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
August 2019

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/0490C

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

Our Ref: 1458/19-0025

18 September 2019

By Post and E-mail

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

Attn: Mr. LAU Ka Kin, Marcus (E/CM16)

Dear Sir,

RE: CONTRACT NO. CM 13/2016
INDEPENDENT ENVIRONMENTAL CHECKER FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT WORKS (SHWSTW)
MONTHLY ENVIRONMENTAL MONITORING AND AUDIT (EM&A) REPORT (AUGUST 2019)

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for August 2019 (Report No.:0041/17/ED/0490C) from the Environmental Team (ET), Fugro Technical Services Ltd., received on 18 September 2019 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/ck/sc

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 Twenty-fifth Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 August 2019 to 31 August 2019 (the "reporting period").

Breaches of Action and Limit Levels

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

Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 8 August 2019. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

Complaint Log

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

Notifications of Summons and Successful Prosecutions

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

Summary of the Environmental Mitigations Measures

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

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 succeeding reporting month include:

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

Due to inadequacy of representative data collected between August 2017 and May 2018, current H_2S measurement and olfactometry analysis were considered as unsuitable methods to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m3). In order to assess whether SHWSTW is the major H_2S source to ASRs, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASRs are not the appropriate locations for the correlation study as the change of both odour level and H_2S concentrations at ASRs were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

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

1. INTRODUCTION

1.1 Background

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

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

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

1.2 Project Description

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

1.3 Project Organization

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

Table 1.1 Contact Persons and Telephone Numbers of Key Personnel

Organization	Role	Contact Person	Telephone No.	Fax No.
DSD	Project Proponent Representative	Mr. Marcus Lau	2594 7218	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 Works Undertaken during the Reporting Period

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

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

2. AIR QUALITY MONITORING

2.1 Methodology of H_2S Concentration Monitoring

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

Table 2.1 Equipment used for H_2S Concentration Monitoring

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

2.2 Methodology of Odour Patrol Monitoring

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

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

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

Table 2.2 Categories of Odour Intensity

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

2.3 Methodology of Odour Sampling and Olfactometry Analysis

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

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

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

2.4 Monitoring Location

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

2.5 Monitoring Frequency and Duration

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

Table 2.3 Durations and Frequencies of Air Quality Monitoring Programme

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

Remark:
1) In case excessive odour nuisance was detected during the odour patrol monitoring or the standard of the 5 odour units cannot be complied with during the odour panel monitoring, the odour patrol monitoring and H_2S concentration monitoring shall be extended for a period of three months to cater for the warm-up period of the functioning of the additional mitigation measures.
2) In case the relationship between H_2S concentration (ppb) with the odour unit (OU/m3) cannot conclude from the correlation study carried out at the first week of the odour patrol monitoring due to invalid data, additional odour sampling for olfactometry analysis shall be carried out for the correlation study.
3) Sufficient air samples (approximate 60L) may be collected in less than 15 minutes during odour sampling.

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

2.6 Event and Action Plan

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

Table 2.4 Action and Limit Levels for Air Quality Monitoring

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

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

2.7 Quality Assurance and Quality Control

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

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

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

2.8 Monitoring Results and Observations

2.8.1 Air quality monitoring (i.e. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis), was temporary suspended and no monitoring was carried out in the reporting period.

2.8.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). Due to non-ideal

wind direction or domination of non-target smell during the measurements conducted between August 2017 and May 2018, inadequacy of representative data was result between August 2017 and May 2018. Current H_2S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). In order to assess whether SHWSTW is the major H_2S source to ASRs, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASRs are not the appropriate locations for the correlation study as the change of both odour level and H_2S concentrations at ASRs were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

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

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

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

3. WATER QUALITY MONITORING

3.1 Monitoring Station

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

Table 3.1 Location of Water Quality Monitoring

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

3.2 Monitoring Parameter

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

Table 3.2 Parameters for Water Quality Monitoring

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

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

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

3.3 Monitoring Equipment

3.3.1 A multifunctional meter (YSI 6920 V2/ Aqua TROLL 600) will be used to measure dissolved oxygen (DO), concentration, DO saturation, temperature, salinity, pH and turbidity, simultaneously at the same location and water depth. An Acoustic Doppler Current Profiler (ADCP) integrated with echo sounder function will be used to measure water depth, current velocity (speed and direction). The data measured by ADCP will then be downloaded on site to computer on-board. The water depth data measured by the ADCP shall be electronically logged and available for output. All measurement data from the multiparameter monitoring device and ADCP will be integrated with the GPS data from the DGPS logging device, so that data collected at a specific time and location can be shown. The water sampler will be equipped with a multiparameter monitoring device (with water depth probe to determine the exact sampling depth at which a sample is collected). The equipment employed for the monitoring and sampling and their specifications are presented in **Table 3.3**. **Table 3.4** summarizes the equipment used in water quality monitoring.

Table 3.3 Water Quality Monitoring and Sampling Equipment

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

Table 3.4 Equipment used for Water Quality Monitoring

Equipment	Manufacturer / Model	Serial Number
Water Quality Monitoring Device	Aqua TROLL 600 Multiparameter Sonde	490113
Acoustic Doppler Current Profiler	RiverSurveyor M9	5906

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

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

3.4 Laboratory Measurement and Analysis

3.4.1 ALS Technichem (HK) Pty Ltd (HOKLAS Reg. No. 066), is the appointed laboratory for analysis of water samples. The methods adopted by the laboratory and the reporting limits are detailed in **Table 3.5**.

Table 3.5 Laboratory Measurement/Analysis Methods and Reporting Limits

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

3.5 Monitoring Frequency and Duration

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

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

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

3.6 Quality Assurance / Quality Control

3.6.1 The equipment is in compliance with the requirements set out in the EM&A Plan. All in-situ monitoring instruments were calibrated by a HOKLAS-accredited laboratory or by standard solutions. Calibration of temperature, DO, salinity, pH and turbidity is conducted in three month interval.

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

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

For each batch of 20 samples:

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

3.7 Event and Action Plan

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

3.8 Monitoring Results and Observations

3.8.1 Water quality monitoring is carried out on 8 August 2019. A summary of the in-situ water quality monitoring results are presented in **Table 3.6** (Mid-ebb) and **Table 3.7** (Mid-flood) respectively. The complete record and graphical presentation of the in-situ water quality monitoring results is given in **Appendix E.**

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	17	S	1	5.89	28.61	8.09	22.80	3.1	0.18	201.2

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 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)
		S	1	5.79	28.47	8.09	22.86	3.7	0.16	198.0
		M	8.5	5.54	28.40	8.09	22.98	2.9	0.35	179.5
		M	8.5	5.56	28.39	8.09	22.78	3.5	0.29	216.1
		B	16	5.10	28.37	8.09	22.86	3.1	0.26	267.8
		B	16	5.05	28.35	8.10	23.12	3.5	0.29	255.3
B	14	S	1	5.38	28.72	7.63	22.55	3.9	0.18	251.1
		S	1	5.28	29.23	7.62	22.45	3.9	0.12	254.7
		M	7	5.23	29.59	7.66	22.39	3.9	0.33	218.6
		M	7	5.18	29.87	7.57	21.03	3.9	0.19	235.1
		B	13	5.10	30.15	7.51	20.61	4.0	0.26	205.2
		B	13	5.05	30.11	7.25	20.37	3.8	0.34	190.9
C	12	S	1	5.65	27.21	7.40	23.24	3.6	0.22	210.2
		S	1	5.65	27.22	7.39	23.11	3.7	0.32	199.0
		M	6	5.65	27.22	7.35	22.51	3.7	0.28	222.7
		M	6	5.66	27.22	7.32	22.53	3.7	0.18	198.2
		B	11	5.50	27.36	7.46	22.60	3.7	0.26	221.1
		B	11	5.52	28.04	7.56	22.61	3.6	0.26	248.7
D	13	S	1	4.89	27.79	7.62	19.61	4.0	0.31	93.4
		S	1	4.55	27.53	7.55	21.01	4.4	0.16	99.7
		M	6.5	4.59	27.38	7.48	20.71	3.9	0.32	226.2
		M	6.5	4.60	27.31	7.46	22.54	3.6	0.37	233.8
		B	12	4.63	27.25	7.44	22.63	3.6	0.08	211.7
		B	12	4.64	27.22	7.43	23.19	3.6	0.16	192.6
E	16	S	1	4.89	27.88	7.69	23.14	7.0	0.10	215.3
		S	1	4.90	28.26	8.10	23.41	6.7	0.07	234.1
		M	8	4.89	28.26	8.10	23.92	6.3	0.20	240.8
		M	8	4.92	28.27	8.10	23.75	6.3	0.16	248.0
		B	15	4.93	28.34	7.78	22.89	7.8	0.14	247.2
		B	15	4.95	28.24	7.74	21.09	7.1	0.14	251.2
F	23	S	1	4.91	28.27	8.09	23.71	6.9	0.18	228.0
		S	1	4.92	28.27	8.09	23.72	6.4	0.23	237.4
		M	11.5	4.91	28.29	8.10	23.26	6.3	0.49	185.1
		M	11.5	4.92	28.29	8.11	22.96	6.2	0.32	217.9
		B	22	4.93	28.15	7.83	23.15	4.1	0.33	230.6
		B	22	4.91	28.04	7.72	23.92	3.3	0.28	250.9
G	22	S	1	4.96	27.74	8.42	23.40	3.3	0.41	194.1
		S	1	4.94	27.70	8.58	23.47	3.5	0.28	199.8
		M	11	4.93	27.77	8.54	23.47	3.1	0.49	171.4
		M	11	4.94	27.94	8.60	23.12	3.1	0.53	151.9
		B	21	4.93	28.02	8.62	23.46	3.2	0.17	191.6
		B	21	4.91	28.04	8.62	23.79	3.1	0.19	212.5
H	19	S	1	5.26	28.27	8.03	23.47	6.4	0.22	141.2
		S	1	5.38	28.28	8.06	23.34	6.7	0.12	136.3
		M	9.5	5.37	28.26	8.08	23.80	6.9	0.16	268.2
		M	9.5	5.29	28.27	8.08	23.02	6.5	0.10	232.8
		B	18	5.35	28.28	8.08	23.51	9.0	0.24	261.6
		B	18	4.99	28.29	8.08	23.57	8.8	0.31	260.3

Table 3.7 Summary of In-situ Monitoring Results (Mid-flood)

Monitoring Station	Water Depth (m)	Sampling Depth (m)		Dissolved oxygen (mg/L)	Temperature (degree Celsius)	pH	Salinity (ppt)	Turbidity (NTU)	Current speed (m/s)	Current velocity (degree magnetic)
A	15	S	1	5.73	28.65	8.38	25.14	4.8	0.26	198.3
		S	1	5.71	28.90	8.33	22.94	4.6	0.27	197.2
		M	7.5	5.40	28.93	8.35	22.82	4.2	0.41	206.7
		M	7.5	5.33	29.10	8.42	23.48	4.7	0.39	224.8
		B	14	5.15	29.24	8.42	21.48	4.6	0.68	134.0
		B	14	5.13	29.38	8.61	25.46	4.6	0.70	133.3
B	14	S	1	5.94	29.20	7.86	21.71	4.1	0.27	174.0
		S	1	5.87	29.14	8.04	22.38	4.1	0.30	174.0
		M	7	5.87	29.16	7.86	22.33	4.8	0.25	185.3
		M	7	5.75	28.97	8.00	22.50	4.8	0.35	192.3
		B	13	5.42	28.71	8.19	23.28	4.9	0.36	216.1
		B	13	5.42	28.71	8.19	23.28	4.9	0.28	228.3
C	12	S	1	5.80	28.76	7.95	23.03	5.8	0.17	135.0
		S	1	5.76	29.08	7.95	22.24	5.9	0.20	107.9
		M	6	5.84	29.09	7.96	22.36	5.6	0.22	159.2
		M	6	5.97	29.22	7.97	22.45	5.7	0.27	152.8
		B	11	5.92	29.25	8.09	22.09	6.4	0.17	212.0
		B	11	5.95	29.27	8.04	22.21	6.5	0.23	219.4
D	14	S	1	5.10	30.38	8.72	23.18	4.1	0.20	121.3
		S	1	5.11	28.89	8.55	23.19	4.2	0.24	153.1
		M	7	5.35	28.79	8.60	23.17	5.1	0.21	135.5
		M	7	5.34	28.86	8.54	22.90	5.0	0.17	141.1
		B	13	5.28	28.82	8.55	22.95	5.1	0.28	176.9
		B	13	5.16	28.75	8.54	23.01	5.2	0.28	191.3
E	14	S	1	6.96	29.23	8.72	24.06	4.0	0.25	245.0
		S	1	6.96	29.86	8.55	24.39	4.4	0.15	233.7
		M	7	6.01	30.06	8.60	22.79	4.8	0.30	114.7
		M	7	5.98	30.02	8.54	23.76	4.8	0.21	151.9
		B	13	5.63	29.85	8.55	24.18	4.7	0.26	151.3
		B	13	5.68	29.98	8.72	24.75	4.5	0.22	157.8
F	18	S	1	5.92	32.49	8.51	20.46	5.0	0.24	233.0
		S	1	5.90	29.78	8.58	19.65	5.2	0.20	252.1
		M	9	5.88	29.58	8.42	21.87	4.5	0.24	153.2
		M	9	5.81	29.06	8.32	22.94	4.7	0.30	183.0
		B	17	5.51	28.95	8.49	22.95	4.1	0.20	179.8
		B	17	5.38	29.11	8.63	22.50	4.1	0.25	191.2
G	13	S	1	7.31	30.34	7.85	20.46	4.5	0.25	213.5
		S	1	7.27	30.76	7.94	19.65	4.7	0.24	206.0
		M	6.5	7.16	31.19	7.86	21.87	4.8	0.28	106.7
		M	6.5	7.13	31.41	7.90	22.94	4.7	0.29	107.0
		B	12	7.10	31.69	7.98	22.95	5.1	0.37	209.6
		B	12	7.07	32.04	7.94	22.50	5.1	0.49	132.6
H	19	S	1	7.31	29.89	7.97	20.46	4.0	0.33	210.8
		S	1	7.34	29.88	8.02	19.65	3.7	0.31	209.4
		M	9.5	7.35	29.87	8.01	21.87	3.8	0.30	188.6
		M	9.5	7.35	29.88	8.12	22.94	3.1	0.30	231.2
		B	18	7.33	29.90	8.15	22.95	4.1	0.37	173.3
		B	18	7.37	30.01	8.15	22.50	3.5	0.35	167.5

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

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_2^- as N (mg/L)	NO_3^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
A	17	S	1	8.8	<0.005	0.199	0.830	1.030	5	0.04	1.2
		S	1	8.4	<0.005	0.214	0.802	1.020	8	0.05	1.1
		M	8.5	8.6	<0.005	0.188	0.801	0.989	8	0.05	1.6
		M	8.5	8.2	<0.005	0.215	0.775	0.990	12	0.05	2.0
		B	16	9.7	0.014	0.193	0.786	0.993	9	0.06	1.8
		B	16	10.2	<0.005	0.196	0.776	0.973	12	0.05	1.0
B	14	S	1	8.6	0.017	0.192	0.798	1.010	1	0.05	1.8
		S	1	9.2	0.005	0.194	0.790	0.989	ND	0.06	1.4
		M	7	10.0	0.006	0.189	0.803	0.998	10	0.06	1.8
		M	7	9.4	0.008	0.186	0.81	1.000	15	0.05	1.6
		B	13	11.5	<0.005	0.183	0.813	0.996	7	0.06	1.6
		B	13	11.7	0.014	0.182	0.817	1.010	5	0.06	1.8
C	12	S	1	7.6	<0.005	0.188	0.790	0.978	34	0.06	1.3
		S	1	7.1	<0.005	0.194	0.815	1.010	29	0.05	1.1
		M	6	8.3	<0.005	0.221	0.793	1.010	59	0.05	<1.0
		M	6	8.1	<0.005	0.182	0.794	0.976	54	0.06	1.1
		B	11	9.4	<0.005	0.182	0.789	0.971	30	0.06	1.1
		B	11	9.1	<0.005	0.180	0.798	0.978	22	0.06	<1.0
D	13	S	1	12.0	<0.005	0.192	0.800	0.992	45	0.05	1.1
		S	1	12.8	<0.005	0.198	0.793	0.991	53	0.05	1.1
		M	6.5	10.2	<0.005	0.194	0.802	0.996	29	0.05	<1.0
		M	6.5	9.7	<0.005	0.193	0.810	1.000	34	0.05	<1.0
		B	12	8.9	<0.005	0.198	0.787	0.985	24	0.05	1.4
		B	12	8.5	<0.005	0.218	0.774	0.993	21	0.05	1.7
E	16	S	1	8.0	<0.005	0.180	0.751	0.930	5	0.05	1.5
		S	1	7.6	<0.005	0.174	0.724	0.898	7	0.05	2.0
		M	8	8.5	<0.005	0.171	0.750	0.921	13	0.05	1.9
		M	8	8.9	<0.005	0.167	0.745	0.912	11	0.05	1.7
		B	15	9.8	<0.005	0.167	0.713	0.880	10	0.05	1.9
		B	15	10.6	<0.005	0.165	0.738	0.903	7	0.05	1.8
F	23	S	1	9.2	<0.005	0.199	0.788	0.987	10	0.05	<1.0
		S	1	9.5	<0.005	0.220	0.762	0.982	14	0.05	<1.0
		M	11.5	8.5	<0.005	0.185	0.801	0.986	11	0.05	<1.0
		M	11.5	8.5	<0.005	0.165	0.744	0.909	16	0.05	<1.0
		B	22	8.1	0.024	0.219	0.773	1.020	12	0.05	2.7
		B	22	7.5	0.030	0.217	0.781	1.030	8	0.05	1.6
G	22	S	1	8.8	<0.005	0.194	0.724	0.918	11	0.05	2.6
		S	1	8.1	<0.005	0.196	0.716	0.912	15	0.05	2.8
		M	11	9.2	<0.005	0.216	0.723	0.940	13	0.05	2.0
		M	11	9.4	0.012	0.172	0.748	0.932	9	0.05	1.4
		B	21	9.9	0.018	0.224	0.772	1.010	12	0.05	2.0
		B	21	10.5	<0.005	0.216	0.776	0.993	19	0.05	1.6
H	19	S	1	10.5	<0.005	0.214	0.712	0.926	1	0.05	1.5
		S	1	10.4	0.018	0.196	0.782	0.996	ND	0.05	<1.0
		M	9.5	9.2	0.055	0.217	0.731	1.000	14	0.05	1.8

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_2^- as N (mg/L)	NO_3^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
		M	9.5	9.3	0.062	0.190	0.718	0.970	9	0.05	2.3
		B	18	7.8	0.083	0.215	0.728	1.020	18	0.05	2.7
		B	18	8.1	0.094	0.190	0.724	1.010	12	0.05	2.8

Table 3.9 Summary of Laboratory Analysis Results (Mid-flood)

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_2^- as N (mg/L)	NO_3^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
A	15	S	1	7.8	<0.005	0.168	0.748	0.915	ND	0.05	1.4
		S	1	7.4	<0.005	0.165	0.750	0.915	ND	0.05	1.4
		M	7.5	8.1	<0.005	0.176	0.702	0.879	ND	0.05	1.0
		M	7.5	8.3	<0.005	0.180	0.696	0.876	ND	1.73	<1.0
		B	14	8.2	<0.005	0.172	0.735	0.907	ND	0.05	1.4
		B	14	7.6	<0.005	0.175	0.700	0.875	ND	0.05	<1.0
B	14	S	1	7.0	<0.005	0.170	0.751	0.921	ND	0.05	1.1
		S	1	7.7	<0.005	0.178	0.748	0.926	1	0.05	1.3
		M	7	6.5	<0.005	0.183	0.750	0.934	3	0.05	1.6
		M	7	6.2	<0.005	0.178	0.745	0.923	ND	0.05	1.2
		B	13	5.6	<0.005	0.176	0.755	0.931	1	0.05	2.4
		B	13	5.8	<0.005	0.160	0.810	0.970	2	0.05	2.4
C	12	S	1	5.8	<0.005	0.173	0.835	1.010	2	0.04	1.6
		S	1	6.2	<0.005	0.172	0.828	1.000	3	0.05	1.5
		M	6	6.8	<0.005	0.177	0.814	0.991	3	0.05	1.6
		M	6	7.1	<0.005	0.171	0.822	0.993	5	0.05	1.4
		B	11	9.3	<0.005	0.177	0.790	0.967	2	0.05	1.5
		B	11	8.6	<0.005	0.178	0.798	0.976	1	0.05	1.6
D	14	S	1	7.8	<0.005	0.178	0.821	0.999	2	0.05	2.4
		S	1	7.4	<0.005	0.177	0.808	0.985	3	0.05	2.6
		M	7	9.5	<0.005	0.177	0.761	0.938	ND	0.05	2.0
		M	7	9.8	<0.005	0.185	0.719	0.904	ND	0.05	1.1
		B	13	10.7	<0.005	0.178	0.783	0.961	1	0.05	2.3
		B	13	10.5	<0.005	0.176	0.809	0.985	2	0.05	1.9
E	14	S	1	8.5	<0.005	0.182	0.779	0.961	8	0.05	1.2
		S	1	8.9	<0.005	0.176	0.776	0.952	5	0.05	1.2
		M	7	9.1	<0.005	0.182	0.762	0.944	2	0.05	1.5
		M	7	9.5	<0.005	0.177	0.766	0.943	1	0.05	1.1
		B	13	9.9	<0.005	0.180	0.770	0.949	2	0.05	1.0
		B	13	9.5	<0.005	0.177	0.761	0.938	3	0.05	1.4
F	18	S	1	14.8	<0.005	0.175	0.778	0.953	ND	0.05	1.4
		S	1	14.7	<0.005	0.179	0.734	0.913	1	0.05	1.3
		M	9	12.8	<0.005	0.181	0.808	0.989	2	0.05	1.5
		M	9	12.4	<0.005	0.174	0.718	0.893	1	0.05	<1.0
		B	17	10.1	<0.005	0.180	0.793	0.974	1	0.05	2.1
		B	17	10.7	<0.005	0.171	0.798	0.970	ND	0.05	1.8
G	13	S	1	9.2	<0.005	0.178	0.728	0.906	ND	0.05	<1.0
		S	1	9.1	<0.005	0.179	0.728	0.908	ND	0.05	<1.0
		M	6.5	8.5	<0.005	0.175	0.732	0.907	ND	0.05	1.4
		M	6.5	8.5	<0.005	0.179	0.722	0.902	ND	0.05	1.1
		B	12	6.9	<0.005	0.173	0.732	0.905	ND	0.05	1.2
		B	12	6.7	<0.005	0.177	0.731	0.908	ND	0.05	1.2

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_2^- as N (mg/L)	NO_3^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
H	19	S	1	8.3	<0.005	0.182	0.757	0.939	ND	0.05	1.7
		S	1	8.3	<0.005	0.180	0.767	0.947	1	0.05	1.6
		M	9.5	8.5	<0.005	0.191	0.740	0.931	ND	0.06	2.2
		M	9.5	8.6	<0.005	0.183	0.734	0.917	ND	0.06	2.7
		B	18	8.4	<0.005	0.186	0.764	0.950	2	0.06	2.3
		B	18	8.5	0.011	0.175	0.742	0.928	1	0.05	1.6

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

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

Table 3.10 Weather condition of water quality monitoring

Date	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
	Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
8 August 2019	33.5	30.4	27.7	74	0.0

Source: Hong Kong Observatory

4. SEDIMENT QUALITY MONITORING AND BENTHIC SURVEY

4.1 Monitoring Station

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

Table 4.1 Location of Sediment Quality Monitoring and Benthic Survey

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

4.2 Monitoring Parameter

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

Table 4.2 Parameters for Sediment Quality Monitoring and Benthic Survey

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

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

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

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

4.3 Sampling Equipment

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

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

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

4.4 Sampling Procedure

Benthic Survey, Particle Size Distribution and TOC Analysis

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

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

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

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

4.5 Laboratory Measurement and Analysis

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

Table 4.3 Laboratory Measurement/Analysis Methods and Reporting Limits

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

4.6 Taxonomic Identification of Benthic Organism

4.6.1 Taxonomic identification of benthic organisms will be performed using stereo dissecting and high-power compound microscopes where it is necessary. Benthic organisms will be counted and identified to lower taxonomic levels as far as practicable with biomass (wet weight, to 0.01gram) of each individual recorded. If breakage of soft-bodied organism occurs, only anterior portions of fragments will be counted, although all fragments will be retained and

weighted for biomass determinations (wet weight, to 0.01gram). Data of species abundance and biomass will be recorded.

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

4.7 Monitoring Frequency and Duration

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

4.8 Quality Assurance / Quality Control

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

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

For each batch of 20 samples:

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

4.9 Event and Action Plan

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

4.10 Monitoring Results and Observations

4.10.1 Sediment quality monitoring and benthic survey is carried out on 8 August 2019. A summary of laboratory analysis results for the sediment quality monitoring and benthic survey are presented in **Table 4.4** and **Table 4.5** respectively. The complete record and graphical presentation of the sediment quality monitoring results is given in **Appendix G.**

Table 4.4 Summary of laboratory analysis results for sediment monitoring

Monitoring Station	pH value	NH_3 as N (mg/L)	Total N (mg-N/kg)	Total P (mg-P/kg)	Cd (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Hg (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	As (mg/kg)	Ag (mg/kg)
A	8.8	5	826	303	<0.10	30.3	25.9	35.4	0.14	17.8	88.0	13.9	0.23
B	8.6	8	1220	397	<0.10	42.0	38.5	44.6	0.20	25.1	117	15.5	0.44
C	8.5	14	1170	450	0.10	48.0	41.8	51.4	0.22	29.5	130	14.1	0.31
D	8.5	12	1180	477	<0.10	46.1	40.4	50.8	0.22	27.8	127	16.0	0.29
E	8.6	14	1510	487	<0.10	48.9	43.6	51.0	0.23	29.0	133	13.0	0.36
F	8.5	26	1880	593	<0.10	48.9	45.1	51.9	0.24	30.1	138	13.3	0.38
G	8.6	18	1540	497	0.11	48.4	49.2	54.7	0.25	29.8	137	13.1	0.39
H	8.5	11	1180	439	0.10	46.0	43.6	46.0	0.18	27.8	113	14.8	0.29

Table 4.5 Summary of laboratory analysis results for benthic survey

Monitoring Station	Total organic carbon (%)	Grain size profile (%)				Description
		Gravel	Sand	Silt	Clay	
A	0.63	13	43	21	23	Dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments
B	0.86	0	33	36	31	Dark grey, slightly sandy SILT/CLAY with shell fragments
C	0.92	0	3	55	42	Dark grey, slightly sandy SILT/CLAY
D	0.93	0	4	56	40	Dark grey, slightly sandy SILT/CLAY with shell fragments
E	1.07	0	6	52	42	Dark grey, slightly sandy SILT/CLAY with shell fragments
F	1.19	1	4	55	40	Dark grey, slightly sandy SILT/CLAY with shell fragments
G	0.90	13	21	36	30	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments
H	0.90	0	1	53	40	Dark grey, slightly sandy SILT/CLAY with shell fragments

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

4.10.3 Construction works from expansion of Hong Kong International Airport was observed nearby the Project site and its vicinity and may affect the sediment quality. The above conditions may affect monitoring results. The weather condition is summarized and presented in **Table 4.6**.

Table 4.6 Weather condition of water quality monitoring

Date	Air Temperature			Mean Relative Humidity (%)	Total Rainfall (mm)
	Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)		
8 August 2019	33.5	30.4	27.7	74	0.0

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 8 August 2019

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	30	13.00	18	2.62	0.91
B	27	12.44	15	2.43	0.90
C	13	0.03	8	1.99	0.96
D	22	5.97	13	2.28	0.89
E	58	32.37	21	2.76	0.91
F	43	21.34	15	2.42	0.89
G	27	29.50	14	2.48	0.94
H	35	15.23	17	2.41	0.85
TOTAL	255	129.87			

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

i) Abundance

A total of 255 macrobenthic organisms was recorded from the eight monitoring stations during the August 2019 monitoring period. Compared to both dry (March 2004) and wet (August 2004) seasons baseline data, the present total abundance was relatively lower. This trend was observed since the start of the monitoring activities in April 2018. Generally, decreasing abundances were observed during wet season monitoring periods while increasing abundances during dry season monitoring periods. These variations in the abundances might be attributed to the natural response of the macrobenthic communities to seasonal changes. However, similar to the previous monitoring periods, these observed seasonal variation are not statistically significant (F-value = 1.38; F-crit = 2.10; P-value = 0.22; $\alpha = 0.05$).

Similar to the previous monitoring periods, a more apparent variation (F-value = 2.89; F-crit = 2.15; P-value = 0.01 ; $\alpha = 0.05$) in the total abundances were observed. The lowest abundance with 13 individuals (ind.) was recorded in Station C and the highest (58 ind.) was recorded in Station E. Abundance distribution showed that the impact stations, Stations C and D, has relatively lower values compared to the reference stations, a similar trend was observed in the baseline data. Sediments in these stations remained to be well-sorted composed silt/clay substrate. However, during the present monitoring period, abundance-sediment size correlation was less apparent compared to other monitoring periods.

ii) Biomass

The total wet biomass recorded in the eight monitoring stations was 129.87g, which is higher compared to the previous monitoring period (94.27g) but remained higher compared to the baseline data. The highest total biomass was observed in Station E (32.37g) while the impact stations, Station C (0.03g) and Station D (5.97g) exhibited the lowest biomass. The relatively higher biomass observed in Station E was contributed by the relatively higher biomass of the molluscan species, *Paphia undulata*. Relatively higher biomass were also recorded in Stations F and G due to the presence of this species.

iii) Taxonomic Composition

A total of eight (8) phyla comprising of 34 families and 50 genera were identified. The macrobenthic assemblage is remained to be dominated by annelida (64.32%), molluscs (17.25 %), and arthropods (9.80%). The dominant species (abundance ≥10) were the polychaetes, *Poecilochaetus* sp. (10 ind.) and *Mediomastus* sp. (11 ind.) recorded in Stations E and Station H, respectively. Similar to the baseline data, the most dominant groups during the present monitoring period were the capitellids (21.57% of the population identified), typical of unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000).

Highest number of genera was recorded in Station E (21) and the lowest in Station C (8). Similar to abundance and biomass, relatively lower number of taxa was observed at impact stations compared to the reference stations.

iv) Diversity

Benthic diversity index (*H'*) and evenness index (*J*) ranged from 1.99 – 2.28 and 0.89 – 0.96 in impact stations, and 2.41 – 2.76 and 0.85 – 0.94 in the reference station. These 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 recorded in the previous monitoring periods. Compared with the baseline survey result, apparent increase in diversity index and evenness index was observed.

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

5. CHINESE WHITE DOLPHIN MONITORING

5.1 Data Interpretation

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

5.1.2 The increased amount of sewage discharged from Siu Ho Wan Sewage Treatment Works was identified as a potential issue of concern for CWDs. Referring to the latest AFCD's report, "Monitoring of Marine Mammals in Hong Kong Waters (2018-19)", 192 line-transect vessel surveys with a total survey effort of 6055.6km was conducted amongst 10 survey areas in Hong Kong from April 2018 to March 2019; the areas included NEL, Northwest Lantau (NWL), West Lantau (WL), Southwest Lantau (SWL), Southeast Lantau (SEL), Deep Bay (DB), Lamma (LM), Po Toi (PT), Ninepins (NP), and Sai Kung (SK). Additionally, under the Hong Kong-Zhuhai-Macao Bridge related EM&A, supplementary surveys with a total survey effort of 5,541.6 were conducted at NEL, NWL, WL and SWL, bringing the total survey effort to 11,597.2 km.

5.1.3 During the 12-month monitoring period – from the AFCD monitoring surveys, 150 groups of 451 CWDs were sighted from April 2018 to March 2019. Also, additional sighting contributed from various HZMB-related EM&A surveys with a total of 296 groups of 928 dolphins were sighted altogether during the same 12-month periods. Among them, 247 were sighted during on-effort line-transect surveys, while the remaining numbers were made during off-effort search.

5.1.4 During the 2018-2019 monitoring period, 97% dolphin sightings were made at WL (184 sightings), NWL (65) and SWL (38). On the contrary, dolphins rarely occurred in the SEL and DB areas with only 4 sightings each. Despite the large survey effort conducted in the NEL survey area, no sightings were present from the combined data sets. Details of the CWDs abundances among 10 survey areas are presented in **Appendix I**.

5.1.5 The impact of increased effluent discharged from Siu Ho Wan outfall on CWDs is not mentioned in this report. However, as mentioned in the 2017 - 2018 AFCD study; there has been a dramatic decline in dolphin occurrence at NEL from 2012 where dolphins were still frequently spotted near Brothers Islands. Presently, there is a complete absence of dolphins in NEL waters continuing from 2018, as no dolphin was sighted there in the past four consecutive years during AFCD surveys.

5.1.6 Dolphin decline in NEL waters has been strongly linked to the construction works of HZMB and increase in high-speed ferry traffic to/from the Sky Pier as reported in previous monitoring periods. Unfortunately, there was still no sign of recovery even though the marine works for the HZMB was completed in 2017. The lack of recovery in dolphins usage in this once-important dolphin habitat could also be related to the persistent disturbance of construction works in the nearby massive reclamation project for the 3RS works, since 2016, and such disturbance will continue at least for several years which may continue to affect the potential recovery of dolphin usage in NEL waters. Continued systematic dolphin surveying in Lantau Island is necessary to further study this issue.

6. ADVICE ON IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

6.1 Implementation Status

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

7. ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS

7.1.1 SHWSTW is reminded to fully comply with EP conditions. All measures and recommendations in the EP, EIA Report and approved Waste Management Plan (WMP) shall be fully and properly implemented. During the reporting period, following measures in related to solid and liquid waste management were implemented:

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

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

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 temporary suspended and no monitoring was carried out in the reporting period. No exceedances of Action/Limit levels at ASRs were recorded.

8.1.2 Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 8 August 2019. No specific Action/Limit level has to be followed since the purpose of the monitoring is to collect data for future purpose.

9. SUMMARY OF ENVIRONMENTAL COMPLAINTS

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

Table 9.1 Cumulative Statistics on Complaints

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

Table 9.2 Cumulative Statistics on Notification of Summons and Successful Prosecutions

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

10. FUTURE KEY ISSUES

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

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

ii. Due to inadequacy of representative data collected between August 2017 and May 2018, current H_2S measurement and olfactometry analysis were considered as unsuitable method to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m3). In order to assess whether SHWSTW is the major H_2S source to ASRs, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR are not appropriate locations for the correlation study as the change of both odour level and H_2S concentrations at ASRs were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval.

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

11. CONCLUSION

11.1.1 Air quality monitoring i.e. H_2S concentration monitoring, odour patrol monitoring and olfactometry analysis, was temporary suspended and no monitoring was carried out in the reporting period. No exceedances of Action/Limit levels at ASR were recorded as no complaint was received during the reporting period.

11.1.2 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). Due to non-ideal wind direction or domination of non-target smell during the measurements conducted between August 2017 and May 2018, inadequacy of representative data was result between August 2017 and May 2018. Current H_2S measurement and olfactometry analysis was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). In order to assess whether SHWSTW is the major H_2S source to ASR, three additional air quality monitoring events were conducted on February 2018. The data showed that site boundary of SHWSTW and the location of ASR is not appropriate for the correlation study as the change of both odour level and H_2S concentrations at ASR were not sensitive to that at site boundary of SHWSTW. Alternative methods shall be proposed and submitted for EPD's approval. Since six months air quality monitoring and additional three months air quality monitoring had been conducted according to Section 2.2 of OEM&A Plan without any complaint or non-compliance recorded, air quality monitoring was temporarily suspended until alternative methods of correlation study was approved by EPD. The temporary suspension was approved by EPD's memo dated 14 May 2018.

11.1.3 Water quality monitoring, sediment quality monitoring and benthic survey were conducted on 8 August 2019 to collect data for future reference in accordance with Section 5.5 and 6.5 of the Operational EM&A Plan. The details of methodology and results collected of the monitoring were presented in Section 3 and Section 4. Heavy marine traffic and construction works from expansion of Hong Kong International Airport were observed nearby the Project site and its vicinity and may affect the water and sediment quality The above conditions may affect monitoring results.

11.1.4 The latest AFCD's report dated 1 August 2019, "*Monitoring of Marine Mammals in Hong Kong Waters (2018-19)*" in terms of the distribution and abundance of CWDs was reviewed. According to the advice from AFCD, the data of distribution and abundance of CWDs would only be available in the annual reports for Monitoring of Marine Mammals In Hong Kong Waters which cover monitoring data from 1 April to 31 March (next year). The updated status of the distribution and abundance of CWDs will be provided once the annual report (2019-20) is uploaded to AFCD"s webpage.

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

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

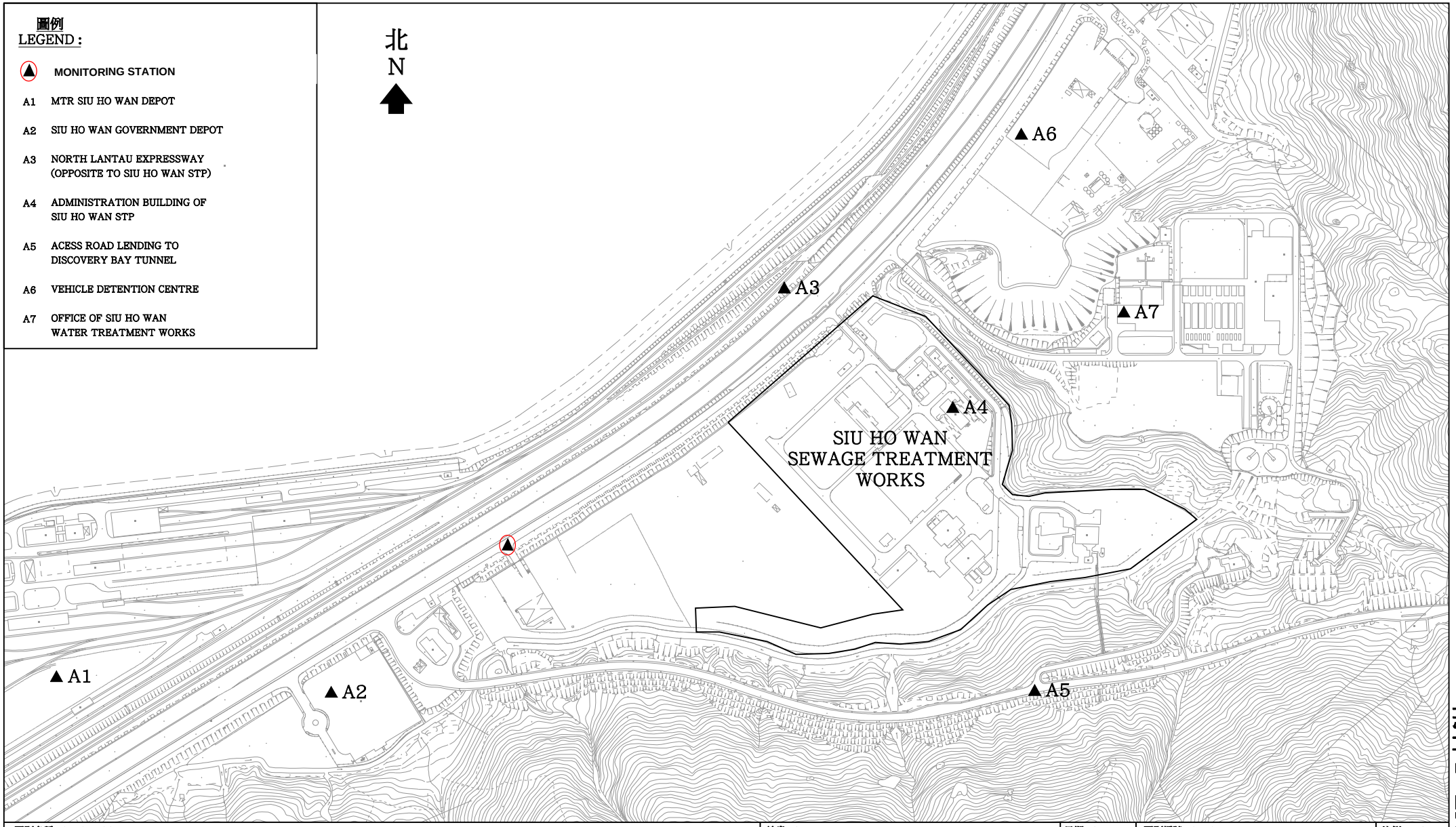
FUGRO TECHNICAL SERVICES LIMITED

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 Stations of Air Sensitive Receivers



圖則名稱 drawing title

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

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

圖則編號 drawing no. DCM/2006/063

比例 scale N.T.S.

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

附件1 ENCLOSURE 1

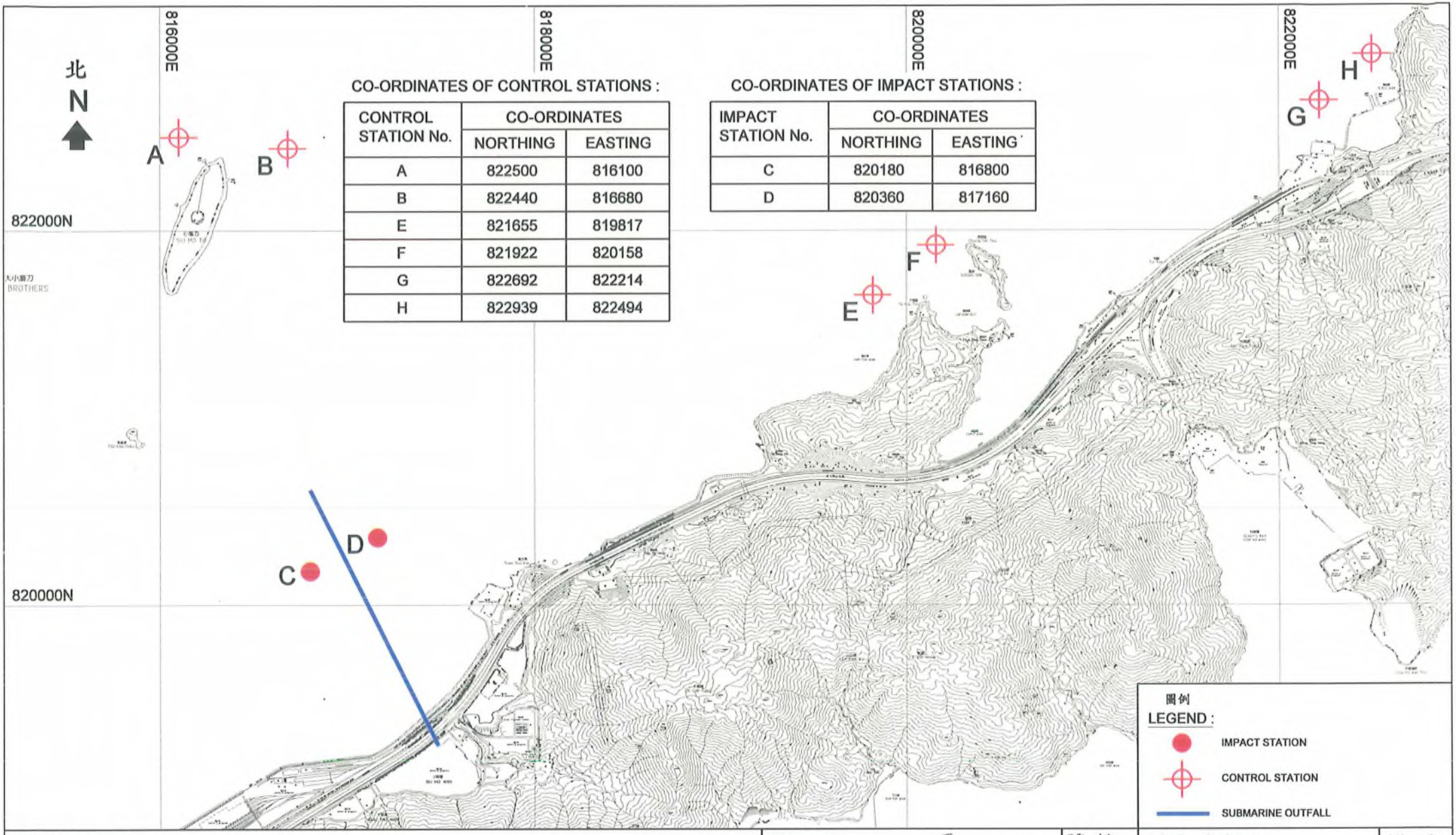
FUGRO TECHNICAL SERVICES LIMITED

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



CO-ORDINATES OF CONTROL STATIONS :

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

CO-ORDINATES OF IMPACT STATIONS :

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

圖例
LEGEND :

- IMPACT STATION
- CONTROL STATION
- SUBMARINE OUTFALL

圖則名稱 drawing title

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

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

圖則編號 drawing no. DCM/2004/002

比例 scale N.T.S.

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

Location of the Tide Gauge

Source: Google Maps

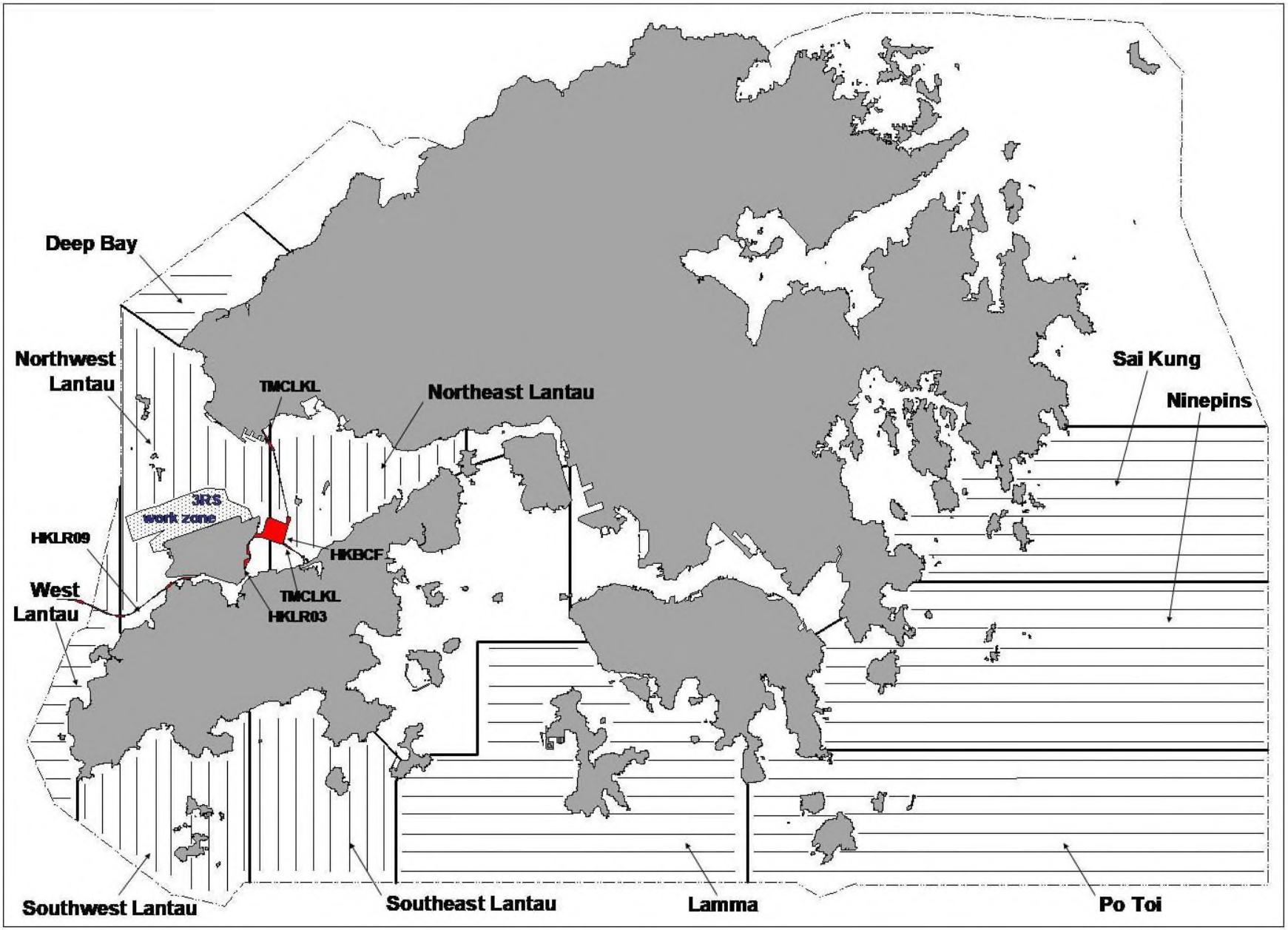
FUGRO TECHNICAL SERVICES LIMITED

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



Ten Line-Transect Survey Areas within the Study Area for the 2018-19 Monitoring Study

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

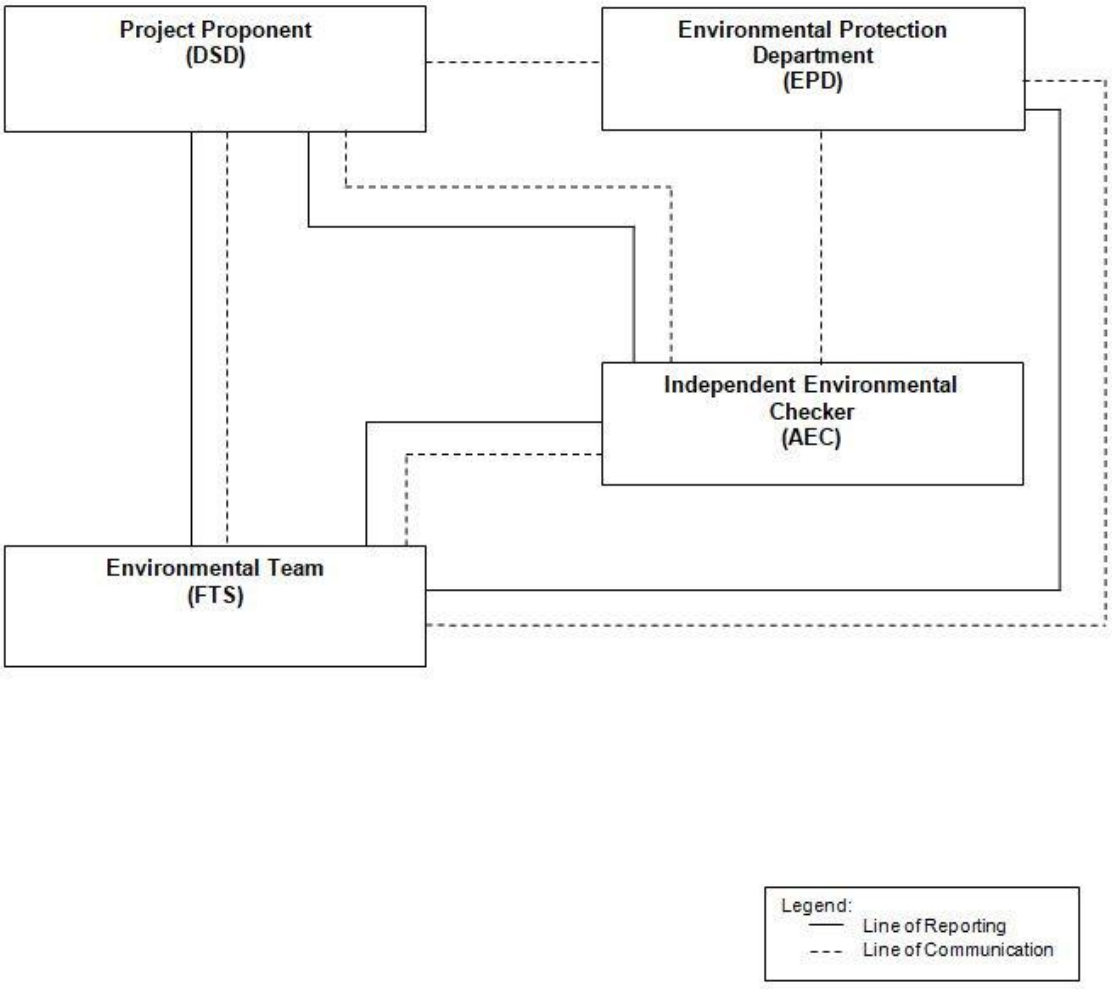
Appendix A

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 the Present Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
				1 August	2	3
4	5	6	7	8 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Ebb (06:41) Mid-Flood (13:01)	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Remarks

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

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 the Next Reporting Period

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

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 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. : 142626WA191452(1)

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

Information Supplied by Client

Client	:	Fugro Technical Services Limited (MCL)
Client's address	:	Rm. 723 - 726, 7/F, Profit Industrial Building, No. 1-15, Kwai Fung Crescent, Kwai Chung, N.T.
Sample description	:	One Aqua Troll 600 Multi-parameter Water Quality Meter
Client sample ID	:	Serial No. 490113
Test required	:	Calibration of the Aqua Troll 600 Multi-parameter Water Quality Meter

Laboratory Information

Lab. sample ID	:	WA191452/2
Date of calibration	:	02/07/2019
Next calibration date	:	01/10/2019
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. : 142626WA191452(1)

Results :

A. pH calibration

pH reading at 26°C for Q.C. solution(6.86) and at 26°C for Q.C. solution(9.18)		
Theoretical	Measured	Deviation
9.18	9.18	0.00
6.86	6.86	0.00

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.05	+0.05	± 0.5
20	20.07	+0.07	± 1.0
30	29.87	-0.13	± 1.5
40	39.76	-0.24	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	7.34	7.32
2	7.36	7.33
3	7.35	7.33
Average	7.35	7.33

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

Certified by : _____
Approved Signatory : HO Kin Man, John
Assistant General Manager – Laboratories
Date : 11/7/2019

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. : 142626WA191452(1)

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
25.70	25.72

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
4	4.07	+0.07	± 0.4
8	8.09	+0.09	± 0.6
40	39.77	-0.23	± 3.0
80	79.54	-0.46	± 4.0

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

Date : 11/7/2019

** End of Report **

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

SonTek
a xylem brand

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

Certificate of Calibration

TEST REPORT

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

POWER TEST

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

NOISE TEST

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

VERIFICATION

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

OPTIONS

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

Verified by: **ainthasane**

This report was generated on 5/24/2017.

FUGRO TECHNICAL SERVICES LIMITED

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 Water Quality Monitoring

Water Quality Monitoring Data

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (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	8/8/2019	Mid-Ebb	Fine	Moderate	6:13	17	S	1	1	8.09	22.80	28.61	82.5	5.89	3.1	0.18	201.2	8.8	<0.005	0.199	0.830	1.030	5	0.04	1.2
A	8/8/2019	Mid-Ebb	Fine	Moderate	6:13	17	S	1	2	8.09	22.86	28.47	81.5	5.79	3.7	0.16	198.0	8.4	<0.005	0.214	0.802	1.020	8	0.05	1.1
A	8/8/2019	Mid-Ebb	Fine	Moderate	6:13	17	M	8.5	1	8.09	22.98	28.40	78.8	5.54	2.9	0.35	179.5	8.6	<0.005	0.188	0.801	0.989	8	0.05	1.6
A	8/8/2019	Mid-Ebb	Fine	Moderate	6:13	17	M	8.5	2	8.09	22.78	28.39	78.2	5.56	3.5	0.29	216.1	8.2	<0.005	0.215	0.775	0.990	12	0.05	2.0
A	8/8/2019	Mid-Ebb	Fine	Moderate	6:13	17	B	16	1	8.09	22.86	28.37	74.8	5.10	3.1	0.26	267.8	9.7	0.014	0.193	0.786	0.993	9	0.06	1.8
A	8/8/2019	Mid-Ebb	Fine	Moderate	6:13	17	B	16	2	8.10	23.12	28.35	74.8	5.05	3.5	0.29	255.3	10.2	<0.005	0.196	0.776	0.973	12	0.05	1.0
B	8/8/2019	Mid-Ebb	Fine	Moderate	6:21	14	S	1	1	7.63	22.55	28.72	76.9	5.38	3.9	0.18	251.1	8.6	0.017	0.192	0.798	1.010	1	0.05	1.8
B	8/8/2019	Mid-Ebb	Fine	Moderate	6:21	14	S	1	2	7.62	22.45	29.23	76.4	5.28	3.9	0.12	254.7	9.2	0.005	0.194	0.790	0.989	ND	0.06	1.4
B	8/8/2019	Mid-Ebb	Fine	Moderate	6:21	14	M	7	1	7.66	22.39	29.59	75.4	5.23	3.9	0.33	218.6	10.0	0.006	0.189	0.803	0.998	10	0.06	1.8
B	8/8/2019	Mid-Ebb	Fine	Moderate	6:21	14	M	7	2	7.57	21.03	29.87	75.2	5.18	3.9	0.19	235.1	9.4	0.008	0.186	0.81	1	15	0.05	1.6
B	8/8/2019	Mid-Ebb	Fine	Moderate	6:21	14	B	13	1	7.51	20.61	30.15	74.2	5.10	4.0	0.26	205.2	11.5	<0.005	0.183	0.813	0.996	7	0.06	1.6
B	8/8/2019	Mid-Ebb	Fine	Moderate	6:21	14	B	13	2	7.25	20.37	30.11	74.5	5.05	3.8	0.34	190.9	11.7	0.014	0.182	0.817	1.010	5	0.06	1.8
C	8/8/2019	Mid-Ebb	Fine	Moderate	6:39	12	S	1	1	7.40	23.24	27.21	77.7	5.65	3.6	0.22	210.2	7.6	<0.005	0.188	0.790	0.978	34	0.06	1.3
C	8/8/2019	Mid-Ebb	Fine	Moderate	6:39	12	S	1	2	7.39	23.11	27.22	77.8	5.65	3.7	0.32	199.0	7.1	<0.005	0.194	0.815	1.010	29	0.05	1.1
C	8/8/2019	Mid-Ebb	Fine	Moderate	6:39	12	M	6	1	7.35	22.51	27.22	77.8	5.65	3.7	0.28	222.7	8.3	<0.005	0.221	0.793	1.010	59	0.05	<1.0
C	8/8/2019	Mid-Ebb	Fine	Moderate	6:39	12	M	6	2	7.32	22.53	27.22	77.9	5.66	3.7	0.18	198.2	8.1	<0.005	0.182	0.794	0.976	54	0.06	1.1
C	8/8/2019	Mid-Ebb	Fine	Moderate	6:39	12	B	11	1	7.46	22.60	27.36	75.0	5.50	3.7	0.26	221.1	9.4	<0.005	0.182	0.789	0.971	30	0.06	1.1
C	8/8/2019	Mid-Ebb	Fine	Moderate	6:39	12	B	11	2	7.56	22.61	28.04	75.5	5.52	3.6	0.26	248.7	9.1	<0.005	0.180	0.798	0.978	22	0.06	<1.0
D	8/8/2019	Mid-Ebb	Fine	Moderate	6:54	13	S	1	1	7.62	19.61	27.79	73.3	4.89	4.0	0.31	93.4	12.0	<0.005	0.192	0.800	0.992	45	0.05	1.1
D	8/8/2019	Mid-Ebb	Fine	Moderate	6:54	13	S	1	2	7.55	21.01	27.53	72.1	4.55	4.4	0.16	99.7	12.8	<0.005	0.198	0.793	0.991	53	0.05	1.1
D	8/8/2019	Mid-Ebb	Fine	Moderate	6:54	13	M	6.5	1	7.48	20.71	27.38	71.3	4.59	3.9	0.32	226.2	10.2	<0.005	0.194	0.802	0.996	29	0.05	<1.0
D	8/8/2019	Mid-Ebb	Fine	Moderate	6:54	13	M	6.5	2	7.46	22.54	27.31	71.3	4.60	3.6	0.37	233.8	9.7	<0.005	0.193	0.810	1.000	34	0.05	<1.0
D	8/8/2019	Mid-Ebb	Fine	Moderate	6:54	13	B	12	1	7.44	22.63	27.25	71.5	4.63	3.6	0.08	211.7	8.9	<0.005	0.198	0.787	0.985	24	0.05	1.4
D	8/8/2019	Mid-Ebb	Fine	Moderate	6:54	13	B	12	2	7.43	23.19	27.22	71.7	4.64	3.6	0.16	192.6	8.5	<0.005	0.218	0.774	0.993	21	0.05	1.7
E	8/8/2019	Mid-Ebb	Fine	Moderate	7:09	16	S	1	1	7.69	23.14	27.88	72.4	4.89	7.0	0.10	215.3	8.0	<0.005	0.180	0.751	0.930	5	0.05	1.5
E	8/8/2019	Mid-Ebb	Fine	Moderate	7:09	16	S	1	2	8.10	23.41	28.26	72.5	4.90	6.7	0.07	234.1	7.6	<0.005	0.174	0.724	0.898	7	0.05	2.0
E	8/8/2019	Mid-Ebb	Fine	Moderate	7:09	16	M	8	1	8.10	23.92	28.26	72.4	4.89	6.3	0.20	240.8	8.5	<0.005	0.171	0.750	0.921	13	0.05	1.9
E	8/8/2019	Mid-Ebb	Fine	Moderate	7:09	16	M	8	2	8.10	23.75	28.27	72.7	4.92	6.3	0.16	248.0	8.9	<0.005	0.167	0.745	0.912	11	0.05	1.7
E	8/8/2019	Mid-Ebb	Fine	Moderate	7:09	16	B	15	1	7.78	22.89	28.34	72.9	4.93	7.8	0.14	247.2	9.8	<0.005	0.167	0.713	0.880	10	0.05	1.9
E	8/8/2019	Mid-Ebb	Fine	Moderate	7:09	16	B	15	2	7.74	21.09	28.24	73.3	4.95	7.1	0.14	251.2	10.6	<0.005	0.165	0.738	0.903	7	0.05	1.8
F	8/8/2019	Mid-Ebb	Fine	Moderate	7:22	23	S	1	1	8.09	23.71	28.27	72.9	4.91	6.9	0.18	228.0	9.2	<0.005	0.199	0.788	0.987	10	0.05	<1.0
F	8/8/2019	Mid-Ebb	Fine	Moderate	7:22	23	S	1	2	8.09	23.72	28.27	73.0	4.92	6.4	0.23	237.4	9.5	<0.005	0.220	0.762	0.982	14	0.05	<1.0
F	8/8/2019	Mid-Ebb	Fine	Moderate	7:22	23	M	11.5	1	8.10	23.26	28.29	72.9	4.91	6.3	0.49	185.1	8.5	<0.005	0.185	0.801	0.986	11	0.05	<1.0
F	8/8/2019	Mid-Ebb	Fine	Moderate	7:22	23	M	11.5	2	8.11	22.96	28.29	73.0	4.92	6.2	0.32	217.9	8.5	<0.005	0.165	0.744	0.909	16	0.05	<1.0
F	8/8/2019	Mid-Ebb	Fine	Moderate	7:22	23	B	22	1	7.83	23.15	28.15	73.0	4.93	4.1	0.33	230.6	8.1	0.024	0.219	0.773	1.020	12	0.05	2.7
F	8/8/2019	Mid-Ebb	Fine	Moderate	7:22	23	B	22	2	7.72	23.92	28.04	72.6	4.91	3.3	0.28	250.9	7.5	0.030	0.217	0.781	1.030	8	0.05	1.6
G	8/8/2019	Mid-Ebb	Fine	Moderate	7:39	22	S	1	1	8.42	23.40	27.74	73.8	4.96	3.3	0.41	194.1	8.8	<0.005	0.194	0.724	0.918	11	0.05	2.6
G	8/8/2019	Mid-Ebb	Fine	Moderate	7:39	22	S	1	2	8.58	23.47	27.70	73.3	4.94	3.5	0.28	199.8	8.1	<0.005	0.196	0.716	0.912	15	0.05	2.8
G	8/8/2019	Mid-Ebb	Fine	Moderate	7:39	22	M	11	1	8.54	23.47	27.77	73.1	4.93	3.1	0.49	171.4	9.2	<0.005	0.216	0.723	0.940	13	0.05	2.0
G	8/8/2019	Mid-Ebb	Fine	Moderate	7:39	22	M	11	2	8.60	23.12	27.94	73.2	4.94	3.1	0.53	151.9	9.4	0.012	0.172	0.748	0.932	9	0.05	1.4
G	8/8/2019	Mid-Ebb	Fine	Moderate	7:39	22	B	21	1	8.62	23.46	28.02	73.0	4.93	3.2	0.17	191.6	9.9	0.018	0.224	0.772	1.010	12	0.05	2.0
G	8/8/2019	Mid-Ebb	Fine	Moderate	7:39	22	B	21	2	8.62	23.79	28.04	72.8	4.91	3.1	0.19	212.5	10.5	<0.005	0.216	0.776	0.993	19	0.05	1.6
H	8/8/2019	Mid-Ebb	Fine	Moderate	7:50	19	S	1	1	8.03	23.47	28.27	77.3	5.26	6.4	0.22	141.2	10.5	<0.005	0.214	0.712	0.926	1	0.05	1.5
H	8/8/2019	Mid-Ebb	Fine	Moderate	7:50	19	S	1	2	8.06	23.34	28.28	78.9	5.38	6.7	0.12	136.3	10.4	0.018	0.196	0.782	0.996	ND	0.05	<1.0
H	8/8/2019	Mid-Ebb	Fine	Moderate	7:50	19	M	9.5	1	8.08	23.80	28.26	78.2	5.37	6.9	0.16	268.2	9.2	0.055	0.217	0.731	1.000	14	0.05	1.8
H	8/8/2019	Mid-Ebb	Fine	Moderate	7:50	19	M	9.5	2	8.08	23.02	28.27	77.6	5.29	6.5	0.10	232.8	9.3	0.062	0.190	0.718	0.970	9	0.05	2.3
H	8/8/2019	Mid-Ebb	Fine	Moderate	7:50	19	B	18	1	8.08	23.51	28.28	78.6	5.35	9.0	0.24	261.6	7.8	0.083	0.215	0.728	1.020	18	0.05	2.7
H	8/8/2019	Mid-Ebb	Fine	Moderate	7:50	19	B	18	2	8.08	23.57	28.29	74.0	4.99	8.8	0.31	260.3	8.1	0.094	0.190	0.724	1.010	12	0.05	2.8

Note: 1. ND: Not Detected

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (solube and particulate) (mg/L)	BOD_5 (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	8/8/2019	Mid-Flood	Fine	Moderate	12:37	15	S	1	1	8.38	25.14	28.65	86.3	5.73	4.8	0.26	198.3	7.8	<0.005	0.168	0.748	0.915	ND	0.05	1.4
A	8/8/2019	Mid-Flood	Fine	Moderate	12:37	15	S	1	2	8.33	22.94	28.90	85.9	5.71	4.6	0.27	197.2	7.4	<0.005	0.165	0.750	0.915	ND	0.05	1.4
A	8/8/2019	Mid-Flood	Fine	Moderate	12:37	15	M	7.5	1	8.35	22.82	28.93	80.7	5.40	4.2	0.41	206.7	8.1	<0.005	0.176	0.702	0.879	ND	0.05	1.0
A	8/8/2019	Mid-Flood	Fine	Moderate	12:37	15	M	7.5	2	8.42	23.48	29.10	80.3	5.33	4.7	0.39	224.8	8.3	<0.005	0.180	0.696	0.876	ND	1.73	<1.0
A	8/8/2019	Mid-Flood	Fine	Moderate	12:37	15	B	14	1	8.42	21.48	29.24	77.3	5.15	4.6	0.68	134.0	8.2	<0.005	0.172	0.735	0.907	ND	0.05	1.4
A	8/8/2019	Mid-Flood	Fine	Moderate	12:37	15	B	14	2	8.61	25.46	29.38	77.3	5.13	4.6	0.70	133.3	7.6	<0.005	0.175	0.700	0.875	ND	0.05	<1.0
B	8/8/2019	Mid-Flood	Fine	Moderate	12:48	14	S	1	1	7.86	21.71	29.20	88.7	5.94	4.1	0.27	174.0	7.0	<0.005	0.170	0.751	0.921	ND	0.05	1.1
B	8/8/2019	Mid-Flood	Fine	Moderate	12:48	14	S	1	2	8.04	22.38	29.14	87.9	5.87	4.1	0.30	174.0	7.7	<0.005	0.178	0.748	0.926	1	0.05	1.3
B	8/8/2019	Mid-Flood	Fine	Moderate	12:48	14	M	7	1	7.86	22.33	29.16	87.8	5.87	4.8	0.25	185.3	6.5	<0.005	0.183	0.750	0.934	3	0.05	1.6
B	8/8/2019	Mid-Flood	Fine	Moderate	12:48	14	M	7	2	8.00	22.50	28.97	85.8	5.75	4.8	0.35	192.3	6.2	<0.005	0.178	0.745	0.923	ND	0.05	1.2
B	8/8/2019	Mid-Flood	Fine	Moderate	12:48	14	B	13	1	8.19	23.28	28.71	80.8	5.42	4.9	0.36	216.1	5.6	<0.005	0.176	0.755	0.931	1	0.05	2.4
B	8/8/2019	Mid-Flood	Fine	Moderate	12:48	14	B	13	2	8.19	23.28	28.71	80.8	5.42	4.9	0.28	228.3	5.8	<0.005	0.160	0.810	0.970	2	0.05	2.4
C	8/8/2019	Mid-Flood	Fine	Moderate	13:06	12	S	1	1	7.95	23.03	28.76	89.1	5.80	5.8	0.17	135.0	5.8	<0.005	0.173	0.835	1.010	2	0.04	1.6
C	8/8/2019	Mid-Flood	Fine	Moderate	13:06	12	S	1	2	7.95	22.24	29.08	86.1	5.76	5.9	0.20	107.9	6.2	<0.005	0.172	0.828	1.000	3	0.05	1.5
C	8/8/2019	Mid-Flood	Fine	Moderate	13:06	12	M	6	1	7.96	22.36	29.09	87.2	5.84	5.6	0.22	159.2	6.8	<0.005	0.177	0.814	0.991	3	0.05	1.6
C	8/8/2019	Mid-Flood	Fine	Moderate	13:06	12	M	6	2	7.97	22.45	29.22	89.4	5.97	5.7	0.27	152.8	7.1	<0.005	0.171	0.822	0.993	5	0.05	1.4
C	8/8/2019	Mid-Flood	Fine	Moderate	13:06	12	B	11	1	8.09	22.09	29.25	88.7	5.92	6.4	0.17	212.0	9.3	<0.005	0.177	0.790	0.967	2	0.05	1.5
C	8/8/2019	Mid-Flood	Fine	Moderate	13:06	12	B	11	2	8.04	22.21	29.27	89.1	5.95	6.5	0.23	219.4	8.6	<0.005	0.178	0.798	0.976	1	0.05	1.6
D	8/8/2019	Mid-Flood	Fine	Moderate	13:25	14	S	1	1	8.72	23.18	30.38	76.3	5.10	4.1	0.20	121.3	7.8	<0.005	0.178	0.821	0.999	2	0.05	2.4
D	8/8/2019	Mid-Flood	Fine	Moderate	13:25	14	S	1	2	8.55	23.19	28.89	76.4	5.11	4.2	0.24	153.1	7.4	<0.005	0.177	0.808	0.985	3	0.05	2.6
D	8/8/2019	Mid-Flood	Fine	Moderate	13:25	14	M	7	1	8.60	23.17	28.79	80.0	5.35	5.1	0.21	135.5	9.5	<0.005	0.177	0.761	0.938	ND	0.05	2.0
D	8/8/2019	Mid-Flood	Fine	Moderate	13:25	14	M	7	2	8.54	22.90	28.86	79.7	5.34	5.0	0.17	141.1	9.8	<0.005	0.185	0.719	0.904	ND	0.05	1.1
D	8/8/2019	Mid-Flood	Fine	Moderate	13:25	14	B	13	1	8.55	22.95	28.82	78.8	5.28	5.1	0.28	176.9	10.7	<0.005	0.178	0.783	0.961	1	0.05	2.3
D	8/8/2019	Mid-Flood	Fine	Moderate	13:25	14	B	13	2	8.54	23.01	28.75	78.2	5.16	5.2	0.28	191.3	10.5	<0.005	0.176	0.809	0.985	2	0.05	1.9
E	8/8/2019	Mid-Flood	Fine	Moderate	13:36	14	S	1	1	8.72	24.06	29.23	92.1	6.96	4.0	0.25	245.0	8.5	<0.005	0.182	0.779	0.961	8	0.05	1.2
E	8/8/2019	Mid-Flood	Fine	Moderate	13:36	14	S	1	2	8.55	24.39	29.86	92.4	6.96	4.4	0.15	233.7	8.9	<0.005	0.176	0.776	0.952	5	0.05	1.2
E	8/8/2019	Mid-Flood	Fine	Moderate	13:36	14	M	7	1	8.60	22.79	30.06	89.5	6.01	4.8	0.30	114.7	9.1	<0.005	0.182	0.762	0.944	2	0.05	1.5
E	8/8/2019	Mid-Flood	Fine	Moderate	13:36	14	M	7	2	8.54	23.76	30.02	89.1	5.98	4.8	0.21	151.9	9.5	<0.005	0.177	0.766	0.943	1	0.05	1.1
E	8/8/2019	Mid-Flood	Fine	Moderate	13:36	14	B	13	1	8.55	24.18	29.85	86.4	5.63	4.7	0.26	151.3	9.9	<0.005	0.180	0.770	0.949	2	0.05	1.0
E	8/8/2019	Mid-Flood	Fine	Moderate	13:36	14	B	13	2	8.72	24.75	29.98	86.6	5.68	4.5	0.22	157.8	9.5	<0.005	0.177	0.761	0.938	3	0.05	1.4
F	8/8/2019	Mid-Flood	Fine	Moderate	13:49	18	S	1	1	8.51	20.46	32.49	88.3	5.92	5.0	0.24	233.0	14.8	<0.005	0.175	0.778	0.953	ND	0.05	1.4
F	8/8/2019	Mid-Flood	Fine	Moderate	13:49	18	S	1	2	8.58	19.65	29.78	87.8	5.90	5.2	0.20	252.1	14.7	<0.005	0.179	0.734	0.913	1	0.05	1.3
F	8/8/2019	Mid-Flood	Fine	Moderate	13:49	18	M	9	1	8.42	21.87	29.58	88.3	5.88	4.5	0.24	153.2	12.8	<0.005	0.181	0.808	0.989	2	0.05	1.5
F	8/8/2019	Mid-Flood	Fine	Moderate	13:49	18	M	9	2	8.32	22.94	29.06	88.5	5.81	4.7	0.30	183.0	12.4	<0.005	0.174	0.718	0.893	1	0.05	<1.0
F	8/8/2019	Mid-Flood	Fine	Moderate	13:49	18	B	17	1	8.49	22.95	28.95	82.5	5.51	4.1	0.20	179.8	10.1	<0.005	0.180	0.793	0.974	1	0.05	2.1
F	8/8/2019	Mid-Flood	Fine	Moderate	13:49	18	B	17	2	8.63	22.50	29.11	80.5	5.38	4.1	0.25	191.2	10.7	<0.005	0.171	0.798	0.970	ND	0.05	1.8
G	8/8/2019	Mid-Flood	Fine	Moderate	14:06	13	S	1	1	7.85	20.46	30.34	98.7	7.31	4.5	0.25	213.5	9.2	<0.005	0.178	0.728	0.906	ND	0.05	<1.0
G	8/8/2019	Mid-Flood	Fine	Moderate	14:06	13	S	1	2	7.94	19.65	30.76	98.9	7.27	4.7	0.24	206.0	9.1	<0.005	0.179	0.728	0.908	ND	0.05	<1.0
G	8/8/2019	Mid-Flood	Fine	Moderate	14:06	13	M	6.5	1	7.86	21.87	31.19	98.1	7.16	4.8	0.28	106.7	8.5	<0.005	0.175	0.732	0.907	ND	0.05	1.4
G	8/8/2019	Mid-Flood	Fine	Moderate	14:06	13	M	6.5	2	7.90	22.94	31.41	98.1	7.13	4.7	0.29	107.0	8.5	<0.005	0.179	0.722	0.902	ND	0.05	1.1
G	8/8/2019	Mid-Flood	Fine	Moderate	14:06	13	B	12	1	7.98	22.95	31.69	98.0	7.10	5.1	0.37	209.6	6.9	<0.005	0.173	0.732	0.905	ND	0.05	1.2
G	8/8/2019	Mid-Flood	Fine	Moderate	14:06	13	B	12	2	7.94	22.50	32.04	98.2	7.07	5.1	0.49	132.6	6.7	<0.005	0.177	0.731	0.908	ND	0.05	1.2
H	8/8/2019	Mid-Flood	Fine	Moderate	14:20	19	S	1	1	7.97	20.46	29.89	97.9	7.31	4.0	0.33	210.8	8.3	<0.005	0.182	0.757	0.939	ND	0.05	1.7
H	8/8/2019	Mid-Flood	Fine	Moderate	14:20	19	S	1	2	8.02	19.65	29.88	98.3	7.34	3.7	0.31	209.4	8.3	<0.005	0.180	0.767	0.947	1	0.05	1.6
H	8/8/2019	Mid-Flood	Fine	Moderate	14:20	19	M	9.5	1	8.01	21.87	29.87	98.4	7.35	3.8	0.30	188.6	8.5	<0.005	0.191	0.740	0.931	ND	0.06	2.2
H	8/8/2019	Mid-Flood	Fine	Moderate	14:20	19	M	9.5	2	8.12	22.94	29.88	98.4	7.35	3.1	0.30	231.2	8.6	<0.005	0.183	0.734	0.917	ND	0.06	2.7
H	8/8/2019	Mid-Flood	Fine	Moderate	14:20	19	B	18	1	8.15	22.95	29.90	98.2	7.33	4.1	0.37	173.3	8.4	<0.005	0.186	0.764	0.950	2	0.06	2.3
H	8/8/2019	Mid-Flood	Fine	Moderate	14:20	19	B	18	2	8.15	22.50	30.01	98.9	7.37	3.5	0.35	167.5	8.5	0.011	0.175	0.742	0.928	1	0.05	1.6

Note: 1. ND: Not Detected

CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 28
Contact	: MR CYRUS LAI	Contact	: Richard Fung	Work Order	: HK1933344
Address	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: c.lai@fugro.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 3565 4374	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT			Date Samples Received	: 08-Aug-2019
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 22-Aug-2019
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	Managing Director	Inorganics
Ng Sin Kou, May	Laboratory Manager	Microbiology_ENV

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 08-Aug-2019 to 22-Aug-2019.

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: HK1933344

Sample(s) were received in chilled condition.

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

Sample information (Project name, Sample ID, Sampling date/ time) is provided by client.

Sample(s) arrived in the laboratory at 16:35. Microbiological sample(s), in 125mL plastic bottle labelled sterile, with addition of sodium thiosulfate solution.

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

EK063A - Total Inorganic Nitrogen is the sum of the Total Oxidizable Nitrogen and Ammonical Nitrogen.

EP030 - 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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
					HK1933344-001	HK1933344-002	HK1933344-003	HK1933344-004	HK1933344-005
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		8.8	8.4	8.6	8.2	9.7
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	0.014
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.199	0.214	0.188	0.215	0.193
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.830	0.802	0.801	0.775	0.786
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		1.03	1.02	0.989	0.990	0.993
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.04	0.05	0.05	0.05	0.06
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		0.04	0.03	0.02	0.03	0.02
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.2	1.1	1.6	2.0	1.8
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		5	8	8	12	9

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-006	HK1933344-007	HK1933344-008	HK1933344-009	HK1933344-010
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	10.2	8.6	9.2	10.0	9.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.017	0.005	0.006	0.008
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.196	0.192	0.194	0.189	0.186
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.776	0.798	0.790	0.803	0.810
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.973	1.01	0.989	0.998	1.00
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.06	0.06	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.02	0.02	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.0	1.8	1.4	1.8	1.6
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	12	1	NOT DETECTED	10	15

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-011	HK1933344-012	HK1933344-013	HK1933344-014	HK1933344-015
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	11.5	11.7	7.6	7.1	8.3
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.014	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.183	0.182	0.188	0.194	0.221
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.813	0.817	0.790	0.815	0.793
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.996	1.01	0.978	1.01	1.01
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.06	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.04	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	1.8	1.3	1.1	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	7	5	34	29	59

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-016	HK1933344-017	HK1933344-018	HK1933344-019	HK1933344-020
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.1	9.4	9.1	12.0	12.8
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.182	0.182	0.180	0.192	0.198
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.794	0.789	0.798	0.800	0.793
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.976	0.971	0.978	0.992	0.991
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.06	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	1.1	<1.0	1.1	1.1
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	54	30	22	45	53

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-021	HK1933344-022	HK1933344-023	HK1933344-024	HK1933344-025
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	10.2	9.7	8.9	8.5	8.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.194	0.193	0.198	0.218	0.180
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.802	0.810	0.787	0.774	0.751
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.996	1.00	0.985	0.993	0.930
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	1.4	1.7	1.5
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	29	34	24	21	5

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-026	HK1933344-027	HK1933344-028	HK1933344-029	HK1933344-030
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.6	8.5	8.9	9.8	10.6
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.174	0.171	0.167	0.167	0.165
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.724	0.750	0.745	0.713	0.738
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.898	0.921	0.912	0.880	0.903
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.03	0.02	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.0	1.9	1.7	1.9	1.8
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	7	13	11	10	7

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-031	HK1933344-032	HK1933344-033	HK1933344-034	HK1933344-035
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.2	9.5	8.5	8.5	8.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	0.024
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.199	0.220	0.185	0.165	0.219
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.788	0.762	0.801	0.744	0.773
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.987	0.982	0.986	0.909	1.02
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.04	0.03	0.03	0.02	0.01
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	2.7
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	10	14	11	16	12

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-036	HK1933344-037	HK1933344-038	HK1933344-039	HK1933344-040
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.5	8.8	8.1	9.2	9.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.030	<0.005	<0.005	<0.005	0.012
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.217	0.194	0.196	0.216	0.172
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.781	0.724	0.716	0.723	0.748
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.03	0.918	0.912	0.940	0.932
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	<0.01	<0.01	0.01	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	2.6	2.8	2.0	1.4
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	8	11	15	13	9

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-041	HK1933344-042	HK1933344-043	HK1933344-044	HK1933344-045
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.9	10.5	10.5	10.4	9.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.018	<0.005	<0.005	0.018	0.055
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.224	0.216	0.214	0.196	0.217
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.772	0.776	0.712	0.782	0.731
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.01	0.993	0.926	0.996	1.00
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.03	0.01	0.03	0.01
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.0	1.6	1.5	<1.0	1.8
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	12	19	1	NOT DETECTED	14

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-046	HK1933344-047	HK1933344-048	HK1933344-049	HK1933344-050
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.3	7.8	8.1	7.8	7.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.062	0.083	0.094	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.190	0.215	0.190	0.168	0.165
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.718	0.728	0.724	0.748	0.750
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.970	1.02	1.01	0.915	0.915
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.3	2.7	2.8	1.4	1.4
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	9	18	12	NOT DETECTED	NOT DETECTED

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-051	HK1933344-052	HK1933344-053	HK1933344-054	HK1933344-055
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.1	8.3	8.2	7.6	7.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.176	0.180	0.172	0.175	0.170
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.702	0.696	0.735	0.700	0.751
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.879	0.876	0.907	0.875	0.921
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	1.73	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.0	<1.0	1.4	<1.0	1.1
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER			Client sample ID	B/S/F/Dup	B/M/F	B/M/F/Dup	B/B/F	B/B/F/Dup
			Client sampling date / time	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	*CAS Number*	*LOR*	*Unit*	HK1933344-056	HK1933344-057	HK1933344-058	HK1933344-059	HK1933344-060
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	7.7	6.5	6.2	5.6	5.8
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.178	0.183	0.178	0.176	0.160
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.748	0.750	0.745	0.755	0.810
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.926	0.934	0.923	0.931	0.970
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.02	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.3	1.6	1.2	2.4	2.4
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	3	NOT DETECTED	1	2

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-061	HK1933344-062	HK1933344-063	HK1933344-064	HK1933344-065
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.8	6.2	6.8	7.1	9.3
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.173	0.172	0.177	0.171	0.177
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.835	0.828	0.814	0.822	0.790
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	1.01	1.00	0.991	0.993	0.967
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	1.5	1.6	1.4	1.5
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	2	3	3	5	2

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-066	HK1933344-067	HK1933344-068	HK1933344-069	HK1933344-070
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.6	7.8	7.4	9.5	9.8
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.178	0.178	0.177	0.177	0.185
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.798	0.821	0.808	0.761	0.719
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.976	0.999	0.985	0.938	0.904
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	2.4	2.6	2.0	1.1
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	2	3	NOT DETECTED	NOT DETECTED

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-071	HK1933344-072	HK1933344-073	HK1933344-074	HK1933344-075
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	10.7	10.5	8.5	8.9	9.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.178	0.176	0.182	0.176	0.182
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.783	0.809	0.779	0.776	0.762
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.961	0.985	0.961	0.952	0.944
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.3	1.9	1.2	1.2	1.5
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	2	8	5	2

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-076	HK1933344-077	HK1933344-078	HK1933344-079	HK1933344-080
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.5	9.9	9.5	14.8	14.7
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.177	0.180	0.177	0.175	0.179
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.766	0.770	0.761	0.778	0.734
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.943	0.949	0.938	0.953	0.913
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.1	1.0	1.4	1.4	1.3
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	2	3	NOT DETECTED	1

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-081	HK1933344-082	HK1933344-083	HK1933344-084	HK1933344-085
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	12.8	12.4	10.1	10.7	9.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.181	0.174	0.180	0.171	0.178
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.808	0.718	0.793	0.798	0.728
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.989	0.893	0.974	0.970	0.906
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.5	<1.0	2.1	1.8	<1.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	2	1	1	NOT DETECTED	NOT DETECTED

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	*CAS Number*	*LOR*	*Unit*	HK1933344-086	HK1933344-087	HK1933344-088	HK1933344-089	HK1933344-090
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	9.1	8.5	8.5	6.9	6.7
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.179	0.175	0.179	0.173	0.177
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.728	0.732	0.722	0.732	0.731
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.908	0.907	0.902	0.905	0.908
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.05	0.05	0.05
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.03	0.03	0.03	0.03
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	<1.0	1.4	1.1	1.2	1.2
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER			Client sample ID	H/S/F	H/S/F/Dup	H/M/F	H/M/F/Dup	H/B/F
			Client sampling date / time	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933344-091	HK1933344-092	HK1933344-093	HK1933344-094	HK1933344-095
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.3	8.3	8.5	8.6	8.4
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.182	0.180	0.191	0.183	0.186
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.757	0.767	0.740	0.734	0.764
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.939	0.947	0.931	0.917	0.950
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	0.05	0.06	0.06	0.06
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	0.03	0.03	0.03	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.7	1.6	2.2	2.7	2.3
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	NOT DETECTED	1	NOT DETECTED	NOT DETECTED	2

Sub-Matrix: WATER			Client sample ID	H/B/F/Dup	----	----	----	----
			Client sampling date / time	08-Aug-2019	----	----	----	----
Compound	CAS Number	LOR	Unit	HK1933344-096	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	8.5	----	----	----	----
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.011	----	----	----	----
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.175	----	----	----	----
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.742	----	----	----	----
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.928	----	----	----	----
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.05	----	----	----	----
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	----	----	----	----
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.6	----	----	----	----
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	----	----	----	----

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: 2515073)								
HK1933344-001	A/S/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	8.8	8.7	1.15
HK1933344-011	B/B/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	11.5	12.0	3.84
EA/ED: Physical and Aggregate Properties (QC Lot: 2515074)								
HK1933344-021	D/M/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	10.2	9.8	4.02
HK1933344-031	F/S/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	9.2	9.4	2.70
EA/ED: Physical and Aggregate Properties (QC Lot: 2515075)								
HK1933344-041	G/B/E	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	9.9	10.2	3.47
HK1933344-051	A/M/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	8.1	7.9	2.18
EA/ED: Physical and Aggregate Properties (QC Lot: 2515076)								
HK1933344-061	C/S/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	5.8	5.5	4.90
HK1933344-071	D/B/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	10.7	10.4	2.37
EA/ED: Physical and Aggregate Properties (QC Lot: 2515077)								
HK1933344-081	F/M/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	12.8	12.4	3.58
HK1933344-091	H/S/F	**EA025: Suspended Solids (SS)**	----	0.5	mg/L	8.3	8.1	3.05
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516188)								
HK1933344-020	D/S/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	<0.005	<0.005	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516190)								
HK1933344-060	B/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	<0.005	<0.005	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516191)								
HK1933344-080	F/S/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	<0.005	<0.005	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516192)								
HK1933344-090	G/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	<0.005	<0.005	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516356)								
HK1933344-020	D/S/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.198	0.200	0.804
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516358)								
HK1933344-040	G/M/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.172	0.165	4.15
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516360)								
HK1933344-060	B/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.160	0.165	2.77
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516362)								
HK1933344-080	F/S/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.179	0.176	2.03

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: 2516364)								
HK1933344-090	G/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.177	0.180	1.73
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516820)								
HK1933344-020	D/S/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516821)								
HK1933344-020	D/S/E/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516822)								
HK1933344-040	G/M/E/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516823)								
HK1933344-040	G/M/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516824)								
HK1933344-060	B/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516825)								
HK1933344-060	B/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516826)								
HK1933344-080	F/S/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516827)								
HK1933344-080	F/S/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516828)								
HK1933344-090	G/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.05	0.05	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516829)								
HK1933344-090	G/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.03	0.03	0.00

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

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			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: 2515073)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	106	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 2515074)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	94.5	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 2515075)											

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: 2515075) - Continued											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	102	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 2515076)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	108	----	85	115	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 2515077)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	95.5	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516188)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	109	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516189)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	104	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516190)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	108	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516191)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	98.2	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516192)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.05 mg/L	109	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516356)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	102	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516358)											
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: 2516360)											
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: 2516362)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	104	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516364)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	98.8	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516820)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	94.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516821)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	97.8	----	94	101	----	----

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: 2516822)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	99.2	----	94	101	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516823)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	95.3	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516824)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	97.8	----	94	101	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516825)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	98.6	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516826)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.0	----	94	101	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516827)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	97.0	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516828)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.3	----	94	101	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516829)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.9	----	85	115	----	----
EP: Aggregate Organics (QC Lot: 2515206)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	97.4	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 2515207)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	106	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 2515208)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	94.8	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 2515209)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	97.9	----	81	115	----	----
EP: Aggregate Organics (QC Lot: 2515210)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	93.9	----	81	115	----	----

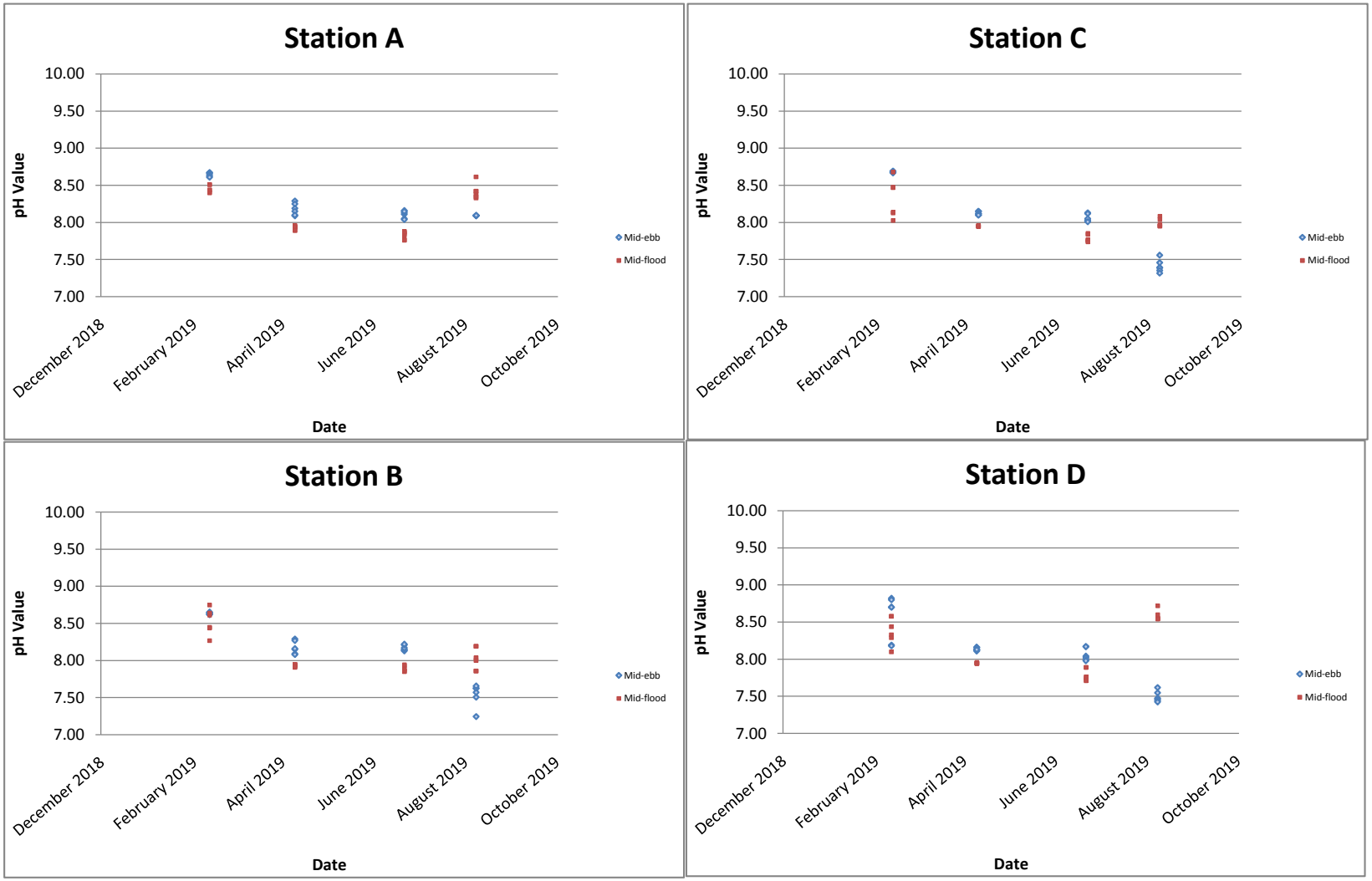
Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

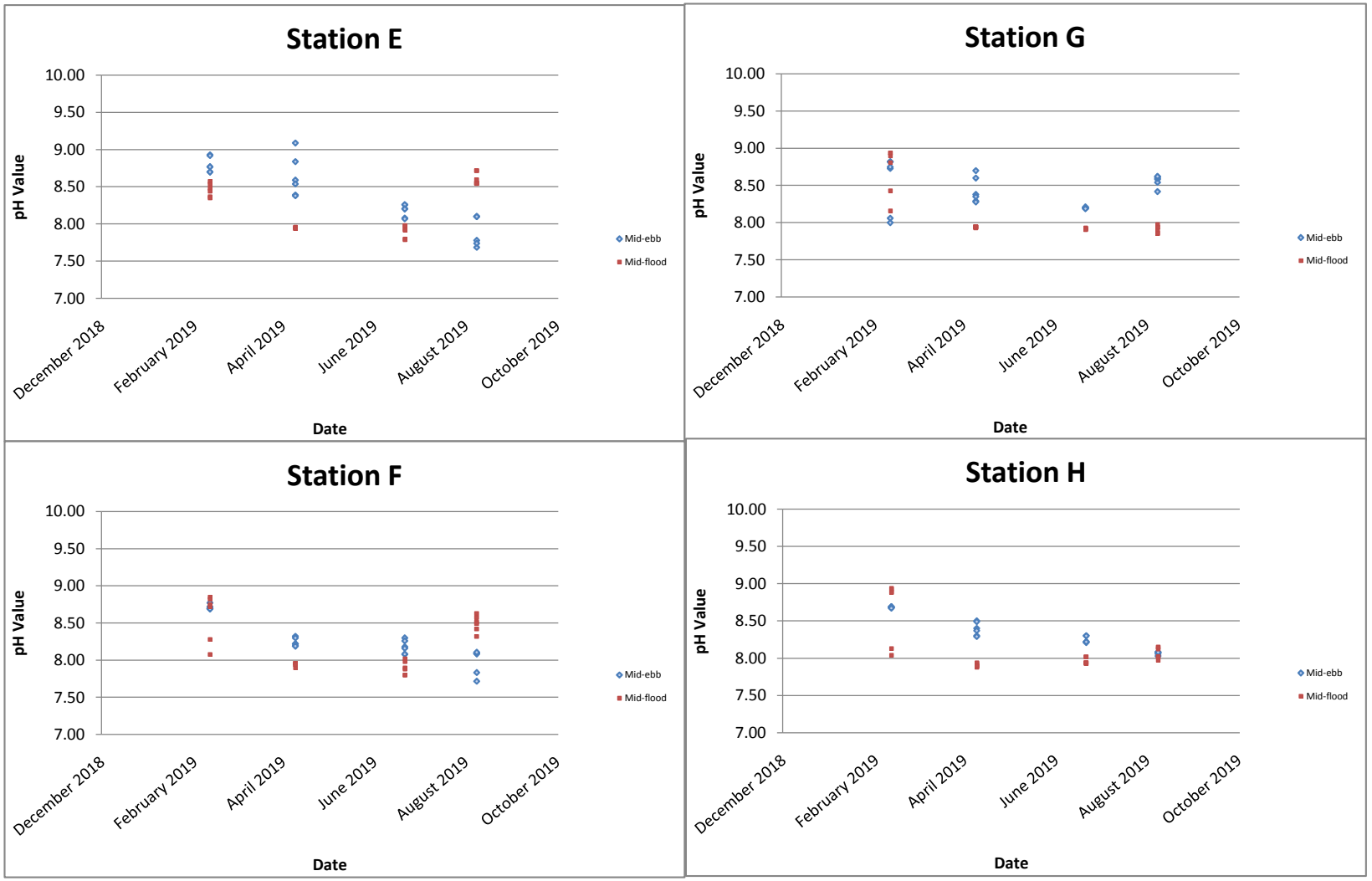
Matrix: **WATER**

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: 2516188)										
HK1933344-020	D/S/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	94.5	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516189)										
HK1933344-040	G/M/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	91.6	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516190)										
HK1933344-060	B/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	87.6	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516191)										
HK1933344-080	F/S/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	95.3	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516192)										
HK1933344-090	G/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	88.9	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516356)										
HK1933344-020	D/S/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	102	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516358)										
HK1933344-040	G/M/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	109	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516360)										
HK1933344-060	B/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	113	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516362)										
HK1933344-080	F/S/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	111	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516364)										
HK1933344-090	G/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	104	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516820)										
HK1933344-020	D/S/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	89.2	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516821)										

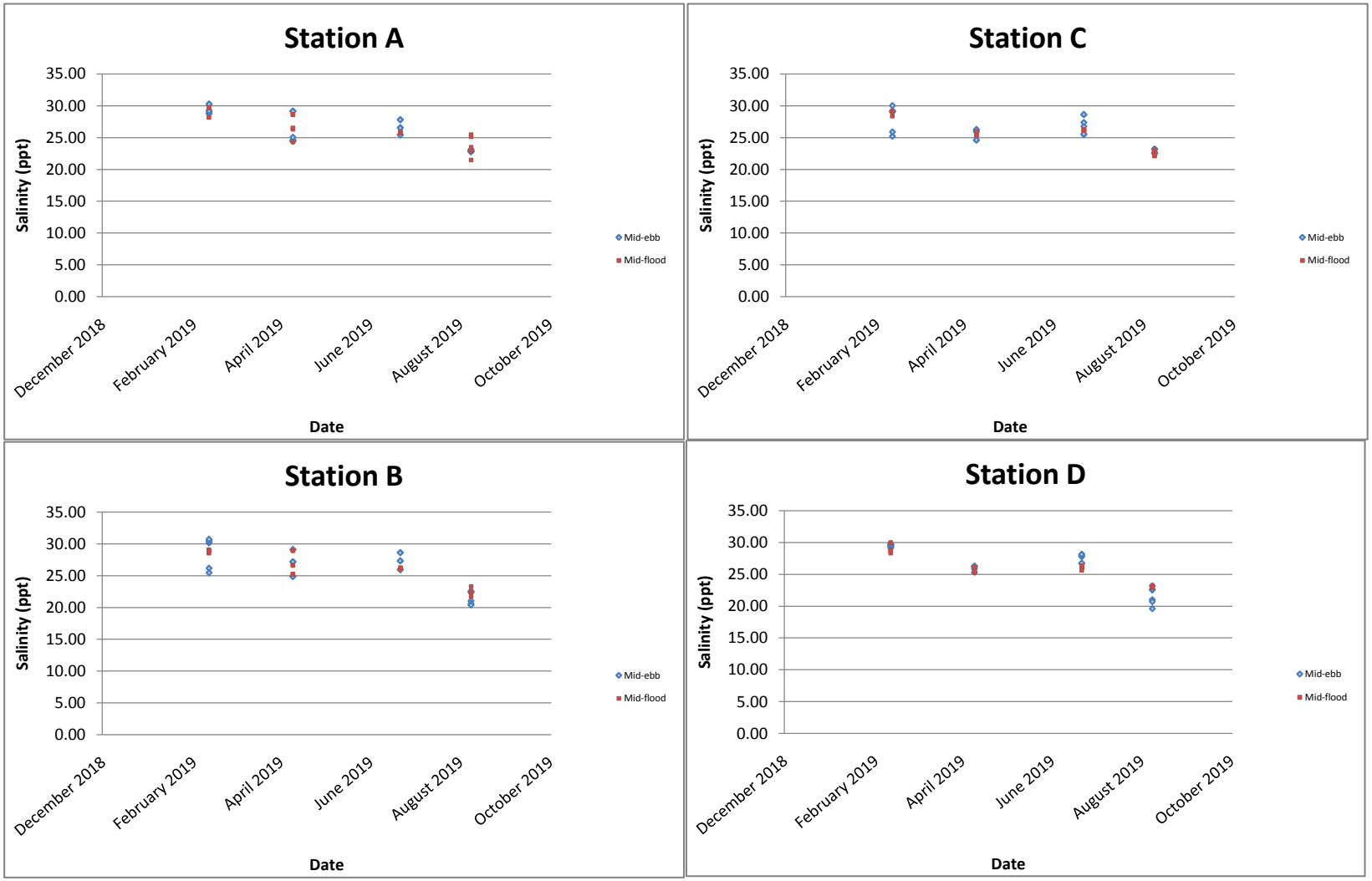
Matrix: **WATER**

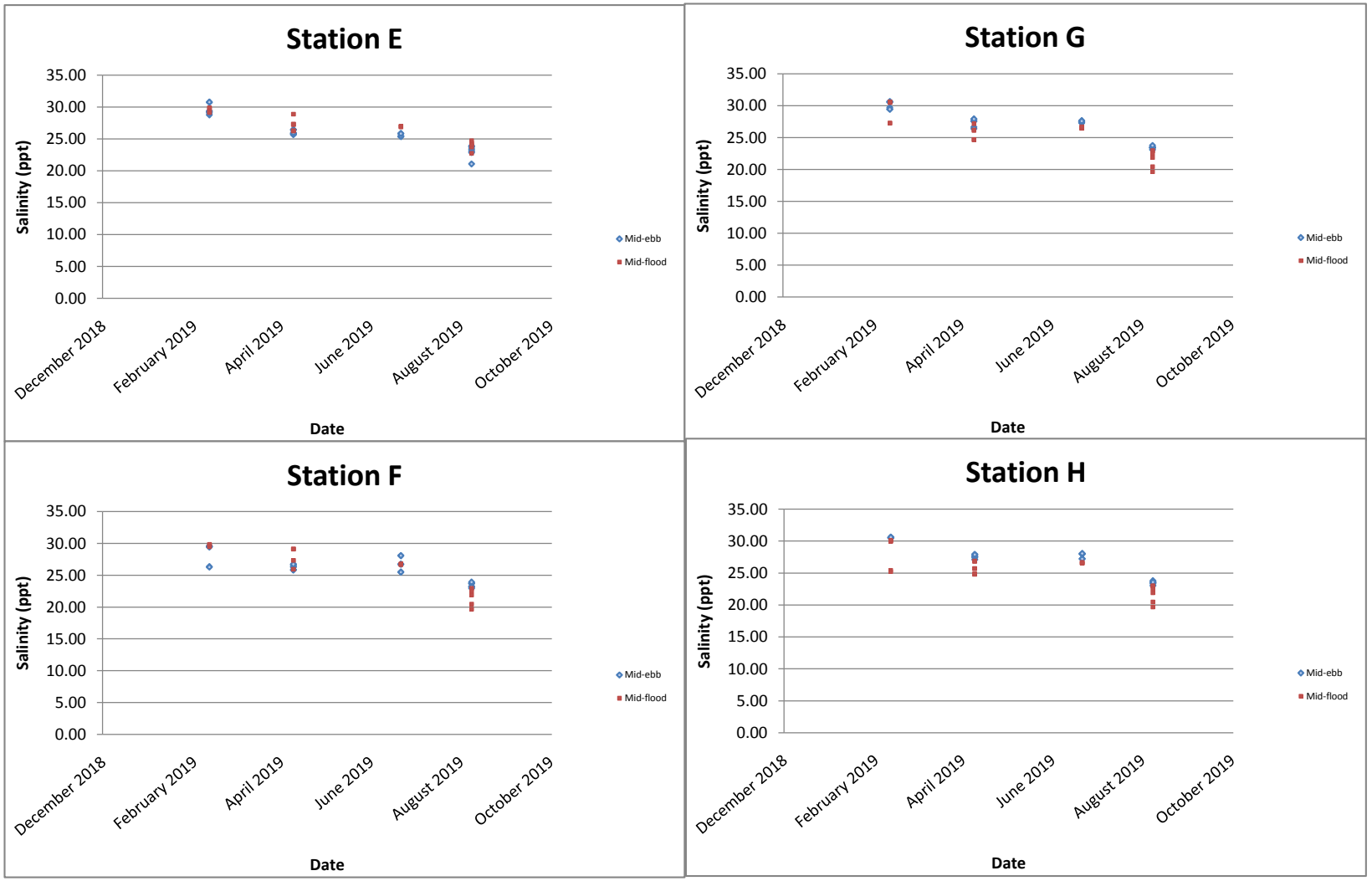
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516821) - Continued										
HK1933344-020	D/S/E/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	92.5	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516822)										
HK1933344-040	G/M/E/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	90.7	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516823)										
HK1933344-040	G/M/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	86.2	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516824)										
HK1933344-060	B/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	90.3	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516825)										
HK1933344-060	B/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	87.1	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516826)										
HK1933344-080	F/S/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	91.1	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516827)										
HK1933344-080	F/S/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	90.5	----	75	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516828)										
HK1933344-090	G/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	87.8	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2516829)										
HK1933344-090	G/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	89.7	----	75	125	----	25

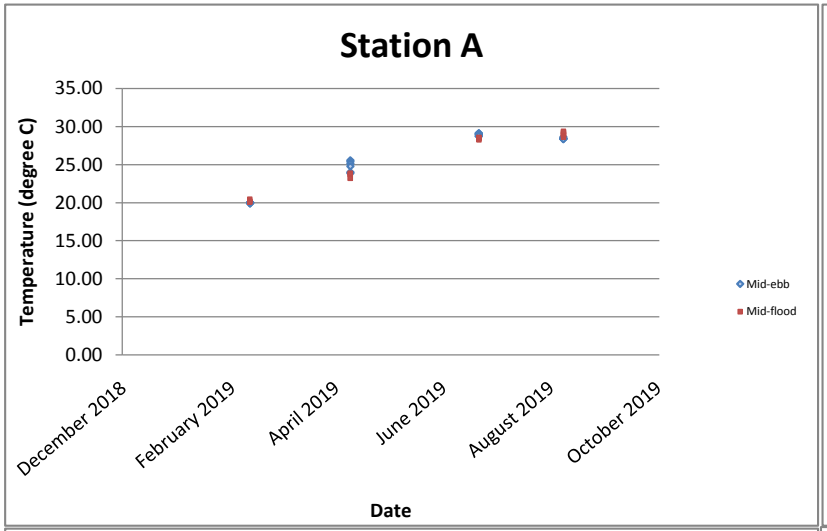

Station A
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station C
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station B
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station D
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

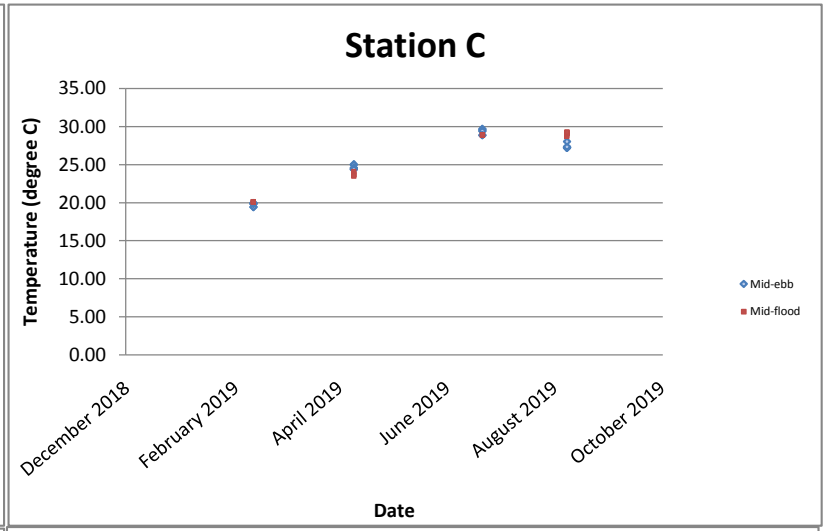

Station E
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station G
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station F
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station H
10.00
9.50
9.00
8.50
8.00
7.50
7.00
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

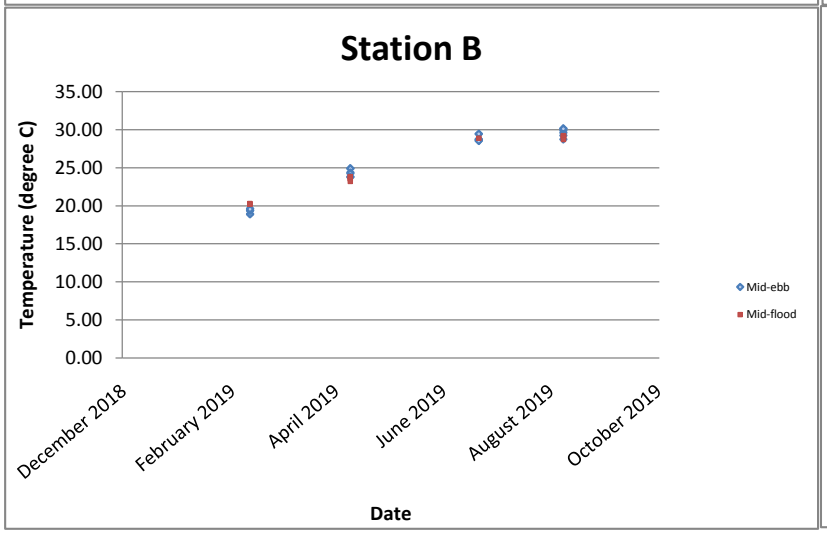
Salinity (ppt)

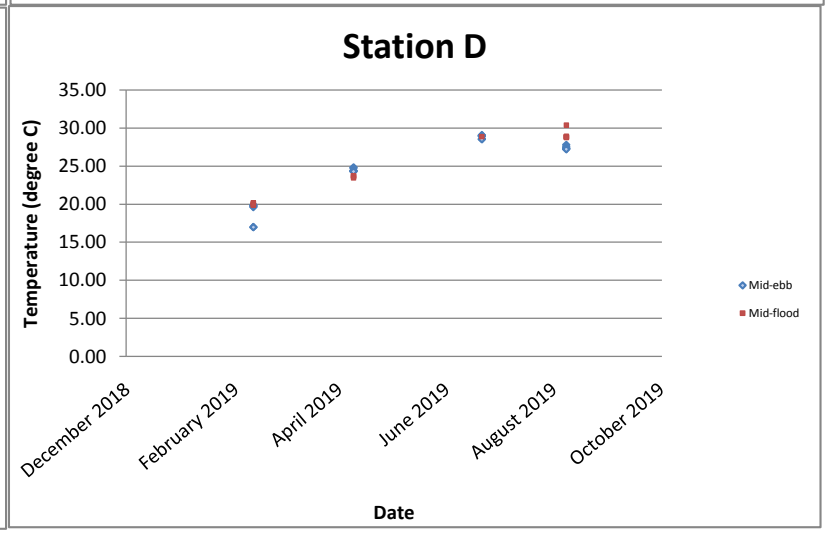


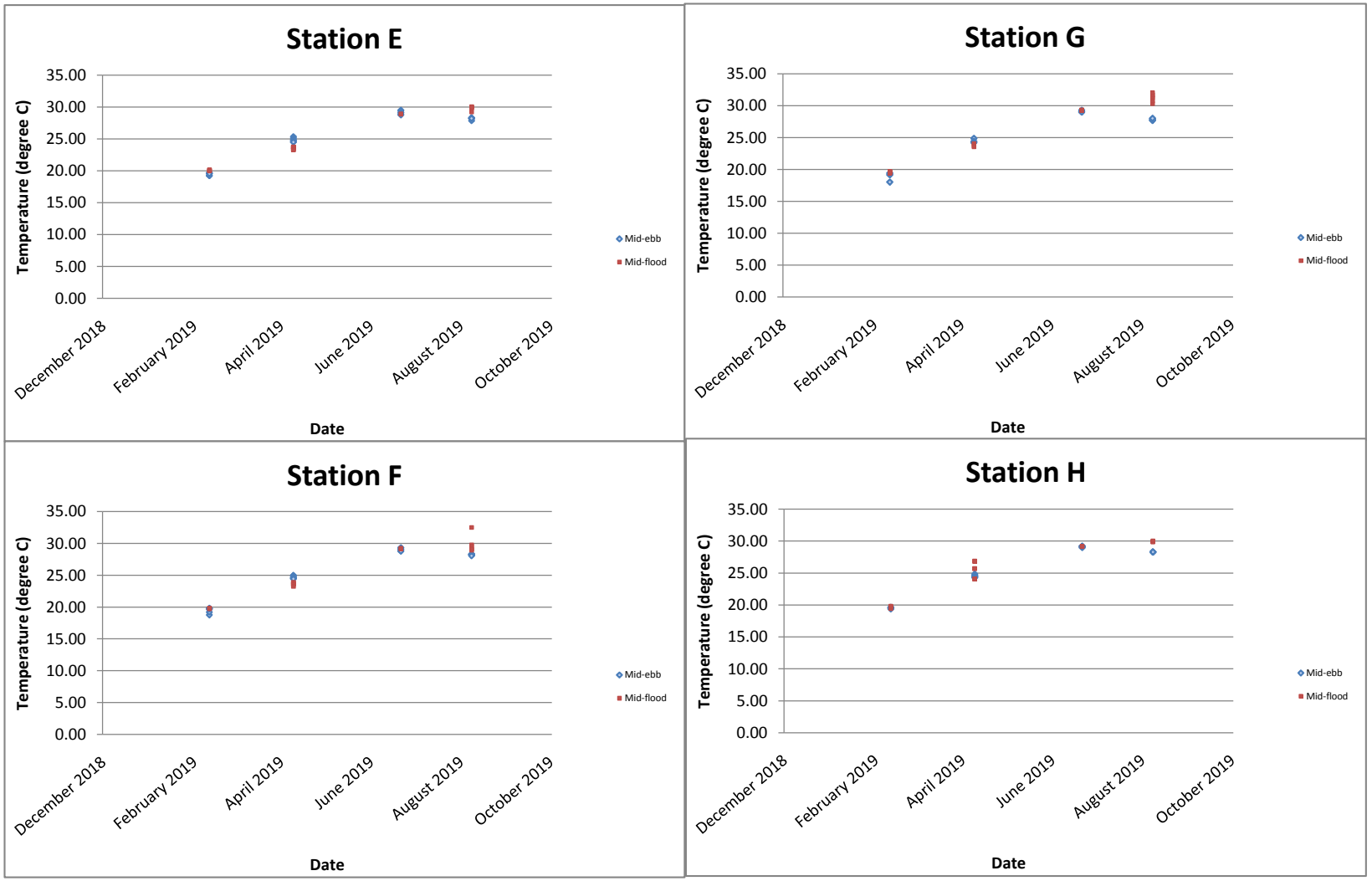

Station E
Salinity (ppt)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station G
Salinity (ppt)
Date
Mid-ebb
Mid-flood
Station F
Salinity (ppt)
Date
Mid-ebb
Mid-flood
Station H
Salinity (ppt)
Date
Mid-ebb
Mid-flood

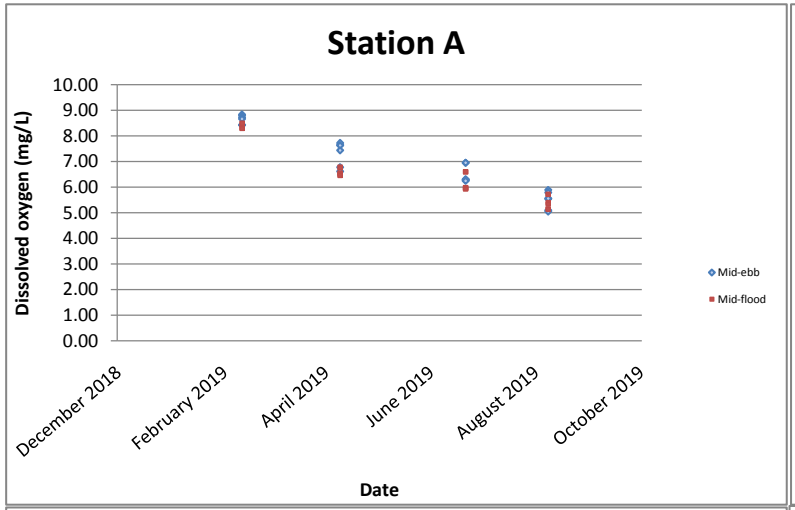

Station A
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

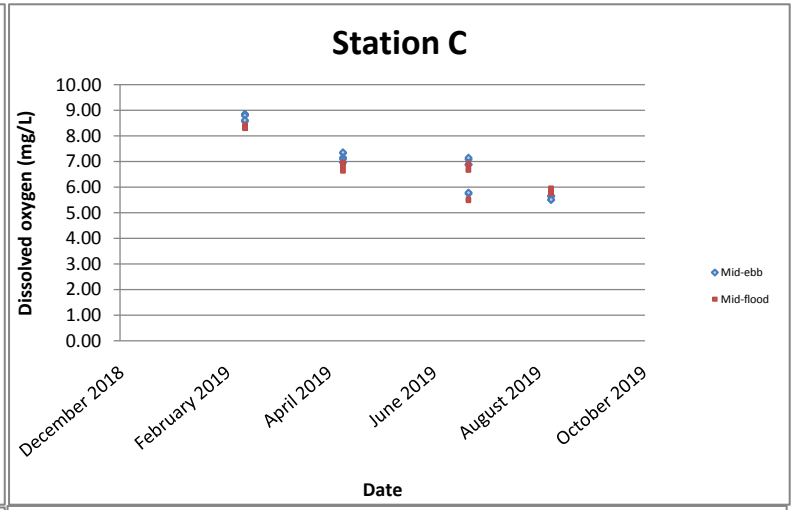

Station C
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

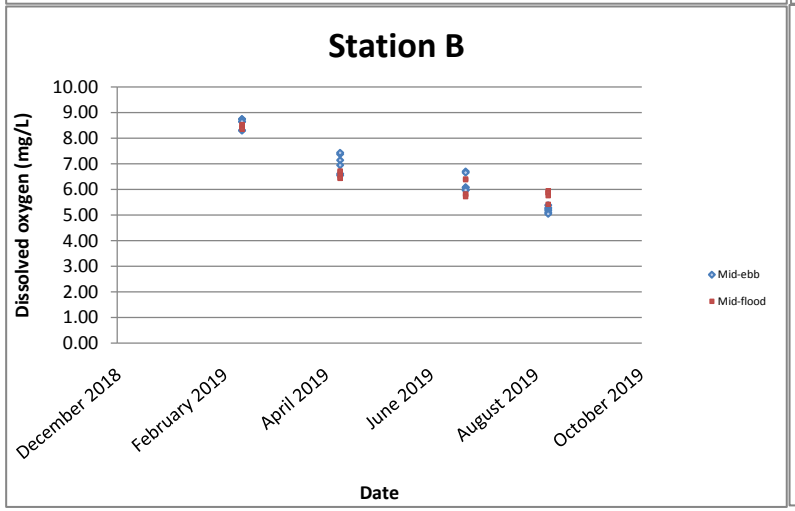

Station B
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

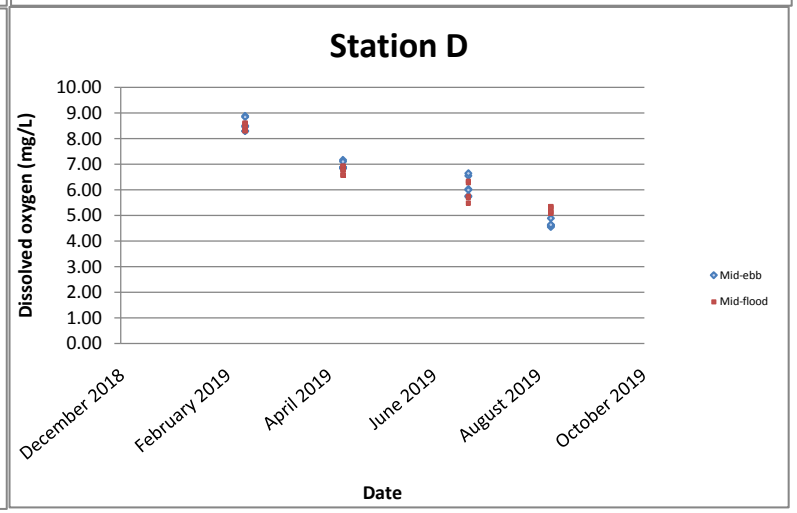

Station D
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

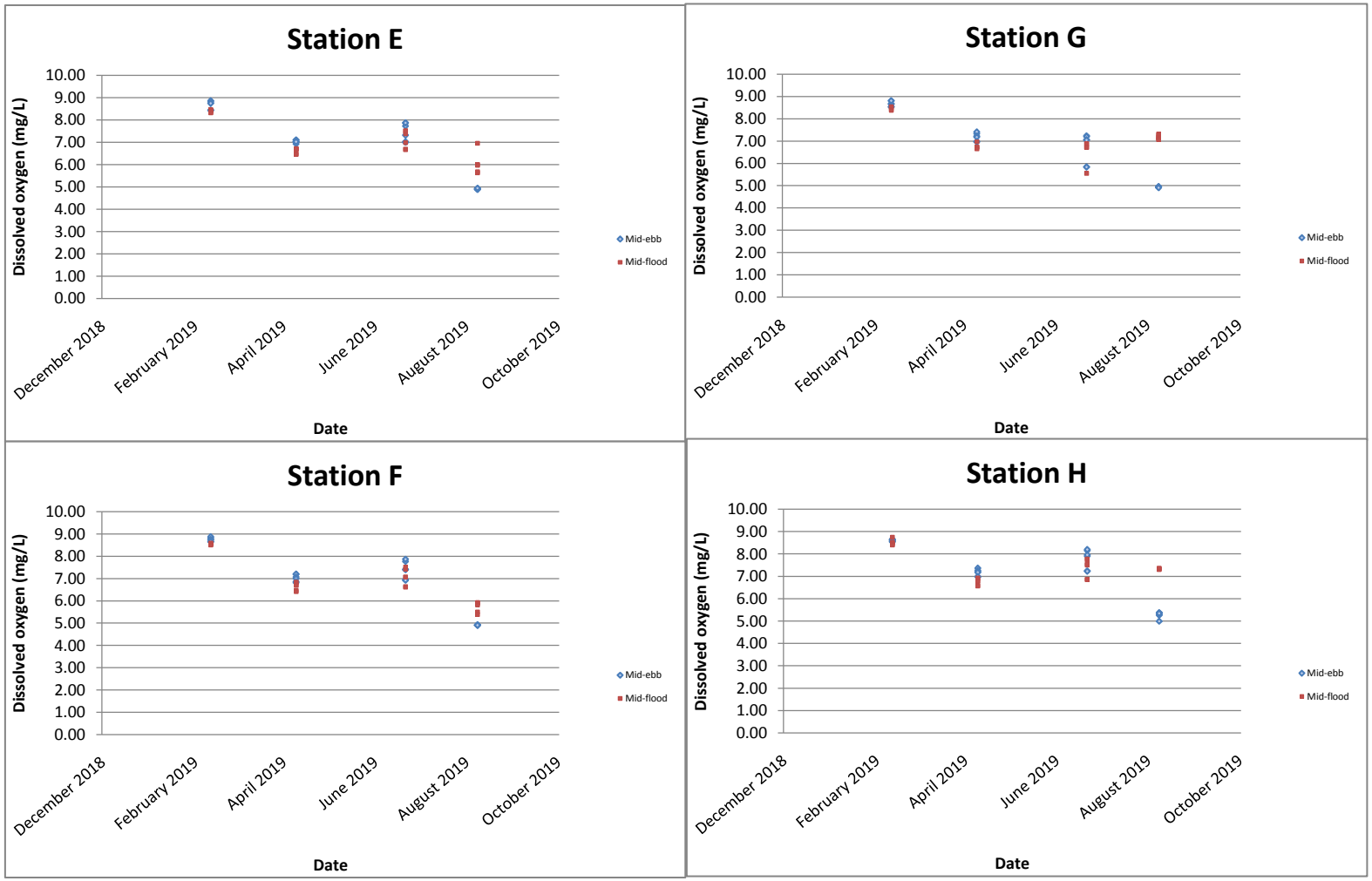

Station E
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station G
Temperature (degree C)
Date
Mid-ebb
Mid-flood
Station F
Temperature (degree C)
Date
Mid-ebb
Mid-flood
Station H
Temperature (degree C)
Date
Mid-ebb
Mid-flood

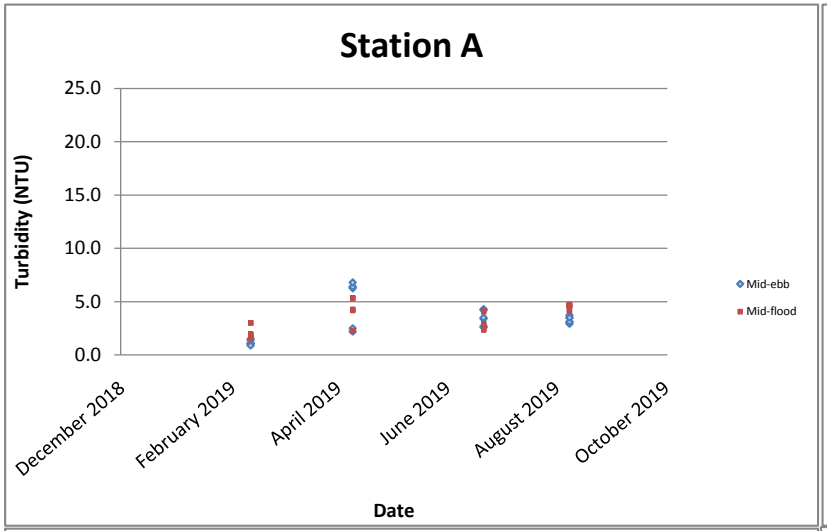

Station A
Dissolved oxygen (mg/L)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

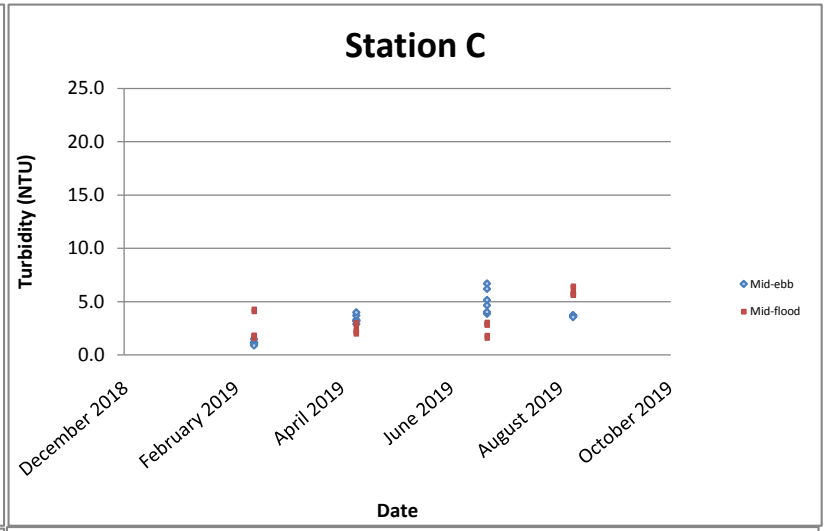

Station C
Dissolved oxygen (mg/L)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

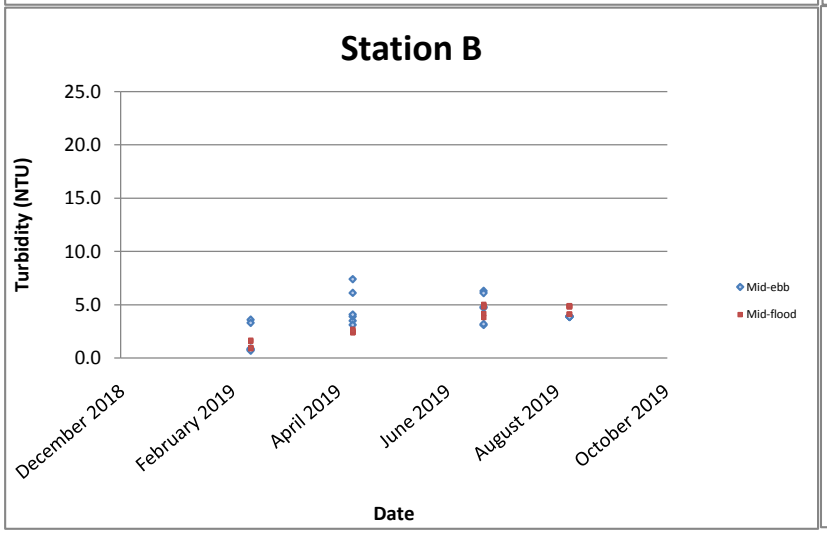

Station B
Dissolved oxygen (mg/L)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

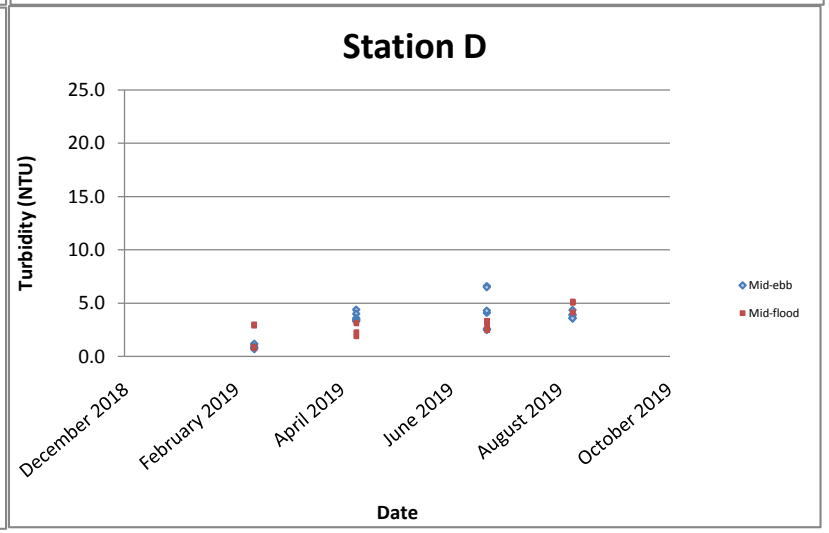

Station D
Dissolved oxygen (mg/L)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

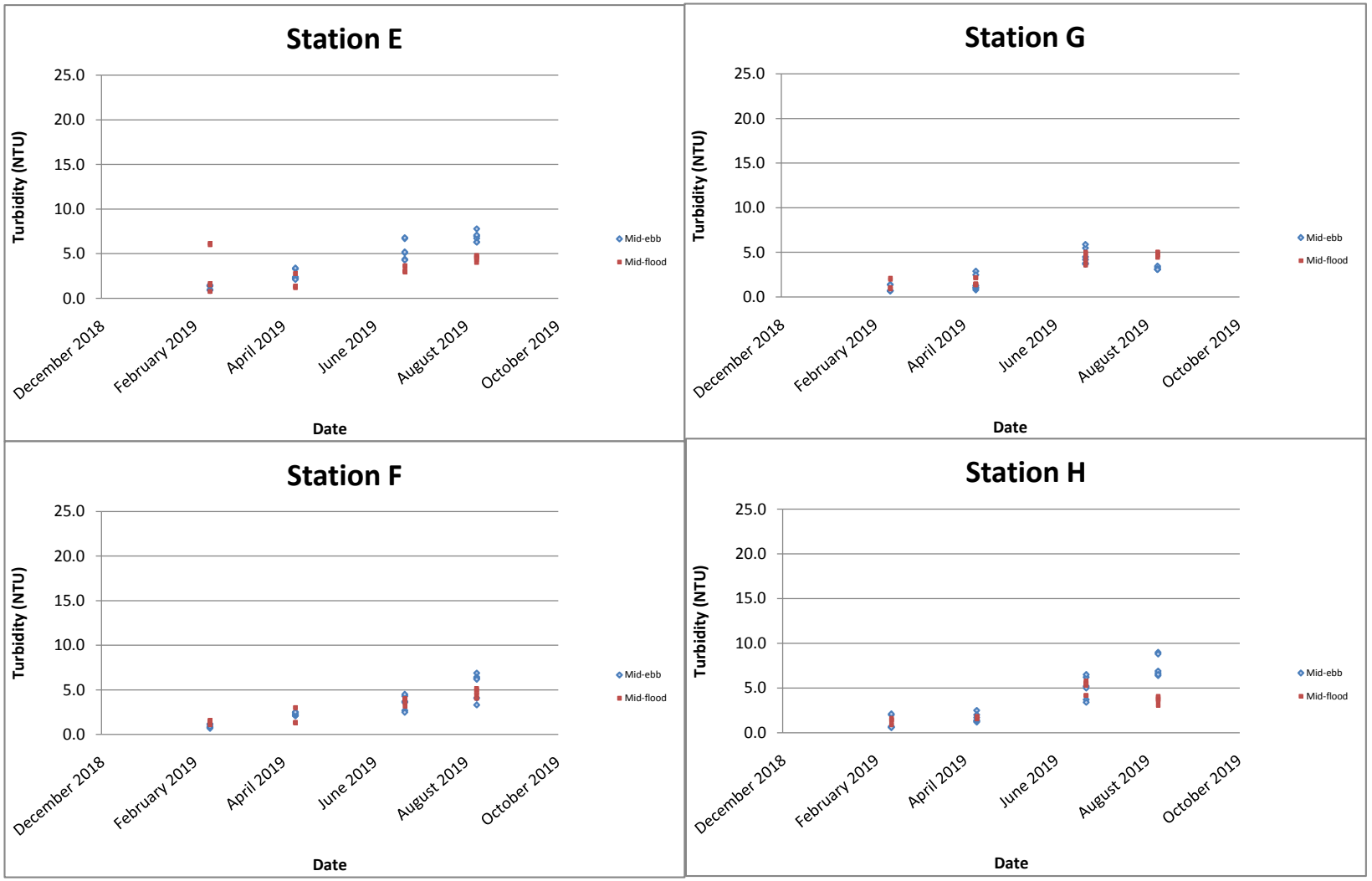

Station E
Dissolved oxygen (mg/L)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station G
Dissolved oxygen (mg/L)
Date
Mid-ebb
Mid-flood
Station F
Dissolved oxygen (mg/L)
Date
Mid-ebb
Mid-flood
Station H
Dissolved oxygen (mg/L)
Date
Mid-ebb
Mid-flood

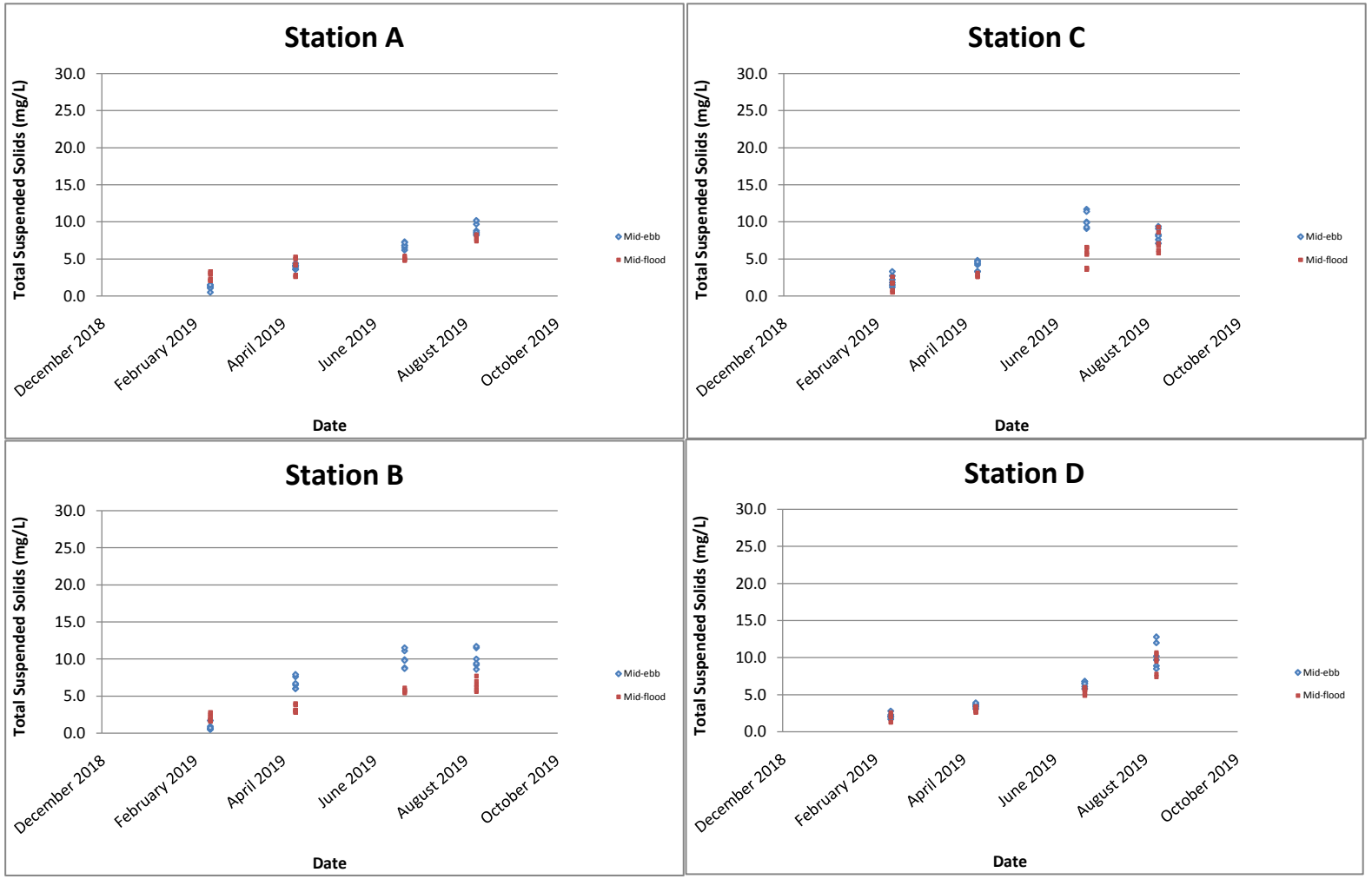

Station A
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood


Station C
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

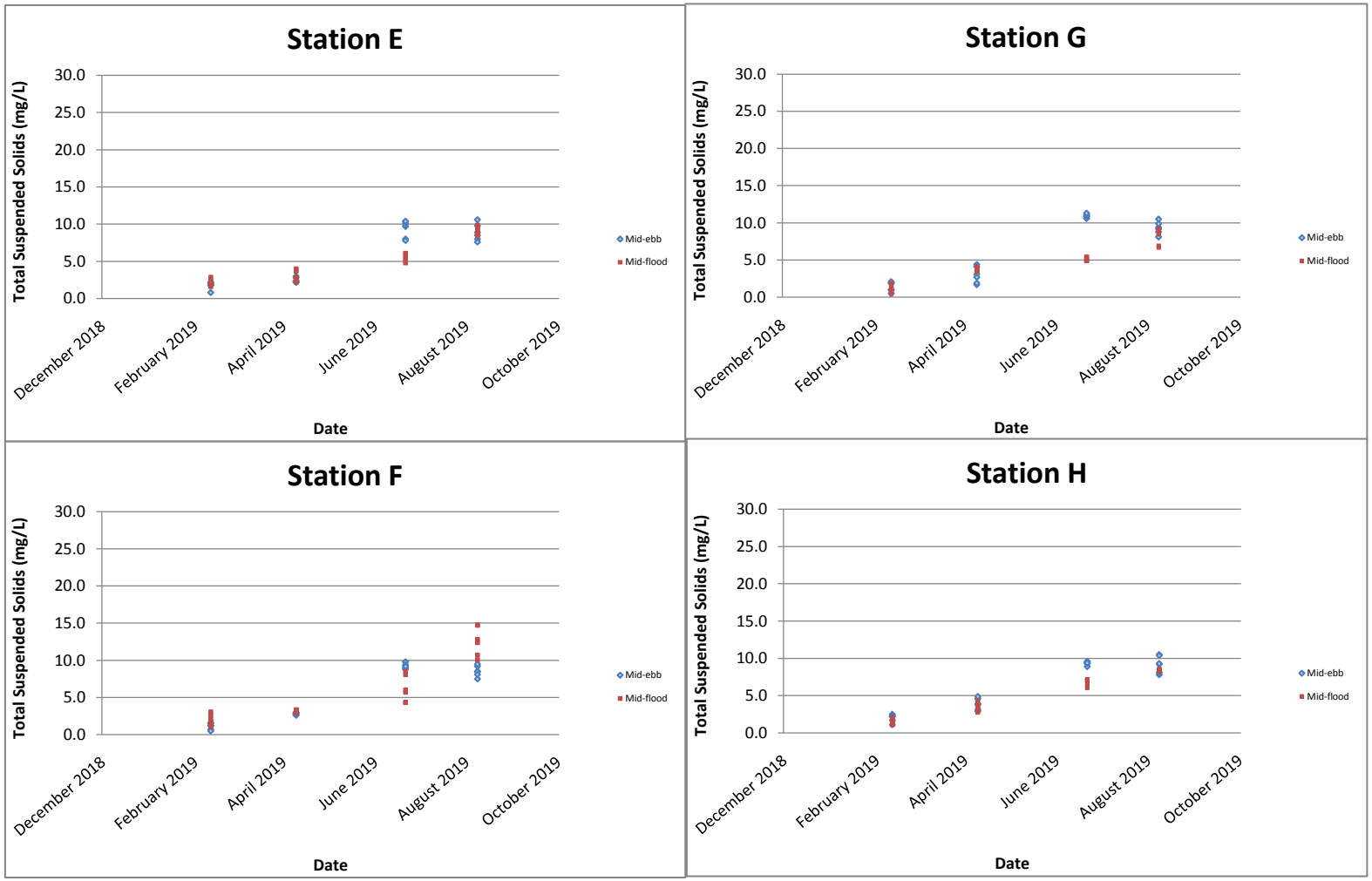

Station B
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood


Station D
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood


Station E
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station G
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station F
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood
Station H
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Mid-ebb
Mid-flood

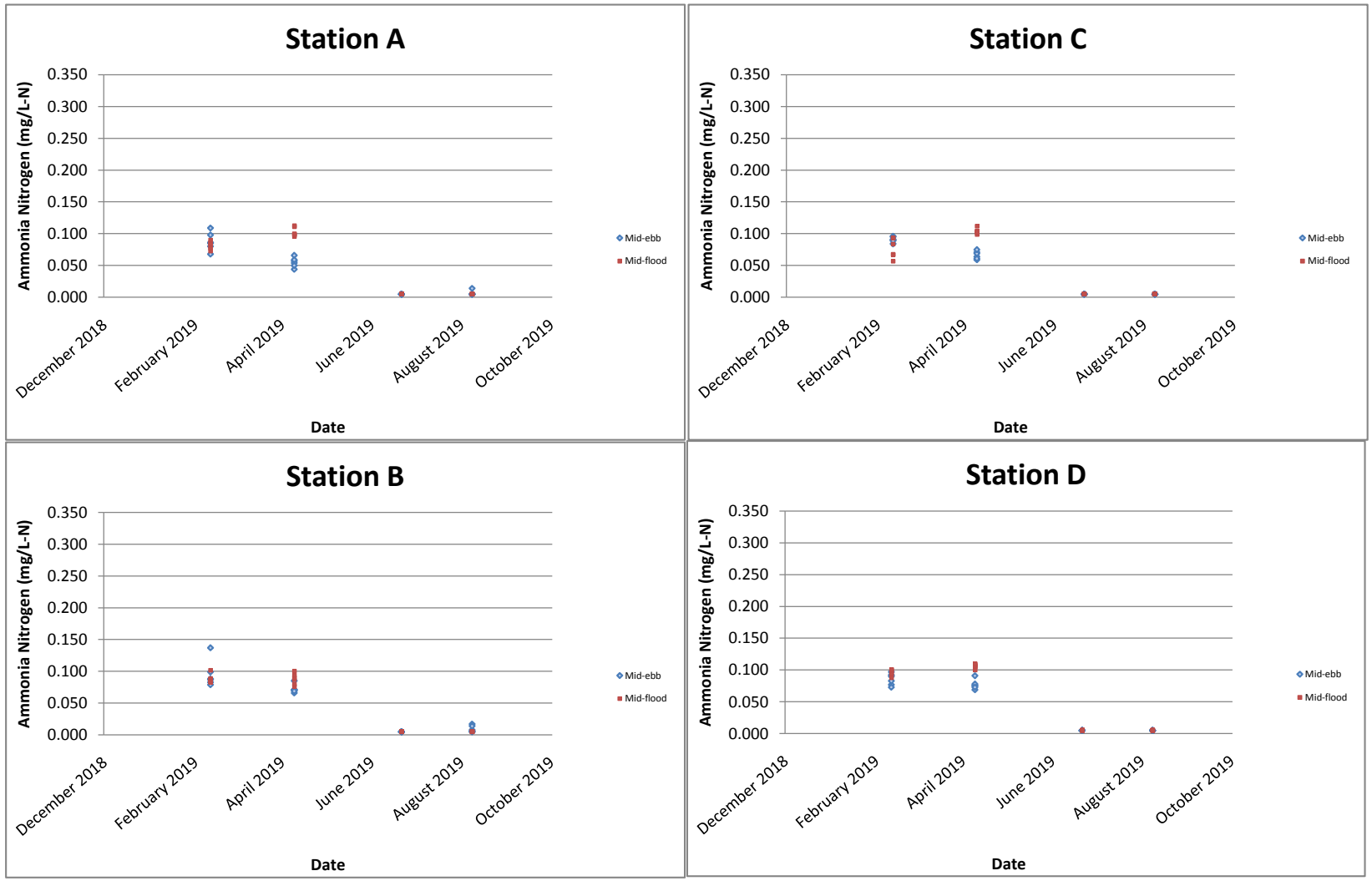


Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

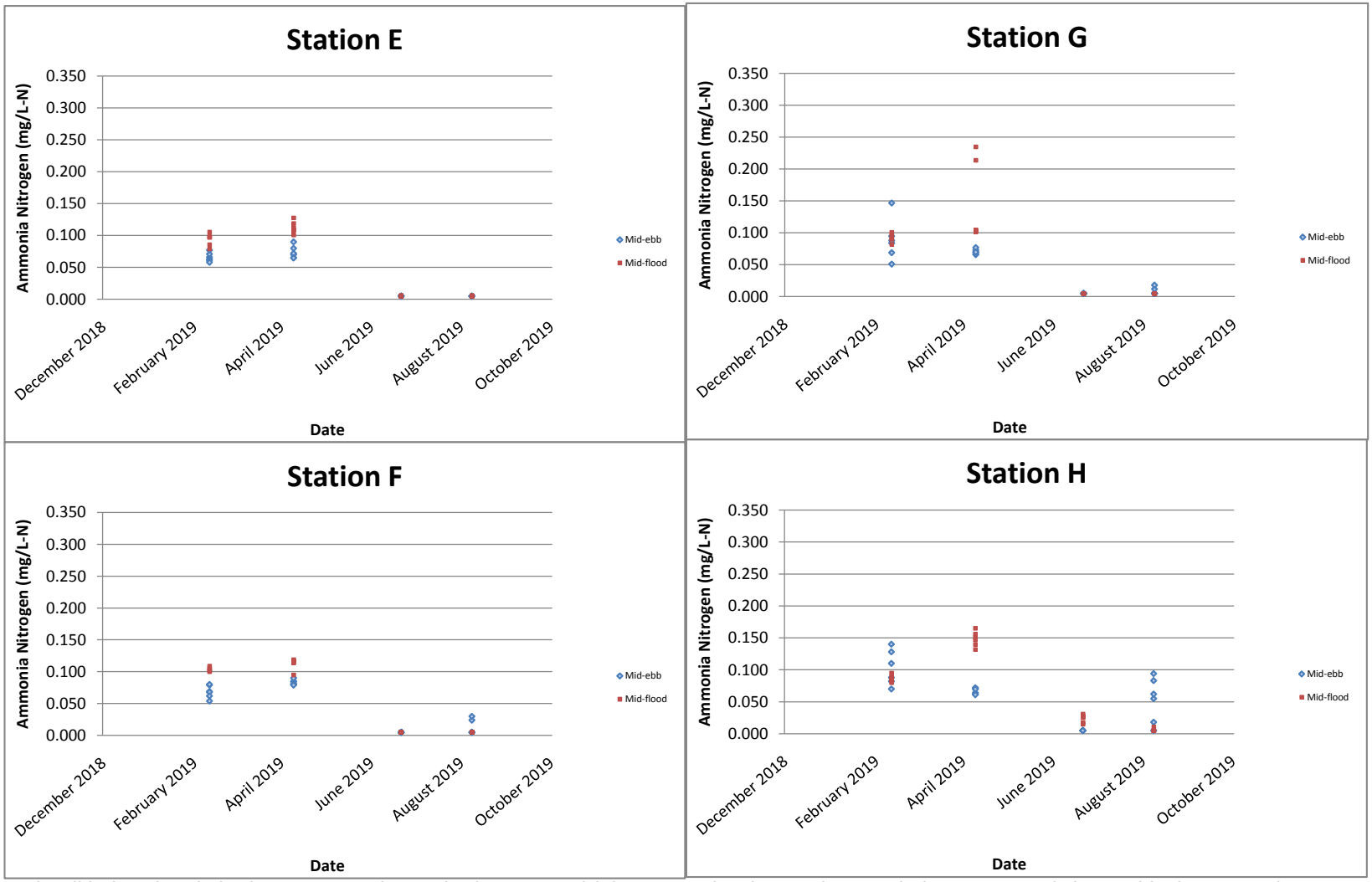


Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

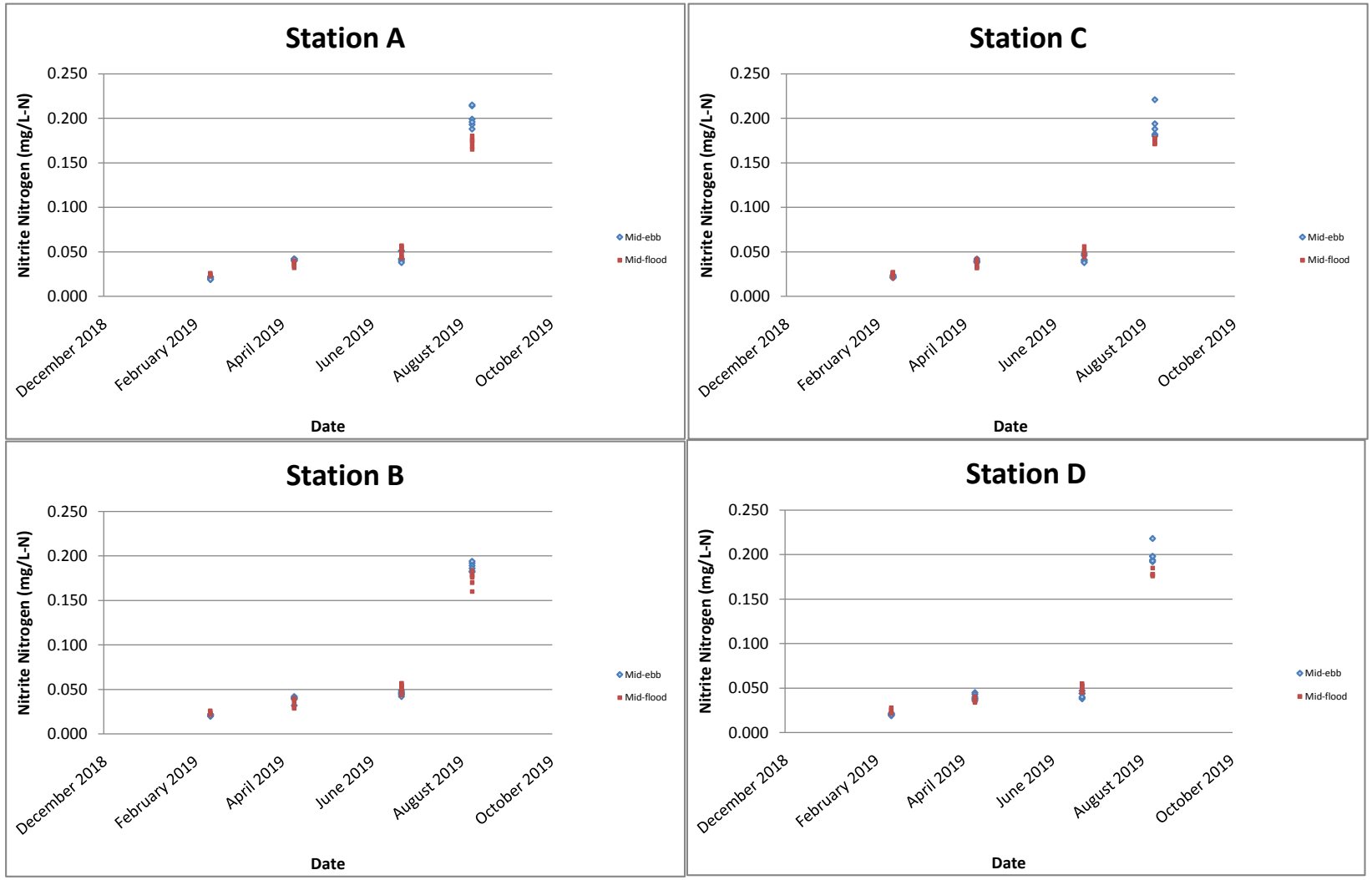
Ammonia Nitrogen (mg/L-N)



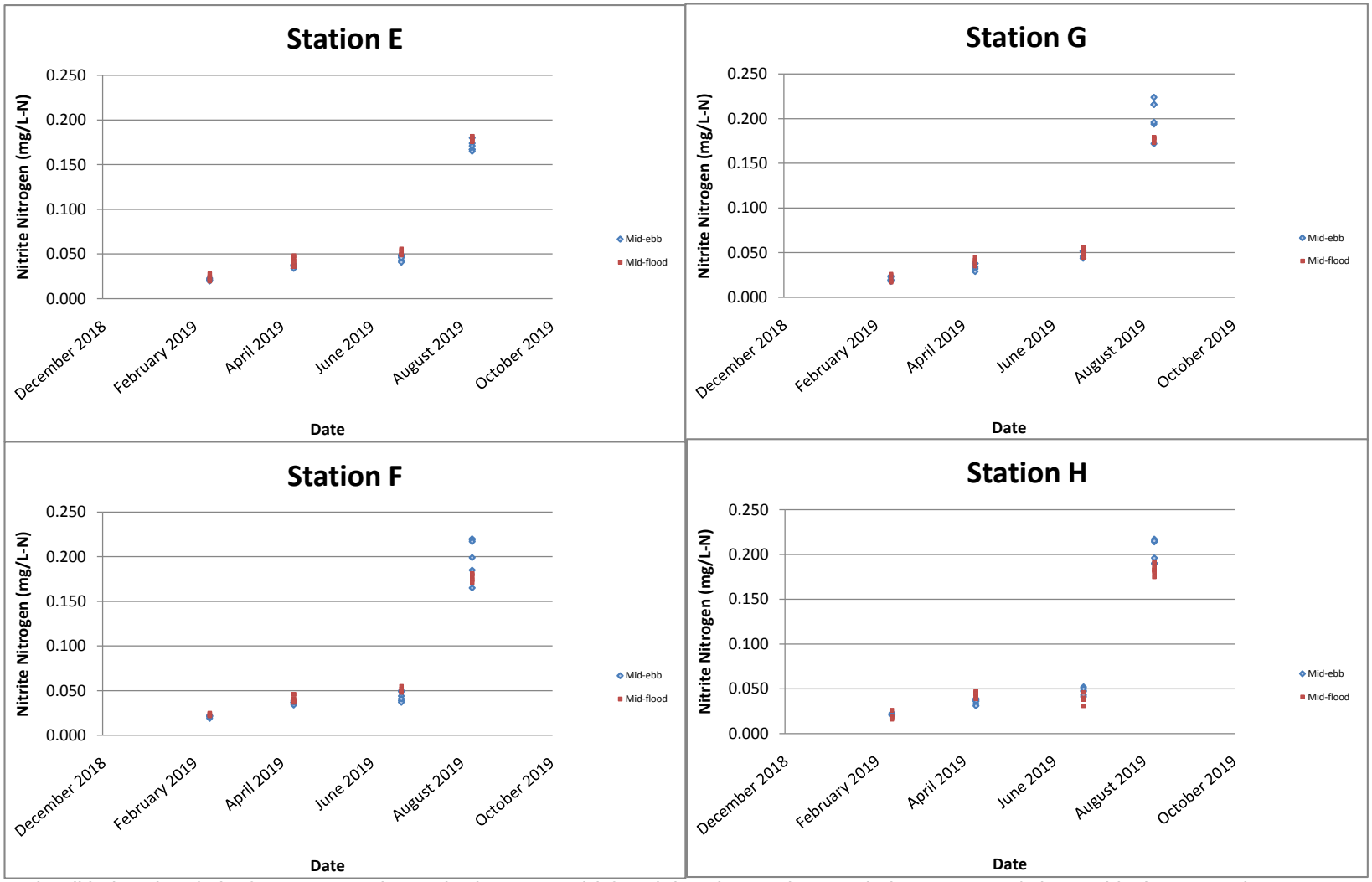
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Ammonia Nitrogen is regarded as 0.005 mg/L in graphical presentation.



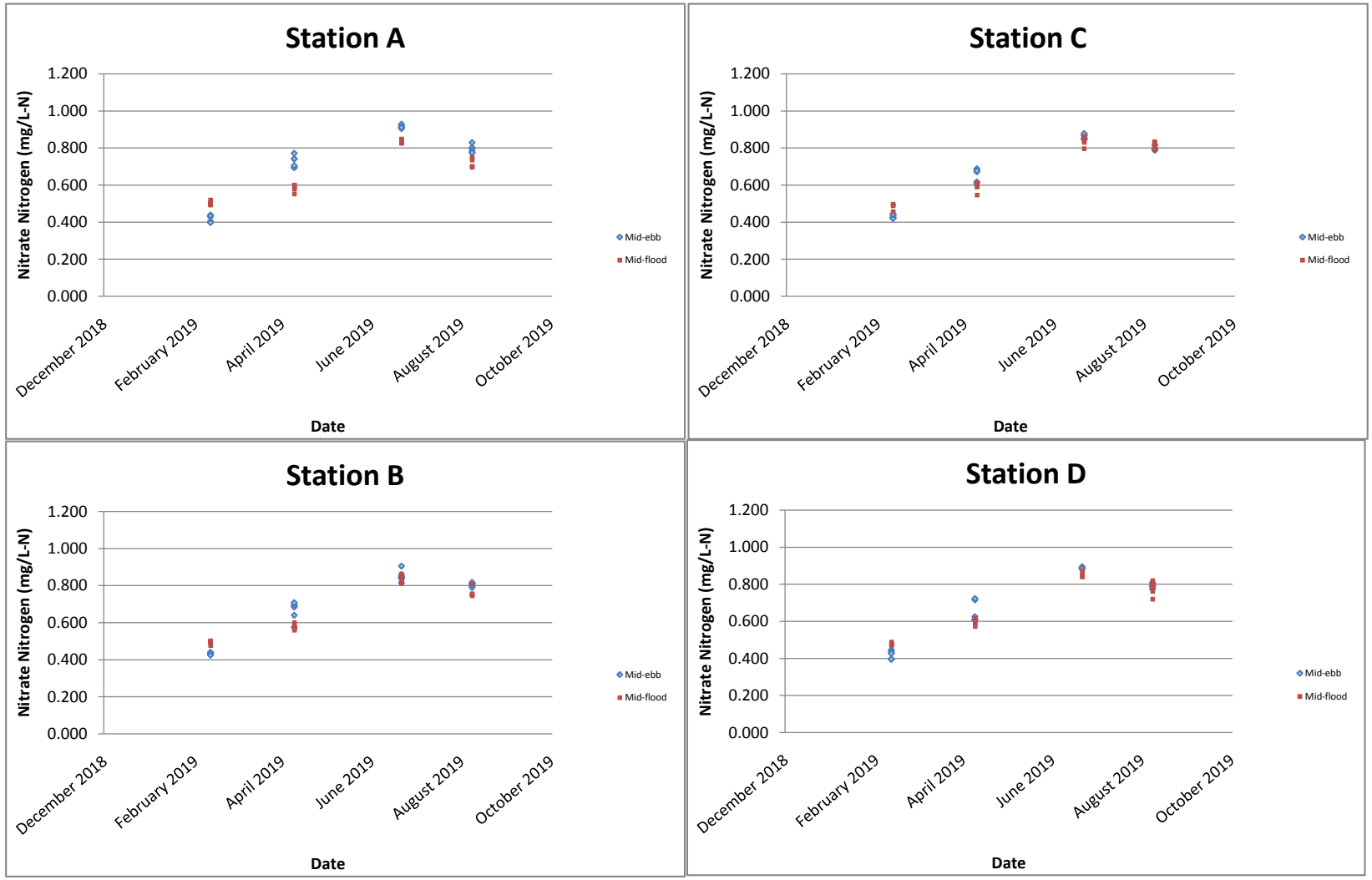
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Ammonia Nitrogen is regarded as 0.005 mg/L in graphical presentation.



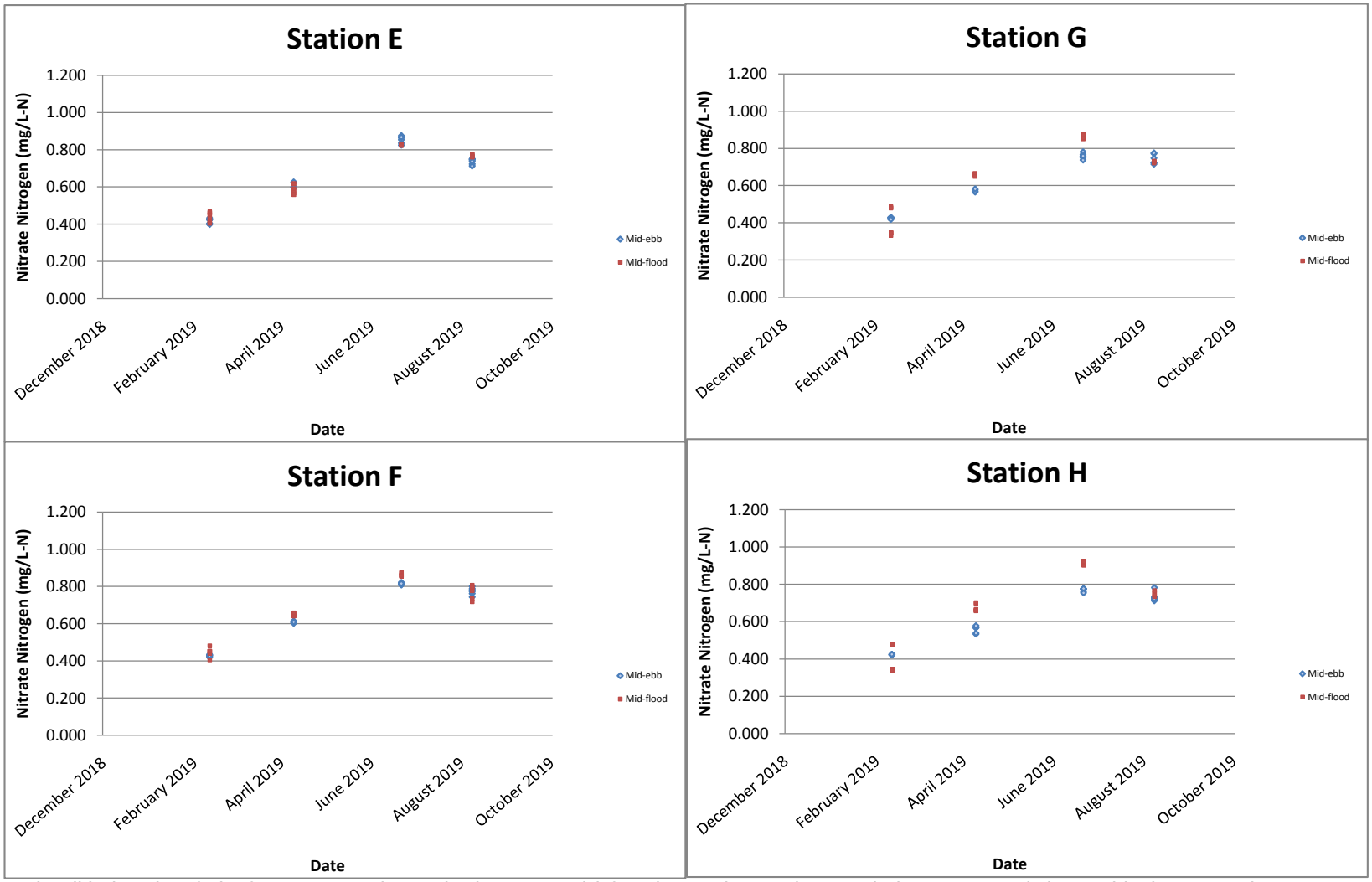
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrite Nitrogen is regarded as 0.005 mg/L in graphical presentation.



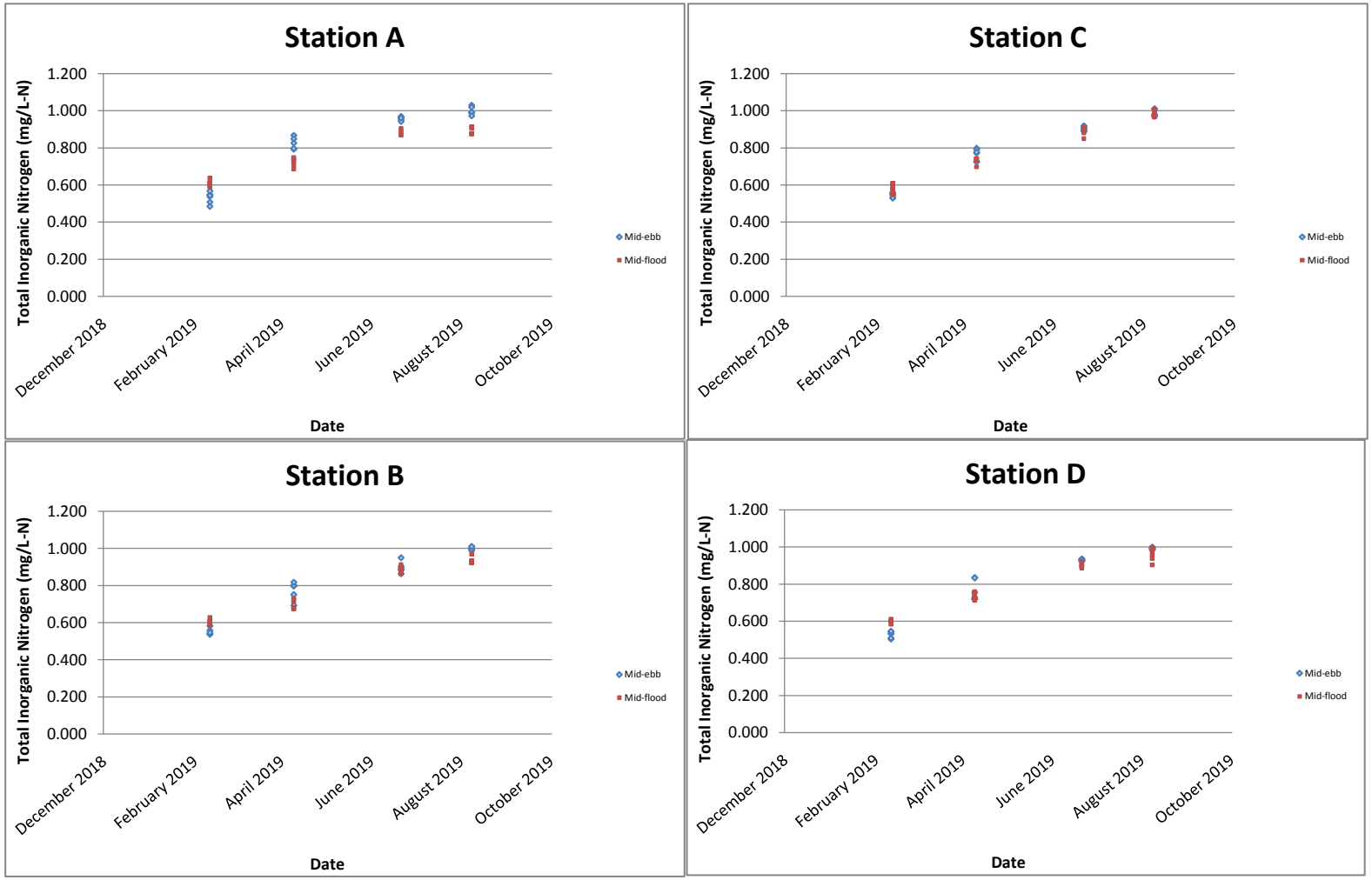
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrite Nitrogen is regarded as 0.005 mg/L in graphical presentation.



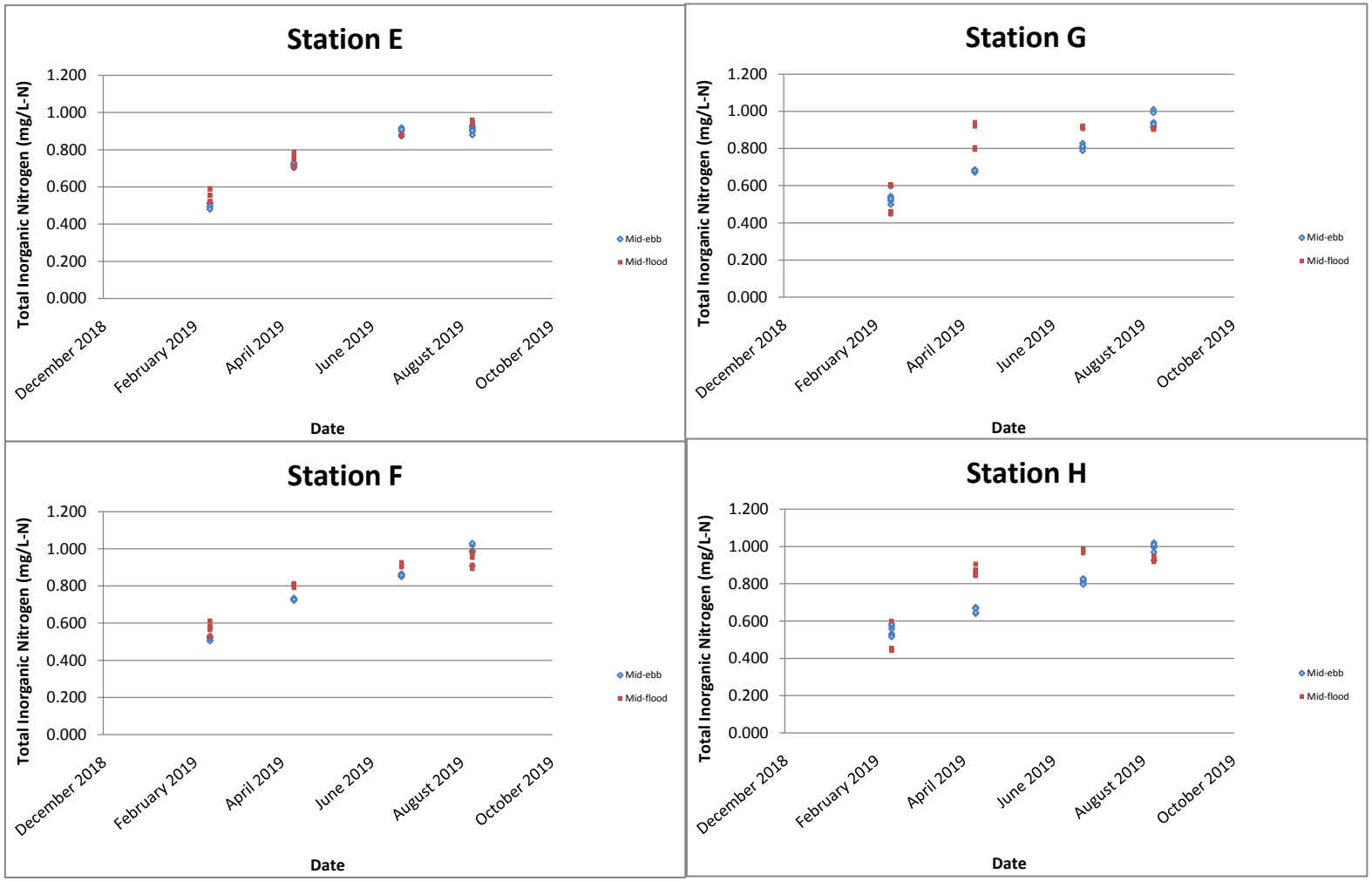
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrate Nitrogen is regarded as 0.005 mg/L in graphical presentation.



Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrate Nitrogen is regarded as 0.005 mg/L in graphical presentation.

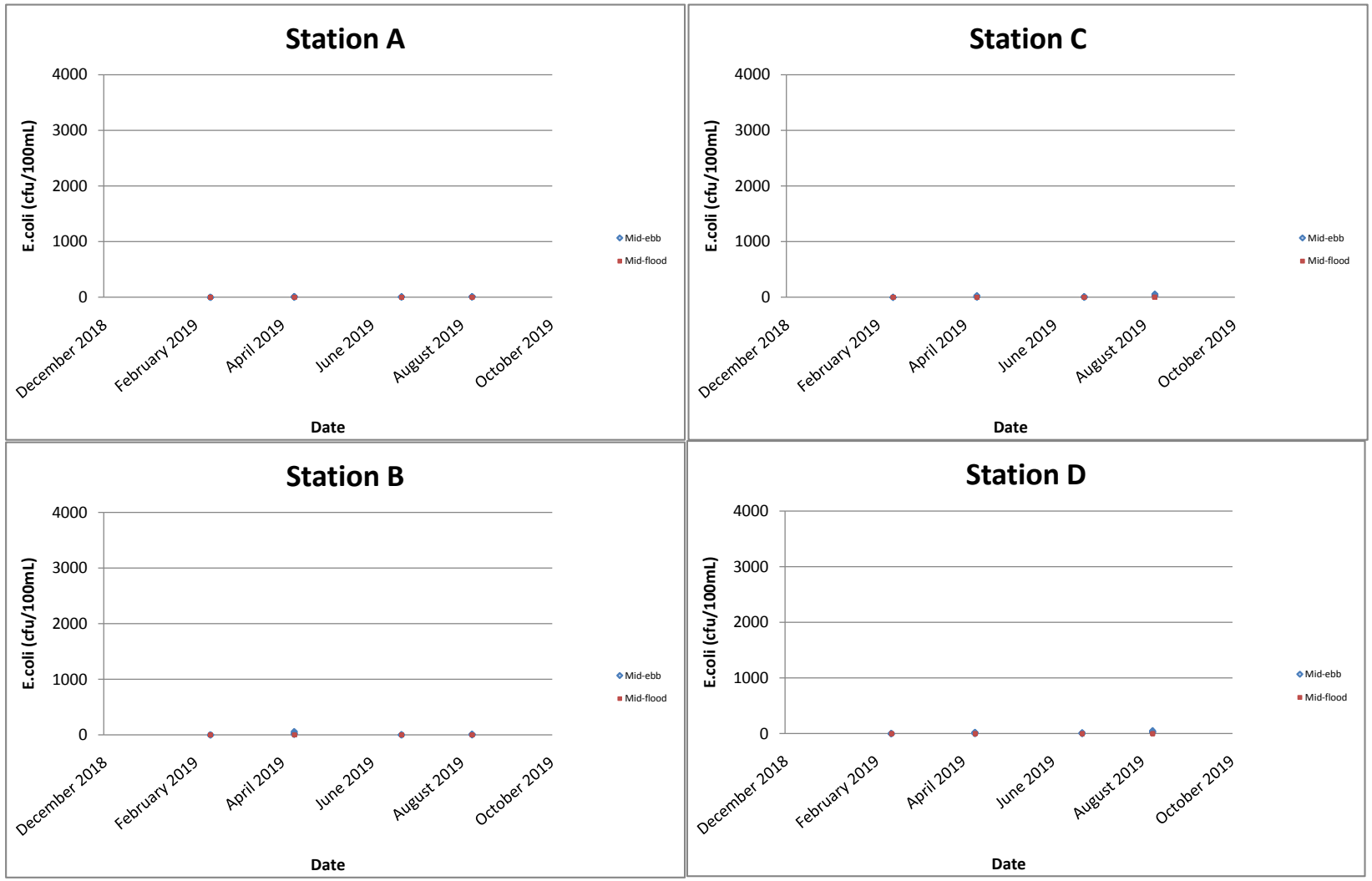


Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

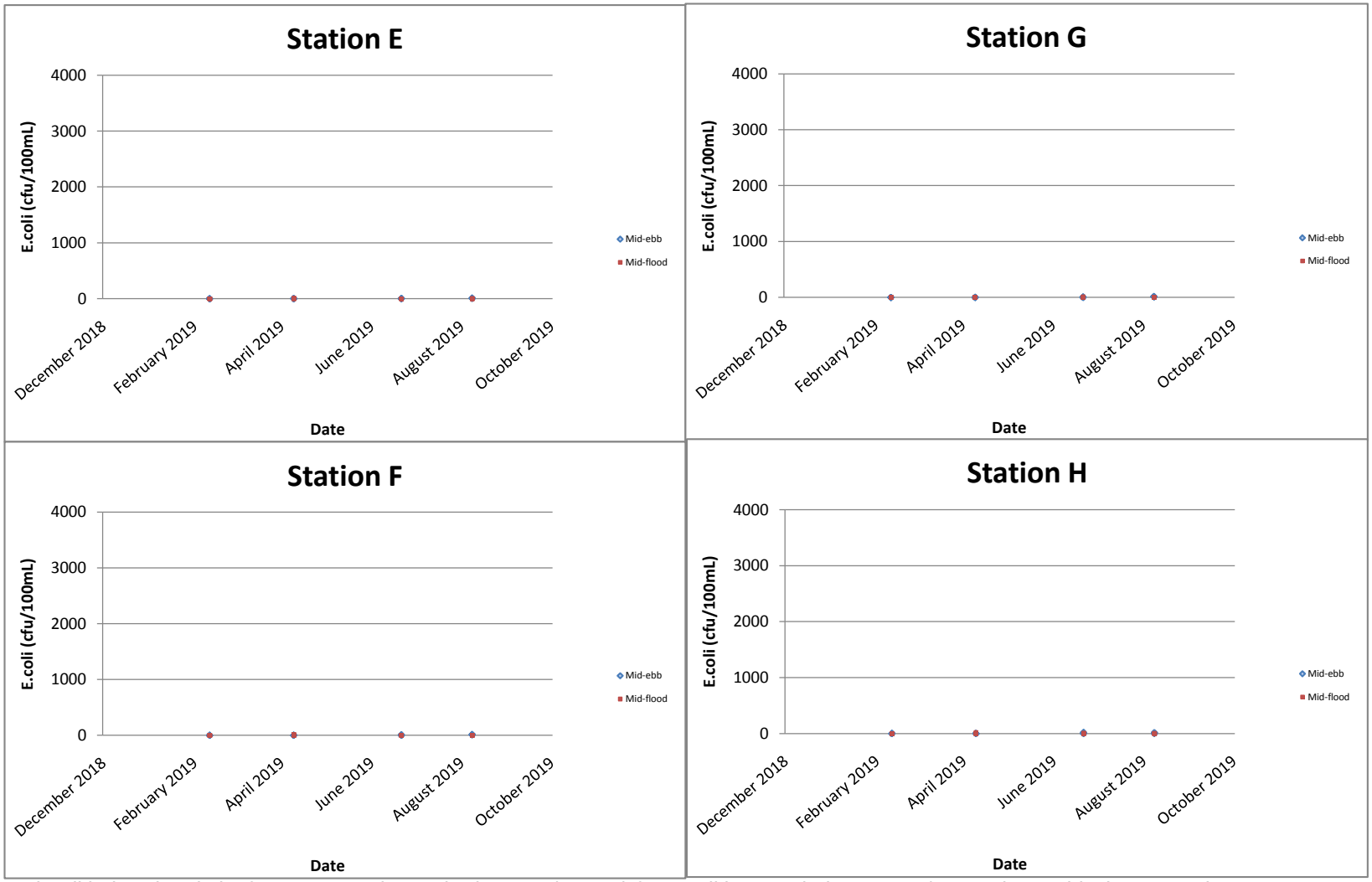


Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

E.coli (cfu/100mL)

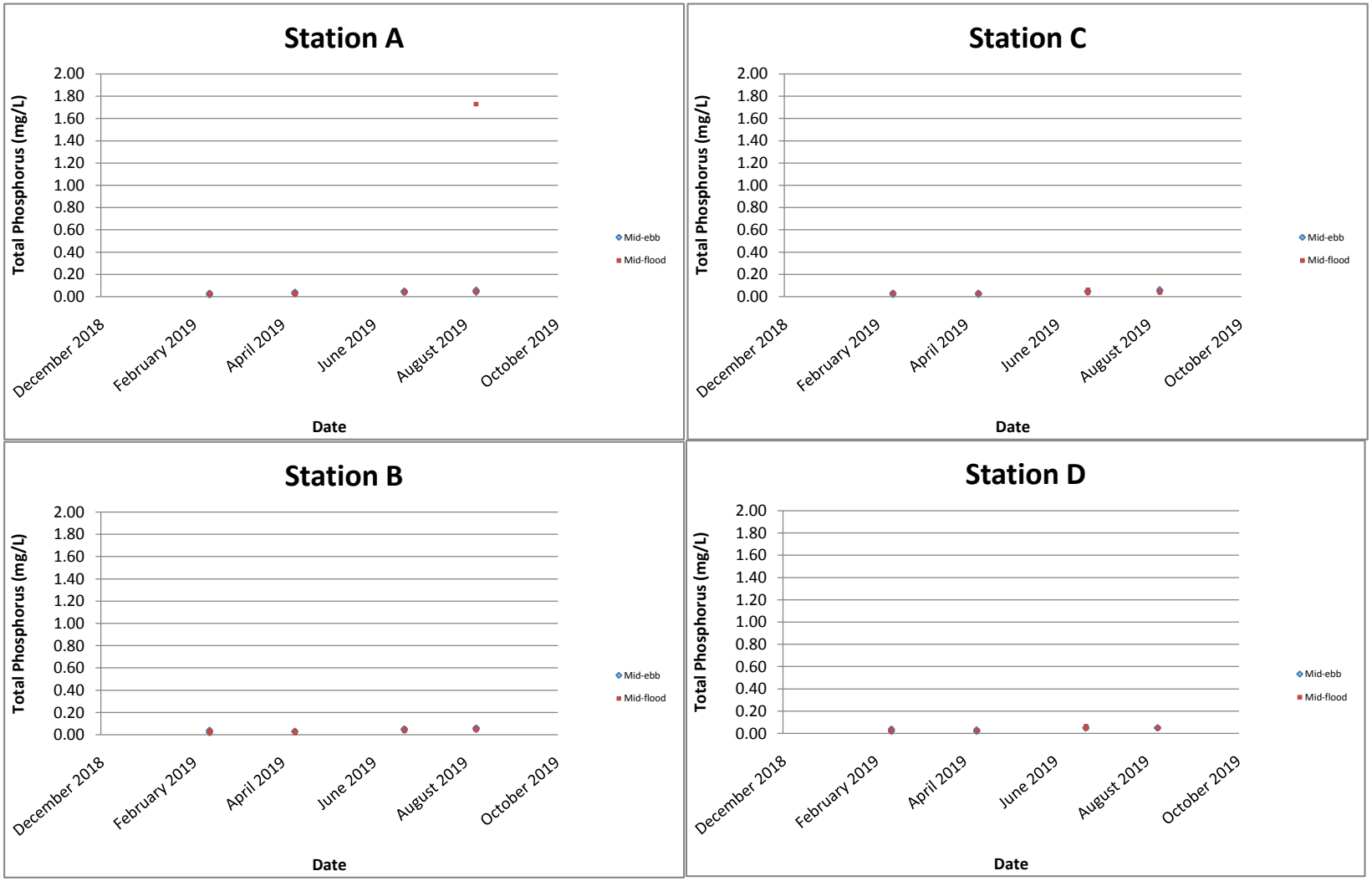


Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 0 CFU/100mL in graphical presentation.

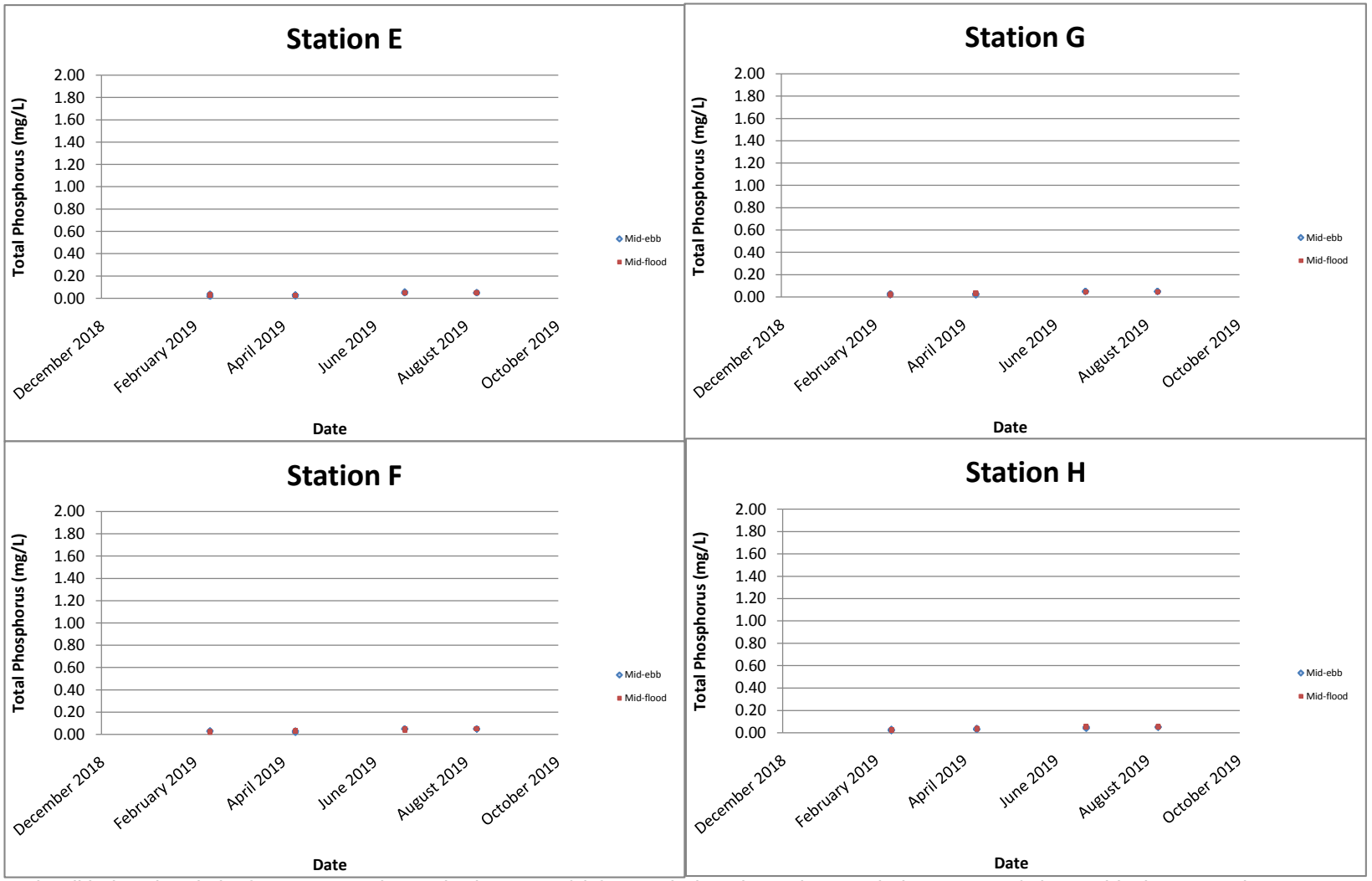


Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 0 CFU/100mL in graphical presentation.

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

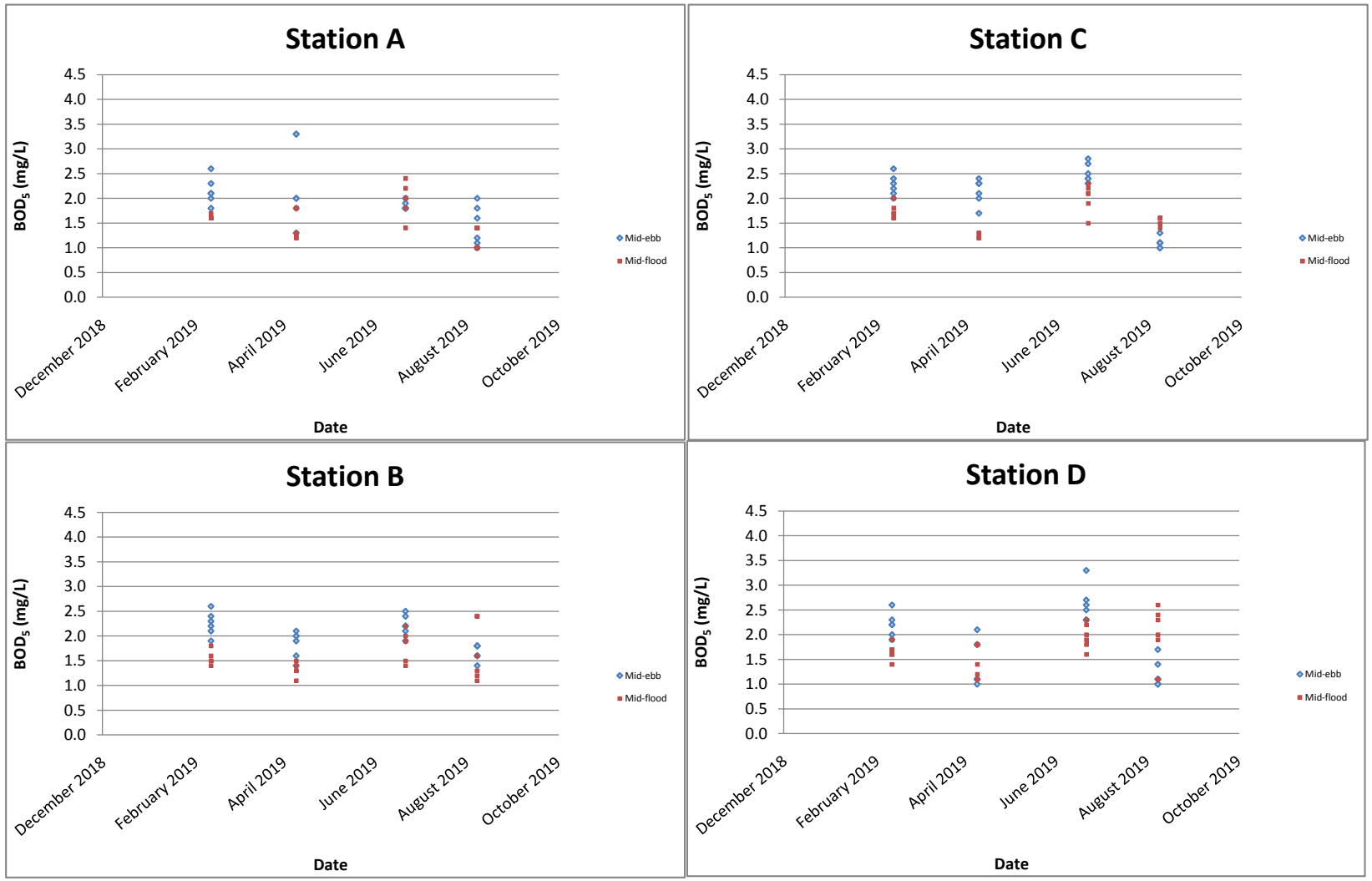


Remark: All below the Limit of Report sample results (<0.01 mg/L) for Total Phosphorus is regarded as 0.01 mg/L in graphical presentation.

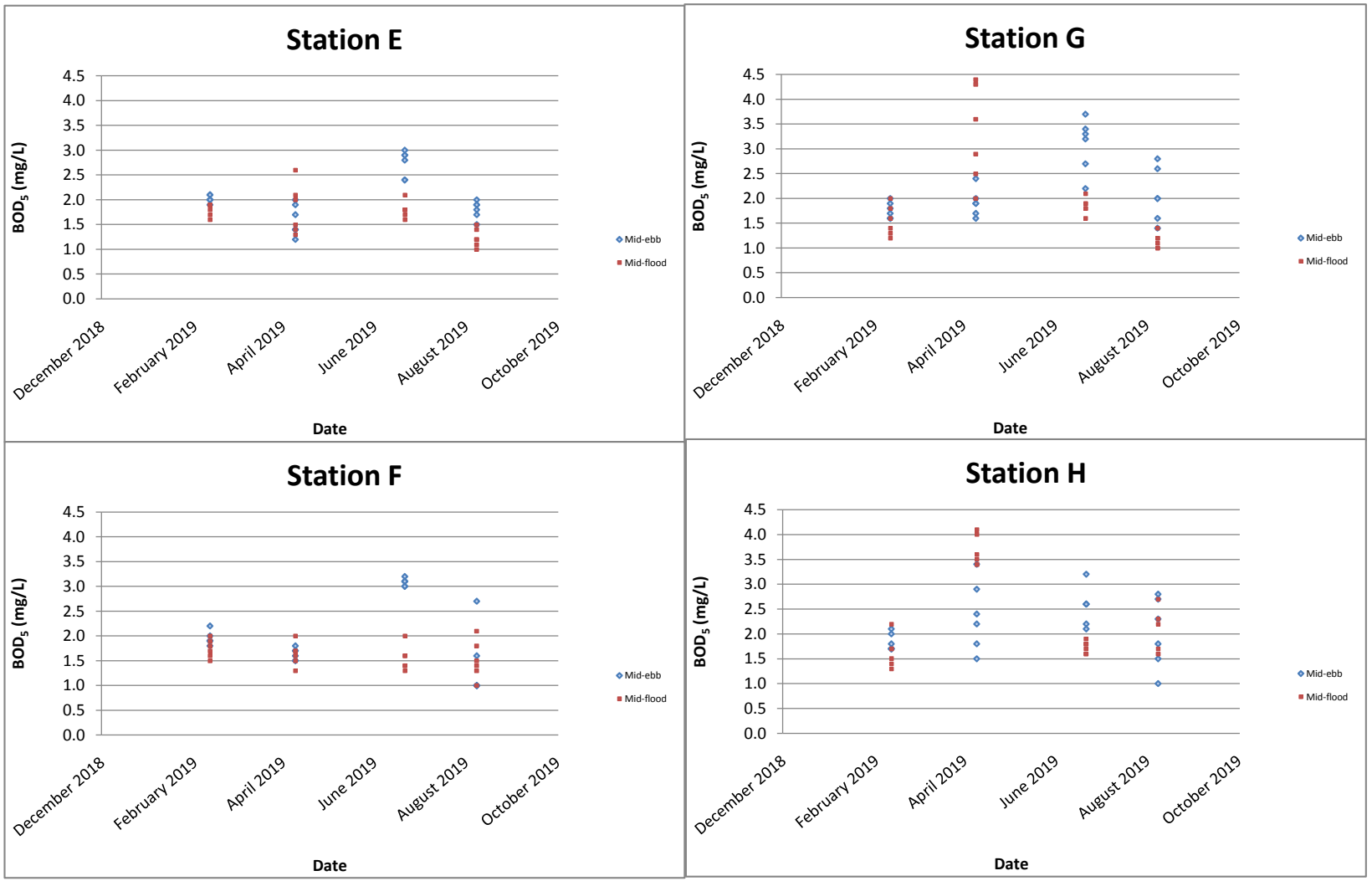


Remark: All below the Limit of Report sample results (<0.01 mg/L) for Total Phosphorus is regarded as 0.01 mg/L in graphical presentation.

BOD_5 (mg/L)



Remark: All below the Limit of Report sample results (<1.0 mg/L) for BOD_5 is regarded as 1.0 mg/L in graphical presentation.



Remark: All below the Limit of Report sample results (<1.0 mg/L) for BOD_5 is regarded as 1.0 mg/L in graphical presentation.

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

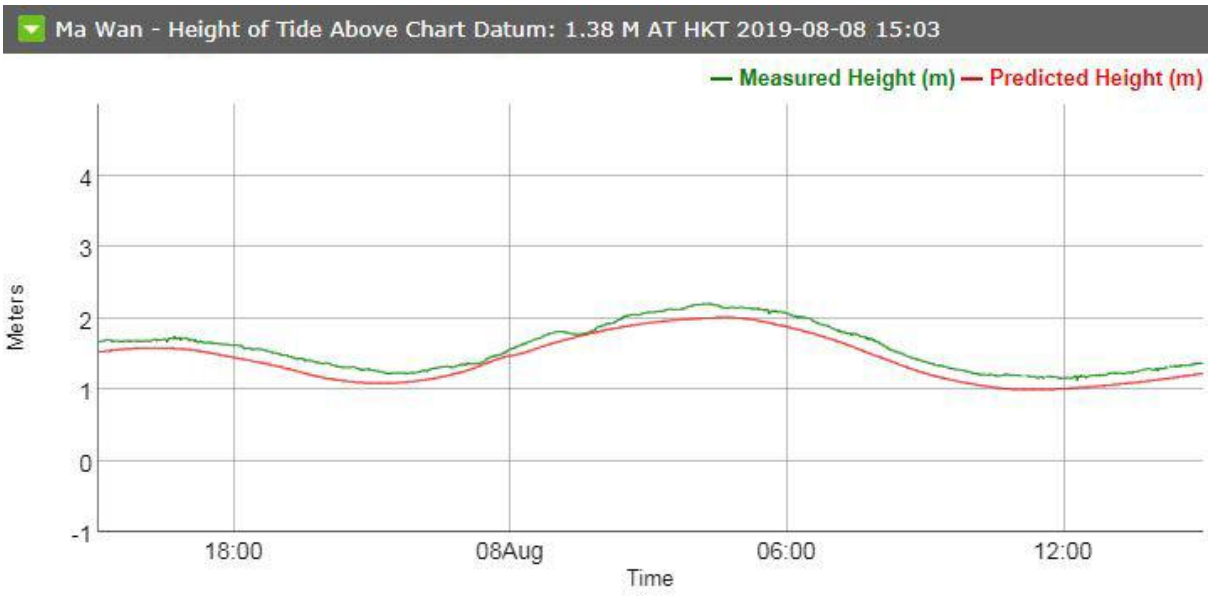
Tidal Data obtained from Ma Wan Marine Traffic Station

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

Report No.: 0041/17/ED/0490C



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 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	8/8/2019	Sunny	Moderate	9:22	8.8	5	826	303	<0.10	30.3	25.9	35.4	0.14	17.8	88.0	13.9	0.23
B	8/8/2019	Sunny	Moderate	9:38	8.6	8	1220	397	<0.10	42.0	38.5	44.6	0.20	25.1	117	15.5	0.44
C	8/8/2019	Sunny	Moderate	10:00	8.5	14	1170	450	0.10	48.0	41.8	51.4	0.22	29.5	130	14.1	0.31
D	8/8/2019	Sunny	Moderate	10:12	8.5	12	1180	477	<0.10	46.1	40.4	50.8	0.22	27.8	127	16.0	0.29
E	8/8/2019	Sunny	Moderate	10:34	8.6	14	1510	487	<0.10	48.9	43.6	51.0	0.23	29.0	133	13.0	0.36
F	8/8/2019	Sunny	Moderate	10:47	8.5	26	1880	593	<0.10	48.9	45.1	51.9	0.24	30.1	138	13.3	0.38
G	8/8/2019	Sunny	Moderate	11:07	8.6	18	1540	497	0.11	48.4	49.2	54.7	0.25	29.8	137	13.1	0.39
H	8/8/2019	Sunny	Moderate	11:21	8.5	11	1180	439	0.10	46.0	43.6	46.0	0.18	27.8	113	14.8	0.29

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distrbution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	8/8/2019	Sunny	Moderate	9:22	0.63	13	43	21	23
B	8/8/2019	Sunny	Moderate	9:38	0.86	0	33	36	31
C	8/8/2019	Sunny	Moderate	10:00	0.92	0	3	55	42
D	8/8/2019	Sunny	Moderate	10:12	0.93	0	4	56	40
E	8/8/2019	Sunny	Moderate	10:34	1.07	0	6	52	42
F	8/8/2019	Sunny	Moderate	10:47	1.19	1	4	55	40
G	8/8/2019	Sunny	Moderate	11:07	0.90	13	21	36	30
H	8/8/2019	Sunny	Moderate	11:21	0.90	0	1	53	40

CERTIFICATE OF ANALYSIS

Client	: FUGRO TECHNICAL SERVICES LIMITED	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 13
Contact	: MR CYRUS LAI	Contact	: Richard Fung	Work Order	: HK1933349
Address	: ROOM 723 & 725, 7/F, BLOCK B, PROFIT INDUSTRIAL BUILDING, 1-15 KWAI FONG CRESCENT, KWAI FONG, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong		
E-mail	: c.lai@fugro.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: +852 3565 4374	Telephone	: +852 2610 1044		
Facsimile	: ----	Facsimile	: +852 2610 2021		
Project	: CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT			Date Samples Received	: 08-Aug-2019
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 23-Aug-2019
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	Managing Director	Inorganics
Fung Lim Chee, Richard	Managing Director	Metals_ENV

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 08-Aug-2019 to 22-Aug-2019.

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: HK1933349

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.

Sample information (Project name, Sample ID, Sampling date/ time) is provided by client.

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

Sample 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.

EA002SOIL - pH value is reported as at 25°C.

EK055S - Ammoniacal Nitrogen was determined and reported on a 1:5 soil / 1M KCl solution extract.

EK059A - Nitrate and Nitrite were determined and reported on a 1:5 soil / 1M KCl solution extract.

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.

EA002SOIL - Soil sample(s) analysed on as air-dry weight basis. pH value determined and reported on a 1:5 soil / water extract.

EA002SOIL - Calibration range of pH value is 4.0 - 10.0. Results exceeding this range is for reference only.

EK062A - Total Nitrogen is the sum of Total Oxidizable (NOx) and Total Kjeldahl Nitrogen.

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
					HK1933349-001	HK1933349-002	HK1933349-003	HK1933349-004	HK1933349-005
EA/ED: Physical and Aggregate Properties									
EA002SOIL: pH Value	----	0.1	pH Unit		8.8	8.6	8.5	8.5	8.6
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		43.0	53.9	61.5	60.8	60.2
ED/EK: Inorganic Nonmetallic Parameters									
EK055S: Ammonia as N	7664-41-7	0.5	mg/kg		5	8	14	12	14
EK062A: Total Nitrogen as N	----	10	mg/kg		826	1220	1170	1180	1510
EK067A: Total Phosphorus as P	----	10	mg/kg		303	397	450	477	487
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg		13.9	15.5	14.1	16.0	13.0
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		30.3	42.0	48.0	46.1	48.9
EG020: Copper	7440-50-8	0.20	mg/kg		25.9	38.5	41.8	40.4	43.6
EG020: Lead	7439-92-1	0.20	mg/kg		35.4	44.6	51.4	50.8	51.0
EG020: Mercury	7439-97-6	0.05	mg/kg		0.14	0.20	0.22	0.22	0.23
EG020: Nickel	7440-02-0	0.20	mg/kg		17.8	25.1	29.5	27.8	29.0
EG020: Silver	7440-22-4	0.10	mg/kg		0.23	0.44	0.31	0.29	0.36
EG020: Zinc	7440-66-6	0.5	mg/kg		88.0	117	130	127	133

Sub-Matrix: SEDIMENT			Client sample ID	F/Sediment	G/Sediment	H/Sediment	A/Benthic Survey	B/Benthic Survey
			Client sampling date / time	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933349-006	HK1933349-007	HK1933349-008	HK1933349-009	HK1933349-010
EA/ED: Physical and Aggregate Properties								
EA002SOIL: pH Value	----	0.1	pH Unit	8.5	8.6	8.5	----	----
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	62.6	56.1	55.4	43.2	55.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055S: Ammonia as N	7664-41-7	0.5	mg/kg	26	18	11	----	----
EK062A: Total Nitrogen as N	----	10	mg/kg	1880	1540	1180	----	----
EK067A: Total Phosphorus as P	----	10	mg/kg	593	497	439	----	----
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	0.5	mg/kg	13.3	13.1	14.8	----	----
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	0.11	0.10	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	48.9	48.4	46.0	----	----
EG020: Copper	7440-50-8	0.20	mg/kg	45.1	49.2	43.6	----	----
EG020: Lead	7439-92-1	0.20	mg/kg	51.9	54.7	46.0	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	0.24	0.25	0.18	----	----
EG020: Nickel	7440-02-0	0.20	mg/kg	30.1	29.8	27.8	----	----
EG020: Silver	7440-22-4	0.10	mg/kg	0.38	0.39	0.29	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	138	137	113	----	----
EP: Aggregate Organics								
EP005: Total Organic Carbon	----	0.05	%	----	----	----	0.63	0.86

Sub-Matrix: SEDIMENT			Client sample ID	C/Benthic Survey	D/Benthic Survey	E/Benthic Survey	F/Benthic Survey	G/Benthic Survey
			Client sampling date / time	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	CAS Number	LOR	Unit	HK1933349-011	HK1933349-012	HK1933349-013	HK1933349-014	HK1933349-015
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	62.0	61.6	60.3	60.8	54.2
EP: Aggregate Organics								
EP005: Total Organic Carbon	----	0.05	%	0.92	0.93	1.07	1.19	0.90

Sub-Matrix: SEDIMENT				Client sample ID	H/Benthic Survey	----	----	----	----
				Client sampling date / time	08-Aug-2019	----	----	----	----
Compound	CAS Number	LOR	Unit		HK1933349-016	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		58.5	----	----	----	----
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%		0.90	----	----	----	----

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	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019	08-Aug-2019
Compound	*CAS Number*	*LOR*	*Unit*	HK1933349-017	HK1933349-018	HK1933349-019	HK1933349-020	HK1933349-021
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**	**1**	**2**	<1	<1
EG020: Copper	7440-50-8	1	µg/L	**2**	**3**	**4**	**2**	**2**
EG020: Lead	7439-92-1	1	µg/L	**1**	<1	**2**	<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	08-Aug-2019	08-Aug-2019	08-Aug-2019	----	----
Compound	CAS Number	LOR	Unit	HK1933349-022	HK1933349-023	HK1933349-024	-------	-------
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	2	<1	<1	----	----
EG020: Copper	7440-50-8	1	µg/L	4	2	2	----	----
EG020: Lead	7439-92-1	1	µg/L	2	<1	<1	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EG020: Nickel	7440-02-0	1	µg/L	3	2	2	----	----
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: 2519093)								
HK1933349-002	B/Sediment	**EA002SOIL: pH Value**	----	0.1	pH Unit	8.6	8.8	2.30
EA/ED: Physical and Aggregate Properties (QC Lot: 2519491)								
HK1933349-001	A/Sediment	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	43.0	43.7	1.68
HK1933349-011	C/Benthic Survey	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	62.0	61.8	0.313
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2519134)								
HK1933349-001	A/Sediment	**EK055S: Ammonia as N**	7664-41-7	1	mg/kg	5	5	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2523753)								
HK1933737-001	Anonymous	**EK067A: Total Phosphorus as P**	----	10	mg/kg	6260	6630	5.80
EG: Metals and Major Cations (QC Lot: 2516103)								
HK1933349-002	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	0.20	0.20	0.00
		EG020: Copper	7440-50-8	0.05	mg/kg	38.5	38.1	1.08
		EG020: Lead	7439-92-1	0.05	mg/kg	44.6	44.5	0.273
		EG020: Nickel	7440-02-0	0.05	mg/kg	25.1	24.6	1.95
		EG020: Silver	7440-22-4	0.05	mg/kg	0.44	0.53	18.8
		EG020: Arsenic	7440-38-2	0.5	mg/kg	15.5	15.2	1.97
		EG020: Chromium	7440-47-3	0.5	mg/kg	42.0	40.4	3.72
		EG020: Zinc	7440-66-6	0.5	mg/kg	117	115	2.31
EP: Aggregate Organics (QC Lot: 2524166)								
HK1933349-010	B/Benthic Survey	**EP005: Total Organic Carbon**	----	0.05	%	0.86	0.86	0.00
HK1933870-002	Anonymous	**EP005: Total Organic Carbon**	----	0.05	%	1.74	1.89	8.19

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: 2516169)								
HK1933349-018	B/Rinsate Blank	**EG020: Cadmium**	7440-43-9	0.2	µg/L	<0.2	<0.2	0.00
		EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	<0.5	0.00
		EG020: Chromium	7440-47-3	1	µg/L	1	1	0.00
		EG020: Copper	7440-50-8	1	µg/L	3	3	0.00
		EG020: Lead	7439-92-1	1	µg/L	<1	<1	0.00

Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report: LOR	Unit	Original Result	Duplicate Result	RPD (%)
EG: Metals and Major Cations - Total (QC Lot: 2516169) - Continued								
HK1933349-018	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: 2519134)											
EK055S: Ammonia as N	7664-41-7	1	mg/kg	<1	10 mg/kg	105	----	85	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2523753)											
EK067A: Total Phosphorus as P	----	10	mg/kg	<10	695 mg/kg	89.9	----	84	95	----	----
EG: Metals and Major Cations (QC Lot: 2516103)											
EG020: Arsenic	7440-38-2	0.5	mg/kg	<0.5	5 mg/kg	103	----	85	110	----	----
EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.01	5 mg/kg	110	----	85	115	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	<0.5	5 mg/kg	102	----	85	115	----	----
EG020: Copper	7440-50-8	0.05	mg/kg	<0.05	5 mg/kg	106	----	85	114	----	----
EG020: Lead	7439-92-1	0.05	mg/kg	<0.05	5 mg/kg	106	----	87	115	----	----
EG020: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	101	----	85	115	----	----
EG020: Nickel	7440-02-0	0.05	mg/kg	<0.05	5 mg/kg	101	----	85	115	----	----
EG020: Silver	7440-22-4	0.05	mg/kg	<0.05	5 mg/kg	109	----	85	115	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	<0.5	5 mg/kg	104	----	85	115	----	----
EP: Aggregate Organics (QC Lot: 2524166)											
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	97.2	----	90	106	----	----

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: 2516169)											

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: 2516169) - Continued											
EG020: Arsenic	7440-38-2	10	µg/L	<10	100 µg/L	99.0	----	85	110	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	100 µg/L	97.6	----	85	109	----	----
EG020: Chromium	7440-47-3	1	µg/L	<1	100 µg/L	98.4	----	86	111	----	----
EG020: Copper	7440-50-8	1	µg/L	<1	100 µg/L	102	----	90	111	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	100 µg/L	101	----	89	111	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	105	----	85	115	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	100 µg/L	97.1	----	87	110	----	----
EG020: Silver	7440-22-4	1	µg/L	<1	100 µg/L	97.5	----	85	114	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	100 µg/L	94.2	----	86	114	----	----

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

Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
					MS	MSD	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2519134)										
HK1933349-002	B/Sediment	**EK055S: Ammonia as N**	7664-41-7	10 mg/kg	88.4	----	75	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 2523753)										
HK1933737-001	Anonymous	**EK067A: Total Phosphorus as P**	----	100 mg/kg	96.0	----	75	125	----	----
EG: Metals and Major Cations (QC Lot: 2516103)										
HK1933349-001	A/Sediment	**EG020: Arsenic**	7440-38-2	5 mg/kg	107	----	75	125	----	----
		EG020: Cadmium	7440-43-9	5 mg/kg	109	----	75	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	93.0	----	75	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	96.0	----	75	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	----	75	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	94.6	----	75	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	99.8	----	75	125	----	----
		EG020: Silver	7440-22-4	5 mg/kg	106	----	75	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75	125	----	----
EP: Aggregate Organics (QC Lot: 2524166)										
HK1933349-009	A/Benthic Survey	**EP005: Total Organic Carbon**	----	40 %	104	----	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: 2516169)										
HK1933349-017	A/Rinsate Blank	**EG020: Arsenic**	7440-38-2	100 µg/L	99.8	----	75	125	----	----
		EG020: Cadmium	7440-43-9	100 µg/L	96.9	----	75	125	----	----
		EG020: Chromium	7440-47-3	100 µg/L	99.4	----	75	125	----	----
		EG020: Copper	7440-50-8	100 µg/L	86.4	----	75	125	----	----
		EG020: Lead	7439-92-1	100 µg/L	84.9	----	75	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	89.0	----	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: 2516169) - Continued										
HK1933349-017	A/Rinsate Blank	**EG020: Nickel**	7440-02-0	100 µg/L	87.8	----	75	125	----	----
		EG020: Silver	7440-22-4	100 µg/L	96.5	----	75	125	----	----
		EG020: Zinc	7440-66-6	100 µg/L	82.4	----	75	125	----	----

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	:	MR CYRUS LAI	WORK ORDER	: **HK1933349**
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 DATE RECEIVED DATE OF ISSUE	: 1 : 8-AUG-2019 : 22-AUG-2019
PROJECT	:	CONTRACT NO. CM 14/2016 ENVIRONMENTAL TEAM FOR OPERATIONAL ENVIRONMENTAL MONITORING AND AUDIT FOR SIU HO WAN SEWAGE TREATMENT PLANT	NO. OF SAMPLES CLIENT ORDER	: 24 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.**
- **Sample information (Project name, Sample ID, Sampling date/ time) is provided by client.**
- **Particle Size Distribution was subcontracted to and analysed by Gammon Construction Limited.**
- **Sample 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.**
- **EA002SOIL - pH value is reported as at 25°C.**
- **EK055S - Ammoniacal Nitrogen was determined and reported on a 1:5 soil / 1M KCl solution extract.**
- **EK059A - Nitrate and Nitrite were determined and reported on a 1:5 soil / 1M KCl solution extract.**
- **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.**
- **EA002SOIL - Soil sample(s) analysed on as air-dry weight basis. pH value determined and reported on a 1:5 soil / water extract.**
- **EA002SOIL - Calibration range of pH value is 4.0 - 10.0. Results exceeding this range is for reference only.**
- **EK062A - Total Nitrogen is the sum of Total Oxidizable (NOx) and Total Kjeldahl Nitrogen.**

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 : HK1933349
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.
HK1933349-001	A/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-002	B/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-003	C/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-004	D/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-005	E/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-006	F/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-007	G/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-008	H/Sediment	SEDIMENT	08-Aug-2019	
HK1933349-009	A/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-010	B/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-011	C/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-012	D/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-013	E/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-014	F/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-015	G/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-016	H/Benthic Survey	SEDIMENT	08-Aug-2019	J2999-272.48
HK1933349-017	A/Rinsate Blank	WATER	08-Aug-2019	
HK1933349-018	B/Rinsate Blank	WATER	08-Aug-2019	
HK1933349-019	C/Rinsate Blank	WATER	08-Aug-2019	
HK1933349-020	D/Rinsate Blank	WATER	08-Aug-2019	
HK1933349-021	E/Rinsate Blank	WATER	08-Aug-2019	
HK1933349-022	F/Rinsate Blank	WATER	08-Aug-2019	
HK1933349-023	G/Rinsate Blank	WATER	08-Aug-2019	
HK1933349-024	H/Rinsate Blank	WATER	08-Aug-2019	

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

Report No : J2999-272.48

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

Project : - Contract No.: Date : 12/08/2019

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 (%)		
HK1933349-009	A/Benthic Survey	D									1,5,7	13	43	21	23	Dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments	-‡
HK1933349-010	B/Benthic Survey	D									1,5,7	0	33	36	31	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1933349-011	C/Benthic Survey	D									1,5,7	0	3	55	42	Dark grey, slightly sandy SILT/CLAY	-‡
HK1933349-012	D/Benthic Survey	D									1,5,7	0	4	56	40	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1933349-013	E/Benthic Survey	D									1,5,7	0	6	52	42	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1933349-014	F/Benthic Survey	D									1,5,7	1	4	55	40	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡
HK1933349-015	G/Benthic Survey	D									1,5,7	13	21	36	30	Dark grey, slightly gravelly, slightly sandy SILT/CLAY with shell fragments	-‡
HK1933349-016	H/Benthic Survey	D									1,5,7	0	7	53	40	Dark grey, slightly sandy SILT/CLAY with shell fragments	-‡

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

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

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

Sampling History - Refer the Individual Test Report; Estimated Uncertainty - Refer the Individual Test Report. ‡ - Information provided by customer.

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

Checked by : T K Lam

Approved By : Chung Hei Wing, Principal Laboratory Officer

Date : 19/08/2019

HKAS has accredited this laboratory (Reg. No. HOKLAS 055) under 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. : J2999-272.48

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

Date Received : 12/08/2019
Tested Date : 12/08/2019

Works Order No. : 272
Sample ID No. : HK1933349-009
Sample No. : A/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

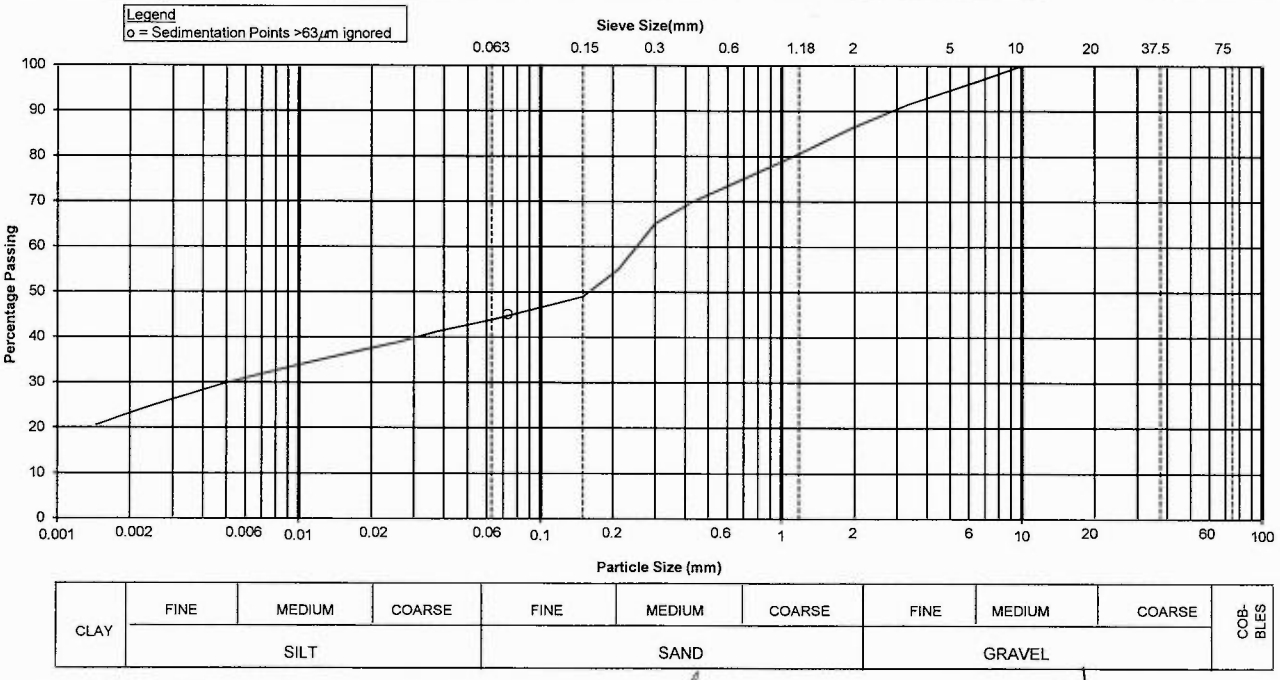
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	96	-	-
5.00 mm	95	-	-
3.35 mm	92	-	-
2.00 mm	87	-	-
1.18 mm	81	-	-
600 µm	73	-	-
425 µm	70	-	-
300 µm	65	-	-
212 µm	55	-	-
150 µm	49	-	-
63 µm	44	-	-
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 (%)
0.0730	-	45	-
0.0520	-	43	-
0.0369	-	41	-
0.0263	-	39	-
0.0187	-	37	-
0.0097	-	34	-
0.0049	-	30	-
0.0025	-	25	-
0.0015	-	21	-

SUMMARY :

Gravel (%)	:	**13**
Sand (%)	:	**43**
Silt (%)	:	**21**
Clay (%)	:	**23**



Technician : C M Yip
Date : 12/08/2019

Checked By :
Name : T K Lam
Date : 17/08/2019

Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

HKAS has accredited this laboratory (Reg. No. HOKLAS 055) under 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. : J2999-272.48

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

Date Received : 12/08/2019
Tested Date : 12/08/2019

Works Order No. : 272
Sample ID No. : HK1933349-010
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

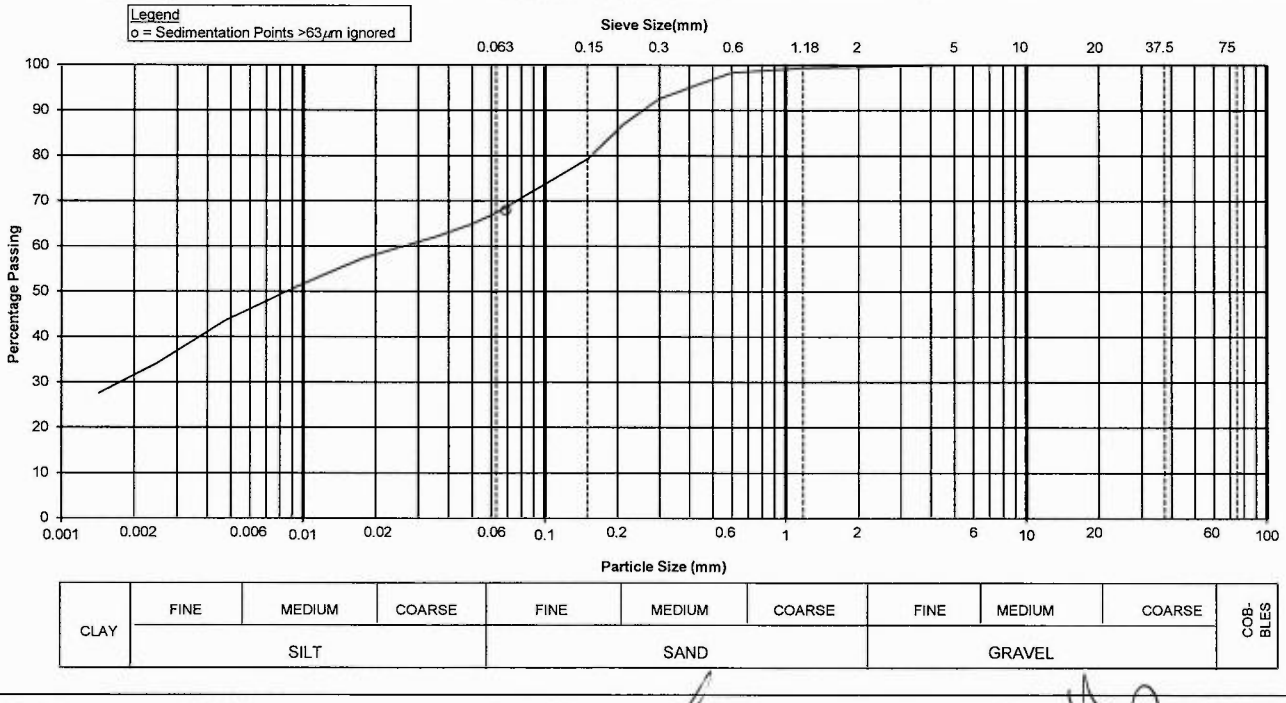
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	99	-	-
600 µm	98	-	-
425 µm	96	-	-
300 µm	93	-	-
212 µm	87	-	-
150 µm	79	-	-
63 µm	67	-	-
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 (%)
0.0688	-	68	-
0.0491	-	65	-
0.0350	-	62	-
0.0249	-	60	-
0.0177	-	57	-
0.0093	-	51	-
0.0048	-	44	-
0.0024	-	34	-
0.0014	-	28	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**33**
Silt (%)	:	**36**
Clay (%)	:	**31**



Technician : C M Yip
Date : 12/08/2019

Checked By :
Name : T K Lam
Date : 17/08/2019

Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

HKAS has accredited this laboratory (Reg. No. HOKLAS 055) under 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. : J2999-272.48

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

Date Received : 12/08/2019
Tested Date : 12/08/2019

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

Works Order No. : 272
Sample ID No. : HK1933349-011
Sample No. : C/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

ˆUpon request * Delete as appropriate ‡Information provided by customer

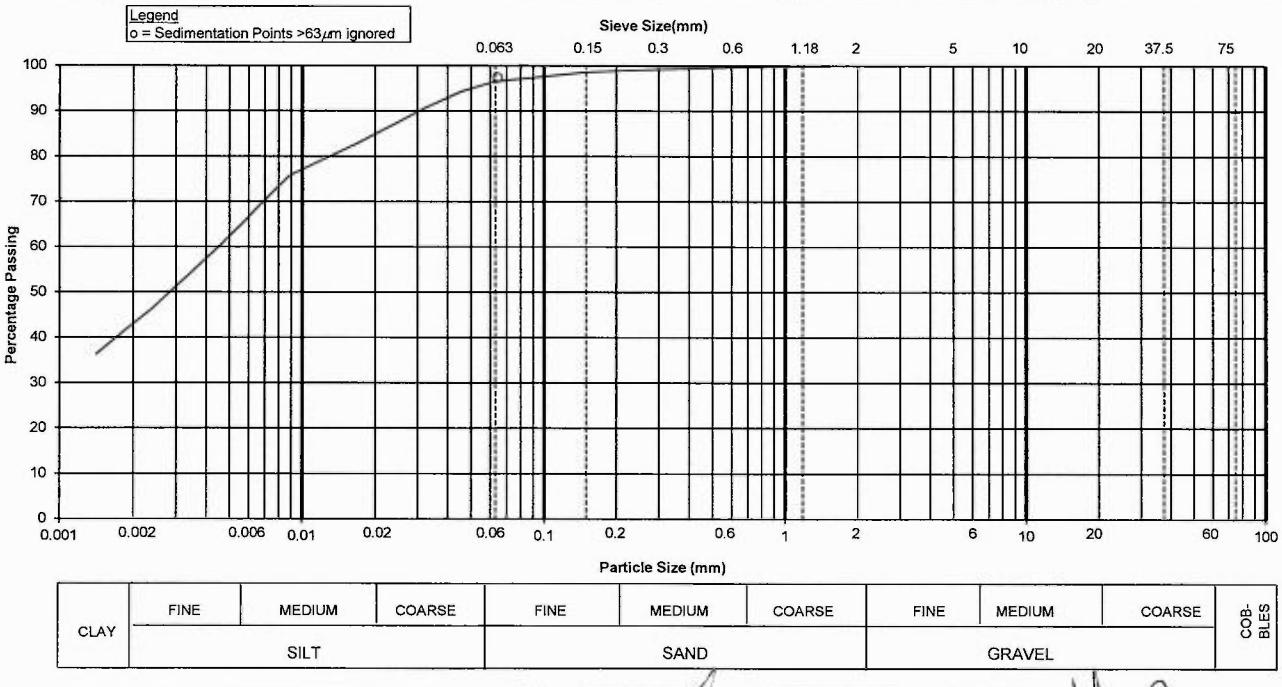
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	99	-	-
300 µm	99	-	-
212 µm	99	-	-
150 µm	99	-	-
63 µm	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 (%)
0.0643	-	97	-
0.0459	-	94	-
0.0328	-	91	-
0.0235	-	87	-
0.0168	-	83	-
0.0089	-	76	-
0.0046	-	61	-
0.0024	-	46	-
0.0014	-	36	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**3**
Silt (%)	:	**55**
Clay (%)	:	**42**



Technician : C M Yip
Date : 12/08/2019

Checked By :
Name : T K Lam
Date : 17/08/2019

Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

HKAS has accredited this laboratory (Reg. No. HOKLAS 055) under 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. : J2999-272.48

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

Works Order No. : 272
Sample ID No. : HK1933349-012
Sample No. : D/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 12/08/2019
Tested Date : 12/08/2019

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

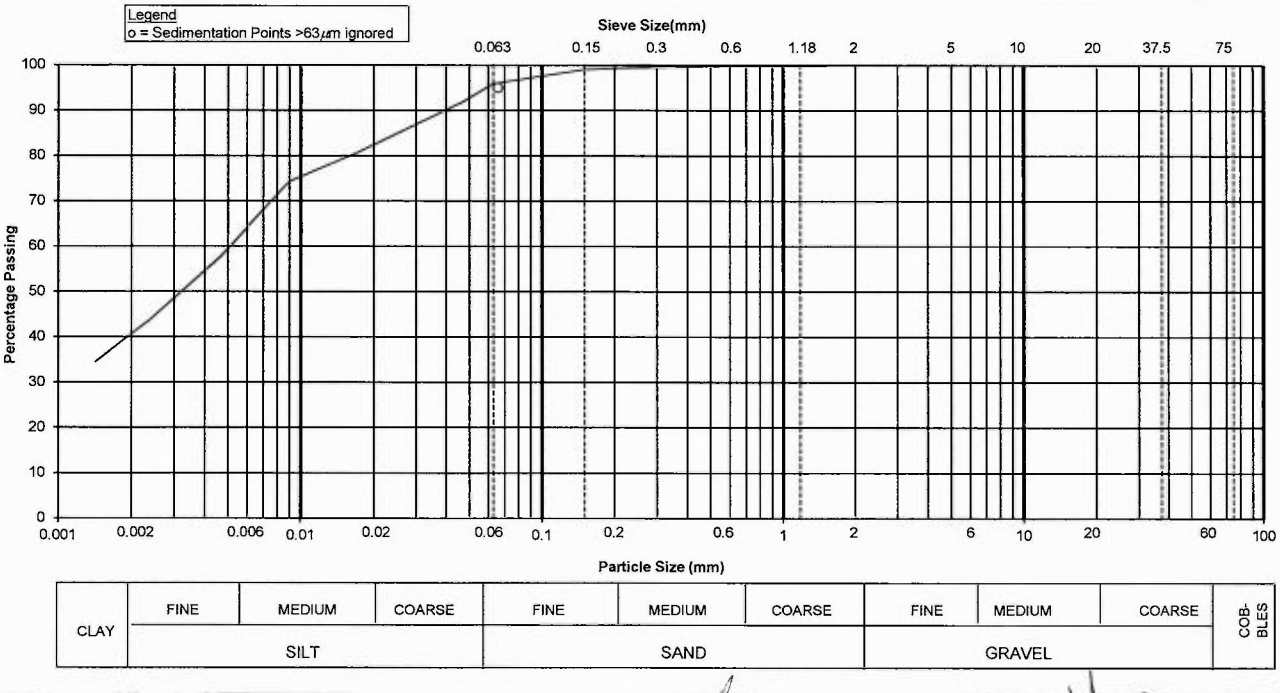
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 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	99	-	-
150 µm	99	-	-
63 µm	96	-	-
0 µm	0		

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

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0657	-	95	-
0.0469	-	92	-
0.0335	-	88	-
0.0239	-	84	-
0.0171	-	81	-
0.0090	-	74	-
0.0047	-	58	-
0.0024	-	44	-
0.0014	-	34	-

SUMMARY :

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



Technician : C M Yip
Date : 12/08/2019

Checked By :
Name : T K Lam
Date : 17/08/2019

Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

Form : GESR003.5 / Sept.14.18 / Issue 1 / Rev 3

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. : J2999-272.48

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

Works Order No. : 272
Sample ID No. : HK1933349-013
Sample No. : E/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 12/08/2019
Tested Date : 12/08/2019

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

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

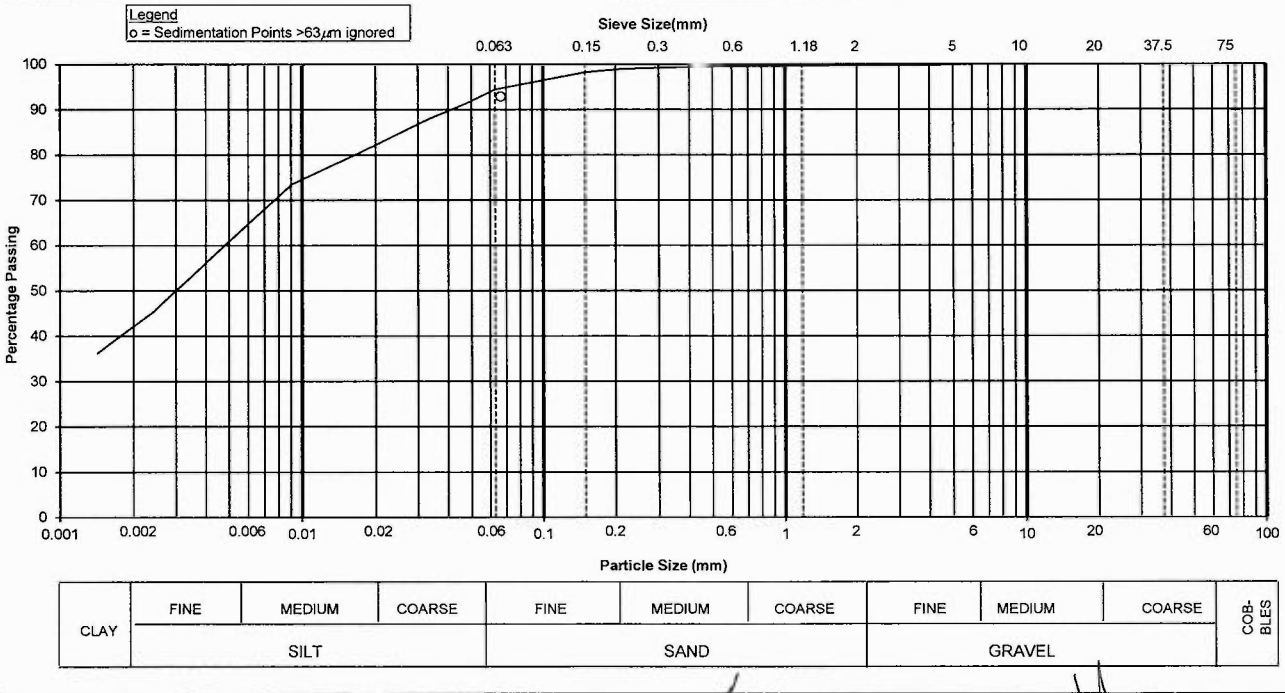
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	99	-	-
425 µm	99	-	-
300 µm	99	-	-
212 µm	99	-	-
150 µm	98	-	-
63 µm	94	-	-
0 µm	0		

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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0664	-	93	-
0.0472	-	91	-
0.0337	-	88	-
0.0240	-	84	-
0.0172	-	80	-
0.0090	-	73	-
0.0047	-	59	-
0.0024	-	45	-
0.0014	-	36	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**6**
Silt (%)	:	**52**
Clay (%)	:	**42**



Technician : C M Yip
Date : 12/08/2019

Checked By :
Name : T K Lam
Date : 17/08/2019

Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

HKAS has accredited this laboratory (Reg. No. HOKLAS 055) under 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. : J2999-272.48

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

Works Order No. : 272
Sample ID No. : HK1933349-014
Sample No. : F/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 12/08/2019
Tested Date : 12/08/2019

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

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

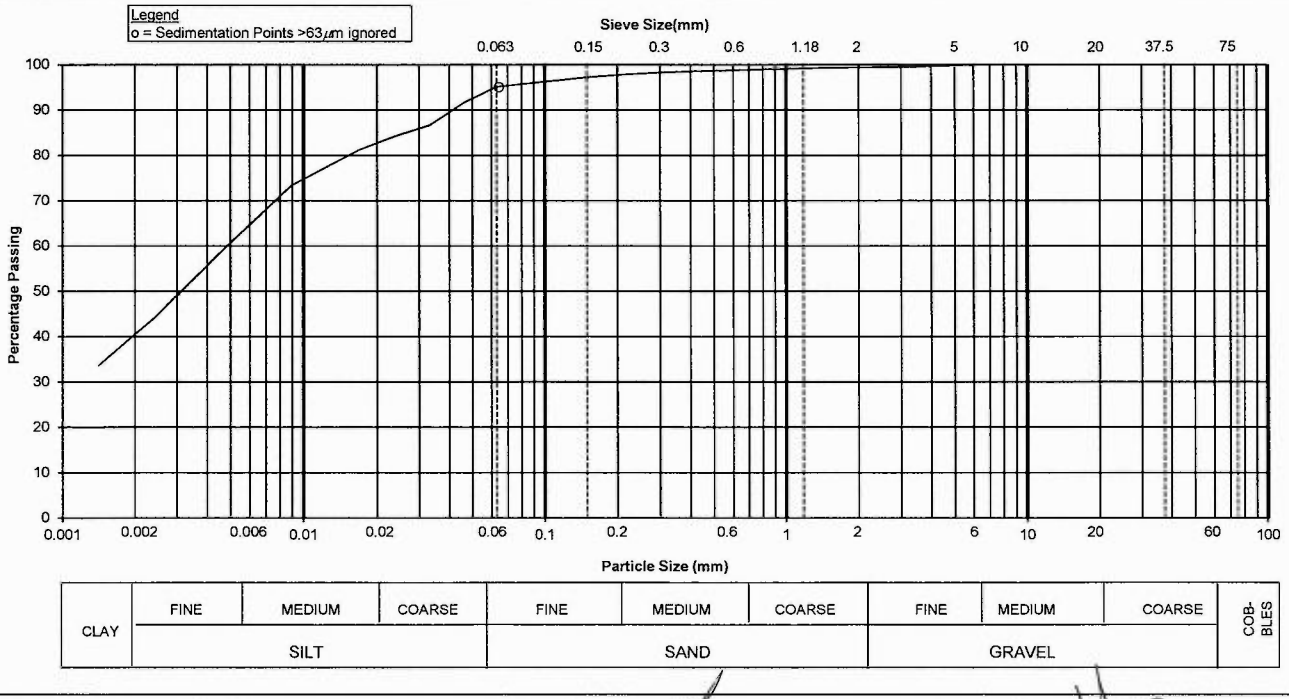
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	99	-	-
2.00 mm	99	-	-
1.18 mm	99	-	-
600 µm	99	-	-
425 µm	99	-	-
300 µm	98	-	-
212 µm	98	-	-
150 µm	97	-	-
63 µm	95	-	-
0 µm	0		

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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0644	-	95	-
0.0460	-	92	-
0.0331	-	87	-
0.0236	-	84	-
0.0168	-	81	-
0.0089	-	73	-
0.0046	-	59	-
0.0024	-	44	-
0.0014	-	34	-

SUMMARY :

Gravel (%)	:	**1**
Sand (%)	:	**4**
Silt (%)	:	**55**
Clay (%)	:	**40**



Technician : C M Yip
Date : 12/08/2019

Checked By :
Name : T K Lam
Date : 17/08/2019

Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

HKAS has accredited this laboratory (Reg. No. HOKLAS 055) under 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. : J2999-272.48

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

Works Order No. : 272
Sample ID No. : HK1933349-015
Sample No. : G/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 12/08/2019
Tested Date : 12/08/2019

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

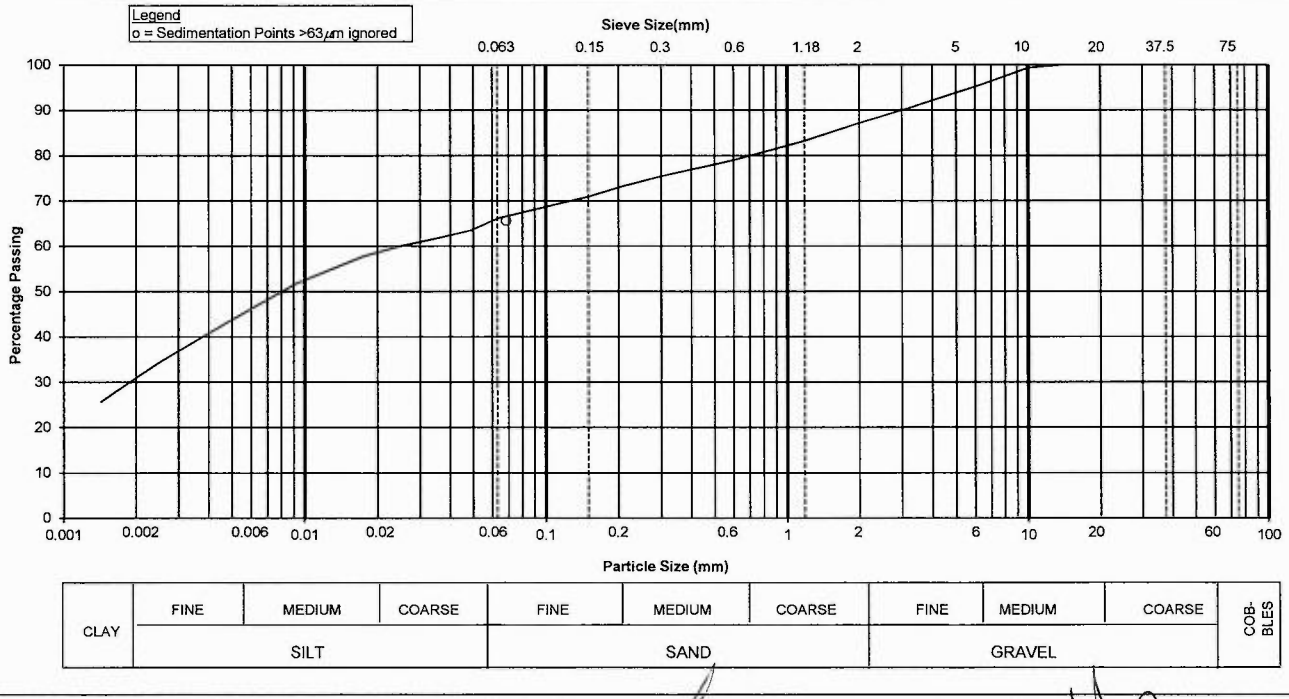
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	99	-	-
6.30 mm	95	-	-
5.00 mm	94	-	-
3.35 mm	91	-	-
2.00 mm	87	-	-
1.18 mm	83	-	-
600 µm	79	-	-
425 µm	77	-	-
300 µm	75	-	-
212 µm	73	-	-
150 µm	71	-	-
63 µm	66	-	-
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 (%)
0.0684	-	66	-
0.0487	-	63	-
0.0347	-	62	-
0.0246	-	60	-
0.0175	-	58	-
0.0092	-	52	-
0.0047	-	43	-
0.0024	-	34	-
0.0014	-	26	-

SUMMARY :

Gravel (%)	:	**13**
Sand (%)	:	**21**
Silt (%)	:	**36**
Clay (%)	:	**30**



Form : GESR003.5 / Sept.14.18 / Issue 1 / Rev 3

Technician : C M Yip
Date : 12/08/2019

Checked By :
Name : T K Lam
Date : 17/08/2019

Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

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. : J2999-272.48

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

Works Order No. : 272
Sample ID No. : HK1933349-016
Sample No. : H/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 12/08/2019
Tested Date : 12/08/2019

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

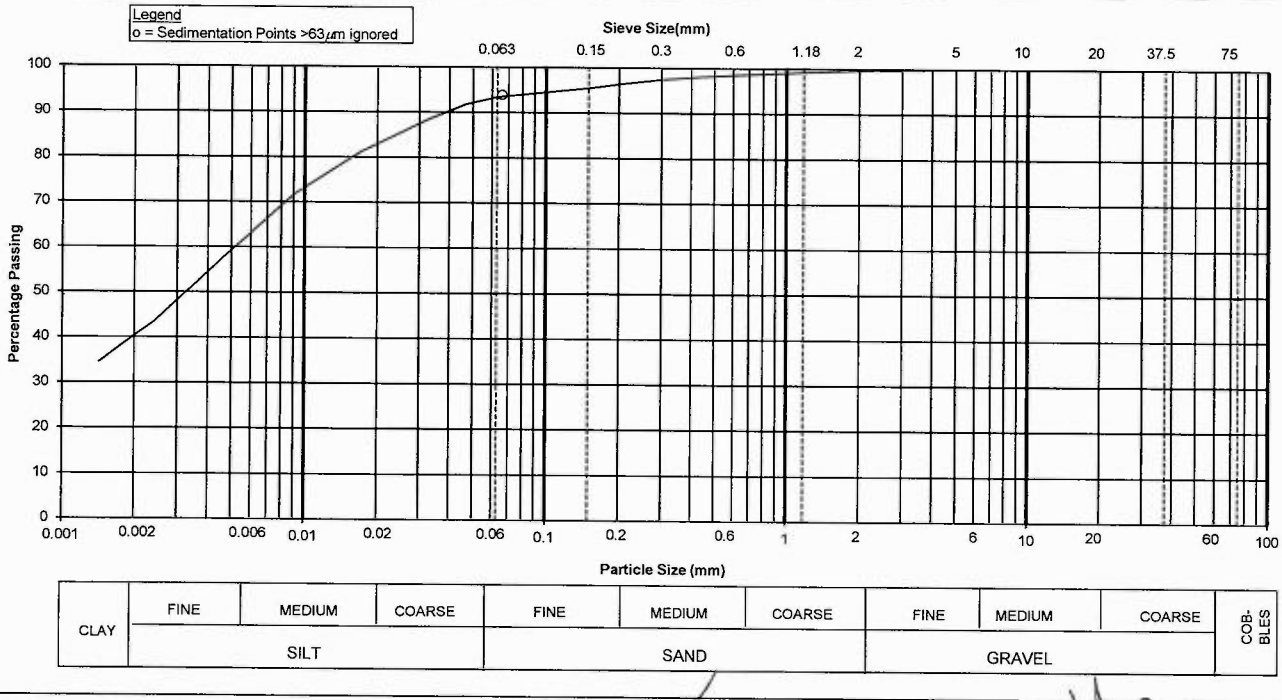
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	99	-	-
600 µm	99	-	-
425 µm	98	-	-
300 µm	97	-	-
212 µm	97	-	-
150 µm	95	-	-
63 µm	93	-	-
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	-	94	-
0.0469	-	92	-
0.0334	-	89	-
0.0239	-	85	-
0.0171	-	81	-
0.0090	-	72	-
0.0047	-	58	-
0.0024	-	44	-
0.0014	-	34	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**7**
Silt (%)	:	**53**
Clay (%)	:	**40**



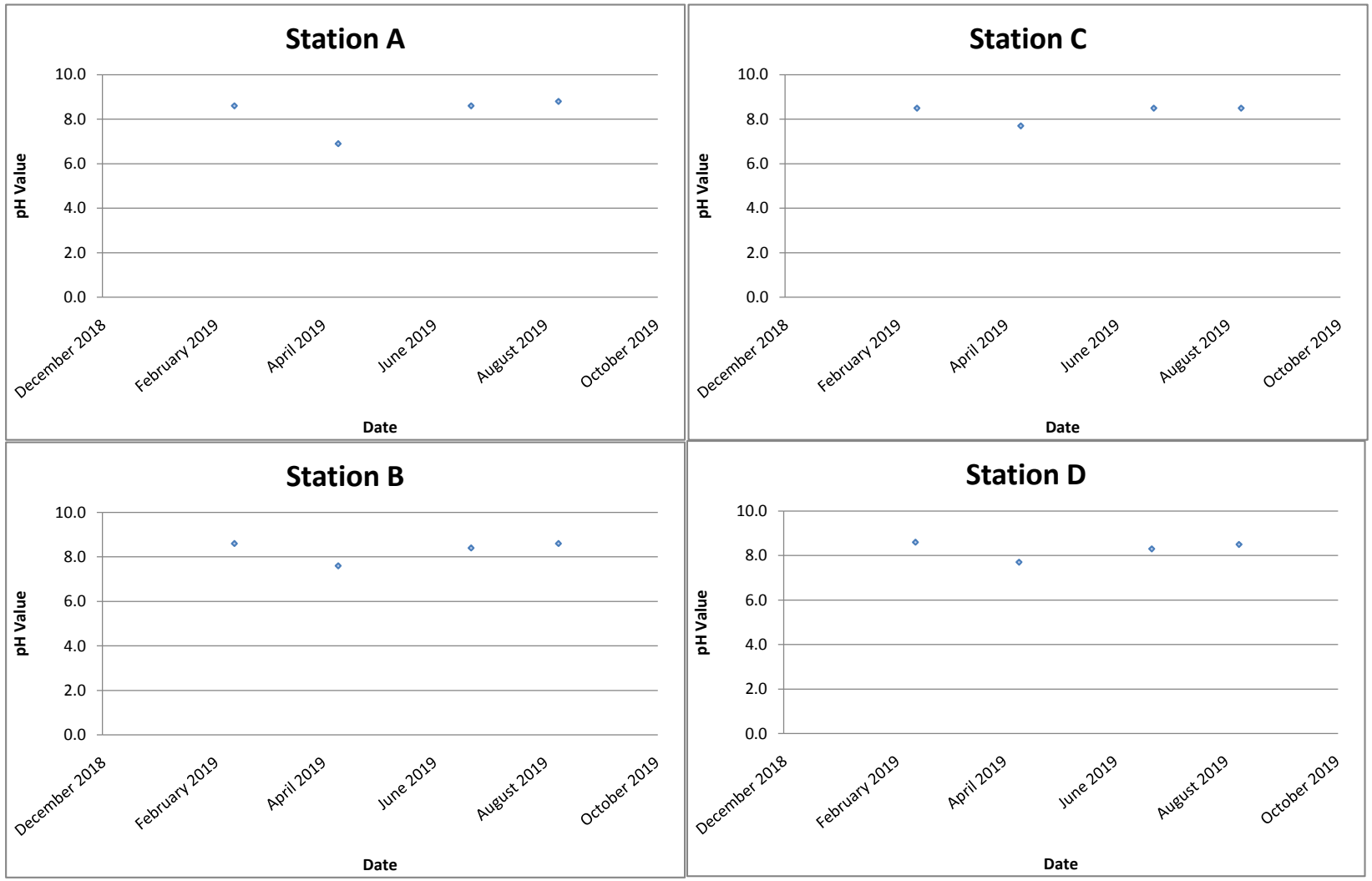
Technician : C M Yip
Date : 12/08/2019

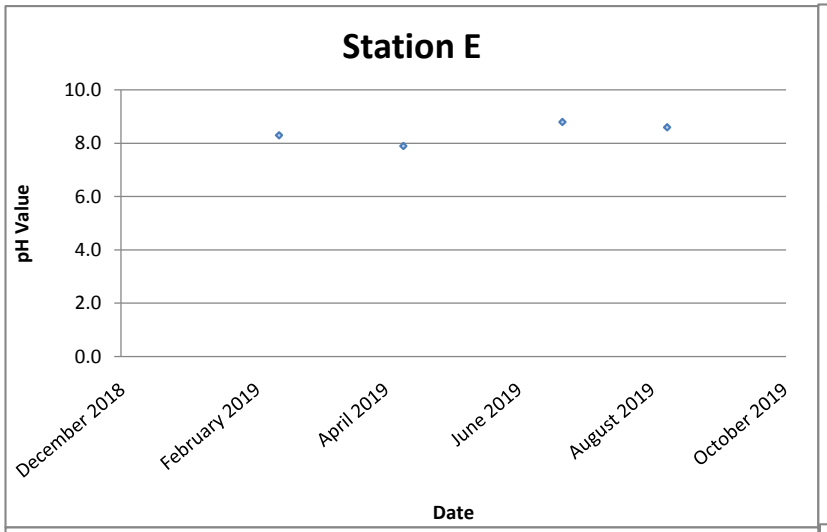
Checked By :
Name : T K Lam
Date : 17/08/2019

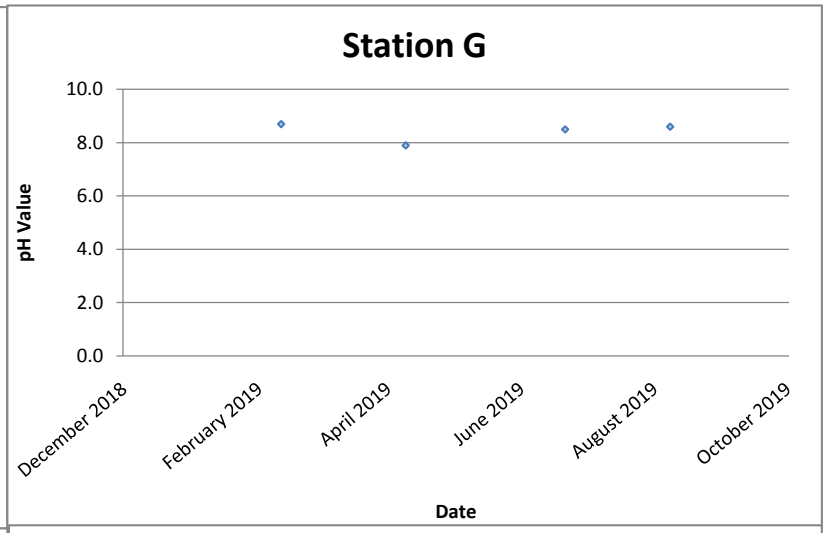
Approved By :
Signatory : Chung Hei Wing
Date : 17/08/2019

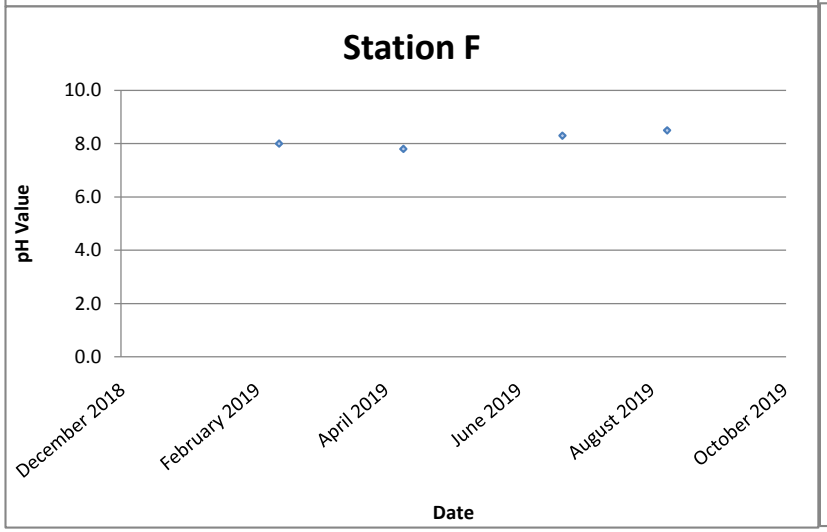
HKAS has accredited this laboratory (Reg. No. HOKLAS 055) under HOKLAS for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. This report shall not be reproduced unless with prior written approval from this laboratory.

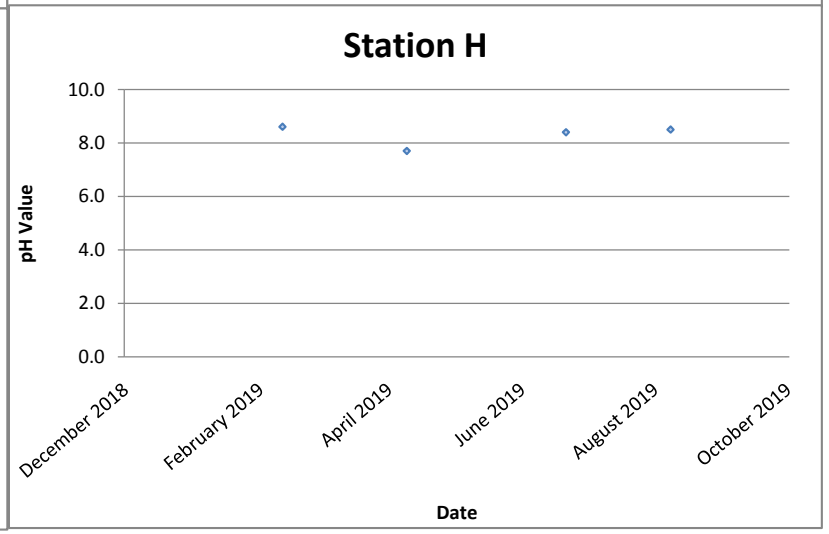
Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

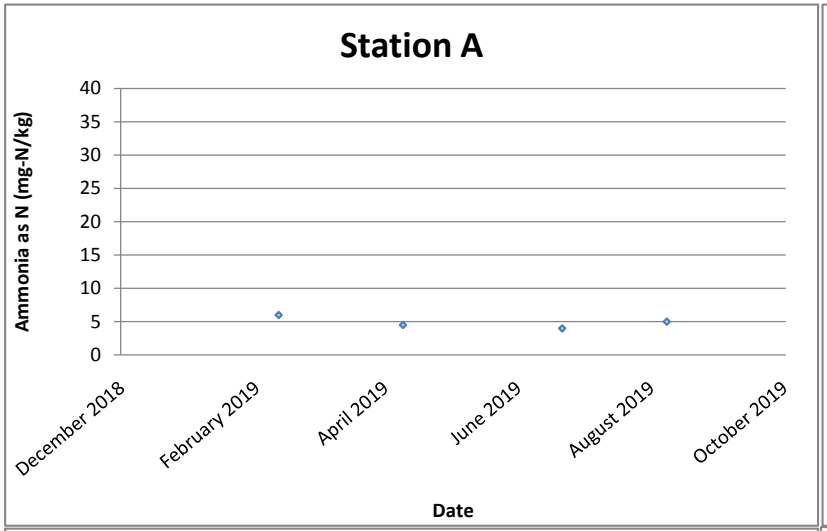

Station A
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

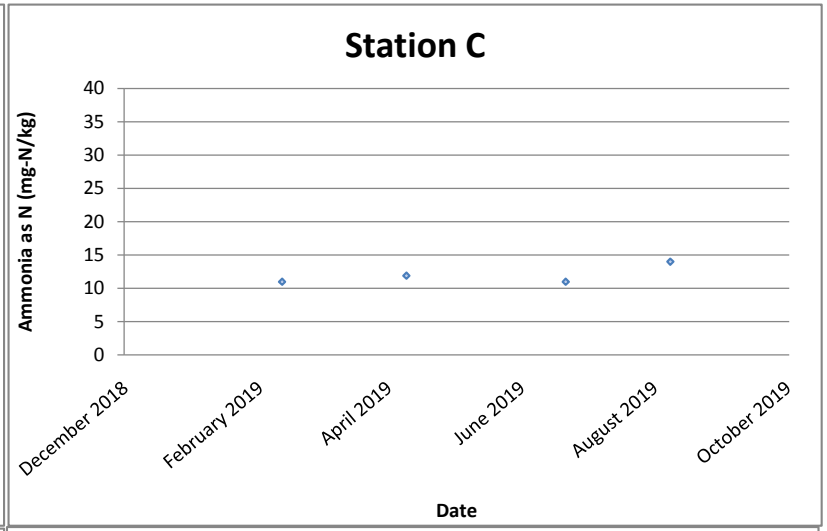

Station E
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

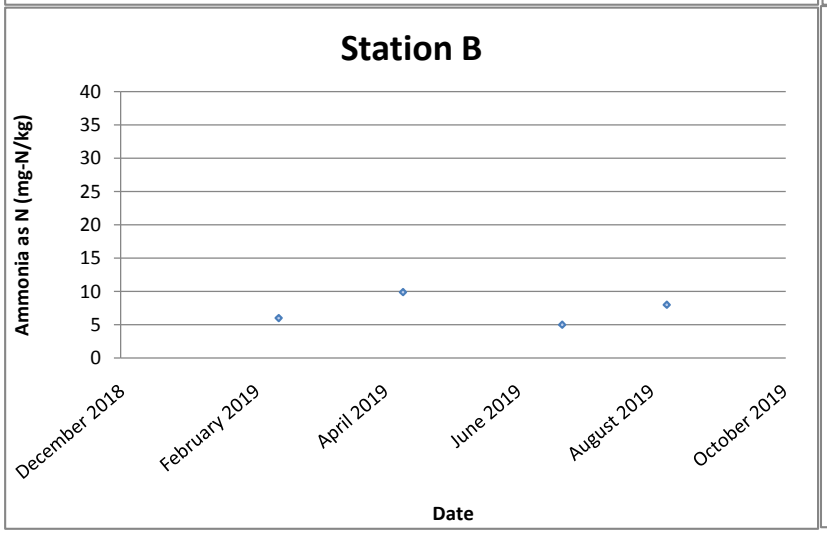

Station G
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

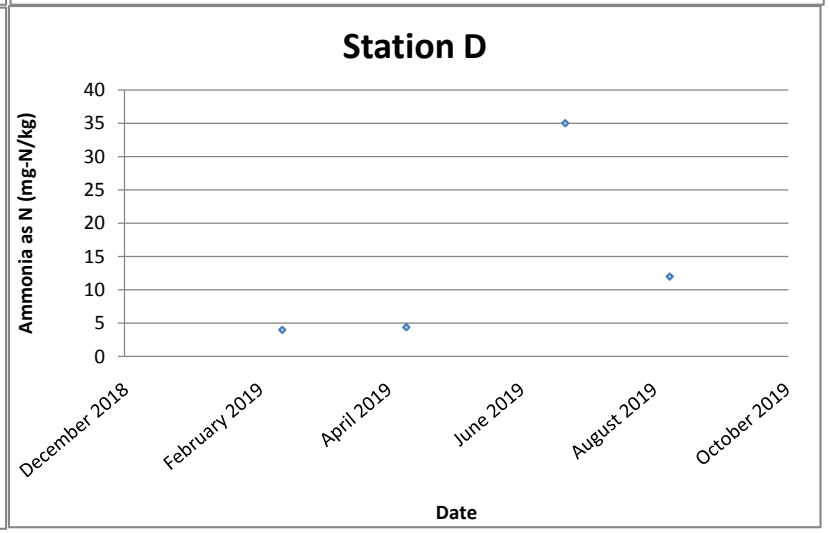

Station F
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

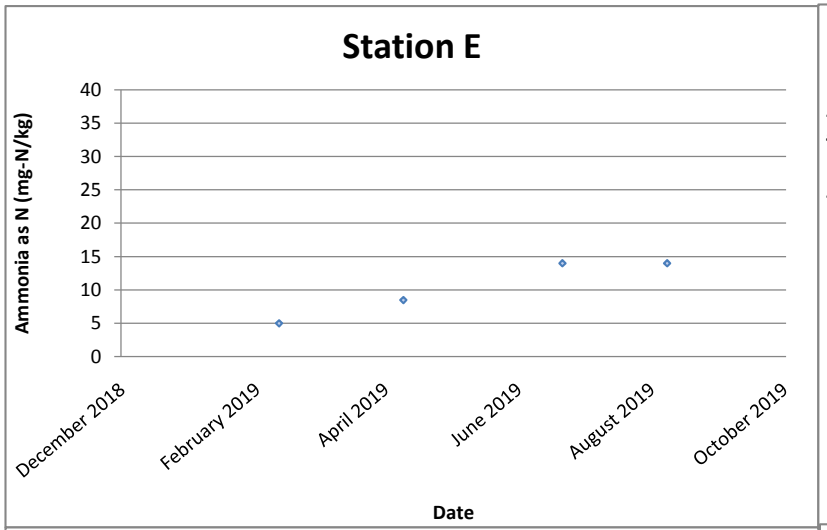

Station H
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

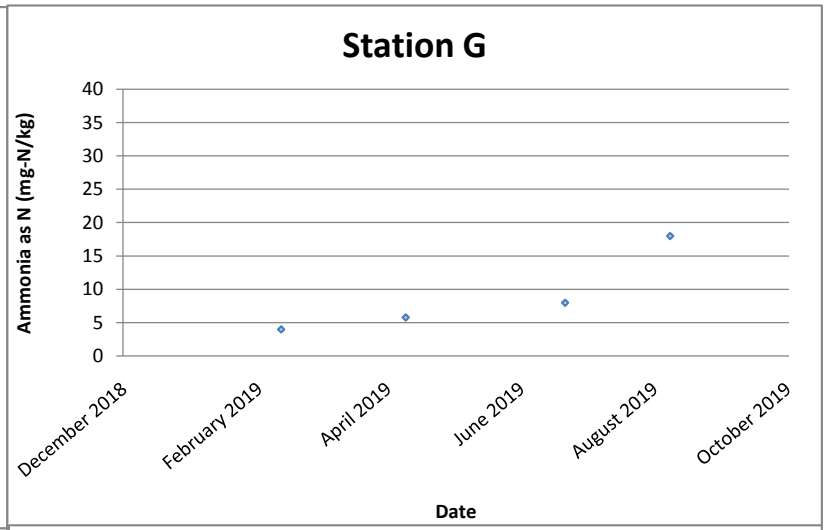

Station A
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

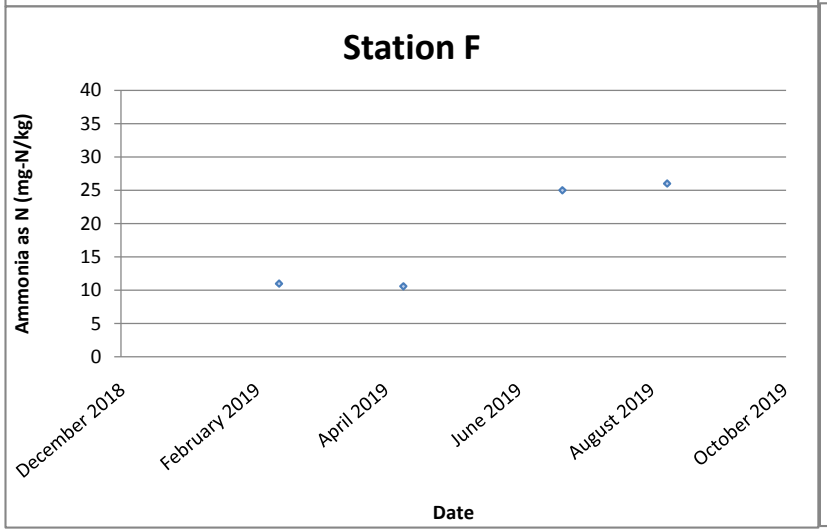

Station C
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

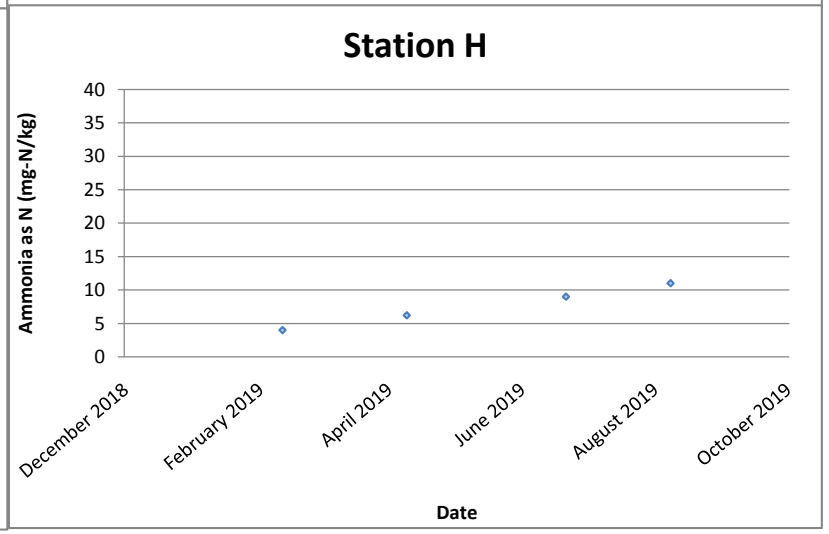

Station B
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

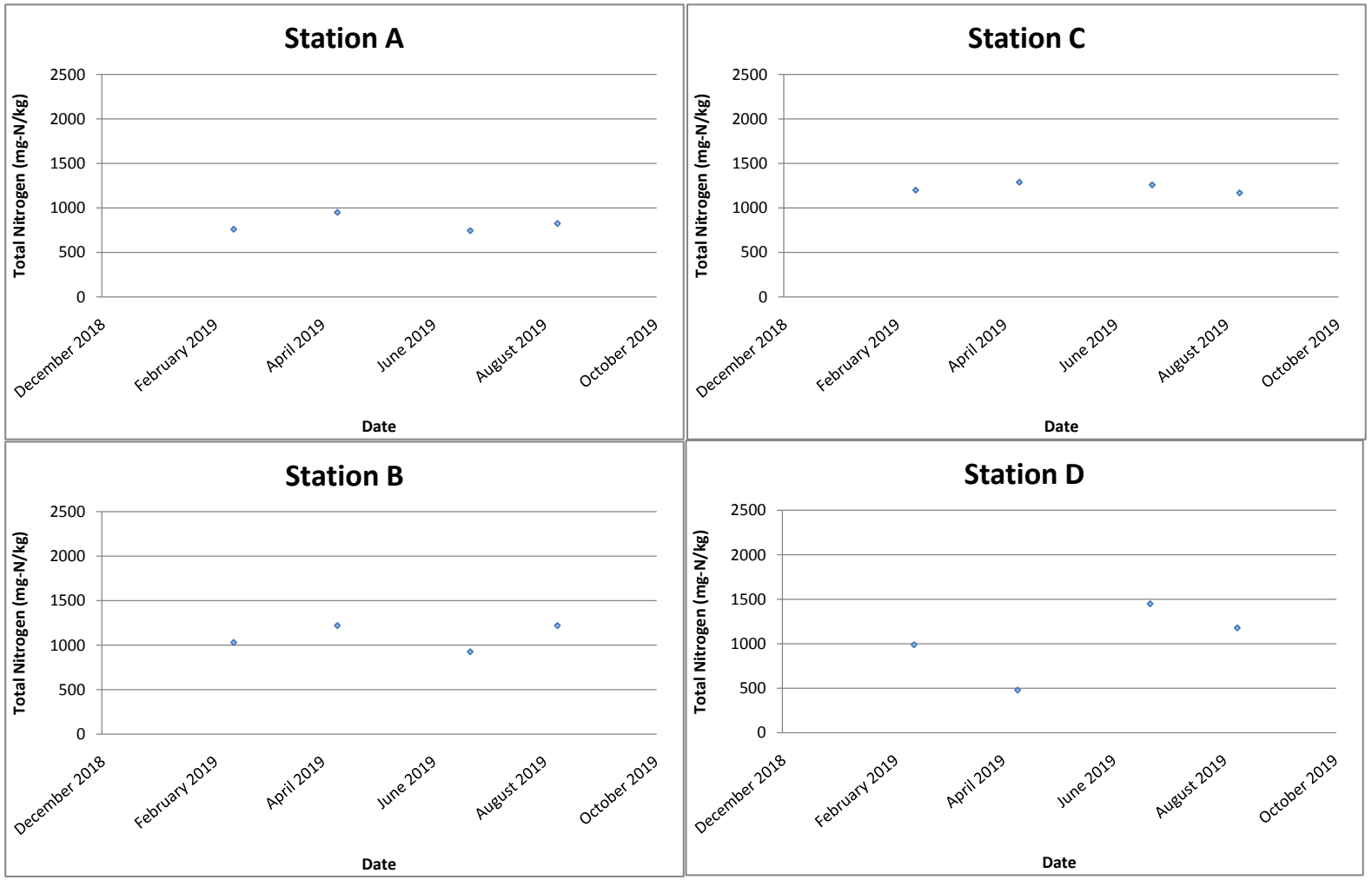

Station D
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

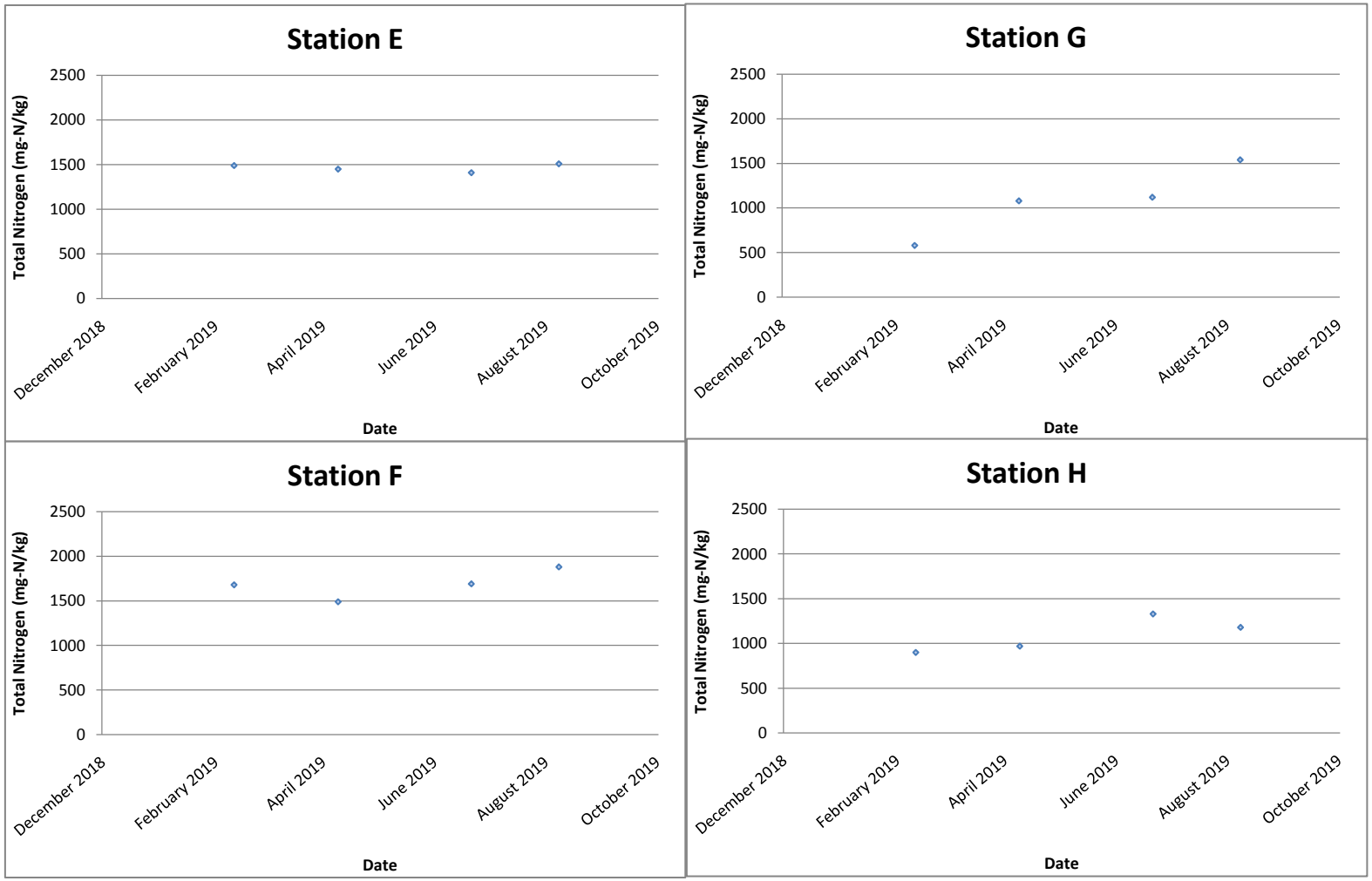

Station E
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

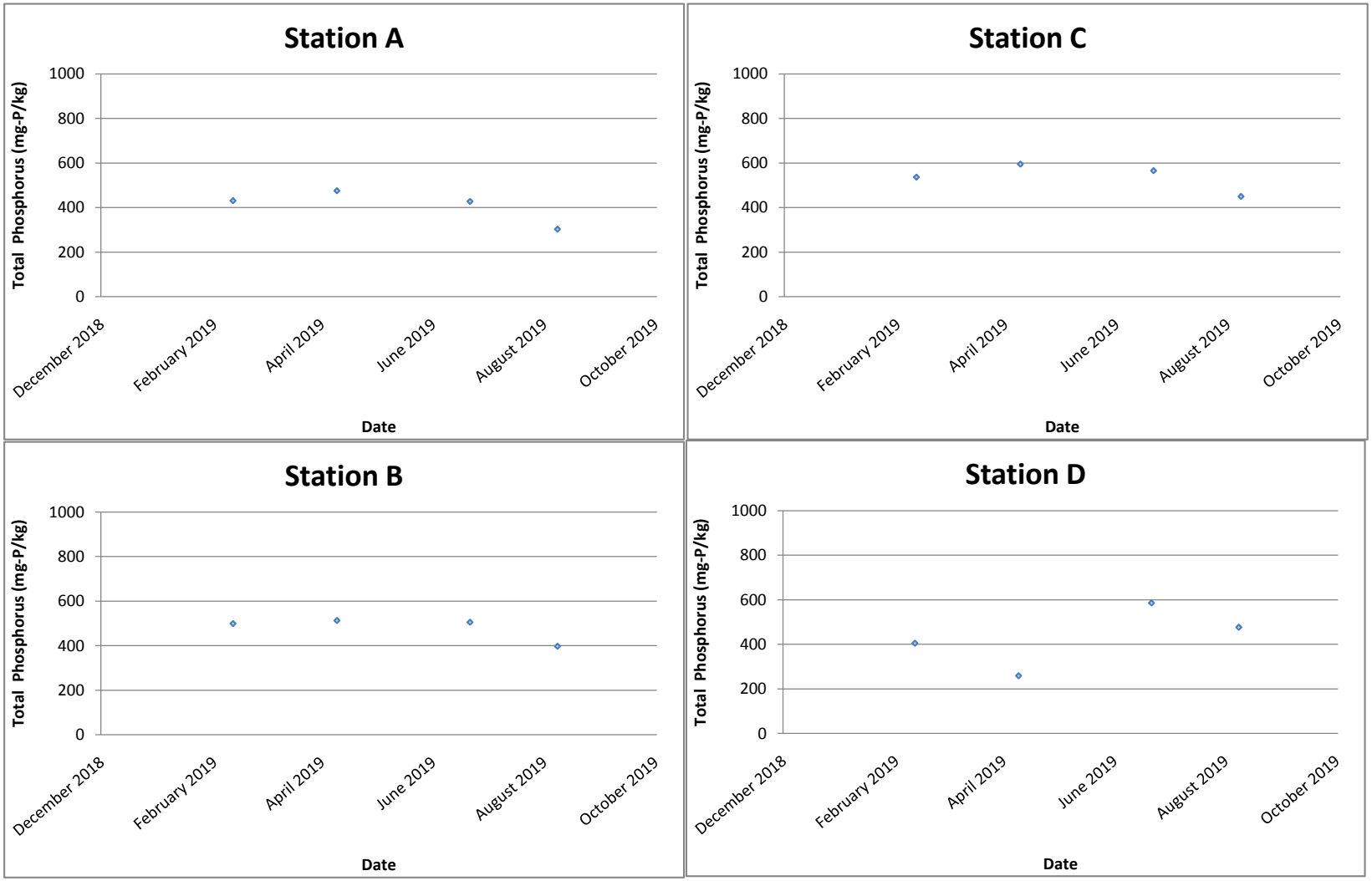

Station G
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

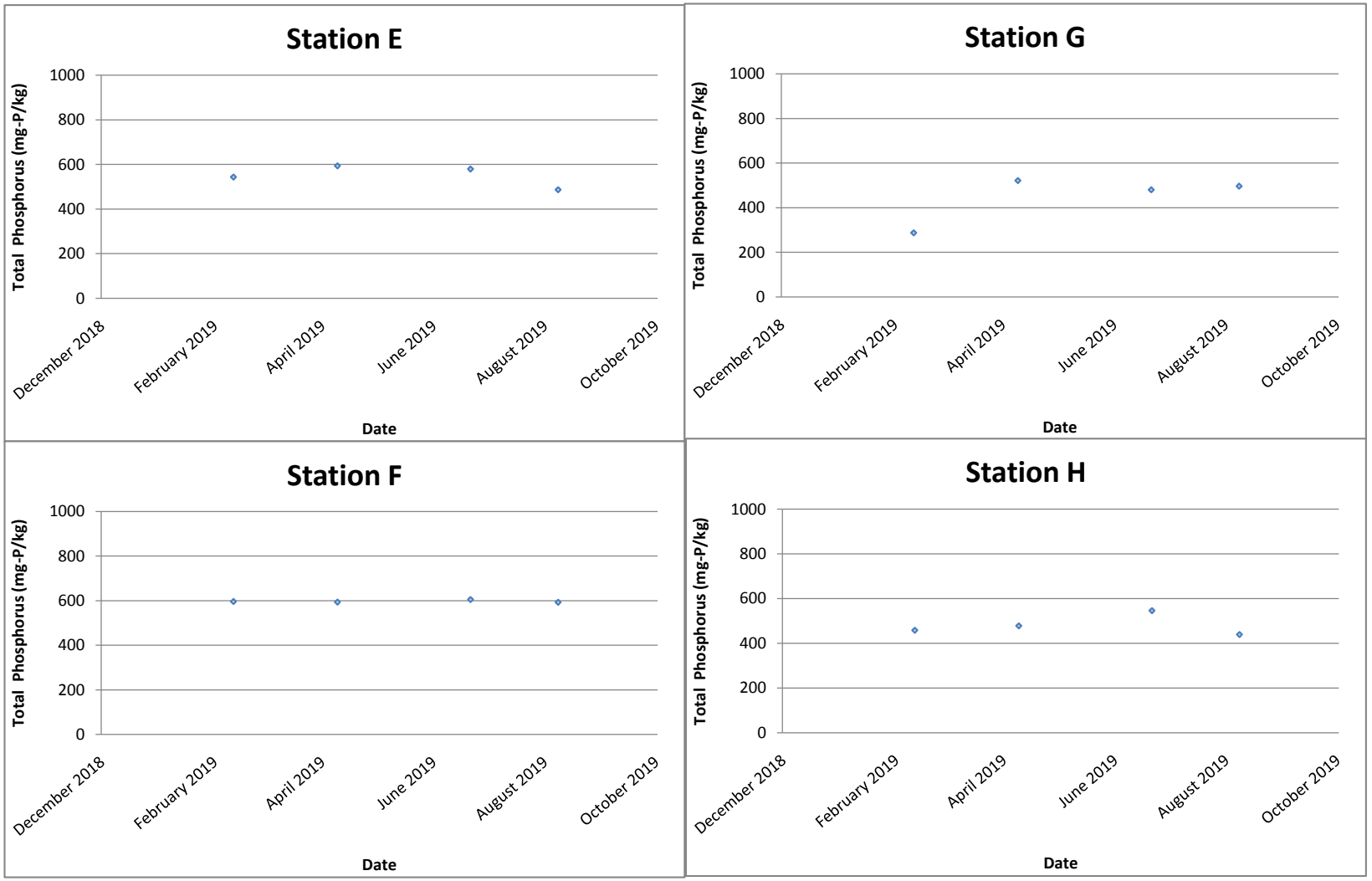

Station F
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date


Station H
Ammonia as N (mg-N/kg)
40
35
30
25
20
15
10
5
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

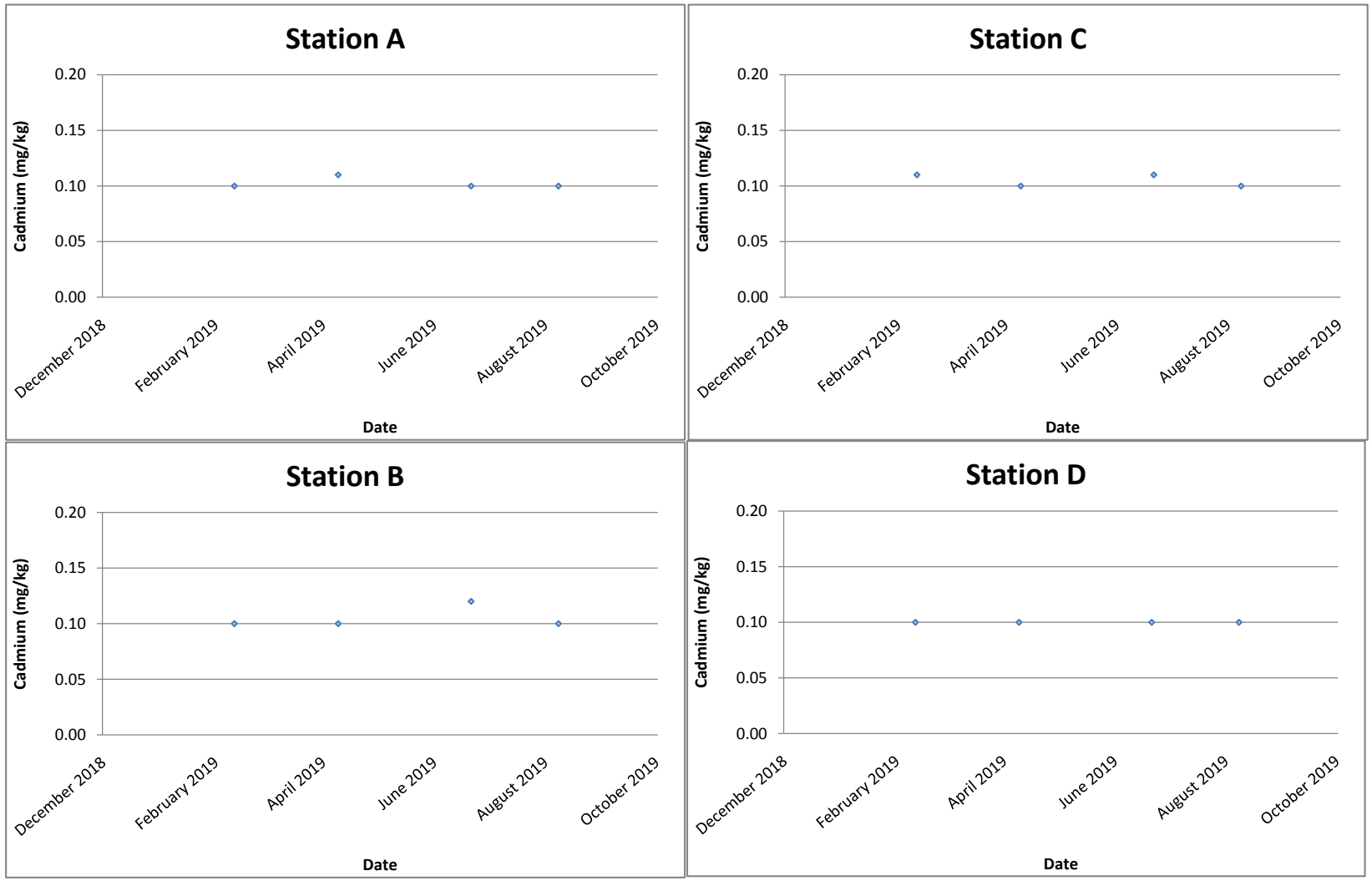

Station A
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date


Station E
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date


Station A
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

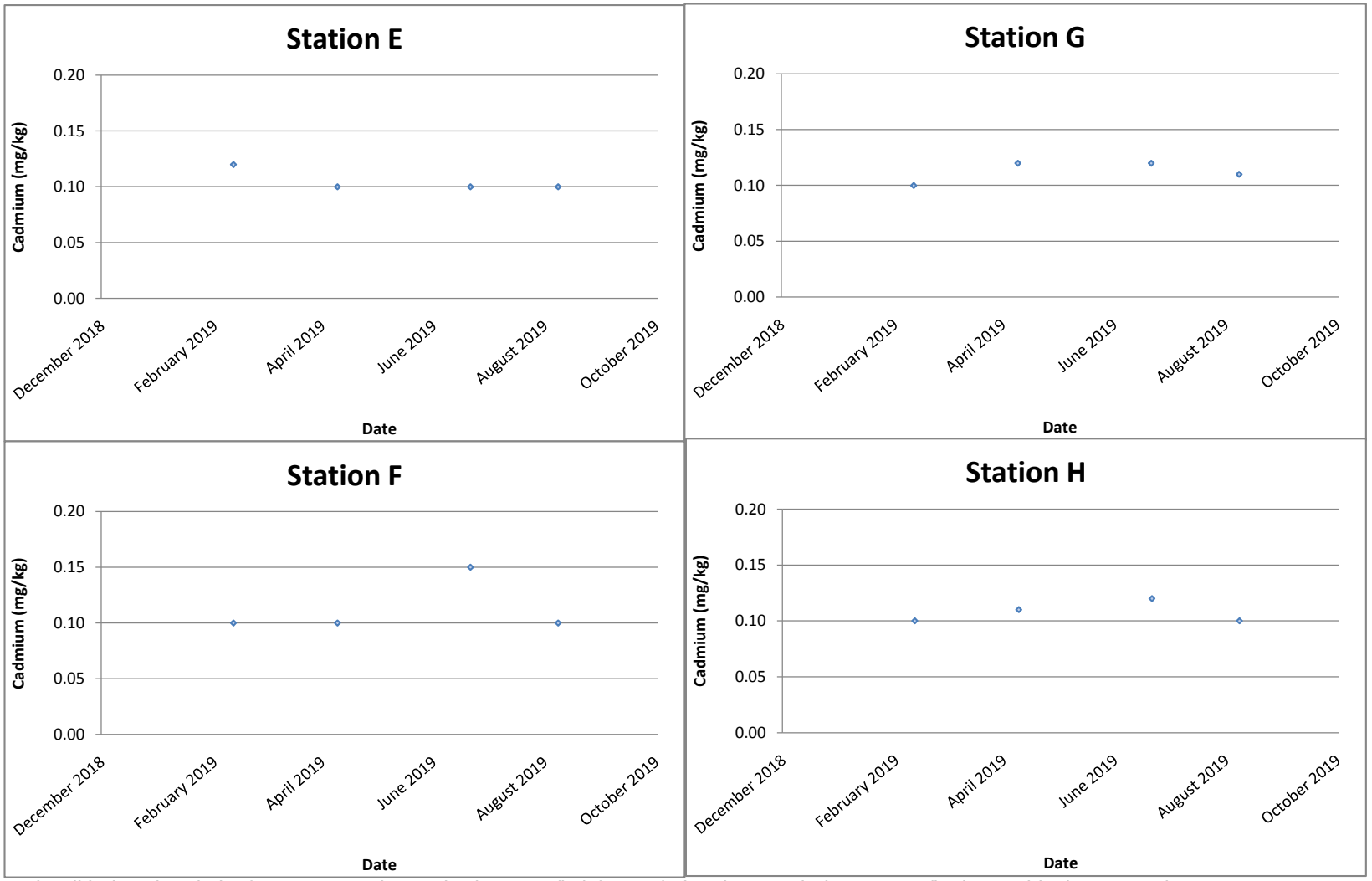

Station E
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

Cadmium (mg/kg)

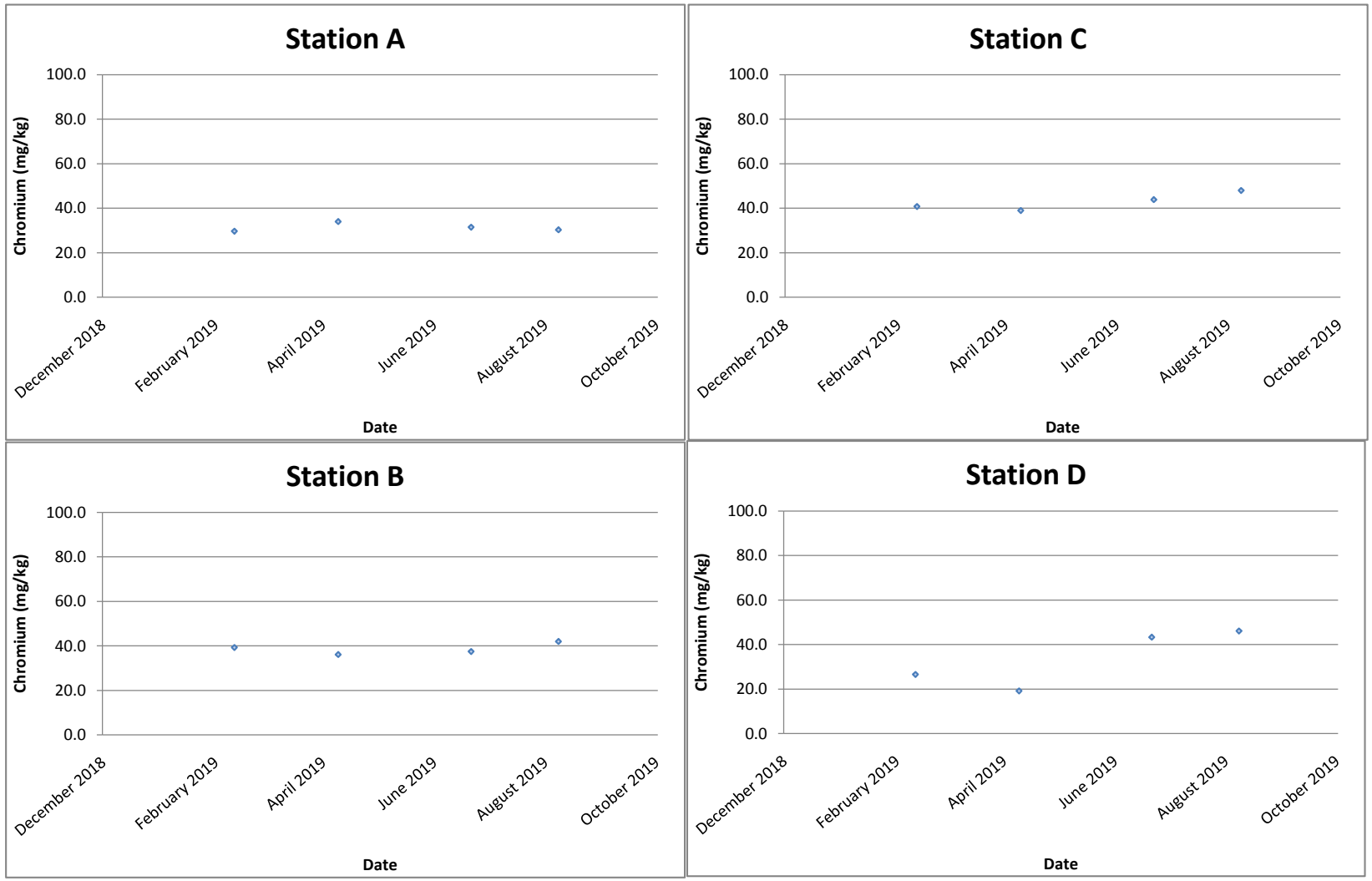


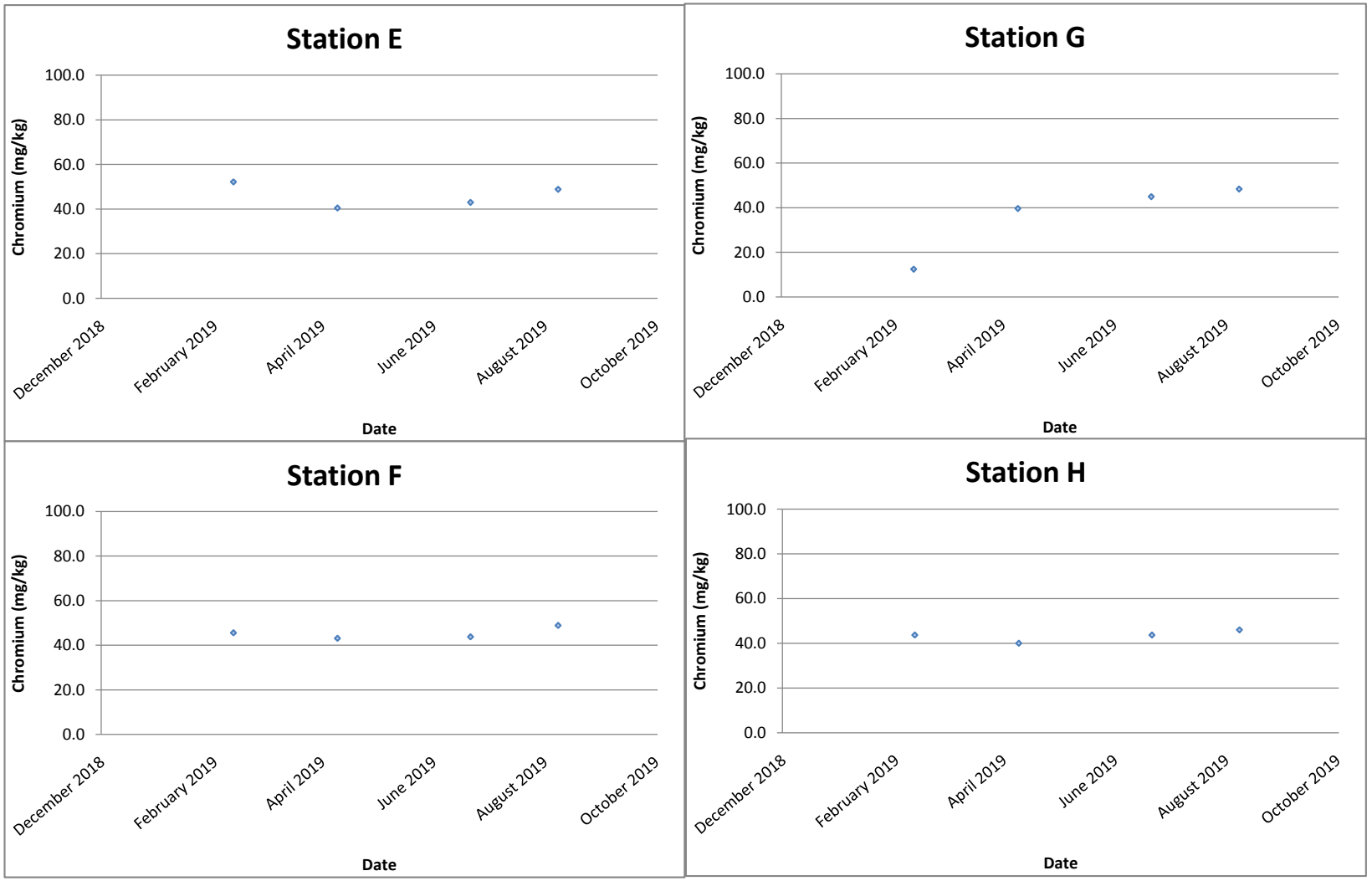
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

Cadmium (mg/kg)

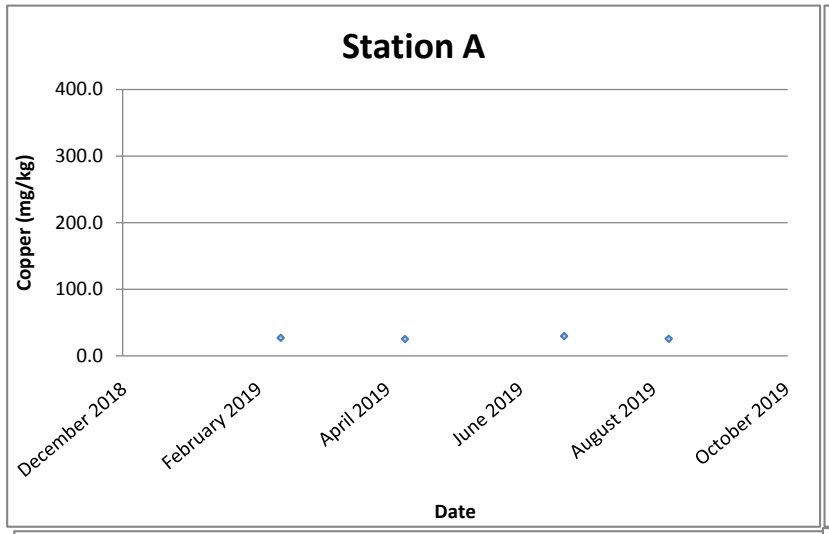


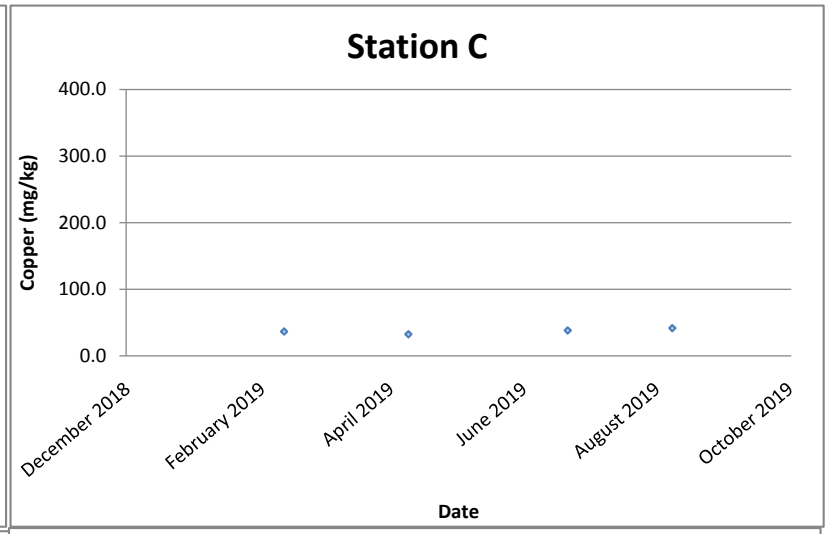
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

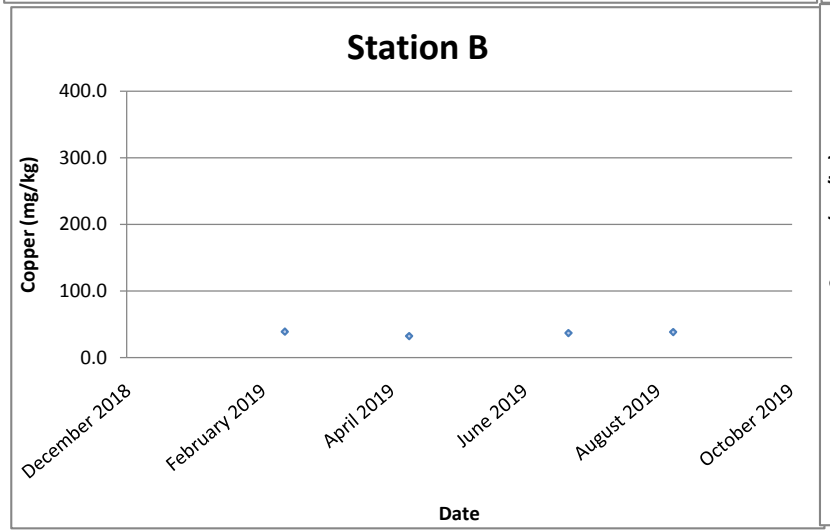

Station A
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

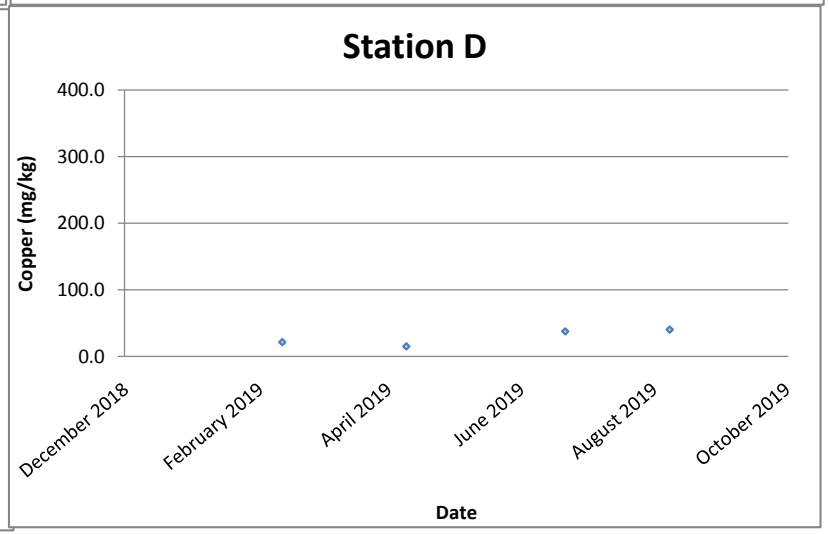

Station E
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

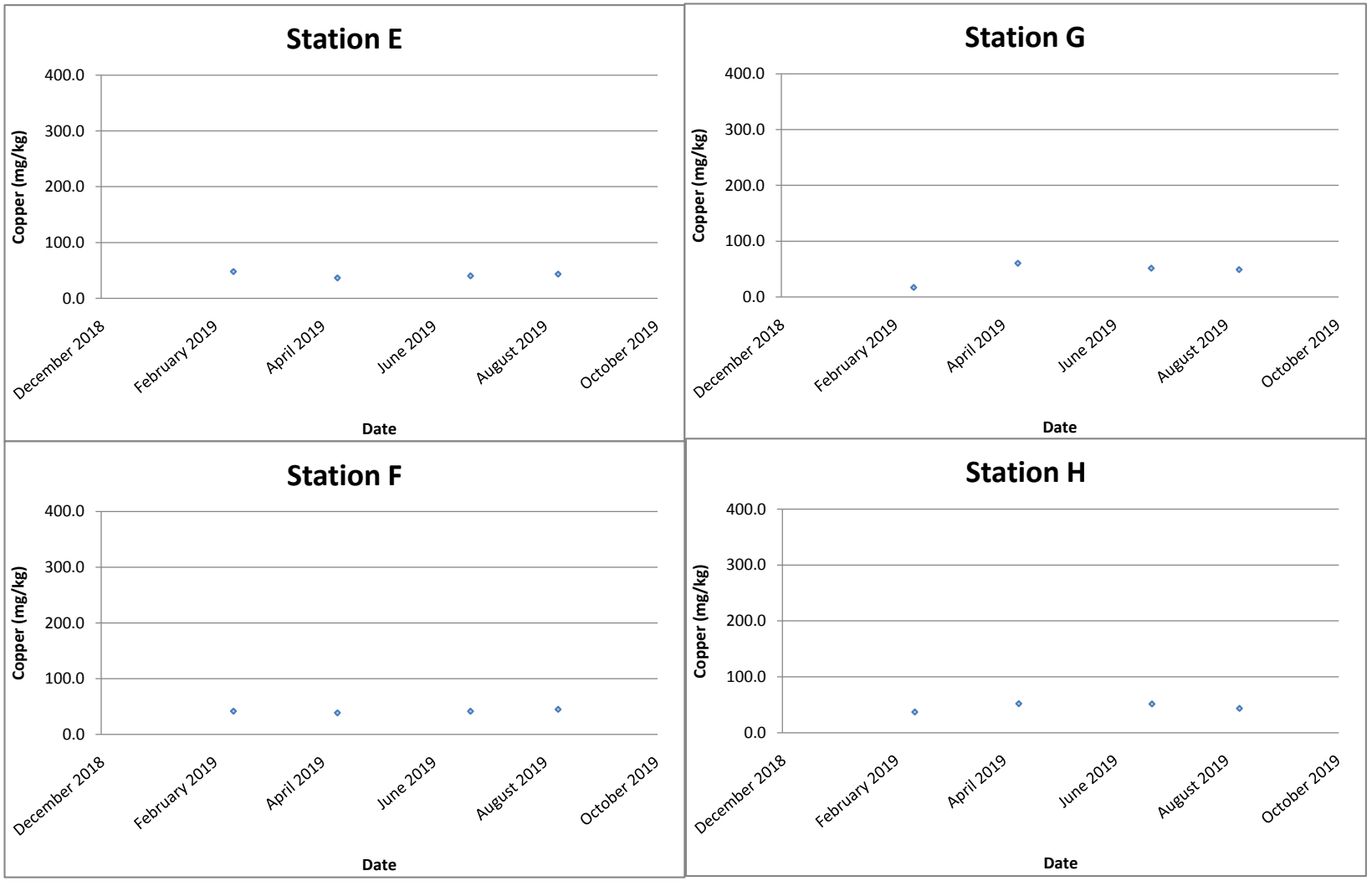
Copper (mg/kg)


Station A
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

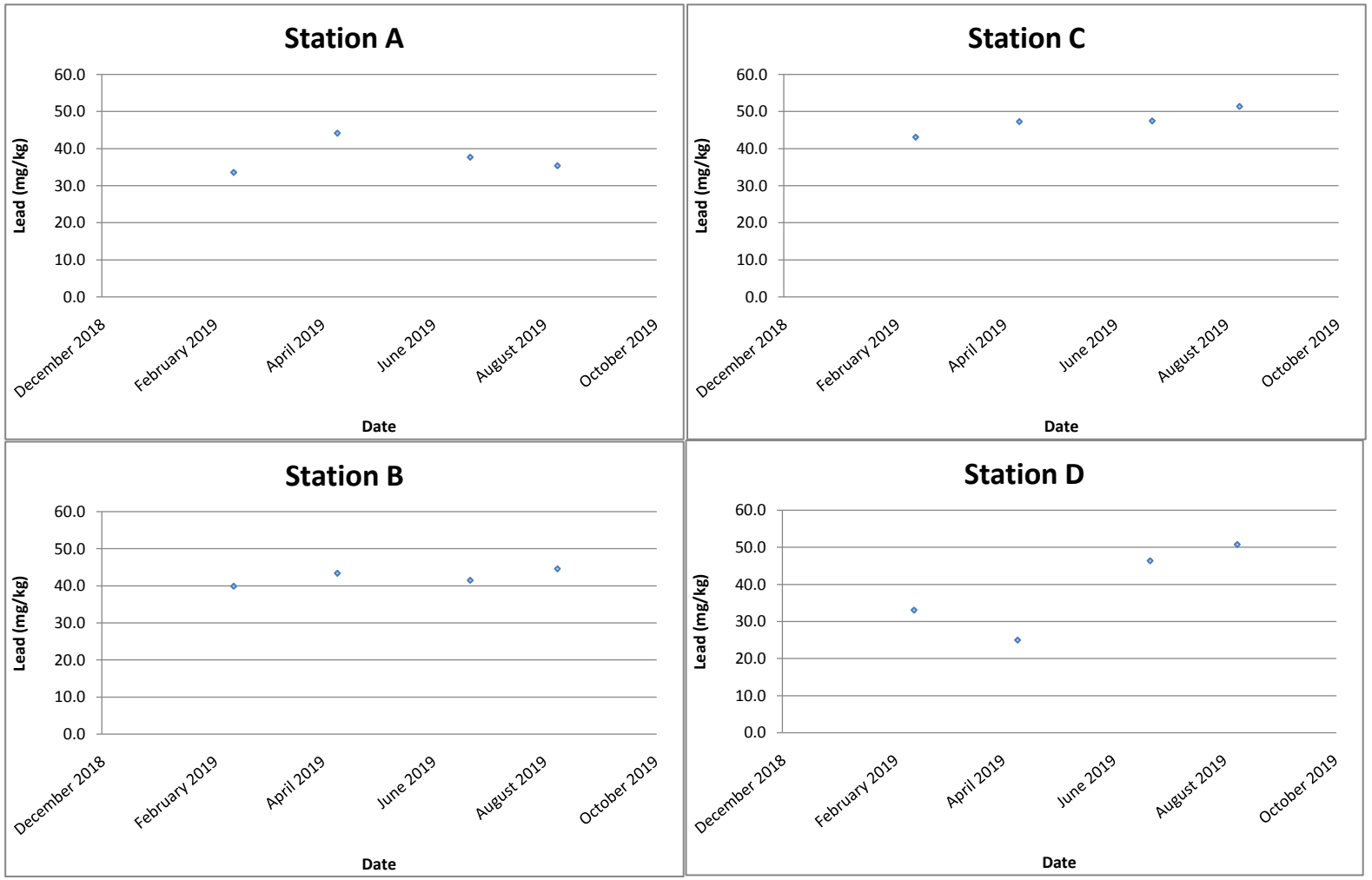

Station C
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

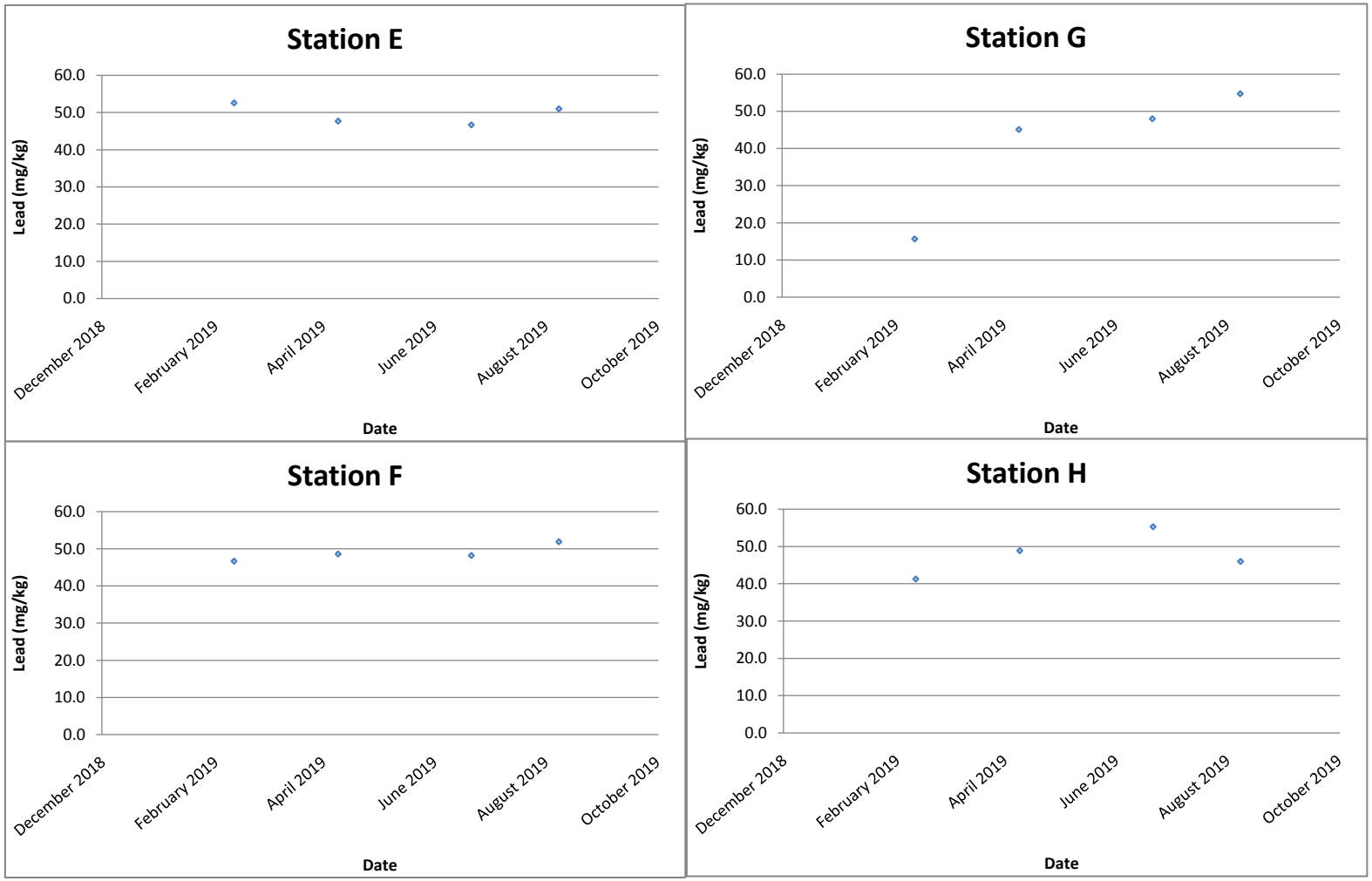

Station B
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

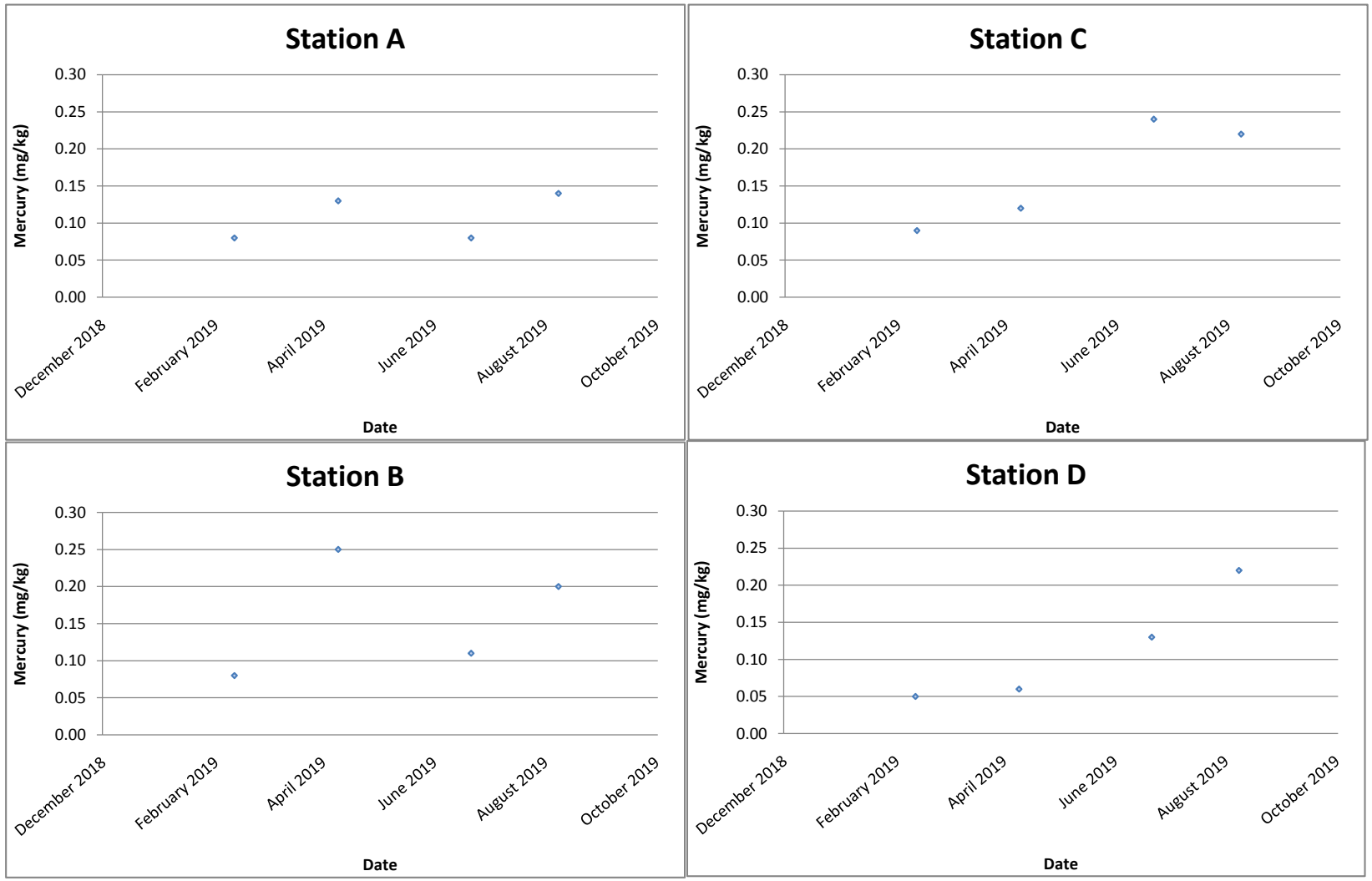

Station D
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

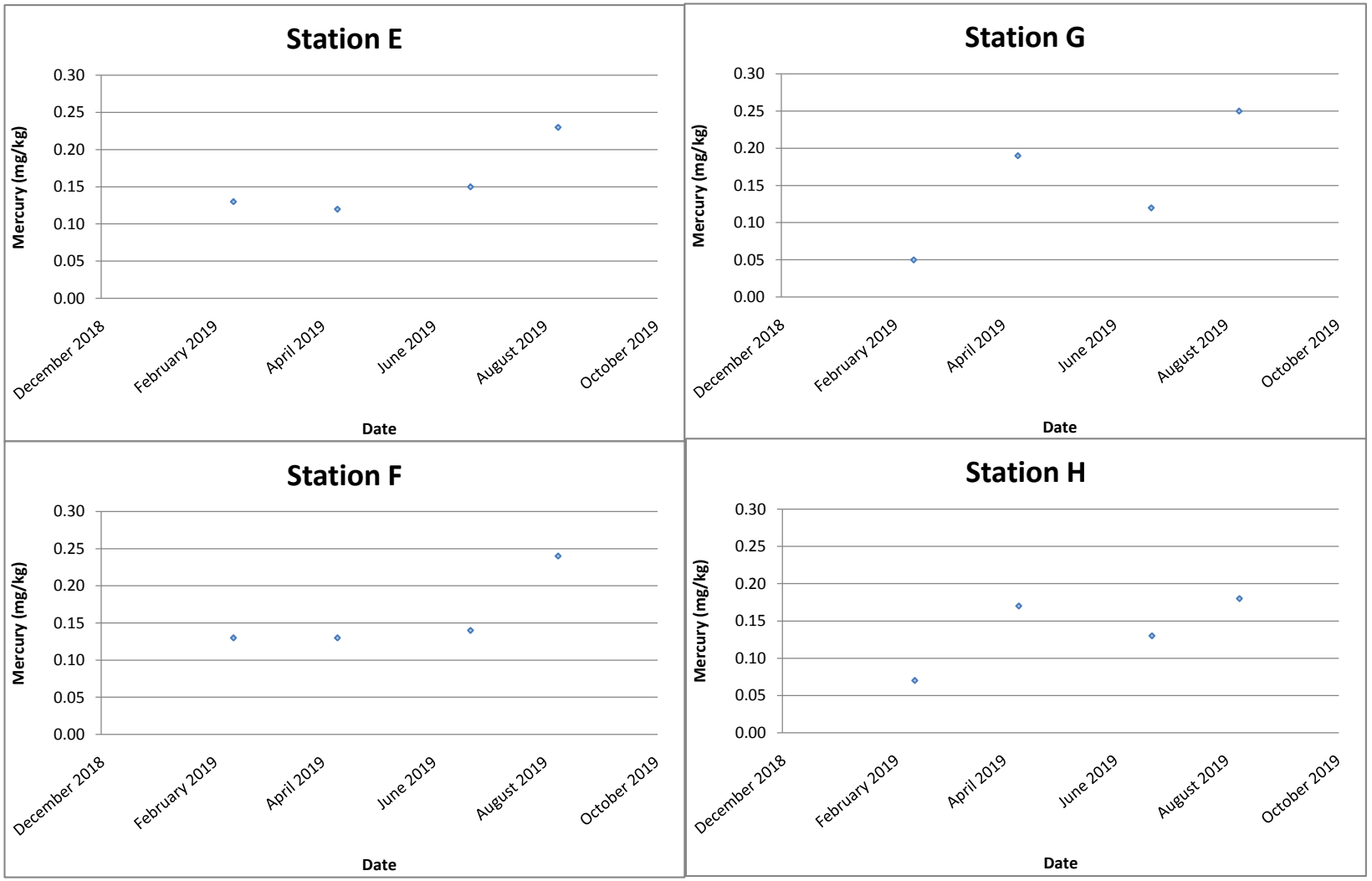

Station E
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

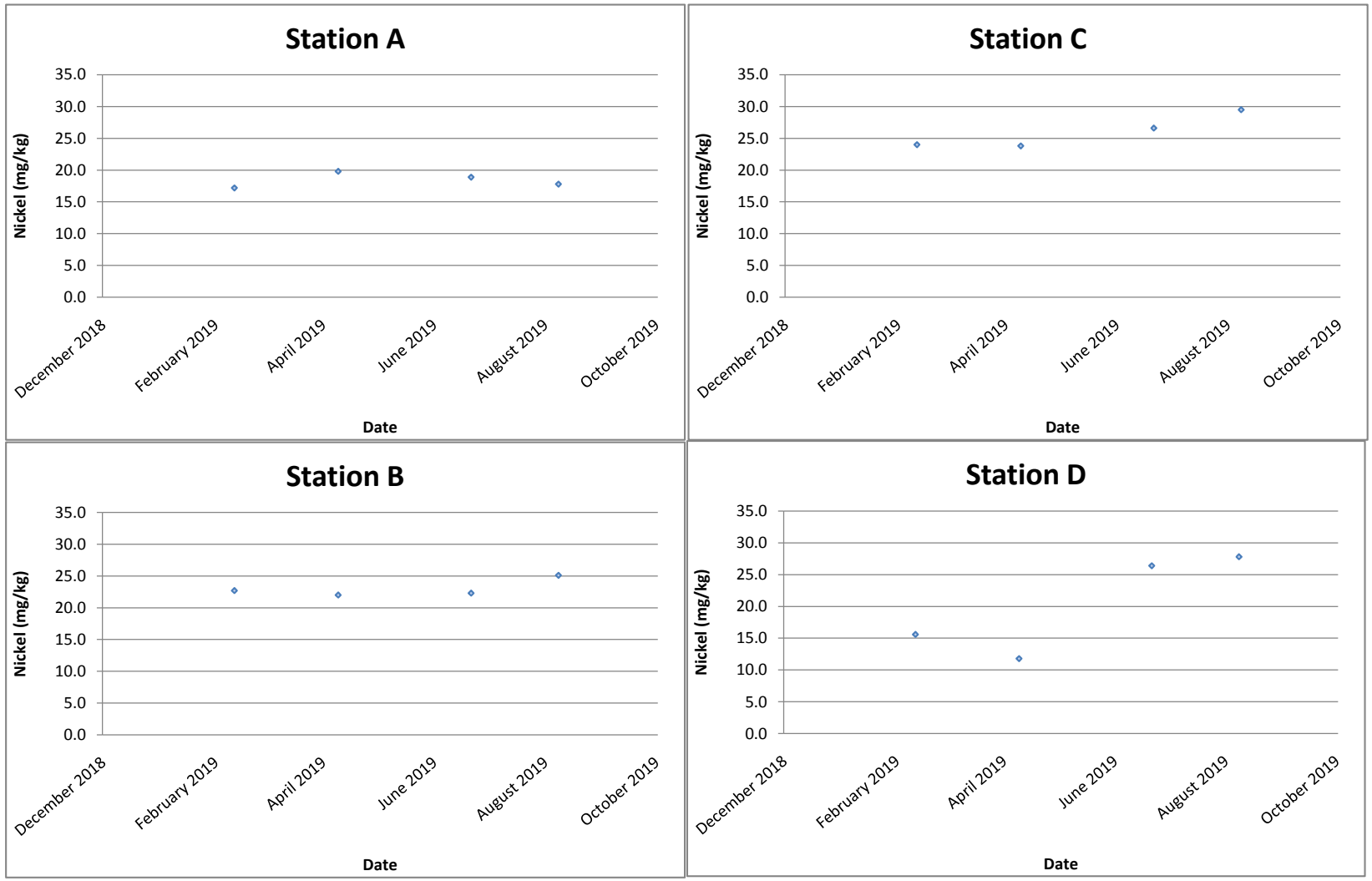
Lead (mg/kg)

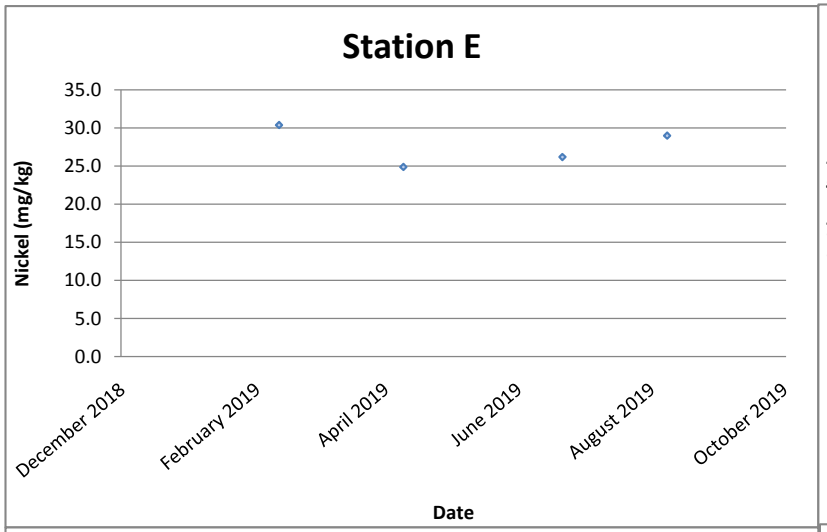

Station A
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

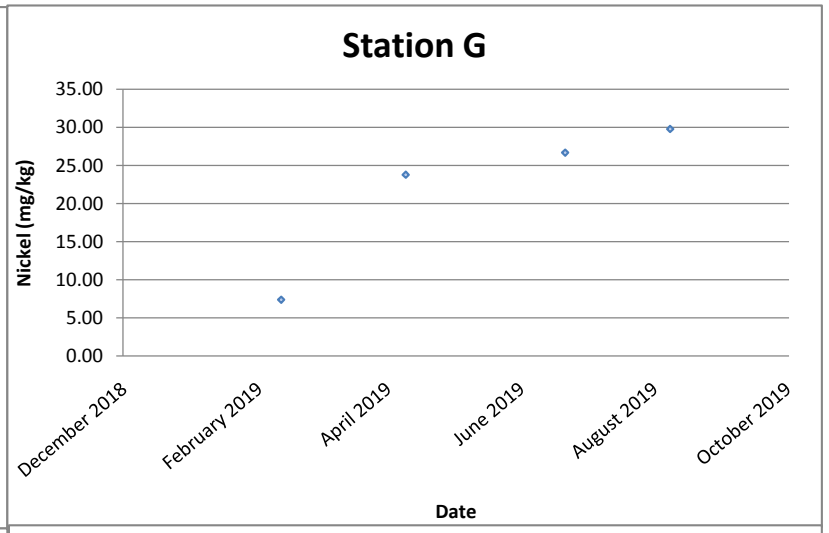

Station E
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Lead (mg/kg)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

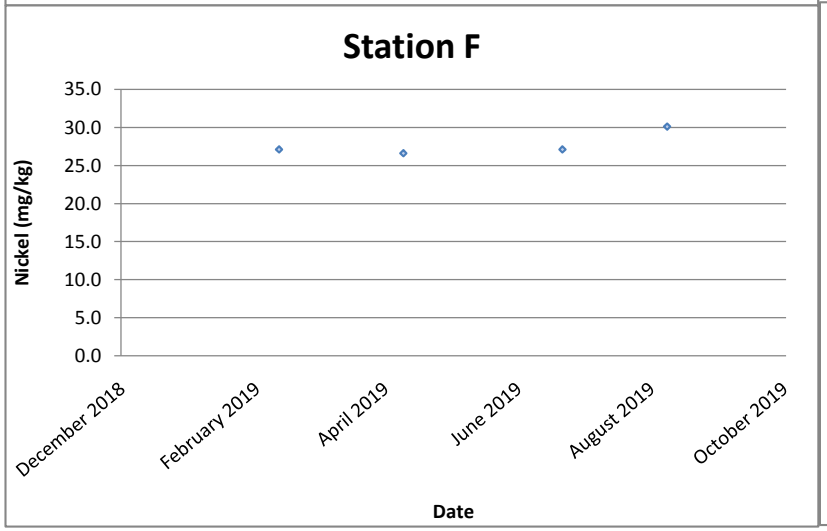

Station A
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

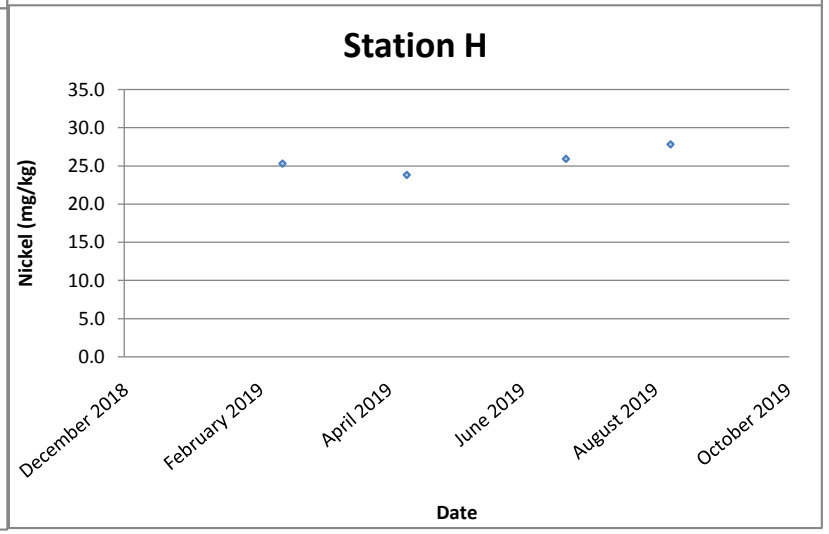

Station E
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Mercury (mg/kg)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date


Station A
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

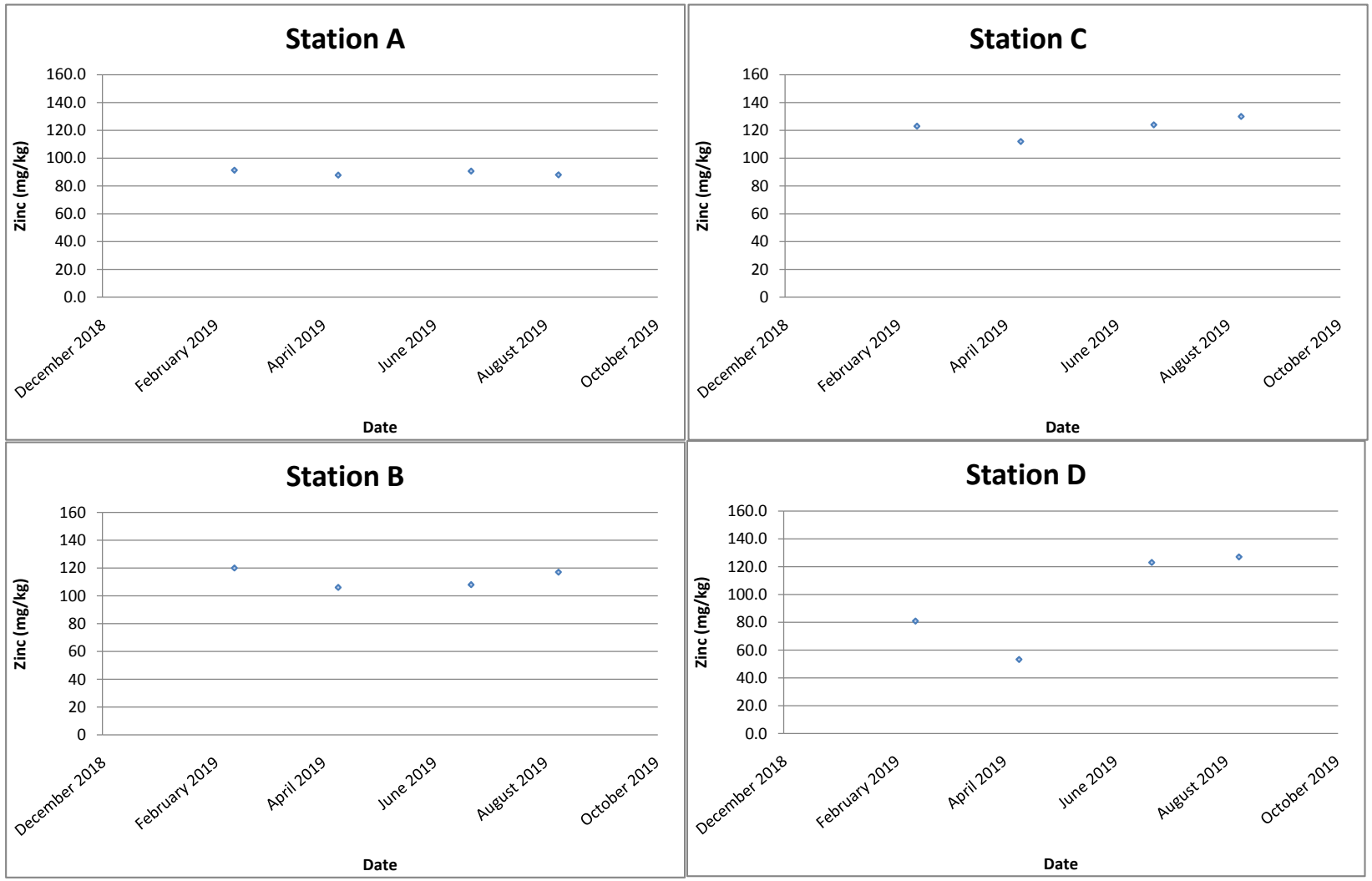

Station E
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

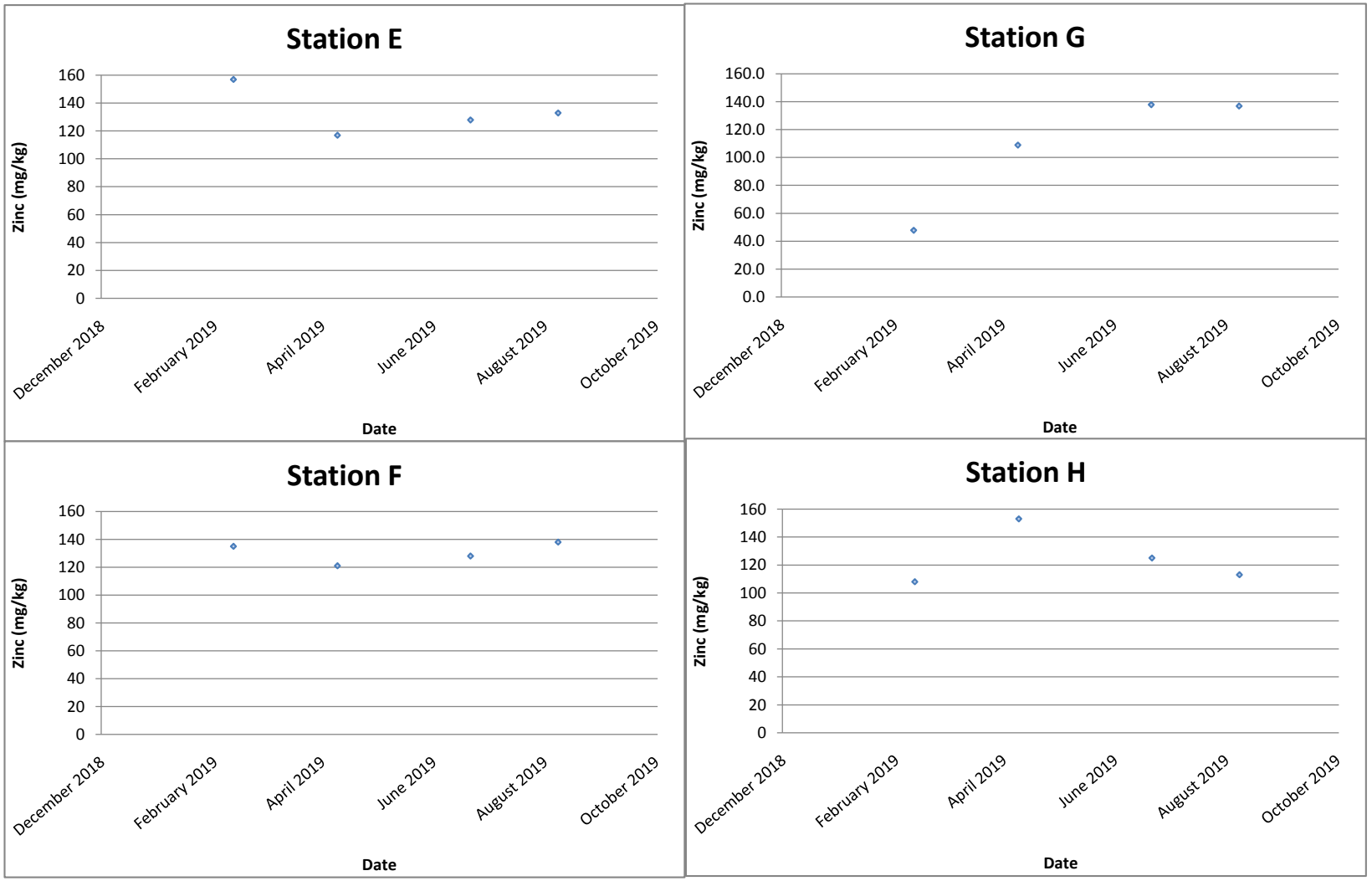

Station G
Nickel (mg/kg)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

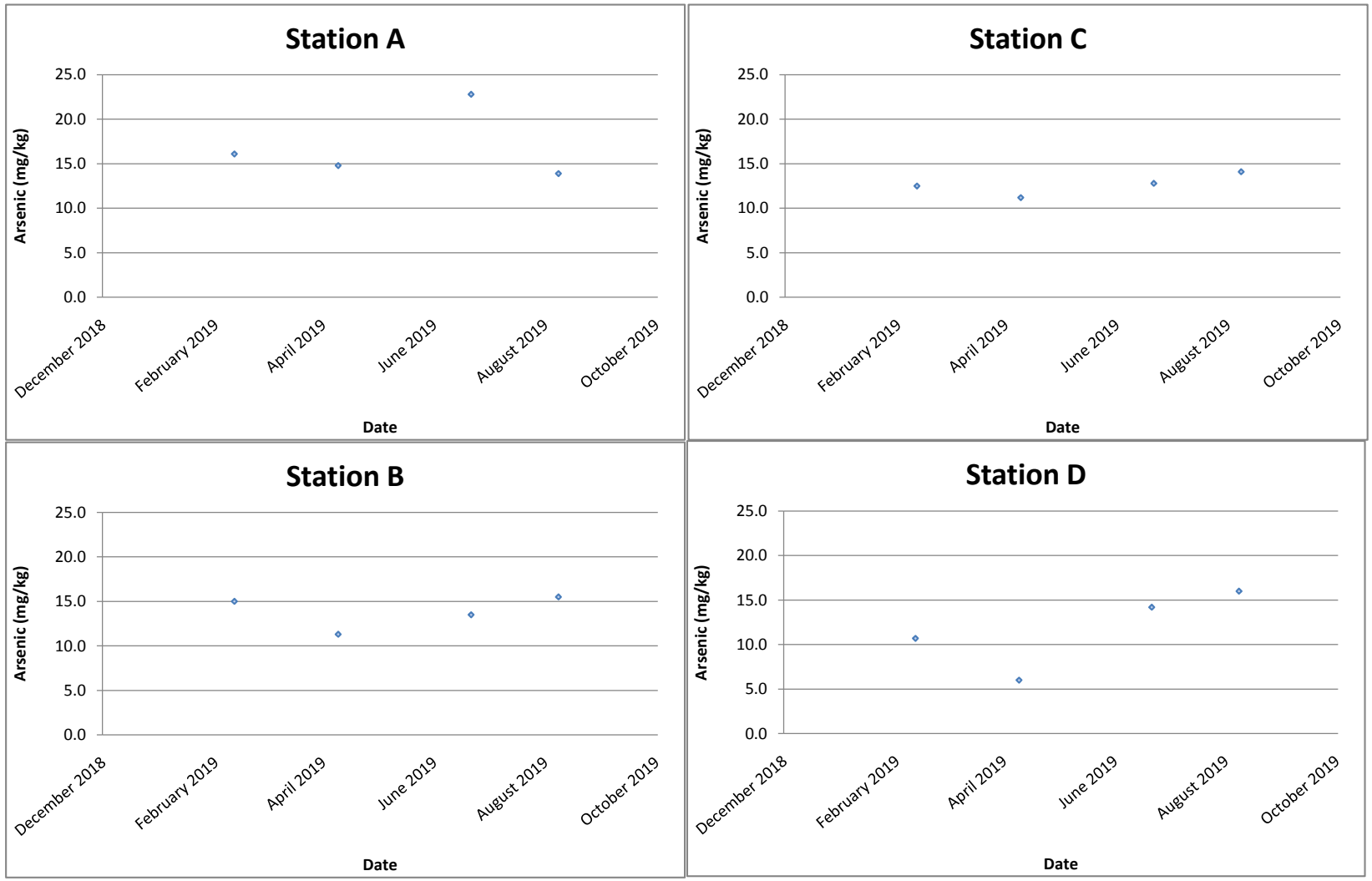

Station F
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

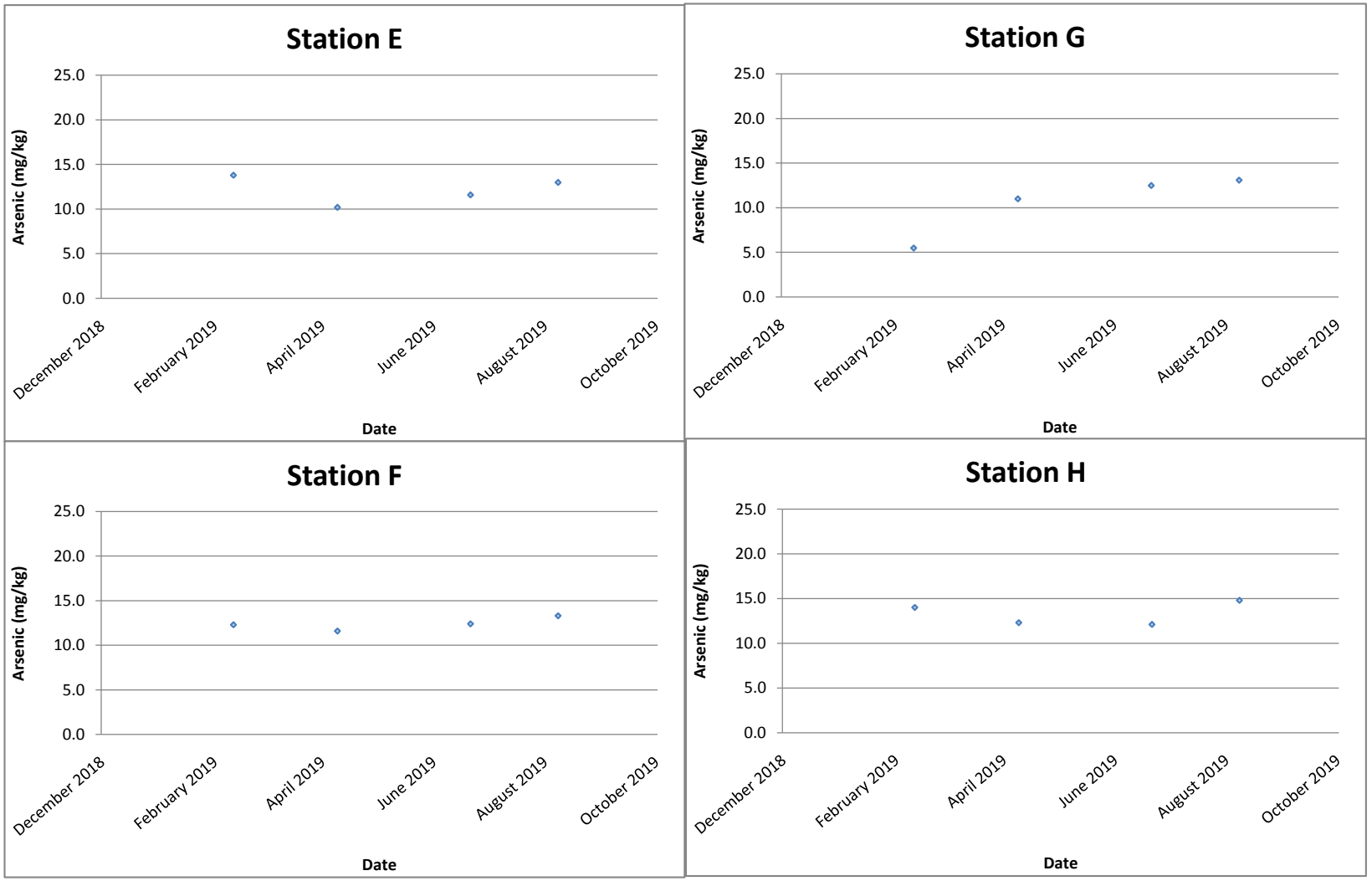

Station H
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

Zinc (mg/kg)

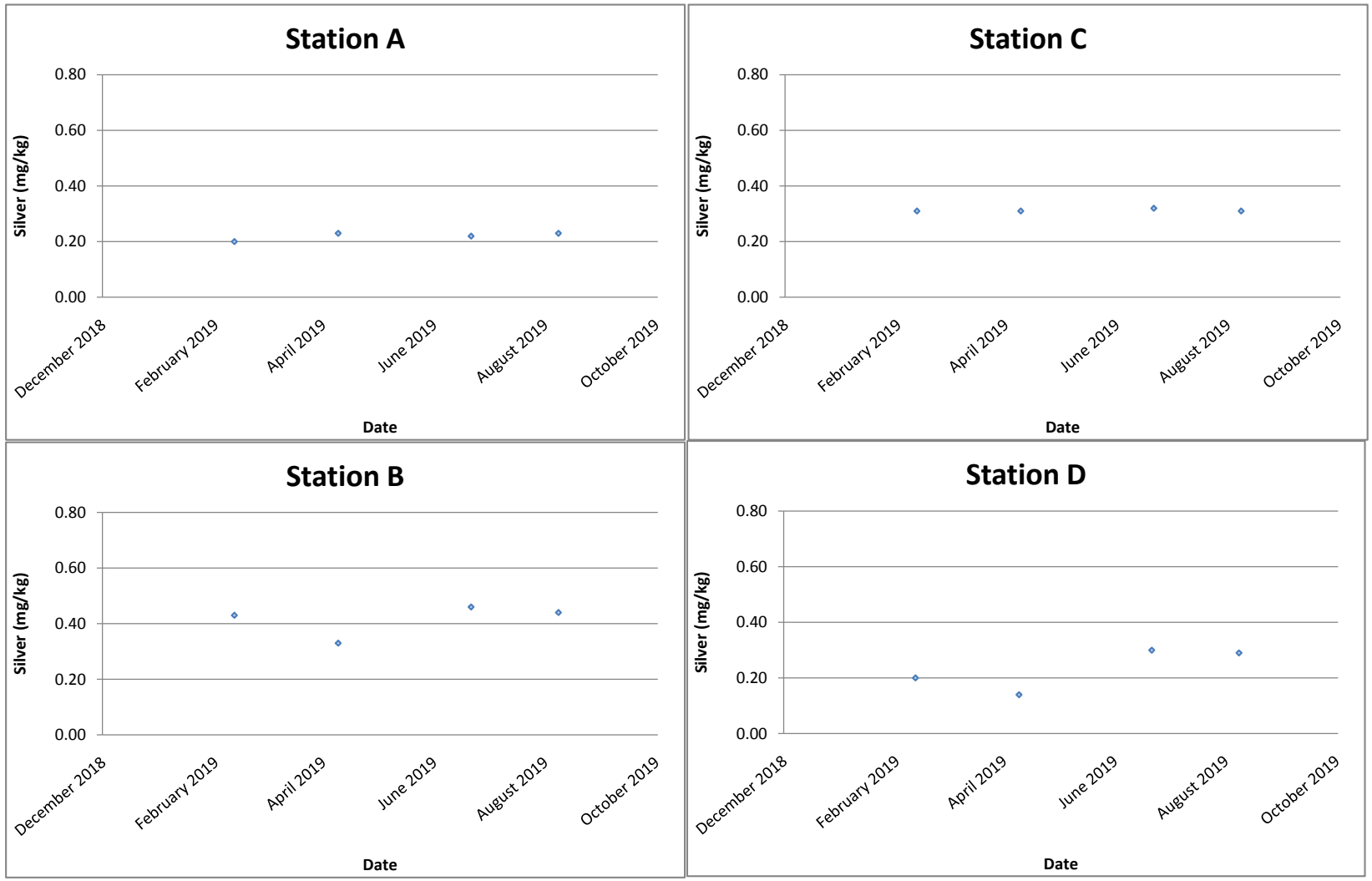

Station A
Zinc (mg/kg)
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Zinc (mg/kg)
160
140
120
100
80
60
40
20
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Zinc (mg/kg)
160
140
120
100
80
60
40
20
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Zinc (mg/kg)
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

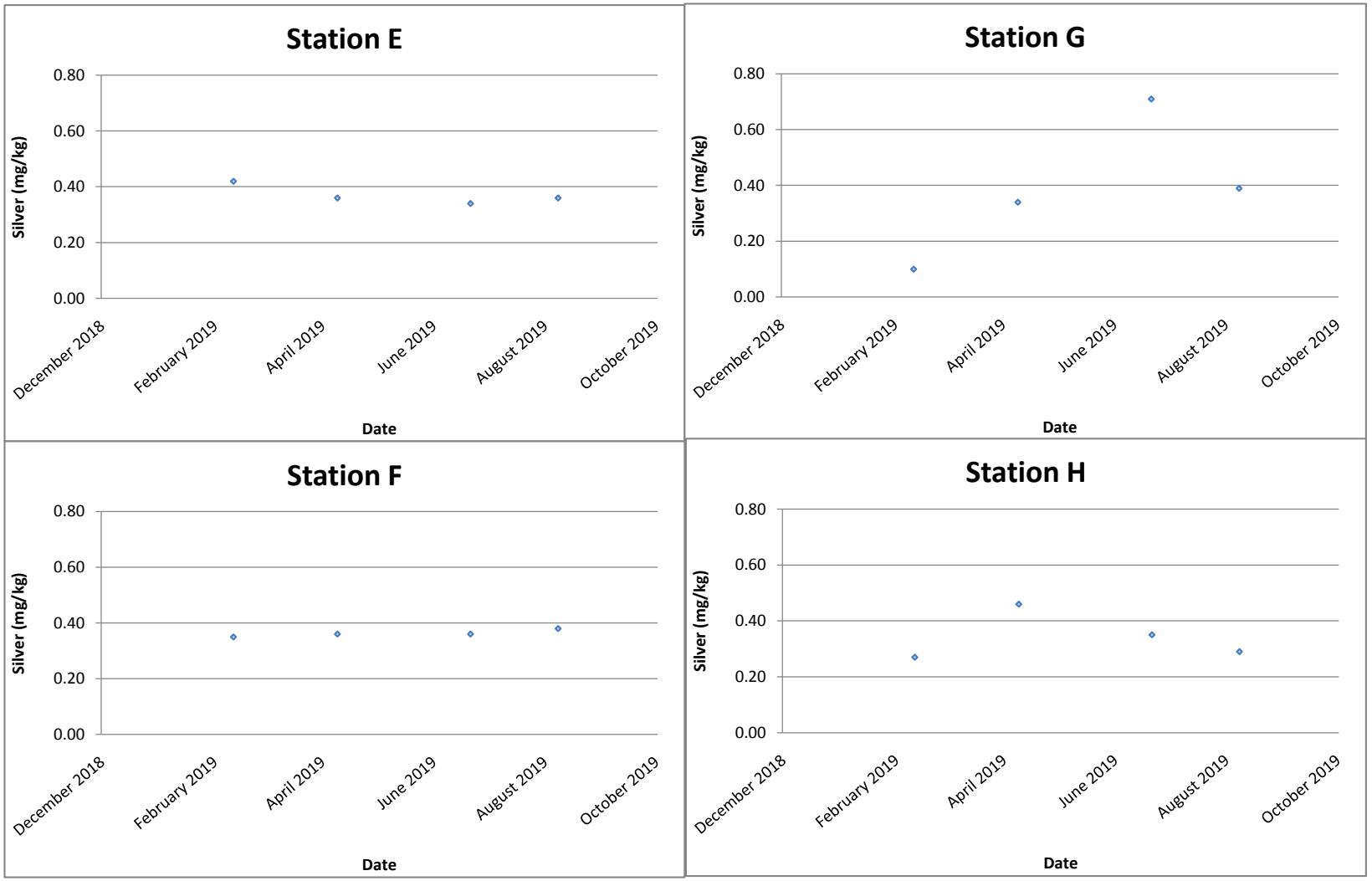

Station E
Zinc (mg/kg)
160
140
120
100
80
60
40
20
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Zinc (mg/kg)
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Zinc (mg/kg)
160
140
120
100
80
60
40
20
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Zinc (mg/kg)
160
140
120
100
80
60
40
20
0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date


Station A
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date


Station E
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date

Silver (mg/kg)


Station A
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station C
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station B
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station D
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date


Station E
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station G
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station F
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
Date
Station H
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
December 2018
February 2019
April 2019
June 2019
August 2019
October 2019
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 H

Benthic Survey Report

Benthic Faunal Monitoring

Conducted in August 2019

Summary Report

Abundance

A total of 255 macrobenthic organisms was recorded from the eight monitoring stations during the August 2019 monitoring period. Compared to both dry (March 2004) and wet (August 2004) seasons baseline data, the present total abundance was relatively lower. This trend was observed since the start of the monitoring activities in April 2018. The abundance distribution across monitoring periods is shown in Figure 1. Generally, decreasing abundances were observed during wet season monitoring periods while increasing abundances during dry season monitoring periods. These variations in the abundances might be attributed to the natural response of the macrobenthic communities to seasonal changes. However, similar to the previous monitoring periods, these observed seasonal variation are not statistically significant (F-value = 1.38; F-crit = 2.10; P-value = 0.22; α = 0.05).

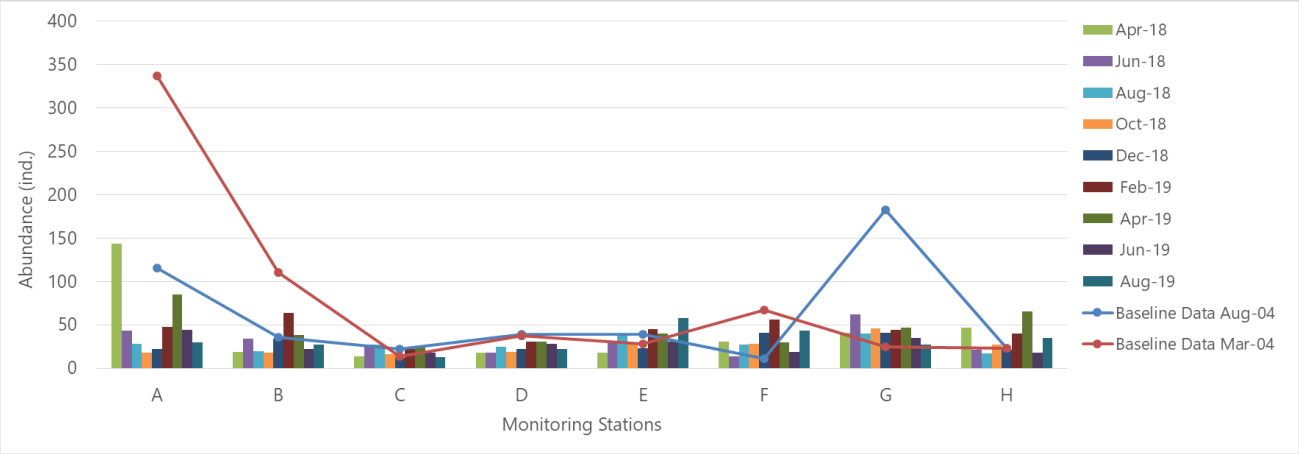


Figure 1. Total abundance (ind.) of benthic organisms collected in the eight monitoring stations

Similar to the previous monitoring periods, a more apparent variation (F-value = 2.89; F-crit = 2.15; P-value = 0.01; α = 0.05) in the total abundances were observed. The lowest abundance with 13 individuals (ind.) was recorded in Station C and the highest (58 ind.) was recorded in Station E. Abundance distribution showed that the impact stations, Stations C and D, has relatively lower values compared to the reference stations, a similar trend was observed in the baseline data. Sediments in these stations remained to be well-sorted composed silt/clay substrate. However,

during the present monitoring period, abundance-sediment size correlation was less apparent compared to other monitoring periods.

Biomass

The total wet biomass recorded in the eight monitoring stations was 129.87g, which is higher compared to the previous monitoring period (94.27g) but remained higher compared to the baseline data. The highest total biomass was observed in Station E (32.37g) while the impact stations, Station C (0.03g) and Station D (5.97g) exhibited the lowest biomass. The relatively higher biomass observed in Station E was contributed by the relatively higher biomass of the molluscan species, *Paphia undulata*. Relatively higher biomass were also recorded in Stations F and G due to the presence of this species. The total biomass distribution across monitoring periods and stations is shown in Figure 2.

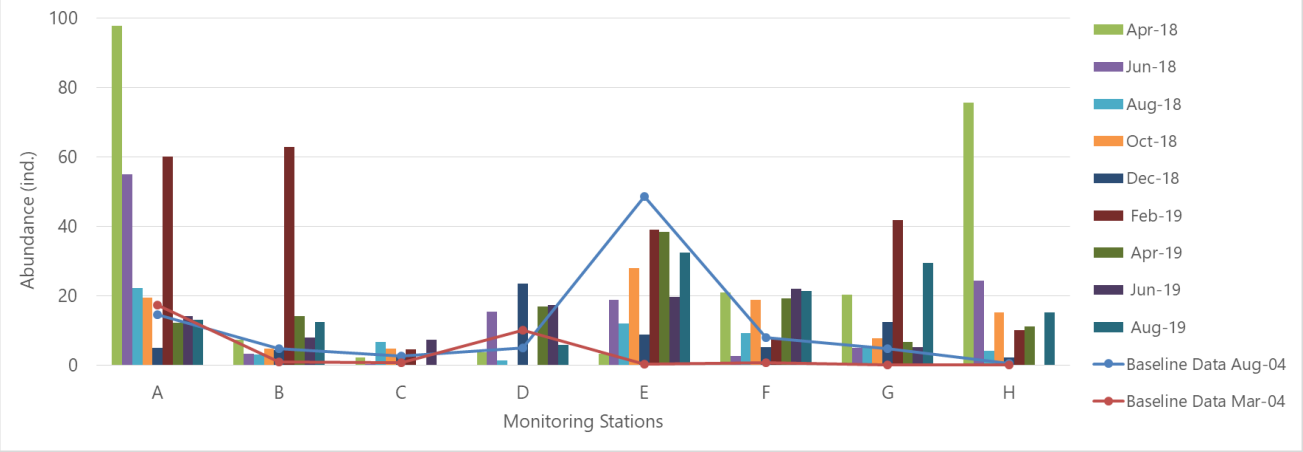


Figure 2. Total biomass (g) of benthic organisms collected in the eight monitoring stations

Taxonomic Composition

A total of eight (8) phyla comprising of 34 families and 50 genera were identified. The macrobenthic assemblage is remained to be dominated by annelida (64.32%), molluscs (17.25 %), and arthropods (9.80%) as shown in Figure 3. The dominant species (abundance ≥10) were the polychaetes, *Poecilochaetus* sp. (10 ind.) and *Mediomastus* sp. (11 ind.) recorded in Stations E and Station H, respectively. Similar to the baseline data, the most dominant groups during the present monitoring period were the capitellids (21.57% of the population identified), typical of unbalanced and organically enriched habitats (Pearson and Rosenberg 1978; Borja et al. 2000).

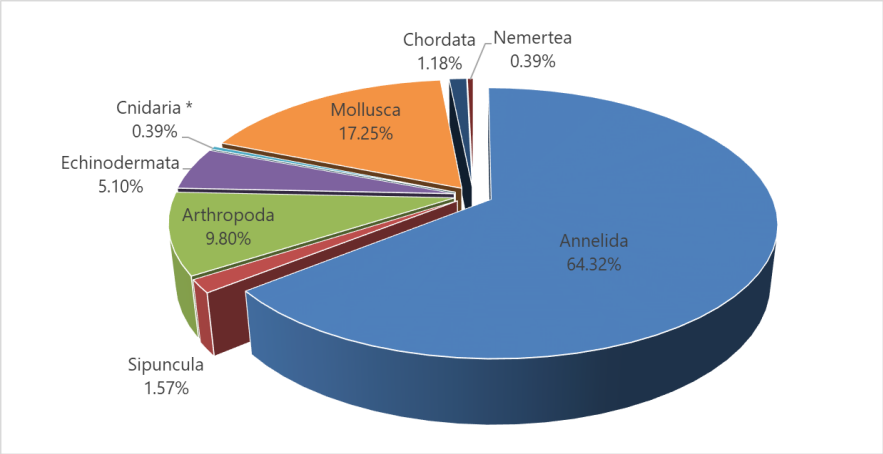


Figure 3. Percent composition of benthic organisms collected in the eight monitoring stations, August 2019

Highest number of genera was recorded in Station E (21) and the lowest in Station C (8). Similar to abundance and biomass, relatively lower number of taxa was observed at impact stations compared to the reference stations.

Diversity

Benthic diversity index (*H'*) and evenness index (*J*) ranged from 1.99 – 2.28 and 0.89 – 0.96 in impact stations, and 2.41 – 2.76 and 0.85 – 0.94 in the reference station. These 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 recorded in the previous monitoring periods. Compared with the baseline survey result, apparent increase in diversity index and evenness index was observed.

Abundance and biomass of macrobenthic organisms are shown in Tables 1 and 2 and data summary for different sampling time was presented in Tables 3 to 7 of Appendix A. Representative photos of specimens were given in Appendix B.

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 Pollution 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: August 27, 2019

Appendix A: Data Summaries

Table 1. Abundance of macrobenthic communities in the eight monitoring stations, August 2019

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*	1	1	1	1	1	0	0	0
Annelida	Polychaeta	Aciculata	Aphroditidae	*c.f. Laetmonice*	0	0	3	2	0	0	0	0
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella(C.capitata)*	0	0	2	0	5	1	1	5
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	2	1	0	2	2	2	2	2
Annelida	Polychaeta	Capitellida	Capitellidae	*Mediomastus*	2	0	1	1	3	4	4	11
Annelida	Polychaeta	Capitellida	Capitellidae	*Notomastus*	0	0	0	0	0	0	2	0
Annelida	Polychaeta	Errantia	Phyllodocidae	*Phyllodoce*	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Eunicida	Eunicidae	*Eunice*	0	1	0	0	0	0	0	0
Annelida	Polychaeta	-	Cossuridae	*Cossurella(C. aciculata)*	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Phyllodocida	Hesionidae	*Hesione(H. intertexta)*	1	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Nereidae	*Neanthes*	0	0	0	7	1	1	0	0
Annelida	Polychaeta	Phyllodocida	Nereidae	*Nereis1*	1	0	2	0	2	0	0	1
Annelida	Polychaeta	Phyllodocida	Nereidae	*Nereis2*	1	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Pilargidae	*Sigambra*	0	0	0	0	1	0	0	0
Annelida	Polychaeta	Phyllodocida	Phyllodocidae	*Eteone*	0	0	0	0	0	0	0	2
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus (A. dibranchis)*	0	7	1	0	0	0	0	0
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus (A. lyrochaeta)*	0	0	0	0	2	1	0	0
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys (N. polybranchia)*	0	0	0	0	0	0	2	0
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys*	0	1	2	1	4	0	0	0
Annelida	Polychaeta	Scolecida	Opheliidae	*Ophelia*	0	0	1	0	0	0	1	1
Annelida	Polychaeta	Scolecida	Scalibregmidae	*c.f. Scalibregma*	0	0	0	1	0	0	0	0
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*	0	1	0	0	10	0	2	1

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Spionida	Spionidae	*Paraprionospio*	0	0	0	0	1	4	0	0
Annelida	Polychaeta	Spionida	Spionidae	*Prionospio*	1	4	0	2	4	0	0	1
Annelida	Polychaeta	Sternaspida	Sternaspidae	*Sternaspis(S. scutata)*	0	1	0	0	5	1	0	1
Annelida	Polychaeta	Terebellida	Terebellidae	*Amaeana*	1	0	0	0	0	0	0	0
Annelida	Polychaeta	Terebellida	Terebellidae	*Loimia(L.loimia)*	1	0	0	0	0	0	1	0
Annelida	Polychaeta	Terebellida	Terebellidae	*Terebella*	0	0	0	0	1	0	0	1
Annelida	Polychaeta	Terebellida	Trichobranchidae	*Terebellides (T. stroemii)*	1	0	0	0	0	0	2	0
Annelida	Oligochaeta	Lumbriculida	Lumbriculidae	*Lumbriculus sp.1*	1	1	0	0	0	0	0	2
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	*Sipunculus*	2	2	0	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Alpheidae	*Alpheus*	0	1	0	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Dotillidae	*Ilyoplax*	2	2	0	0	0	0	1	1
Arthropoda	Crustacea	Decapoda	Macrophthalmidae	*Cleistostoma*	0	0	0	0	0	0	0	1
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	1	0	0	1	1	0	2	0
Arthropoda	Crustacea	Decapoda	Pilumnidae	*Typhlocarcinus*	2	2	0	0	0	1	0	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.1*	0	0	0	0	1	4	0	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.2*	0	0	0	0	1	0	0	0
Arthropoda	Maxillopoda	Sessilia	Balanidae	*Balanus*	0	1	0	0	0	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*	8	1	0	1	1	1	1	0
Cnidaria	Anthozoa	Pennatulacea	-	*sea pen*	0	0	0	1	0	0	0	0
Mollusca	Bivalvia	Veneroida	Dreissenidae	*Mytilopsis*	1	0	0	0	0	0	0	0
Mollusca	Bivalvia	Veneroida	Kellidae	*Pseudopythina*	0	0	0	1	0	6	0	0
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*	0	0	0	0	6	6	5	2
Mollusca	Bivalvia	Veneroida	Veneridae	*c.f. Phylloda foliacea*	0	0	0	0	2	2	0	0
Mollusca	Bivalvia	Veneroida	Veneridae	*Timoclea (T. scabra)*	0	0	0	0	0	0	1	0
Mollusca	Bivalvia	Myoida	Corbulidae	*Potamocorbula*	0	0	0	0	4	8	0	0
Chordata	Actinopterygii	Perciformes	Gobiidae	UNID Goby	1	0	0	0	0	0	0	0
Chordata	Actinopterygii	Perciformes	Gobiidae	*Trypauchen(T. vagina)*	0	0	0	1	0	1	0	0
Nemertea	Enopla	-	-	UNID 1	0	0	0	0	0	0	0	1

Table 2. Biomass macrobenthic communities in the eight monitoring stations, August 2019

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Aciculata	Glyceridae	*Glycera*	0.007	0.004	0.003	0.002	0.026	0	0	0
Annelida	Polychaeta	Aciculata	Aphroditidae	*c.f. Laetmonice*	0	0	0.011	0.007	0	0	0	0
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella(C.capitata)*	0	0	0.002	0	0.004	0.002	0.001	0.007
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	0.001	0.001	0	0.001	0	0.001	0.001	0.002
Annelida	Polychaeta	Capitellida	Capitellidae	*Mediomastus*	0.002	0	0.001	0.001	0.002	0.011	0.006	0.013
Annelida	Polychaeta	Capitellida	Capitellidae	*Notomastus*	0	0	0	0	0	0	0.002	0
Annelida	Polychaeta	Errantia	Phyllodocidae	*Phyllodoce*	0	0	0	0	0	0	0	0.008
Annelida	Polychaeta	Eunicida	Eunicidae	*Eunice*	0	2.898	0	0	0	0	0	0
Annelida	Polychaeta	-	Cossuridae	*Cossurella(C. aciculata)*	0	0	0	0	0	0	0	0.004
Annelida	Polychaeta	Phyllodocida	Hesionidae	*Hesione(H. intertexta)*	0.003	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Nereidae	*Neanthes*	0	0	0	0.024	0.001	0.002	0	0
Annelida	Polychaeta	Phyllodocida	Nereidae	*Nereis1*	0.002	0	0.002	0	0.003	0	0	0.001
Annelida	Polychaeta	Phyllodocida	Nereidae	*Nereis2*	0.003	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Pilargidae	*Sigambra*	0	0	0	0	0.013	0	0	0
Annelida	Polychaeta	Phyllodocida	Phyllodocidae	*Eteone*	0	0	0	0	0	0	0	0.002
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus (A. dibranchis)*	0	0.018	0.004	0	0	0	0	0
Annelida	Polychaeta	Nereidida	Nephtyidae	*Aglaophamus*	0	0	0	0.000	0.005	0.006	0	0

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
				(A. lyrochaeta)								
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys (N. polybranchia)*	0	0	0	0	0	0	0.004	0
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys*	0.000	0.001	0.003	0.001	0.005	0	0	0
Annelida	Polychaeta	Scolecida	Opheliidae	*Ophelia*	0	0	0.002	0	0	0	0.009	0.021
Annelida	Polychaeta	Scolecida	Scalibregmidae	*c.f. Scalibregma*	0	0	0	0.039	0	0	0	0
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*	0	0.003	0	0	0.048	0	0.011	0.002
Annelida	Polychaeta	Spionida	Spionidae	*Paraprionospio*	0	0	0	0	0	0.002	0	0
Annelida	Polychaeta	Spionida	Spionidae	*Prionospio*	0	0.005	0	0.003	0.003	0	0	0.001
Annelida	Polychaeta	Sternaspida	Sternaspidae	*Sternaspis(S. scutata)*	0	0.005	0	0	0.053	0.007	0.000	0.006
Annelida	Polychaeta	Terebellida	Terebellidae	*Amaeana*	2.576	0	0	0	0	0	0	0
Annelida	Polychaeta	Terebellida	Terebellidae	*Loimia(L.loimia)*	0.005	0	0	0	0	0	0.002	0
Annelida	Polychaeta	Terebellida	Terebellidae	*Terebella*	0	0	0	0	0.007	0	0	0.908
Annelida	Polychaeta	Terebellida	Trichobranchidae	*Terebellides (T. stroemii)*	0.001	0	0	0	0	0	0.002	0
Annelida	Oligochaeta	Lumbriculida	Lumbriculidae	*Lumbriculus sp.1*	0.004	0.002	0	0	0	0	0	0.018
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	*Sipunculus*	0.002	0.008	0	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Alpheidae	*Alpheus*	0.000	3.235	0	0	0	0	0	0
Arthropoda	Crustacea	Decapoda	Dotillidae	*Ilyoplax*	4.312	3.874	0	0	0	0	3.698	3.139
Arthropoda	Crustacea	Decapoda	Macrophthalmidae	*Cleistostoma*	0.000	0.000	0	0	0	0	0	3.882
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile	0.002	0	0	0.003	0.133	0	1.056	0

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Arthropoda	Crustacea	Decapoda	Pilumnidae	*Typhlocarcinus*	1.798	1.345	0	0	0	0.025	0	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.1*	0	0	0	0	0	0.002	0	0
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus sp.2*	0	0	0	0	0	0	0	0
Arthropoda	Maxillopoda	Sessilia	Balanidae	*Balanus*	0	1.005	0	0	0	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*	4.225	0.036	0	1.068	0.018	0.013	0.075	0
Cnidaria	Anthozoa	Pennatulacea	-	*sea pen*	0	0	0	0.487	0	0	0	0
Mollusca	Bivalvia	Veneroida	Dreissenidae	*Mytilopsis*	0.033	0	0	0.000	0.000	0.000	0.000	0
Mollusca	Bivalvia	Veneroida	Kellidae	*Pseudopythina*	0	0	0	4.300	0.000	6.500	0.000	0
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*	0.000	0.000	0	0.000	30.800	10.400	24.600	6.300
Mollusca	Bivalvia	Veneroida	Veneridae	*c.f. Phylloda foliacea*	0	0.000	0	0.000	0.205	0.011	0.000	0
Mollusca	Bivalvia	Veneroida	Veneridae	*Timoclea (T. scabra)*	0.000	0.000	0	0.000	0.000	0.000	0.031	0.000
Mollusca	Bivalvia	Myoida	Corbulidae	*Potamocorbula*	0.000	0.000	0	0.000	1.036	2.748	0.000	0.000
Chordata	Actinopterygii	Perciformes	Gobiidae	UNID Goby	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chordata	Actinopterygii	Perciformes	Gobiidae	*Trypauchen(T. vagina)*	0.000	0.000	0.000	0.032	0.000	1.607	0.000	0.000
Nemertea	Enopla	-	-	UNID 1	0	0	0	0	0	0	0	0.918

Table 3. Summary of Benthic Survey Data, August 2019

Stations	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	30	13.00	18	2.62	0.91
B	27	12.44	15	2.43	0.90
C*	13	0.03	8	1.99	0.96
D*	22	5.97	13	2.28	0.89
E	58	32.37	21	2.76	0.91
F	43	21.34	15	2.42	0.89
G	27	29.50	14	2.48	0.94
H	35	15.23	17	2.41	0.85
TOTAL	255	129.87			

Table 4. Summary of Benthic Survey Baseline Data, August 2004

Stations	Abundance	Total Biomass	Number of Taxa	Diversity (H')	Evenness (J)
A	115	14.56	24	0.93	0.29
B	36	4.76	14	0.89	0.34
C*	22	2.66	13	0.80	0.31
D*	39	5.07	11	0.62	0.26
E	39	48.69	16	0.89	0.32
F	11	8.07	9	0.68	0.31
G	182	4.91	31	1.10	0.32
H	23	0.49	11	0.81	0.34

Table 5. Summary of Benthic Survey Baseline Data, March 2004

Stations	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	337	17.39	38	0.78	0.21
B	110	0.9	21	0.82	0.27
C*	14	0.7	10	0.69	0.30
D*	37	10.07	20	1.01	0.34
E	28	0.44	11	0.76	0.32
F	67	0.78	16	0.85	0.31
G	25	0.09	9	0.64	0.29
H	23	0.15	11	0.44	0.18

*Impact Sites

Table 6. Taxonomic Composition (%) of Benthic Survey

Taxon	Apr-18	Jun-18	Aug-18	Oct-18	Dec-18	Feb-19	Apr-19	Jun-19	Aug-19
Annelida	31.12	53.01	65.02	65.35	69.44	54.99	70.28	57.67	64.31
Sipuncula	0.30	0.80	0.45	0	0.93	0	0	0	1.57
Arthropoda	13.60	15.66	12.11	13.86	10.19	20.23	10.83	7.91	9.80
Echinodermata	15.11	4.82	5.38	2.97	2.78	3.42	4.72	4.65	5.10
Cnidaria	0.60	0.40	0	0	0.93	0.85	0	0.93	0.39
Mollusca	50.45	21.29	15.69	16.83	12.96	19.94	13.33	27.44	17.25
Chordata	2.11	0.80	0.45	0	0.93	0.28	0.56	0.93	1.18
Nemertea	0.30	3.22	0.90	0.99	1.85	0.28	0.28	0.47	0.39

Table 7. Taxonomic Composition (abundance) of Benthic Survey

Taxon	Apr-18	Jun-18	Aug-18	Oct-18	Dec-18	Feb-19	Apr-19	Jun-19	Aug-19
Annelida	103	132	145	132	150	193	253	124	164
Sipuncula	1	2	1	0	2	0	0	0	4
Arthropoda	45	39	27	28	22	71	39	17	25
Echinodermata	5	12	12	6	6	12	17	10	13
Cnidaria	2	1	0	0	2	3	0	2	1
Mollusca	167	53	35	34	28	70	48	59	44
Chordata	7	2	1	0	2	1	2	2	3
Nemertea	1	8	2	2	4	1	1	1	1
Grand total	331	249	223	202	216	351	360	215	255

Appendix B: Representative Taxa Identified

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>A) The species of Mollusca, Glycera sp. and Sternaspis scutata</td><td>B) Some species of Arthropoda</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>C) The species of Sipuncula</td><td>D) The species of Chordata, Trypauchen vagina</td></tr>
</table>

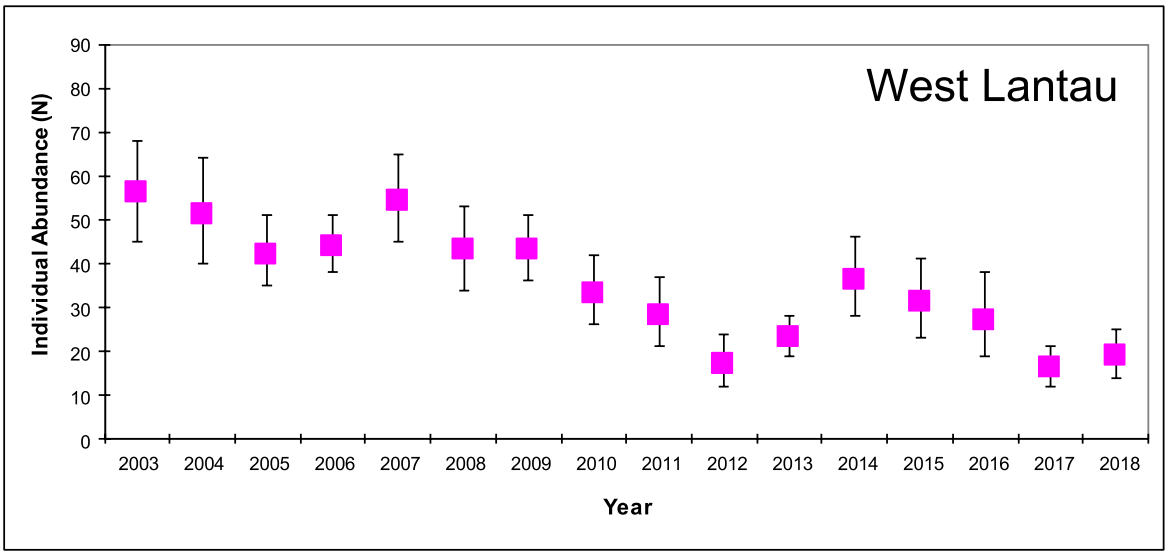
FUGRO TECHNICAL SERVICES LIMITED

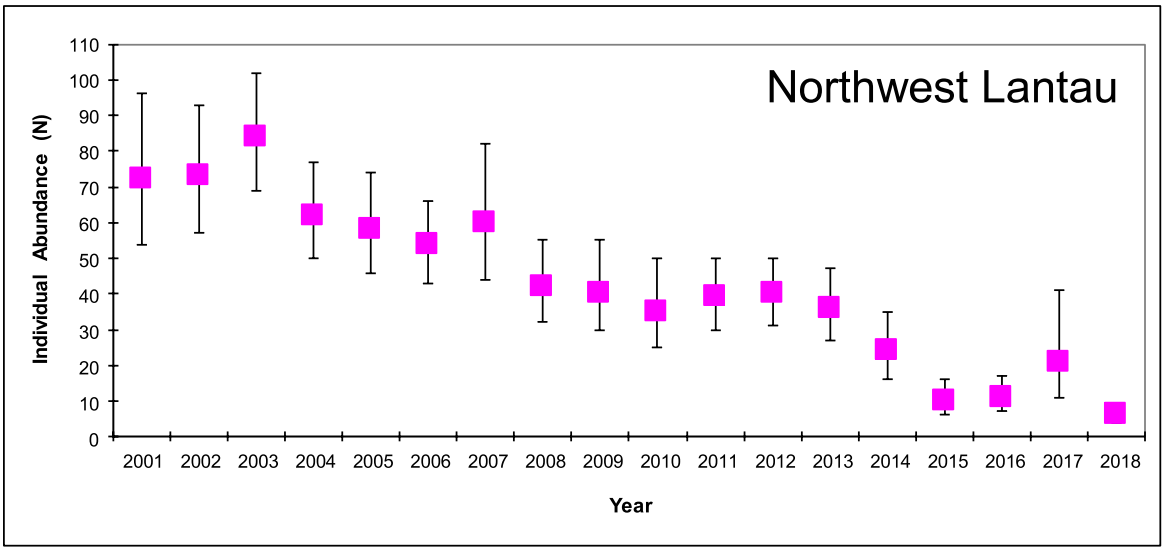
Fugro Development Centre,
5 Lok Yi Street, Tai Lam,
Tuen Mun, N.T.,
Hong Kong.

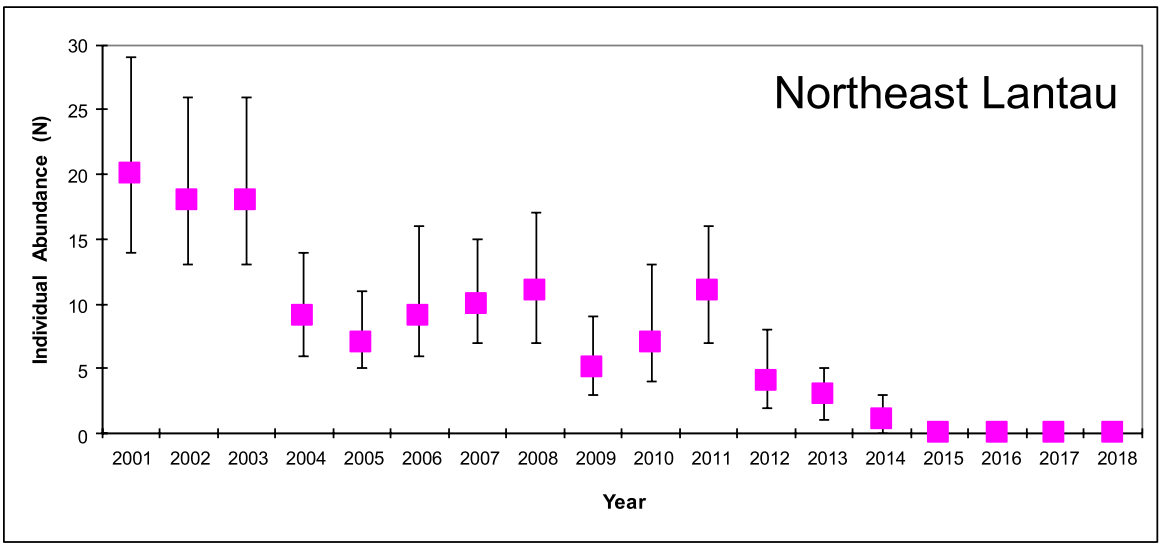
Tel : +852 2450 8233
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix I

Annual Abundance of Chinese White Dolphins from 2001 - 2018







Temporal trends in annual abundance estimates of Chinese white dolphins in WL, NWL & NEL from 2001-18 (error bars: 95% confidence interval of abundance estimates)

Source: Monitoring of Marine Mammals in Hong Kong Waters (2018 - 2019), 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 J

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/0490C

Photo 1. A ponar 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/0490C

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 K

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