016	0.257	0.357	29.0	0.03	<1.0
B	14	S	1	3.9	0.092	0.025	0.432	0.548	7.0	0.04	<1.0
		S	1	3.6	0.101	0.027	0.425	0.553	5.0	0.03	<1.0
		M	7	3.5	0.128	0.017	0.257	0.402	76.0	0.04	<1.0
		M	7	4.2	0.110	0.012	0.279	0.401	69.0	0.03	<1.0
		B	13	4.0	0.108	0.024	0.360	0.492	5.0	0.04	<1.0
		B	13	4.2	0.086	0.025	0.427	0.538	6.0	0.03	1.1
C	12	S	1	3.6	0.040	0.041	0.583	0.664	1.0	0.03	1.1
		S	1	4.1	0.046	0.040	0.584	0.670	<1	0.03	1.3
		M	6	4.8	0.066	0.035	0.535	0.636	1.0	0.03	1.3
		M	6	3.5	0.067	0.038	0.539	0.644	2.0	0.03	1.0
		B	11	3.0	0.081	0.030	0.433	0.544	2.0	0.03	1.1
		B	11	4.2	0.078	0.027	0.439	0.544	3.0	0.03	1.0
D	13	S	1	3.5	0.052	0.037	0.576	0.664	<1	0.05	1.5
		S	1	4.9	0.050	0.042	0.556	0.648	1.0	0.03	1.4
		M	6.5	3.1	0.049	0.040	0.577	0.666	3.0	0.03	1.3
		M	6.5	4.9	0.040	0.044	0.590	0.674	4.0	0.04	1.1
		B	12	5.8	0.045	0.033	0.522	0.600	1.0	0.03	1.0
		B	12	6.6	0.039	0.047	0.650	0.736	2.0	0.03	1.5
E	17	S	1	4.6	0.052	0.038	0.543	0.633	6.0	0.03	1.2

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_3^- as N (mg/L)	NO_2^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
		S	1	5.6	0.051	0.034	0.554	0.639	8.0	0.03	1.0
		M	8.5	4.0	0.087	0.035	0.535	0.657	11.0	0.03	1.1
		M	8.5	4.6	0.108	0.030	0.436	0.574	9.0	0.04	<1.0
		B	16	4.0	0.042	0.041	0.579	0.662	3.0	0.03	1.2
		B	16	4.0	0.038	0.040	0.588	0.666	3.0	0.03	1.1
F	23	S	1	3.4	0.084	0.040	0.569	0.693	1.0	0.03	1.5
		S	1	4.0	0.071	0.039	0.564	0.674	1.0	0.03	1.5
		M	11.5	3.4	0.052	0.041	0.562	0.655	4.0	0.03	1.2
		M	11.5	3.5	0.055	0.035	0.555	0.645	3.0	0.03	<1.0
		B	22	4.7	0.058	0.036	0.549	0.643	4.0	0.05	1.1
		B	22	5.0	0.055	0.040	0.532	0.627	6.0	0.05	1.3
G	18	S	1	3.1	0.075	0.019	0.361	0.455	25.0	0.04	1.0
		S	1	4.4	0.078	0.022	0.361	0.461	20.0	0.04	1.0
		M	9	3.6	0.118	0.026	0.366	0.510	36.0	0.04	1.1
		M	9	5.4	0.100	0.022	0.353	0.475	31.0	0.04	<1.0
		B	17	3.7	0.078	0.028	0.454	0.560	17.0	0.04	1.1
		B	17	5.2	0.079	0.026	0.462	0.567	20.0	0.04	1.1
H	18	S	1	4.7	0.054	0.027	0.481	0.562	4.0	0.03	1.2
		S	1	4.8	0.068	0.039	0.449	0.556	5.0	0.03	1.4
		M	9	5.1	0.061	0.031	0.462	0.574	8.0	0.03	1.3
		M	9	3.4	0.080	0.026	0.474	0.580	6.0	0.04	<1.0
		B	17	4.6	0.051	0.038	0.477	0.566	2.0	0.04	<1.0
		B	17	4.4	0.059	0.033	0.488	0.580	2.0	0.04	<1.0

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_3^- as N (mg/L)	NO_2^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
A	14	S	1	8.6	0.060	0.053	0.774	0.887	12.0	0.05	<1.0
		S	1	9.1	0.056	0.053	0.792	0.901	11.0	0.04	<1.0
		M	7	9.1	0.057	0.055	0.784	0.896	1.0	0.04	<1.0
		M	7	8.5	0.054	0.040	0.621	0.715	2.0	0.03	<1.0
		B	13	9.2	0.084	0.047	0.773	0.904	10.0	0.04	1.7
		B	13	10.1	0.081	0.055	0.748	0.884	8.0	0.04	1.4
B	14	S	1	6.7	0.108	0.051	0.717	0.876	31.0	0.04	<1.0
		S	1	6.2	0.108	0.044	0.710	0.862	29.0	0.04	<1.0
		M	7	6.8	0.060	0.048	0.692	0.800	49.0	0.04	<1.0
		M	7	7.6	0.053	0.063	0.769	0.885	45.0	0.04	1.3
		B	13	6.8	0.068	0.045	0.656	0.769	25.0	0.06	1.4
		B	13	6.2	0.049	0.044	0.735	0.828	28.0	0.05	1.8
C	12	S	1	8.7	0.005	0.050	0.659	0.714	22.0	0.03	1.6
		S	1	9.5	<0.005	0.048	0.670	0.718	26.0	0.03	1.5
		M	6	9.4	0.037	0.038	0.640	0.715	24.0	0.03	1.5
		M	6	8.4	0.051	0.042	0.607	0.700	20.0	0.03	1.2
		B	11	8.8	0.012	0.047	0.665	0.724	18.0	0.03	2.0
		B	11	8.8	0.010	0.044	0.664	0.718	21.0	0.03	1.8
D	14	S	1	6.6	0.074	0.039	0.597	0.710	17.0	0.03	1.3
		S	1	7.3	0.074	0.048	0.648	0.770	16.0	0.03	1.5
		M	7	6.9	0.034	0.051	0.596	0.680	23.0	0.03	1.2
		M	7	7.2	0.025	0.043	0.642	0.710	19.0	0.04	1.6

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_3^- as N (mg/L)	NO_2^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
		B	13	7.1	0.029	0.037	0.672	0.738	15.0	0.03	1.5
		B	13	7.8	0.019	0.047	0.645	0.711	18.0	0.03	1.7
E	14	S	1	4.4	0.057	0.033	0.456	0.546	110.0	0.03	1.4
		S	1	5.6	0.051	0.033	0.491	0.575	120.0	0.04	1.4
		M	7	5.2	0.053	0.035	0.475	0.563	89.0	0.04	1.4
		M	7	6.4	0.043	0.035	0.510	0.588	94.0	0.04	1.6
		B	13	9	0.088	0.021	0.443	0.552	86.0	0.05	1.2
		B	13	10.8	0.088	0.045	0.651	0.784	78.0	0.03	1.6
F	18	S	1	4.8	0.055	0.032	0.477	0.564	84.0	0.03	1.4
		S	1	5.9	0.060	0.032	0.478	0.571	80.0	0.03	1.4
		M	9	5.8	0.075	0.035	0.503	0.613	120.0	0.04	1.9
		M	9	4.9	0.073	0.032	0.474	0.579	150.0	0.04	1.2
		B	17	6.6	0.045	0.037	0.509	0.591	110.0	0.04	1.4
		B	17	7.3	0.042	0.044	0.598	0.685	130.0	0.03	1.3
G	13	S	1	5	0.060	0.027	0.443	0.530	35.0	0.03	1.1
		S	1	6.1	0.061	0.035	0.461	0.557	40.0	0.04	1.1
		M	6.5	5.6	0.066	0.030	0.456	0.552	67.0	0.04	1.2
		M	6.5	6.9	0.063	0.030	0.450	0.543	62.0	0.04	1.7
		B	12	5	0.060	0.033	0.440	0.533	53.0	0.05	1.4
		B	12	6.8	0.062	0.030	0.440	0.532	58.0	0.04	<1.0
H	19	S	1	4.8	0.059	0.025	0.467	0.551	59.0	0.04	<1.0
		S	1	4.5	0.056	0.027	0.469	0.552	63.0	0.04	1.0
		M	9.5	4.8	0.061	0.030	0.457	0.548	57.0	0.05	1.1
		M	9.5	4.8	0.057	0.026	0.451	0.534	60.0	0.04	1.1
		B	18	5	0.062	0.025	0.458	0.545	70.0	0.04	1.0
		B	18	4.2	0.059	0.036	0.447	0.542	64.0	0.04	1.1

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. Location of the tide gauge The tidal data is present in **Appendix H**.

3.8.4 No special phenomena were observed during water quality monitoring on 12 April 2018. The weather condition is summarized and presented in **Table 3.9**.

Table 3.9 Weather condition of water quality monitoring

Date	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
	Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
12 April 2018	28.1	25.6	23.9	82	0

Source: Hong Kong Observatory

4. SEDIMENT QUALITY MONITORING AND BENTHIC SURVEY

4.1 Monitoring Location

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

Table 4.1 Location of Sediment Quality Monitoring and Benthic Survey

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

4.2 Monitoring Parameter

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

Table 4.2 Parameters for Sediment Quality Monitoring and Benthic Survey

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

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

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

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

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

4.3 Sampling Equipment

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

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

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

4.4 Sampling Procedure

Benthic Survey, Particle Size Distribution and TOC Analysis

4.4.1 A modified Van Veen grab sampler (capacity of ~ 11.3 litres) shall be deployed at each of the benthic survey locations to collect single grab sample at each location. The grab sampler should be lowered through the water column slowly at a constant rate (approximately 30 cm/s) to prevent the formation of a pressure wave that may disturb surficial deposits. The grab will then be retrieved and evaluated on board of the survey vessel. Any sample showing uneven penetration or only partially filled with sediment shall be rejected. Samples will be placed in a plastic box with an identification card. Sub-samples (approximately 1 kg) should be splitted up for analysis of particle size distribution and TOC. The remaining sediment samples should be washed gently to separate the benthic organisms and the sediment using a watering hose with marine seawater supply, by a sieve stack (comprising 1 mm and 0.5 mm meshes). Benthic organisms remaining on the sieve should be removed into pre-labeled ziplock plastic bags. A 10% solution of buffered formalin containing Rose Bengal in seawater will be added

to the bag to ensure tissue preservation. Samples will be sealed in plastic containers for transport to the laboratory for sorting and identification of benthic organisms.

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

4.4.2 Ponar grab sampler (capacity of ~ 1 litres) shall be deployed at each of the benthic survey locations to collect single grab sample at each location. The grab sampler should be lowered through the water column slowly at a constant rate (approximately 30 cm/s) to prevent the formation of a pressure wave that may disturb surficial deposits. The grab will then be retrieved and evaluated on board of the survey vessel. Any sample showing uneven penetration or only partially filled with sediment shall be rejected. Samples will be placed in a plastic box with an identification card. Sediment samples will be then transferred into brand new soil jars with QA/QC monitoring for laboratory analysis. Samples shall be preserved and stored in accordance with approved SOP of HOKLAS accredited laboratory and the recommendations stipulated in ETWB TC (W) No. 34/2002.

4.4.3 Sediment samples shall be collected and packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory on the same day of collection for analysis.

4.5 Laboratory Measurement and Analysis

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

Table 4.3 Laboratory Measurement/Analysis Methods and Reporting Limits

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

4.6 Taxonomic Identification of Benthic Organism

4.6.1 Taxonomic identification of benthic organisms will be performed using stereo dissecting and high-power compound microscopes where it is necessary. Benthic organisms will be counted and identified to lower taxonomic levels as far as practicable with biomass (wet weight, to

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

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

4.7 Monitoring Frequency and Duration

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

4.8 Quality Assurance / Quality Control

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

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

For each batch of 20 samples:

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

4.9 Event and Action Plan

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

4.10 Monitoring Results and Observations

4.10.1 Sediment quality monitoring and benthic survey is carried out on 12 April 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 I.**

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	8.8	4	500	374	<0.1	25.0	23.2	25.7	0.07	15.7	75.3	18.6	0.20
B	8.7	8	1170	498	<0.1	40.0	39.1	36.2	0.12	25.5	115	12.9	0.40
C	8.5	10	1120	559	<0.1	42.8	37.5	39.2	0.12	27.0	119	13.1	0.30
D	8.8	3	550	272	<0.1	22.4	19.3	24.5	0.07	14.2	66.5	7.5	0.17
E	8.5	12	1330	584	<0.1	45.8	43.3	41.2	0.16	29.4	132	12.5	0.42
F	8.3	22	1190	571	<0.1	43.0	41.8	39.5	0.11	27.8	125	12.8	0.36
G	8.6	4	860	450	<0.1	32.9	41.8	33.5	0.11	20.6	104	9.7	0.30
H	8.3	13	1260	528	<0.1	38.3	43.9	34.2	0.12	24.7	119	10.9	0.46

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	0.80	7	47	28	18	Dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments
B	1.12	0	15	49	36	Dark grey, slightly sandy SILT/CLAY with shell fragments
C	1.00	0	4	58	38	Dark grey, slightly sandy SILT/CLAY with shell fragments
D	1.13	0	9	58	33	Dark grey, slightly sandy SILT/CLAY with shell fragments
E	1.27	0	6	57	37	Dark grey, slightly sandy SILT/CLAY with shell fragments
F	1.21	0	3	59	38	Dark grey, slightly sandy SILT/CLAY
G	1.26	7	15	50	28	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
H	1.00	6	20	47	27	Dark grey, slightly gravelly, 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 I**.

4.10.3 No special phenomena were observed during water quality monitoring on 12 April 2018. The weather condition is summarized and presented in **Table 4.6**.

Table 4.6 Weather condition of water quality monitoring

Date	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
	Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
12 April 2018	28.1	25.6	23.9	82	0

Source: Hong Kong Observatory

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

Table 4.7 Summary of benthic survey data on 12 April 2018

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	143	97.76	16	1.56	0.56
B	19	7.36	10	2.16	0.94
C	14	2.18	8	1.95	0.94
D	18	3.65	7	1.73	0.89
E	18	3.31	9	2.11	0.96
F	31	20.90	13	2.16	0.84
G	41	20.36	17	2.47	0.87
H	47	75.66	18	2.54	0.88
TOTAL	331	231.17	41		

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

i) Abundance
A total of 331 macrobenthic organisms were collected from the eight monitoring stations. The lowest abundance was 14 individuals (ind.) recorded in Station C and the highest was 143 ind. in Station A. Abundance distribution showed that the impact stations, Stations C and D, have relatively lower abundances compared to the reference stations. Noticeable also is that abundances generally increase as the distance from the impact stations increases.

ii) Biomass
The total wet biomass for all the eight monitoring stations was 231.17g. The highest total biomass was observed in Station A (97.76g), while Station C (2.18g) exhibited the lowest biomass. The relatively higher biomass observed in Station A were due to the increased number of the bivalve species, Ruditapes variegatus. Similar to abundance distribution, biomass at the impact stations were generally lower compared to those of the reference stations.

iii) Taxonomic Composition
Specimens were identified to family, genus and species level or to the lowest practicable taxon as possible. A total of eight phyla comprising of 35 families and 41 genera were identified. The benthic fauna composition is dominated by Mollusca (50.45%), Annelida (31.12%), and Arthropoda (13.60%). The most dominant species (abundance >10) was the bivalve, *R. variegatus*, with the abundance of 90 ind. and 12 ind. in Stations A and H, respectively. *Talonostrea talonata*, another species of bivalve also showed dominance in Station A with 12 ind. recorded.

iv) Diversity
Benthic diversity index (H') ranged from 1.72 – 1.95 in impact stations and 1.56 – 2.54 among the reference stations, which suggest that benthic faunal diversity is relatively higher at reference stations than those at impact stations. However, overall diversity in the eight monitoring stations was within the range of typical values. The diversity indices (0.62 – 1.1) during the baseline study (August 2004) was lower than that of the present study for all stations.

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

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

5. CHINESE WHITE DOLPHIN MONITORING

5.1 Data Interpretation

5.1.1 In accordance with Section 4.1 of the EM&A Plan, relevant information on the distribution and abundance of CWDs in Hong Kong should be obtained from the Agriculture, Fisheries and Conservation Department (AFCD), and be reviewed on a bimonthly basis during the operational phase of the Project for a period of 5 years.

5.1.2 The latest AFCD's report, "*Monitoring of Marine Mammals in Hong Kong Waters (2016-17)*", in terms of the distribution and abundance of CWDs, was reviewed in the Monthly EM&A report in August 2017. According to the advice from AFCD, the data of distribution and abundance of CWDs would only be available in the annual reports for Monitoring of Marine Mammals In Hong Kong Waters which cover monitoring data from 1 April to 31 March (next year). The next annual report (2017-18) shall be published around June 2018. The updated status of the distribution and abundance of CWDs will be provided once the annual report (2017-18) is uploaded to AFCD's webpage.

6. ADVICE ON IMPLEMENTATION STATUS OF ENVIRONMENTAL MITGATION MEASURES

6.1 Implemtation Status

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

7. ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS

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

- The influent of waste water shall be treated by CEPT with UV disinfection;
- Trip-ticket system shall be implemented for sludge and sediment;
- The acceptance criteria for Landfill disposal should be followed;
- Chemical waste should be properly handled and stored temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

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

8. SUMMARY OF EXCEEDANCE OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

8.1.1 Air quality monitoring i.e. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis was carried out on 4, 9, 18 and 25 April 2018. No exceedances of Action/Limit levels at ASR were recorded.

8.1.2 Although results of olfactometry analysis from the odour sampling during the reporting period exceeded the compliance of 5 odour units (based on averaging time of 5 seconds at the nearest ASR), no relationship can be drawn from the H_2S concentration and the exceeded results of the odour unit from the olfactometry analysis so far in the reporting period. Besides, based on the onsite odour patrol monitoring and the records of wind direction, the exceedances from the olfactometry analysis were not project-related. Therefore, no non-compliance of odour monitoring at ASR were recorded in the reporting period.

9. SUMMARY OF ENVIRONMENTAL COMPLAINTS

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

Table 9.1 Cumulative Statistics on Complaints

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

Table 9.2 Cumulative Statistics on Notification of Summons and Successful Prosecutions

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

10. FUTURE KEY ISSUES

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

i. Potential environmental impacts arising from the operation of SHWSTW are mainly associated with air quality, water quality, sediment quality, benthic ecology, waste management and distribution and abundance of CWDs.

ii. As inadequacy of representative data was result in the past 9 months, current H_2S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m3). In order to assess whether SHWSTW is the major H2S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H2S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

iii. Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, temporary suspension of air quality monitoring was proposed and submitted for EPD's approval.

11. CONCLUSION

11.1.1 Air quality monitoring i.e. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis was carried out in the reporting month. No exceedances of Action/Limit levels at ASR were recorded as no complaint was received during the reporting period. Although results of olfactometry analysis from the odour sampling during the reporting period exceeded the criterion of 5 odour units (based on averaging time of 5 seconds at the nearest ASR), onsite odour patrol monitoring indicated that the measurements were affected by other dominant odour or non-ideal wind directions and no relationship can be drawn from the H_2S concentration and the exceeded results of the odour unit from the olfactometry analysis so far in the reporting period. Besides, based on the onsite odour patrol monitoring and the records of wind direction, the exceedances from the olfactometry analysis were not project-related. Therefore, no non-compliance of odour monitoring at ASR were recorded in the reporting period.

11.1.2 During this reporting period, H_2S data collected (total 4 measurements) could not be considered as representative data to reflect the odour impact from SHWSTW. In the measurement conducted on 25 April 2018, non-ideal wind direction (SE) was recorded during the measurement. In other words, the wind direction was not from SHWSTW towards ASR.

11.1.3 For the measurements on 4, 9 and 18 April 2018, only non-target smell (vegetation & gasoline) was recorded from onsite odour patrol which indicated that no effluent smell could be recorded during the measurement and the result of olfactometry analysis to nature of odour was non-specified. Hence, the result (17 & 19 OU) from olfactometry analysis could be considered interfered and dominated by non-target smell from the surrounding environment. Therefore the measured H_2S data from the reporting period could not reflect the odour impact from SHWSTW during operational phase and correlation between the H_2S concentration and the olfactometry analysis was unable to be drawn in the reporting period. As inadequacy of representative data was result in the past 8 months, current H_2S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). In order to assess whether SHWSTW is the major H2S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H_2S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval. Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, temporary suspension of air quality monitoring was proposed and submitted for EPD's approval.

11.1.4 Water quality monitoring, sediment quality monitoring and benthic survey were conducted on 12 April 2018 to collect data for future reference in accordance with Section 5.5 and 6.5 of the Operational EM&A Plan. The details of methodology and results collected of the monitoring were presented in Section 3 and **Section 4**. No special phenomena were observed during the monitoring.

11.1.5 The latest AFCD's report, "*Monitoring of Marine Mammals in Hong Kong Waters (2016-17)*", in terms of the distribution and abundance of CWDs, was reviewed in the Monthly EM&A report in August 2017. According to the advice from AFCD, the data of distribution and abundance of CWDs would only be available in the annual reports for Monitoring of Marine Mammals In Hong Kong Waters which cover monitoring data from 1 April to 31 March (next

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

year). The next annual report (2017-18) shall be published around June 2018. The updated status of the distribution and abundance of CWDs will be provided once the annual report (2017-18) is uploaded to AFCD's webpage. The updated status of the distribution and abundance of CWDs will be provided once the annual report (2017-18) is uploaded to AFCD's webpage.

11.1.6 SHWSTW is reminded to fully *comply with EP conditions. All environmental mitigation m*easures and recommendations in the EP, EIA Report and approved waste management plan shall be fully and properly implemented.

11.1.7 No complaint (written or verbal), inspection notice, notification of summons or prosecution was received in relation to the environmental impact during the report period.

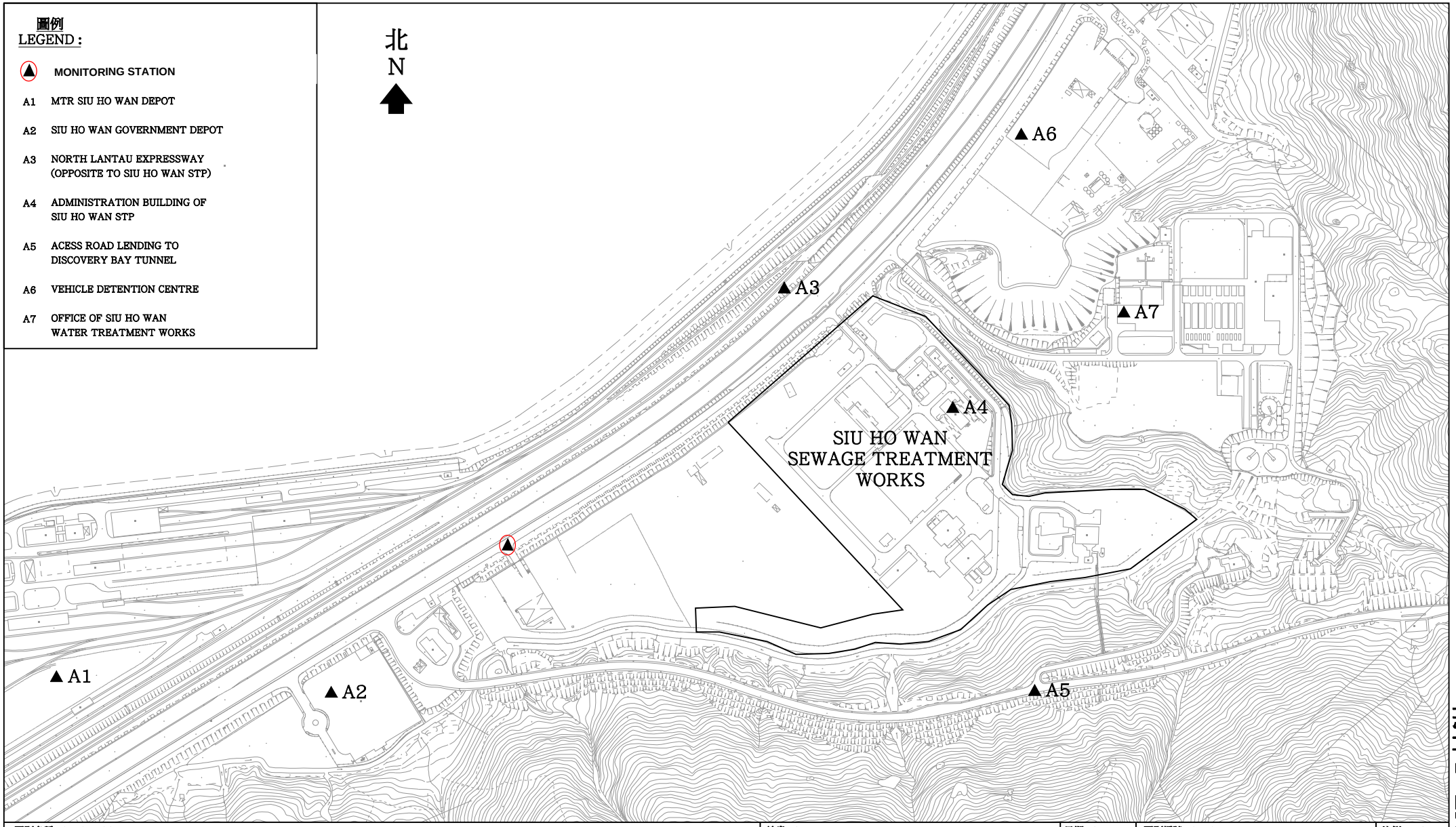
FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Figure 1

Monitoring Location of Air Sensitive Receiver



圖則名稱 drawing title

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

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

圖則編號 drawing no. DCM/2006/063

比例 scale N.T.S.

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

附件1 ENCLOSURE 1

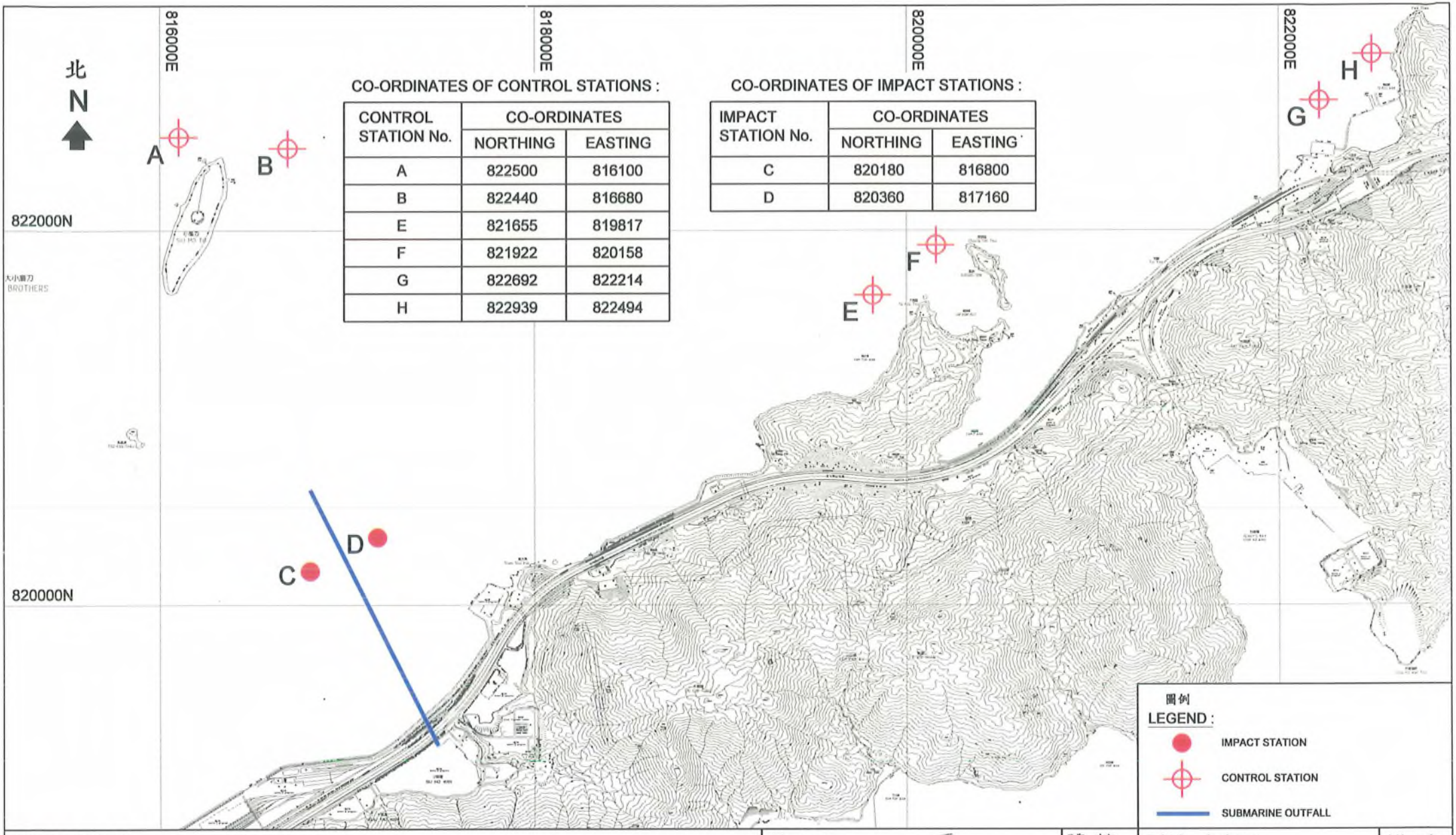
FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Figure 2

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



CO-ORDINATES OF CONTROL STATIONS :

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

CO-ORDINATES OF IMPACT STATIONS :

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

圖例
LEGEND :

- IMPACT STATION
- CONTROL STATION
- SUBMARINE OUTFALL

圖則名稱 drawing title

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

繪畫 drawn	H.K. LAI	日期 date	06-02-2004
核對 checked	C.K. LAM	日期 date	04-03-2004
批核 approved	S.K. WONG	日期 date	04-03-2004
部門 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION		

圖則編號 drawing no. DCM/2004/002

比例 scale N.T.S.

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

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Figure 3

Location of the Tide Gauge

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Figure 2 - Location of the Tide Gauge

Source: Google Maps

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Figure 4

Location of Survey Areas of Chinese White Dolphins

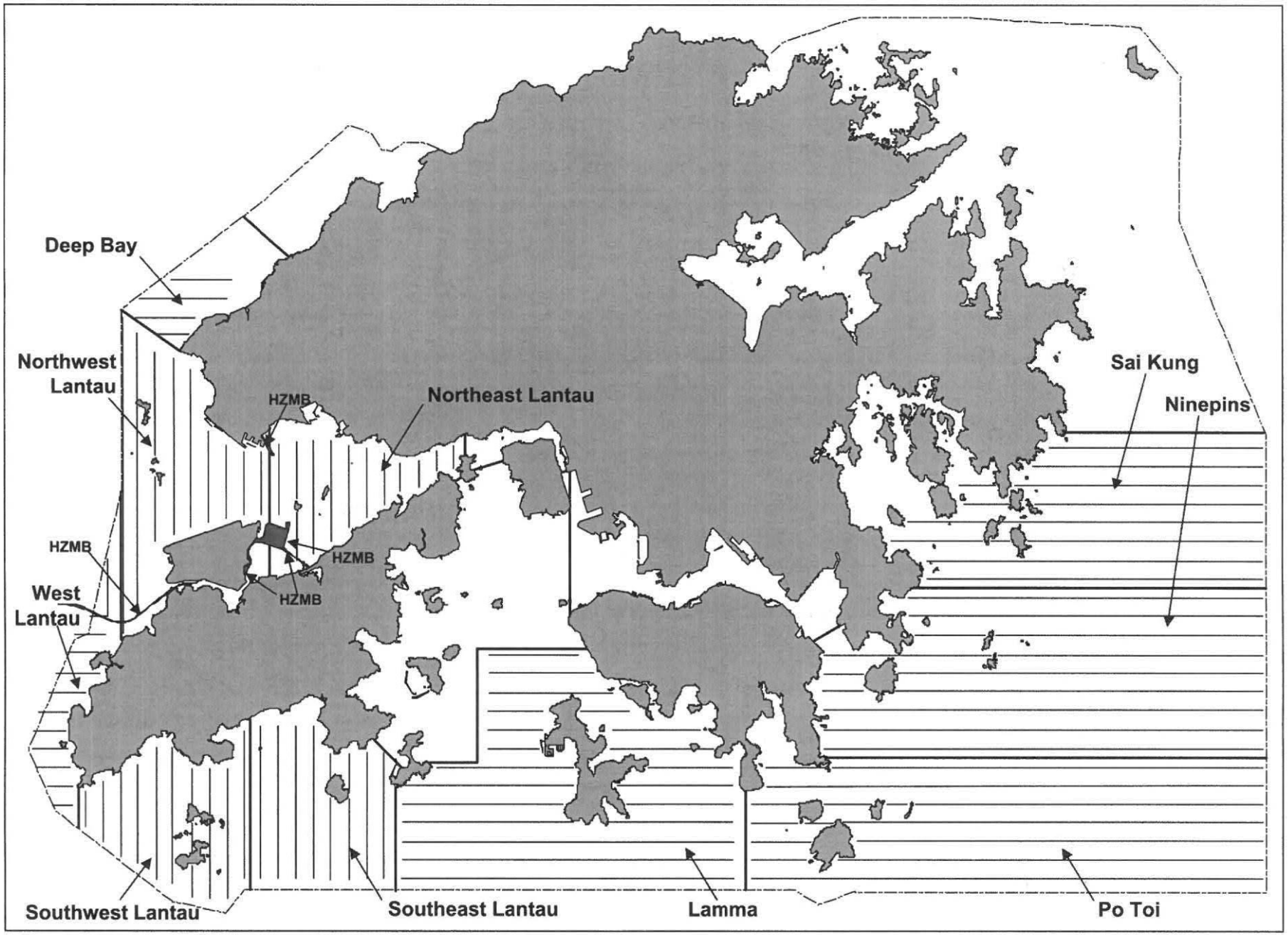


Figure 2 Ten Line-Transect Survey Areas within the Study Area chosen for the Present Monitoring Study (2016-17)

Source: Monitoring of Marine Mammals in Hong Kong Waters (2016-17), AFCD

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

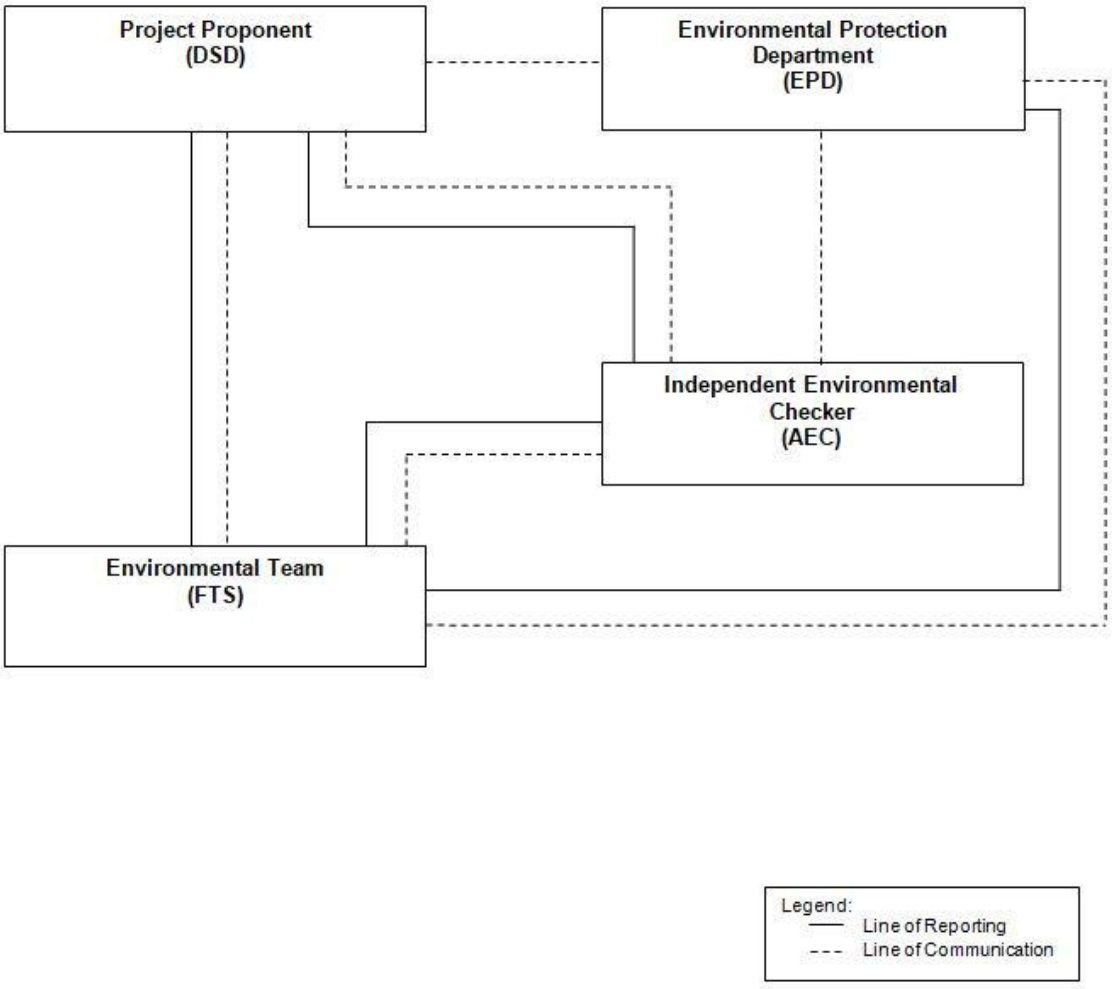
Appendix A

Project Organization Chart

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com



FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix B

Monitoring Schedule for Present and Next Reporting Period

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Monitoring Schedule for Present Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
1 April	2	3	4 H_2S concentration monitoring and odour patrol monitoring and odour sampling	5	6	7
8	9 H_2S concentration monitoring and odour patrol monitoring and odour sampling	10	11	12 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Ebb (10:51) Mid-Flood (15:56)	13	14
15	16	17	18 H_2S concentration monitoring and odour patrol monitoring and odour sampling	19	20	21
22	23	24	25 H_2S concentration monitoring and odour patrol monitoring and odour sampling	26	27	28
29	30					

Remarks

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

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Monitoring Schedule for Next Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
		1 May	2 H_2S concentration monitoring and odour patrol monitoring and odour sampling	3	4	5
6	7	8	9 H_2S concentration monitoring and odour patrol monitoring and odour sampling	10	11	12
13	14	15	16 H_2S concentration monitoring and odour patrol monitoring and odour sampling	17	18	19
20	21	22	23 H_2S concentration monitoring and odour patrol monitoring and odour sampling	24	25	26
27	28	29	30 H_2S concentration monitoring and odour patrol monitoring and odour sampling	31		

Remarks

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

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix C

Event and Action Plan for Air Quality Monitoring

EVENT	ACTION		
	ET	IEC	*Operator
Action Level			
One complaint received for specific odour event	1. Check Operator's working methods; 2. Discuss with Operator on required remedial actions	1. Discuss with ET and Operator on the possible remedial actions; 2. Advise the Operator on the effectiveness of the proposed remedial measures; 3 Supervise implementation of remedial measures	1. Identify/ confirm source with ET; 2. Discuss with ET for remedial actions required; 3. Ensure remedial actions properly implemented 4. Rectify any unacceptable practice; 5. Amend operation methods if appropriate
Limit Level			
More than one complaint	1. Investigated the causes of complaint; 2. Check Operator's working methods; 3. Carry out analysis of Operator's working procedures to determine possible mitigation to be implemented; 4. Arrange meeting with ET and EPD to discuss the remedial actions to be taken; 5. Discuss with EPD and the Operator on the required remedial actions; 6. Submit proposals for remedial actions within 3 working days of notification; 7. Assess effectiveness of Operator's remedial actions and keep EPD informed of the results; 8. Amend proposal if appropriate; 9. Resubmit proposal if problem still not under control	1. Discuss amongst ET and the Operator on the potential remedial actions; 2. Review the proposed remedial actions whenever necessary to assure their effectiveness and advise the Operator accordingly; 3. Supervise implementation of remedial measures	1. Indentify/ confirm source with ET; 2. Confirm receipt of notification of failure in writing; 3. Inform ET, IEC and EPD; 4. Discuss with EPD and ET on the required remedial actions; 5. Ensure remedial actions properly implemented; 6. Take immediate action to avoid further exceedance; 7. Implement the agreed proposals

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

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix D

Copy of Calibration Certificates of H_2S Analyzer

ARIZONA INSTRUMENT LLC
3375 N. Delaware St., Chandler, AZ 85225
(800) 528-7411 • (602) 470-1414
www.azic.com • customerservice@azic.com

Certification of Instrument Calibration

Guyline (Asia) Ltd
Rm 1611, Eastern Harbour Centre
Quarry Bay,

RMA # 2459849

This is to certify that the Jerome **X631 0003** Gold Film Hydrogen Sulfide Analyzer, Serial Number **2966**, with Sensor Number **14-11-23-R2D**, was calibrated with standard units traceable to NIST.

Calibration Status as Received: **Out of Calibration**

		Actual		Calibration Gas		Allowable Range
Incoming:	Range 1	0.346	ppm H2S	0.500	ppm H2S	+/- 6%
	RSD %	10.17				<5%
Outgoing:	Range 1	0.476	ppm H2S	0.500	ppm H2S	+/- 6%
	RSD %	2.18				<5%

Calibration Status as Left: **In Calibration**

Estimated Uncertainty of Calibration System: 2.8%

Calibration Date: 02-Jun-2017 Recalibration Date: 01-Jun-2018

Temperature °F: % Relative Humidity:

Approved By: Cheryl Hradek Date Approved: 05-Jun-2017
Title: Cheryl Hradek - Quality Control

Equipment Used:

H2S Calibration Standard: CC-57152 **NIST#:** 1385481
Calibration Date: 17-Aug-2016 **Calibration Date Due:** 18-Aug-2019

Mass Flow Controller B: 124604 **NIST#:** 152971
Calibration Date: 28-Nov-2016 **Calibration Date Due:** 28-Nov-2017

Mass Flow Controller D: 124602 **NIST#:** 151792
Calibration Date: 08-Nov-2016 **Calibration Date Due:** 08-Nov-2017

Digital Multimeter: 66961028 **NIST#:** 7000660
Calibration Date: 28-Mar-2017 **Calibration Date Due:** 28-Mar-2018

Flowmeter: US10H44183 **NIST#:** 1813; 1817; 1796
Calibration Date: 08-Nov-2016 **Calibration Date Due:** 09-Nov-2017

Calibration Procedure Used: 730-0032

Arizona Instrument certifies that the above listed instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracy are traceable to the NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY within the limitations of the Institute's calibration services, or have been derived from accepted values of natural physical constants, or have been derived by the ratio type of self-calibration techniques.
Disclaimer: Any unauthorized adjustments, removal or breaking of QC seals, or other customer modifications on your Jerome Analyzer WILL VOID this factory calibration. Because any of the above acts could affect the calibration and readings of the instrument, their certification will no longer be valid and, further, Arizona Instrument LLC WILL NOT be responsible for any liabilities created as a result of using the instrument after such adjustments, seal removal, or modifications.
As long as a functional test is within range, according to the procedure outlined in the Operator's Manual, the instrument is performing correctly.

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix E

Results and Graphical Presentation of Air Quality Monitoring

Results and Graphical Presentation of Air Quality Monitoring

Date of Measurement:	04 April 2018
Monitoring Location:	ASR
Start Time:	10:30
End Time:	10:45
Temperature (°C)	26.0
Wind Speed (m/s)	1.4
Wind Direction	E
Relative Humidity (%)	68

Date (YYYY-MM-DD)	Time (hh:mm:ss)	H2S conc. (ppm)
2018-04-04	10:30:14	0.004
2018-04-04	10:31:14	0.001
2018-04-04	10:32:14	0.003
2018-04-04	10:33:14	0.013
2018-04-04	10:34:14	0.005
2018-04-04	10:35:14	0.003
2018-04-04	10:36:14	0.003
2018-04-04	10:37:14	0.001
2018-04-04	10:38:14	0.002
2018-04-04	10:39:14	0.001
2018-04-04	10:40:14	0.003
2018-04-04	10:41:14	0.007
2018-04-04	10:42:14	0.003
2018-04-04	10:43:14	0.003
2018-04-04	10:44:14	0.003
	Average H2S conc. (ppm)	0.004

Results and Graphical Presentation of Air Quality Monitoring

Date of Measurement:	09 April 2018
Monitoring Location:	ASR
Start Time:	10:03
End Time:	10:18
Temperature (°C)	25.0
Wind Speed (m/s)	1.1
Wind Direction	E
Relative Humidity (%)	65

Date (YYYY-MM-DD)	Time (hh:mm:ss)	H2S conc. (ppm)
2018-04-09	10:03:08	0.014
2018-04-09	10:04:08	0.012
2018-04-09	10:05:08	0.009
2018-04-09	10:06:08	0.003
2018-04-09	10:07:08	0.003
2018-04-09	10:08:08	0.004
2018-04-09	10:09:08	0.008
2018-04-09	10:10:08	0.007
2018-04-09	10:11:08	0.008
2018-04-09	10:12:08	0.004
2018-04-09	10:13:08	0.003
2018-04-09	10:14:08	0.007
2018-04-09	10:15:08	0.003
2018-04-09	10:16:08	0.004
2018-04-09	10:17:08	0.004
	Average H2S conc. (ppm)	0.006

Results and Graphical Presentation of Air Quality Monitoring

Date of Measurement:	18 April 2018
Monitoring Location:	ASR
Start Time:	10:03
End Time:	10:18
Temperature (°C)	21.8
Wind Speed (m/s)	2.4
Wind Direction	E
Relative Humidity (%)	81

Date (YYYY-MM-DD)	Time (hh:mm:ss)	H2S conc. (ppm)
2018-04-18	10:03:51	0.010
2018-04-18	10:04:51	0.005
2018-04-18	10:05:51	0.008
2018-04-18	10:06:51	0.007
2018-04-18	10:07:51	0.007
2018-04-18	10:08:51	0.006
2018-04-18	10:09:51	0.007
2018-04-18	10:10:51	0.006
2018-04-18	10:11:51	0.007
2018-04-18	10:12:51	0.004
2018-04-18	10:13:51	0.004
2018-04-18	10:14:51	0.003
2018-04-18	10:15:51	0.003
2018-04-18	10:16:51	0.003
2018-04-18	10:17:51	0.003
	Average H2S conc. (ppm)	0.006

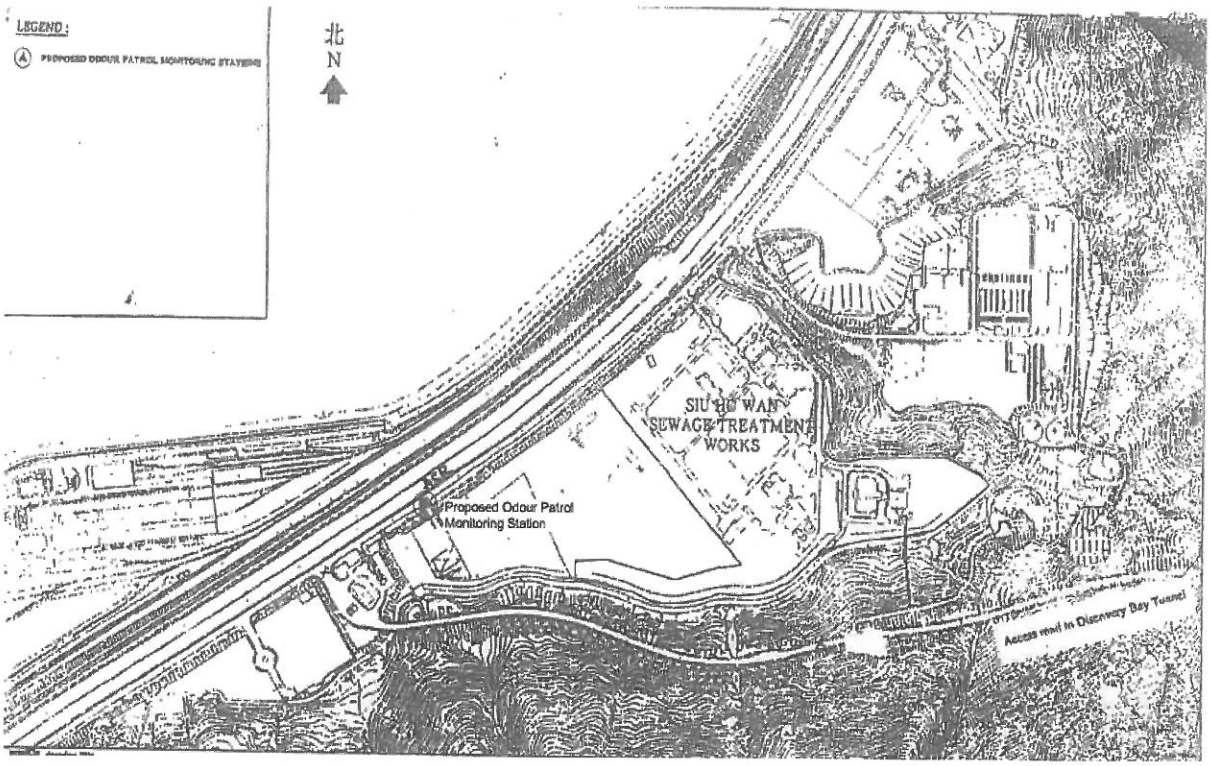
Results and Graphical Presentation of Air Quality Monitoring

Date of Measurement:	25 April 2018
Monitoring Location:	ASR
Start Time:	10:01
End Time:	10:16
Temperature (°C)	23.5
Wind Speed (m/s)	2.6
Wind Direction	SE
Relative Humidity (%)	77

Date (YYYY-MM-DD)	Time (hh:mm:ss)	H2S conc. (ppm)
2018-04-25	10:01:56	0.003
2018-04-25	10:02:56	0.003
2018-04-25	10:03:56	0.006
2018-04-25	10:04:56	0.010
2018-04-25	10:05:56	0.020
2018-04-25	10:06:56	0.018
2018-04-25	10:07:56	0.007
2018-04-25	10:08:56	0.007
2018-04-25	10:09:56	0.013
2018-04-25	10:10:56	0.014
2018-04-25	10:11:56	0.017
2018-04-25	10:12:56	0.015
2018-04-25	10:13:56	0.004
2018-04-25	10:14:56	0.006
2018-04-25	10:15:56	0.004
	Average H2S conc. (ppm)	0.010

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.
Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

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



Odour Patrol Monitoring Date: 4-4-2019 Weather: Fine

Location:	ASR – Cheung Tung Road near the Bus Depot at the west of treatment plant				
Temperature:	26°C	Start Time:	10:30	End Time:	10:45
Wind Speed:	1.4m/s		Wind Direction:	E	
Nature of Odour:	Gasoline				
*Odour Intensity: (tick as appropriate)	☐ Not detected	☑ Slight	☐ Noticeable	☐ Strong	☐ Extreme

***Classification Criteria:**

Not detected : No odour perceived or an odour so weak that it cannot be readily characterised or described.
Slight : Identifiable odour, barely noticeable
Noticeable : Identifiable odour, noticeable
Strong : Identifiable odour, strong
Extreme : Severe odour

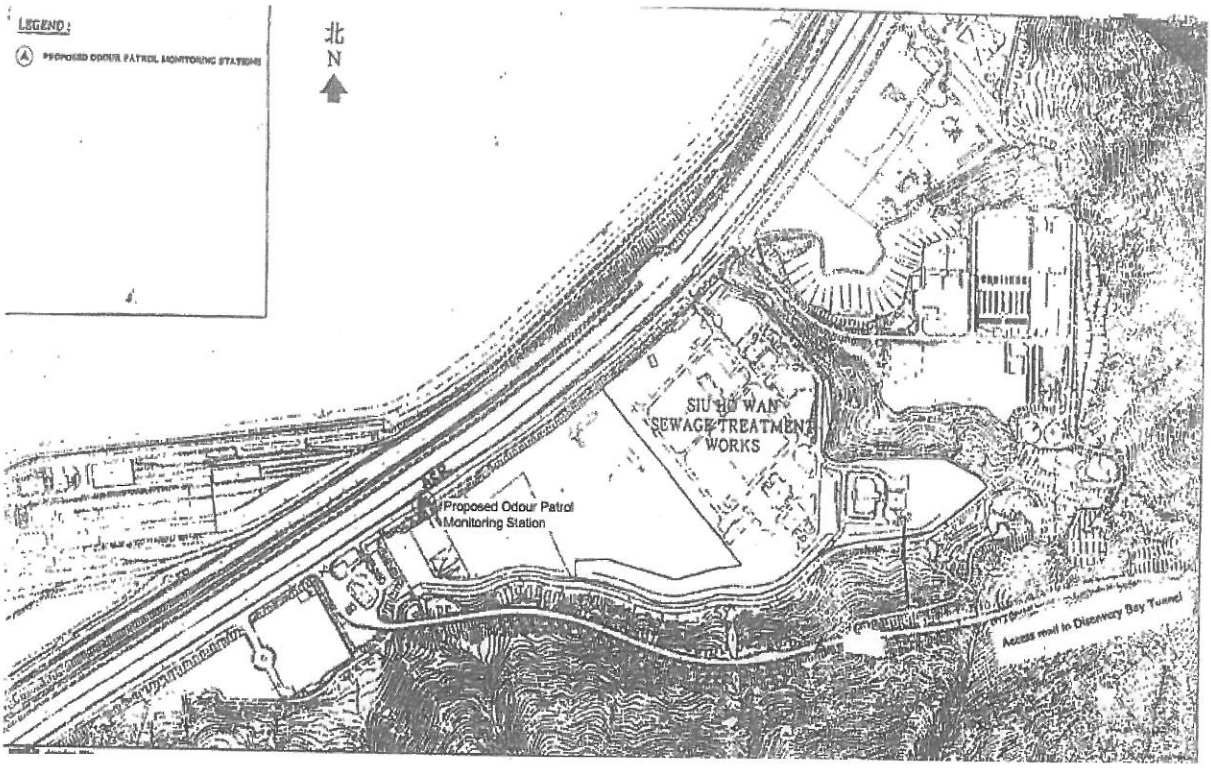
Recorded by: Nok
Name: Wong Kar Nok
Date: 4-4-2019

Checked by:
Name: Choi Kam Ho
Date: 4-4-2019

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

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



Odour Patrol Monitoring Date: 9/4/2019 Weather: Fine

Location:	ASR – Cheung Tung Road near the Bus Depot at the west of treatment plant				
Temperature:	25°C	Start Time:	10:03	End Time:	10:19
Wind Speed:	1.1 m/s		Wind Direction:	E	
Nature of Odour:	Vegetations				
*Odour Intensity: (tick as appropriate)	☐ Not detected	☑ Slight	☐ Noticeable	☐ Strong	☐ Extreme

***Classification Criteria:**

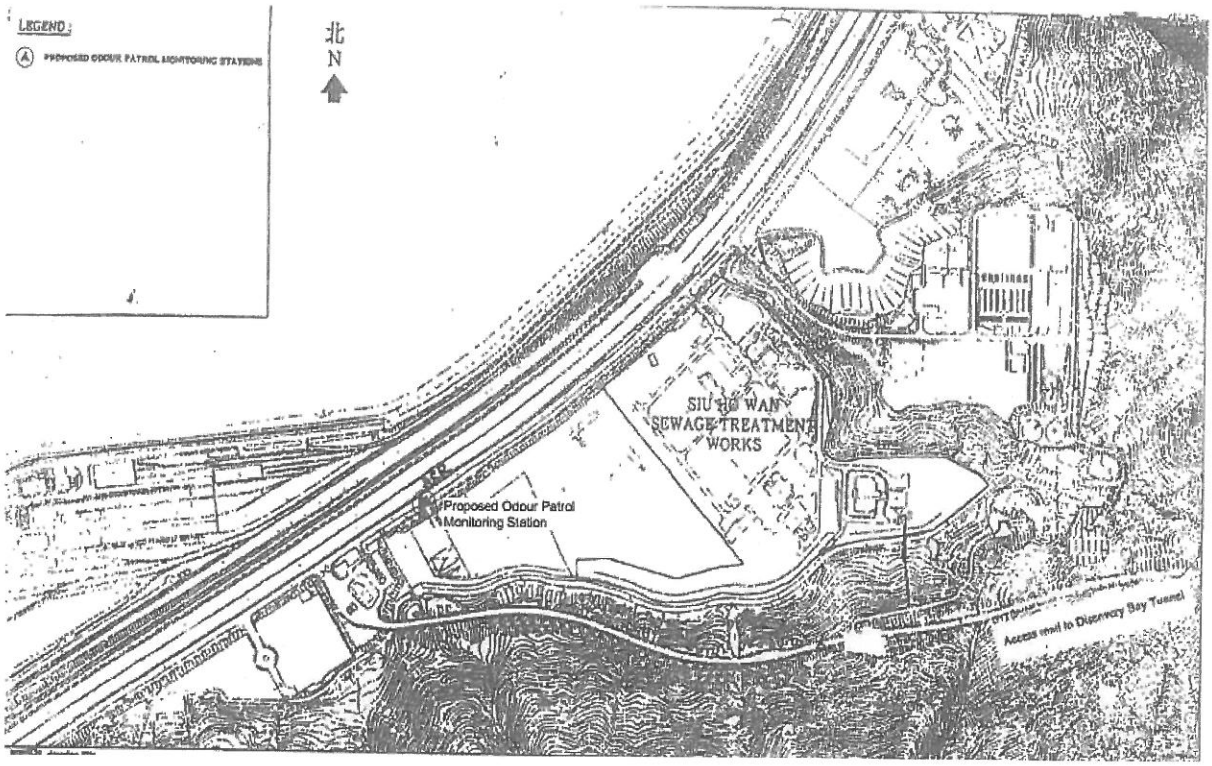
Not detected	: No odour perceived or an odour so weak that it cannot be readily characterised or described.
Slight	: Identifiable odour, barely noticeable
Noticeable	: Identifiable odour, noticeable
Strong	: Identifiable odour, strong
Extreme	: Severe odour

Recorded by: Toby
Name: WAN KA HO
Date: 9/4/2019

Checked by:
Name: Chor Kam Ho
Date: 9-4-2019

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.
Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

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



Odour Patrol Monitoring Date: 18/4/2019 Weather: Cloudy

Location:	ASR – Cheung Tung Road near the Bus Depot at the west of treatment plant				
Temperature:	21.6°C	Start Time:	10:03	End Time:	10:18
Wind Speed:	2.4m/s		Wind Direction:	E	
Nature of Odour:	vegetations				
*Odour Intensity: (tick as appropriate)	☐ Not detected	☑ Slight	☐ Noticeable	☐ Strong	☐ Extreme

***Classification Criteria:**

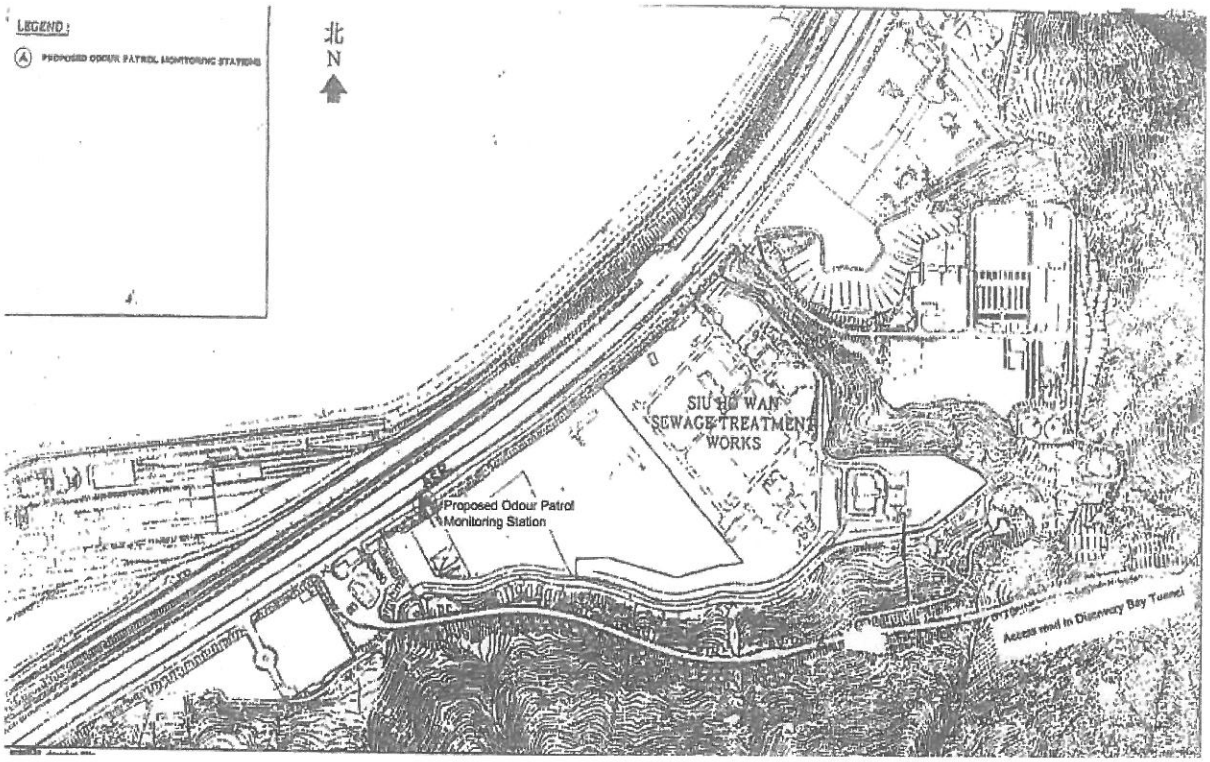
Not detected : No odour perceived or an odour so weak that it cannot be readily characterised or described.
Slight : Identifiable odour, barely noticeable
Noticeable : Identifiable odour, noticeable
Strong : Identifiable odour, strong
Extreme : Severe odour

Recorded by: Toby
Name: WAN KA HO
Date: 18/4/2019

Checked by:
Name: Chan Kam Ho
Date: 18-4-2019

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.
Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

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



Odour Patrol Monitoring Date: 25/4/2018 Weather: Cloudy

Location:	ASR – Cheung Tung Road near the Bus Depot at the west of treatment plant				
Temperature:	23.5°C	Start Time:		End Time:	
Wind Speed:	26m/s		Wind Direction:	SE	
Nature of Odour:	gasoline				
*Odour Intensity: (tick as appropriate)	☐ Not detected	☑ Slight	☐ Noticeable	☐ Strong	☐ Extreme

***Classification Criteria:**

Not detected : No odour perceived or an odour so weak that it cannot be readily characterised or described.
Slight : Identifiable odour, barely noticeable
Noticeable : Identifiable odour, noticeable
Strong : Identifiable odour, strong
Extreme : Severe odour

Recorded by: Toby
Name: WAN KA HO
Date: 25/4/2018

Checked by:
Name: Chan Kam Ho
Date: 25-4-2018

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

CERTIFICATE OF ANALYSIS

CLIENT:	Furgo Technical Services Limited	WORK ORDER:	HK1824767
CONTACT:	Cyrus Lai		
ADDRESS:	Room 723 & 725, 7/F, Block B, Profit Industrial Building 1-15 Kwai Fung Crescent, Kwai Chung Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	1
		DATE RECEIVED:	4 April 2018
		DATE OF ISSUE:	30 April 2018
PROJECT:	Odour Survey for Siu Ho Wan Sewage Treatment Plant	SAMPLE TYPE:	Air
SITE:	Siu Ho Wan	NO. OF SAMPLES:	1
PO:	---		

COMMENTS

Air sample(s) were collected by ALS Technichem (HK) staff on 4th April, 2018 at Siu Ho Wan.

The sample(s) were analysed and reported on an as received basis.

NOTES

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

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

Richard Fung
General Manager - Hong Kong

METHOD STATEMENT
A. Odour Concentration
1. Odour Sampling

Odour gas sample was collected by passive sampling technique. A Nalophan™ sampling bag was placed inside an air-tight sampler and then drawn to vacuum. Approximately 60 litre of gas sample was collected into the sampling bag for testing.

The sample was collected at the ASR of the Siu Ho Wan and shown in Appendix 1.

2. Olfactometry Testing

Odour concentration was determined by a Forced-choice Dynamic Olfactometer in accordance with the European Standard Method (EN13725).

This European Standard specifies a method for the objective determination of the odour concentration of a gaseous sample using dynamic olfactometry with human assessors and the emission rate of odours emanating from point sources, area sources with outward flow and area sources without outward flow.

This European Standard is applicable to the measurement of odour concentration of pure substances, defined mixtures and undefined mixtures of gaseous odorants in air or nitrogen, using dynamic olfactometry with a panel of human assessors being the sensor.

The unit of measurement is the odour unit per cubic metre: OU_E/m^3. The odour concentration is measured by determining the dilution factor required to reach the detection threshold. The odour concentration at the detection threshold is by definition 1 OU_E/m^3. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement including pre-dilution prior to the olfactometry analysis is typically from 10^1 OU_E/m^3 to 10^7 OU_E/m^3.

Olfactometry Testing was performed by using the ScentroidTM SS6000 Olfactometer. The testing was performed by at least five qualified panellists who have been selected through an n-butanol screening test.

All testing finished within 24 hours after sample receipt.

RESULT

1. Odour Concentration

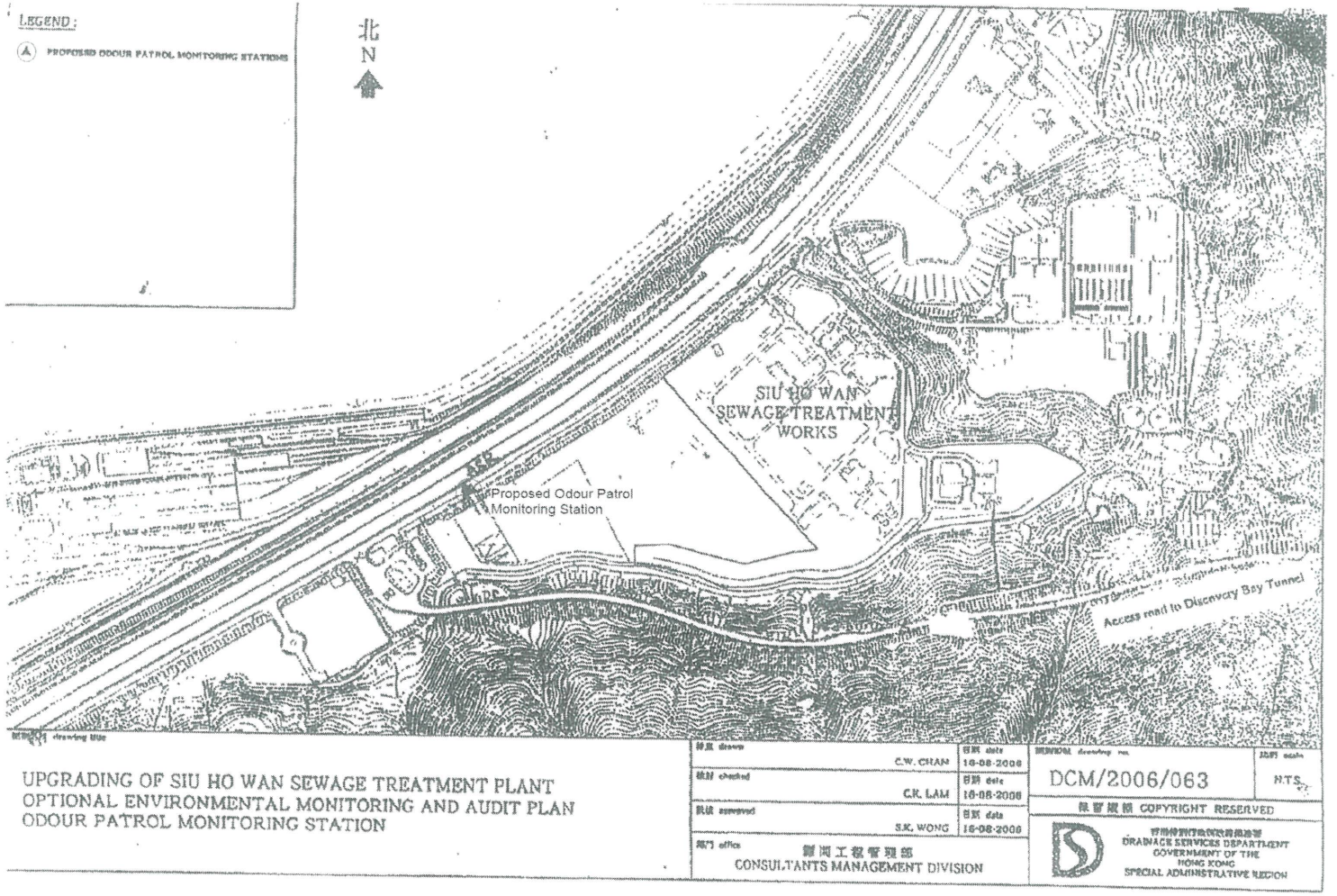
ALS Sample ID	Location	Sample Type	Sampling Date	Sampling Time	LOR (OU_E/m^3)	Odour Concentration (OU_E/m^3)	Ambient Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction
HK1824767-A001	Siu Ho Wan - ASR	Air	4 April 2018	10:30	5	19	26	68	1.4	East

Remark:

1. *LOR denotes limit of reporting.*
2. The Ambient temperature, relative humidity, wind speed and wind direction were measured and provided by the client.
3. The collected sample volume of the gas sample is sufficient for olfactometry analysis.

APPENDIX 1

A1.1. Layout of the Sampling Location



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

CERTIFICATE OF ANALYSIS

CLIENT:	Furgo Technical Services Limited	WORK ORDER:	HK1824768
CONTACT:	Cyrus Lai		
ADDRESS:	Room 723 & 725, 7/F, Block B, Profit Industrial Building 1-15 Kwai Fung Crescent, Kwai Chung Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	1
		DATE RECEIVED:	9 April 2018
		DATE OF ISSUE:	30 April 2018
PROJECT:	Odour Survey for Siu Ho Wan Sewage Treatment Plant	SAMPLE TYPE:	Air
SITE:	Siu Ho Wan	NO. OF SAMPLES:	1
PO:	---		

COMMENTS

Air sample(s) were collected by ALS Technichem (HK) staff on 9th April, 2018 at Siu Ho Wan.

The sample(s) were analysed and reported on an as received basis.

NOTES

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

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

Richard Fung
General Manager - Hong Kong

METHOD STATEMENT
A. Odour Concentration
1. Odour Sampling

Odour gas sample was collected by passive sampling technique. A Nalophan™ sampling bag was placed inside an air-tight sampler and then drawn to vacuum. Approximately 60 litre of gas sample was collected into the sampling bag for testing.

The sample was collected at the ASR of the Siu Ho Wan and shown in Appendix 1.

2. Olfactometry Testing

Odour concentration was determined by a Forced-choice Dynamic Olfactometer in accordance with the European Standard Method (EN13725).

This European Standard specifies a method for the objective determination of the odour concentration of a gaseous sample using dynamic olfactometry with human assessors and the emission rate of odours emanating from point sources, area sources with outward flow and area sources without outward flow.

This European Standard is applicable to the measurement of odour concentration of pure substances, defined mixtures and undefined mixtures of gaseous odorants in air or nitrogen, using dynamic olfactometry with a panel of human assessors being the sensor.

The unit of measurement is the odour unit per cubic metre: OU_E/m^3. The odour concentration is measured by determining the dilution factor required to reach the detection threshold. The odour concentration at the detection threshold is by definition 1 OU_E/m^3. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement including pre-dilution prior to the olfactometry analysis is typically from 10^1 OU_E/m^3 to 10^7 OU_E/m^3.

Olfactometry Testing was performed by using the ScentroidTM SS6000 Olfactometer. The testing was performed by at least five qualified panellists who have been selected through an n-butanol screening test.

All testing finished within 24 hours after sample receipt.

RESULT

1. Odour Concentration

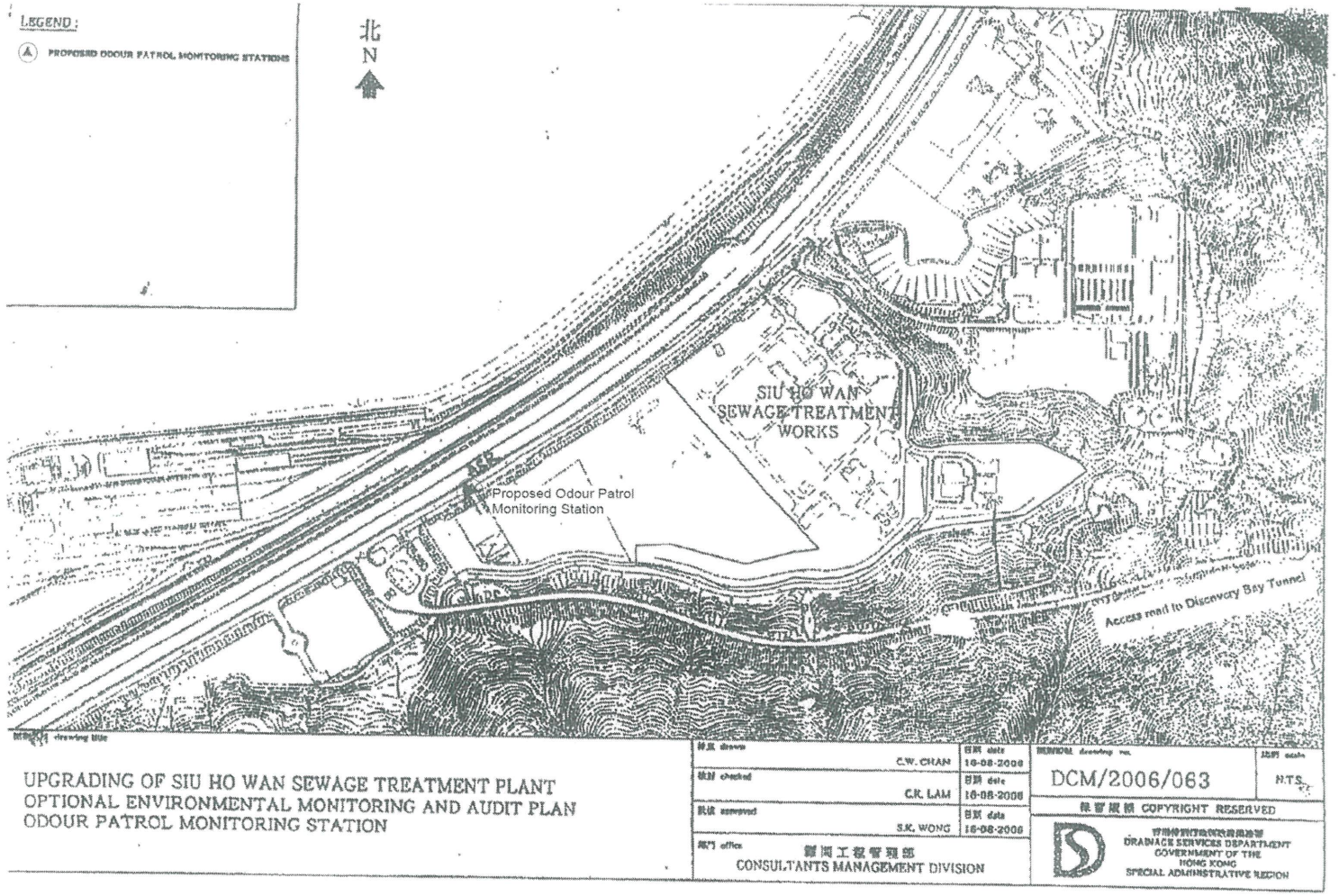
ALS Sample ID	Location	Sample Type	Sampling Date	Sampling Time	LOR (OU_E/m^3)	Odour Concentration (OU_E/m^3)	Ambient Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction
HK1824768-A001	Siu Ho Wan - ASR	Air	9 April 2018	10:03	5	17	25	65	1.1	East

Remark:

1. *LOR denotes limit of reporting.*
2. The Ambient temperature, relative humidity, wind speed and wind direction were measured and provided by the client.
3. The collected sample volume of the gas sample is sufficient for olfactometry analysis.

APPENDIX 1

A1.1. Layout of the Sampling Location



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

CERTIFICATE OF ANALYSIS

CLIENT:	Furgo Technical Services Limited	WORK ORDER:	HK1826778
CONTACT:	Cyrus Lai		
ADDRESS:	Room 723 & 725, 7/F, Block B, Profit Industrial Building 1-15 Kwai Fung Crescent, Kwai Chung Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	1
		DATE RECEIVED:	18 April 2018
		DATE OF ISSUE:	30 April 2018
PROJECT:	Odour Survey for Siu Ho Wan Sewage Treatment Plant	SAMPLE TYPE:	Air
SITE:	Siu Ho Wan	NO. OF SAMPLES:	1
PO:	---		

COMMENTS

Air sample(s) were collected by ALS Technichem (HK) staff on 18th April, 2018 at Siu Ho Wan.

The sample(s) were analysed and reported on an as received basis.

NOTES

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

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

Richard Fung
General Manager - Hong Kong

METHOD STATEMENT
A. Odour Concentration
1. Odour Sampling

Odour gas sample was collected by passive sampling technique. A Nalophan™ sampling bag was placed inside an air-tight sampler and then drawn to vacuum. Approximately 60 litre of gas sample was collected into the sampling bag for testing.

The sample was collected at the ASR of the Siu Ho Wan and shown in Appendix 1.

2. Olfactometry Testing

Odour concentration was determined by a Forced-choice Dynamic Olfactometer in accordance with the European Standard Method (EN13725).

This European Standard specifies a method for the objective determination of the odour concentration of a gaseous sample using dynamic olfactometry with human assessors and the emission rate of odours emanating from point sources, area sources with outward flow and area sources without outward flow.

This European Standard is applicable to the measurement of odour concentration of pure substances, defined mixtures and undefined mixtures of gaseous odorants in air or nitrogen, using dynamic olfactometry with a panel of human assessors being the sensor.

The unit of measurement is the odour unit per cubic metre: OU_E/m^3. The odour concentration is measured by determining the dilution factor required to reach the detection threshold. The odour concentration at the detection threshold is by definition 1 OU_E/m^3. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement including pre-dilution prior to the olfactometry analysis is typically from 10^1 OU_E/m^3 to 10^7 OU_E/m^3.

Olfactometry Testing was performed by using the ScentroidTM SS6000 Olfactometer. The testing was performed by at least five qualified panellists who have been selected through an n-butanol screening test.

All testing finished within 24 hours after sample receipt.

RESULT

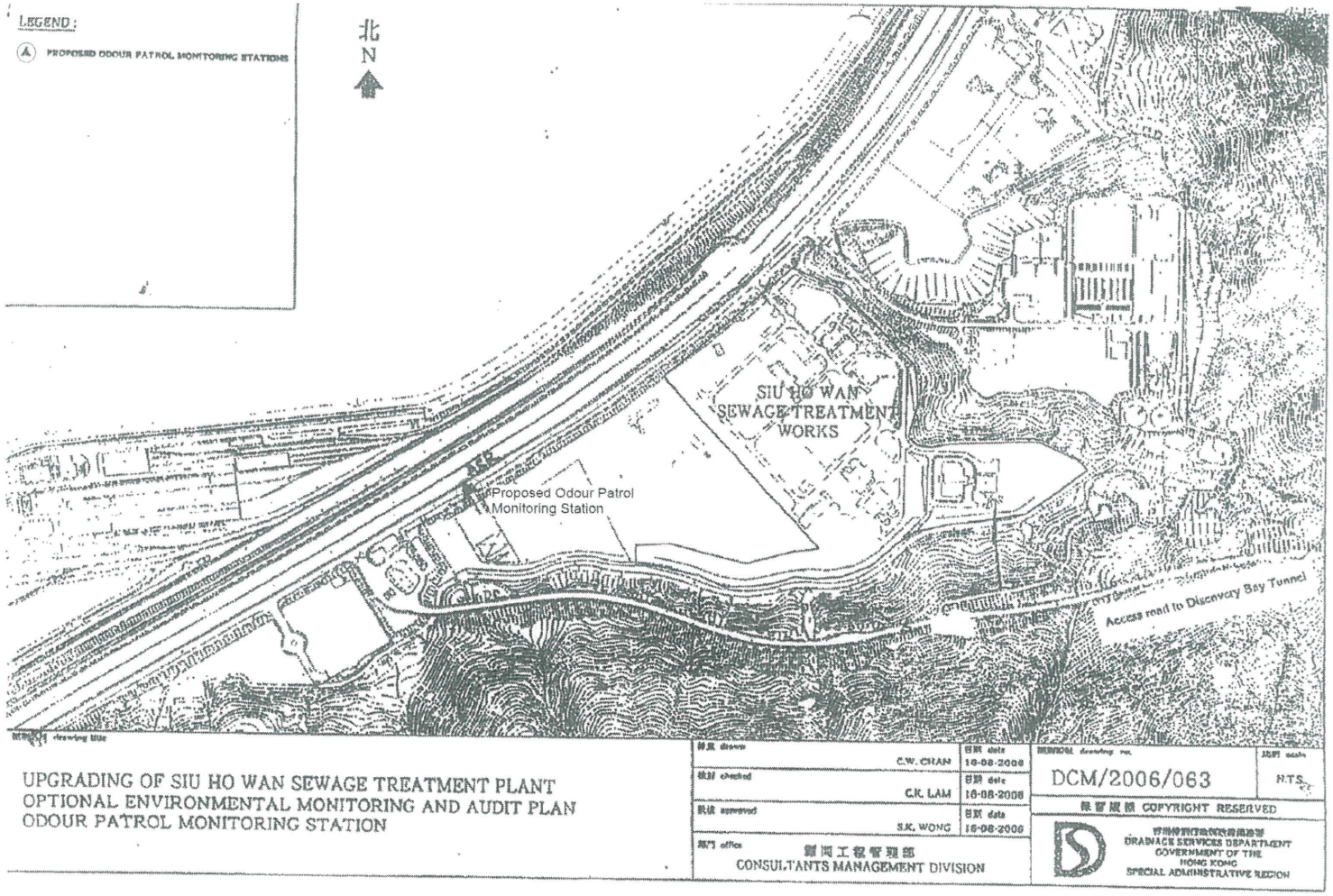
1. Odour Concentration

ALS Sample ID	Location	Sample Type	Sampling Date	Sampling Time	LOR (OU_E/m^3)	Odour Concentration (OU_E/m^3)	Ambient Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction
HK1826778-A001	Siu Ho Wan - ASR	Air	18 April 2018	10:03	5	19	21.8	81	2.4	East

Remark:
1. *LOR denotes limit of reporting.*
2. The Ambient temperature, relative humidity, wind speed and wind direction were measured and provided by the client.
3. The collected sample volume of the gas sample is sufficient for olfactometry analysis.

APPENDIX 1

A1.1. Layout of the Sampling Location



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

CERTIFICATE OF ANALYSIS

CLIENT:	Furgo Technical Services Limited	WORK ORDER:	HK1826779
CONTACT:	Cyrus Lai		
ADDRESS:	Room 723 & 725, 7/F, Block B, Profit Industrial Building 1-15 Kwai Fung Crescent, Kwai Chung Hong Kong	LABORATORY:	Hong Kong
		SUB-BATCH:	1
		DATE RECEIVED:	25 April 2018
		DATE OF ISSUE:	30 April 2018
PROJECT:	Odour Survey for Siu Ho Wan Sewage Treatment Plant	SAMPLE TYPE:	Air
SITE:	Siu Ho Wan	NO. OF SAMPLES:	1
PO:	---		

COMMENTS

Air sample(s) were collected by ALS Technichem (HK) staff on 25th April, 2018 at Siu Ho Wan.

The sample(s) were analysed and reported on an as received basis.

NOTES

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

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

Richard Fung
General Manager - Hong Kong

METHOD STATEMENT
A. Odour Concentration
1. Odour Sampling

Odour gas sample was collected by passive sampling technique. A Nalophan™ sampling bag was placed inside an air-tight sampler and then drawn to vacuum. Approximately 60 litre of gas sample was collected into the sampling bag for testing.

The sample was collected at the ASR of the Siu Ho Wan and shown in Appendix 1.

2. Olfactometry Testing

Odour concentration was determined by a Forced-choice Dynamic Olfactometer in accordance with the European Standard Method (EN13725).

This European Standard specifies a method for the objective determination of the odour concentration of a gaseous sample using dynamic olfactometry with human assessors and the emission rate of odours emanating from point sources, area sources with outward flow and area sources without outward flow.

This European Standard is applicable to the measurement of odour concentration of pure substances, defined mixtures and undefined mixtures of gaseous odorants in air or nitrogen, using dynamic olfactometry with a panel of human assessors being the sensor.

The unit of measurement is the odour unit per cubic metre: OU_E/m^3. The odour concentration is measured by determining the dilution factor required to reach the detection threshold. The odour concentration at the detection threshold is by definition 1 OU_E/m^3. The odour concentration is then expressed in terms of multiples of the detection threshold. The range of measurement including pre-dilution prior to the olfactometry analysis is typically from 10^1 OU_E/m^3 to 10^7 OU_E/m^3.

Olfactometry Testing was performed by using the ScentroidTM SS6000 Olfactometer. The testing was performed by at least five qualified panellists who have been selected through an n-butanol screening test.

All testing finished within 24 hours after sample receipt.

RESULT

1. Odour Concentration

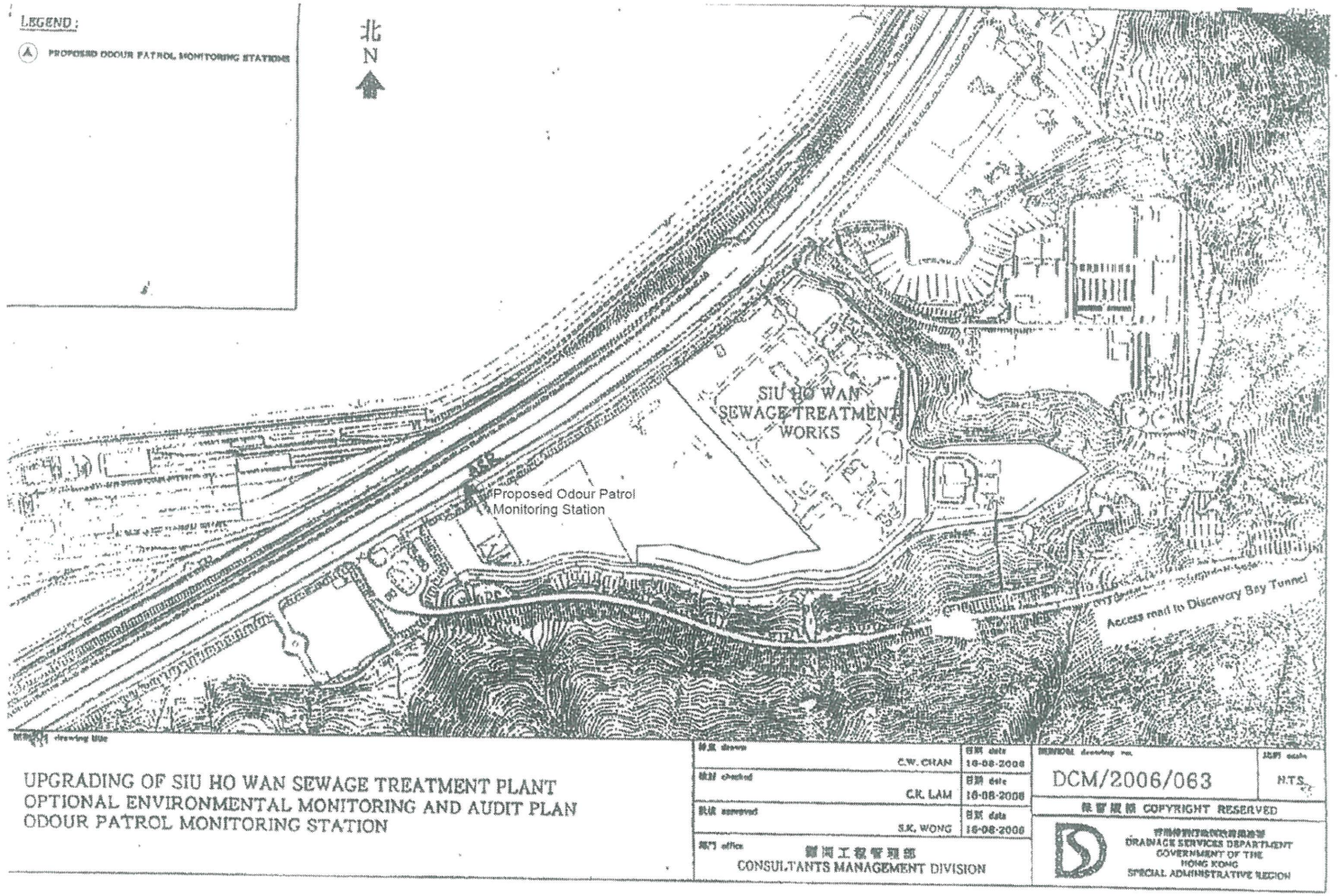
ALS Sample ID	Location	Sample Type	Sampling Date	Sampling Time	LOR (OU_E/m^3)	Odour Concentration (OU_E/m^3)	Ambient Temperature (°C)	Relative Humidity (%)	Wind Speed (m/s)	Wind Direction
HK1826779-A001	Siu Ho Wan - ASR	Air	25 April 2018	10:01	5	15	23.5	77	2.6	South East

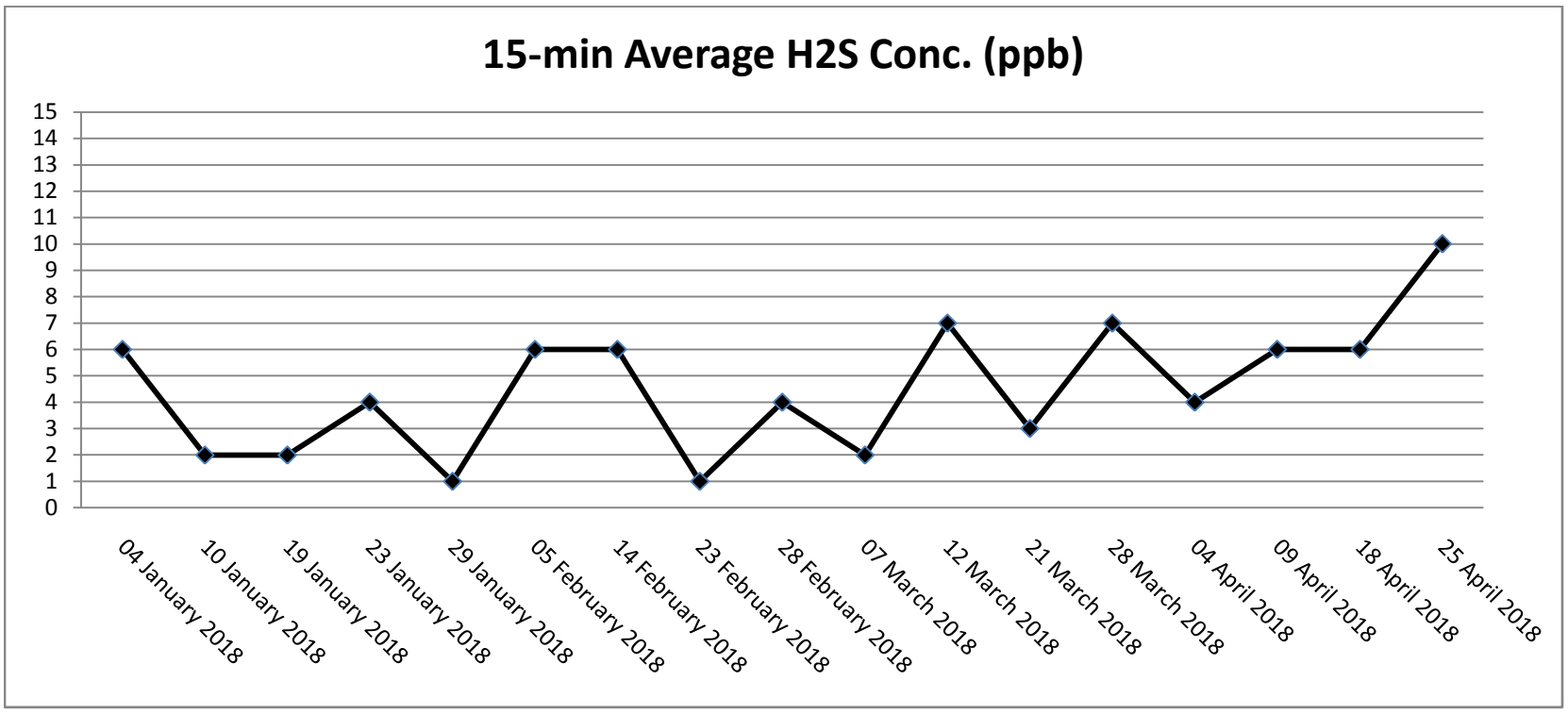
Remark:

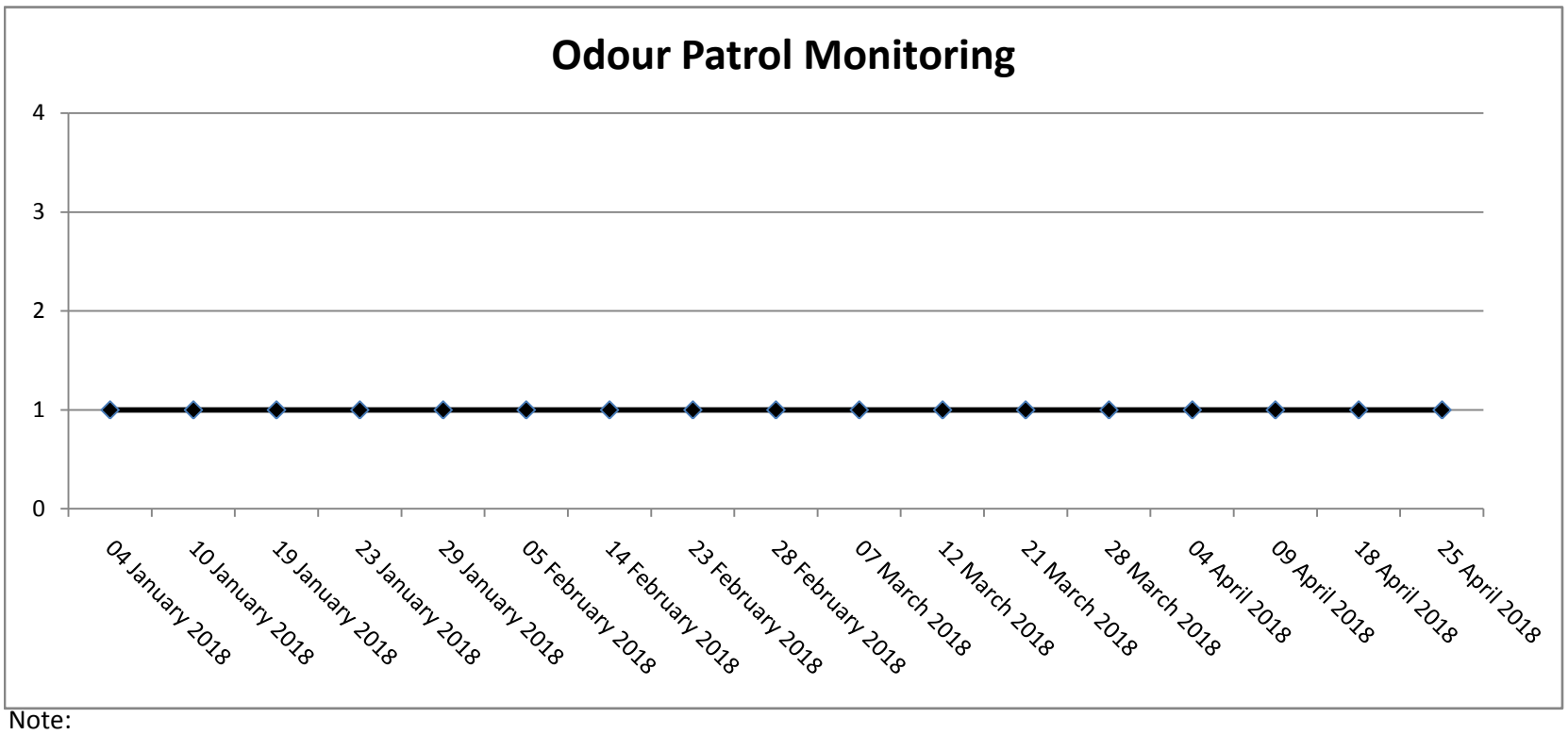
1. *LOR denotes limit of reporting.*
2. The Ambient temperature, relative humidity, wind speed and wind direction were measured and provided by the client.
3. The collected sample volume of the gas sample is sufficient for olfactometry analysis.

APPENDIX 1

A1.1. Layout of the Sampling Location

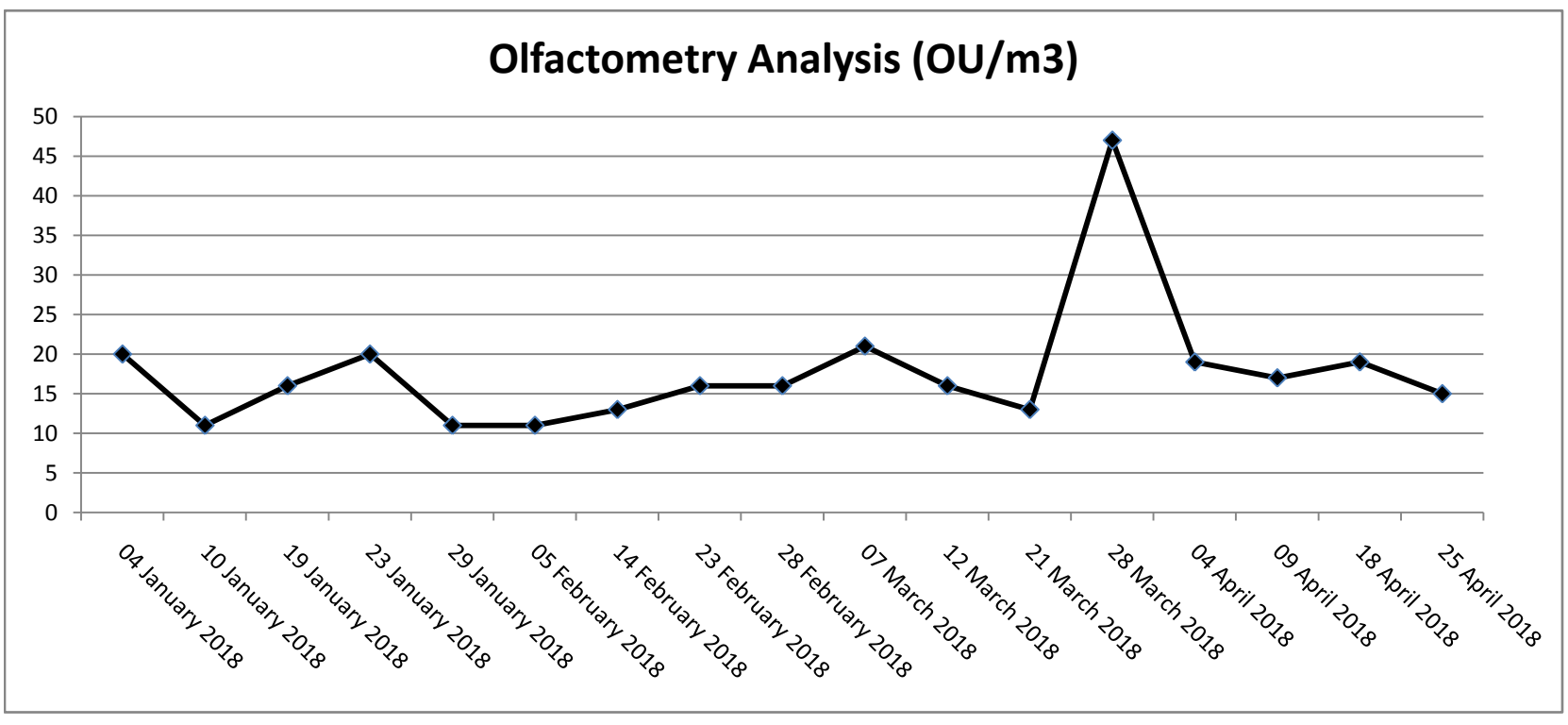






Note:

Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix F

Copy of the Calibration Certificates for Water Quality Monitoring Equipment

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MateriaLab

Report No. : 142626WA180326(3)

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

Information Supplied by Client

Client	:	Fugro Technical Services Limited
Client's address	:	Rm. 23, 25, 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. 536385
Test required	:	Calibration of the Aqua Troll 600 Multi-parameter Water Quality Meter

Laboratory Information

Lab. sample ID	:	WA180326/4
Date of calibration	:	26/02/2018
Next calibration date	:	25/05/2018
Test method used	:	In-house comparison method

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

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MateriaLab

Report No. : 142626WA180326(3)

Results :

A. pH calibration

pH reading at 18°C for Q.C. solution(6.86) and at 18°C for Q.C. solution(9.18)		
Theoretical	Measured	Deviation
9.18	9.17	-0.01
6.86	6.87	+0.01

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.09	+0.09	± 0.5
20	20.04	+0.04	± 1.0
30	29.90	-0.10	± 1.5
40	39.85	-0.15	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	8.55	8.54
2	8.60	8.59
3	8.60	8.58
Average	8.58	8.57

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
Manager – Chemistry Department

Date : 21/3/2018

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

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MateriaLab

Report No. : 142626WA180326(3)

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
17.40	17.54

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.05	+0.05	± 0.4
8	8.09	+0.09	± 0.6
40	40.60	+0.60	± 3.0
80	81.67	+1.67	± 4.0

Certified by : _____
Approved Signatory : HO Kin Man, John
Manager – Chemistry Department

Date : 21/3/2018

** End of Report **

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

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MateriaLab

Report No. : 142626WA180549(7)

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

Information Supplied by Client

Client	:	Fugro Technical Services Limited
Client's address	:	Rm. 23, 25, 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. 525253
Test required	:	Calibration of the Aqua Troll 600 Multi-parameter Water Quality Meter

Laboratory Information

Lab. sample ID	:	WA180549/8
Date of calibration	:	19/03/2018
Next calibration date	:	18/06/2018
Test method used	:	In-house comparison method

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

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MateriaLab

Report No. : 142626WA180549(7)

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	9.20	+0.02
6.86	6.87	+0.01

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.08	+0.08	± 0.5
20	20.14	+0.14	± 1.0
30	30.17	+0.17	± 1.5
40	40.28	+0.28	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	8.14	8.15
2	8.10	8.13
3	8.11	8.12
Average	8.12	8.13

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
Manager – Chemistry Department

Date : 12/9/2018

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

FUGRO TECHNICAL SERVICES LIMITED
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

MateriaLab

Report No. : 142626WA180549(7)

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
24.80	24.66

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.07	+0.07	± 0.4
8	8.10	+0.10	± 0.6
40	40.01	+0.01	± 3.0
80	81.62	+1.62	± 4.0

Certified by : _____
Approved Signatory : HO Kin Man, John
Manager – Chemistry Department

Date : 12/4/2018

** End of Report **

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

SonTek
a xylem brand

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

Certificate of Calibration

TEST REPORT

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

POWER TEST

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

NOISE TEST

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

VERIFICATION

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

OPTIONS

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

Verified by: **ainthasane**

This report was generated on 5/24/2017.

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.

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix G

Results and Graphical Presentation of Water Quality Monitoring

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (solube and particulate) (mg/L)	BOD_5 (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:15	17	S	1	1	8.07	30.42	22.97	96.5	6.94	1.9	0.20	100.5	2.9	0.075	0.036	0.514	0.625	1.0	0.04	<1.0
A	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:15	17	S	1	2	8.10	30.44	23.07	97.8	7.03	2.1	0.24	104.9	3.5	0.075	0.034	0.519	0.628	2.0	0.03	<1.0
A	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:15	17	M	8.5	1	8.09	32.86	22.54	90.9	6.51	2.3	0.12	107.2	4.0	0.094	0.018	0.285	0.398	21.0	0.03	<1.0
A	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:15	17	M	8.5	2	8.09	32.71	22.58	90.8	6.48	2.4	0.12	113.9	4.8	0.097	0.016	0.290	0.403	19.0	0.03	<1.0
A	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:15	17	B	16	1	8.10	33.27	22.50	90.4	6.45	2.4	0.16	209.5	4.7	0.102	0.017	0.302	0.422	26.0	0.03	<1.0
A	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:15	17	B	16	2	8.10	33.31	22.50	90.4	6.46	2.3	0.18	224.6	4.5	0.084	0.016	0.257	0.357	29.0	0.03	<1.0
B	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:40	14	S	1	1	8.13	31.46	23.16	99.7	7.12	1.9	0.08	140.8	3.9	0.092	0.025	0.432	0.548	7.0	0.04	<1.0
B	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:40	14	S	1	2	8.12	31.23	23.25	98.7	7.07	1.8	0.10	136.6	3.6	0.101	0.027	0.425	0.553	5.0	0.03	<1.0
B	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:40	14	M	7	1	8.11	33.15	22.58	94.2	6.70	2.1	0.19	195.6	3.5	0.128	0.017	0.257	0.402	76.0	0.04	<1.0
B	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:40	14	M	7	2	8.12	33.17	22.58	93.8	6.70	2.1	0.17	201.6	4.2	0.110	0.012	0.279	0.401	69.0	0.03	<1.0
B	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:40	14	B	13	1	8.12	33.50	22.48	91.1	6.49	3.3	0.07	205.9	4.0	0.108	0.024	0.360	0.492	5.0	0.04	<1.0
B	12/4/2018	Mid-Ebb	Cloudy	Smooth	10:40	14	B	13	2	8.11	33.52	22.48	91.0	6.48	3.5	0.07	205.4	4.2	0.086	0.025	0.427	0.538	6.0	0.03	1.1
C	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:07	12	S	1	1	8.20	30.70	23.62	109.5	7.92	2.1	0.13	245.4	3.6	0.040	0.041	0.583	0.664	1.0	0.03	1.1
C	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:07	12	S	1	2	8.21	29.99	23.67	113.0	8.05	1.8	0.14	239.4	4.1	0.046	0.040	0.584	0.670	<1	0.03	1.3
C	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:07	12	M	6	1	8.12	32.12	22.73	95.1	6.78	2.0	0.36	222.9	4.8	0.066	0.035	0.535	0.636	1.0	0.03	1.3
C	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:07	12	M	6	2	8.12	32.12	22.72	94.6	6.77	2.0	0.34	204.9	3.5	0.067	0.038	0.539	0.644	2.0	0.03	1.0
C	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:07	12	B	11	1	8.10	32.74	22.56	91.0	6.54	1.9	0.37	244.7	3.0	0.081	0.030	0.433	0.544	2.0	0.03	1.1
C	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:07	12	B	11	2	8.10	32.75	22.56	91.4	6.52	1.9	0.36	237.1	4.2	0.078	0.027	0.439	0.544	3.0	0.03	1.0
D	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:20	13	S	1	1	8.21	29.72	23.66	112.3	8.02	1.5	0.22	131.8	3.5	0.052	0.037	0.576	0.664	<1	0.05	1.5
D	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:20	13	S	1	2	8.21	29.86	23.62	111.6	7.96	1.8	0.19	136.6	4.9	0.050	0.042	0.556	0.648	1.0	0.03	1.4
D	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:20	13	M	6.5	1	8.11	32.26	22.68	95.6	6.81	2.1	0.23	164.6	3.1	0.049	0.040	0.577	0.666	3.0	0.03	1.3
D	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:20	13	M	6.5	2	8.11	32.18	22.70	94.0	6.71	1.9	0.22	158.2	4.9	0.040	0.044	0.590	0.674	4.0	0.04	1.1
D	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:20	13	B	12	1	8.10	32.70	22.56	91.9	6.53	2.0	0.12	205.9	5.8	0.045	0.033	0.522	0.600	1.0	0.03	1.0
D	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:20	13	B	12	2	8.10	32.90	22.53	90.4	6.46	2.0	0.12	205.4	6.6	0.039	0.047	0.650	0.736	2.0	0.03	1.5
E	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:45	17	S	1	1	8.18	30.21	23.37	106.9	7.68	1.9	0.16	181.2	4.6	0.052	0.038	0.543	0.633	6.0	0.03	1.2
E	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:45	17	S	1	2	8.19	30.23	23.37	102.5	7.70	1.9	0.15	163.1	5.6	0.051	0.034	0.554	0.639	8.0	0.03	1.0
E	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:45	17	M	8.5	1	8.13	33.17	22.51	90.0	6.41	2.8	0.35	229.1	4.0	0.087	0.035	0.535	0.657	11.0	0.03	1.1
E	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:45	17	M	8.5	2	8.13	33.21	22.50	89.9	6.40	2.8	0.25	228.5	4.6	0.108	0.030	0.436	0.574	9.0	0.04	<1.0
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:45	17	B	16	1	8.11	33.28	22.46	89.4	6.39	2.9	0.40	256.4	4.0	0.042	0.041	0.579	0.662	3.0	0.03	1.2
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:45	17	B	16	2	8.11	33.28	22.46	89.4	6.39	2.9	0.35	257.7	4.0	0.038	0.040	0.588	0.666	3.0	0.03	1.1
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:55	23	S	1	1	8.18	30.21	23.37	106.7	7.68	1.9	0.30	119.4	3.4	0.084	0.040	0.569	0.693	1.0	0.03	1.5
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:55	23	S	1	2	8.19	30.23	23.37	106.5	7.70	1.9	0.31	117.5	4.0	0.071	0.039	0.564	0.674	1.0	0.03	1.5
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:55	23	M	11.5	1	8.13	33.17	22.51	93.8	6.41	2.8	0.45	133.1	3.4	0.052	0.041	0.562	0.655	4.0	0.03	1.2
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:55	23	M	11.5	2	8.13	33.21	22.50	93.5	6.40	2.8	0.47	141.5	3.5	0.055	0.035	0.555	0.645	3.0	0.03	<1.0
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:55	23	B	22	1	8.11	33.28	22.46	91.3	6.39	2.9	0.26	133.1	4.7	0.058	0.036	0.549	0.643	4.0	0.05	1.1
F	12/4/2018	Mid-Ebb	Cloudy	Smooth	11:55	23	B	22	2	8.11	33.28	22.46	91.3	6.39	2.9	0.31	128.9	5.0	0.055	0.040	0.532	0.627	6.0	0.05	1.3
G	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:09	18	S	1	1	8.15	31.98	23.07	99.4	7.10	2.1	0.20	179.5	3.1	0.075	0.019	0.361	0.455	25.0	0.04	1.0
G	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:09	18	S	1	2	8.15	31.95	23.06	99.6	7.10	2.1	0.21	181.5	4.4	0.078	0.022	0.361	0.461	20.0	0.04	1.0
G	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:09	18	M	9	1	8.15	32.50	22.98	97.5	6.82	1.8	0.36	227.4	3.6	0.118	0.026	0.366	0.510	36.0	0.04	1.1
G	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:09	18	M	9	2	8.15	32.54	22.99	97.3	6.82	1.8	0.37	231.6	5.4	0.100	0.022	0.353	0.475	31.0	0.04	<1.0
G	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:09	18	B	17	1	8.13	33.31	22.55	90.3	6.45	2.4	0.35	217.8	3.7	0.078	0.028	0.454	0.560	17.0	0.04	1.1
G	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:09	18	B	17	2	8.12	33.31	22.55	90.5	6.46	2.0	0.33	215.6	5.2	0.079	0.026	0.462	0.567	20.0	0.04	1.1
H	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:19	18	S	1	1	8.17	31.15	23.20	105.0	7.42	2.1	0.22	116.4	4.7	0.054	0.027	0.481	0.562	4.0	0.03	1.2
H	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:19	18	S	1	2	8.17	31.15	23.40	104.9	7.40	2.1	0.22	114.3	4.8	0.068	0.039	0.449	0.556	5.0	0.03	1.4
H	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:19	18	M	9	1	8.16	32.34	22.90	97.5	6.96	2.0	0.31	158.4	5.1	0.061	0.031	0.462	0.574	8.0	0.03	1.3
H	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:19	18	M	9	2	8.16	32.34	22.90	97.6	6.96	2.0	0.33	154.2	3.4	0.080	0.026	0.474	0.580	6.0	0.04	<1.0
H	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:19	18	B	17	1	8.15	32.35	22.96	96.3	6.83	1.8	0.40	135.6	4.6	0.051	0.038	0.477	0.566	2.0	0.04	<1.0
H	12/4/2018	Mid-Ebb	Cloudy	Smooth	12:19	18	B	17	2	8.15	32.56	22.96	96.4	6.85	1.8	0.42	139.2	4.4	0.059	0.033	0.488	0.580	2.0	0.04	<1.0

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)	Nitrate Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (solube and particulate) (mg/L)	BOD_5 (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	12/4/2018	Mid-Flood	Cloudy	Smooth	16:52	14	S	1	1	8.20	29.31	23.55	111.5	8.05	3.2	0.05	252.6	8.6	0.060	0.053	0.774	0.887	12.0	0.05	<1.0
A	12/4/2018	Mid-Flood	Cloudy	Smooth	16:52	14	S	1	2	8.20	29.23	23.55	112.2	8.03	3.2	0.09	256.1	9.1	0.056	0.053	0.792	0.901	11.0	0.04	<1.0
A	12/4/2018	Mid-Flood	Cloudy	Smooth	16:52	14	M	7	1	8.13	31.46	22.91	96.7	6.93	4.0	0.29	268.4	9.1	0.057	0.055	0.784	0.896	1.0	0.04	<1.0
A	12/4/2018	Mid-Flood	Cloudy	Smooth	16:52	14	M	7	2	8.13	31.48	22.91	96.6	6.92	4.1	0.29	273.1	8.5	0.054	0.040	0.621	0.715	2.0	0.03	<1.0
A	12/4/2018	Mid-Flood	Cloudy	Smooth	16:52	14	B	13	1	8.11	33.35	22.53	90.8	6.50	8.1	0.27	246.9	9.2	0.084	0.047	0.773	0.904	10.0	0.04	1.7
A	12/4/2018	Mid-Flood	Cloudy	Smooth	16:52	14	B	13	2	8.11	33.36	22.53	91.0	6.49	8.5	0.27	264.5	10.1	0.081	0.055	0.748	0.884	8.0	0.04	1.4
B	12/4/2018	Mid-Flood	Cloudy	Smooth	17:02	14	S	1	1	8.21	29.46	23.52	109.8	7.96	2.8	0.26	221.5	6.7	0.108	0.051	0.717	0.876	31.0	0.04	<1.0
B	12/4/2018	Mid-Flood	Cloudy	Smooth	17:02	14	S	1	2	8.21	29.56	23.44	111.9	8.05	2.8	0.22	177.5	6.2	0.108	0.044	0.710	0.862	29.0	0.04	<1.0
B	12/4/2018	Mid-Flood	Cloudy	Smooth	17:02	14	M	7	1	8.17	30.96	23.05	99.1	7.07	1.9	0.08	170.9	6.8	0.060	0.048	0.692	0.800	49.0	0.04	<1.0
B	12/4/2018	Mid-Flood	Cloudy	Smooth	17:02	14	M	7	2	8.17	30.99	23.05	98.5	7.03	1.9	0.04	136.1	7.6	0.053	0.063	0.769	0.885	45.0	0.04	1.3
B	12/4/2018	Mid-Flood	Cloudy	Smooth	17:02	14	B	13	1	8.13	32.06	22.79	93.7	6.69	3.3	0.11	211.3	6.8	0.068	0.045	0.656	0.769	25.0	0.06	1.4
B	12/4/2018	Mid-Flood	Cloudy	Smooth	17:02	14	B	13	2	8.13	32.16	22.79	93.4	6.68	3.4	0.10	253.8	6.2	0.049	0.044	0.735	0.828	28.0	0.05	1.8
C	12/4/2018	Mid-Flood	Cloudy	Smooth	17:15	12	S	1	1	8.25	29.40	23.39	108.2	7.77	3.4	0.08	192.6	8.7	0.005	0.050	0.659	0.714	22.0	0.03	1.6
C	12/4/2018	Mid-Flood	Cloudy	Smooth	17:15	12	S	1	2	8.24	29.48	23.37	108.2	7.79	3.4	0.09	204.0	9.5	<0.005	0.048	0.670	0.718	26.0	0.03	1.5
C	12/4/2018	Mid-Flood	Cloudy	Smooth	17:15	12	M	6	1	8.15	32.46	22.76	95.1	6.76	6.0	0.19	243.8	9.4	0.037	0.038	0.640	0.715	24.0	0.03	1.5
C	12/4/2018	Mid-Flood	Cloudy	Smooth	17:15	12	M	6	2	8.15	32.52	22.74	94.1	6.73	5.9	0.14	239.4	8.4	0.051	0.042	0.607	0.700	20.0	0.03	1.2
C	12/4/2018	Mid-Flood	Cloudy	Smooth	17:15	12	B	11	1	8.12	32.75	22.68	92.7	6.63	7.0	0.23	240.4	8.8	0.012	0.047	0.665	0.724	18.0	0.03	2.0
C	12/4/2018	Mid-Flood	Cloudy	Smooth	17:15	12	B	11	2	8.12	32.78	22.67	93.0	6.59	7.0	0.17	245.3	8.8	0.010	0.044	0.664	0.718	21.0	0.03	1.8
D	12/4/2018	Mid-Flood	Cloudy	Smooth	17:30	14	S	1	1	8.19	29.37	23.62	108.7	7.81	3.0	0.10	236.0	6.6	0.074	0.039	0.597	0.710	17.0	0.03	1.3
D	12/4/2018	Mid-Flood	Cloudy	Smooth	17:30	14	S	1	2	8.22	29.40	23.61	108.8	7.81	3.4	0.11	232.0	7.3	0.074	0.048	0.648	0.770	16.0	0.03	1.5
D	12/4/2018	Mid-Flood	Cloudy	Smooth	17:30	14	M	7	1	8.17	33.07	22.62	93.0	6.61	3.3	0.42	222.8	6.9	0.034	0.051	0.596	0.680	23.0	0.03	1.2
D	12/4/2018	Mid-Flood	Cloudy	Smooth	17:30	14	M	7	2	8.14	33.14	22.61	92.5	6.59	3.3	0.38	223.8	7.2	0.025	0.043	0.642	0.710	19.0	0.04	1.6
D	12/4/2018	Mid-Flood	Cloudy	Smooth	17:30	14	B	13	1	8.12	33.33	22.53	89.7	6.39	5.2	0.34	216.1	7.1	0.029	0.037	0.672	0.738	15.0	0.03	1.5
D	12/4/2018	Mid-Flood	Cloudy	Smooth	17:30	14	B	13	2	8.12	33.35	22.53	89.6	6.39	5.2	0.35	221.1	7.8	0.019	0.047	0.645	0.711	18.0	0.03	1.7
E	12/4/2018	Mid-Flood	Cloudy	Smooth	17:53	14	S	1	1	8.20	30.64	23.49	111.3	7.96	3.3	0.18	175.4	4.4	0.057	0.033	0.456	0.546	110.0	0.03	1.4
E	12/4/2018	Mid-Flood	Cloudy	Smooth	17:53	14	S	1	2	8.21	30.62	23.49	111.6	7.97	3.3	0.17	169.6	5.6	0.051	0.033	0.491	0.575	120.0	0.04	1.4
E	12/4/2018	Mid-Flood	Cloudy	Smooth	17:53	14	M	7	1	8.15	32.58	22.96	99.6	7.11	2.5	0.46	206.0	5.2	0.053	0.035	0.475	0.563	89.0	0.04	1.4
E	12/4/2018	Mid-Flood	Cloudy	Smooth	17:53	14	M	7	2	8.14	32.53	22.96	100.0	7.13	2.5	0.44	204.2	6.4	0.043	0.035	0.510	0.588	94.0	0.04	1.6
E	12/4/2018	Mid-Flood	Cloudy	Smooth	17:53	14	B	13	1	8.13	33.34	22.63	93.6	6.68	4.5	0.32	165.8	9	0.088	0.021	0.443	0.552	86.0	0.05	1.2
E	12/4/2018	Mid-Flood	Cloudy	Smooth	17:53	14	B	13	2	8.13	33.36	22.63	94.5	6.74	4.5	0.29	163.2	10.8	0.088	0.045	0.651	0.784	78.0	0.03	1.6
F	12/4/2018	Mid-Flood	Cloudy	Smooth	18:07	18	S	1	1	8.26	29.94	23.61	113.2	8.09	2.4	0.22	172.7	4.8	0.055	0.032	0.477	0.564	84.0	0.03	1.4
F	12/4/2018	Mid-Flood	Cloudy	Smooth	18:07	18	S	1	2	8.26	29.94	23.62	112.7	8.03	2.0	0.20	167.5	5.9	0.060	0.032	0.478	0.571	80.0	0.03	1.4
F	12/4/2018	Mid-Flood	Cloudy	Smooth	18:07	18	M	9	1	8.14	33.35	22.70	92.8	6.60	3.1	0.50	200.5	5.8	0.075	0.035	0.503	0.613	120.0	0.04	1.9
F	12/4/2018	Mid-Flood	Cloudy	Smooth	18:07	18	M	9	2	8.14	33.35	22.70	92.7	6.61	3.2	0.48	189.4	4.9	0.073	0.032	0.474	0.579	150.0	0.04	1.2
F	12/4/2018	Mid-Flood	Cloudy	Smooth	18:07	18	B	17	1	8.14	33.54	22.63	90.8	6.46	4.1	0.45	183.9	6.6	0.045	0.037	0.509	0.591	110.0	0.04	1.4
F	12/4/2018	Mid-Flood	Cloudy	Smooth	18:07	18	B	17	2	8.14	33.55	22.63	90.9	6.46	4.0	0.37	183.6	7.3	0.042	0.044	0.598	0.685	130.0	0.03	1.3
G	12/4/2018	Mid-Flood	Cloudy	Smooth	18:15	13	S	1	1	8.17	31.40	23.32	102.4	7.30	2.7	0.15	266.6	5	0.060	0.027	0.443	0.530	35.0	0.03	1.1
G	12/4/2018	Mid-Flood	Cloudy	Smooth	18:15	13	S	1	2	8.18	31.43	23.22	102.3	7.29	2.7	0.16	269.2	6.1	0.061	0.035	0.461	0.557	40.0	0.04	1.1
G	12/4/2018	Mid-Flood	Cloudy	Smooth	18:15	13	M	6.5	1	8.16	32.26	23.04	97.9	6.96	3.1	0.40	230.8	5.6	0.066	0.030	0.456	0.552	67.0	0.04	1.2
G	12/4/2018	Mid-Flood	Cloudy	Smooth	18:15	13	M	6.5	2	8.16	32.29	23.04	98.1	6.98	3.2	0.39	235.7	6.9	0.063	0.030	0.450	0.543	62.0	0.04	1.7
G	12/4/2018	Mid-Flood	Cloudy	Smooth	18:15	13	B	12	1	8.15	32.67	22.80	95.2	6.75	3.8	0.37	240.0	5	0.060	0.033	0.440	0.533	53.0	0.05	1.4
G	12/4/2018	Mid-Flood	Cloudy	Smooth	18:15	13	B	12	2	8.15	32.78	22.80	94.9	6.73	3.9	0.34	242.3	6.8	0.062	0.030	0.440	0.532	58.0	0.04	<1.0
H	12/4/2018	Mid-Flood	Cloudy	Smooth	18:25	19	S	1	1	8.19	31.49	23.28	103.5	7.40	1.6	0.39	137.1	4.8	0.059	0.025	0.467	0.551	59.0	0.04	<1.0
H	12/4/2018	Mid-Flood	Cloudy	Smooth	18:25	19	S	1	2	8.19	31.55	23.28	103.5	7.46	1.7	0.34	132.7	4.5	0.056	0.027	0.469	0.552	63.0	0.04	1.0
H	12/4/2018	Mid-Flood	Cloudy	Smooth	18:25	19	M	9.5	1	8.17	32.10	23.03	98.0	7.00	2.9	0.38	163.7	4.8	0.061	0.030	0.457	0.548	57.0	0.05	1.1
H	12/4/2018	Mid-Flood	Cloudy	Smooth	18:25	19	M	9.5	2	8.17	32.19	23.02	98.0	7.00	2.9	0.40	166.1	4.8	0.057	0.026	0.451	0.534	60.0	0.04	1.1
H	12/4/2018	Mid-Flood	Cloudy	Smooth	18:25	19	B	18	1	8.14	33.61	22.63	92.0	6.53	3.3	0.22	144.3	5	0.062	0.025	0.458	0.545	70.0	0.04	1.0
H	12/4/2018	Mid-Flood	Cloudy	Smooth	18:25	19	B	18	2	8.14	33.64	22.63	91.7	6.52	3.3	0.24	146.9	4.2	0.059	0.036	0.447	0.542	64.0	0.04	1.1

CERTIFICATE OF ANALYSIS

Client	: MATERIALAB CONSULTANTS LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 28
Contact	: MR CYRUS LAI	Contact	: Elaine Cheung	Work Order	: HK1824746
Address	: RM 723 & 725 7/F, BLOCK B PROFIT INDUSTRIAL BUILDING, NO. 1-15 KWAI FUNG CRESCENT, KWAI CHUNG, N.T. HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: ----	E-mail	: elaine.cheung@alsglobal.com		
Telephone	: ----	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT			Date Samples Received	: 12-Apr-2018
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 24-Apr-2018
C-O-C number	: ----			No. of samples received	: 96
Site	: ----			No. of samples analysed	: 96

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

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

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 12-Apr-2018 to 23-Apr-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: HK1824746

Sample(s) were received in chilled condition.

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

Sample(s) arrived in the laboratory at 17:25. Microbiological sample(s), in 125mL plastic bottle labelled sterile, with addition of sodium thiosulfate solution.

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

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

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

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID	A/S/E	A/S/E/Dup	A/M/E	A/M/E/Dup	A/B/E
				Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
					HK1824746-001	HK1824746-002	HK1824746-003	HK1824746-004	HK1824746-005
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		2.9	3.5	4.0	4.8	4.7
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.075	0.075	0.094	0.097	0.102
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.036	0.034	0.018	0.016	0.017
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.514	0.519	0.285	0.290	0.302
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.625	0.628	0.398	0.403	0.422
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.04	0.03	0.03	0.03	0.03
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	<1.0	<1.0
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		1	2	21	19	26

Sub-Matrix: WATER			Client sample ID	A/B/E/Dup	B/S/E	B/S/E/Dup	B/M/E	B/M/E/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-006	HK1824746-007	HK1824746-008	HK1824746-009	HK1824746-010
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.5	3.9	3.6	3.5	4.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.084	0.092	0.101	0.128	0.110
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.016	0.025	0.027	0.017	0.012
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.257	0.432	0.425	0.257	0.279
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.357	0.548	0.553	0.402	0.401
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.04	0.03	0.04	0.03
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	<1.0	<1.0	<1.0	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	29	7	5	76	69

Sub-Matrix: WATER			Client sample ID	B/B/E	B/B/E/Dup	C/S/E	C/S/E/Dup	C/M/E
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-011	HK1824746-012	HK1824746-013	HK1824746-014	HK1824746-015
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.0	4.2	3.6	4.1	4.8
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.108	0.086	0.040	0.046	0.066
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.024	0.025	0.041	0.040	0.035
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.360	0.427	0.583	0.584	0.535
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.492	0.538	0.664	0.670	0.636
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.03	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.03	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.1	1.1	1.3	1.3
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	5	6	1	NOT DETECTED	1

Sub-Matrix: WATER			Client sample ID	C/M/E/Dup	C/B/E	C/B/E/Dup	D/S/E	D/S/E/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-016	HK1824746-017	HK1824746-018	HK1824746-019	HK1824746-020
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.5	3.0	4.2	3.5	4.9
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.067	0.081	0.078	0.052	0.050
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.038	0.030	0.027	0.037	0.042
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.539	0.433	0.439	0.576	0.556
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.644	0.544	0.544	0.664	0.648
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.05	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.03	0.03	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.0	1.1	1.0	1.5	1.4
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	2	2	3	NOT DETECTED	1

Sub-Matrix: WATER			Client sample ID	D/M/E	D/M/E/Dup	D/B/E	D/B/E/Dup	E/S/E
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-021	HK1824746-022	HK1824746-023	HK1824746-024	HK1824746-025
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.1	4.9	5.8	6.6	4.6
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.049	0.040	0.045	0.039	0.052
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.040	0.044	0.033	0.047	0.038
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.577	0.590	0.522	0.650	0.543
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.666	0.674	0.600	0.736	0.633
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.04	0.03	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.3	1.1	1.0	1.5	1.2
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	3	4	1	2	6

Sub-Matrix: WATER			Client sample ID	E/S/E/Dup	E/M/E	E/M/E/Dup	E/B/E	E/B/E/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-026	HK1824746-027	HK1824746-028	HK1824746-029	HK1824746-030
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.6	4.0	4.6	4.0	4.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.051	0.087	0.108	0.042	0.038
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.034	0.035	0.030	0.041	0.040
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.554	0.535	0.436	0.579	0.588
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.639	0.657	0.574	0.662	0.666
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.04	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.03	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.0	1.1	<1.0	1.2	1.1
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	8	11	9	3	3

Sub-Matrix: WATER			Client sample ID	F/S/E	F/S/E/Dup	F/M/E	F/M/E/Dup	F/B/E
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-031	HK1824746-032	HK1824746-033	HK1824746-034	HK1824746-035
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.4	4.0	3.4	3.5	4.7
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.084	0.071	0.052	0.055	0.058
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.040	0.039	0.041	0.035	0.036
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.569	0.564	0.562	0.555	0.549
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.693	0.674	0.655	0.645	0.643
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	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	1.5	1.5	1.2	<1.0	1.1
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	1	4	3	4

Sub-Matrix: WATER			Client sample ID	F/B/E/Dup	G/S/E	G/S/E/Dup	G/M/E	G/M/E/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-036	HK1824746-037	HK1824746-038	HK1824746-039	HK1824746-040
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.0	3.1	4.4	3.6	5.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.055	0.075	0.078	0.118	0.100
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.040	0.019	0.022	0.026	0.022
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.532	0.361	0.361	0.366	0.353
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.627	0.455	0.461	0.510	0.475
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.04	0.04	0.04	0.04
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	1.0	1.0	1.1	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	6	25	20	36	31

Sub-Matrix: WATER			Client sample ID	G/B/E	G/B/E/Dup	H/S/E	H/S/E/Dup	H/M/E
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-041	HK1824746-042	HK1824746-043	HK1824746-044	HK1824746-045
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.7	5.2	4.7	4.8	5.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.078	0.079	0.054	0.068	0.081
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.028	0.026	0.027	0.039	0.031
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.454	0.462	0.481	0.449	0.462
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.560	0.567	0.562	0.556	0.574
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.03	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	1.1	1.2	1.4	1.3
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	17	20	4	5	8

Sub-Matrix: WATER			Client sample ID	H/M/E/Dup	H/B/E	H/B/E/Dup	A/S/F	A/S/F/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	*CAS Number*	*LOR*	*Unit*	HK1824746-046	HK1824746-047	HK1824746-048	HK1824746-049	HK1824746-050
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.4	4.6	4.4	8.6	9.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.080	0.051	0.059	0.060	0.056
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.026	0.038	0.033	0.053	0.053
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.474	0.477	0.488	0.774	0.792
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.580	0.566	0.580	0.887	0.901
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.05	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	6	2	2	12	11

Sub-Matrix: WATER			Client sample ID	A/M/F	A/M/F/Dup	A/B/F	A/B/F/Dup	B/S/F
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-051	HK1824746-052	HK1824746-053	HK1824746-054	HK1824746-055
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.1	8.5	9.2	10.1	6.7
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.057	0.054	0.084	0.081	0.108
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.055	0.040	0.047	0.055	0.051
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.784	0.621	0.773	0.748	0.717
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.896	0.715	0.904	0.884	0.876
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.03	0.04	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	1.7	1.4	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	2	10	8	31

Sub-Matrix: WATER			Client sample ID	B/S/F/Dup	B/M/F	B/M/F/Dup	B/B/F	B/B/F/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-056	HK1824746-057	HK1824746-058	HK1824746-059	HK1824746-060
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.2	6.8	7.6	6.8	6.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.108	0.060	0.053	0.068	0.049
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.044	0.048	0.063	0.045	0.044
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.710	0.692	0.769	0.656	0.735
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.862	0.800	0.885	0.769	0.828
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.06	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	<1.0	<1.0	1.3	1.4	1.8
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	29	49	45	25	28

Sub-Matrix: WATER			Client sample ID	C/S/F	C/S/F/Dup	C/M/F	C/M/F/Dup	C/B/F
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-061	HK1824746-062	HK1824746-063	HK1824746-064	HK1824746-065
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.7	9.5	9.4	8.4	8.8
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.005	<0.005	0.037	0.051	0.012
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.050	0.048	0.038	0.042	0.047
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.659	0.670	0.640	0.607	0.665
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.714	0.718	0.715	0.700	0.724
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	1.5	1.5	1.2	2.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	22	26	24	20	18

Sub-Matrix: WATER			Client sample ID	C/B/F/Dup	D/S/F	D/S/F/Dup	D/M/F	D/M/F/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-066	HK1824746-067	HK1824746-068	HK1824746-069	HK1824746-070
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.8	6.6	7.3	6.9	7.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.010	0.074	0.074	0.034	0.025
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.044	0.039	0.048	0.051	0.043
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.664	0.597	0.648	0.596	0.642
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.718	0.710	0.770	0.680	0.710
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.01	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.8	1.3	1.5	1.2	1.6
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	21	17	16	23	19

Sub-Matrix: WATER			Client sample ID	D/B/F	D/B/F/Dup	E/S/F	E/S/F/Dup	E/M/F
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-071	HK1824746-072	HK1824746-073	HK1824746-074	HK1824746-075
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.1	7.8	4.4	5.6	5.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.029	0.019	0.057	0.051	0.053
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.037	0.047	0.033	0.033	0.035
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.672	0.645	0.456	0.491	0.475
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.738	0.711	0.546	0.575	0.563
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.03	0.03	0.04	0.04
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	1.5	1.7	1.4	1.4	1.4
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	15	18	110	120	89

Sub-Matrix: WATER			Client sample ID	E/M/F/Dup	E/B/F	E/B/F/Dup	F/S/F	F/S/F/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-076	HK1824746-077	HK1824746-078	HK1824746-079	HK1824746-080
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.4	9.0	10.8	4.8	5.9
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.043	0.088	0.088	0.055	0.060
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.035	0.021	0.045	0.032	0.032
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.510	0.443	0.651	0.477	0.478
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.588	0.552	0.784	0.564	0.571
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.03	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	1.2	1.6	1.4	1.4
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	94	86	78	84	80

Sub-Matrix: WATER			Client sample ID	F/M/F	F/M/F/Dup	F/B/F	F/B/F/Dup	G/S/F
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-081	HK1824746-082	HK1824746-083	HK1824746-084	HK1824746-085
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.8	4.9	6.6	7.3	5.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.075	0.073	0.045	0.042	0.060
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.035	0.032	0.037	0.044	0.027
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.503	0.474	0.509	0.598	0.443
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.613	0.579	0.591	0.685	0.530
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.9	1.2	1.4	1.3	1.1
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	120	150	110	130	35

Sub-Matrix: WATER			Client sample ID	G/S/F/Dup	G/M/F	G/M/F/Dup	G/B/F	G/B/F/Dup
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-086	HK1824746-087	HK1824746-088	HK1824746-089	HK1824746-090
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	6.1	5.6	6.9	5.0	6.8
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.061	0.066	0.063	0.060	0.062
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.035	0.030	0.030	0.033	0.030
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.461	0.456	0.450	0.440	0.440
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.557	0.552	0.543	0.533	0.532
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.04	0.05	0.04
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	1.1	1.2	1.7	1.4	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	40	67	62	53	58

Sub-Matrix: WATER			Client sample ID	H/S/F	H/S/F/Dup	H/M/F	H/M/F/Dup	H/B/F
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824746-091	HK1824746-092	HK1824746-093	HK1824746-094	HK1824746-095
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.8	4.5	4.8	4.8	5.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.059	0.056	0.061	0.057	0.062
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.025	0.027	0.030	0.026	0.025
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.467	0.469	0.457	0.451	0.458
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.551	0.552	0.548	0.534	0.545
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.05	0.04	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.02	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.0	1.1	1.1	1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	59	63	57	60	70

Sub-Matrix: WATER			Client sample ID	H/B/F/Dup	----	----	----	----
			Client sampling date / time	12-Apr-2018	----	----	----	----
Compound	CAS Number	LOR	Unit	HK1824746-096	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.2	----	----	----	----
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.059	----	----	----	----
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.036	----	----	----	----
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.447	----	----	----	----
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.542	----	----	----	----
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	----	----	----	----
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	----	----	----	----
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	----	----	----	----
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	64	----	----	----	----

Laboratory Duplicate (DUP) Report

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1566743)								
HK1824746-001	A/S/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	2.9	3.6	22.1
HK1824746-011	B/B/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	4.0	3.6	10.6
EA/ED: Physical and Aggregate Properties (QC Lot: 1566744)								
HK1824746-021	D/M/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	3.1	4.6	40.6
HK1824746-031	F/S/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	3.4	4.2	19.5
EA/ED: Physical and Aggregate Properties (QC Lot: 1566745)								
HK1824746-041	G/B/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	3.7	4.1	11.2
HK1824746-051	A/M/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	9.1	9.6	5.79
EA/ED: Physical and Aggregate Properties (QC Lot: 1566746)								
HK1824746-061	C/S/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	8.7	8.0	7.90
HK1824746-071	D/B/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	7.1	8.1	12.6
EA/ED: Physical and Aggregate Properties (QC Lot: 1566747)								
HK1824746-081	F/M/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	5.8	5.3	10.4
HK1824746-091	H/S/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	4.8	4.2	13.4
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565878)								
HK1824746-001	A/S/E	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565879)								
HK1824746-001	A/S/E	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565880)								
HK1824746-021	D/M/E	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.03	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565881)								
HK1824746-021	D/M/E	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.02	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565882)								
HK1824746-041	G/B/E	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.04	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565883)								
HK1824746-041	G/B/E	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.02	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565884)								
HK1824746-061	C/S/F	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565885)								
HK1824746-061	C/S/F	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.01	0.02	0.00

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565886)								
HK1824746-081	F/M/F	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565887)								
HK1824746-081	F/M/F	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.02	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566374)								
HK1824746-001	A/S/E	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.036	0.036	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566377)								
HK1824746-021	D/M/E	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.040	0.036	10.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566380)								
HK1824746-041	G/B/E	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.028	0.025	7.94
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566382)								
HK1824746-061	C/S/F	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.050	0.042	17.7
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566385)								
HK1824746-081	F/M/F	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.035	0.038	8.72
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567190)								
HK1824746-001	A/S/E	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.075	0.074	2.14
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567191)								
HK1824746-023	D/B/E	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.045	0.044	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567192)								
HK1824746-041	G/B/E	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.078	0.079	1.31
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567193)								
HK1824746-063	C/M/F	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.037	0.034	10.6
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567194)								
HK1824746-091	H/S/F	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.059	0.063	7.04

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

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 1566743)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	87.0	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1566744)											

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EA/ED: Physical and Aggregate Properties (QC Lot: 1566744) - Continued											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	114	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1566745)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	110	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1566746)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	86.5	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 1566747)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	90.5	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565878)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	102	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565879)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	98.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565880)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	102	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565881)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.5	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565882)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	102	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565883)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	97.3	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565884)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	103	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565885)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	97.6	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565886)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	102	----	92	104	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565887)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	95.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566374)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	94.2	----	85	115	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566377)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	103	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566380)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	99.4	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566382)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	96.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566385)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	113	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567190)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	101	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567191)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	105	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567192)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	97.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567193)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	99.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567194)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	98.0	----	85	115	----	----
EP: Aggregate Organics (QC Lot: 1566583)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	106	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1566584)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	100	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1566585)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	102	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1566586)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	103	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 1566587)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	103	----	81	115	----	----

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

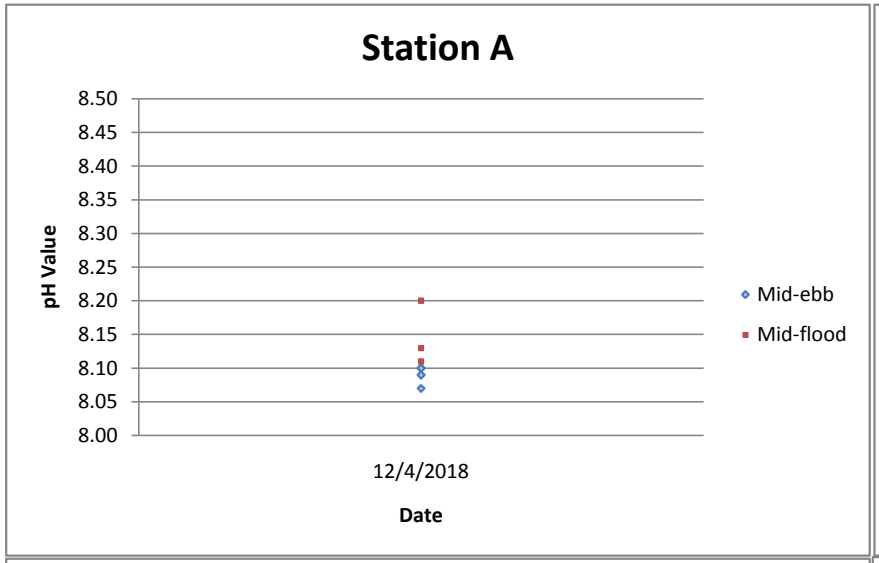
Matrix: **WATER**

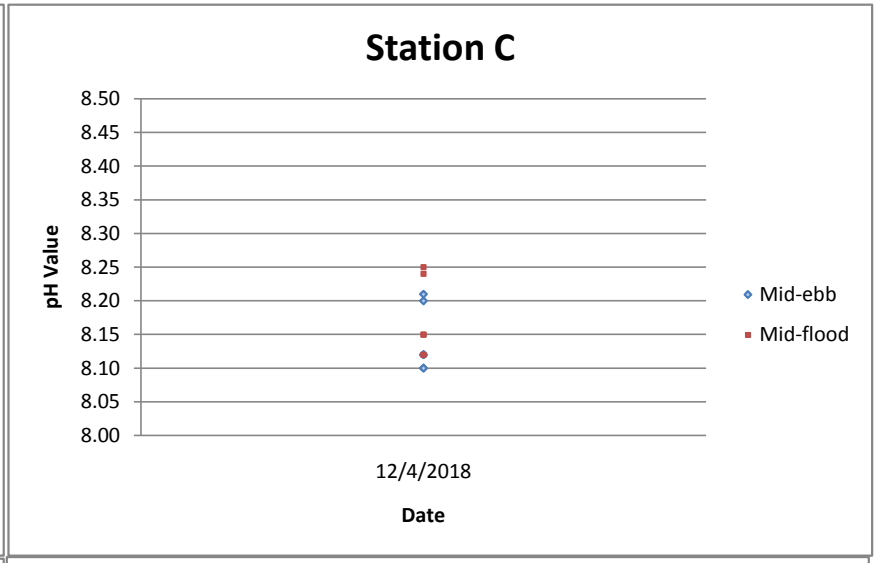
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565878)										
HK1824746-001	A/S/E	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	90.1	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565879)										
HK1824746-001	A/S/E	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	98.0	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565880)										
HK1824746-021	D/M/E	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	100	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565881)										
HK1824746-021	D/M/E	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	100	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565882)										
HK1824746-041	G/B/E	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	106	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565883)										
HK1824746-041	G/B/E	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	110	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565884)										
HK1824746-061	C/S/F	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	90.5	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565885)										
HK1824746-061	C/S/F	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	99.2	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565886)										
HK1824746-081	F/M/F	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	111	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1565887)										
HK1824746-081	F/M/F	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	102	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566374)										
HK1824746-001	A/S/E	**EK057A: Nitrite as N**	14797-65-0	0.5 mg/L	100	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566377)										
HK1824746-021	D/M/E	**EK057A: Nitrite as N**	14797-65-0	0.5 mg/L	105	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566380)										
HK1824746-041	G/B/E									

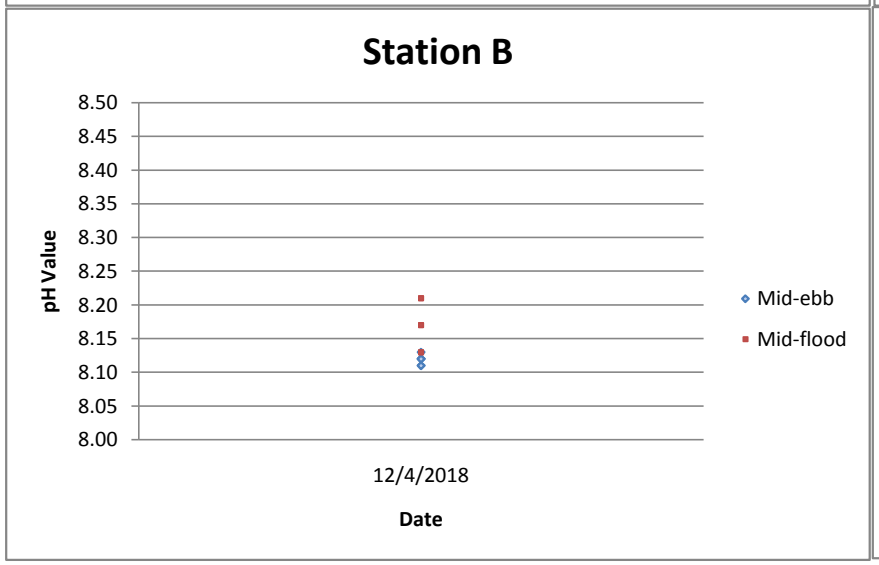
Matrix: **WATER**

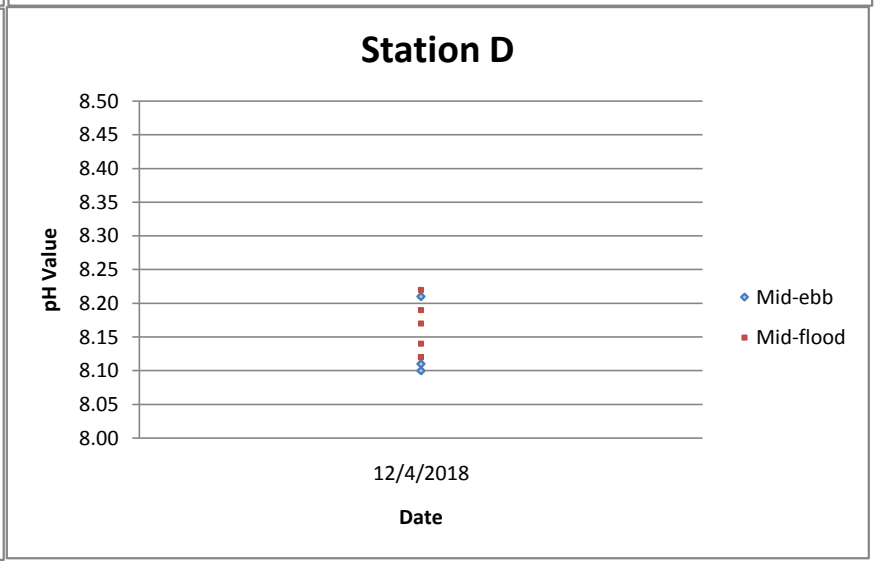
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566380) - Continued										
HK1824746-041	G/B/E	**EK057A: Nitrite as N**	14797-65-0	0.5 mg/L	90.6	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566382)										
HK1824746-061	C/S/F	**EK057A: Nitrite as N**	14797-65-0	0.5 mg/L	93.8	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1566385)										
HK1824746-081	F/M/F	**EK057A: Nitrite as N**	14797-65-0	0.5 mg/L	97.4	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567190)										
HK1824746-001	A/S/E	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	99.1	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567191)										
HK1824746-023	D/B/E	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	103	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567192)										
HK1824746-041	G/B/E	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	107	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567193)										
HK1824746-063	C/M/F	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	103	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1567194)										
HK1824746-091	H/S/F	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	103	----	75	125	----	----

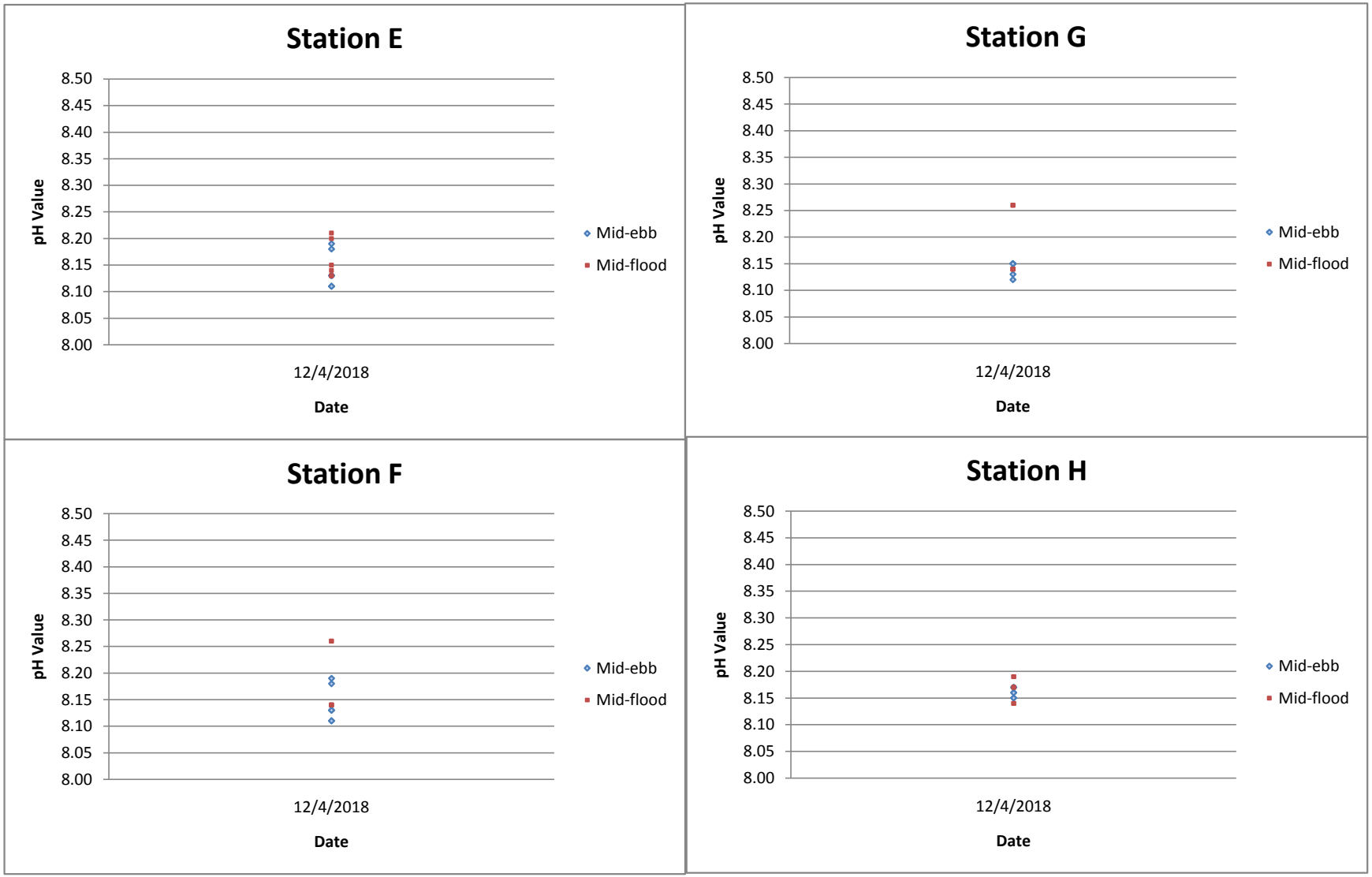
pH value


Station A
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood

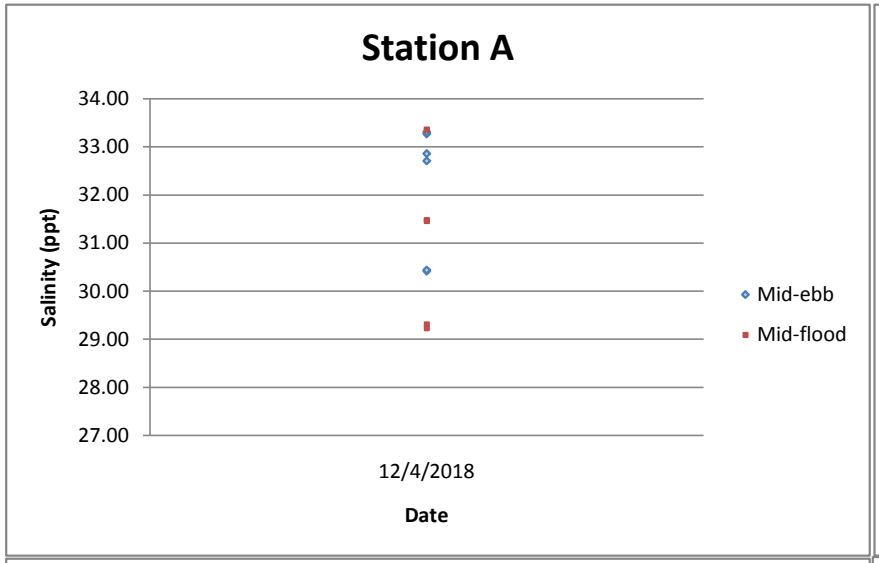

Station C
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood

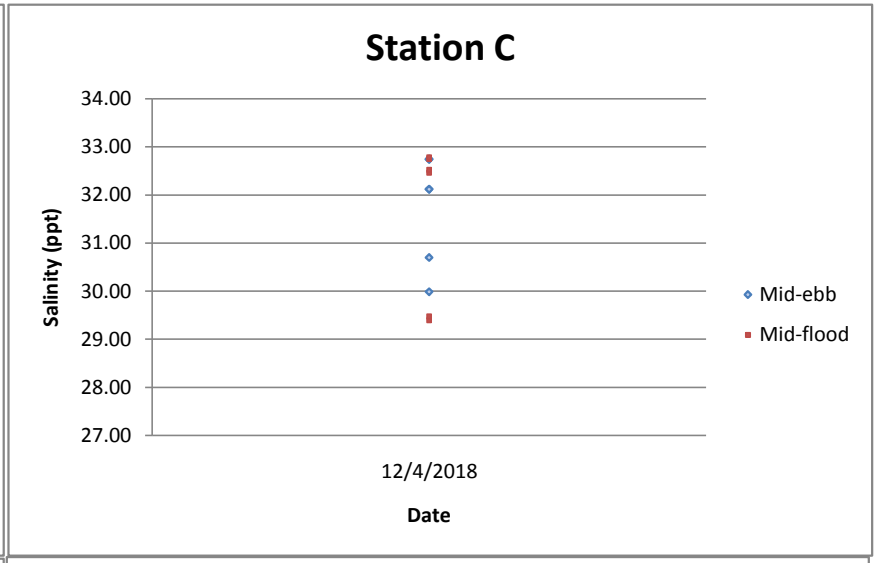

Station B
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood

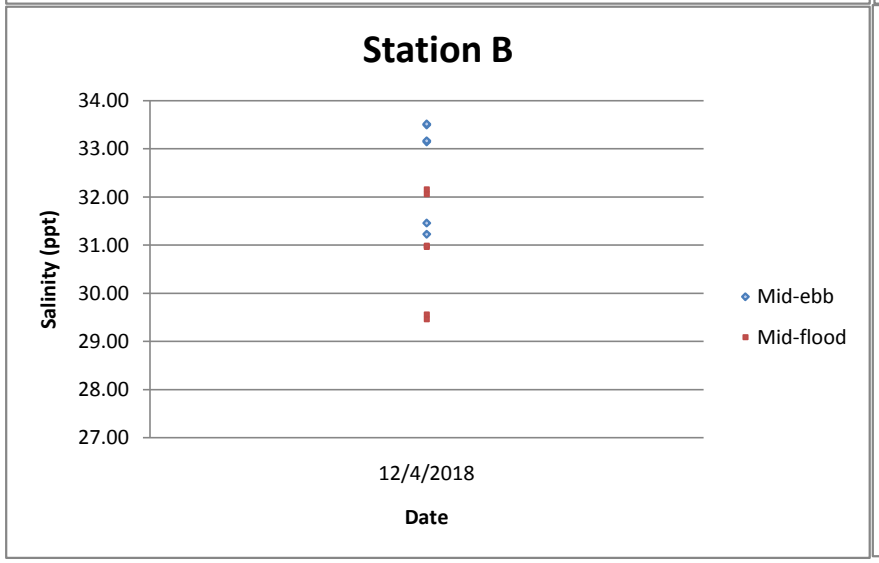

Station D
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood

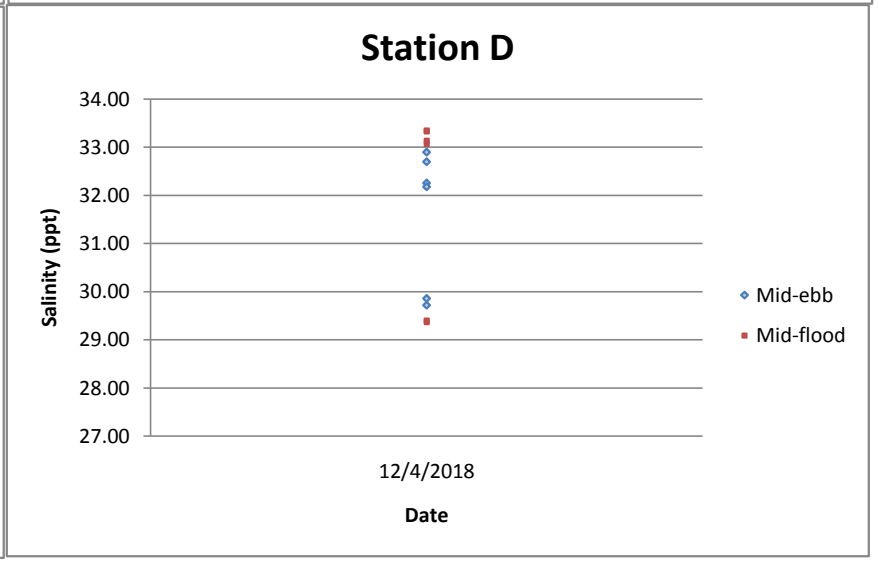

Station E
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
8.50
8.45
8.40
8.35
8.30
8.25
8.20
8.15
8.10
8.05
8.00
pH Value
12/4/2018
Date
Mid-ebb
Mid-flood

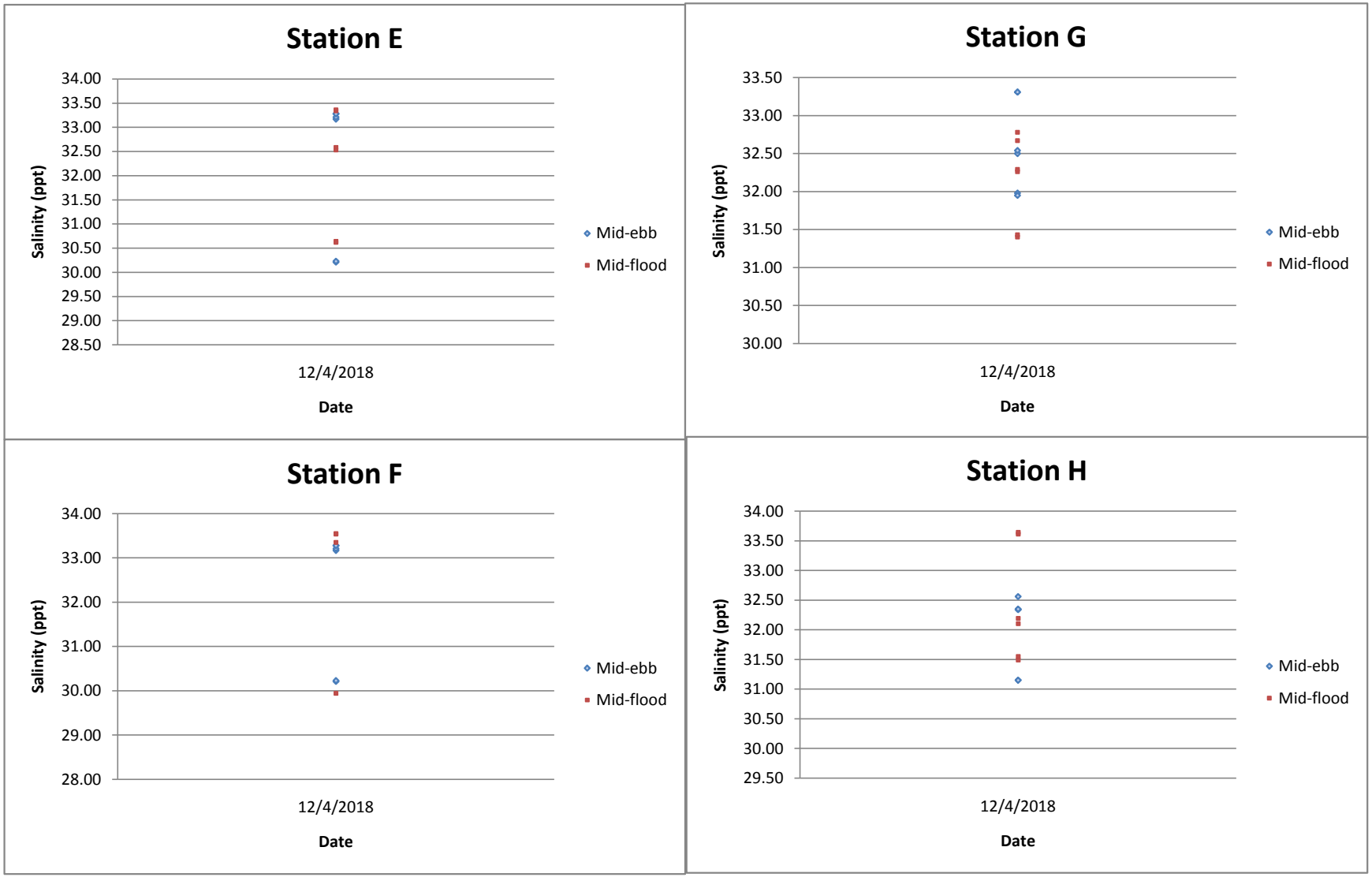
Salinity (ppt)



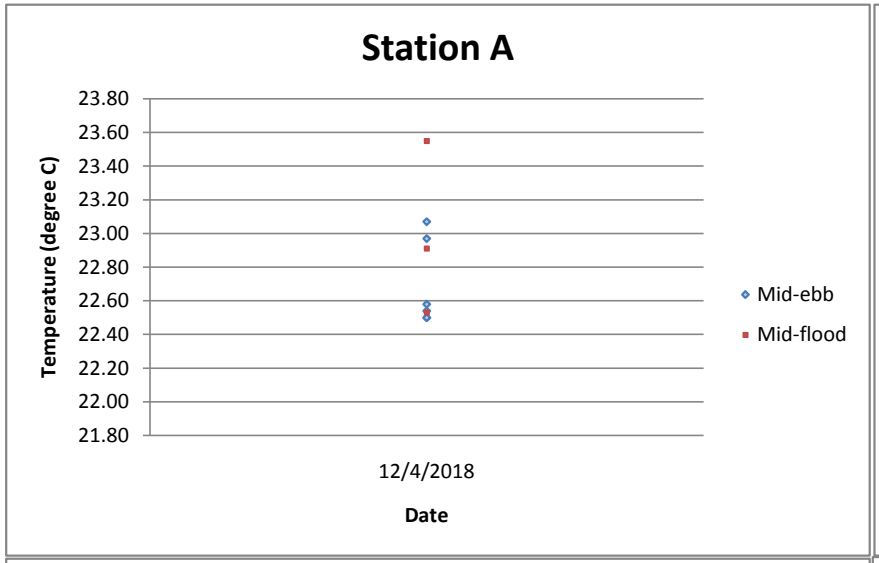


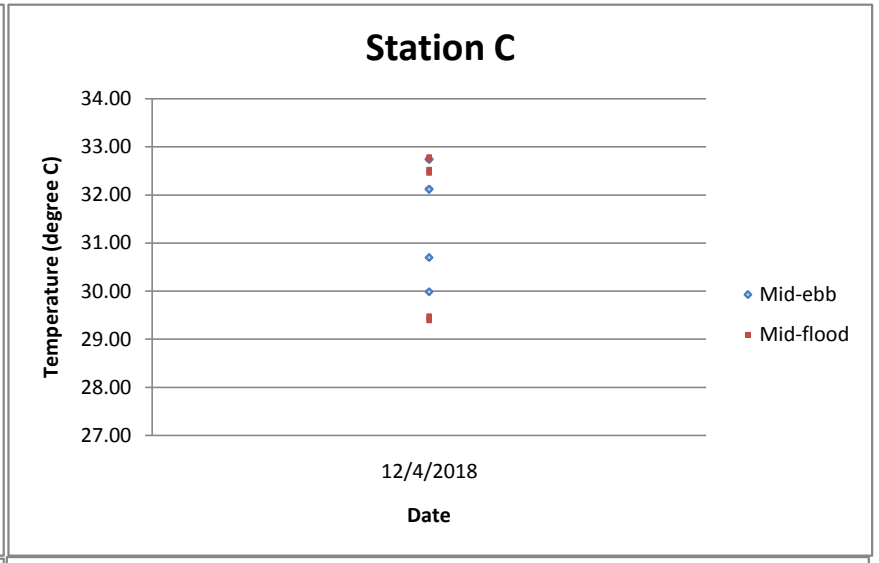


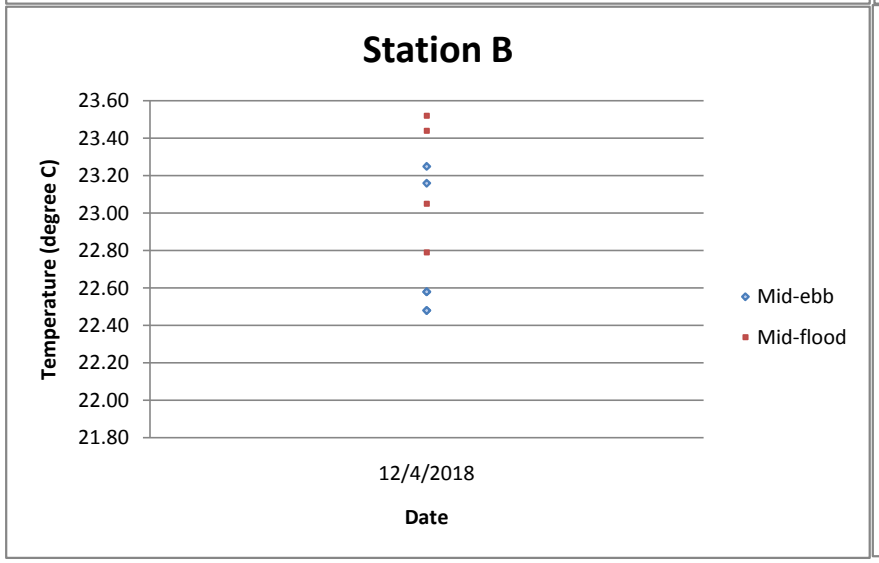


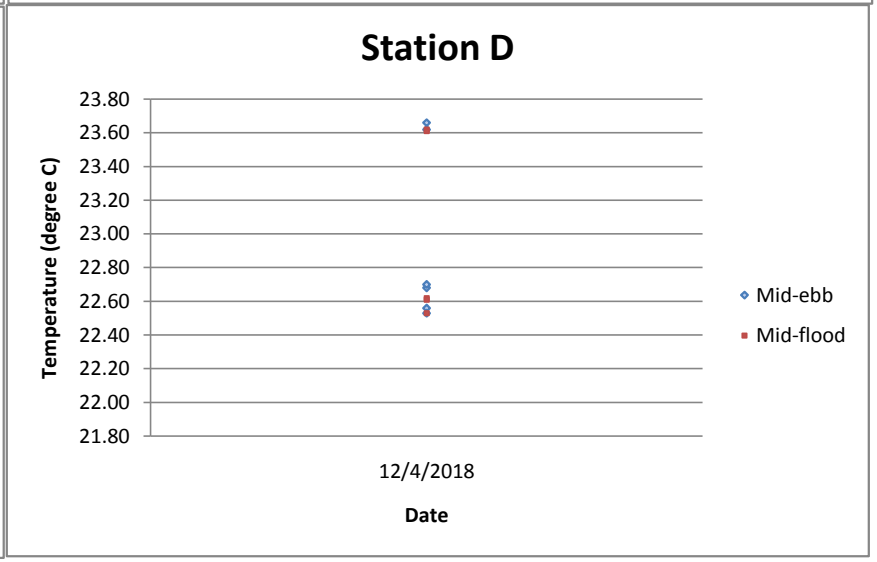

Station E
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
29.50
29.00
28.50
Salinity (ppt)
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
Salinity (ppt)
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
34.00
33.00
32.00
31.00
30.00
29.00
28.00
Salinity (ppt)
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
34.00
33.50
33.00
32.50
32.00
31.50
31.00
30.50
30.00
29.50
Salinity (ppt)
12/4/2018
Date
Mid-ebb
Mid-flood

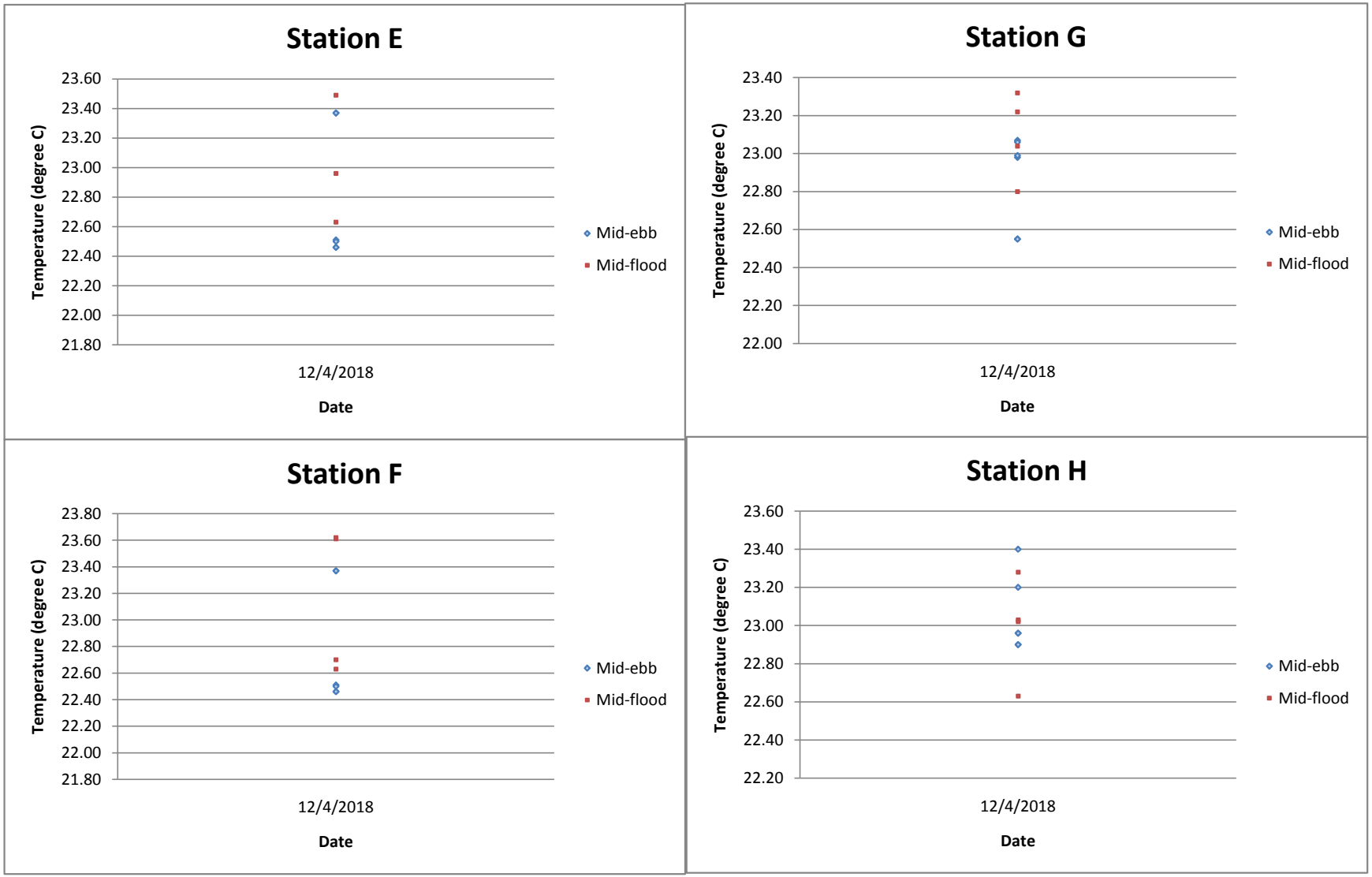
Temperature (degree C)

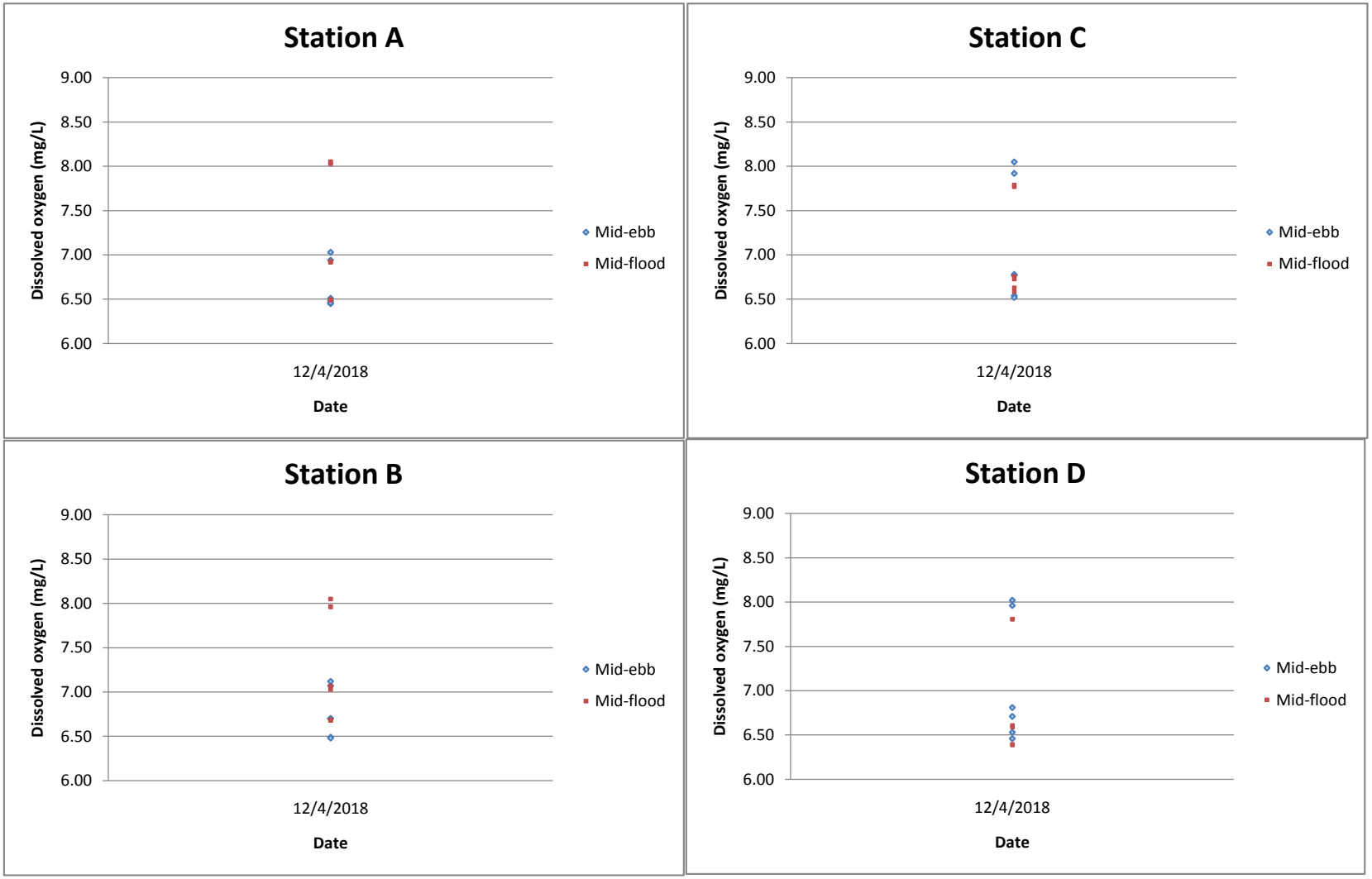


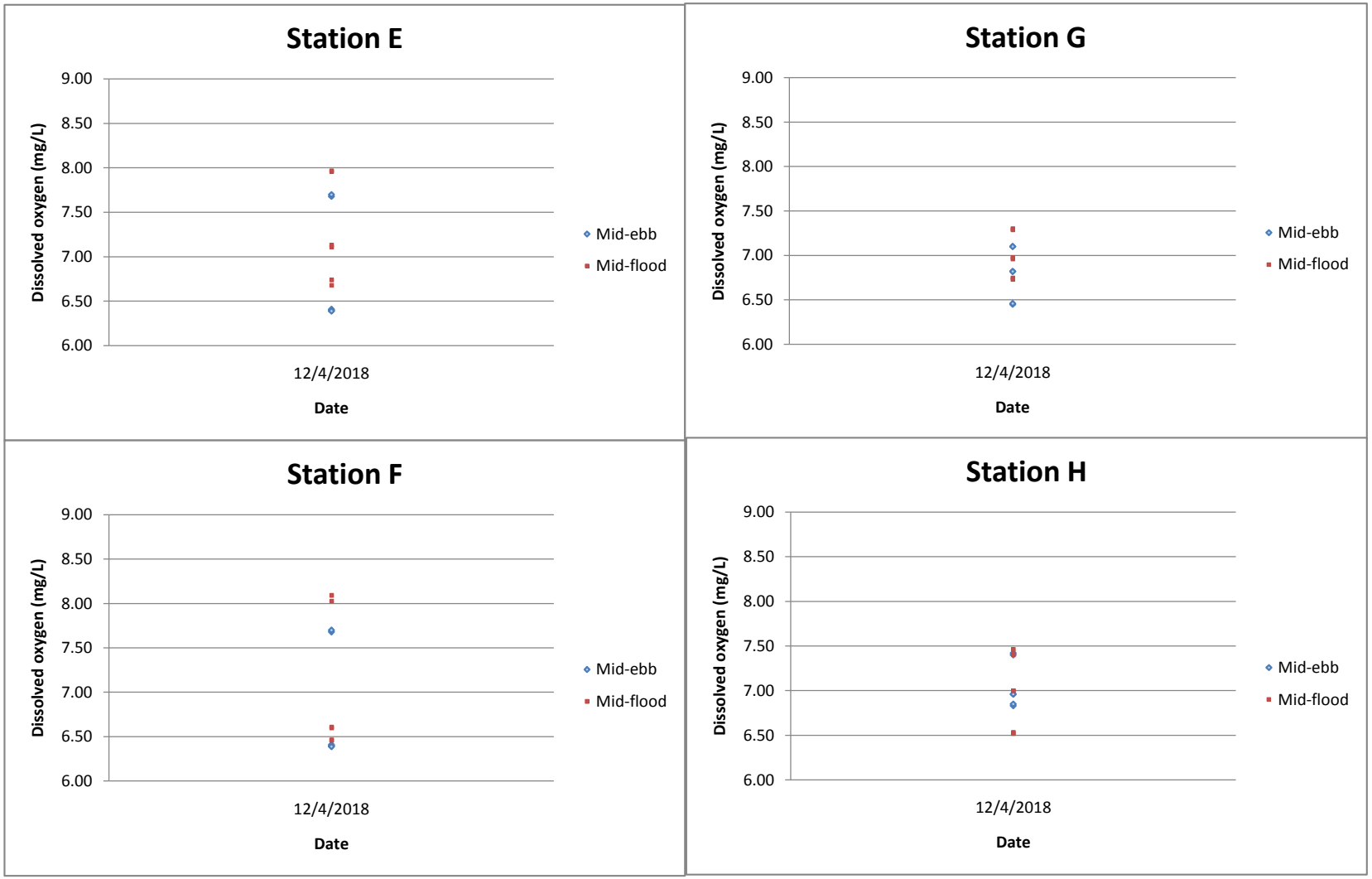




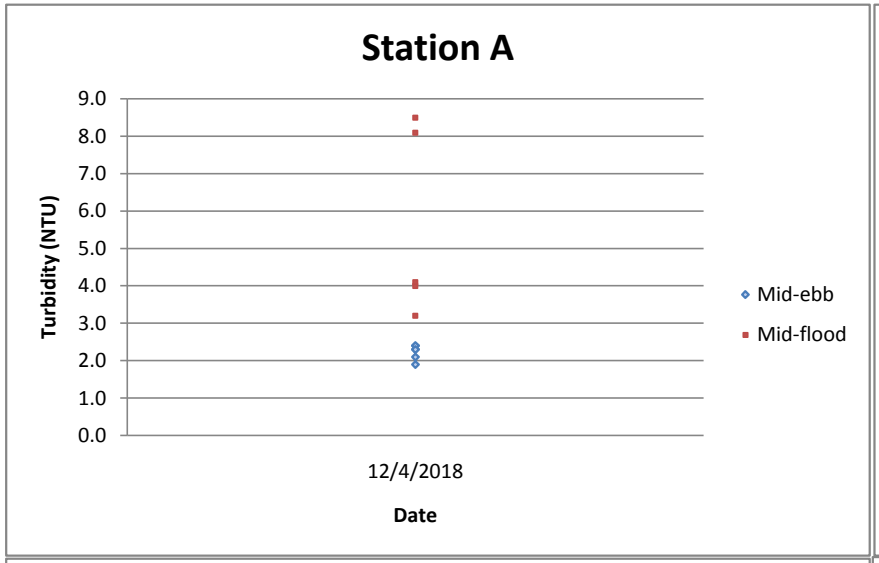


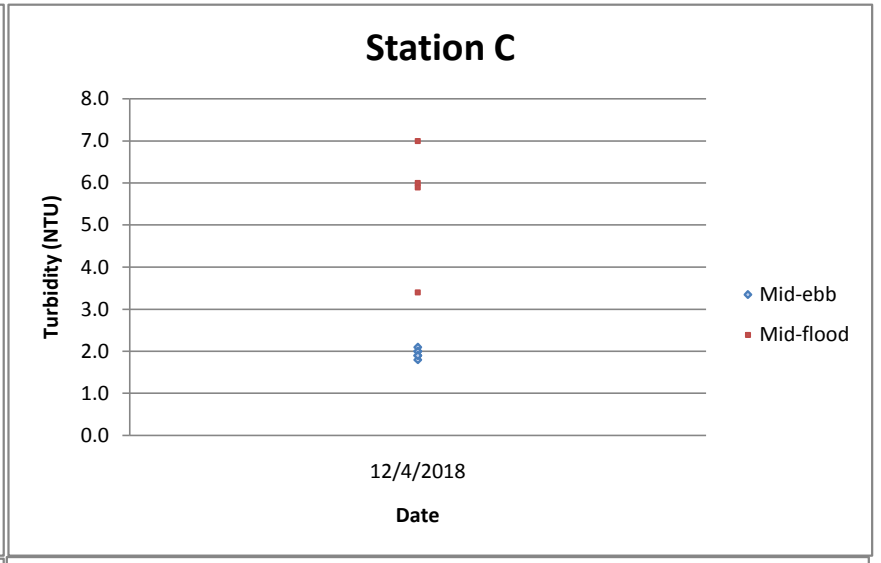

Station E
Temperature (degree C)
23.60
23.40
23.20
23.00
22.80
22.60
22.40
22.20
22.00
21.80
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
Temperature (degree C)
23.40
23.20
23.00
22.80
22.60
22.40
22.20
22.00
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
Temperature (degree C)
23.80
23.60
23.40
23.20
23.00
22.80
22.60
22.40
22.20
22.00
21.80
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
Temperature (degree C)
23.60
23.40
23.20
23.00
22.80
22.60
22.40
22.20
12/4/2018
Date
Mid-ebb
Mid-flood

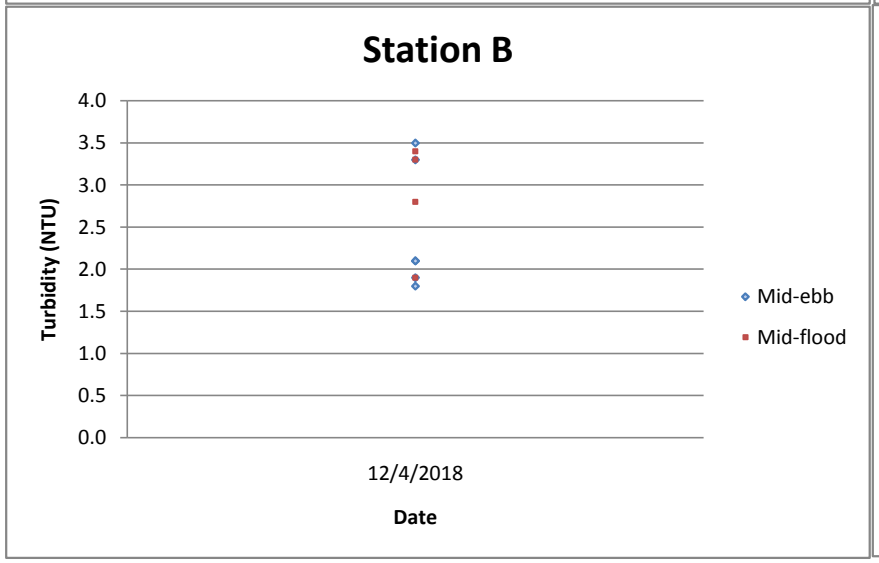

Station A
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood
Station C
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood
Station B
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood
Station D
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood

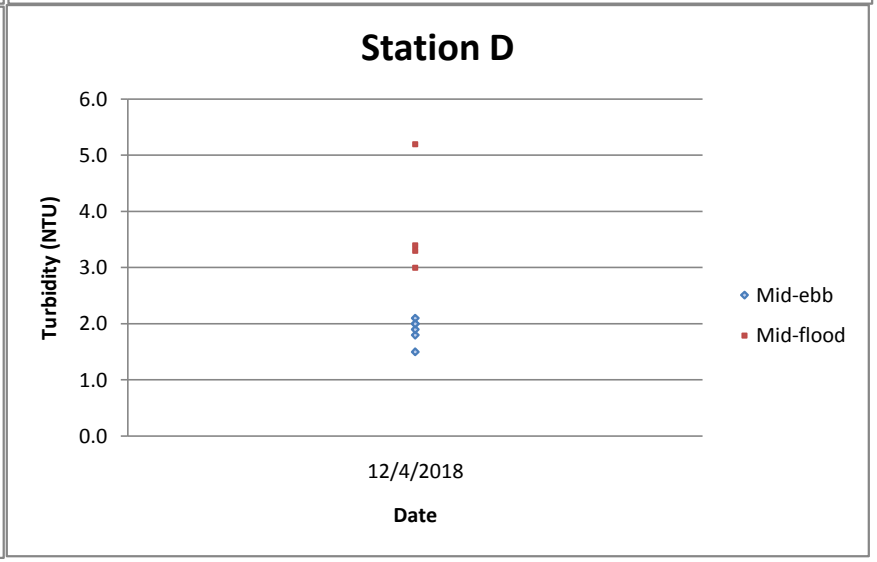

Station E
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
Dissolved oxygen (mg/L)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
12/4/2018
Date
Mid-ebb
Mid-flood

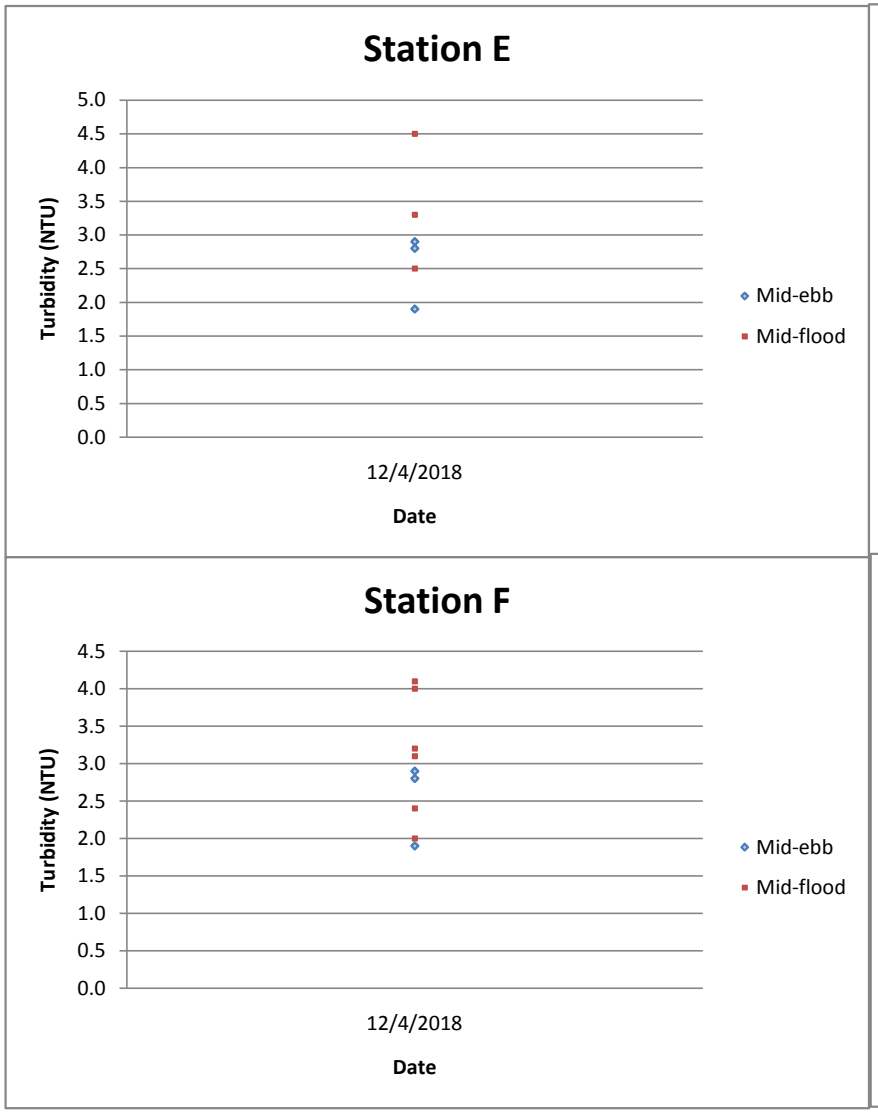
Turbidity (NTU)

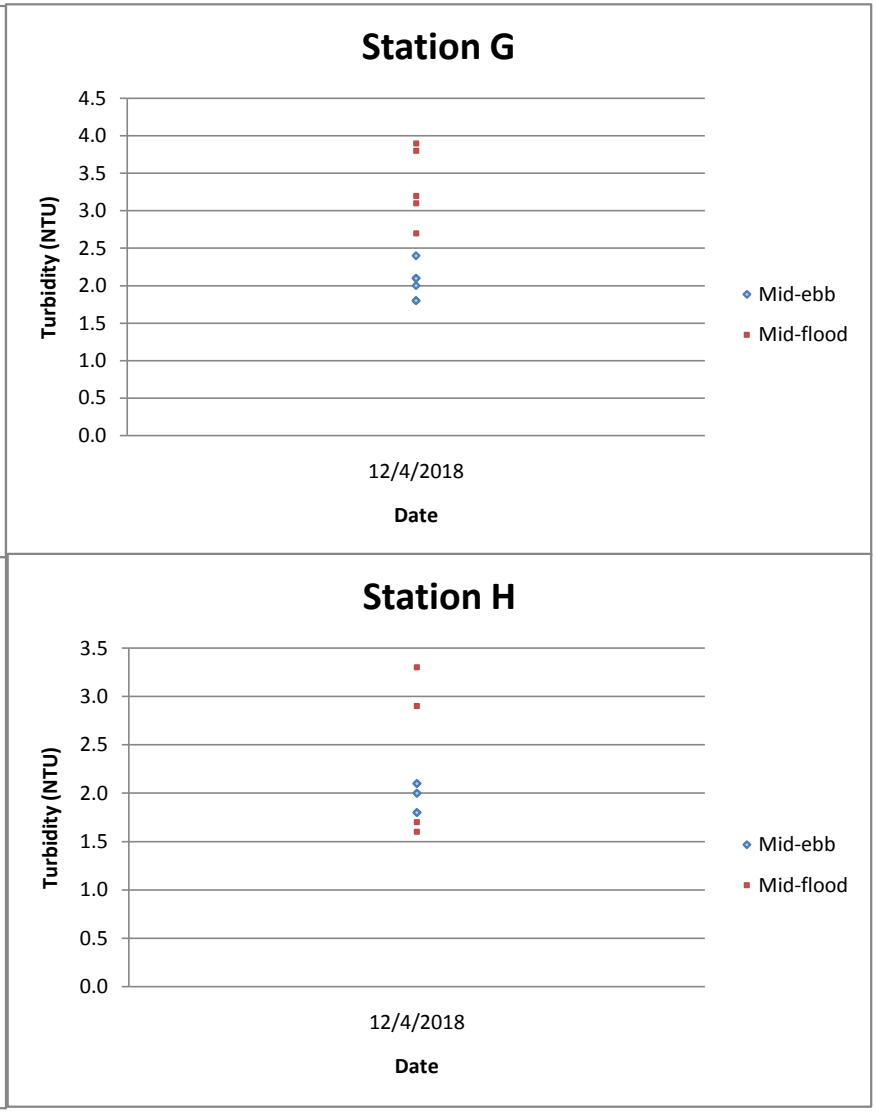








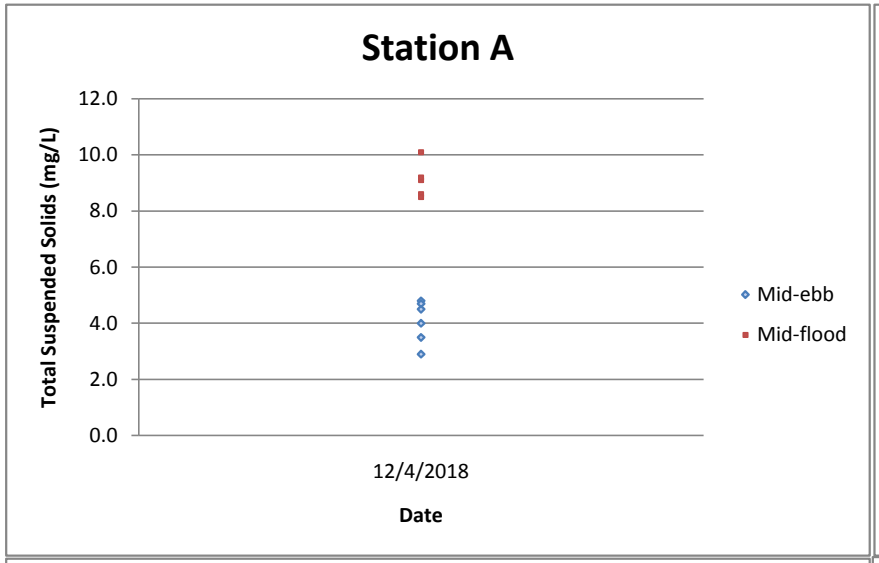

Station E
Turbidity (NTU)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

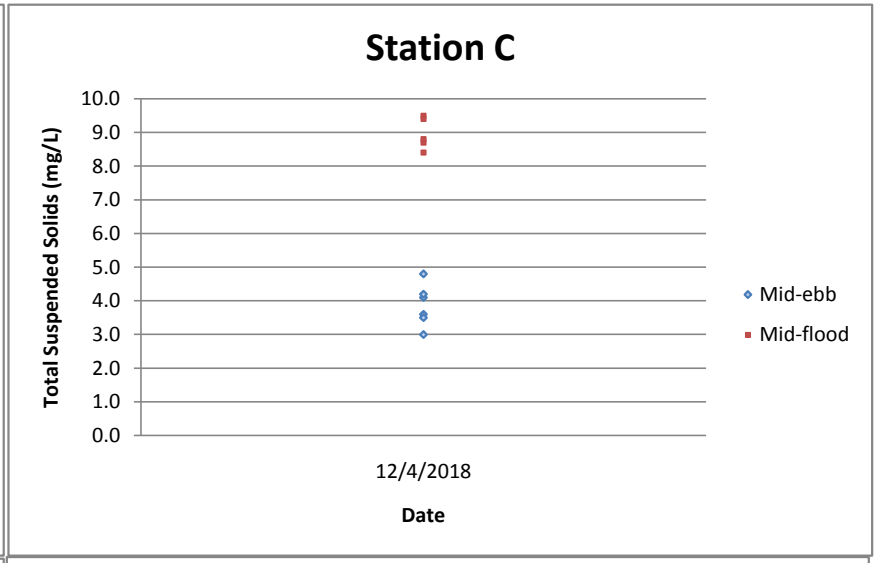

Station G
Turbidity (NTU)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

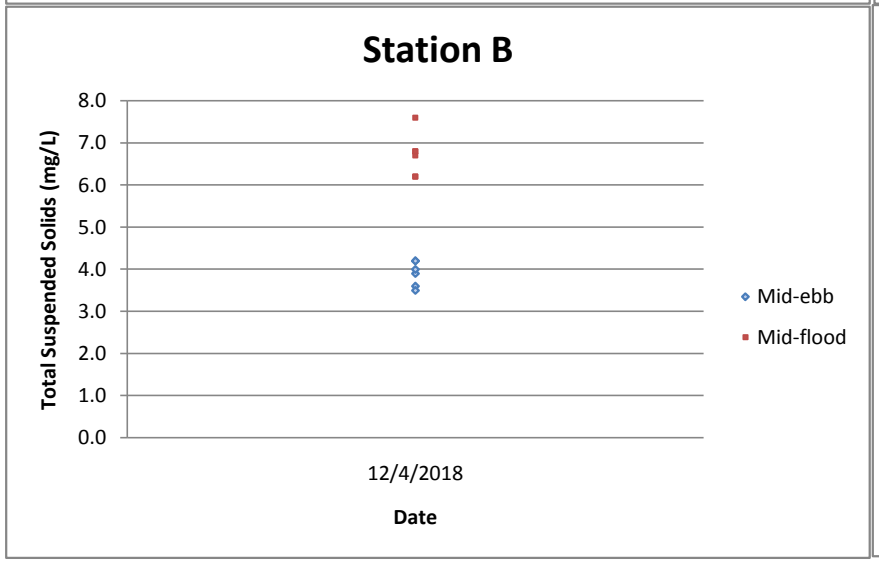
Station F
Turbidity (NTU)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

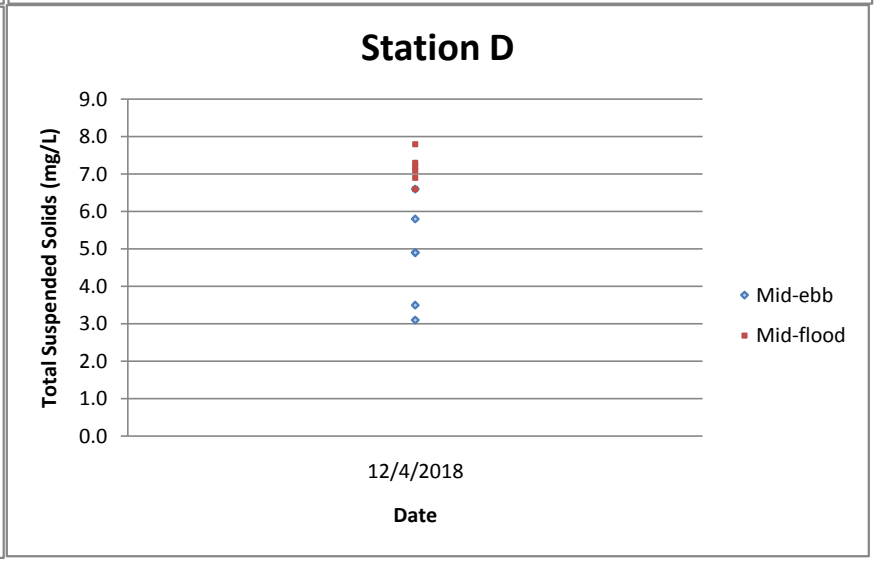
Station H
Turbidity (NTU)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

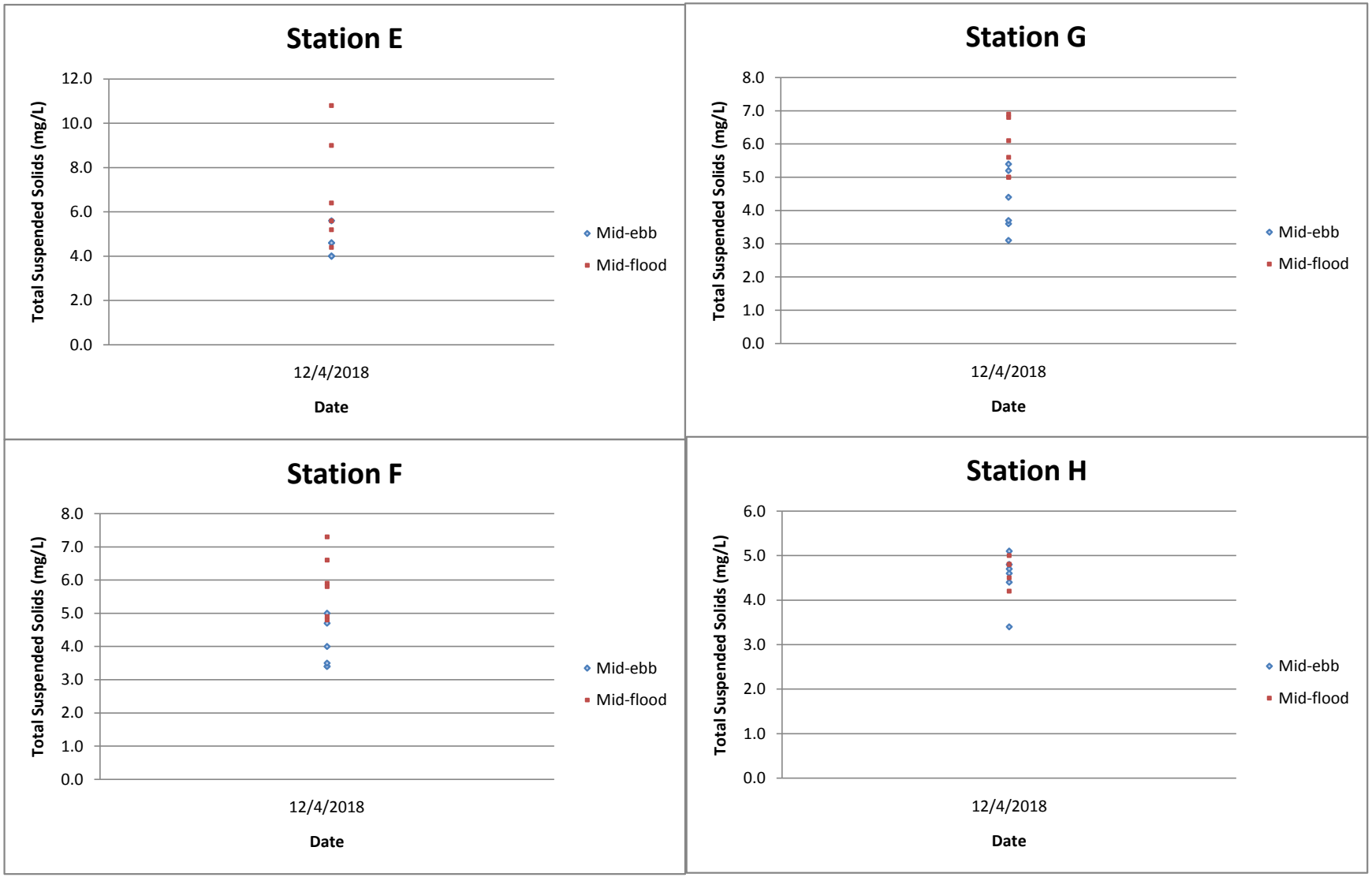
Total Suspended Solids (mg/L)

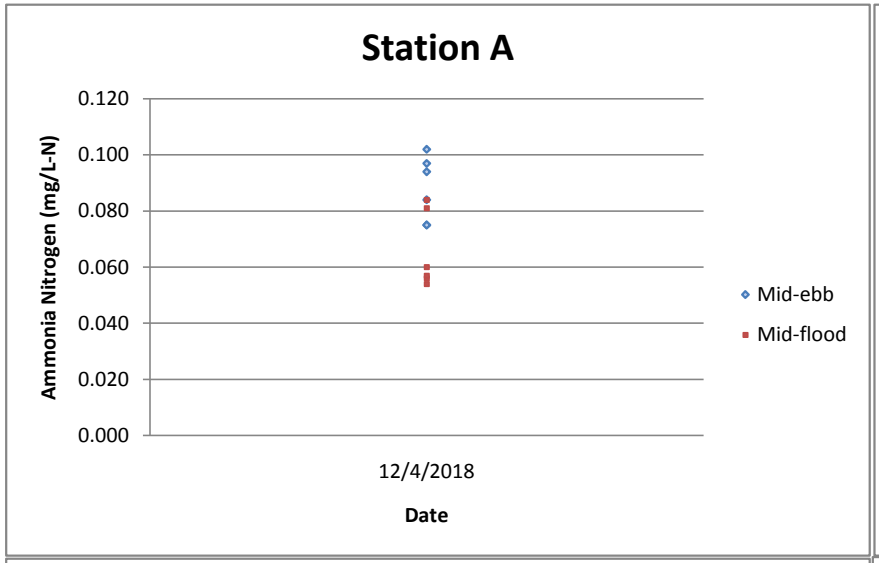


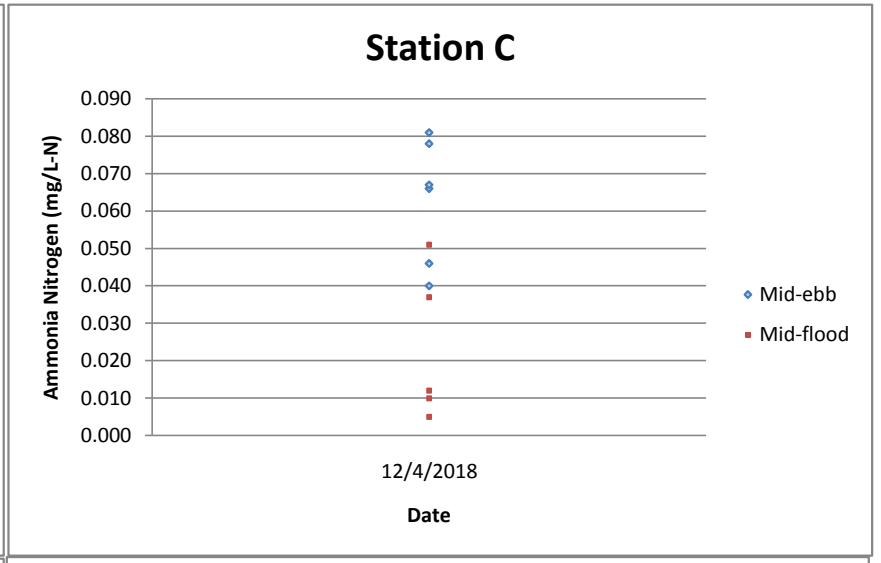


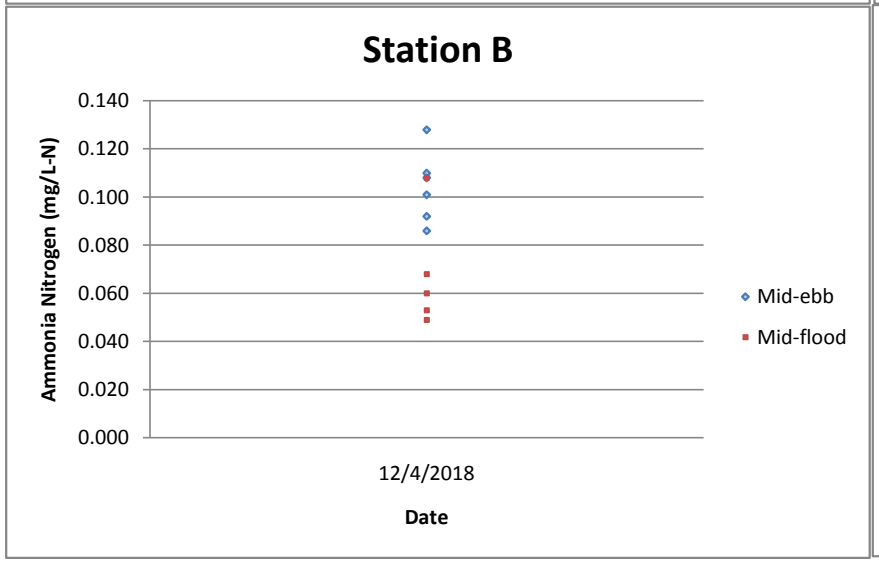


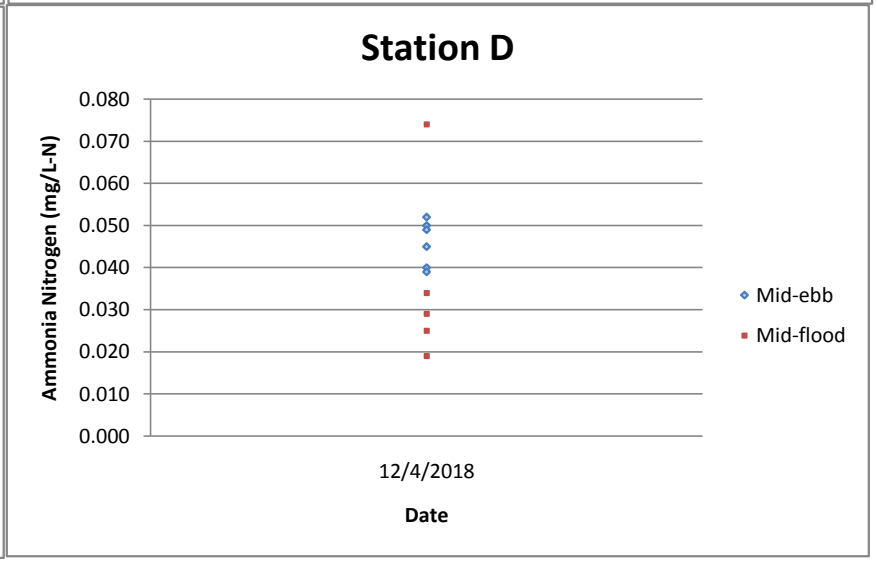


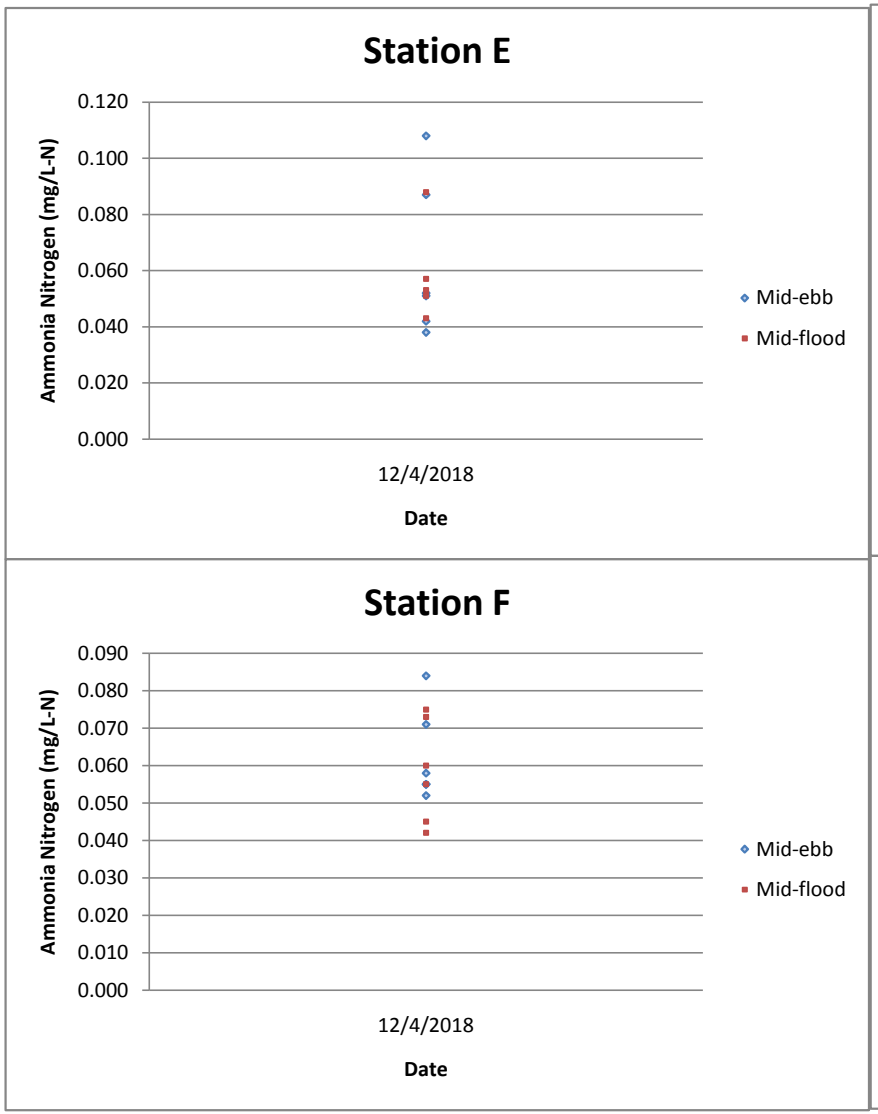

Station E
Total Suspended Solids (mg/L)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
Total Suspended Solids (mg/L)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
Total Suspended Solids (mg/L)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
Total Suspended Solids (mg/L)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

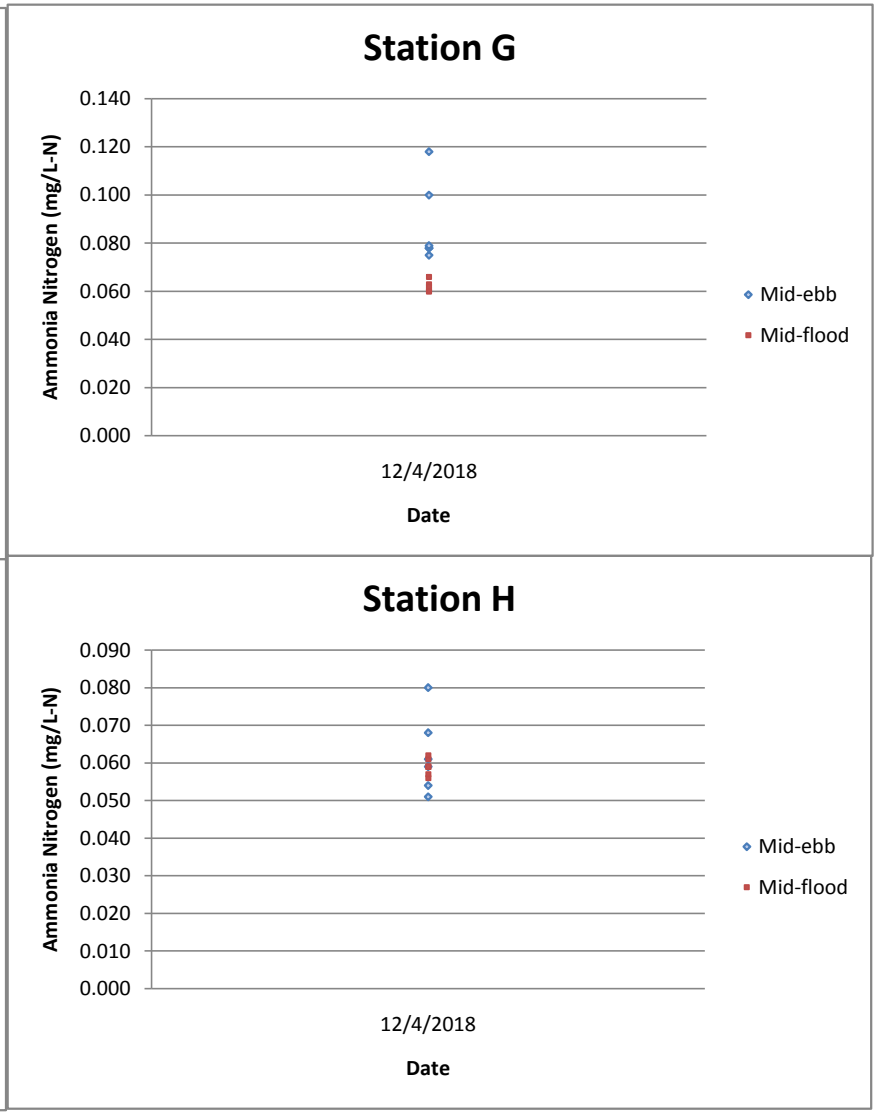

Station A
Ammonia Nitrogen (mg/L-N)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
12/4/2018
Date
Mid-ebb
Mid-flood


Station C
Ammonia Nitrogen (mg/L-N)
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
12/4/2018
Date
Mid-ebb
Mid-flood


Station B
Ammonia Nitrogen (mg/L-N)
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
12/4/2018
Date
Mid-ebb
Mid-flood


Station D
Ammonia Nitrogen (mg/L-N)
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

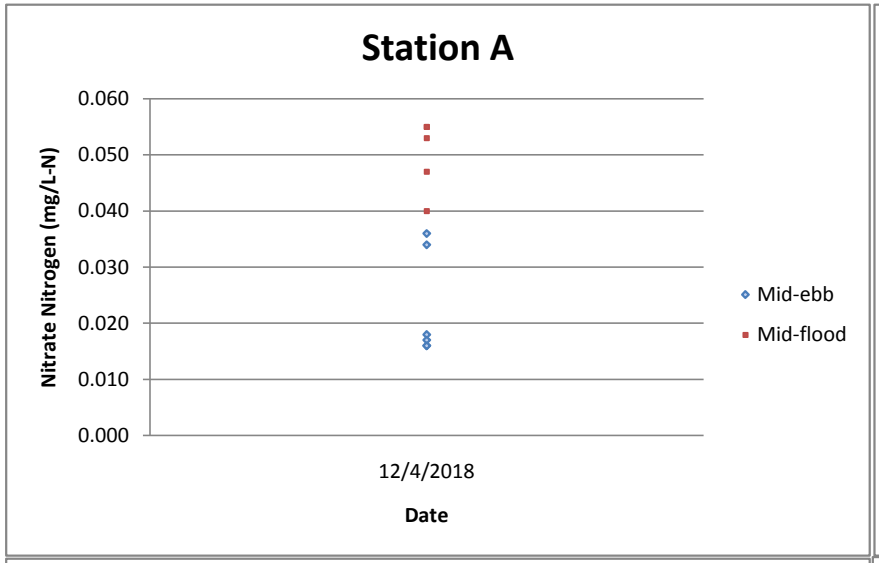

Station E
Ammonia Nitrogen (mg/L-N)
0.120
0.100
0.080
0.060
0.040
0.020
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

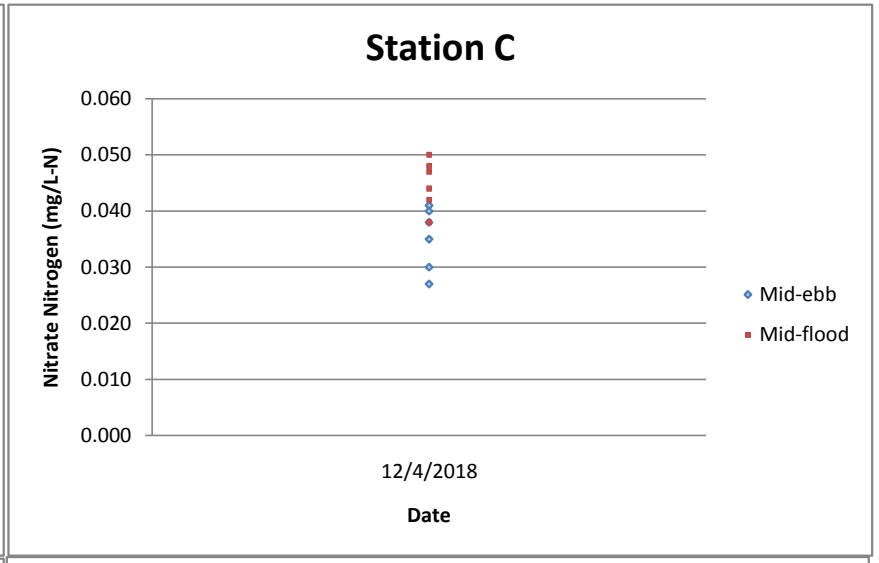

Station G
Ammonia Nitrogen (mg/L-N)
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

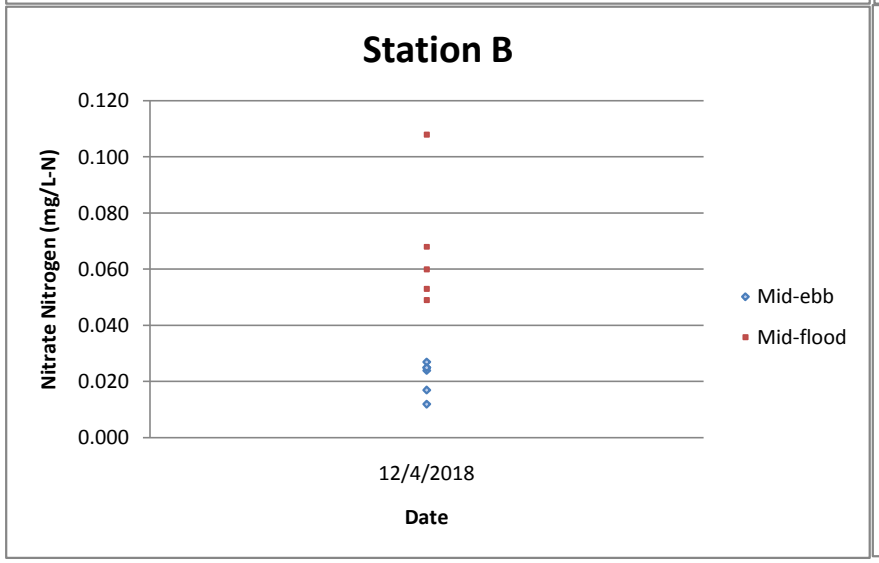
Station F
Ammonia Nitrogen (mg/L-N)
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

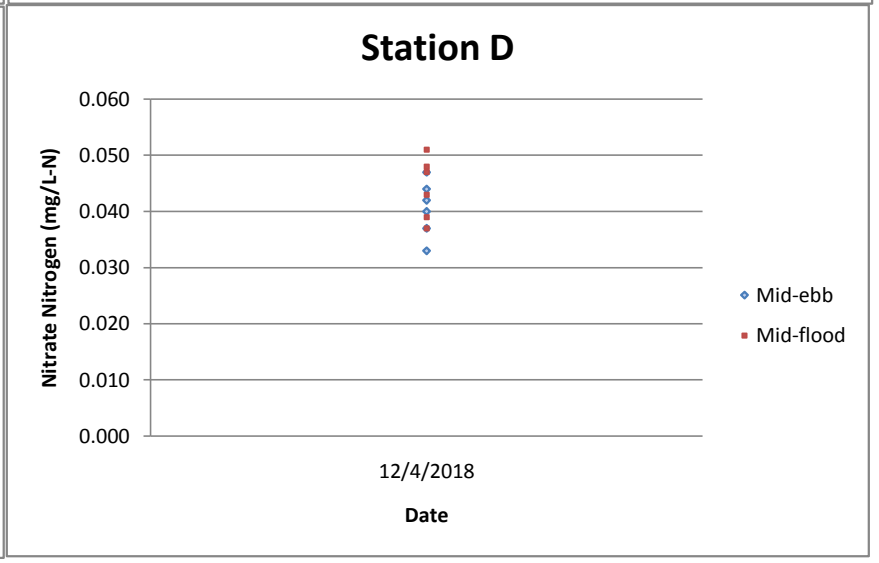
Station H
Ammonia Nitrogen (mg/L-N)
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

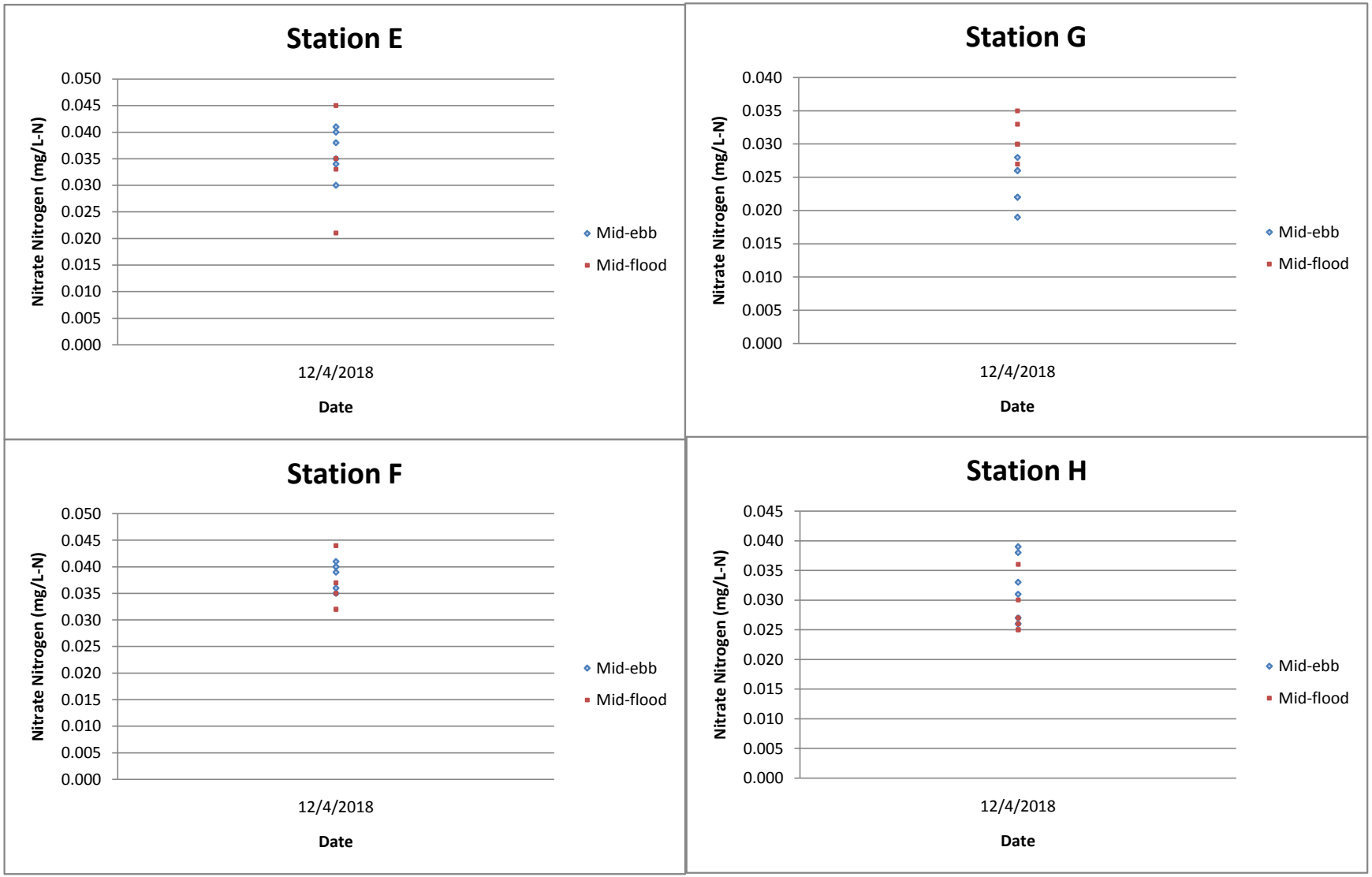
Nitrate Nitrogen (mg/L-N)



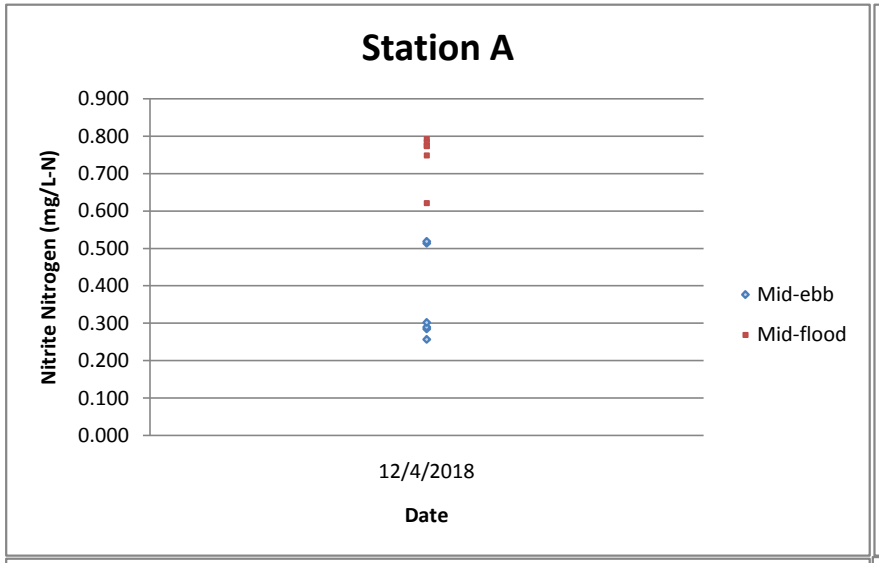


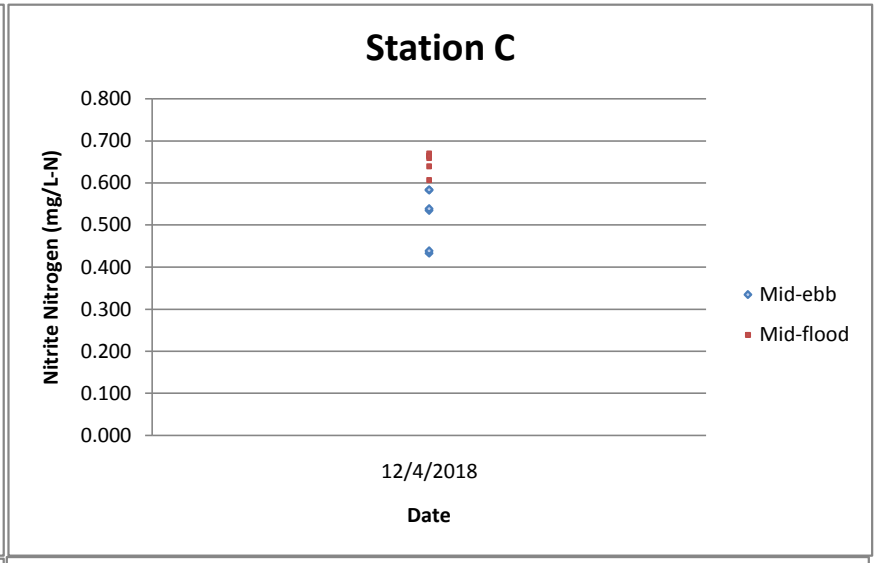


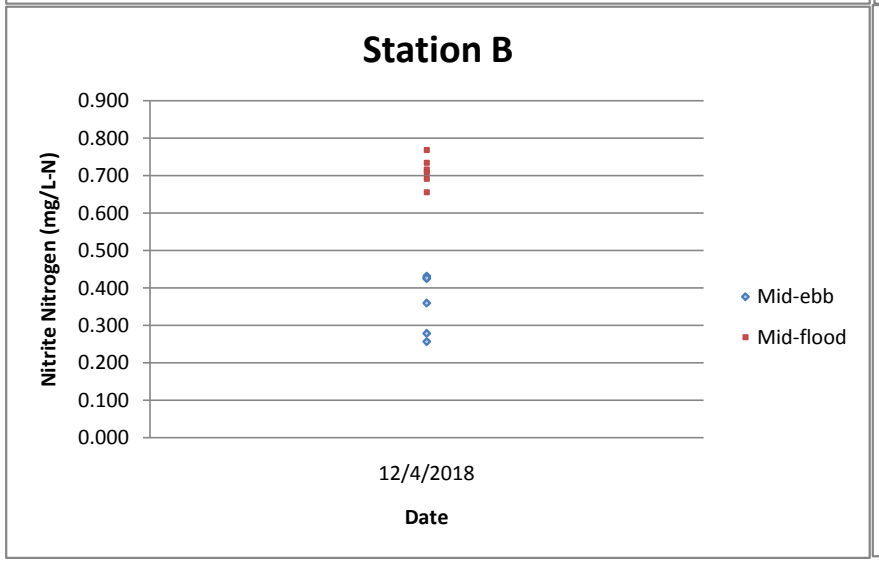


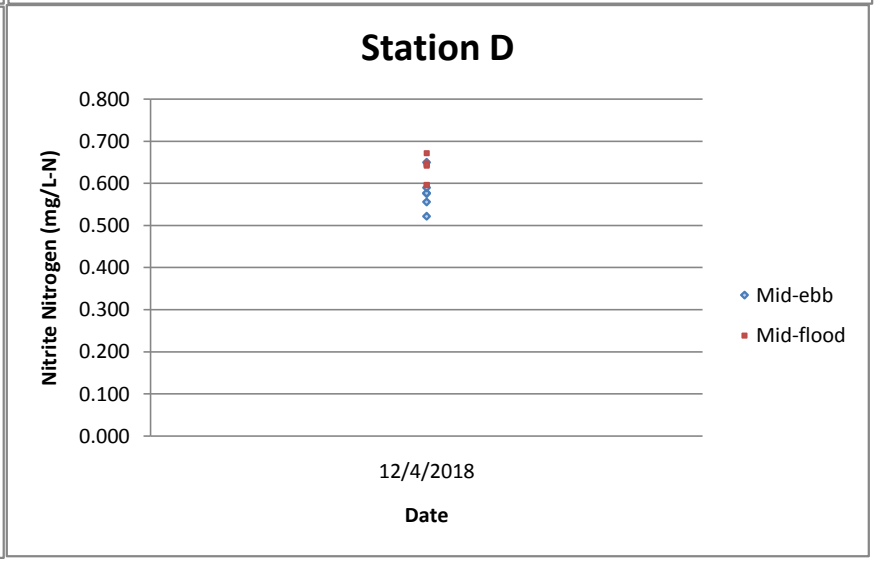

Station E
Nitrate Nitrogen (mg/L-N)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
Nitrate Nitrogen (mg/L-N)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
Nitrate Nitrogen (mg/L-N)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
Nitrate Nitrogen (mg/L-N)
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

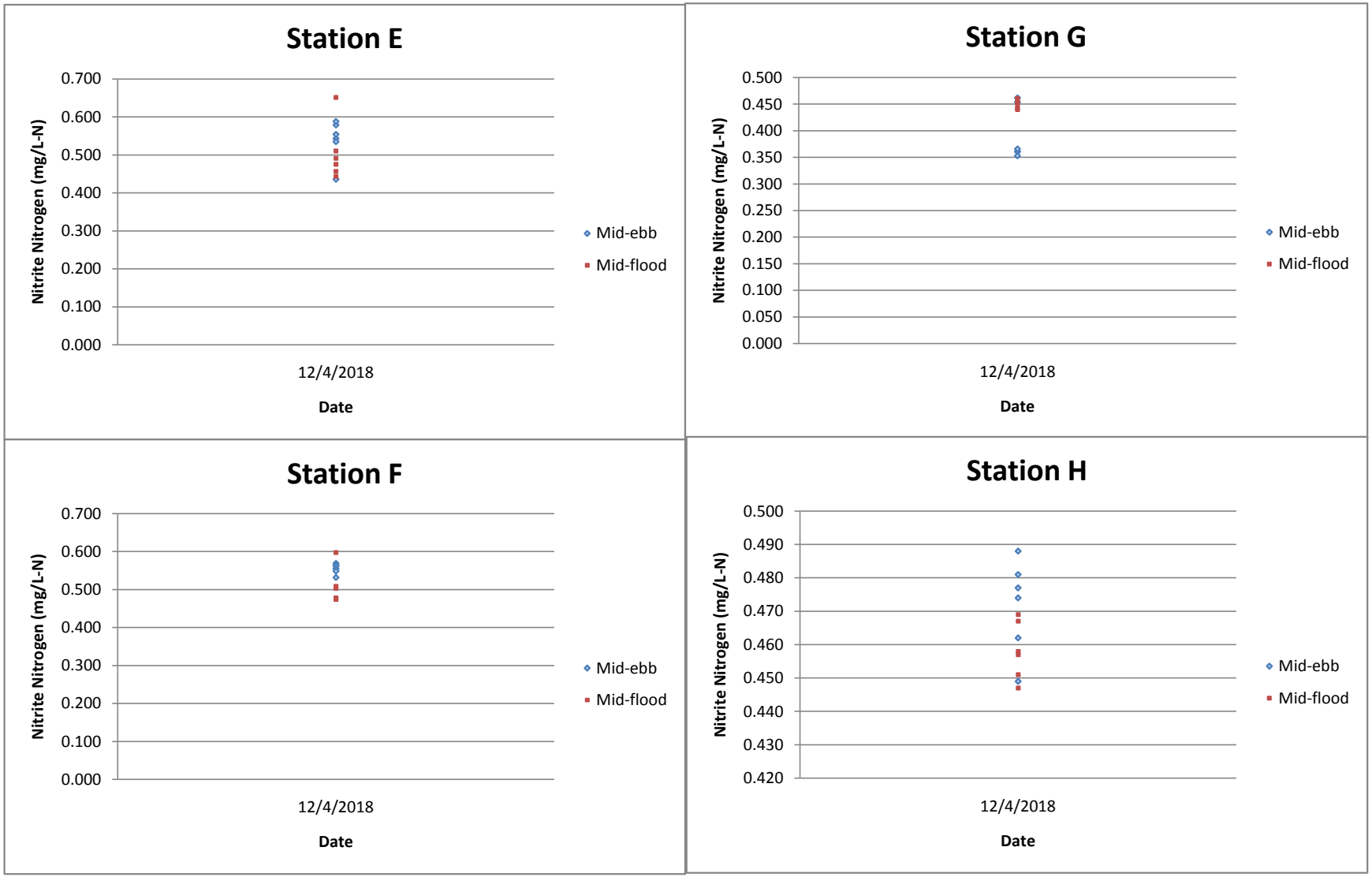
Nitrite Nitrogen (mg/L-N)

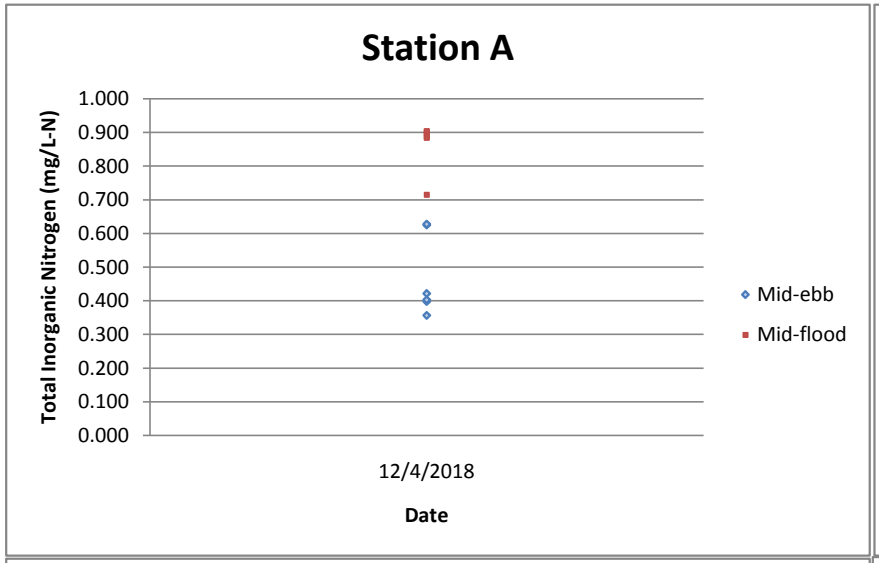


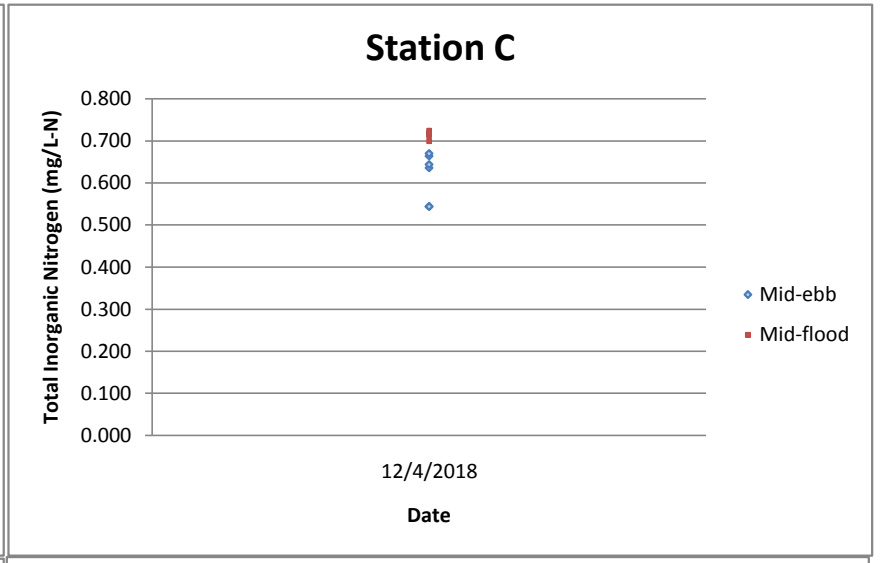


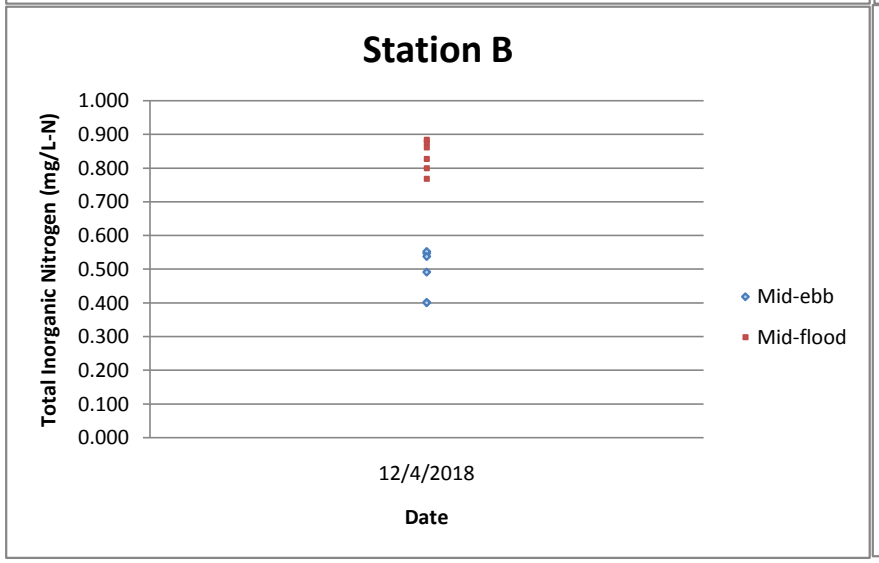


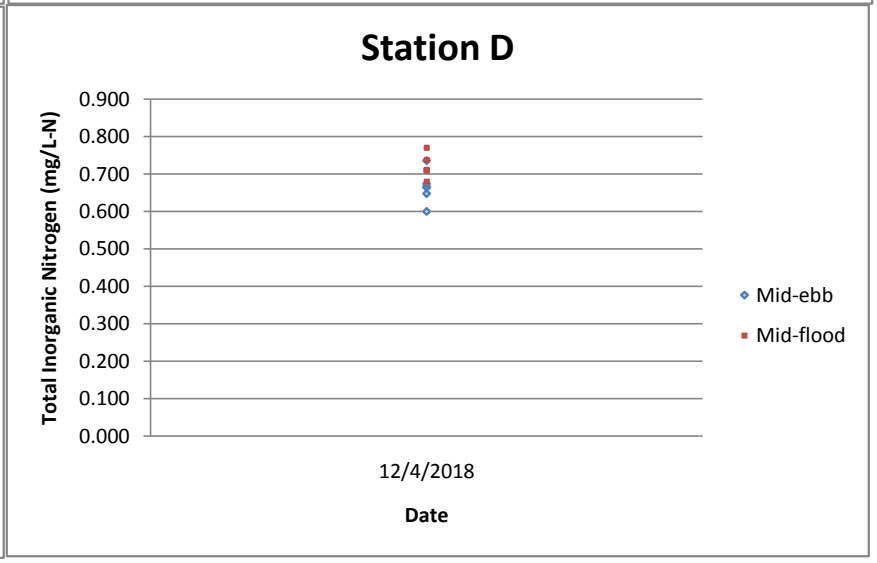


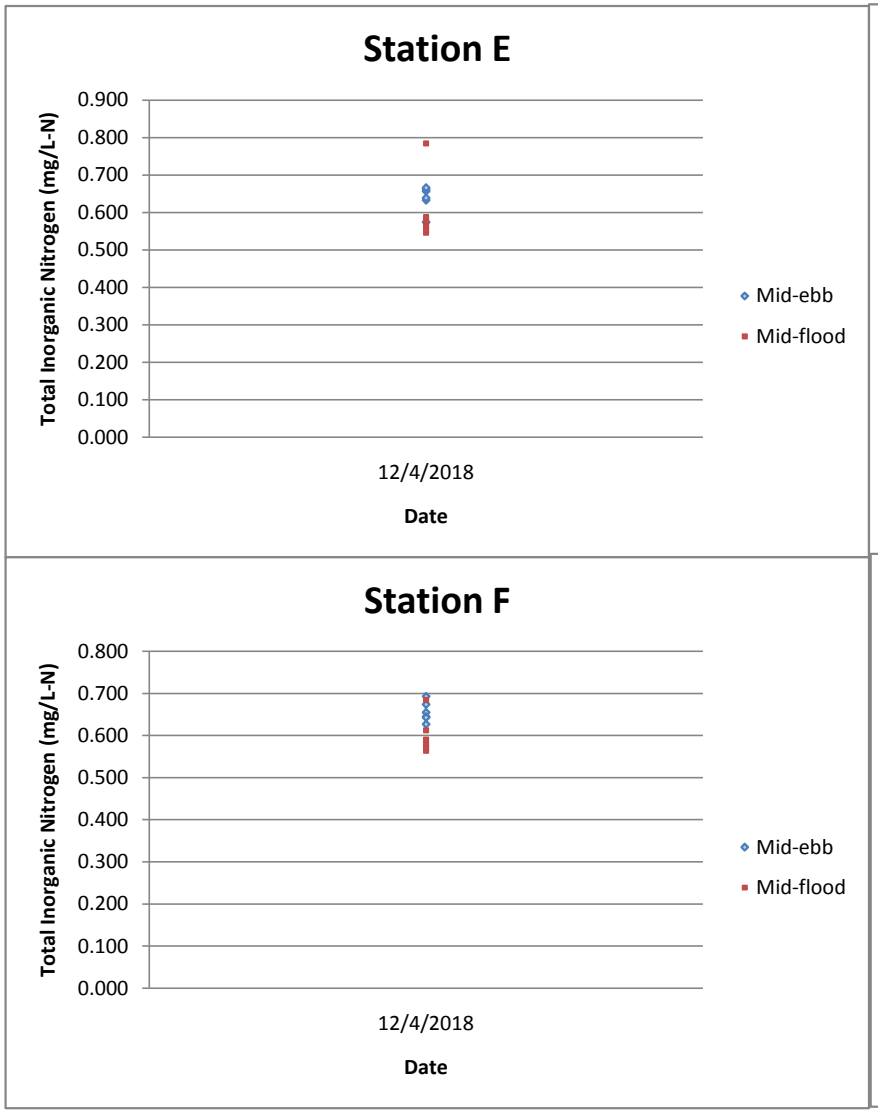

Station E
Nitrite Nitrogen (mg/L-N)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
Nitrite Nitrogen (mg/L-N)
0.500
0.450
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
Nitrite Nitrogen (mg/L-N)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
Nitrite Nitrogen (mg/L-N)
0.500
0.490
0.480
0.470
0.460
0.450
0.440
0.430
0.420
12/4/2018
Date
Mid-ebb
Mid-flood

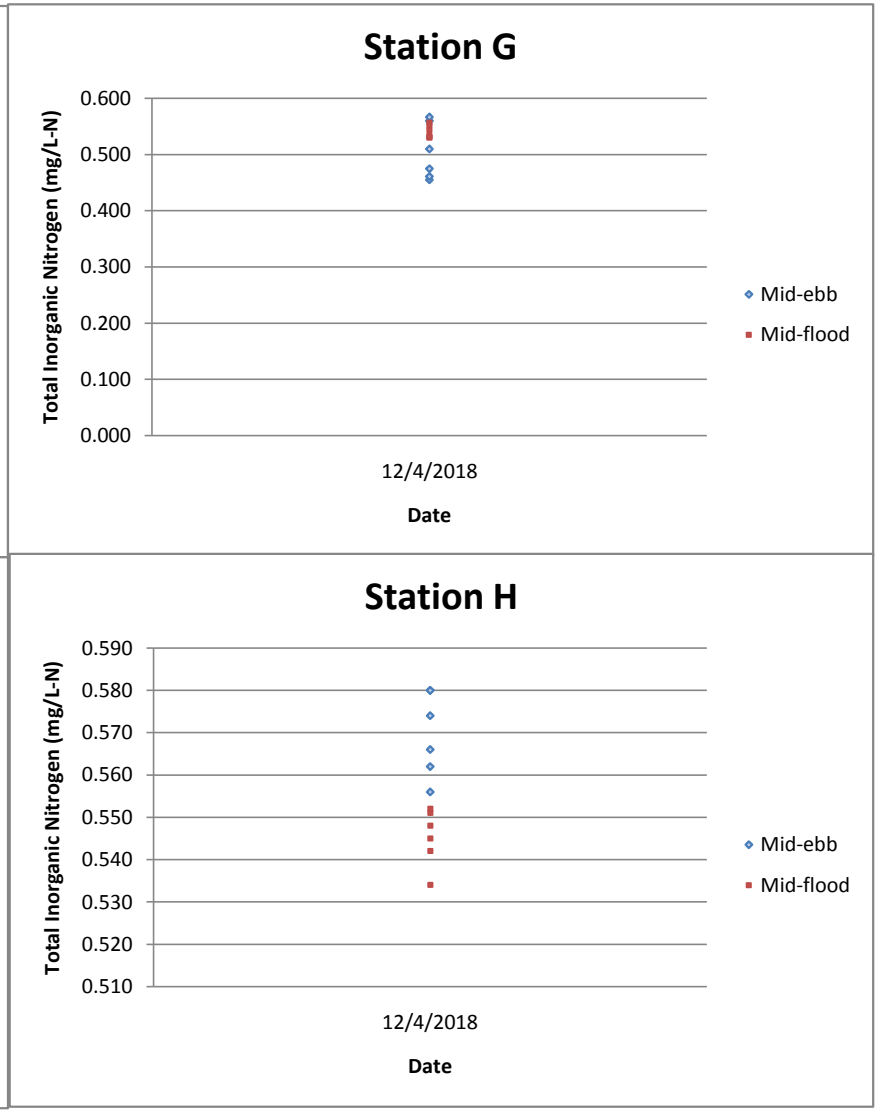

Station A
Total Inorganic Nitrogen (mg/L-N)
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood


Station C
Total Inorganic Nitrogen (mg/L-N)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood


Station B
Total Inorganic Nitrogen (mg/L-N)
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood


Station D
Total Inorganic Nitrogen (mg/L-N)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

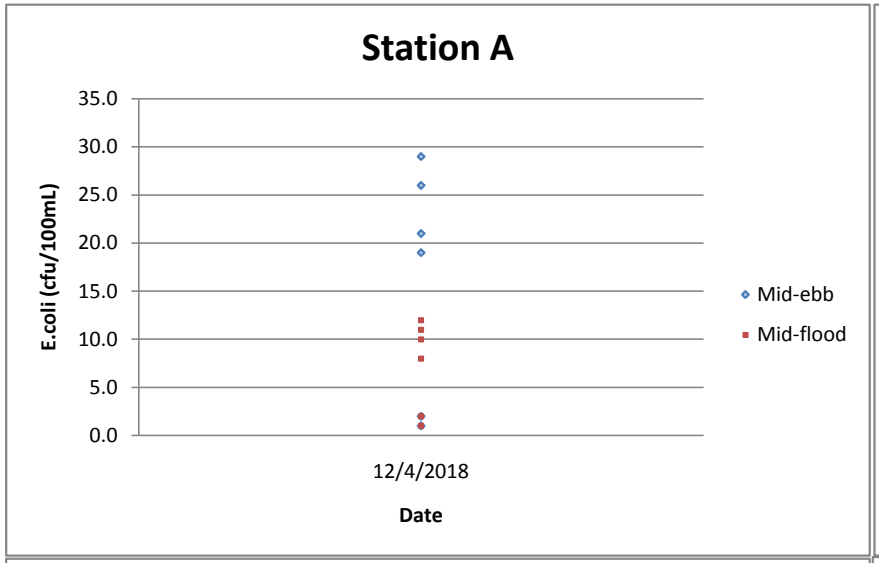

Station E
Total Inorganic Nitrogen (mg/L-N)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

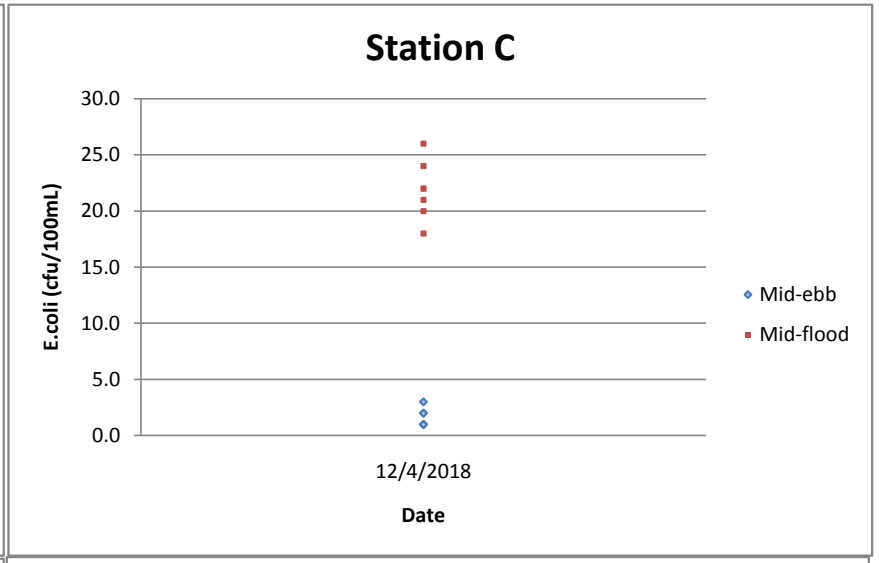

Station G
Total Inorganic Nitrogen (mg/L-N)
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

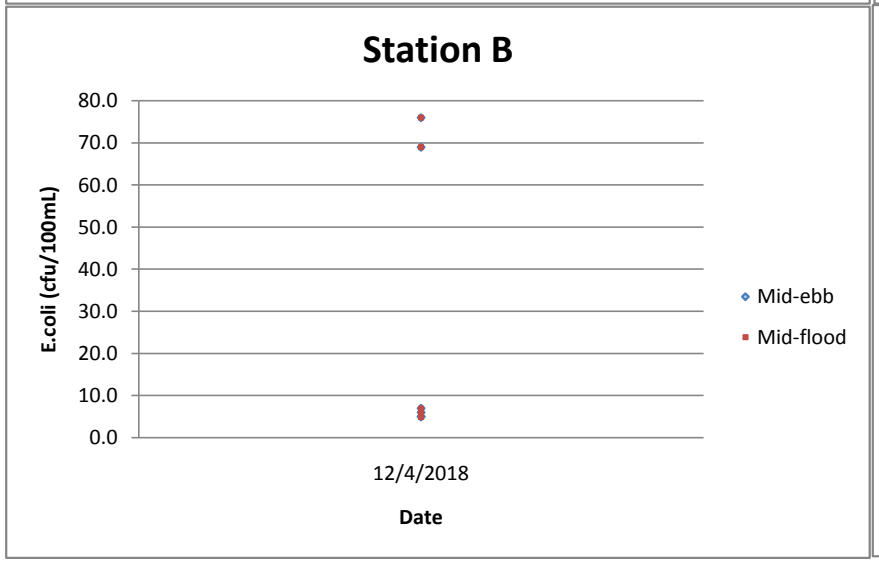
Station F
Total Inorganic Nitrogen (mg/L-N)
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
12/4/2018
Date
Mid-ebb
Mid-flood

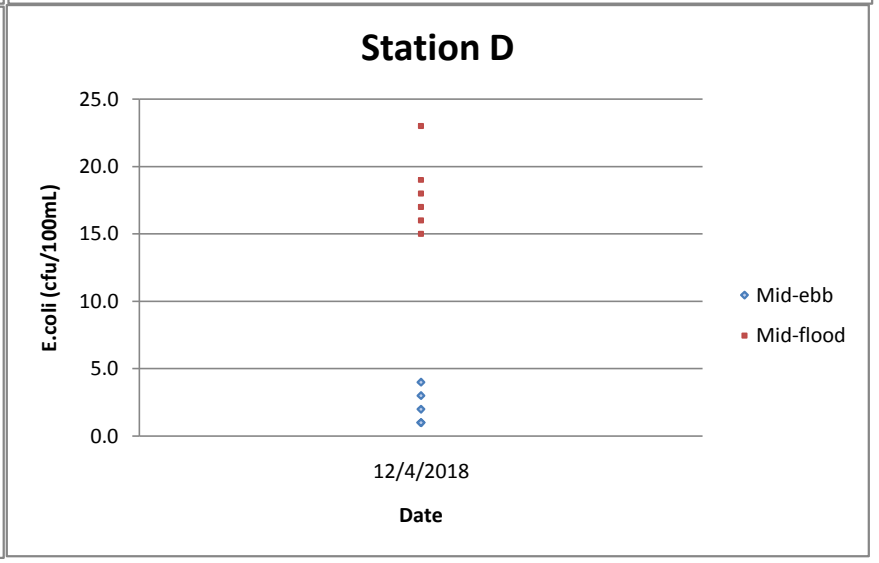
Station H
Total Inorganic Nitrogen (mg/L-N)
0.590
0.580
0.570
0.560
0.550
0.540
0.530
0.520
0.510
12/4/2018
Date
Mid-ebb
Mid-flood

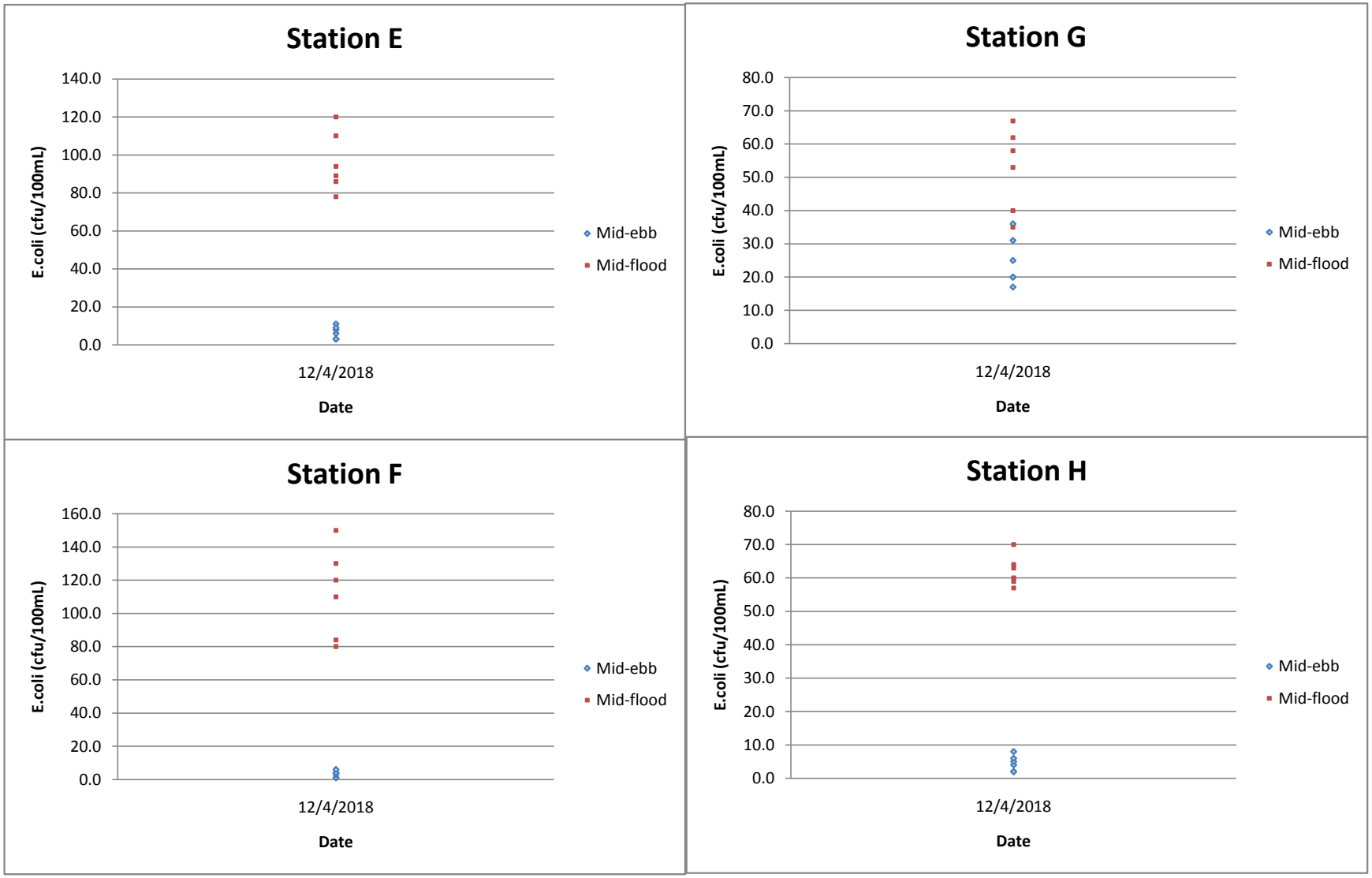
E.coli (cfu/100mL)



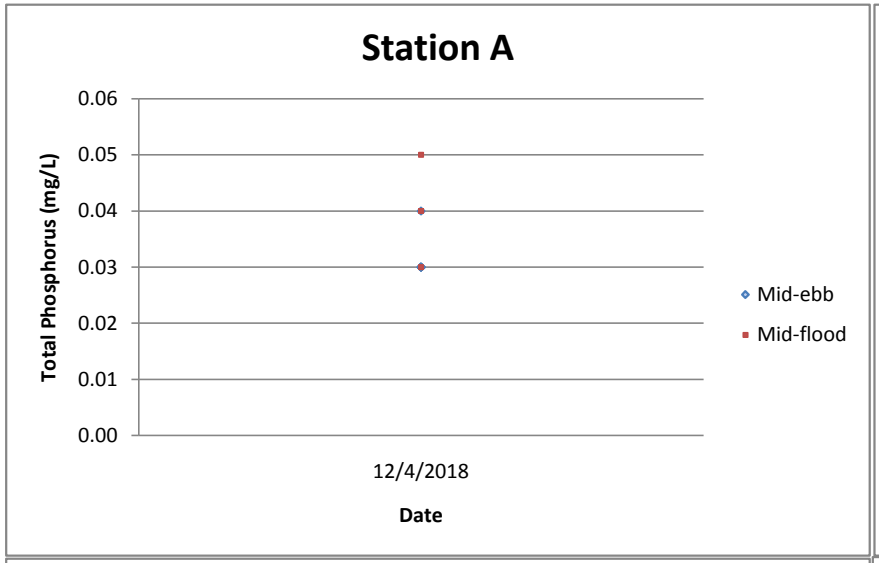


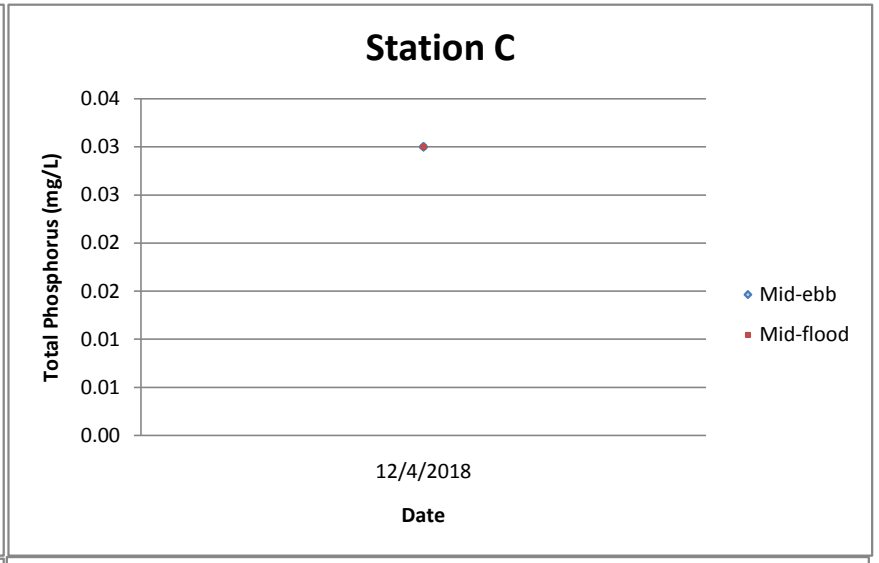


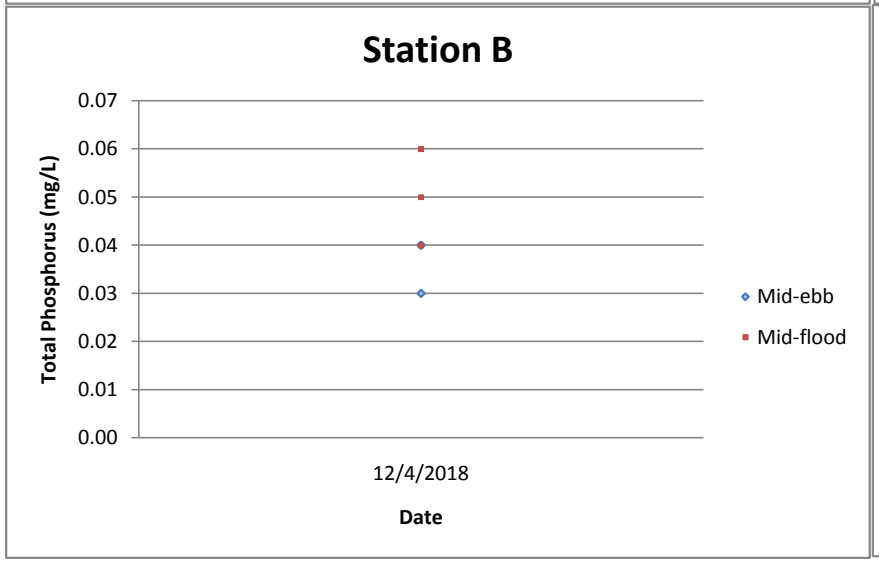


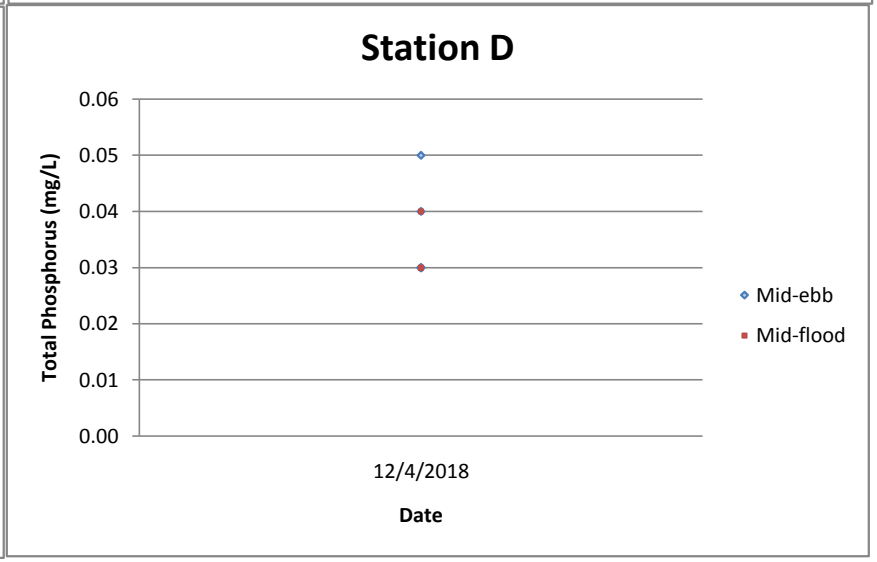

Station E
E.coli (cfu/100mL)
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
E.coli (cfu/100mL)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
E.coli (cfu/100mL)
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
E.coli (cfu/100mL)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

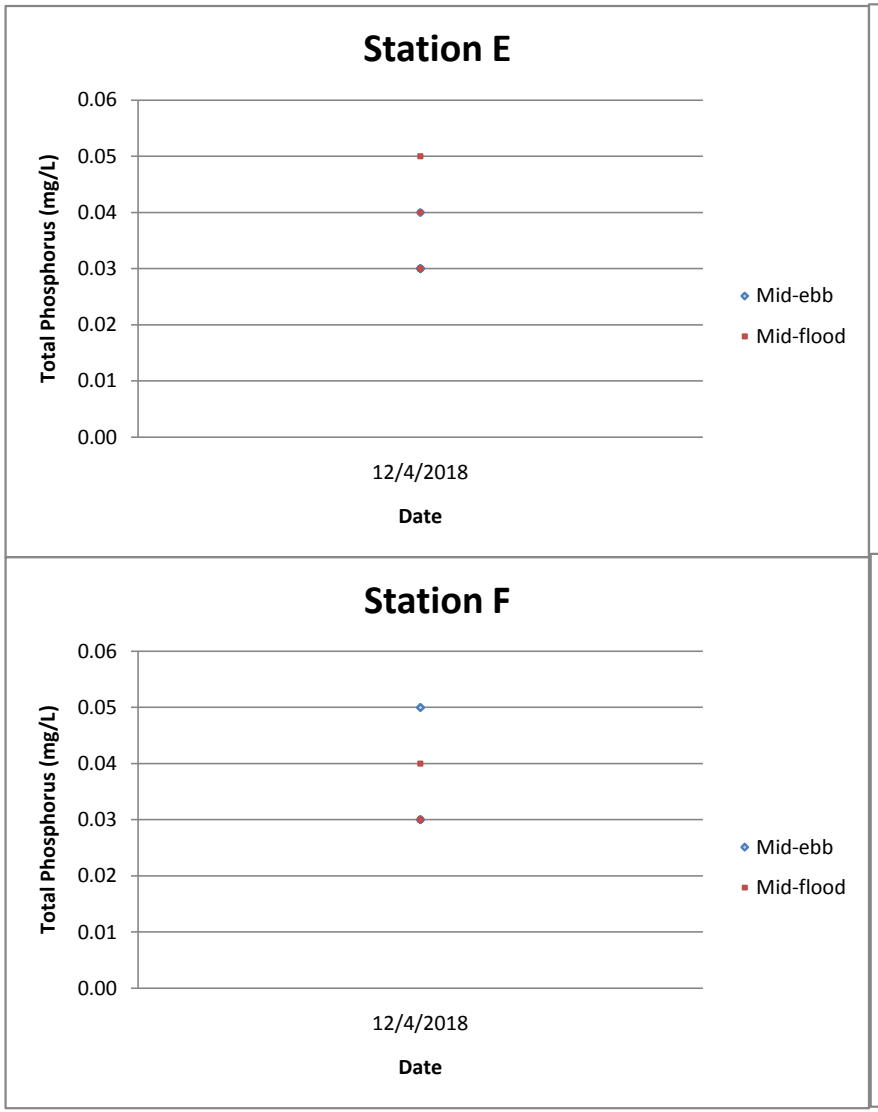
Total Phosphorus (solube and particulate) (mg/L)

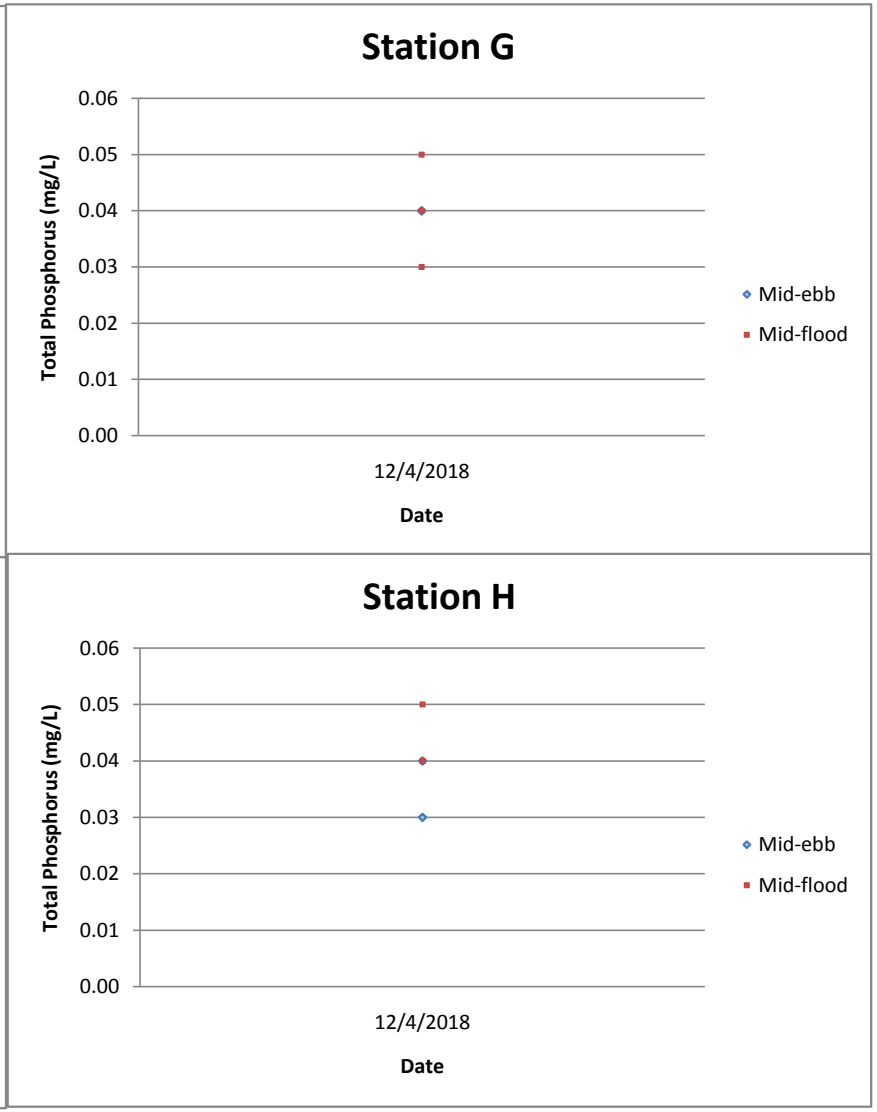






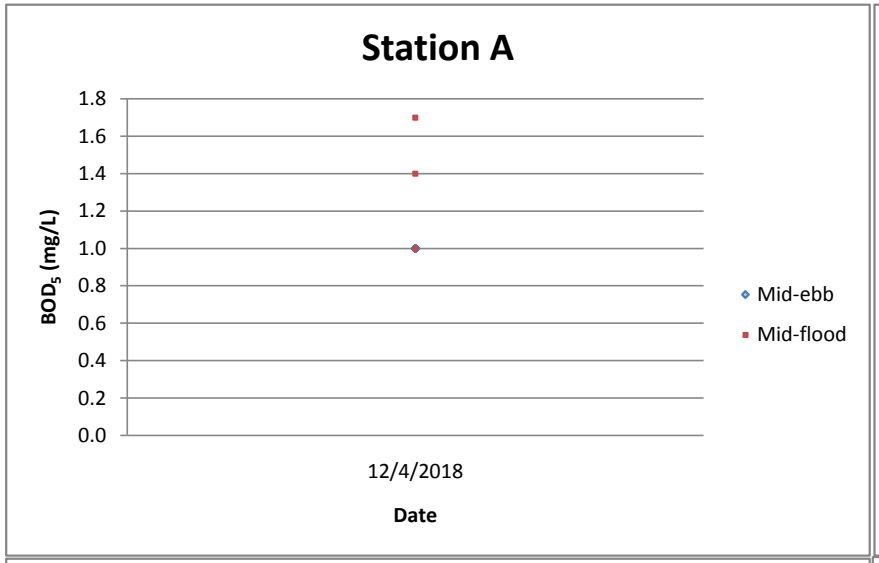


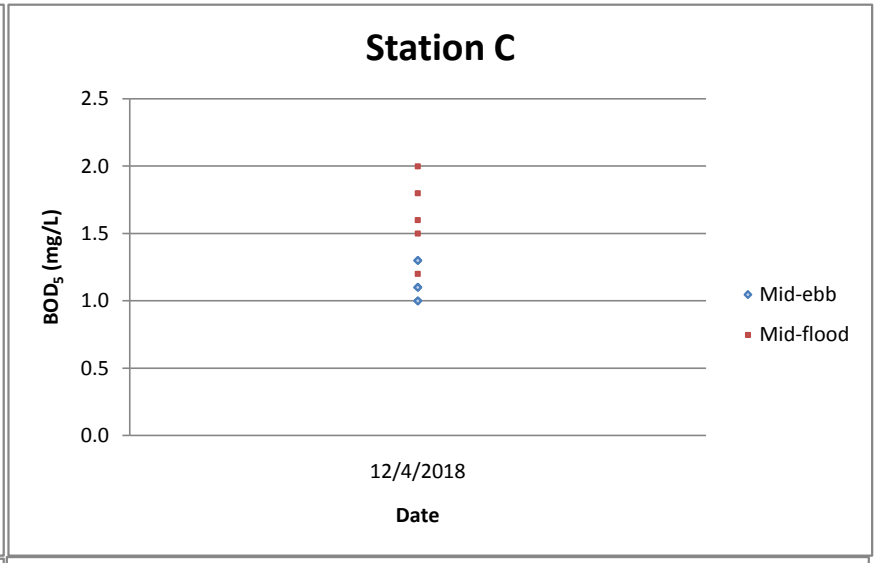

Station E
Total Phosphorus (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
12/4/2018
Date
Mid-ebb
Mid-flood

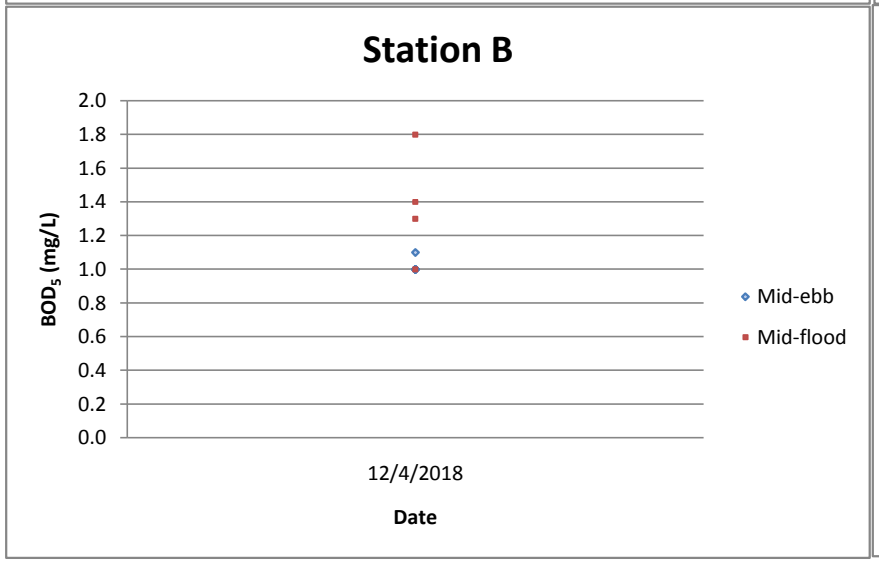

Station G
Total Phosphorus (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
12/4/2018
Date
Mid-ebb
Mid-flood

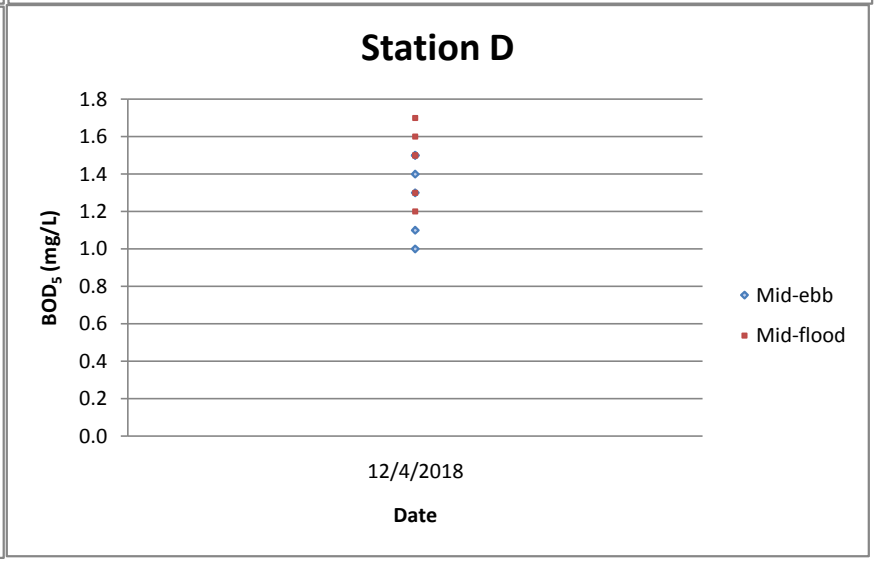
Station F
Total Phosphorus (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
12/4/2018
Date
Mid-ebb
Mid-flood

Station H
Total Phosphorus (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
12/4/2018
Date
Mid-ebb
Mid-flood

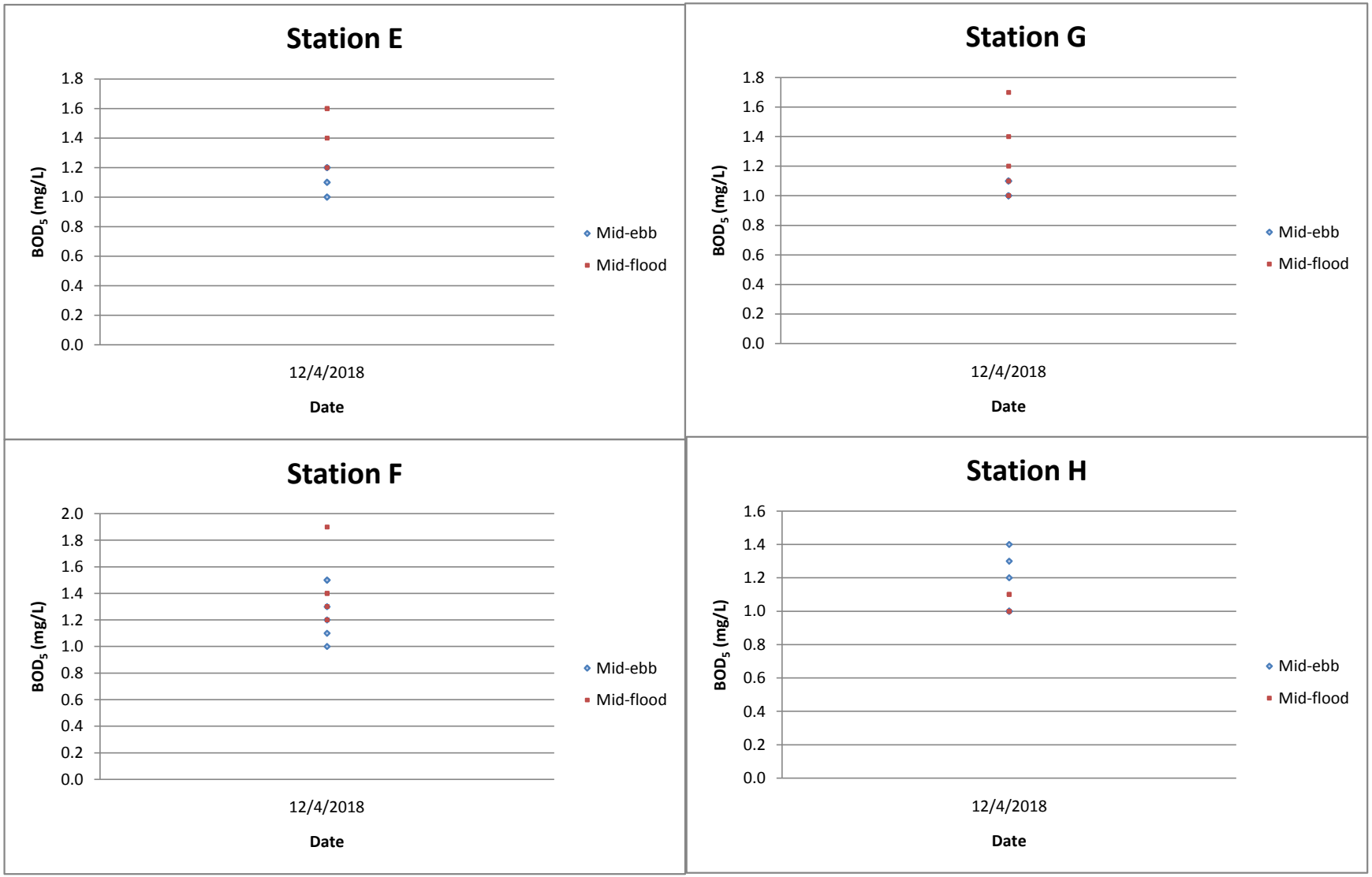

Station A
BOD5 (mg/L)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12/4/2018
Date
Mid-ebb
Mid-flood


Station C
BOD5 (mg/L)
2.5
2.0
1.5
1.0
0.5
0.0
12/4/2018
Date
Mid-ebb
Mid-flood


Station B
BOD5 (mg/L)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12/4/2018
Date
Mid-ebb
Mid-flood


Station D
BOD5 (mg/L)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

BOD_5 (mg/L)


Station E
BOD5 (mg/L)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station G
BOD5 (mg/L)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station F
BOD5 (mg/L)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12/4/2018
Date
Mid-ebb
Mid-flood
Station H
BOD5 (mg/L)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
12/4/2018
Date
Mid-ebb
Mid-flood

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

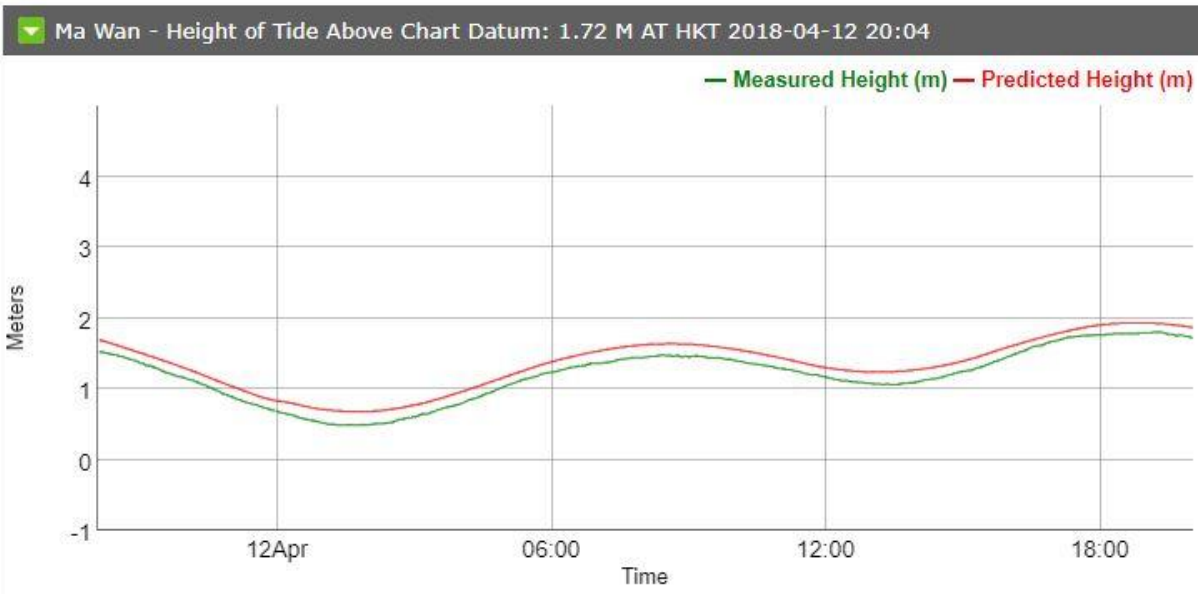
Appendix H

Tidal Data obtained from Ma Wan Marine Traffic Station

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com



Source: Tidal Data is obtained from the tide gauge of Hydrographic Office of Marine Department

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix I

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

Monitoring Location	Date	Weather	Sea Condition	Time	Sediment Monitoring												
					pH	Ammonia as N (mg-N/kg)	Total Nitrogen (mg-N/kg)	Total Phosphorus (mg-P/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Arsenic (mg/kg)	Silver (mg/kg)
A	12/4/2018	Cloudy	Smooth	15:23	8.8	4	500	374	<0.10	25.0	23.2	25.7	0.07	15.7	75.3	18.6	0.20
B	12/4/2018	Cloudy	Smooth	15:07	8.7	8	1170	498	<0.10	40.0	39.1	36.2	0.12	25.5	115	12.9	0.40
C	12/4/2018	Cloudy	Smooth	14:46	8.5	10	1120	559	<0.10	42.8	37.5	39.2	0.12	27.0	119	13.1	0.30
D	12/4/2018	Cloudy	Smooth	14:33	8.8	3	550	272	<0.10	22.4	19.3	24.5	0.07	14.2	66.5	7.5	0.17
E	12/4/2018	Cloudy	Smooth	14:03	8.5	12	1330	584	<0.10	45.8	43.3	41.2	0.16	29.4	132	12.5	0.42
F	12/4/2018	Cloudy	Smooth	13:43	8.3	22	1190	571	<0.10	43.0	41.8	39.5	0.11	27.8	125	12.8	0.36
G	12/4/2018	Cloudy	Smooth	13:15	8.6	4	860	450	<0.10	32.9	41.8	33.5	0.11	20.6	104	9.7	0.30
H	12/4/2018	Cloudy	Smooth	12:37	8.3	13	1260	528	<0.10	38.3	43.9	34.2	0.12	24.7	119	10.9	0.46

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distrbution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	12/4/2018	Cloudy	Smooth	15:23	0.80	7	47	28	18
B	12/4/2018	Cloudy	Smooth	15:07	1.12	0	15	49	36
C	12/4/2018	Cloudy	Smooth	14:46	1.00	0	4	58	38
D	12/4/2018	Cloudy	Smooth	14:33	1.13	0	9	58	33
E	12/4/2018	Cloudy	Smooth	14:03	1.27	0	6	57	37
F	12/4/2018	Cloudy	Smooth	13:43	1.21	0	3	59	38
G	12/4/2018	Cloudy	Smooth	13:15	1.26	7	15	50	28
H	12/4/2018	Cloudy	Smooth	12:37	1.00	6	20	47	27

CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 12
Contact	: MR CYRUS LAI	Contact	: Elaine Cheung	Work Order	: HK1824751
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	: elaine.cheung@alsglobal.com		
Telephone	: +852 3565 4374	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT			Date Samples Received	: 12-Apr-2018
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 30-Apr-2018
C-O-C number	: ----			No. of samples received	: 24
Site	: ----			No. of samples analysed	: 24

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

Signatories	*Position*	*Authorised results for*
Fung Lim Chee, Richard	General Manager	Inorganics
Fung Lim Chee, Richard	General Manager	Metals

General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. Testing period is from 12-Apr-2018 to 26-Apr-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: HK1824751

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.

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

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

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

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**

Compound	CAS Number	LOR	Unit	Client sample ID: A/Sediment	B/Sediment	C/Sediment	D/Sediment	E/Sediment
				Client sampling date / time: 12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
				HK1824751-001	HK1824751-002	HK1824751-003	HK1824751-004	HK1824751-005
EA/ED: Physical and Aggregate Properties								
EA002: pH Value	----	0.1	pH Unit	8.8	8.7	8.5	8.8	8.5
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	37.4	50.2	61.0	41.6	58.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055: Ammonia as N	7664-41-7	0.5	mg/kg	4	8	10	3	12
EK062A: Total Nitrogen as N	----	10	mg/kg	500	1170	1120	550	1330
EK067A: Total Phosphorus as P	----	10	mg/kg	374	498	559	272	584
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	0.5	mg/kg	18.6	12.9	13.1	7.5	12.5
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
EG020: Chromium	7440-47-3	0.5	mg/kg	25.0	40.0	42.8	22.4	45.8
EG020: Copper	7440-50-8	0.20	mg/kg	23.2	39.1	37.5	19.3	43.3
EG020: Lead	7439-92-1	0.20	mg/kg	25.7	36.2	39.2	24.5	41.2
EG020: Mercury	7439-97-6	0.05	mg/kg	0.07	0.12	0.12	0.07	0.16
EG020: Nickel	7440-02-0	0.20	mg/kg	15.7	25.5	27.0	14.2	29.4
EG020: Silver	7440-22-4	0.10	mg/kg	0.20	0.40	0.30	0.17	0.42
EG020: Zinc	7440-66-6	0.5	mg/kg	75.3	115	119	66.5	132

Sub-Matrix: SEDIMENT				Client sample ID	F/Sediment	G/Sediment	H/Sediment	A/Benthic Survey	B/Benthic Survey
				Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit		HK1824751-006	HK1824751-007	HK1824751-008	HK1824751-009	HK1824751-010
EA/ED: Physical and Aggregate Properties									
EA002: pH Value	----	0.1	pH Unit		8.3	8.6	8.3	----	----
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		63.2	49.5	52.3	43.7	54.0
ED/EK: Inorganic Nonmetallic Parameters									
EK055: Ammonia as N	7664-41-7	0.5	mg/kg		22	4	13	----	----
EK062A: Total Nitrogen as N	----	10	mg/kg		1190	860	1260	----	----
EK067A: Total Phosphorus as P	----	10	mg/kg		571	450	528	----	----
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg		12.8	9.7	10.9	----	----
EG020: Cadmium	7440-43-9	0.10	mg/kg		<0.10	<0.10	<0.10	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg		43.0	32.9	38.3	----	----
EG020: Copper	7440-50-8	0.20	mg/kg		41.8	41.8	43.9	----	----
EG020: Lead	7439-92-1	0.20	mg/kg		39.5	33.5	34.2	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg		0.11	0.11	0.12	----	----
EG020: Nickel	7440-02-0	0.20	mg/kg		27.8	20.6	24.7	----	----
EG020: Silver	7440-22-4	0.10	mg/kg		0.36	0.30	0.46	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg		125	104	119	----	----
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%		----	----	----	0.80	1.12

Sub-Matrix: SEDIMENT			Client sample ID	C/Benthic Survey	D/Benthic Survey	E/Benthic Survey	F/Benthic Survey	G/Benthic Survey
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824751-011	HK1824751-012	HK1824751-013	HK1824751-014	HK1824751-015
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	61.2	59.2	58.8	60.2	56.5
EP: Aggregate Organics								
EP005: Total Organic Carbon	----	0.05	%	1.00	1.13	1.27	1.21	1.26

Sub-Matrix: SEDIMENT				Client sample ID	H/Benthic Survey	----	----	----	----
				Client sampling date / time	12-Apr-2018	----	----	----	----
Compound	CAS Number	LOR	Unit	HK1824751-016	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	51.6	----	----	----	----
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%	1.00	----	----	----	----

Sub-Matrix: WATER			Client sample ID	A/Rinsate Blank	B/Rinsate Blank	C/Rinsate Blank	D/Rinsate Blank	E/Rinsate Blank
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018	12-Apr-2018
Compound	CAS Number	LOR	Unit	HK1824751-017	HK1824751-018	HK1824751-019	HK1824751-020	HK1824751-021
EG: Metals and Major Cations - Total								
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	<10	<10
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
EG020: Chromium	7440-47-3	1	µg/L	<1	2	2	<1	<1
EG020: Copper	7440-50-8	1	µg/L	1	2	2	<1	<1
EG020: Lead	7439-92-1	1	µg/L	<1	2	1	<1	<1
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EG020: Nickel	7440-02-0	1	µg/L	2	2	2	2	2
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	<1	<1
EG020: Zinc	7440-66-6	10	µg/L	<10	<10	<10	<10	<10

Sub-Matrix: WATER			Client sample ID	F/Rinsate Blank	G/Rinsate Blank	H/Rinsate Blank	----	----
			Client sampling date / time	12-Apr-2018	12-Apr-2018	12-Apr-2018	----	----
Compound	CAS Number	LOR	Unit	HK1824751-022	HK1824751-023	HK1824751-024	-------	-------
EG: Metals and Major Cations - Total								
EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	<10	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	<0.2	<0.2	----	----
EG020: Chromium	7440-47-3	1	µg/L	1	2	<1	----	----
EG020: Copper	7440-50-8	1	µg/L	2	2	<1	----	----
EG020: Lead	7439-92-1	1	µg/L	1	2	<1	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EG020: Nickel	7440-02-0	1	µg/L	2	2	1	----	----
EG020: Silver	7440-22-4	1	µg/L	<1	<1	<1	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	<10	<10	----	----

Laboratory Duplicate (DUP) Report

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EA/ED: Physical and Aggregate Properties (QC Lot: 1572819)								
HK1824751-001	A/Sediment	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	37.4	37.0	1.11
HK1824751-011	C/Benthic Survey	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	61.2	60.7	0.809
EA/ED: Physical and Aggregate Properties (QC Lot: 1573147)								
HK1824751-001	A/Sediment	**EA002: pH Value**	----	0.1	pH Unit	8.8	8.8	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1576181)								
HK1824751-001	A/Sediment	**EK067A: Total Phosphorus as P**	----	20	mg/kg	374	355	5.26
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1577650)								
HK1824751-001	A/Sediment	**EK055: Ammonia as N**	7664-41-7	1	mg/kg	4	4	0.00
EG: Metals and Major Cations (QC Lot: 1569178)								
HK1824751-002	B/Sediment	**EG020: Cadmium**	7440-43-9	0.01	mg/kg	<0.10	<0.10	0.00
		EG020: Mercury	7439-97-6	0.02	mg/kg	0.12	0.12	0.00
		EG020: Copper	7440-50-8	0.05	mg/kg	39.1	37.8	3.36
		EG020: Lead	7439-92-1	0.05	mg/kg	36.2	36.4	0.576
		EG020: Nickel	7440-02-0	0.05	mg/kg	25.5	24.6	3.70
		EG020: Silver	7440-22-4	0.05	mg/kg	0.40	0.38	4.32
		EG020: Arsenic	7440-38-2	0.5	mg/kg	12.9	12.6	2.06
		EG020: Chromium	7440-47-3	0.5	mg/kg	40.0	38.7	3.20
		EG020: Zinc	7440-66-6	0.5	mg/kg	115	114	1.39
EP: Aggregate Organics (QC Lot: 1587105)								
HK1824751-010	B/Benthic Survey	**EP005: Total Organic Carbon**	----	0.05	%	1.12	1.06	6.12
HK1825143-003	Anonymous	**EP005: Total Organic Carbon**	----	0.05	%	4.74	4.98	4.95

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1569204)								
HK1824751-018	B/Rinsate Blank	**EG020: Cadmium**	7440-43-9	0.2	µg/L	<0.2	<0.2	0.00
		EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	0.00
		EG020: Chromium	7440-47-3	1	µg/L	2	2	0.00
		EG020: Copper	7440-50-8	1	µg/L	2	2	0.00
		EG020: Lead	7439-92-1	1	µg/L	2	2	0.00

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 1569204) - Continued								
HK1824751-018	B/Rinsate Blank	**EG020: Nickel**	7440-02-0	1	µg/L	2	2	0.00
		EG020: Silver	7440-22-4	1	µg/L	<1	<1	0.00
		EG020: Arsenic	7440-38-2	10	µg/L	<10	<10	0.00
		EG020: Zinc	7440-66-6	10	µg/L	<10	<10	0.00

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

Matrix: **SOIL**

Method: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1576181)											
EK067A: Total Phosphorus as P	----	20	mg/kg	<20	695 mg/kg	92.8	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 1577650)											
EK055: Ammonia as N	7664-41-7	1	mg/kg	<1	5 mg/kg	106	----	85	119	----	----
EG: Metals and Major Cations (QC Lot: 1569178)											
EG020: Arsenic	7440-38-2	0.5	mg/kg	<0.5	5 mg/kg	89.1	----	85	115	----	----
EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.01	5 mg/kg	95.5	----	85	115	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	<0.5	5 mg/kg	95.7	----	85	115	----	----
EG020: Copper	7440-50-8	0.05	mg/kg	<0.05	5 mg/kg	97.6	----	85	115	----	----
EG020: Lead	7439-92-1	0.05	mg/kg	<0.05	5 mg/kg	107	----	85	115	----	----
EG020: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	110	----	85	115	----	----
EG020: Nickel	7440-02-0	0.05	mg/kg	<0.05	5 mg/kg	93.4	----	85	115	----	----
EG020: Silver	7440-22-4	0.05	mg/kg	<0.05	5 mg/kg	103	----	85	115	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	<0.5	5 mg/kg	98.6	----	85	115	----	----
EP: Aggregate Organics (QC Lot: 1587105)											
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	101	----	88	110	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report: LOR	Unit	Result	Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report: Spike Concentration	Spike Recovery (%): LCS	DCS	Recovery Limits(%): Low	High	RPD (%): Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1569204)											

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1569204) - Continued											
EG020: Arsenic	7440-38-2	10	µg/L	<10	100 µg/L	91.7	----	79	109	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	100 µg/L	94.4	----	80	106	----	----
EG020: Chromium	7440-47-3	1	µg/L	<1	100 µg/L	93.0	----	77	115	----	----
EG020: Copper	7440-50-8	1	µg/L	<1	100 µg/L	102	----	77	113	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	100 µg/L	106	----	80	110	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	99.4	----	75	121	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	100 µg/L	93.4	----	78	112	----	----
EG020: Silver	7440-22-4	1	µg/L	<1	100 µg/L	102	----	78	104	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	100 µg/L	93.1	----	76	114	----	----

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

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 1569178)										
HK1824751-001	A/Sediment	**EG020: Arsenic**	7440-38-2	5 mg/kg	89.2	----	75	125	----	----
		EG020: Cadmium	7440-43-9	5 mg/kg	90.0	----	75	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	79.8	----	75	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	88.4	----	75	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	96.4	----	75	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	80.4	----	75	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	86.8	----	75	125	----	----
		EG020: Silver	7440-22-4	5 mg/kg	102	----	75	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75	125	----	----
EP: Aggregate Organics (QC Lot: 1587105)										
HK1825920-001	Anonymous	**EP005: Total Organic Carbon**	----	40 %	102	----	75	125	----	----

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
EG: Metals and Major Cations - Total (QC Lot: 1569204)										
HK1824751-017	A/Rinsate Blank	**EG020: Arsenic**	7440-38-2	100 µg/L	98.3	----	75	125	----	----
		EG020: Cadmium	7440-43-9	100 µg/L	102	----	75	125	----	----
		EG020: Chromium	7440-47-3	100 µg/L	89.2	----	75	125	----	----
		EG020: Copper	7440-50-8	100 µg/L	82.8	----	75	125	----	----
		EG020: Lead	7439-92-1	100 µg/L	88.8	----	75	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	86.4	----	75	125	----	----
		EG020: Nickel	7440-02-0	100 µg/L	77.4	----	75	125	----	----
		EG020: Silver	7440-22-4	100 µg/L	97.1	----	75	125	----	----
		EG020: Zinc	7440-66-6	100 µg/L	84.6	----	75	125	----	----

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: MR CYRUS LAI	WORK ORDER	: **HK1824751**
CLIENT	: FUGRO TECHNICAL SERVICES LIMITED		
ADDRESS	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	SUB-BATCH	: 1
		DATE RECEIVED	: 12-APR-2018
		DATE OF ISSUE	: 27-APR-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.
- Water sample(s) digested by In-house method E-3005 prior to the determination of total metals. The In-house method is developed based on USEPA method 3005.
- Soil sample(s) as received, digested by In-house method E-3051A prior to the determination of metals. The In-house method is developed based on USEPA method 3051A.
- pH determined and reported on a 1:5 soil / water extract.
- 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	: HK1824751
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.
HK1824751-001	A/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-002	B/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-003	C/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-004	D/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-005	E/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-006	F/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-007	G/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-008	H/Sediment	SEDIMENT	12-Apr-2018	
HK1824751-009	A/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-010	B/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-011	C/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-012	D/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-013	E/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-014	F/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-015	G/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-016	H/Benthic Survey	SEDIMENT	12-Apr-2018	J2999-272.30
HK1824751-017	A/Rinsate Blank	WATER	12-Apr-2018	
HK1824751-018	B/Rinsate Blank	WATER	12-Apr-2018	
HK1824751-019	C/Rinsate Blank	WATER	12-Apr-2018	
HK1824751-020	D/Rinsate Blank	WATER	12-Apr-2018	
HK1824751-021	E/Rinsate Blank	WATER	12-Apr-2018	
HK1824751-022	F/Rinsate Blank	WATER	12-Apr-2018	
HK1824751-023	G/Rinsate Blank	WATER	12-Apr-2018	
HK1824751-024	H/Rinsate Blank	WATER	12-Apr-2018	

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

Gammon

HOKLAS 055 TEST CAL

Report No : J2999-272.30

Customer : ALS Technichem (HK) Pty Ltd

Job No. : J2999

Works Order No. : 272

Project : -

Contract No.:

Date : 16/04/2018

Sample ID	Sample			Δ Moisture Content	Test 6.1 Liquid Limit	Test 6.1 Plastic Limit	Test 6.1 Plasticity Index	Test 6.2 Liquidity Index	Passing 425μm Test Sieve	Preparation Method	Particle Size Distribution					Description	Sample Origin
											#	Percentage					
No.	No.	Type	Depth (m)	(%)	(%)	(%)	(%)		(%)		Test Method	Gravel (%)	Sand (%)	Silt (%)	Clay (%)		
HK1824751-009	A/Benthic Survey	D									1,5,7	7	47	28	18	Dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments	-‡
HK1824751-010	B/Benthic Survey	D									1,5,7	0	15	49	36	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1824751-011	C/Benthic Survey	D									1,5,7	0	4	58	38	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1824751-012	D/Benthic Survey	D									1,5,7	0	9	58	33	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1824751-013	E/Benthic Survey	D									1,5,7	0	6	57	37	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1824751-014	F/Benthic Survey	D									1,5,7	0	3	59	38	Dark grey, slightly sandy SILT/CLAY	-‡
HK1824751-015	G/Benthic Survey	D									1,5,7	7	15	50	28	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	-‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)

= Test Method in accordance with GEOSPEC3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).

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

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

Checked by : T K Lam

Approved By : Lau Wai Cheong, Deputy Laboratory Manager

Date : 26/04/2018

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

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

Report No : J2999-272.30

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

Project : - Contract No.: Date : 16/04/2018

Sample ID	Sample			Δ Moisture Content	Test 6.1 Liquid Limit	Test 6.1 Plastic Limit	Test 6.1 Plasticity Index	Test 6.2 Liquidity Index	Passing 425μm Test Sieve	Preparation Method	Particle Size Distribution					Description	Sample Origin
											#	Percentage					
No.	No.	Type	Depth (m)	(%)	(%)	(%)	(%)		(%)		Test Method	Gravel (%)	Sand (%)	Silt (%)	Clay (%)		
HK1824751-016	H/Benthic Survey	D									1,5,7	6	20	47	27	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	-‡

Legend : Δ = Test Method in accordance with GEOSPEC 3 : 2001 Test 5.1 Moisture Content at 45°C ± 5°C (A), Test 5.2 Moisture Content at 105°C ± 5°C (B), Test 5.3 Comparative Moisture Content 45/105°C± 5°C (C)

= Test Method in accordance with GEOSPEC3 : 2001 Test 8.1 (1), 8.2 (2), 8.3 (3), 8.4 (4), 8.5 (5), 8.6 (6), 8.7 (7).

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

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

Checked by : T K Lam

Approved By : Lau Wai Cheong, Deputy Laboratory Manager Date : 26/04/2018

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

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

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

Report No. : J2999-272.30

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

Works Order No. : 272
Sample ID No. : HK1824751-009
Sample No. : A/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/04/2018
Tested Date : 18/04/2018

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

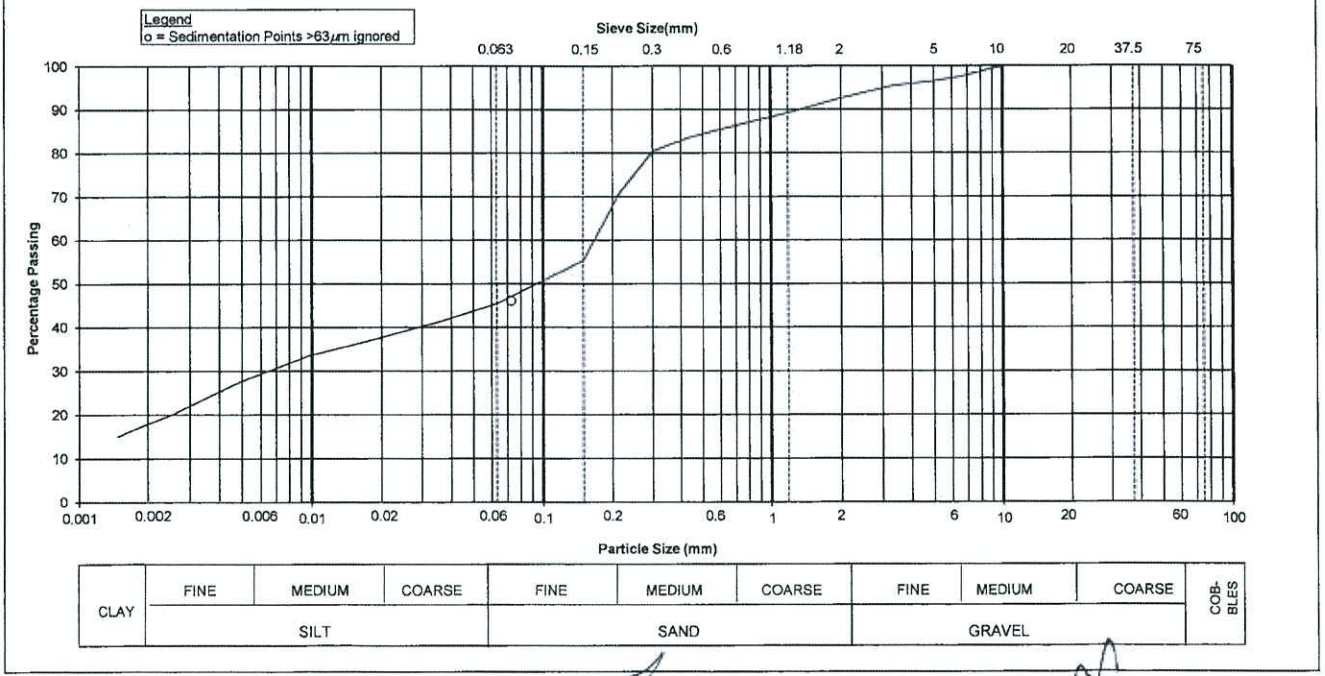
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	97	-	-
5.00 mm	97	-	-
3.35 mm	95	-	-
2.00 mm	93	-	-
1.18 mm	89	-	-
600 µm	86	-	-
425 µm	84	-	-
300 µm	80	-	-
212 µm	71	-	-
150 µm	55	-	-
63 µm	46	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0724	-	46	-
0.0515	-	44	-
0.0367	-	42	-
0.0261	-	39	-
0.0186	-	37	-
0.0097	-	34	-
0.0049	-	28	-
0.0025	-	20	-
0.0015	-	15	-

SUMMARY :

Gravel (%)	:	**7**
Sand (%)	:	**47**
Silt (%)	:	**28**
Clay (%)	:	**18**



Technician : K Y Sun
Date : 18/04/2018

Checked By :
Name : T K Lam
Date : 21/04/2018

Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

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

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

Report No. : J2999-272.30

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

Date Received : 16/04/2018
Tested Date : 18/04/2018

Works Order No. : 272
Sample ID No. : HK1824751-010
Sample No. : B/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

ˆUpon request * Delete as appropriate ‡Information provided by customer

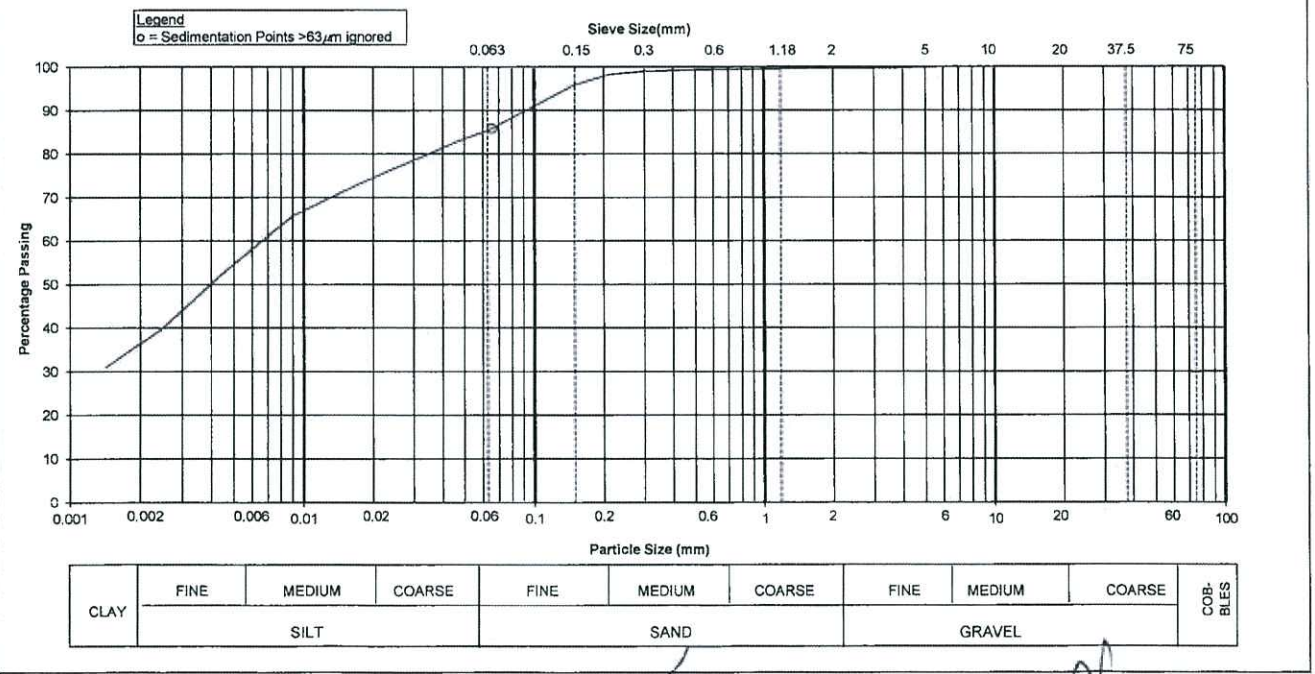
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	99	-	-
425 µm	99	-	-
300 µm	99	-	-
212 µm	98	-	-
150 µm	96	-	-
63 µm	85	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0655	-	86	-
0.0467	-	83	-
0.0334	-	80	-
0.0239	-	76	-
0.0171	-	73	-
0.0090	-	66	-
0.0047	-	53	-
0.0024	-	40	-
0.0014	-	31	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**15**
Silt (%)	:	**49**
Clay (%)	:	**36**



Technician : K Y Sun
Date : 18/04/2018

Checked By :
Name : T K Lam
Date : 21/04/2018

Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

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

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

Report No. : J2999-272.30

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

Works Order No. : 272
Sample ID No. : HK1824751-011
Sample No. : C/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/04/2018
Tested Date : 18/04/2018

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

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

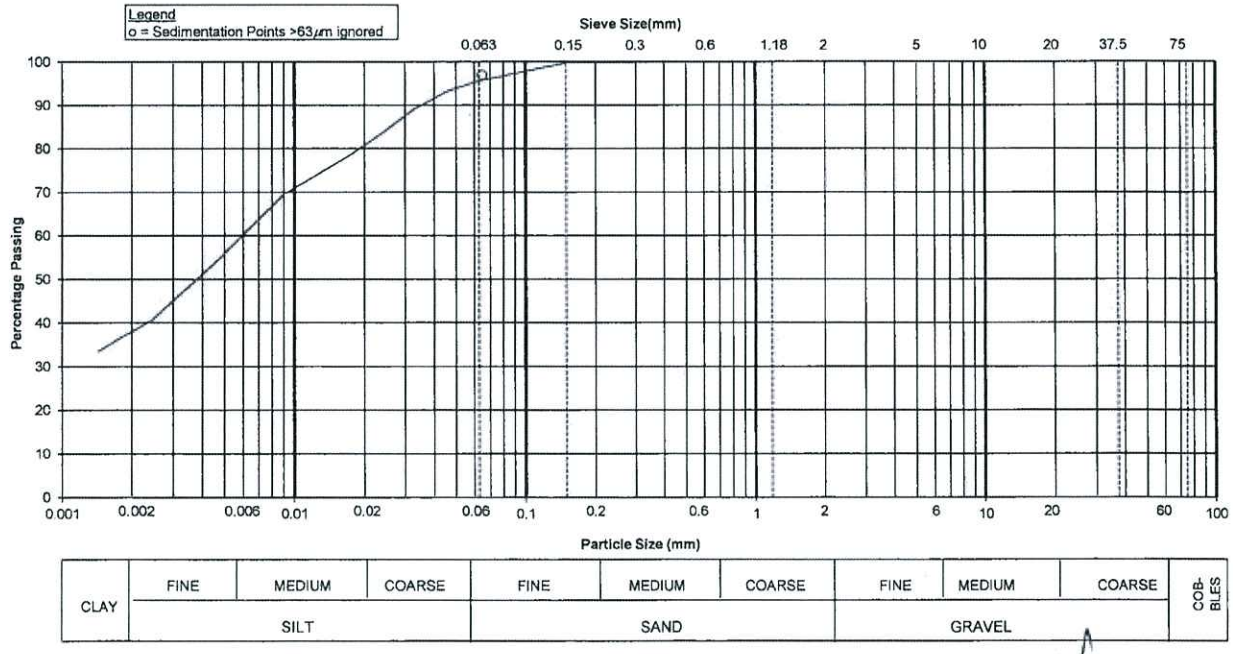
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	100	-	-
212 µm	100	-	-
150 µm	100	-	-
63 µm	96	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0647	-	97	-
0.0462	-	93	-
0.0331	-	89	-
0.0238	-	84	-
0.0171	-	78	-
0.0090	-	70	-
0.0047	-	55	-
0.0024	-	41	-
0.0014	-	34	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**4**
Silt (%)	:	**58**
Clay (%)	:	**38**



Technician : K Y Sun
Date : 18/04/2018

Checked By :
Name : T K Lam
Date : 21/04/2018

Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

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

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

Report No. : J2999-272.30

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

Works Order No. : 272
Sample ID No. : HK1824751-012
Sample No. : D/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/04/2018
Tested Date : 18/04/2018

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

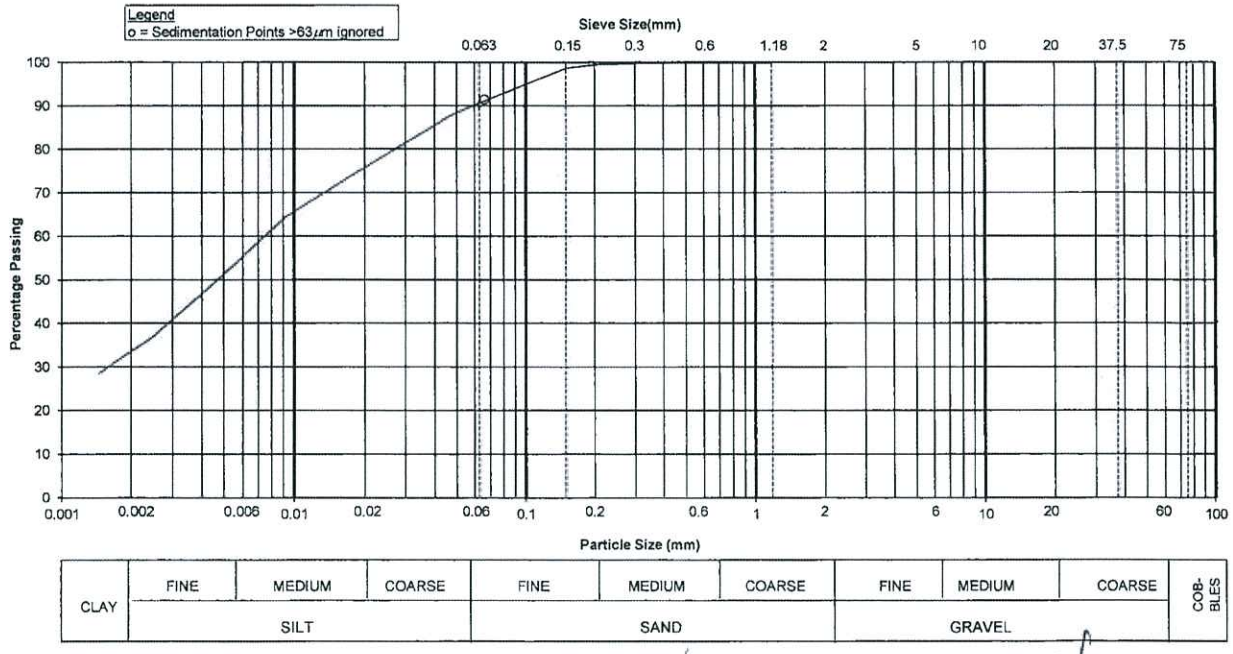
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	100	-	-
212 µm	100	-	-
150 µm	99	-	-
63 µm	91	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0659	-	91	-
0.0471	-	88	-
0.0338	-	83	-
0.0242	-	78	-
0.0173	-	74	-
0.0092	-	64	-
0.0047	-	50	-
0.0025	-	37	-
0.0014	-	29	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**9**
Silt (%)	:	**58**
Clay (%)	:	**33**



Technician : K Y Sun
Date : 18/04/2018

Checked By :
Name : T K Lam
Date : 21/04/2018

Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

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

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

Report No. : J2999-272.30

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

Date Received : 16/04/2018
Tested Date : 18/04/2018

Works Order No. : 272
Sample ID No. : HK1824751-013
Sample No. : E/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

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

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

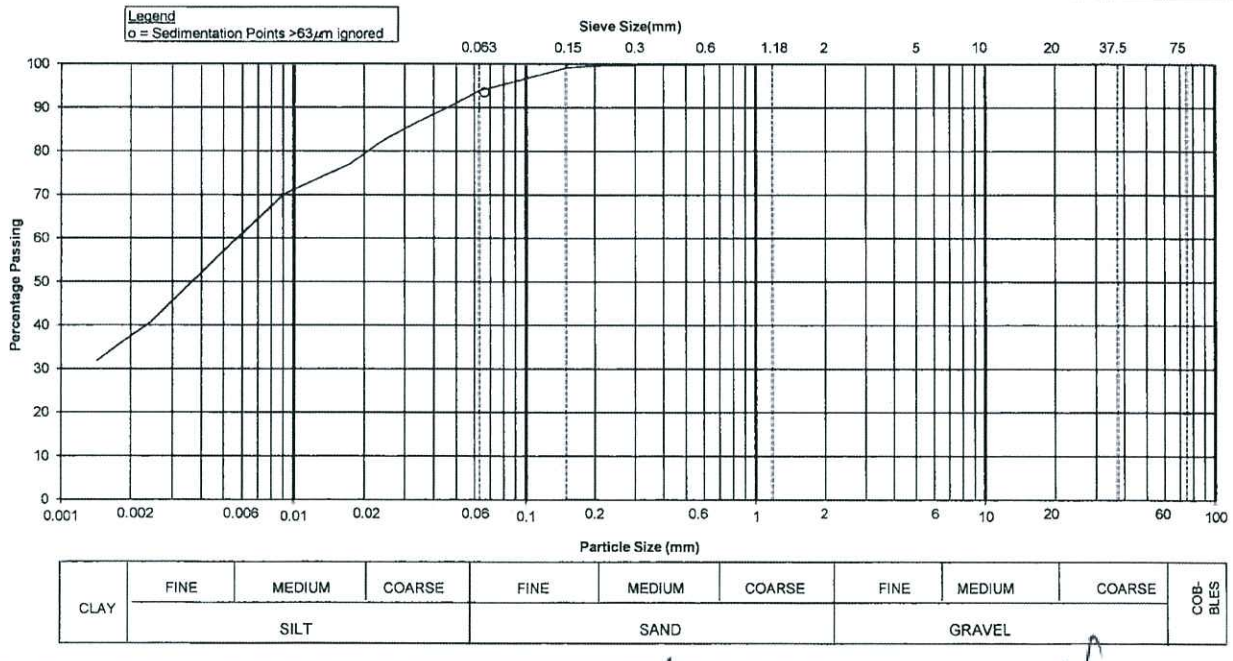
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	100	-	-
212 µm	100	-	-
150 µm	99	-	-
63 µm	94	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0660	-	94	-
0.0471	-	90	-
0.0336	-	87	-
0.0241	-	82	-
0.0173	-	77	-
0.0091	-	70	-
0.0047	-	56	-
0.0024	-	41	-
0.0014	-	32	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**6**
Silt (%)	:	**57**
Clay (%)	:	**37**



Technician : K Y Sun
Date : 18/04/2018

Checked By :
Name : T K Lam
Date : 21/04/2018

Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

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

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

Report No. : J2999-272.30

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

Works Order No. : 272
Sample ID No. : HK1824751-014
Sample No. : F/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 16/04/2018
Tested Date : 18/04/2018

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

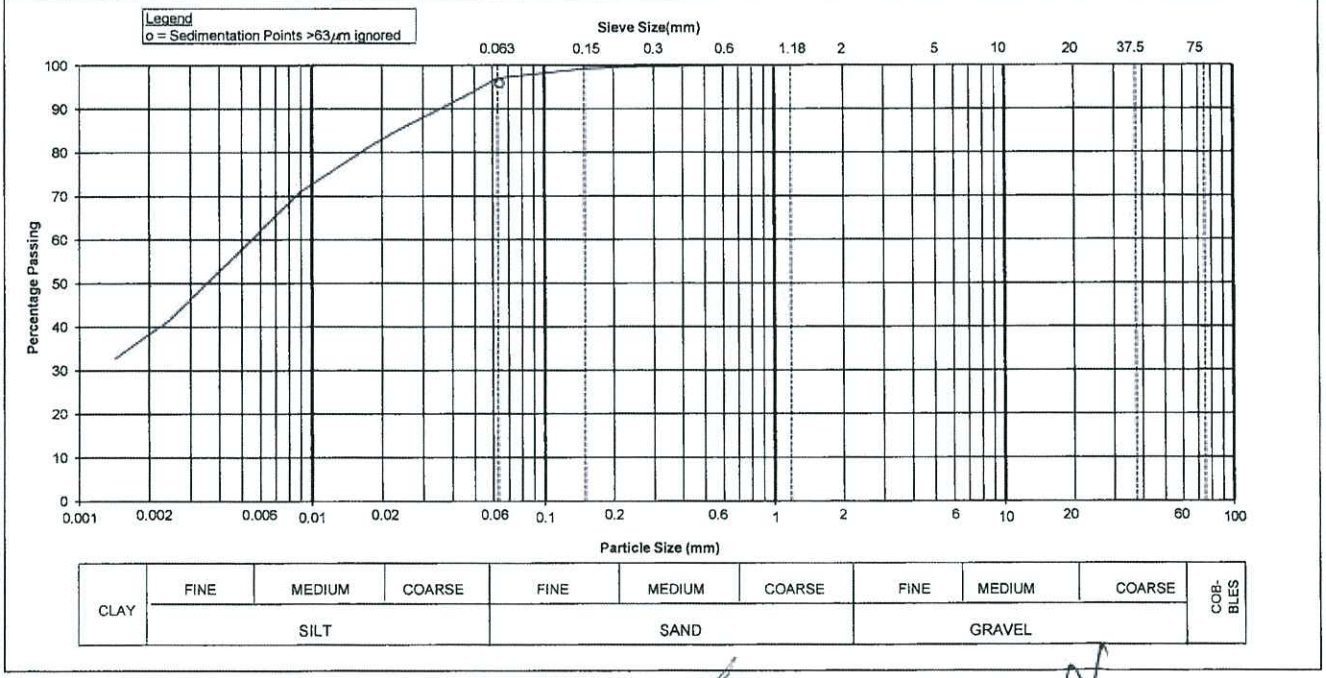
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	100	-	-
212 µm	100	-	-
150 µm	99	-	-
63 µm	97	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0638	-	96	-
0.0456	-	93	-
0.0326	-	89	-
0.0234	-	85	-
0.0168	-	81	-
0.0089	-	71	-
0.0046	-	56	-
0.0024	-	42	-
0.0014	-	33	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**3**
Silt (%)	:	**59**
Clay (%)	:	**38**



Technician : K Y Sun
Date : 18/04/2018

Checked By :
Name : T K Lam
Date : 21/04/2018

Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

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

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

Report No. : J2999-272.30

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

Date Received : 16/04/2018
Tested Date : 18/04/2018

Works Order No. : 272
Sample ID No. : HK1824751-015
Sample No. : G/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

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

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

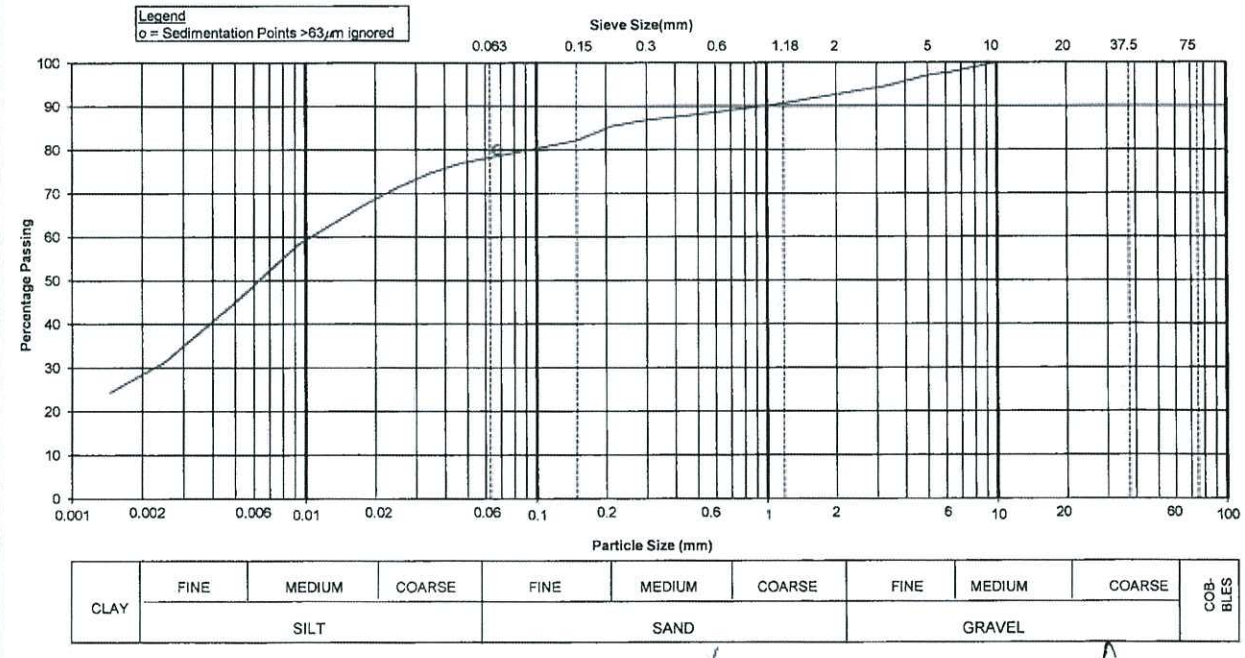
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	98	-	-
5.00 mm	97	-	-
3.35 mm	95	-	-
2.00 mm	93	-	-
1.18 mm	91	-	-
600 µm	89	-	-
425 µm	88	-	-
300 µm	87	-	-
212 µm	86	-	-
150 µm	82	-	-
63 µm	78	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0674	-	80	-
0.0481	-	77	-
0.0342	-	75	-
0.0245	-	71	-
0.0175	-	67	-
0.0093	-	58	-
0.0048	-	44	-
0.0025	-	31	-
0.0015	-	24	-

SUMMARY :

Gravel (%)	:	**7**
Sand (%)	:	**15**
Silt (%)	:	**50**
Clay (%)	:	**28**



Technician : K Y Sun
Date : 18/04/2018

Checked By :
Name : T K Lam
Date : 21/04/2018

Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

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

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

Report No. : J2999-272.30

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

Date Received : 16/04/2018
Tested Date : 18/04/2018

Works Order No. : 272
Sample ID No. : HK1824751-016
Sample No. : H/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

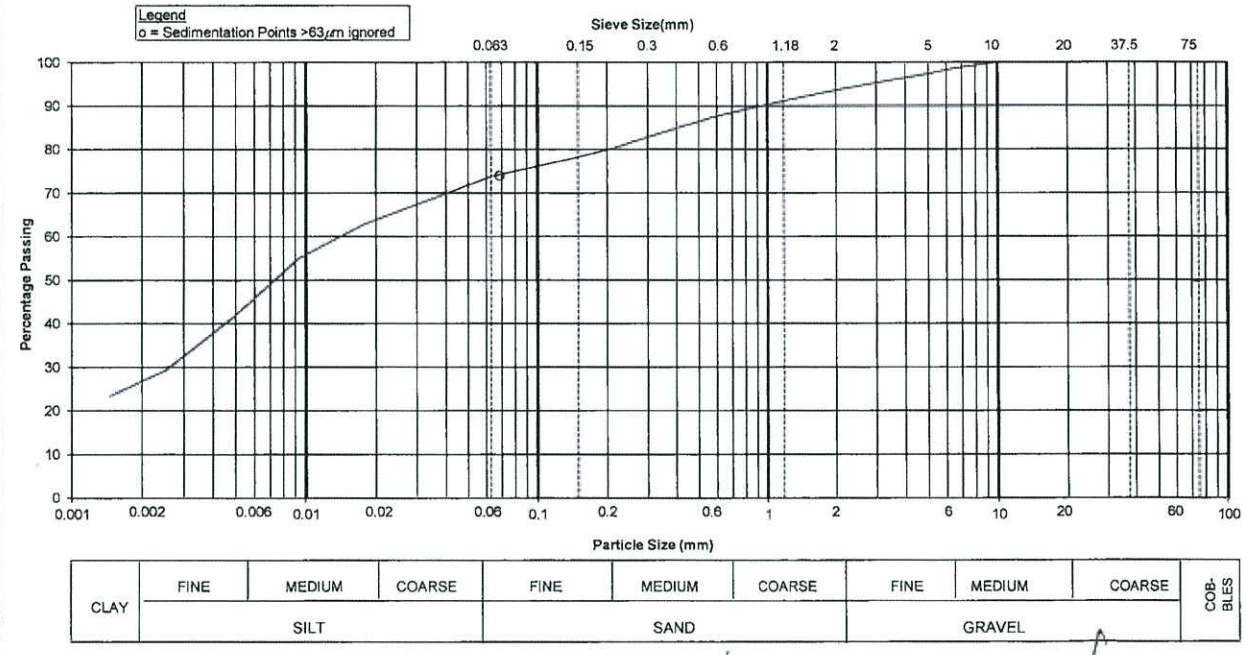
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	99	-	-
5.00 mm	97	-	-
3.35 mm	96	-	-
2.00 mm	94	-	-
1.18 mm	91	-	-
600 µm	88	-	-
425 µm	85	-	-
300 µm	83	-	-
212 µm	80	-	-
150 µm	78	-	-
63 µm	74	-	-
0 µm	0		

SEDIMENTATION ANALYSIS
Specific Gravity (# if assumed) : 2.65 #
Dispersant Details : Sodium hexametaphosphate, Sodium carbonate
Sampling History : As received
The presence of any visible organic matter in the soil : None

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0684	-	74	-
0.0487	-	72	-
0.0347	-	69	-
0.0248	-	66	-
0.0177	-	63	-
0.0093	-	55	-
0.0048	-	41	-
0.0025	-	29	-
0.0015	-	23	-

SUMMARY :

Gravel (%)	:	**6**
Sand (%)	:	**20**
Silt (%)	:	**47**
Clay (%)	:	**27**



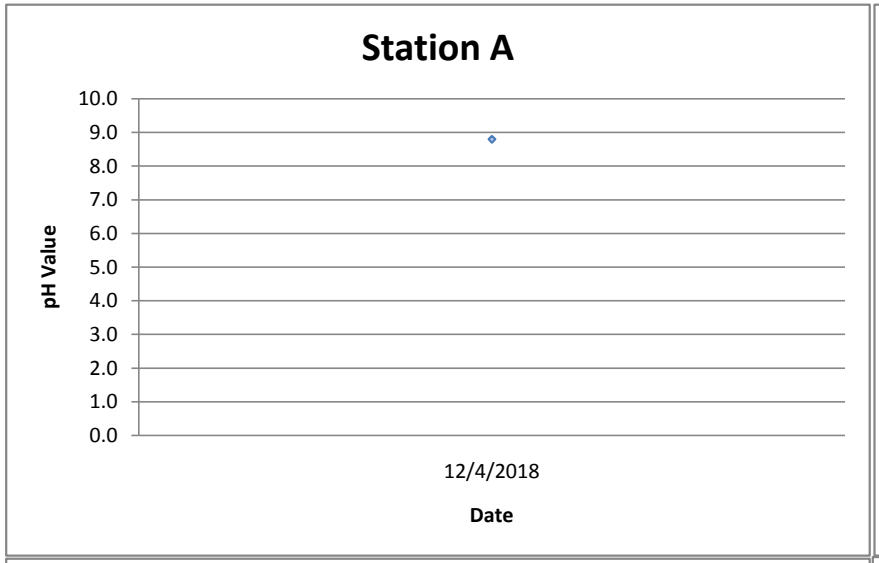
Technician : K Y Sun
Date : 18/04/2018

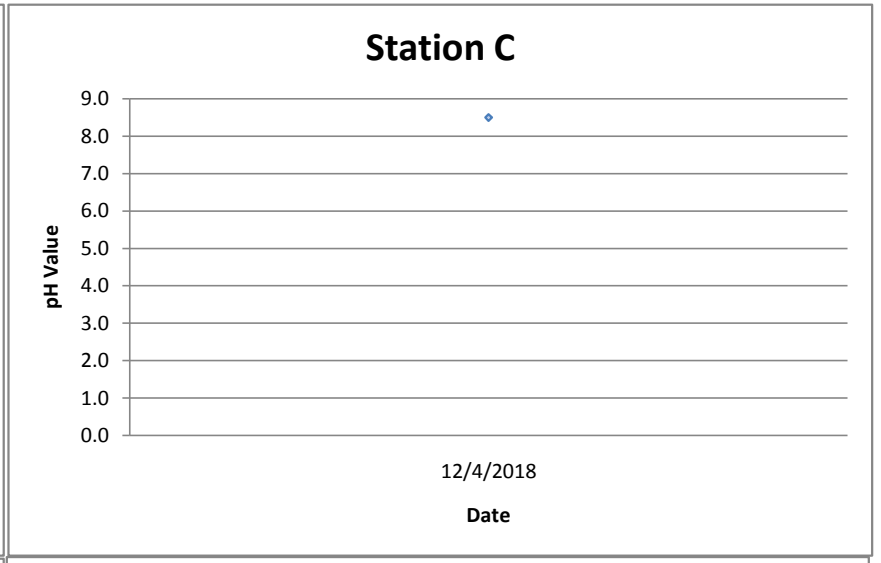
Checked By :
Name : T K Lam
Date : 21/04/2018

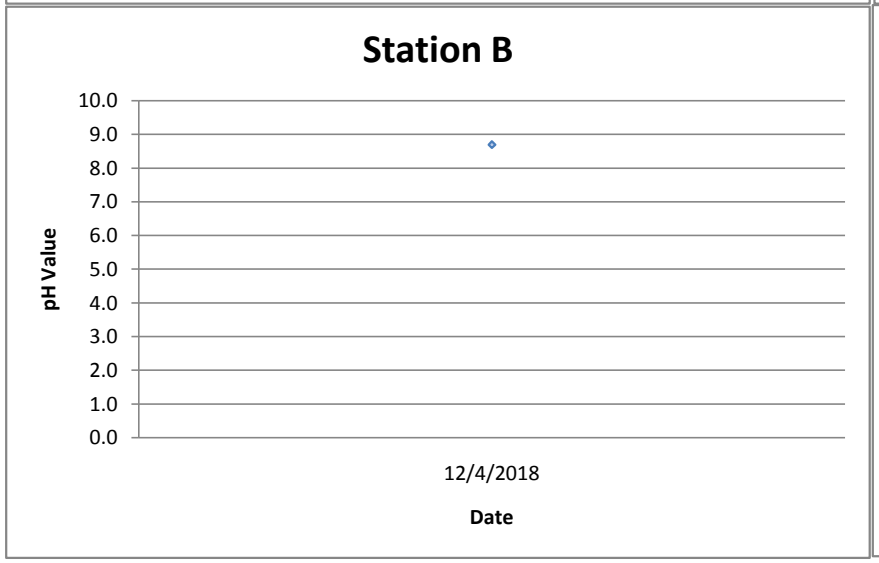
Approved By :
Signatory : Lau Wai Cheong
Date : 21/04/2018

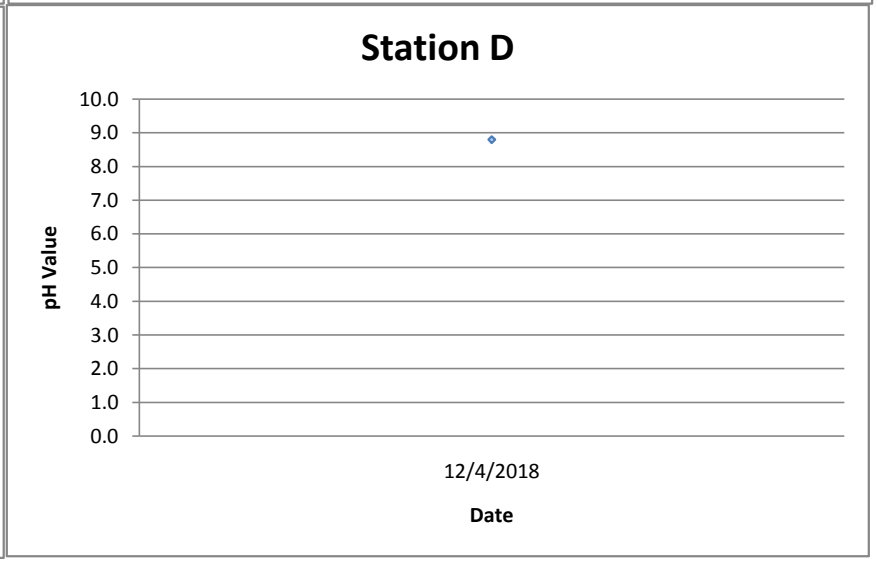
Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. 055 - TEST) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

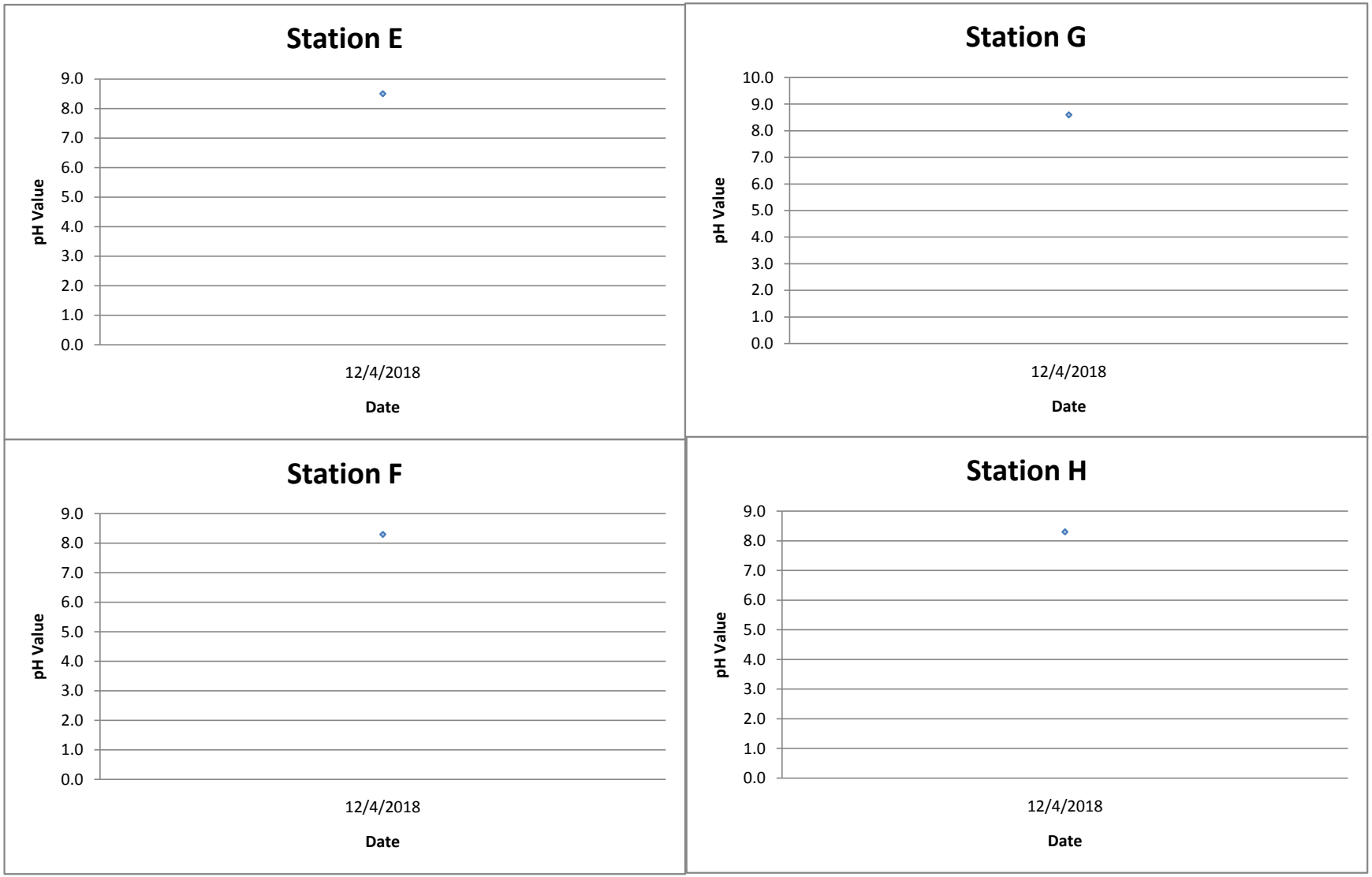
Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547


Station A
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date

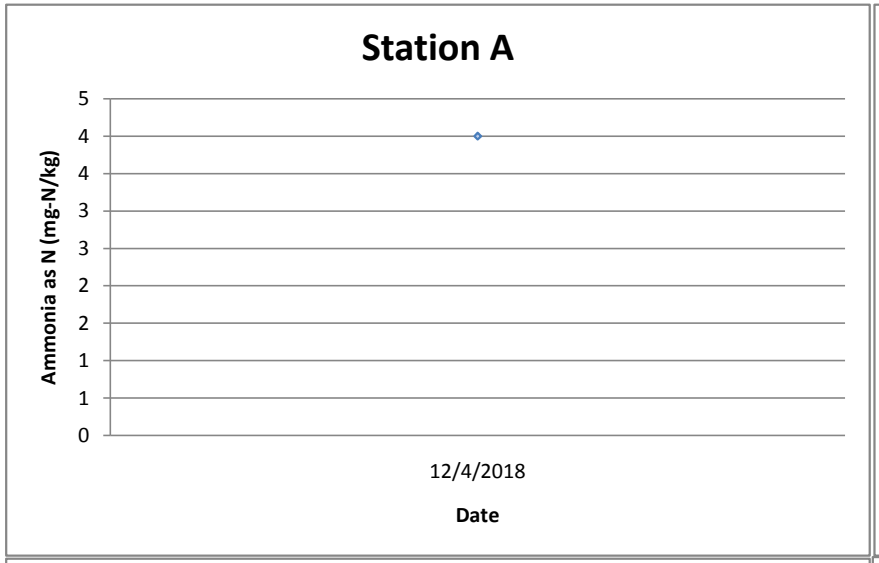

Station C
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date

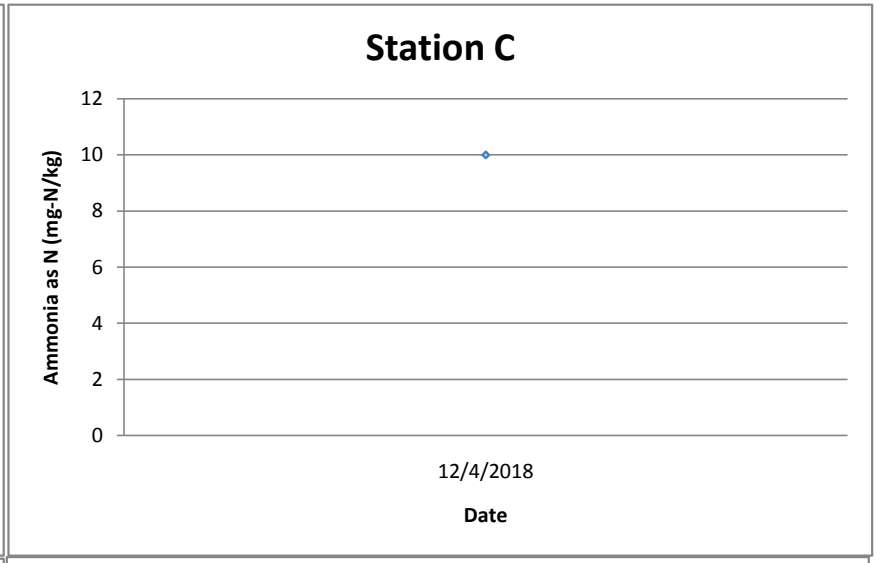

Station B
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date

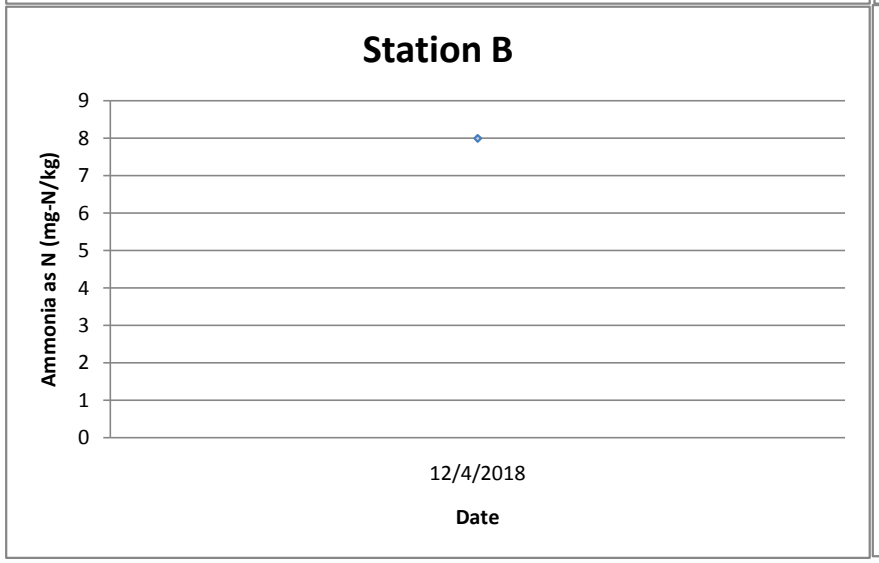

Station D
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date

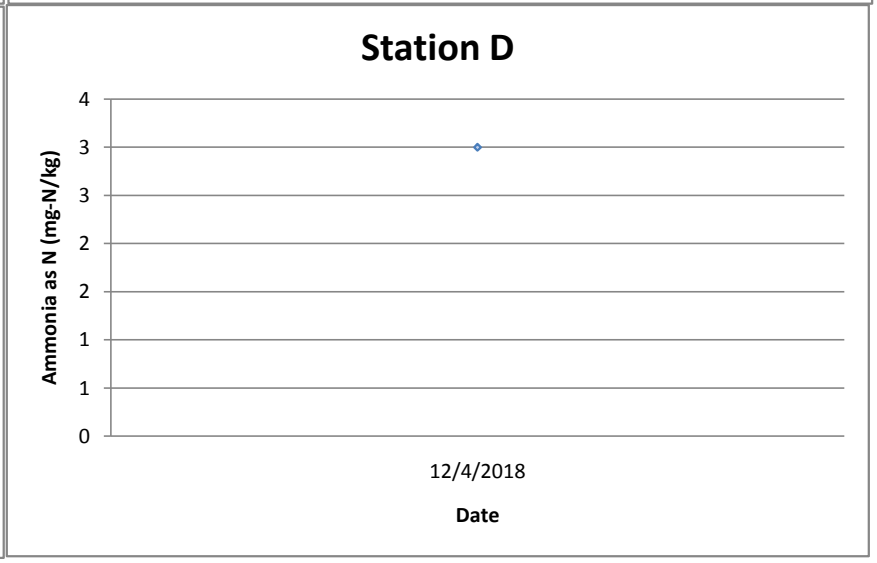

Station E
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date
Station G
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date
Station F
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date
Station H
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
pH Value
12/4/2018
Date

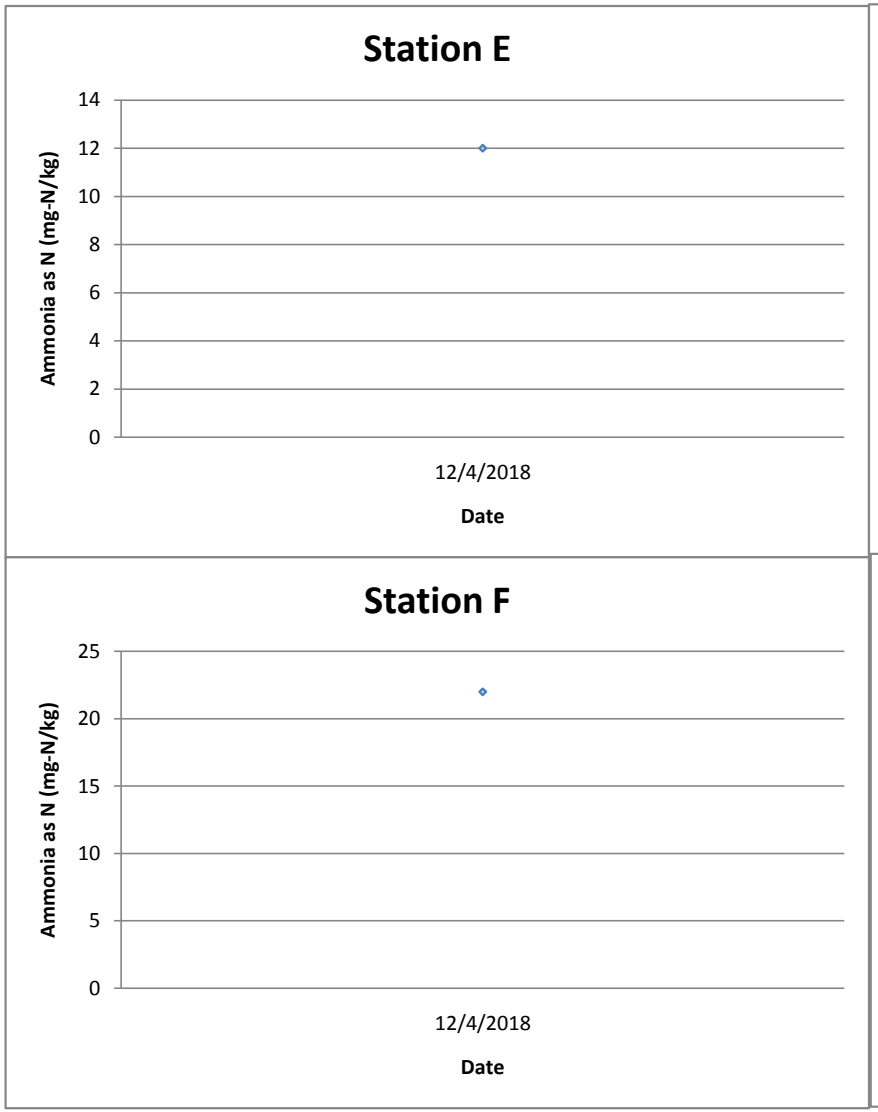
Ammonia Nitrogen (mg-N/kg)

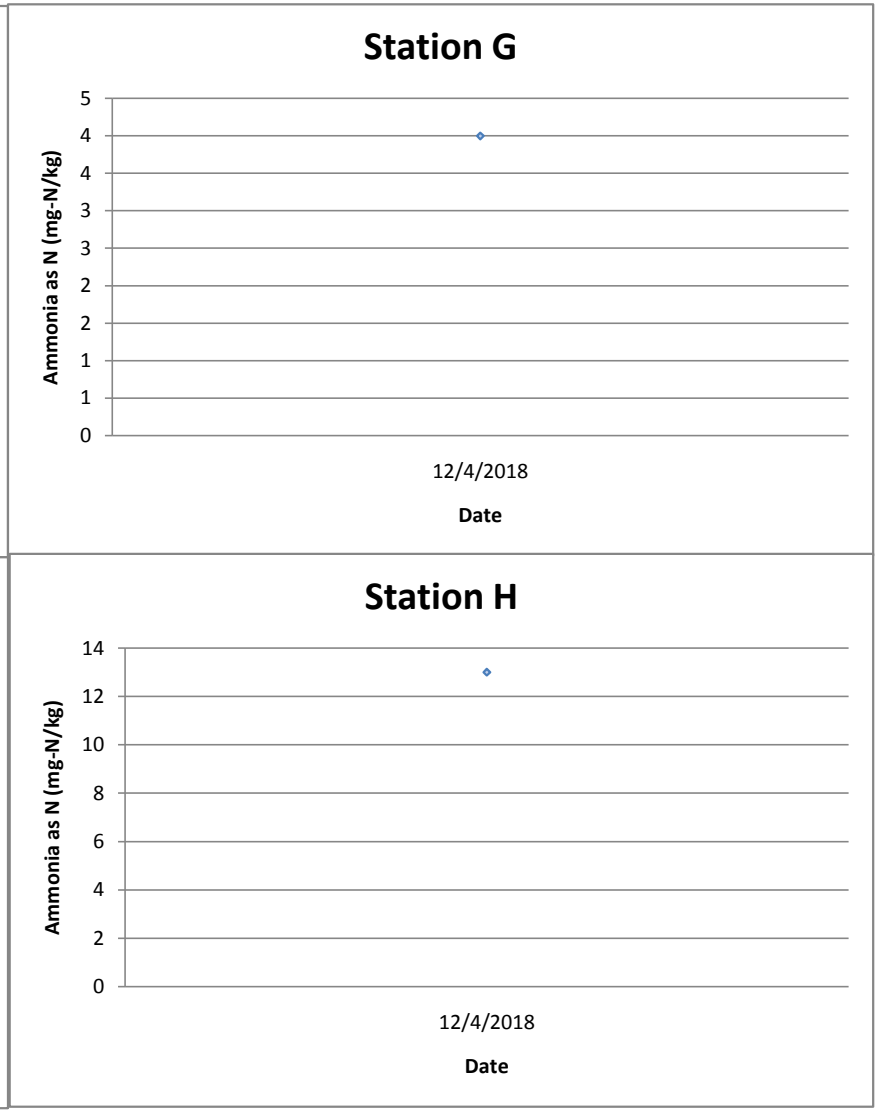






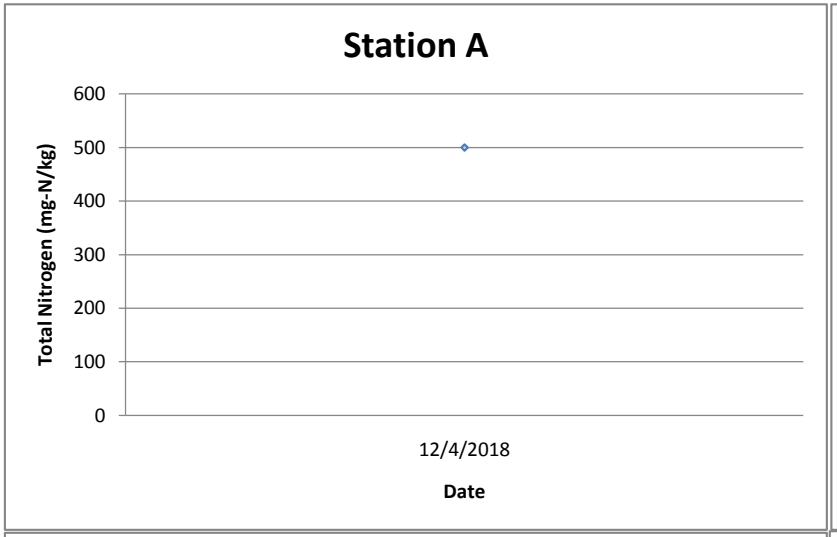


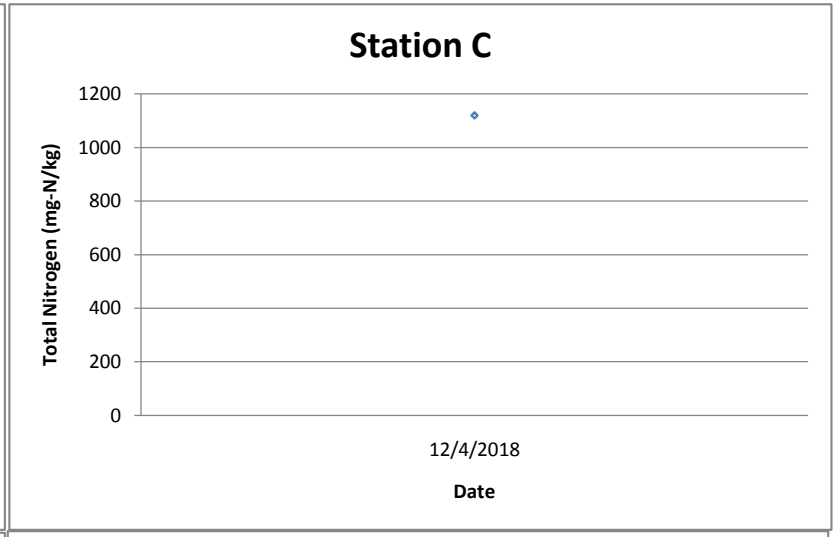

Station E
Ammonia as N (mg-N/kg)
14
12
10
8
6
4
2
0
12/4/2018
Date

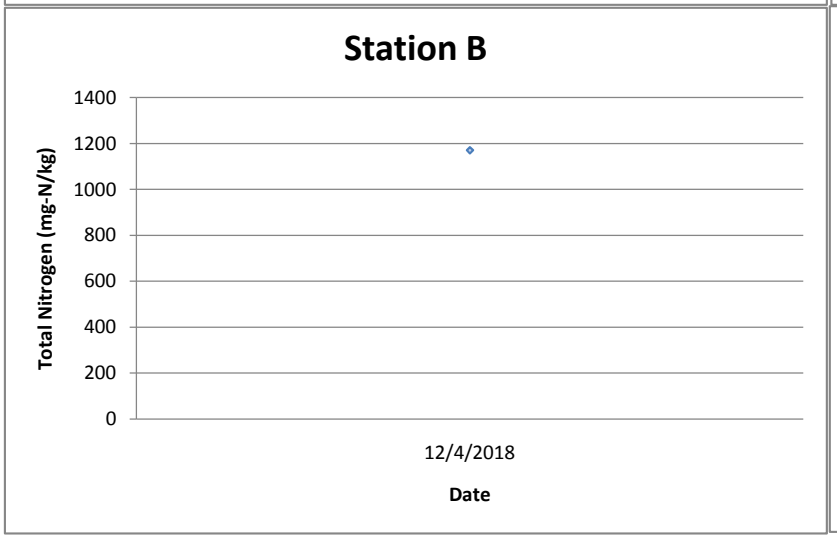

Station G
Ammonia as N (mg-N/kg)
5
4
4
3
3
2
2
1
1
0
12/4/2018
Date

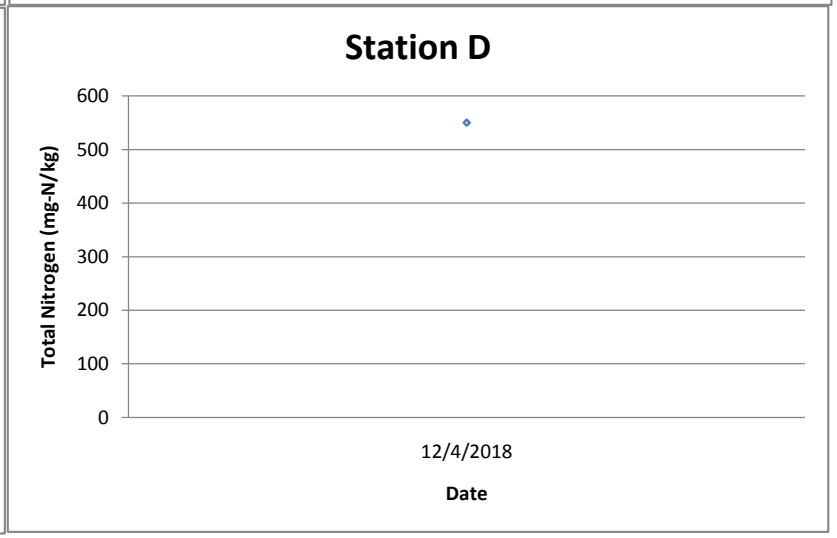
Station F
Ammonia as N (mg-N/kg)
25
20
15
10
5
0
12/4/2018
Date

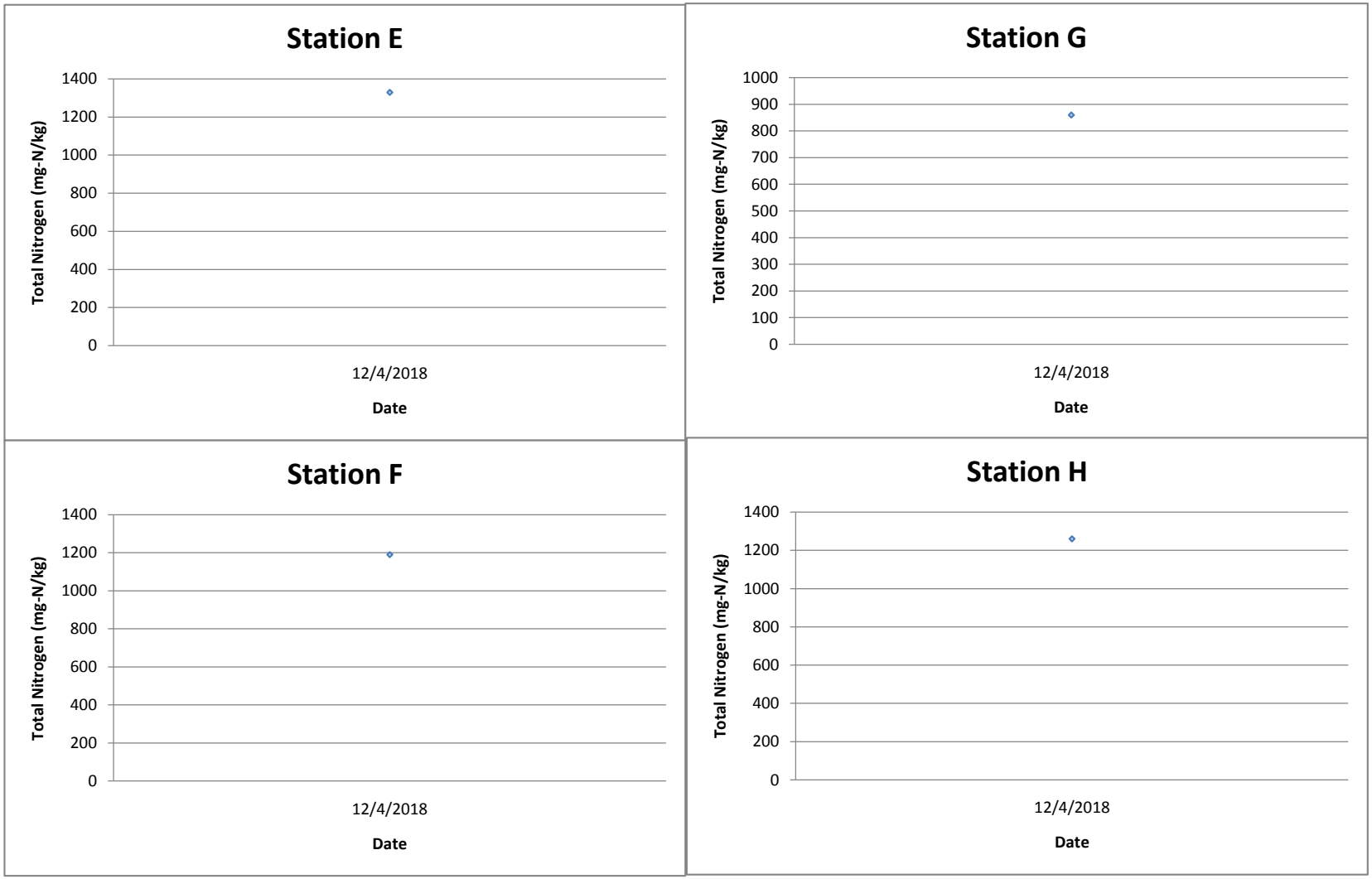
Station H
Ammonia as N (mg-N/kg)
14
12
10
8
6
4
2
0
12/4/2018
Date


Station A
Total Nitrogen (mg-N/kg)
600
500
400
300
200
100
0
12/4/2018
Date

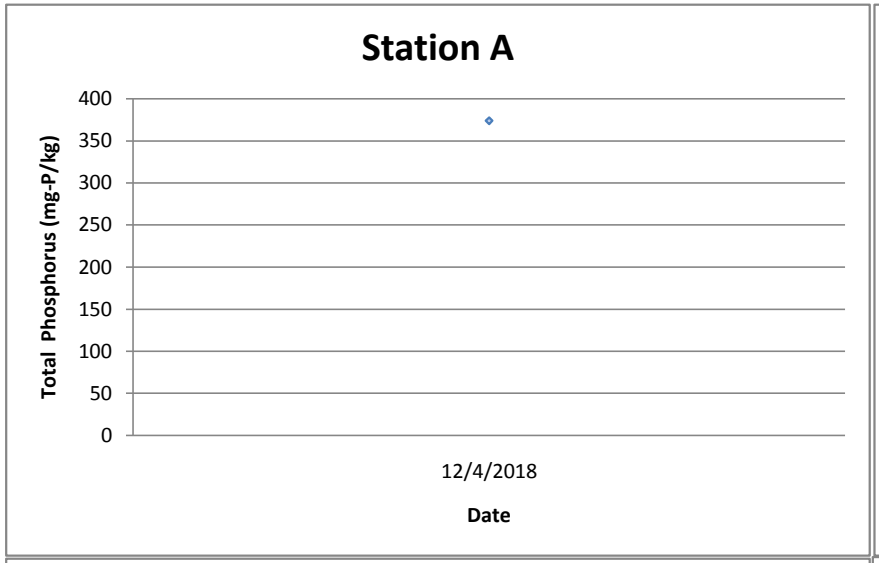

Station C
Total Nitrogen (mg-N/kg)
1200
1000
800
600
400
200
0
12/4/2018
Date

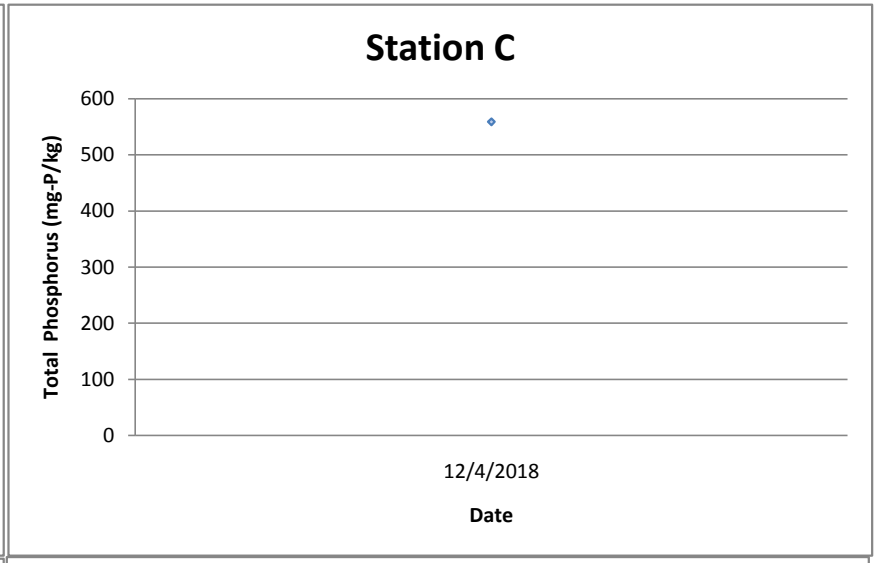

Station B
Total Nitrogen (mg-N/kg)
1400
1200
1000
800
600
400
200
0
12/4/2018
Date

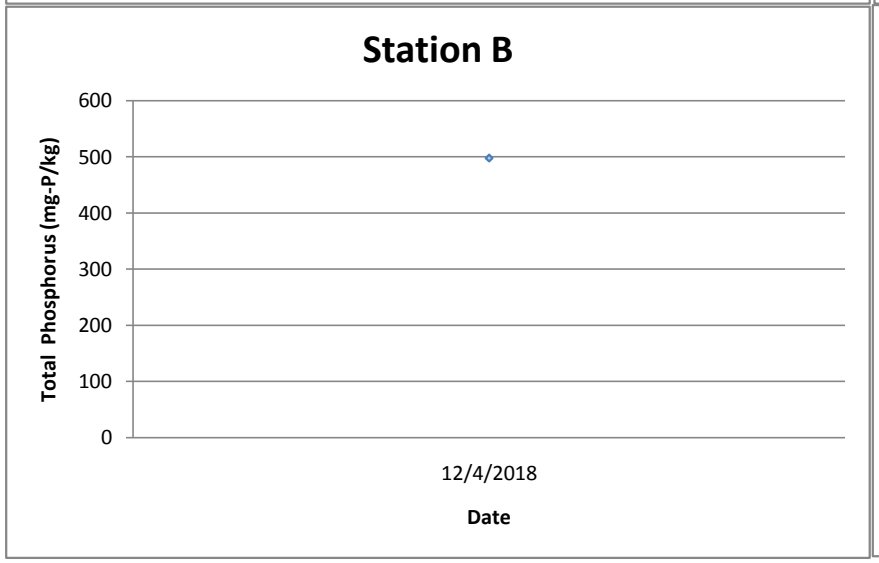

Station D
Total Nitrogen (mg-N/kg)
600
500
400
300
200
100
0
12/4/2018
Date

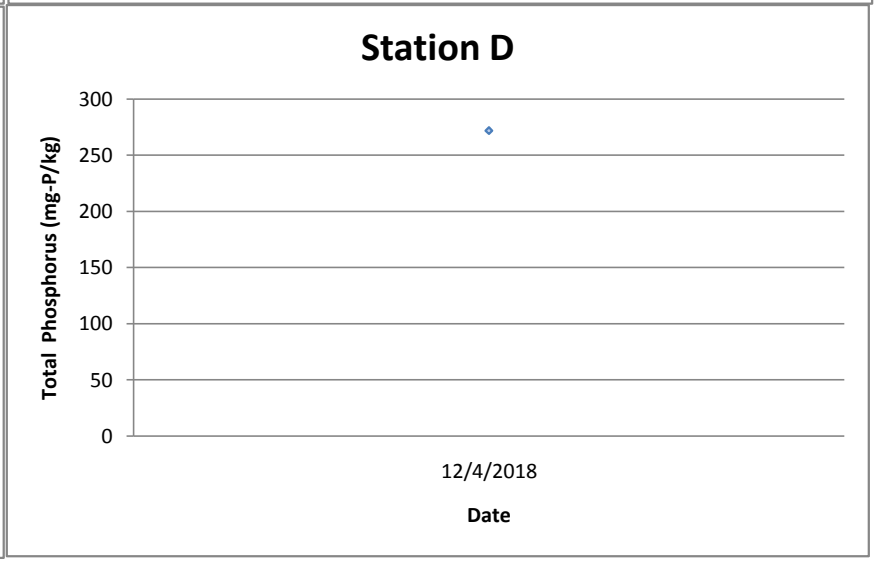

Station E
Total Nitrogen (mg-N/kg)
1400
1200
1000
800
600
400
200
0
12/4/2018
Date
Station G
Total Nitrogen (mg-N/kg)
1000
900
800
700
600
500
400
300
200
100
0
12/4/2018
Date
Station F
Total Nitrogen (mg-N/kg)
1400
1200
1000
800
600
400
200
0
12/4/2018
Date
Station H
Total Nitrogen (mg-N/kg)
1400
1200
1000
800
600
400
200
0
12/4/2018
Date

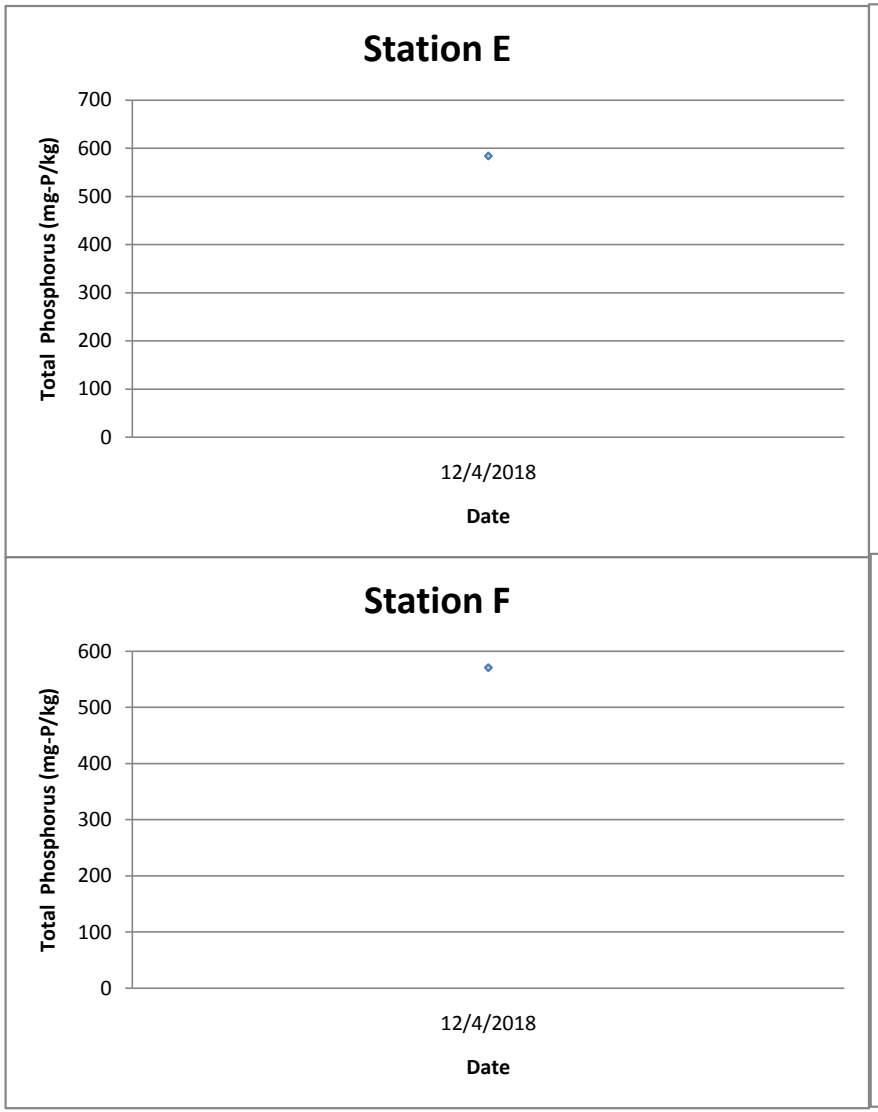
Total Phosphorus (mg-P/kg)

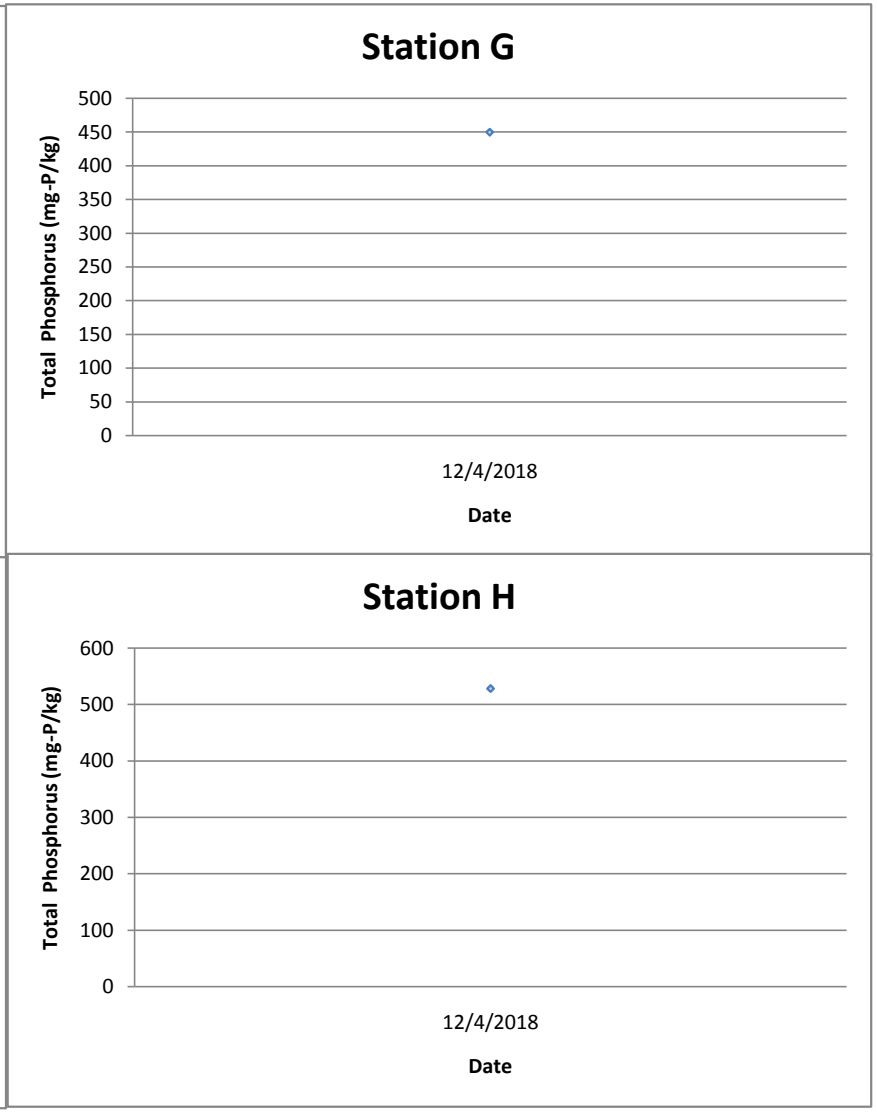






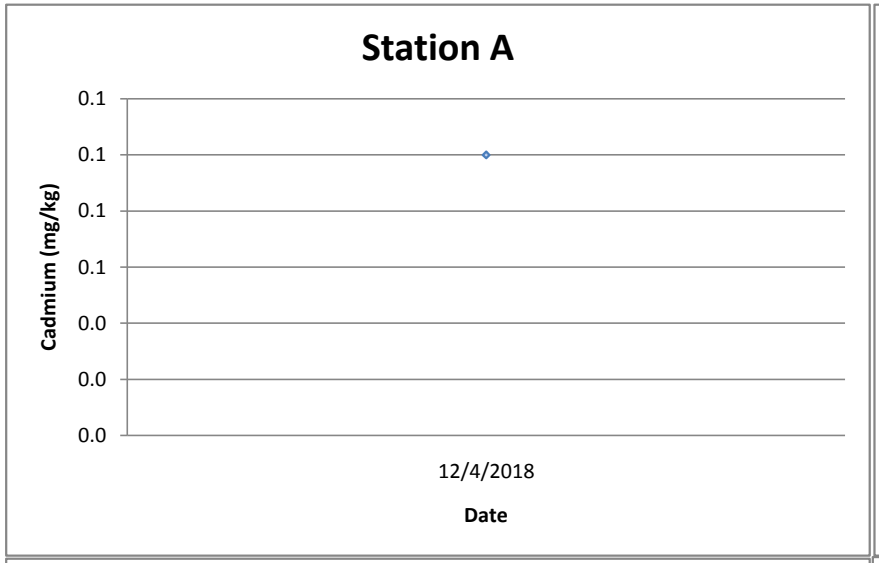


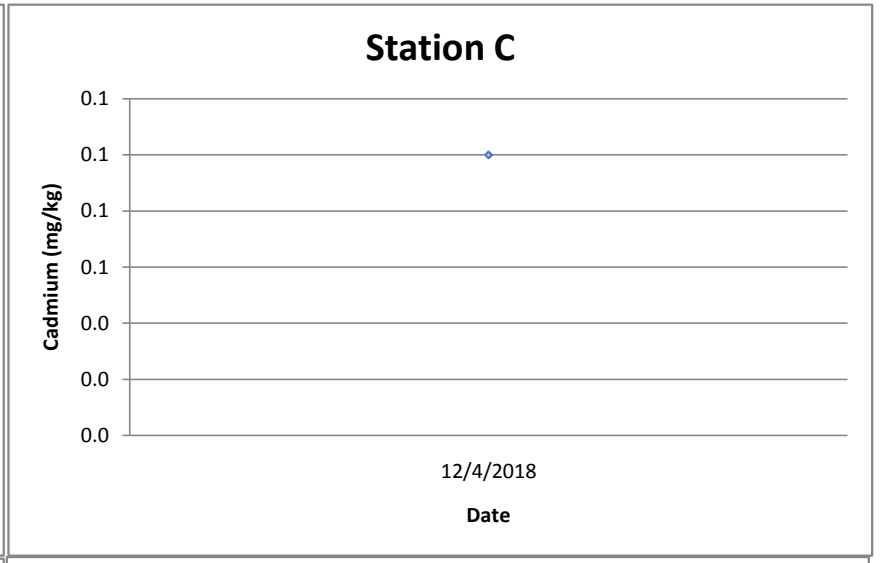

Station E
Total Phosphorus (mg-P/kg)
700
600
500
400
300
200
100
0
12/4/2018
Date

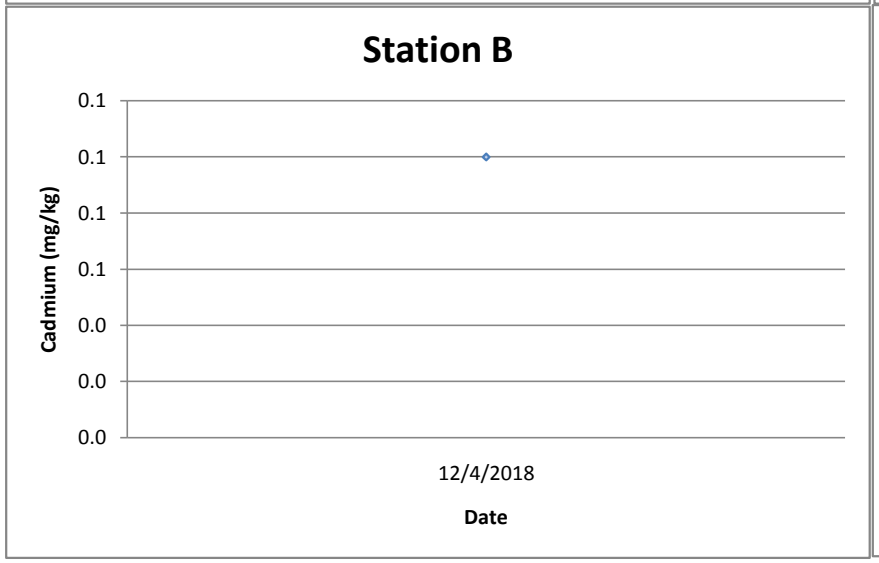

Station G
Total Phosphorus (mg-P/kg)
500
450
400
350
300
250
200
150
100
50
0
12/4/2018
Date

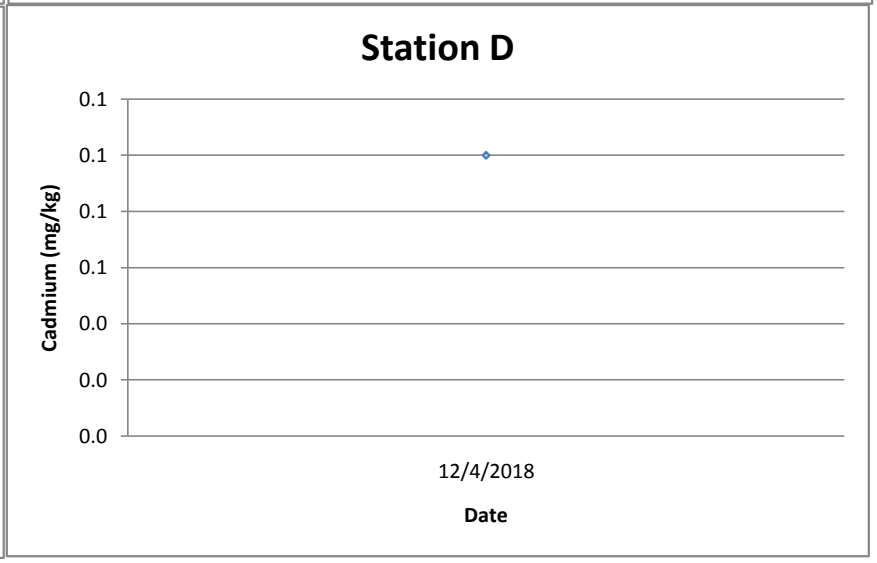
Station F
Total Phosphorus (mg-P/kg)
600
500
400
300
200
100
0
12/4/2018
Date

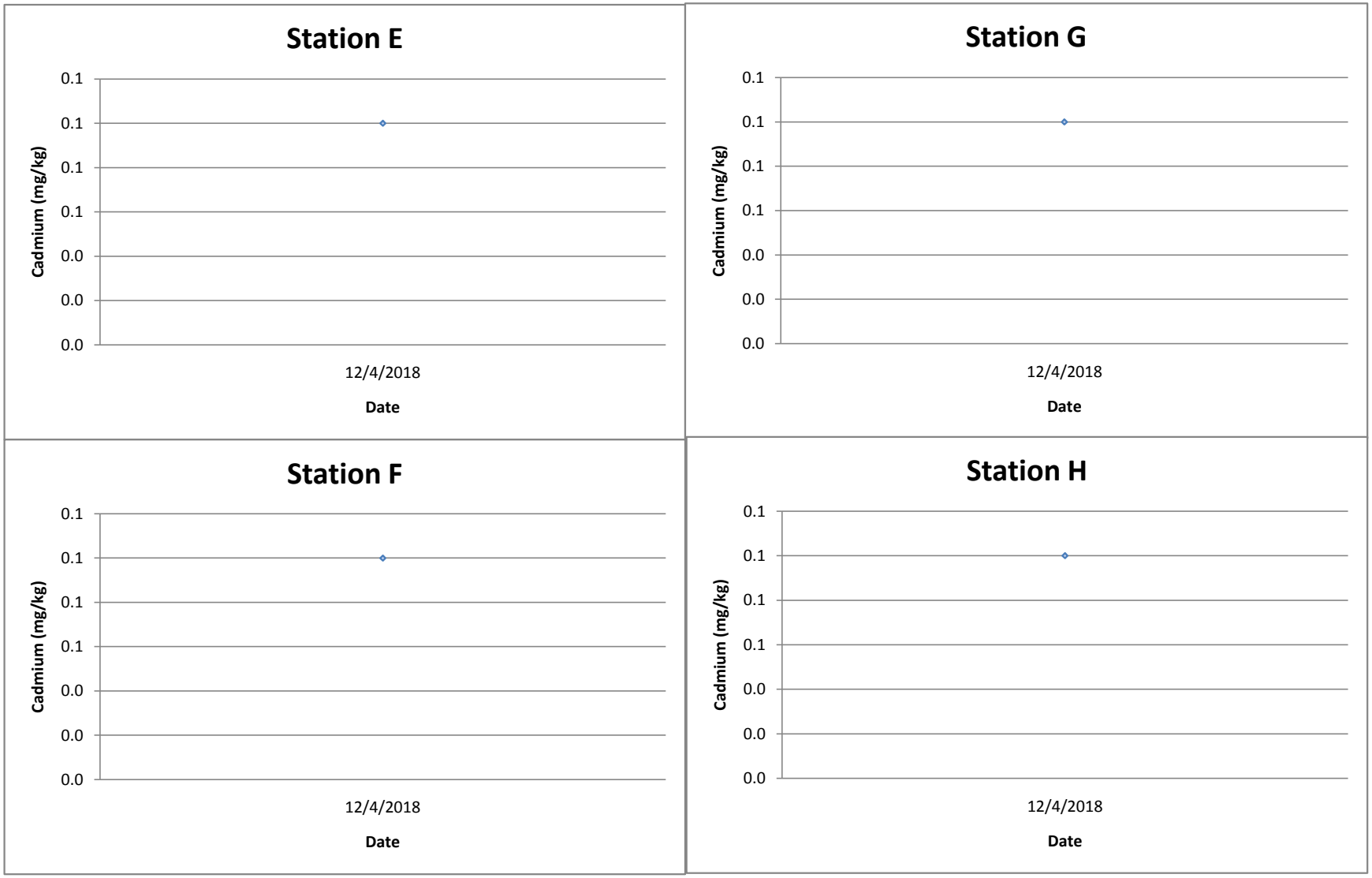
Station H
Total Phosphorus (mg-P/kg)
600
500
400
300
200
100
0
12/4/2018
Date

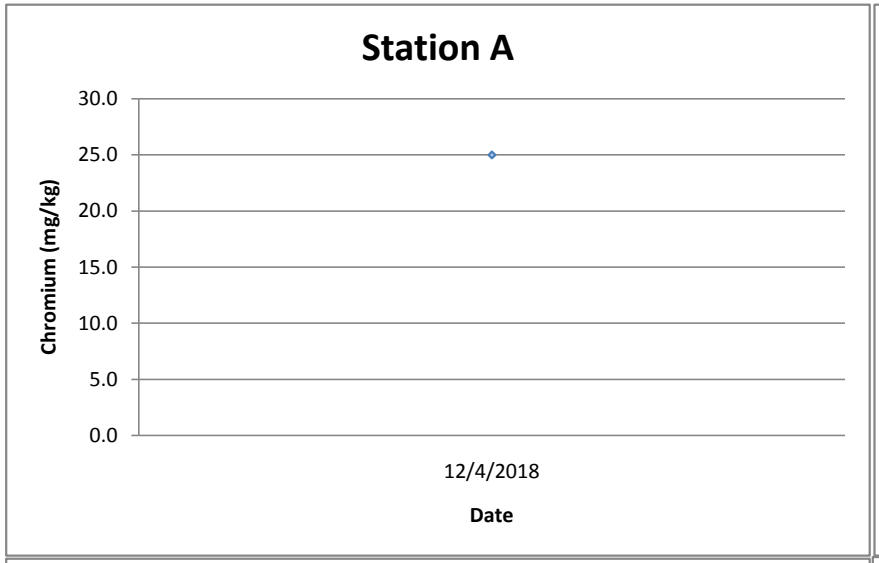

Station A
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date

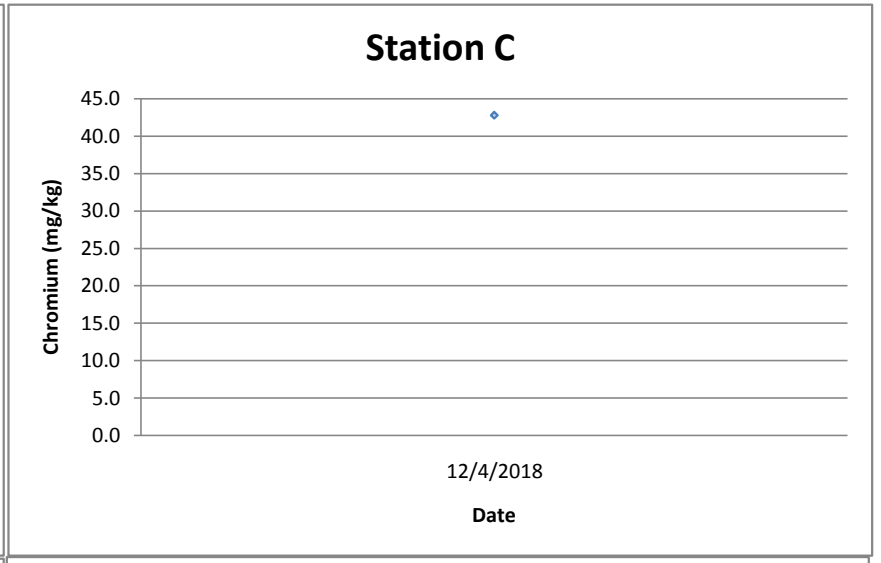

Station C
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date

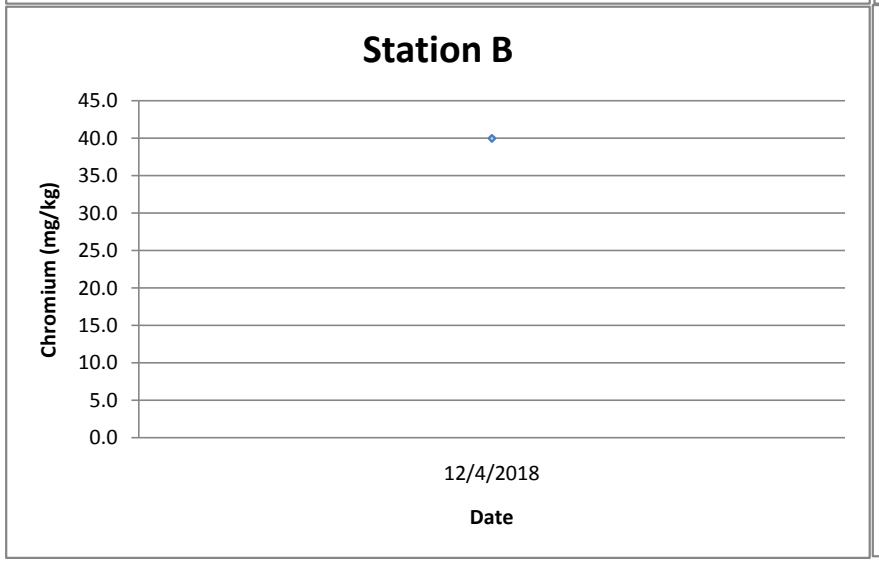

Station B
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date

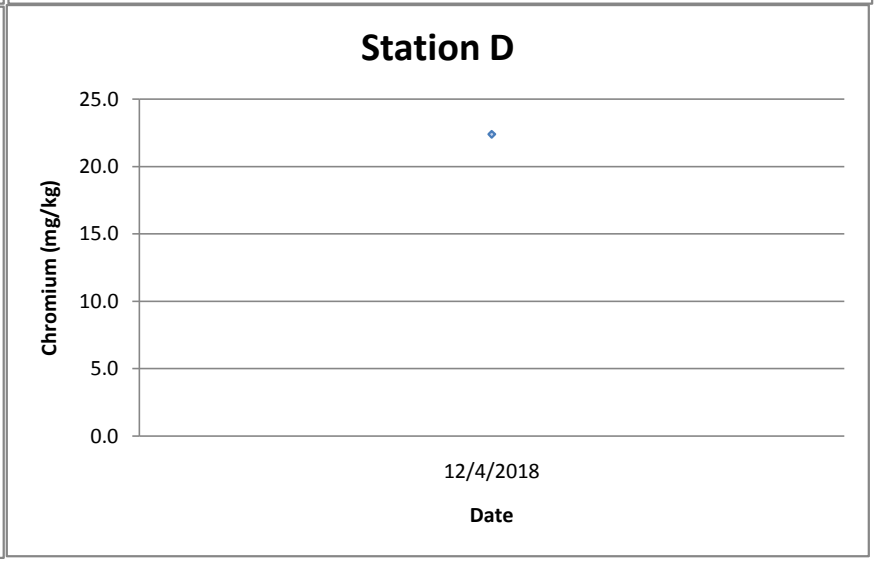

Station D
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date

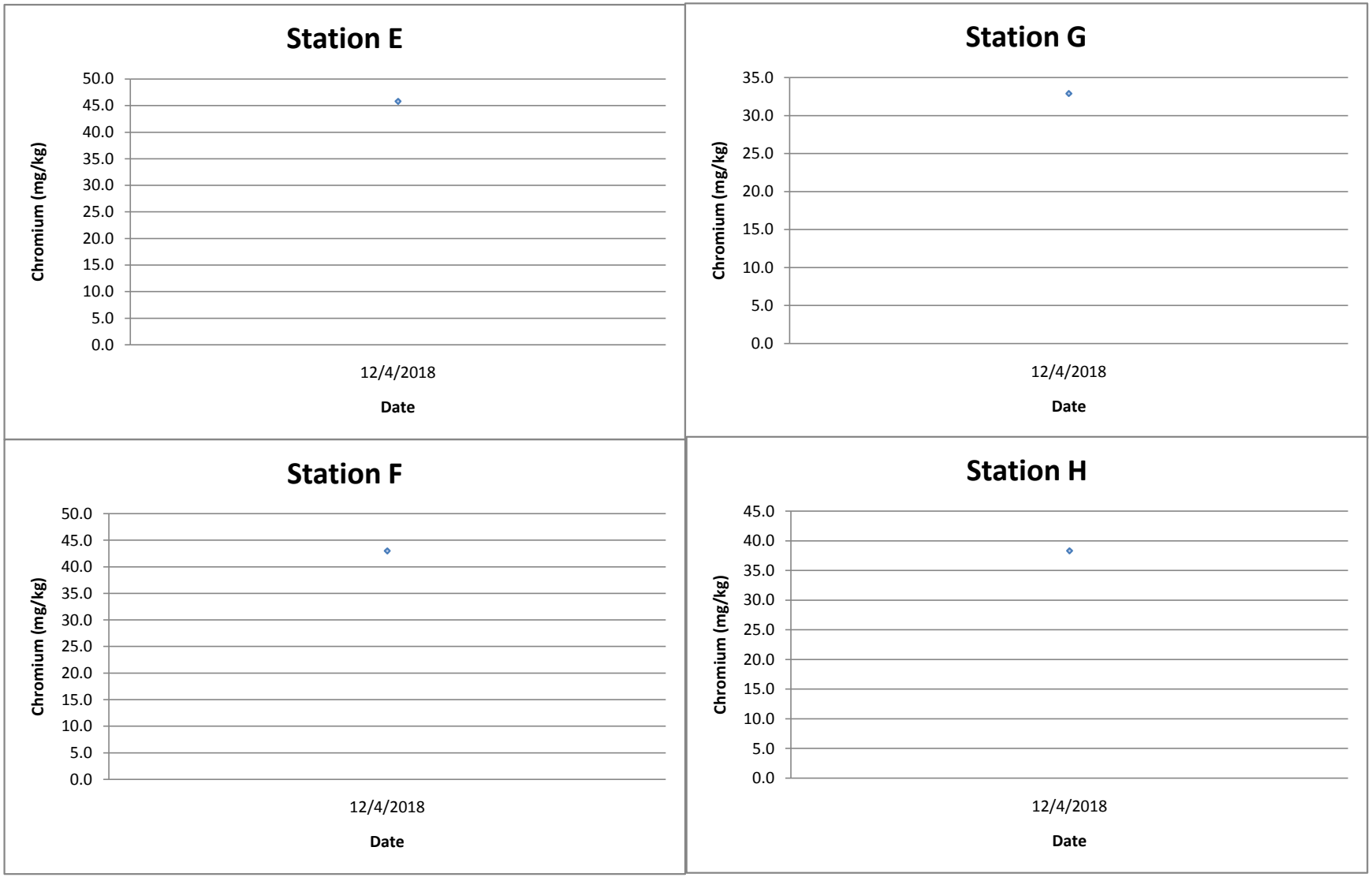

Station E
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date
Station G
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date
Station F
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date
Station H
Cadmium (mg/kg)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
12/4/2018
Date

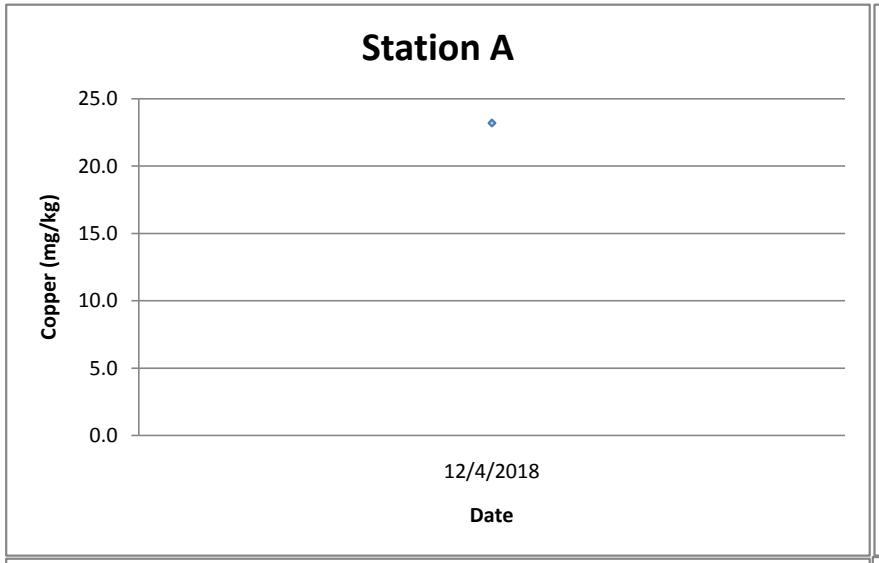

Station A
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Chromium (mg/kg)
12/4/2018
Date

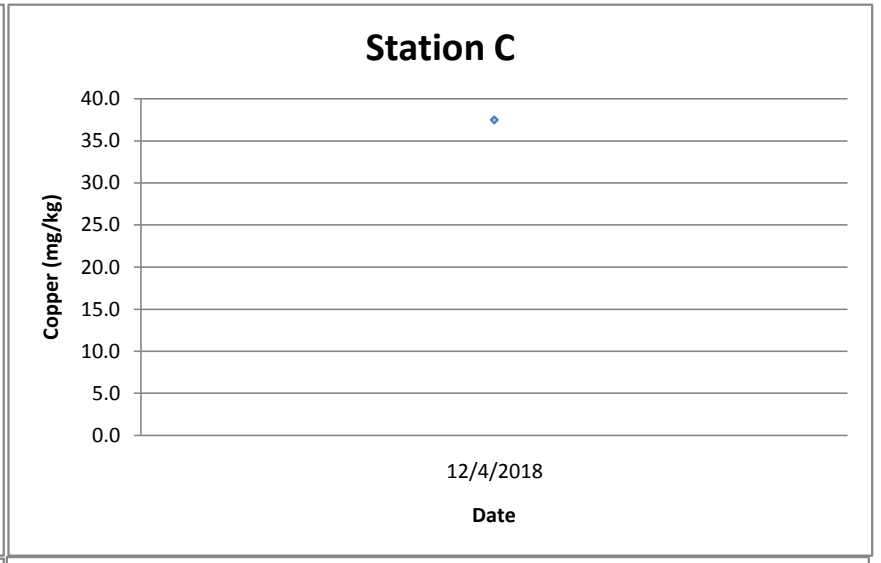

Station C
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Chromium (mg/kg)
12/4/2018
Date

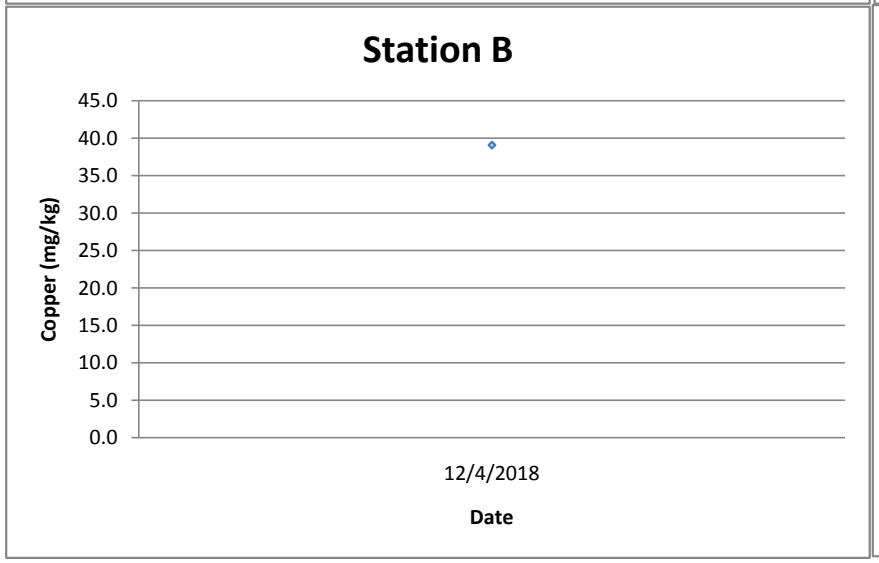

Station B
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Chromium (mg/kg)
12/4/2018
Date

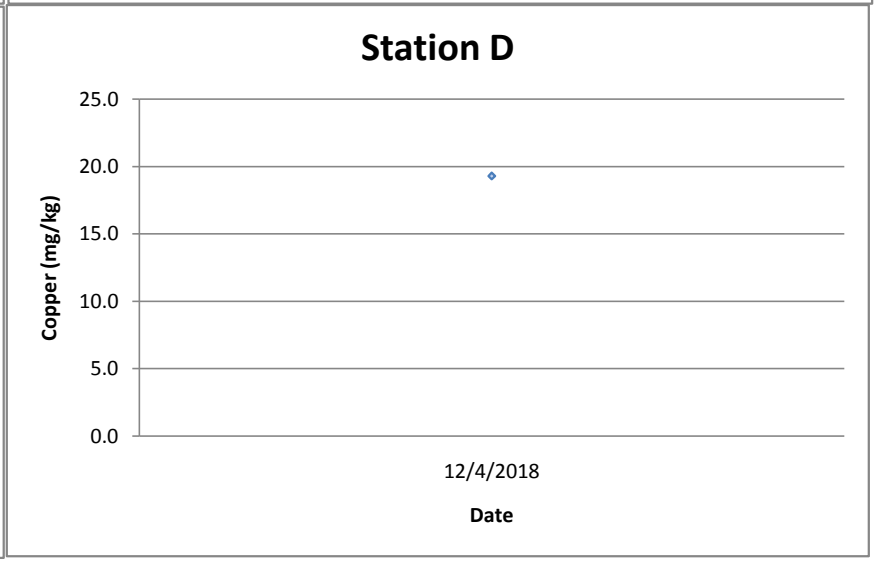

Station D
25.0
20.0
15.0
10.0
5.0
0.0
Chromium (mg/kg)
12/4/2018
Date

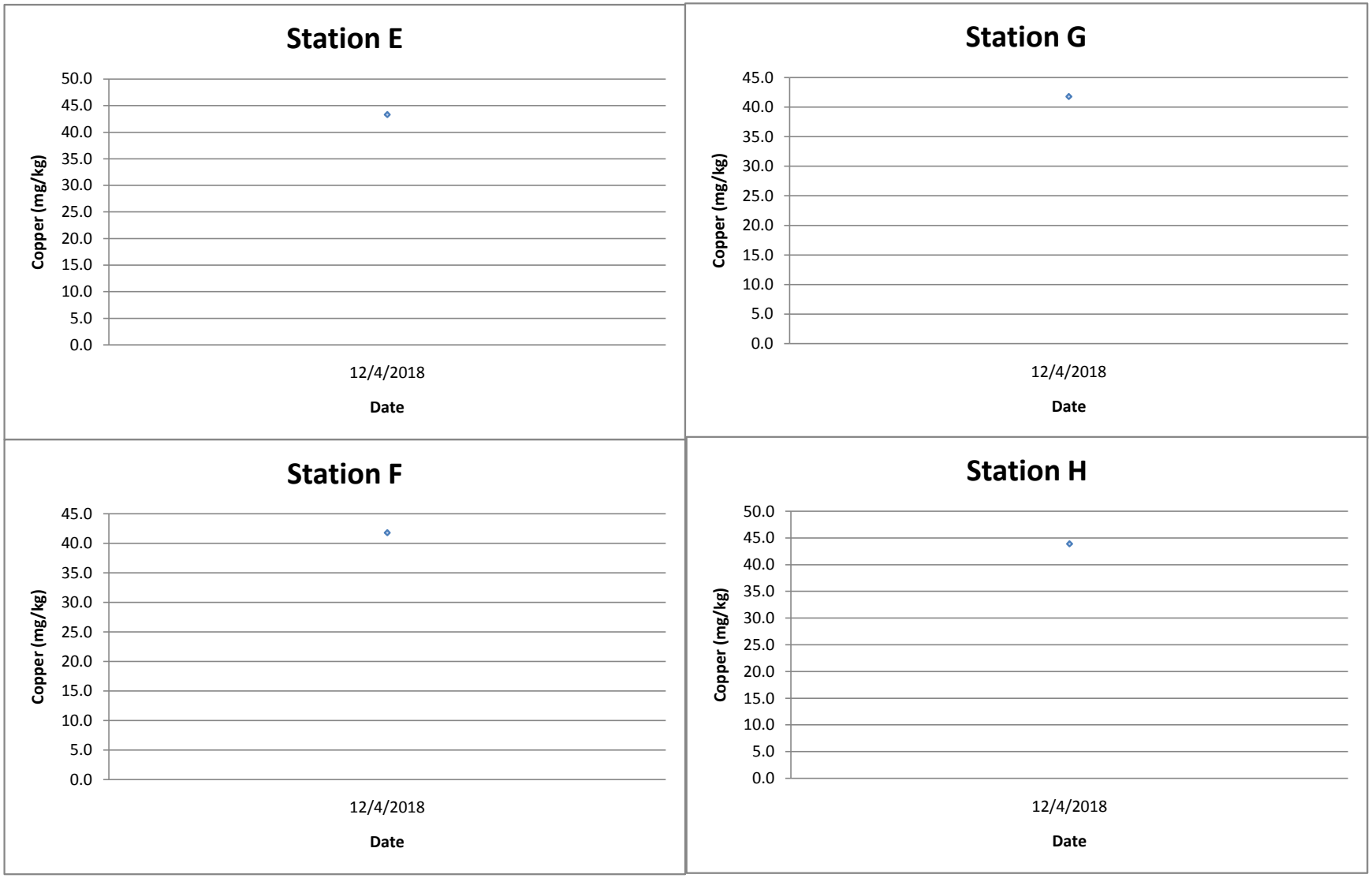

Station E
Chromium (mg/kg)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date
Station G
Chromium (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date
Station F
Chromium (mg/kg)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date
Station H
Chromium (mg/kg)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date

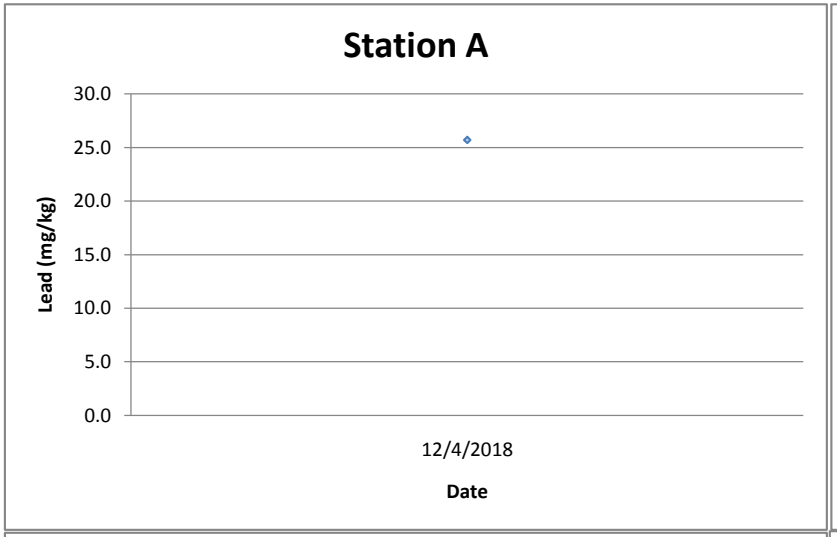

Station A
25.0
20.0
15.0
10.0
5.0
0.0
Copper (mg/kg)
12/4/2018
Date

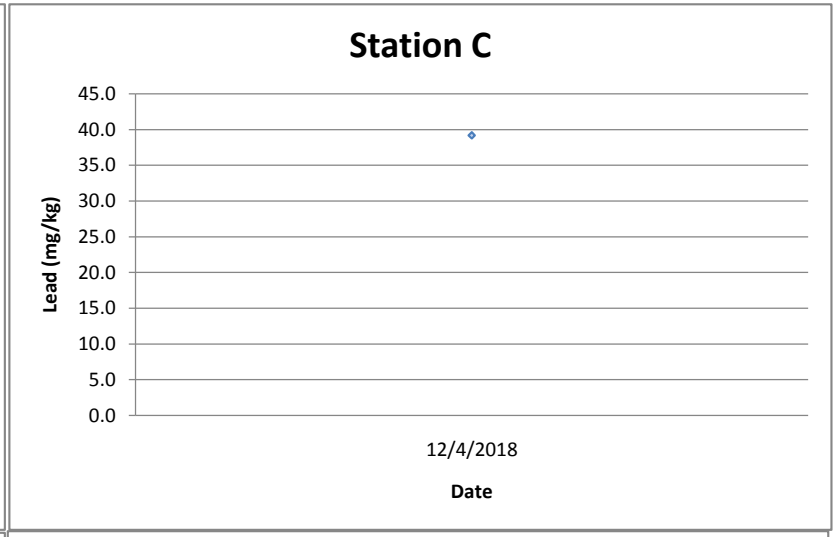

Station C
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Copper (mg/kg)
12/4/2018
Date

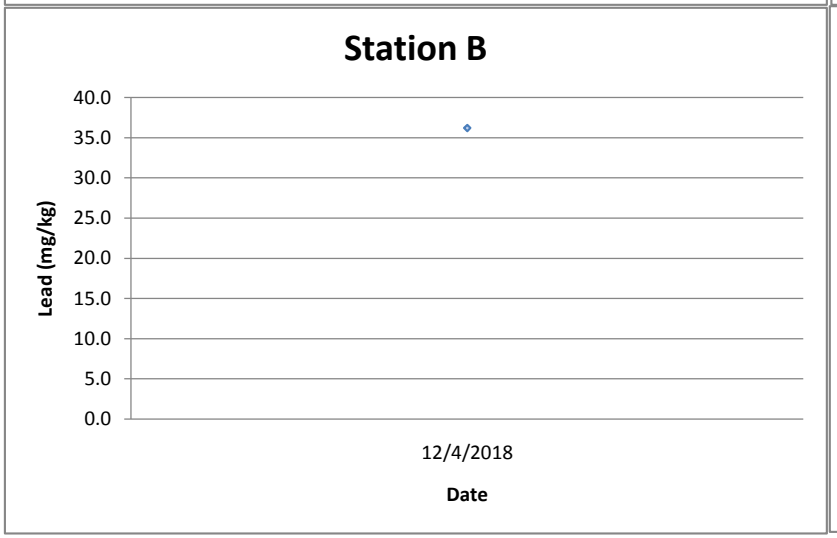

Station B
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Copper (mg/kg)
12/4/2018
Date

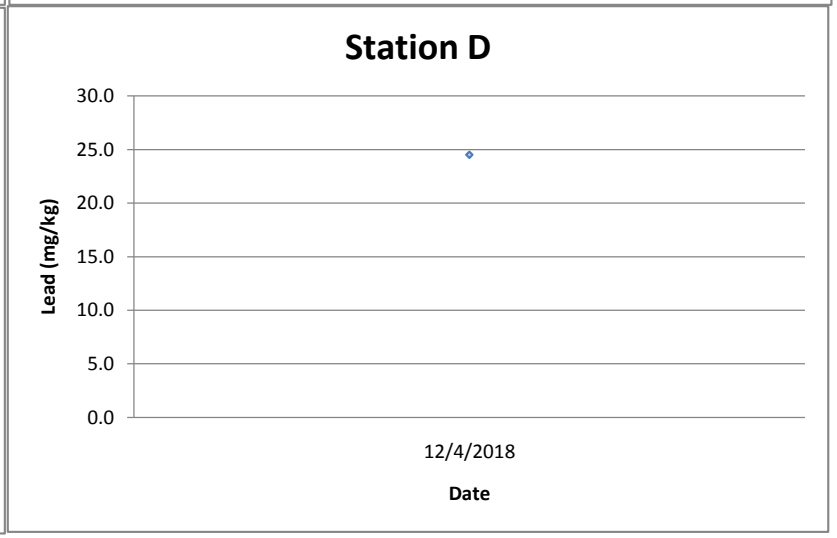

Station D
25.0
20.0
15.0
10.0
5.0
0.0
Copper (mg/kg)
12/4/2018
Date

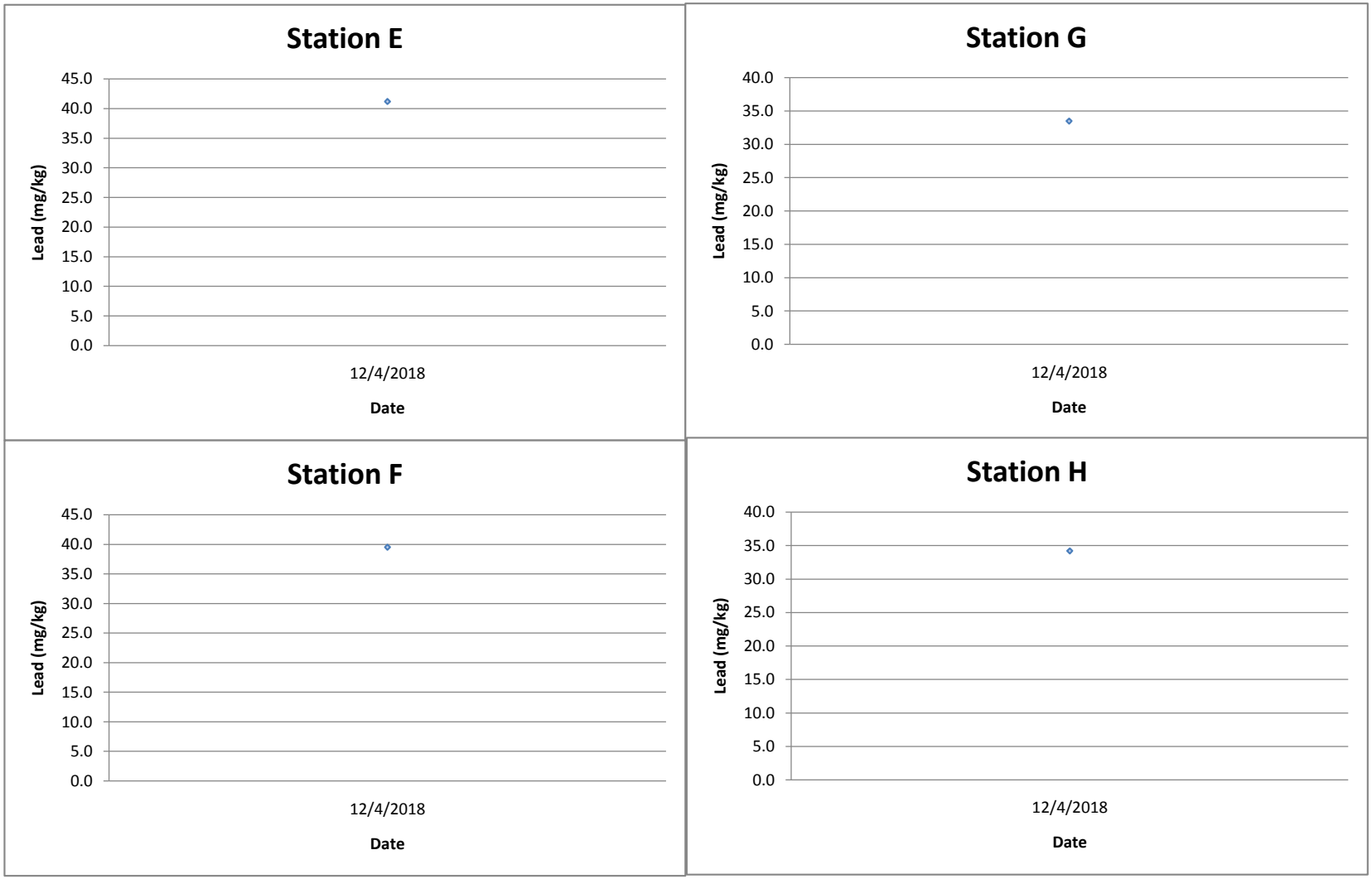

Station E
Copper (mg/kg)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date
Station G
Copper (mg/kg)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date
Station F
Copper (mg/kg)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date
Station H
Copper (mg/kg)
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date


Station A
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date

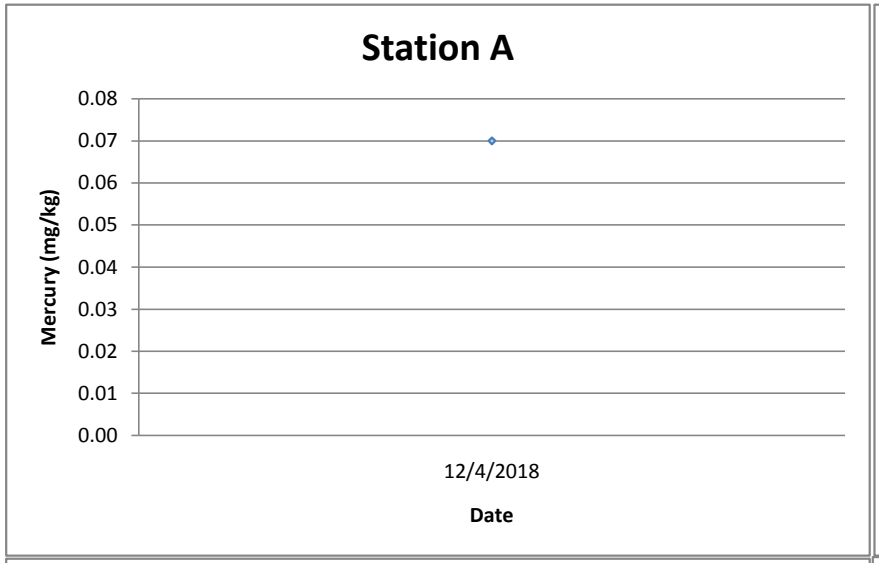

Station C
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date

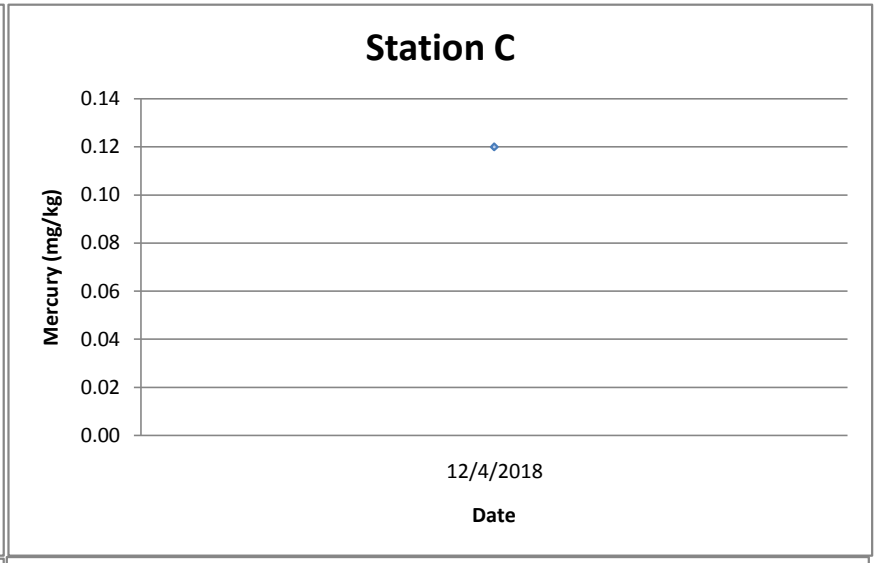

Station B
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date

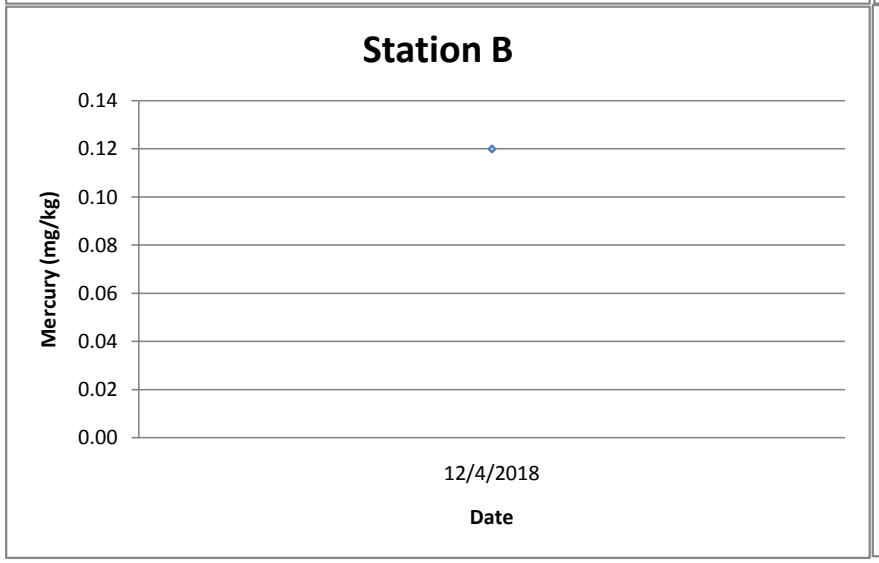

Station D
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date

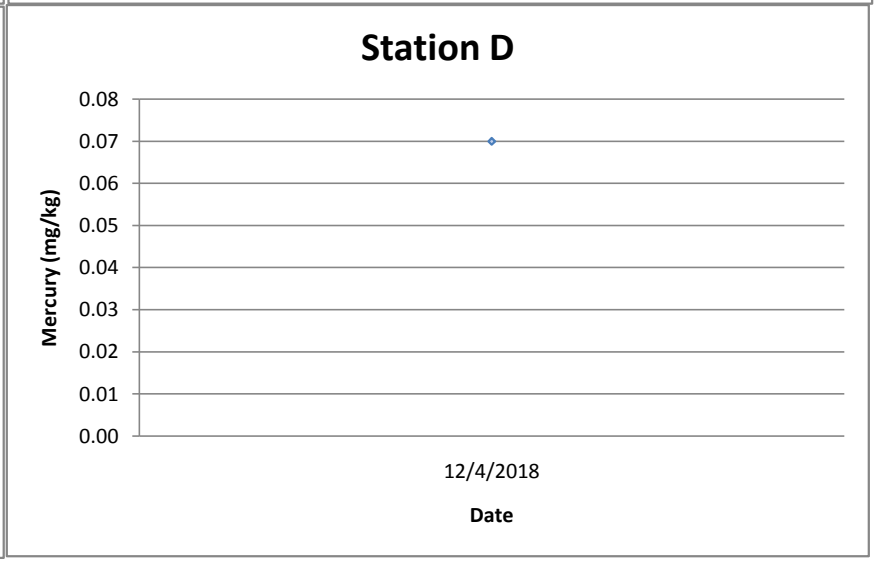

Station E
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date
Station G
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date
Station F
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date
Station H
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Lead (mg/kg)
12/4/2018
Date

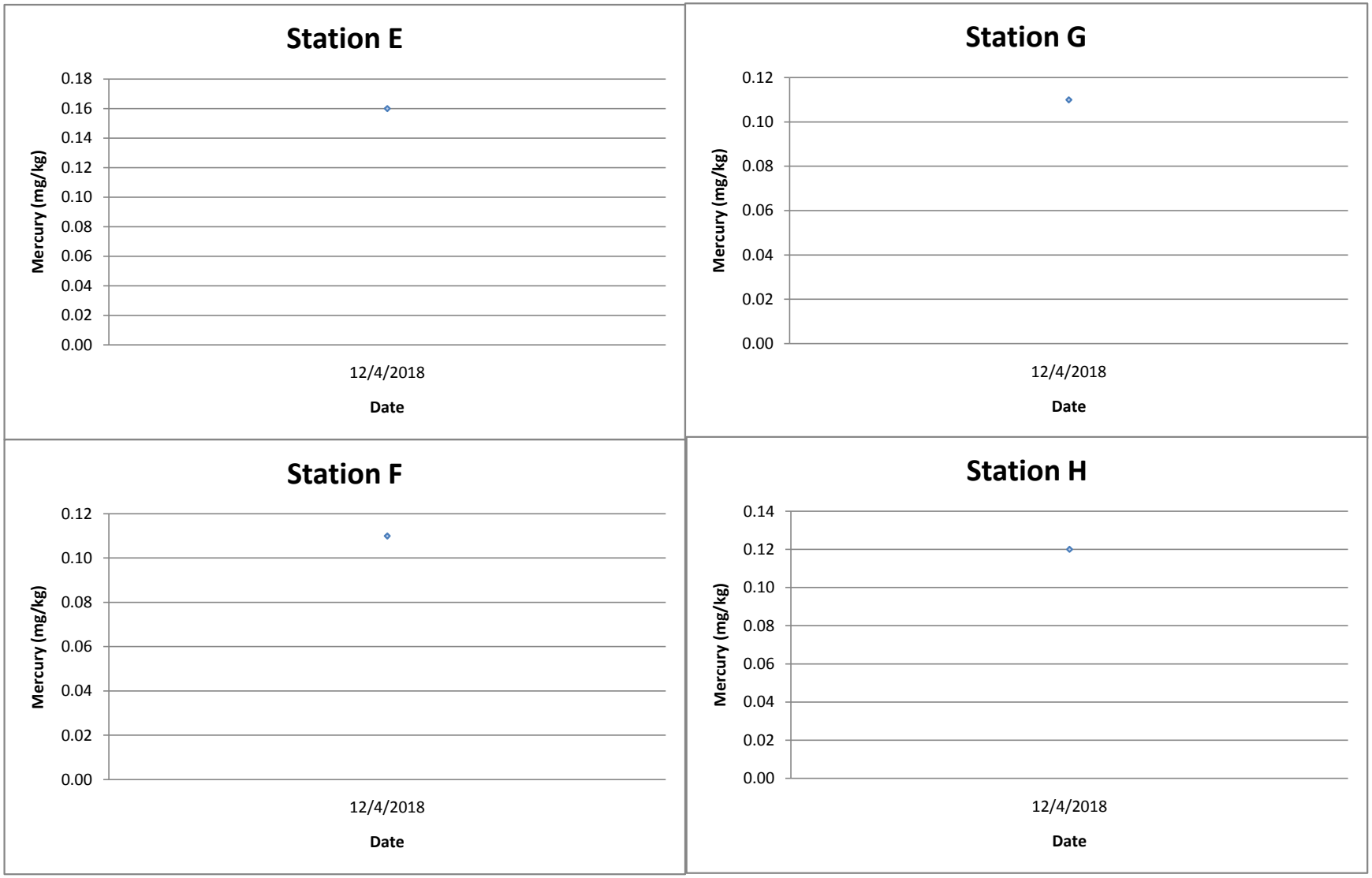
Mercury (mg/kg)

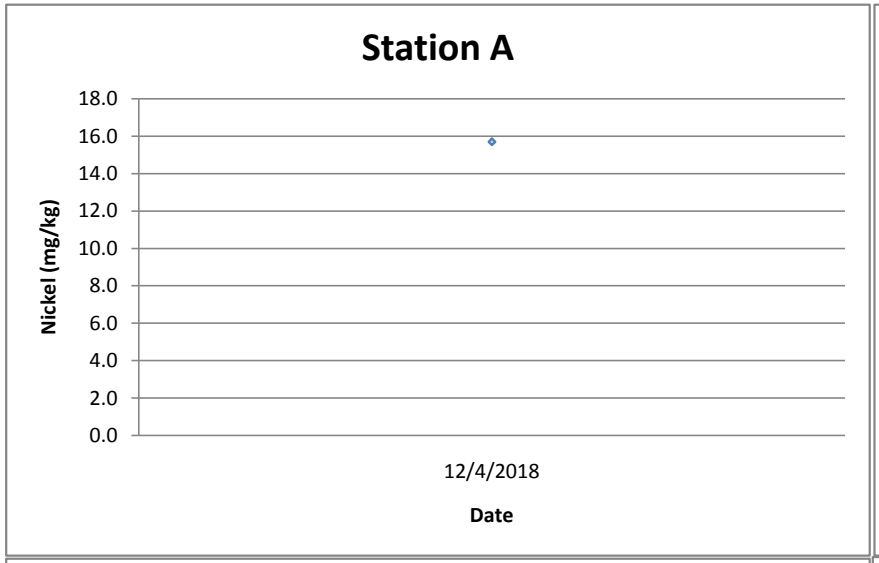


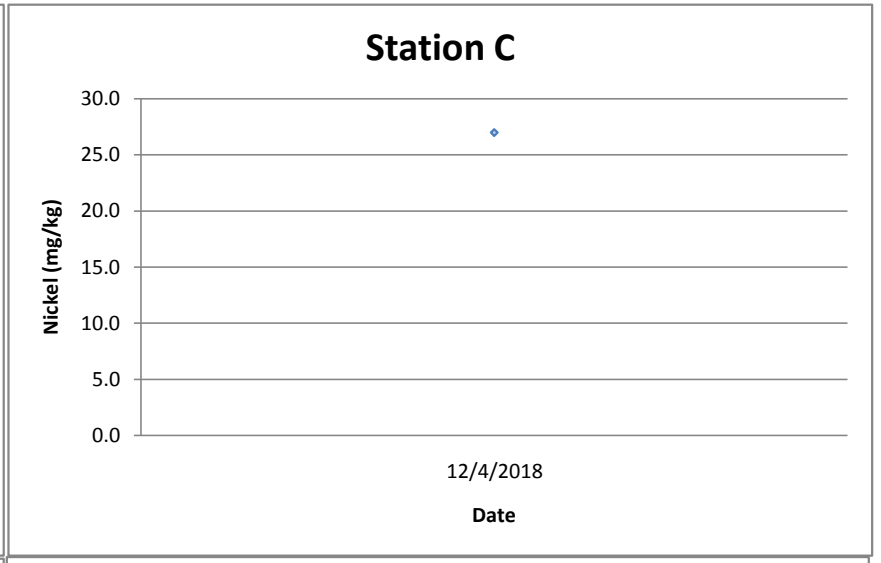


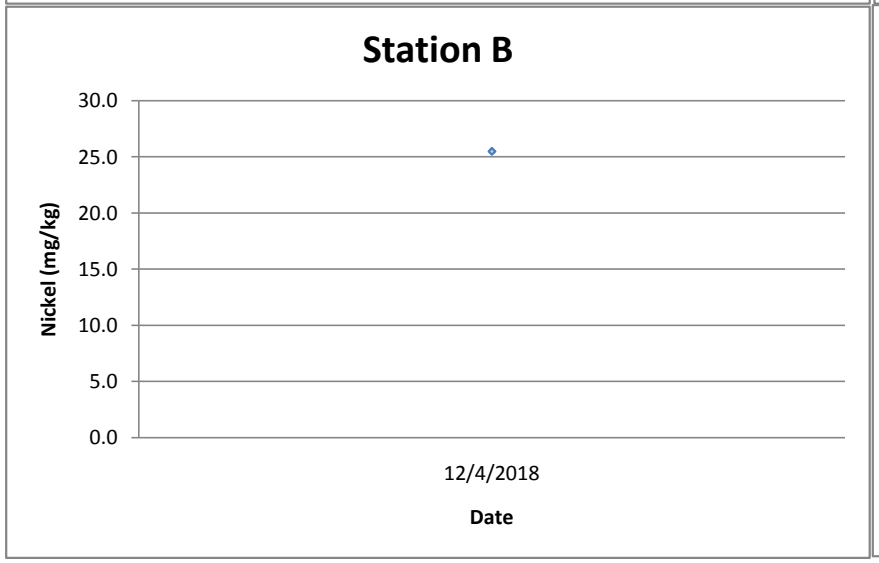


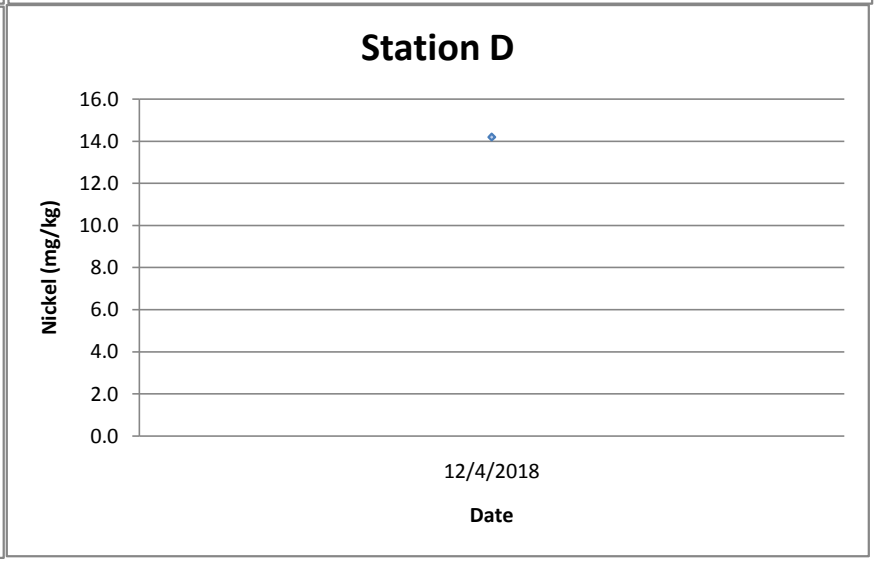


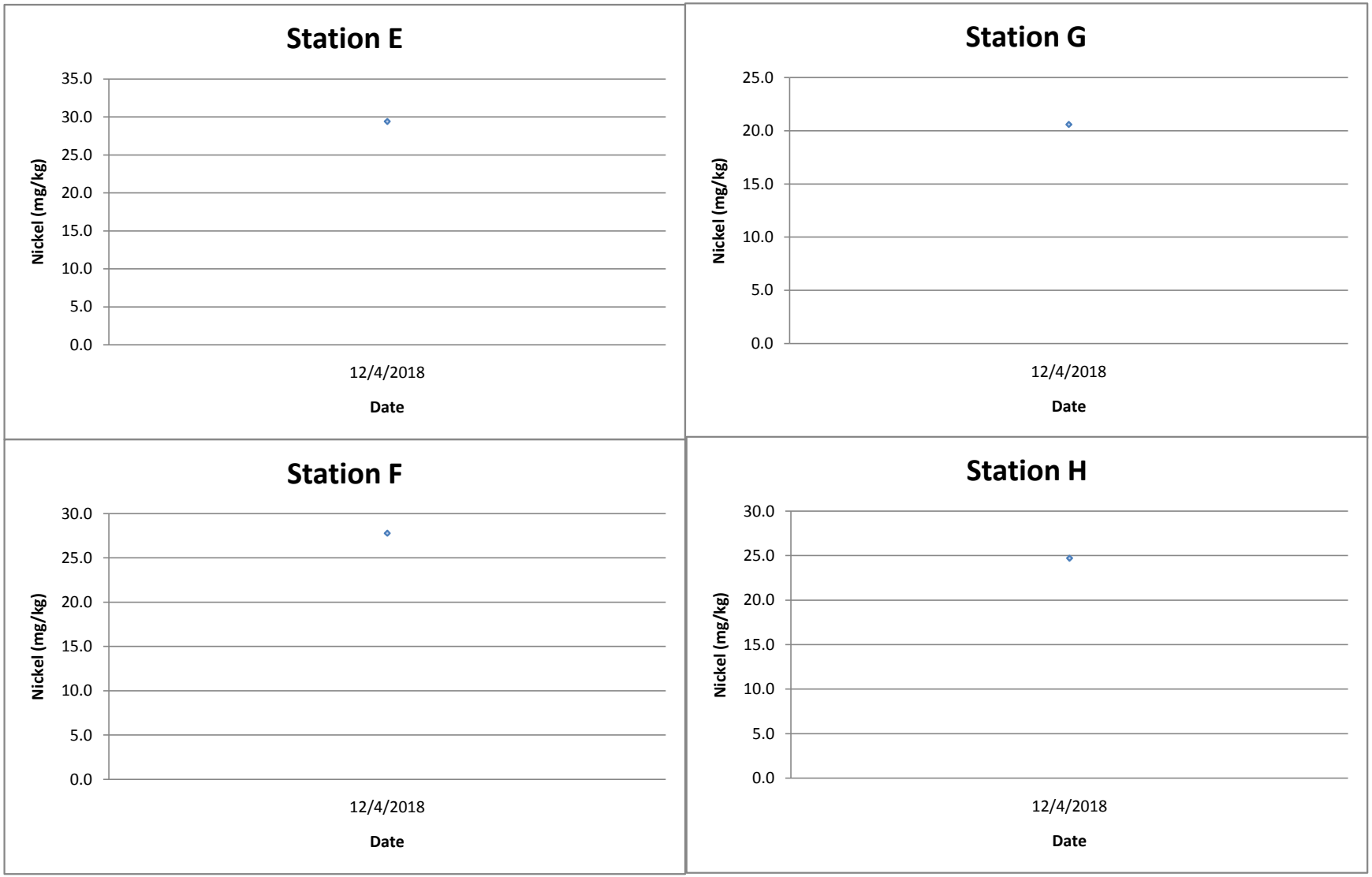

Station E
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Mercury (mg/kg)
12/4/2018
Date
Station G
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Mercury (mg/kg)
12/4/2018
Date
Station F
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Mercury (mg/kg)
12/4/2018
Date
Station H
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Mercury (mg/kg)
12/4/2018
Date

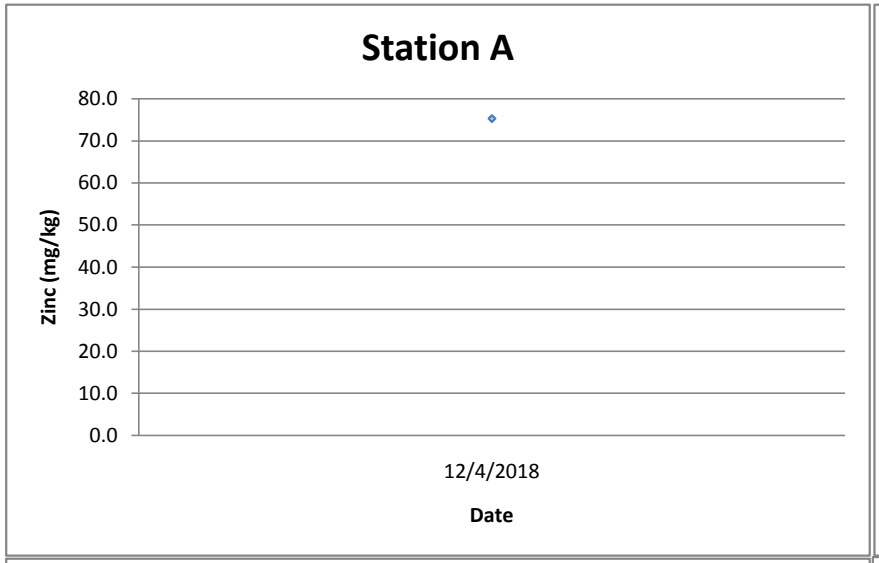

Station A
Nickel (mg/kg)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12/4/2018
Date

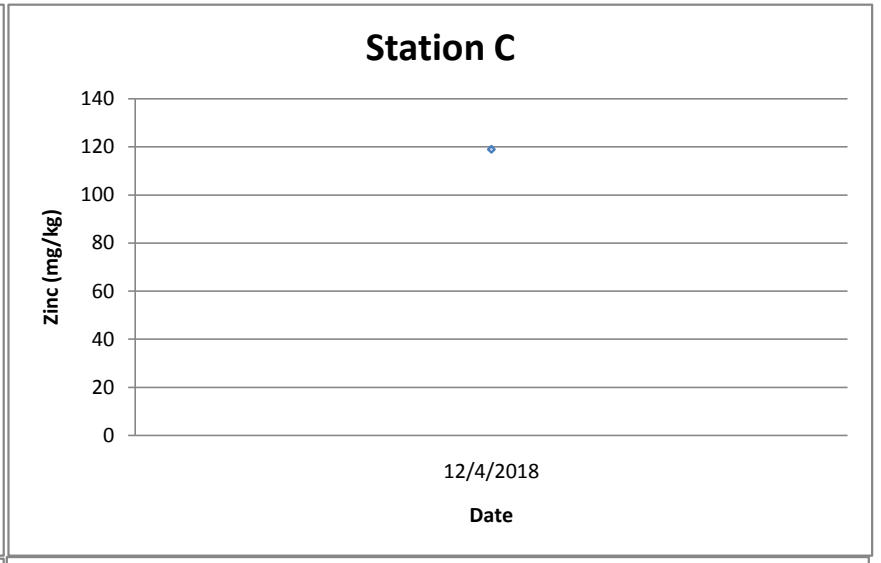

Station C
Nickel (mg/kg)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date

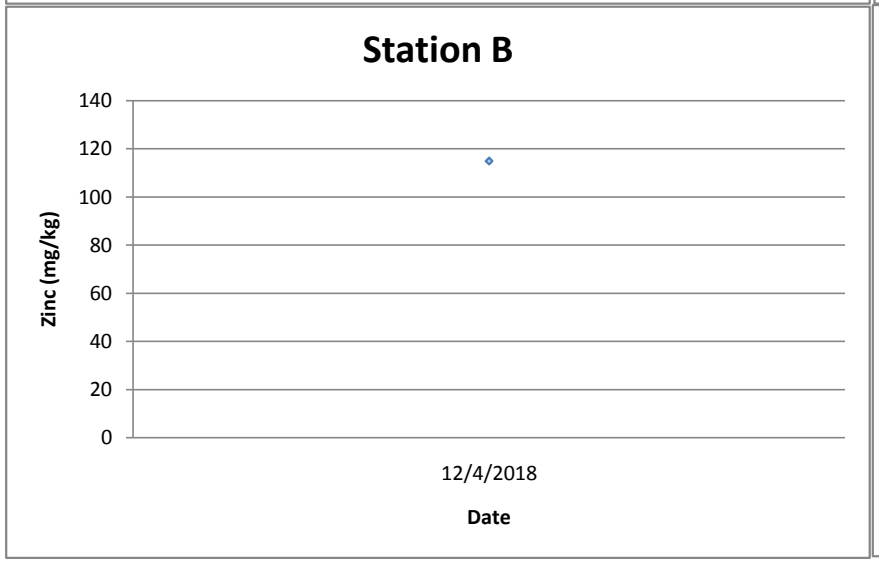

Station B
Nickel (mg/kg)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
12/4/2018
Date

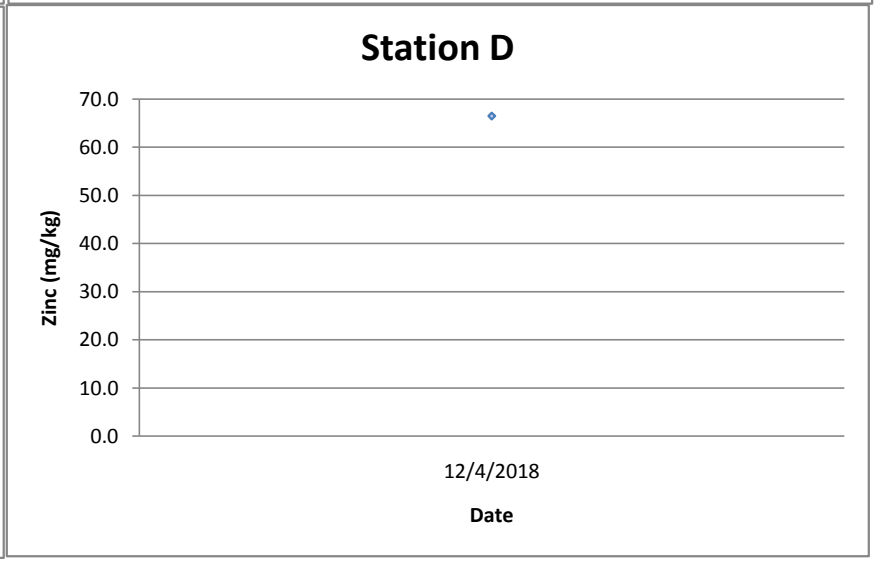

Station D
Nickel (mg/kg)
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12/4/2018
Date

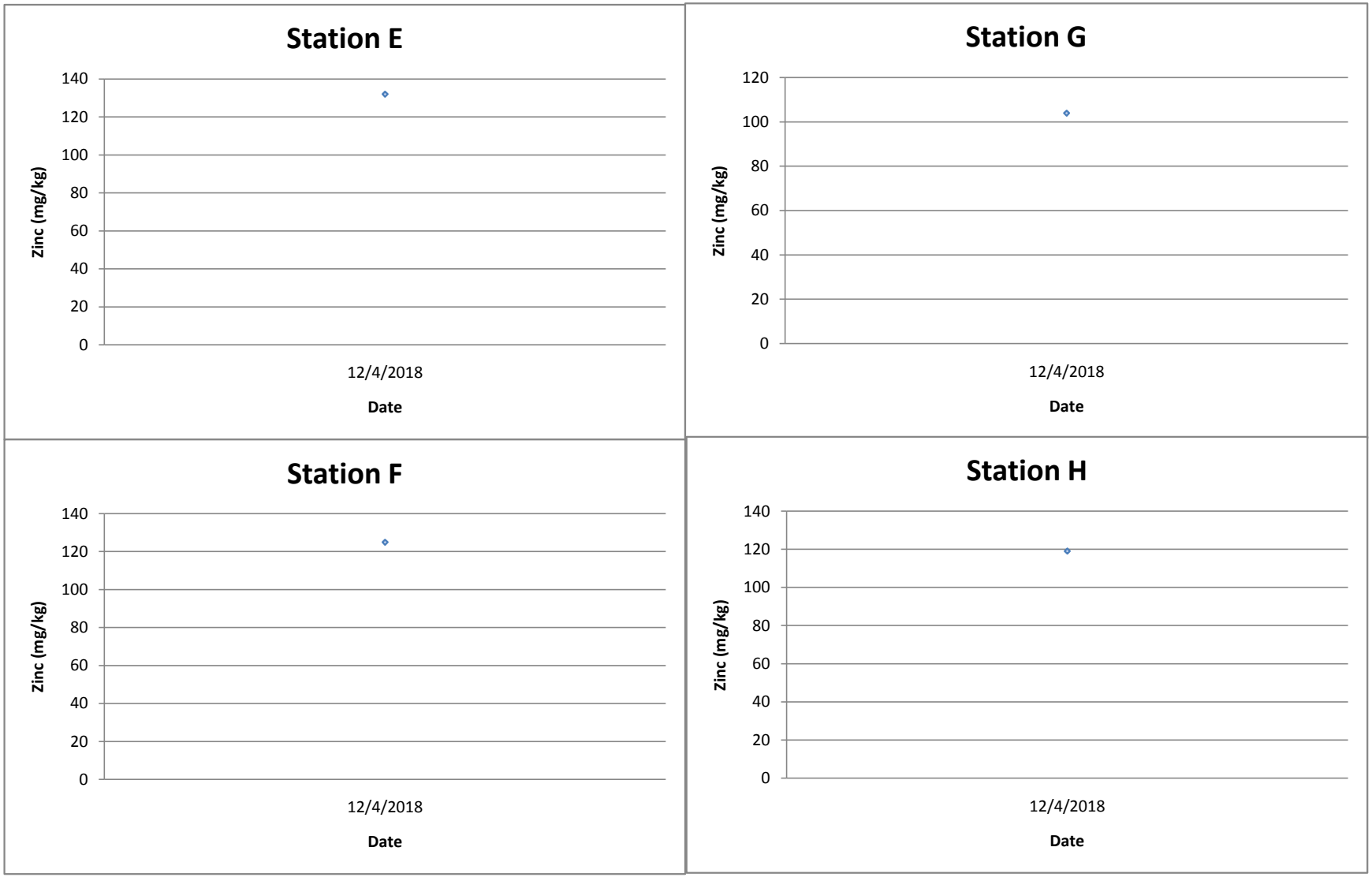

Station E
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
12/4/2018
Date
Station G
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
12/4/2018
Date
Station F
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
12/4/2018
Date
Station H
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Nickel (mg/kg)
12/4/2018
Date

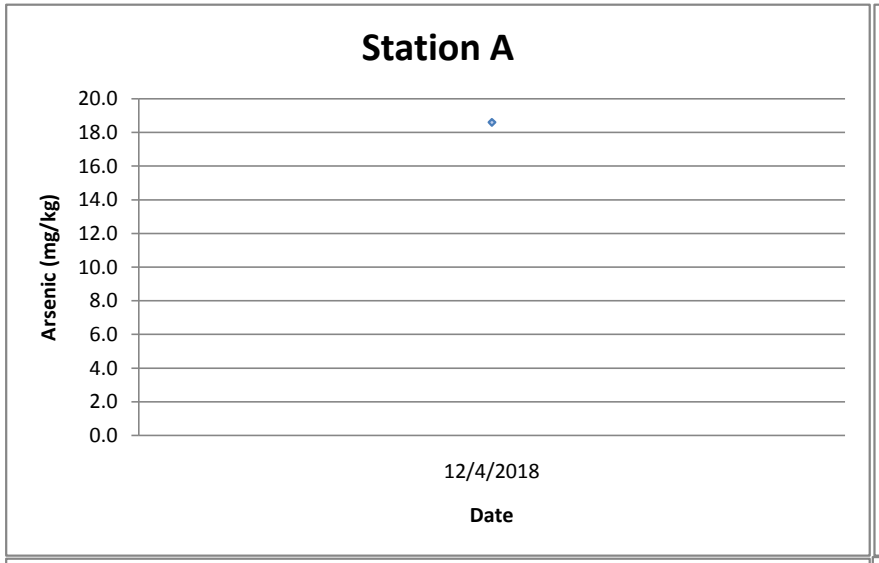

Station A
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Zinc (mg/kg)
12/4/2018
Date

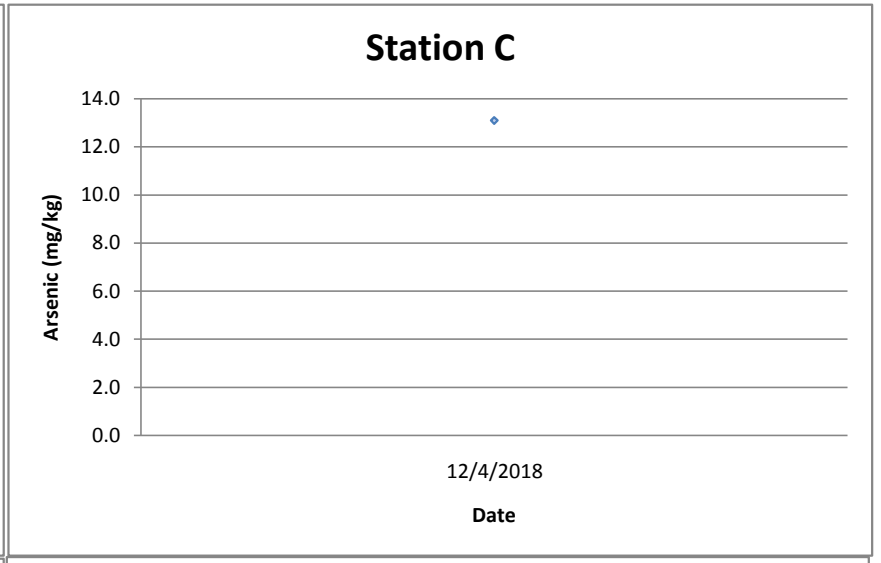

Station C
140
120
100
80
60
40
20
0
Zinc (mg/kg)
12/4/2018
Date

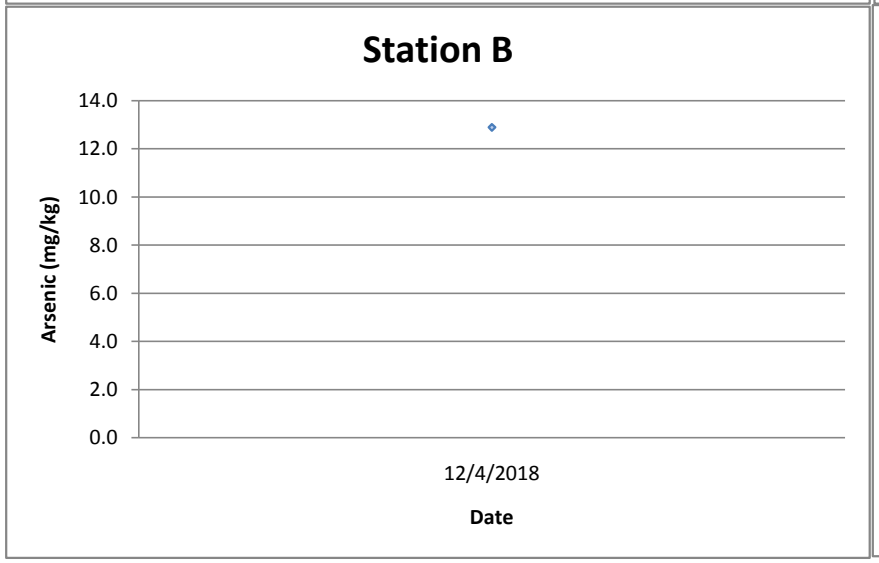

Station B
140
120
100
80
60
40
20
0
Zinc (mg/kg)
12/4/2018
Date

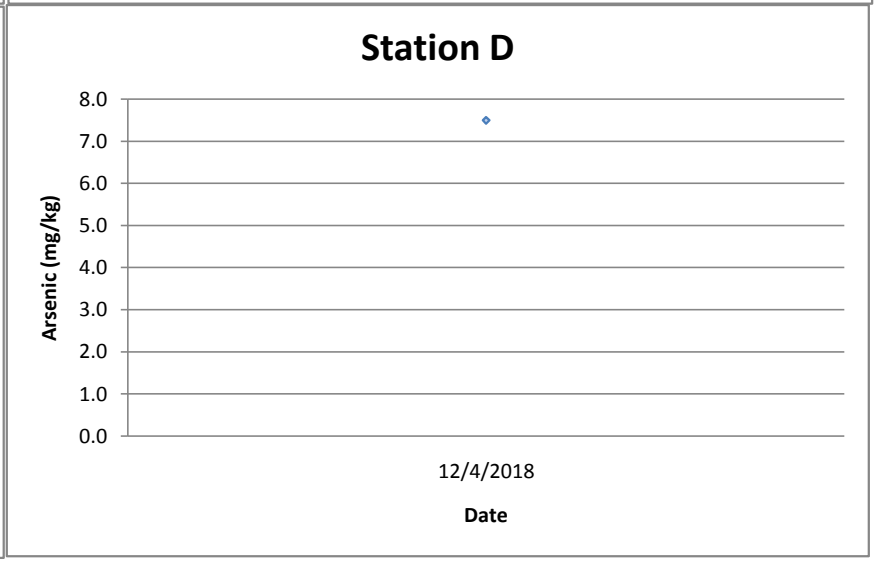

Station D
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Zinc (mg/kg)
12/4/2018
Date

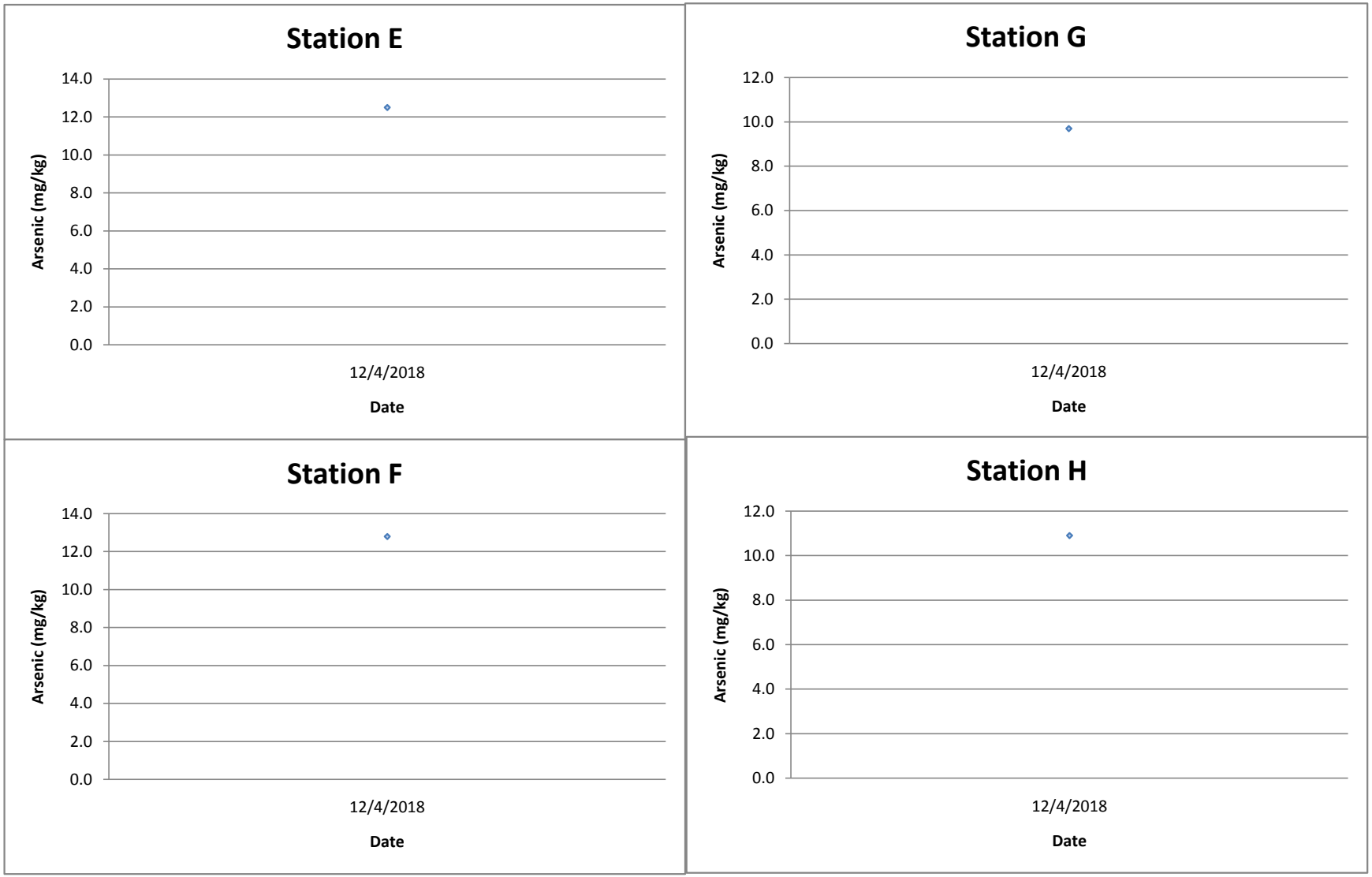

Station E
Zinc (mg/kg)
140
120
100
80
60
40
20
0
12/4/2018
Date
Station G
Zinc (mg/kg)
120
100
80
60
40
20
0
12/4/2018
Date
Station F
Zinc (mg/kg)
140
120
100
80
60
40
20
0
12/4/2018
Date
Station H
Zinc (mg/kg)
140
120
100
80
60
40
20
0
12/4/2018
Date

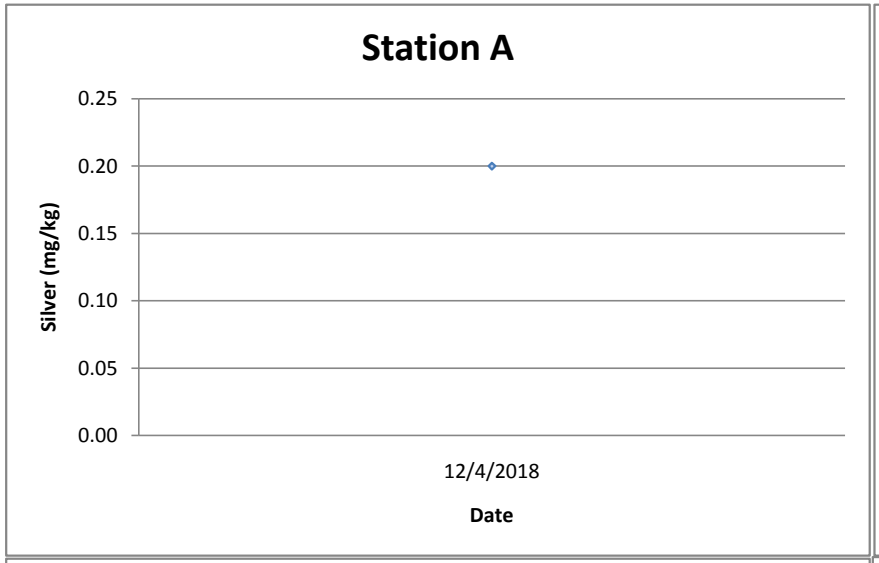

Station A
Arsenic (mg/kg)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12/4/2018
Date

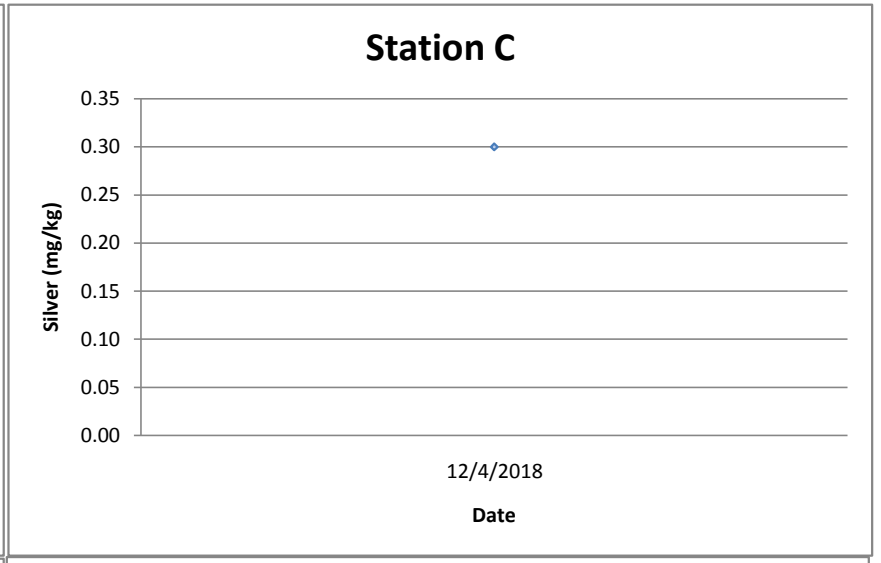

Station C
Arsenic (mg/kg)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12/4/2018
Date

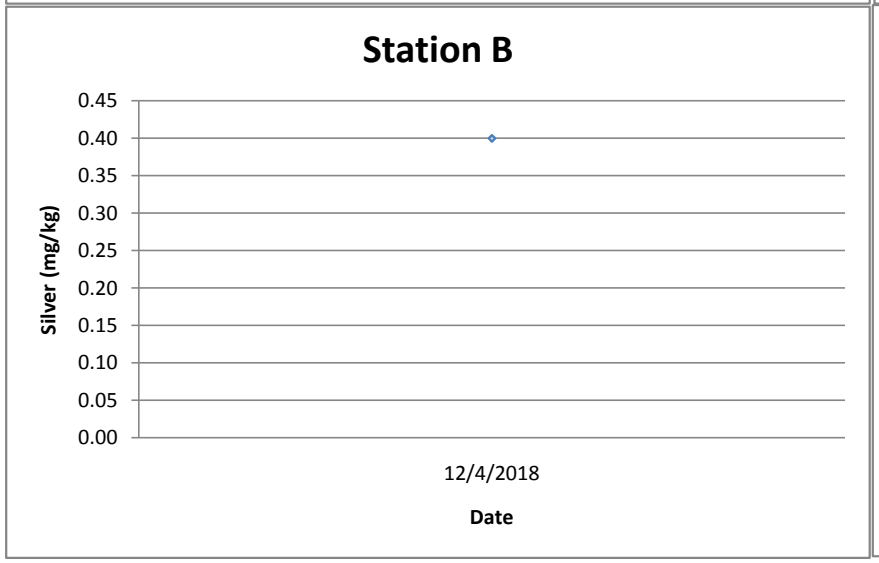

Station B
Arsenic (mg/kg)
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
12/4/2018
Date

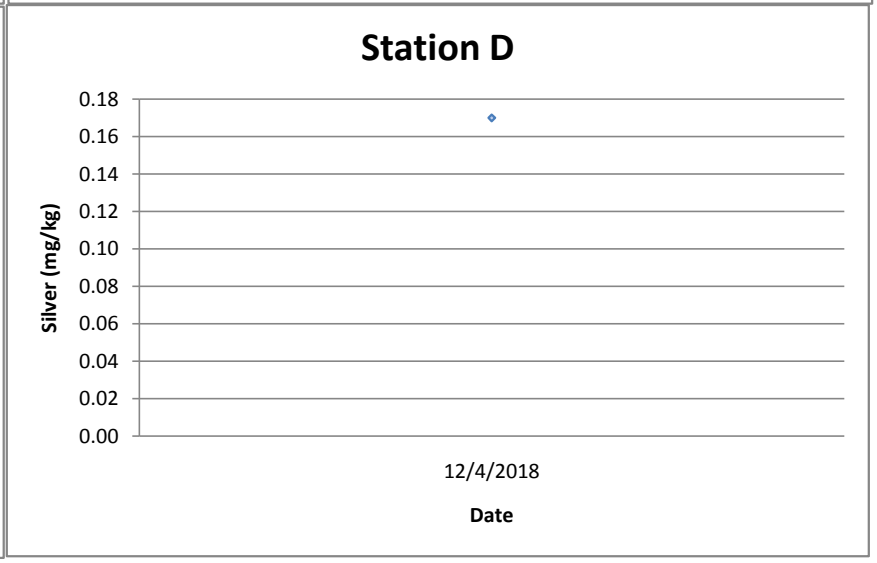

Station D
Arsenic (mg/kg)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
12/4/2018
Date

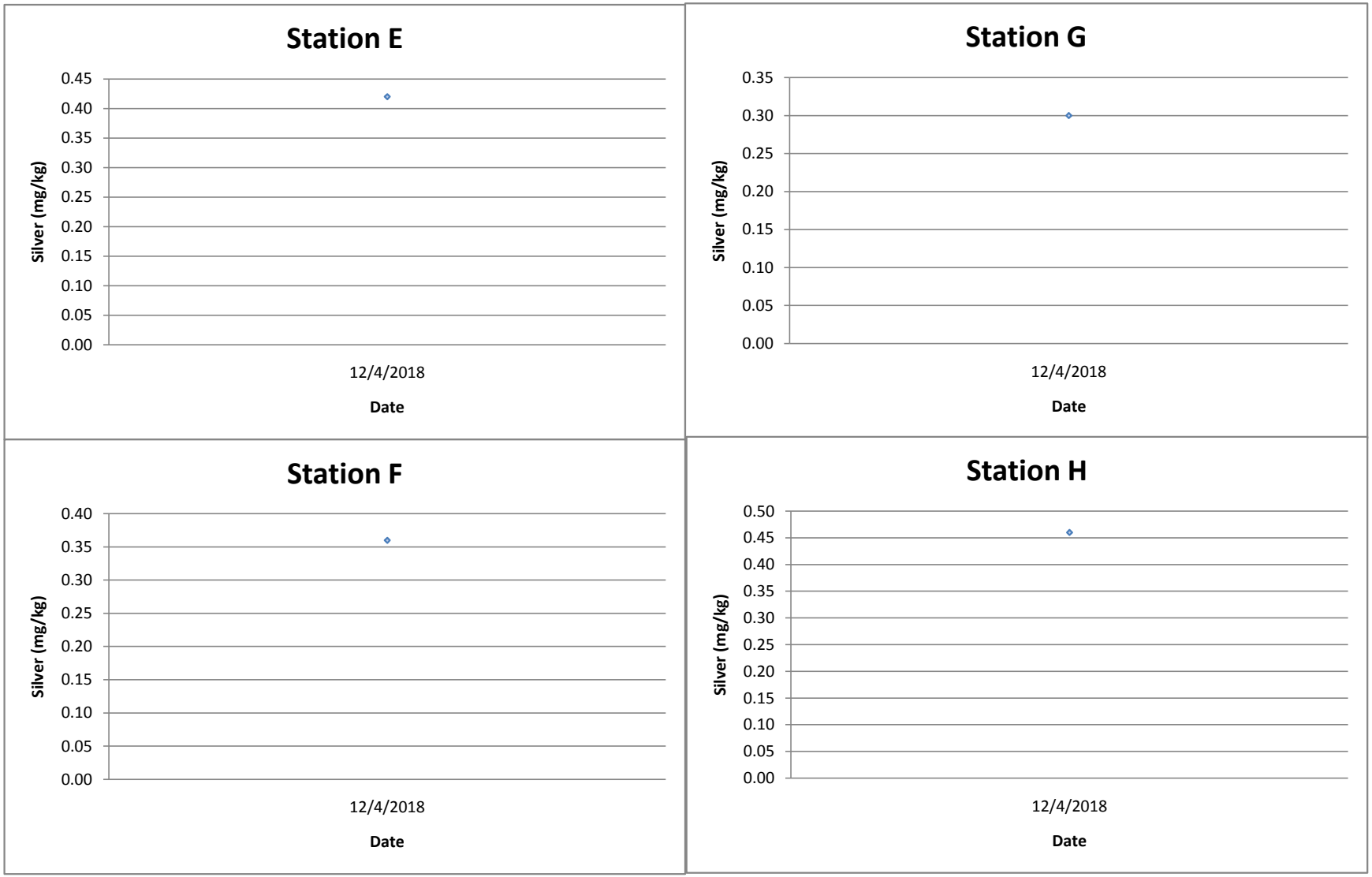

Station E
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Arsenic (mg/kg)
12/4/2018
Date
Station G
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Arsenic (mg/kg)
12/4/2018
Date
Station F
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Arsenic (mg/kg)
12/4/2018
Date
Station H
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Arsenic (mg/kg)
12/4/2018
Date


Station A
0.25
0.20
0.15
0.10
0.05
0.00
Silver (mg/kg)
12/4/2018
Date


Station C
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Silver (mg/kg)
12/4/2018
Date


Station B
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Silver (mg/kg)
12/4/2018
Date


Station D
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Silver (mg/kg)
12/4/2018
Date


Station E
Silver (mg/kg)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
12/4/2018
Date
Station G
Silver (mg/kg)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
12/4/2018
Date
Station F
Silver (mg/kg)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
12/4/2018
Date
Station H
Silver (mg/kg)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
12/4/2018
Date

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix J

Benthic Survey Report

Benthic Faunal Monitoring

Conducted in April 2018

Summary Report

Abundance

A total of 331 macrobenthic organisms were collected from the eight monitoring stations. The lowest abundance was 14 individuals (ind.) recorded in Station C and the highest was 143 ind. in Station A. Abundance distribution showed that the impact stations, Stations C and D, have relatively lower abundances compared to the reference stations, a similar trend is observed in the baseline data (August 2004) (Figure 1). Noticeable also is that abundances generally increase as the distance from the impact stations increases. This observation is indicative of a point-source disturbance, which will be verified with continued monitoring.

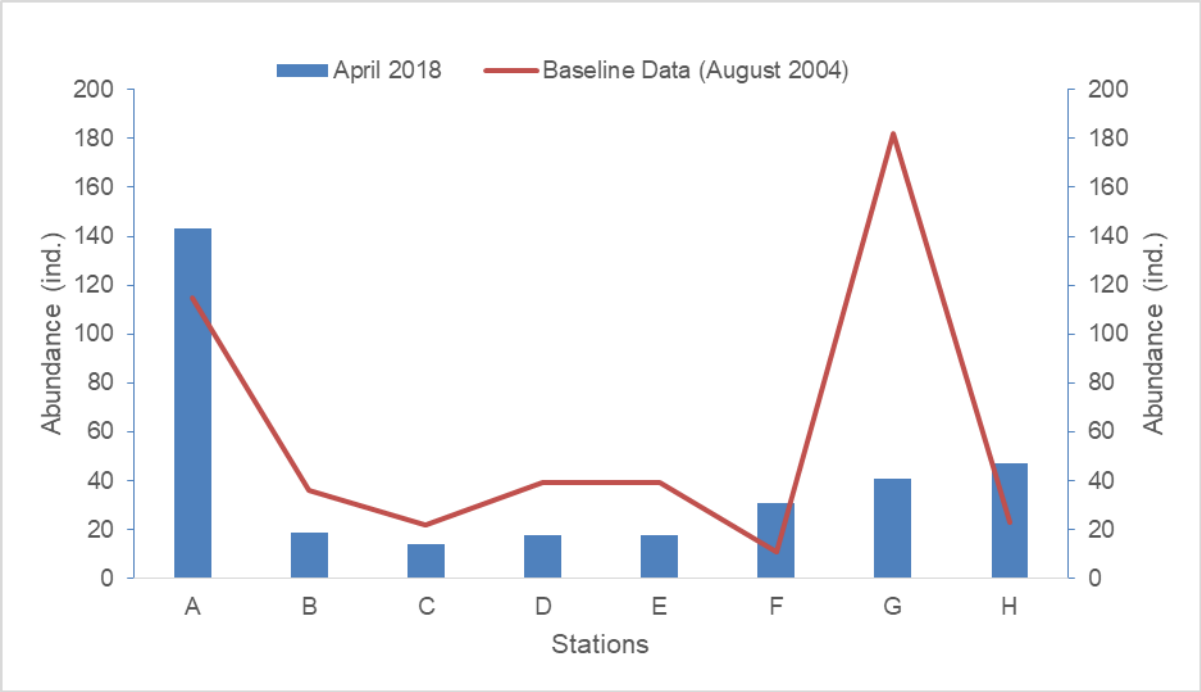


Figure 1. Total abundance (ind.) of benthic organisms collected in the eight monitoring stations, August 2004 and April 2018

Biomass

The total wet biomass for all the eight monitoring stations was 231.17g. The highest total biomass was observed in Station A (97.76g), while Station C (2.18g) exhibited the lowest biomass. The relatively higher biomass observed in Station A were due to the increased number of the bivalve species, *Ruditapes*

variegatus. Similar to abundance distribution, biomass at the impact stations were generally lower compared to those of the reference stations, which was also observed in the baseline data (August 2004) as shown in Figure 2.

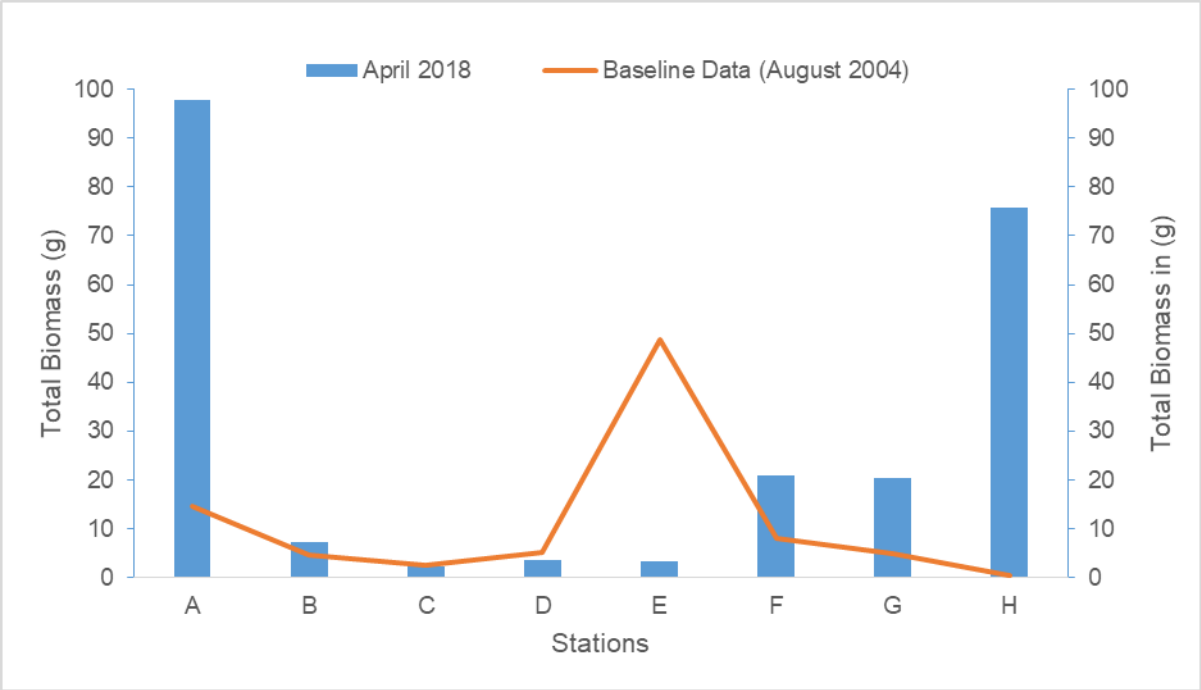


Figure 2. Total biomass (g) of benthic organisms collected in the eight monitoring stations, August 2004 and April 2018

Taxonomic Composition

Specimens were identified to family, genus and species level or to the lowest practicable taxon as possible. Fauchald (1977), Huang Z.G. (1994), Rouse & Pleijel (2001), and Xu et al. (2008) were used as the reference for taxonomic or species identification and nomenclature. During the present study, a total of eight phyla comprising of 35 families and 41 genera were identified. The benthic assemblage was dominated by Mollusca (50.45%), Annelida (31.12%), and Arthropoda (13.60%) (Figure 3). During the baseline (August 2004) study, the dominant phyla were Annelida (73.29%), Arthropoda (18.80%) and Echinodermata (3.63%). No nemerteans were collected in the baseline study. A table for comparison is shown in Appendix A. From the data of the baseline study, Phylum Coelentera was referred to as Cnidaria.

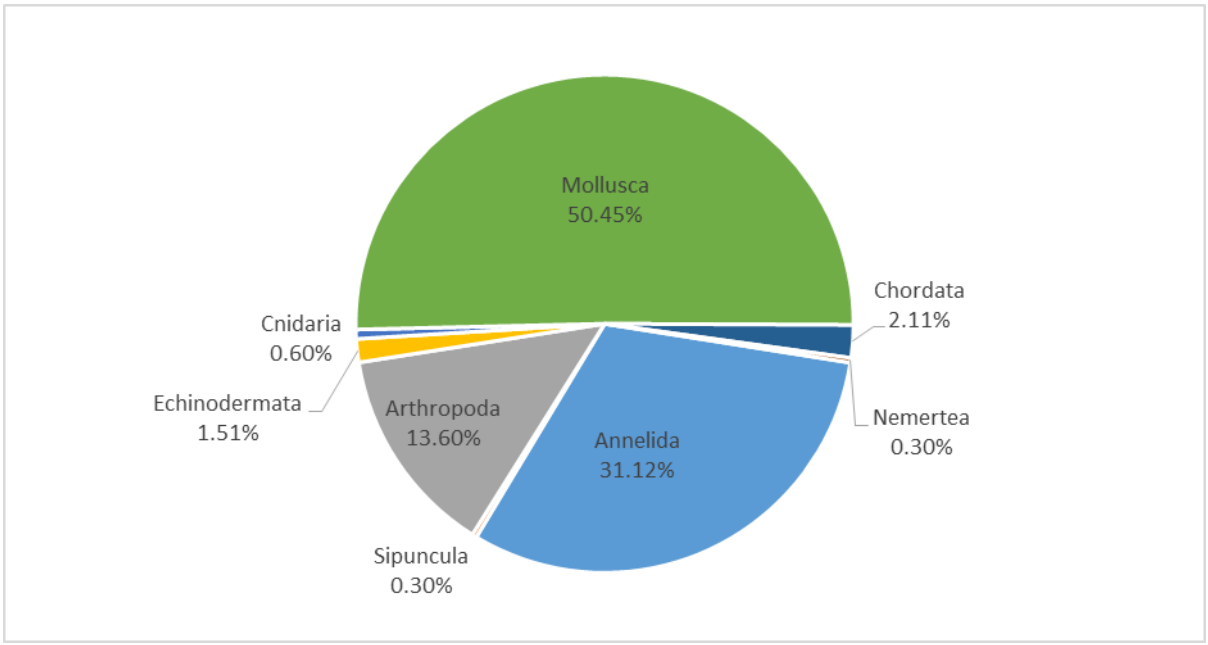


Figure 3. Percent composition of benthic organisms collected in the eight monitoring stations, April 2018

The most dominant species (abundance >10) was the bivalve, *R. variegatus*, with the abundance of 90 ind. and 12 ind. in Stations A and H, respectively. *Talonostrea talonata*, another species of bivalve also showed dominance in Station A with 12 ind. recorded. Compared to the baseline study (August 2004), the most dominant groups were the capitellid and cirratulid polychaetes, typical of unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000).

During the baseline study, the highest number of genera was recorded in Station G and the lowest in Station F. For the present study, the highest number of genera was recorded in Station H and the lowest in Station D. Similar to abundance and biomass, relatively lower number of taxa was observed at impact stations compared to the reference stations.

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

Diversity

Benthic diversity index (*H'*) ranged from 1.72 – 1.95 in impact stations and 1.56 – 2.54 among the reference stations as shown in Appendix A, which suggest that benthic faunal diversity is relatively higher at reference stations than those at impact stations. However, overall diversity in the eight monitoring stations was within the range of typical values. The diversity indices (0.62 – 1.1) during the baseline study (August 2004) was lower than that of the present study for all stations, as shown in the summary table in Appendix A.

References:

Borja, A., Franco, J. and Perez, V. (2000). A marine biotic index to establish the ecological quality of soft-bottom benthos within European estuarine and coastal environments. Marine Polltuion Bulletin, 40, 1100-1114.

Fauchald K. (1977) The Polychaete Worms Definitions And Keys To Orders, Families And Genera.

Natural History Museum of Los Angeles County. Science Series 28: 1 – 190.

Huang Z.G. (1994). Marine Species and Their Distributions in China's Seas. China Ocean Press, Beijing.

Pearson, T. and Rosenberg, R. (1978). Macrobenthic succession in relation to organic enrichment and pollution of the marine environment. Oceanography and Marine Biology Annual Review, 16, 229-311.

Rouse G. W. & Pleijel F. (2001) Polychaetes. Oxford University Press. United Kingdom.

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

Approved by Supervisor

Name of Consultant : China Hong Kong Ecology Consultants Ltd.

Signature of Supervisor : 

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

Date: May 2, 2018

Appendix A: Data Summaries

Summary of Benthic Survey Data, April 2018

Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	143	97.76	16	1.56	0.56
B	19	7.36	10	2.16	0.94
C*	14	2.18	8	1.95	0.94
D*	18	3.65	7	1.73	0.89
E	18	3.31	9	2.11	0.96
F	31	20.90	13	2.16	0.84
G	41	20.36	17	2.47	0.87
H	47	75.66	18	2.54	0.88
TOTAL	331	231.17	41 **		

*Impact Sites, **Total count of different identified Taxa

Summary of Benthic Survey Baseline Data, August 2004

Stations	Abundance (ind.)	Total Biomass (g)	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, Baseline (August 2004) and April 2018

Taxonomic Composition	Aug-04	Apr-18
Annelida	73.29%	31.12%
Sipuncula	0.21%	0.30%
Arthropoda	18.80%	13.60%
Echinodermata	3.63%	15.11%
Cnidaria *	0.43%	0.60%
Mollusca	3.42%	50.45%
Chordata	0.21%	2.11%
Nemertea	0%	0.30%

Taxonomic Composition (abundance) of Benthic Survey, Baseline (August 2004) and April 2018

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

Benthic Species Recorded in April 2018

Rec. No.	Station code	Abundance (ind.)	Total biomass (g)	Date of Sampling	Phylum	Class	Order	Family	Genus/ Species
1	A	3	0.911	12/04/18	Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*
2	A	1	3.221	12/04/18	Annelida	Polychaeta	Amphinomida	Amphinomidae	*Chloeia parva*
3	A	3	0.013	12/04/18	Annelida	Polychaeta	Aciculata	Nereidae	*Ceratonereis*
4	A	5	1.028	12/04/18	Annelida	Polychaeta	Aciculata	Nereidae	*Nereis*
5	A	3	0.865	12/04/18	Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*
6	A	4	1.334	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
7	A	1	0.003	12/04/18	Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*
8	A	1	0.002	12/04/18	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae	-
9	A	1	1.321	12/04/18	Arthropoda	Crustacea	Decapoda	Alpheidae	*Alpheus*
10	A	7	4.803	12/04/18	Arthropoda	Crustacea	Decapoda	Pilumnidae	*Typhlocarcinus*
11	A	5	0.003	12/04/18	Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*
12	A	2	0.901	12/04/18	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*
13	A	1	1.755	12/04/18	Mollusca	Bivalvia	Mytiloida	Mytilidae	*Modiolus*
14	A	12	27.200	12/04/18	Mollusca	Bivalvia	Ostreoida	Ostreidae	*Talonostrea(T. talonata)*
15	A	90	29.100	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes(R. variegatus)*
16	A	4	25.300	12/04/18	Chordata	Ascidiacea	Stolidobranchia	-	-
17	B	4	0.033	12/04/18	Annelida	Polychaeta	Aciculata	Nereidae	*Ceratonereis*
18	B	1	0.002	12/04/18	Annelida	Polychaeta	Aciculata	Nereidae	*Nereis*
19	B	1	0.002	12/04/18	Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*
20	B	3	0.008	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
21	B	1	0.001	12/04/18	Annelida	Polychaeta	Spionida	Spionidae	*Prionospio*
22	B	2	0.003	12/04/18	Annelida	Polychaeta	Terebellida	Pectinariidae	*Lagis*
23	B	1	T	12/04/18	Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*
24	B	1	3.195	12/04/18	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	*Acaudina*
25	B	2	1.156	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*
26	B	3	2.958	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes(R.*

									variegatus)
27	C	2	0.003	12/04/18	Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*
28	C	2	0.004	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
29	C	1	0.001	12/04/18	Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*
30	C	1	0.002	12/04/18	Annelida	Polychaeta	Spionida	Spionidae	*Prionospio*
31	C	1	0.003	12/04/18	Annelida	Polychaeta	Terebellida	Terebellidae	*Terebella*
32	C	2	0.001	12/04/18	Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*
33	C	1	0.006	12/04/18	Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*
34	C	4	2.156	12/04/18	Mollusca	Bivalvia	Veneroida	Tellinidae	*c.f. Augulus*
35	D	2	0.008	12/04/18	Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*
36	D	1	0.002	12/04/18	Annelida	Polychaeta	Canalipalpata	Oweniidae	*Owenia*
37	D	4	0.006	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
38	D	1	0.001	12/04/18	Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*
39	D	1	0.136	12/04/18	Arthropoda	Crustacea	Decapoda	Pilumnidae	*Typhlocarcinus*
40	D	6	0.481	12/04/18	Mollusca	Bivalvia	Veneroida	Tellinidae	*c.f. Augulus*
41	D	3	3.017	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*
42	E	3	0.005	12/04/18	Annelida	Polychaeta	Aciculata	Nereidae	*Nereis*
43	E	1	0.002	12/04/18	Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*
44	E	3	0.007	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
45	E	3	0.004	12/04/18	Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*
46	E	1	0.001	12/04/18	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae	-
47	E	2	T	12/04/18	Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*
48	E	2	0.918	12/04/18	Mollusca	Bivalvia	Veneroida	Tellinidae	*c.f. Augulus*
49	E	2	2.365	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*
50	E	1	0.004	12/04/18	Nemertea	Enopla	-	-	UNID 1
51	F	1	0.003	12/04/18	Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*
52	F	2	0.001	12/04/18	Annelida	Polychaeta	Canalipalpata	Oweniidae	*Owenia*
53	F	2	0.002	12/04/18	Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*
54	F	1	0.002	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
55	F	3	0.004	12/04/18	Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*
56	F	1	0.001	12/04/18	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae	-
57	F	1	T	12/04/18	Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	*Sipunculus*

58	F	7	0.002	12/04/18	Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*
59	F	1	3.851	12/04/18	Mollusca	Bivalvia	Veneroida	Psammobiidae	*Psammotaea*
60	F	9	4.392	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes(R. variegatus)*
61	F	1	1.526	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Chione (C. isabellina)*
62	F	1	0.211	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Timoclea (T. scabra)*
63	F	1	10.900	12/04/18	Chordata	Actinopterygii	Perciformes	Gobiidae	UNID goby
64	G	1	0.002	12/04/18	Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*
65	G	1	0.001	12/04/18	Annelida	Polychaeta	Phyllodocimorpha	Goniadidae	*Glycinde*
66	G	3	0.017	12/04/18	Annelida	Polychaeta	Aciculata	Nereidae	*Nereis*
67	G	1	0.001	12/04/18	Annelida	Polychaeta	Canalipalpata	Oweniidae	*Owenia*
68	G	5	0.021	12/04/18	Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*
69	G	6	0.054	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
70	G	1	0.001	12/04/18	Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*
71	G	1	0.001	12/04/18	Annelida	Oligochaeta	Lumbriculida	Lumbriculidae	-
72	G	10	0.004	12/04/18	Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*
73	G	1	1.062	12/04/18	Arthropoda	Malacostraca	Decapoda	Leucosiidae	*Nursia*
74	G	2	0.500	12/04/18	Arthropoda	Maxillopoda	Sessilia	Balanidae	*Balanus*
75	G	1	0.731	12/04/18	Cnidaria	Anthozoa	Pennatulacea	Virgulariidae	*c.f. Virgularia*
76	G	2	9.200	12/04/18	Mollusca	Bivalvia	Ostreoida	Ostreidae	*Ostrea*
77	G	3	7.800	12/04/18	Mollusca	Bivalvia	Ostreoida	Ostreidae	*Talonostrea(T. talonata)*
78	G	1	0.435	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes(R. variegatus)*
79	G	1	0.328	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*c.f. Meretrix (M. lusoria)*
80	G	1	0.198	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Timoclea (T. scabra)*
81	H	3	0.003	12/04/18	Annelida	Polychaeta	Aciculata	Nereidae	*Nereis*
82	H	1	0.001	12/04/18	Annelida	Polychaeta	Canalipalpata	Oweniidae	*Owenia*
83	H	3	0.002	12/04/18	Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*
84	H	1	T	12/04/18	Annelida	Polychaeta	-	Maldanidae	*Maldanella*
85	H	1	0.001	12/04/18	Annelida	Polychaeta	-	Opheliidae	*c.f. Ophelia*

86	H	4	0.256	12/04/18	Annelida	Polychaeta	Phyllodocida	Nephtyidae	*Nephthys*
87	H	1	0.002	12/04/18	Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*
88	H	1	0.001	12/04/18	Annelida	Polychaeta	Spionida	Spionidae	*Prionospio*
89	H	2	0.918	12/04/18	Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile
90	H	2	2.225	12/04/18	Arthropoda	Crustacea	Decapoda	Pilumnidae	*Typhlocarcinus*
91	H	2	0.800	12/04/18	Arthropoda	Malacostraca	Decapoda	Porcellanidae	*Porcellanella (P. picta)*
92	H	1	1.189	12/04/18	Echinodermata	Holothuroidea	Molpadiida	Caudinidae	*Acaudina*
93	H	1	42.000	12/04/18	Cnidaria	Anthozoa	Pennatulacea	Pennatulidae	*Pteroeides*
94	H	1	0.834	12/04/18	Mollusca	Bivalvia	Adapedonta	Solenidae	*Solen*
95	H	6	11.800	12/04/18	Mollusca	Bivalvia	Ostreoida	Ostreidae	*Talonostrea(T. talonata)*
96	H	3	2.019	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*
97	H	12	6.112	12/04/18	Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes(R. variegatus)*
98	H	2	7.500	12/04/18	Chordata	Ascidiacea	Stolidobranchia	-	-

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

Benthic Species Recorded during the Baseline Study (August 2004)

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

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

Upgrading of Siu Ho Wan Sewage Treatment Plant

Benthic Species Recorded In August 2004

ID	Station	Number	Mass (g)	Phylum	Class	Order	Family	Genus	Species
81	E1	3	0.0423	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
82	E1	1	0.0014	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
83	E1	10	41.4922	Echinodermata	Echinoidea	Spatangoida	Loveniidae	Lovenia	Lovenia subcarinata
84	E1	2	0.0672	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
85	E1	1	0.0171	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenophthalmus	Neoxenophthalmus obscurus
86	E1	2	0.013	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
87	E1	1	0.0098	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio multipinnata
88	E1	1	0.0021	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
89	E1	1	0.0203	Annelida	Polychaeta	Sternaspida	Sternaspidae	Sternaspis	Sternaspis sculata
90	E1	1	0.006	Mollusca	Bivalvia	Veneroida	Semelidae	Theora	Theora lata
91	E1	1	0.0823	Arthropoda	Crustacea	Decapoda	Pilumnidae	Typhlocarcinus	Typhlocarcinus nudus
92	E2	2	0.023	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
93	E2	1	0.0083	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
94	E2	1	0.0016	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
95	E2	1	0.0171	Annelida	Polychaeta	Eunicida	Onuphidae	Diopatra	Diopatra sp.
96	E2	1	0.0062	Annelida	Polychaeta	Phyllodocida	Hesionidae	Leocrates	Leocrates chinensis
97	E2	1	0.446	Annelida	Polychaeta	Terebellida	Terebellidae	Loimia	Loimia medusa
98	E2	2	6.348	Echinodermata	Echinoidea	Spatangoida	Loveniidae	Lovenia	Lovenia subcarinata
99	E2	1	0.0067	Annelida	Polychaeta	Eunicida	Lumbrineridae	Lumbrineris	Lumbrineris sp.
100	E2	1	0.0336	Mollusca	Bivalvia	Veneroida	Tellinidae	Nitidotellina	Nitidotellina minuta
101	E2	4	0.0477	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
102	F1	1	0.0162	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
103	F1	1	0.4824	Mollusca	Gastropoda	Neogastropoda	Nassariidae	Nassarius	Nassarius sp.
104	F1	1	0.0088	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
105	F1	1	0.0046	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
106	F1	1	0.0018	Annelida	Polychaeta	Phyllodocida	Pilargiidae	Sigambra	Sigambra hanaokai
107	F1	1	0.0126	Annelida	Polychaeta	Sternaspida	Sternaspidae	Sternaspis	Sternaspis sculata
108	F2	1	0.0284	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
109	F2	2	7.2811	Echinodermata	Echinoidea	Spatangoida	Loveniidae	Lovenia	Lovenia subcarinata
110	F2	1	0.0222	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
111	F2	1	0.2073	Annelida	Polychaeta	Ophellida	Opheliidae	Ophelia	Ophelina grandis
112	G1	7	0.1547	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
113	G1	1	0.0003	Arthropoda	Crustacea	Tanaidacea	Apseudidae	Apseudes	Apseudes sp.
114	G1	1	0.0414	Arthropoda	Crustacea	Decapoda	Callianassidae	Callianassa	Callianassa sp.
115	G1	3	0.0024	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
116	G1	4	0.0033	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
117	G1	9	0.3983	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice indica
118	G1	1	0.0397	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
119	G1	2	0.0173	Arthropoda	Crustacea	Decapoda	Goneplacidae	Hexapus	Hexapus granuliforus
120	G1	1	0.0245	Annelida	Polychaeta	Phyllodocida	Polynoidae	Lepidonotus	Lepidonotus sp.

Upgrading of Siu Ho Wan Sewage Treatment Plant									
Benthic Species Recorded In August 2004									
ID	Station	Number	Mass (g)	Phylum	Class	Order	Family	Genus	Species
121	G1	3	0.819	Arthropoda	Crustacea	Decapoda	Pinnotheridae	Neoxenophthalmus	Neoxenophthalmus obscurus
122	G1	4	0.0108	Annelida	Polychaeta	Phyllodocida	Nereidae	Nereis	Nereis sp.
123	G1	20	0.0822	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
124	G1	1	0.0005	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio ehlersi
125	G1	2	0.0053	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio queenslandica
126	G1	1	0.094	Arthropoda	Crustacea	Decapoda	Porcellanidae	Raphidopus	Raphidopus ciliatus
127	G1	2	0.0006	Annelida	Polychaeta	Phyllodocida	Syllidae	Syllis	Syllis sp.
128	G2	1	0.0027	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
129	G2	2	0.108	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
130	G2	1	0.0028	Arthropoda	Crustacea	Tanaidacea	Apseudidae	Apseudes	Apseudes sp.
131	G2	3	0.0058	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
132	G2	1	0.2476	Arthropoda	Crustacea	Decapoda	Goneplacidae	Eucrate	Eucrate haswelli
133	G2	2	0.063	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice indica
134	G2	1	0.0169	Annelida	Polychaeta	Terebellida	Terebellidae	Lanice	Lanice sp.
135	G2	1	0.0645	Mollusca	Bivalvia	Veneroida	Dreissenidae	Mytilopsis	Mytilopsis sallei
136	G2	2	0.0017	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
137	G2	1	0.0059	Annelida	Polychaeta	Ophellida	Ophellidae	Ophelia	Ophelina grandis
138	G2	7	0.0211	Annelida	Polychaeta	Spionida	Spionidae	Prionospio	Prionospio queenslandica
139	G2	5	0.3759	Arthropoda	Crustacea	Decapoda	Porcellanidae	Raphidopus	Raphidopus ciliatus
140	G2	1	0.0002	Annelida	Polychaeta	Phyllodocida	Syllidae	Syllis	Syllis sp.
141	G2	1	0.0026	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
142	G2	7	0.0952	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
143	G2	1	0.0469	Annelida	Polychaeta	Terebellida	Terebellidae	Amaeana	Amaeana sp.
144	G2	1	0.0008	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
145	G2	7	0.0042	Arthropoda	Crustacea	Amphipoda	Corophiidae	Corophium	Corophium sp.
146	G2	8	0.1768	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice indica
147	G2	1	0.0025	Annelida	Polychaeta	Phyllodocida	Polynoidae	Gattyana	Gattyana sp.
148	G2	4	0.0105	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis
149	G2	1	0.0162	Arthropoda	Crustacea	Decapoda	Goneplacidae	Hexapus	Hexapus granuliforus
150	G2	1	0.0019	Annelida	Polychaeta	Phyllodocida	Nereidae	Nereis	Nereis sp.
151	G2	7	0.0485	Annelida	Polychaeta	Capitellida	Capitellidae	Notomastus	Notomastus latericens
152	G2	1	0.0084	Annelida	Polychaeta	Spionida	Spionidae	Paraprionospio	Paraprionospio pinnata
153	G2	1	0.0012	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Phyllodoce	Phyllodoce sp.
154	G2	1	0.1746	Arthropoda	Crustacea	Decapoda	Porcellanidae	Raphidopus	Raphidopus ciliatus
155	G2	1	0.0453	Chordata	Osteichthyes	Perciformes	Taenioididae	Trypauchen	Trypauchen vagina
156	G2	2	0.0161	Annelida	Polychaeta	Phyllodocida	Nephtyidae	Aglaophamus	Aglaophamus dibranchis
157	G2	3	0.4835	Arthropoda	Crustacea	Decapoda	Alpheidae	Alpheus	Alpheus sp.
158	G2	1	0.0032	Annelida	Polychaeta	Spionida	Cirratulidae	Cirratulus	Cirratulus sp.
159	G2	3	0.0444	Annelida	Polychaeta	Eunicida	Eunicidae	Eunice	Eunice indica
160	G2	2	0.0351	Annelida	Polychaeta	Phyllodocida	Glyceridae	Glycera	Glycera onomichiensis

Appendix B: Representative Taxa Identified

	
A) The bivalve, *Modiolus* sp.	B) The fire worm, *Chloeia parva*
	
C) Fish belonging to family Gobiidae	D) The sea pen, *Pteroeides*

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix K

Photos of Grab Samplers

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Report No.: 0041/17/ED/0302B

Photo 1. A polar grab sampler

Photo 2. Grab dimension 1

Photo3. Grab dimension 2

Photo4. Grab dimension 3

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Report No.: 0041/17/ED/0302B

Photo 1. A modified Van Veen grab sampler

Photo 2. Grab dimension 1

Photo3. Grab dimension 2

Photo4. Grab dimension 3

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix L

Environmental Mitigation Implementation Schedule (EMIS)

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

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

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

FUGRO TECHNICAL SERVICES LIMITED

Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

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