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
February 2021

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/0620

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

Our Ref. 1458/21-0014

27/F, Overseas Trust Bank Building
160 Gloucester Road
Wan Chai
Hong Kong
T: +852 2815 7028
F: +852 2815 5399

www.asecg.com

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)

10 March 2021

By Post and E-mail

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 (FEBRUARY 2021)

Reference is made to the submission of Monthly Environmental Monitoring and Audit (EM&A) Report for February 2021 (Report No.: 0041/17/ED/0620) from the Environmental Team (ET), Fugro Technical Services Ltd., received on 9 March 2021 via email.

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

Should you have any queries, please feel free to contact the undersigned, or our Ms. Joanne NG at 2815 7028.

Yours faithfully,

For and on behalf of
Allied Environmental Consultants Ltd.

Grace M. H. KWOK
Independent Environmental Checker

GK/jn/cy

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

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APPENDICES

FUGRO TECHNICAL SERVICES LIMITED
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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 Forty-third Monthly EM&A Report for the Project which summarizes findings of the EM&A works during the reporting period from 1 February 2021 to 28 February 2021 (the "reporting period").

Breaches of Action and Limit Levels

Odour patrol monitoring was resumed from January 2020 and carried out on 3, 9, 19 and 25 February 2021. The modified odour patrol monitoring plan including updated Event and Action Plan was approved on March 2020, and modified odour patrol monitoring was commenced from 20 March 2020. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASR) and odour patrol points were recorded and no non-compliance of odour monitoring at ASR were recorded in the reporting period.

Water quality monitoring, sediment quality monitoring and benthic survey were carried out on 4 February 2021. 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.

Fugro Development Centre,
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Hong Kong.

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Website : www.fugro.com

Summary of the Environmental Mitigations Measures

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

Future Key Issues

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

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

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). H_2S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). 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 suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.

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,
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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 Modified Odour Patrol Monitoring

2.2.1 Due to the complaint case received on 28 November 2019, a modified version of odour patrol monitoring is proposed and approved on 13 March 2020. According to the approved proposal for odour patrol monitoring plan (0041/17/ED/0524G), a modified version of odour patrol monitoring was commenced on 20 March 2020 to ensure the mitigation measures are effectively implemented. The modified odour patrol conducted once per week by two independent trained personnel/competent persons (the “patrollists”) patrolling and sniffing along the SHWSTW boundary and the air sensitive receivers (ASRs).

2.2.2 The odour monitoring should not be undertaken on rainy days. Subject to the prevailing weather forecast condition, odour patrol shall be conducted by two patrollists at the downwind locations. During the patrol, the sequence should start from less odourous locations to stronger odourous locations.

2.2.3 The two patrollists shall be satisfied the below requirements during odour patrol:

- Have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/V required by the European Standard menthod: BS EN13725.
- Be free from any respiratory illnesses.
- Not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30min before and during odour patrol.
- Take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics.
- Not communicate with each other about the results of their choices.

2.2.4 During the odour patrol monitoring, the meteorological and surrounding information are recorded 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

2.2.5 The perceived intensity is to be divided into 5 levels which are ranked in a descending order as follows:

Table 2.2 Categories of Odour Intensity for Modified Odour Patrol Monitoring

Odour Level	Odour Intensity	Classification Criteria
0	Not detected	No odour perceived or an odour so weak that it cannot be easily characterised or described.
1	Slight	Slight identifiable odour, and slight chance to have odour nuisance.
2	Moderate	Moderate identifiable odour, and moderate chance to have odour nuisance.
3	Strong	Strong identifiable, likely to have odour nuisance.
4	Extreme	Extreme severe odour, and unacceptable odour level.

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 and odour sampling at ASR, Cheung Tung Road near the Bus Depot at the west of the Siu Ho Wan Treatment Plant, were temporarily suspended from 14 May 2018. The location of ASR is shown in **Figure 1**.

2.4.2 9 odour patrol points is chosen to conduct the modified odour patrol for collecting more representative data and identify the particular source of odour in the site. The nine odour patrol points is as below:

Table 2.3 Odour Patrol Point

Odour Patrol Point	Description
OD1	Eastern Site Boundary
OD2	Southern Site Boundary
OD3	Western Site Boundary
OD4	Northern Site Boundary
OD5	Spur Road near Discovery Bay Tunnel Outlet
OD6	Cheung Tung Road near the Bus Depot
OD7	Cheung Tung Road near O·PARK1
OD8	Sham Shui Kok Dr near MTR Depot
OD9	Discovery Bay Tunnel Toll Plaza

Note:
As access permission from the company of Discovery Bay Tunnel is under requisition progress, OD5 (Spur Road near Discovery Bay Tunnel Outlet) was not covered in odour patrol monitoring in the reporting period temporarily.

2.4.3 The odour patrol points of modified odour patrol is shown in **Figure 2**.

2.5 Monitoring Frequency and Duration

2.5.1 The durations and frequencies of H_2S concentration measurement, odour patrolling and odour sampling are summarized in **Table 2.4** below.

Table 2.4 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		[4]Weekly basis
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/m^3) 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.
4) As advice by EPD on the odour complaint received in November 2019, odour patrol monitoring was resumed on weekly basis from 15 January 2020.

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

2.6 Event and Action Plan

2.6.1 According to the approved proposal for odour patrol monitoring plan (0041/17/ED/0524G), updated Action and limit levels for air quality monitoring are presented in **Table 2.5**.

Table 2.5 Action and Limit Levels for Air Quality Monitoring

Parameter	Action	Limit
Odour Nuisance	One complaint received for specific odour event / Odour intensity of 2 or above is measured from odour patrol	Two or more independent complaints received for specific odour event in 3 months / Odour intensity of 3 or above is measured from odour patrol

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 As advice by EPD on the odour complaint received in November 2019, odour patrol monitoring was resumed on weekly basis. The odour patrol monitoring was carried out on 3, 9, 19 and 25 February 2021. As access permission from the company of Discovery Bay Tunnel is under requisition progress, OD5 (Spur Road near Discovery Bay Tunnel Outlet) was not covered in odour patrol monitoring in the reporting period temporarily.

2.8.2 The meteorological data including temperature, wind speed and direction of the reporting period at ASR is summarised in **Table 2.6**.

Table 2.6 Summary of Meteorological Data in Reporting Period

Date	Location	Temperature (°C)	Relative Humidity (%)	Wind Direction	Wind Speed (m/s)
3 February 2021	OD1	21.7	46	NE	1.6
	OD2			NE	0.4
	OD3			NE	4.0
	OD4			NE	2.5
	OD6			NE	1.2
	OD7			NE	0.8
	OD8			NE	1.3
	OD9			NE	0.4
9 February 2021	OD1	18.4	73	S	1.5
	OD2			E	0.4
	OD3			SE	1.4
	OD4			NE	1.2
	OD6			E	1.2
	OD7			E	0.9
	OD8			NE	0.4
	OD9			E	0.2
19 February 2021	OD1	19.5	48	NW	0.2
	OD2			NW	0.3
	OD3			N	0.2
	OD4			N	0.3
	OD6			N	0.7
	OD7			N	0.5
	OD8			NW	0.4

	OD9			NW	0.8
25 February 2021	OD1	19.1	91	NW	0.3
	OD2			N	0.2
	OD3			N	0.4
	OD4			N	0.6
	OD6			N	0.8
	OD7			N	0.7
	OD8			NW	0.2
	OD9			N	0.9

2.8.3 The monitoring results in the reporting period are summarised in **Table 2.7**. Graphical pots of results and details of monitoring data are shown in **Appendix D**.

Table 2.7 Summary of Air Quality Monitoring Result in Reporting Period

Monitoring Location	Monitoring Parameter
	Odour Patrol^ (Odour Level)
	Range
OD1	0 - 0
OD2	0 - 1
OD3	0 - 0
OD4	0 - 0
OD6	0 - 0
OD7	0 - 0
OD8	0 - 0
OD9	0 - 0

Remark:
^Odour Level: 0 – Not detected, 1 – Slight, 2 – Moderate, 3 – Strong, 4 – Extreme

2.8.4 According to the approved EM&A plan, a correlation study has to be carried out to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). H_2S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). 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 suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.

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

2.8.6 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 3**.

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 4**.

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. Copy of the calibration certificates for water quality monitoring equipment are presented in **Appendix E**.

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	525120
Acoustic Doppler Current Profiler	RiverSurveyor M9	5906

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

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

3.4 Laboratory Measurement and Analysis

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

Table 3.5 Laboratory Measurement/Analysis Methods and Reporting Limits

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

3.5 Monitoring Frequency and Duration

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

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

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

3.6 Quality Assurance / Quality Control

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

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

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

For each batch of 20 samples:

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

3.7 Event and Action Plan

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

3.8 Monitoring Results and Observations

3.8.1 Water quality monitoring is carried out was 4 February 2021. 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 F.**

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	8.60	18.55	8.02	29.50	3.2	0.04	47.1

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

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	8.50	18.52	8.03	29.53	3.1	0.03	45.4
		M	8.5	8.64	18.54	8.02	29.53	2.1	0.02	86.1
		M	8.5	8.61	18.52	8.03	29.56	2.2	0.02	89.9
		B	16	8.45	18.44	8.01	29.63	2.4	0.02	56.1
		B	16	8.53	18.42	8.01	29.61	2.6	0.03	54.6
B	14	S	1	8.25	18.72	8.00	29.38	4.3	0.31	58.2
		S	1	8.36	18.71	8.02	29.35	4.1	0.30	60.7
		M	7	8.56	18.53	8.03	29.50	2.1	0.09	41.9
		M	7	8.59	18.54	8.04	29.60	2.2	0.10	44.1
		B	13	8.42	18.42	8.00	29.77	4.3	0.12	82.5
		B	13	8.49	18.43	8.01	29.69	4.1	0.14	86.7
C	12	S	1	8.56	18.63	8.04	29.25	1.2	0.10	349.7
		S	1	8.91	18.61	8.06	29.28	1.3	0.09	356.1
		M	6	8.55	18.53	8.02	29.36	1.4	0.16	326.8
		M	6	8.59	18.50	8.10	29.41	1.3	0.17	319.7
		B	11	8.47	18.52	8.04	29.41	1.6	0.11	19.1
		B	11	8.53	18.59	8.09	29.31	1.8	0.10	17.6
D	13	S	1	8.28	18.70	8.00	29.18	2.1	0.04	288.1
		S	1	8.30	18.60	8.03	29.21	2.3	0.03	279.2
		M	6.5	8.61	18.55	8.03	29.30	2.8	0.07	313.3
		M	6.5	8.63	18.57	8.04	29.33	2.9	0.06	319.8
		B	12	8.50	18.49	8.04	29.43	1.2	0.03	358.6
		B	12	8.53	18.51	8.04	29.48	1.3	0.03	345.2
E	16	S	1	8.61	18.53	8.01	29.47	1.0	0.01	49.2
		S	1	8.68	18.56	8.02	29.44	1.1	0.02	47.1
		M	8	8.62	18.43	8.02	29.55	1.2	0.02	76.5
		M	8	8.66	18.45	8.02	29.56	1.3	0.04	71.5
		B	15	8.50	18.44	8.03	29.56	1.0	0.02	65.3
		B	15	8.56	18.45	8.04	29.55	1.1	0.04	69.1
F	23	S	1	7.98	18.67	7.92	29.36	1.5	0.03	306.5
		S	1	7.82	18.61	7.93	29.35	1.6	0.04	301.4
		M	11.5	8.58	18.44	7.96	29.54	2.9	0.06	291.6
		M	11.5	8.59	18.44	7.95	29.56	2.7	0.04	282.3
		B	22	8.54	18.40	8.00	29.58	1.2	0.03	314.6
		B	22	8.45	18.41	8.01	29.51	1.3	0.03	319.8
G	22	S	1	8.79	18.38	7.87	29.41	1.2	0.05	309.2
		S	1	8.92	18.39	7.88	29.44	1.3	0.04	317.1
		M	11	9.59	18.39	7.96	29.48	1.8	3.00	282.5
		M	11	9.60	18.41	7.91	29.49	2.0	0.04	28.5
		B	21	9.52	18.38	8.00	29.55	1.2	0.05	298.7
		B	21	9.56	18.39	8.01	29.56	1.3	0.07	292.6
H	19	S	1	8.46	18.49	8.21	28.41	1.3	0.16	301.1
		S	1	8.48	18.50	8.21	28.41	1.4	0.17	295.8
		M	9.5	8.44	18.48	8.21	28.45	1.9	0.14	326.5
		M	9.5	8.46	18.49	8.21	28.45	1.8	0.18	329.4
		B	18	8.34	18.44	8.19	28.54	1.2	0.20	311.2
		B	18	8.35	18.45	8.20	28.50	1.1	0.21	314.3

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	8.62	18.55	8.03	29.50	1.8	0.02	75.2
		S	1	8.51	18.51	8.02	29.56	1.9	0.05	79.8
		M	7.5	8.55	18.55	8.03	29.49	2.0	0.06	56.2
		M	7.5	8.51	18.53	8.01	29.51	2.3	0.08	53.3
		B	14	8.37	18.44	8.02	29.79	3.0	0.04	83.3
		B	14	8.42	18.46	8.02	29.81	3.3	0.03	85.4
B	14	S	1	8.53	18.82	7.92	29.33	1.3	0.05	21.4
		S	1	8.46	18.81	7.93	29.30	1.5	0.06	19.2
		M	7	8.55	18.52	8.02	29.48	1.4	0.04	343.3
		M	7	8.48	18.51	8.03	29.44	1.6	0.06	353.1
		B	13	8.53	18.45	8.06	29.76	3.3	0.02	263.8
		B	13	8.43	18.46	8.06	29.77	3.9	0.01	251.2
C	12	S	1	8.52	18.61	8.05	29.26	1.6	0.06	316.2
		S	1	8.59	18.69	8.09	29.28	1.5	0.08	322.5
		M	6	8.57	18.57	8.06	29.31	1.5	0.09	281.7
		M	6	8.51	18.51	8.05	29.30	1.3	0.11	276.6
		B	11	8.45	18.50	8.05	29.39	1.8	0.63	301.8
		B	11	8.41	18.51	8.01	29.21	2.0	0.78	303.9
D	14	S	1	8.53	18.65	8.01	29.18	5.1	0.09	319.9
		S	1	8.51	18.64	8.03	29.14	5.3	0.10	322.8
		M	7	8.64	18.55	8.02	29.29	1.3	0.05	291.7
		M	7	8.60	18.51	8.01	29.33	1.2	0.04	286.5
		B	13	8.44	18.48	8.03	29.43	1.2	0.06	276.5
		B	13	8.41	18.42	8.01	29.41	1.3	0.07	275.8
E	14	S	1	8.62	18.53	8.00	29.48	1.1	0.02	291.7
		S	1	8.56	18.51	8.02	29.45	1.2	0.03	286.5
		M	7	8.55	18.44	8.00	29.55	1.5	0.01	2769.6
		M	7	8.48	18.42	8.03	29.51	1.4	0.05	275.8
		B	13	8.52	18.44	8.01	29.56	1.2	0.06	302.5
		B	13	8.50	18.40	8.02	29.53	1.1	0.09	311.6
F	18	S	1	8.47	18.55	7.91	29.42	1.7	0.03	301.6
		S	1	8.40	18.55	7.90	29.41	1.6	0.02	309.7
		M	9	8.60	18.43	8.00	29.54	1.9	0.04	263.8
		M	9	8.66	18.49	8.02	29.51	2.1	0.04	275.6
		B	17	8.59	18.41	7.99	29.58	1.4	0.02	298.8
		B	17	8.51	18.44	7.96	29.55	1.5	0.05	291.7
G	13	S	1	8.61	18.37	7.88	29.49	1.7	0.01	285.4
		S	1	8.68	18.39	7.89	29.51	1.8	0.05	299.7
		M	6.5	8.58	18.00	7.96	29.48	1.7	0.07	273.5
		M	6.5	8.49	18.44	7.94	29.49	1.8	0.02	272.1
		B	12	8.49	18.38	7.97	29.54	1.2	0.05	262.4
		B	12	8.51	18.39	7.96	29.53	1.1	0.07	265.3
H	19	S	1	8.28	18.65	8.11	28.30	1.4	0.19	316.5
		S	1	8.43	18.53	8.17	28.35	1.3	0.17	311.9
		M	9.5	8.40	18.48	8.18	28.52	1.3	0.18	326.8
		M	9.5	8.38	18.47	8.18	28.50	1.4	0.20	331.1
		B	18	8.36	18.45	8.19	28.53	1.6	0.21	332.8
		B	18	8.36	18.44	8.19	28.55	1.5	0.20	325.7

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 F**.

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_2^- as N (mg/L)	NO_3^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
A	17	S	1	2.1	0.050	0.009	0.222	0.281	2	0.01	1.5
		S	1	2.4	0.049	0.011	0.222	0.282	2	0.01	1.7
		M	8.5	2.8	0.051	0.013	0.223	0.287	ND	<0.01	1.3
		M	8.5	2.8	0.054	0.015	0.222	0.291	1	<0.01	1.8
		B	16	3.6	0.092	<0.005	0.242	0.333	3	0.01	1.5
		B	16	3.5	0.085	0.006	0.229	0.320	2	<0.01	1.3
B	14	S	1	2.8	0.040	0.012	0.222	0.274	1	0.01	1.7
		S	1	2.6	0.049	<0.005	0.231	0.280	2	0.01	1.8
		M	7	3.7	0.049	0.013	0.224	0.285	2	<0.01	2.1
		M	7	3.6	0.04	0.018	0.214	0.272	4	<0.01	1.9
		B	13	4.7	0.078	0.010	0.224	0.312	2	<0.01	1.8
		B	13	4.8	0.099	0.012	0.219	0.331	ND	<0.01	1.5
C	12	S	1	3.8	0.072	0.011	0.231	0.314	1	<0.01	2.1
		S	1	4.0	0.057	0.017	0.225	0.300	2	0.01	2.5
		M	6	5.1	0.055	0.017	0.220	0.292	1	<0.01	2.2
		M	6	4.8	0.053	0.014	0.224	0.292	ND	<0.01	1.9
		B	11	6.2	0.063	0.016	0.227	0.306	ND	0.01	2.0
		B	11	6.6	0.079	0.010	0.227	0.316	ND	<0.01	2.2
D	13	S	1	3.6	0.058	0.010	0.228	0.296	ND	<0.01	1.6
		S	1	3.2	0.054	0.013	0.223	0.289	1	<0.01	1.8
		M	6.5	3.9	0.063	0.017	0.229	0.310	ND	0.02	2.2
		M	6.5	4.2	0.048	0.013	0.223	0.284	ND	<0.01	2.1
		B	12	5.6	0.054	0.009	0.239	0.302	2	<0.01	2.4
		B	12	5.6	0.055	0.016	0.225	0.296	1	<0.01	2.0
E	16	S	1	4.4	0.054	0.016	0.241	0.311	ND	0.03	2.1
		S	1	4.6	0.052	0.011	0.244	0.308	ND	0.02	1.7
		M	8	4.8	0.044	0.017	0.233	0.294	ND	<0.01	1.5
		M	8	5.1	0.053	0.006	0.244	0.303	ND	<0.01	1.3
		B	15	5.8	0.073	0.013	0.239	0.326	ND	<0.01	1.9
		B	15	5.6	0.092	0.014	0.242	0.348	ND	0.02	2.0
F	23	S	1	3.0	0.128	0.018	0.234	0.381	1	0.02	2.4
		S	1	2.7	0.130	0.010	0.245	0.385	ND	0.04	2.5
		M	11.5	3.4	0.072	0.012	0.239	0.323	1	0.03	2.6
		M	11.5	3.7	0.065	0.018	0.238	0.321	3	0.03	2.5
		B	22	4.8	0.056	0.008	0.254	0.319	2	0.04	2.4
		B	22	4.8	0.070	0.012	0.248	0.330	3	0.03	2.5
G	22	S	1	2.8	0.114	0.016	0.258	0.387	ND	0.05	2.0
		S	1	3.0	0.123	0.017	0.258	0.398	2	0.03	1.9
		M	11	4.1	0.066	0.016	0.259	0.342	2	0.03	2.2
		M	11	3.9	0.051	0.009	0.266	0.326	2	0.04	2.0
		B	21	4.4	0.146	0.007	0.270	0.422	1	0.03	2.0
		B	21	4.8	0.133	<0.005	0.272	0.405	ND	0.03	2.0
H	19	S	1	4.2	0.204	<0.005	0.268	0.472	1	0.04	2.2
		S	1	4.5	0.115	<0.005	0.288	0.403	ND	0.03	2.4
		M	9.5	5.0	0.220	<0.005	0.271	0.491	ND	0.03	2.6

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	4.6	0.241	<0.005	0.271	0.512	1	0.03	2.1
		B	18	5.7	0.052	<0.005	0.294	0.347	1	0.03	2.4
		B	18	6.0	0.060	0.006	0.297	0.362	ND	0.02	1.9

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

Monitoring Station	Water Depth (m)	Sampling Depth (m)		TSS (mg/L)	NH_3 as N (mg/L)	NO_2^- as N (mg/L)	NO_3^- as N (mg/L)	TIN (mg/L)	E.coli (cfu/100mL)	Total P (mg/L)	BOD_5 (mg/L)
A	15	S	1	5.4	0.056	0.006	0.251	0.313	2	<0.01	2.1
		S	1	5.7	0.064	0.009	0.242	0.315	3	<0.01	1.8
		M	7.5	4.6	0.054	0.007	0.256	0.317	1	<0.01	2.1
		M	7.5	4.9	0.056	<0.005	0.255	0.311	2	0.02	1.8
		B	14	3.8	0.098	0.008	0.248	0.354	1	0.02	1.9
		B	14	3.5	0.104	0.010	0.242	0.356	3	0.01	2.2
B	14	S	1	3.6	0.058	<0.005	0.253	0.311	2	<0.01	1.7
		S	1	3.6	0.054	<0.005	0.259	0.312	1	<0.01	1.4
		M	7	4.3	0.097	0.010	0.248	0.356	3	0.01	1.9
		M	7	4.1	0.073	0.01	0.234	0.318	3	0.02	2.2
		B	13	4.9	0.059	0.007	0.232	0.297	2	<0.01	2.0
		B	13	4.7	0.052	0.012	0.231	0.295	4	<0.01	1.4
C	12	S	1	3.4	0.053	<0.005	0.240	0.293	ND	<0.01	1.3
		S	1	3.4	0.041	0.014	0.226	0.282	1	<0.01	1.3
		M	6	4.6	0.044	<0.005	0.245	0.289	ND	<0.01	1.9
		M	6	4.9	0.054	0.010	0.241	0.304	ND	0.01	2.1
		B	11	5.4	0.064	0.008	0.233	0.305	ND	<0.01	1.2
		B	11	5.2	0.052	0.010	0.229	0.290	1	<0.01	1.5
D	14	S	1	5.7	0.048	0.006	0.238	0.292	ND	<0.01	1.8
		S	1	5.4	0.038	0.010	0.236	0.283	1	0.02	1.4
		M	7	4.5	0.057	<0.005	0.237	0.294	ND	<0.01	1.8
		M	7	4.2	0.061	0.008	0.232	0.302	ND	<0.01	1.4
		B	13	3.5	0.092	0.007	0.238	0.337	1	<0.01	1.2
		B	13	3.8	0.119	<0.005	0.248	0.367	1	<0.01	1.0
E	14	S	1	4.8	0.050	<0.005	0.260	0.310	1	0.02	1.6
		S	1	4.5	0.048	0.006	0.258	0.312	ND	0.02	1.2
		M	7	5.8	0.118	<0.005	0.283	0.402	ND	0.02	1.7
		M	7	5.6	0.113	0.006	0.262	0.381	ND	0.02	1.2
		B	13	6.4	0.118	<0.005	0.279	0.397	1	0.02	1.2
		B	13	6.0	0.112	0.010	0.280	0.402	1	0.02	1.3
F	18	S	1	4.5	0.110	0.008	0.252	0.370	2	0.02	1.9
		S	1	4.2	0.097	<0.005	0.261	0.358	1	0.02	2.2
		M	9	3.2	0.102	0.016	0.240	0.359	1	0.02	1.4
		M	9	3.4	0.117	<0.005	0.262	0.378	1	0.04	1.6
		B	17	2.2	0.166	0.008	0.250	0.424	ND	<0.01	1.2
		B	17	2.4	0.105	<0.005	0.259	0.364	1	0.02	1.3
G	13	S	1	3.5	0.080	0.006	0.296	0.382	ND	0.02	1.6
		S	1	3.2	0.074	<0.005	0.279	0.353	3	0.02	1.3
		M	6.5	4.4	0.121	<0.005	0.322	0.443	ND	0.02	1.3
		M	6.5	4.8	0.124	0.009	0.312	0.444	1	0.03	1.6
		B	12	5.7	0.100	<0.005	0.317	0.417	1	0.04	1.9
		B	12	6.0	0.116	0.006	0.311	0.433	1	0.02	2.1

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	6.0	0.193	0.007	0.269	0.469	ND	0.01	1.9
		S	1	5.6	0.091	0.005	0.286	0.382	1	<0.01	1.3
		M	9.5	4.4	0.458	0.005	0.273	0.736	1	0.02	2.5
		M	9.5	4.0	0.388	0.006	0.264	0.657	ND	0.03	2.0
		B	18	3.0	0.122	<0.005	0.303	0.424	ND	<0.01	1.4
		B	18	2.5	0.106	0.007	0.318	0.431	2	<0.01	1.4

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 G**.

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)		
4 February 2021	23.8	19.4	16.8	68	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 3**.

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 4**.

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 4 February 2021. 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 H.**

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	8.4	1.2	760	406	<0.10	31.9	25.8	39.6	0.12	18.6	77.3	14.9	0.18
B	8.4	6.0	850	484	<0.10	32.4	30.8	38.6	0.11	18.8	86.1	11.8	0.32
C	8.2	10.7	1070	545	<0.10	42.3	34.7	42.2	0.11	24.5	104	11.7	0.27
D	8.4	6.4	1020	466	0.10	32.5	29.4	36.5	0.11	19.6	84.0	9.6	0.23
E	8.2	10.7	1450	601	<0.10	39.9	37.9	45.2	0.12	23.9	104	11.2	0.32
F	8.1	27.6	1360	622	<0.10	35.8	36.0	42.3	0.11	21.7	95.8	11.4	0.33
G	8.4	4.1	1000	474	0.13	38.8	94.0	83.4	0.11	21.2	228	11.1	0.33
H	8.3	3.5	1120	517	<0.10	41.4	101	49.4	0.12	23.4	117	12.0	0.66

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	0.77	15	41	22	22	Dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments
B	0.85	1	26	42	31	Dark grey, slightly sandy SILT/CLAY with shell fragments
C	0.93	0	6	52	42	Dark grey, slightly sandy SILT/CLAY with shell fragments
D	0.81	1	19	47	33	Dark grey, slightly sandy SILT/CLAY with shell fragments
E	1.05	0	9	53	38	Dark grey, slightly sandy SILT/CLAY with shell fragments
F	1.10	0	3	54	43	Dark grey, SILT/CLAY with shell fragments
G	0.84	3	21	43	33	Dark grey, slightly sandy SILT/CLAY with shell fragments
H	0.88	1	10	49	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 H**.

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)		
4 February 2021	23.8	19.4	16.8	68	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 4 February 2021

Monitoring Station	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	248	3.34	12	1.25	0.50
B	134	1.89	15	1.45	0.53
C	46	22.98	11	2.08	0.87
D	54	26.64	12	1.91	0.77
E	161	1.68	13	0.99	0.39
F	177	1.32	7	0.61	0.31
G	145	3.72	9	0.96	0.44
H	33	1.59	10	1.67	0.72
TOTAL	998	63.16			

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

i) Abundance

A total of 998 macrobenthic organisms was recorded from the eight monitoring stations during February 2021 monitoring period. Current result showed higher total abundance as compared to both dry (March 2004) and wet (August 2004) seasons baseline data. The increase in total abundance was due to the increase in abundance of the arthropod Gammarus with respect to the previous monitoring period (December 2020). Members of this genus generally favour high dissolved oxygen levels (DO) and low temperature of the water column for survival (Zadereev et. al, 2010). The current monitoring period (winter season) was recorded with high DO levels that ranged from 8.37 mg/L to 9.33 mg/L; and low water temperatures that only ranged from 18.33°C to 18.60°C. These, in addition to the possible absence or decreased abundance of their fish and decapod predators, could be the reason for the Gammarus' high abundance this period (Nelson et al, 1979a).

A significant seasonal variation of the macrobenthic abundances was noted during the current monitoring period (F-value = 3.48; F-crit = 1.66; P-value = 0.00001).

The lowest abundance of 33 individuals (ind.) was recorded at Station H while the highest (248 ind.) was noted at Station A, both as reference stations. Current abundances in the impact stations C and D also increased relative to December 2020 monitoring results. The rest of the remaining stations were also observed with increased abundances. Similar with the previous monitoring periods, differences in the total abundance across the monitoring stations were still statistically significant (F-value = 2.97; F-crit = 2.07; P-value = 0.01).

ii) Biomass

The total wet biomass recorded in the eight monitoring stations was 63.16 g with the highest biomass at the impact sites Station D (26.64g) and Station C (22.98g). Among the different genera noted in these two stations, the polychaete Naineris (20.41g) at Station D and the sea cucumber Acaudina (22.6g) at Station C, contributed to the current high recorded biomass.

Meanwhile, it was in the reference Station F that the lowest (1.32g) biomass was observed. Low biomass values were also noted in Stations H (1.59g) and E (1.68g). However, relative to the December 2020 period, an overall increased biomass was noted during the current monitoring period.

iii) Taxonomic Composition

A total of seven comprising of 30 families and 34 genera were identified. The macrobenthic assemblage was noted with a shift in the dominating group from the annelids of last December 2020 to arthropods (70%) during the current survey. Currently, the annelids were already noted with lesser dominance (23%) such that the monitoring stations could have experienced lessen organic enrichment (Pearson and Rosenberg, 1978) as evident by the low percentage of the total organics (as low as 0.77%) during the period.

There was no dominant genera (member species > 10) recorded during the current monitoring activity.

iv) Diversity

Benthic diversity index (H') ranged from 1.91 to 2.08 in the impact stations while its values ranged from 0.61 to 1.67 among the different reference stations. Impact stations had relatively higher diversity values as compared to reference stations.

Meanwhile, in terms of evenness index (J) values, reference Station F had the lowest value (0.31) and followed by another reference Station E (0.39). Current results showed that both the impact Stations C and D were able to maintain high evenness index relative to the December 2020 results. Current results indicated an overall increase in diversity and evenness values from the baseline survey condition.

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

5. CHINESE WHITE DOLPHIN MONITORING

5.1 Data Interpretation

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

5.1.2 The latest AFCD's report dated 21 July 2020, "*Monitoring of Marine Mammals in Hong Kong Waters (2019-20)*", in terms of the distribution and abundance of CWDs, was reviewed in the Monthly EM&A report in July 2020. 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 (2020-21) is uploaded to AFCD's webpage.

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 L**.

7. ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS

7.1.1 SHWSTW is reminded to fully comply with EP conditions. All measures and recommendations in the EP, EIA Report and approved Waste Management Plan (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 L**.

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

8. SUMMARY OF EXCEEDANCE OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

8.1.1 Odour patrol monitoring was resumed and carried out on 3, 9, 19 and 25 February 2021. 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 4 February 2021. 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	1
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

9.1.2 The cumulative complaint log and summaries of complaints are presented in **Appendix K**.

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. 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). H_2S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). 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 suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.

11. CONCLUSION

11.1.1 Odour patrol monitoring was resumed from January 2020 and carried out on 3, 9, 19 and 25 February 2021. The modified odour patrol monitoring plan including updated Event and Action Plan was approved on March 2020, and odour patrol monitoring was commenced from 20 March 2020. No exceedances of Action/Limit levels at Air Sensitive Receivers (ASR) and odour patrol points were recorded and no non-compliance of odour monitoring at odour patrol points were recorded in 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). H_2S measurement and olfactometry analysis conducted between August 2017 and May 2018 was considered as unlikely way to establish the relationship of H_2S concentration (ppb) with the odour unit (OU/m^3). 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 suspension on air quality monitoring was approved by EPD's memo dated 14 May 2018. In order to recommence the monitoring, a review on air quality monitoring had been carried out to determine reasonable odour-related criteria and was submitted to EPD for approval on 24 March 2020. Comments from EPD was received on 1 April 2020 and the review is currently under revision for further submission to the EPD.

11.1.3 Water quality monitoring, sediment quality monitoring and benthic survey were conducted on 4 February 2021 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 21 July 2020, "*Monitoring of Marine Mammals in Hong Kong Waters (2019-20)*" in terms of the distribution and abundance of CWDs was reviewed in the Monthly EM&A report in July 2020. 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 (2020-21) 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.

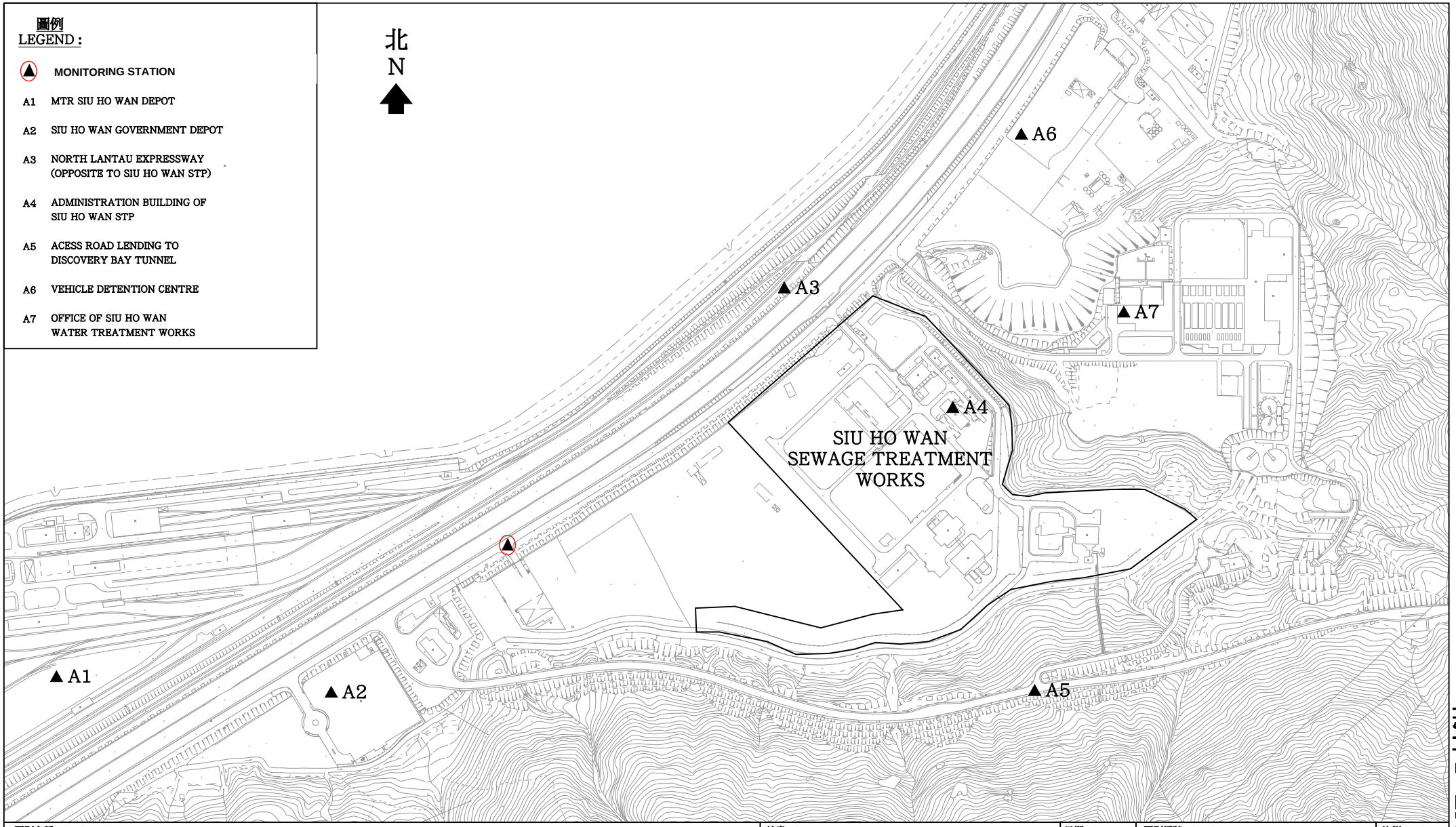
FUGRO TECHNICAL SERVICES LIMITED

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

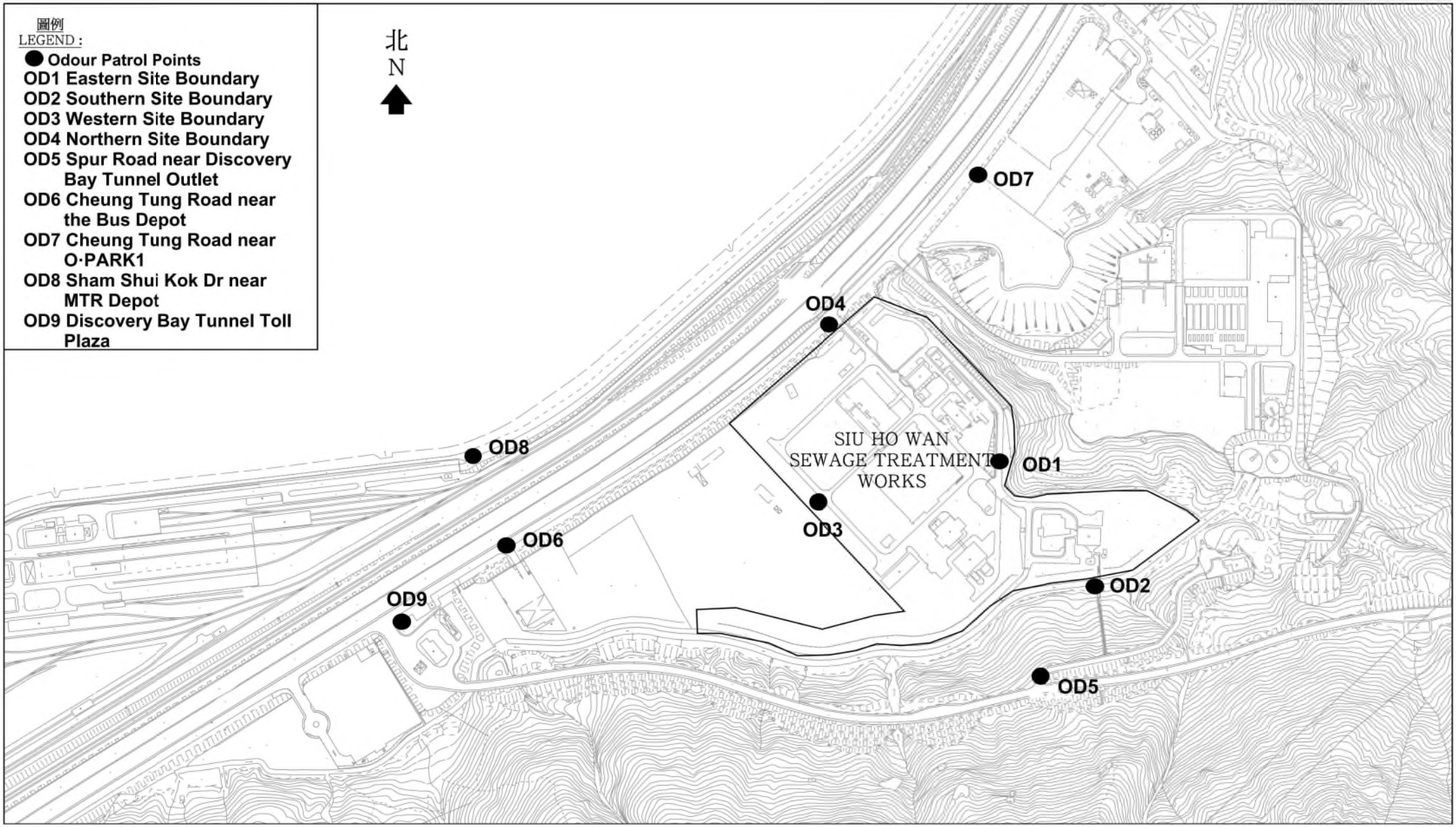
FUGRO TECHNICAL SERVICES LIMITED

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

Odour Patrol Points of Modified Odour Patrol


圖例
LEGEND :
Odour Patrol Points
OD1 Eastern Site Boundary
OD2 Southern Site Boundary
OD3 Western Site Boundary
OD4 Northern Site Boundary
OD5 Spur Road near Discovery Bay Tunnel Outlet
OD6 Cheung Tung Road near the Bus Depot
OD7 Cheung Tung Road near O·PARK1
OD8 Sham Shui Kok Dr near MTR Depot
OD9 Discovery Bay Tunnel Toll Plaza
北
N
OD7
OD4
OD8
SIU HO WAN
SEWAGE TREATMENT
WORKS
OD1
OD3
OD6
OD9
OD2
OD5

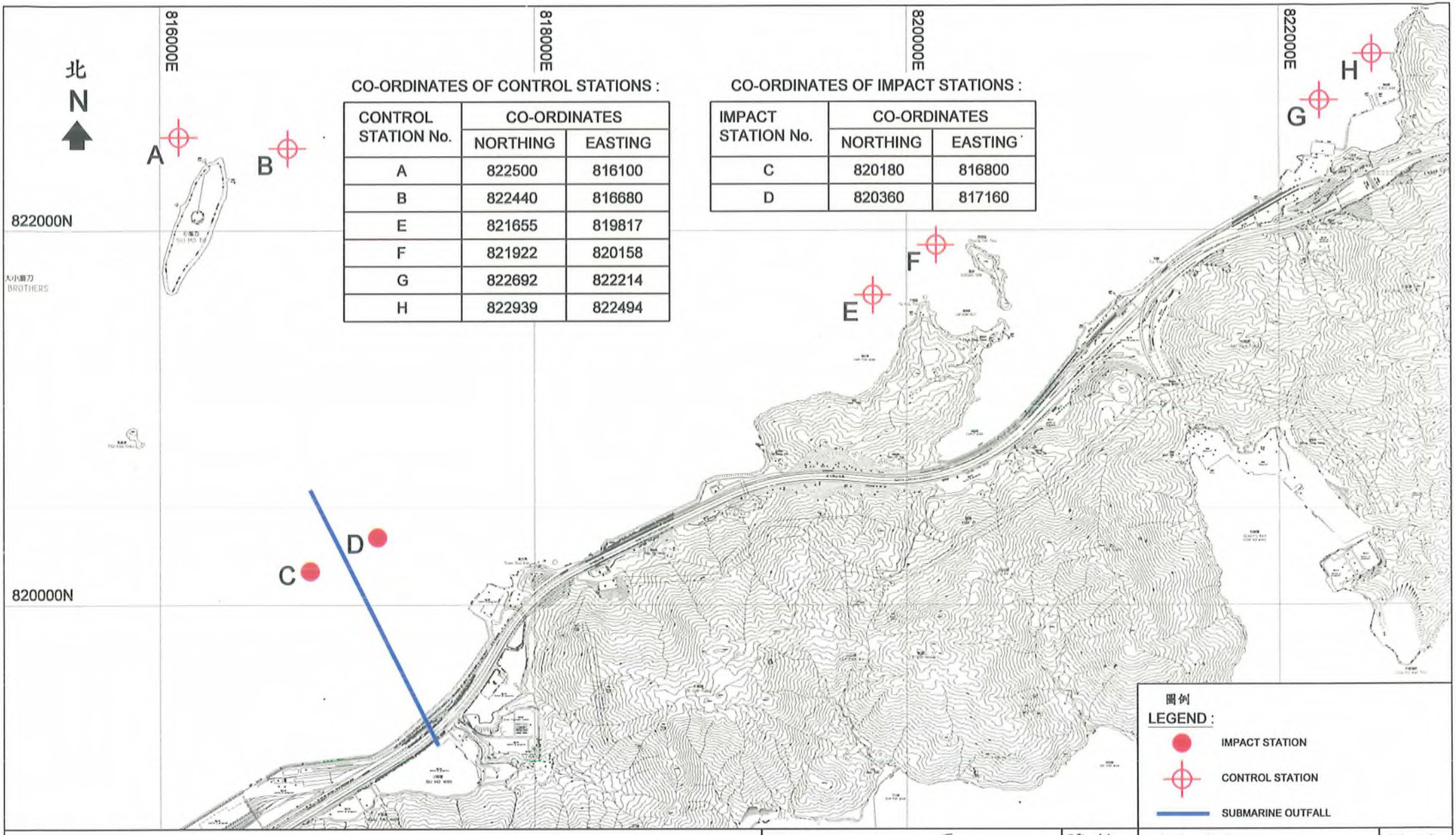
FUGRO TECHNICAL SERVICES LIMITED

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

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 4

Location of the Tide Gauge

FUGRO TECHNICAL SERVICES LIMITED

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

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Fax : +852 2450 6138
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Website : www.fugro.com

Location of the Tide Gauge

Source: Google Maps

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Fax : +852 2450 6138
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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.

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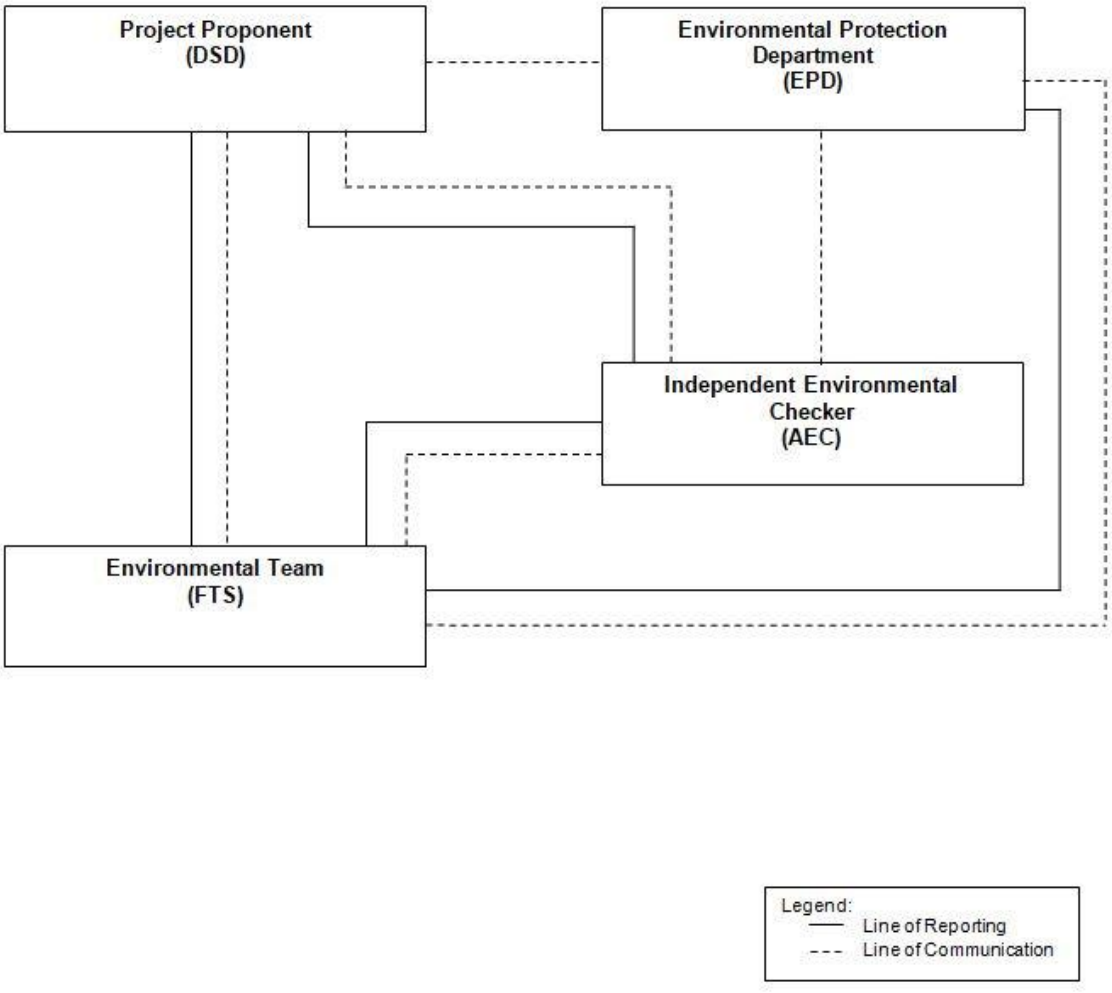

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Hong Kong.

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

Report No.: 0041/17/ED/0620

Monitoring Schedule for the Present Reporting Period

Sun	Mon	Tue	Wed	Thur	Fri	Sat
	1 February	2	3 Odour Patrol	4 Water Quality Monitoring and Sediment Quality Monitoring and Benthic Survey Mid-Flood (11:37) Mid-Ebb (17:58)	5	6
7	8	9 Odour Patrol	10	11	12	13
14	15	16	17	18	19 Odour Patrol	20
21	22	23	24	25 Odour Patrol	26	27
28						

Remarks

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

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Hong Kong.

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

Monitoring Schedule for the Next Reporting Period

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

Remarks

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

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Appendix C

Event and Action Plan for Air Quality Monitoring

EVENT	ACTION		
	ET	**IEC**	***Operator**
Action Level			
One complaint received for specific odour event / Odour intensity of 2 or above is measured from odour patrol	1. Identify source/reason of exceedance or odour complaints; 2. Notify the IEC and Operator of exceedance; 3. Repeat odour patrol to confirm finding; 4. If exceedance continues, notify the IEC and Operator; 5. Carry out investigation to identify the source/reason of exceedance or complaints; 6. Check Operator's working methods; and 7. Discuss with Operator on required remedial actions.	1. Check odour patrol results submitted by ET; 2. Discuss with ET and Operator on the possible remedial actions; 3. Advise the Operator on the effectiveness of the proposed remedial measures; 4. Supervise implementation of remedial measures.	1. Notify the ET and IEC when receipt of odour complaint; 2. Confirm receipt of notification of exceedance in writing; 3. Identify/ confirm source with ET; 4. Discuss with ET for remedial actions required; 5. Ensure remedial actions properly implemented 6. Rectify any unacceptable practice; and 7. Amend operation methods if appropriate.
Limit Level			
More than one complaint in 3 months / Odour intensity of 3 or above is measured from odour patrol	1. Identify source/reason of exceedance or odour complaints; 2. Notify the IEC and Operator of exceedance; 3. Repeat odour patrol to confirm finding; 4. If exceedance continues, notify the IEC and Operator; 5. Carry out investigation to identify the source/reason of exceedance or complaints; 6. Check Operator's working methods; 7. Carry out analysis of Operator's working procedures to determine possible mitigation to be implemented; 8. Arrange meeting with ET and EPD to discuss the remedial actions to be taken; 9. Discuss with EPD and the	1. Check odour patrol results submitted by ET; 2. Discuss amongst ET and the Operator on the potential remedial actions; 3. Review the proposed remedial actions whenever necessary to assure their effectiveness and advise the Operator accordingly; 4. Supervise implementation of remedial measures.	1. Notify the ET and IEC when receipt of odour complaint; 2. Confirm receipt of notification of exceedance in writing; 3. Indentify/ confirm source with ET; 4. Inform ET, IEC and EPD; 5. Discuss with EPD and ET on the required remedial actions; 6. Ensure remedial actions properly implemented; 7. Take immediate action to avoid further exceedance; 8. Implement the agreed proposals.

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	Operator on the required remedial actions; 10. Submit proposals for remedial actions within 3 working days of notification; 11. Assess effectiveness of Operator's remedial actions and keep EPD informed of the results; 12. Amend proposal if appropriate; and 13. Resubmit proposal if problem still not under control.		

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

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Hong Kong.

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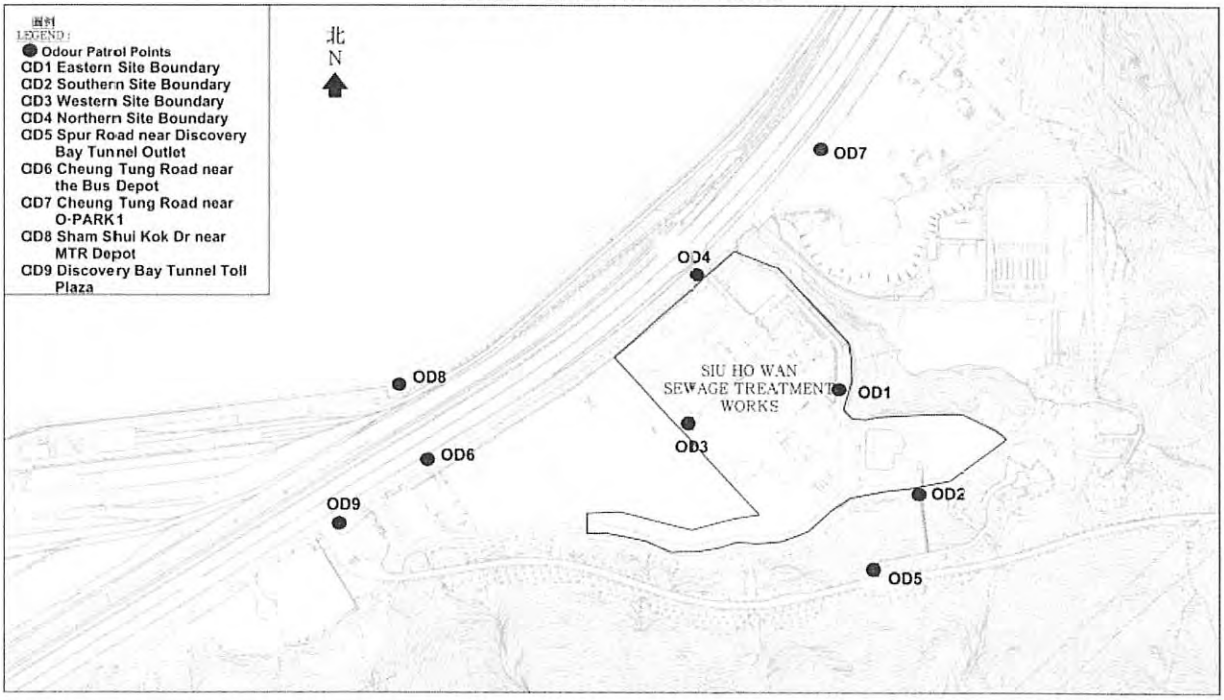
Fax : +852 2450 6138
E-mail : matlab@fugro.com
Website : www.fugro.com

Appendix D

Results and Graphical Presentation of Air Quality Monitoring

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.
Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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



Date	3/2/2021	Weather	Fine	Temperature	21.7°C	Humidity	46%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	10:47	NE	1.6	0	/
OD2	Southern Site Boundary	10:50	NE	0.4	1	Effluent
OD3	Western Site Boundary	10:46	NE	4	0	/
OD4	Northern Site Boundary	10:43	NE	2.5	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	10:31	NE	1.2	0	/
OD7	Cheung Tung Road near O-PARK1	10:33	NE	0.9	0	/
OD8	Sham Shui Kok Dr near MTR Depot	10:23	NE	1.3	0	/
OD9	Discovery Bay Tunnel Toll Plaza	10:29	NE	0.4	0	/

***Classification Criteria:**

Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by: _____
Name: LAW YEE CHUNG
Date: 3 Feb 2021

Checked by: _____
Name: CHOI KAM HO
Date: 3 February 2021

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.
Tel : (852)-24508238
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Email : mcl@fugro.com.hk

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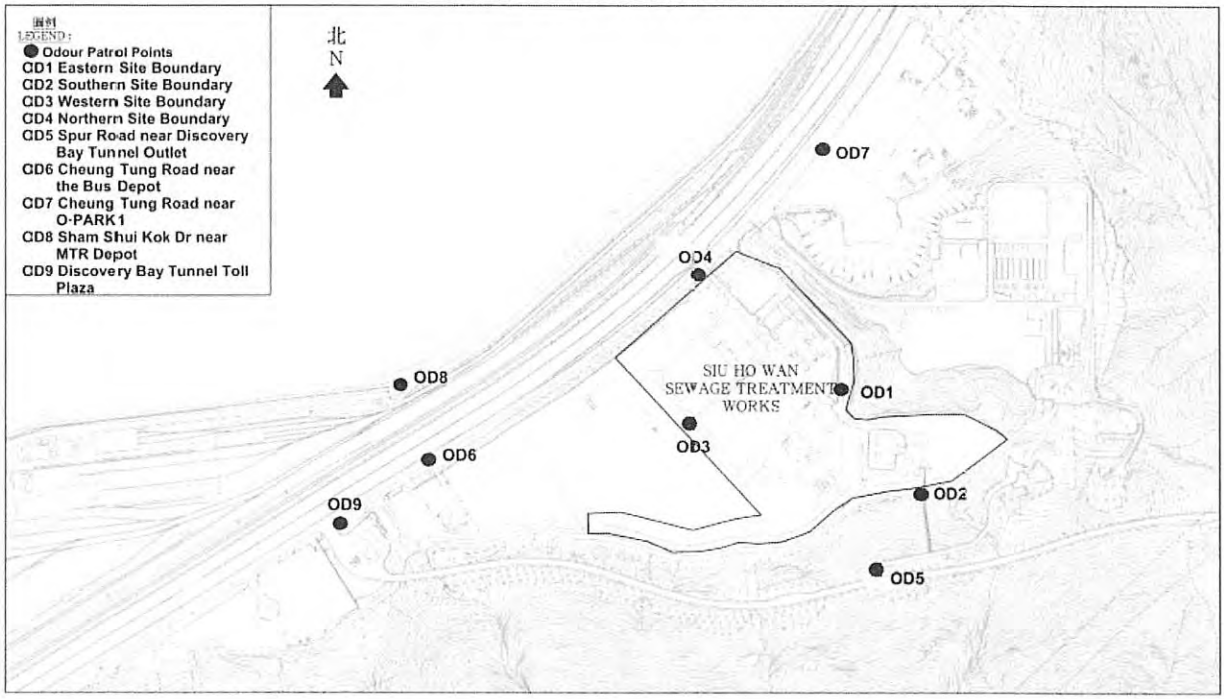

Date	3/2/2021	Weather	Fine	Temperature	21.7°C	Humidity	46%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	10:47	NE	1.6	0	/
OD2	Southern Site Boundary	10:50	NE	0.4	0	/
OD3	Western Site Boundary	10:46	NE	4	0	/
OD4	Northern Site Boundary	10:43	NE	2.5	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	10:31	NE	1.2	0	/
OD7	Cheung Tung Road near O-PARK1	10:33	NE	0.8	0	/
OD8	Sham Shui Kok Dr near MTR Depot	10:23	NE	1.3	0	/
OD9	Discovery Bay Tunnel Toll Plaza	10:29	NE	0.4	0	/

*Classification Criteria:

Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by:
Name: Tiny Chan
Date: 3/2/2021

Checked by:
Name: CHOI KAM HO
Date: 3 February 2021

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.
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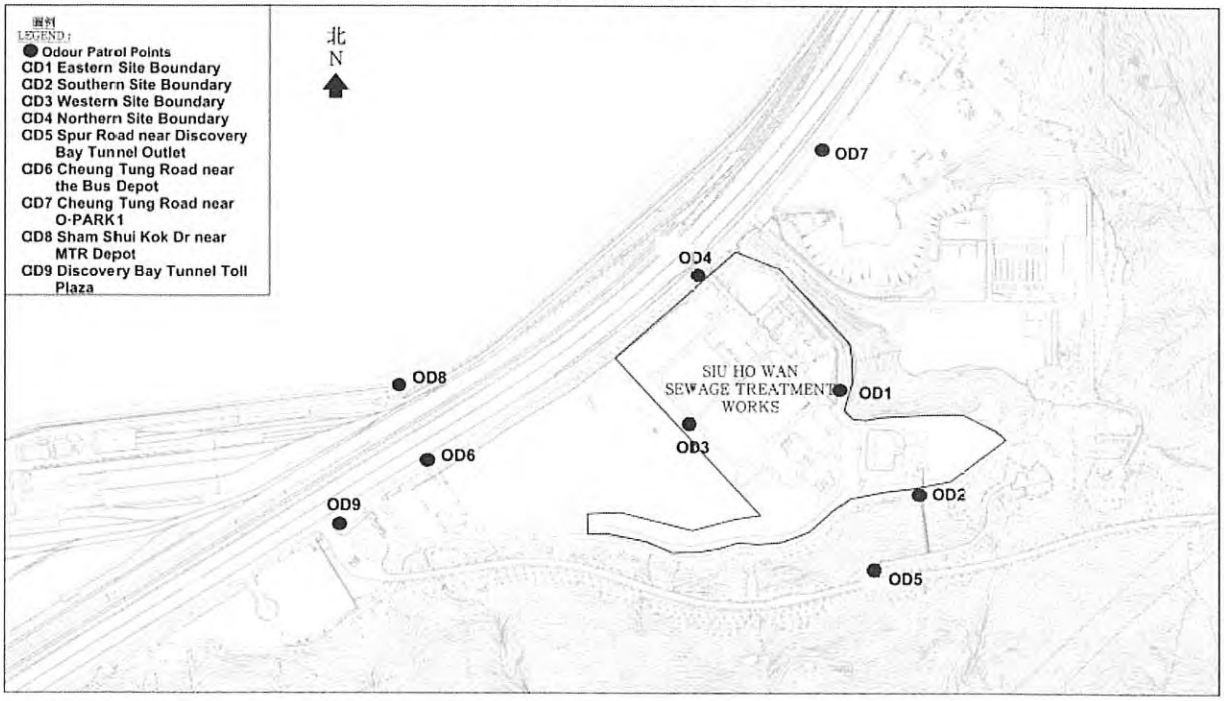

Date	9/2/2021	Weather	Cloudy	Temperature	18.4°C	Humidity	73%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	10:58	S	1.5	0	/
OD2	Southern Site Boundary	11:02	E	0.4	0	/
OD3	Western Site Boundary	10:53	SE	1.4	0	/
OD4	Northern Site Boundary	10:49	NE	1.2	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	10:37	E	1.2	0	/
OD7	Cheung Tung Road near O·PARK1	10:40	E	0.9	0	/
OD8	Sham Shui Kok Dr near MTR Depot	10:29	NE	0.4	0	/
OD9	Discovery Bay Tunnel Toll Plaza	10:35	E	0.2	0	/

***Classification Criteria:**

Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by:
Name: Ting Chan
Date: 9/2/2021

Checked by:
Name: CHOI KAM HO
Date: 9 February 2021

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.
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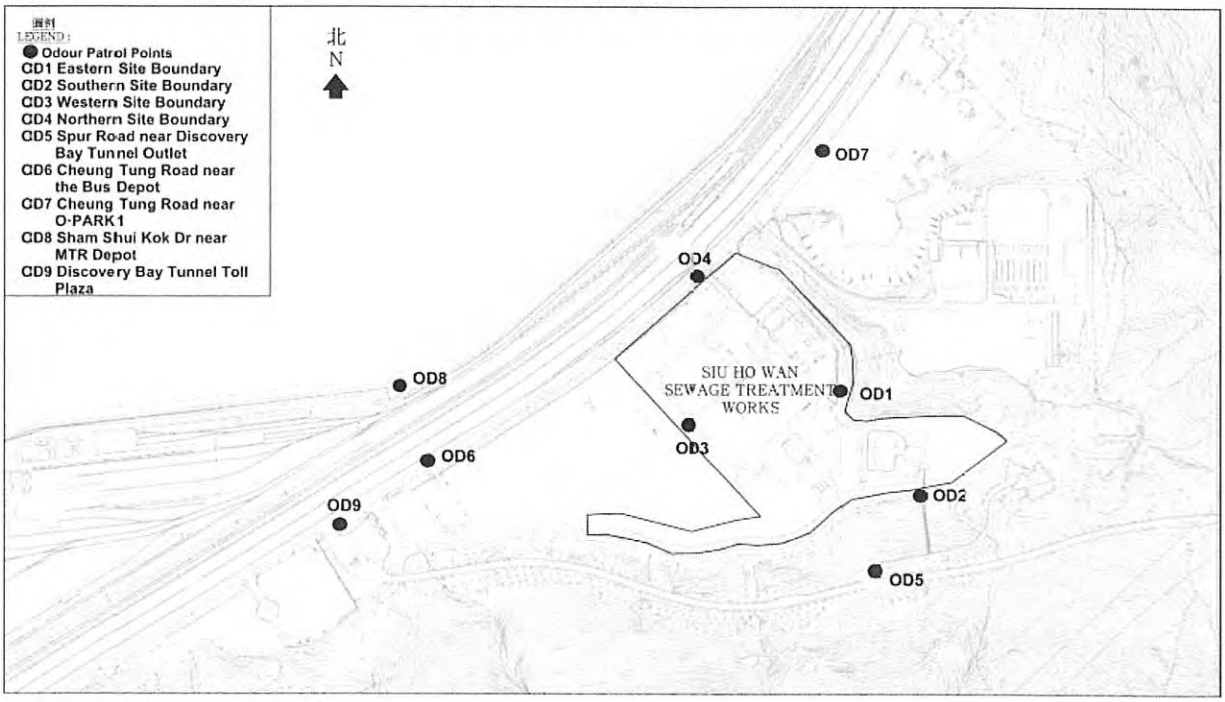

Date	9/2/2021	Weather	Cloudy	Temperature	18.4°C	Humidity	73%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	10:58	S	1.5	0	/
OD2	Southern Site Boundary	11:02	E	0.4	0	/
OD3	Western Site Boundary	10:53	SE	1.4	0	/
OD4	Northern Site Boundary	10:49	NE	1.2	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	10:37	E	1.2	0	/
OD7	Cheung Tung Road near O·PARK1	10:40	E	0.9	0	/
OD8	Sham Shui Kok Dr near MTR Depot	10:29	NE	0.4	0	/
OD9	Discovery Bay Tunnel Toll Plaza	10:35	E	0.2	0	/

***Classification Criteria:**

Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by: WOO
Name: WOO KA HO
Date: 9/2/2021

Checked by: [signature]
Name: CHOI KAM HO
Date: 9 February 2021

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
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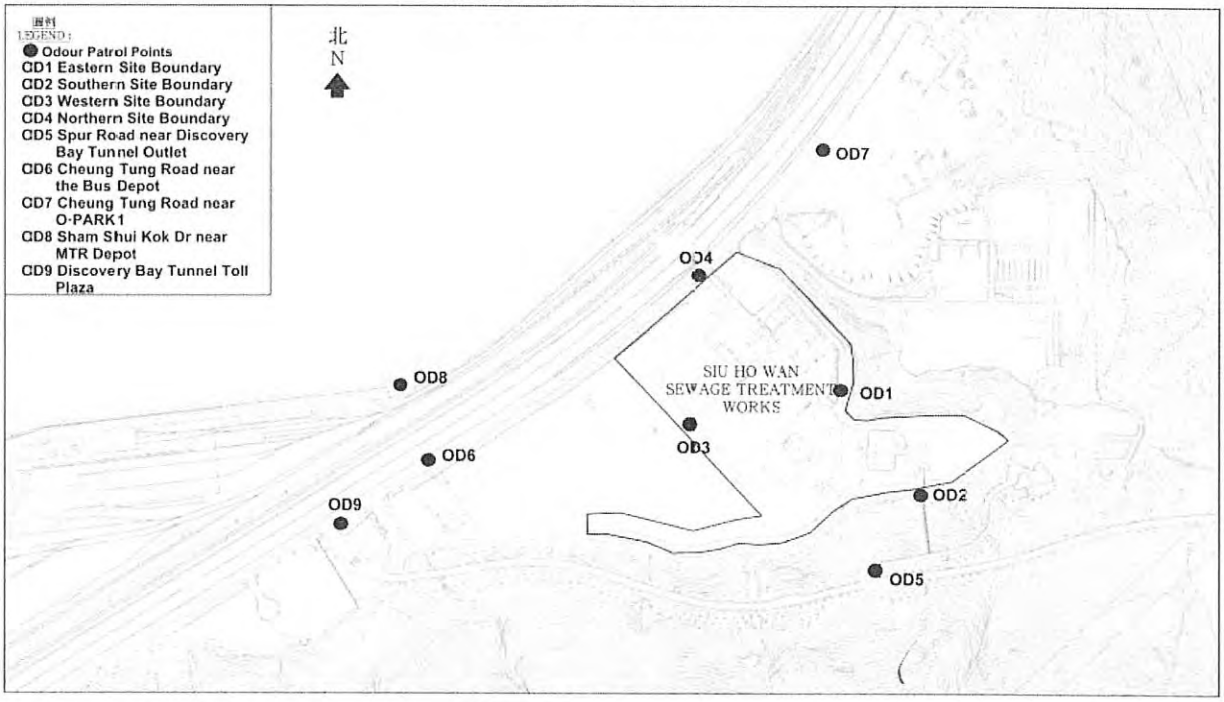

Date	19/2/21	Weather	Sunny	Temperature	19.5°C	Humidity	48%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1040	NW	0.2	0	/
OD2	Southern Site Boundary	1042	NW	0.3	0	/
OD3	Western Site Boundary	1038	N	0.2	0	/
OD4	Northern Site Boundary	1035	N	0.3	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	1026	N	0.7	0	/
OD7	Cheung Tung Road near O·PARK1	1027	N	0.5	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1018	NW	0.4	0	/
OD9	Discovery Bay Tunnel Toll Plaza	1024	NW	0.8	0	/

***Classification Criteria:**

Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by: WOO
Name: Woo Ka Ho
Date: 19/2/21

Checked by:
Name: CHOI KAM HO
Date: 19 February 2021

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
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Tel : (852)-24508238
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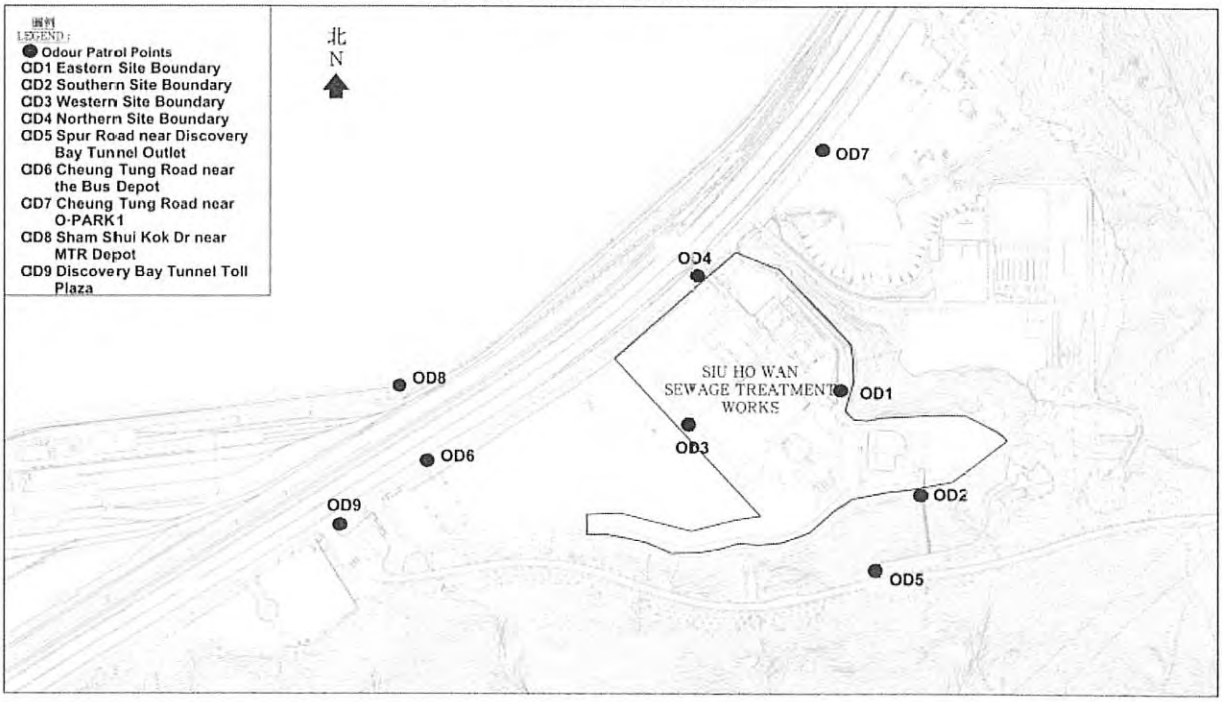

Date	19/2/2021	Weather	Sunny	Temperature	19.5°C	Humidity	48%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	10:40	NW	0.2	0	/
OD2	Southern Site Boundary	10:42	NW	0.3	0	/
OD3	Western Site Boundary	10:39	N	0.2	0	/
OD4	Northern Site Boundary	10:35	N	0.3	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	10:26	N	0.7	0	/
OD7	Cheung Tung Road near O·PARK1	10:27	N	0.5	0	/
OD8	Sham Shui Kok Dr near MTR Depot	10:19	NW	0.4	0	/
OD9	Discovery Bay Tunnel Toll Plaza	10:24	NW	0.8	0	/

***Classification Criteria:**

Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by: Wan Siu Wai
Name: Tom Wan
Date: 19/2/2021

Checked by:
Name: CHOI WAM HO
Date: 19 February 2021

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Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
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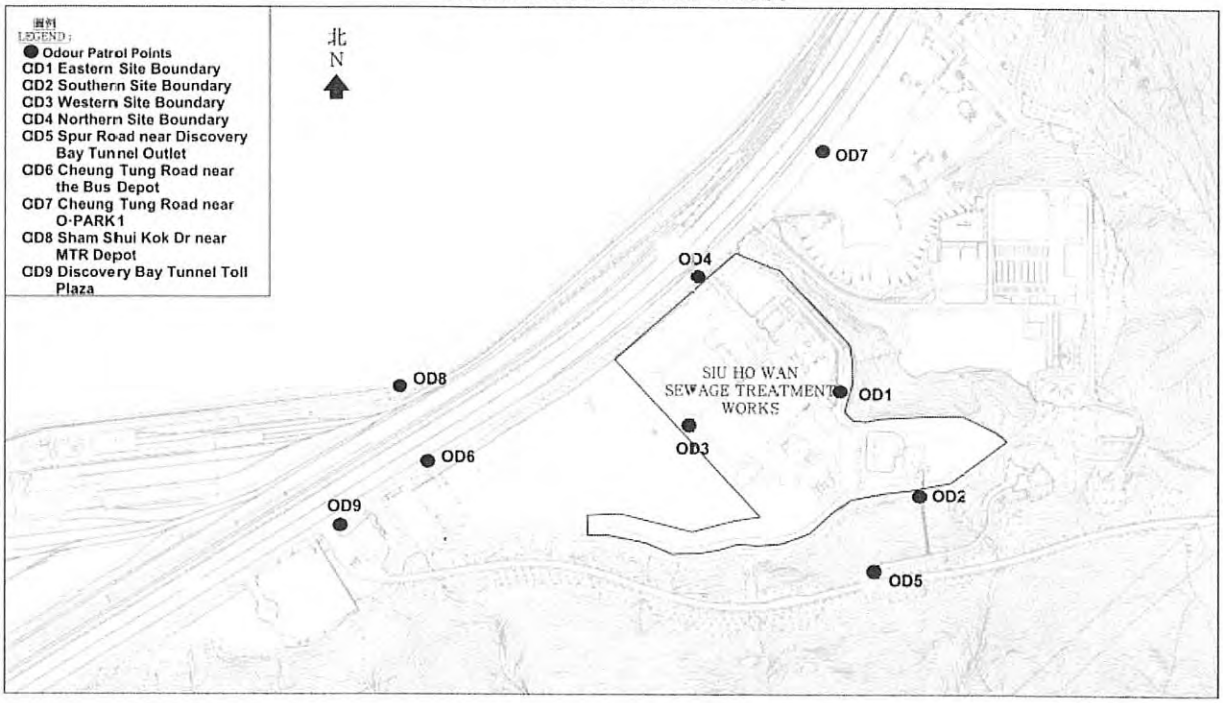

Date	25/2/21	Weather	Cloudy	Temperature	19.1°C	Humidity	91%

ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1038	NW	0.3	0	/
OD2	Southern Site Boundary	1040	N	0.2	0	/
OD3	Western Site Boundary	1036	N	0.4	0	/
OD4	Northern Site Boundary	1033	N	0.6	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	1020	N	0.8	0	/
OD7	Cheung Tung Road near O·PARK1	1022	N	0.7	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1013	NW	0.2	0	/
OD9	Discovery Bay Tunnel Toll Plaza	1018	N	0.9	0	/

***Classification Criteria:**

Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by: Woo Ka Ho
Name: Woo Ka Ho
Date: 25/2/2021

Checked by:
Name: CHOI KAM HO
Date: 25 February 2021

FUGRO TECHNICAL SERVICES LIMITED
Room 723 - 726, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.
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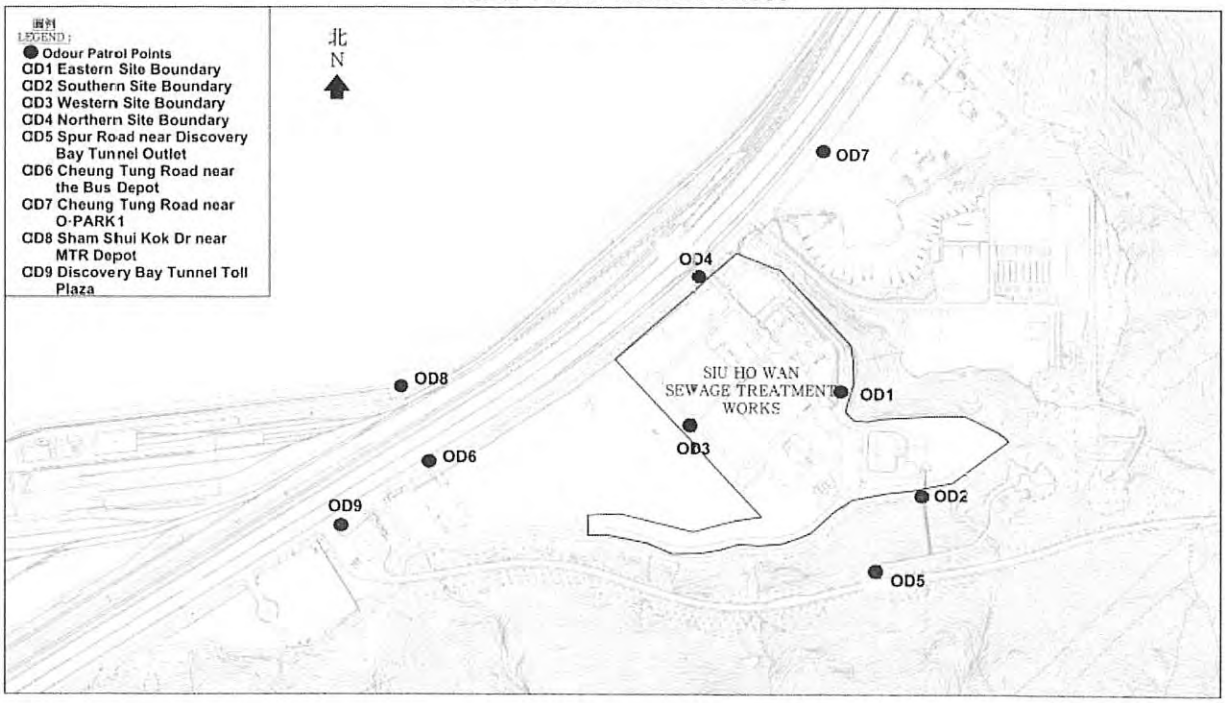
Odour Patrol Record Sheet



Date	25/Feb 2021	Weather	CLOUDY	Temperature	19.1 °C	Humidity	91%

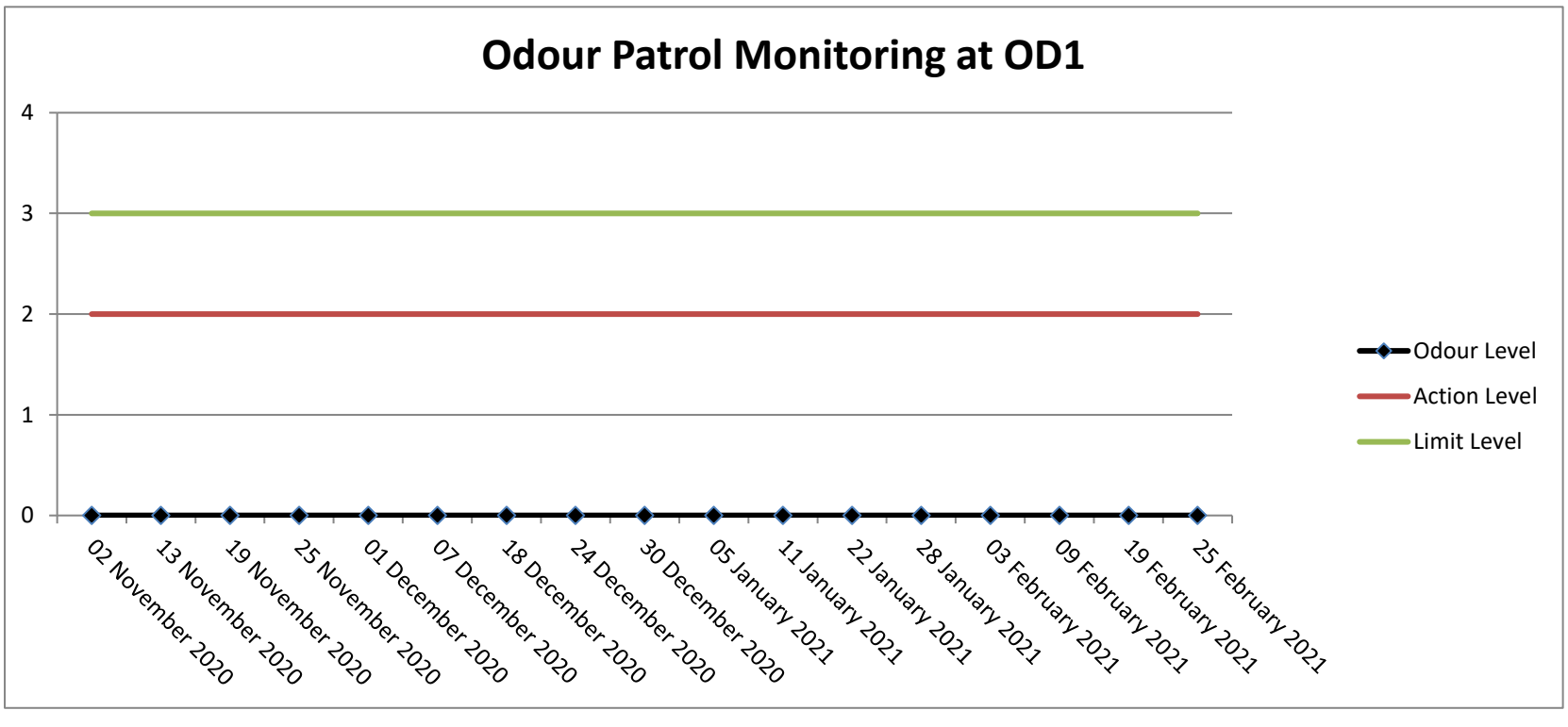
ID	Location	Time	Wind Direction	Wind Speed (m/s)	Odour intensity	Odour Characteristics
OD1	Eastern Site Boundary	1038	NW	0.3	0	/
OD2	Southern Site Boundary	1040	N	0.2	0	/
OD3	Western Site Boundary	1036	N	0.4	0	/
OD4	Northern Site Boundary	1033	N	0.6	0	/
OD5	Spur Road near Discovery Bay Tunnel Outlet	/	/	/	/	/
OD6	Cheung Tung Road near the Bus Depot	1020	N	0.8	0	/
OD7	Cheung Tung Road near O·PARK1	1022	N	0.7	0	/
OD8	Sham Shui Kok Dr near MTR Depot	1013	NW	0.2	0	/
OD9	Discovery Bay Tunnel Toll Plaza	1018	N	0.9	0	/

***Classification Criteria:**

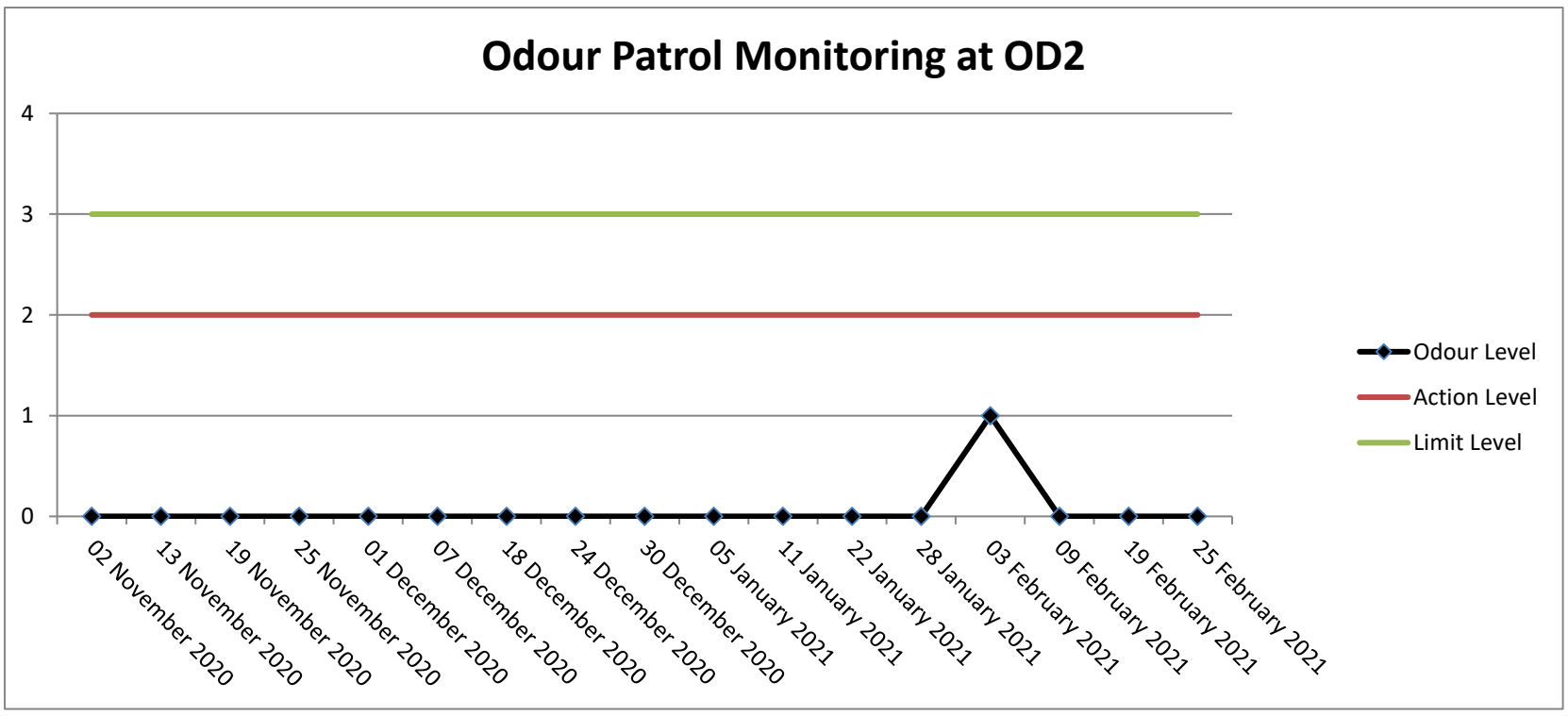
Not detected	: No odour perceived or an odour so weak that it cannot be easily characterised or described
Slight	: Slight identifiable odour, and slight chance to have odour nuisance
Moderate	: Moderate identifiable odour, and moderate chance to have odour nuisance
Strong	: Strong identifiable, likely to have odour nuisance
Extreme	: Extreme severe odour, and unacceptable odour level

Recorded by:
Name: FONG KA CHUN
Date: 25 Feb 2021

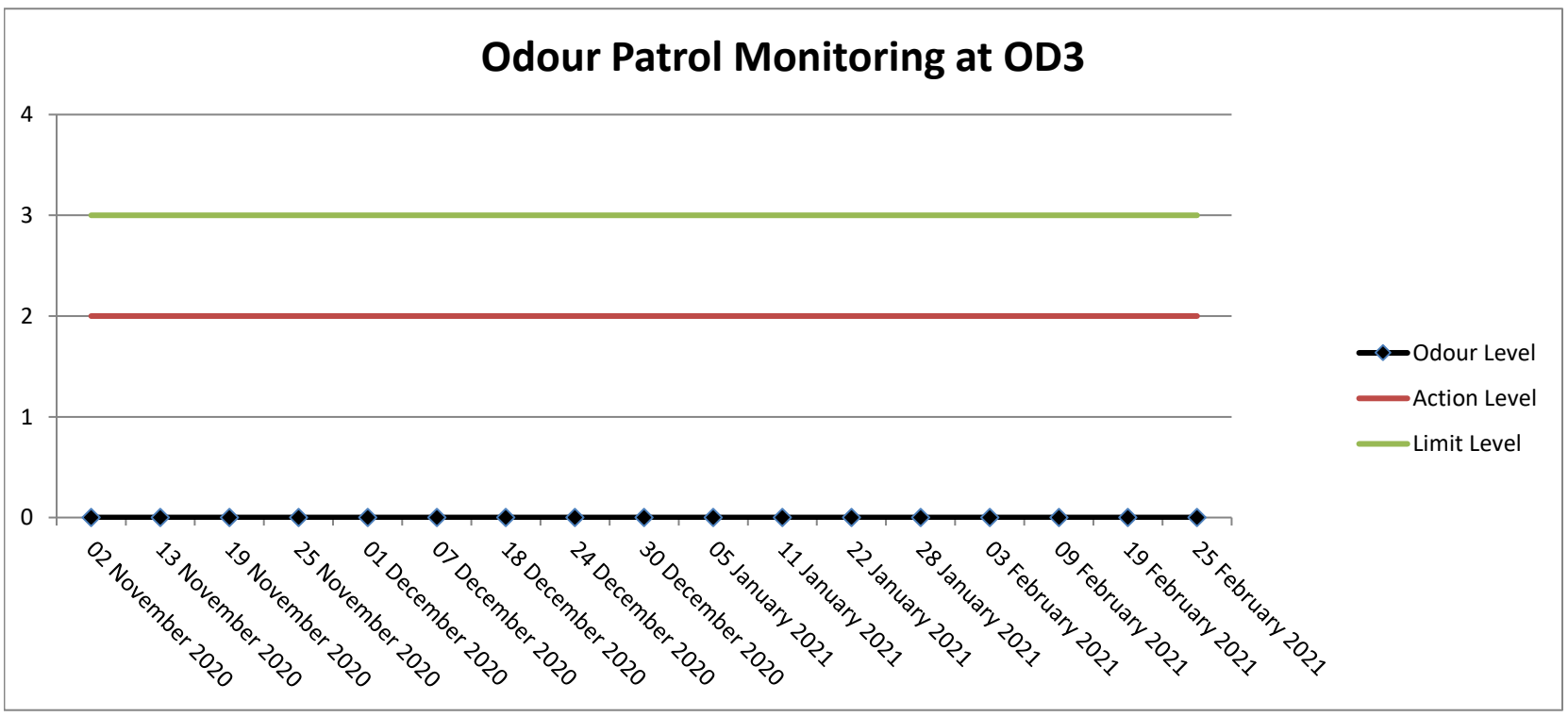
Checked by:
Name: CHOI KAM HO
Date: 25 February 2021



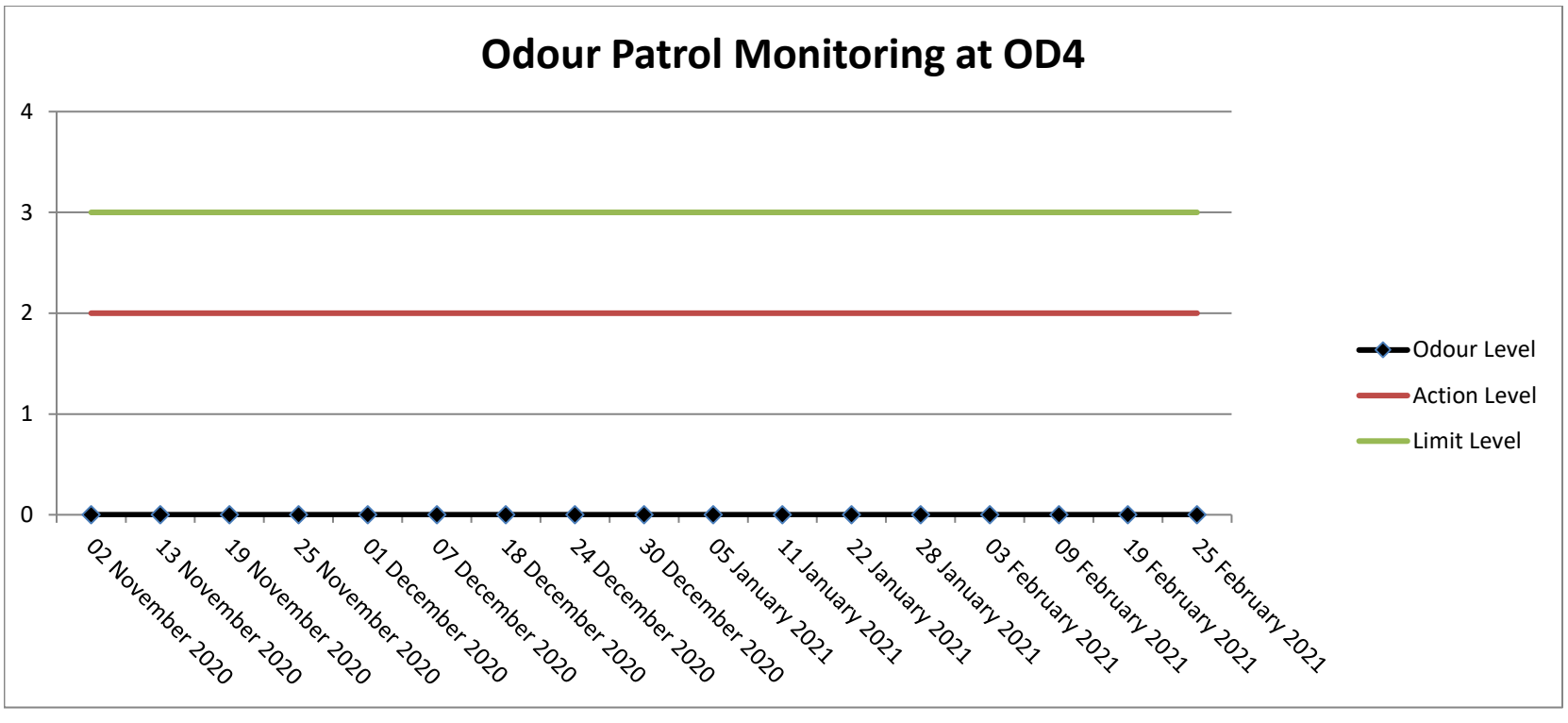
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



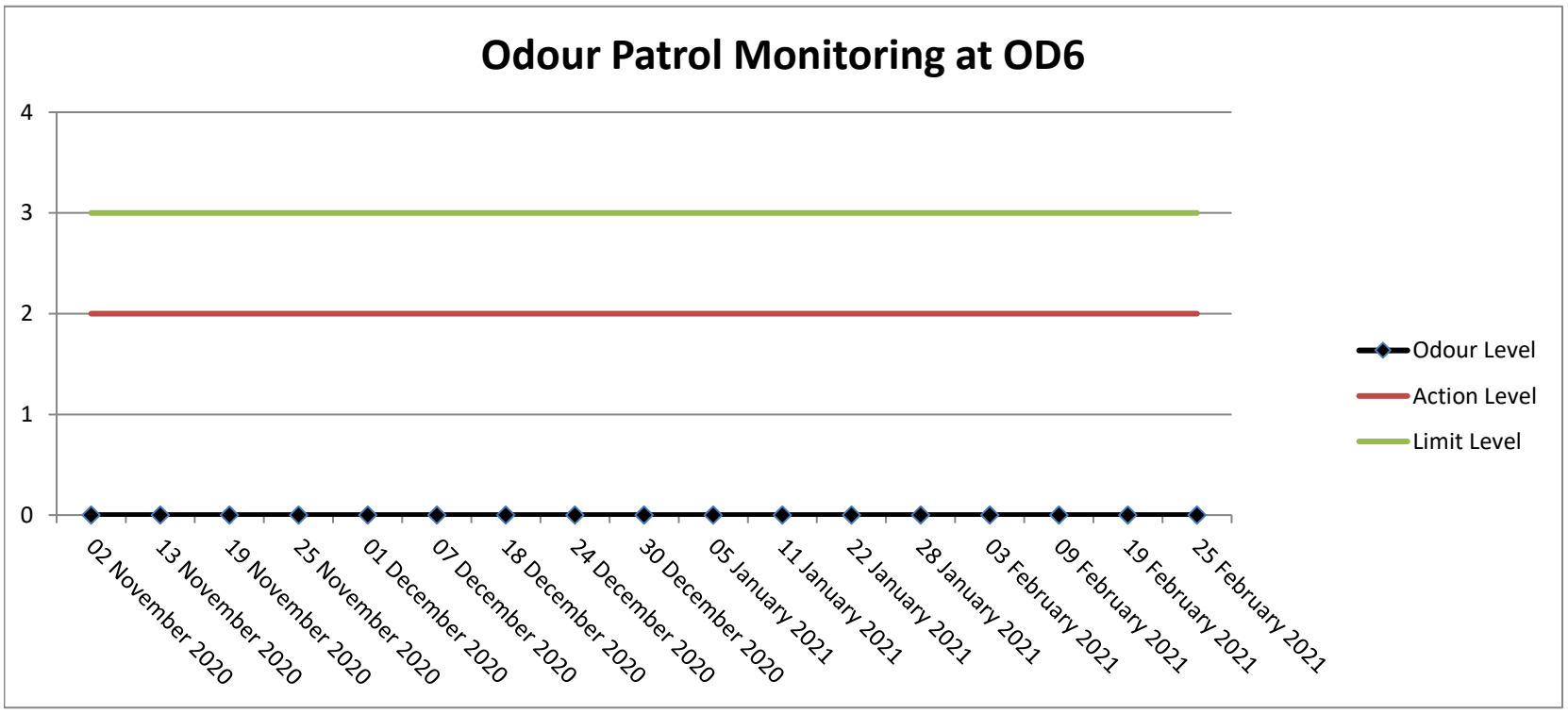
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



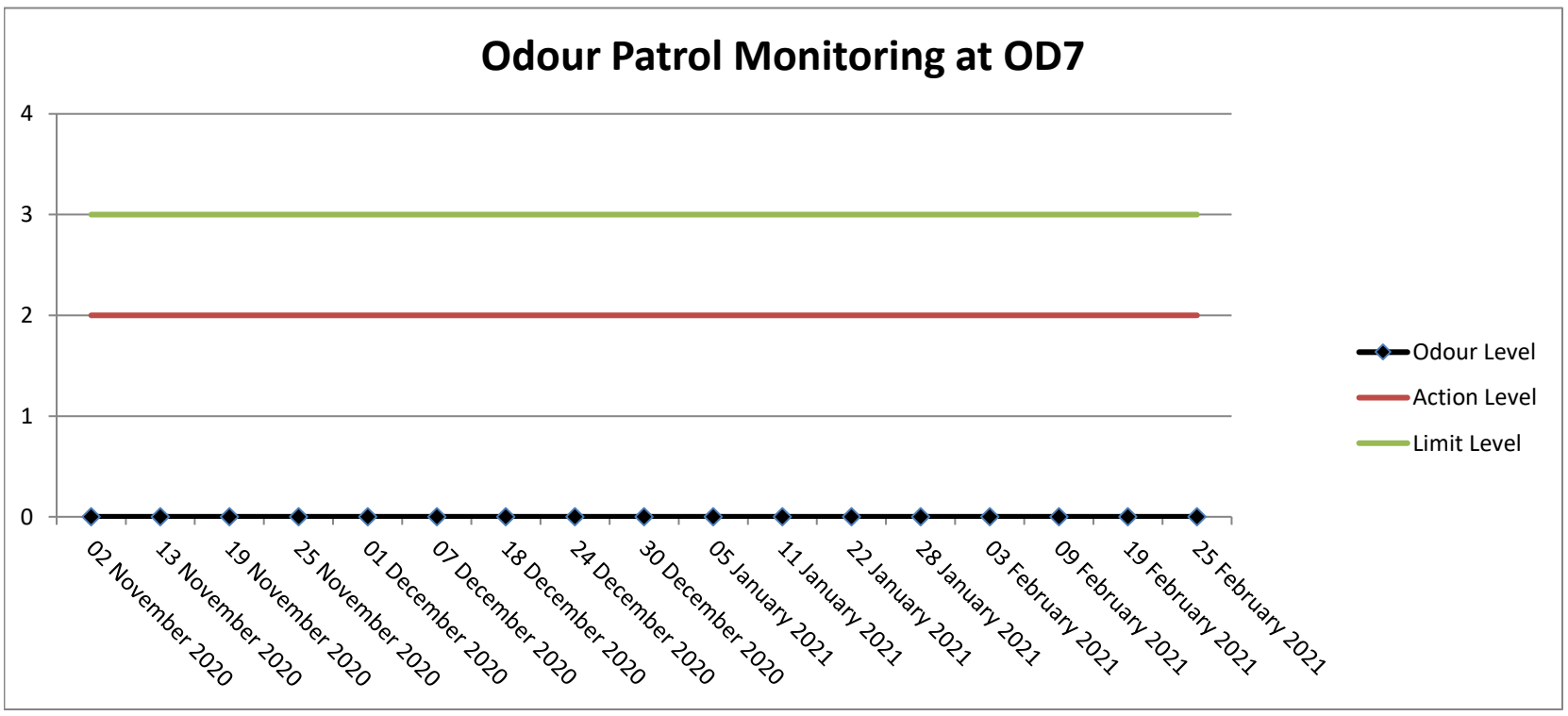
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



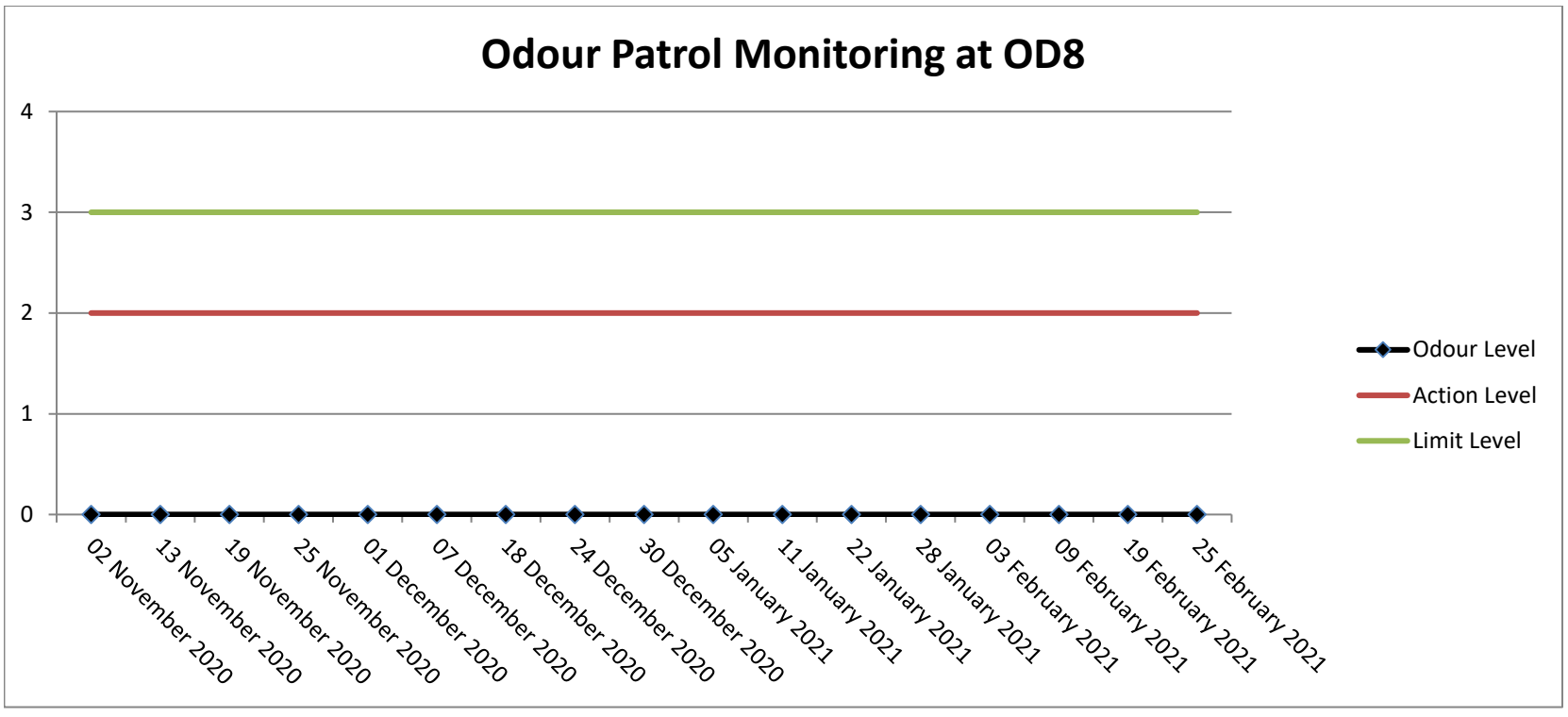
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



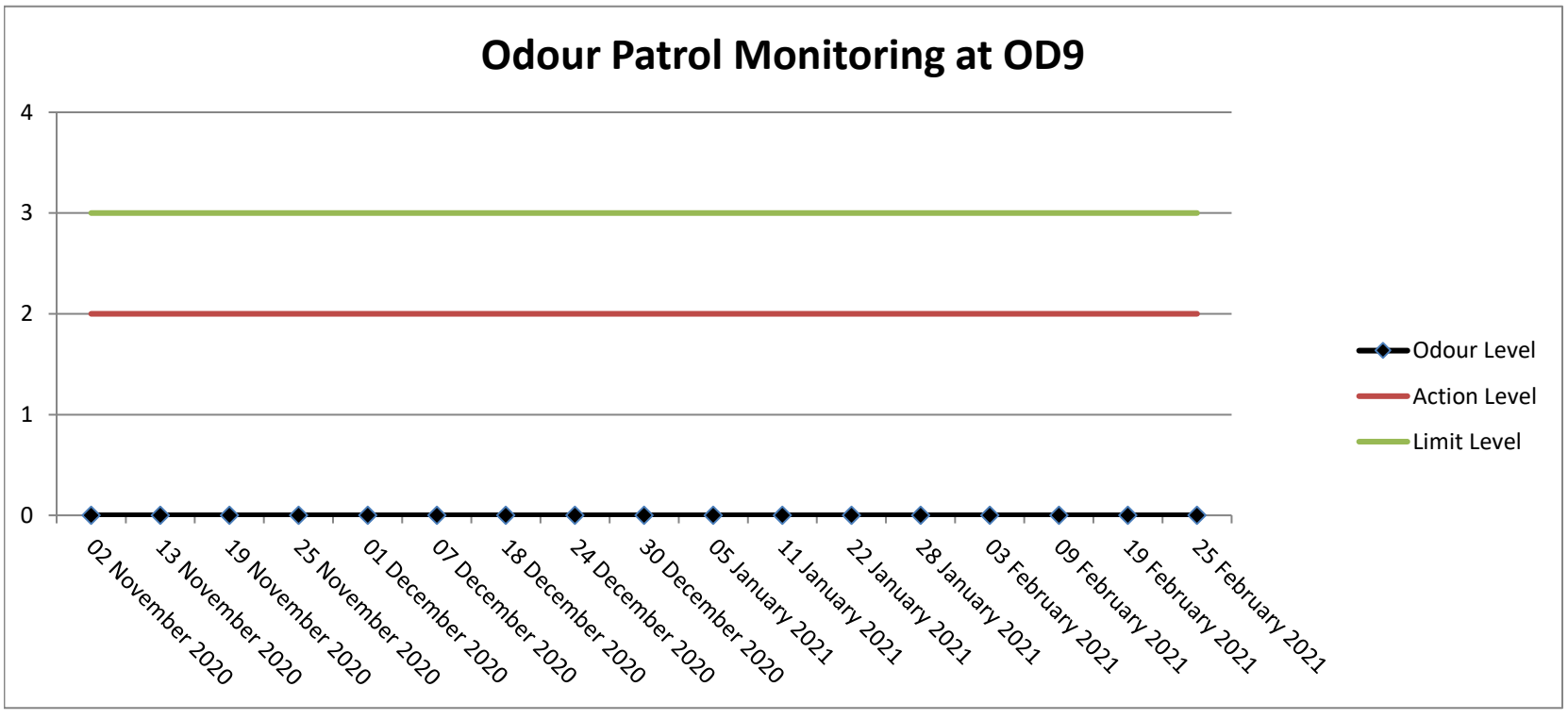
Note:
Y-axis refers to the Odour Level: 0 - Not Detected; 1- Slight; 2 - Moderate; 3 - Strong; 4 - Extreme



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



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



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

Remark:
As access permission from the company of Discovery Bay Tunnel is under requisition progress, the odour patrol monitoring will not cover OD5 (Spur Road near Discovery Bay Tunnel Outlet) temporarily.

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

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, NT
Hong Kong

Report No. : 142626WA210061

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

Information Supplied by Client

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

Laboratory Information

Lab. sample ID	:	WA210061/1
Date of calibration	:	14/12/2020
Next calibration date	:	13/03/2021
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, NT
Hong Kong

Report No. : 142626WA210061

Results :

A. pH calibration

pH reading at 25°C for Q.C. solution(6.86) and at 25°C for Q.C. solution(9.18)		
Theoretical	Measured	Deviation
9.18	9.18	0.00
6.86	6.87	+0.01

B. Salinity calibration

Salinity, ppt			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
10	10.05	+0.05	± 0.5
20	20.08	+0.08	± 1.0
30	29.85	-0.15	± 1.5
40	39.74	-0.26	± 2.0

C. Dissolved Oxygen calibration

Trial No.	Dissolved oxygen content, mg/L	
	By calibrated D.O. meter	By D.O. meter
1	7.38	7.37
2	7.37	7.37
3	7.37	7.38
Average	7.37	7.37

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 : 8/1/2021

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, NT
Hong Kong

Report No. : 142626WA210061

Results :

D. Temperature calibration

Thermometer reading, °C	Meter reading, °C
23.89	23.94

E. Turbidity calibration

Turbidity, N.T.U.			
Theoretical	Measured	Deviation	Maximum acceptable Deviation
0	-	-	± 0.5
4	4.07	+0.07	± 0.6
8	8.09	+0.09	± 0.8
40	39.71	-0.29	± 3.0
80	79.57	-0.43	± 4.0

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

Date : 8/1/2021

** 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 F

Results and Graphical Presentation of Water Quality Monitoring

Monitoring Location	Date	Tide Mode	Weather	Sea Condition	Time	Water Depth (m)	Monitoring Level	Monitoring Level (m)	Replicate	In-situ Measurement								Laboratory Analysis							
										pH	Salinity (ppt)	Temperature (degree C)	DO Saturation (%)	DO (mg/L)	Turbidity (NTU)	Current Speed (m/s)	Current Direction (degree magnetic)	Total Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L-N)	Nitrite Nitrogen (mg/L-N)	Nitrate Nitrogen (mg/L-N)	Total Inorganic Nitrogen (mg/L-N)	E.coli (cfu/100mL)	Total phosphorus (solube and particulate) (mg/L)	BOD_5 (mg/L)
										Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
A	4/2/2021	Mid-Ebb	Fine	Moderate	16:30	17	S	1	1	8.02	29.50	18.55	109.0	8.60	3.2	0.04	47.1	2.1	0.050	0.009	0.222	0.281	2	0.01	1.5
A	4/2/2021	Mid-Ebb	Fine	Moderate	16:30	17	S	1	2	8.03	29.53	18.52	108.7	8.50	3.1	0.03	45.4	2.4	0.049	0.011	0.222	0.282	2	0.01	1.7
A	4/2/2021	Mid-Ebb	Fine	Moderate	16:30	17	M	8.5	1	8.02	29.53	18.54	108.7	8.64	2.1	0.02	86.1	2.8	0.051	0.013	0.223	0.287	ND	<0.01	1.3
A	4/2/2021	Mid-Ebb	Fine	Moderate	16:30	17	M	8.5	2	8.03	29.56	18.52	107.2	8.61	2.2	0.02	89.9	2.8	0.054	0.015	0.222	0.291	1	<0.01	1.8
A	4/2/2021	Mid-Ebb	Fine	Moderate	16:30	17	B	16	1	8.01	29.63	18.44	106.4	8.45	2.4	0.02	56.1	3.6	0.092	<0.005	0.242	0.333	3	0.01	1.5
A	4/2/2021	Mid-Ebb	Fine	Moderate	16:30	17	B	16	2	8.01	29.61	18.42	107.8	8.53	2.6	0.03	54.6	3.5	0.085	0.006	0.229	0.320	2	<0.01	1.3
B	4/2/2021	Mid-Ebb	Fine	Moderate	16:46	14	S	1	1	8.00	29.38	18.72	104.8	8.25	4.3	0.31	58.2	2.8	0.040	0.012	0.222	0.274	1	0.01	1.7
B	4/2/2021	Mid-Ebb	Fine	Moderate	16:46	14	S	1	2	8.02	29.35	18.71	105.9	8.36	4.1	0.30	60.7	2.6	0.049	<0.005	0.231	0.280	2	0.01	1.8
B	4/2/2021	Mid-Ebb	Fine	Moderate	16:46	14	M	7	1	8.03	29.50	18.53	108.4	8.56	2.1	0.09	41.9	3.7	0.049	0.013	0.224	0.285	2	<0.01	2.1
B	4/2/2021	Mid-Ebb	Fine	Moderate	16:46	14	M	7	2	8.04	29.60	18.54	109.7	8.59	2.2	0.10	44.1	3.6	0.04	0.018	0.214	0.272	4	<0.01	1.9
B	4/2/2021	Mid-Ebb	Fine	Moderate	16:46	14	B	13	1	8.00	29.77	18.42	106.5	8.42	4.3	0.12	82.5	4.7	0.078	0.010	0.224	0.312	2	<0.01	1.8
B	4/2/2021	Mid-Ebb	Fine	Moderate	16:46	14	B	13	2	8.01	29.69	18.43	107.8	8.49	4.1	0.14	86.7	4.8	0.099	0.012	0.219	0.331	ND	<0.01	1.5
C	4/2/2021	Mid-Ebb	Fine	Moderate	17:06	12	S	1	1	8.04	29.25	18.63	108.7	8.56	1.2	0.10	349.7	3.8	0.072	0.011	0.231	0.314	1	<0.01	2.1
C	4/2/2021	Mid-Ebb	Fine	Moderate	17:06	12	S	1	2	8.06	29.28	18.61	110.5	8.91	1.3	0.09	356.1	4.0	0.057	0.017	0.225	0.300	2	0.01	2.5
C	4/2/2021	Mid-Ebb	Fine	Moderate	17:06	12	M	6	1	8.02	29.36	18.53	108.5	8.55	1.4	0.16	326.8	5.1	0.055	0.017	0.220	0.292	1	<0.01	2.2
C	4/2/2021	Mid-Ebb	Fine	Moderate	17:06	12	M	6	2	8.10	29.41	18.50	109.8	8.59	1.3	0.17	319.7	4.8	0.053	0.014	0.224	0.292	ND	<0.01	1.9
C	4/2/2021	Mid-Ebb	Fine	Moderate	17:06	12	B	11	1	8.04	29.41	18.52	106.8	8.47	1.6	0.11	19.1	6.2	0.063	0.016	0.227	0.306	ND	0.01	2.0
C	4/2/2021	Mid-Ebb	Fine	Moderate	17:06	12	B	11	2	8.09	29.31	18.59	108.7	8.53	1.8	0.10	17.6	6.6	0.079	0.010	0.227	0.316	ND	<0.01	2.2
D	4/2/2021	Mid-Ebb	Fine	Moderate	17:22	13	S	1	1	8.00	29.18	18.70	102.3	8.28	2.1	0.04	288.1	3.6	0.058	0.010	0.228	0.296	ND	<0.01	1.6
D	4/2/2021	Mid-Ebb	Fine	Moderate	17:22	13	S	1	2	8.03	29.21	18.60	103.6	8.30	2.3	0.03	279.2	3.2	0.054	0.013	0.223	0.289	1	<0.01	1.8
D	4/2/2021	Mid-Ebb	Fine	Moderate	17:22	13	M	6.5	1	8.03	29.30	18.55	108.9	8.61	2.8	0.07	313.3	3.9	0.063	0.017	0.229	0.310	ND	0.02	2.2
D	4/2/2021	Mid-Ebb	Fine	Moderate	17:22	13	M	6.5	2	8.04	29.33	18.57	109.2	8.63	2.9	0.06	319.8	4.2	0.048	0.013	0.223	0.284	ND	<0.01	2.1
D	4/2/2021	Mid-Ebb	Fine	Moderate	17:22	13	B	12	1	8.04	29.43	18.49	107.5	8.50	1.2	0.03	358.6	5.6	0.054	0.009	0.239	0.302	2	<0.01	2.4
D	4/2/2021	Mid-Ebb	Fine	Moderate	17:22	13	B	12	2	8.04	29.48	18.51	107.8	8.53	1.3	0.03	345.2	5.6	0.055	0.016	0.225	0.296	1	<0.01	2.0
E	4/2/2021	Mid-Ebb	Fine	Moderate	17:41	16	S	1	1	8.01	29.47	18.53	108.9	8.61	1.0	0.01	49.2	4.4	0.054	0.016	0.241	0.311	ND	0.03	2.1
E	4/2/2021	Mid-Ebb	Fine	Moderate	17:41	16	S	1	2	8.02	29.44	18.56	109.3	8.68	1.1	0.02	47.1	4.6	0.052	0.011	0.244	0.308	ND	0.02	1.7
E	4/2/2021	Mid-Ebb	Fine	Moderate	17:41	16	M	8	1	8.02	29.55	18.43	109.0	8.62	1.2	0.02	76.5	4.8	0.044	0.017	0.233	0.294	ND	<0.01	1.5
E	4/2/2021	Mid-Ebb	Fine	Moderate	17:41	16	M	8	2	8.02	29.56	18.45	109.7	8.66	1.3	0.04	71.5	5.1	0.053	0.006	0.244	0.303	ND	<0.01	1.3
E	4/2/2021	Mid-Ebb	Fine	Moderate	17:41	16	B	15	1	8.03	29.56	18.44	107.5	8.50	1.0	0.02	65.3	5.8	0.073	0.013	0.239	0.326	ND	<0.01	1.9
E	4/2/2021	Mid-Ebb	Fine	Moderate	17:41	16	B	15	2	8.04	29.55	18.45	108.1	8.56	1.1	0.04	69.1	5.6	0.092	0.014	0.242	0.348	ND	0.02	2.0
F	4/2/2021	Mid-Ebb	Fine	Moderate	17:56	23	S	1	1	7.92	29.36	18.67	101.5	7.98	1.5	0.03	306.5	3.0	0.128	0.018	0.234	0.381	1	0.02	2.4
F	4/2/2021	Mid-Ebb	Fine	Moderate	17:56	23	S	1	2	7.93	29.35	18.61	101.4	7.82	1.6	0.04	301.4	2.7	0.130	0.010	0.245	0.385	ND	0.04	2.5
F	4/2/2021	Mid-Ebb	Fine	Moderate	17:56	23	M	11.5	1	7.96	29.54	18.44	108.5	8.58	2.9	0.06	291.6	3.4	0.072	0.012	0.239	0.323	1	0.03	2.6
F	4/2/2021	Mid-Ebb	Fine	Moderate	17:56	23	M	11.5	2	7.95	29.56	18.44	108.8	8.59	2.7	0.04	282.3	3.7	0.065	0.018	0.238	0.321	3	0.03	2.5
F	4/2/2021	Mid-Ebb	Fine	Moderate	17:56	23	B	22	1	8.00	29.58	18.40	108.3	8.54	1.2	0.03	314.6	4.8	0.056	0.008	0.254	0.319	2	0.04	2.4
F	4/2/2021	Mid-Ebb	Fine	Moderate	17:56	23	B	22	2	8.01	29.51	18.41	107.1	8.45	1.3	0.03	319.8	4.8	0.070	0.012	0.248	0.330	3	0.03	2.5
G	4/2/2021	Mid-Ebb	Fine	Moderate	18:14	22	S	1	1	7.87	29.41	18.38	102.3	8.79	1.2	0.05	309.2	2.8	0.114	0.016	0.258	0.387	ND	0.05	2.0
G	4/2/2021	Mid-Ebb	Fine	Moderate	18:14	22	S	1	2	7.88	29.44	18.39	104.9	8.92	1.3	0.04	317.1	3.0	0.123	0.017	0.258	0.398	2	0.03	1.9
G	4/2/2021	Mid-Ebb	Fine	Moderate	18:14	22	M	11	1	7.96	29.48	18.39	108.1	9.59	1.8	3.00	282.5	4.1	0.066	0.016	0.259	0.342	2	0.03	2.2
G	4/2/2021	Mid-Ebb	Fine	Moderate	18:14	22	M	11	2	7.91	29.49	18.41	108.9	9.60	2.0	0.04	28.5	3.9	0.051	0.009	0.266	0.326	2	0.04	2.0
G	4/2/2021	Mid-Ebb	Fine	Moderate	18:14	22	B	21	1	8.00	29.55	18.38	107.5	9.52	1.2	0.05	298.7	4.4	0.146	0.007	0.270	0.422	1	0.03	2.0
G	4/2/2021	Mid-Ebb	Fine	Moderate	18:14	22	B	21	2	8.01	29.56	18.39	107.9	9.56	1.3	0.07	292.6	4.8	0.133	<0.005	0.272	0.405	ND	0.03	2.0
H	4/2/2021	Mid-Ebb	Fine	Moderate	18:29	19	S	1	1	8.21	28.41	18.49	106.8	8.46	1.3	0.16	301.1	4.2	0.204	<0.005	0.268	0.472	1	0.04	2.2
H	4/2/2021	Mid-Ebb	Fine	Moderate	18:29	19	S	1	2	8.21	28.41	18.50	106.9	8.48	1.4	0.17	295.8	4.5	0.115	<0.005	0.288	0.403	ND	0.03	2.4
H	4/2/2021	Mid-Ebb	Fine	Moderate	18:29	19	M	9.5	1	8.21	28.45	18.48	106.7	8.44	1.9	0.14	326.5	5.0	0.220	<0.005	0.271	0.491	ND	0.03	2.6
H	4/2/2021	Mid-Ebb	Fine	Moderate	18:29	19	M	9.5	2	8.21	28.45	18.49	106.9	8.46	1.8	0.18	329.4	4.6	0.241	<0.005	0.271	0.512	1	0.03	2.1
H	4/2/2021	Mid-Ebb	Fine	Moderate	18:29	19	B	18	1	8.19	28.54	18.44	105.4	8.34	1.2	0.20	311.2	5.7	0.052	<0.005	0.294	0.347	1	0.03	2.4
H	4/2/2021	Mid-Ebb	Fine	Moderate	18:29	19	B	18	2	8.20	28.50	18.45	105.6	8.35	1.1	0.21	314.3	6.0	0.060	0.006	0.297	0.362	ND	0.02	1.9

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	4/2/2021	Mid-Flood	Fine	Moderate	12:09	15	S	1	1	8.03	29.50	18.55	109.4	8.62	1.8	0.02	75.2	5.4	0.056	0.006	0.251	0.313	2	<0.01	2.1
A	4/2/2021	Mid-Flood	Fine	Moderate	12:09	15	S	1	2	8.02	29.56	18.51	108.7	8.51	1.9	0.05	79.8	5.7	0.064	0.009	0.242	0.315	3	<0.01	1.8
A	4/2/2021	Mid-Flood	Fine	Moderate	12:09	15	M	7.5	1	8.03	29.49	18.55	108.3	8.55	2.0	0.06	56.2	4.6	0.054	0.007	0.256	0.317	1	<0.01	2.1
A	4/2/2021	Mid-Flood	Fine	Moderate	12:09	15	M	7.5	2	8.01	29.51	18.53	107.1	8.51	2.3	0.08	53.3	4.9	0.056	<0.005	0.255	0.311	2	0.02	1.8
A	4/2/2021	Mid-Flood	Fine	Moderate	12:09	15	B	14	1	8.02	29.79	18.44	106.9	8.37	3.0	0.04	83.3	3.8	0.098	0.008	0.248	0.354	1	0.02	1.9
A	4/2/2021	Mid-Flood	Fine	Moderate	12:09	15	B	14	2	8.02	29.81	18.46	107.9	8.42	3.3	0.03	85.4	3.5	0.104	0.010	0.242	0.356	3	0.01	2.2
B	4/2/2021	Mid-Flood	Fine	Moderate	11:53	14	S	1	1	7.92	29.33	18.82	94.1	8.53	1.3	0.05	21.4	3.6	0.058	<0.005	0.253	0.311	2	<0.01	1.7
B	4/2/2021	Mid-Flood	Fine	Moderate	11:53	14	S	1	2	7.93	29.30	18.81	95.1	8.46	1.5	0.06	19.2	3.6	0.054	<0.005	0.259	0.312	1	<0.01	1.4
B	4/2/2021	Mid-Flood	Fine	Moderate	11:53	14	M	7	1	8.02	29.48	18.52	108.2	8.55	1.4	0.04	343.3	4.3	0.097	0.010	0.248	0.356	3	0.01	1.9
B	4/2/2021	Mid-Flood	Fine	Moderate	11:53	14	M	7	2	8.03	29.44	18.51	107.1	8.48	1.6	0.06	353.1	4.1	0.073	0.01	0.234	0.318	3	0.02	2.2
B	4/2/2021	Mid-Flood	Fine	Moderate	11:53	14	B	13	1	8.06	29.76	18.45	107.9	8.53	3.3	0.02	263.8	4.9	0.059	0.007	0.232	0.297	2	<0.01	2.0
B	4/2/2021	Mid-Flood	Fine	Moderate	11:53	14	B	13	2	8.06	29.77	18.46	105.4	8.43	3.9	0.01	251.2	4.7	0.052	0.012	0.231	0.295	4	<0.01	1.4
C	4/2/2021	Mid-Flood	Fine	Moderate	11:33	12	S	1	1	8.05	29.26	18.61	107.8	8.52	1.6	0.06	316.2	3.4	0.053	<0.005	0.240	0.293	ND	<0.01	1.3
C	4/2/2021	Mid-Flood	Fine	Moderate	11:33	12	S	1	2	8.09	29.28	18.69	108.7	8.59	1.5	0.08	322.5	3.4	0.041	0.014	0.226	0.282	1	<0.01	1.3
C	4/2/2021	Mid-Flood	Fine	Moderate	11:33	12	M	6	1	8.06	29.31	18.57	108.7	8.57	1.5	0.09	281.7	4.6	0.044	<0.005	0.245	0.289	ND	<0.01	1.9
C	4/2/2021	Mid-Flood	Fine	Moderate	11:33	12	M	6	2	8.05	29.30	18.51	107.9	8.51	1.3	0.11	276.6	4.9	0.054	0.010	0.241	0.304	ND	0.01	2.1
C	4/2/2021	Mid-Flood	Fine	Moderate	11:33	12	B	11	1	8.05	29.39	18.50	106.8	8.45	1.8	0.63	301.8	5.4	0.064	0.008	0.233	0.305	ND	<0.01	1.2
C	4/2/2021	Mid-Flood	Fine	Moderate	11:33	12	B	11	2	8.01	29.21	18.51	105.6	8.41	2.0	0.78	303.9	5.2	0.052	0.010	0.229	0.290	1	<0.01	1.5
D	4/2/2021	Mid-Flood	Fine	Moderate	11:17	14	S	1	1	8.01	29.18	18.65	108.0	8.53	5.1	0.09	319.9	5.7	0.048	0.006	0.238	0.292	ND	<0.01	1.8
D	4/2/2021	Mid-Flood	Fine	Moderate	11:17	14	S	1	2	8.03	29.14	18.64	107.1	8.51	5.3	0.10	322.8	5.4	0.038	0.010	0.236	0.283	1	0.02	1.4
D	4/2/2021	Mid-Flood	Fine	Moderate	11:17	14	M	7	1	8.02	29.29	18.55	109.3	8.64	1.3	0.05	291.7	4.5	0.057	<0.005	0.237	0.294	ND	<0.01	1.8
D	4/2/2021	Mid-Flood	Fine	Moderate	11:17	14	M	7	2	8.01	29.33	18.51	108.3	8.60	1.2	0.04	286.5	4.2	0.061	0.008	0.232	0.302	ND	<0.01	1.4
D	4/2/2021	Mid-Flood	Fine	Moderate	11:17	14	B	13	1	8.03	29.43	18.48	107.3	8.44	1.2	0.06	276.5	3.5	0.092	0.007	0.238	0.337	1	<0.01	1.2
D	4/2/2021	Mid-Flood	Fine	Moderate	11:17	14	B	13	2	8.01	29.41	18.42	106.8	8.41	1.3	0.07	275.8	3.8	0.119	<0.005	0.248	0.367	1	<0.01	1.0
E	4/2/2021	Mid-Flood	Fine	Moderate	10:56	14	S	1	1	8.00	29.48	18.53	109.1	8.62	1.1	0.02	291.7	4.8	0.050	<0.005	0.260	0.310	1	0.02	1.6
E	4/2/2021	Mid-Flood	Fine	Moderate	10:56	14	S	1	2	8.02	29.45	18.51	107.1	8.56	1.2	0.03	286.5	4.5	0.048	0.006	0.258	0.312	ND	0.02	1.2
E	4/2/2021	Mid-Flood	Fine	Moderate	10:56	14	M	7	1	8.00	29.55	18.44	108.1	8.55	1.5	0.01	2769.6	5.8	0.118	<0.005	0.283	0.402	ND	0.02	1.7
E	4/2/2021	Mid-Flood	Fine	Moderate	10:56	14	M	7	2	8.03	29.51	18.42	107.4	8.48	1.4	0.05	275.8	5.6	0.113	0.006	0.262	0.381	ND	0.02	1.2
E	4/2/2021	Mid-Flood	Fine	Moderate	10:56	14	B	13	1	8.01	29.56	18.44	107.7	8.52	1.2	0.06	302.5	6.4	0.118	<0.005	0.279	0.397	1	0.02	1.2
E	4/2/2021	Mid-Flood	Fine	Moderate	10:56	14	B	13	2	8.02	29.53	18.40	107.2	8.50	1.1	0.09	311.6	6.0	0.112	0.010	0.280	0.402	1	0.02	1.3
F	4/2/2021	Mid-Flood	Fine	Moderate	10:41	18	S	1	1	7.91	29.42	18.55	105.8	8.47	1.7	0.03	301.6	4.5	0.110	0.008	0.252	0.370	2	0.02	1.9
F	4/2/2021	Mid-Flood	Fine	Moderate	10:41	18	S	1	2	7.90	29.41	18.55	104.3	8.40	1.6	0.02	309.7	4.2	0.097	<0.005	0.261	0.358	1	0.02	2.2
F	4/2/2021	Mid-Flood	Fine	Moderate	10:41	18	M	9	1	8.00	29.54	18.43	108.7	8.60	1.9	0.04	263.8	3.2	0.102	0.016	0.240	0.359	1	0.02	1.4
F	4/2/2021	Mid-Flood	Fine	Moderate	10:41	18	M	9	2	8.02	29.51	18.49	109.5	8.66	2.1	0.04	275.6	3.4	0.117	<0.005	0.262	0.378	1	0.04	1.6
F	4/2/2021	Mid-Flood	Fine	Moderate	10:41	18	B	17	1	7.99	29.58	18.41	109.4	8.59	1.4	0.02	298.8	2.2	0.166	0.008	0.250	0.424	ND	<0.01	1.2
F	4/2/2021	Mid-Flood	Fine	Moderate	10:41	18	B	17	2	7.96	29.55	18.44	108.1	8.51	1.5	0.05	291.7	2.4	0.105	<0.005	0.259	0.364	1	0.02	1.3
G	4/2/2021	Mid-Flood	Fine	Moderate	10:22	13	S	1	1	7.88	29.49	18.37	108.8	8.61	1.7	0.01	285.4	3.5	0.080	0.006	0.296	0.382	ND	0.02	1.6
G	4/2/2021	Mid-Flood	Fine	Moderate	10:22	13	S	1	2	7.89	29.51	18.39	109.8	8.68	1.8	0.05	299.7	3.2	0.074	<0.005	0.279	0.353	3	0.02	1.3
G	4/2/2021	Mid-Flood	Fine	Moderate	10:22	13	M	6.5	1	7.96	29.48	18.00	108.5	8.58	1.7	0.07	273.5	4.4	0.121	<0.005	0.322	0.443	ND	0.02	1.3
G	4/2/2021	Mid-Flood	Fine	Moderate	10:22	13	M	6.5	2	7.94	29.49	18.44	107.1	8.49	1.8	0.02	272.1	4.8	0.124	0.009	0.312	0.444	1	0.03	1.6
G	4/2/2021	Mid-Flood	Fine	Moderate	10:22	13	B	12	1	7.97	29.54	18.38	108.4	8.49	1.2	0.05	262.4	5.7	0.100	<0.005	0.317	0.417	1	0.04	1.9
G	4/2/2021	Mid-Flood	Fine	Moderate	10:22	13	B	12	2	7.96	29.53	18.39	108.9	8.51	1.1	0.07	265.3	6.0	0.116	0.006	0.311	0.433	1	0.02	2.1
H	4/2/2021	Mid-Flood	Fine	Moderate	10:08	19	S	1	1	8.11	28.30	18.65	103.8	8.28	1.4	0.19	316.5	6.0	0.193	0.007	0.269	0.469	ND	0.01	1.9
H	4/2/2021	Mid-Flood	Fine	Moderate	10:08	19	S	1	2	8.17	28.35	18.53	106.6	8.43	1.3	0.17	311.9	5.6	0.091	0.005	0.286	0.382	1	<0.01	1.3
H	4/2/2021	Mid-Flood	Fine	Moderate	10:08	19	M	9.5	1	8.18	28.52	18.48	106.2	8.40	1.3	0.18	326.8	4.4	0.458	0.005	0.273	0.736	1	0.02	2.5
H	4/2/2021	Mid-Flood	Fine	Moderate	10:08	19	M	9.5	2	8.18	28.50	18.47	106.0	8.38	1.4	0.20	331.1	4.0	0.388	0.006	0.264	0.657	ND	0.03	2.0
H	4/2/2021	Mid-Flood	Fine	Moderate	10:08	19	B	18	1	8.19	28.53	18.45	105.8	8.36	1.6	0.21	332.8	3.0	0.122	<0.005	0.303	0.424	ND	<0.01	1.4
H	4/2/2021	Mid-Flood	Fine	Moderate	10:08	19	B	18	2	8.19	28.55	18.44	105.6	8.36	1.5	0.20	325.7	2.5	0.106	0.007	0.318	0.431	2	<0.01	1.4

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	: HK2104349
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	: 04-Feb-2021
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 22-Feb-2021
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. 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 04-Feb-2021 to 22-Feb-2021.

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: HK2104349

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.

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

Microbiological sample(s) was/ were collected in 125mL sterile plastic bottles containing sodium thiosulfate. Sample(s) arrived at the laboratory at 19:30.

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.

EK067P - Total Phosphorus - Filtered is not HOKLAS accredited.

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Sample ID	A/S/E	A/S/E/Dup	A/M/E	A/M/E/Dup	A/B/E
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
					HK2104349-001	HK2104349-002	HK2104349-003	HK2104349-004	HK2104349-005
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		2.1	2.4	2.8	2.8	3.6
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.050	0.049	0.051	0.054	0.092
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.009	0.011	0.013	0.015	<0.005
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.222	0.222	0.223	0.222	0.242
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.281	0.282	0.287	0.291	0.333
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.01	0.01	<0.01	<0.01	0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.5	1.7	1.3	1.8	1.5
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		2	2	NOT DETECTED	1	3

Sub-Matrix: WATER			Sample ID	A/B/E/Dup	B/S/E	B/S/E/Dup	B/M/E	B/M/E/Dup
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit	HK2104349-006	HK2104349-007	HK2104349-008	HK2104349-009	HK2104349-010
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.5	2.8	2.6	3.7	3.6
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.085	0.040	0.049	0.049	0.040
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.006	0.012	<0.005	0.013	0.018
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.229	0.222	0.231	0.224	0.214
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.320	0.274	0.280	0.285	0.272
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.01	0.01	<0.01	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.3	1.7	1.8	2.1	1.9
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	2	1	2	2	4

Sub-Matrix: WATER			Sample ID	B/B/E	B/B/E/Dup	C/S/E	C/S/E/Dup	C/M/E
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit	HK2104349-011	HK2104349-012	HK2104349-013	HK2104349-014	HK2104349-015
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.7	4.8	3.8	4.0	5.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.078	0.099	0.072	0.057	0.055
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.010	0.012	0.011	0.017	0.017
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.224	0.219	0.231	0.225	0.220
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.312	0.331	0.314	0.300	0.292
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	<0.01	0.01	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.8	1.5	2.1	2.5	2.2
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	2	NOT DETECTED	1	2	1

Sub-Matrix: WATER				Sample ID	C/M/E/Dup	C/B/E	C/B/E/Dup	D/S/E	D/S/E/Dup
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-016	HK2104349-017	HK2104349-018	HK2104349-019	HK2104349-020
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		4.8	6.2	6.6	3.6	3.2
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.053	0.063	0.079	0.058	0.054
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.014	0.016	0.010	0.010	0.013
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.224	0.227	0.227	0.228	0.223
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.292	0.306	0.316	0.296	0.289
EK067P: Total Phosphorus as P	----	0.01	mg/L		<0.01	0.01	<0.01	<0.01	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.9	2.0	2.2	1.6	1.8
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	1

Sub-Matrix: WATER				Sample ID	D/M/E	D/M/E/Dup	D/B/E	D/B/E/Dup	E/S/E
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-021	HK2104349-022	HK2104349-023	HK2104349-024	HK2104349-025
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		3.9	4.2	5.6	5.6	4.4
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.063	0.048	0.054	0.055	0.054
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.017	0.013	0.009	0.016	0.016
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.229	0.223	0.239	0.225	0.241
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.310	0.284	0.302	0.296	0.311
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.02	<0.01	<0.01	<0.01	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		2.2	2.1	2.4	2.0	2.1
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		NOT DETECTED	NOT DETECTED	2	1	NOT DETECTED

Sub-Matrix: WATER				Sample ID	E/S/E/Dup	E/M/E	E/M/E/Dup	E/B/E	E/B/E/Dup
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	*CAS Number*	*LOR*	*Unit*		HK2104349-026	HK2104349-027	HK2104349-028	HK2104349-029	HK2104349-030
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		4.6	4.8	5.1	5.8	5.6
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.052	0.044	0.053	0.073	0.092
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.011	0.017	0.006	0.013	0.014
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.244	0.233	0.244	0.239	0.242
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.308	0.294	0.303	0.326	0.348
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.02	<0.01	<0.01	<0.01	0.02
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.7	1.5	1.3	1.9	2.0
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER				Sample ID	F/S/E	F/S/E/Dup	F/M/E	F/M/E/Dup	F/B/E
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-031	HK2104349-032	HK2104349-033	HK2104349-034	HK2104349-035
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		3.0	2.7	3.4	3.7	4.8
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.128	0.130	0.072	0.065	0.056
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.018	0.010	0.012	0.018	0.008
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.234	0.245	0.239	0.238	0.254
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.381	0.385	0.323	0.321	0.319
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.02	0.04	0.03	0.03	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		0.02	0.02	0.02	0.02	0.03
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		2.4	2.5	2.6	2.5	2.4
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		1	NOT DETECTED	1	3	2

Sub-Matrix: WATER			Sample ID	F/B/E/Dup	G/S/E	G/S/E/Dup	G/M/E	G/M/E/Dup
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit	HK2104349-036	HK2104349-037	HK2104349-038	HK2104349-039	HK2104349-040
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	4.8	2.8	3.0	4.1	3.9
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.070	0.114	0.123	0.066	0.051
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.012	0.016	0.017	0.016	0.009
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.248	0.258	0.258	0.259	0.266
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.330	0.387	0.398	0.342	0.326
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.03	0.05	0.03	0.03	0.04
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.03	0.04	0.03	0.02	0.02
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	2.5	2.0	1.9	2.2	2.0
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	3	NOT DETECTED	2	2	2

Sub-Matrix: WATER				Sample ID	G/B/E	G/B/E/Dup	H/S/E	H/S/E/Dup	H/M/E
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-041	HK2104349-042	HK2104349-043	HK2104349-044	HK2104349-045
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		4.4	4.8	4.2	4.5	5.0
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.146	0.133	0.204	0.115	0.220
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.007	<0.005	<0.005	<0.005	<0.005
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.270	0.272	0.268	0.288	0.271
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.422	0.405	0.472	0.403	0.491
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.03	0.03	0.04	0.03	0.03
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	0.03	0.02	0.02	0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		2.0	2.0	2.2	2.4	2.6
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		1	NOT DETECTED	1	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER				Sample ID	H/M/E/Dup	H/B/E	H/B/E/Dup	A/S/F	A/S/F/Dup
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	*CAS Number*	*LOR*	*Unit*		HK2104349-046	HK2104349-047	HK2104349-048	HK2104349-049	HK2104349-050
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		**4.6**	**5.7**	**6.0**	**5.4**	**5.7**
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		**0.241**	**0.052**	**0.060**	**0.056**	**0.064**
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		<0.005	<0.005	**0.006**	**0.006**	**0.009**
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		**0.271**	**0.294**	**0.297**	**0.251**	**0.242**
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		**0.512**	**0.347**	**0.362**	**0.313**	**0.315**
EK067P: Total Phosphorus as P	----	0.01	mg/L		**0.03**	**0.03**	**0.02**	<0.01	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		**0.01**	**0.02**	**0.01**	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		**2.1**	**2.4**	**1.9**	**2.1**	**1.8**
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		**1**	**1**	**NOT DETECTED**	**2**	**3**

Sub-Matrix: WATER				Sample ID	A/M/F	A/M/F/Dup	A/B/F	A/B/F/Dup	B/S/F
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	*CAS Number*	*LOR*	*Unit*		HK2104349-051	HK2104349-052	HK2104349-053	HK2104349-054	HK2104349-055
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		**4.6**	**4.9**	**3.8**	**3.5**	**3.6**
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		**0.054**	**0.056**	**0.098**	**0.104**	**0.058**
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		**0.007**	<0.005	**0.008**	**0.010**	<0.005
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		**0.256**	**0.255**	**0.248**	**0.242**	**0.253**
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		**0.317**	**0.311**	**0.354**	**0.356**	**0.311**
EK067P: Total Phosphorus as P	----	0.01	mg/L		<0.01	**0.02**	**0.02**	**0.01**	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	<0.01	**0.01**	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		**2.1**	**1.8**	**1.9**	**2.2**	**1.7**
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		**1**	**2**	**1**	**3**	**2**

Sub-Matrix: WATER				Sample ID	B/S/F/Dup	B/M/F	B/M/F/Dup	B/B/F	B/B/F/Dup
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-056	HK2104349-057	HK2104349-058	HK2104349-059	HK2104349-060
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		3.6	4.3	4.1	4.9	4.7
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.054	0.097	0.073	0.059	0.052
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		<0.005	0.010	0.010	0.007	0.012
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.259	0.248	0.234	0.232	0.231
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.312	0.356	0.318	0.297	0.295
EK067P: Total Phosphorus as P	----	0.01	mg/L		<0.01	0.01	0.02	<0.01	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.4	1.9	2.2	2.0	1.4
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		1	3	3	2	4

Sub-Matrix: WATER				Sample ID	C/S/F	C/S/F/Dup	C/M/F	C/M/F/Dup	C/B/F
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-061	HK2104349-062	HK2104349-063	HK2104349-064	HK2104349-065
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		3.4	3.4	4.6	4.9	5.4
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.053	0.041	0.044	0.054	0.064
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		<0.005	0.014	<0.005	0.010	0.008
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.240	0.226	0.245	0.241	0.233
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.293	0.282	0.289	0.304	0.305
EK067P: Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	<0.01	0.01	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.3	1.3	1.9	2.1	1.2
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		NOT DETECTED	1	NOT DETECTED	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER			Sample ID	C/B/F/Dup	D/S/F	D/S/F/Dup	D/M/F	D/M/F/Dup
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit	HK2104349-066	HK2104349-067	HK2104349-068	HK2104349-069	HK2104349-070
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	5.2	5.7	5.4	4.5	4.2
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.052	0.048	0.038	0.057	0.061
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	0.010	0.006	0.010	<0.005	0.008
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.229	0.238	0.236	0.237	0.232
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.290	0.292	0.283	0.294	0.302
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	<0.01	0.02	<0.01	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.5	1.8	1.4	1.8	1.4
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	1	NOT DETECTED	1	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER				Sample ID	D/B/F	D/B/F/Dup	E/S/F	E/S/F/Dup	E/M/F
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	*CAS Number*	*LOR*	*Unit*		HK2104349-071	HK2104349-072	HK2104349-073	HK2104349-074	HK2104349-075
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		3.5	3.8	4.8	4.5	5.8
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.092	0.119	0.050	0.048	0.118
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.007	<0.005	<0.005	0.006	<0.005
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.238	0.248	0.260	0.258	0.283
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.337	0.367	0.310	0.312	0.402
EK067P: Total Phosphorus as P	----	0.01	mg/L		<0.01	<0.01	0.02	0.02	0.02
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.2	1.0	1.6	1.2	1.7
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		1	1	1	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER				Sample ID	E/M/F/Dup	E/B/F	E/B/F/Dup	F/S/F	F/S/F/Dup
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-076	HK2104349-077	HK2104349-078	HK2104349-079	HK2104349-080
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		5.6	6.4	6.0	4.5	4.2
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.113	0.118	0.112	0.110	0.097
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.006	<0.005	0.010	0.008	<0.005
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.262	0.279	0.280	0.252	0.261
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.381	0.397	0.402	0.370	0.358
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.02	0.02	0.02	0.02	0.02
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		0.01	0.02	0.02	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.2	1.2	1.3	1.9	2.2
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		NOT DETECTED	1	1	2	1

Sub-Matrix: WATER				Sample ID	F/M/F	F/M/F/Dup	F/B/F	F/B/F/Dup	G/S/F
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-081	HK2104349-082	HK2104349-083	HK2104349-084	HK2104349-085
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		3.2	3.4	2.2	2.4	3.5
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.102	0.117	0.166	0.105	0.080
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.016	<0.005	0.008	<0.005	0.006
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.240	0.262	0.250	0.259	0.296
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.359	0.378	0.424	0.364	0.382
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.02	0.04	<0.01	0.02	0.02
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		<0.01	0.02	<0.01	0.01	0.02
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.4	1.6	1.2	1.3	1.6
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		1	1	NOT DETECTED	1	NOT DETECTED

Sub-Matrix: WATER			Sample ID	G/S/F/Dup	G/M/F	G/M/F/Dup	G/B/F	G/B/F/Dup
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit	HK2104349-086	HK2104349-087	HK2104349-088	HK2104349-089	HK2104349-090
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	3.2	4.4	4.8	5.7	6.0
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	0.074	0.121	0.124	0.100	0.116
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	<0.005	0.009	<0.005	0.006
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	0.279	0.322	0.312	0.317	0.311
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	0.353	0.443	0.444	0.417	0.433
EK067P: Total Phosphorus as P	----	0.01	mg/L	0.02	0.02	0.03	0.04	0.02
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	0.02	<0.01	0.01	0.01	0.01
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	1.3	1.3	1.6	1.9	2.1
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	3	NOT DETECTED	1	1	1

Sub-Matrix: WATER				Sample ID	H/S/F	H/S/F/Dup	H/M/F	H/M/F/Dup	H/B/F
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104349-091	HK2104349-092	HK2104349-093	HK2104349-094	HK2104349-095
EA/ED: Physical and Aggregate Properties									
EA025: Suspended Solids (SS)	----	0.5	mg/L		6.0	5.6	4.4	4.0	3.0
ED/EK: Inorganic Nonmetallic Parameters									
EK055A: Ammonia as N	7664-41-7	0.005	mg/L		0.193	0.091	0.458	0.388	0.122
EK057A: Nitrite as N	14797-65-0	0.005	mg/L		0.007	0.005	0.005	0.006	<0.005
EK058A: Nitrate as N	14797-55-8	0.005	mg/L		0.269	0.286	0.273	0.264	0.303
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L		0.469	0.382	0.736	0.657	0.424
EK067P: Total Phosphorus as P	----	0.01	mg/L		0.01	<0.01	0.02	0.03	<0.01
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L		0.01	<0.01	0.02	<0.01	<0.01
EP: Aggregate Organics									
EP030: Biochemical Oxygen Demand	----	1.0	mg/L		1.9	1.3	2.5	2.0	1.4
EM: Microbiological Testing									
EM002: E. coli	----	1	CFU/100mL		NOT DETECTED	1	1	NOT DETECTED	NOT DETECTED

Sub-Matrix: WATER			Sample ID	H/B/F/Dup	---	---	---	---
			Sampling date / time	04-Feb-2021	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	HK2104349-096	-------	-------	-------	-------
EA/ED: Physical and Aggregate Properties								
EA025: Suspended Solids (SS)	----	0.5	mg/L	**2.5**	---	---	---	---
ED/EK: Inorganic Nonmetallic Parameters								
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	**0.106**	---	---	---	---
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	**0.007**	---	---	---	---
EK058A: Nitrate as N	14797-55-8	0.005	mg/L	**0.318**	---	---	---	---
EK063A: Inorganic Nitrogen as N	----	0.010	mg/L	**0.431**	---	---	---	---
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	---	---	---	---
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	---	---	---	---
EP: Aggregate Organics								
EP030: Biochemical Oxygen Demand	----	1.0	mg/L	**1.4**	---	---	---	---
EM: Microbiological Testing								
EM002: E. coli	----	1	CFU/100mL	**2**	---	---	---	---

Laboratory Duplicate (DUP) Report

Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496601)								
HK2104349-020	D/S/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.054	0.046	16.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496602)								
HK2104349-040	G/M/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.051	0.047	7.94
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496603)								
HK2104349-060	B/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.052	0.043	20.4
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496604)								
HK2104349-080	F/S/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.097	0.092	5.54
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496605)								
HK2104349-096	H/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.005	mg/L	0.106	0.118	10.2
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496871)								
HK2104349-020	D/S/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.013	0.012	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496873)								
HK2104349-040	G/M/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.009	0.006	38.9
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496875)								
HK2104349-060	B/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.012	<0.005	78.8
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496877)								
HK2104349-080	F/S/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	<0.005	0.012	81.0
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496879)								
HK2104349-096	H/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.005	mg/L	0.007	0.041	144
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499758)								
HK2104349-020	D/S/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	<0.01	<0.01	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499759)								
HK2104349-020	D/S/E/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	<0.01	<0.01	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499760)								
HK2104349-040	G/M/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	0.02	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499761)								
HK2104349-040	G/M/E/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.04	0.03	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499762)								
HK2104349-060	B/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	<0.01	<0.01	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499763)								

Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				
				LOR	Unit	Original Result	Duplicate Result	RPD (%)
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499763) - Continued								
HK2104349-060	B/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	<0.01	<0.01	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499764)								
HK2104349-080	F/S/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.01	mg/L	<0.01	<0.01	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499765)								
HK2104349-080	F/S/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	0.02	0.02	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499767)								
HK2104349-096	H/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.01	mg/L	<0.01	<0.01	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: 3496671)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	106	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3496672)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	102	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3496673)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	95.5	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3496674)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	104	----	85.9	117	----	----
EA/ED: Physical and Aggregate Properties (QC Lot: 3496675)											
EA025: Suspended Solids (SS)	----	0.5	mg/L	<0.5	20 mg/L	98.0	----	85.9	117	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496601)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.5 mg/L	99.2	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496602)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.5 mg/L	99.6	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496603)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.5 mg/L	98.4	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496604)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.5 mg/L	100	----	85.0	115	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496605)											
EK055A: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.5 mg/L	100	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496871)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	92.8	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496873)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	106	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496875)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	99.4	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496877)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	101	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496879)											
EK057A: Nitrite as N	14797-65-0	0.005	mg/L	<0.005	0.05 mg/L	101	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499758)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	97.9	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499759)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	96.8	----	93.6	102	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499760)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	95.8	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499761)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	98.1	----	93.6	102	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499762)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.3	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499763)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	94.5	----	93.6	102	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499764)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	97.6	----	85.0	115	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499765)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	94.5	----	93.6	102	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499766)											
EK067P: Total Phosphorus - Filtered	----	0.01	mg/L	<0.01	0.5 mg/L	96.9	----	85.0	115	----	----

Matrix: **WATER**

Method: Compound	CAS Number	Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report					
					Spike Concentration	Spike Recovery (%)		Recovery Limits(%)		RPD (%)	
		LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499767)											
EK067P: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.5 mg/L	95.4	----	93.6	102	----	----
EP: Aggregate Organics (QC Lot: 3497765)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	98.6	----	81.0	115	----	----
EP: Aggregate Organics (QC Lot: 3497766)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	98.8	----	81.0	115	----	----
EP: Aggregate Organics (QC Lot: 3497767)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	96.1	----	81.0	115	----	----
EP: Aggregate Organics (QC Lot: 3497768)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	100	----	81.0	115	----	----
EP: Aggregate Organics (QC Lot: 3497769)											
EP030: Biochemical Oxygen Demand	----	----	mg/L	----	198 mg/L	101	----	81.0	115	----	----

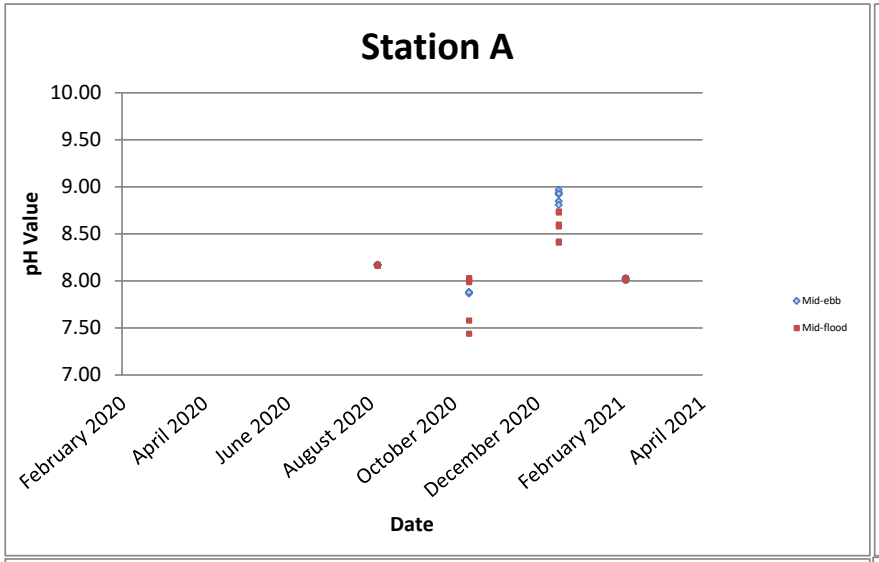
Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

Matrix: **WATER**

Laboratory sample ID	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: 3496601)										
HK2104349-020	D/S/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	92.9	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496602)										
HK2104349-040	G/M/E/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	109	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496603)										
HK2104349-060	B/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	95.4	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496604)										
HK2104349-080	F/S/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	96.2	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496605)										
HK2104349-096	H/B/F/Dup	**EK055A: Ammonia as N**	7664-41-7	0.5 mg/L	94.6	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496871)										
HK2104349-020	D/S/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	102	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496873)										
HK2104349-040	G/M/E/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	96.3	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496875)										
HK2104349-060	B/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	99.5	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496877)										
HK2104349-080	F/S/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	104	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3496879)										
HK2104349-096	H/B/F/Dup	**EK057A: Nitrite as N**	14797-65-0	0.25 mg/L	104	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499758)										
HK2104349-020	D/S/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	77.5	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499759)										

Matrix: **WATER**

Laboratory sample ID	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: 3499759) - Continued										
HK2104349-020	D/S/E/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	88.2	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499760)										
HK2104349-040	G/M/E/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	94.7	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499761)										
HK2104349-040	G/M/E/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	87.3	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499762)										
HK2104349-060	B/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	95.8	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499763)										
HK2104349-060	B/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	90.7	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499764)										
HK2104349-080	F/S/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	81.0	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499765)										
HK2104349-080	F/S/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	99.7	----	75.0	125	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499766)										
HK2104349-096	H/B/F/Dup	**EK067P: Total Phosphorus - Filtered**	----	0.5 mg/L	109	----	75.0	125	----	25
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3499767)										
HK2104349-096	H/B/F/Dup	**EK067P: Total Phosphorus as P**	----	0.5 mg/L	97.4	----	75.0	125	----	----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8.00
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7.00
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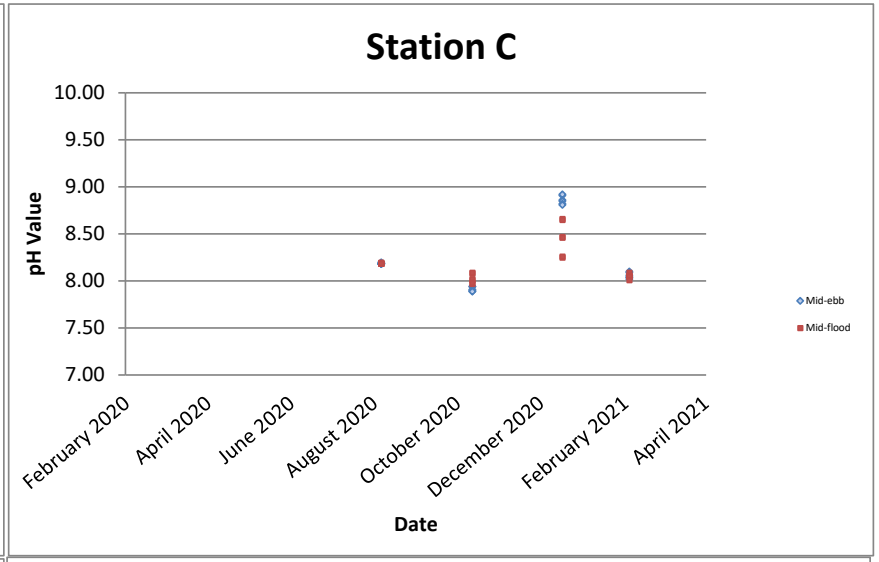
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood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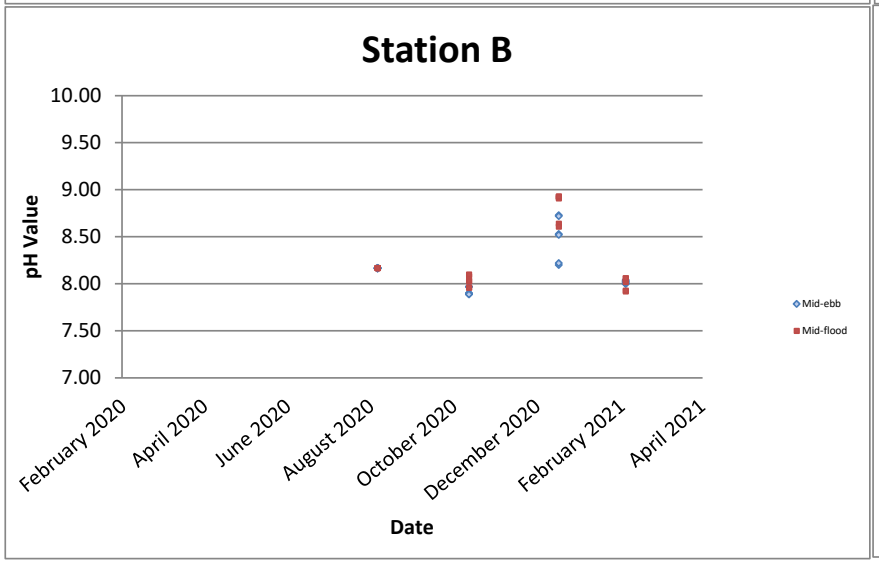
9.00
8.50
8.00
7.50
7.00
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood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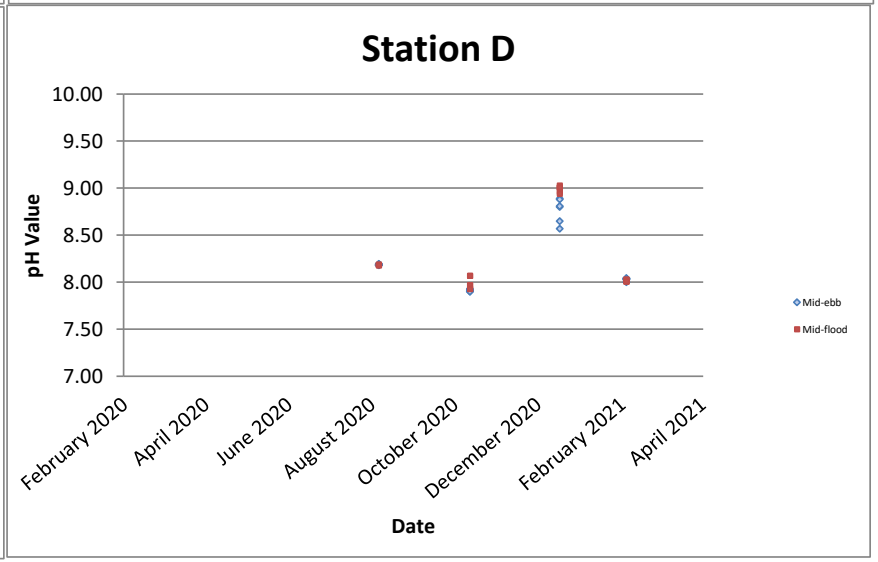
9.00
8.50
8.00
7.50
7.00
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood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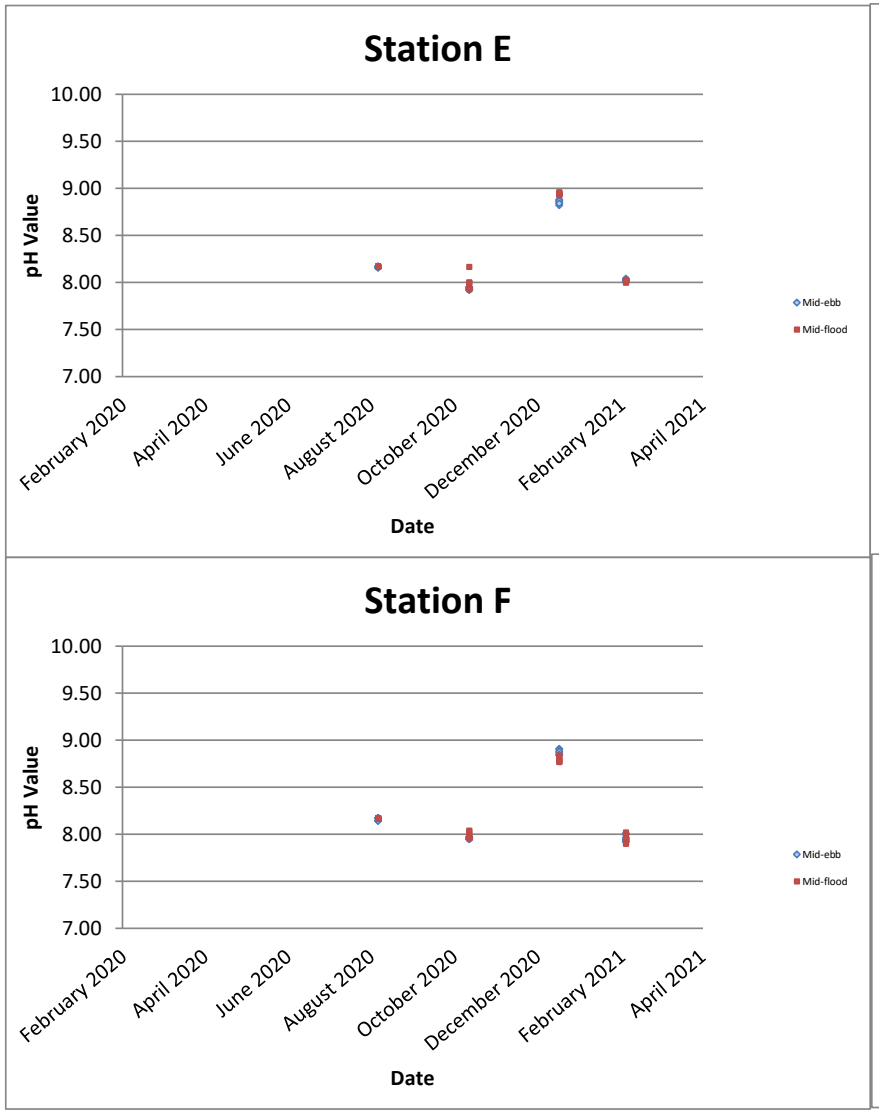
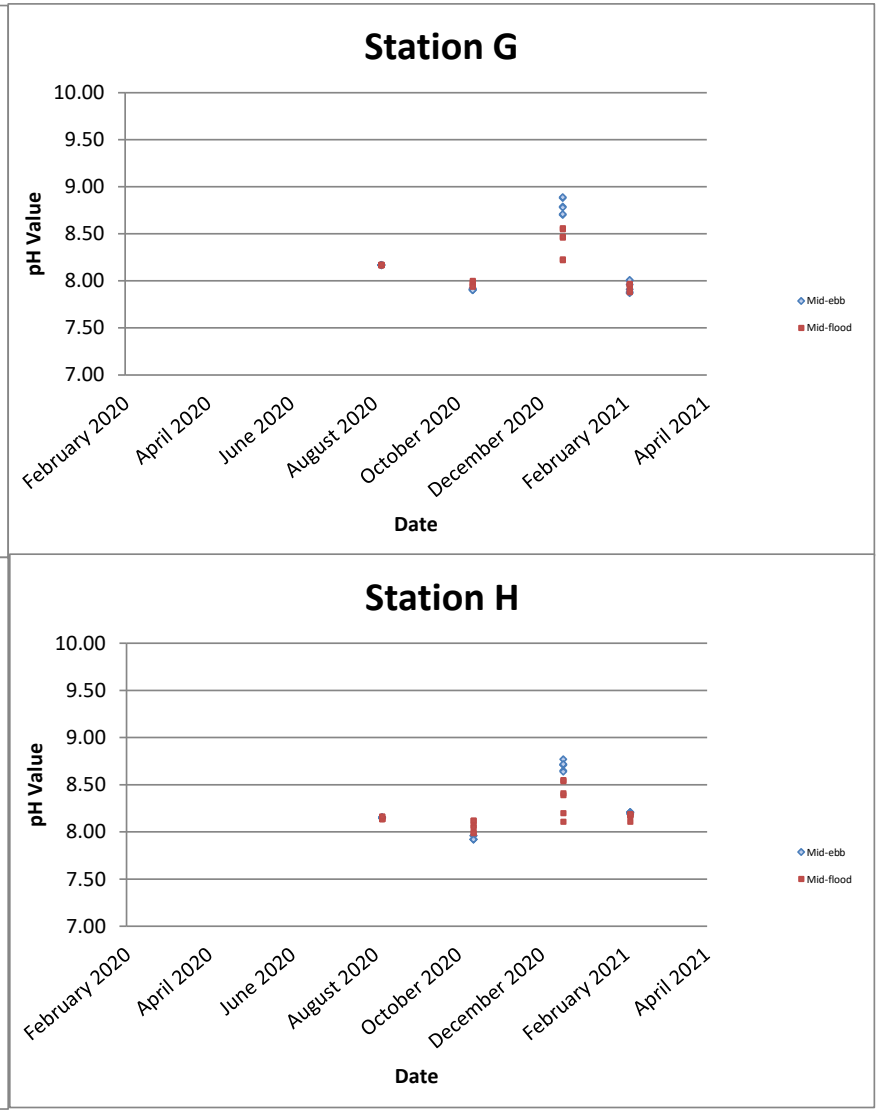
8.00
7.50
7.00
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

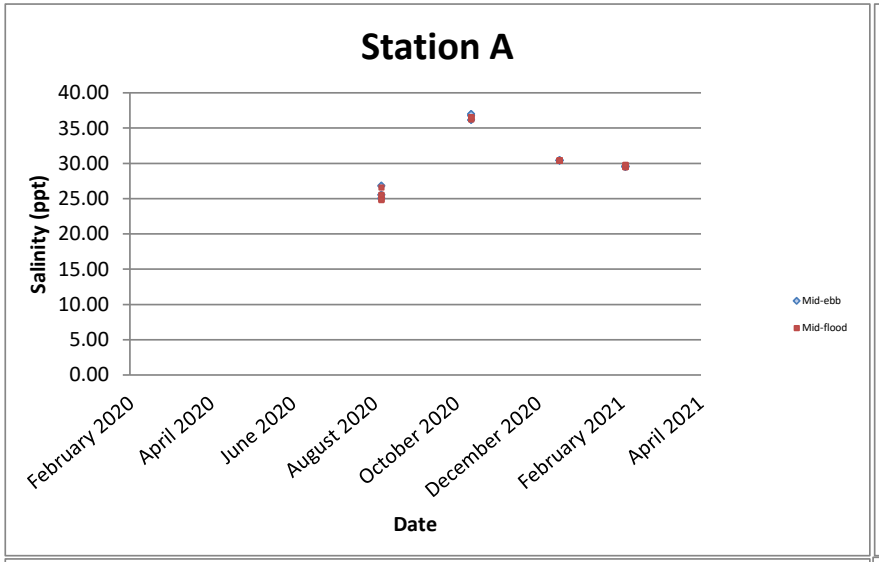

Station E
pH Value
10.00
9.50
9.00
8.50
8.00
7.50
7.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

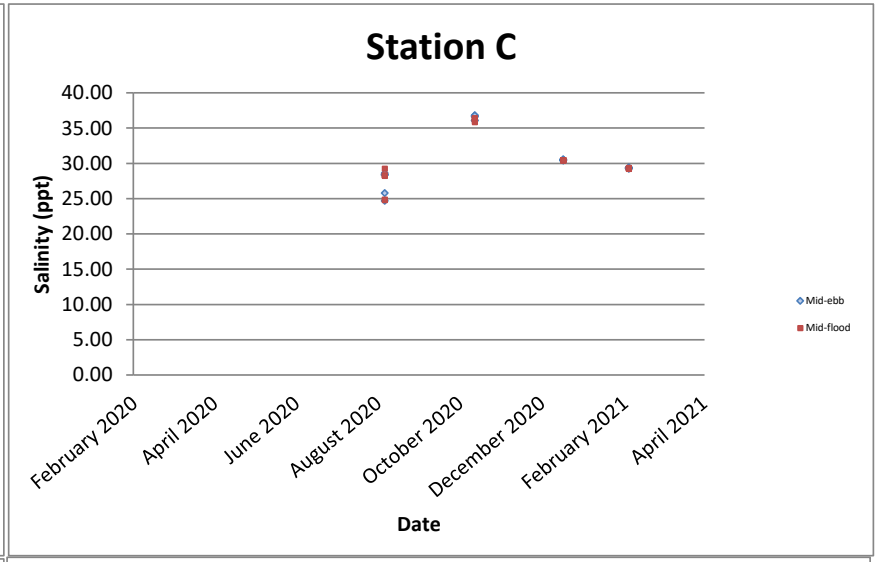

Station G
pH Value
10.00
9.50
9.00
8.50
8.00
7.50
7.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

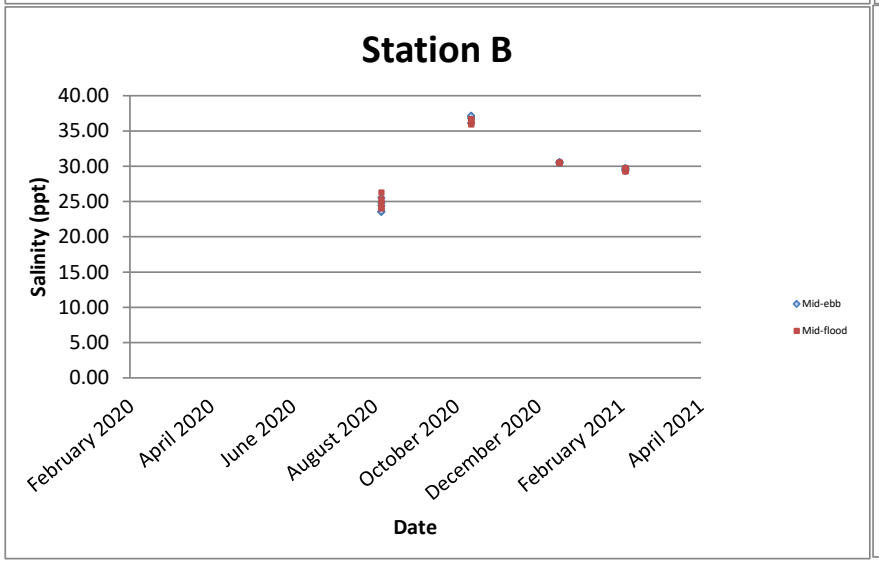
Station F
pH Value
10.00
9.50
9.00
8.50
8.00
7.50
7.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

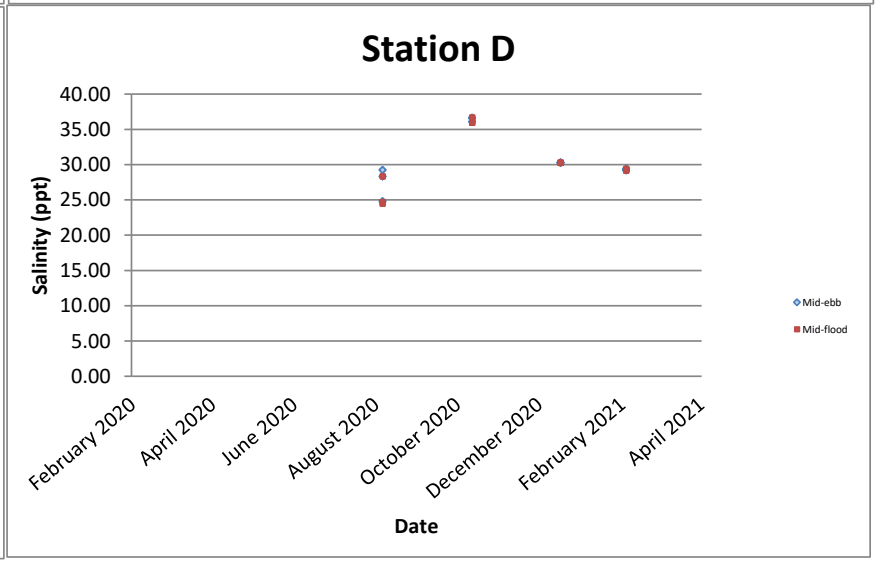
Station H
pH Value
10.00
9.50
9.00
8.50
8.00
7.50
7.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

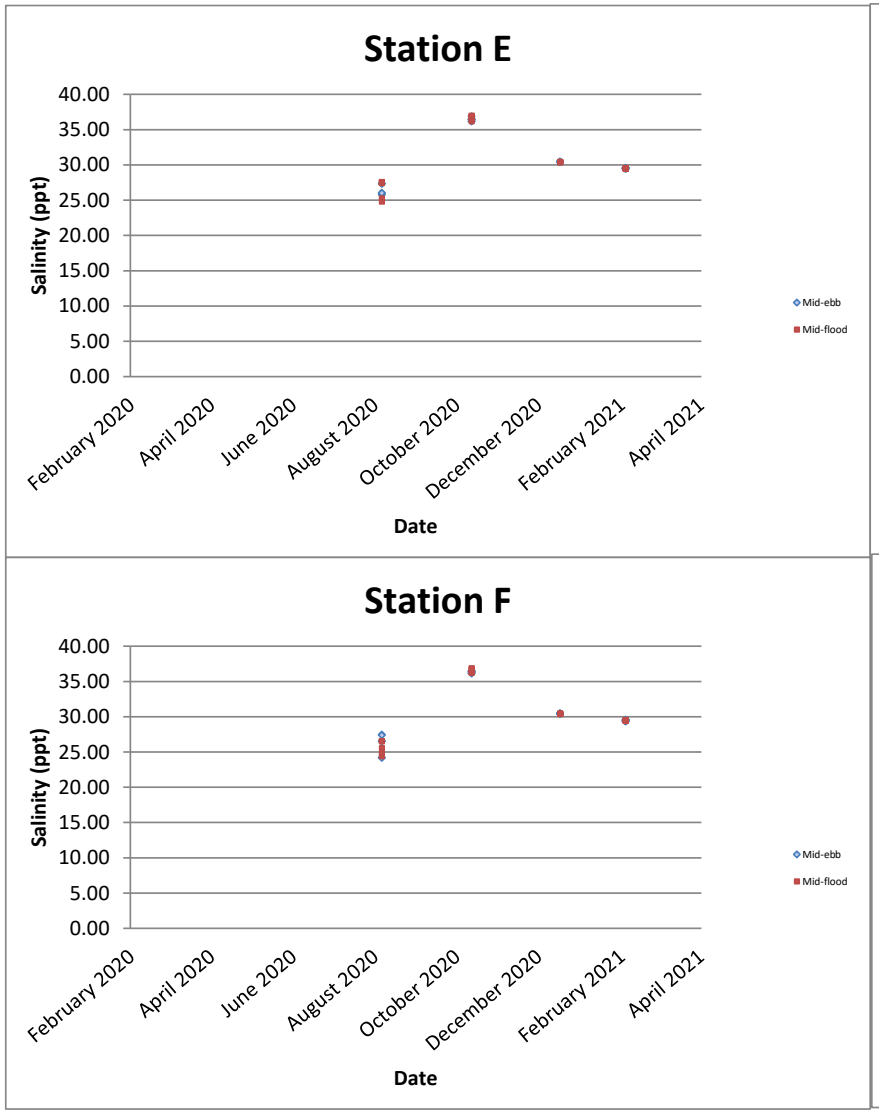
Salinity (ppt)

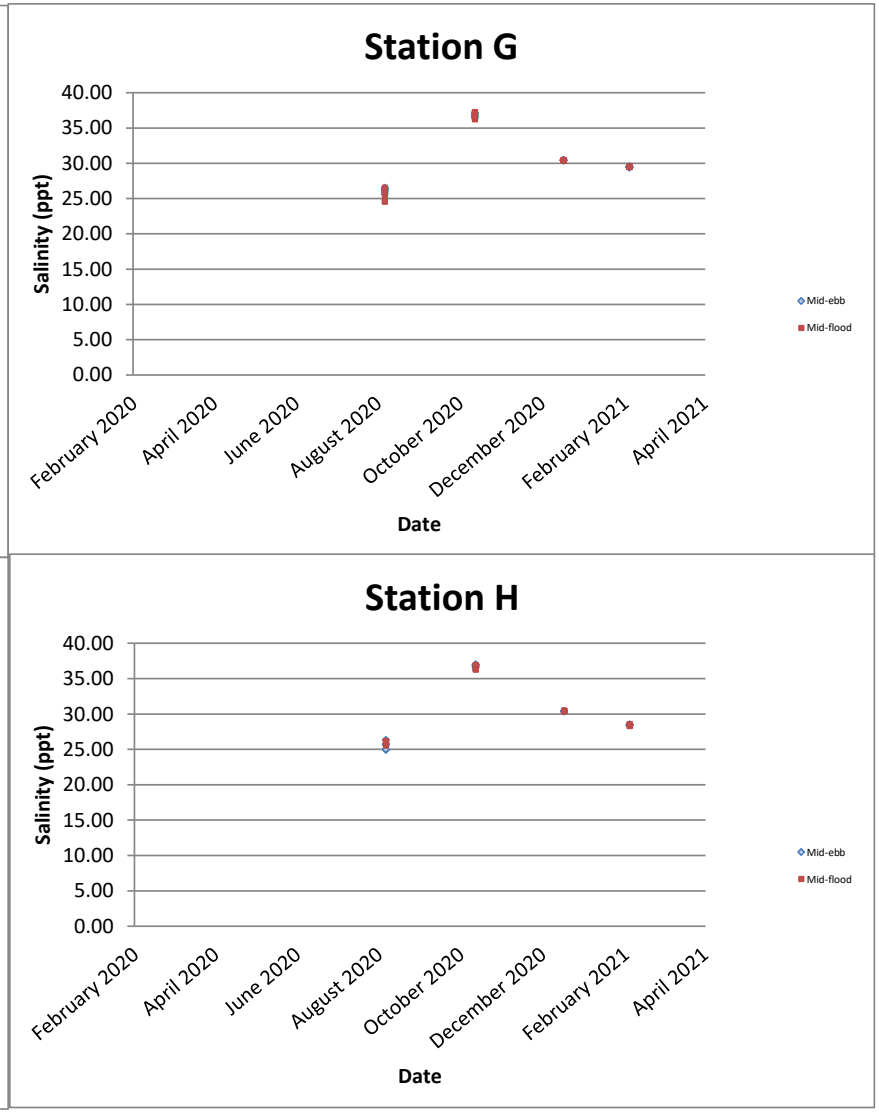








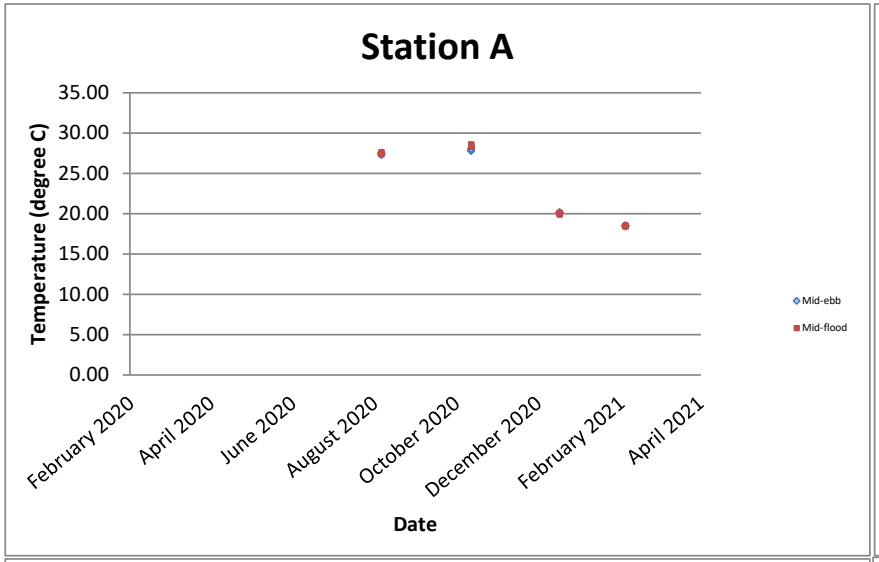

Station E
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

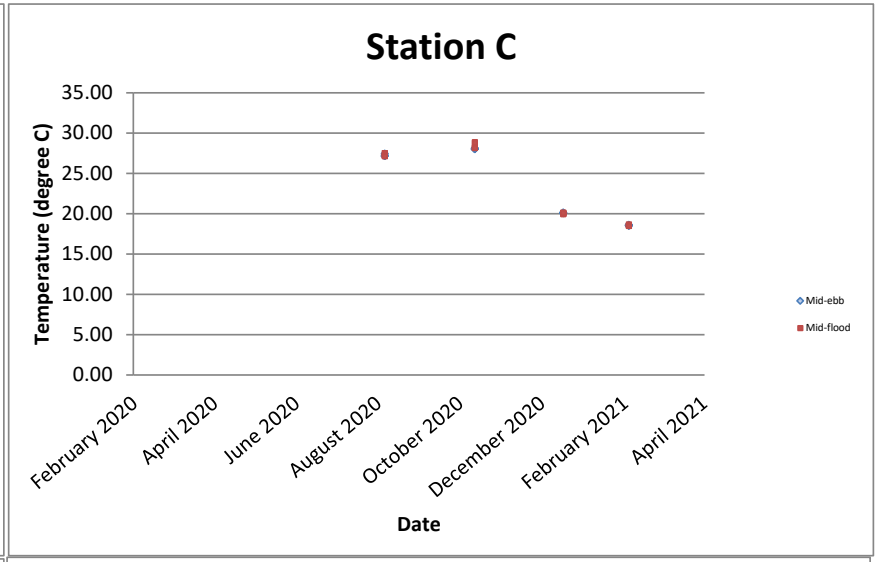

Station G
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

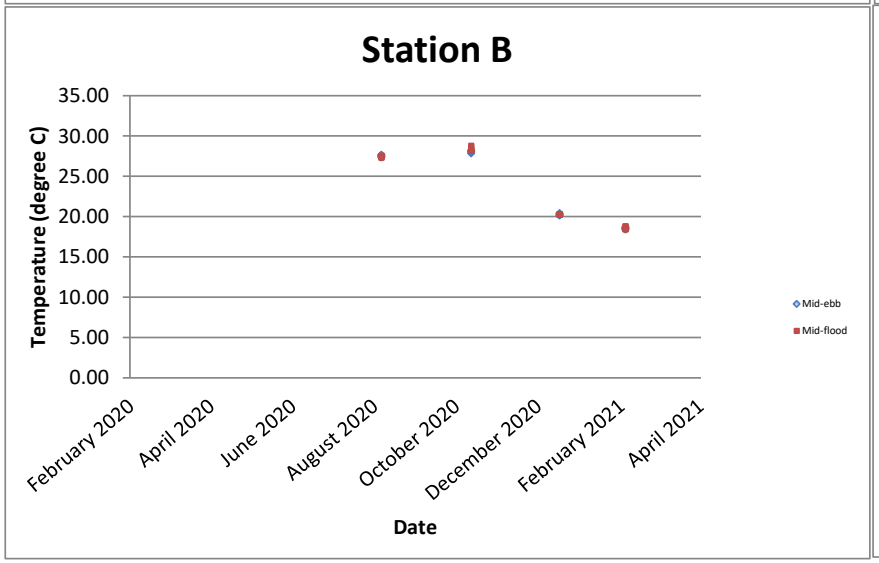
Station F
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

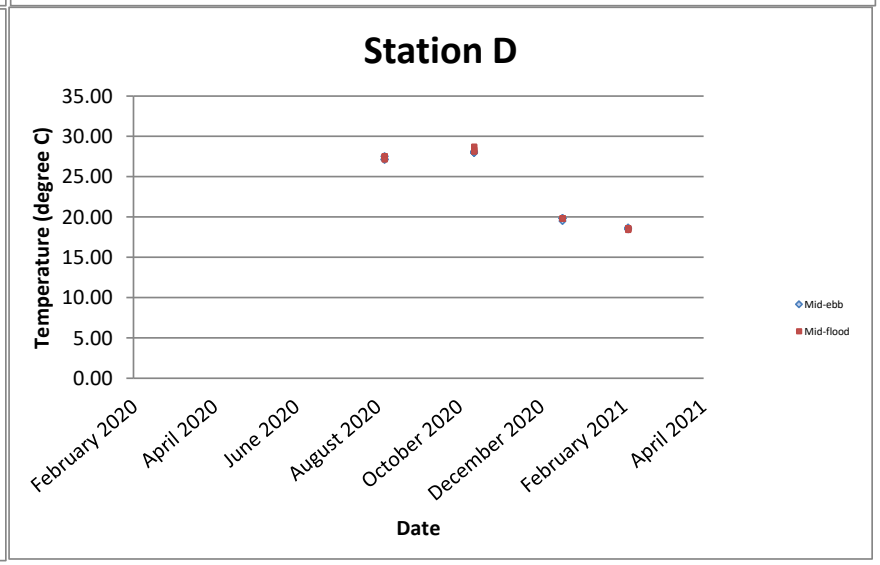
Station H
Salinity (ppt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

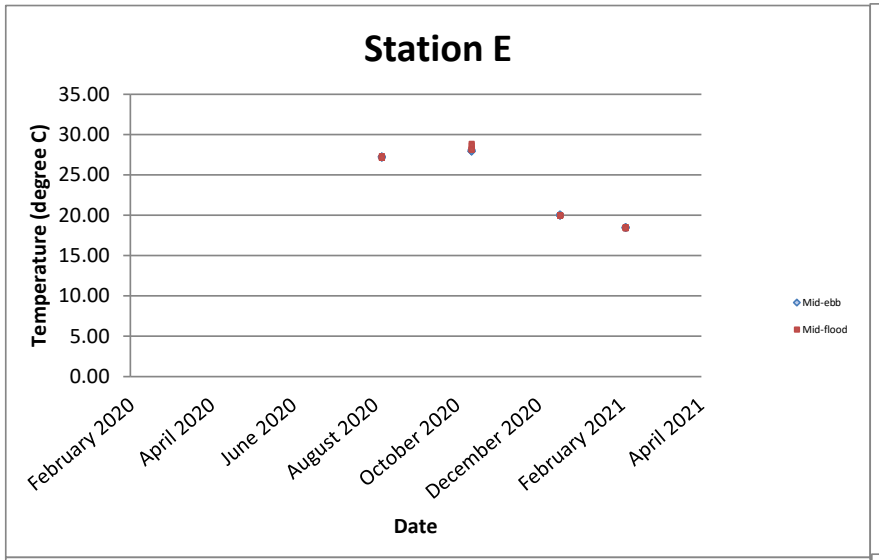
Temperature (degree C)

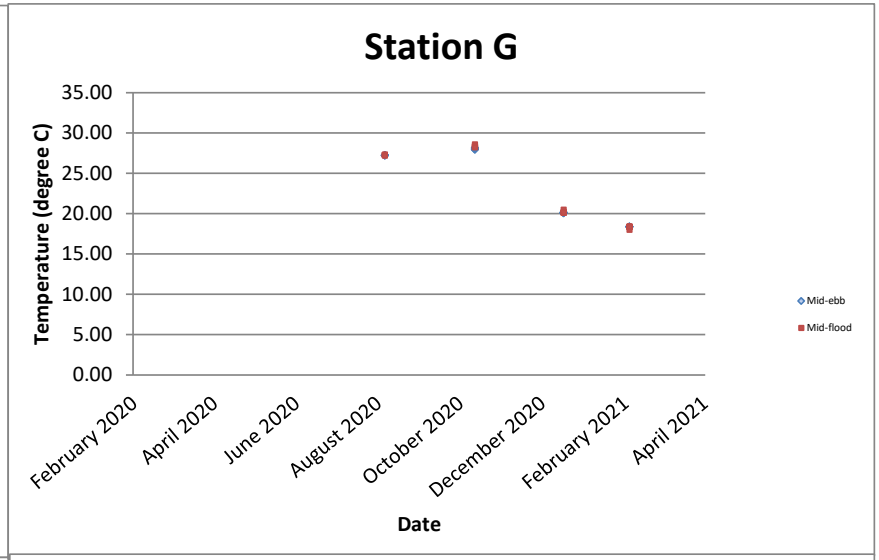


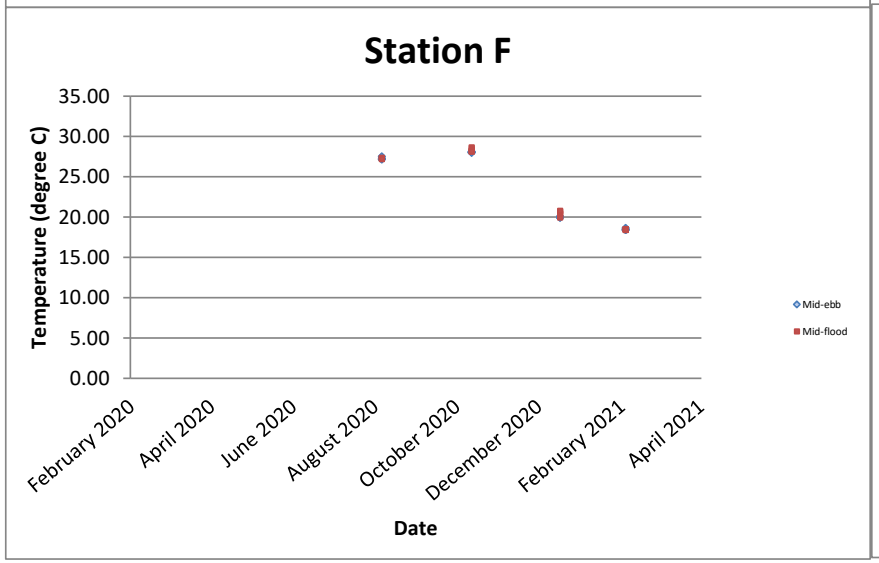


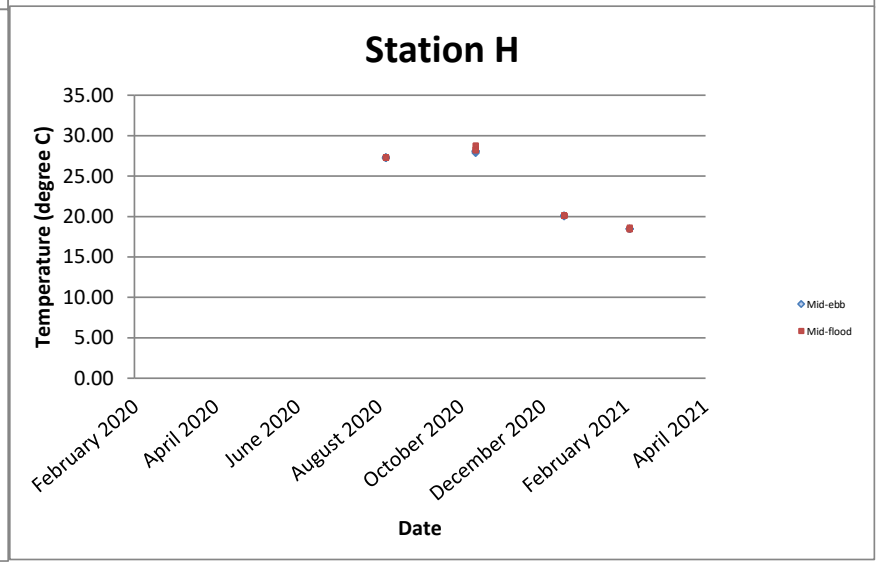




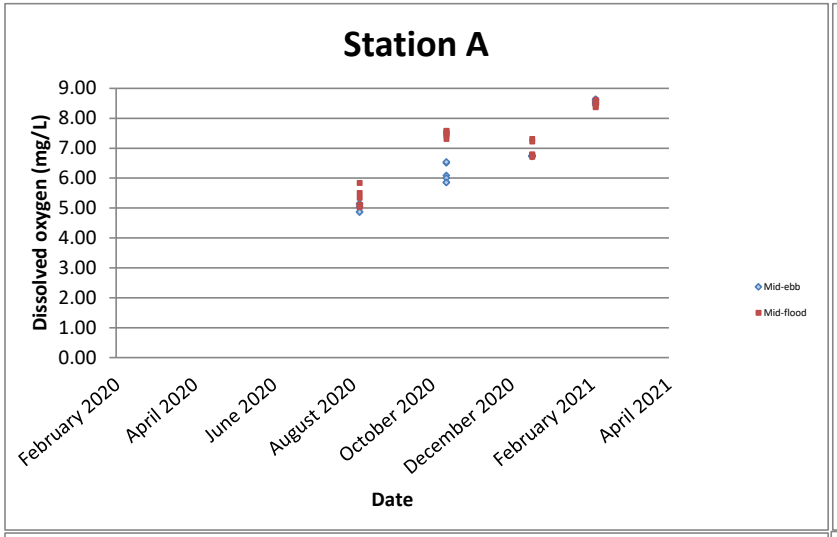

Station E
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

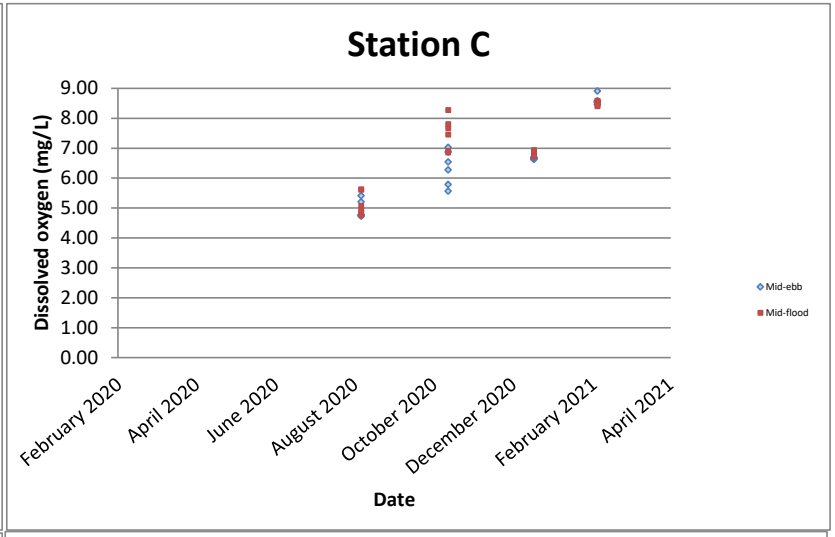

Station G
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

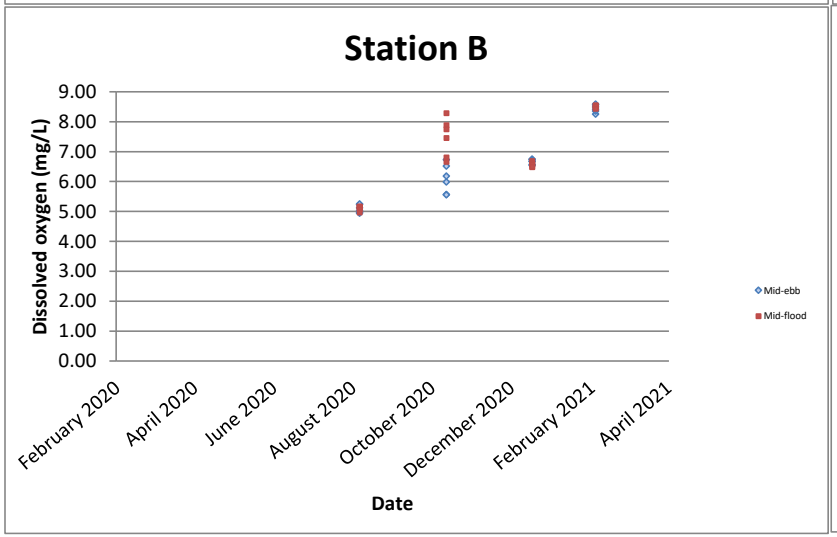

Station F
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

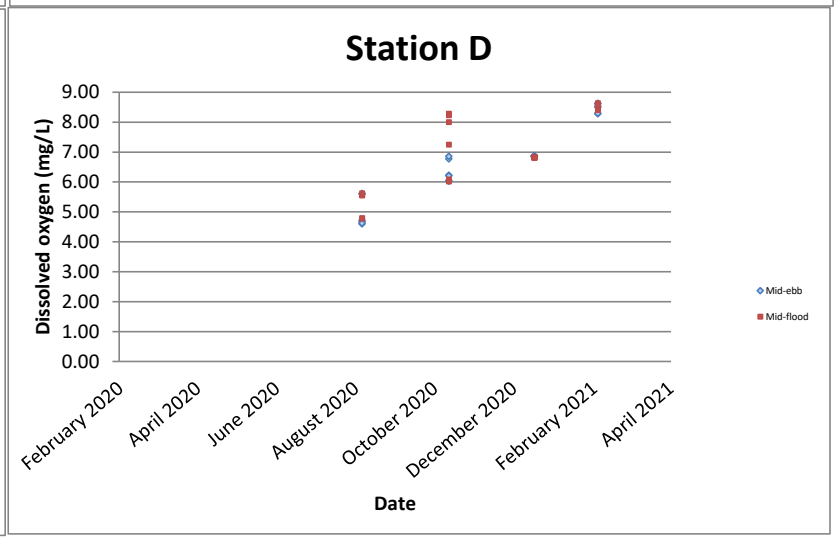

Station H
Temperature (degree C)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

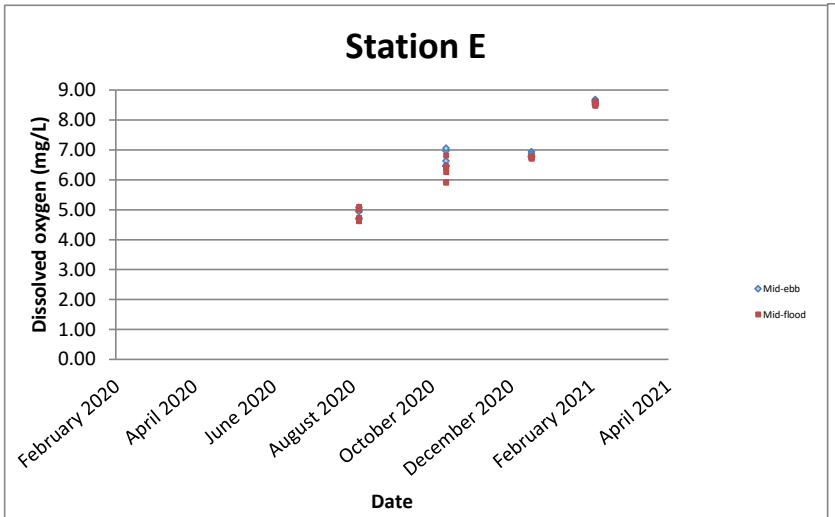
Dissolved oxygen (mg/L)

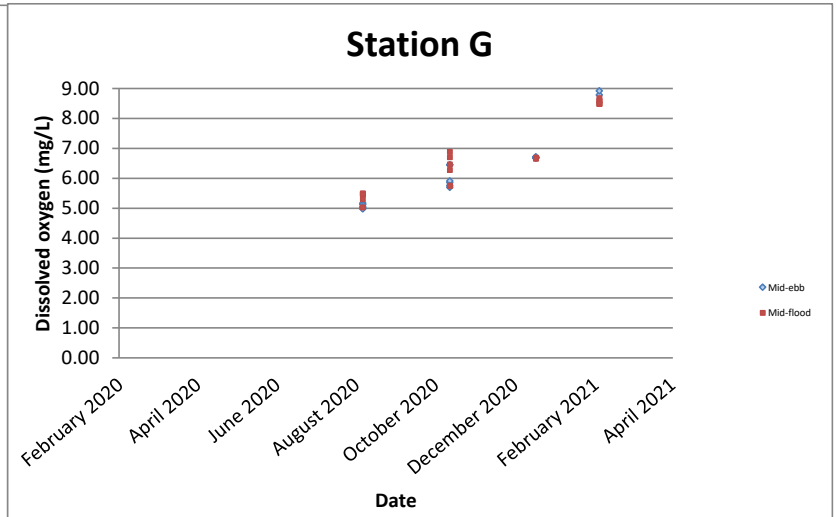


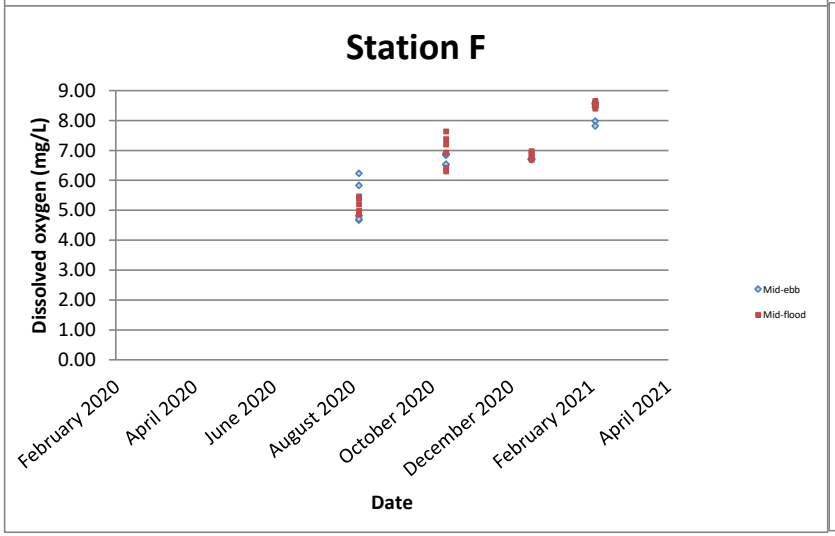


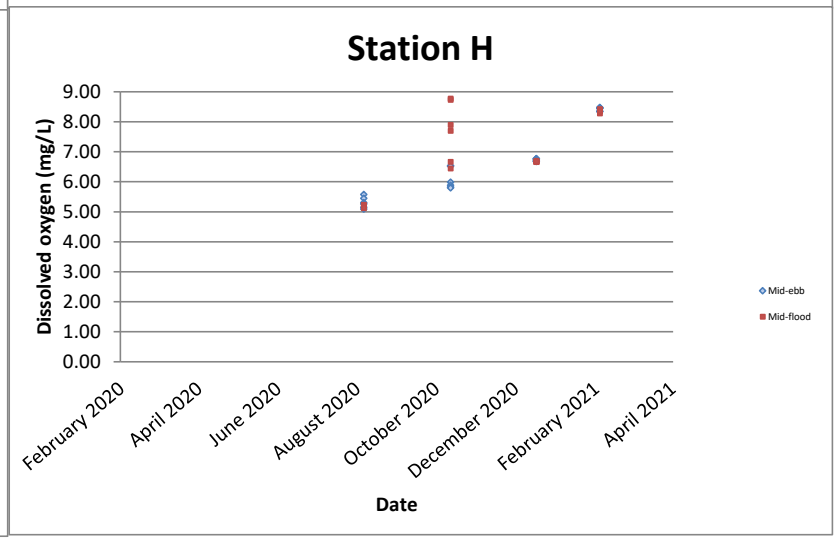


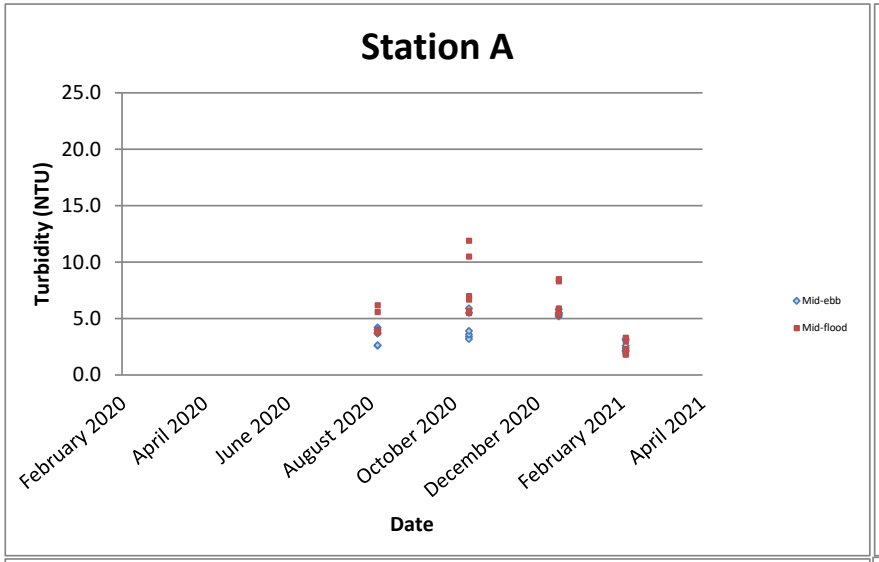


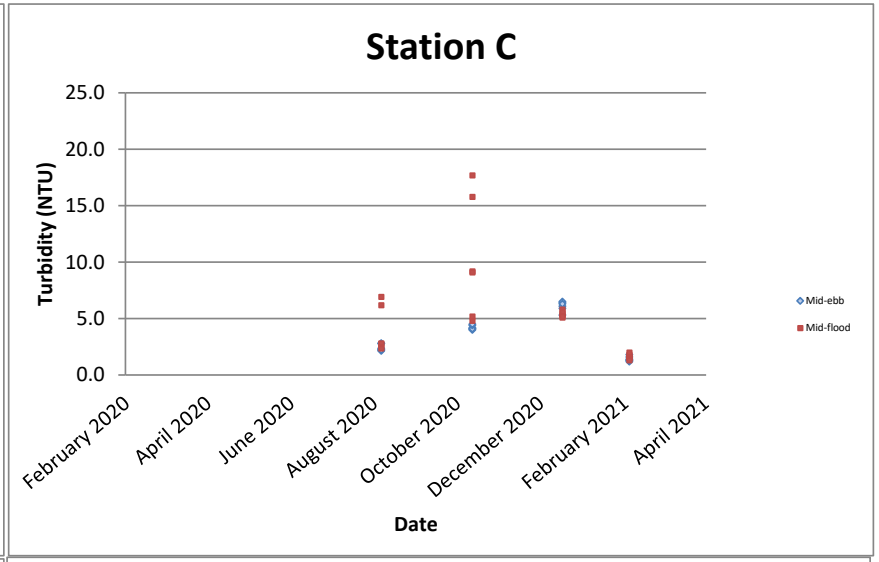

Station E
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

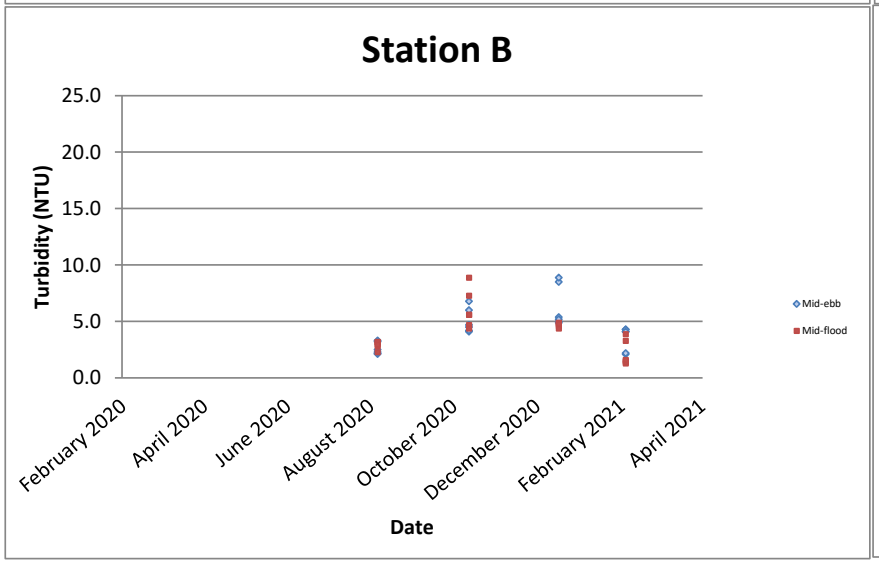

Station G
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

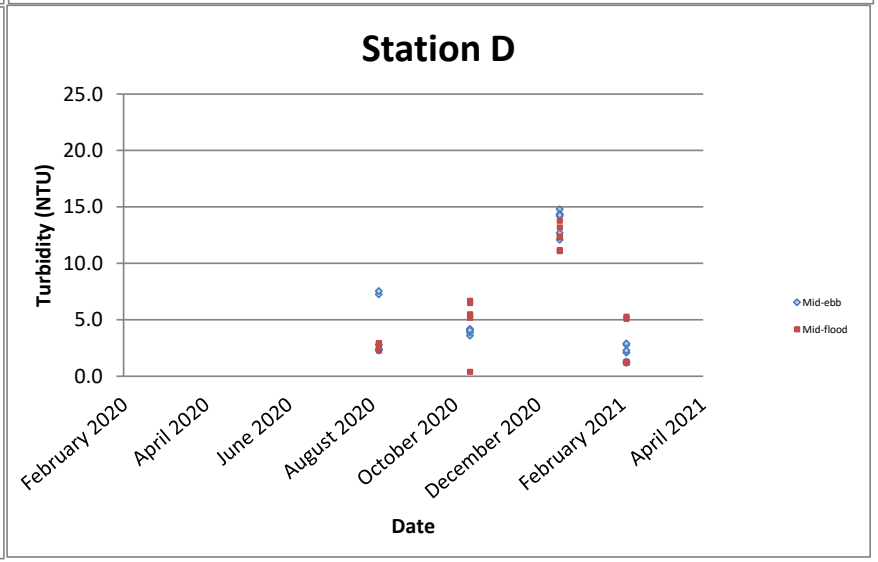

Station F
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

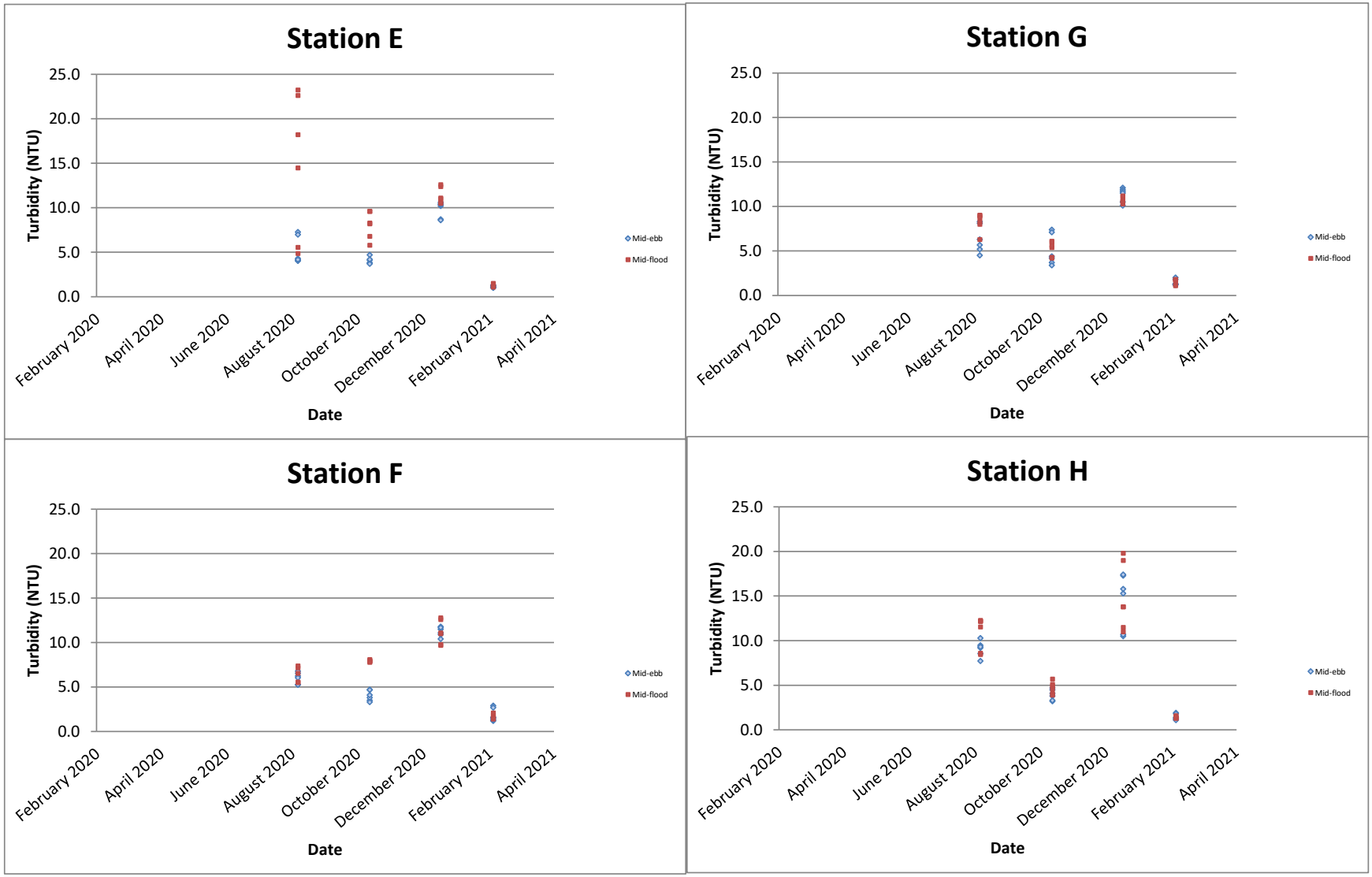

Station H
Dissolved oxygen (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood


Station A
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

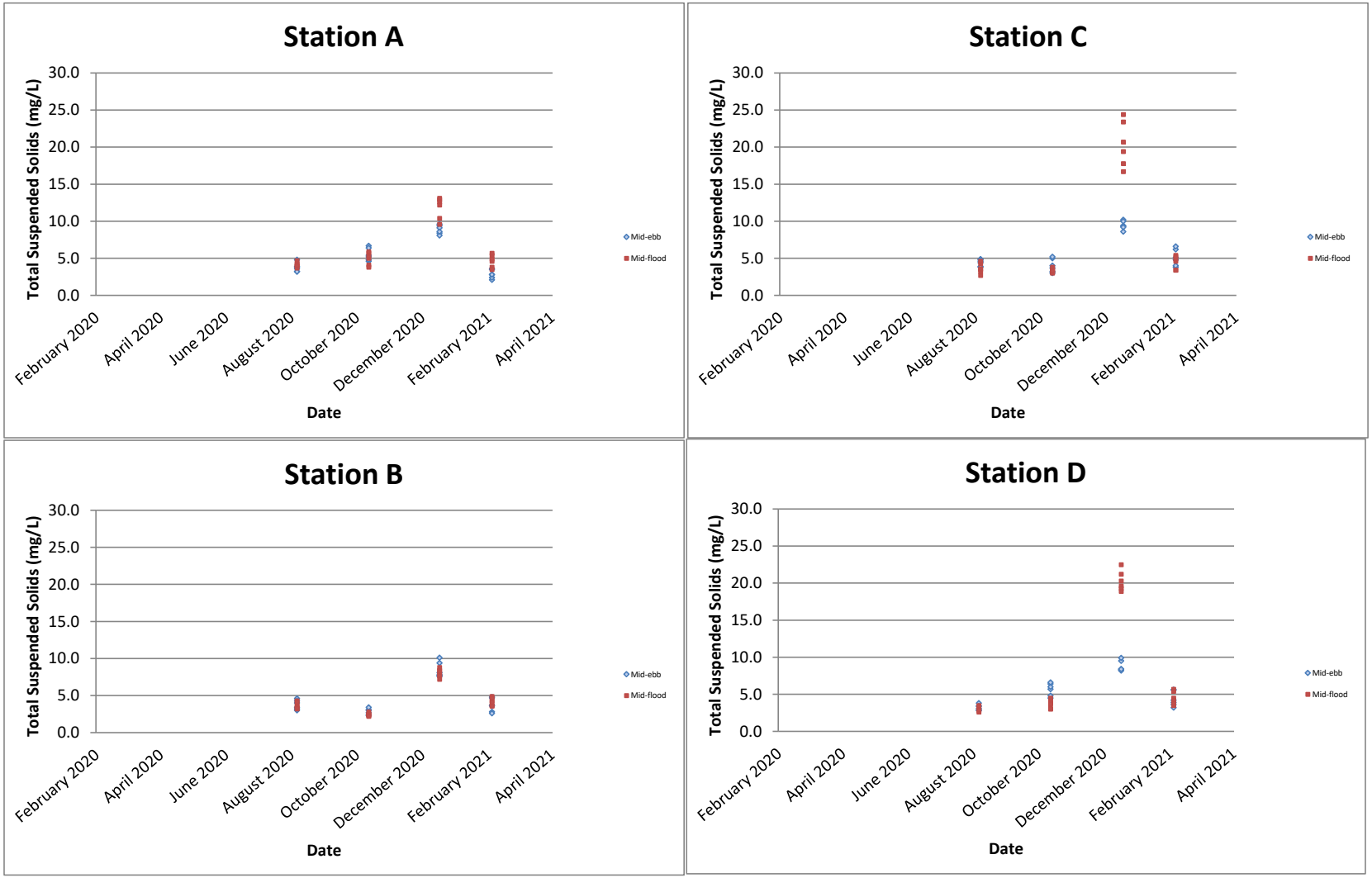

Station C
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood


Station B
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood

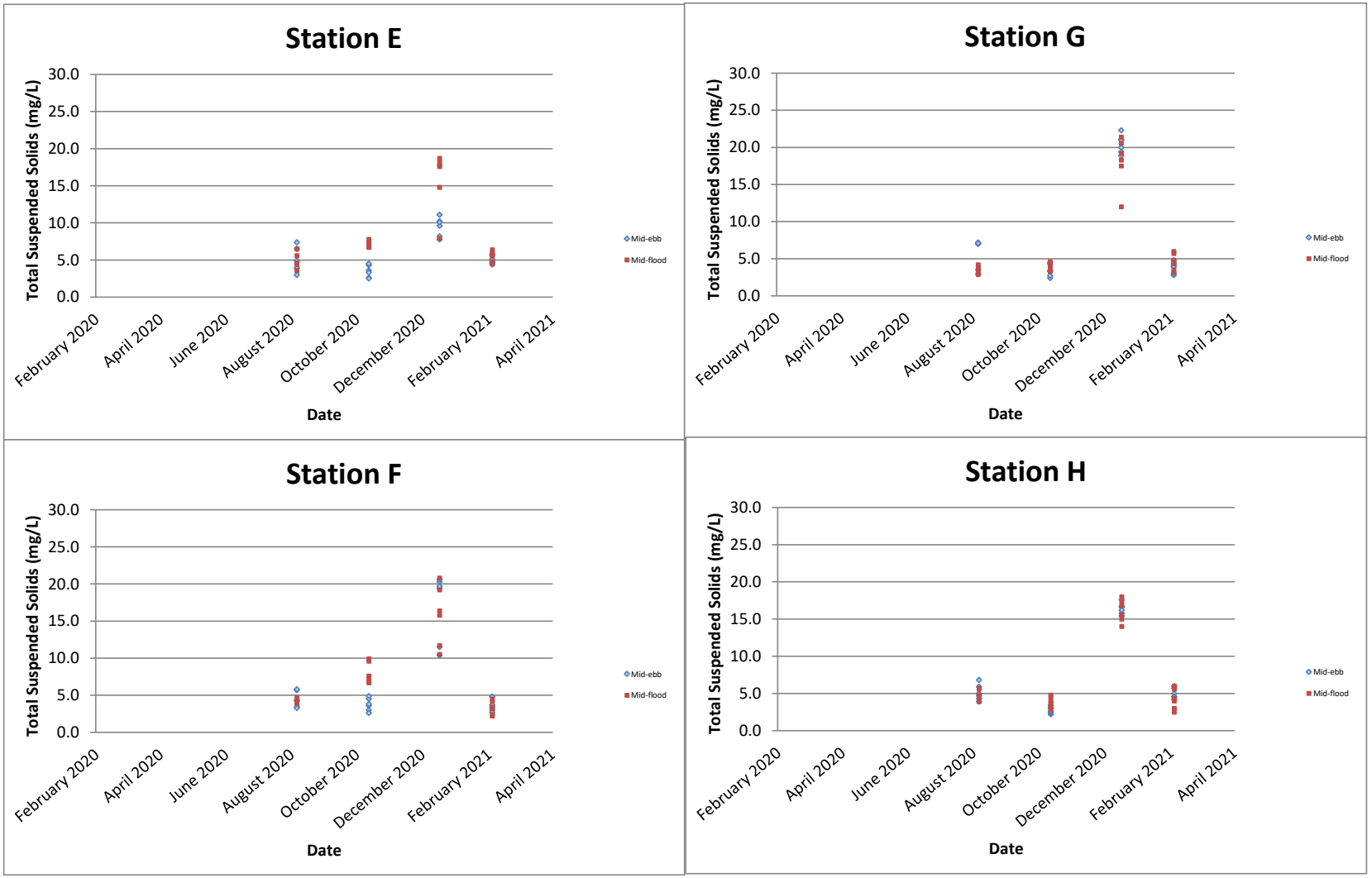

Station D
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood


Station E
Turbidity (NTU)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Mid-ebb
Mid-flood
Station G
Turbidity (NTU)
Date
Mid-ebb
Mid-flood
Station F
Turbidity (NTU)
Date
Mid-ebb
Mid-flood
Station H
Turbidity (NTU)
Date
Mid-ebb
Mid-flood

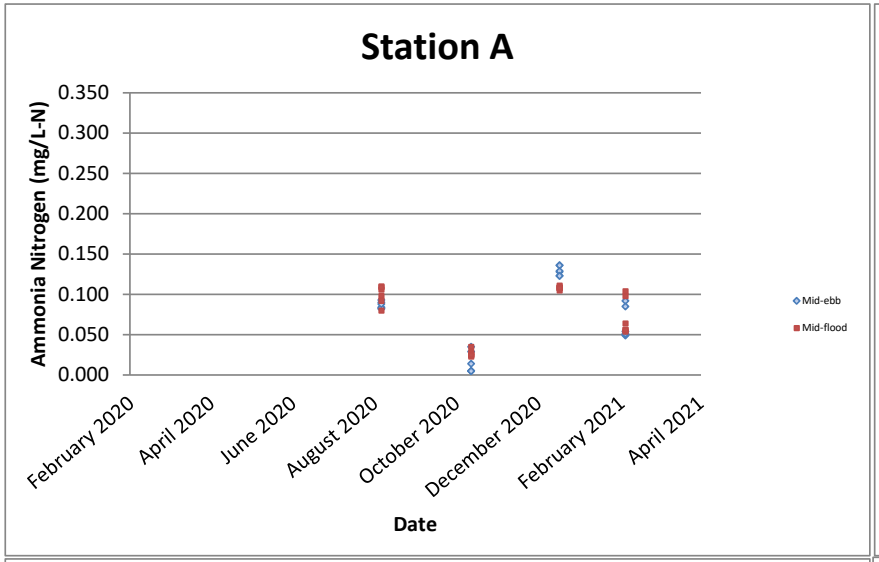
Total Suspended Solids (mg/L)

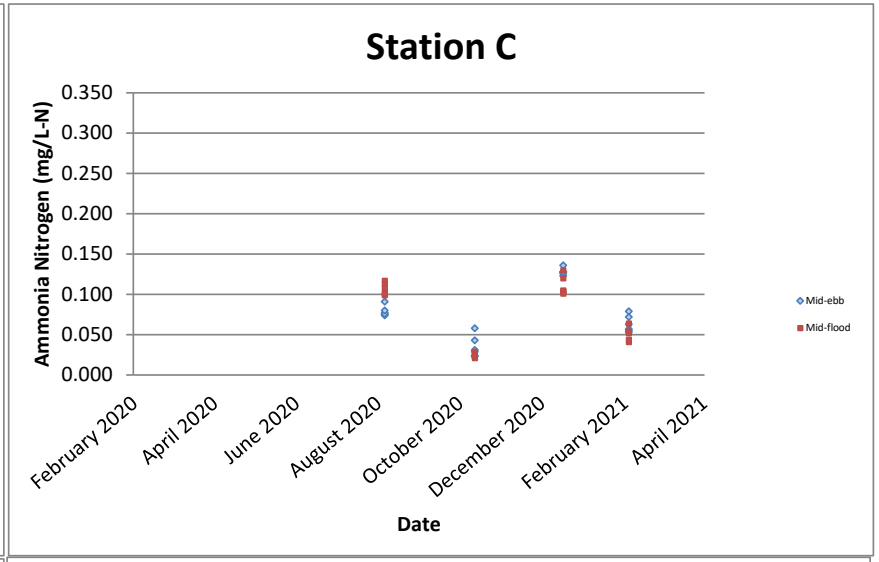


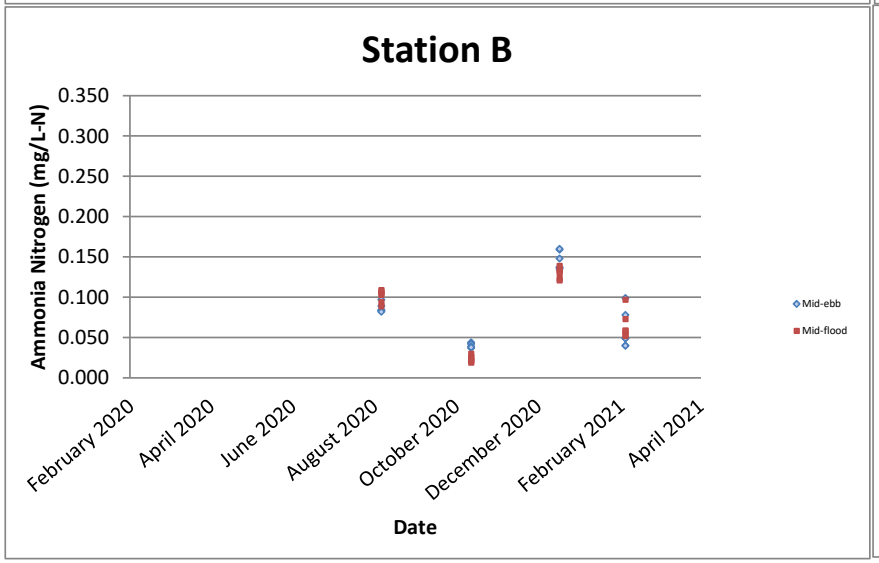
Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

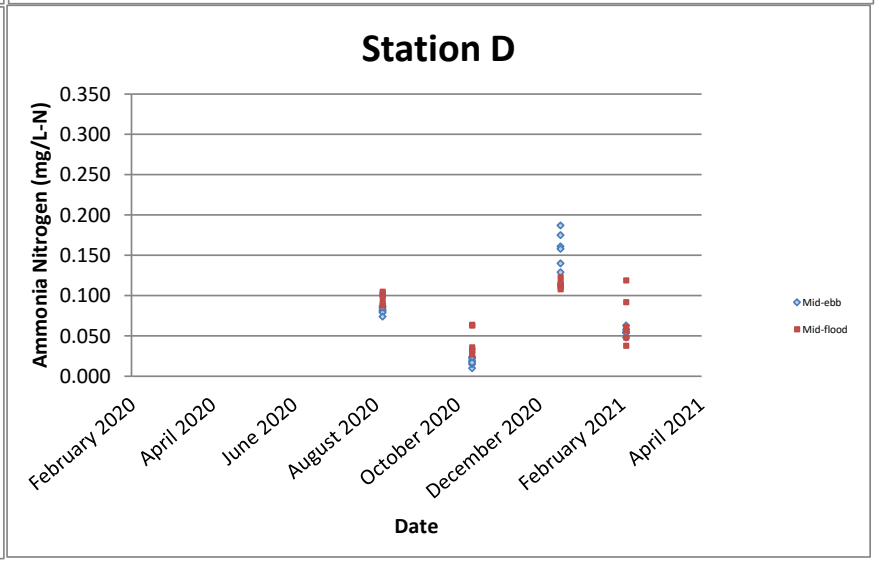


Remark: All below the Limit of Report sample results (<0.5 mg/L) for Total Suspended Solids is regarded as 0.5 mg/L in graphical presentation.

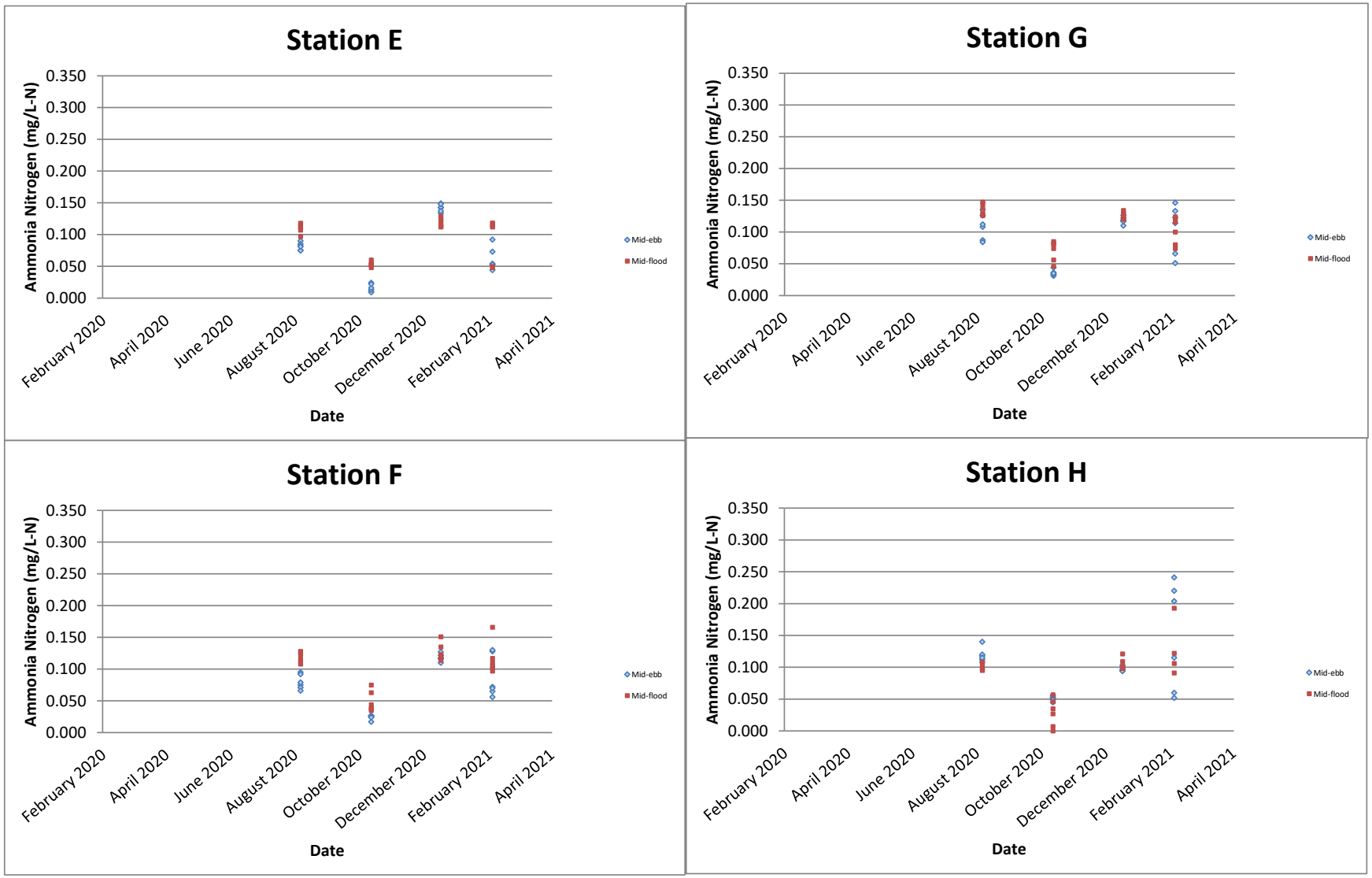




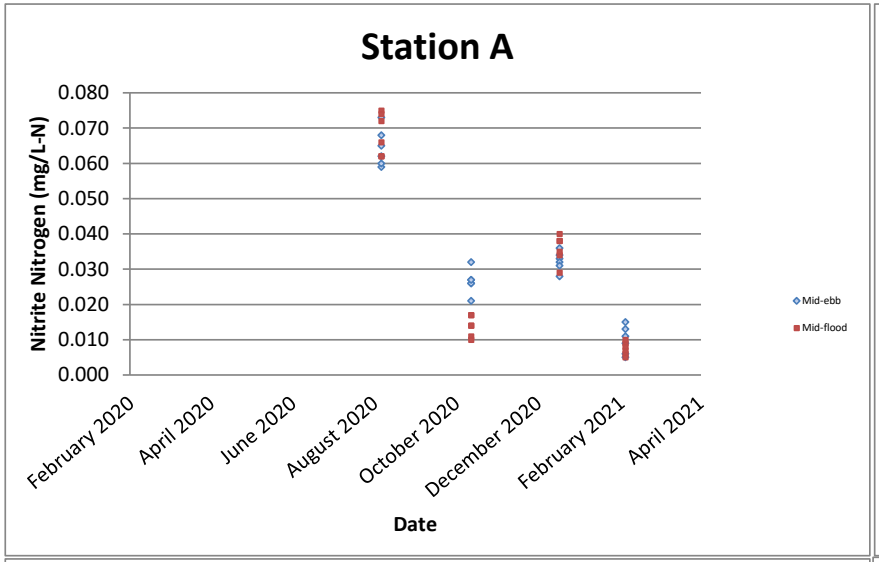


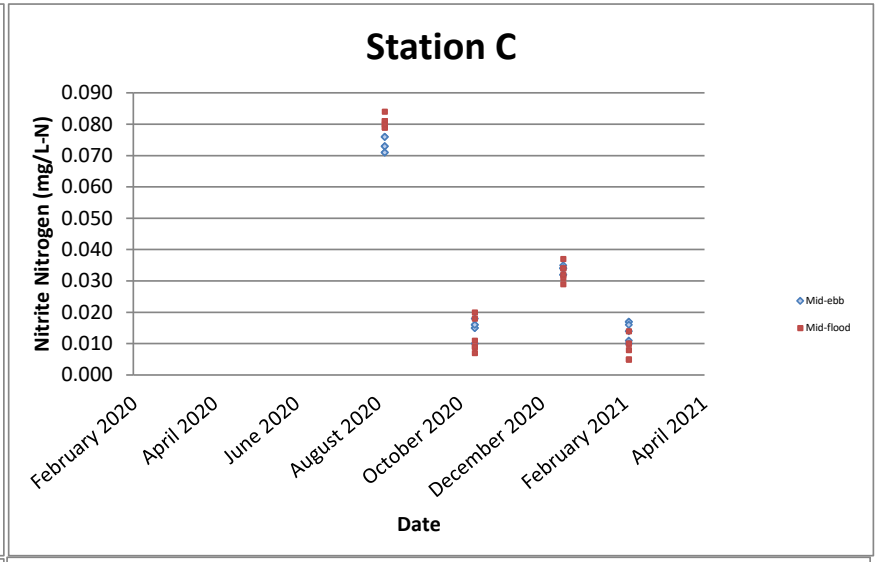


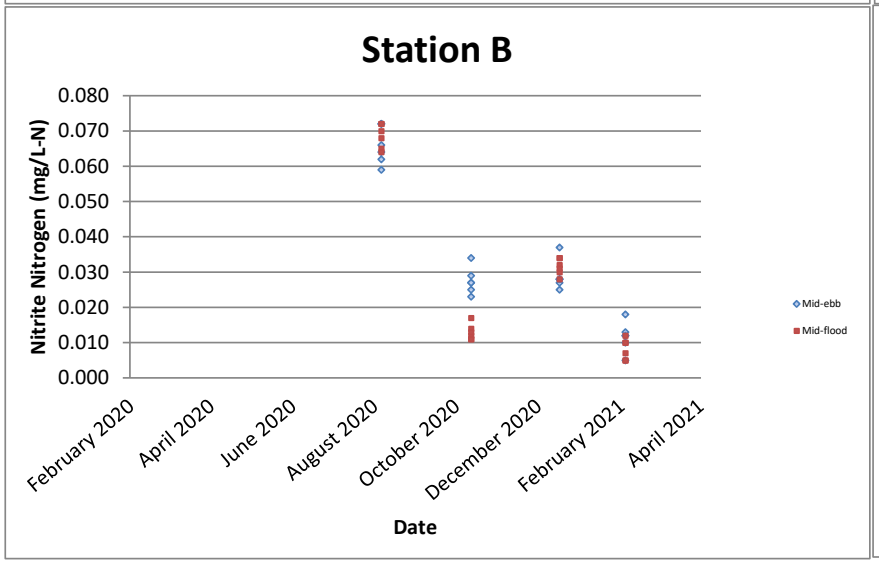
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Ammonia Nitrogen is regarded as 0.005 mg/L in graphical presentation.

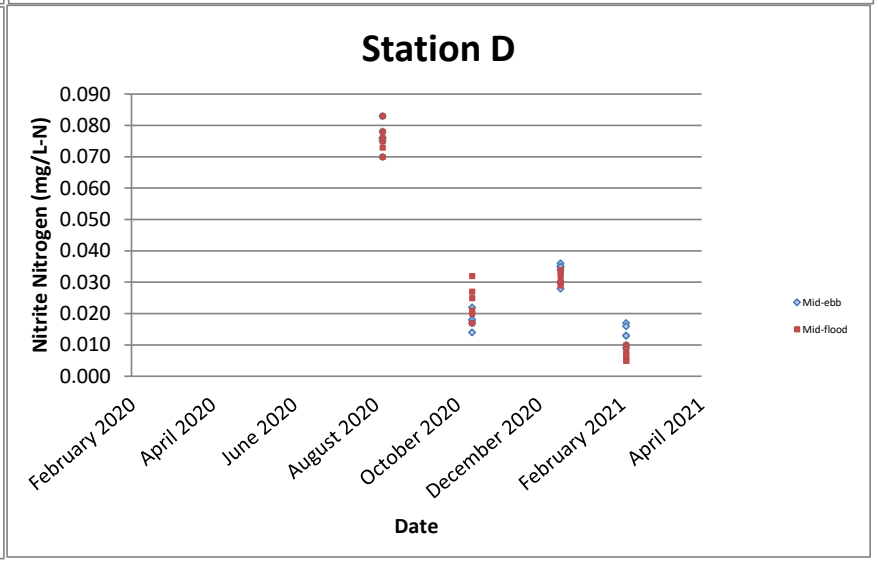


Remark: All below the Limit of Report sample results (<0.005 mg/L) for Ammonia Nitrogen is regarded as 0.005 mg/L in graphical presentation.

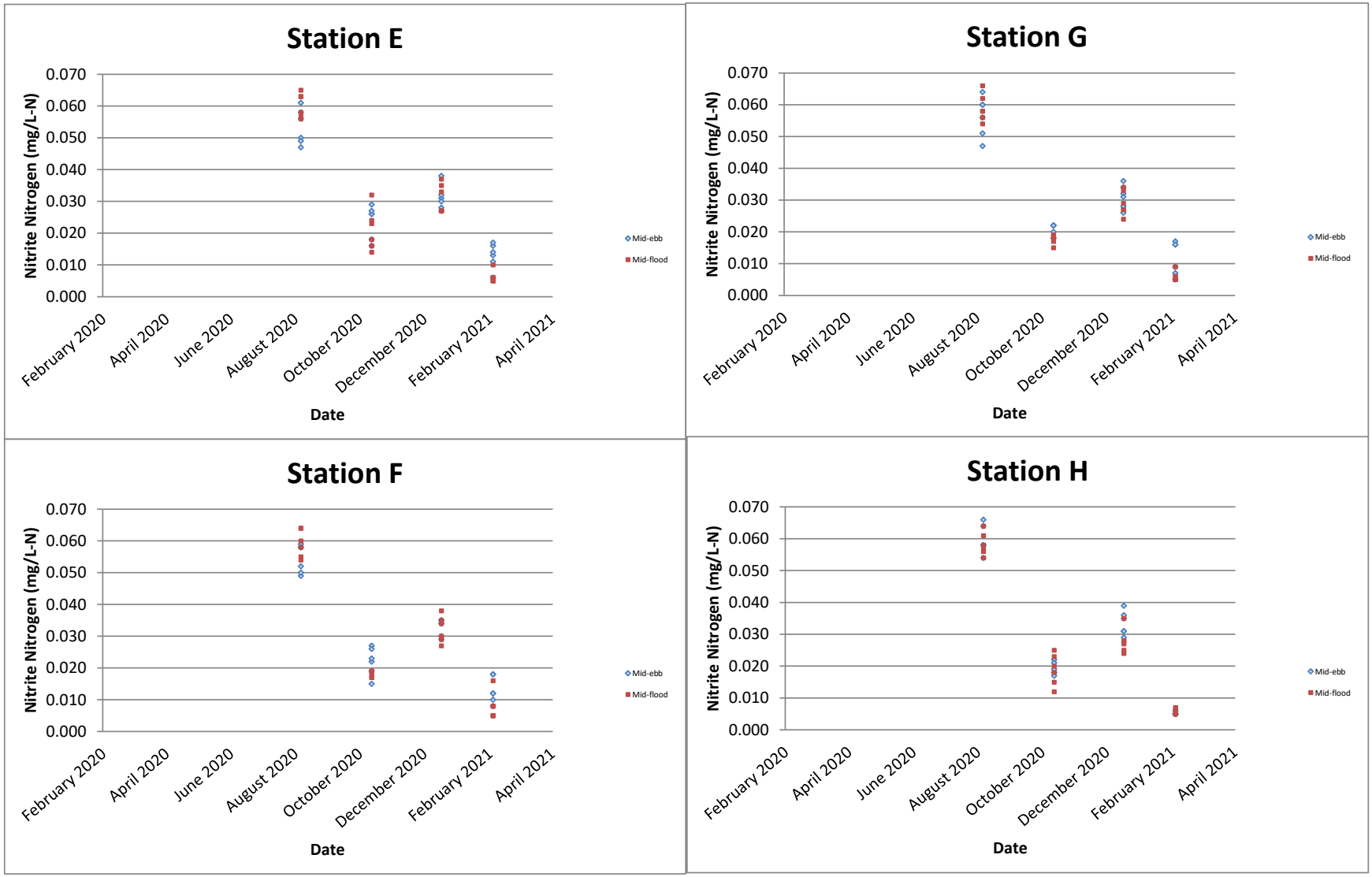






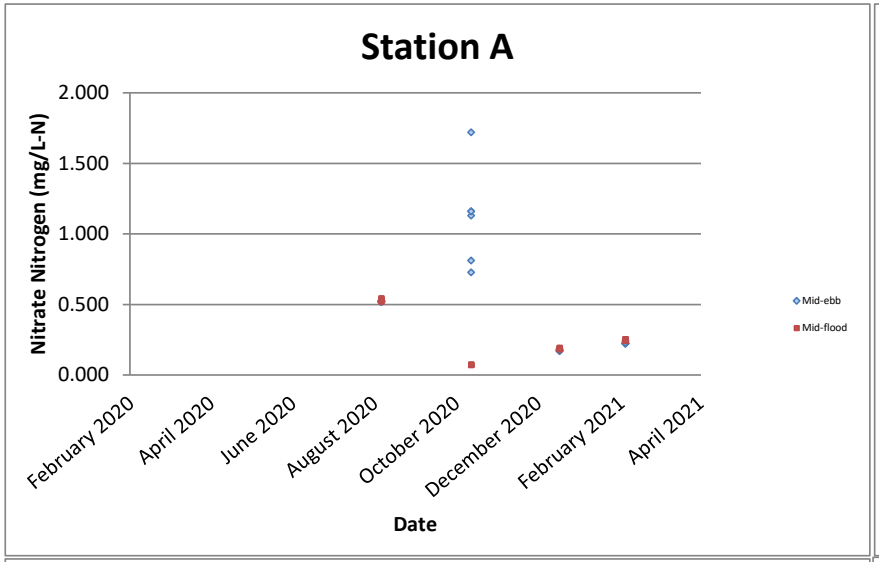


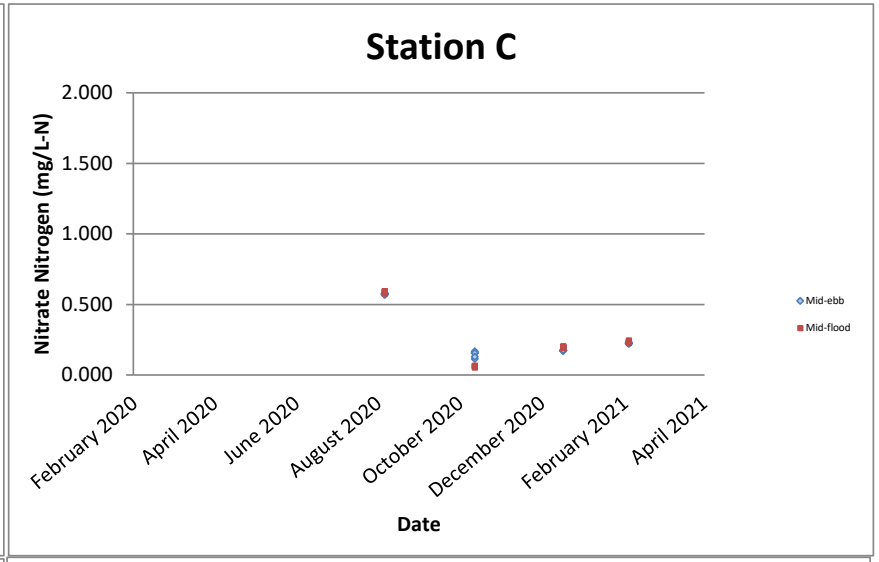
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrite Nitrogen is regarded as 0.005 mg/L in graphical presentation.

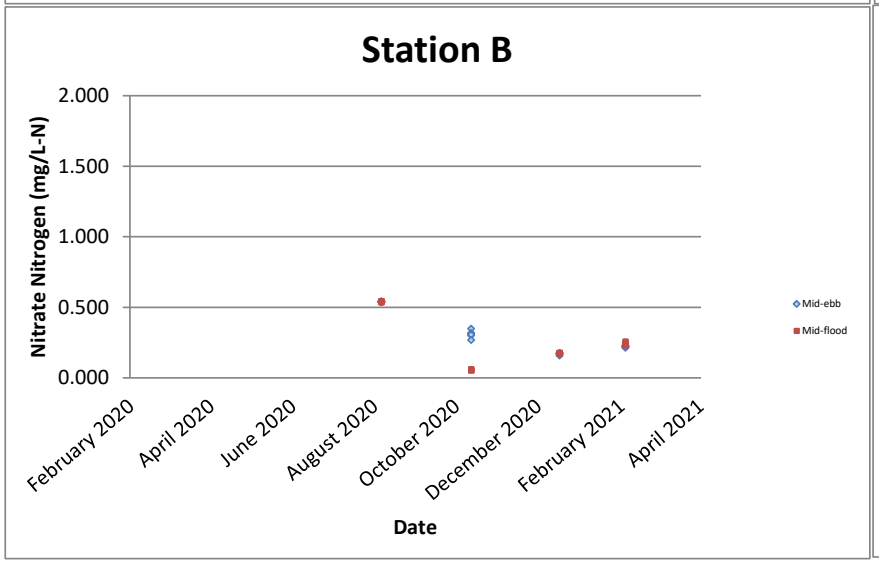


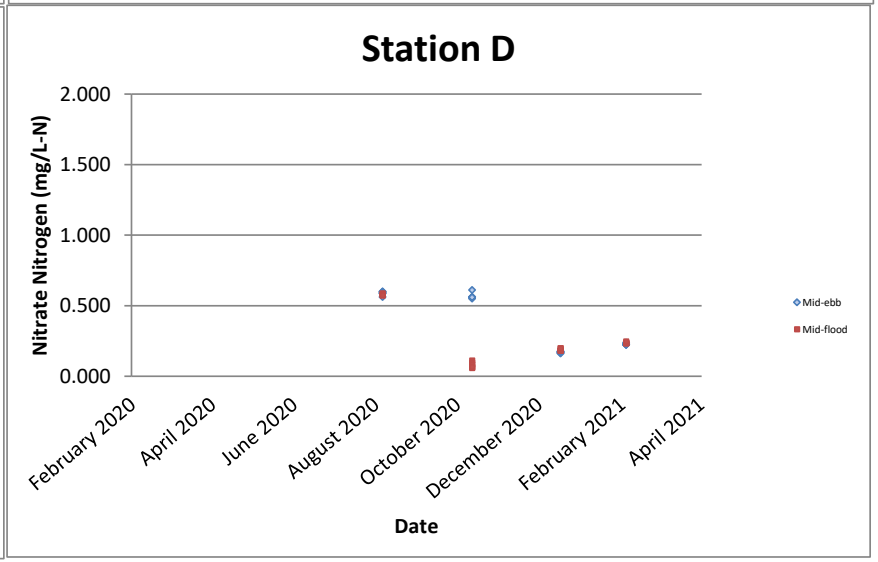
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrite Nitrogen is regarded as 0.005 mg/L in graphical presentation.

Nitrate Nitrogen (mg/L-N)

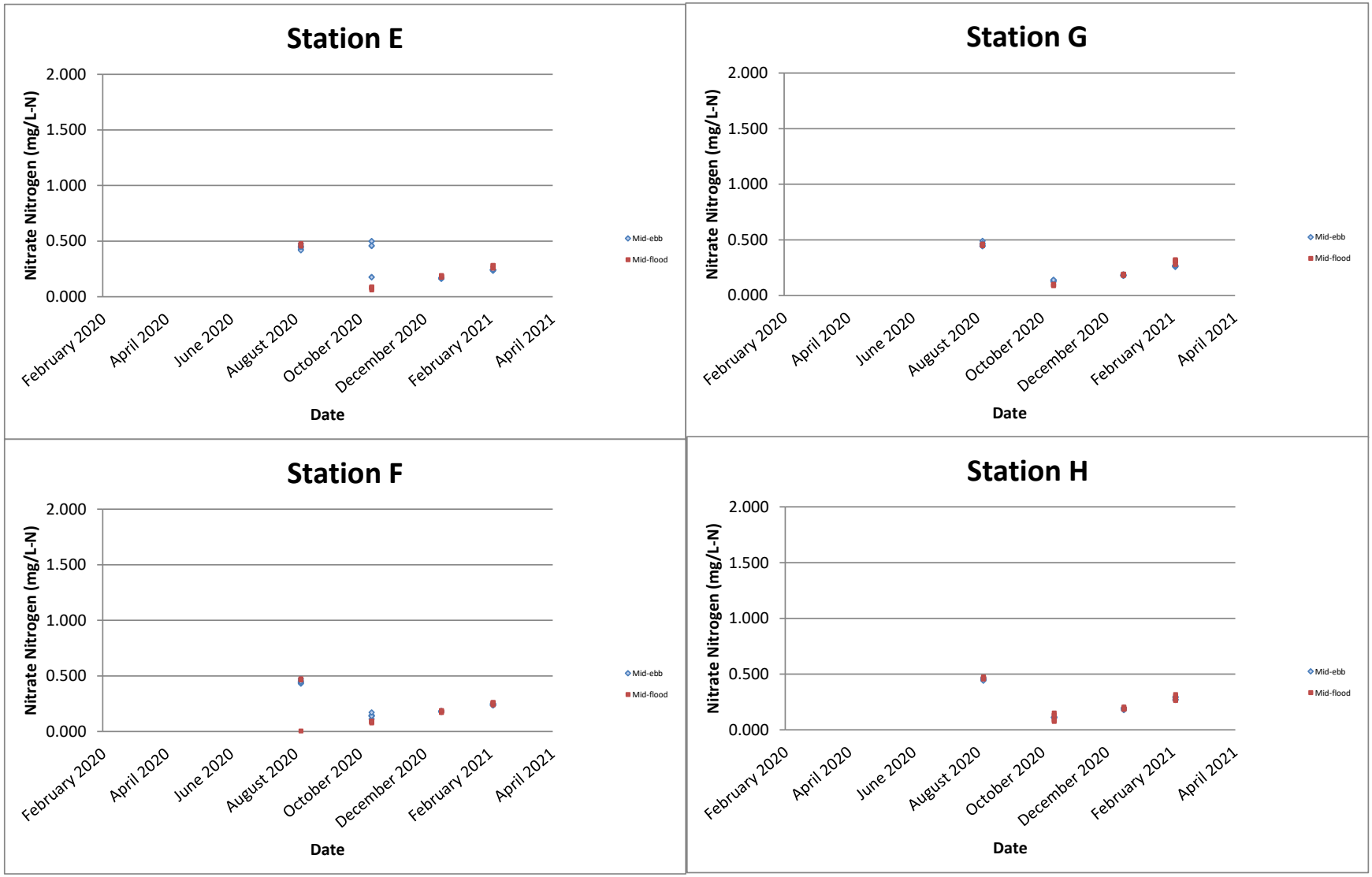




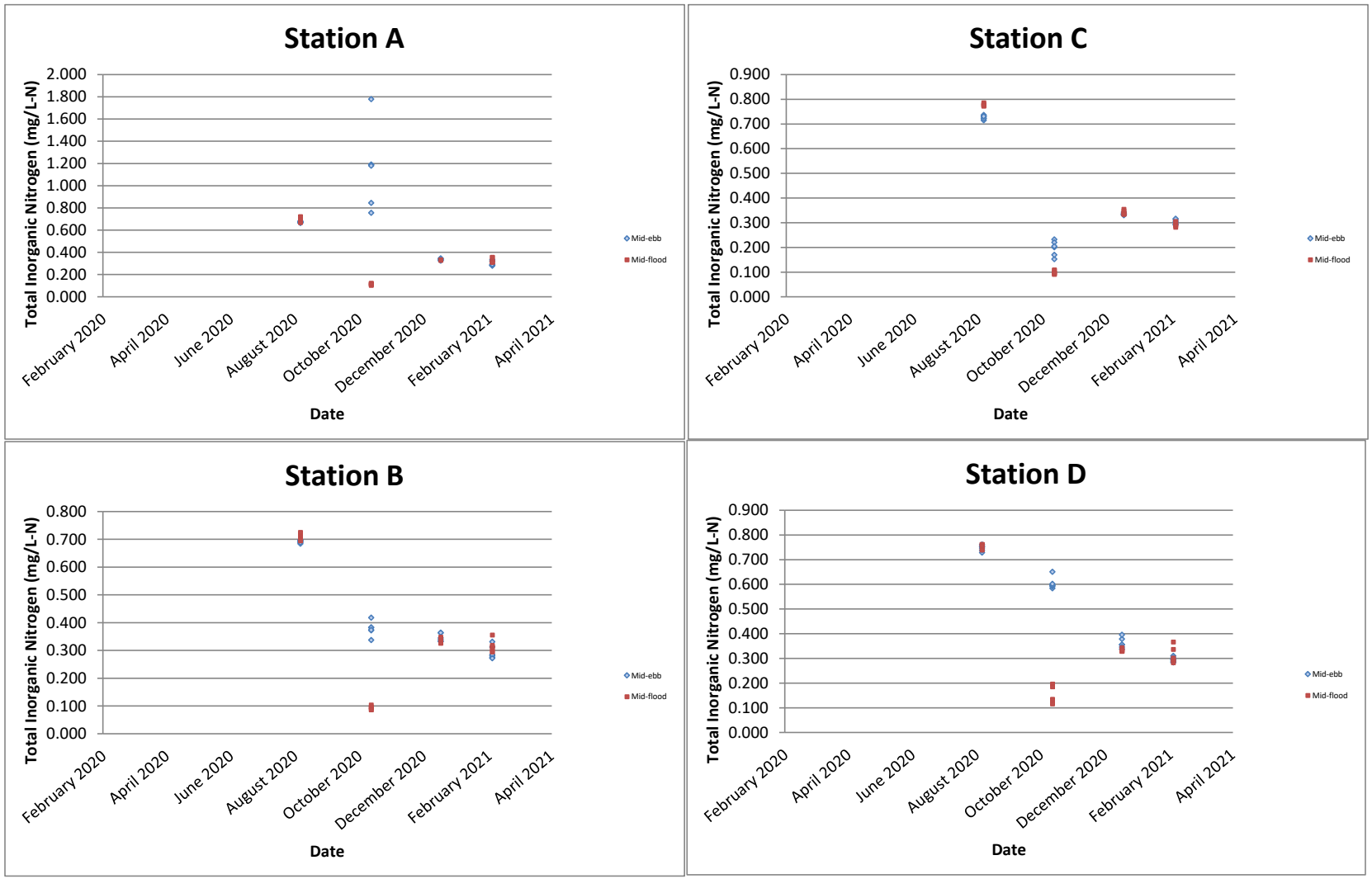




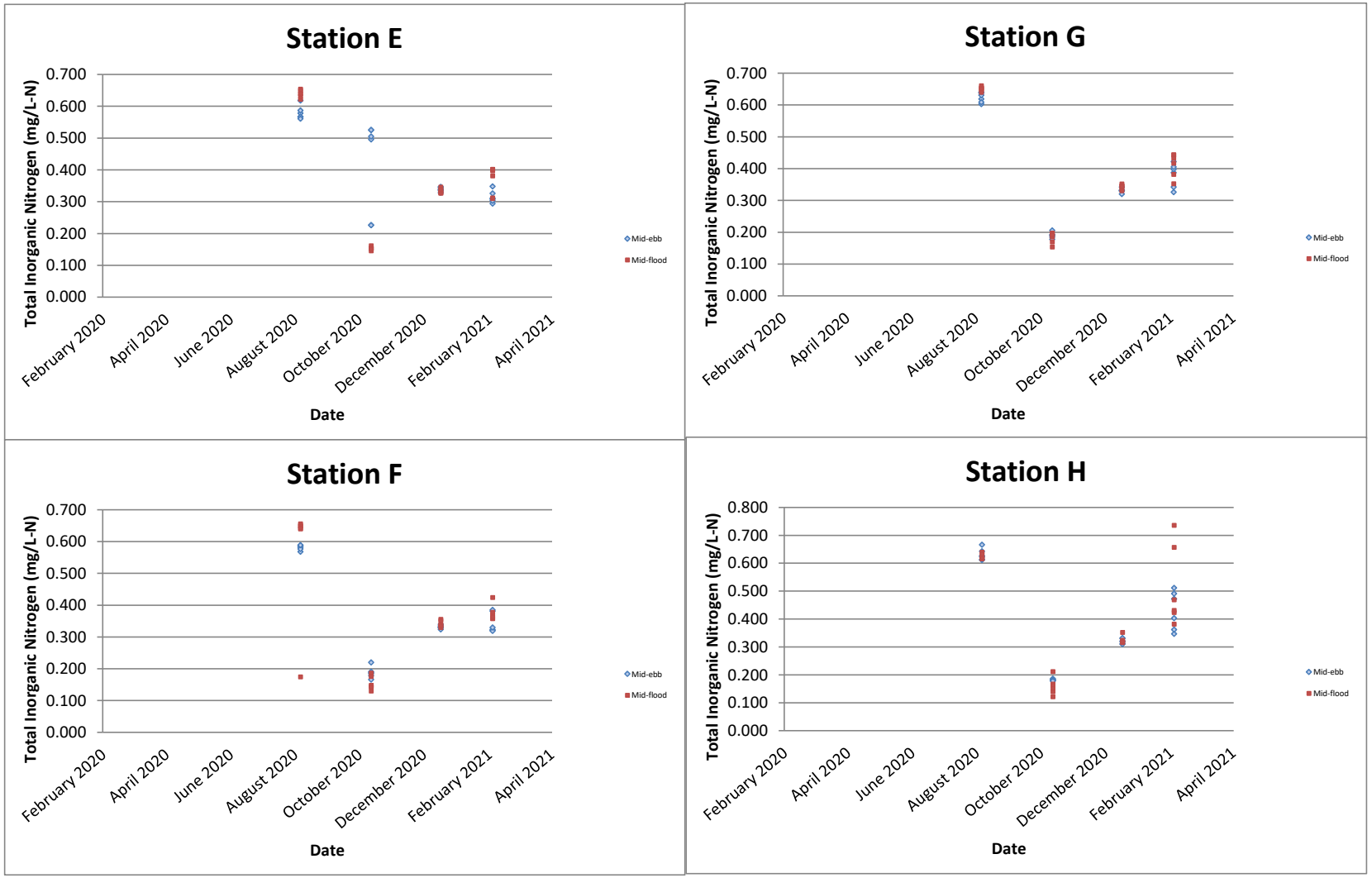
Remark: All below the Limit of Report sample results (<0.005 mg/L) for Nitrate Nitrogen is regarded as 0.005 mg/L in graphical presentation.



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.

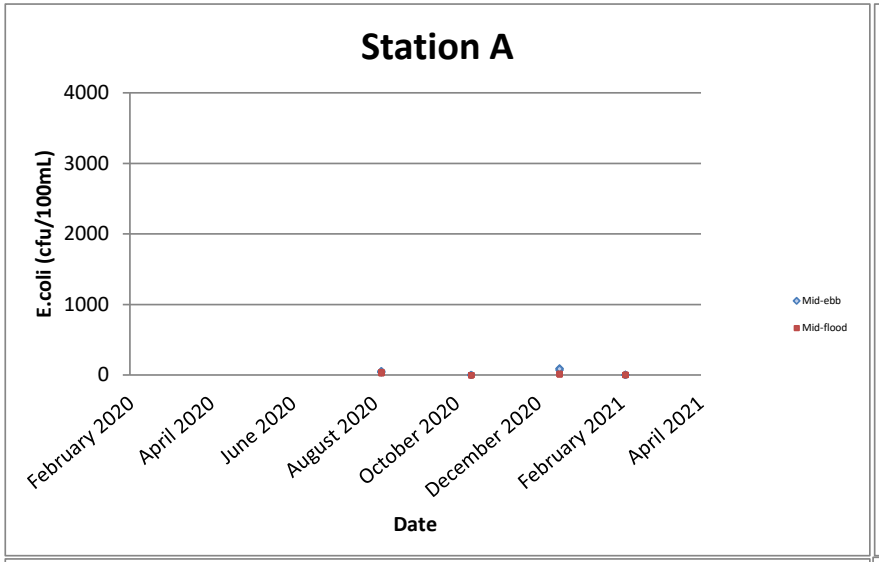


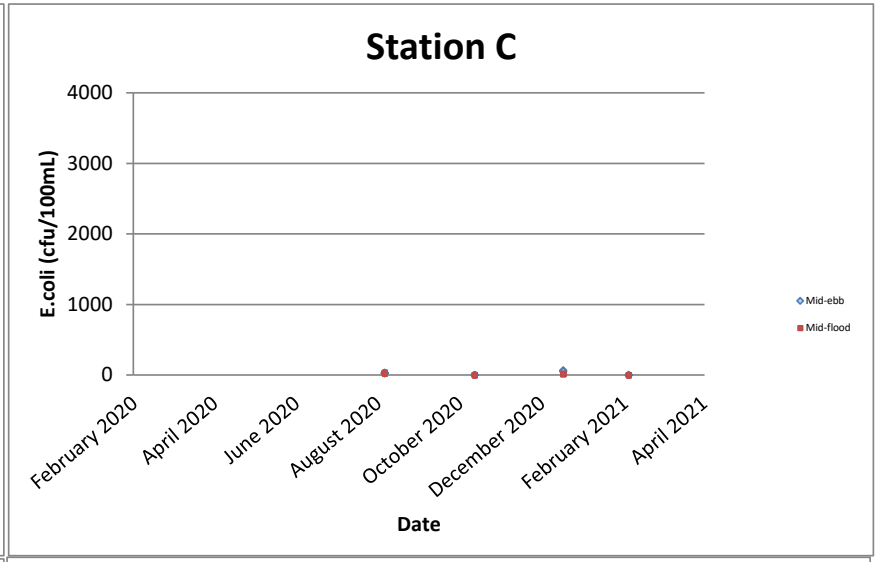
Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

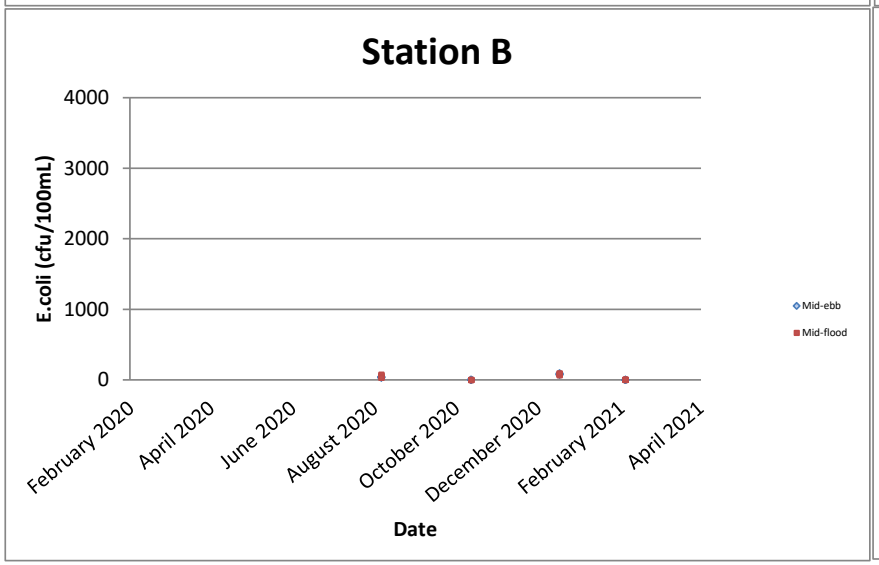


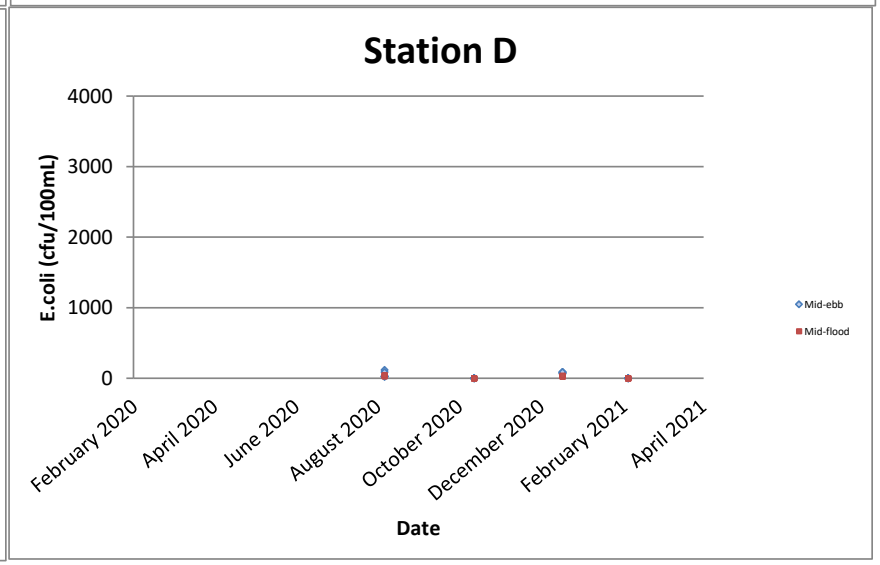
Remark: All below the Limit of Report sample results (<0.010 mg/L) for Total Inorganic Nitrogen is regarded as 0.010 mg/L in graphical presentation.

E.coli (cfu/100mL)



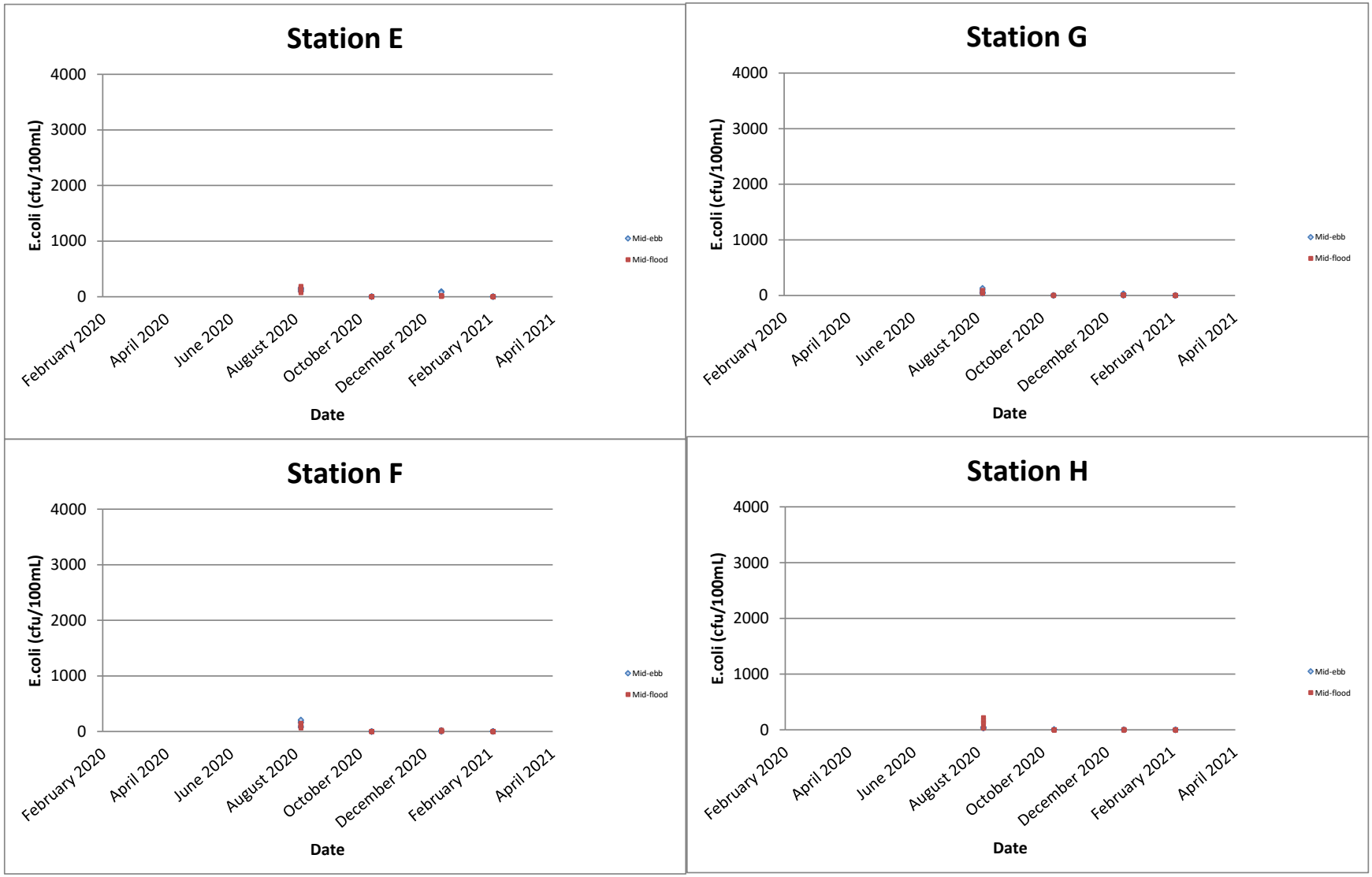






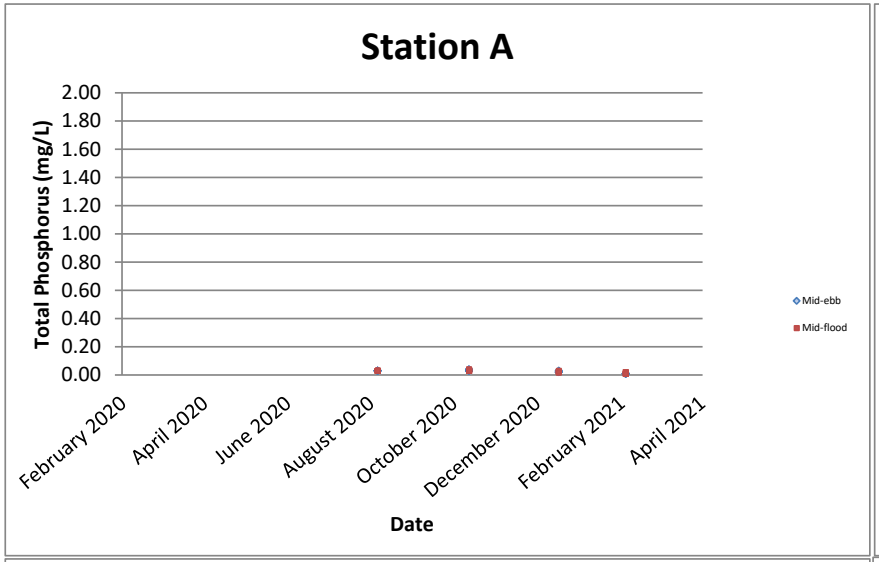
Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

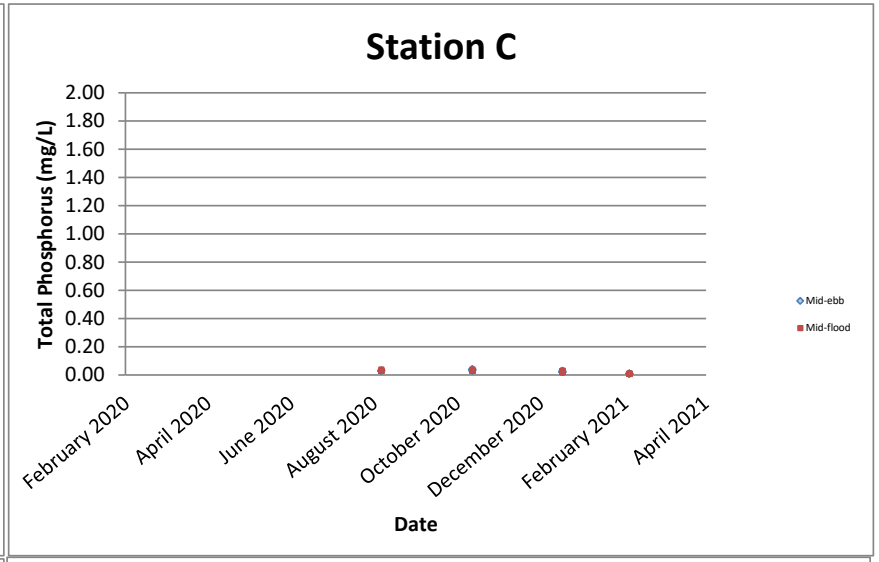
E.coli (cfu/100mL)

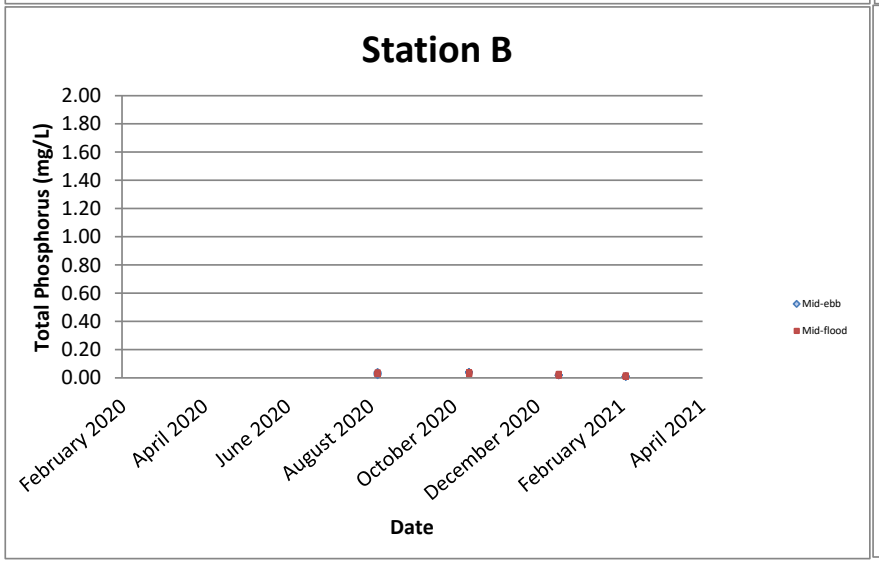


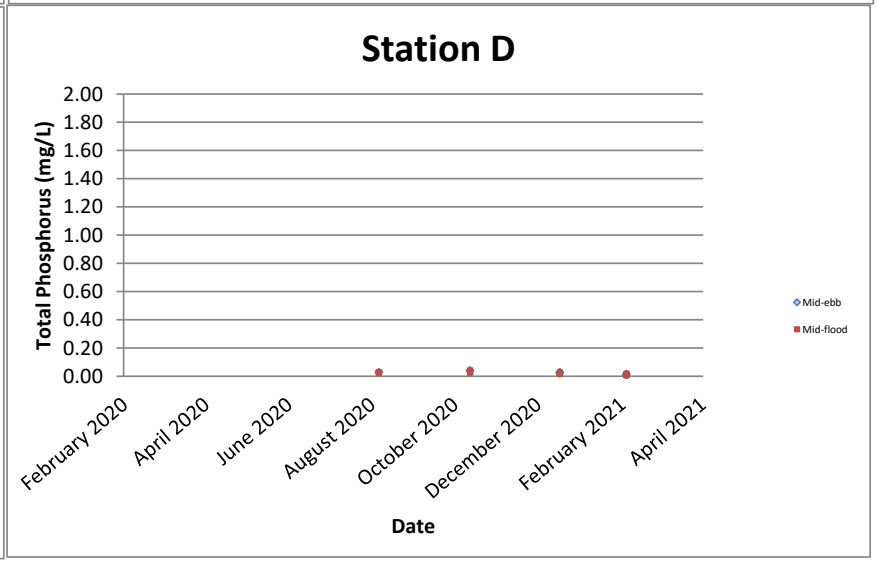
Remark: All below the Limit of Report sample results (<1 CFU/100mL) for E.coli is regarded as 1 CFU/100mL in graphical presentation.

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



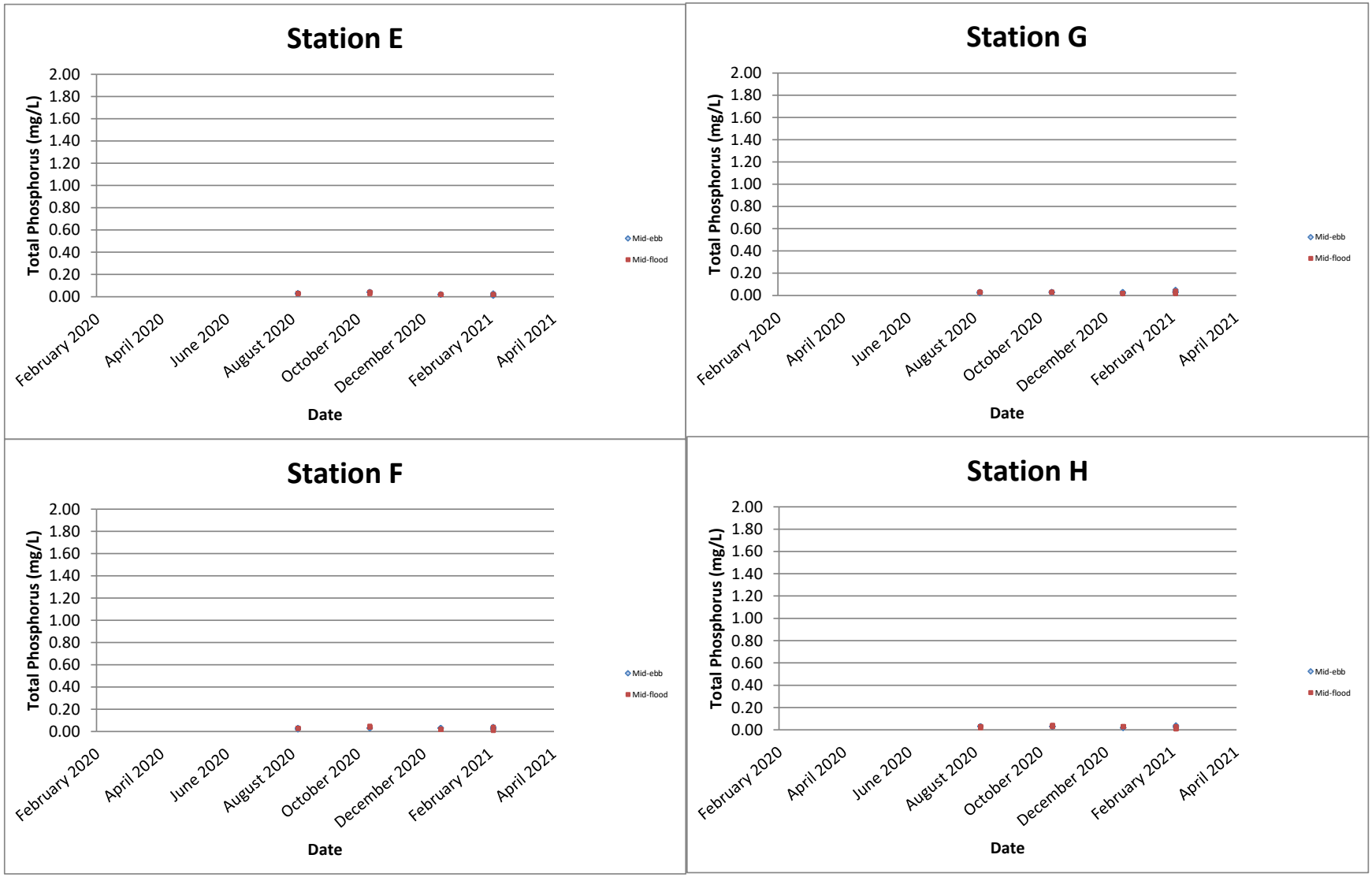






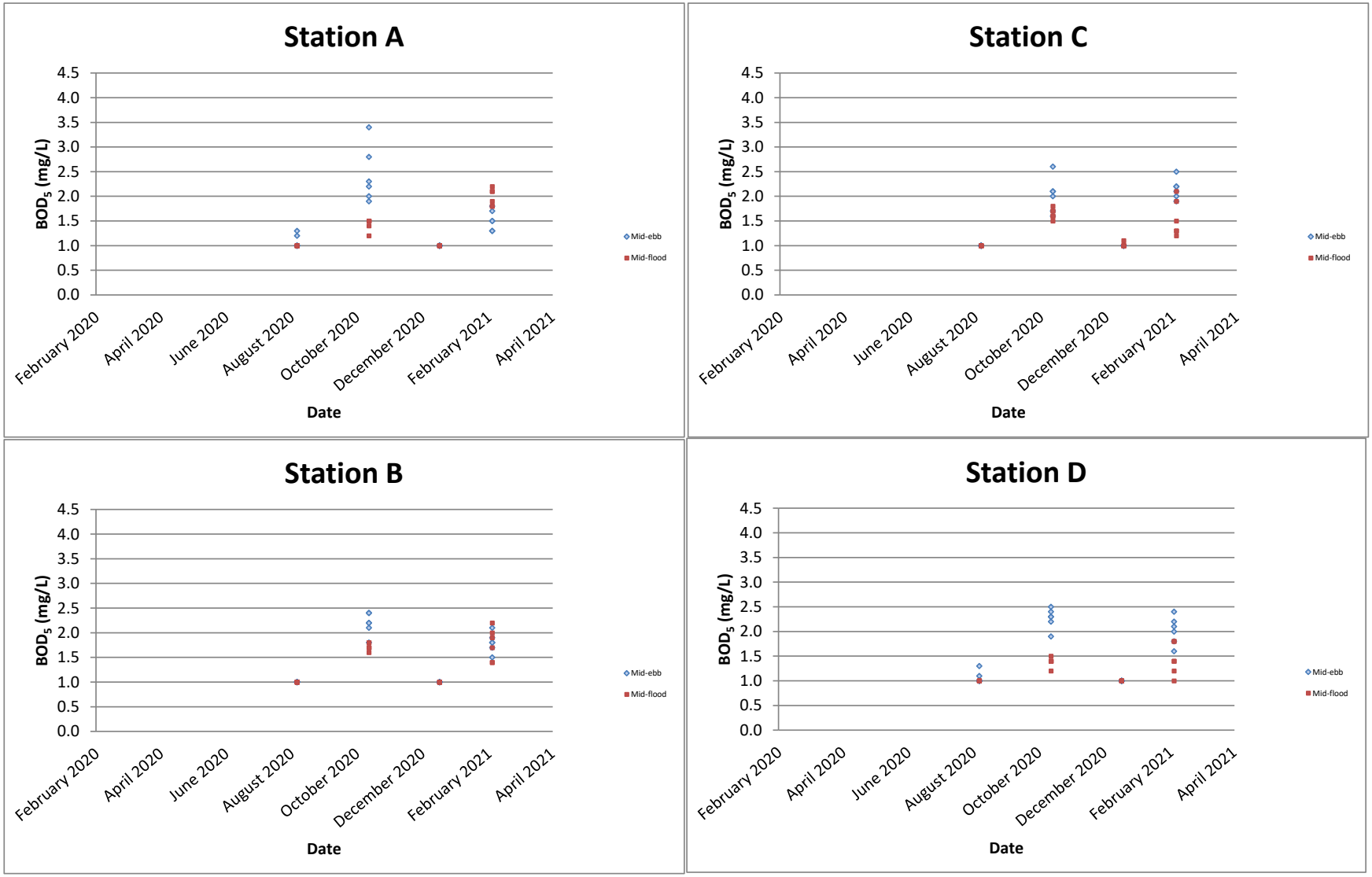
Remark: All below the Limit of Report sample results (<0.01 mg/L) for Total Phosphorus is regarded as 0.01 mg/L in graphical presentation.

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

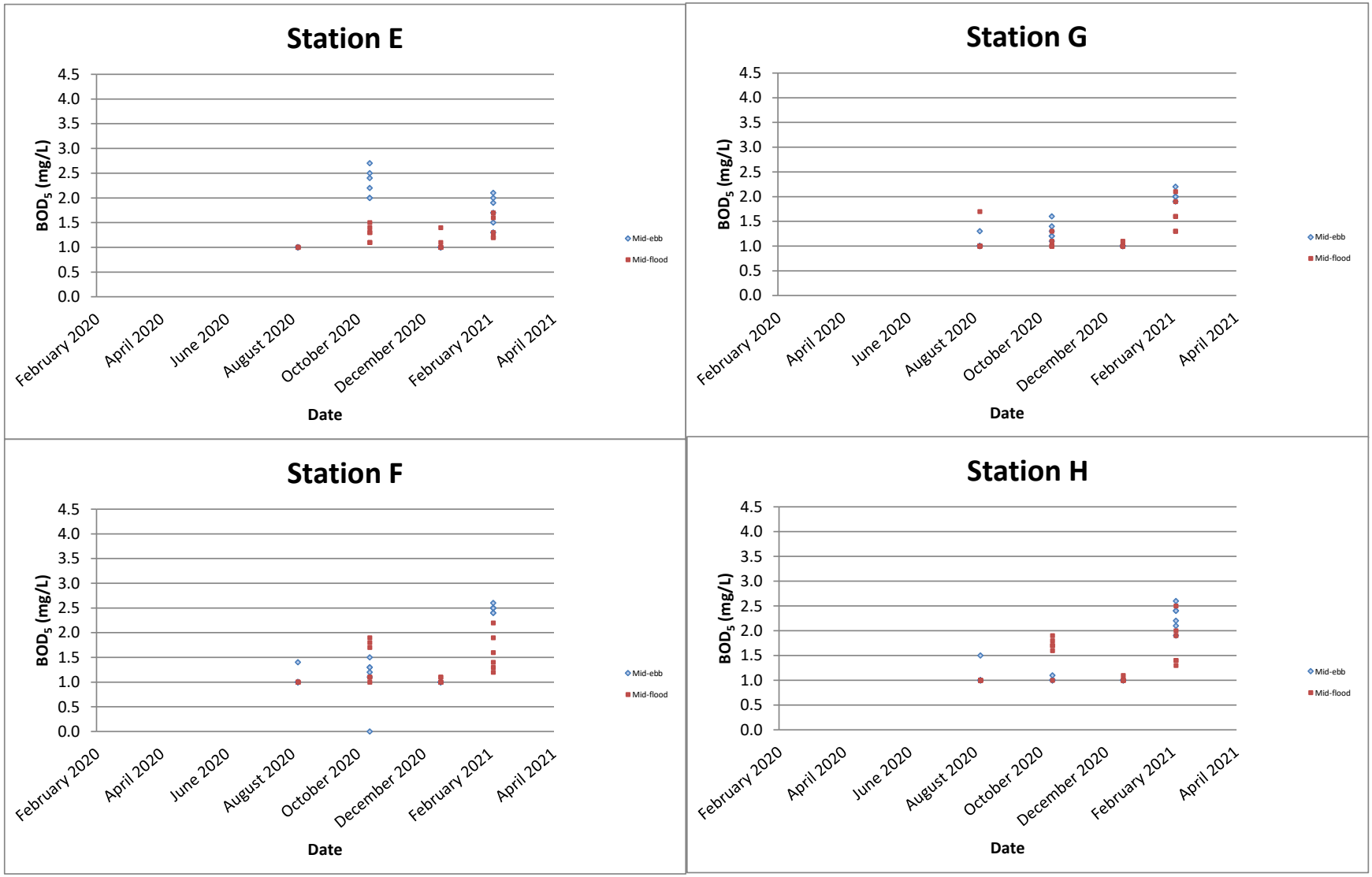


Remark: All below the Limit of Report sample results (<0.01 mg/L) for Total Phosphorus is regarded as 0.01 mg/L in graphical presentation.

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 G

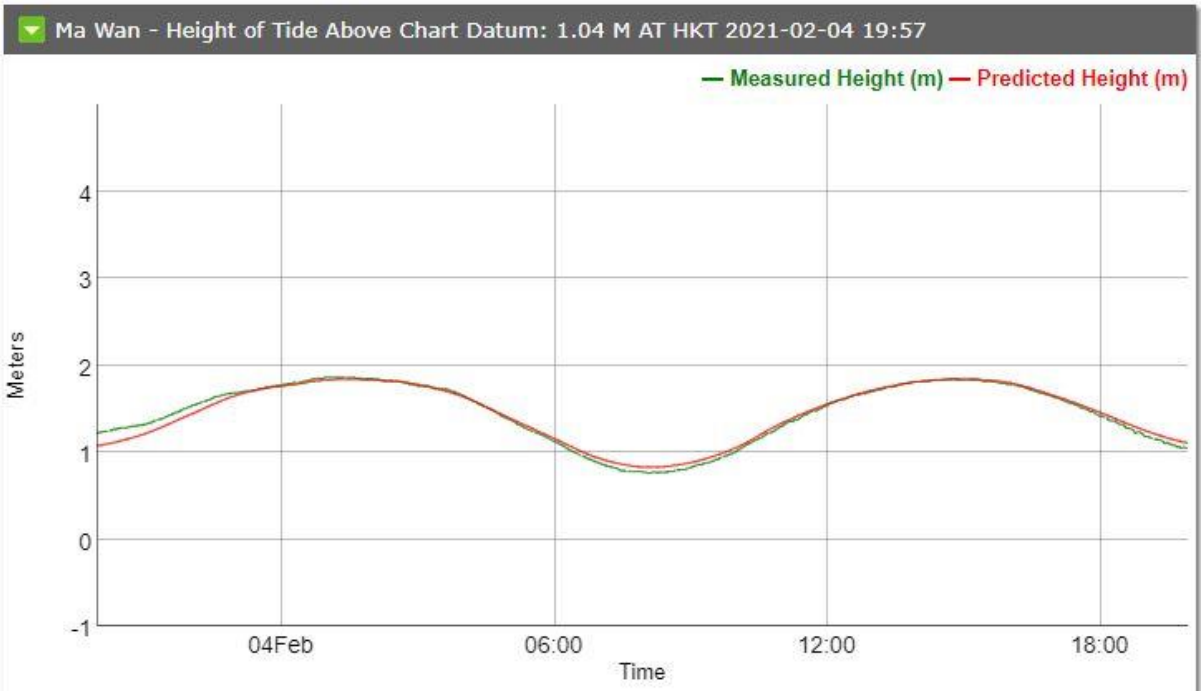
Tidal Data obtained from Ma Wan Marine Traffic Station

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/0620



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

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

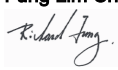
Monitoring Location	Date	Weather	Sea Condition	Time	Sediment Monitoring												
					pH	Ammonia as N (mg-N/kg)	Total Nitrogen (mg-N/kg)	Total Phosphorus (mg-P/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Arsenic (mg/kg)	Silver (mg/kg)
A	4/2/2021	Fine	Moderate	14:40	8.4	1.2	760	406	<0.10	31.9	25.8	39.6	0.12	18.6	77.3	14.9	0.18
B	4/2/2021	Fine	Moderate	14:30	8.4	6.0	850	484	<0.10	32.4	30.8	38.6	0.11	18.8	86.1	11.8	0.32
C	4/2/2021	Fine	Moderate	14:12	8.2	10.7	1070	545	<0.10	42.3	34.7	42.2	0.11	24.5	104	11.7	0.27
D	4/2/2021	Fine	Moderate	14:00	8.4	6.4	1020	466	0.10	32.5	29.4	36.5	0.11	19.6	84.0	9.6	0.23
E	4/2/2021	Fine	Moderate	13:41	8.2	10.7	1450	601	<0.10	39.9	37.9	45.2	0.12	23.9	104	11.2	0.32
F	4/2/2021	Fine	Moderate	13:30	8.1	27.6	1360	622	<0.10	35.8	36.0	42.3	0.11	21.7	95.8	11.4	0.33
G	4/2/2021	Fine	Moderate	13:07	8.4	4.1	1000	474	0.13	38.8	94.0	83.4	0.11	21.2	228	11.1	0.33
H	4/2/2021	Fine	Moderate	12:50	8.3	3.5	1120	517	<0.10	41.4	101	49.4	0.12	23.4	117	12.0	0.66

Monitoring Location	Date	Weather	Sea Condition	Time	Benthic Survey				
					Total Organic Carbon (%)	Particle Size Distrbution			
						Gravel (%)	Sand (%)	Silt (%)	Clay (%)
A	4/2/2021	Fine	Moderate	14:40	0.77	15	41	22	22
B	4/2/2021	Fine	Moderate	14:30	0.85	1	26	42	31
C	4/2/2021	Fine	Moderate	14:12	0.93	0	6	52	42
D	4/2/2021	Fine	Moderate	14:00	0.81	1	19	47	33
E	4/2/2021	Fine	Moderate	13:41	1.05	0	9	53	38
F	4/2/2021	Fine	Moderate	13:30	1.10	0	3	54	43
G	4/2/2021	Fine	Moderate	13:07	0.84	3	21	43	33
H	4/2/2021	Fine	Moderate	12:50	0.88	1	10	49	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	: HK2104354
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	: 04-Feb-2021
Order number	: 0041/17	Quote number	: HKE/1654/2017_R1	Issue Date	: 22-Feb-2021
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. 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 04-Feb-2021 to 22-Feb-2021.

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: HK2104354

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.

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

Result(s) of soil/sediment sample(s) was / were reported on dry weight basis.

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

Due to matrix interference, sample(s) required dilution prior to metals analysis, LOR has been adjusted accordingly.

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 on a 1:5 soil / 1M KCl solution extract.

EK059A - Nitrate and Nitrite were determined 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	Sample ID	A/Sediment	B/Sediment	C/Sediment	D/Sediment	E/Sediment
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
					HK2104354-001	HK2104354-002	HK2104354-003	HK2104354-004	HK2104354-005
EA/ED: Physical and Aggregate Properties									
EA002SOIL: pH Value	----	0.1	pH Unit		8.4	8.4	8.2	8.4	8.2
EA055: Moisture Content (dried @ 103°C)	----	0.1	%		44.9	51.8	60.9	52.8	60.7
ED/EK: Inorganic Nonmetallic Parameters									
EK055S: Ammonia as N	7664-41-7	0.5	mg/kg		1.2	6.0	10.7	6.4	10.7
EK062A: Total Nitrogen as N	----	10	mg/kg		760	850	1070	1020	1450
EK067A: Total Phosphorus as P	----	10	mg/kg		406	484	545	466	601
EG: Metals and Major Cations									
EG020: Arsenic	7440-38-2	0.5	mg/kg		14.9	11.8	11.7	9.6	11.2
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		31.9	32.4	42.3	32.5	39.9
EG020: Copper	7440-50-8	0.20	mg/kg		25.8	30.8	34.7	29.4	37.9
EG020: Lead	7439-92-1	0.20	mg/kg		39.6	38.6	42.2	36.5	45.2
EG020: Mercury	7439-97-6	0.05	mg/kg		0.12	0.11	0.11	0.11	0.12
EG020: Nickel	7440-02-0	0.20	mg/kg		18.6	18.8	24.5	19.6	23.9
EG020: Silver	7440-22-4	0.10	mg/kg		0.18	0.32	0.27	0.23	0.32
EG020: Zinc	7440-66-6	0.5	mg/kg		77.3	86.1	104	84.0	104

Sub-Matrix: SEDIMENT			Sample ID	F/Sediment	G/Sediment	H/Sediment	A/Benthic Survey	B/Benthic Survey
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit	HK2104354-006	HK2104354-007	HK2104354-008	HK2104354-009	HK2104354-010
EA/ED: Physical and Aggregate Properties								
EA002SOIL: pH Value	----	0.1	pH Unit	8.1	8.4	8.3	----	----
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	61.2	57.2	58.0	47.9	53.1
ED/EK: Inorganic Nonmetallic Parameters								
EK055S: Ammonia as N	7664-41-7	0.5	mg/kg	27.6	4.1	3.5	----	----
EK062A: Total Nitrogen as N	----	10	mg/kg	1360	1000	1120	----	----
EK067A: Total Phosphorus as P	----	10	mg/kg	622	474	517	----	----
EG: Metals and Major Cations								
EG020: Arsenic	7440-38-2	0.5	mg/kg	11.4	11.1	12.0	----	----
EG020: Cadmium	7440-43-9	0.10	mg/kg	<0.10	0.13	<0.10	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	35.8	38.8	41.4	----	----
EG020: Copper	7440-50-8	0.20	mg/kg	36.0	94.0	101	----	----
EG020: Lead	7439-92-1	0.20	mg/kg	42.3	83.4	49.4	----	----
EG020: Mercury	7439-97-6	0.05	mg/kg	0.11	0.11	0.12	----	----
EG020: Nickel	7440-02-0	0.20	mg/kg	21.7	21.2	23.4	----	----
EG020: Silver	7440-22-4	0.10	mg/kg	0.33	0.33	0.66	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	95.8	228	117	----	----
EP: Aggregate Organics								
EP005: Total Organic Carbon	----	0.05	%	----	----	----	0.77	0.85

Sub-Matrix: SEDIMENT			Sample ID	C/Benthic Survey	D/Benthic Survey	E/Benthic Survey	F/Benthic Survey	G/Benthic Survey
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit	HK2104354-011	HK2104354-012	HK2104354-013	HK2104354-014	HK2104354-015
EA/ED: Physical and Aggregate Properties								
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	56.5	53.9	61.9	63.8	55.3
EP: Aggregate Organics								
EP005: Total Organic Carbon	----	0.05	%	0.93	0.81	1.05	1.10	0.84

Sub-Matrix: SEDIMENT				Sample ID	H/Benthic Survey	----	----	----	----
				Sampling date / time	04-Feb-2021	----	----	----	----
Compound	CAS Number	LOR	Unit	HK2104354-016	-------	-------	-------	-------	
EA/ED: Physical and Aggregate Properties									
EA055: Moisture Content (dried @ 103°C)	----	0.1	%	56.4	----	----	----	----	
EP: Aggregate Organics									
EP005: Total Organic Carbon	----	0.05	%	0.88	----	----	----	----	

Sub-Matrix: WATER				Sample ID	A/Rinsate Blank	B/Rinsate Blank	C/Rinsate Blank	D/Rinsate Blank	E/Rinsate Blank
				Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021	04-Feb-2021
Compound	CAS Number	LOR	Unit		HK2104354-017	HK2104354-018	HK2104354-019	HK2104354-020	HK2104354-021
EG: Metals and Major Cations - Total									
EG020: Arsenic	7440-38-2	10	µg/L		<100	<100	<100	<100	<100
EG020: Cadmium	7440-43-9	0.2	µg/L		<2.0	<2.0	<2.0	<2.0	<2.0
EG020: Chromium	7440-47-3	1	µg/L		<10	<10	<10	<10	<10
EG020: Copper	7440-50-8	1	µg/L		<10	<10	<10	<10	<10
EG020: Lead	7439-92-1	1	µg/L		<10	<10	<10	<10	<10
EG020: Mercury	7439-97-6	0.5	µg/L		<5.0	<5.0	<5.0	<5.0	<5.0
EG020: Nickel	7440-02-0	1	µg/L		<10	<10	<10	<10	<10
EG020: Silver	7440-22-4	1	µg/L		<10	<10	<10	<10	<10
EG020: Zinc	7440-66-6	10	µg/L		<100	<100	<100	<100	<100

Sub-Matrix: WATER			Sample ID	F/Rinsate Blank	G/Rinsate Blank	H/Rinsate Blank	----	----
			Sampling date / time	04-Feb-2021	04-Feb-2021	04-Feb-2021	----	----
Compound	CAS Number	LOR	Unit	HK2104354-022	HK2104354-023	HK2104354-024	-------	-------
EG: Metals and Major Cations - Total								
EG020: Arsenic	7440-38-2	10	µg/L	<100	<100	<100	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<2.0	<2.0	<2.0	----	----
EG020: Chromium	7440-47-3	1	µg/L	<10	<10	<10	----	----
EG020: Copper	7440-50-8	1	µg/L	<10	<10	<10	----	----
EG020: Lead	7439-92-1	1	µg/L	<10	<10	<10	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<5.0	<5.0	<5.0	----	----
EG020: Nickel	7440-02-0	1	µg/L	<10	<10	<10	----	----
EG020: Silver	7440-22-4	1	µg/L	<10	<10	<10	----	----
EG020: Zinc	7440-66-6	10	µg/L	<100	<100	<100	----	----

Laboratory Duplicate (DUP) Report

Matrix: **SOIL**

Laboratory sample ID	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: 3496687)								
HK2104354-009	A/Benthic Survey	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	47.9	48.6	1.56
HK2104354-011	C/Benthic Survey	**EA055: Moisture Content (dried @ 103°C)**	----	0.1	%	56.5	56.4	0.00
EA/ED: Physical and Aggregate Properties (QC Lot: 3496713)								
HK2104354-001	A/Sediment	**EA002SOIL: pH Value**	----	0.1	pH Unit	8.4	8.5	0.00
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3513482)								
HK2104354-001	A/Sediment	**EK067A: Total Phosphorus as P**	----	10	mg/kg	406	484	17.5
EG: Metals and Major Cations (QC Lot: 3496805)								
HK2104354-002	B/Sediment	**EG020: Cadmium**	7440-43-9	0.01	mg/kg	<0.10	<0.10	0.00
		EG020: Mercury	7439-97-6	0.02	mg/kg	0.11	0.12	12.7
		EG020: Copper	7440-50-8	0.05	mg/kg	30.8	31.2	1.21
		EG020: Lead	7439-92-1	0.05	mg/kg	38.6	38.7	0.352
		EG020: Nickel	7440-02-0	0.05	mg/kg	18.8	18.9	0.749
		EG020: Silver	7440-22-4	0.05	mg/kg	0.32	0.34	6.58
		EG020: Arsenic	7440-38-2	0.5	mg/kg	11.8	11.7	0.00
		EG020: Chromium	7440-47-3	0.5	mg/kg	32.4	32.6	0.828
		EG020: Zinc	7440-66-6	0.5	mg/kg	86.1	87.6	1.79
EP: Aggregate Organics (QC Lot: 3514182)								
HK2104354-009	A/Benthic Survey	**EP005: Total Organic Carbon**	----	0.05	%	0.77	0.77	0.00

Matrix: **WATER**

Laboratory sample ID	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: 3496651)								
HK2104354-018	B/Rinsate Blank	**EG020: Cadmium**	7440-43-9	0.2	µg/L	<2.0	<2.0	0.00
		EG020: Mercury	7439-97-6	0.5	µg/L	<5.0	<5.0	0.00
		EG020: Arsenic	7440-38-2	1	µg/L	<100	<100	0.00
		EG020: Chromium	7440-47-3	1	µg/L	<10	<10	0.00
		EG020: Copper	7440-50-8	1	µg/L	<10	<10	0.00
		EG020: Lead	7439-92-1	1	µg/L	<10	<10	0.00
		EG020: Nickel	7440-02-0	1	µg/L	<10	<10	0.00
		EG020: Silver	7440-22-4	1	µg/L	<10	<10	0.00

Matrix: **WATER**

Laboratory sample ID	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: 3496651) - Continued								
HK2104354-018	B/Rinsate Blank	**EG020: Zinc**	7440-66-6	10	µg/L	<100	<100	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			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: 3496708)											
EK055S: Ammonia as N	7664-41-7	1	mg/kg	<1	10 mg/kg	100	----	85.8	109	----	----
ED/EK: Inorganic Nonmetallic Parameters (QC Lot: 3513482)											
EK067A: Total Phosphorus as P	----	10	mg/kg	<10	512 mg/kg	90.2	----	85.0	115	----	----
EG: Metals and Major Cations (QC Lot: 3496805)											
EG020: Arsenic	7440-38-2	0.5	mg/kg	<0.5	5 mg/kg	92.9	----	85.0	110	----	----
EG020: Cadmium	7440-43-9	0.01	mg/kg	<0.01	0.25 mg/kg	92.0	----	85.0	115	----	----
EG020: Chromium	7440-47-3	0.5	mg/kg	<0.5	5 mg/kg	92.7	----	85.0	115	----	----
EG020: Copper	7440-50-8	0.05	mg/kg	<0.05	5 mg/kg	94.9	----	85.0	114	----	----
EG020: Lead	7439-92-1	0.05	mg/kg	<0.05	5 mg/kg	95.8	----	87.0	115	----	----
EG020: Mercury	7439-97-6	0.02	mg/kg	<0.02	0.1 mg/kg	100	----	85.0	115	----	----
EG020: Nickel	7440-02-0	0.05	mg/kg	<0.05	5 mg/kg	92.7	----	85.0	115	----	----
EG020: Silver	7440-22-4	0.05	mg/kg	<0.05	5 mg/kg	96.5	----	85.0	115	----	----
EG020: Zinc	7440-66-6	0.5	mg/kg	<0.5	5 mg/kg	86.2	----	85.0	115	----	----
EP: Aggregate Organics (QC Lot: 3514182)											
EP005: Total Organic Carbon	----	0.05	%	<0.05	40 %	97.3	----	89.8	107	----	----

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: 3496651)											
EG020: Arsenic	7440-38-2	1	µg/L	<1	50 µg/L	99.9	----	85.0	110	----	----
EG020: Cadmium	7440-43-9	0.2	µg/L	<0.2	5 µg/L	101	----	85.0	109	----	----
EG020: Chromium	7440-47-3	1	µg/L	<1	50 µg/L	101	----	86.0	111	----	----

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: 3496651) - Continued											
EG020: Copper	7440-50-8	1	µg/L	<1	50 µg/L	103	----	90.0	111	----	----
EG020: Lead	7439-92-1	1	µg/L	<1	50 µg/L	101	----	89.0	111	----	----
EG020: Mercury	7439-97-6	0.5	µg/L	<0.5	2 µg/L	108	----	85.0	115	----	----
EG020: Nickel	7440-02-0	1	µg/L	<1	50 µg/L	101	----	87.0	110	----	----
EG020: Silver	7440-22-4	1	µg/L	<1	50 µg/L	90.2	----	85.0	114	----	----
EG020: Zinc	7440-66-6	10	µg/L	<10	50 µg/L	98.7	----	86.0	114	----	----

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

Matrix: **SOIL**

Laboratory sample ID	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: 3513482)										
HK2104354-001	A/Sediment	**EK067A: Total Phosphorus as P**	----	123 mg/kg	98.4	----	75.0	125	----	----
EG: Metals and Major Cations (QC Lot: 3496805)										
HK2104354-001	A/Sediment	**EG020: Arsenic**	7440-38-2	5 mg/kg	81.6	----	75.0	125	----	----
		EG020: Cadmium	7440-43-9	0.25 mg/kg	89.6	----	75.0	125	----	----
		EG020: Chromium	7440-47-3	5 mg/kg	82.8	----	75.0	125	----	----
		EG020: Copper	7440-50-8	5 mg/kg	84.9	----	75.0	125	----	----
		EG020: Lead	7439-92-1	5 mg/kg	# Not Determined	----	75.0	125	----	----
		EG020: Mercury	7439-97-6	0.1 mg/kg	90.9	----	75.0	125	----	----
		EG020: Nickel	7440-02-0	5 mg/kg	84.7	----	75.0	125	----	----
		EG020: Silver	7440-22-4	5 mg/kg	93.7	----	75.0	125	----	----
		EG020: Zinc	7440-66-6	5 mg/kg	# Not Determined	----	75.0	125	----	----
EP: Aggregate Organics (QC Lot: 3514182)										
HK2104354-009	A/Benthic Survey	**EP005: Total Organic Carbon**	----	0.77489 %	93.0	----	75.0	125	----	----

Matrix: **WATER**

Laboratory sample ID	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: 3496651)										
HK2104354-017	A/Rinsate Blank	**EG020: Arsenic**	7440-38-2	50 µg/L	110	----	75.0	125	----	----
		EG020: Cadmium	7440-43-9	5 µg/L	78.5	----	75.0	125	----	----
		EG020: Chromium	7440-47-3	50 µg/L	95.4	----	75.0	125	----	----
		EG020: Copper	7440-50-8	50 µg/L	100	----	75.0	125	----	----
		EG020: Lead	7439-92-1	50 µg/L	86.8	----	75.0	125	----	----
		EG020: Mercury	7439-97-6	2 µg/L	81.0	----	75.0	125	----	----
		EG020: Nickel	7440-02-0	50 µg/L	99.2	----	75.0	125	----	----
		EG020: Silver	7440-22-4	50 µg/L	97.3	----	75.0	125	----	----

Matrix: **WATER**

Laboratory sample ID	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: 3496651) - Continued										
HK2104354-017	A/Rinsate Blank	**EG020: Zinc**	7440-66-6	50 µg/L	95.4	----	75.0	125	----	----

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: MR CYRUS LAI	WORK ORDER	: **HK2104354**
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 : 4-FEB-2021 : 17-FEB-2021
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) was/ were submitted by client. Sample(s) arrived laboratory in chilled condition. The result(s) related only to the item(s) tested.**
- **Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.**
- **Result(s) of soil/sediment sample(s) was / were reported on dry weight basis.**
- **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 on a 1:5 soil / 1M KCl solution extract.**
- **EK059A - Nitrate and Nitrite were determined 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	Managing Director

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

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 : HK2104354
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.
HK2104354-001	A/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-002	B/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-003	C/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-004	D/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-005	E/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-006	F/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-007	G/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-008	H/Sediment	SEDIMENT	04-Feb-2021	
HK2104354-009	A/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-010	B/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-011	C/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-012	D/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-013	E/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-014	F/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-015	G/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-016	H/Benthic Survey	SEDIMENT	04-Feb-2021	J2999-365.2
HK2104354-017	A/Rinsate Blank	WATER	04-Feb-2021	
HK2104354-018	B/Rinsate Blank	WATER	04-Feb-2021	
HK2104354-019	C/Rinsate Blank	WATER	04-Feb-2021	
HK2104354-020	D/Rinsate Blank	WATER	04-Feb-2021	
HK2104354-021	E/Rinsate Blank	WATER	04-Feb-2021	
HK2104354-022	F/Rinsate Blank	WATER	04-Feb-2021	
HK2104354-023	G/Rinsate Blank	WATER	04-Feb-2021	
HK2104354-024	H/Rinsate Blank	WATER	04-Feb-2021	

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

Report No : J2999-365.2

Customer : ALS Technichem (HK) Pty Ltd Job No. : J2999 Works Order No. : 365

Project : - Contract No.: Date : 05/02/2021

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 (%)		
HK2104354-009	A/Benthic Survey	D									1,5,7	15	41	22	22	Dark grey, slightly gravelly, sandy SILT/CLAY with shell fragments	- ‡
HK2104354-010	B/Benthic Survey	D									1,5,7	1	26	42	31	Dark grey, slightly sandy SILT/CLAY with shell fragments	- ‡
HK2104354-011	C/Benthic Survey	D									1,5,7	0	6	52	42	Dark grey, slightly sandy SILT/CLAY with shell fragments	- ‡
HK2104354-012	D/Benthic Survey	D									1,5,7	1	19	47	33	Dark grey, slightly sandy SILT/CLAY with shell fragments	- ‡
HK2104354-013	E/Benthic Survey	D									1,5,7	0	9	53	38	Dark grey, slightly sandy SILT/CLAY with shell fragments	- ‡
HK2104354-014	F/Benthic Survey	D									1,5,7	0	3	54	43	Dark grey, SILT/CLAY with shell fragments	- ‡
HK2104354-015	G/Benthic Survey	D									1,5,7	3	21	43	33	Dark grey, slightly sandy SILT/CLAY with shell fragments	- ‡
HK2104354-016	H/Benthic Survey	D									1,5,7	1	10	49	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, Quality Manager Date : 17/02/2021

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

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

Report No. : J2999-365.2

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

Date Received : 05/02/2021
Tested Date : 05/02/2021

Works Order No. : 365
Sample ID No. : HK2104354-009
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

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

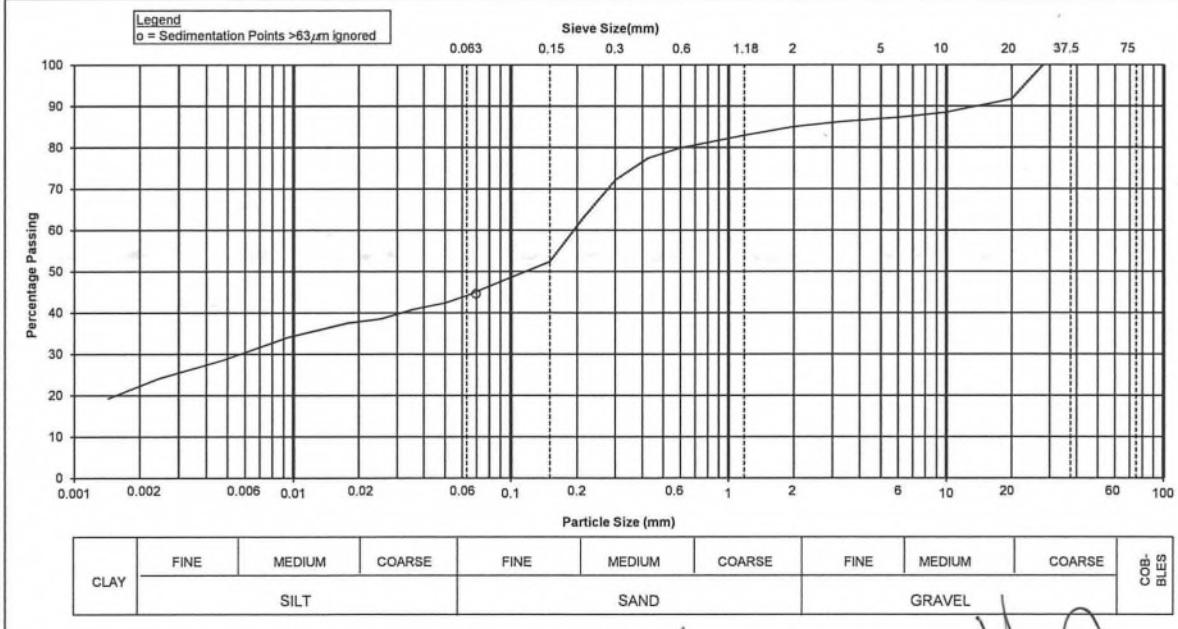
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	92	-	-
14.0 mm	90	-	-
10.0 mm	88	-	-
6.30 mm	87	-	-
5.00 mm	87	-	-
3.35 mm	86	-	-
2.00 mm	85	-	-
1.18 mm	83	-	-
600 µm	80	-	-
425 µm	77	-	-
300 µm	72	-	-
212 µm	63	-	-
150 µm	52	-	-
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)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0697	-	45	-
0.0498	-	42	-
0.0354	-	41	-
0.0253	-	38	-
0.0179	-	38	-
0.0094	-	34	-
0.0048	-	29	-
0.0024	-	24	-
0.0014	-	19	-

SUMMARY :

Gravel (%)	:	**15**
Sand (%)	:	**41**
Silt (%)	:	**22**
Clay (%)	:	**22**



Technician : C M Yip
Date : 05/02/2021

Checked By :
Name : T K Lam
Date : 17/02/2021

Approved By :
Signatory : Chung Hei Wing
Date : 17/02/2021

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

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

Report No. : J2999-365.2

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

Works Order No. : 365
Sample ID No. : HK2104354-010
Sample No. : B/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 05/02/2021
Tested Date : 05/02/2021

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

ˆUpon request * Delete as appropriate ‡Information provided by customer

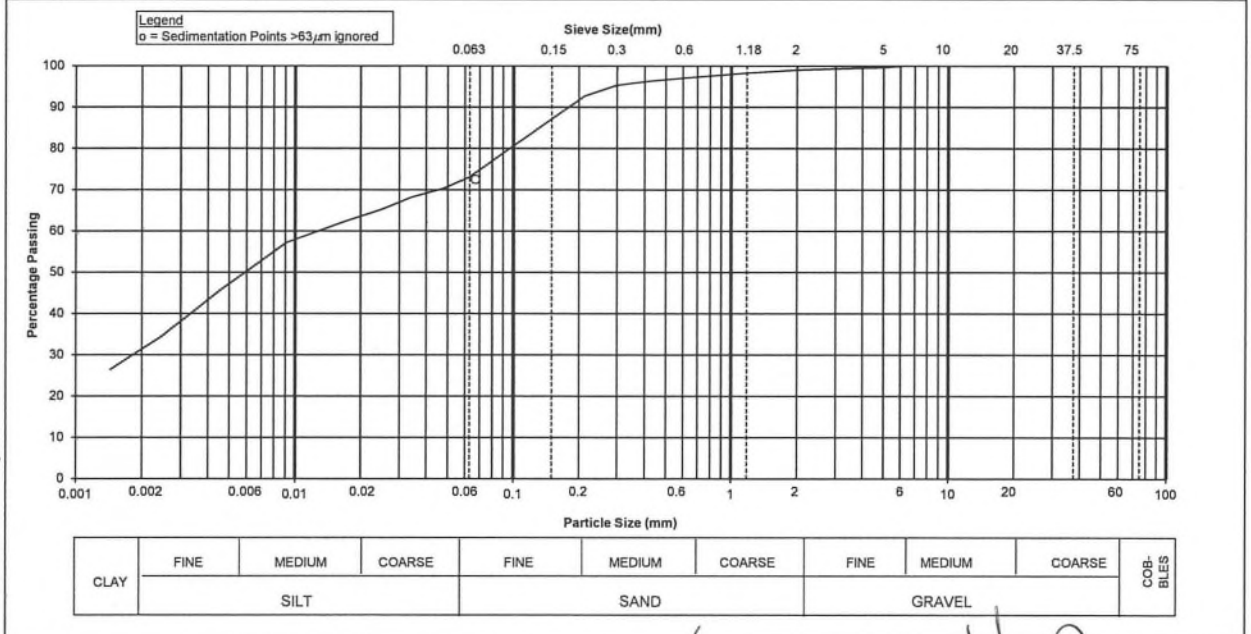
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	ˆExpanded Uncertainty of the Percent Passing (%)	ˆCumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	99	-	-
2.00 mm	99	-	-
1.18 mm	98	-	-
600 µm	97	-	-
425 µm	96	-	-
300 µm	95	-	-
212 µm	93	-	-
150 µm	87	-	-
63 µm	73	-	-
0 µm	0		

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

Particle Diameter (mm)	ˆExpanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	ˆExpanded Uncertainty of % finer than D (%)
0.0671	-	73	-
0.0478	-	70	-
0.0340	-	68	-
0.0243	-	65	-
0.0173	-	62	-
0.0091	-	57	-
0.0047	-	46	-
0.0024	-	34	-
0.0014	-	26	-

SUMMARY :

Gravel (%)	:	**1**
Sand (%)	:	**26**
Silt (%)	:	**42**
Clay (%)	:	**31**



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

Technician : C M Yip
Date : 05/02/2021

Checked By :
Name : T K Lam
Date : 17/02/2021

Approved By :
Signatory : Chung Hei Wing
Date : 17/02/2021

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. : J2999-365.2

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

Works Order No. : 365
Sample ID No. : HK2104354-011
Sample No. : C/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 05/02/2021
Tested Date : 05/02/2021

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

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

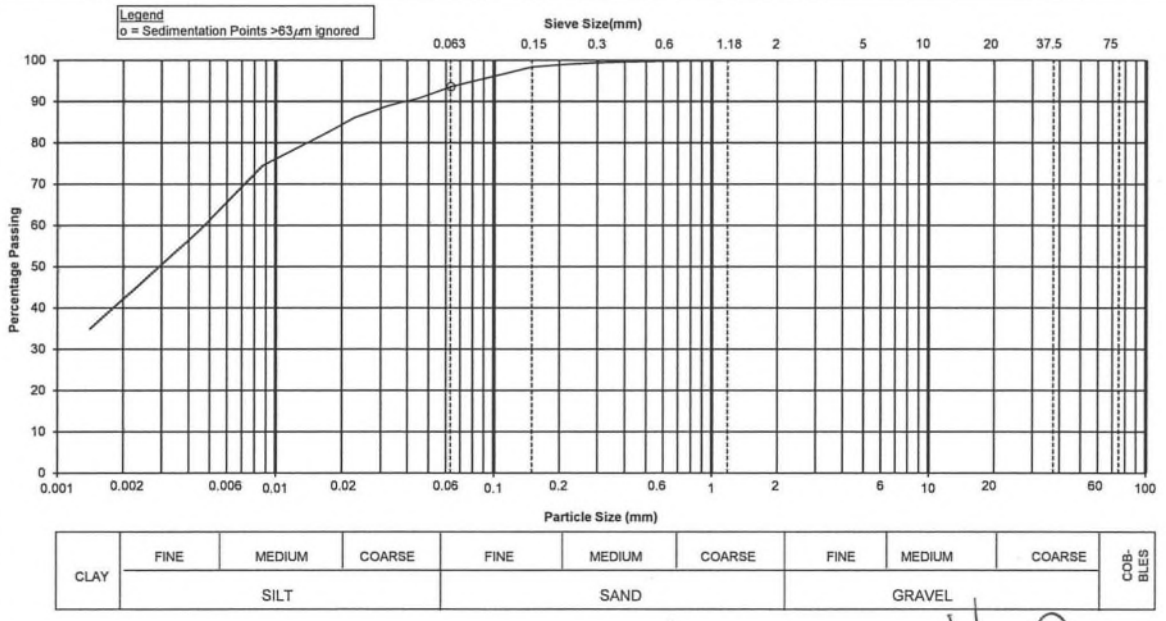
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	99	-	-
212 µm	99	-	-
150 µm	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 (%)
0.0634	-	94	-
0.0453	-	91	-
0.0322	-	89	-
0.0230	-	86	-
0.0165	-	82	-
0.0087	-	74	-
0.0046	-	59	-
0.0024	-	46	-
0.0014	-	35	-

SUMMARY :

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



Technician : C M Yip
Checked By : Name : T K Lam Date : 17/02/2021
Approved By : Signatory : Chung Hei Wing Date : 17/02/2021
Date : 05/02/2021

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

Report No. : J2999-365.2

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

Works Order No. : 365
Sample ID No. : HK2104354-012
Sample No. : D/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 05/02/2021
Tested Date : 05/02/2021

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

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

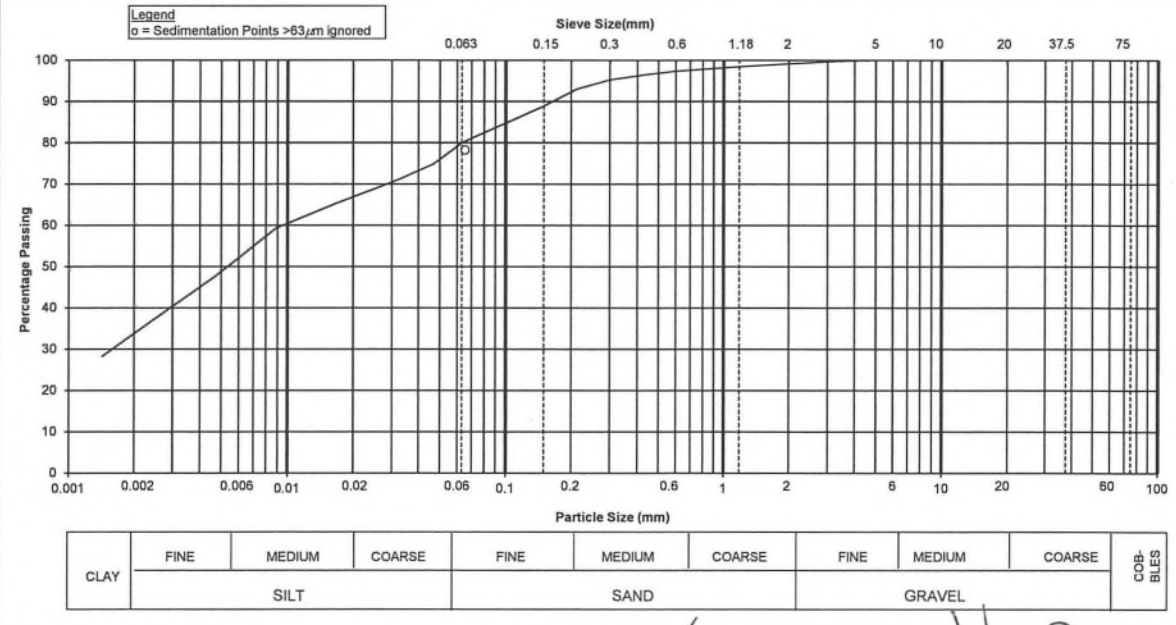
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	99	-	-
1.18 mm	98	-	-
600 µm	97	-	-
425 µm	96	-	-
300 µm	95	-	-
212 µm	93	-	-
150 µm	89	-	-
63 µm	80	-	-
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 (%)
0.0653	-	78	-
0.0468	-	75	-
0.0335	-	71	-
0.0239	-	68	-
0.0171	-	65	-
0.0090	-	59	-
0.0047	-	47	-
0.0024	-	37	-
0.0014	-	28	-

SUMMARY :

Gravel (%)	:	**1**
Sand (%)	:	**19**
Silt (%)	:	**47**
Clay (%)	:	**33**



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

Technician : C M Yip
Date : 05/02/2021

Checked By :
Name : T K Lam
Date : 17/02/2021

Approved By :
Signatory : Chung Pei Wing
Date : 17/02/2021

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. : J2999-365.2

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

Date Received : 05/02/2021
Tested Date : 05/02/2021

Works Order No. : 365
Sample ID No. : HK2104354-013
Sample No. : E/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

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

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

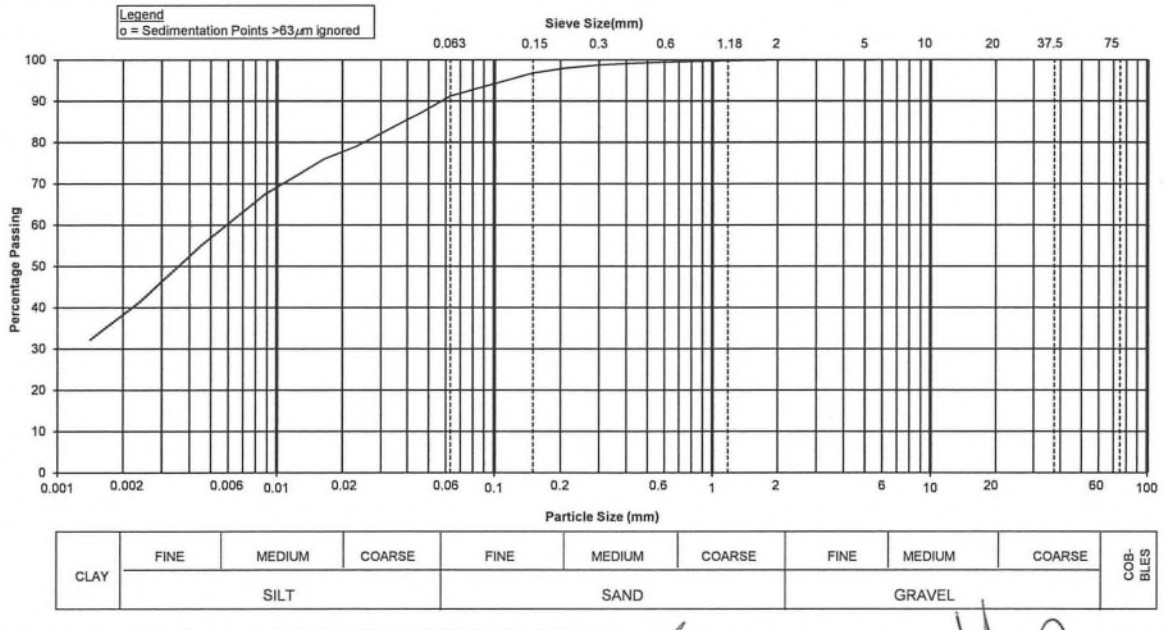
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	99	-	-
425 µm	99	-	-
300 µm	99	-	-
212 µm	98	-	-
150 µm	97	-	-
63 µm	91	-	-
0 µm	0		

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

Particle Diameter (mm)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0625	-	91	-
0.0449	-	87	-
0.0322	-	83	-
0.0231	-	79	-
0.0165	-	76	-
0.0088	-	67	-
0.0046	-	55	-
0.0024	-	41	-
0.0014	-	32	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**9**
Silt (%)	:	**53**
Clay (%)	:	**38**



Technician : C M Yip
Date : 05/02/2021

Checked By :
Name : T K Lam
Date : 17/02/2021

Approved By :
Signatory : Chung Hei Wing
Date : 17/02/2021

Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
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Form : GESR003.5 / Sept.14.18 / Issue 1 / Rev 3

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

Report No. : J2999-365.2

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

Works Order No. : 365
Sample ID No. : HK2104354-014
Sample No. : F/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 05/02/2021
Tested Date : 05/02/2021

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

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

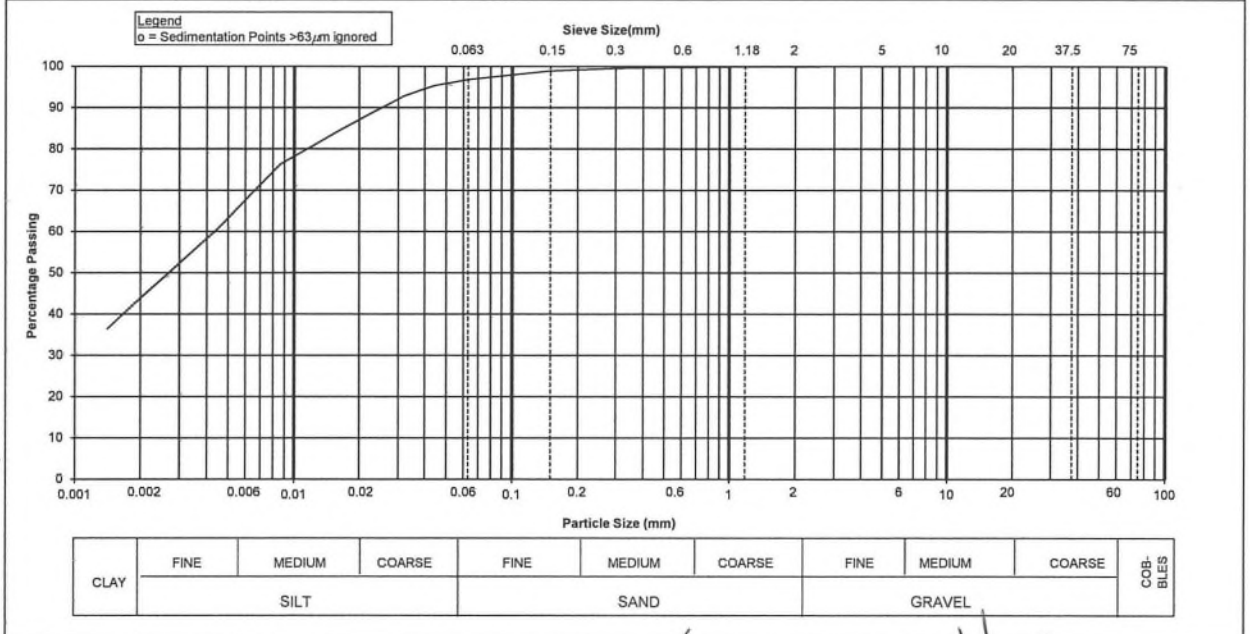
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	100	-	-
2.00 mm	100	-	-
1.18 mm	100	-	-
600 µm	100	-	-
425 µm	100	-	-
300 µm	100	-	-
212 µm	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)	^Expanded Uncertainty of the Particle Diameter (mm)	% Finer than D K (%)	^Expanded Uncertainty of % finer than D (%)
0.0621	-	97	-
0.0442	-	95	-
0.0316	-	93	-
0.0226	-	89	-
0.0162	-	84	-
0.0086	-	76	-
0.0045	-	61	-
0.0024	-	47	-
0.0014	-	36	-

SUMMARY :

Gravel (%)	:	**0**
Sand (%)	:	**3**
Silt (%)	:	**54**
Clay (%)	:	**43**



Technician : C M Yip
Date : 05/02/2021

Checked By :
Name : T K Lam
Date : 17/02/2021

Approved By :
Signatory : Chung Hei Wing
Date : 17/02/2021

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

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

Report No. : J2999-365.2

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

Works Order No. : 365
Sample ID No. : HK2104354-015
Sample No. : G/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

Date Received : 05/02/2021
Tested Date : 05/02/2021

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

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

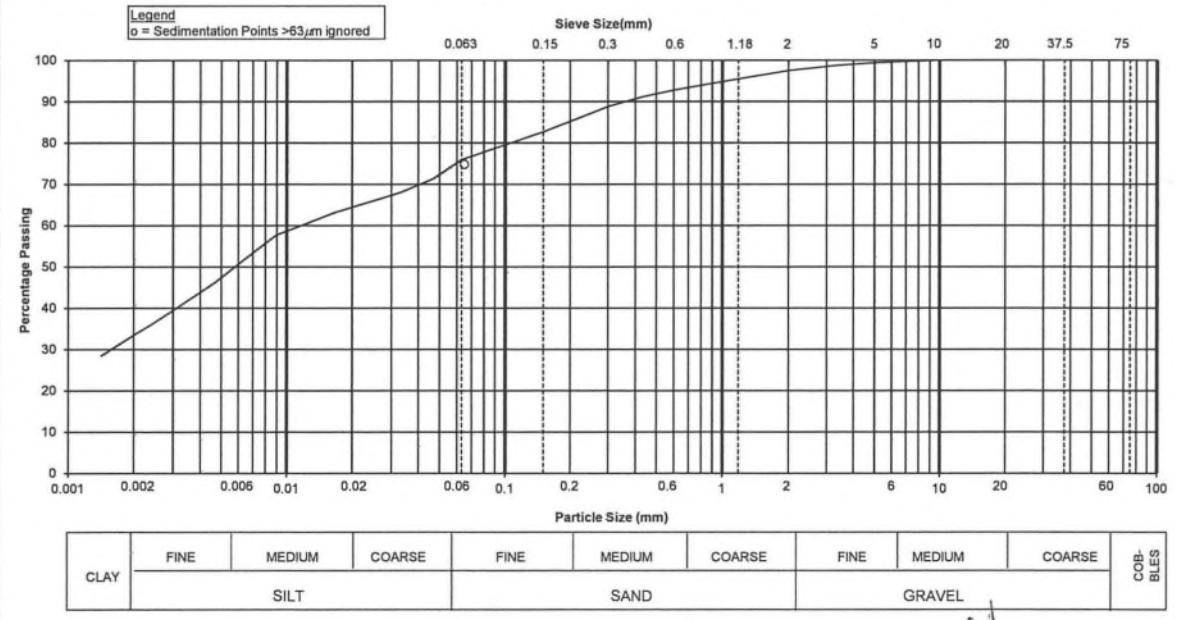
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	99	-	-
3.35 mm	99	-	-
2.00 mm	97	-	-
1.18 mm	95	-	-
600 µm	93	-	-
425 µm	91	-	-
300 µm	89	-	-
212 µm	86	-	-
150 µm	83	-	-
63 µm	76	-	-
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 (%)
0.0649	-	75	-
0.0465	-	71	-
0.0333	-	68	-
0.0238	-	66	-
0.0170	-	63	-
0.0089	-	58	-
0.0046	-	46	-
0.0024	-	36	-
0.0014	-	28	-

SUMMARY :

Gravel (%)	:	**3**
Sand (%)	:	**21**
Silt (%)	:	**43**
Clay (%)	:	**33**



Technician : C M Yip
Date : 05/02/2021

Checked By :
Name : T K Lam
Date : 17/02/2021

Approved By :
Signatory : Chung Hei Wing
Date : 17/02/2021

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

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

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

Report No. : J2999-365.2

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

Date Received : 05/02/2021
Tested Date : 05/02/2021

Works Order No. : 365
Sample ID No. : HK2104354-016
Sample No. : H/Benthic Survey
Sample Depth (m) :
Specimen Depth (m) :
Sample Type : Small Disturbed
Sample Origin : -‡

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

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

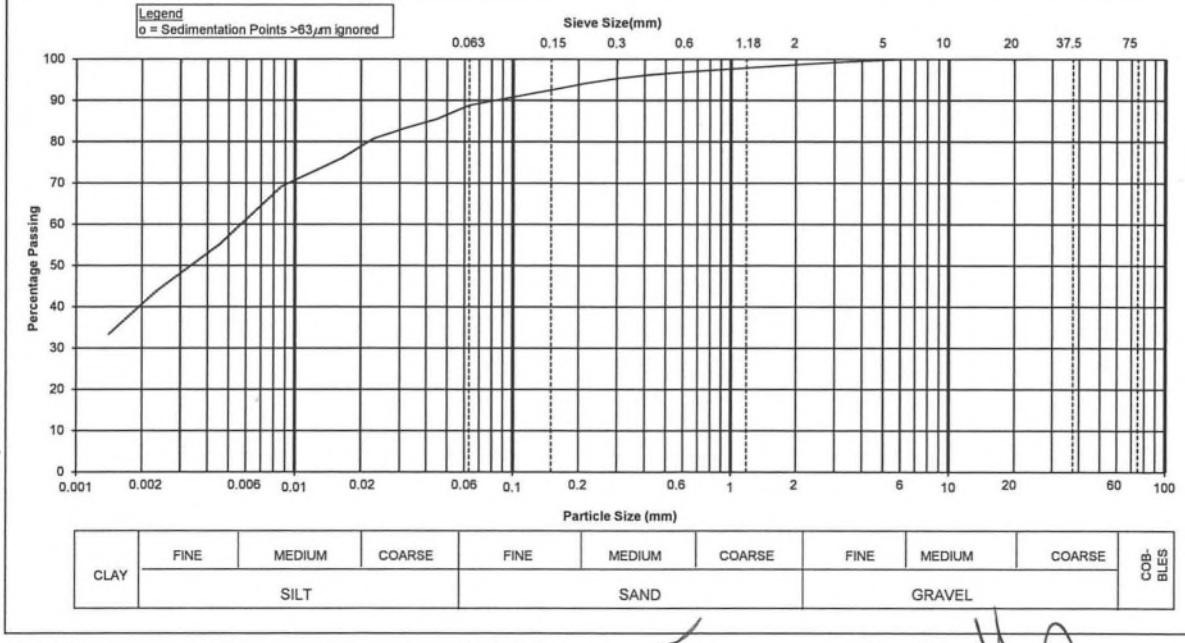
SIEVE ANALYSIS Sieve Size	Percent Passing (%)	^Expanded Uncertainty of the Percent Passing (%)	^Cumulative Percent Passing with Expanded Uncertainty (%)
100.0 mm	100	-	-
75.0 mm	100	-	-
63.0 mm	100	-	-
50.0 mm	100	-	-
37.5 mm	100	-	-
28.0 mm	100	-	-
20.0 mm	100	-	-
14.0 mm	100	-	-
10.0 mm	100	-	-
6.30 mm	100	-	-
5.00 mm	100	-	-
3.35 mm	99	-	-
2.00 mm	99	-	-
1.18 mm	98	-	-
600 µm	97	-	-
425 µm	96	-	-
300 µm	95	-	-
212 µm	94	-	-
150 µm	93	-	-
63 µm	89	-	-
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 (%)
0.0627	-	89	-
0.0449	-	85	-
0.0320	-	83	-
0.0229	-	81	-
0.0165	-	76	-
0.0087	-	69	-
0.0046	-	55	-
0.0024	-	44	-
0.0014	-	33	-

SUMMARY :

Gravel (%)	:	**1**
Sand (%)	:	**10**
Silt (%)	:	**49**
Clay (%)	:	**40**



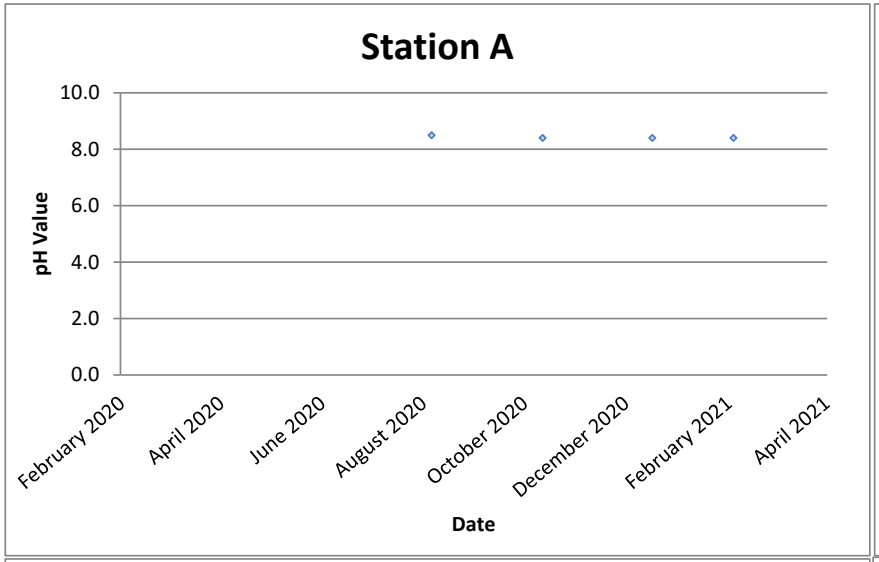
Form : GESR003.5 / Sept.14.18 / Issue 1 / Rev 3

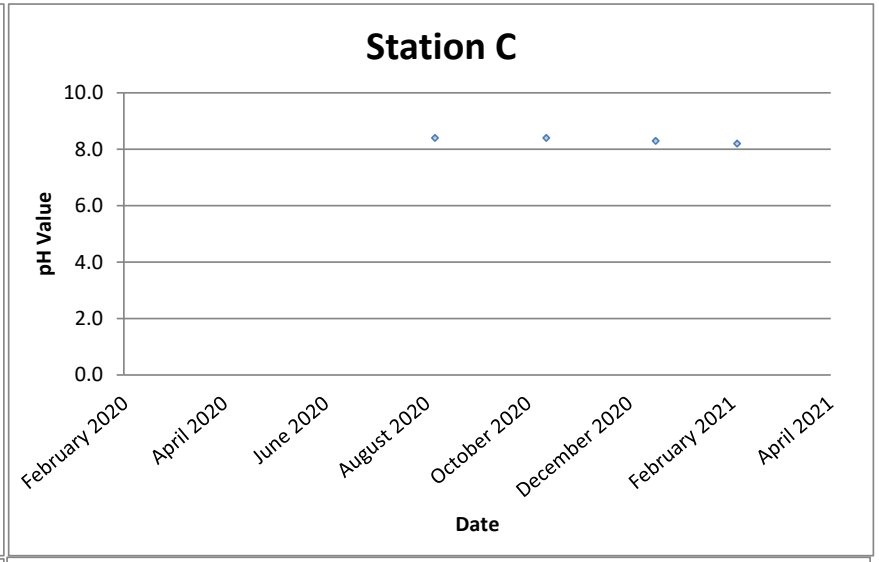
Technician : C M Yip
Date : 05/02/2021

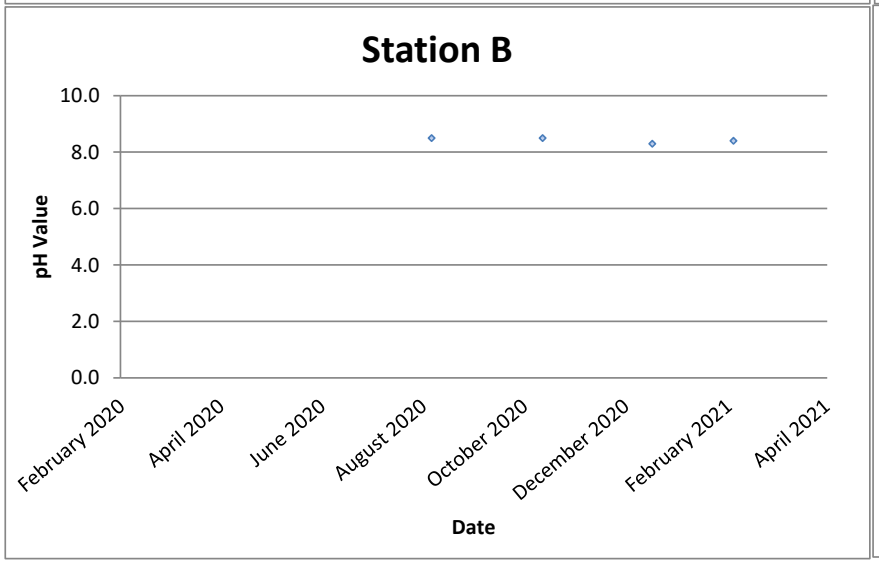
Checked By :
Name : T K Lam
Date : 17/02/2021

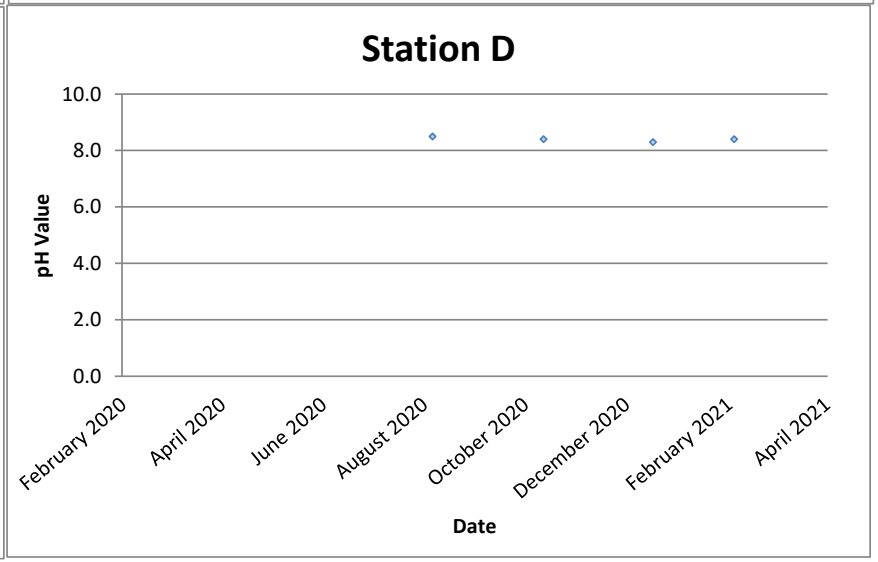
Approved By :
Signatory : Chung Hei Wing
Date : 17/02/2021

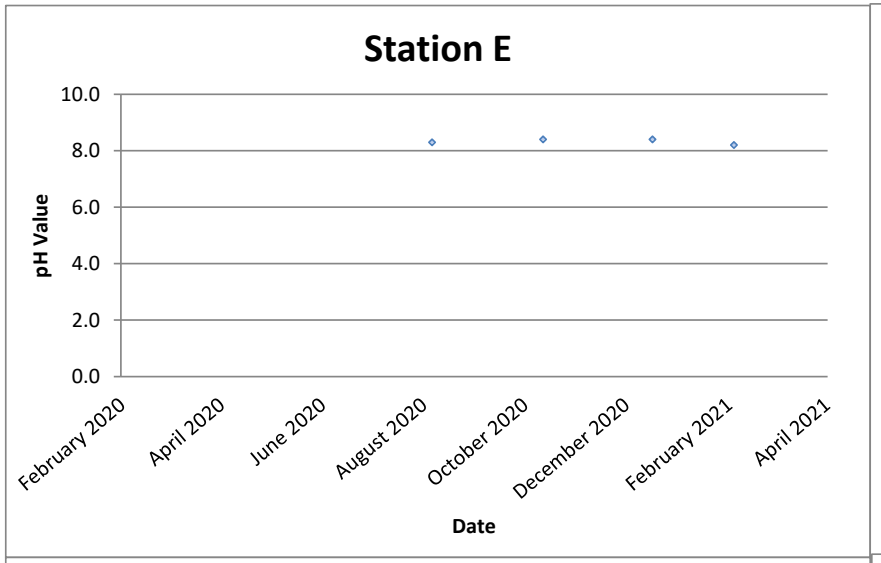
Technology Centre
21 Chun Wang Street, Tseung Kwan O Industrial Estate,
Tseung Kwan O, N.T. Tel :26991980, Fax : 26917547

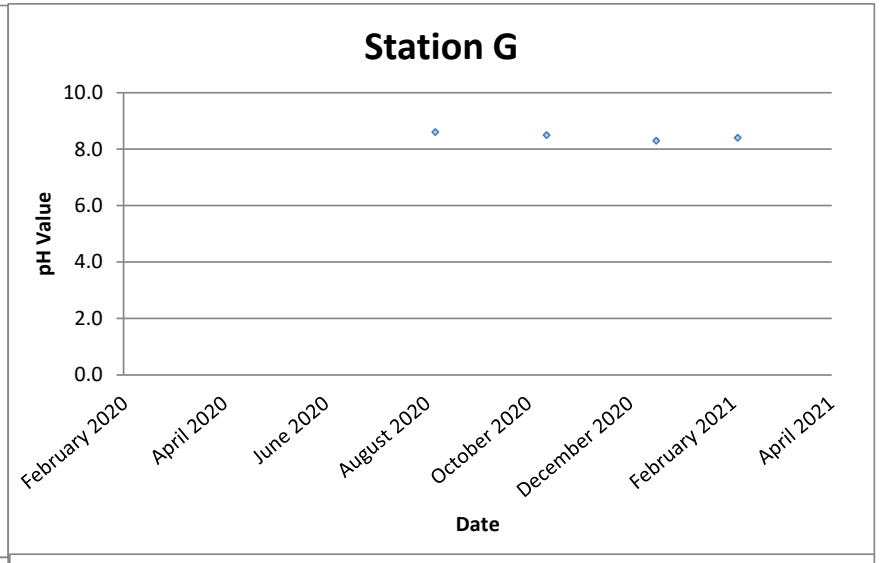

Station A
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

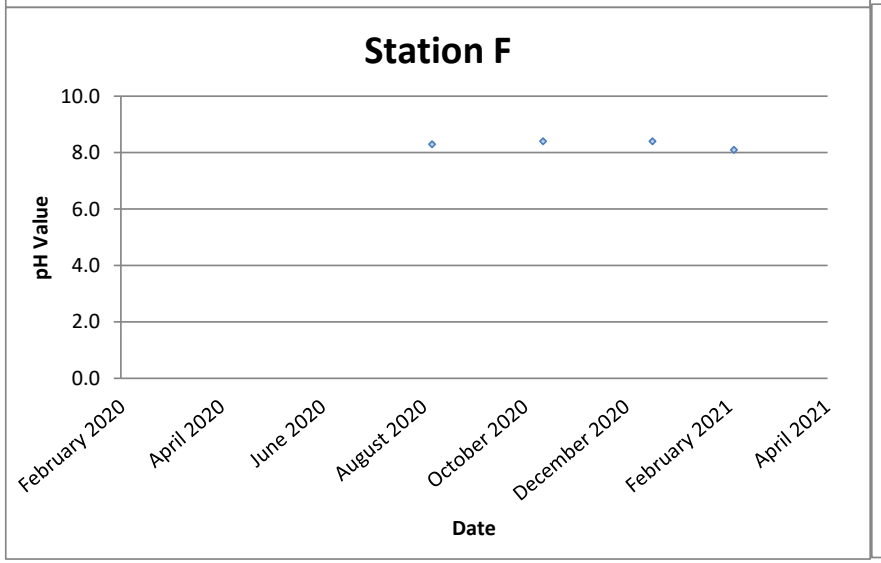

Station C
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

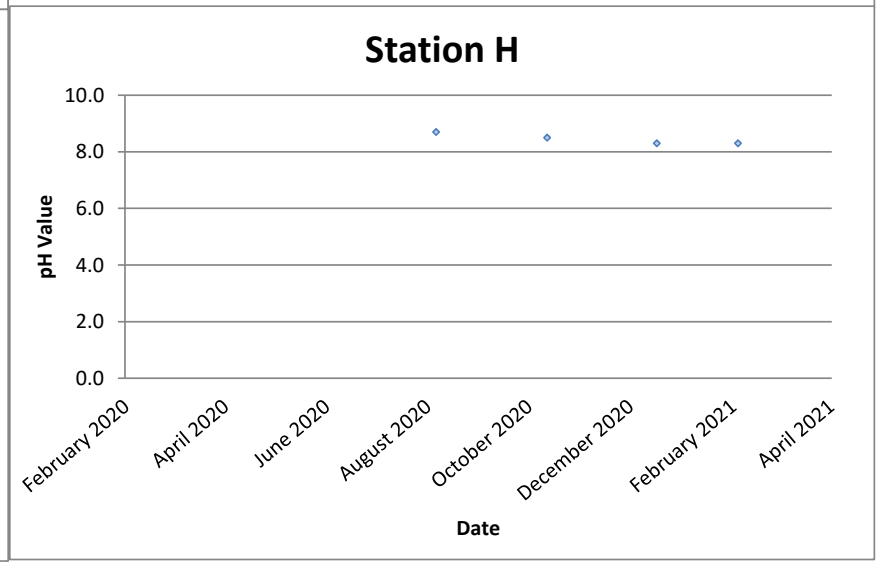

Station B
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

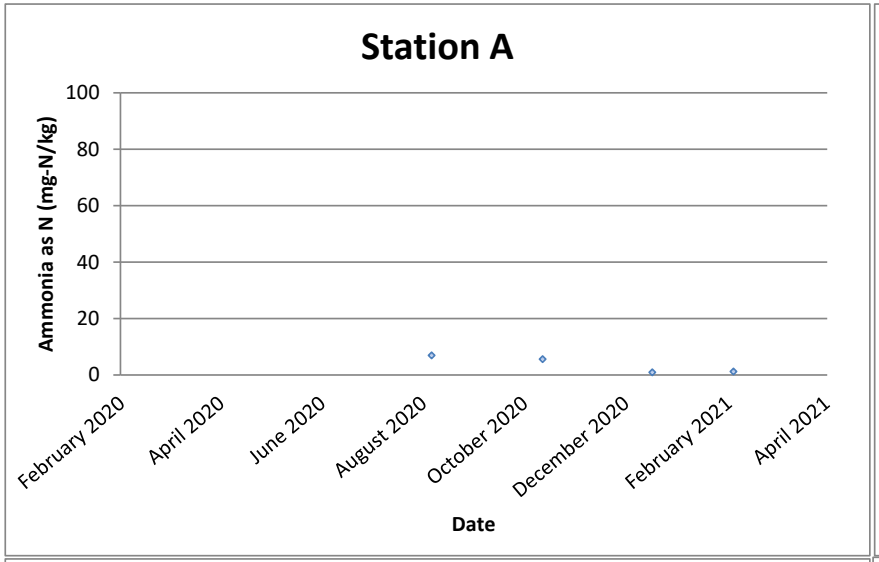

Station D
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

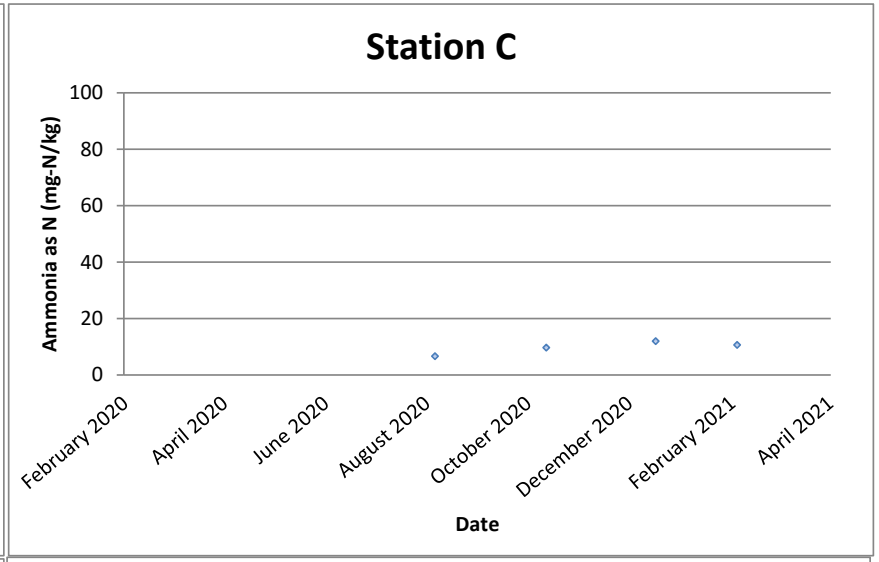

Station E
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

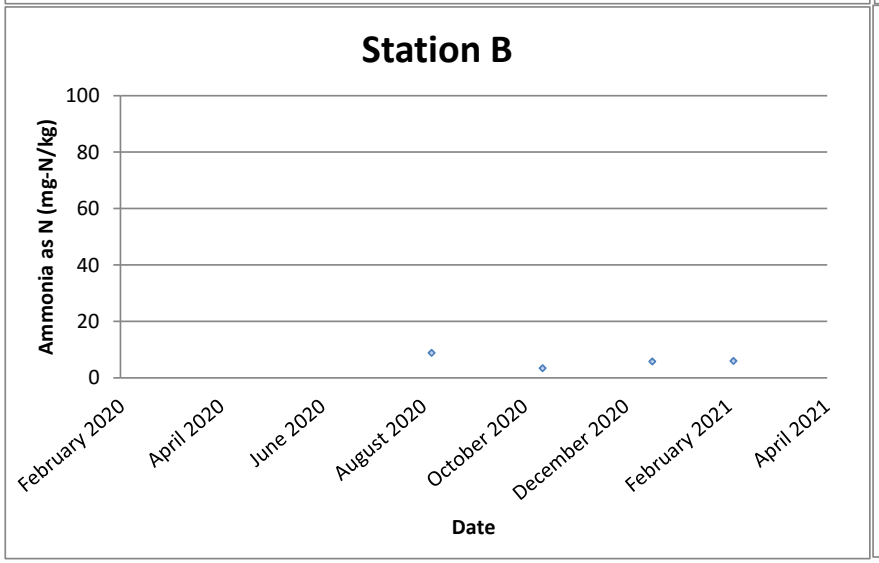

Station G
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

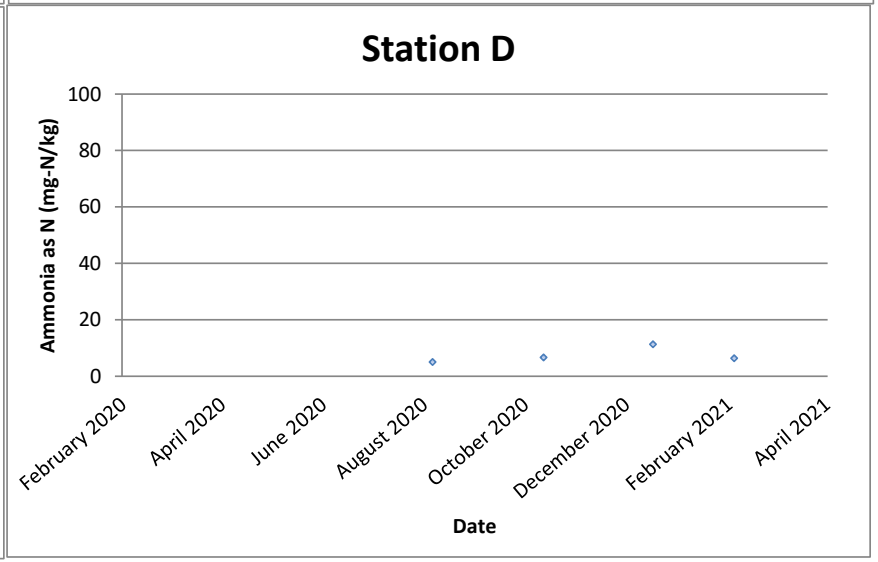

Station F
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

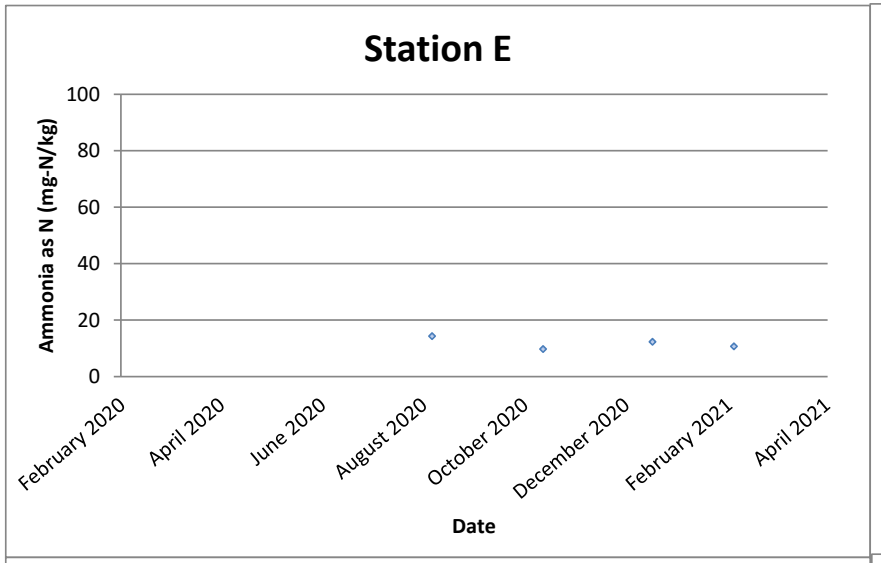

Station H
10.0
8.0
6.0
4.0
2.0
0.0
pH Value
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

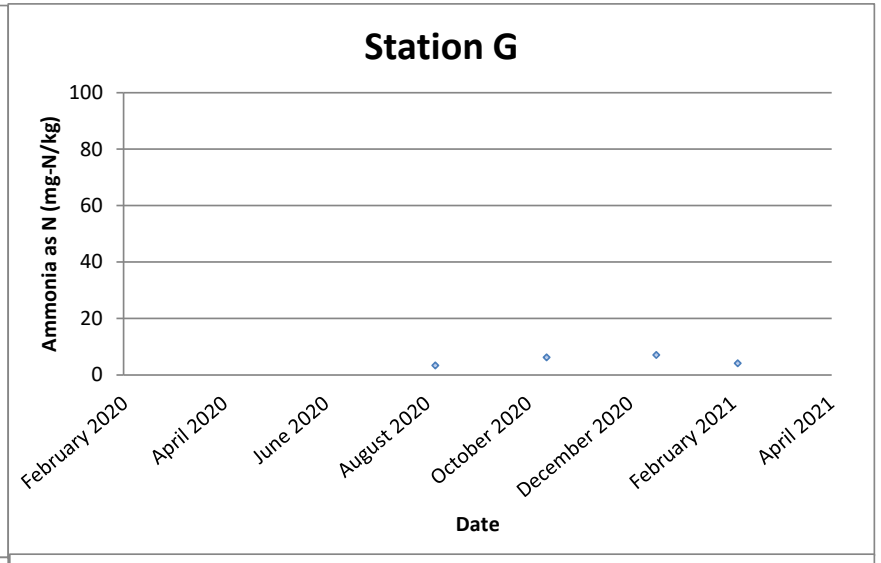

Station A
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

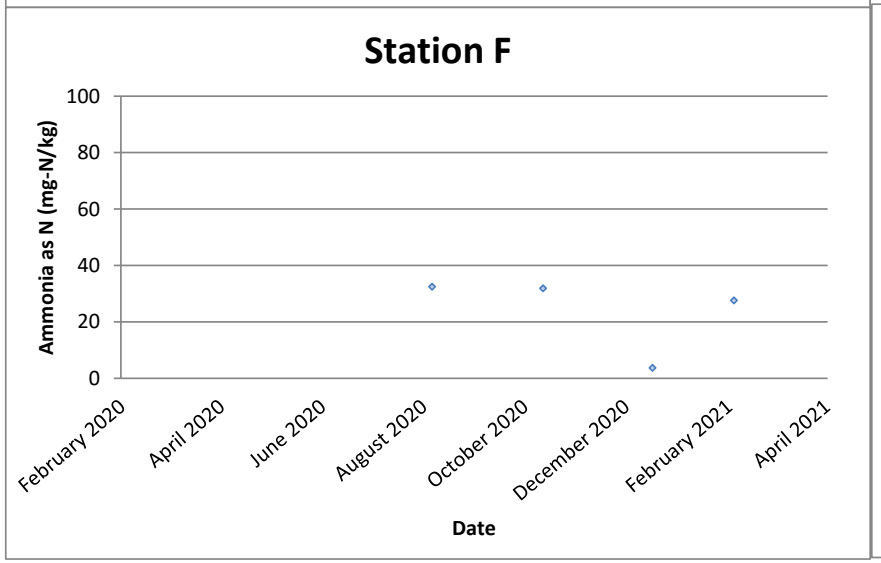

Station C
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

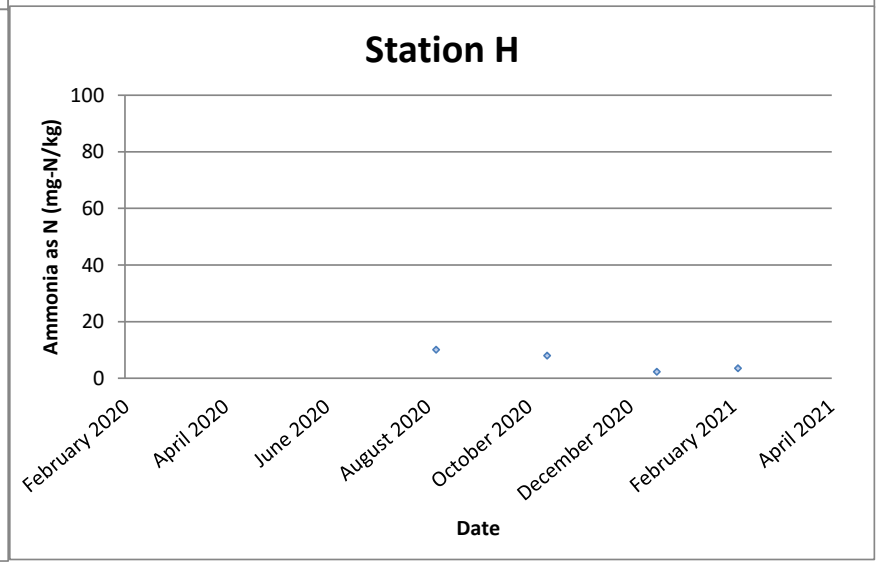

Station B
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

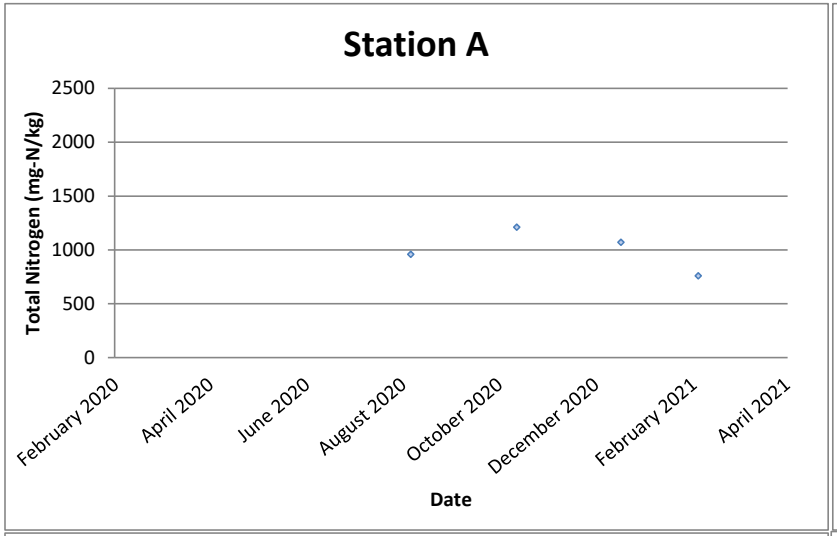

Station D
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

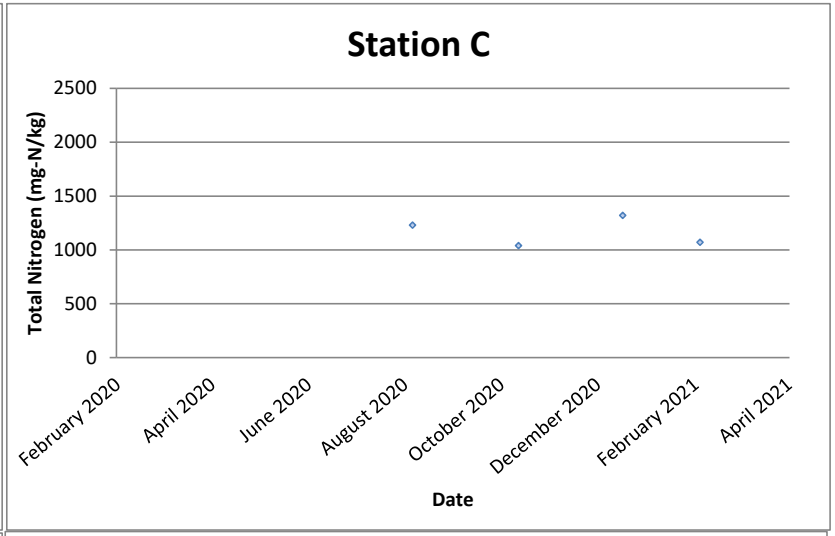

Station E
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

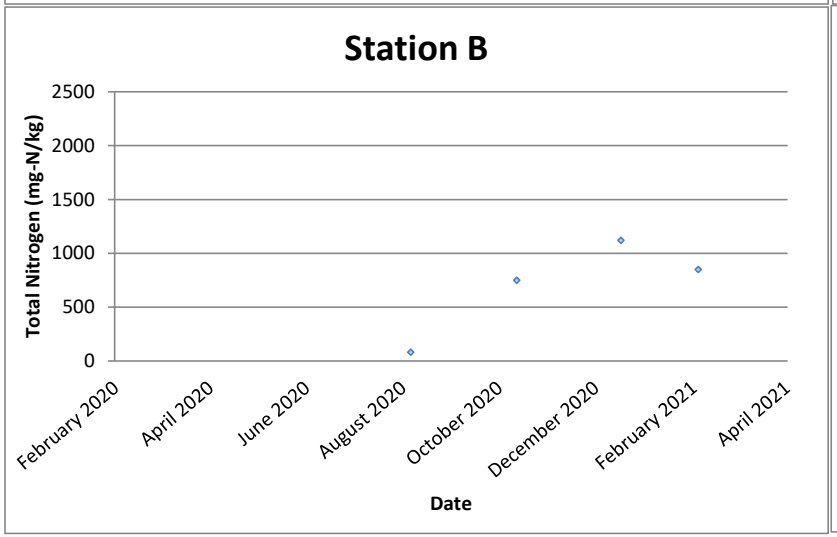

Station G
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

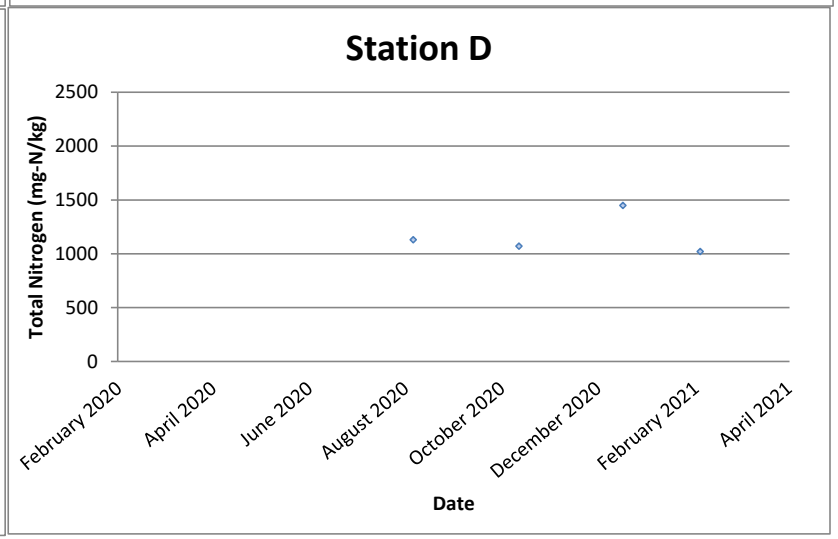

Station F
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

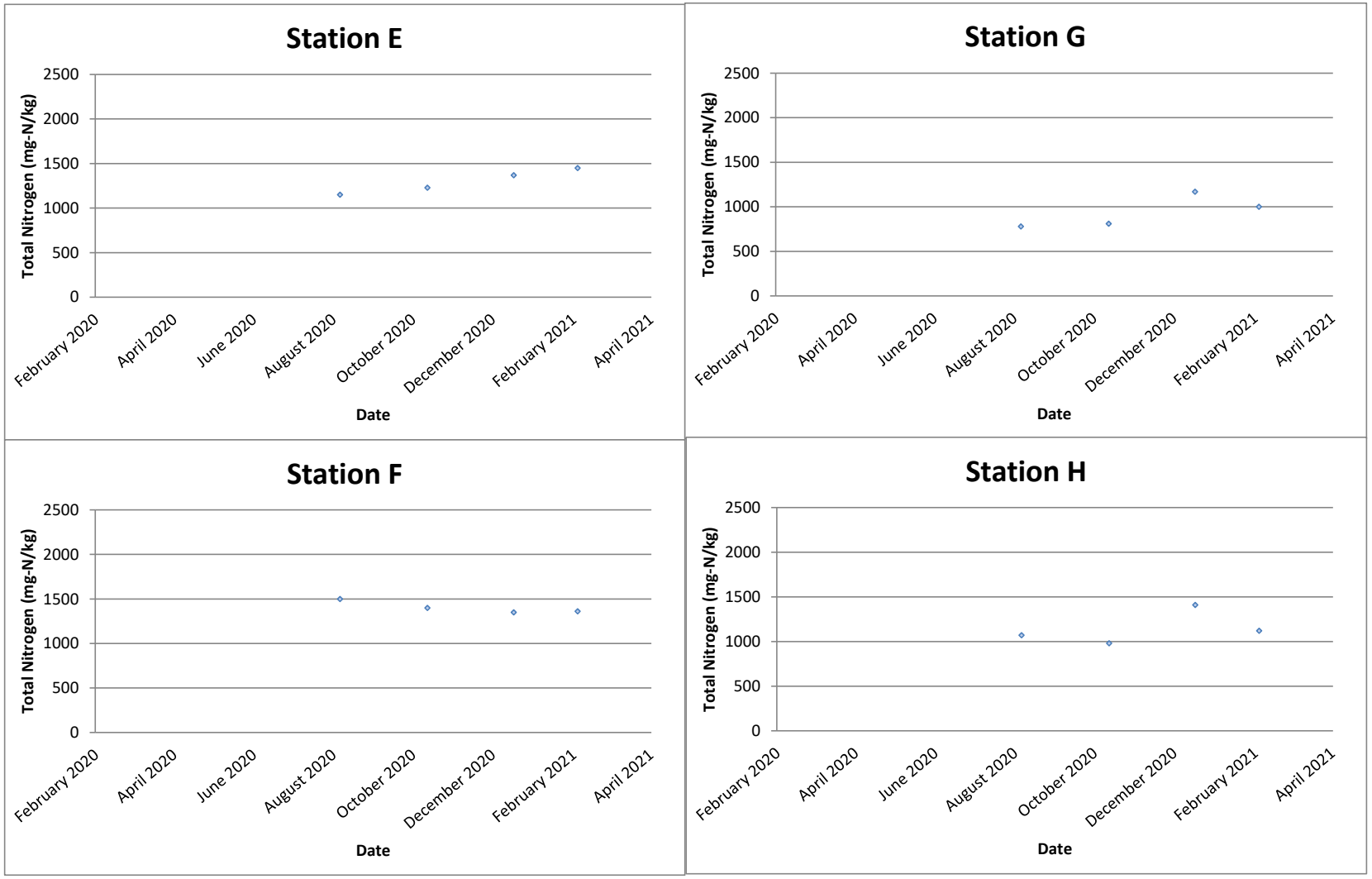

Station H
Ammonia as N (mg-N/kg)
100
80
60
40
20
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station A
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

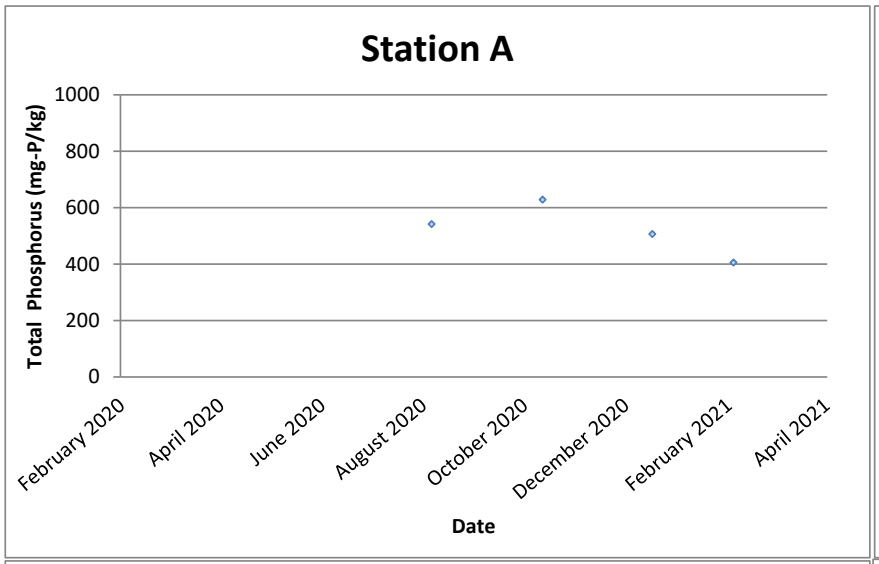

Station C
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

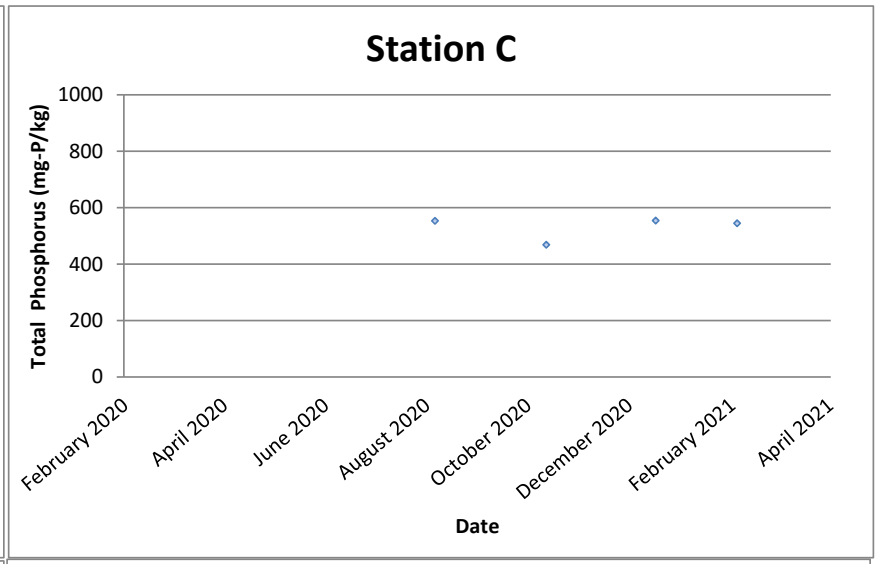

Station B
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

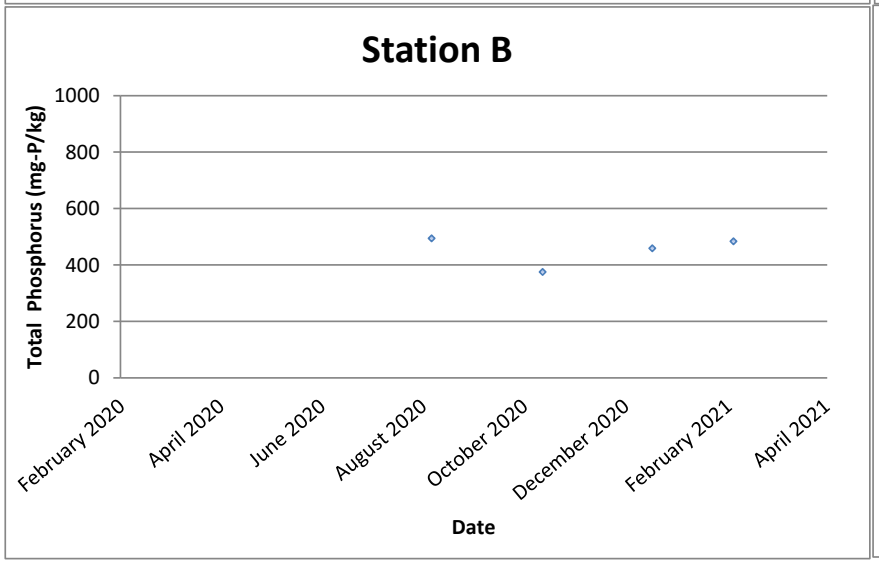

Station D
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

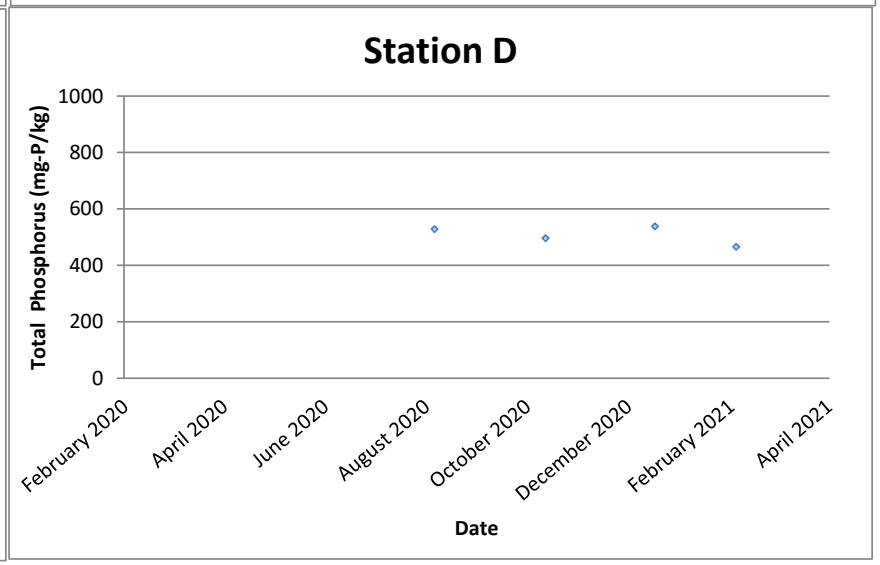

Station E
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station G
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station F
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station H
Total Nitrogen (mg-N/kg)
2500
2000
1500
1000
500
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

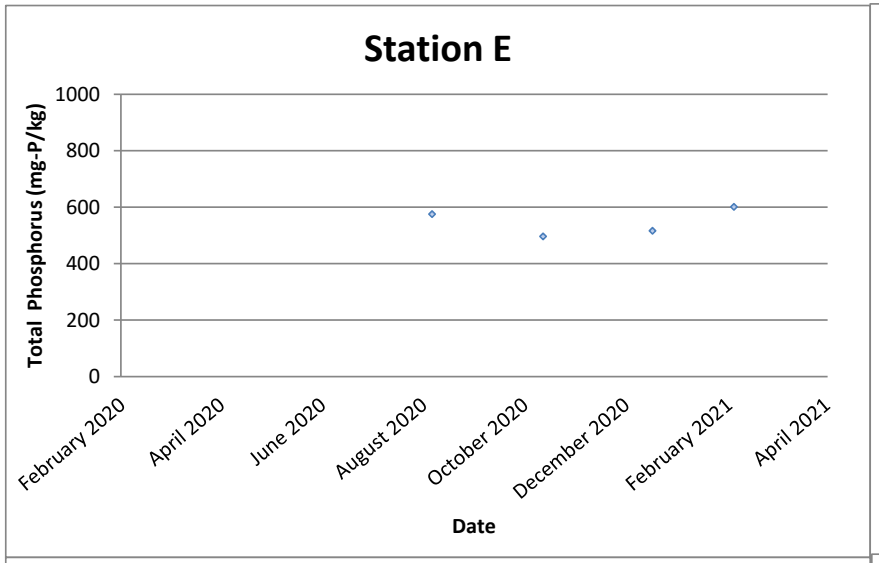
Total Phosphorus (mg-P/kg)

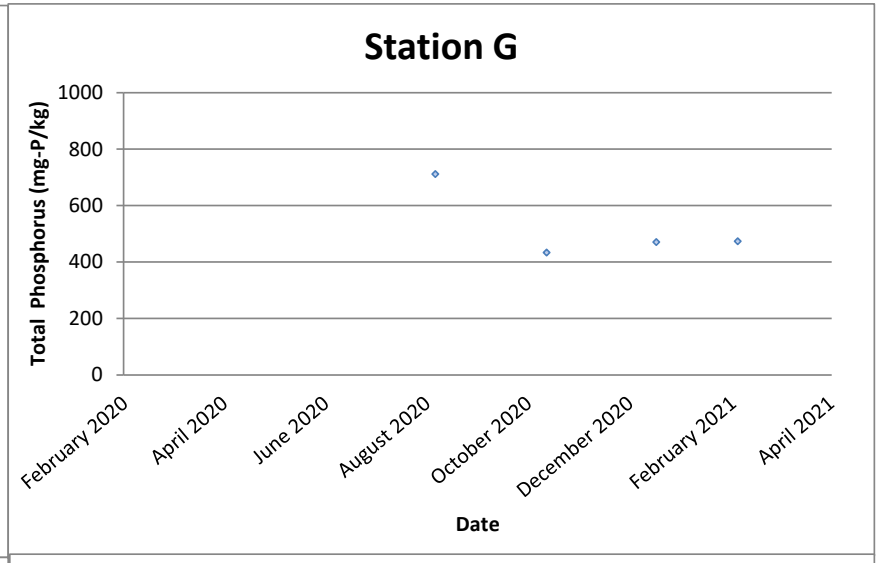


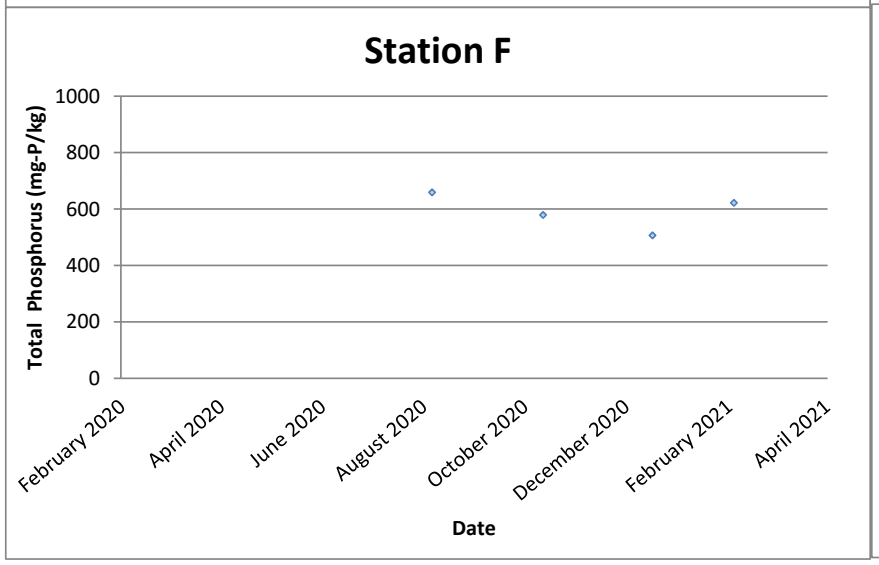


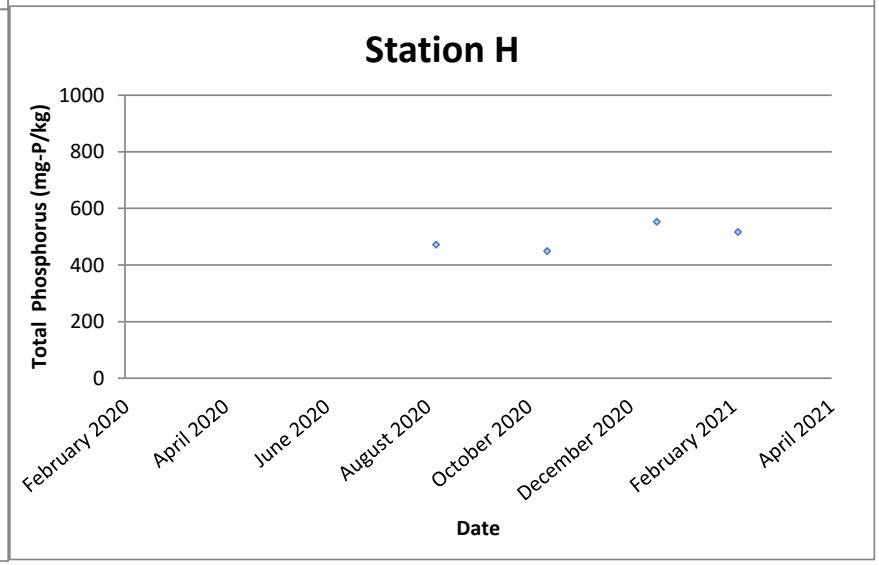


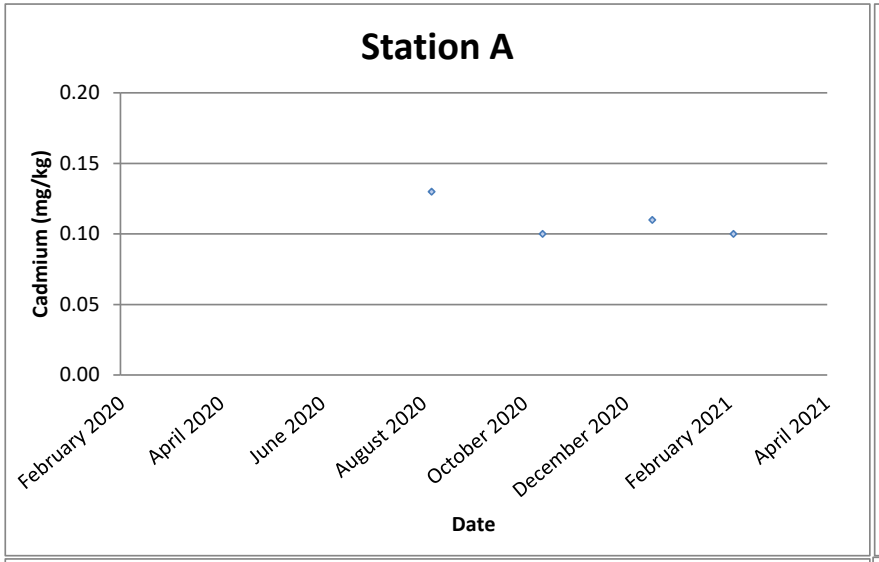


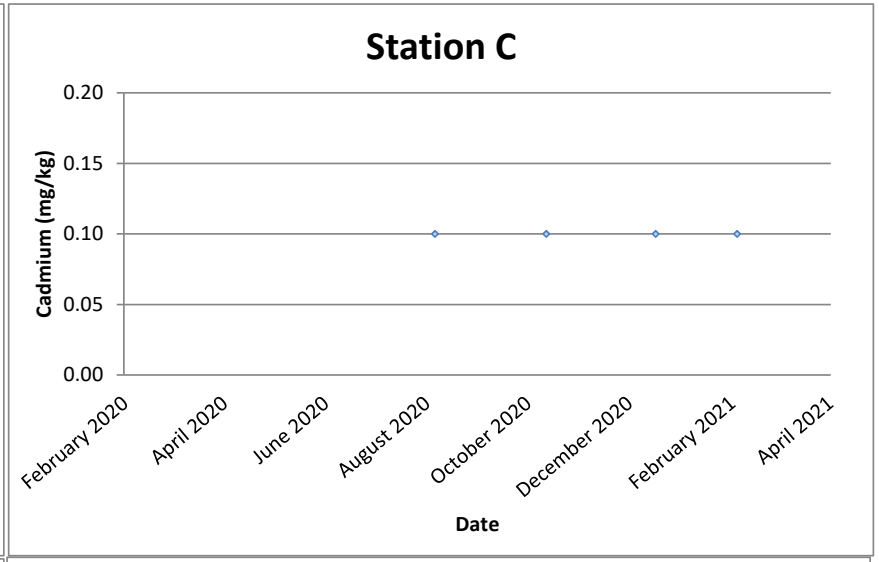

Station E
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

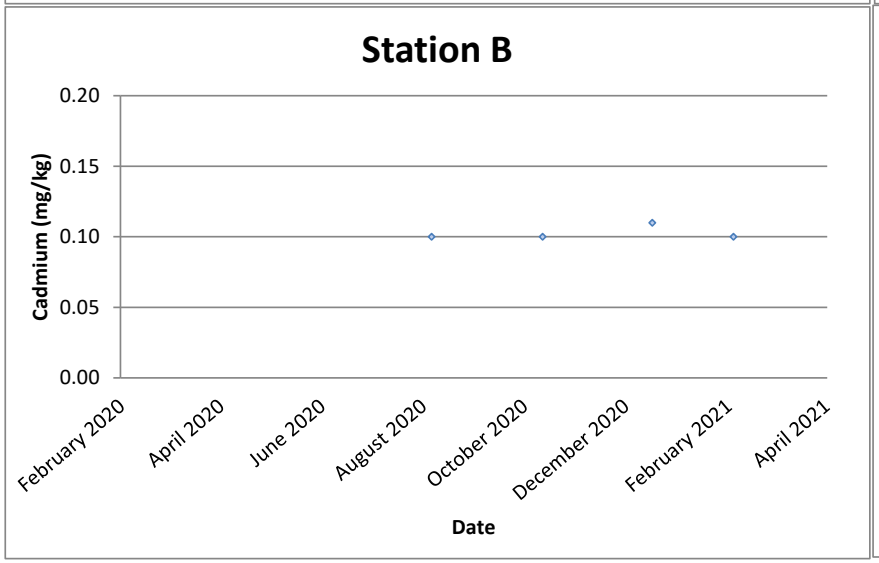

Station G
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

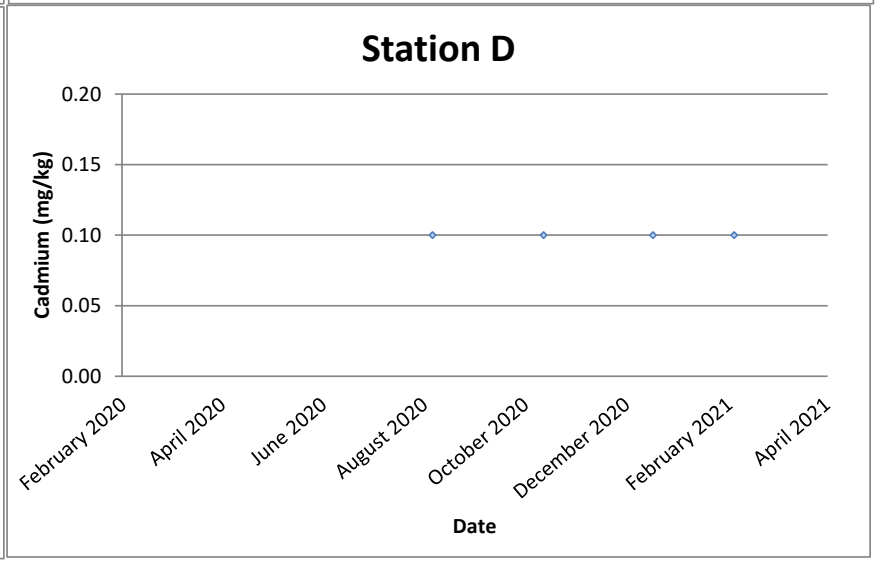

Station F
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station H
Total Phosphorus (mg-P/kg)
1000
800
600
400
200
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

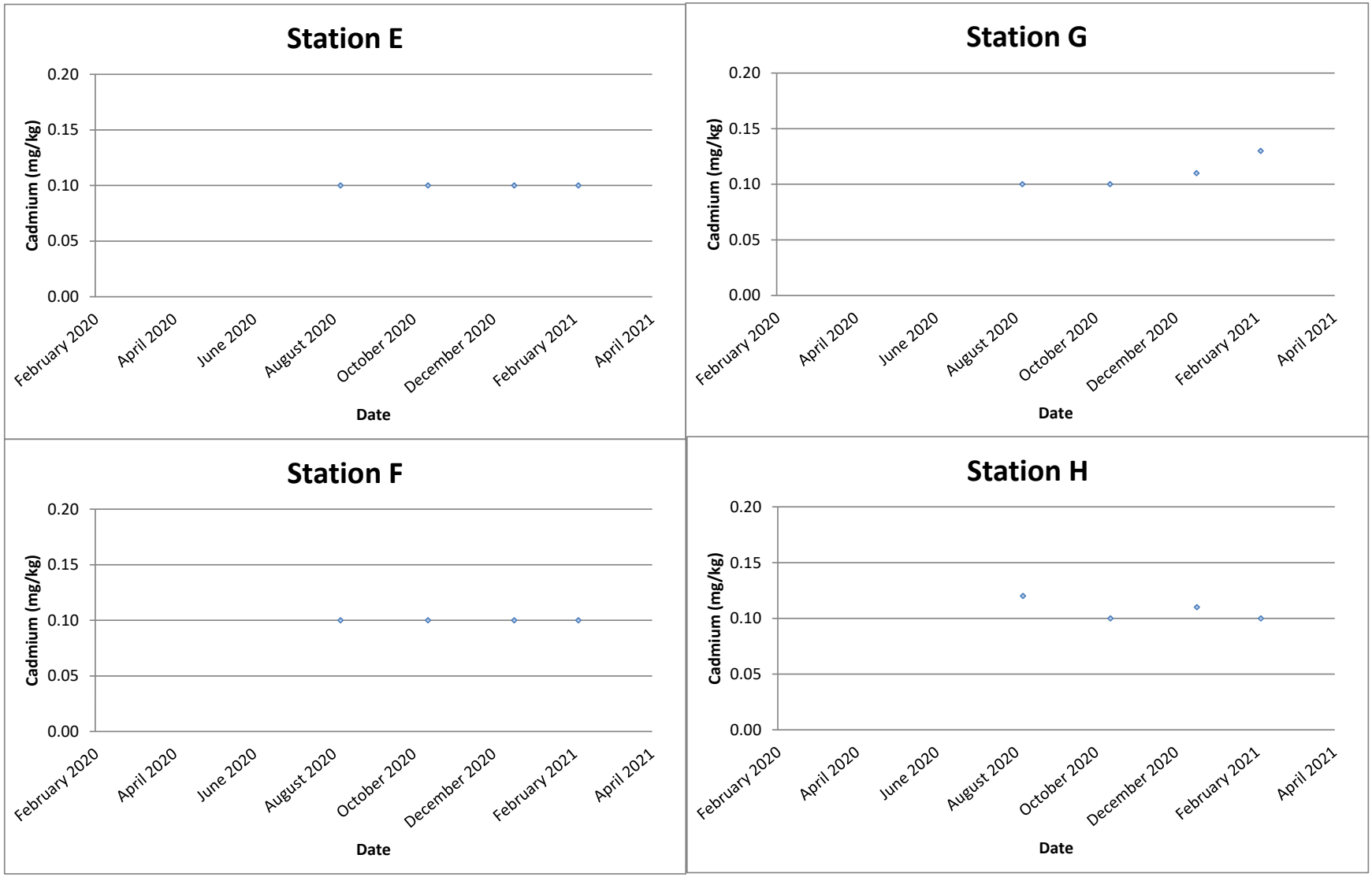




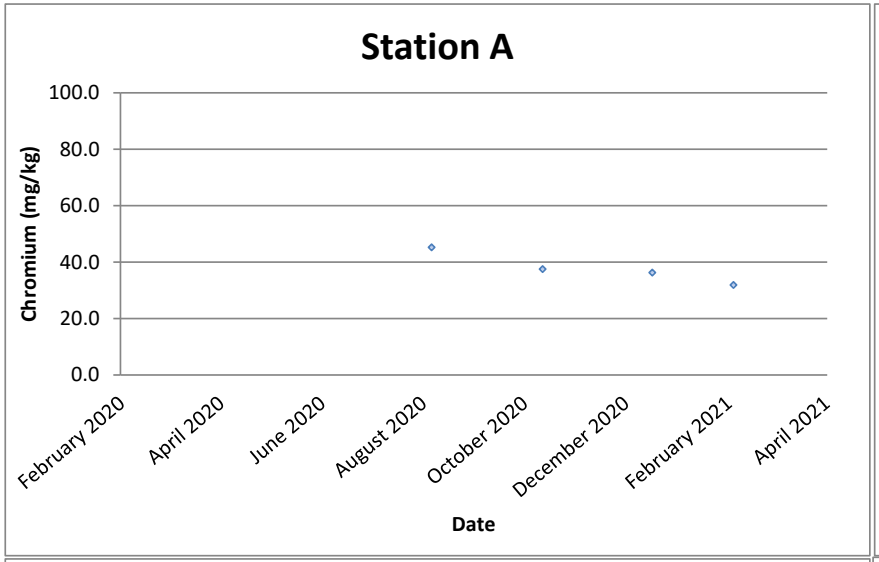


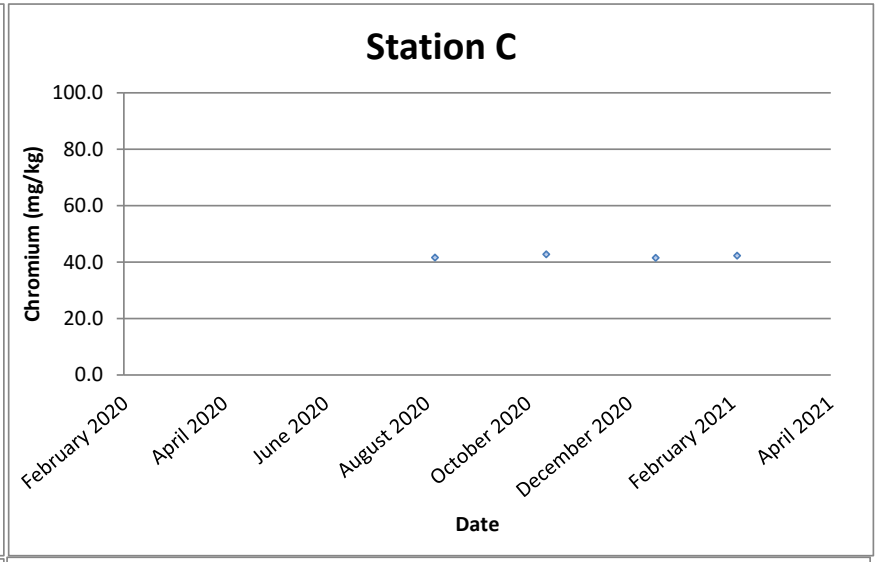


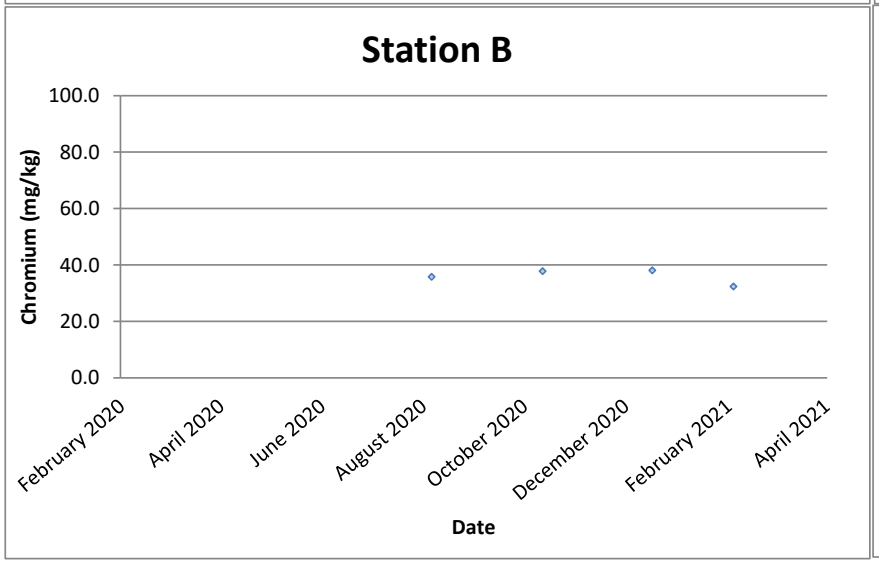
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

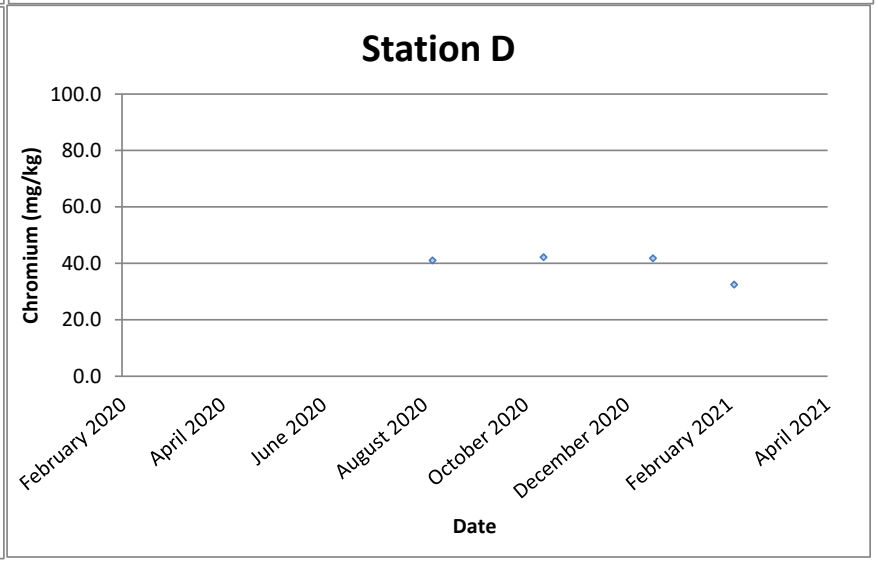


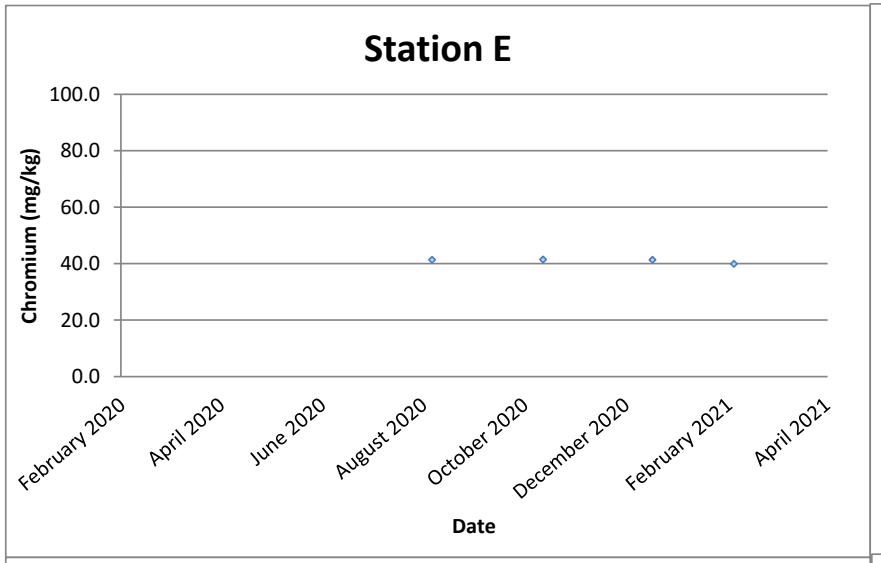
Remark: All below the Limit of Report sample results (<0.1 mg/kg) for Cadmium is regarded as 0.1 mg/kg in graphical presentation.

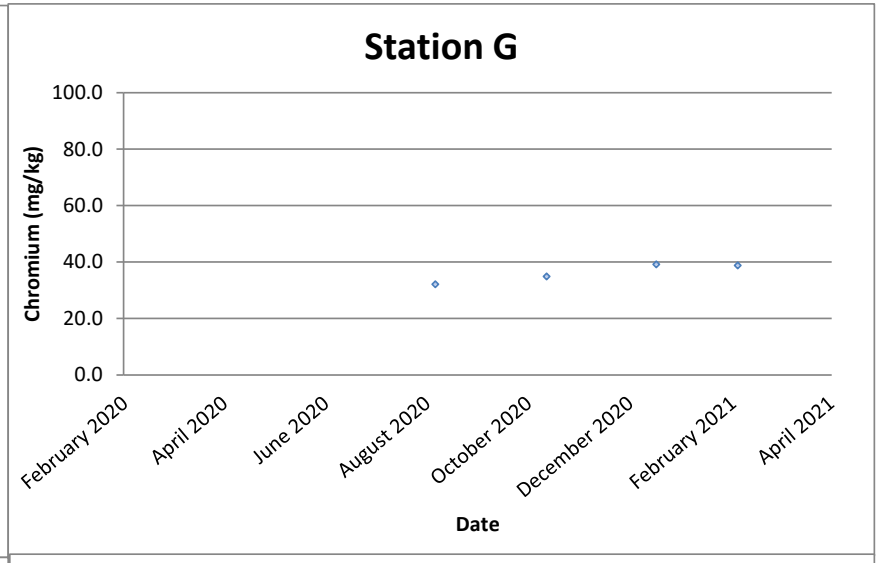

Station A
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

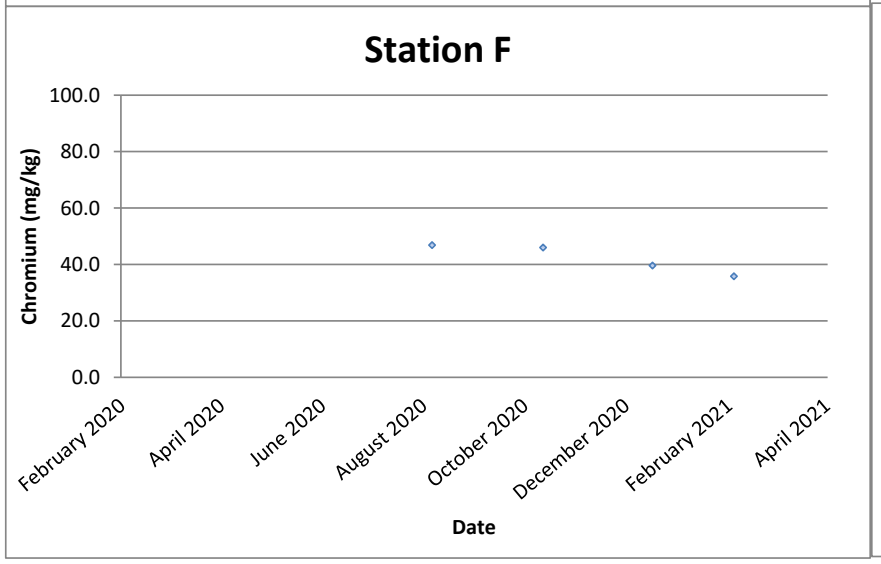

Station C
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

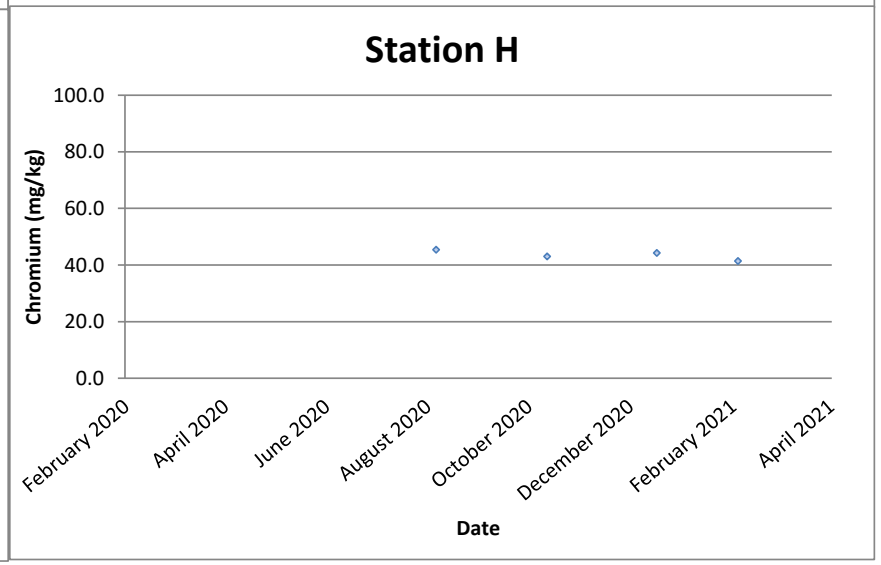

Station B
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

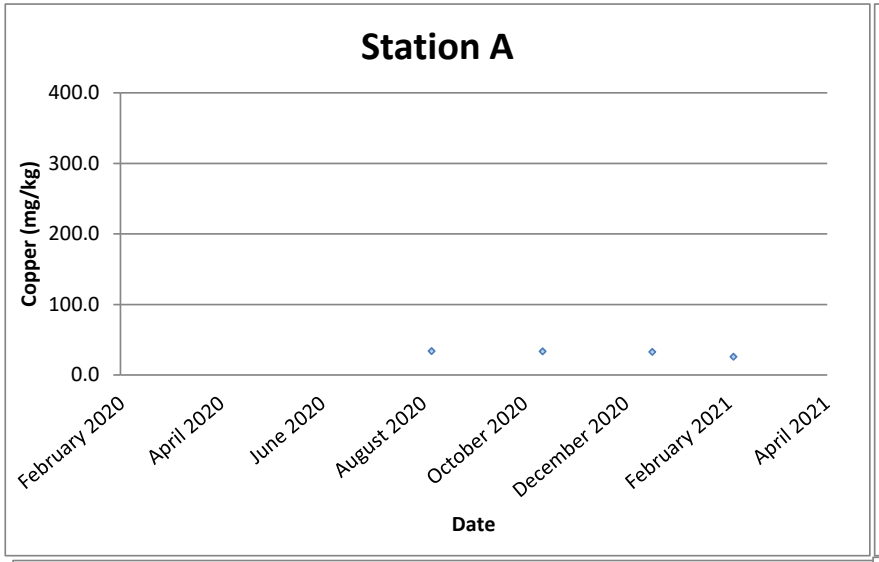

Station D
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

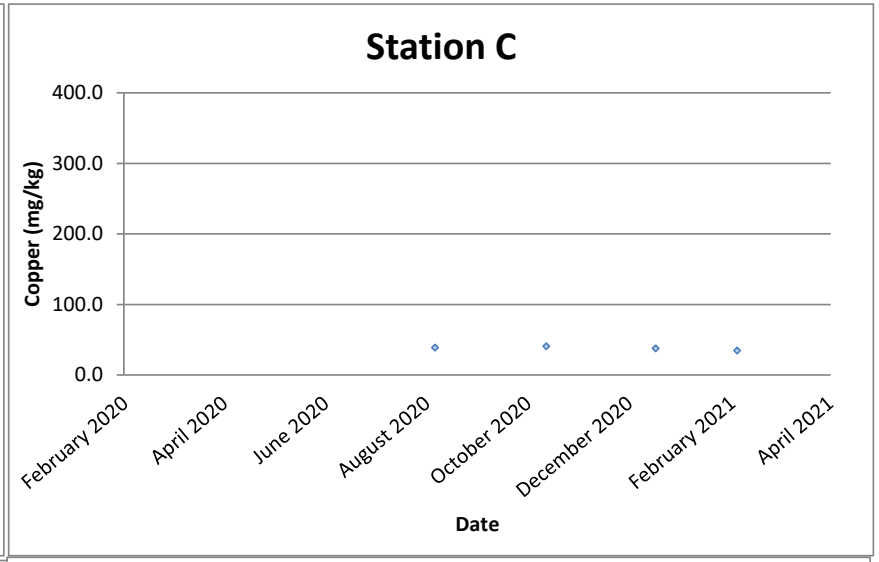

Station E
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

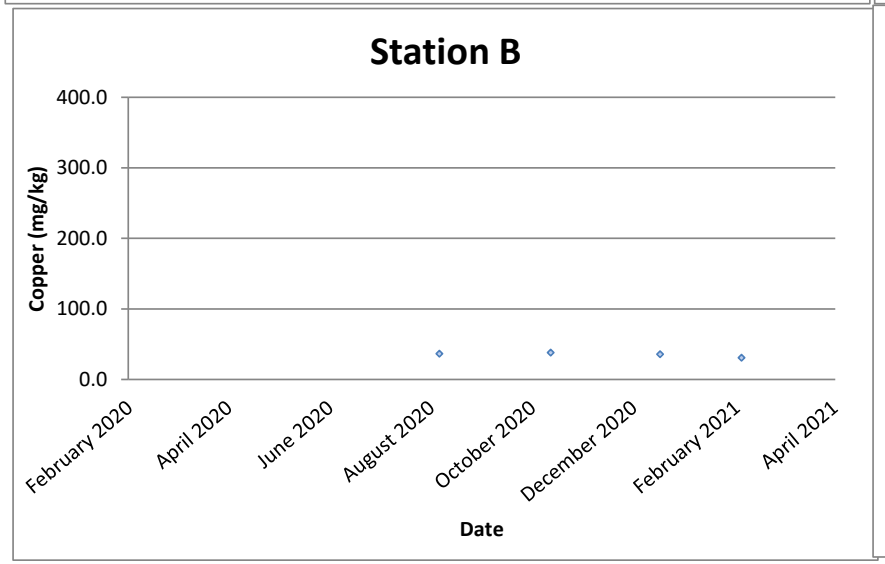

Station G
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

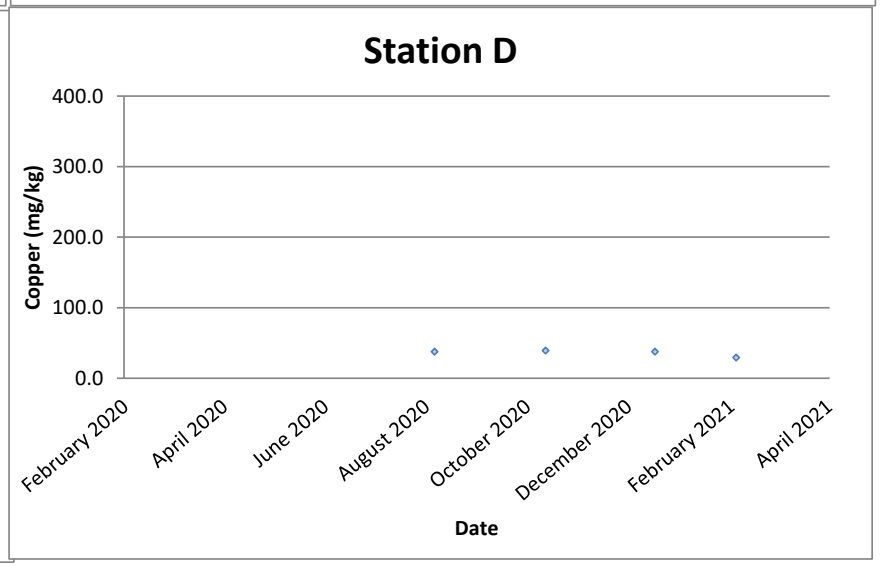

Station F
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

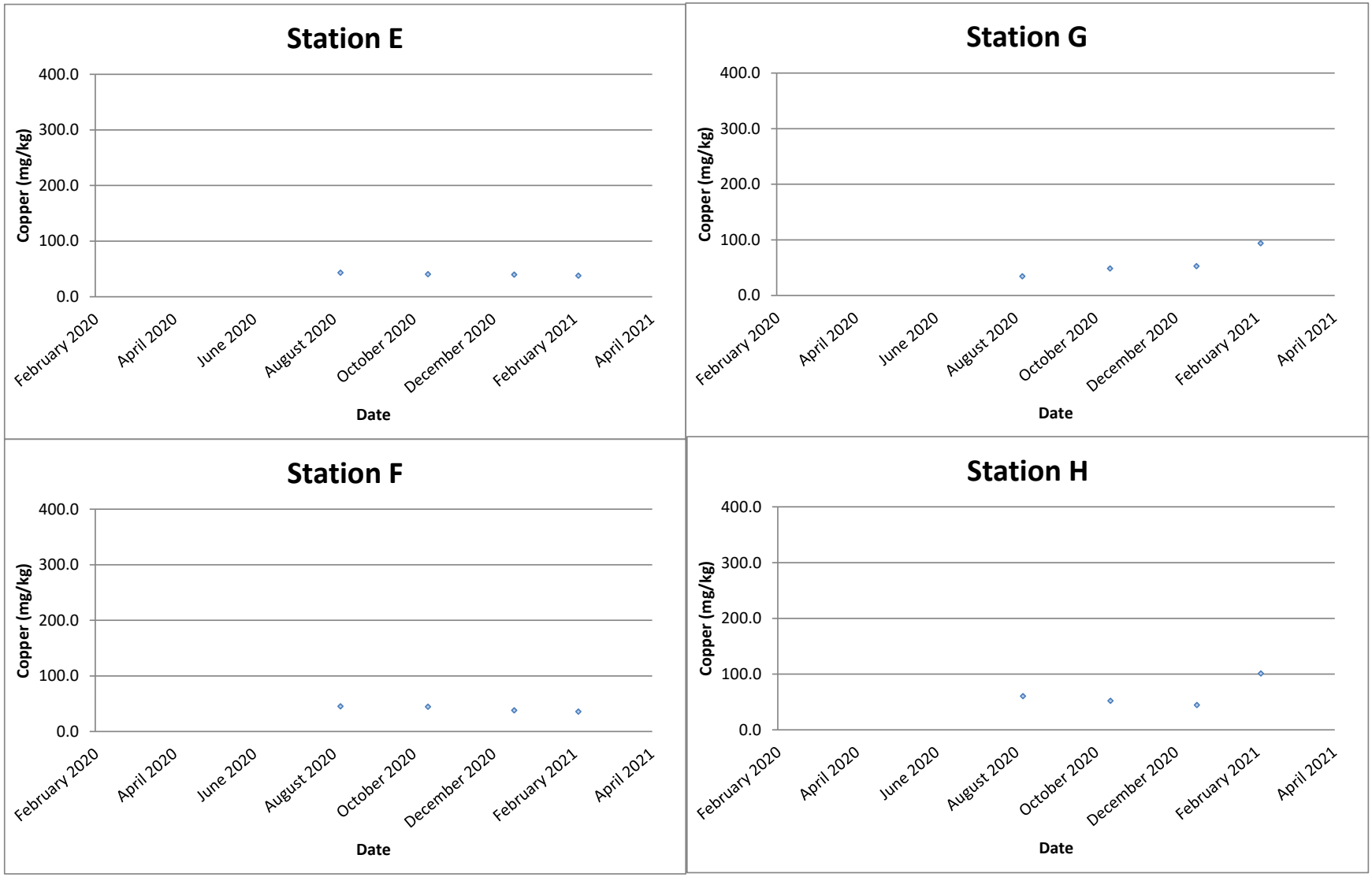

Station H
Chromium (mg/kg)
100.0
80.0
60.0
40.0
20.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station A
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

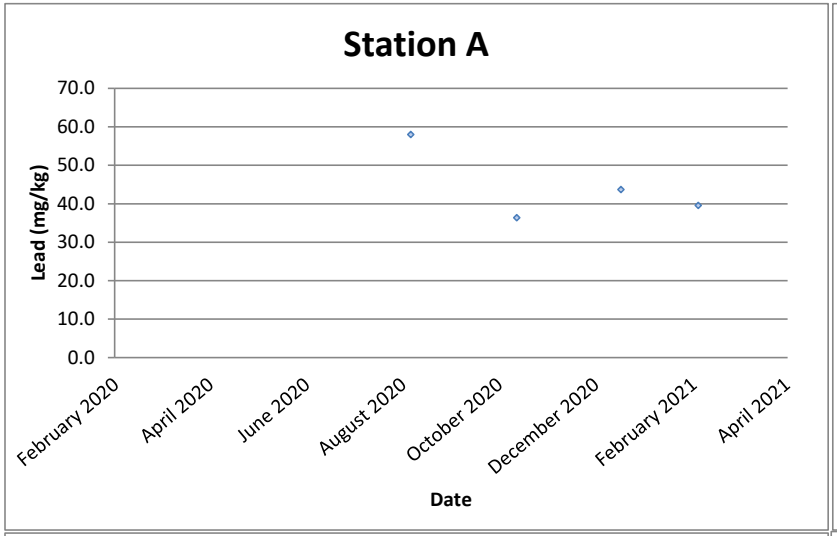

Station C
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

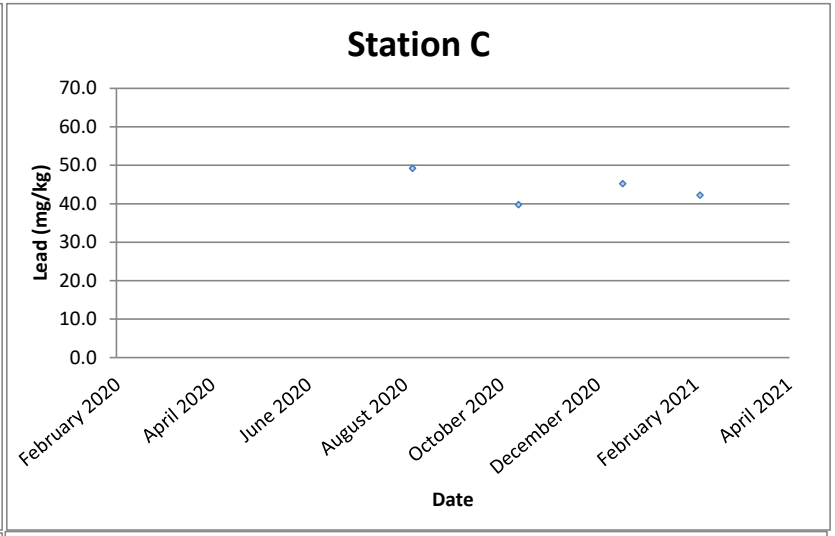

Station B
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

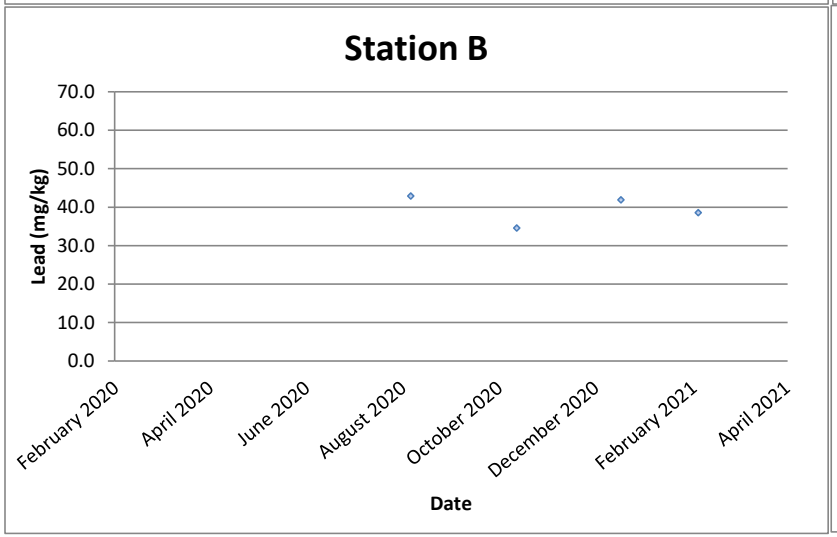

Station D
400.0
300.0
200.0
100.0
0.0
Copper (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

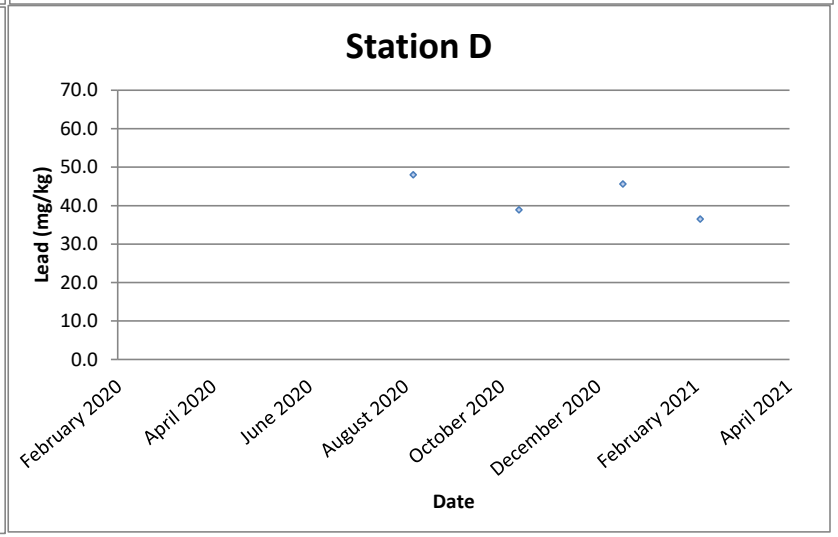

Station E
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station G
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station F
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station H
Copper (mg/kg)
400.0
300.0
200.0
100.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

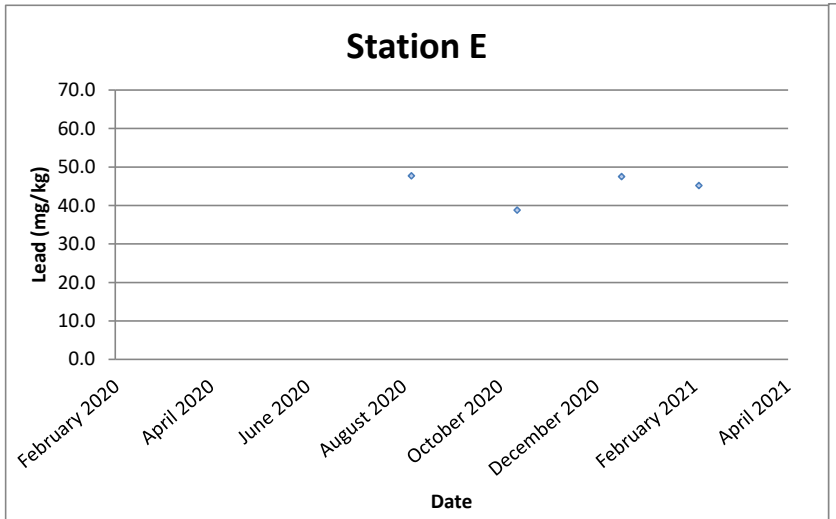
Lead (mg/kg)

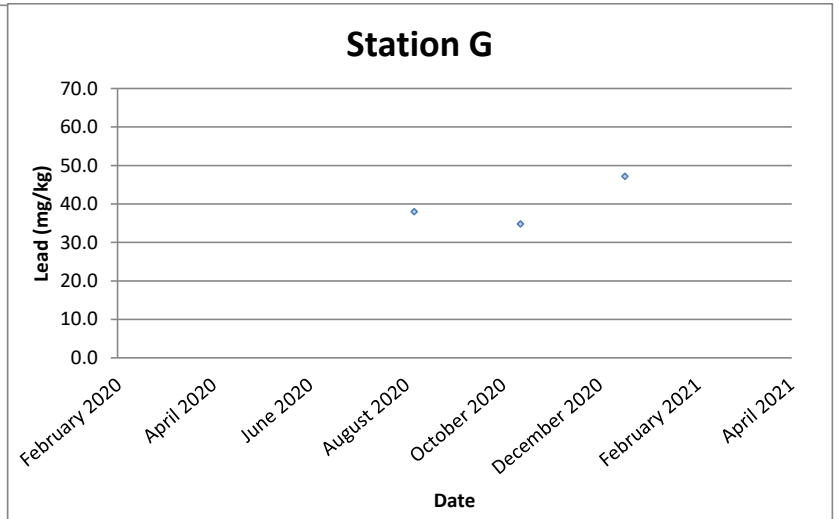

Station A
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

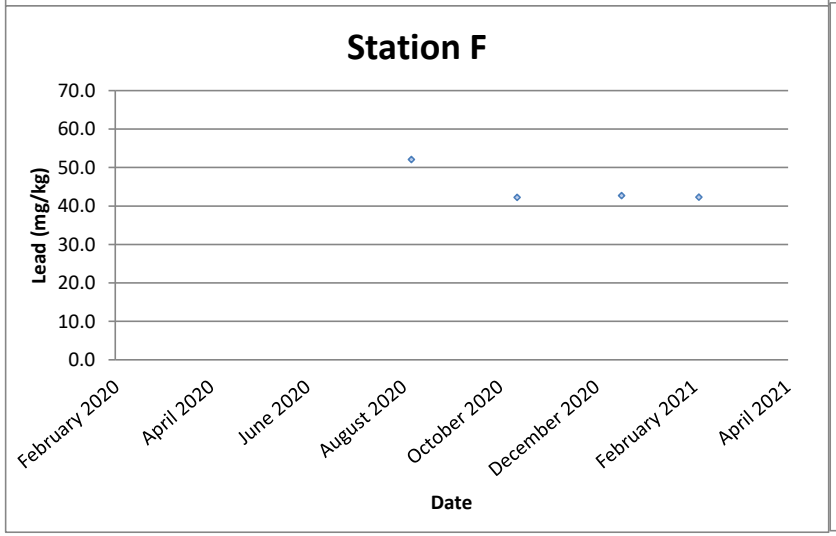

Station C
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

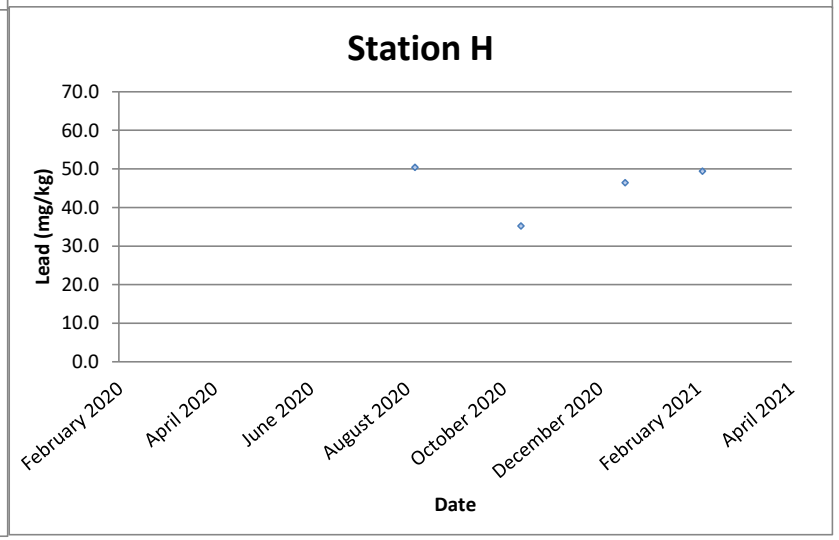

Station B
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station D
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

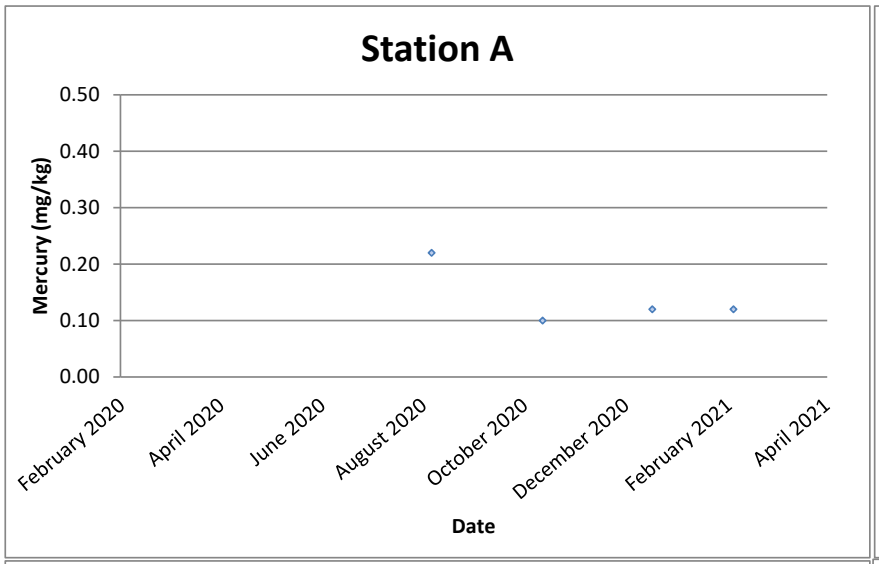

Station E
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

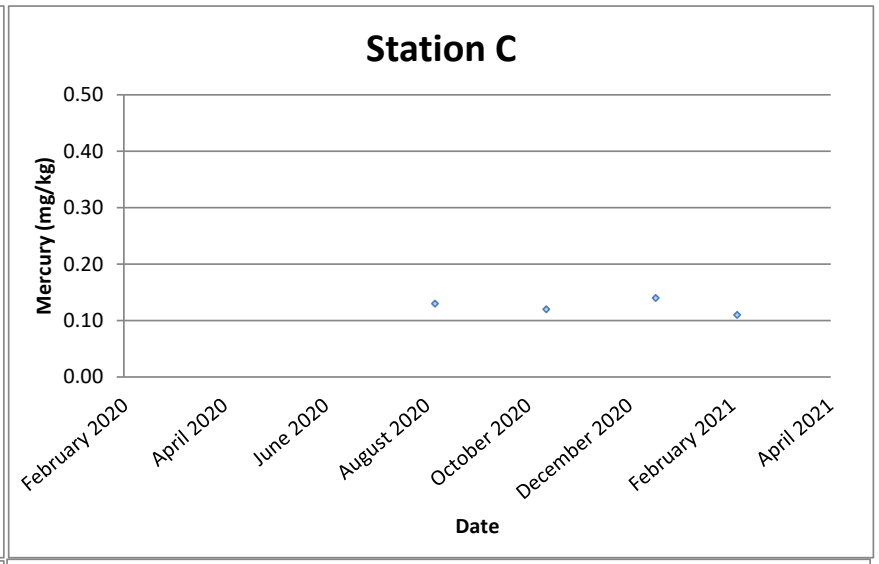

Station G
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

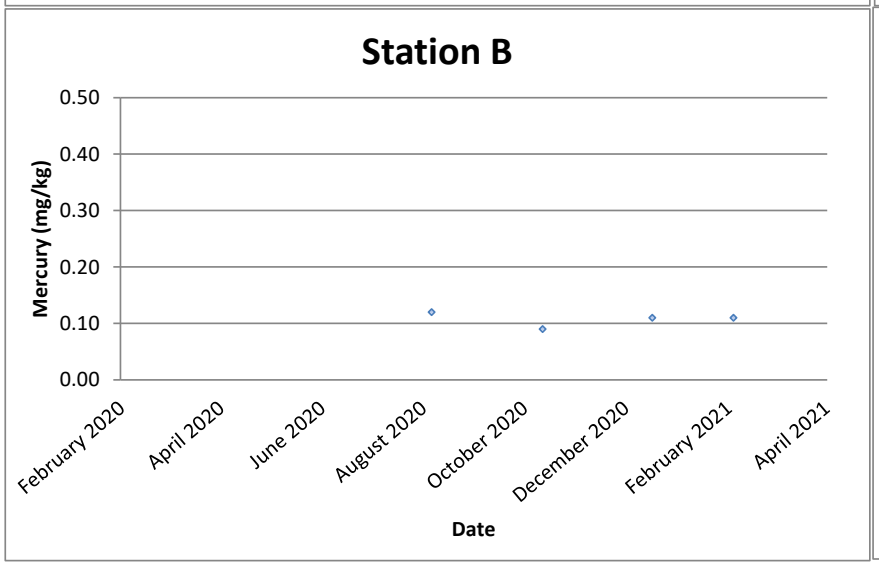

Station F
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

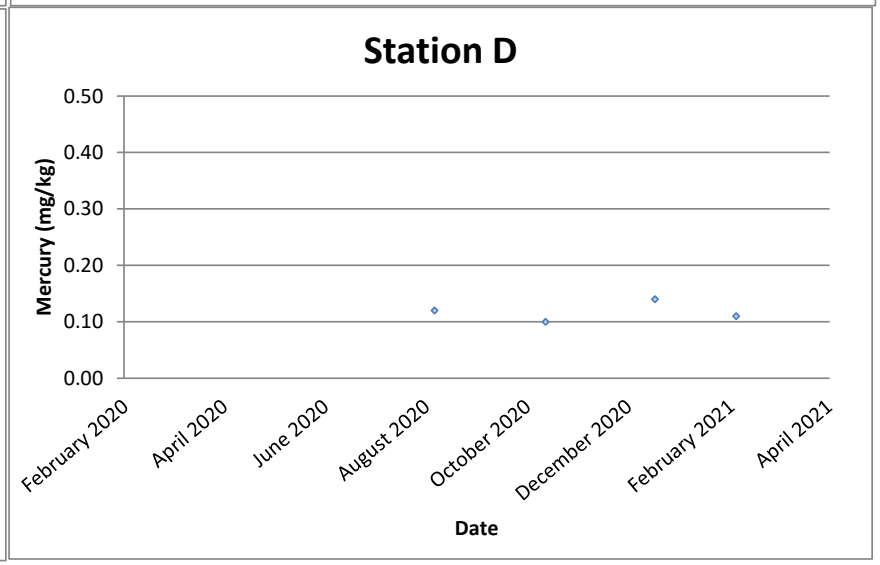

Station H
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Lead (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

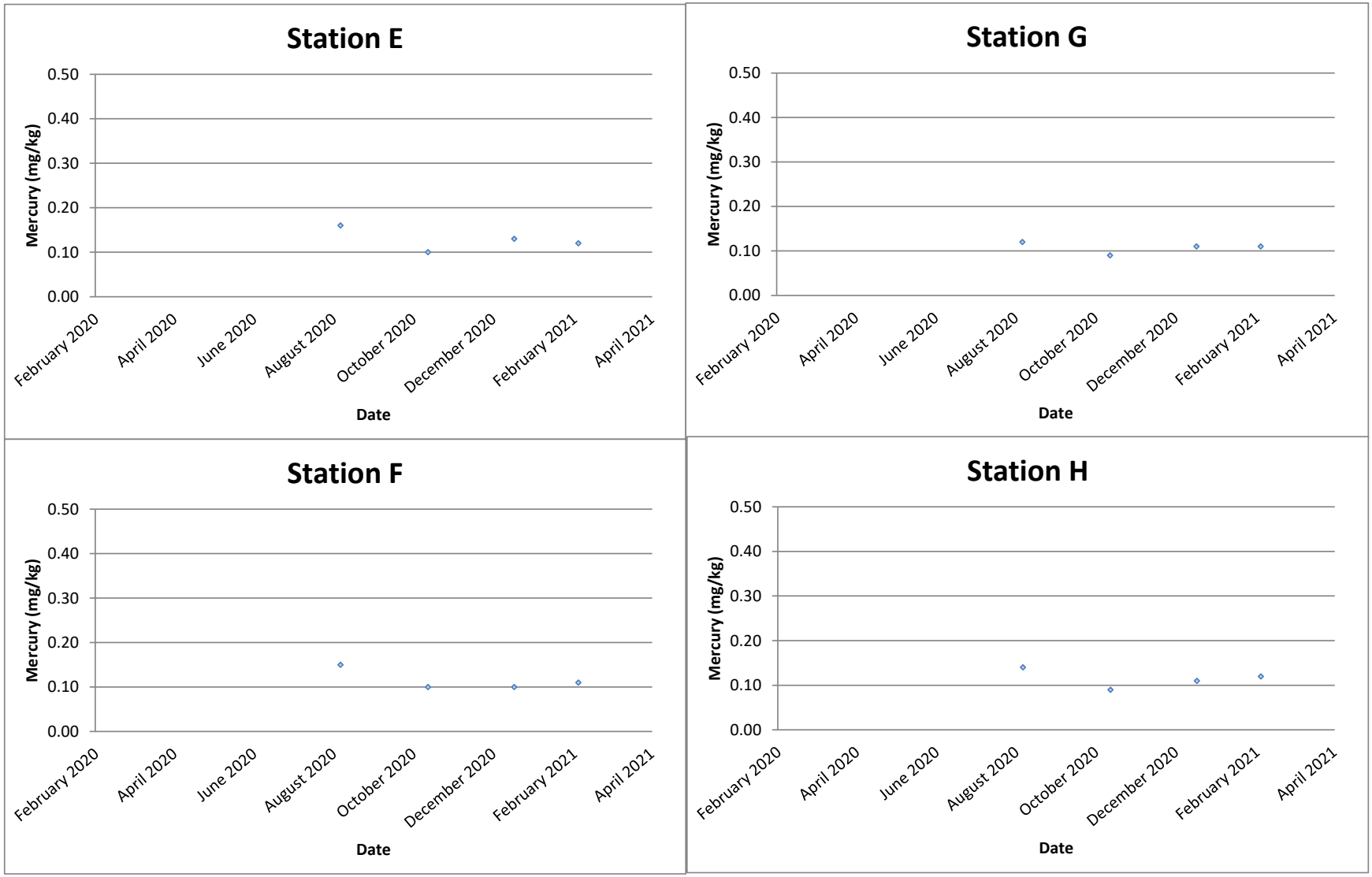
Mercury (mg/kg)

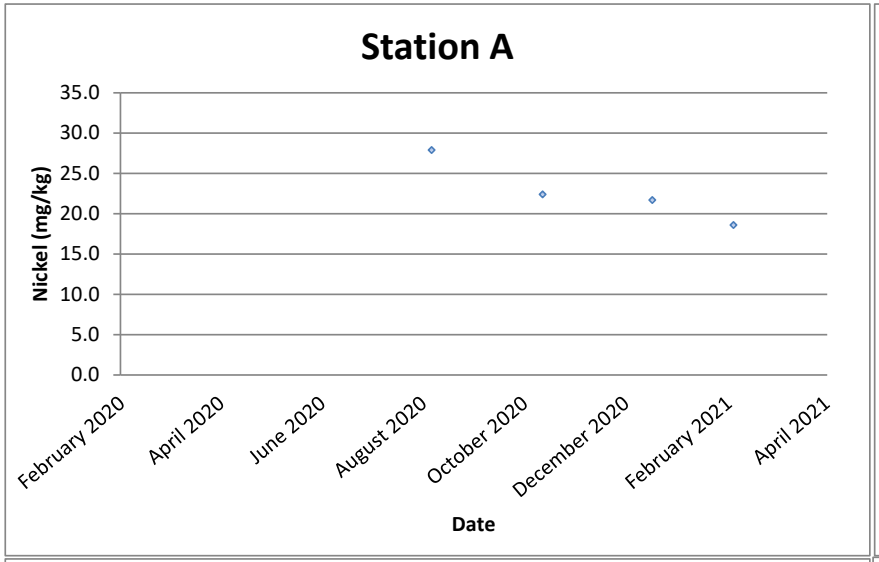


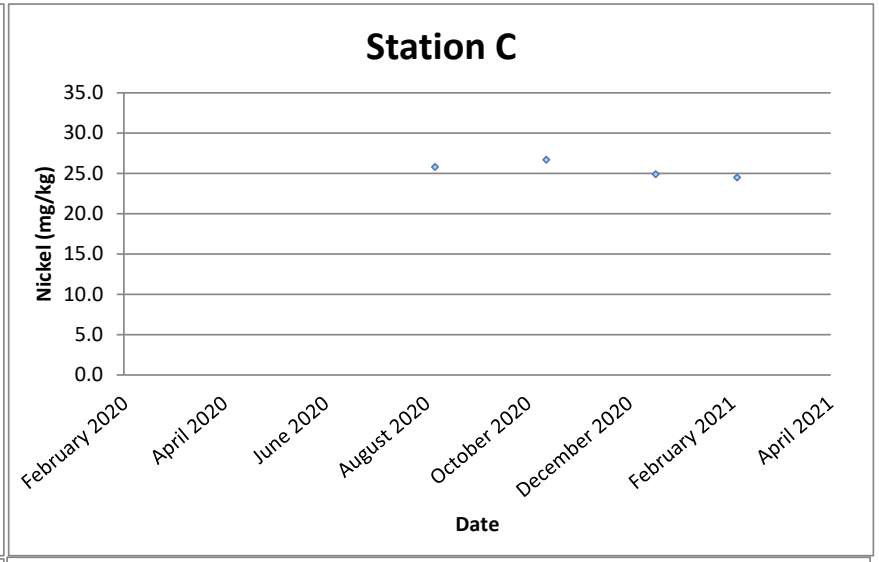


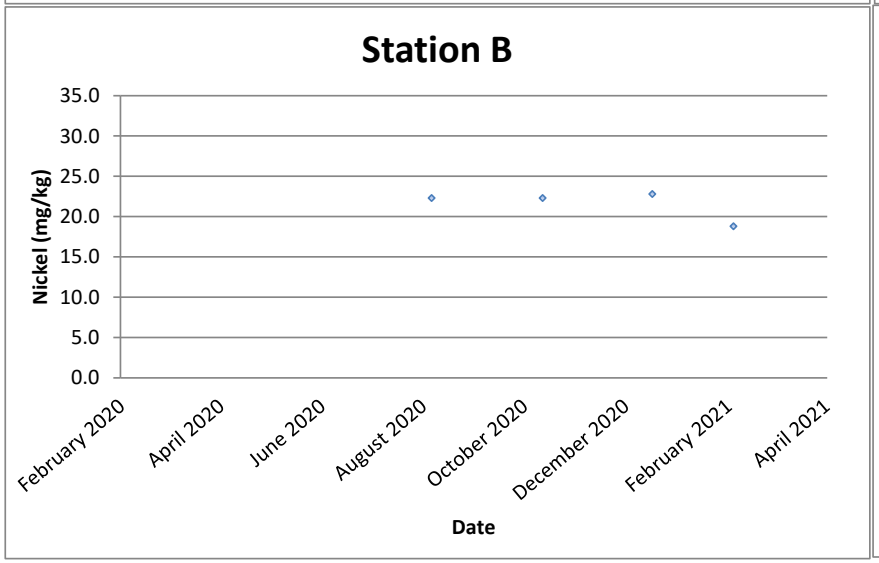


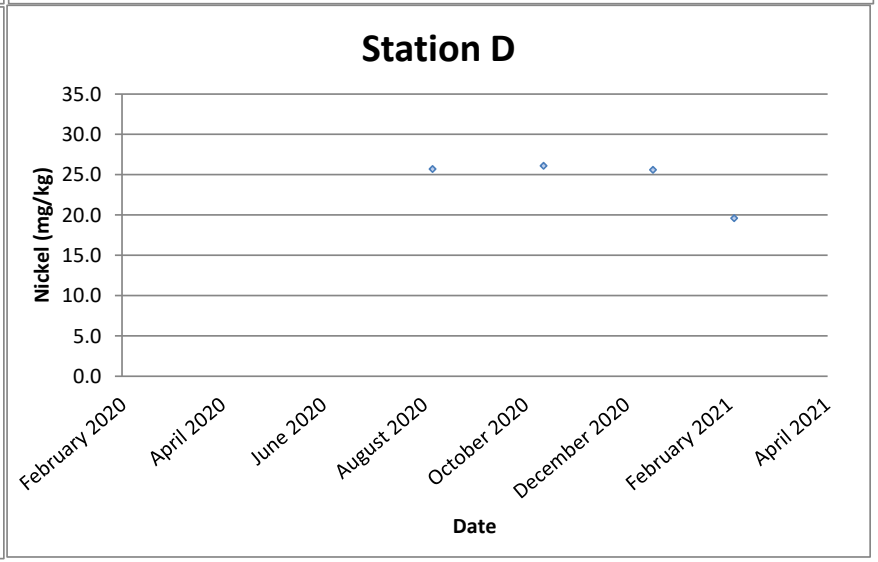


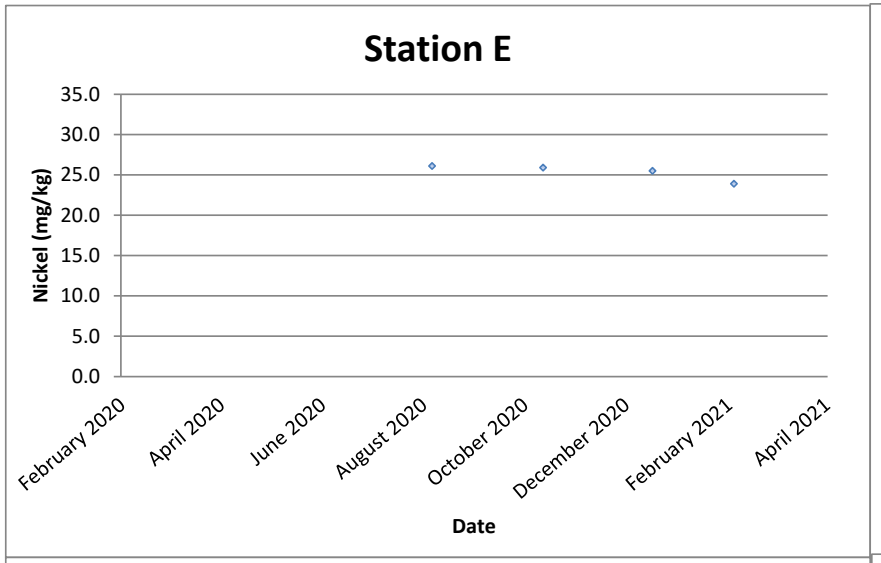

Station E
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station G
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station F
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station H
Mercury (mg/kg)
0.50
0.40
0.30
0.20
0.10
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

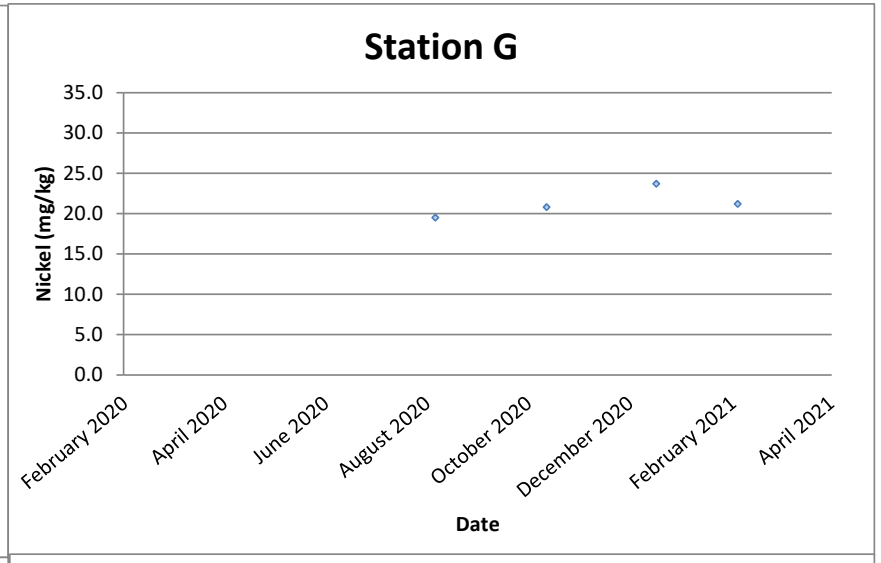

Station A
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

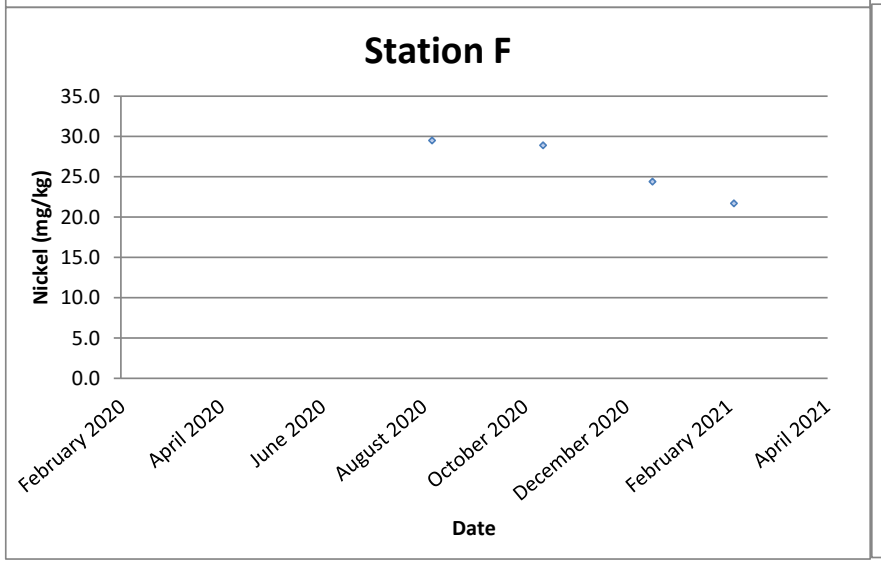

Station C
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

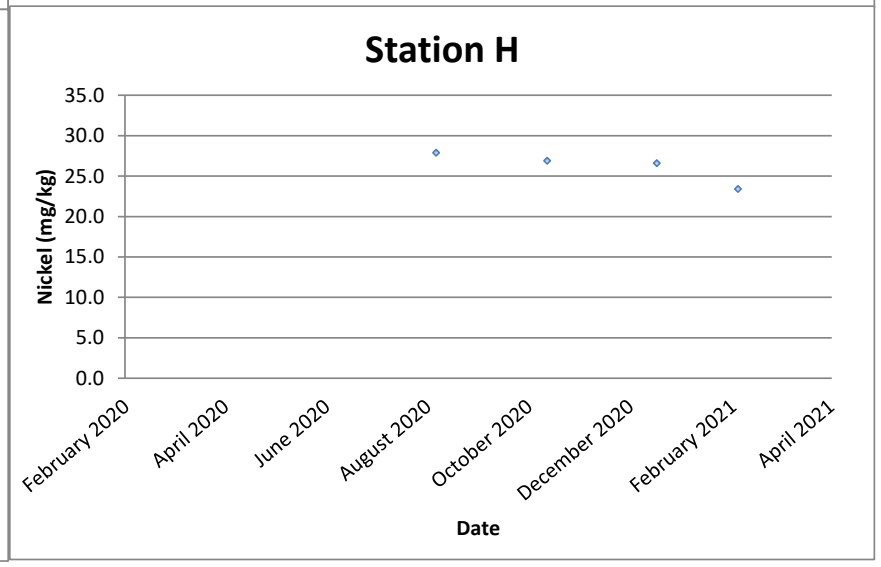

Station B
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

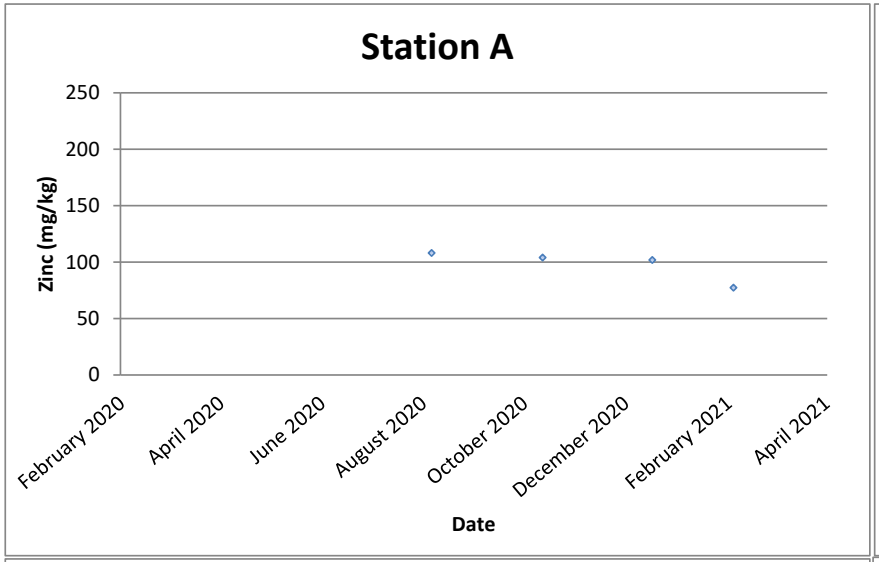

Station D
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

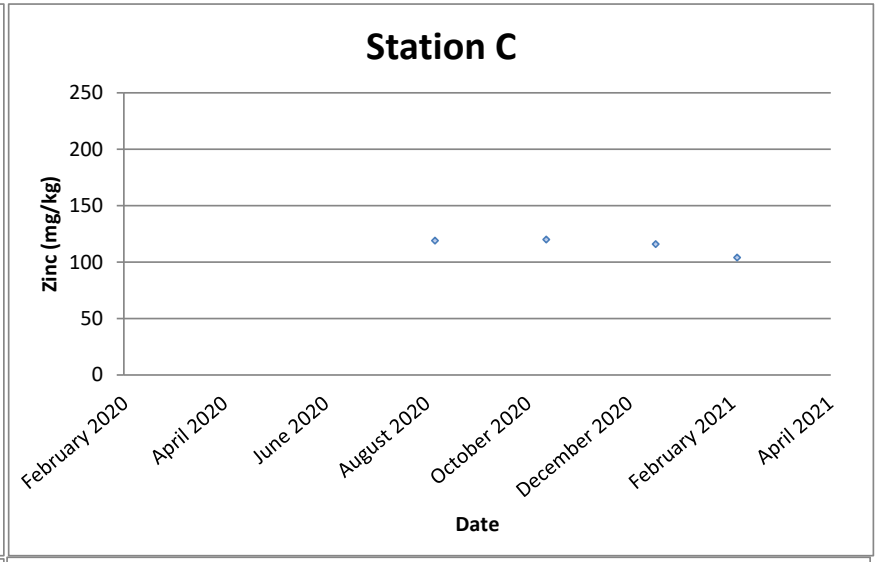

Station E
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

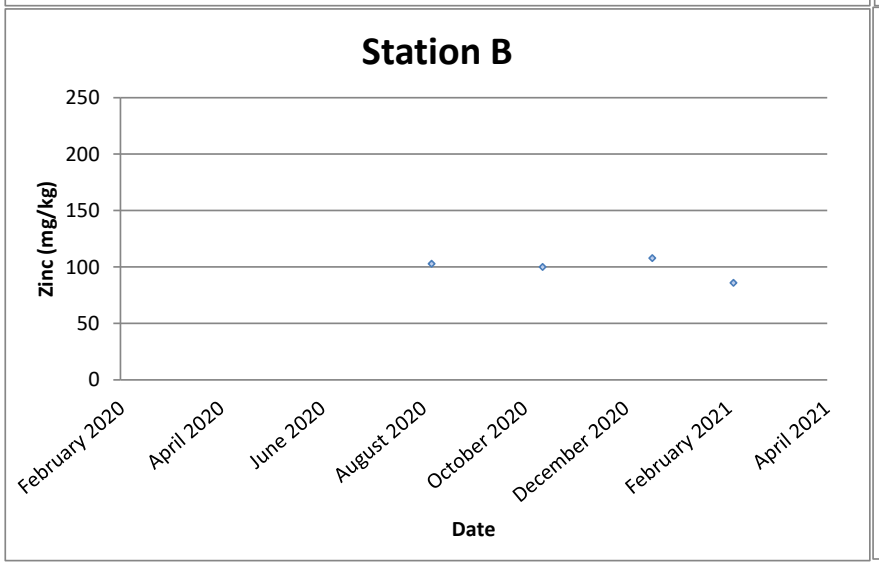

Station G
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

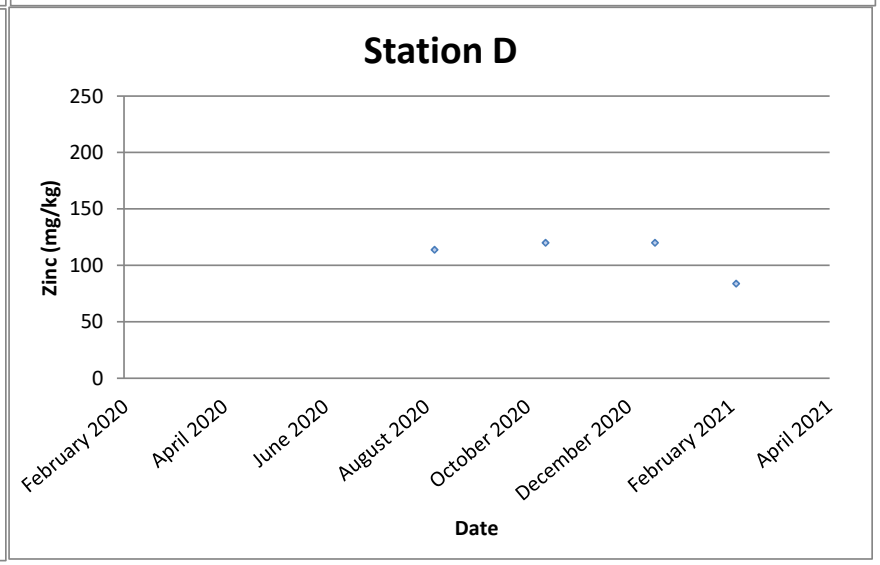

Station F
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

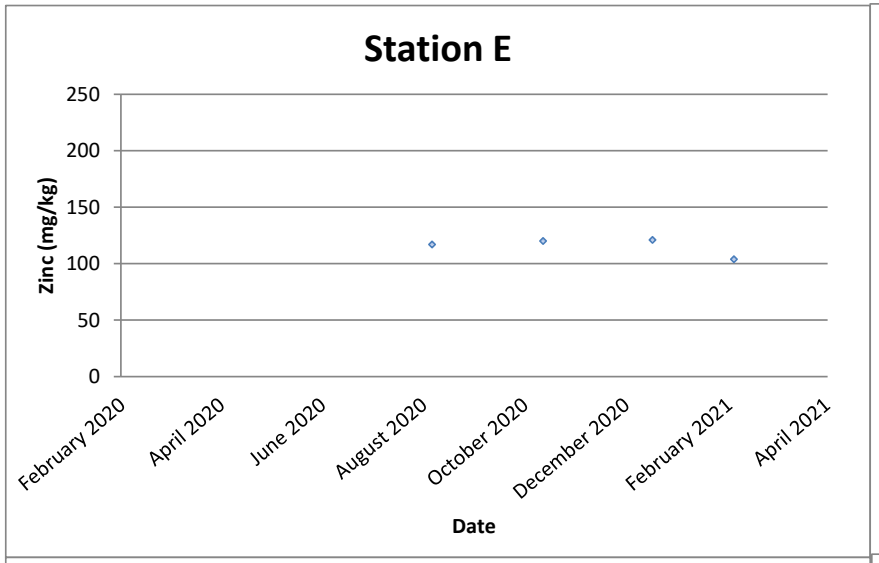

Station H
Nickel (mg/kg)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

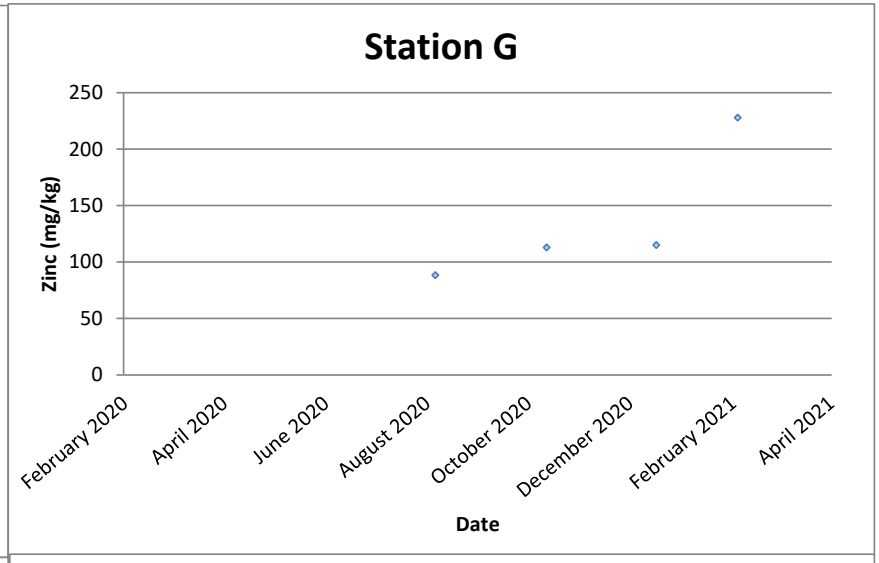

Station A
250
200
150
100
50
0
Zinc (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

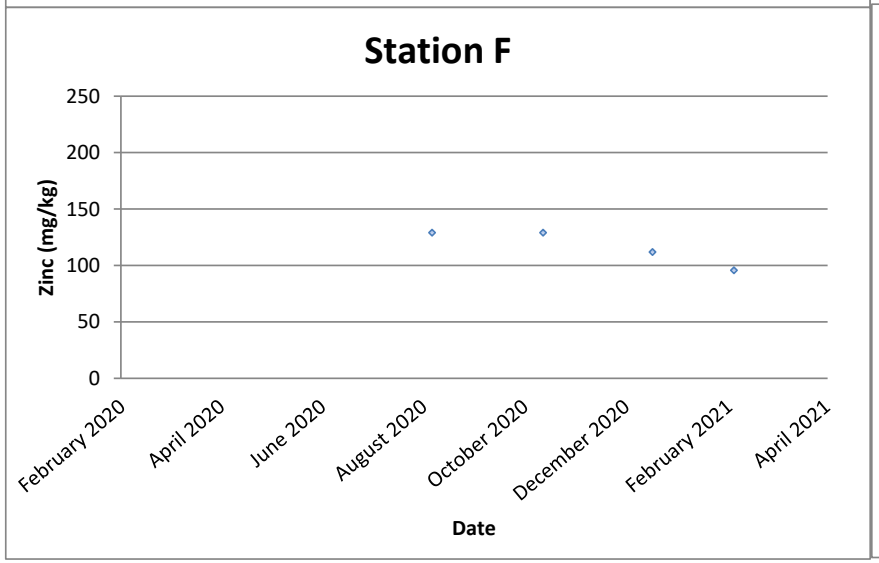

Station C
250
200
150
100
50
0
Zinc (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

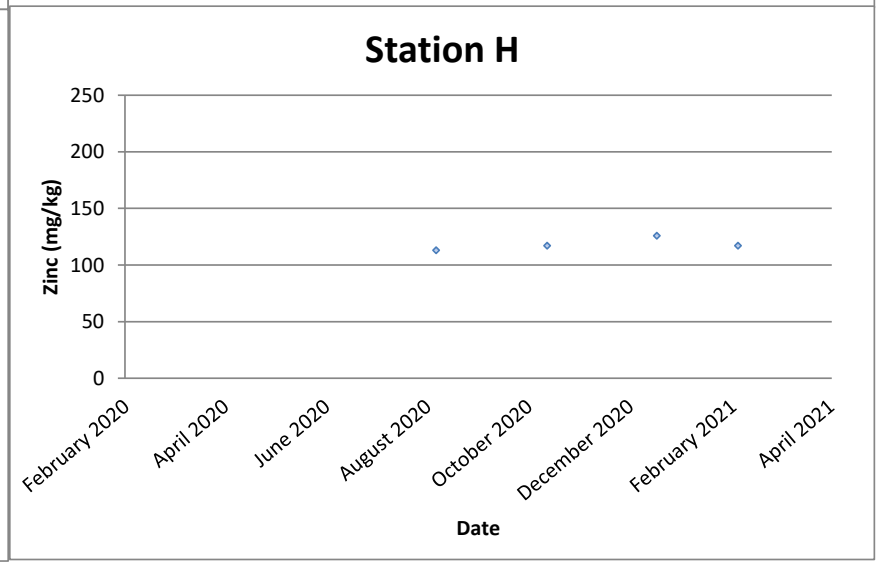

Station B
250
200
150
100
50
0
Zinc (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station D
250
200
150
100
50
0
Zinc (mg/kg)
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

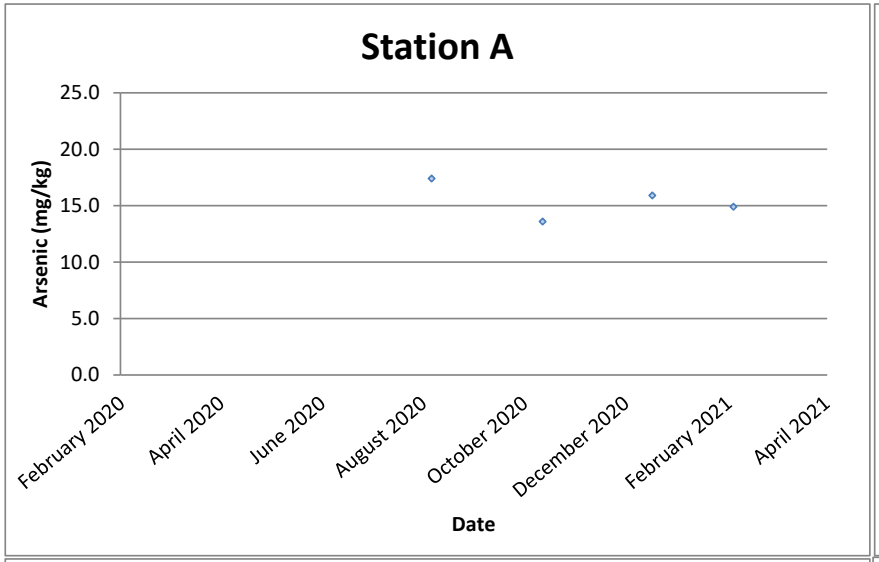

Station E
Zinc (mg/kg)
250
200
150
100
50
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

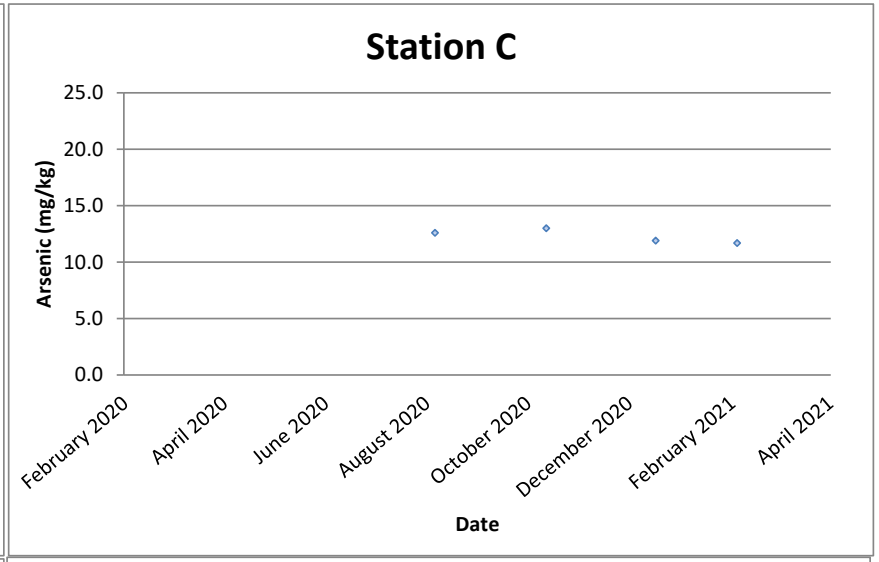

Station G
Zinc (mg/kg)
250
200
150
100
50
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

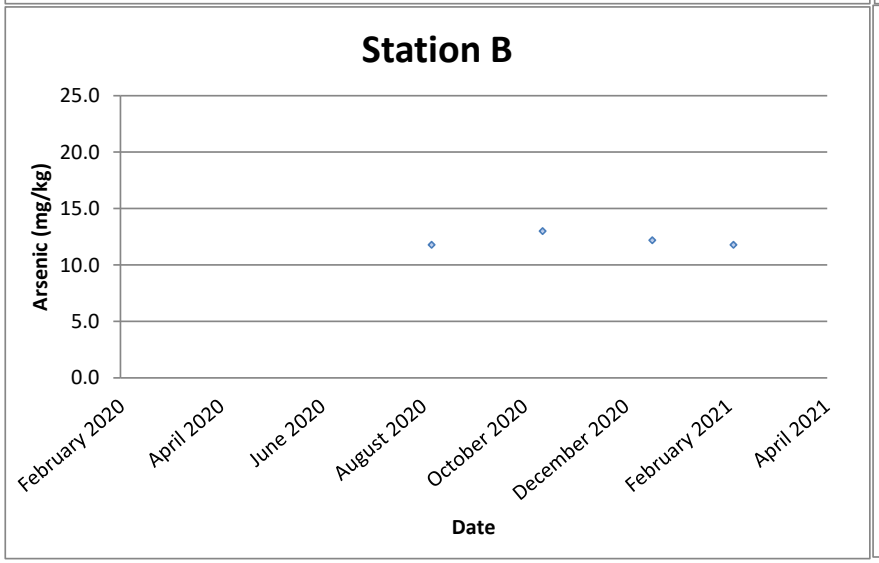

Station F
Zinc (mg/kg)
250
200
150
100
50
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

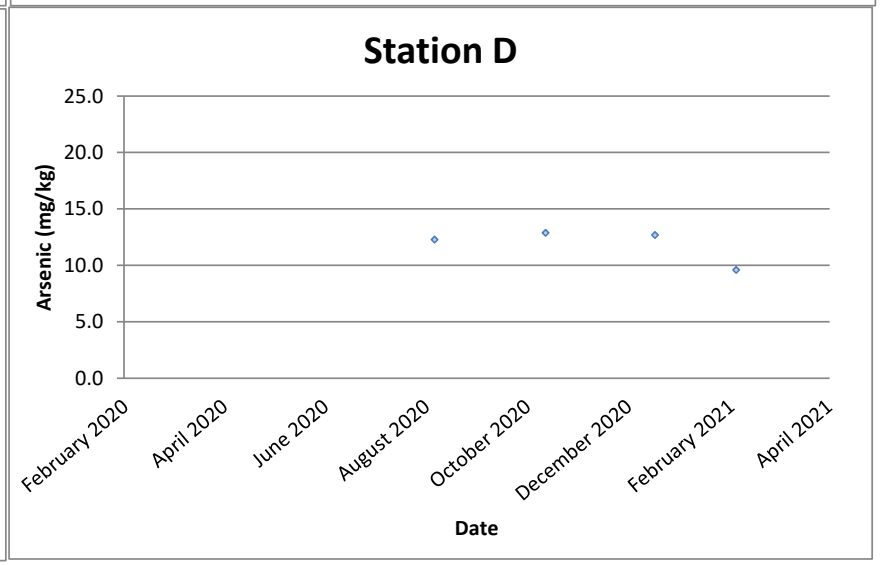

Station H
Zinc (mg/kg)
250
200
150
100
50
0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

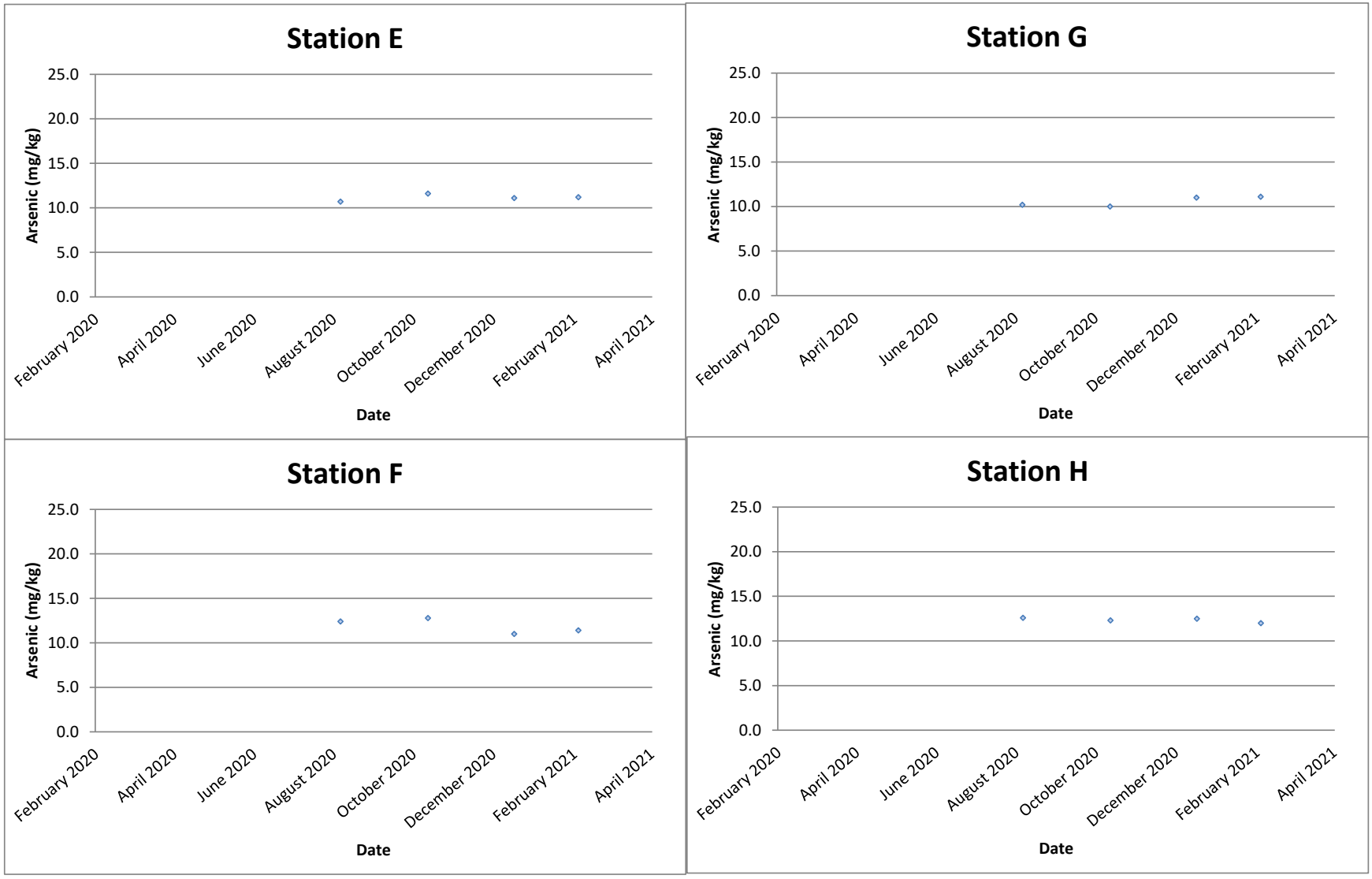
Arsenic (mg/kg)



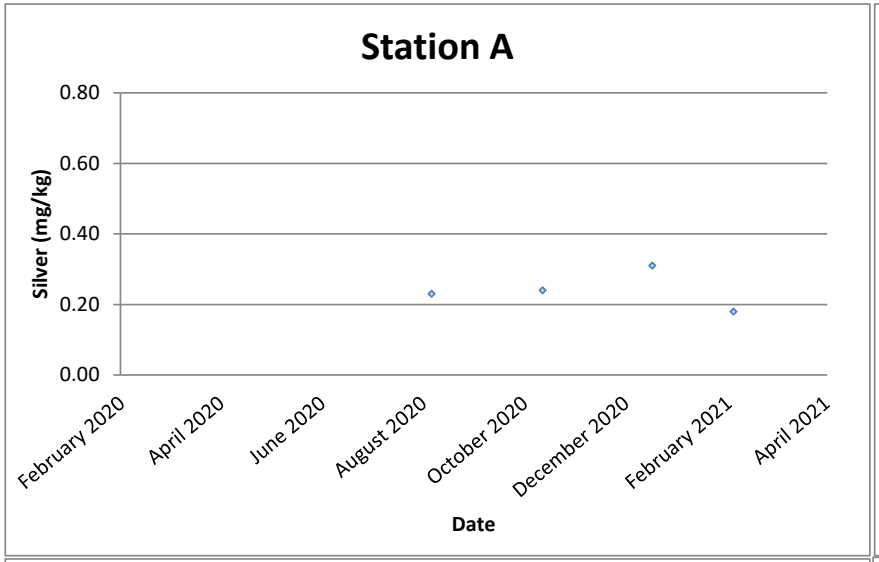


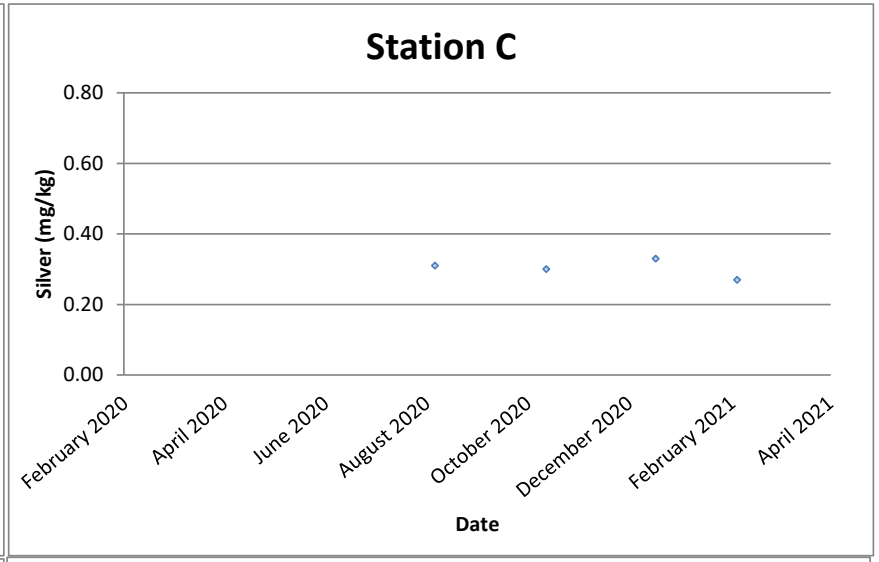


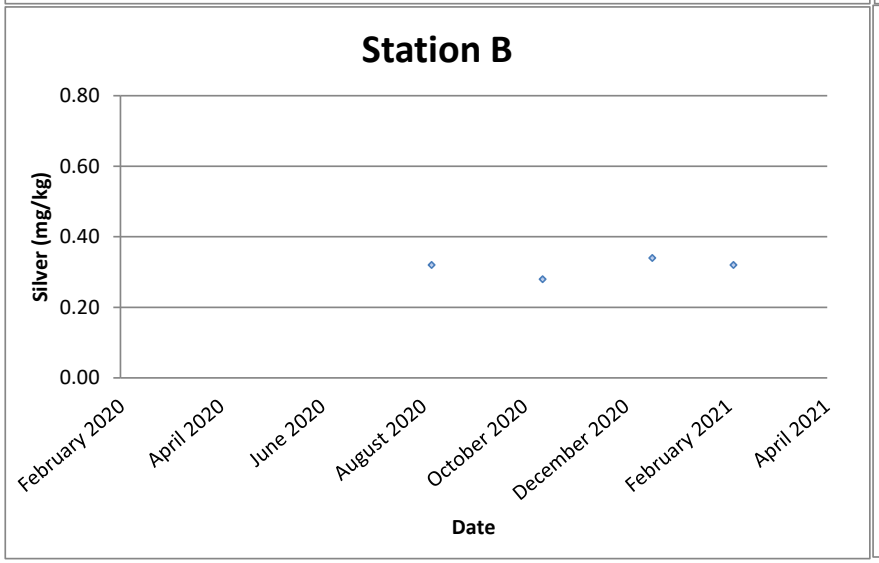


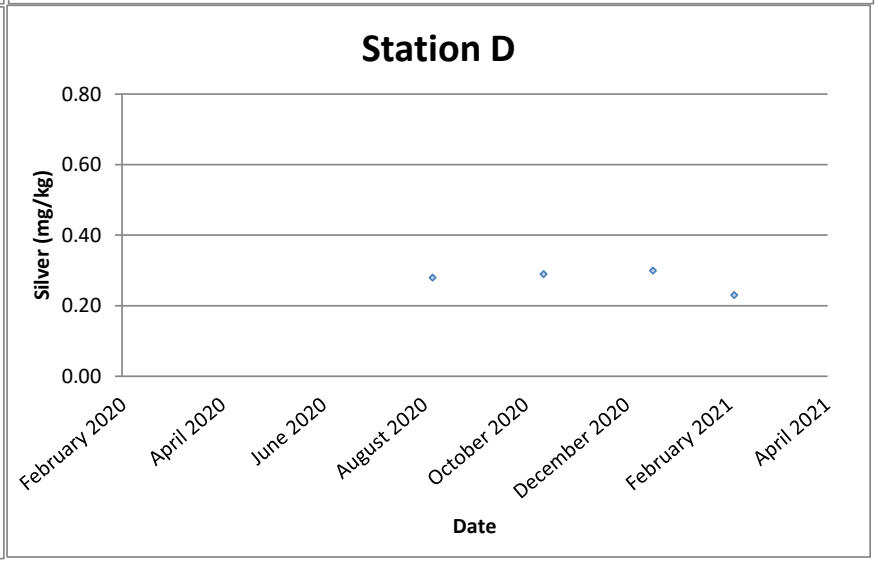

Station E
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station G
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station F
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station H
Arsenic (mg/kg)
25.0
20.0
15.0
10.0
5.0
0.0
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date

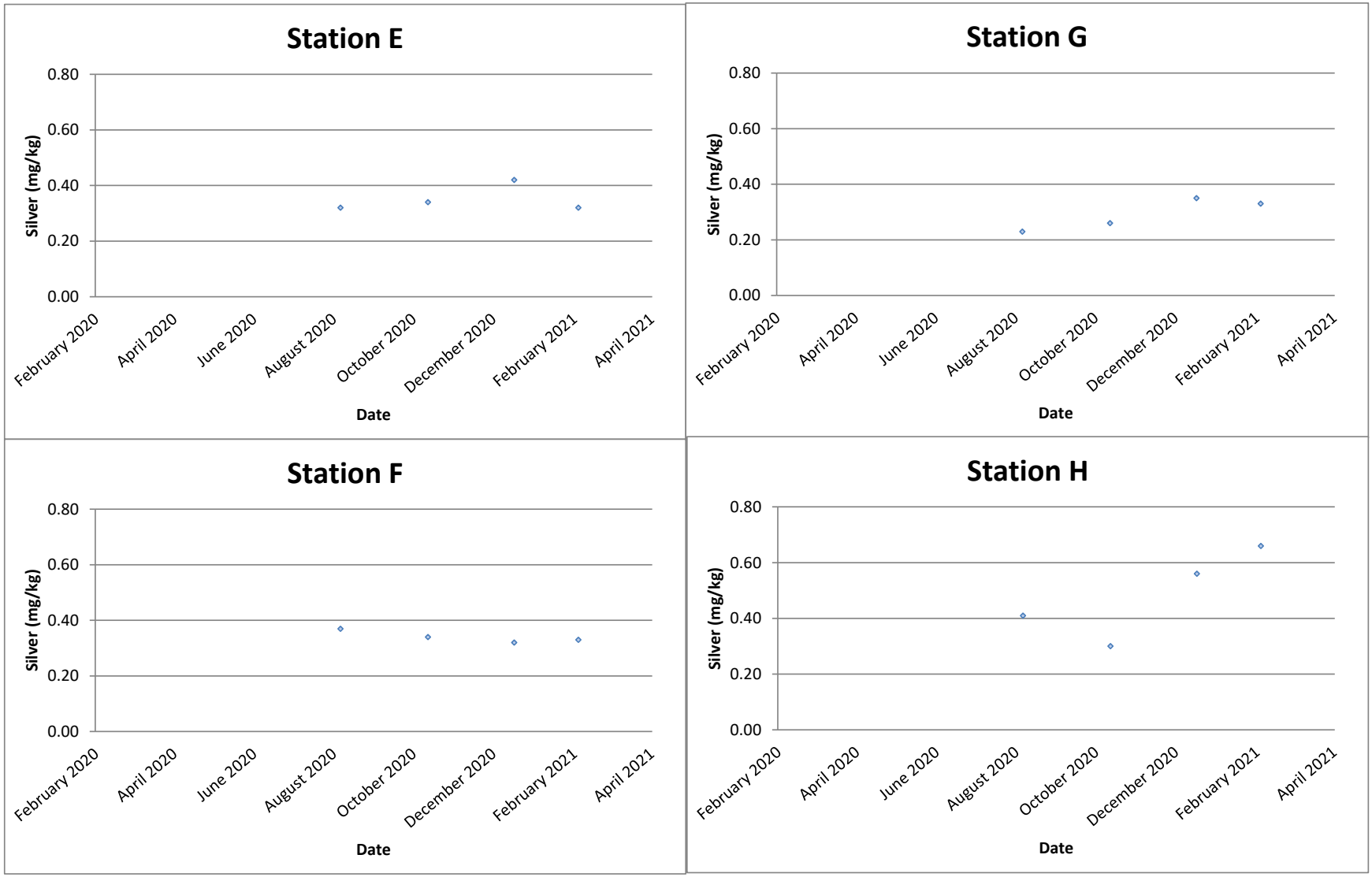
Silver (mg/kg)


Station A
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station C
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station B
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station D
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date


Station E
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station G
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station F
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
Date
Station H
Silver (mg/kg)
0.80
0.60
0.40
0.20
0.00
February 2020
April 2020
June 2020
August 2020
October 2020
December 2020
February 2021
April 2021
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 I

Benthic Survey Report

Benthic Survey Report (February 2021)

Abundance

A total of 998 macrobenthic organisms was recorded from the eight monitoring stations during February 2021 monitoring period. Current result showed higher total abundance as compared to both dry (March 2004) and wet (August 2004) seasons baseline data (**Figure 1**). The increase in total abundance was due to the increase in abundance of the arthropod *Gammarus* with respect to the previous monitoring period (December 2020). Members of this genus generally favour high dissolved oxygen levels (DO) and low temperature of the water column for survival (Zadereev et. al, 2010). The current monitoring period (winter season) was recorded with high DO levels that ranged from 8.37 mg/L to 9.33 mg/L; and low water temperatures that only ranged from 18.33˚C to 18.60˚C. These, in addition to the possible absence or decreased abundance of their fish and decapod predators, could be the reason for the *Gammarus*' high abundance this period (Nelson et al, 1979a).

A significant seasonal variation of the macrobenthic abundances was noted during the current monitoring period (F-value = 3.48; F-crit = 1.66; P-value = 0.00001).

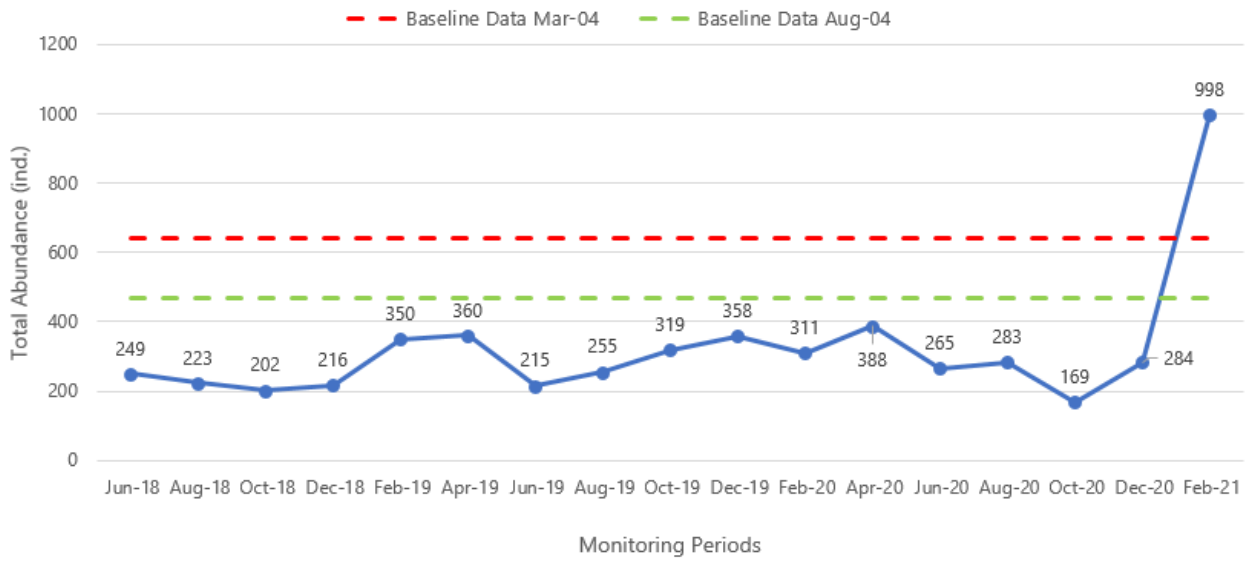


Figure 1. Total abundance (ind.) of benthic organisms across monitoring periods

The lowest abundance of 33 individuals (ind.) was recorded at Station H while the highest (248 ind.) was noted at Station A (**Figure 2**), both as reference stations. Current abundances in the impact stations C and D also increased relative to December 2020 monitoring results. The rest of the remaining stations were also observed with increased abundances. Similar with the previous monitoring periods, differences in the total abundance across the monitoring stations were still statistically significant (F-value = 2.97; F-crit = 2.07; P-value = 0.01).

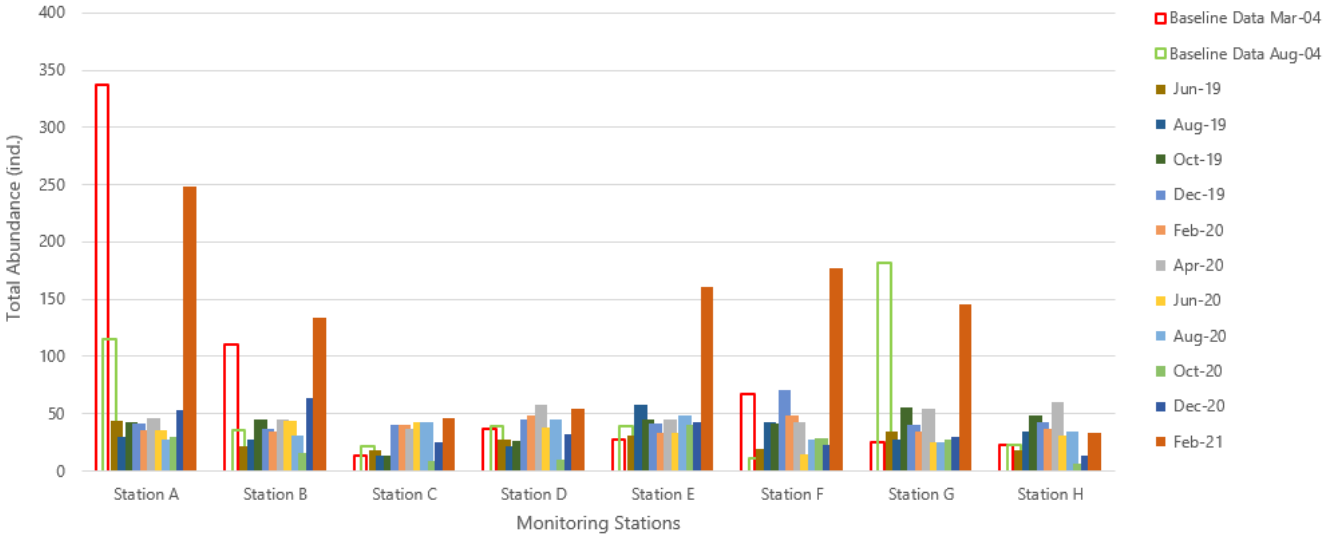


Figure 2. Total abundance (ind.) of benthic organisms across monitoring stations

Biomass

The total wet biomass recorded in the eight monitoring stations was 63.16 g with the highest biomass at the impact sites Station D (26.64g) and Station C (22.98g). Among the different genera noted in these two stations, the polychaete *Naineris* (20.41g) at Station D and the sea cucumber *Acaudina* (22.6g) at Station C, contributed to the current high recorded biomass.

Meanwhile, it was in the reference Station F that the lowest (1.32g) biomass was observed. Low biomass values were also noted in Stations H (1.59g) and E (1.68g). However, relative to the December 2020 period, an overall increased biomass was noted during the current monitoring period. The data of all surveys are shown in **Figure 3**.

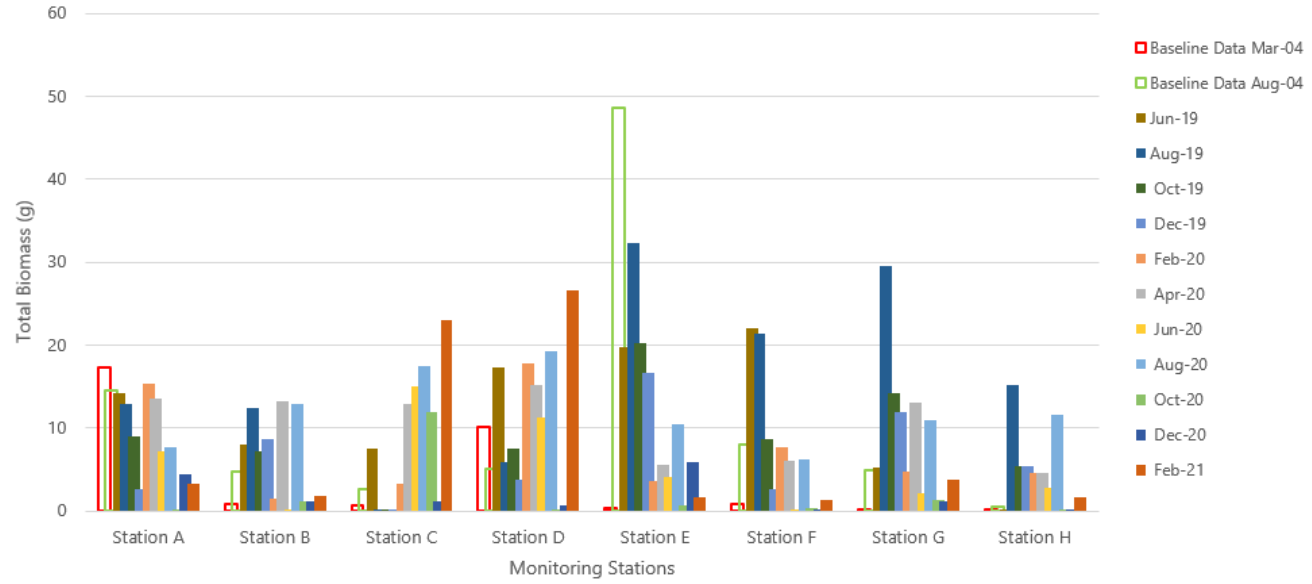


Figure 3. Total biomass (g) of benthic organisms

Taxonomic Composition

A total of seven comprising of 30 families and 34 genera were identified. The macrobenthic assemblage was noted with a shift in the dominating group from the annelids of last December 2020 to arthropods (70%) during the current survey. Currently, the annelids were already noted with lesser dominance (23%) such that the monitoring stations could have experienced lessen organic enrichment (Pearson and Rosenberg, 1978) as evident by the low percentage of the total organics (as low as 0.77%) during the period.

There was no dominant genera (member species > 10) recorded during the current monitoring activity.

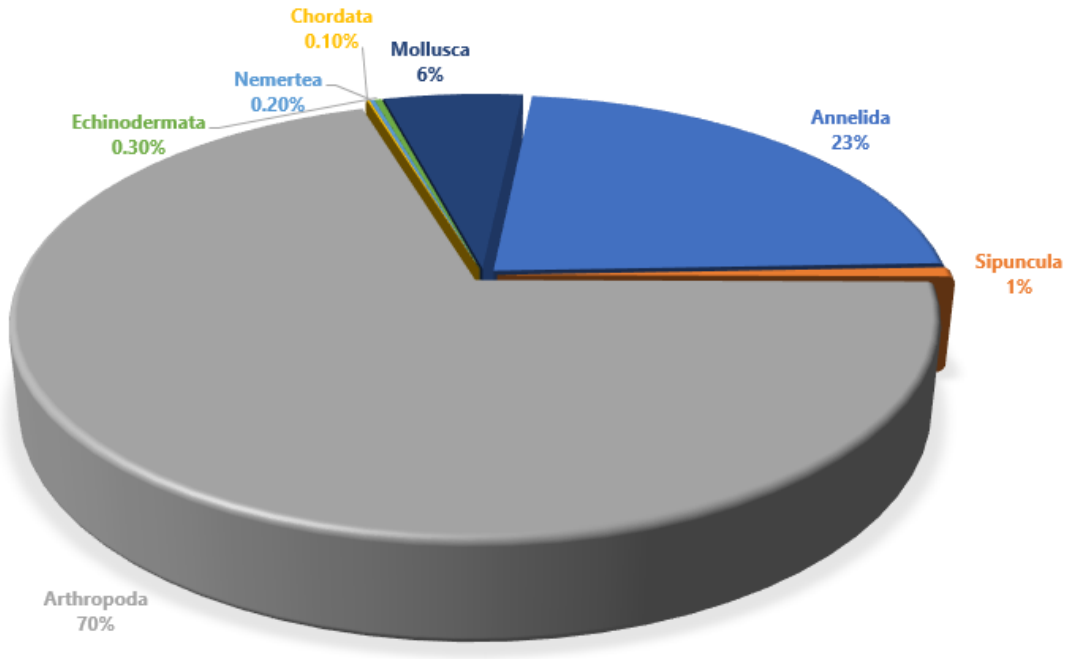


Figure 4. Percent composition of benthic organisms

Diversity

Benthic diversity index (*H'*) ranged from 1.91 to 2.08 in the impact stations while its values ranged from 0.61 to 1.67 among the different reference stations. Impact stations had relatively higher diversity values as compared to reference stations.

Meanwhile, in terms of evenness index (*J*) values, reference Station F had the lowest value (0.31) and followed by another reference Station E (0.39). Current results showed that both the impact Stations C and D were able to maintain high evenness index relative to the December 2020 results. Current results indicated an overall increase in diversity and evenness values from the baseline survey condition.

Abundance and biomass of macrobenthic organisms are shown in **Tables 1** and **2**, respectively. Data summary for different monitoring periods are presented in **Tables 3** to **7**. Representative photos of specimen and assemblages are shown in the last pages of this benthic survey report.

References:

Nelson, W.G. 1979a. Experimental studies of selective predation on amphipods: consequences for amphipod distribution and abundance. Journal of Experimental Marine Biology and Ecology 38: 225-245.

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.

Zadereev, E.S, A. P. Tolomeyev, A. V. Drobotov, A. Y. Emeliyanova and M. V. Gubanov. 2010. The vertical distribution and abundance of *Gammarus lacustris* in the pelagic zone of the meromictic lakes Shira and Shunet (Khakassia, Russia). Aquat Ecol. 44:531–539

Data Summaries

Table 1. Abundance of macrobenthic communities in the eight monitoring stations, February 2021

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Scolecida	Scalibregmidae	c.f. *Scalibregma*					1			
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	24	4	9	21	4	3	10	5
Annelida	Polychaeta		Maldanidae	*Maldanella*	1							
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys*	22	15	7	7	7	17	4	2
Annelida	Polychaeta	Aciculata	Nereidae	*Nereis*	1			3		4		
Annelida	Polychaeta	Capitellida	Capitellidae	*Notomastus*								2
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	*Paralacydonia paradoxa*	6							
Annelida	Polychaeta	Spionida	Spionidae	*Paraprionospio*			5		3			
Annelida	Polychaeta	Terebellida	Pectinariidae	*Pectinaria (Lagis)*		3						
Annelida	Polychaeta	Phyllodocida	Phyllodocidae	*Phyllodoce*		6	3		5	1	1	
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*	10	4			4			
Annelida	Polychaeta	Phyllodocida	Pilargidae	*Sigambra*			2					
Annelida	Polychaeta	Scolecida	Orbiniidae	*Naineris*				1				
Arthropoda	Crustacea	Cumacea	Diastylidae	c.f. *Diastylis*					1			
Arthropoda	Crustacea	Decapoda	Epialtidae	*Doclea*							1	
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*	166	86	11	10	127	150	110	17
Arthropoda	Crustacea	Decapoda	Dotillidae	*Ilyoplax*				2				
Arthropoda	Crustacea	Decapoda	Alpheidae	*Alpheus*	10			1				1
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile				1				1

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Arthropoda	Maxillopoda	Sessilia	Balanidae	*Balanus*	3							
Arthropoda	Malacostraca	Decapoda	Pilumnidae	*Typhlocarcinus*		1						1
Chordata	Actinopterygii	Gobiiformes		Goby					1			
Echinodermata	Holothuroidea	Molpadiida	Caudinidae	*Acaudina*			1					
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*			1		1			
Mollusca	Bivalvia	Veneroida	Veneridae	c.f. *Meretrix (M. lusoria)*		2			4		4	1
Mollusca	Bivalvia	Veneroida	Veneridae	c.f. *Phylloda foliacea*				4				
Mollusca	Bivalvia	Cardiida	Cardiidae	*Cardium*		1						1
Mollusca	Scaphopoda	Dentaliida	Dentaliidae	-		1						
Mollusca	Gastropoda	Neogastropoda	Nassariidae	*Nassarius*			1					
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*		1	1	1	2		2	
Mollusca	Bivalvia	Venerida	Veneridae	*Placamen isabellina*		1						
Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes (R. variegatus)*	3						1	
Mollusca	Bivalvia	Veneroida	Tellinidae	c.f. *Angulus*		6				1	12	2
Mollusca	Bivalvia	Adapedonta	Pharidae	*Sinonovacula*		2		1				
Mollusca	Bivalvia	Venerida	Veneridae	*Timoclea scabra*				2		1		
Nemertea	Anopla	Heteronemertea	Lineidae	*Cerebratulus*	1				1			
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	*Sipunculus*	1	1	5					
Notes: Empty cells denote that the individual is not recorded in the station												

Table 2. Biomass (g) of macrobenthic communities in the eight monitoring stations, February 2021

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Annelida	Polychaeta	Scolecida	Scalibregmidae	c.f. *Scalibregma*					0.008			
Annelida	Polychaeta	Capitellida	Capitellidae	*Capitella*	0.050	0.120	0.035	0.056	0.010	0.002	0.368	0.026
Annelida	Polychaeta		Maldanidae	*Maldanella*	0.005							
Annelida	Polychaeta	Nereidida	Nephtyidae	*Nephtys*	0.280	0.122	0.027	0.015	0.042	0.899	0.038	0.063
Annelida	Polychaeta	Aciculata	Nereidae	*Nereis*	2.405			0.134		0.150		
Annelida	Polychaeta	Capitellida	Capitellidae	*Notomastus*								0.017
Annelida	Polychaeta	Phyllodocida	Paralacydoniidae	*Paralacydonia paradoxa*	0.011							
Annelida	Polychaeta	Spionida	Spionidae	*Paraprionospio*			0.003		0.014			
Annelida	Polychaeta	Terebellida	Pectinariidae	*Pectinaria (Lagis)*		0.035						
Annelida	Polychaeta	Phyllodocida	Phyllodocidae	*Phyllodoce*		0.031	0.021		0.020	0.028	0.085	
Annelida	Polychaeta	Spionida	Poecilochaetidae	*Poecilochaetus*	0.030	0.035			0.004			
Annelida	Polychaeta	Phyllodocida	Pilargidae	*Sigambra*			0.016					
Annelida	Polychaeta	Scolecida	Orbiniidae	*Naineris*				20.410				
Arthropoda	Crustacea	Cumacea	Diastylidae	c.f. *Diastylis*					0.0001			
Arthropoda	Crustacea	Decapoda	Epialtidae	*Doclea*							1.215	
Arthropoda	Malacostraca	Amphipoda	Gammaridae	*Gammarus*		0.065	0.005	0.006	0.101	0.115	0.113	0.016
Arthropoda	Crustacea	Decapoda	Dotillidae	*Ilyoplax*				0.596				
Arthropoda	Crustacea	Decapoda	Alpheidae	*Alpheus*	0.081			0.0001				0.0001
Arthropoda	Crustacea	Decapoda	Penaeidae	Shrimp juvenile								
Arthropoda	Maxillopoda	Sessilia	Balanidae	*Balanus*	0.016							
Arthropoda	Malacostraca	Decapoda	Pilumnidae	*Typhlocarcinus*		0.543						1.345
Chordata	Actinopterygii	Gobiiformes		Goby					0.176			
Echinodermata	Holothuroidea	Molpadiida	Caudinidae	*Acaudina*			22.600					

Phylum	Class	Order	Family	Genus	SHW-Benthic Stations							
					A	B	C	D	E	F	G	H
Echinodermata	Ophiuroidea	Ophiurida	Amphiuridae	*Amphioplus*			0.061		0.027			
Mollusca	Bivalvia	Veneroida	Veneridae	c.f. *Meretrix (M. lusoria)*		0.038			0.581		0.437	0.014
Mollusca	Bivalvia	Veneroida	Veneridae	c.f. *Phylloda foliacea*				0.356				
Mollusca	Bivalvia	Cardiida	Cardiidae	*Cardium*		0.045						0.016
Mollusca	Scaphopoda	Dentaliida	Dentaliidae	-		0.002						
Mollusca	Gastropoda	Neogastropoda	Nassariidae	*Nassarius*			0.166					
Mollusca	Bivalvia	Veneroida	Veneridae	*Paphia (P. undulata)*		0.022	0.022	2.511	0.690		0.104	
Mollusca	Bivalvia	Venerida	Veneridae	*Placamen isabellina*		0.347						
Mollusca	Bivalvia	Veneroida	Veneridae	*Ruditapes (R. variegatus)*	0.363						0.960	
Mollusca	Bivalvia	Veneroida	Tellinidae	c.f. *Angulus*		0.371				0.027	0.398	0.094
Mollusca	Bivalvia	Adapedonta	Pharidae	*Sinonovacula*		0.086		2.511				
Mollusca	Bivalvia	Venerida	Veneridae	*Timoclea scabra*				0.043		0.096		
Nemertea	Anopla	Heteronemertea	Lineidae	*Cerebratulus*	0.036				0.006			
Sipuncula	Sipunculiformes	Sipunculidea	Sipunculidae	*Sipunculus*	0.067	0.025	0.025					

Notes: Empty cells denote that the individual is not recorded in the station

Table 3. Summary of Benthic Survey Data, February 2021

Stations	Abundance (ind.)	Total Biomass (g)	Number of Taxa	Diversity (H')	Evenness (J)
A	248	3.34	12	1.25	0.50
B	134	1.89	15	1.45	0.53
C*	46	22.98	11	2.08	0.87
D*	54	26.64	12	1.91	0.77
E	161	1.68	13	0.99	0.39
F	177	1.32	7	0.61	0.31
G	145	3.72	9	0.96	0.44
H	33	1.59	10	1.67	0.72
TOTAL	998	63.16			

*impact sites

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

Stations	Abundance (ind.)	Total Biomass (g)	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

*impact sites

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

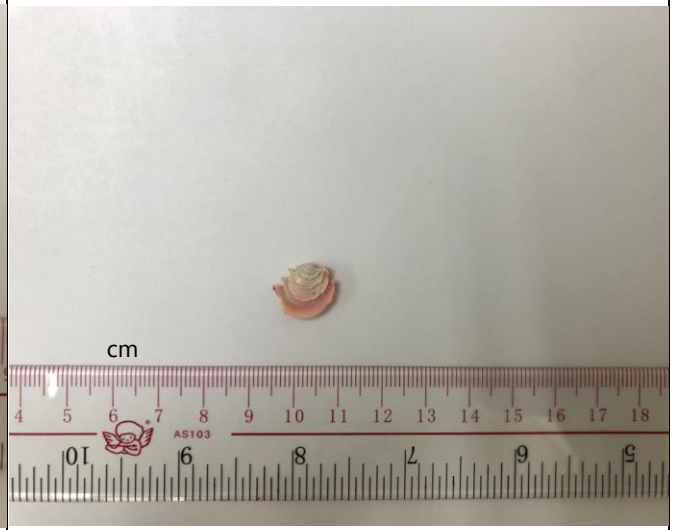
Table 6. Taxonomic Composition (%) of Benthic Survey

% Composition	Mar-04	Aug-04	Feb-19	Apr-19	Jun-19	Aug-19	Oct-19	Dec-19	Feb-20	Apr-20	Jun-20	Aug-20	Oct-20	Dec-20	Feb-21
Annelida	80.19	73.29	54.99	70.28	0.47	64.31	66.14	59.78	60.77	56.44	69.06	63.25	51.48	50.35	22.75
Sipuncula	0.78	0.21	0.00	0.00	0.00	1.57	1.25	0.00	1.29	0.52	1.13	0.35	1.78	1.06	0.70
Arthropoda	11.23	18.80	20.23	10.83	4.65	9.80	19.75	14.53	13.83	28.87	8.30	13.43	18.93	20.77	70.14
Echinodermata	0.62	3.63	3.42	4.72	0.47	5.10	3.13	1.68	1.61	0.77	2.26	3.53	2.96	2.82	0.30
Cnidaria	1.72	0.43	0.85	0.00	1.86	0.39	0.00	0.84	0.32	0.26	0.75	0.00	1.18	0.00	0.00
Mollusca	5.46	3.42	19.94	13.33	0.47	17.25	8.15	22.35	19.94	11.60	15.85	15.90	18.93	24.65	5.81
Chordata	0.00	0.21	0.28	0.56	0.47	1.18	0.94	0.00	0.32	0.52	1.13	1.41	0.00	0.35	0.10
Nemertea	0.00	0.00	0.28	0.28	98.60	0.39	0.63	0.84	1.93	1.03	1.51	2.12	4.73	0.00	0.20

Table 7. Taxonomic Composition (abundance) of Benthic Survey

Abundance	Mar-04	Aug-04	Feb-19	Apr-19	Jun-19	Aug-19	Oct-19	Dec-19	Feb-20	Apr-20	Jun-20	Aug-20	Oct-20	Dec-20	Feb-21
Annelida	514	343	193	253	124	164	211	214	189	219	183	179	87	143	227
Sipuncula	5	1	0	0	0	4	4	0	4	2	3	1	3	3	7
Arthropoda	72	88	71	39	17	25	63	52	43	112	22	38	32	59	700
Echinodermata	4	17	12	17	10	13	10	6	5	3	6	10	5	8	3
Cnidaria	11	2	3	0	2	1	0	3	1	1	2	0	2	0	0
Mollusca	35	16	70	48	59	44	26	80	62	45	42	45	32	70	58
Chordata	0	1	1	2	2	3	3	0	1	2	3	4	0	1	1
Nemertea	0	0	1	1	1	1	2	3	6	4	4	6	8	0	2

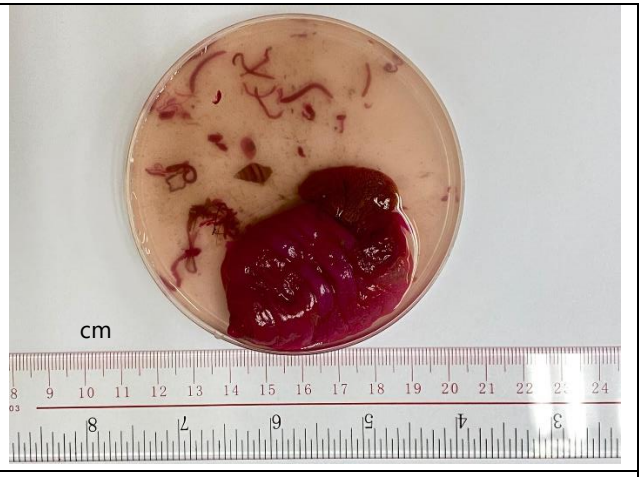
Photos of Representative Taxa Identified

		
A.) Holothuroidea, *Acaudina*	B) Bivalvia, *Ruditapes variegatus*	C.) Bivalvia, *Placamen isabellina*

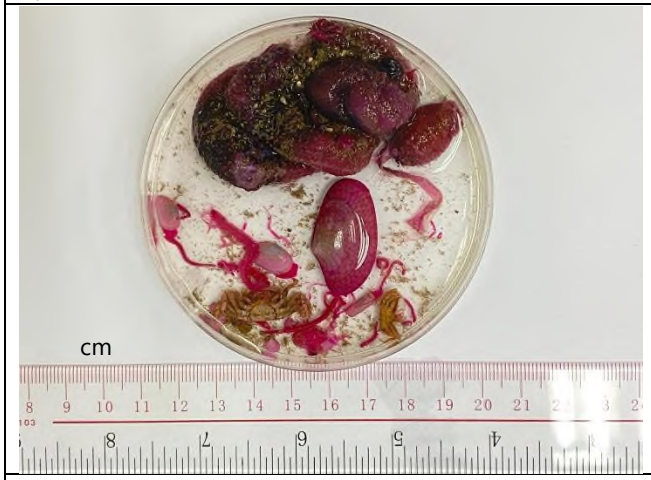
Photos of Macrobenthic Assemblages

A) Station A

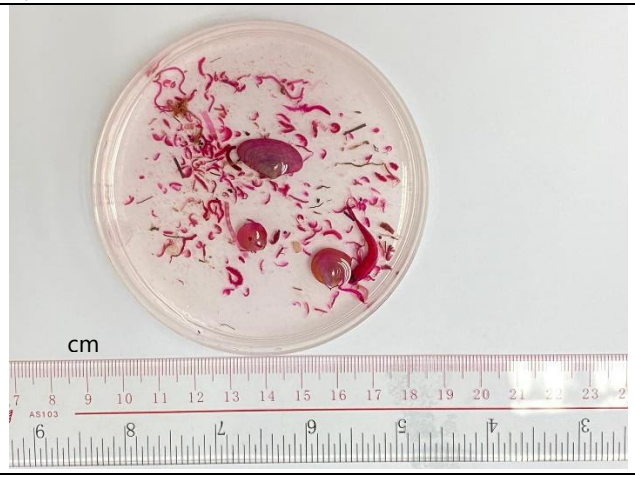
B) Station B



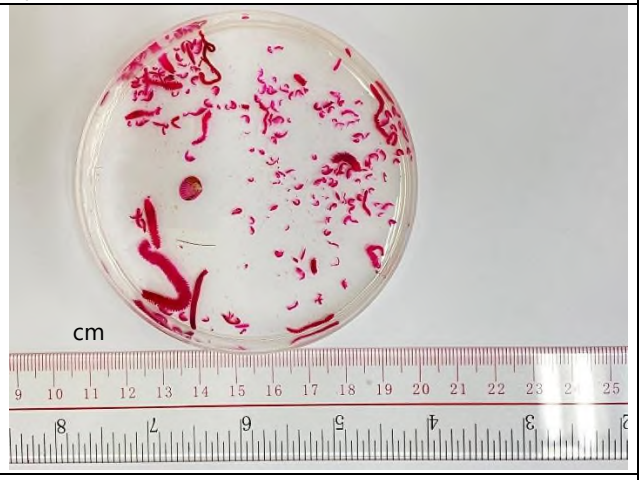
C) Station C



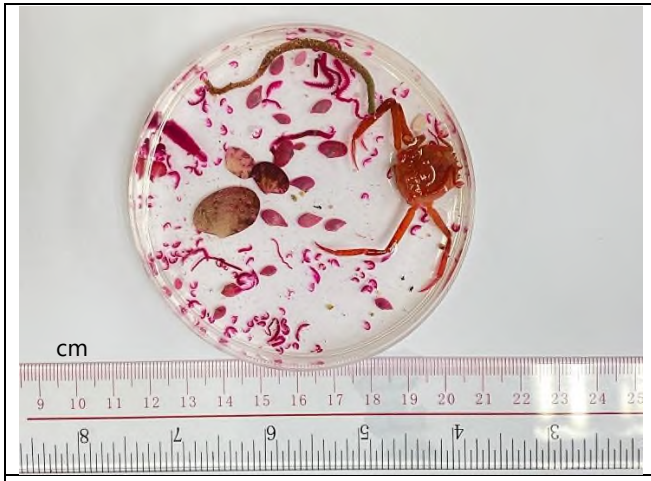
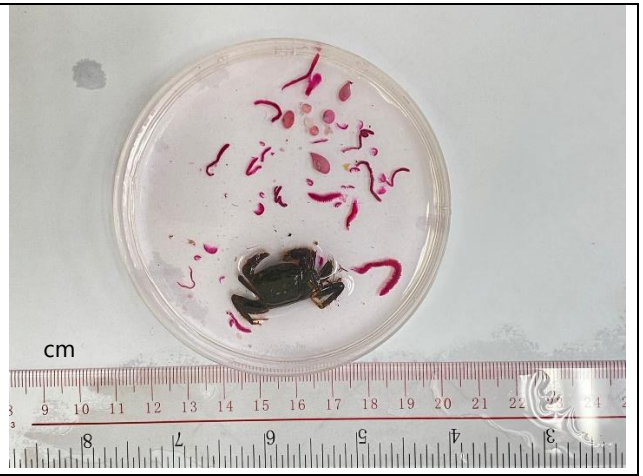
D) Station D



E) Station E



F) Station F

	
G) Station G	H) Station H

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/0620

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/0620

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 Complaints Log

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

Environmental Complaints Log

Complaint Log No.	Date of Complaint	Received From and Received By	Nature of Complaint	Investigation
1	28 November 2019	EPD	According to EPD, a member of public complained that SHWSTW cause a malodour and was smelled as far as the Discovery Bay tunnel portal.	As advised by DSD, the operation of Siu Ho Wan Sewage Treatment Works was properly functioned and there was no special activity on 28th November 2019. Due to the possibility of having unpleasant gases or odours emitted from these non-DSD premises cannot be precluded, the complaint is considered as non-project related.

FUGRO TECHNICAL SERVICES LIMITED

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

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

Appendix L

Environmental Mitigation Implementation Schedule (EMIS)

FUGRO TECHNICAL SERVICES LIMITED

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

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

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

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			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